

TOYOTA

REPAIR MANUAL SUPPLEMENT FOR CHASSIS & BODY

LAND CRUISER/ PRADO

**RZJ9_, VZJ9_ series
KZJ9_, KDJ9_ series
LJ9_ series**

Aug., 2000

FOREWORD

This supplement has been prepared to provide information covering general service repairs for the chassis and body of the TOYOTA LAND CRUISER/LAND CRUISER PRADO which underwent changes in August, 2000.

Applicable models: RZJ90, 95 series
VZJ90, 95 series
KZJ90, 95 series
KDJ90, 95series
LJ90, 95 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/LAND CRUISER PRADO Chassis and Body Repair Manual	RM517E
• LAND CRUISER/LAND CRUISER PRADO Chassis and Body Repair Manual Supplement (Jan., 1998)	RM627E
• LAND CRUISER/LAND CRUISER PRADO Chassis and Body Repair Manual Supplement (Jun., 1999)	RM702E
• 3RZ-F, 3RZ-FE Engine Repair Manual	RM521E
• 3RZ-FE Engine Repair Manual Supplement	RM704E
• 5VZ-FE Engine Repair Manual	RM519E
• 5VZ-FE Engine Repair Manual Supplement	RM703E
• 1KZ-T Engine Repair Manual	RM353E
• 1KZ-T, 1KZ-TE Engine Repair Manual Supplement	RM522E
• 1KZ-TE Engine Repair Manual Supplement	RM790E
• 1KD-FTV Engine Repair Manual	RM806E
• 2L, 3L Engine Repair Manual	RM520E
• A343F Automatic Transmission Repair Manual	RM528E
• LAND CRUISER/LAND CRUISER PRADO Electrical Wiring Diagram	EWD269F
• LAND CRUISER/LAND CRUISER PRADO Electrical Wiring Diagram Supplement (Jan., 1998)	EWD340F
• LAND CRUISER/LAND CRUISER PRADO Electrical Wiring Diagram Supplement (Jun., 1999)	EWD376F

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.

TOYOTA MOTOR CORPORATION

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First Printing: Jul. 10, 2000 01-000710-00

CAUTION

This manual does not include all the necessary items about repair and service. This manual is made for the purpose of the use for the persons who have special techniques and certifications. In the cases that non-specialized or uncertified technicians perform repair or service only using this manual or without proper equipment or tool, that may cause severe injury to you or other people around and also cause damage to your customer's vehicle.

In order to prevent dangerous operation and damages to your customer's vehicle, be sure to follow the instruction shown below.

- Must read this manual thoroughly. It is especially important to have good understanding all the contents written in the PRECAUTION of "IN" section.
- The service method written in this manual is very effective to perform repair and service. When performing the operations following the procedures using this manual, be sure to use tools specified and recommended. If using non-specified or recommended tools and service method, be sure to confirm safety of the technicians and any possibility of causing personal injury or damage to the customer's vehicle before starting the operation.
- If part replacement is necessary, must replace the part with the same part number or equivalent part. Do not replace it with inferior quality.
- It is important to note that this manual contains various "Cautions" and "Notices" that must be carefully observed in order to reduce the risk of personal injury during service or repair, or the possibility that improper service or repair may damage the vehicle or render it unsafe. It is also important to understand that these "Cautions" and "Notices" are not exhaustive, because it is important to warn of all the possible hazardous consequences that might result from failure to follow these instructions.

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PREPARATION	PF
SERVICE SPECIFICATIONS	SS
DIAGNOSTICS	DI
R150F, R151F MANUAL TRANSMISSION	MT
BRAKE	BF
STEERING	SP
BODY ELECTRICAL	BE
AIR CONDITIONING	AC
ALPHABETICAL INDEX	ID

INTRODUCTION

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HOW TO USE THIS MANUAL

GENERAL INFORMATION

IN00U-41

1. 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.

2. PRECAUTION

At the beginning of each section, a PRECAUTION is given that pertains to all repair operations contained in that section.

Read these precautions before starting any repair task.

3. TROUBLESHOOTING

TROUBLESHOOTING tables are included for each system to help you diagnose the problem and find the cause. The fundamentals of how to proceed with troubleshooting are described on page IN-23.

Be sure to read this before performing troubleshooting.

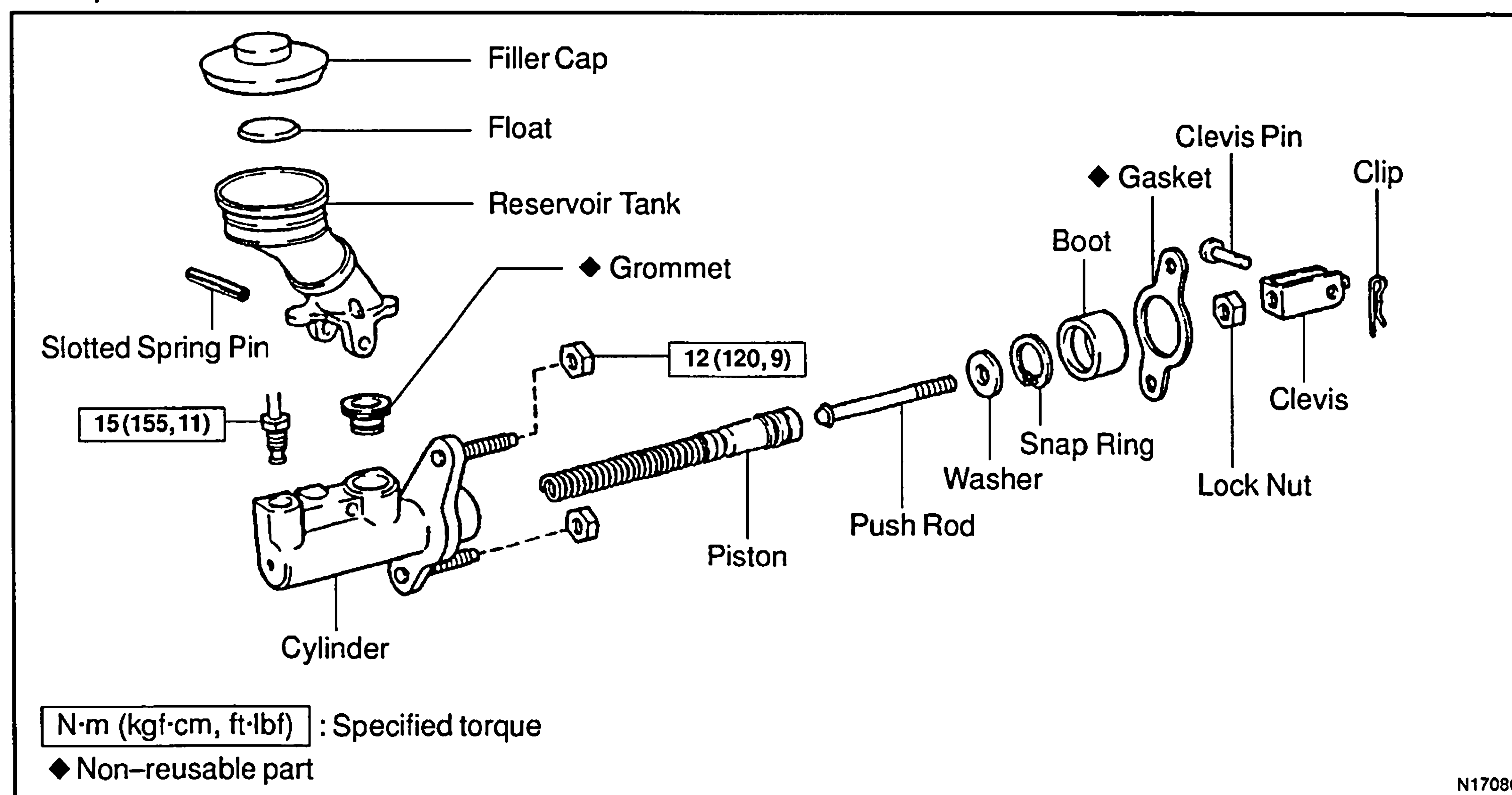
4. PREPARATION

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.

5. REPAIR PROCEDURES

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

Example:



N17080

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:

*Illustration:
what to do and where*

21. CHECK PISTON STROKE OF OVERDRIVE BRAKE

(a) Place SST and a dial indicator onto the overdrive brake piston as shown in the illustration.

SST 09350-30020 (09350-06120)

Set part No.

09350-30020

Component part No.

09350-06120

(b) Measure the stroke applying and releasing the compressed air (392 — 785 kPa, 4 — 8 kgf/cm² or 57 — 114 psi) as shown in the illustration.

Piston stroke: 1.40 — 1.70 mm (0.0551 — 0.0669 in.)

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.

6. REFERENCES

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

7. 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 in Service Specifications section for quick reference.

8. CAUTIONS, NOTICES, HINTS:

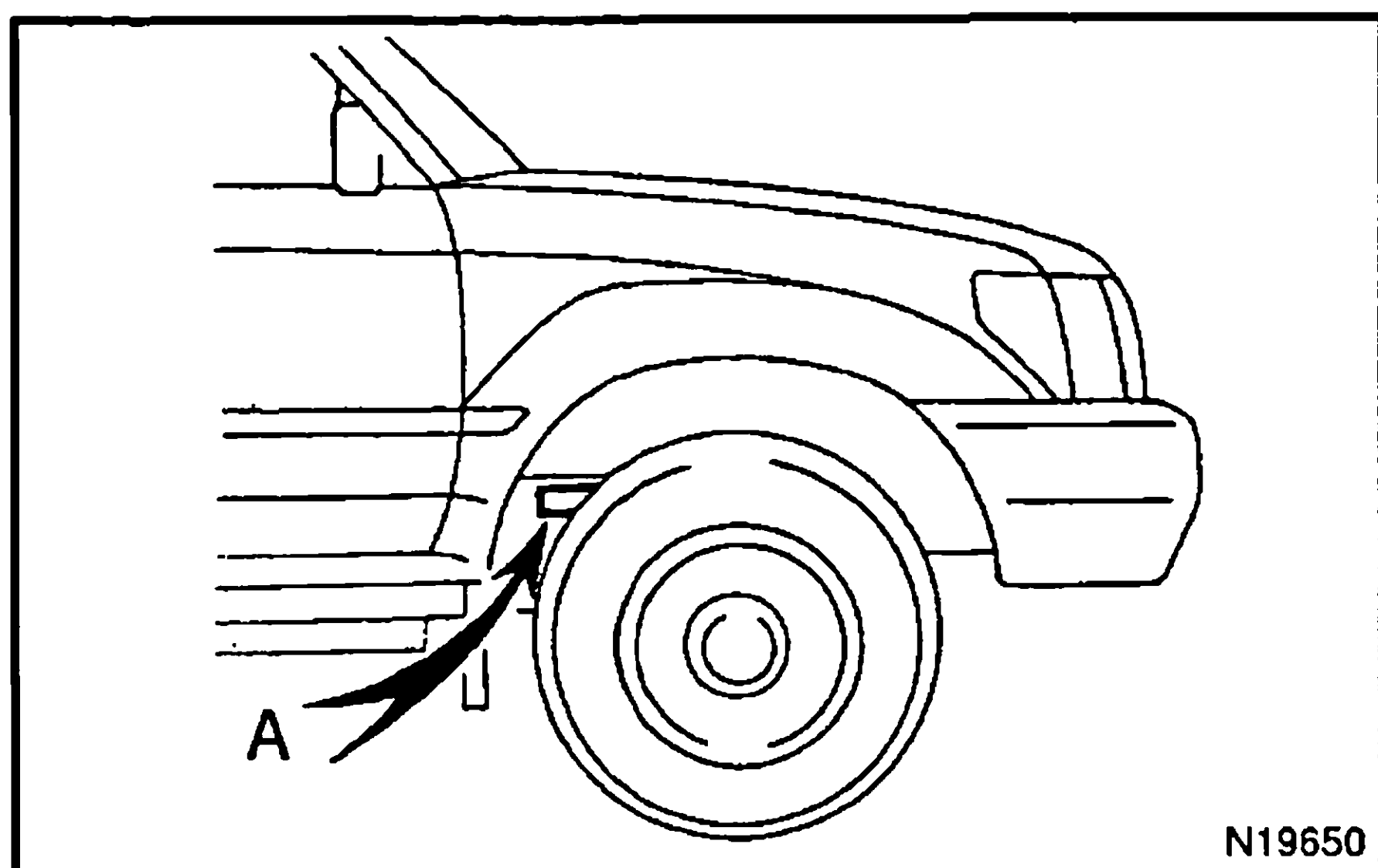
- **CAUTIONS** are presented in bold type, and indicate there is a possibility of injury to you or other people.
- **NOTICES** are also presented in bold type, and indicate the possibility of damage to the components being repaired.
- **HINTS** are separated from the text but do not appear in bold. They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

9. 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 AND ENGINE SERIAL NUMBER

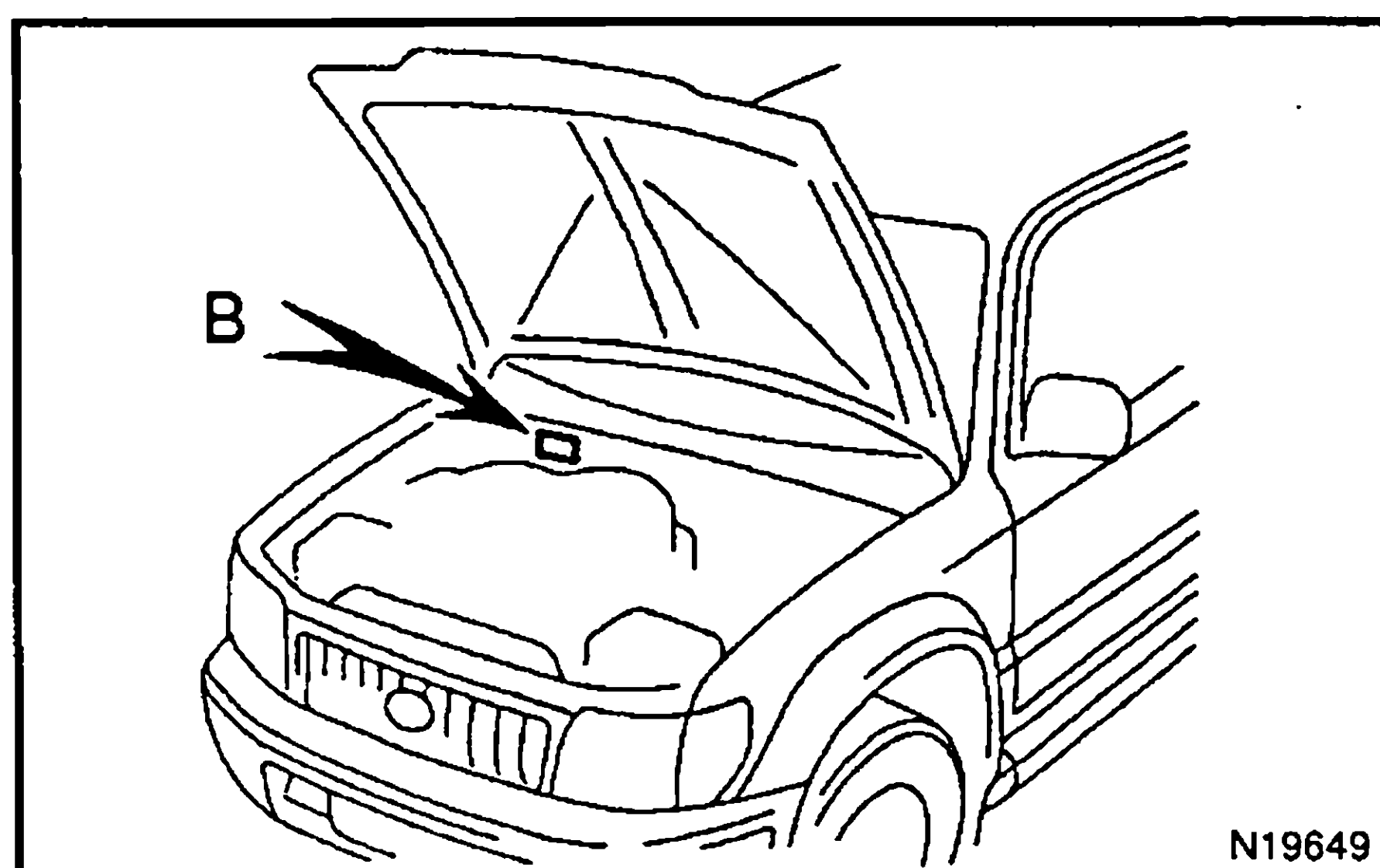
IN09T-03

1. 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 plate.

A: Vehicle Identification Number

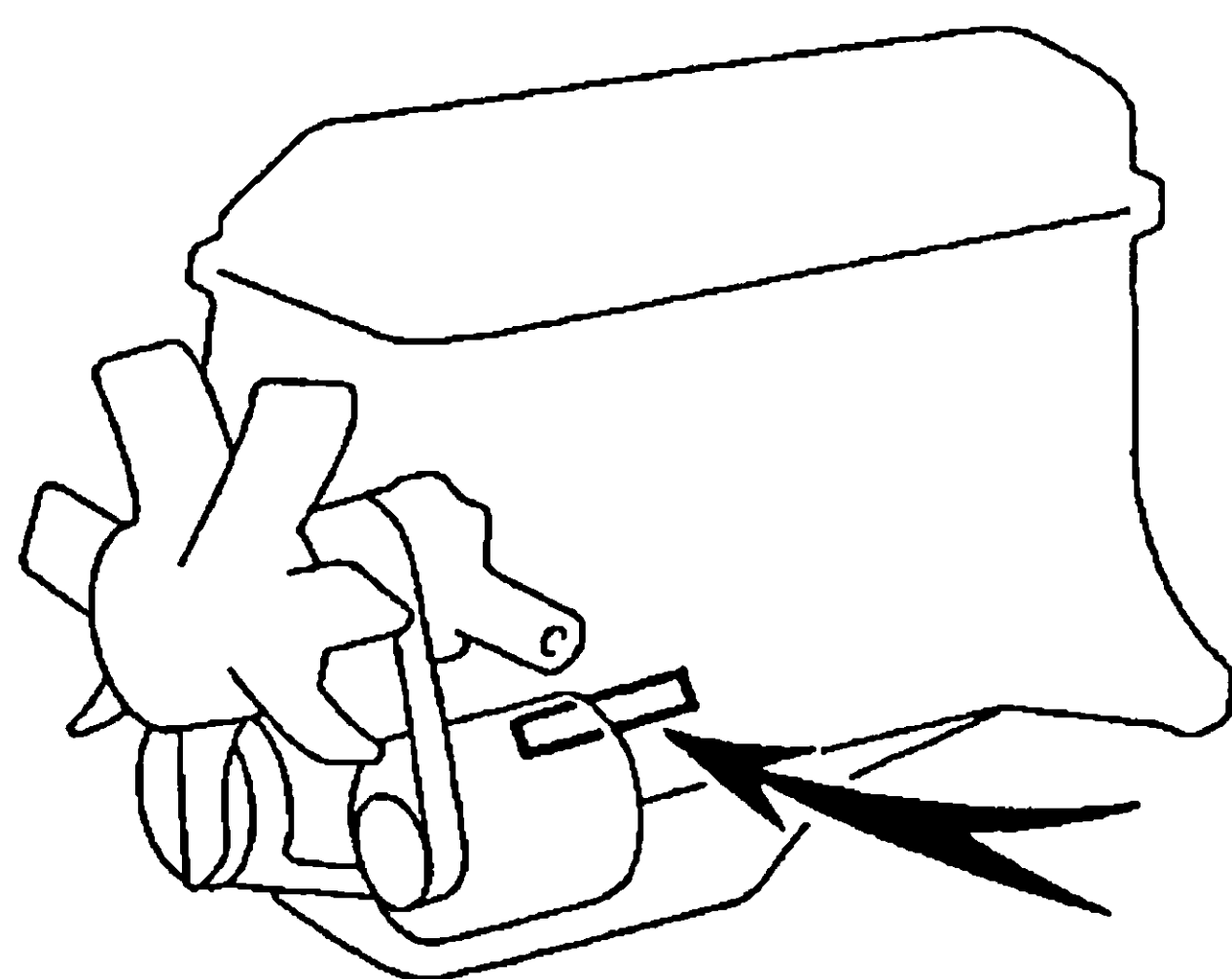
B: Manufacturer's Plate



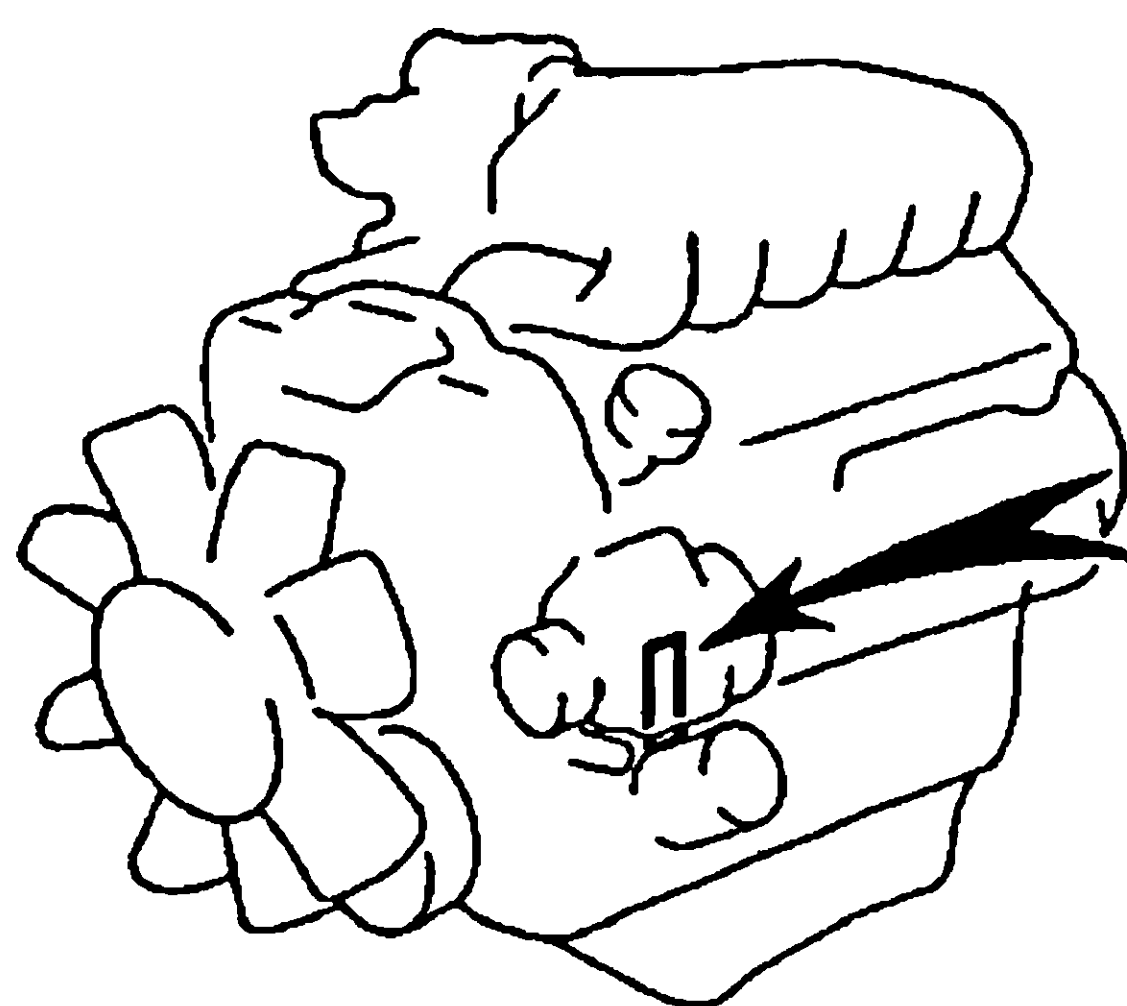
2. ENGINE SERIAL NUMBER

The engine serial number is stamped on the engine block, as shown in the illustration.

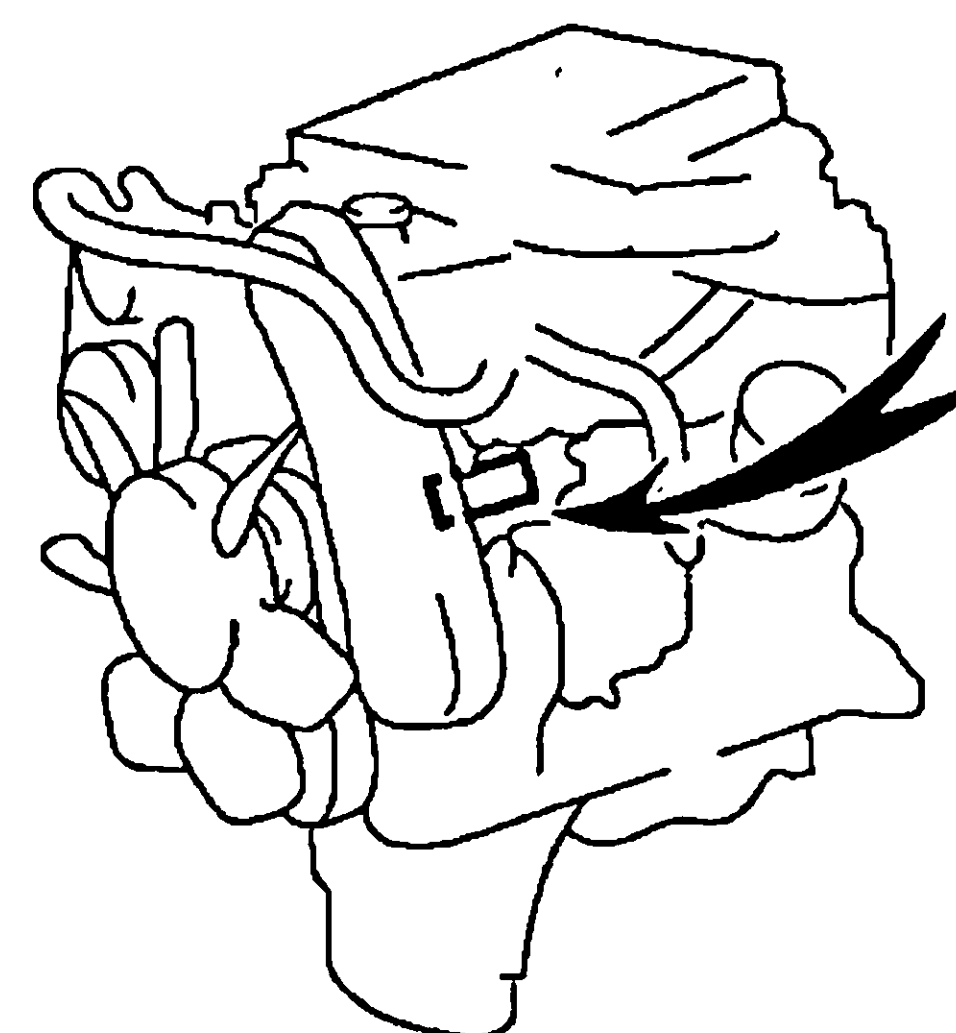
3RZ-FE Engine



5VZ-FE Engine

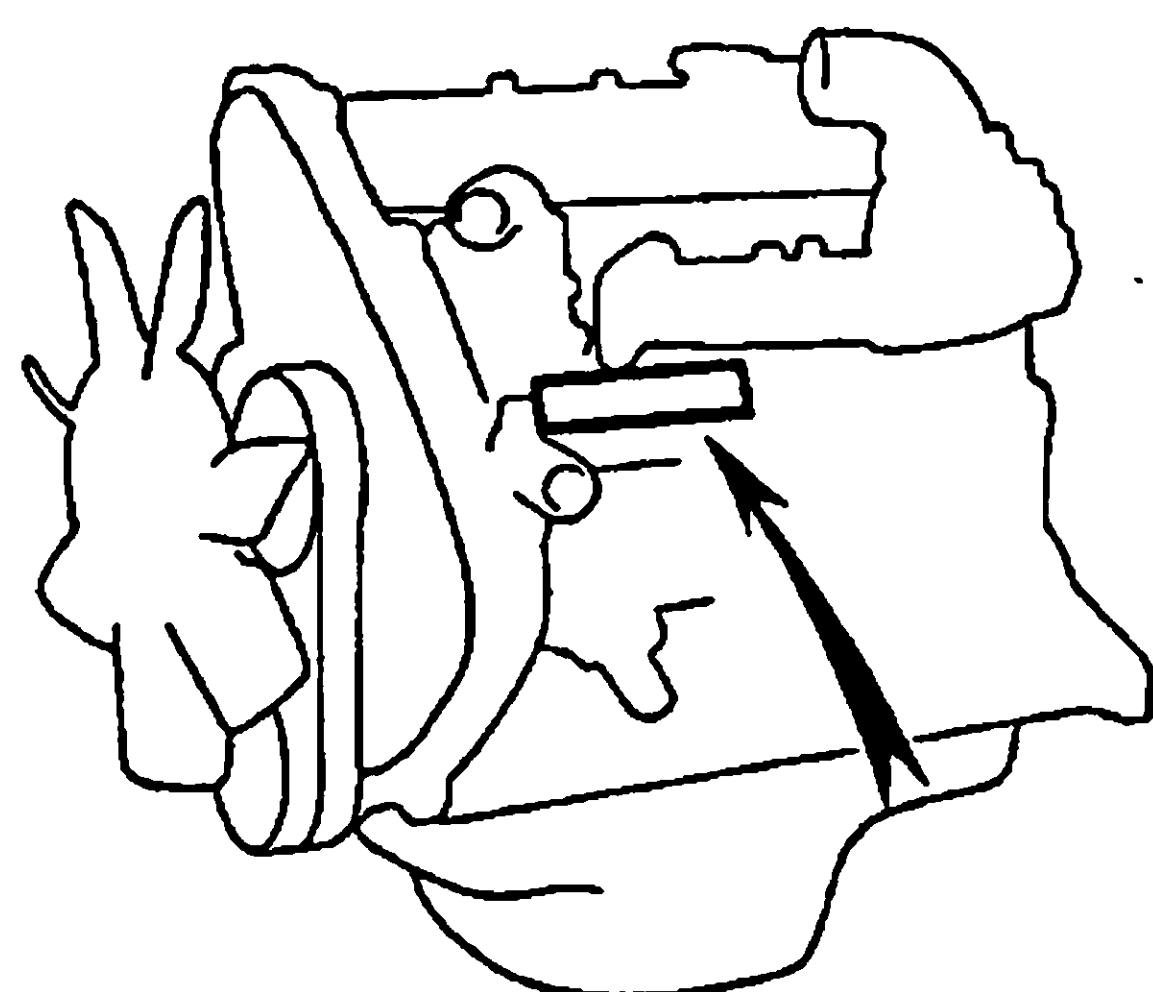


1KD-FTV Engine

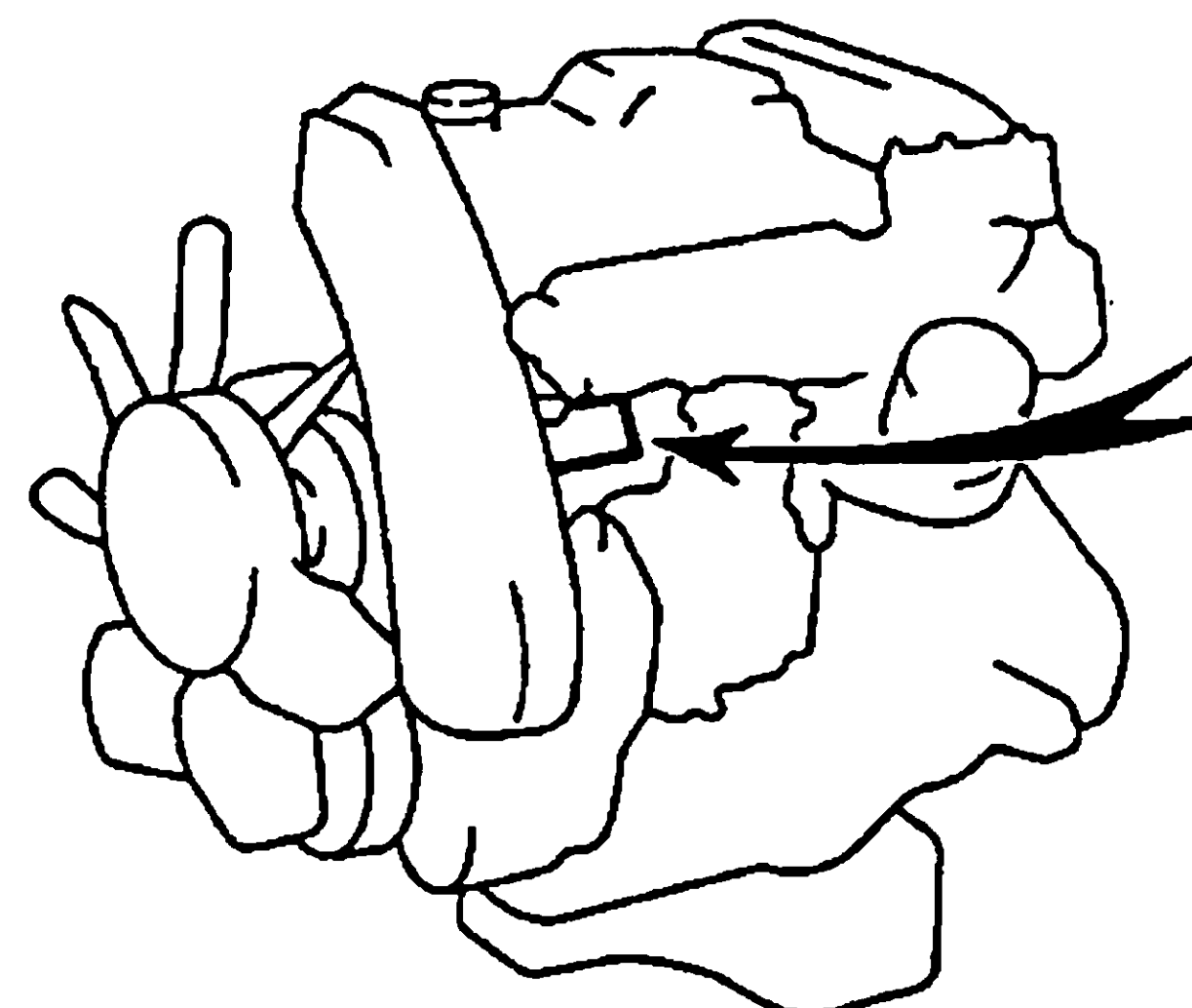


N

3L Engine



1KZ-TE Engine



N17730 N17731 B13663
N19545 N09034

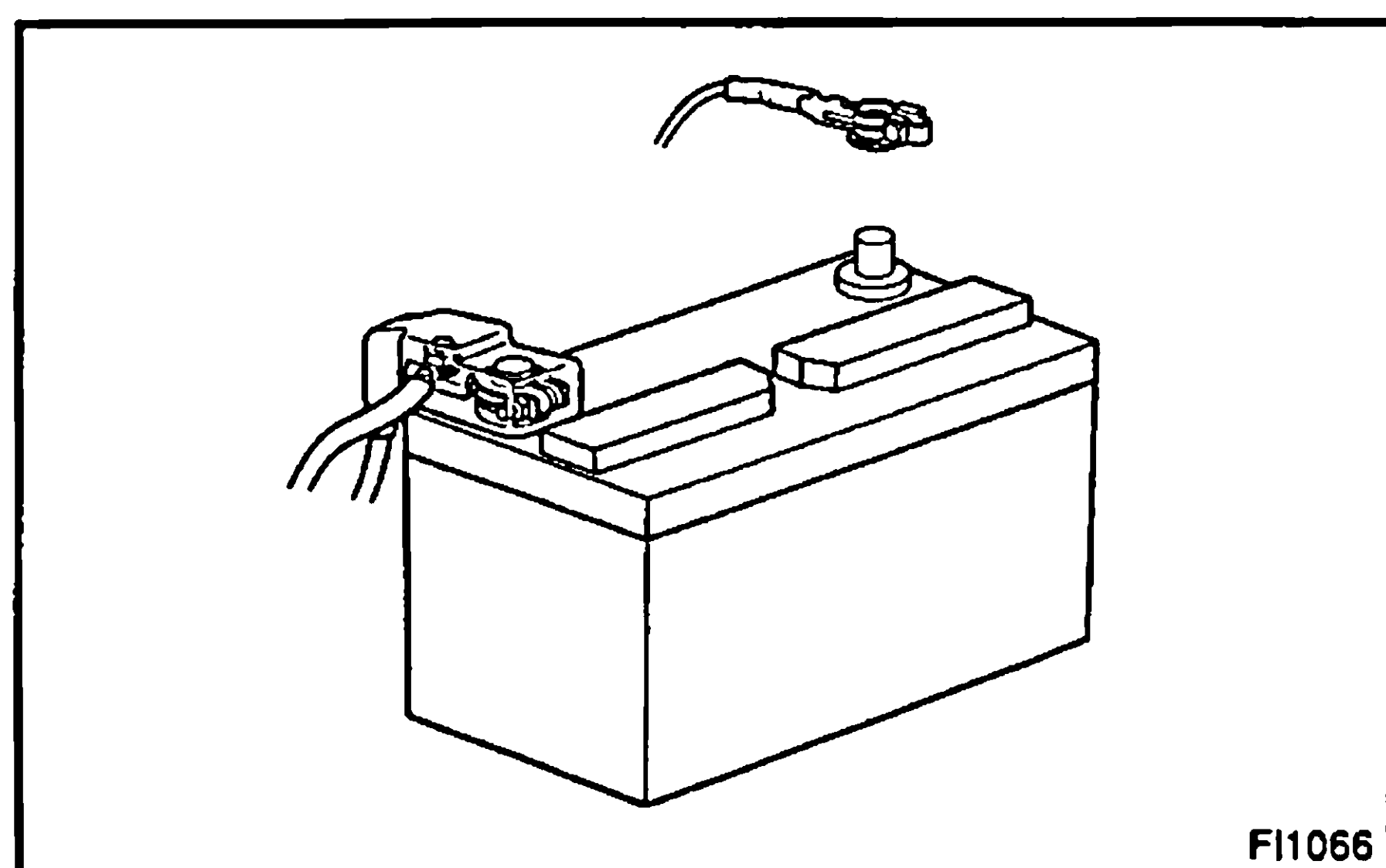
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REPAIR INSTRUCTIONS

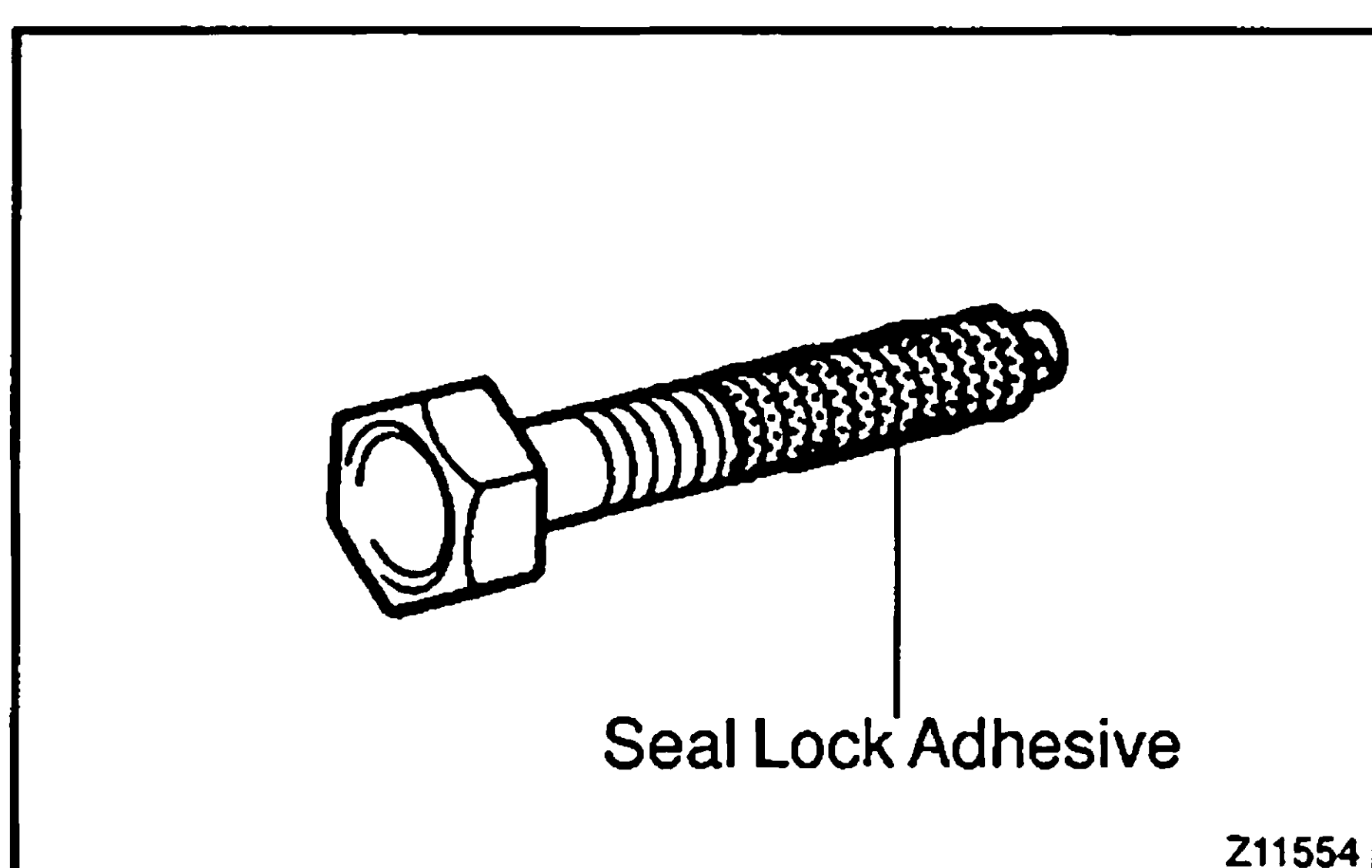
GENERAL INFORMATION

BASIC REPAIR HINT

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

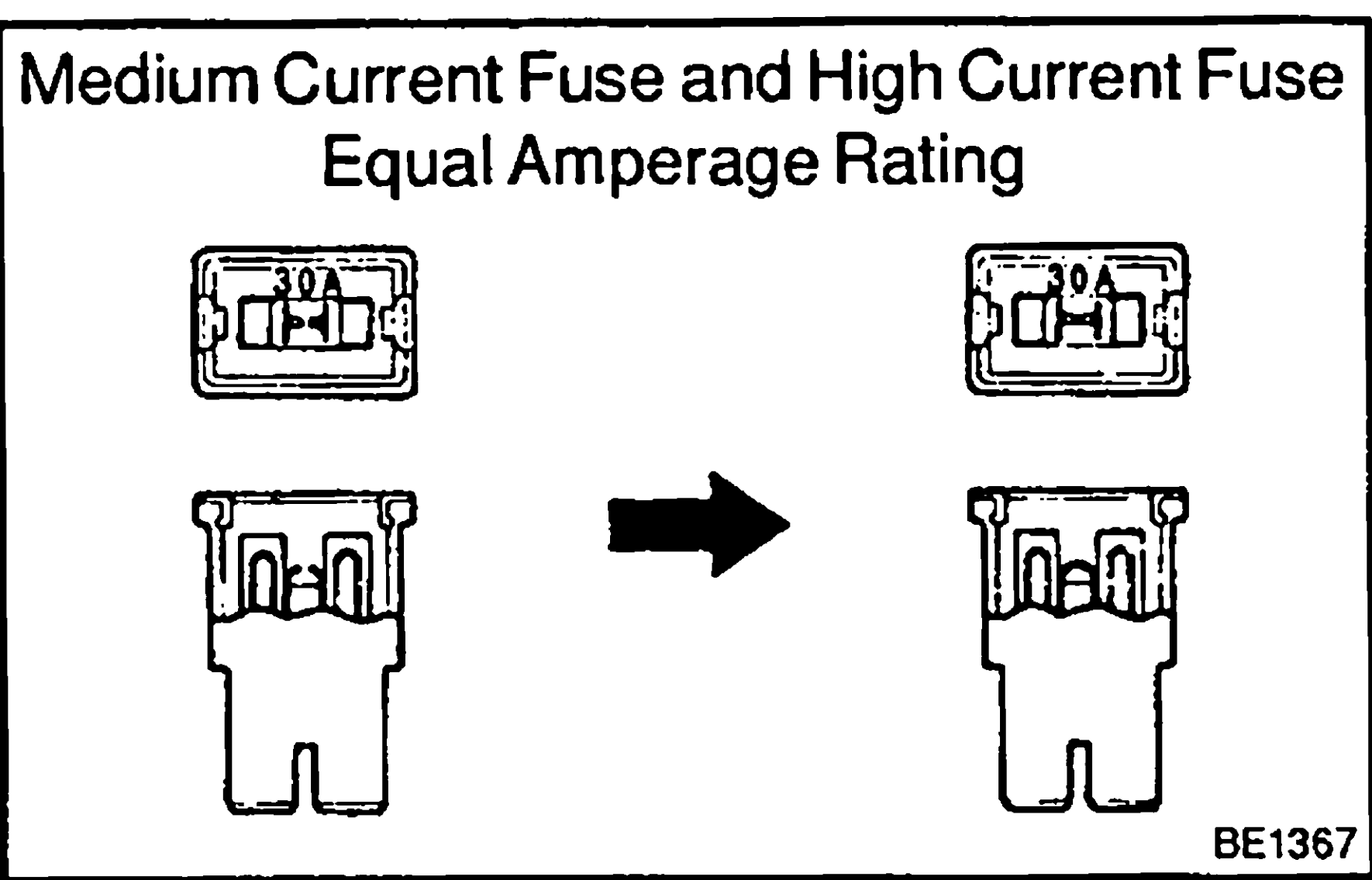


- (f) Precoated parts
Precoated parts are bolts, nuts, etc. that are coated with a seal lock adhesive at the factory.
 - (1) If a precoated part is retightened, loosened or caused to move in any way, it must be recoated with the specified adhesive.
 - (2) When reusing precoated parts, clean off the old adhesive and dry with compressed air. Then apply the specified seal lock adhesive to the bolt, nut or threads.



- (3) Precoated parts are indicated in the component illustrations by the "★" symbol.
- (g) When necessary, use a sealer on gaskets to prevent leaks.
- (h) Carefully observe all specifications for bolt tightening torques. Always use a torque wrench.
- (i) 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 Preparation section in this manual.

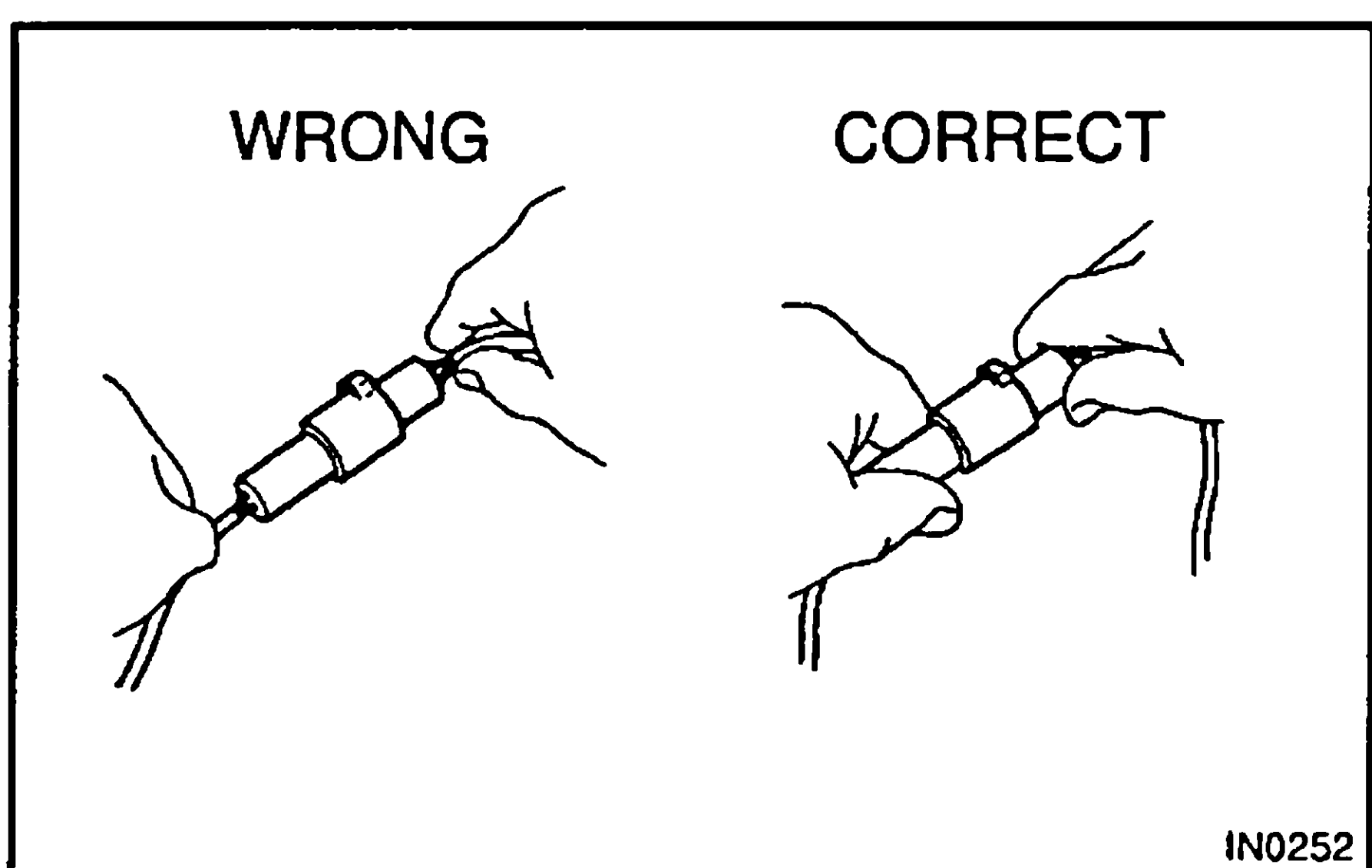
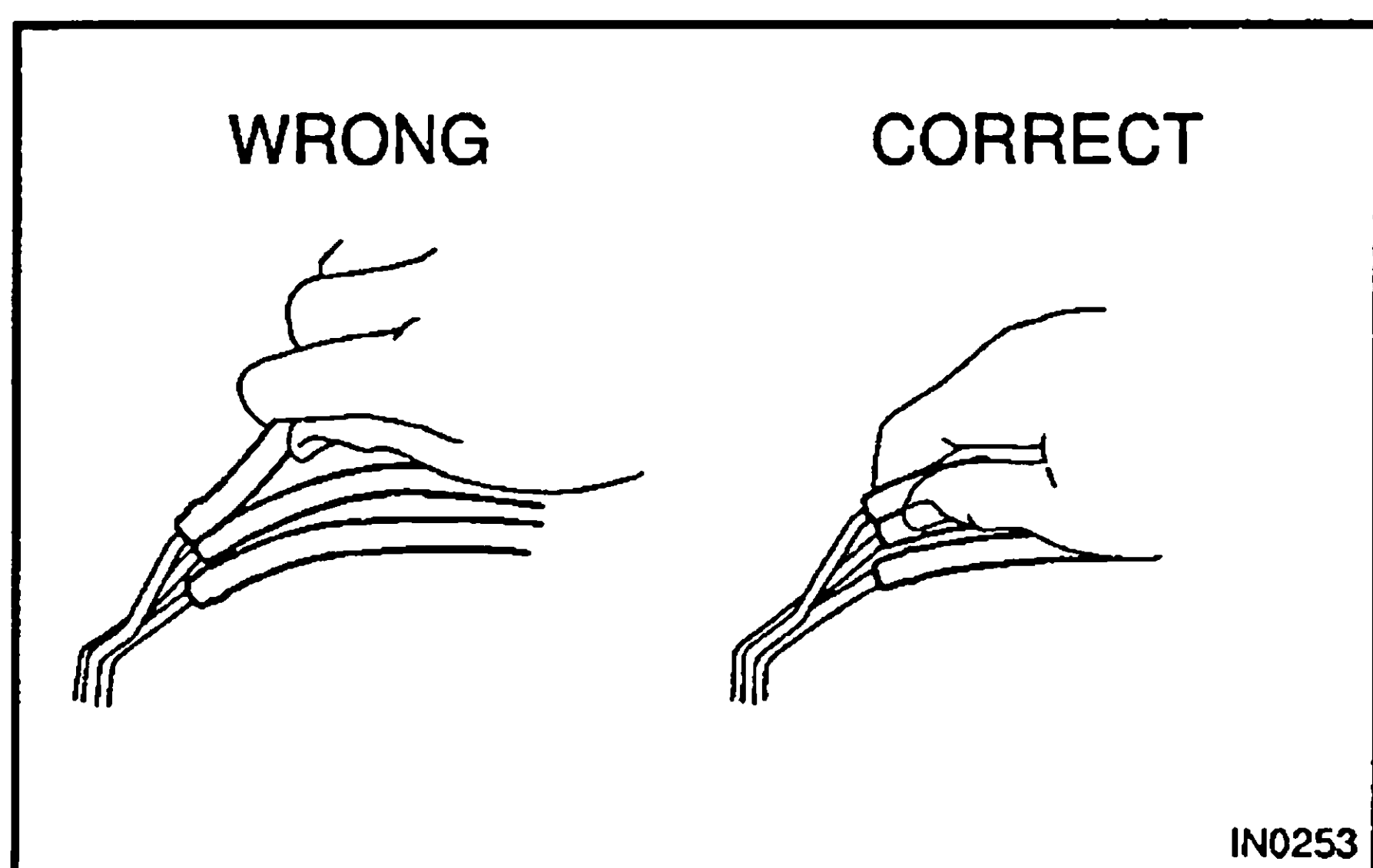
IN



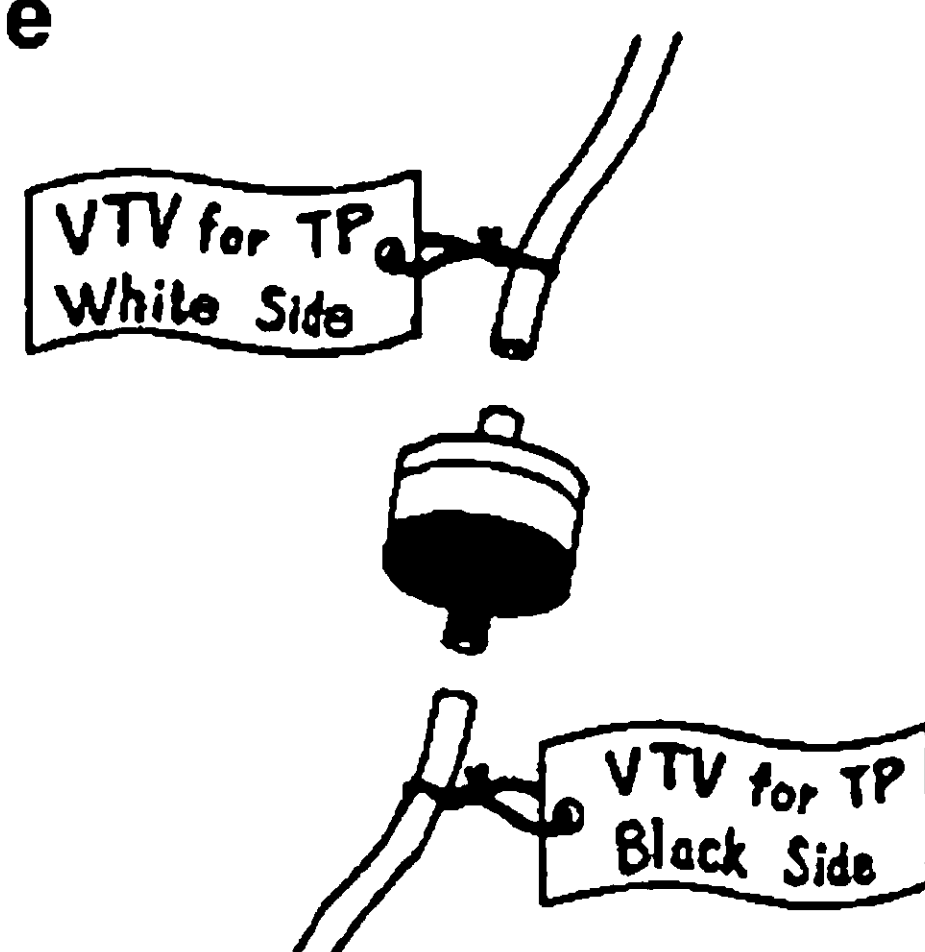
- (j) When replacing fuses, be sure the new fuse has the correct amperage rating. DO NOT exceed the rating or use one with a lower rating.

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

- (k) Care must be taken when jacking up and supporting the vehicle. Be sure to lift and support the vehicle at the proper locations (See page IN-8).
- Cancel the parking brake on the level place and shift the transmission in Neutral (or N position).
 - When jacking up the front wheels of the vehicle at first place stoppers behind the rear wheels.
 - When jacking up the rear wheels of the vehicle at first place stoppers before the front wheels.
 - When either the front or rear wheels only should be jacked up, set rigid racks and place stoppers in front and behind the other wheels on the ground.
 - After the vehicle is jacked up, be sure to support it on rigid racks . 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.
- (l) Observe the following precautions to avoid damage to the following parts:
- (1) 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.)



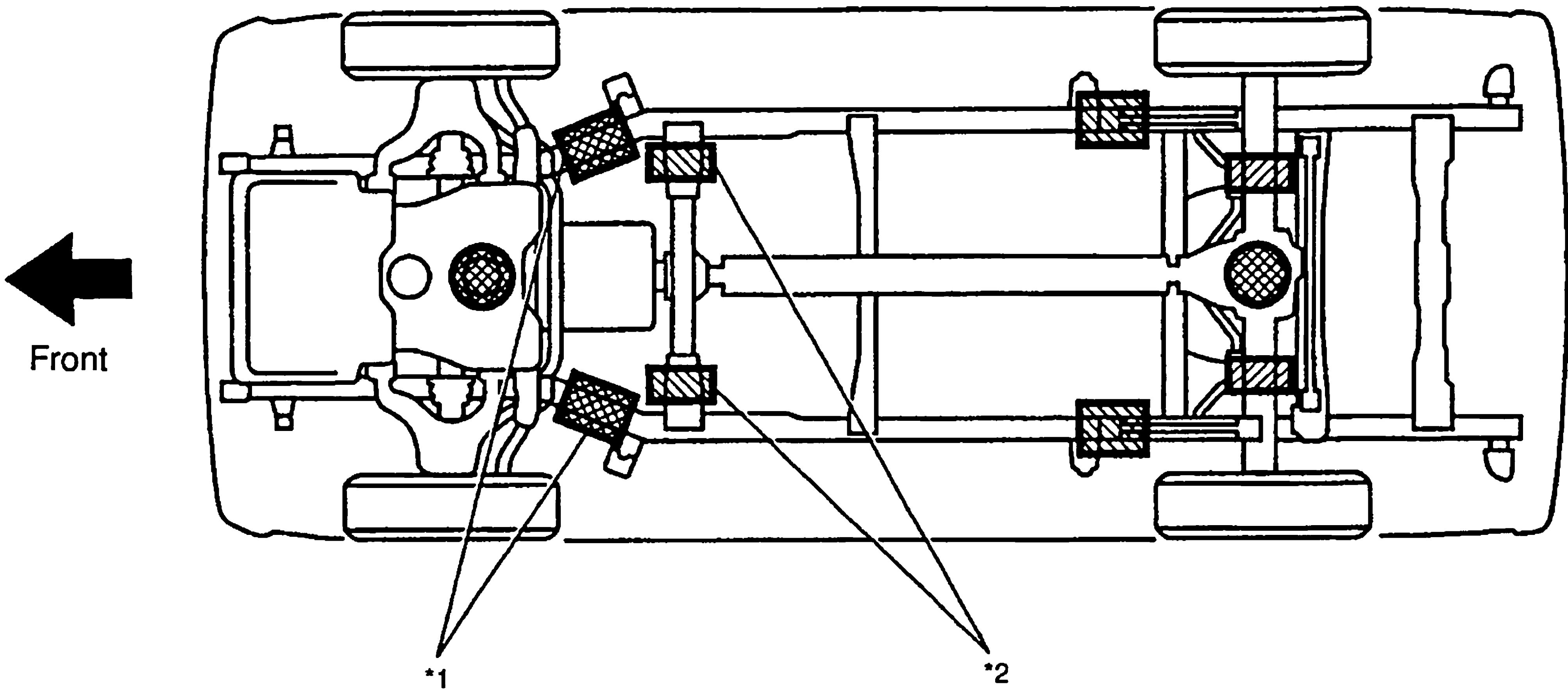
- (2) To disconnect vacuum hoses, pull off the end, not the middle of the hose.
- (3) To pull apart electrical connectors, pull on the connector itself, not the wires.
- (4) Be careful not to drop electrical components, such as sensors or relays. If they are dropped on a hard floor, they should be replaced and not reused.
- (5) When steam cleaning an engine, protect the electronic components, air filter and emission-related components from water.
- (6) Never use an impact wrench to remove or install temperature switches or temperature sensors.
- (7) When checking continuity at the wire connector, insert the tester probe carefully to prevent terminals from bending.
- (8) When using a vacuum gauge, never force the hose onto a connector that is too large. Use a step-down adapter for adjustment. Once the hose has been stretched, it may leak air.

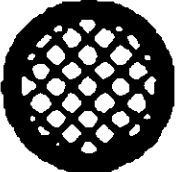
Example

- (m) Installation and removal of vacuum hose:
 - (1) When disconnecting vacuum hoses, use tags to identify how they should be reconnected to.
 - (2) After completing a job, double check that the vacuum hoses are properly connected. A label under the hood shows the proper layout.
- (n) Bleeding of hydraulic brake booster:

When repairing the hydraulic brake booster or ABS, TRC and VSC system, bleeding the air out of the hydraulic brake booster (See Pub. No. RM702E on page BR-1).
- (o) Unless otherwise stated, all resistance is measured at an ambient temperature of 20°C (68°F). Because the resistance may be outside specifications if measured at high temperatures immediately after the vehicle has been running, measurement should be made when the engine has cooled down.

VEHICLE LIFT AND SUPPORT LOCATIONS



- JACK POSITION** 
- Front Center of crossmember
- Rear Center of rear axle housing

- SUPPORT POSITION**
- Safety stand 
- Swing arm type lift 

*1 : Support position when equipping without side step.

*2 : Support position when equipping with side step.

CAUTION : For 3 door models, do not use the swing arm type lift as this type lift may not support the short wheel based models securely.

FOR ALL OF VEHICLES

PRECAUTION

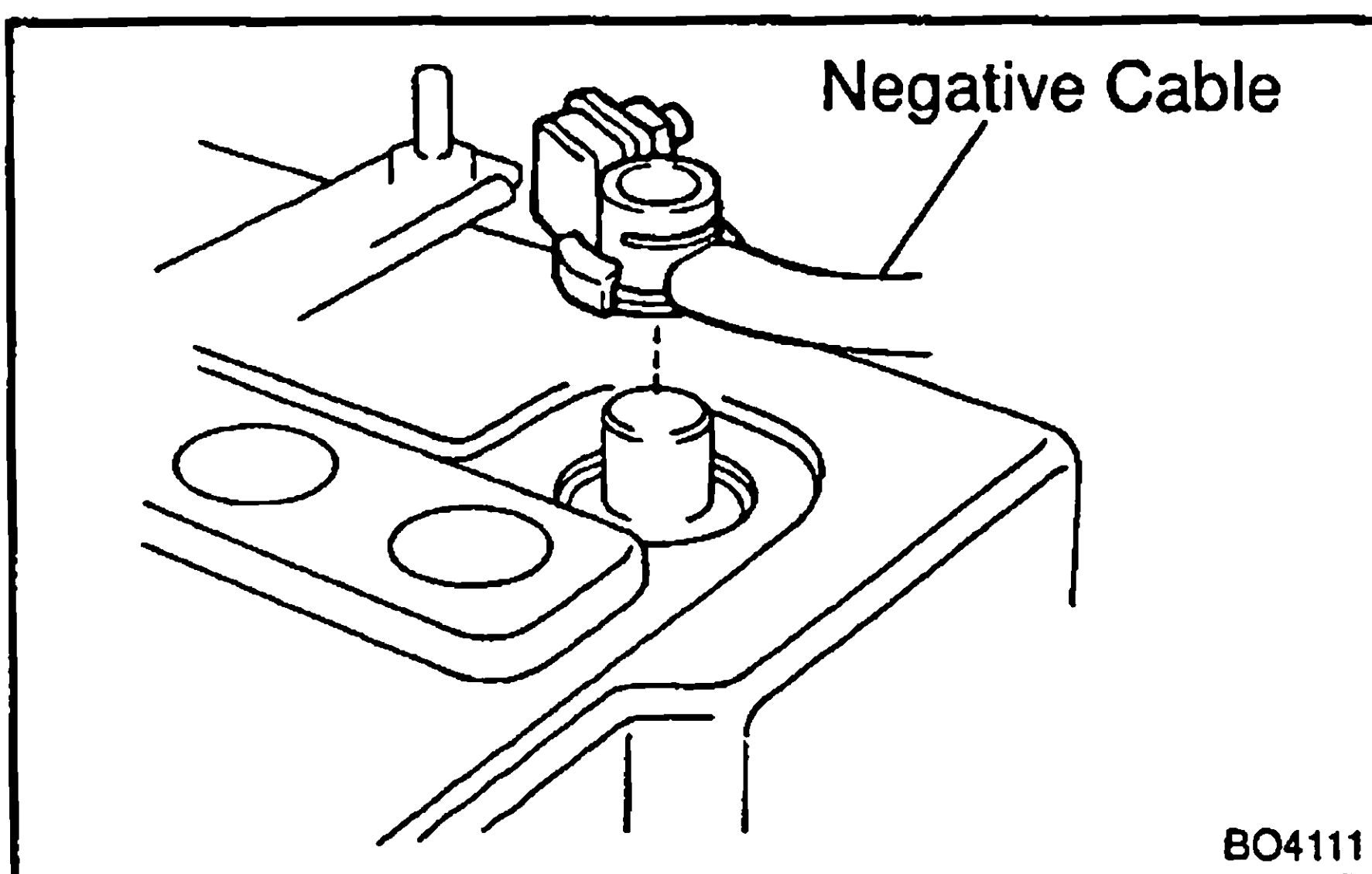
IN0ER-01

1. FOR VEHICLES EQUIPPED WITH SRS AIRBAG AND SEAT BELT PRETENSIONER

- (a) The LAND CRUISER/LAND CRUISER PRADO is equipped with an SRS (Supplemental Restraint System), such as the driver airbag, front passenger airbag assembly and seat belt pretensioner.

Failure to carry out service operations in the correct sequence could cause the supplemental restraint system to unexpectedly deploy during servicing, possibly leading to a serious accident.

Further, if a mistake is made in servicing the supplemental restraint system, it is possible the SRS may fail to operate when required. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the following items carefully, then follow the correct procedure described in this manual.



(b) GENERAL NOTICE

- (1) Malfunction symptoms of the supplemental restraint system are difficult to confirm, so the diagnostic trouble codes become the most important source of information when troubleshooting. When troubleshooting the supplemental restraint system, always inspect the diagnostic trouble codes before disconnecting the battery (See Pub. No. RM627E on page DI-3).

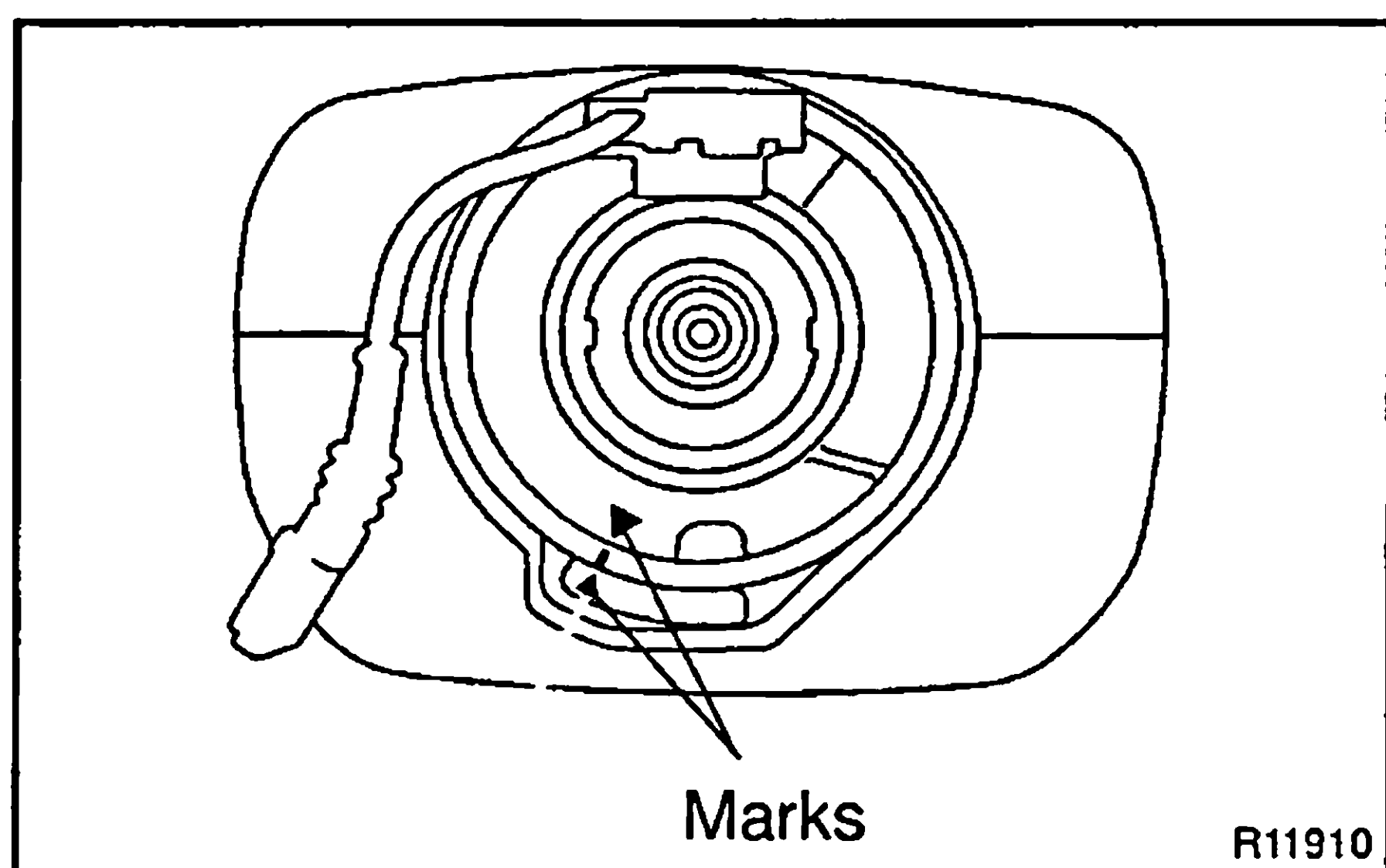
- (2) Work must be started after 90 seconds from the time the ignition switch is turned to the "LOCK" position and the negative (–) terminal cable is disconnected from the battery.

(The supplemental restraint system is equipped with a back-up power source so that if work is started within 90 seconds of disconnecting the negative (–) terminal cable from the battery, the SRS may deploy.)

When the negative (–) terminal cable is disconnected from the battery, memory of the clock and audio systems will be cancelled. So before starting work, make a record of the contents memorized by the each memory system. Then when work is finished, reset the clock and audio systems as before. So when the work is finished, therefore it will be necessary to explain this fact to the customer, and ask the customer to adjust the features and reset the memory. To avoid erasing the memory of each memory system, never use a back-up power supply from another battery.

IN

- (3) Even in cases of a minor collision where the SRS does not deploy, the steering wheel pad, front passenger airbag assembly and seat belt pretensioner should be inspected (See Pub. No. RM627E on page RS-13, RS-27, BO-24 or RM517E on page BO-73).
- (4) Never use SRS parts from another vehicle. When replacing parts, replace them with new parts.
- (5) Before repairs, remove the airbag sensor if shocks are likely to be applied to the sensor during repairs.
- (6) Never disassemble and repair the airbag sensor assembly, steering wheel pad, front passenger airbag assembly or seat belt pretensioner in order to reuse them.
- (7) If the airbag sensor assembly, steering wheel pad, front passenger airbag assembly or seat belt pretensioner have been dropped, or if there are cracks, dents or other defects in the case, bracket or connector, replace them with new ones.
- (8) Do not directly expose the airbag sensor assembly, steering wheel pad, front passenger airbag assembly or seat belt pretensioner to hot air or flames.
- (9) Use a volt/ohmmeter with high impedance (10 k Ω /V minimum) for troubleshooting of the electrical circuit.
- (10) Information labels are attached to the periphery of the SRS components. Follow the instructions on the notices.
- (11) After work on the supplemental restraint system is completed, check the SRS warning light (See Pub. No. RM627E on page DI-3).

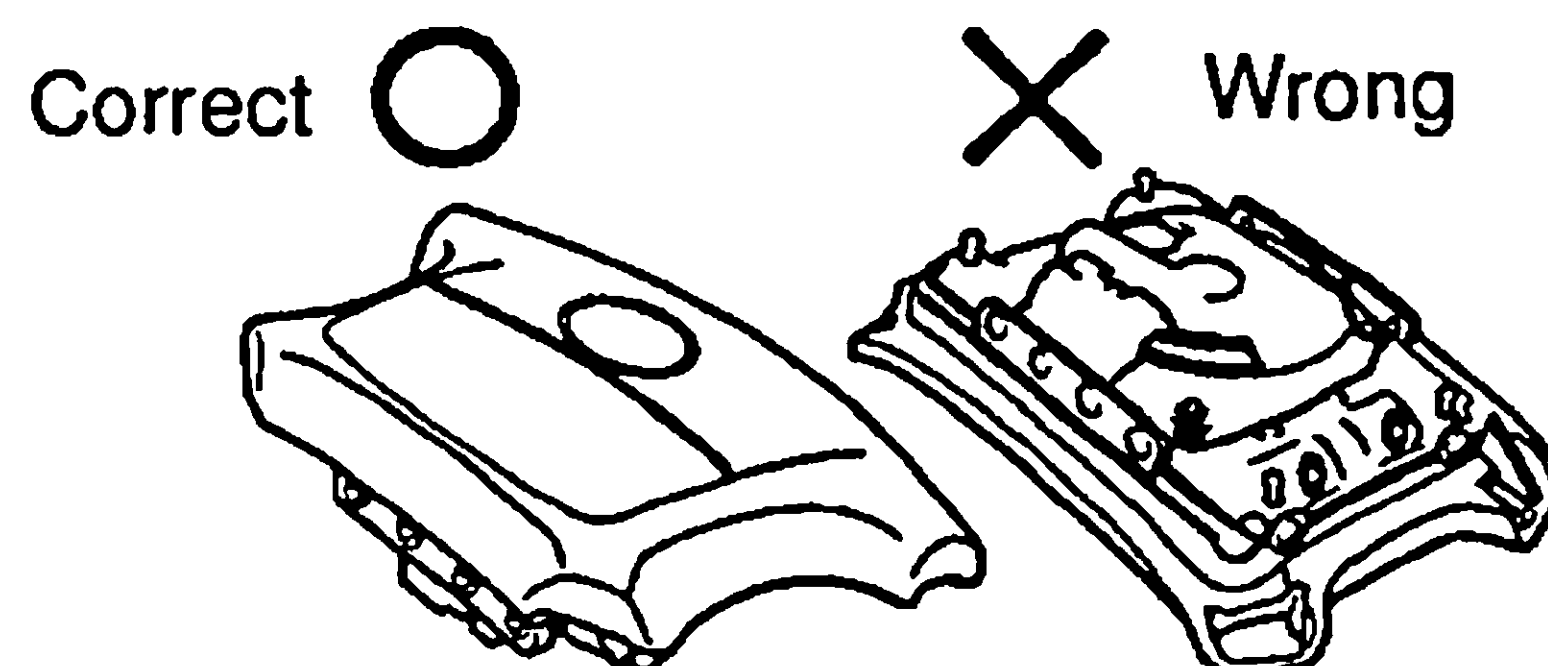


- (c) **SPIRAL CABLE (in Combination Switch)**
The steering wheel must be fitted correctly to the steering column with the spiral cable at the neutral position, otherwise cable disconnection and other troubles may result. Refer to Pub. No. RM627E on page SR-4 of this manual concerning correct steering wheel installation.

(d) STEERING WHEEL PAD (with Airbag)

- (1) When removing the steering wheel pad or handling a new steering wheel pad, it should be placed with the pad top surface facing up.
Storing the pad with its metallic surface facing upward may lead to a serious accident if the airbag inflates for some reason. In addition do not store a steering wheel pad on top of another one.
- (2) Never measure the resistance of the airbag squib. (This may cause the airbag to deploy, which is very dangerous.)
- (3) Grease should not be applied to the steering wheel pad and the pad should not be cleaned with detergents of any kind.
- (4) Store the steering wheel pad where the ambient temperature remains below 93°C (200°F), without high humidity and away from electrical noise.
- (5) When using electric welding, first disconnect the airbag connector (yellow color and 2 pins) under the steering column near the combination switch connector before starting work.
- (6) When disposing of a vehicle or the steering wheel pad alone, the airbag should be deployed using an SST before disposal (See Pub. No. RM627E on page RS-15).
Carry out the operation in a safe place away from electrical noise.

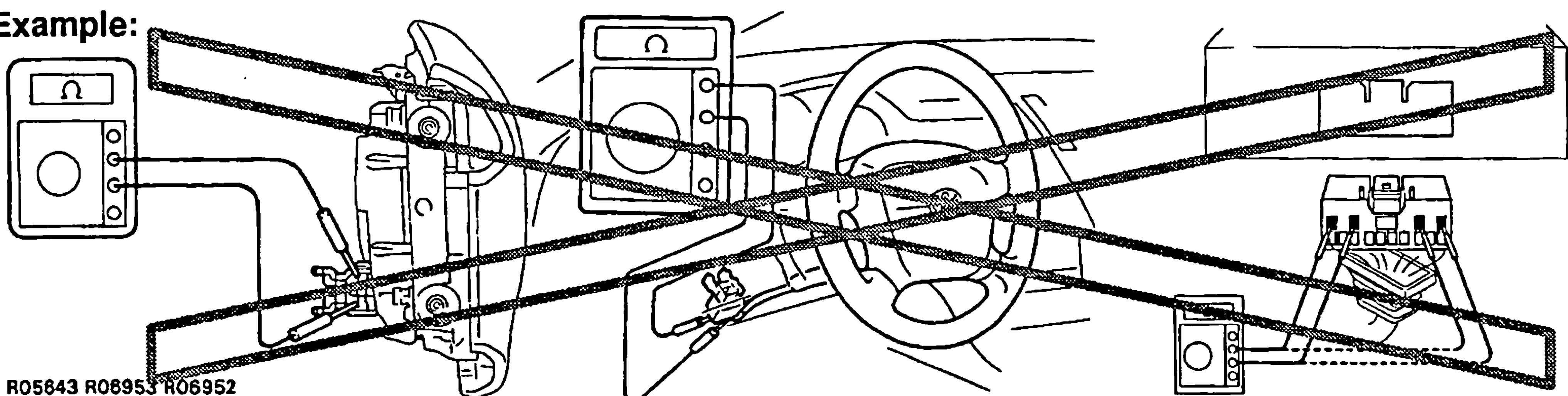
Example:



Z13953

B05084

Example:



R05643 R08953 R06952

Z13950

(e) FRONT PASSENGER AIRBAG ASSEMBLY

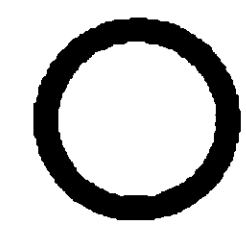
- (1) Always store a removed or new front passenger airbag assembly with the airbag deployment direction facing up.

Storing the airbag assembly with the airbag deployment direction facing down could cause a serious accident if the airbag inflates.

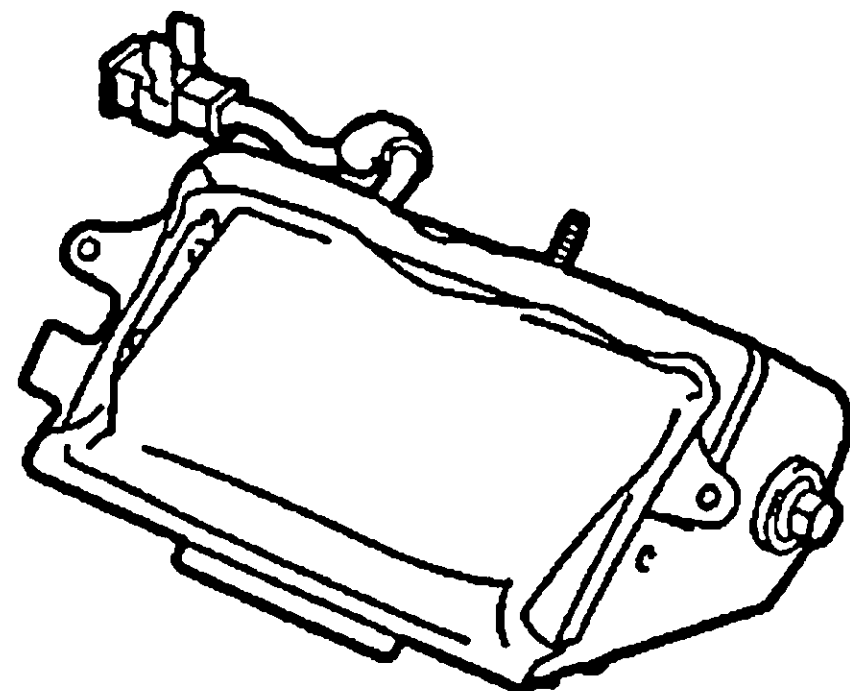
- (2) Never measure the resistance of the airbag squib. (This may cause the airbag to deploy, which is very dangerous.)
- (3) Grease should not be applied to the front passenger airbag assembly and the airbag door should not be cleaned with detergents of any kind.
- (4) Store the airbag assembly where the ambient temperature remains below 93°C (200°F), without high humidity and away from electrical noise.
- (5) When using electric welding, first disconnect the airbag connector (yellow color and 2 pins) installed on the assembly before starting work.
- (6) When disposing of a vehicle or the airbag assembly alone, the airbag should be deployed using an SST before disposal (See Pub. No. RM627E on page RS-29).

Perform the operation in a safe place away from electrical noise.

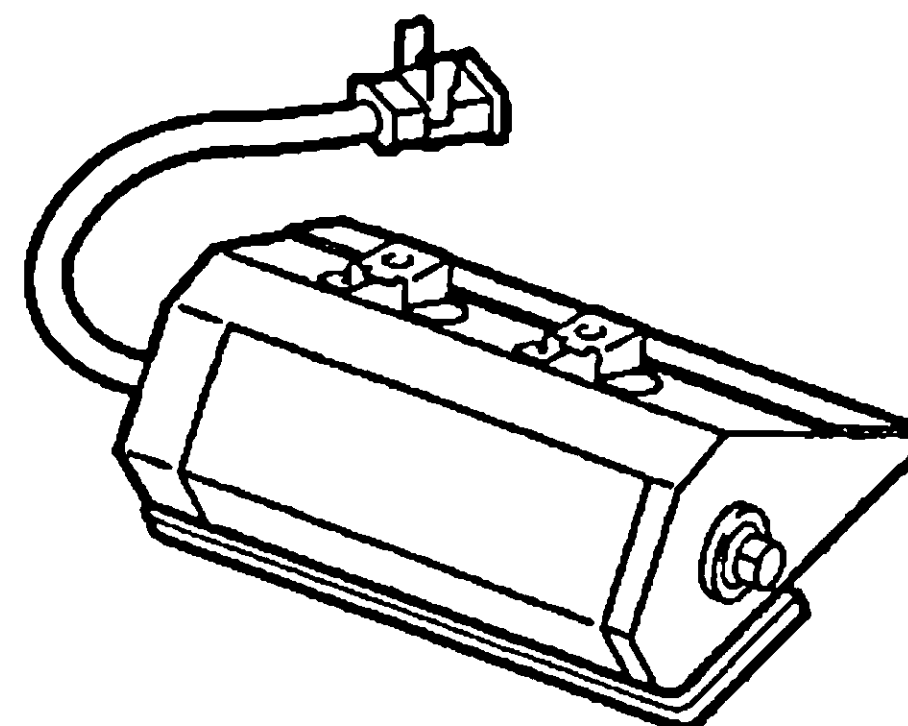
Example:



Correct

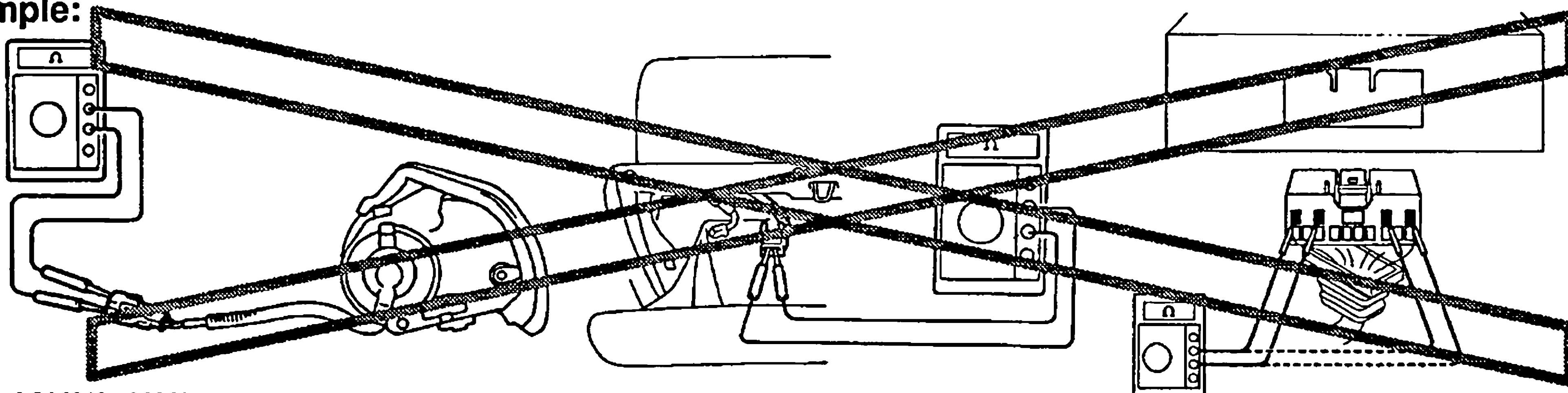


Wrong



B01927

Example:

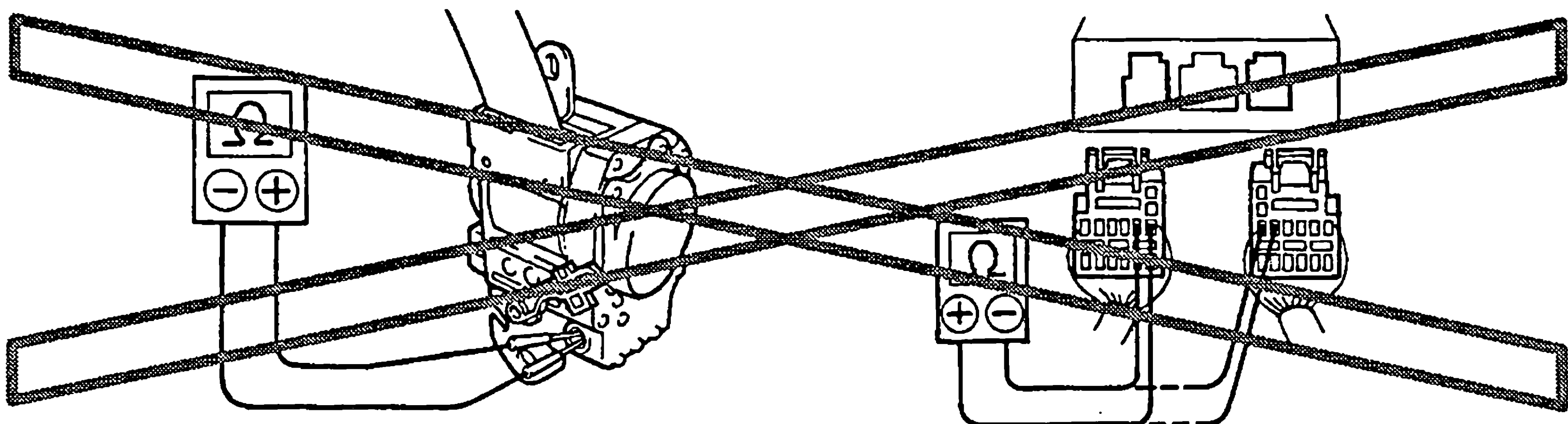


R05648 R05649 R06952

Z13951

- (f) ELECTRICAL TYPE SEAT BELT PRETENSIONER
- (1) Never measure the resistance of the seat belt pretensioner. (This may cause the seat belt pretensioner activation which is very dangerous.)
 - (2) Never disassemble the seat belt pretensioner.
 - (3) Never install the seat belt pretensioner in another vehicle.
 - (4) Store the seat belt pretensioner where the ambient temperature remains below 80°C (176°F) and away from electrical noise without high humidity.
 - (5) When using electric welding, first disconnect the connector (yellow color and 2 pins) before starting work.
 - (6) When disposing of a vehicle or the seat belt pretensioner alone, the seat belt pretensioner should be activated before disposal (See Pub. No. RM627E on page BO-25). Perform the operation in a safe place away from electrical noise.
 - (7) The seat belt pretensioner is hot after activation, so let it cool down sufficiently before the disposal. However never apply water to the seat belt pretensioner.

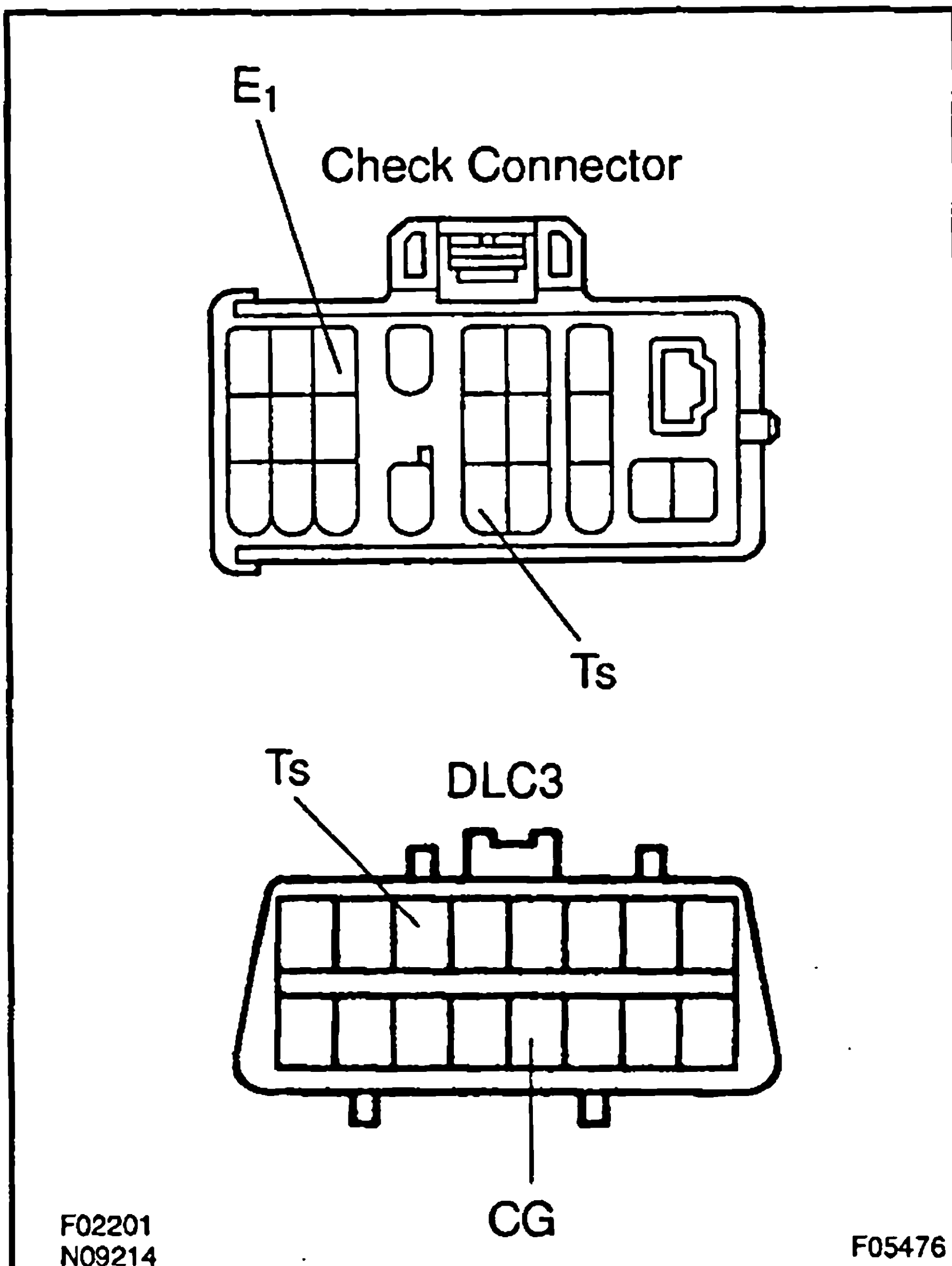
Example:



B04210

- (g) **MECHANICAL TYPE SEAT BELT PRETENSIONER**
 - (1) Before doing any operation which will apply a strong shock to the vehicle, or before removing the seat belt pretensioner, be sure to lock the sensor (See Pub. No. RM517E on page BO-73).
 - (2) Never disassemble the seat belt pretensioner.
 - (3) Do not subject the seat belt pretensioner to shocks or bring magnets close to it.
 - (4) Do not drop the seat belt pretensioner. Never use a seat belt pretensioner which has been dropped.
 - (5) Never install the seat belt pretensioner in another vehicle.
 - (6) Store the seat belt pretensioner on a flat, stable surface where the ambient temperature remains below 80°C (176°F) without high humidity.
 - (7) After frontal collision, always check whether the seat belt pretensioners have been activated.
 - (8) When disposing of a vehicle or the seat belt pretensioner alone, the seat belt pretensioner should be activated before disposal (See Pub. No. RM517E on page BO-74).
 - (9) The seat belt pretensioner is hot after activation, so let it cool down sufficiently before the disposal. However never apply water to the seat belt pretensioner.
- (h) **AIRBAG SENSOR ASSEMBLY**
 - (1) Never reuse the airbag sensor assembly involved in a collision when the SRS has deployed.
 - (2) The connectors to the airbag sensor assembly should be connected or disconnected with the sensor mounted on the floor. If the connectors are connected or disconnected while the airbag sensor assembly is not mounted to the floor, it could cause undesired ignition of the supplemental restraint system.
 - (3) Work must be started after 90 seconds from the time the ignition switch is turned to the "LOCK" position and the negative (–) terminal cable is disconnected from the battery, even if only loosening the set bolts of the airbag sensor assembly.
- (i) **WIRE HARNESS AND CONNECTOR**

The SRS wire harness is integrated with the cowl wire harness assembly. All the connectors in the system are a standard yellow color. If the SRS wire harness becomes disconnected or the connector becomes broken due to an accident, etc., repair or replace it.



2. FOR VEHICLE EQUIPPED WITH VEHICLE Stability CONTROL (VSC) SYSTEM OR ACTIVE TRC SYSTEM

(a) Precaution when using drum tester:

When using a drum tester, make sure that the ignition switch is OFF, start the engine with the diagnosis connector short-circuited between Ts and E₁ (CG) and take a measurement.

NOTICE:

- Check that VSC/TRC or TRC warning light is blinking.
- Ensure that the vehicle does not move using wires.
- After the measurement, disconnect the short circuit and check that the VSC/TRC or TRC warning light is turned off when restarting the engine.

(b) Precaution during VSC operation:

- (1) Since VSC may be affected by the removal/installation of the VSC-related parts, do not remove/install those parts unless absolutely necessary.
- (2) When operating on VSC, follow the instructions in BR section in this manual to surely make preparations or check after operations.

3. WHEN SERVICING FULL-TIME 4WD VEHICLES

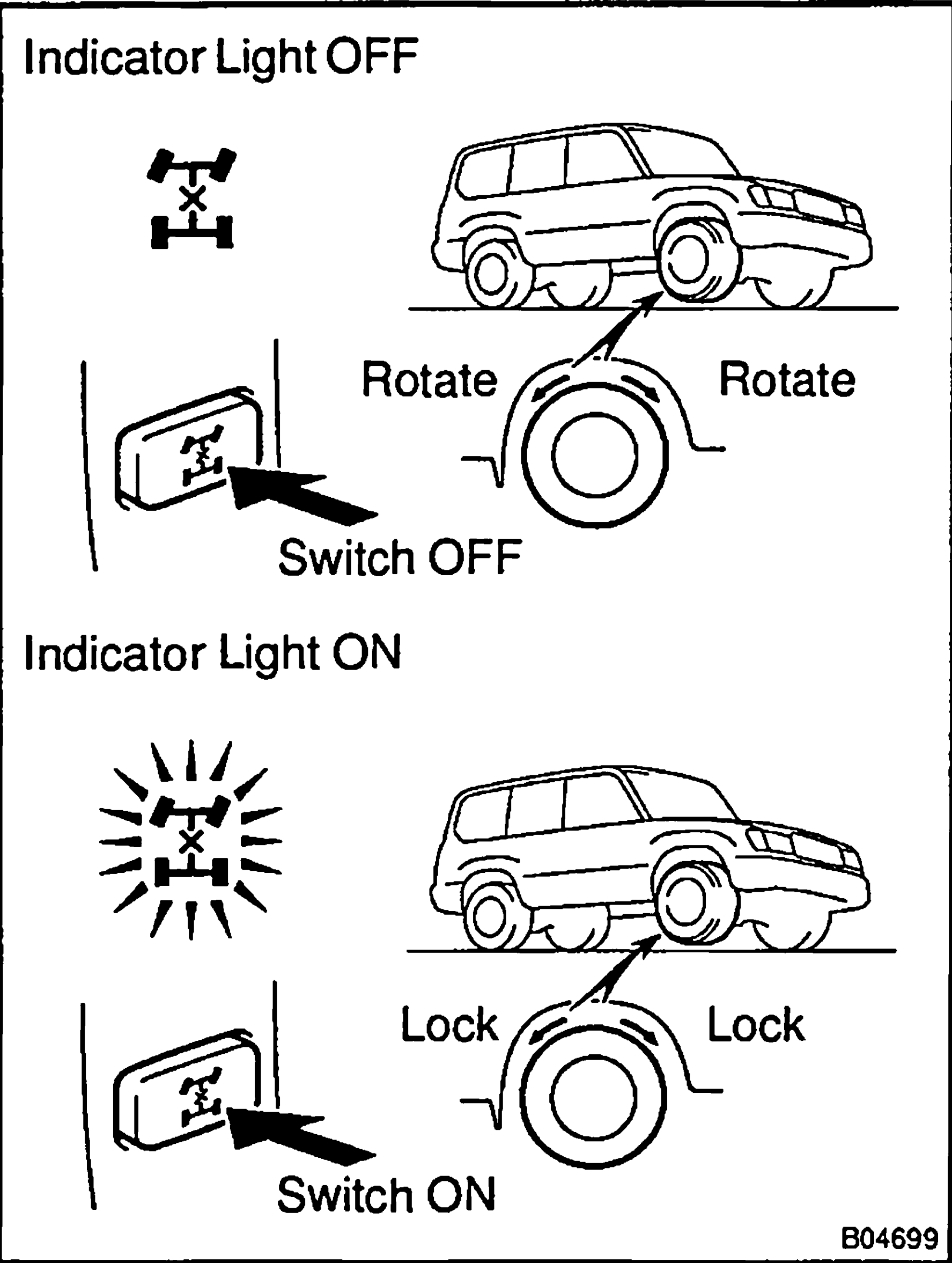
The Full-time 4WD LAND CRUISER/LAND CRUISER PRADO is equipped with the mechanical lock type center differential system.

During tests using 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 FREE or LOCK depending on the type of the test being performed.

HINT:

w/o Vehicle Stability control (VSC) system:

When the transfer select lever is put in "L_L" position, the center differential is put in LOCK condition regardless of the position of the center differential lock switch.



Center differential FREE condition:

	Condition	Wheel
Center differential switch	OFF	A lifted wheel can be rotated even if only one wheel is lifted up, as long as transmission is in N range.
Indicator light	OFF	
Transfer select lever (H/L)	Either will do	

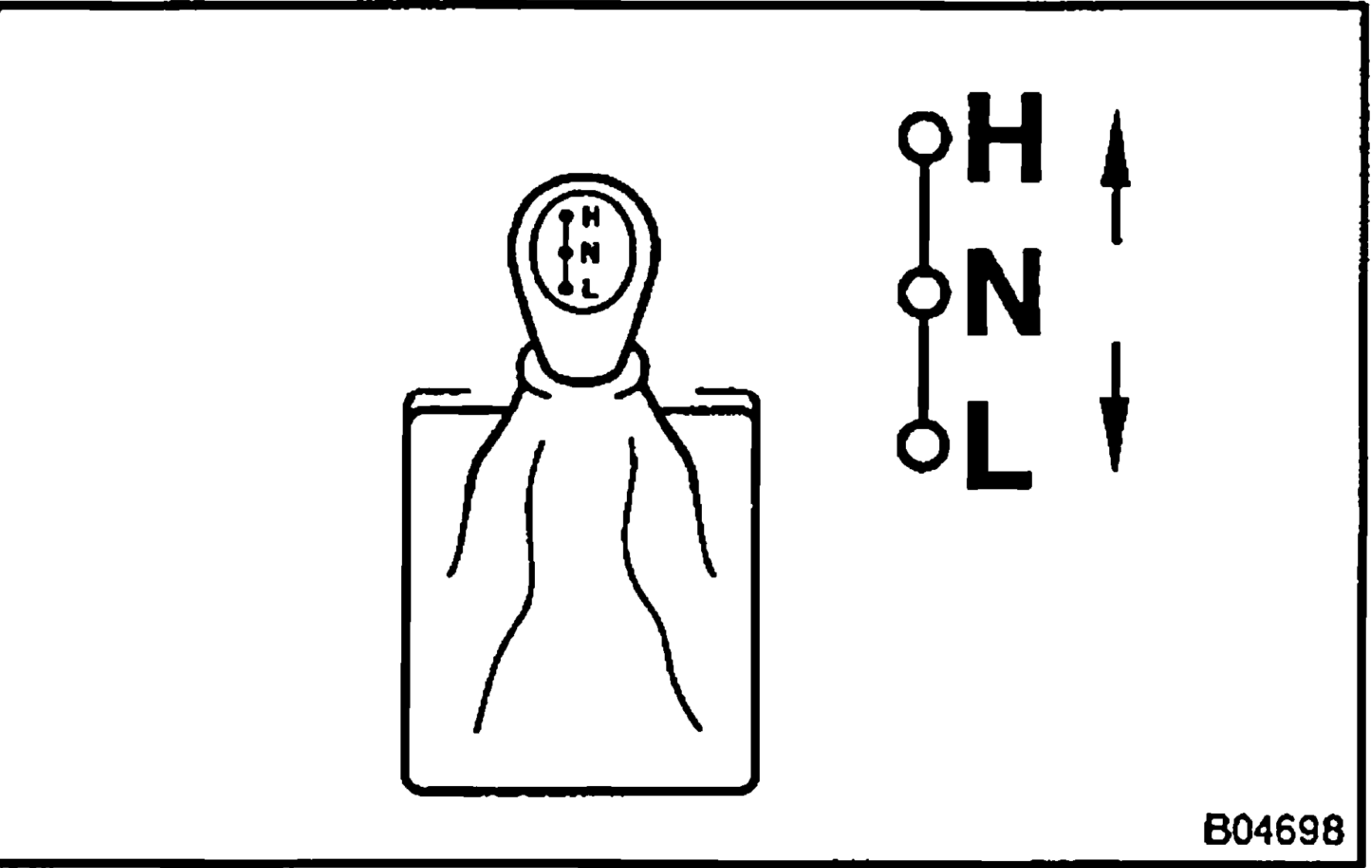
Center differential LOCK conditions:

	Condition	Wheel
Center differential switch	ON	A lifted wheel cannot be rotated even if only one wheel is lifted up, as long as transmission is in N range.
Indicator light	ON	
Transfer select lever (H/L)	Either will do	

CAUTION:

Center differential "LOCK" ↔ "FREE" selecting procedure:

- Operate the switch only when all of 4 wheels are stopped or driven in a straight line.
- Never operate the switch when any wheel is slipping.
- Never operate the switch when any wheel is spinning freely.
- Never operate the switch when swerving or cornering.



Transfer gear "H" ↔ "L" gear shifting procedure:

- When shifting, always put the shift lever of the transmission in N position. In other positions, the gears of the transfer clash, and switching cannot be performed.

HINT:

Center differential "LOCK" ↔ "FREE" selecting procedure:
Move the vehicle forward or backward slightly if the indicator light does not operate correctly when the center differential lock switch is turned ON or OFF.

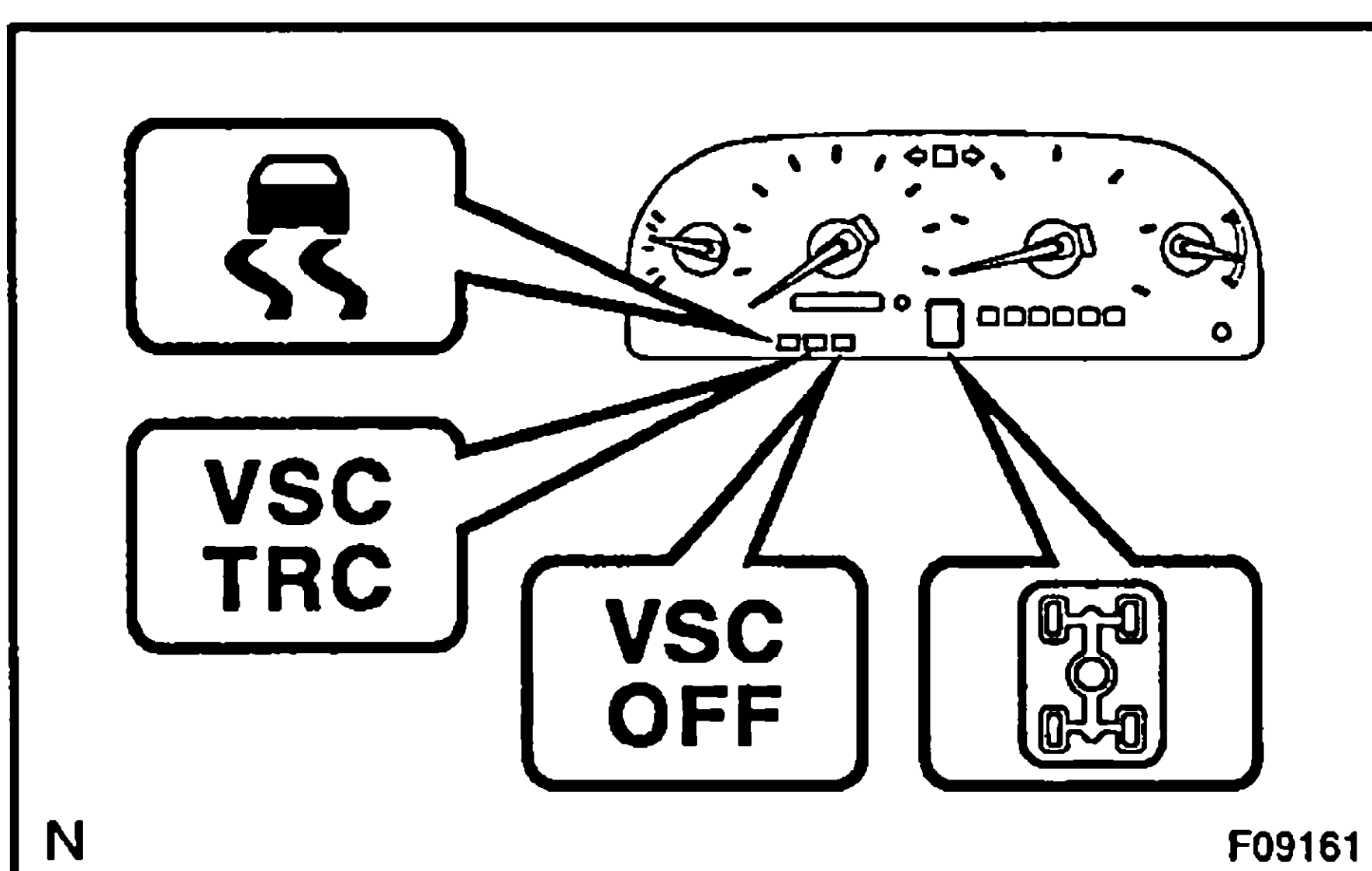
4. WHEN TESTING BRAKES, SPEEDOMETER, ETC.

When carrying out any kind of servicing or testing on a Full-time 4WD with Active Traction Control System or Vehicle Stability Control (VSC) & Traction Control (TRC) System in which the front or rear wheels are to be rotated (braking test, speedometer test), be sure to observe the precautions given below.

Incorrect preparations or test procedures may cause danger as well as unsuccessful test results.

Before starting any such servicing or test, be sure to check the following items:

- Center differential mode position (FREE or LOCK)

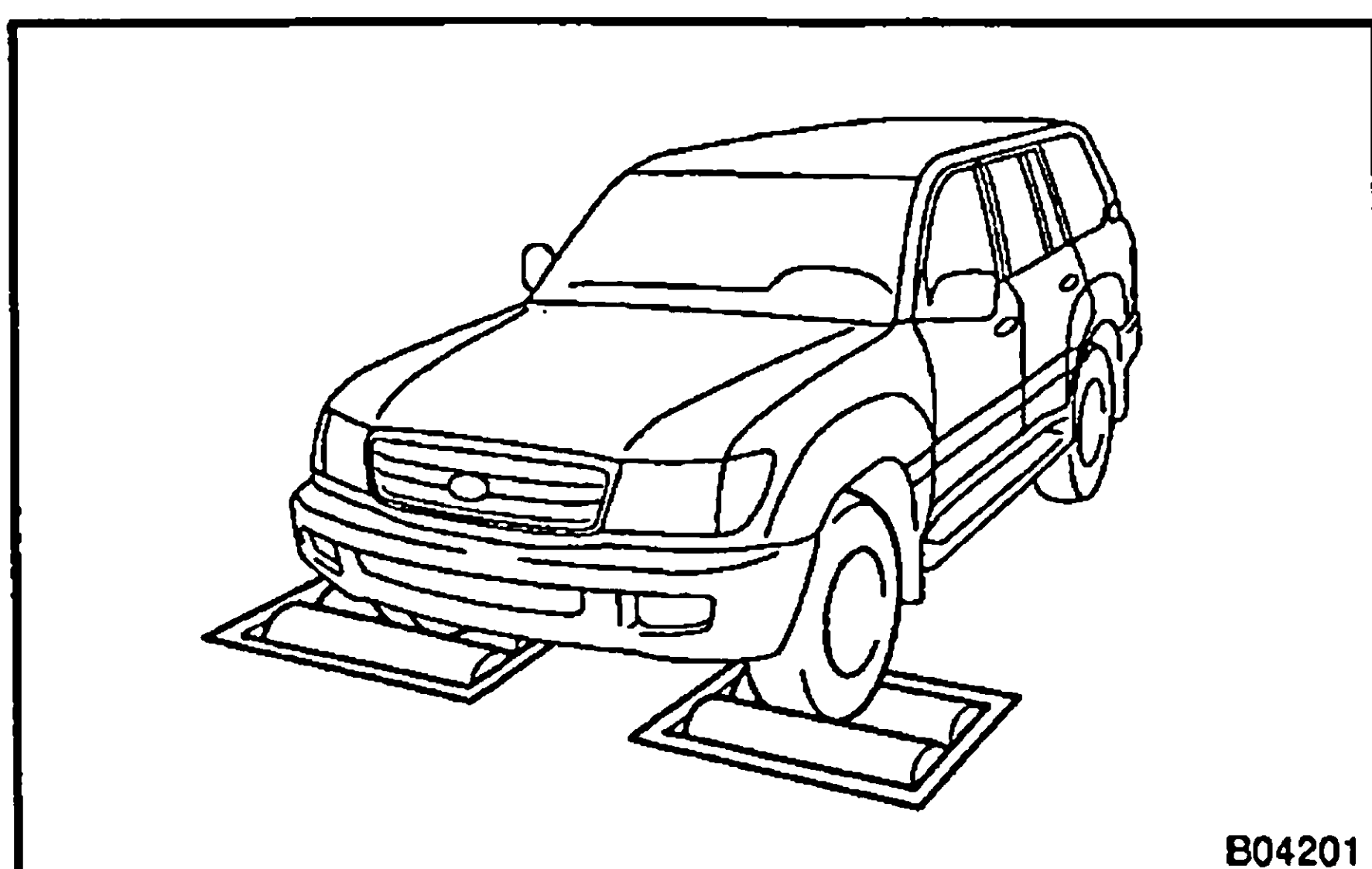


- w/ Vehicle Stability Control (VSC) System:
Center differential switch and VSC OFF indicator light?
- Whether wheels should be touching ground or jacked up
- Transmission gear position (N range)
- Transfer gear position (H or L position)
- Maximum testing vehicle speed
- Maximum testing time

HINT:

w/o Vehicle Stability Control (VSC) System:

When the transfer select lever is put in "L" position, the center differential is put in LOCK condition.



(a) Using Braking Tester:

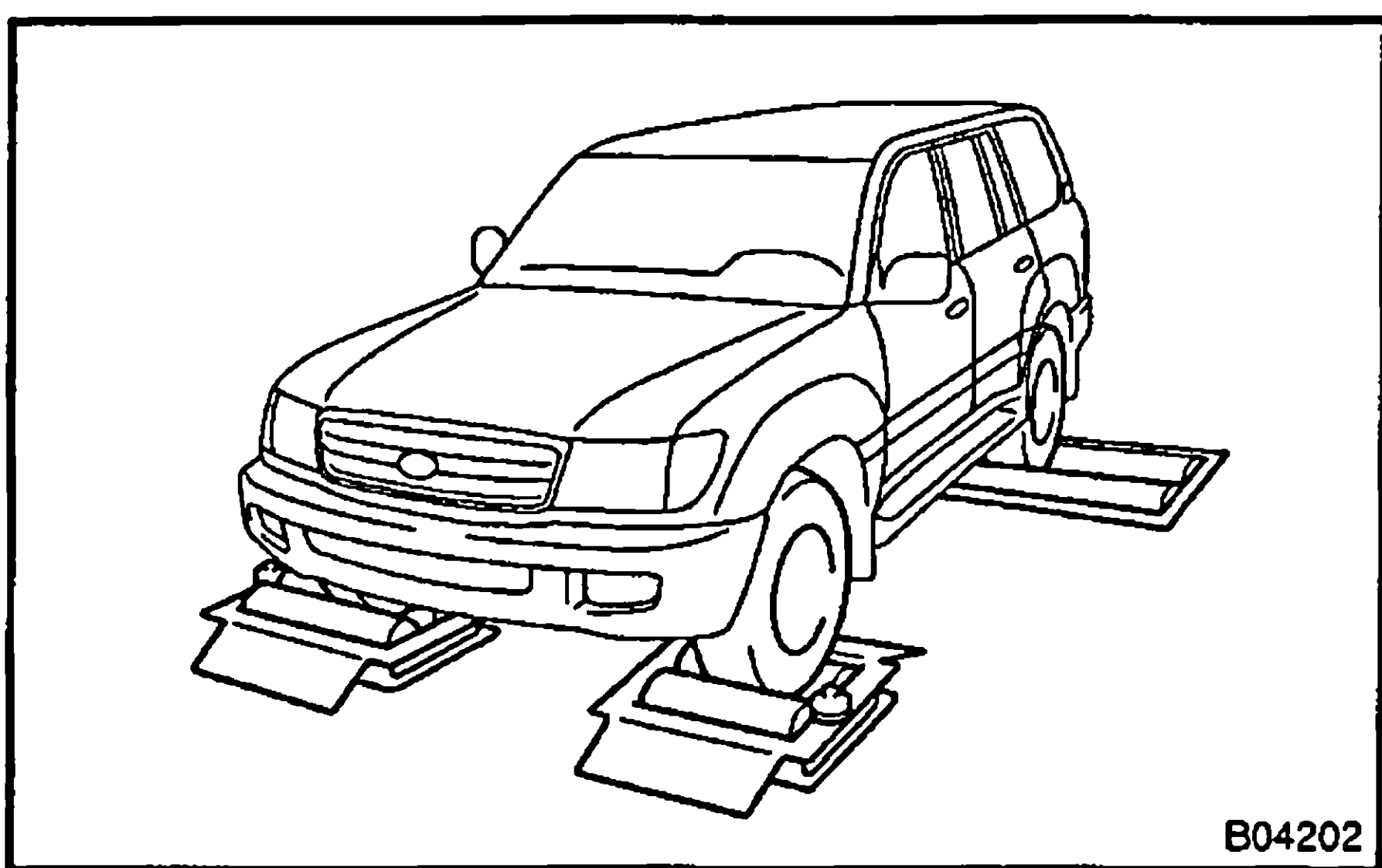
Measure by low-speed type (Vehicle Speed: Below 0.5 km/h or 0.3 mph) brake tester and observe the following instructions before performing the test.

- (1) Position the wheels to be tested (front or rear) on the tester.
- (2) Put the center differential in FREE position.
- (3) Prohibit the Active Traction Control System or Vehicle Stability Control (VSC) & Active Traction Control (TRC) System from the activation (See step 2.).

- (4) Shift the transmission shift lever to "N" range.

HINT:

After completing the test with speedometer tester, do not forget to change the Active Traction Control System or Vehicle Stability Control (VSC) & Active Traction Control (TRC) System to operational condition. Check that TRC warning light or VSC/TRC warning light the VSC warning light goes off when restarting the engine.



- (b) Using Speedometer Tester:

Observe the following instructions and then measure with the rear wheels.

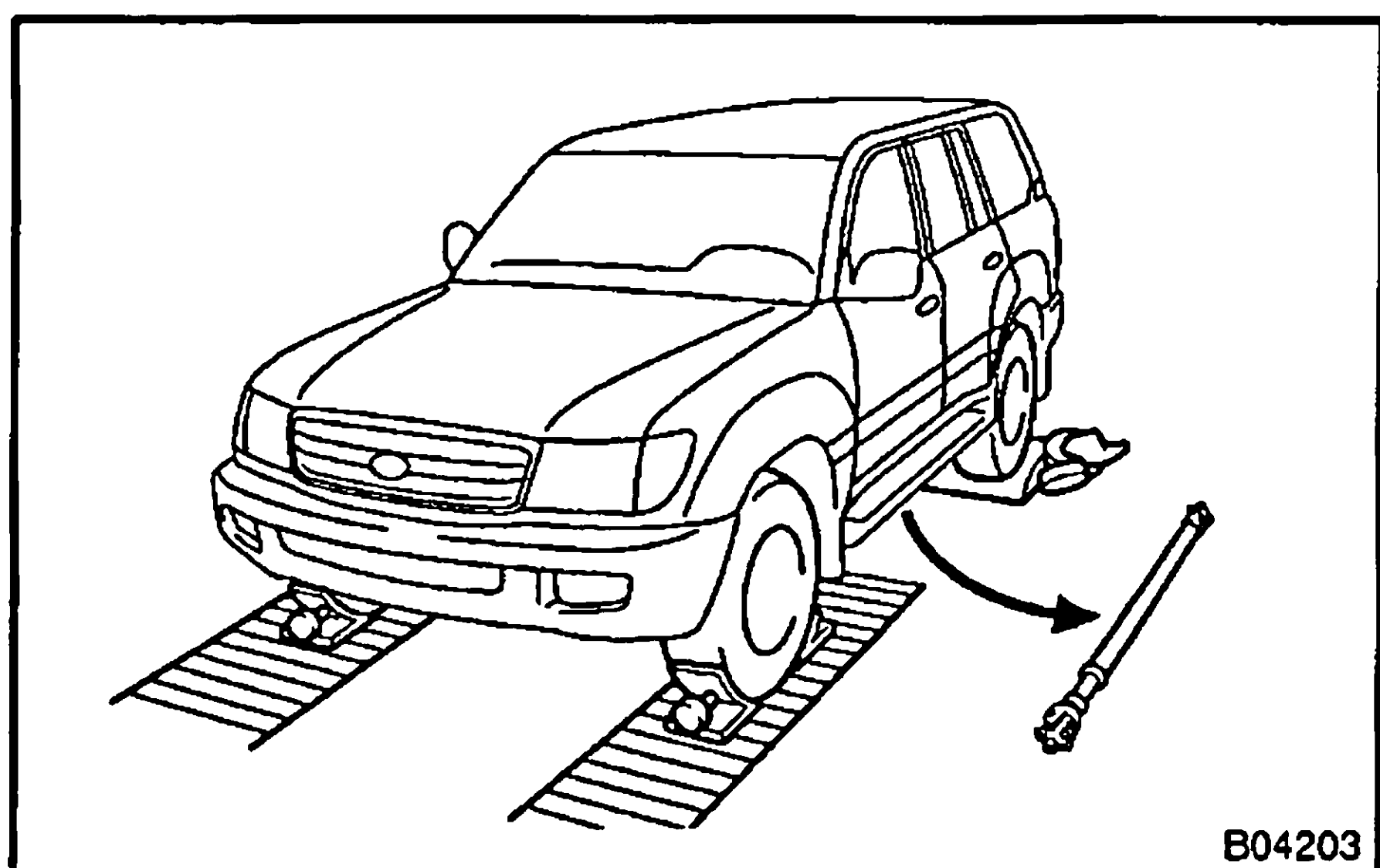
- (1) Position the rear wheels on the tester roller.
- (2) Position the front wheels on the free roller or jack them up.
- (3) Put the center differential in FREE position.
- (4) Prohibit the Active Traction Control System or Vehicle Stability Control (VSC) & Traction Control (TRC) System from the activation (See step 2.).
- (5) Ensure that the vehicle does not move using wires.

CAUTION:

The maximum speed should be less than 60 km/h (37 mph) and maximum driving time should be 1 minute.

HINT:

- Sudden shifting, braking, acceleration or deceleration is not allowed.
- After completing the test with oh-vehicle wheel balancing do not forget to change the Active TRCtion Control System or Vehicle Stability Control (VSC) & Active TRCtion Control (TRC) System to operational condition. Check that the TRC warning light or VSC/TRC warning light warning indicator light goes off when restarting the engine.



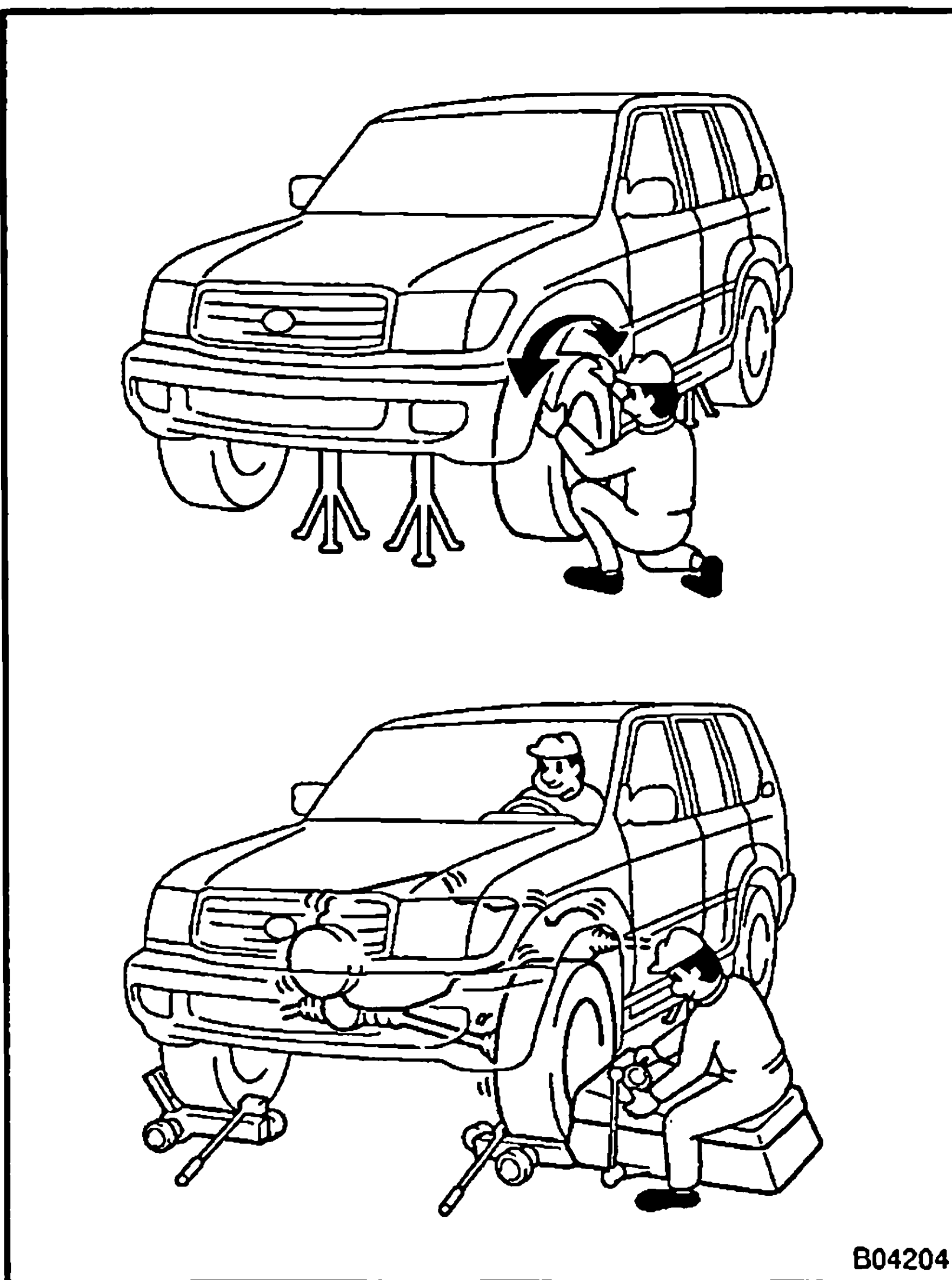
- (c) Using Chassis Dynamometer:

Observe the following instructions and then measure with the rear wheels.

- (1) Remove the front propeller shaft.
- (2) Put the center differential in LOCK position.
- (3) Prohibit the Active TRCtion Control System or Vehicle Stability Control (VSC) & TRCtion Control (TRC) System from the activation (See step 2.).
- (4) Ensure that the vehicle is securely fixed.

HINT:

- Sudden shifting, braking, acceleration or deceleration is not allowed.
- Do not forget to change the Active TRCtion Control System or Vehicle Stability Control (VSC) & TRCtion Control (TRC) System to operational condition. Check that the VSC warning indicator light goes off when restarting the engine.

**(d) On-Vehicle Wheel Balancing:**

When doing on-vehicle wheel balancing on a full-time 4WD vehicle, to prevent each wheel from being rotated at different speed in different directions (which could damage the center differential), always be sure to observe the following precautions.

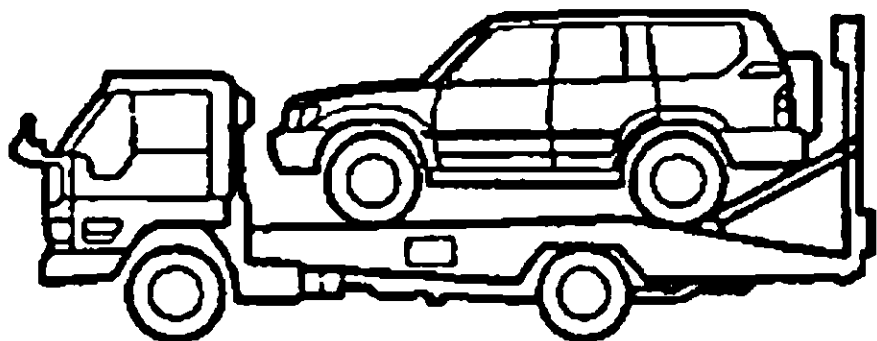
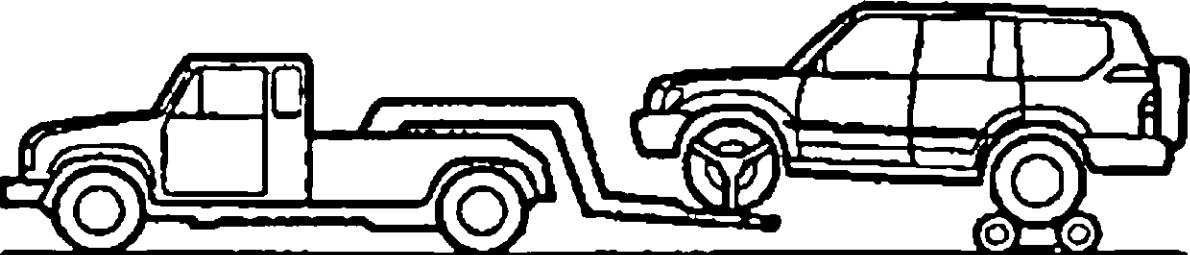
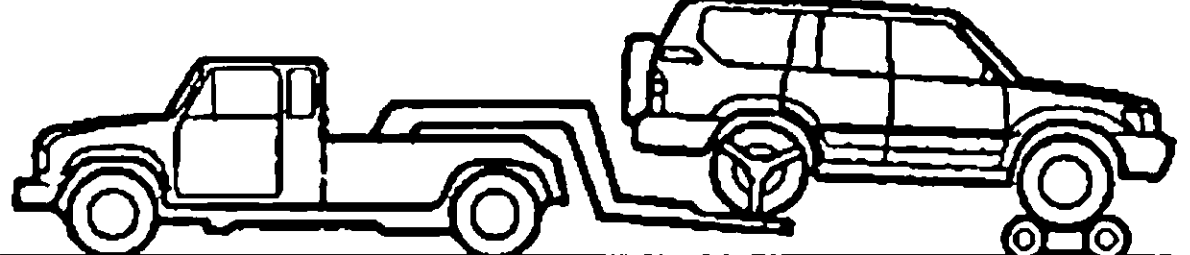
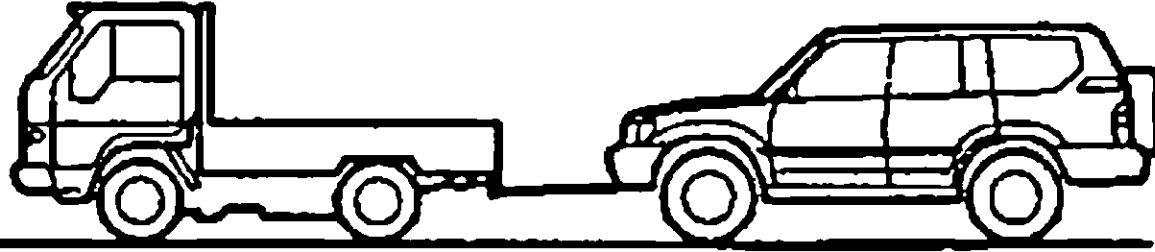
- (1) All of 4 wheels should be jacked up, being apart from the ground completely.
- (2) Put the center differential in LOCK position.
- (3) Prohibit the Vehicle Stability Control (VSC) & TRCtion Control (TRC) System from the activation (See step 2.).
- (4) The parking brake lever should be fully released.
- (5) None of the brakes should be applied.
- (6) The wheels should be driven on the wheel balancer with the engine running.
- (7) Carry out the wheel balancing with the transmission range in D.

HINT:

- When doing this balancing, pay attention to the other wheels rotating at the same time.
- Sudden acceleration, deceleration or braking is not allowed.
- Do not forget to change the Active TRCtion Control System or Vehicle Stability Control (VSC) & TRCtion Control (TRC) System to operational condition. Check that the VSC warning indicator light goes off when restarting the engine.

5. WHEN TOWING FULL-TIME 4WD VEHICLES

- Use one of the methods shown below to tow the vehicle.
- If the vehicle has trouble in the chassis and drive train, use method 1 (flat bed truck).

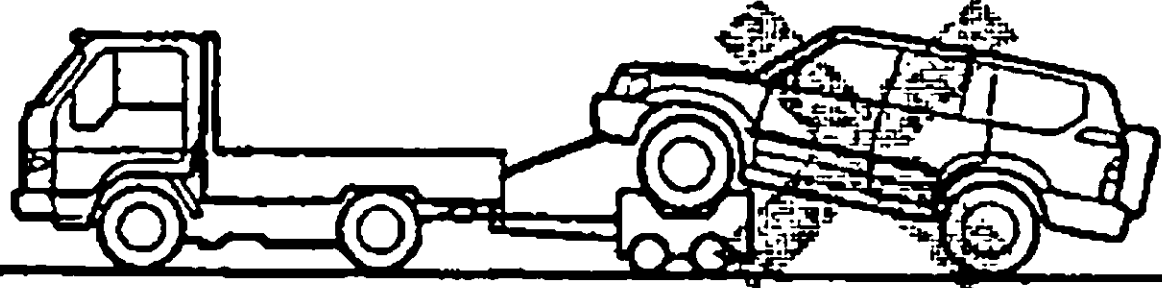
Condition Towing Method	Parking Brake	Transmission Shift Lever Position (M/T)	Transmission Shift Lever Position (A/T)	Transfer Shift Lever Position
① Flat Bed Truck  N19527	Applied	–	"P" Range	"H" Range
② Wheel Lift Type Truck With Dollies – From Front  N20098				
③ Wheel Lift Type Truck With Dollies – From Rear  N20099				
④ Towing with Rope  N19530	Released	Neutral	"N" Range	"HF" Position
HINT : Do not tow the vehicle at a speed faster than 45 km/h (30mph) or distance greater then 80 km (50 miles).				

V08065

NOTICE:

Do not use any towing method other than those shown above.

- For example, the towing methods shown below are dangerous or damage the vehicle, so do not use them.



N19531

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.

V08066

6. FOR VEHICLES EQUIPPED WITH A CATALYTIC CONVERTER**CAUTION:**

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

- (a) Use only unleaded gasoline.
- (b) Avoid prolonged idling.
Avoid running the engine at idle speed for more than 20 minutes.
- (c) Avoid spark jump test.
 - (1) Perform spark jump test only when absolutely necessary. Perform this test as rapidly as possible.
 - (2) While testing, never race the engine.
- (d) Avoid prolonged engine compression measurement.
Engine compression tests must be done as rapidly as possible.
- (e) 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.
- (f) Avoid coasting with ignition turned off and prolonged braking.
- (g) Do not dispose of used catalyst along with parts contaminated with gasoline or oil.

7. IF VEHICLE IS EQUIPPED WITH MOBILE COMMUNICATION SYSTEM

For vehicles with mobile communication systems such as two-way radios and cellular telephones, observe the following precautions.

- (1) Install the antenna as far as possible away from the ECU and sensors of the vehicle's electronic system.
- (2) Install the antenna feeder at least 20 cm (7.87 in.) away from the ECU and sensors of the vehicle's electronic systems. For details about ECU and sensors locations, refer to the section on the applicable component.
- (3) Do not wind the antenna feeder together with the other wiring as much as possible, also avoid running the antenna feeder parallel with other wire harnesses.
- (4) Check that the antenna and feeder are correctly adjusted.
- (5) Do not install powerful mobile communications system.

8. FOR USING HAND-HELD TESTER**CAUTION:**

Observe the following items for safety reasons:

- Before using the hand-held tester, the hand-held tester's operator manual should be read thoroughly.
- Be sure to route all cables securely when driving with the hand-held tester connected to the vehicle. (i.e. Keep cables away from feet, pedals, steering wheel and shift lever.)
- Two persons are required when test driving with the hand-held tester, one person to drive the vehicle and the other person to operate the hand-held tester.

HOW TO TROUBLESHOOT ECU CONTROLLED SYSTEMS

IN04S-29

GENERAL INFORMATION

A large number of ECU controlled systems are used in the LAND CRUISER/LAND CRUISER PRADO. In general, the ECU controlled system is considered to be a very intricate system requiring a high level of technical knowledge and expert skill to troubleshoot. However, the fact is that if you proceed to inspect the circuits one by one, troubleshooting of these systems is not complex. If you have adequate understanding of the system and a basic knowledge of electricity, accurate diagnosis and necessary repair can be performed to locate and fix the problem. This manual is designed through emphasis of the above standpoint to help service technicians perform accurate and effective troubleshooting, and is compiled for the following major ECU controlled systems:

The troubleshooting procedure and how to make use of it are described on the following pages.

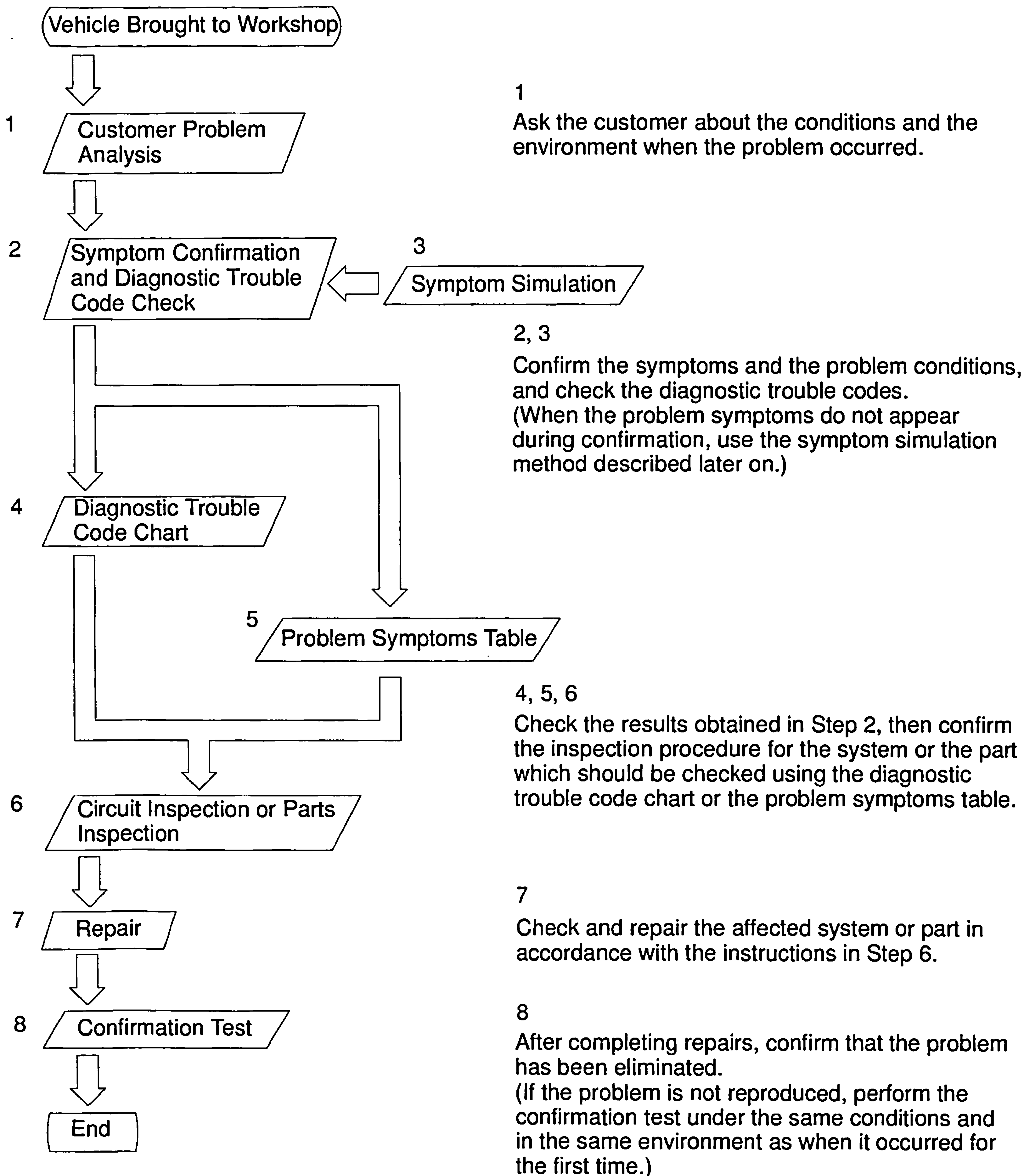
System	Page
1. Anti-Lock Brake System	DI-1
2. Cruise Control System	DI-8
3. Air Conditioning System	DI-35

FOR USING HAND-HELD TESTER

- Before using the tester, the tester's operator manual should be read thoroughly.
- If the tester cannot communicate with ECU controlled systems when you have connected the cable of the tester to DLC3, turned the ignition switch ON and operated the tester, there is a problem on the vehicle side or tester side.
 - (1) If communication is normal when the tester is connected to another vehicle, inspect the diagnosis data link line (Bus $\oplus$ line) or ECU power circuit of the vehicle.
 - (2) If communication is still not possible when the tester is connected to another vehicle, the problem is probably in the tester itself, so perform the Self Test procedures outline in the Tester Operator's Manual.

HOW TO PROCEED WITH TROUBLESHOOTING

Carry out troubleshooting in accordance with the procedure on the following page. Here, only the basic procedure is shown. Details are provided in Diagnostics section, showing the most effective methods for each circuit. Confirm the troubleshooting procedures first for the relevant circuit before beginning troubleshooting of that circuit.



1. CUSTOMER PROBLEM ANALYSIS

In troubleshooting, the problem symptoms must be confirmed accurately and all preconceptions must be cleared away in order to give an accurate judgment. To ascertain just what the problem symptoms are, it is extremely important to ask the customer about the problem and the conditions at the time it occurred.

Important Point in the Problem Analysis:

The following 5 items are important points in the problem analysis. Past problems which are thought to be unrelated and the repair history, etc. may also help in some cases, so as much information as possible should be gathered and its relationship with the problem symptoms should be correctly ascertained for reference in troubleshooting. A customer problem analysis table is provided in Diagnostics section for each system for your use.

Important Points in the Customer Problem Analysis

- What ——— Vehicle model, system name
- When ——— Date, time, occurrence frequency
- Where ——— Road conditions
- Under what conditions? ——— Running conditions, driving conditions, weather conditions
- How did it happen? ——— Problem symptoms

(Sample) Supplemental restraint system check sheet.

CUSTOMER PROBLEM ANALYSIS CHECK Supplemental Restraint System Check Sheet Inspector's Name _____			
Customer's Name		Registration No.	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	Odometer Reading	km miles
Date Problem First Occurred	/ /		
Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Other		
Temperature	Approx. _____		
Vehicle Operation	☐ Starting ☐ Driving ☐ Idling [☐ Constant speed ☐ Other ☐ Acceleration ☐ Deceleration		

2. SYMPTOM CONFIRMATION AND DIAGNOSTIC TROUBLE CODE CHECK

The diagnostic system in the LAND CRUISER/LAND CRUISER PRADO fulfills various functions. The first function is the Diagnostic Trouble Code Check in which a malfunction in the signal circuits to the ECU is stored in code in the ECU memory at the time of occurrence, to be output by the technician during troubleshooting. Another function is the Input Signal Check which checks if the signals from various switches are sent to the ECU correctly.

By using these check functions, the problem areas can be narrowed down quickly and troubleshooting can be performed effectively. Diagnostic functions are incorporated in the following systems in the LAND CRUISER/LAND CRUISER PRADO.

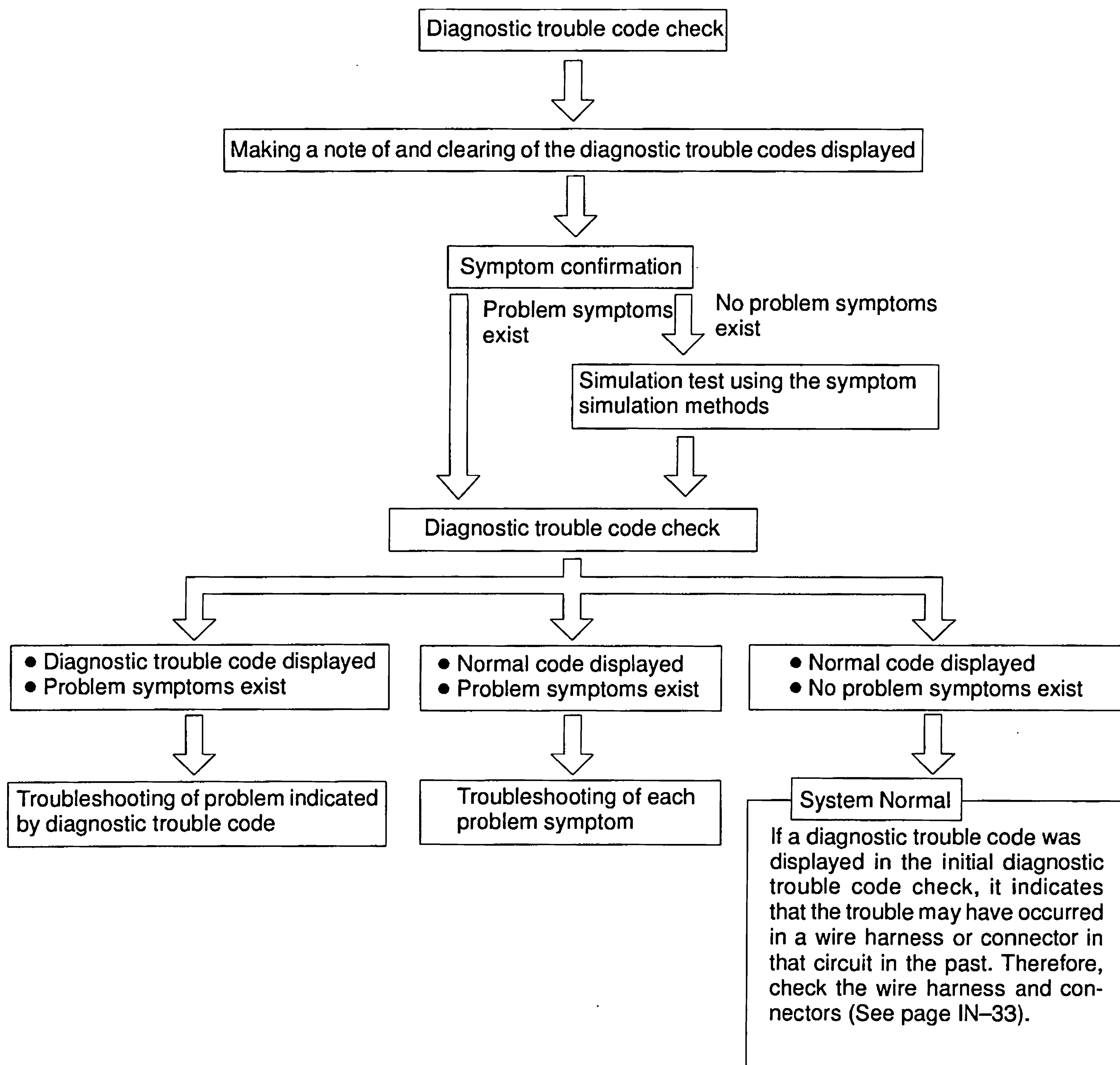
System	Diagnostic Trouble Code Check	Input Signal Check (Sensor Check)	Diagnostic Test Mode (Active Test)
Anti-Lock Brake System	○	○	○
Cruise Control System	○	○	Cancel Signal Check
Air Conditioning System	○		

In diagnostic trouble code check, it is very important to determine whether the problem indicated by the diagnostic trouble code is still occurring or occurred in the past but returned to normal at present. In addition, it must be checked in the problem symptom check whether the malfunction indicated by the diagnostic trouble code is directly related to the problem symptom or not. For this reason, the diagnostic trouble codes should be checked before and after the symptom confirmation to determine the current conditions, as shown in the table below. If this is not done, it may, depending on the case, result in unnecessary troubleshooting for normally operating systems, thus making it more difficult to locate the problem, or in repairs not pertinent to the problem. Therefore, always follow the procedure in correct order and perform the diagnostic trouble code check.

DIAGNOSTIC TROUBLE CODE CHECK PROCEDURE

Diagnostic Trouble Code Check (Make a note of and then clear)	Confirmation of Symptoms	Diagnostic Trouble Code Check	Problem Condition
Diagnostic Trouble Code Display	Problem symptoms exist	Same diagnostic trouble code is displayed	Problem is still occurring in the diagnostic circuit
		Normal code is displayed	The problem is still occurring in a place other than in the diagnostic circuit (The diagnostic trouble code displayed first is either for a past problem or it is a secondary problem)
	No problem symptoms exist		The problem occurred in the diagnostic circuit in the past
Normal Code Display	Problem symptoms exist	Normal code is displayed	The problem is still occurring in a place other than in the diagnostic circuit
	No problem symptoms exist	Normal code is displayed	The problem occurred in a place other than in the diagnostic circuit in the past

Taking into account the points on the previous page, a flow chart showing how to proceed with troubleshooting using the diagnostic trouble code check is shown below. This flow chart shows how to utilize the diagnostic trouble code check effectively, then by carefully checking the results, indicates how to proceed either to diagnostic trouble code troubleshooting or to troubleshooting of problem symptoms table.

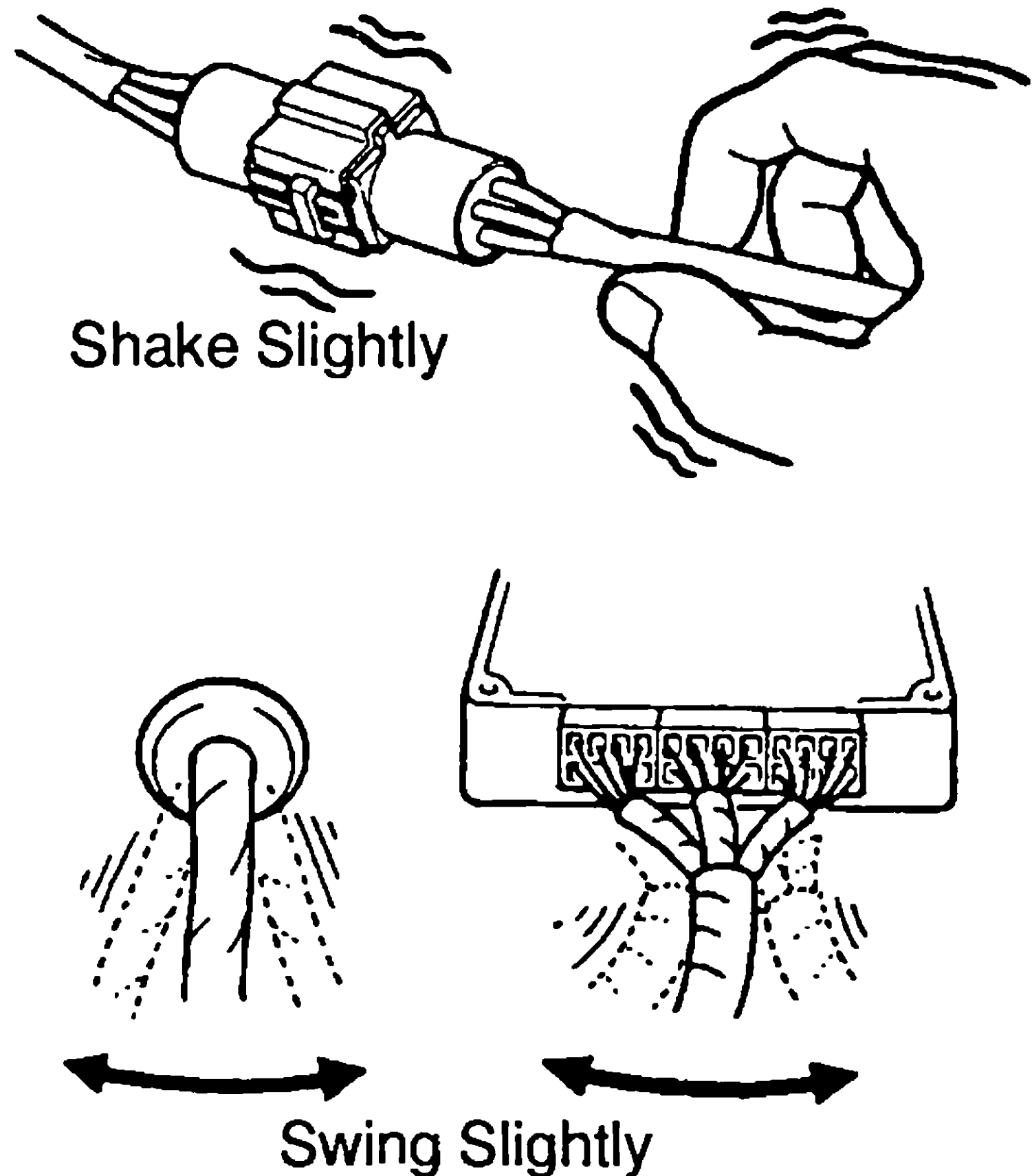
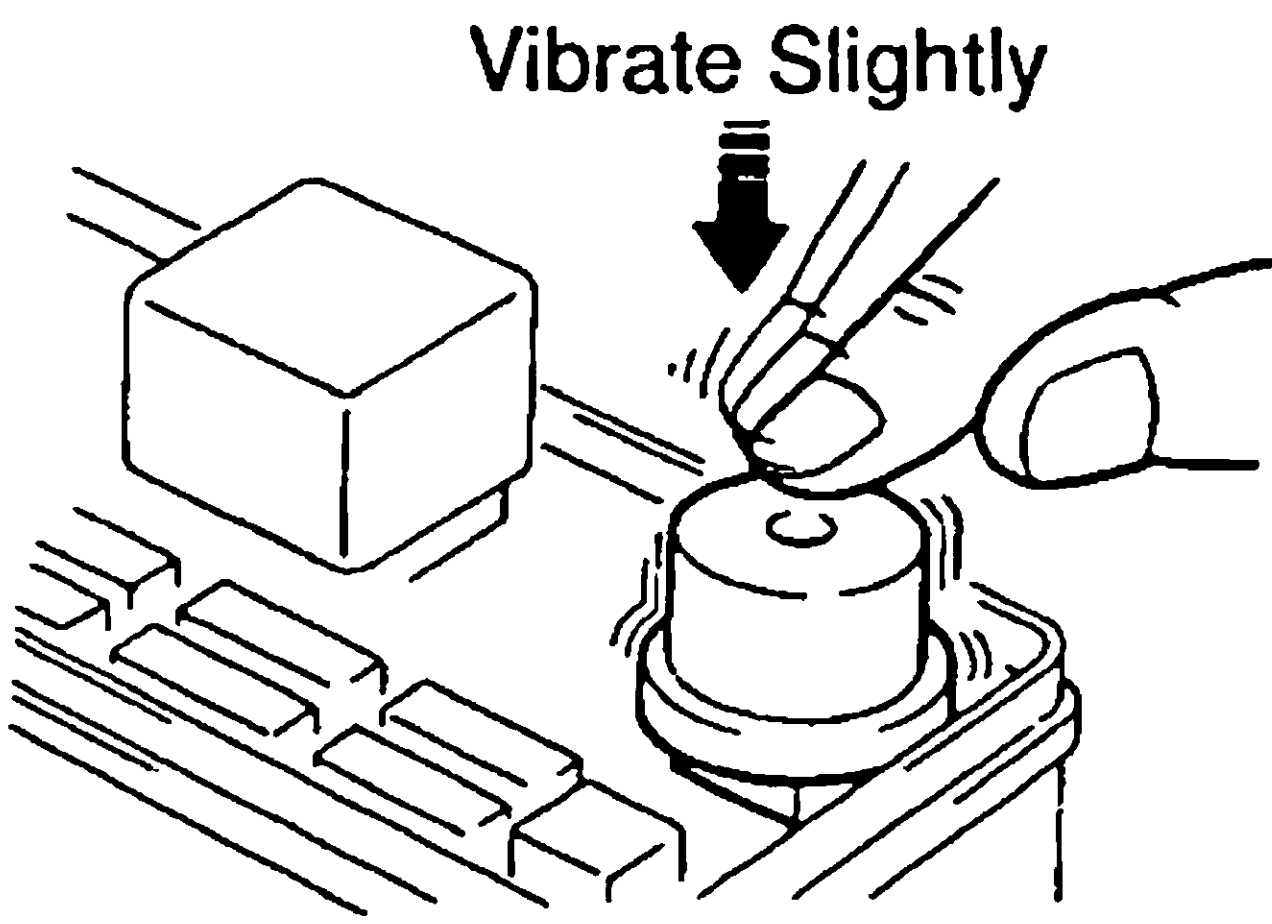


3. SYMPTOM SIMULATION

The most difficult case in troubleshooting is when there are no problem symptoms occurring. In such cases, a thorough customer problem analysis must be carried out, then simulate the same or similar conditions and environment in which the problem occurred in the customer's vehicle. No matter how much experience a technician has, or how skilled he may be, if he proceeds to troubleshoot without confirming the problem symptoms he will tend to overlook something important in the repair operation and make a wrong guess somewhere, which will only lead to a standstill. For example, for a problem which only occurs when the engine is cold, or for a problem which occurs due to vibration caused by the road during driving, etc., the problem can never be determined so long as the symptoms are confirmed with the engine hot condition or the vehicle at a standstill. Since vibration, heat or water penetration (moisture) is likely cause for problem which is difficult to reproduce, the symptom simulation tests introduced here are effective measures in that the external causes are applied to the vehicle in a stopped condition.

Important Points in the Symptom Simulation Test:

In the symptom simulation test, the problem symptoms should of course be confirmed, but the problem area or parts must also be found out. To do this, narrow down the possible problem circuits according to the symptoms before starting this test and connect a tester beforehand. After that, carry out the symptom simulation test, judging whether the circuit being tested is defective or normal and also confirming the problem symptoms at the same time. Refer to the problem symptoms table for each system to narrow down the possible causes of the symptom.

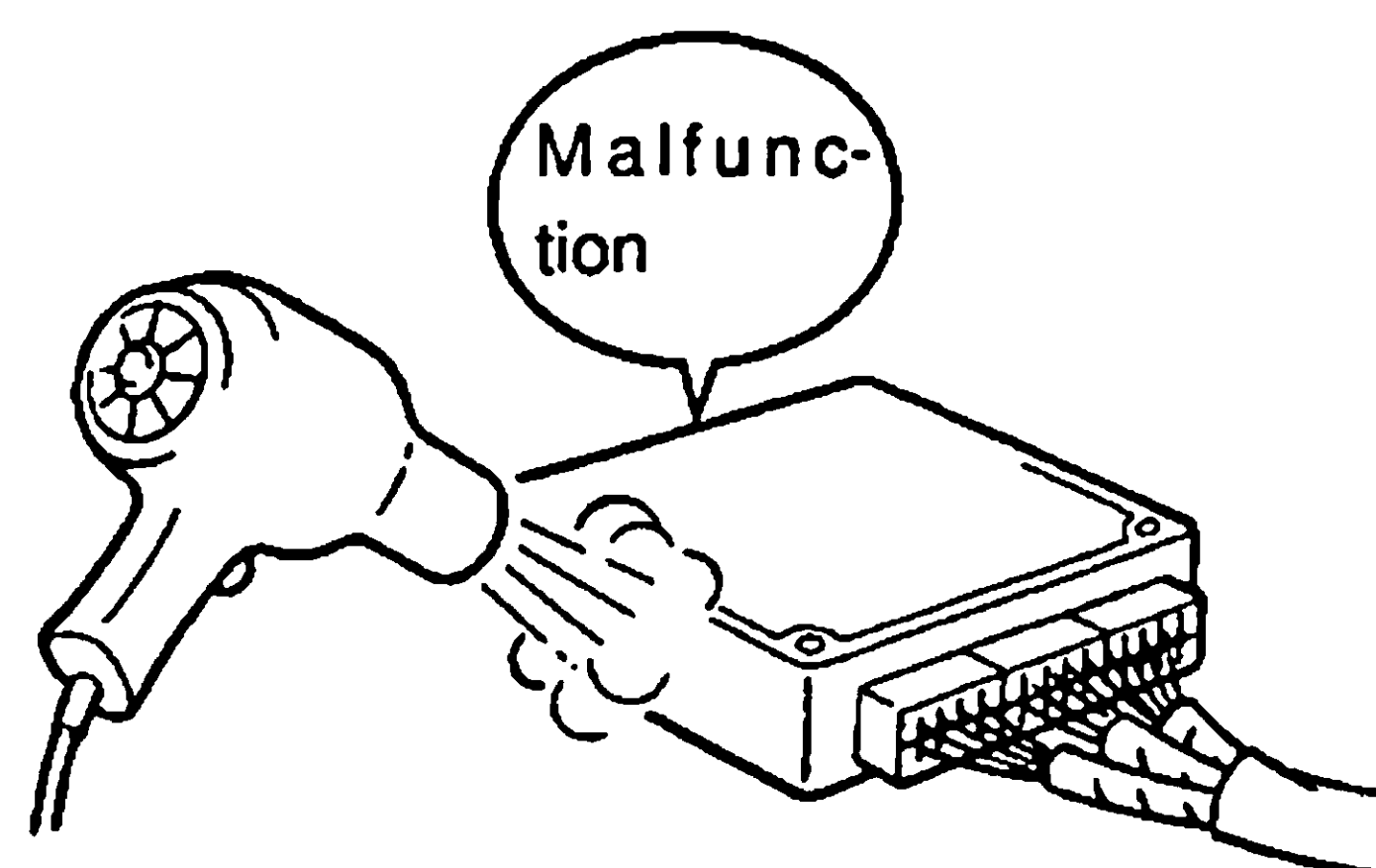
1	VIBRATION METHOD: When vibration seems to be the major cause.	
CONNECTORS Slightly shake the connector vertically and horizontally. WIRE HARNESS Slightly shake the wire harness vertically and horizontally. The connector joint, fulcrum of the vibration, and body through portion are the major areas to be checked thoroughly.		 FI2331 FI2332
PARTS AND SENSOR Apply slight vibration with a finger to the part of the sensor considered to be the problem cause and check that the malfunction occurs. HINT: Applying strong vibration to relays may result in open relays.		 FI2330

2 HEAT METHOD: When the problem seems to occur when the suspect area is heated.

Heat the component that is the likely cause of the malfunction with a hair dryer or similar object. Check to see if the malfunction occurs.

NOTICE:

- (1) Do not heat to more than 60 °C (140 °F). (Temperature is limited not to damage the components.)
- (2) Do not apply heat directly to parts in the ECU.



FI2334

3 WATER SPRINKLING METHOD: When the malfunction seems to occur on a rainy day or in a high-humidity condition.

Sprinkle water onto the vehicle and check to see if the malfunction occurs.

NOTICE:

- (1) Never sprinkle water directly into the engine compartment, but indirectly change the temperature and humidity by applying water spray onto the radiator front surface.
- (2) Never apply water directly onto the electronic components.

HINT:

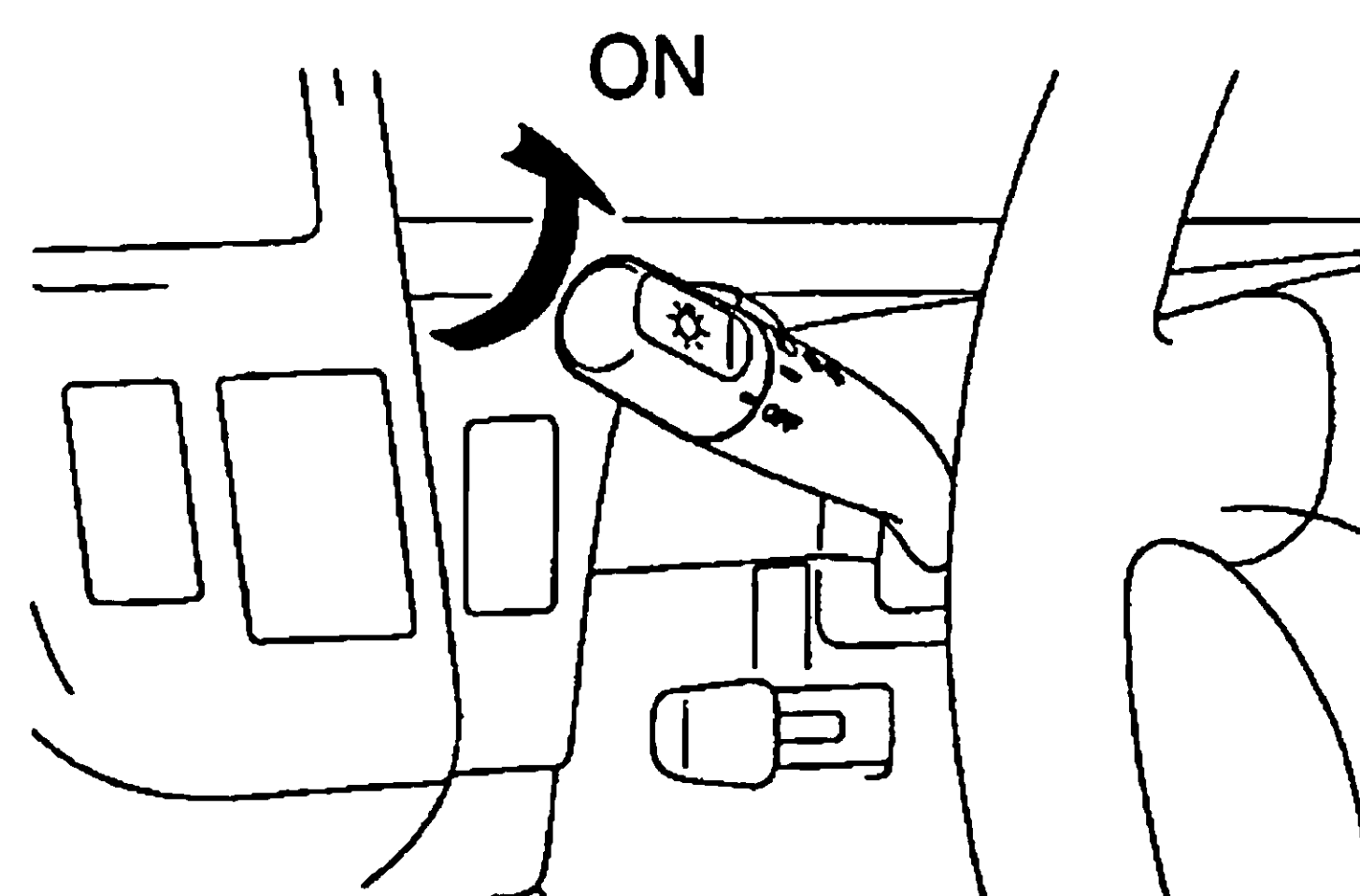
If a vehicle is subject to water leakage, the leaked water may contaminate the ECU. When testing a vehicle with a water leakage problem, special caution must be taken.



FI6649

4 OTHER: When a malfunction seems to occur when electrical load is excessive.

Turn on all electrical loads including the heater blower, head lights, rear window defogger, etc. and check to see if the malfunction occurs.



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4. DIAGNOSTIC TROUBLE CODE CHART

The inspection procedure is shown in the table below. This table permits efficient and accurate troubleshooting using the diagnostic trouble codes displayed in the diagnostic trouble code check. Proceed with troubleshooting in accordance with the inspection procedure given in the diagnostic chart corresponding to the diagnostic trouble codes displayed. The engine diagnostic trouble code chart is shown below as an example.

- **DTC No.**
Indicates the diagnostic trouble code.
- **Page or Instructions**
Indicates the page where the inspection procedure for each circuit is to be found, or gives instructions for checking and repairs.

- **Trouble Area**
Indicates the suspect area of the problem.

- **Detection Item**
Indicates the system of the problem or contents of the problem.

DIAGNOSTIC TROUBLE CODE CHART

If a malfunction code is displayed during the DTC check, check the circuit for that code listed in the table below. (Proceed to the page given for that circuit).

DTC No. (See page)	Detection Item	Trouble Area	SRS Warning Light
11 (DI-14)	● Short in D squib circuit (to ground)	● Steering wheel pad (squib) ● Spiral cable ● Airbag sensor assembly ● Wire harness	ON
12 (DI-19)	● Short in D squib circuit (to B +)	● Steering wheel pad (squib) ● Spiral cable ● Airbag sensor assembly ● Wire harness	ON
13 (DI-23)	● Short in D squib circuit	● Steering wheel pad (squib) ● Spiral cable ● Airbag sensor assembly ● Wire harness	ON
14 (DI-27)	● Open in D squib circuit	● Steering wheel pad (squib) ● Spiral cable ● Airbag sensor assembly ● Wire harness	ON
15 (DI-27)	● Front airbag sensor assembly (RH) malfunction	● Front airbag sensor assembly (RH) ● Wire harness	ON
	● Front airbag sensor assembly (LH) malfunction	● Front airbag sensor assembly (LH) ● Wire harness	
	● Airbag sensor assembly malfunction	● Airbag sensor assembly	

5. PROBLEM SYMPTOMS TABLE

The suspected circuits or parts for each problem symptom are shown in the table below. Use this table to troubleshoot the problem when a "Normal" code is displayed in the diagnostic trouble code check but the problem is still occurring. Numbers in the table indicate the inspection order in which the circuits or parts should be checked.

HINT:
When the problem is not detected by the diagnostic system even though the problem symptom is present, it is considered that the problem is occurring outside the detection range of the diagnostic system, or that the problem is occurring in a system other than the diagnostic system.

● Page
Indicates the page where the flow chart for each circuit is located.

● Circuit Inspection, Inspection Order
Indicates the circuit which needs to be checked for each problem symptom. Check in the order indicated by the numbers.

● Problem Symptom

● Circuit or Part Name
Indicates the circuit or part which needs to be checked.

PROBLEM SYMPTOMS TABLE		
Proceed with troubleshooting of each circuit in the table below.		
Symptom	Suspect Area	See page
● With the ignition switch in the ACC or ON position, the SRS warning light sometimes lights up after approx. 6 seconds have elapsed. ● SRS warning light is always lit up even when ignition switch is in the LOCK position	● SRS warning light circuit (Always lights up when ignition switch is in LOCK position.)	DI-91
● With the ignition switch in the ACC or ON position, the SRS warning light does not light up.	● SRS warning light circuit (Does not light up when ignition switch is turned to ACC or ON.)	DI-93
● DTC is not displayed. ● SRS warning light is always lit up at the time of DTC check procedure. ● DTC is displayed without Tc and E1 terminal connection.	● Tc terminal circuit	DI-97

6. CIRCUIT INSPECTION

How to read and use each page is shown below.

• Diagnostic Trouble Code No. and Detection Item

• Circuit Description
The major role and operation, etc. of the circuit and its component parts are explained.

DTC	13	Short in D Squib Circuit
-----	----	--------------------------

CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag sensor assembly, spiral cable and steering wheel pad.

It causes the airbag to deploy when the airbag deployment conditions are satisfied.

For details of the function of each components, see OPERATION on page RS-2.

DTC 13 is recorded when a short is detected in the D squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
13	•Short circuit between D+ wire harness and D- wire harness of squib •D squib malfunction •Spiral cable malfunction •Airbag sensor assembly malfunction	•Steering wheel pad (D squib) •Spiral cable •Airbag sensor assembly •Wire harness

• Indicates the diagnostic trouble code, diagnostic trouble code set parameter and suspect area of the problem.

WIRING DIAGRAM

D squib

1 G-R

2 G-Y

7

6

D+

D-

Airbag Sensor Assembly

R16015

• Wiring Diagram
This shows a wiring diagram of the circuit. Use this diagram together with ELECTRICAL WIRING DIAGRAM to thoroughly understand the circuit.
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, SB = Sky Blue
The first letter indicates the basic wire color and the second letter indicates the color of the stripe.

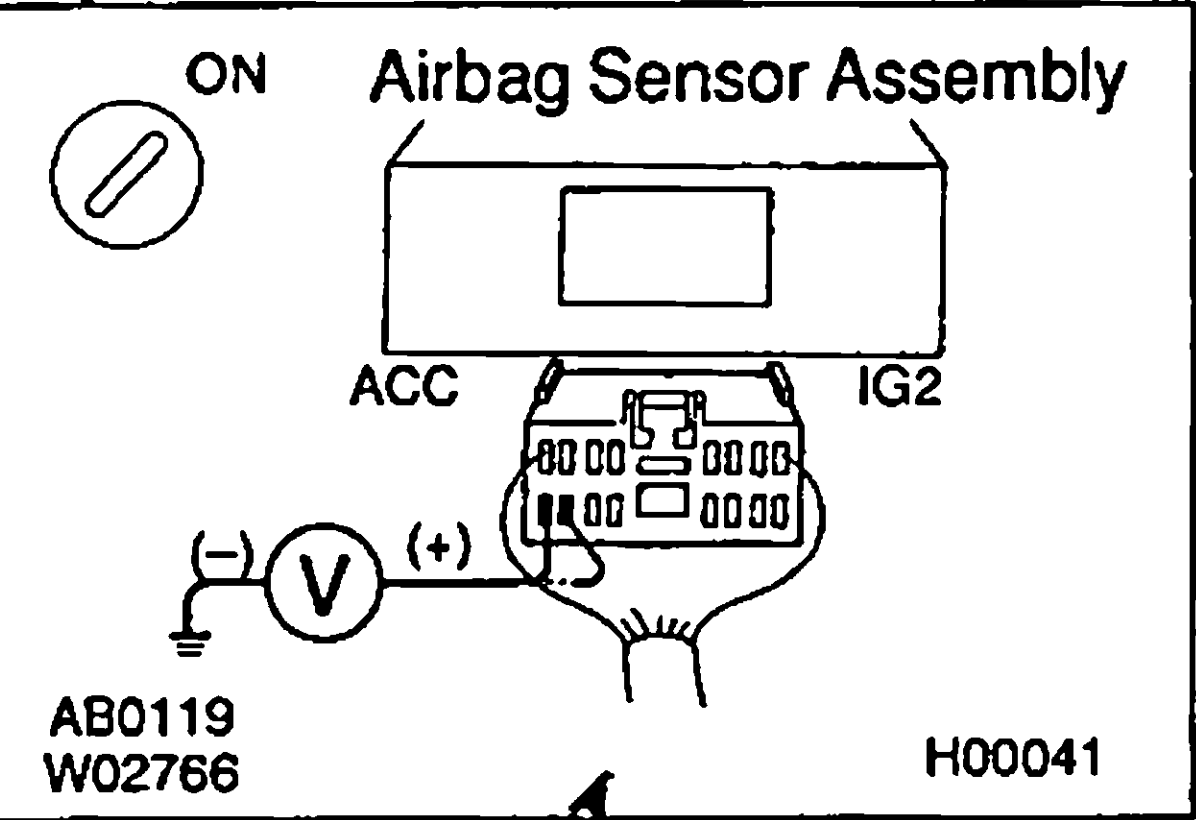
- Indicates the position of the ignition switch during the check.

 LOCK Ignition Switch LOCK (OFF)	 ON Ignition Switch ON
 START Ignition Switch START	 ACC Ignition Switch ACC

- Inspection Procedure
Use the inspection procedure to determine if the circuit is normal or abnormal, and if it is abnormal, use it to determine whether the problem is located in the sensors, actuators, wire harness or ECU.

INSPECTION PROCEDURE

2 Check voltage at IG2 and ACC of airbag sensor assembly.



PREPARATION:
Turn ignition switch ON.

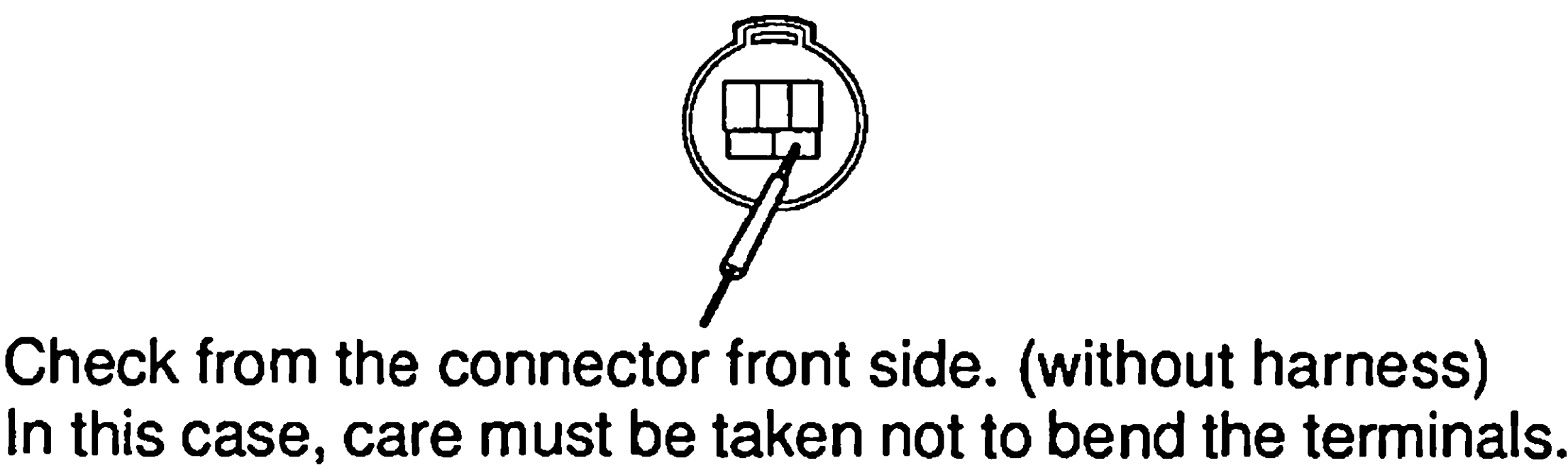
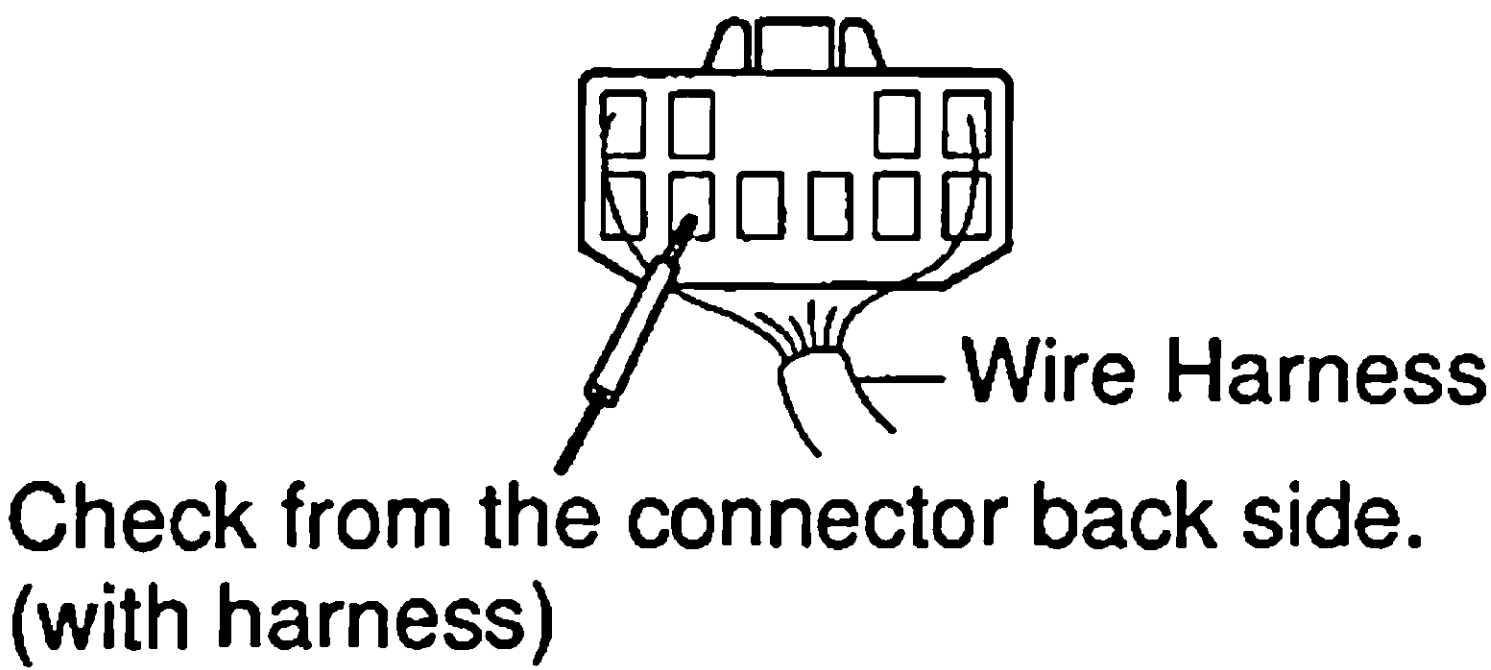
CHECK:
Measure voltage between terminals IG2 and ACC of airbag sensor assembly and body ground.

OK:
Voltage: Below 16 V

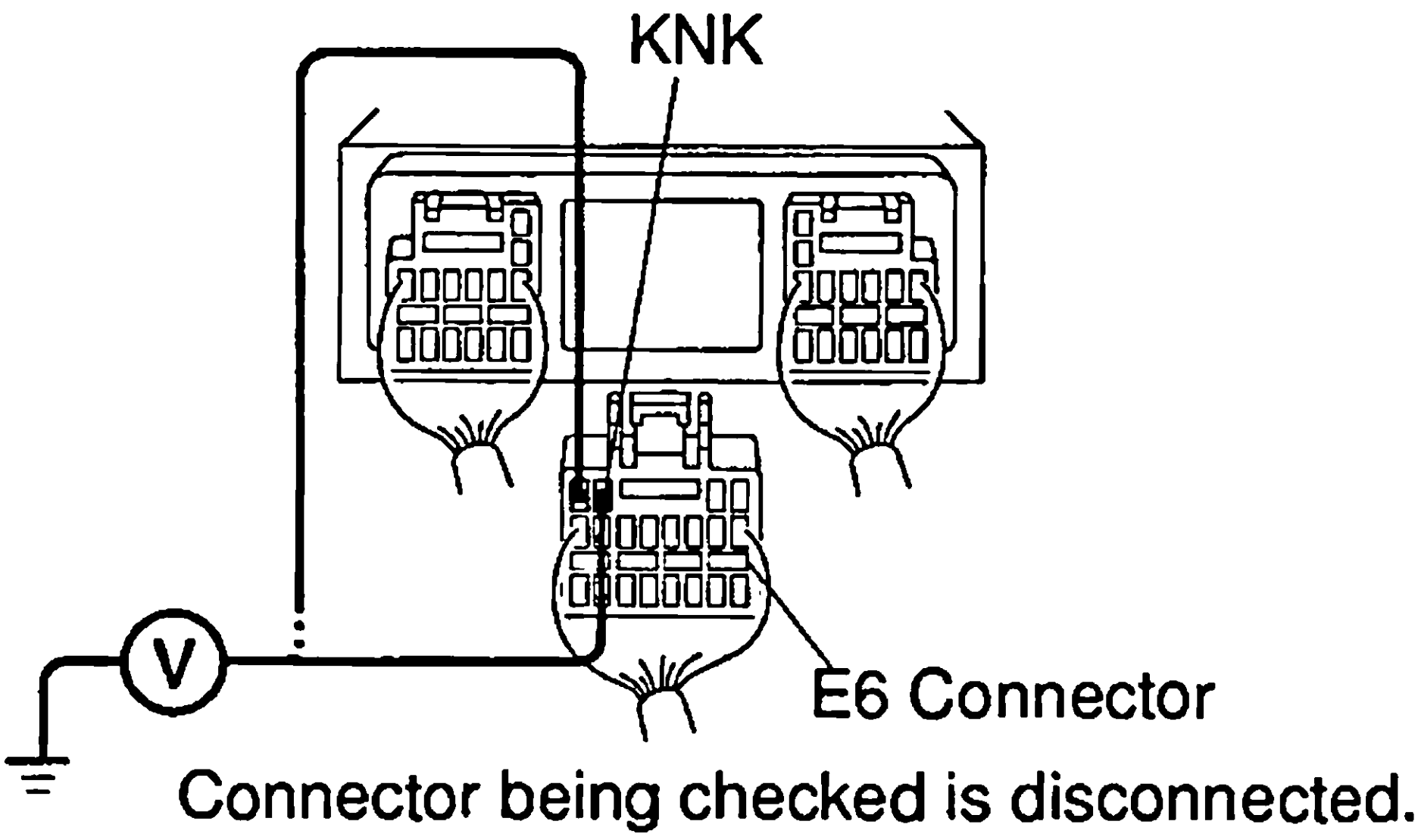
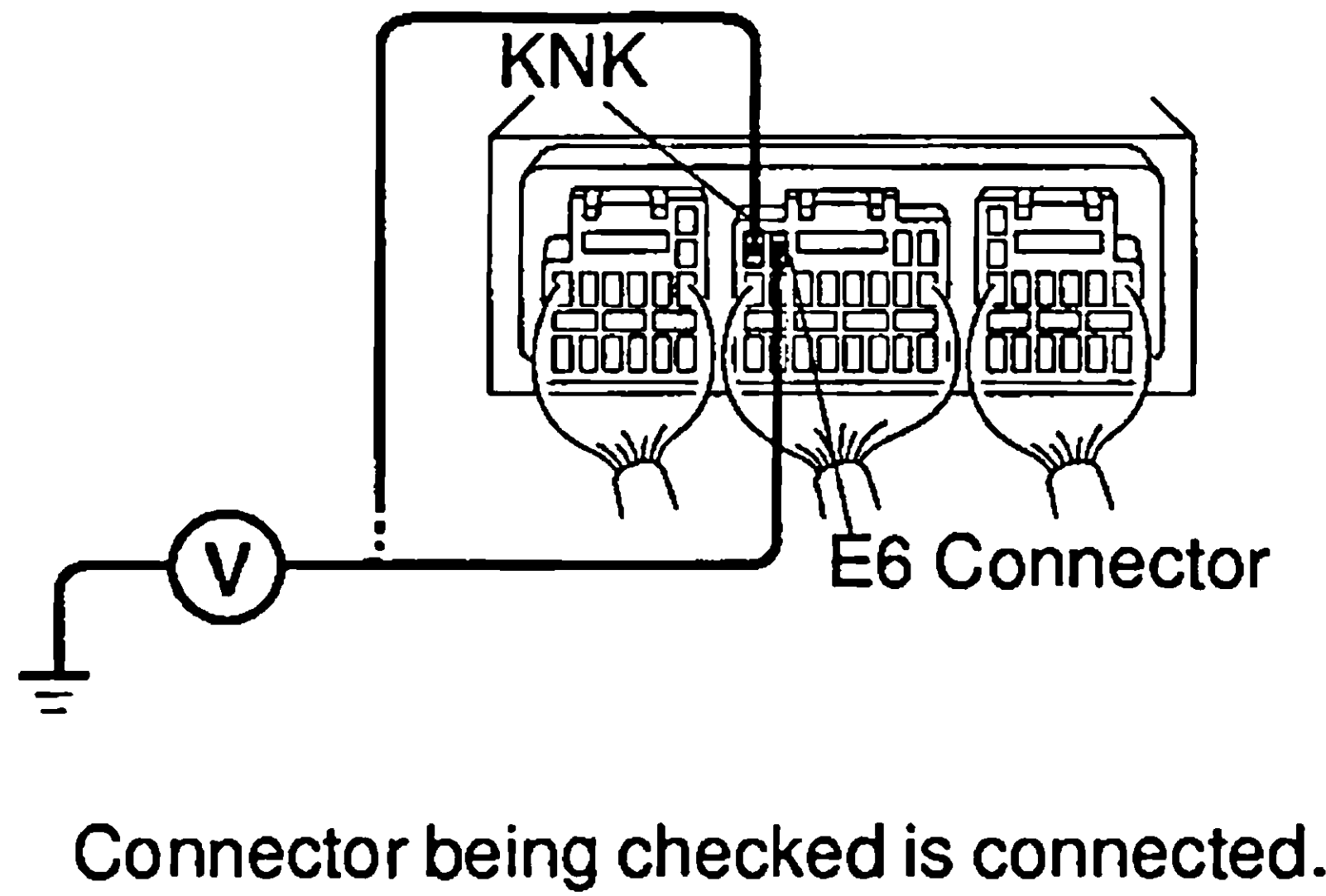
OK

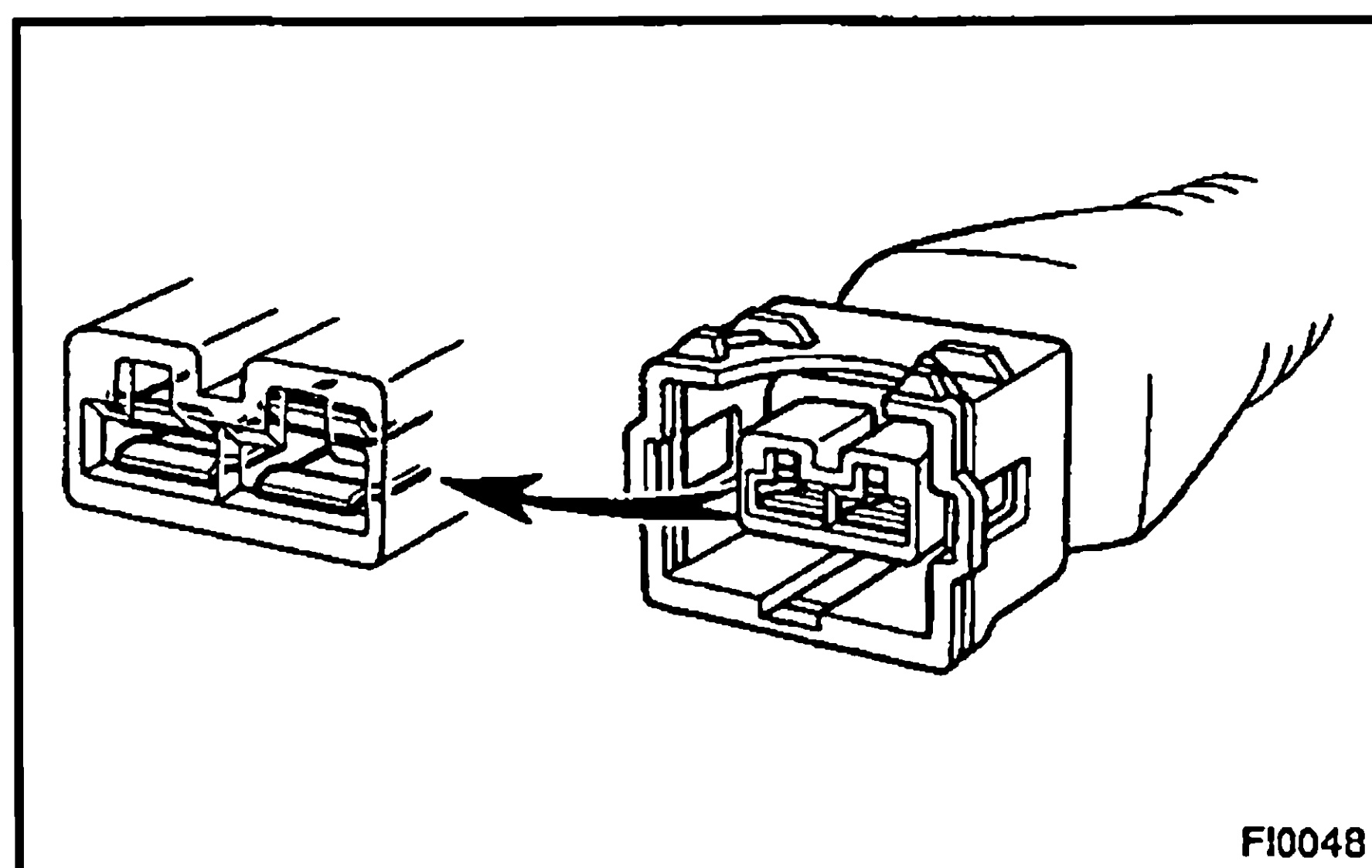
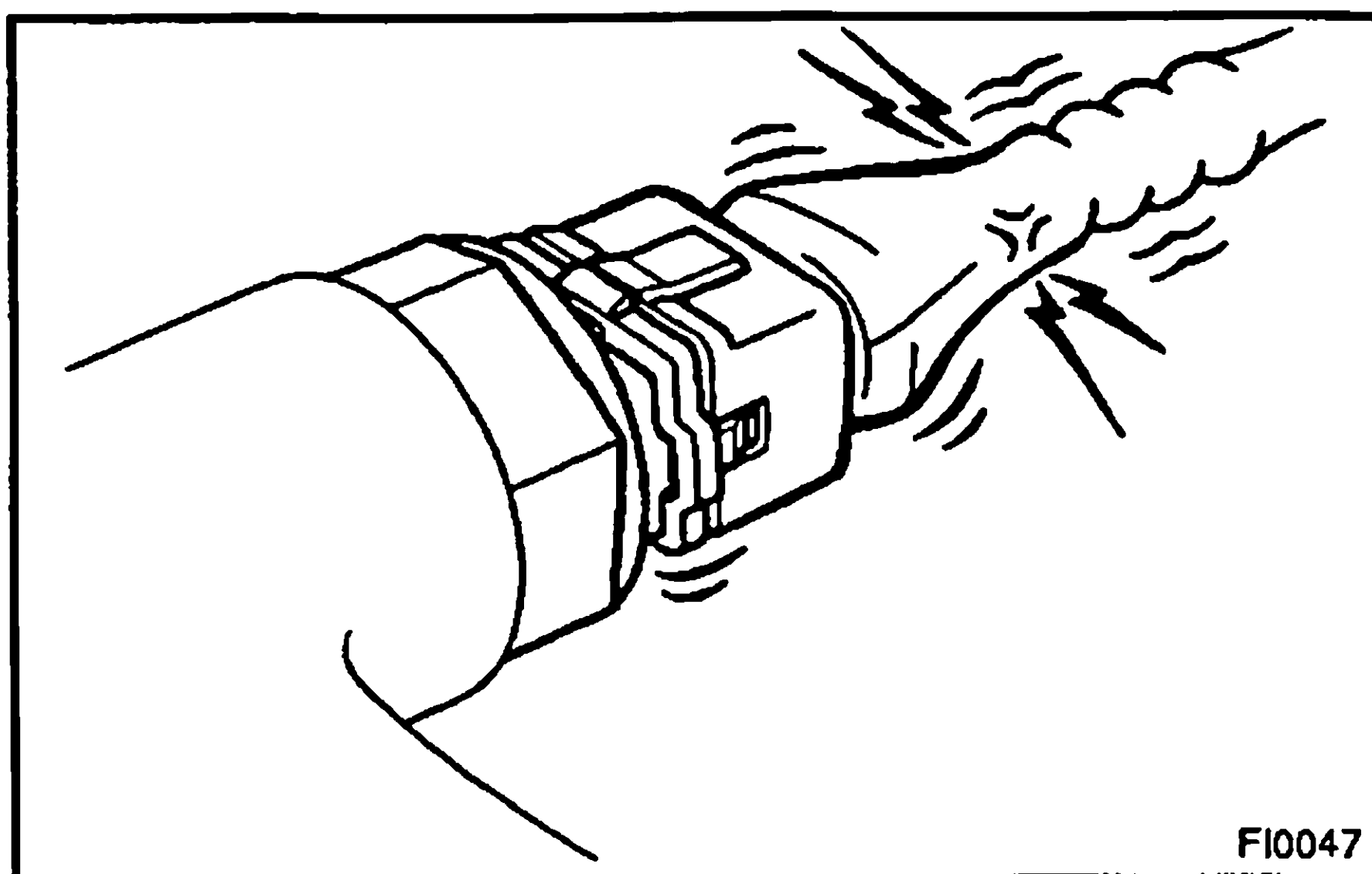
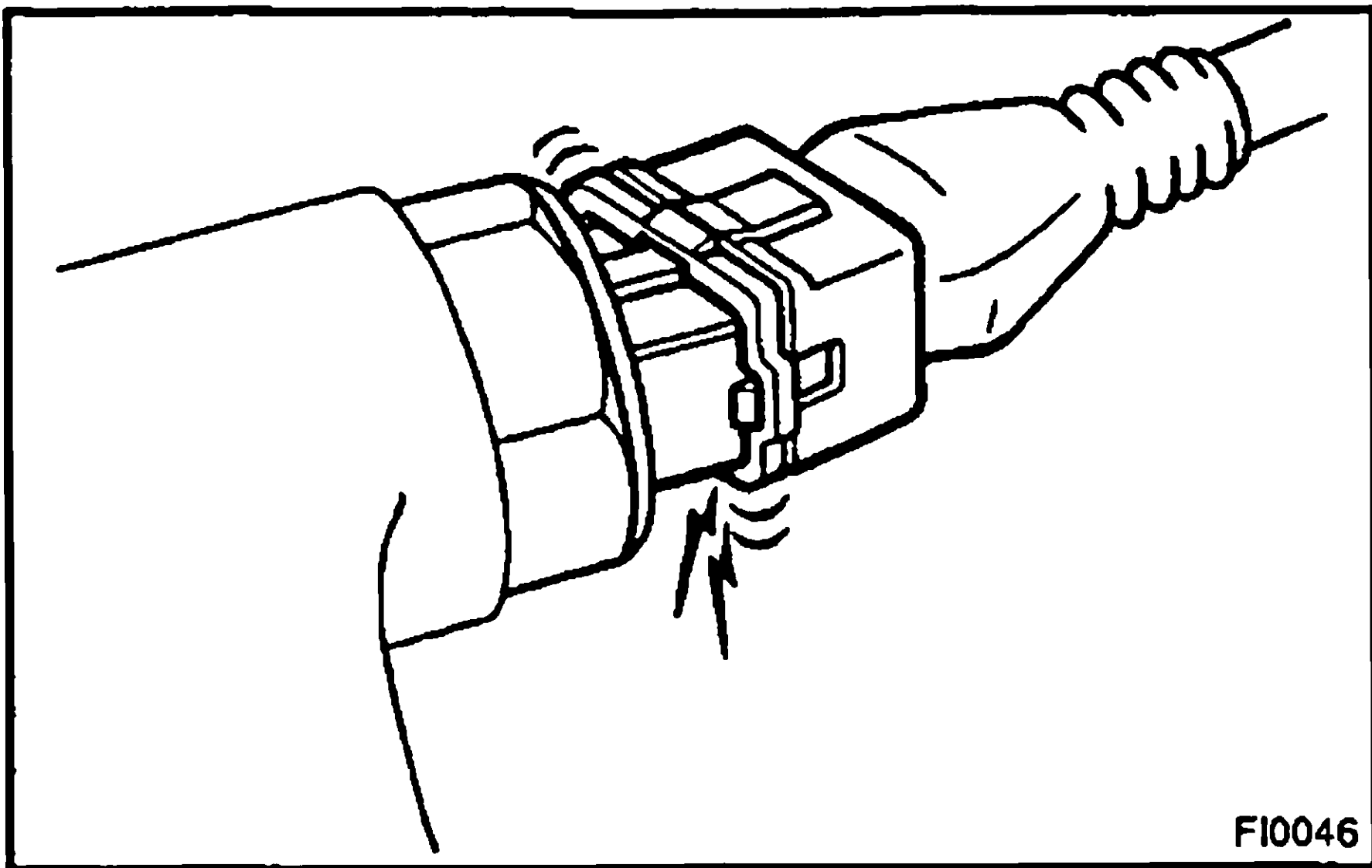
NG Check battery and charging system.
(See charging system section)

- Indicates the place to check the voltage or resistance.
- Indicates the connector position to be checked, from the front or back side.



- Indicates the condition of the connector of ECU during the check.





HOW TO USE THE DIAGNOSTIC CHART AND INSPECTION PROCEDURE

1. CONNECTOR CONNECTION AND TERMINAL INSPECTION

- For troubleshooting, diagnostic trouble code charts or problem symptom table are provided for each circuit with detailed inspection procedures on the following pages.
- When all the component parts, wire harnesses and connectors of each circuit except the ECU are found to be normal in troubleshooting, then it is determined that the problem is in the ECU. Accordingly, if diagnosis is performed without the problem symptoms occurring, refer to step 8 to replace the ECU. So always confirm that the problem symptoms are occurring, or proceed with inspection while using the symptom simulation method.
- The instructions "Check wire harness and connector" and "Check and replace ECU" which appear in the inspection procedure, are common and applicable to all diagnostic trouble codes. Follow the procedure outlined below whenever these instructions appear.

OPEN CIRCUIT:

This could be due to a disconnected wire harness, faulty contact in the connector, and a connector terminal pulled out, etc.

HINT:

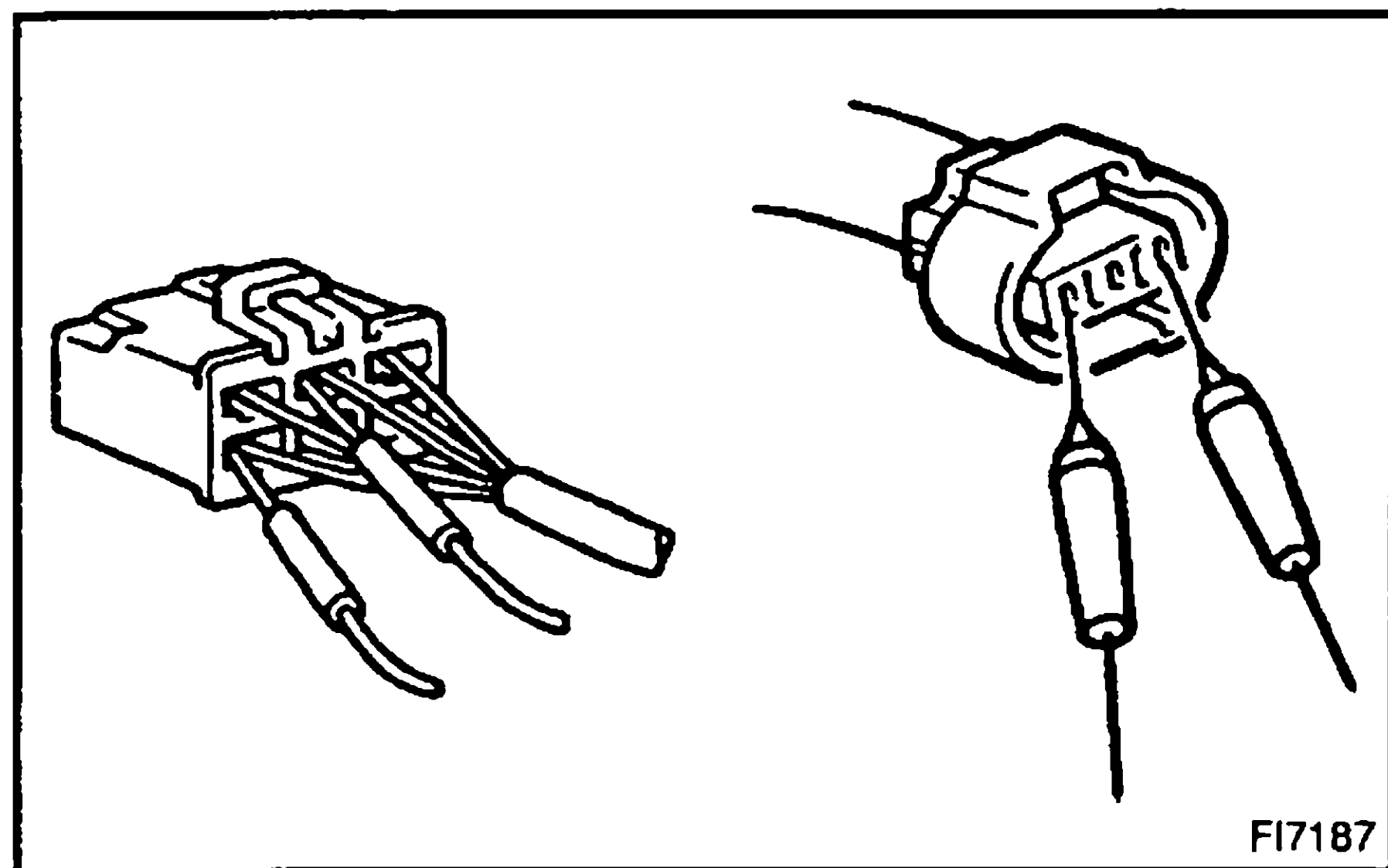
- It is rarely the case that a wire is broken in the middle of it. Most cases occur at the connector. In particular, carefully check the connectors of sensors and actuators
- Faulty contact could be due to rusting of the connector terminals, to foreign materials entering terminals or a deformation of connector terminals. Simply disconnecting and reconnecting the connectors once changes the condition of the connection and may result in a return to normal operation. Therefore, in troubleshooting, if no abnormality is found in the wire harness and connector check, but the problem disappears after the check, then the cause is considered to be in the wire harness or connectors.

SHORT CIRCUIT:

This could be due to a contact between wire harness and the body ground or to a short circuit occurred inside the switch, etc.

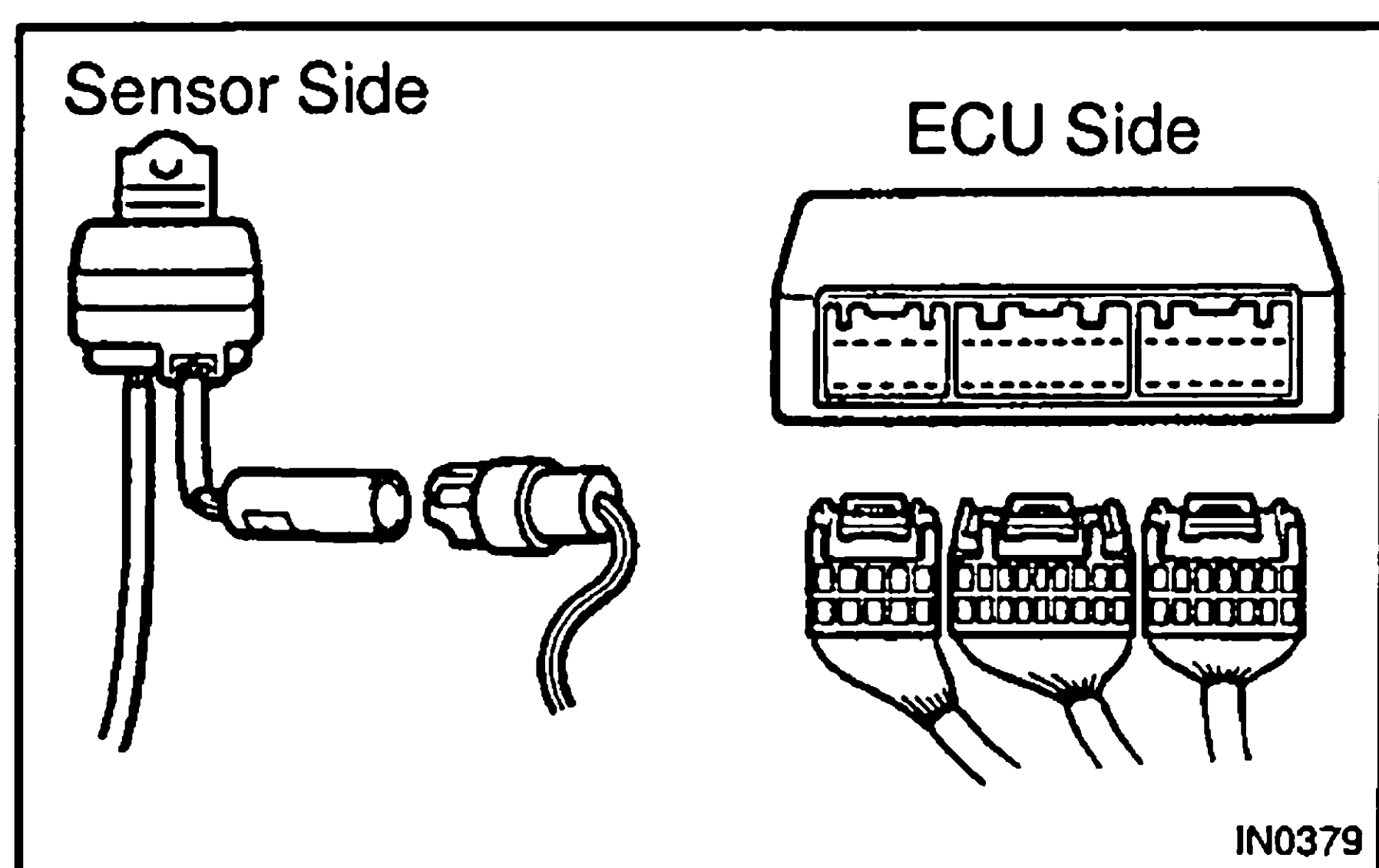
HINT:

When there is a short circuit between the wire harness and body ground, check thoroughly whether the wire harness is caught in the body or is clamped properly.



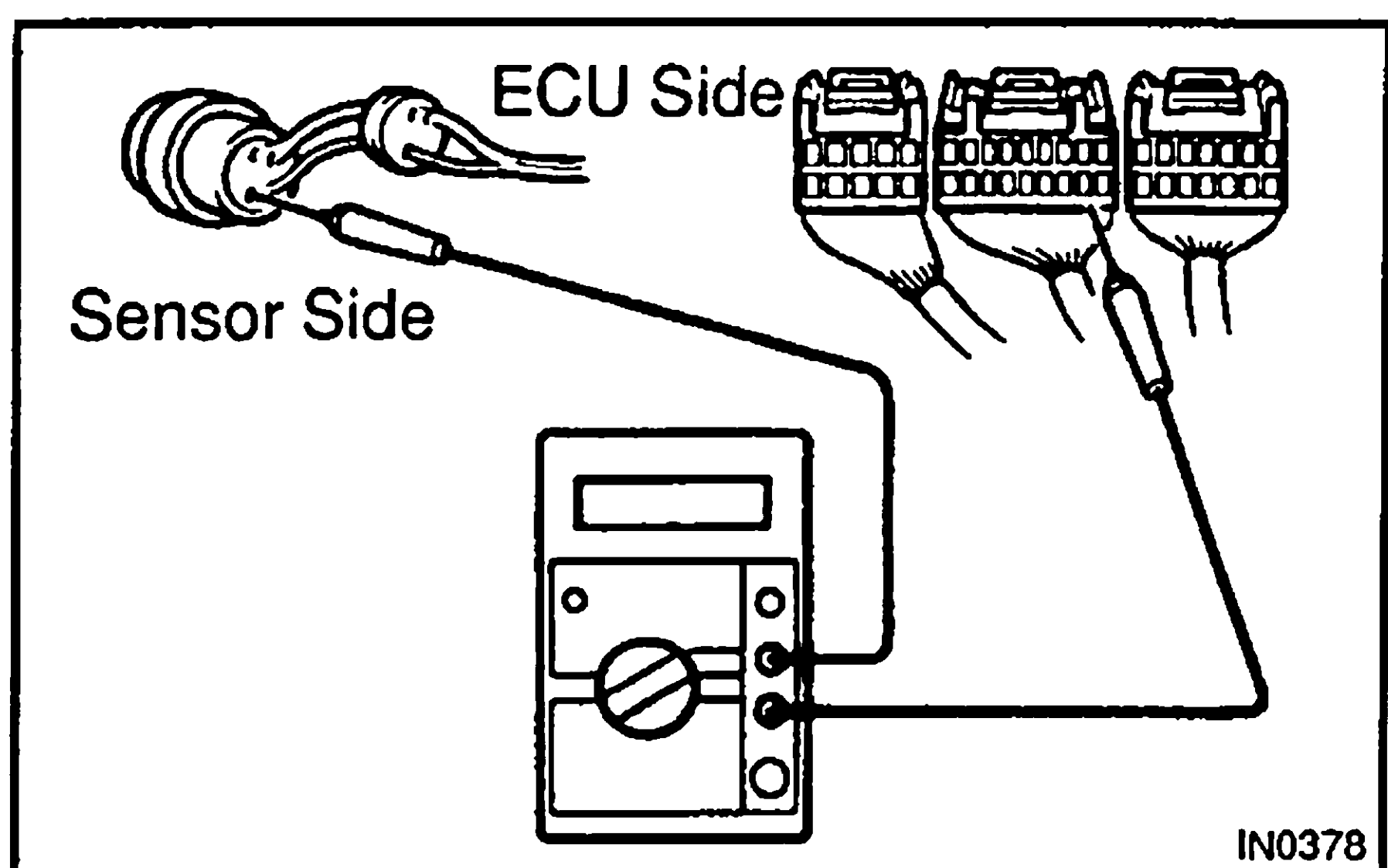
2. CONNECTOR HANDLING

When inserting tester probes into a connector, insert them from the rear of the connector. When necessary, use mini test leads. For water resistant connectors which cannot be accessed from behind, take good care not to deform the connector terminals.



3. CONTINUITY CHECK (OPEN CIRCUIT CHECK)

- (a) Disconnect the connectors at both ECU and sensor sides.

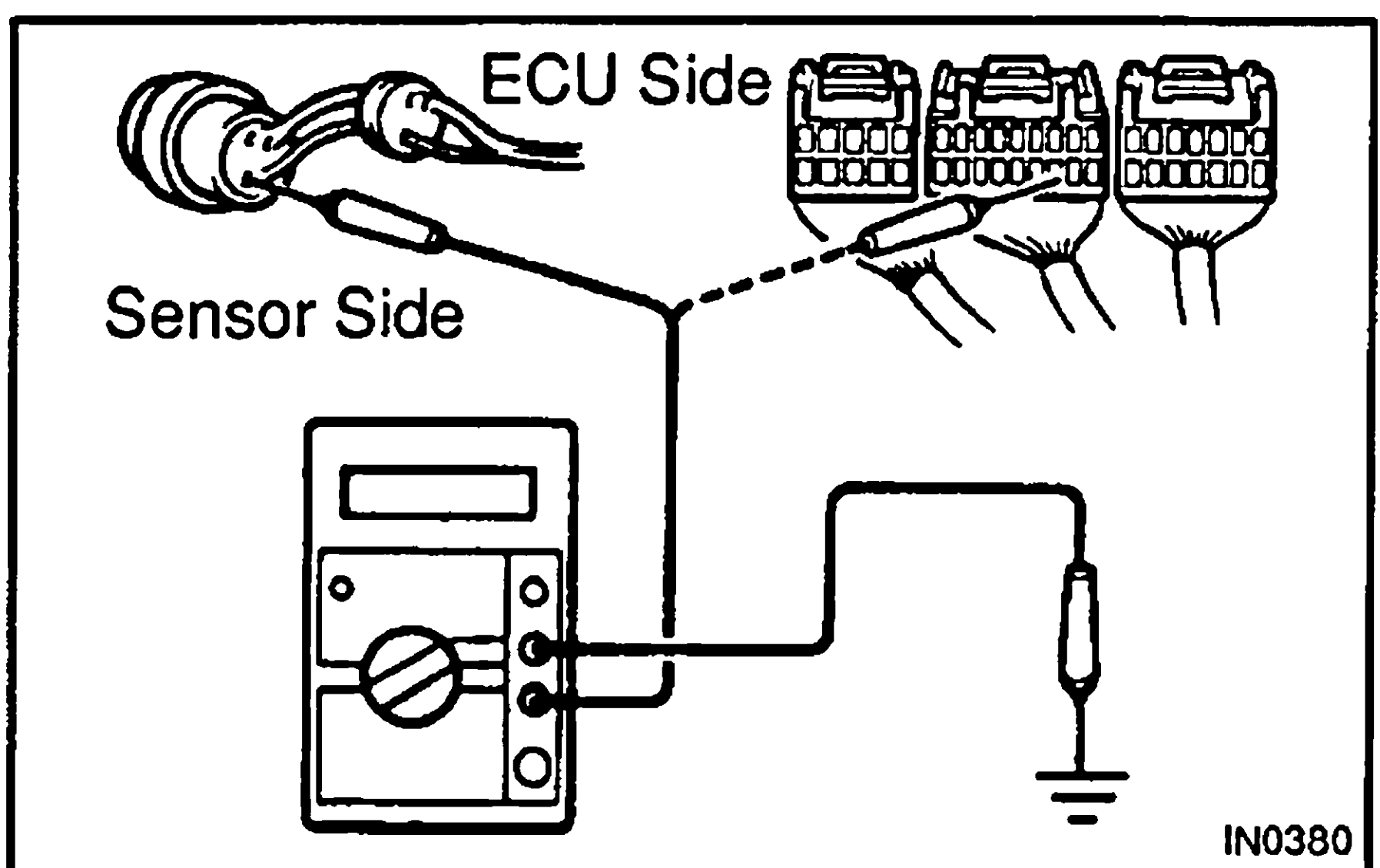


- (b) Measure the resistance between the applicable terminals of the connectors.

Resistance: 1 Ω or less

HINT:

Measure the resistance while lightly shaking the wire harness vertically and horizontally.



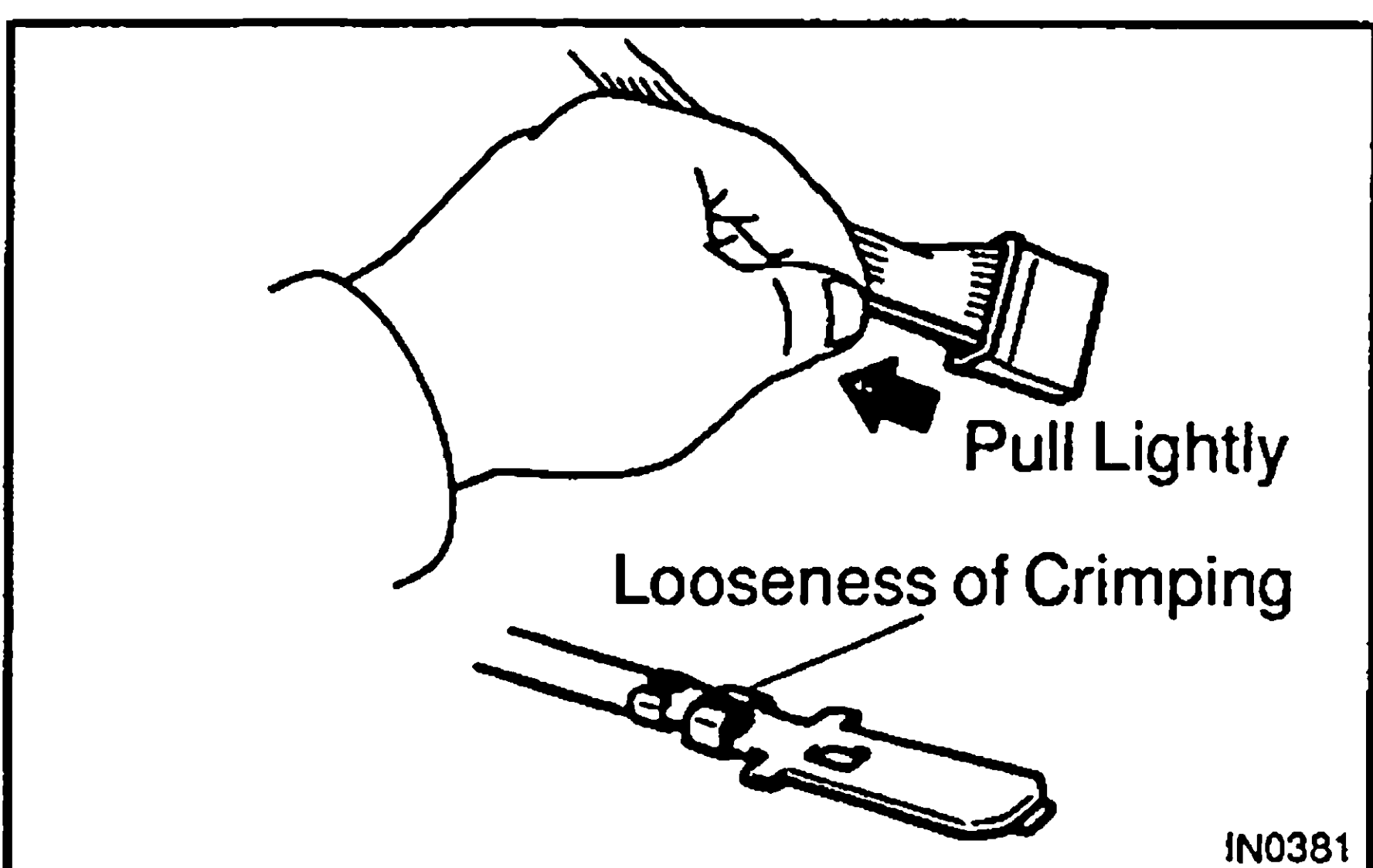
4. RESISTANCE CHECK (SHORT CIRCUIT CHECK)

- (a) Disconnect the connectors on both ends.
- (b) Measure the resistance between the applicable terminals of the connectors and body ground. Be sure to carry out this check on the connectors on both ends.

Resistance: 1 M Ω or higher

HINT:

Measure the resistance while lightly shaking the wire harness vertically and horizontally.



5. VISUAL CHECK AND CONTACT PRESSURE CHECK

- (a) Disconnect the connectors at both ends.
- (b) Check for rust or foreign material, etc. in the terminals of the connectors.
- (c) Check crimped portions for looseness or damage and check that the terminals are secured in lock portion.

HINT:

The terminals should not come out when pulled lightly from the back.

- (d) Prepare a test male terminal and insert it in the female terminal, then pull it out.

NOTICE:

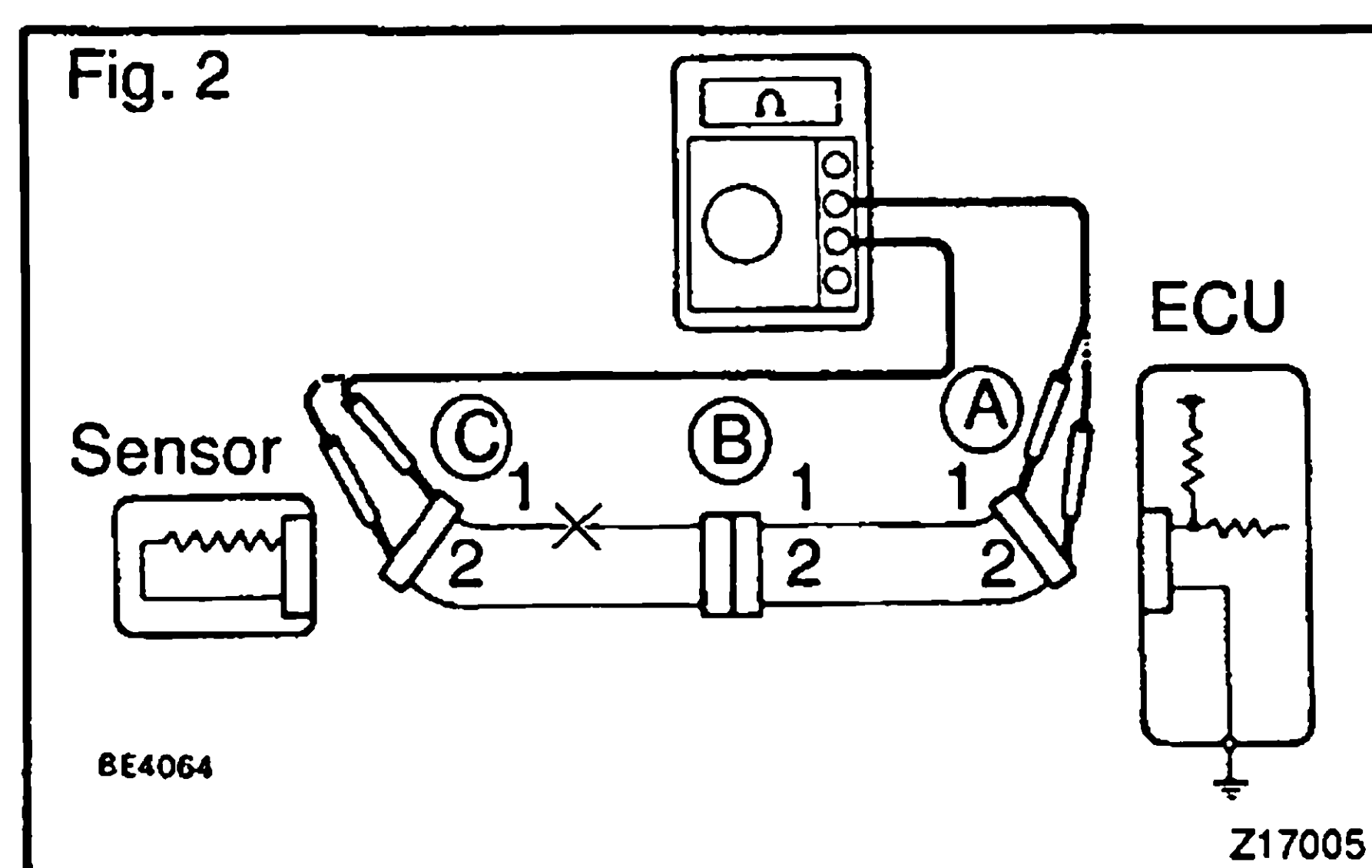
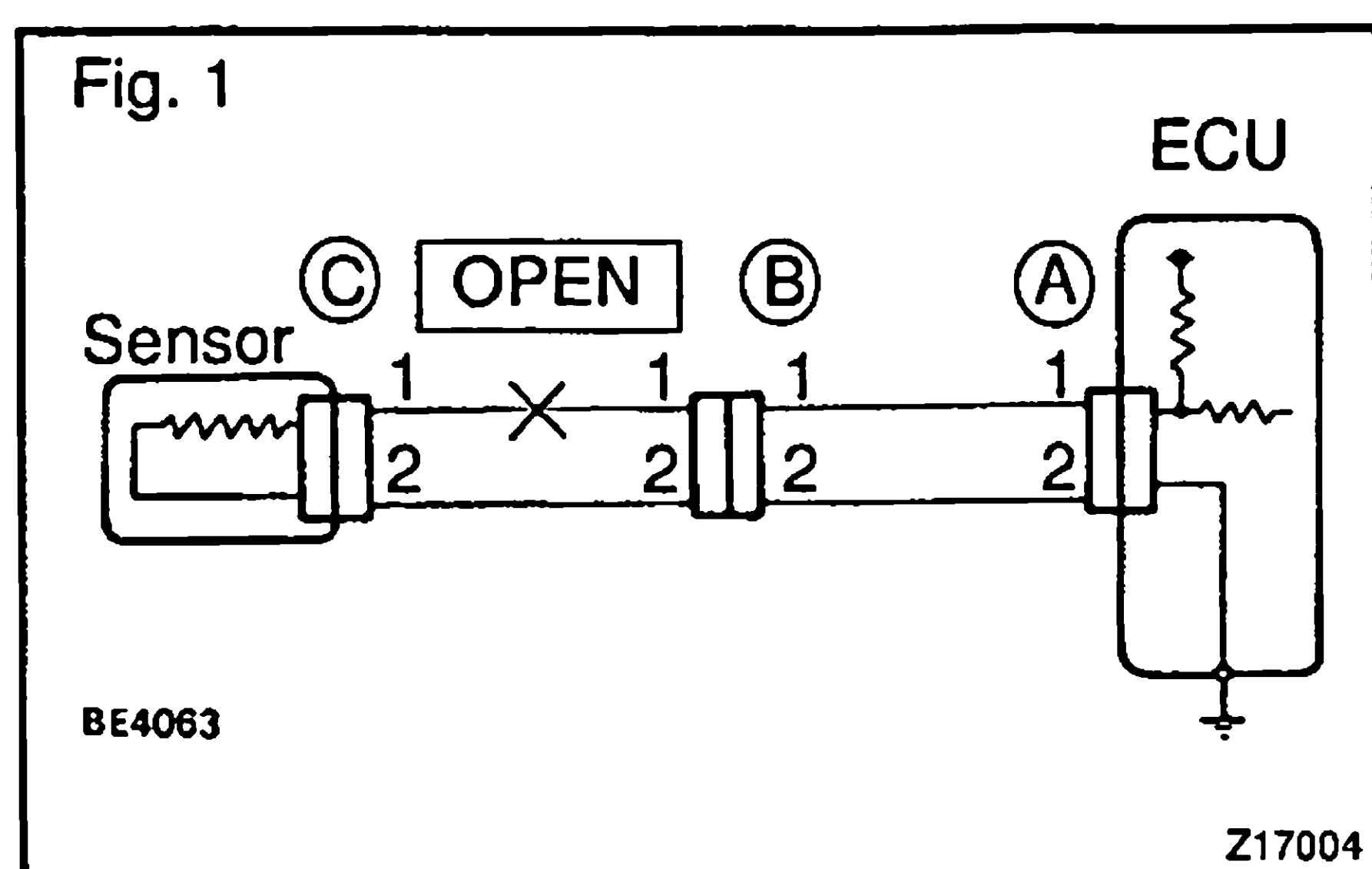
When testing a gold-plated female terminal, always use a gold-plated male terminal.

HINT:

When the test terminal is pulled out more easily than others, there may be poor contact in that section.

6. CHECK OPEN CIRCUIT

For the open circuit in the wire harness in Fig. 1, perform "(a) Continuity Check" or "(b) Voltage Check" to locate the section.



- (a) Check the continuity.
- (1) Disconnect connectors "A" and "C" and measure the resistance between them.
In the case of Fig. 2:
Between terminal 1 of connector "A" and terminal 1 of connector "C" → No continuity (open)
Between terminal 2 of connector "A" and terminal 2 of connector "C" → Continuity
Therefore, it is found out that there is an open circuit between terminal 1 of connector "A" and terminal 1 of connector "C".
 - (2) Disconnect connector "B" and measure the resistance between the connectors.
In the case of Fig. 3:
Between terminal 1 of connector "A" and terminal 1 of connector "B1" → Continuity
Between terminal 1 of connector "B2" and terminal 1 of connector "C" → No continuity (open)
Therefore, it is found out that there is an open circuit between terminal 1 of connector "B2" and terminal 1 of connector "C".

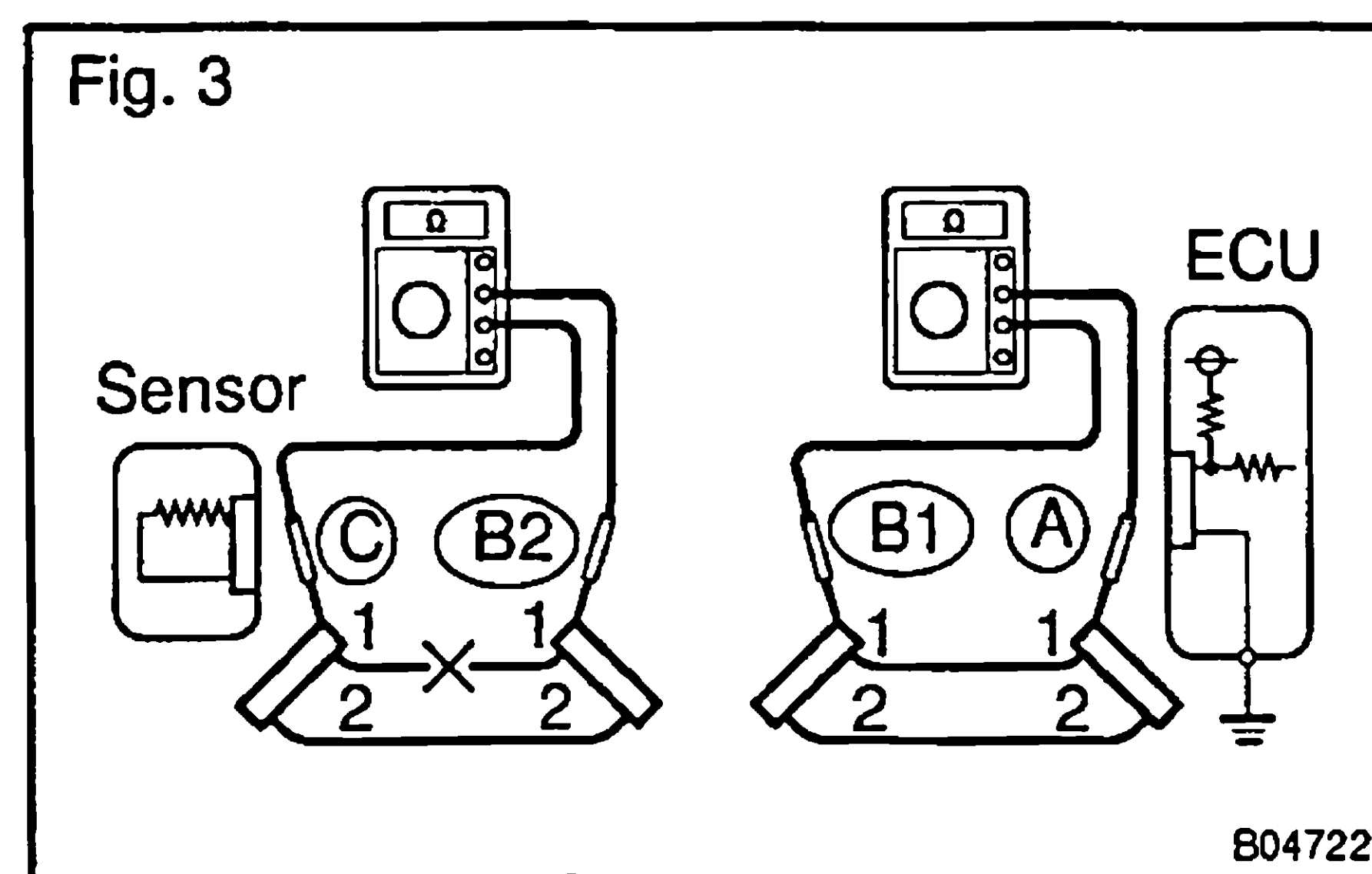
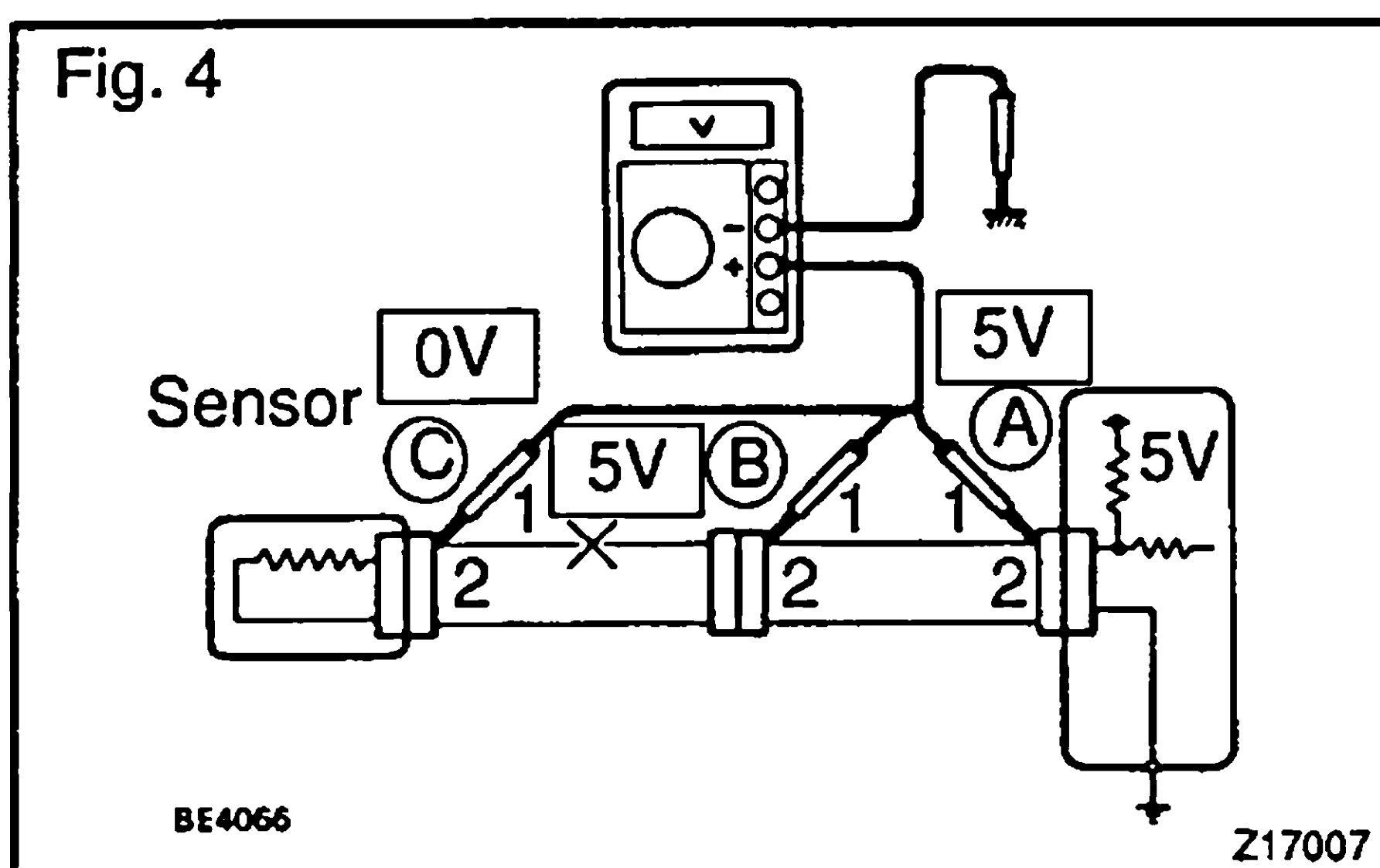


Fig. 4



(b) Check the voltage.

In a circuit in which voltage is applied (to the ECU connector terminal), an open circuit can be checked for by conducting a voltage check.

As shown in Fig. 4, with each connector still connected, measure the voltage between body ground and terminal 1 of connector "A" at the ECU 5V output terminal, terminal 1 of connector "B", and terminal 1 of connector "C", in that order.

If the results are:

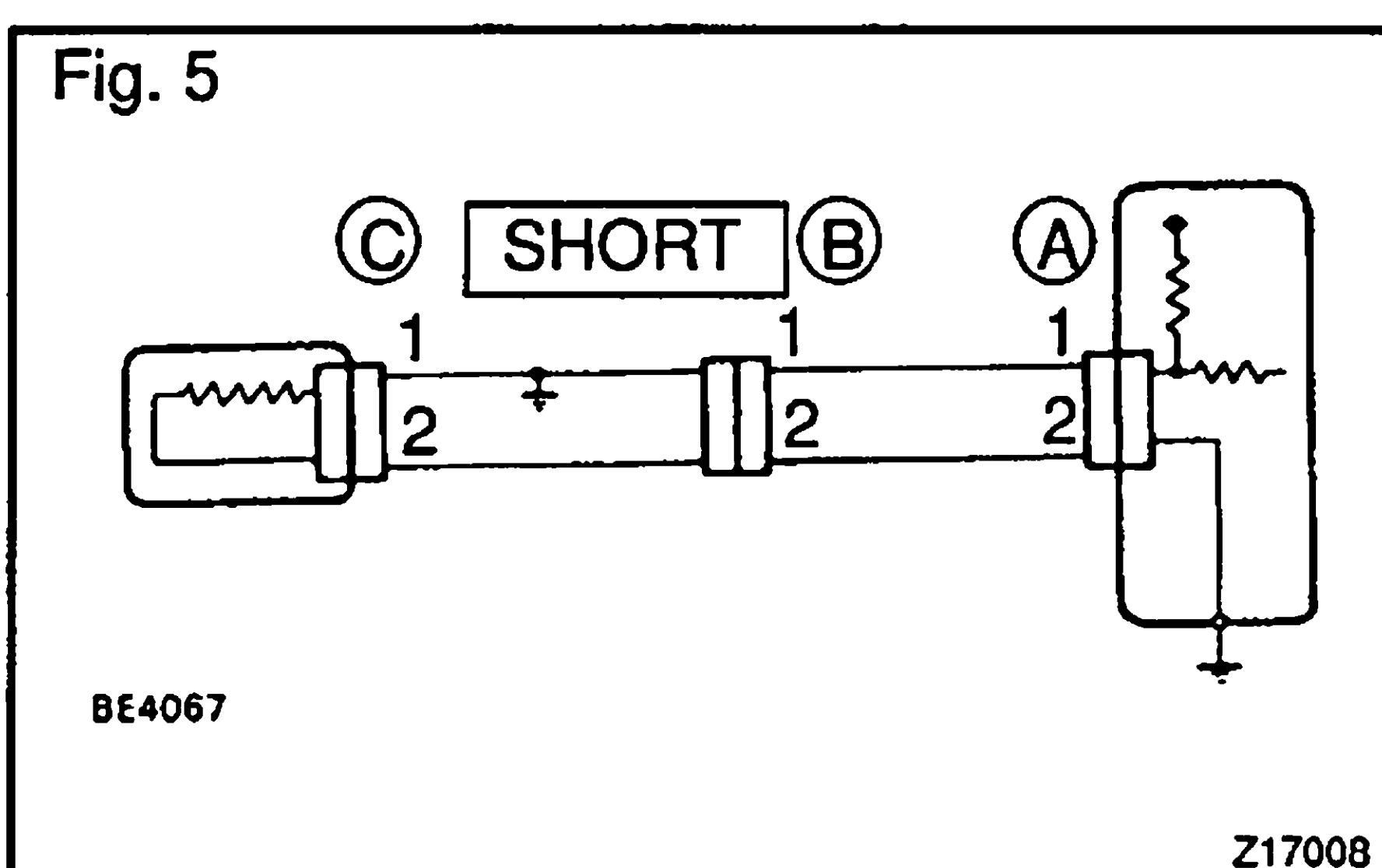
5V: Between Terminal 1 of connector "A" and Body Ground

5V: Between Terminal 1 of connector "B" and Body Ground

0V: Between Terminal 1 of connector "C" and Body Ground

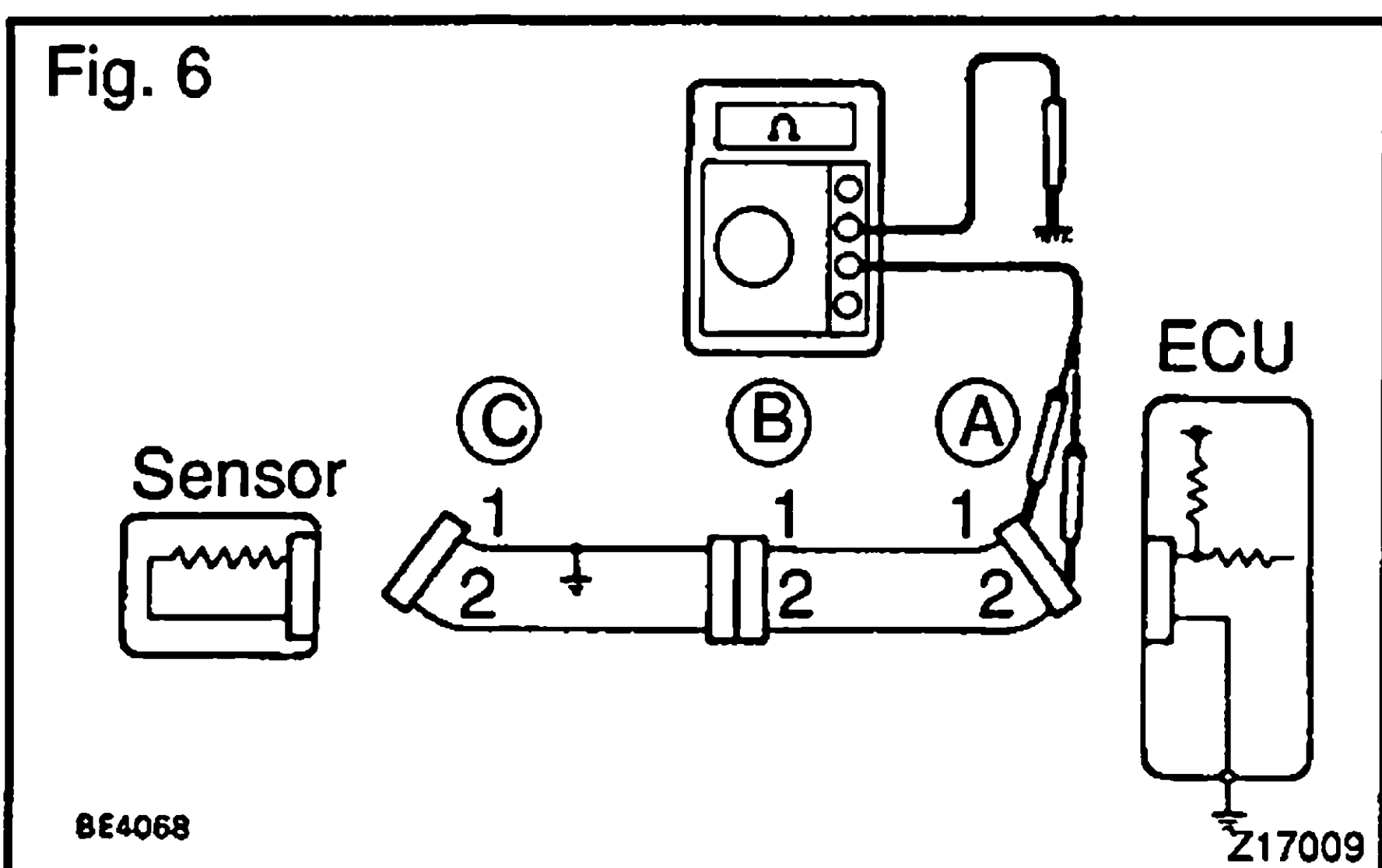
Then it is found out that there is an open circuit in the wire harness between terminal 1 of "B" and terminal 1 of "C".

Fig. 5

**7. CHECK SHORT CIRCUIT**

If the wire harness is ground shorted as in Fig. 5, locate the section by conducting a "continuity check with ground".

Fig. 6



Check the continuity with ground.

- (1) Disconnect connectors "A" and "C" and measure the resistance between terminal 1 and 2 of connector "A" and body ground.

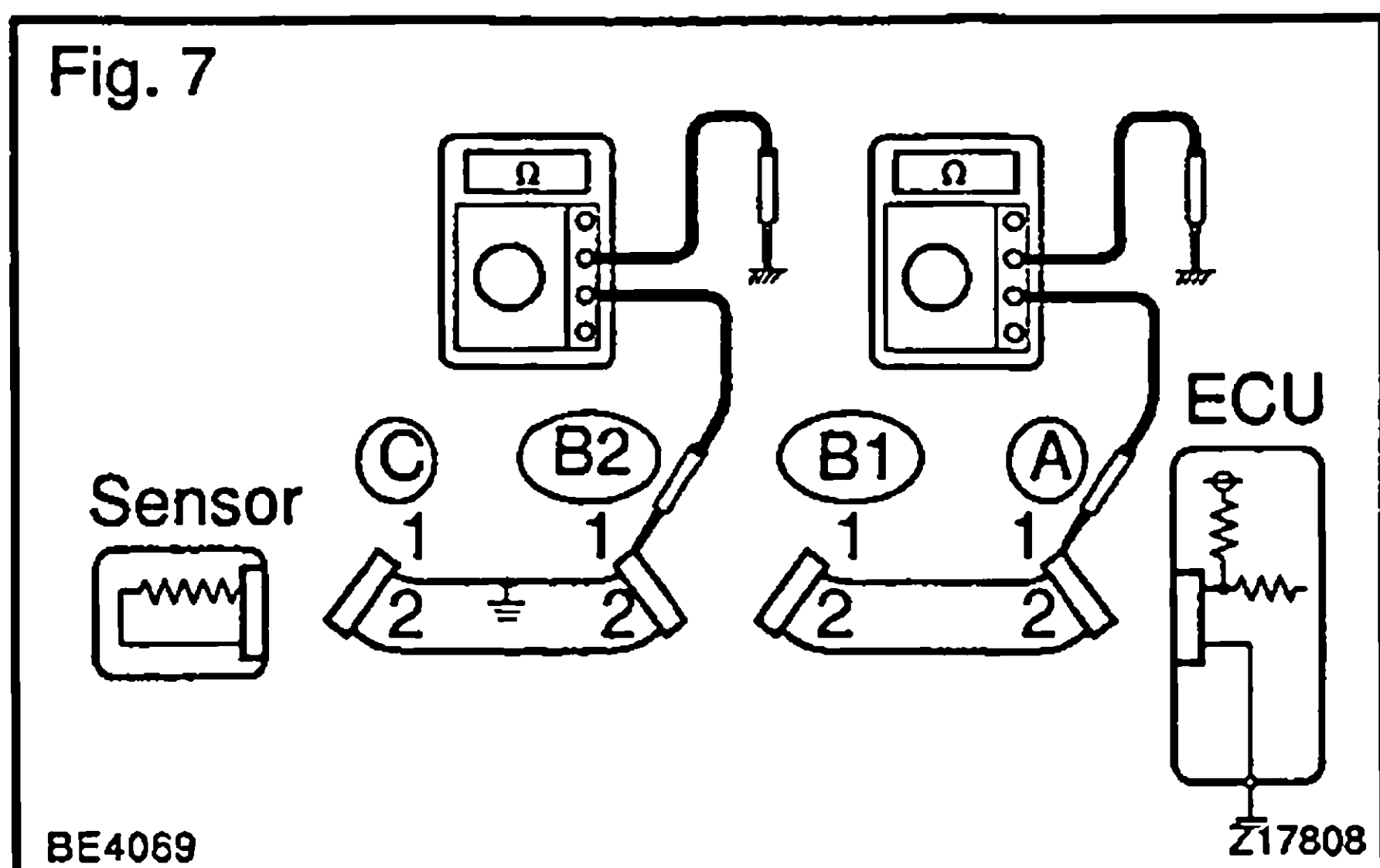
In the case of Fig. 6:

Between terminal 1 of connector "A" and body ground → Continuity (short)

Between terminal 2 of connector "A" and body ground → No continuity

Therefore, it is found out that there is a short circuit between terminal 1 of connector "A" and terminal 1 of connector "C".

Fig. 7



- (2) Disconnect connector "B" and measure the resistance between terminal 1 of connector "A" and body ground, and terminal 1 of connector "B2" and body ground.

In the case of Fig. 7:

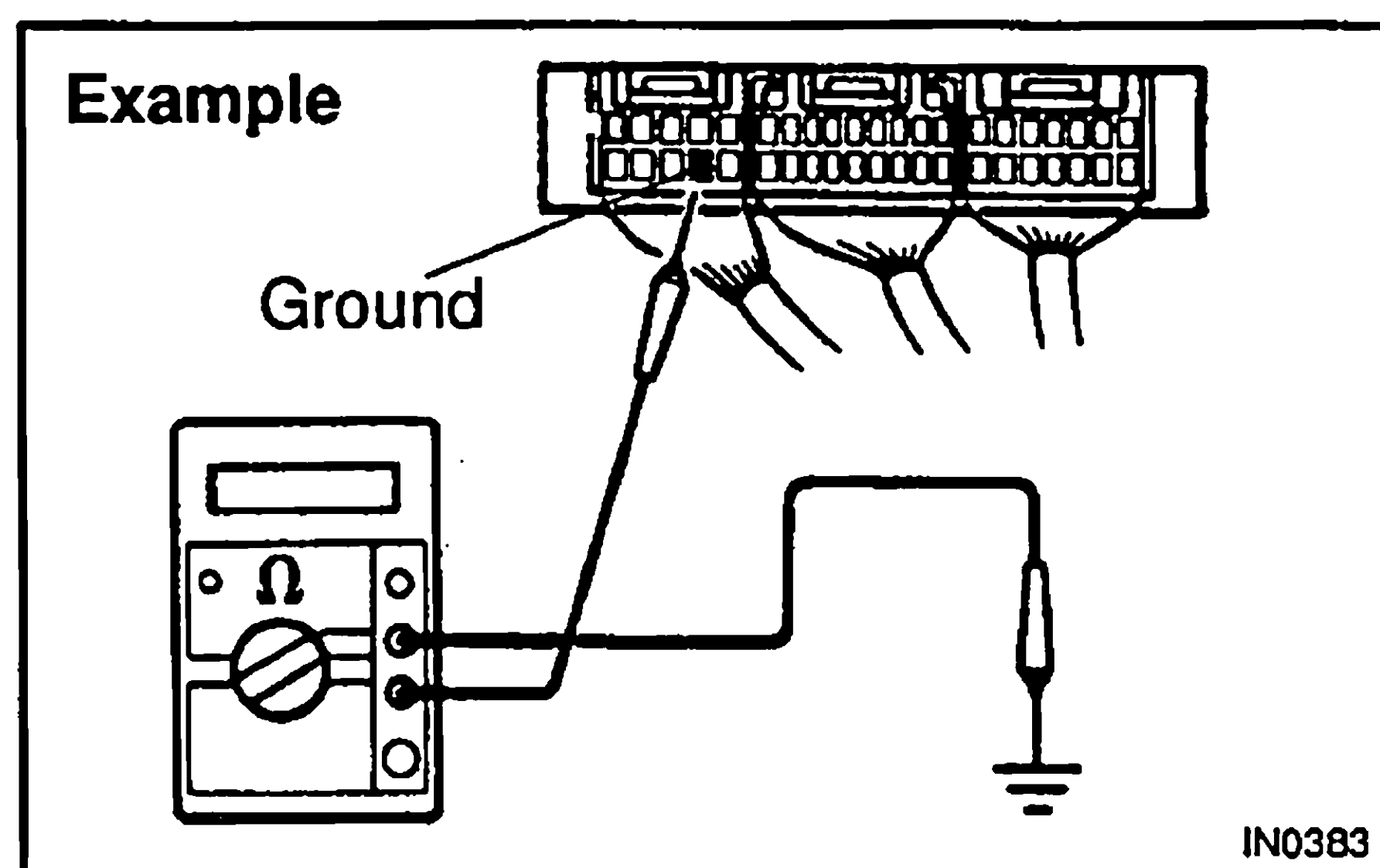
Between terminal 1 of connector "A" and body ground → No continuity

Between terminal 1 of connector "B2" and body ground → Continuity (short)

Therefore, it is found out that there is a short circuit between terminal 1 of connector "B2" and terminal 1 of connector "C".

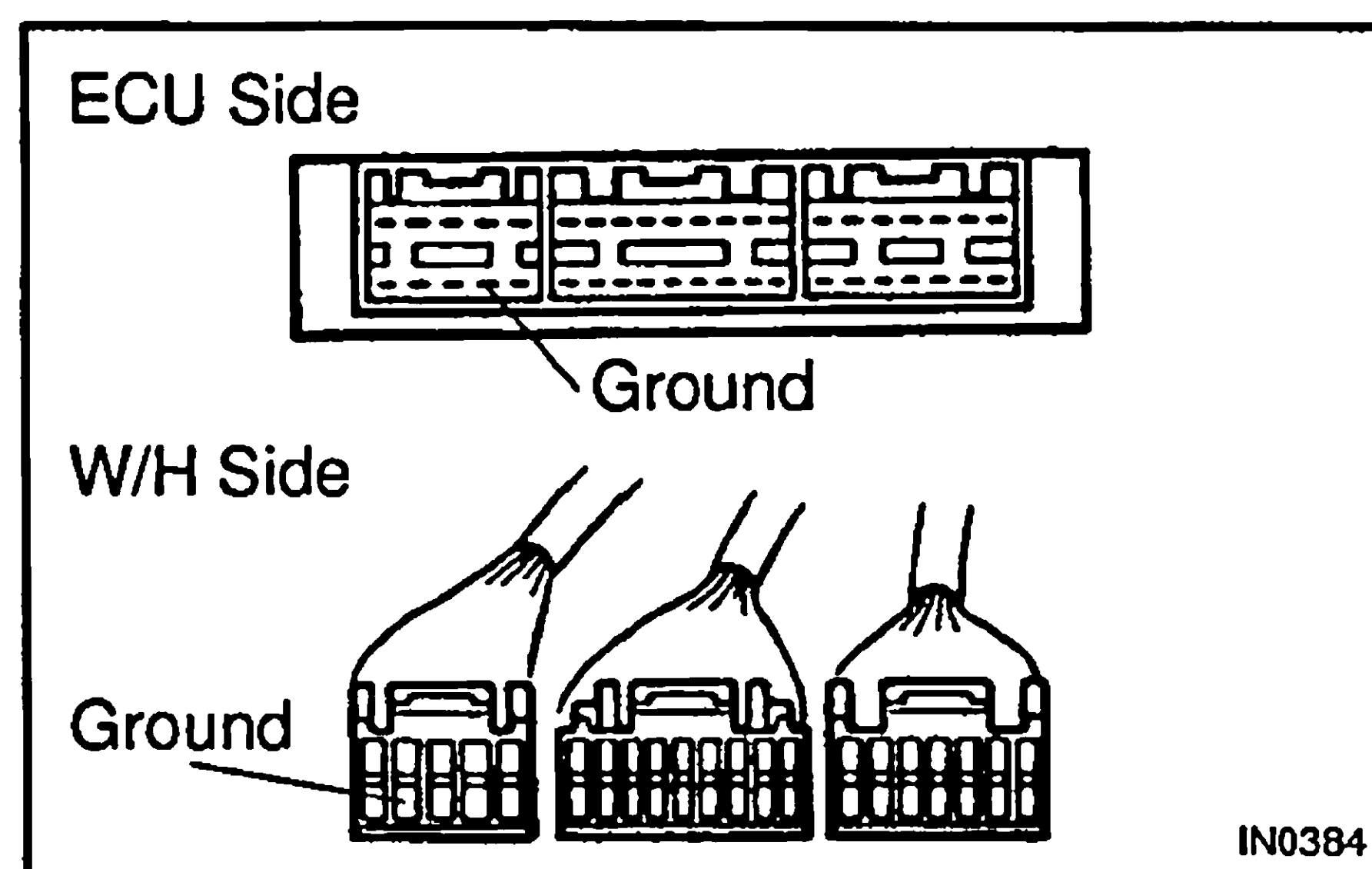
8. CHECK AND REPLACE ECU

First check the ECU ground circuit. If it is faulty, repair it. If it is normal, the ECU could be faulty, so replace the ECU with a normal functioning one and check that the symptoms appear.



- (1) Measure the resistance between the ECU ground terminal and the body ground.

Resistance: 1 Ω or less



- (2) Disconnect the ECU connector, check the ground terminals on the ECU side and the wire harness side for bend and check the contact pressure.

TERMS

ABBREVIATIONS USED IN THIS MANUAL

IN012-15

Abbreviations	Meaning
ABS	Anti-Lock Brake System
A/C	Air Conditioner
AC	Alternating Current
ACC	Accessory
ACIS	Acoustic Control Induction System
ACSD	Automatic Cold Start Device
A.D.D.	Automatic Disconnecting Differential
AHC	Active Height Control Suspension
ALR	Automatic Locking Retractor
ALT	Alternator
AMP	Amplifier
ANT	Antenna
APPROX.	Approximately
A/T	Automatic Transmission (Transaxle)
ATF	Automatic Transmission Fluid
AUTO	Automatic
BA	Brake Assist
BACS	Boost Altitude Compensation System
BAT	Battery
B/L	Bi-Level
BVSV	Bimetallic Vacuum Switching Valve
CB	Circuit Breaker
CD	Compact Disc
CH	Channel
CKD	Complete Knock Down
COMB.	Combination
CPE	Coupe
CRS	Child Restraint System
CTR	Center
DC	Direct Current
DIFF.	Differential
DIFF. LOCK	Differential Lock
DLC	Data Link Connector
DSP	Digital Signal Processor
DTC	Diagnostic Trouble Code
ECT	Electronic Control Transmission
ECU	Electronic Control Unit
EDU	Electronic Driving Unit
EFI	Electronic Fuel Injection
E/G	Engine
ELR	Emergency Locking Retractor
FF	Front-Engine Front-Wheel-Drive

INTRODUCTION – TERMS

FIPG	Formed In Place Gasket
FL	Fusible Link
Fr	Front
FR	Front–Engine Rear–Wheel–Drive
FWD	Front–Wheel–Drive
GND	Ground
H/B	Hatchback
HI	High
HID	High Intensity Discharge (Head Lamp)
HT	Hard Top
HWS	Heated Windshield System
IAC	Idle Air Control
IFS	Independent Front Suspension
IG	Ignition
INT	Intermittent
I/P	Instrument Panel
IRS	Independent Rear Suspension
J/B	Junction Block
J/C	Junction Connector
LAN	Local Area Network
LB	Liftback
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LH	Left–Hand
LHD	Left–Hand Drive
LO	Low
LSD	Limited Slip Differential
LSP & PV	Load Sensing Proportioning And Bypass Valve
LSPV	Load Sensing Proportioning Valve
MAP	Manifold Absolute Pressure
MAX.	Maximum
MIC	Microphone
MIL	Malfunction Indicator Lamp
MIN.	Minimum
MP	Multipurpose
MPI	Multipoint Electronic Fuel Injection
MPX	Multiplex Communication System
MS	Manual Steering
M/T	Manual Transmission (Transaxle)
N	Neutral
No.	Number
O2S	Oxygen Sensor
O/D	Overdrive
OPT	Option
P & BV	Proportioning And Bypass Valve
PCS	Power Control System

PKB	Parking Brake
PPS	Progressive Power Steering
PS	Power Steering
PTO	Power Take-Off
RAM	Random Access Memory
R/B	Relay Block
RBS	Recirculating Ball Type Steering
R/F	Reinforcement
RFS	Rigid Front Suspension
RH	Right-Hand
RHD	Right-Hand Drive
RLY	Relay
ROM	Read Only Memory
Rr	Rear
RR	Rear-Engine Rear-Wheel Drive
RRS	Rigid Rear Suspension
RWD	Rear-Wheel Drive
SDN	Sedan
SEN	Sensor
SICS	Starting Injection Control System
SPEC	Specification
SRS	Supplemental Restraint System
SSM	Special Service Materials
SST	Special Service Tools
STD	Standard
SW	Switch
SYS	System
T/A	Transaxle
TACH	Tachometer
TDC	Top Dead Center
TEMP.	Temperature
TEMS	TOYOTA Electronic Modulated Suspension
TFT	Toyota Free-Tronic
T/M	Transmission
TMC	TOYOTA Motor Corporation
TRC	Traction Control System
U/D	Underdrive
VENT	Ventilator
VIN	Vehicle Identification Number
VSC	Vehicle Skid Control Vehicle Stability Control
w/	With
WGN	Wagon
W/H	Wire Harness
w/o	Without
1st	First
2nd	Second

INTRODUCTION – TERMS

2WD	Two Wheel Drive Vehicle (4x2)
4WD	Four Wheel Drive Vehicle (4x4)

PREPARATION

MANUAL TRANSMISSION (R150F, R151F) .	PP-1
BRAKE	PP-5
STEERING	PP-9
BODY ELECTRICAL	PP-11
AIR CONDITIONING	PP-14

PP

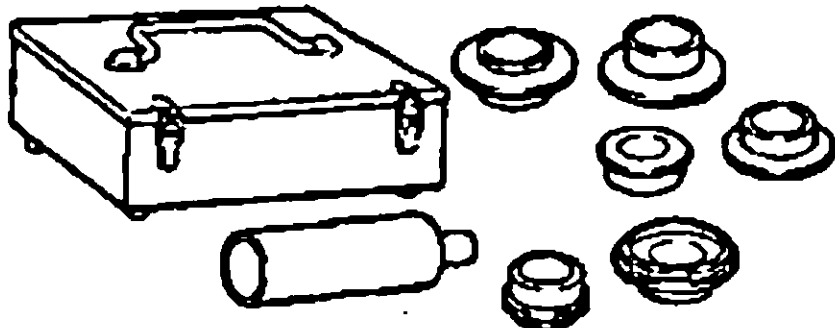
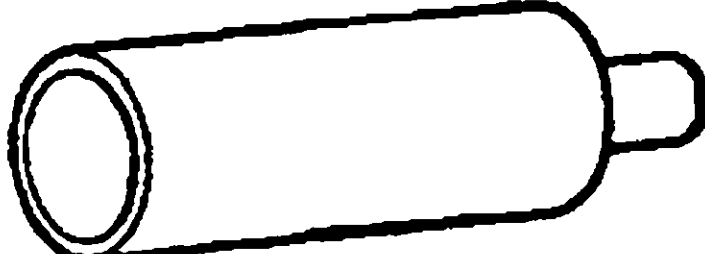
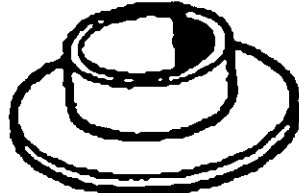
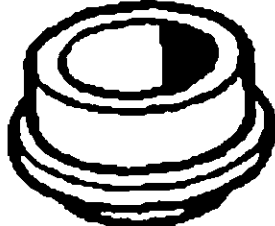
REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
LAND CRUISER/LAND CRUISER PRADO Chassis and Body Repair Manual	RM517E
LAND CRUISER/LAND CRUISER PRADO Chassis and Body Repair Manual Supplement (Jan., 1998)	RM627E
LAND CRUISER/LAND CRUISER PRADO Chassis and Body Repair Manual Supplement (Jun., 1999)	RM702E

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

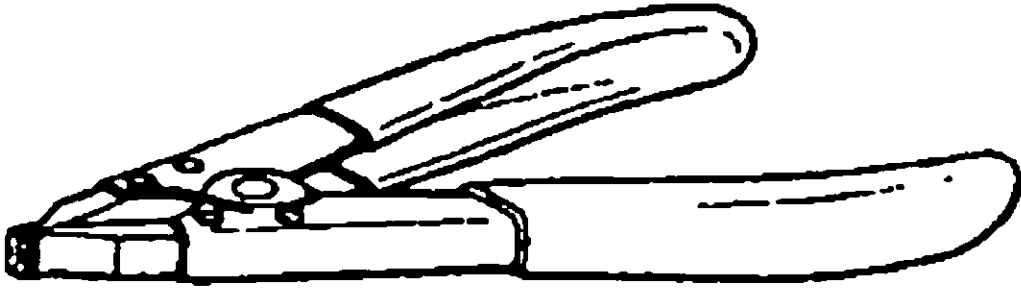
MANUAL TRANSMISSION (R150F, R151F)
SST (Special Service Tools)

PP3FV-01

	09316-60011 Transmission & Transfer Bearing Replacer	
	(09316-00011) Replacer Pipe	Output shaft rear bearing Gear spline piece No. 5
	(09316-00031) Replacer "B"	5th gear
	(09316-00071) Replacer "F"	Output shaft rear bearing Output shaft center bearing

PP

RECOMMENDED TOOLS

	09905-00012 Snap Ring No.1 Expander .	
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EQUIPMENT

Dial indicator	
Micrometer	
Torque wrench	
Feeler gauge	

LUBRICANT

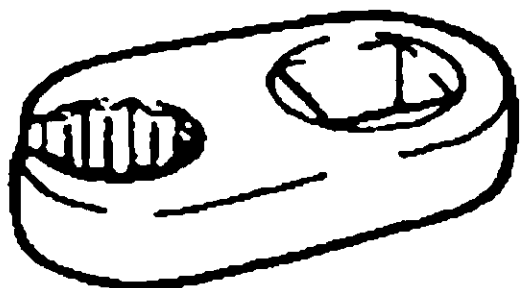
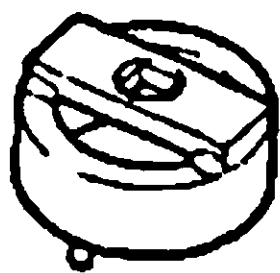
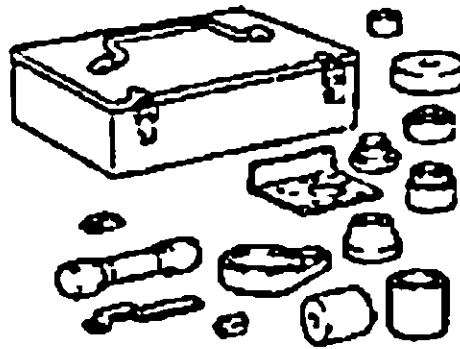
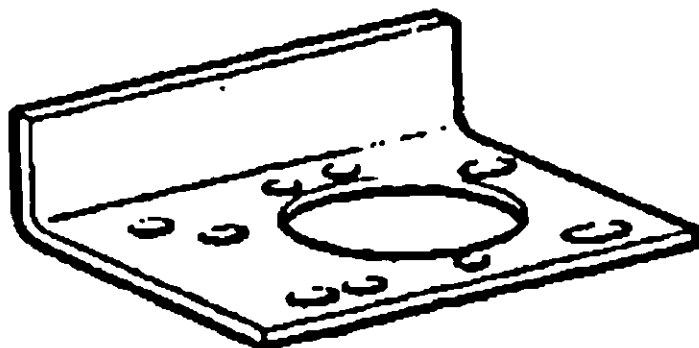
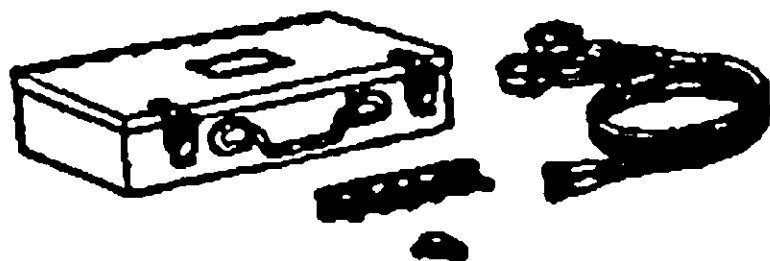
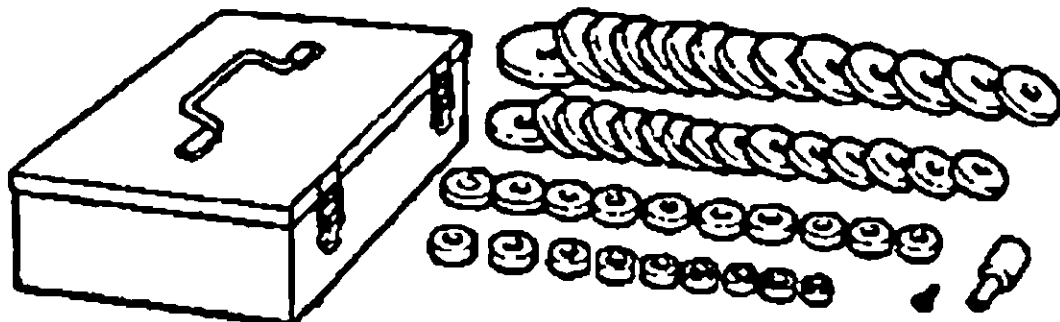
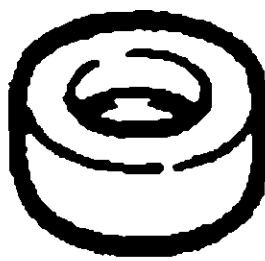
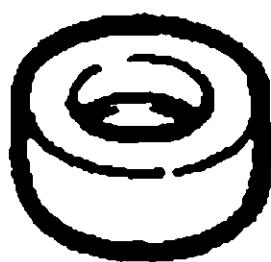
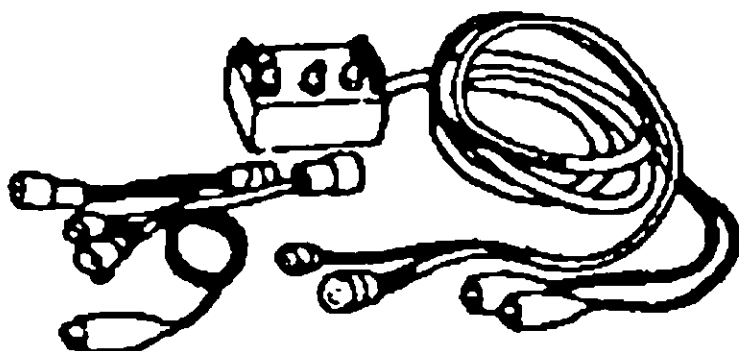
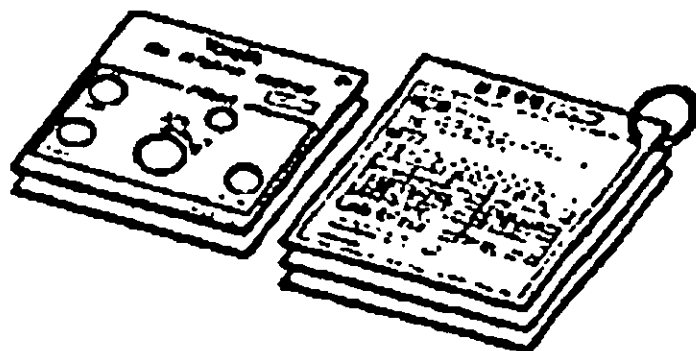
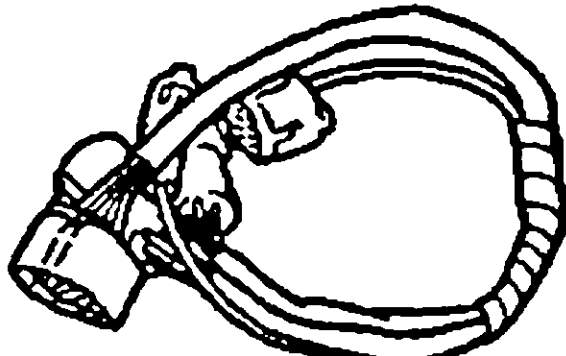
Item	Capacity	Classification
Manual transmission oil	2.2 liters (2.3 US qts, 1.9 Imp. qts)	API GL-4 or GL-5 SAE 75W-90



BRAKE

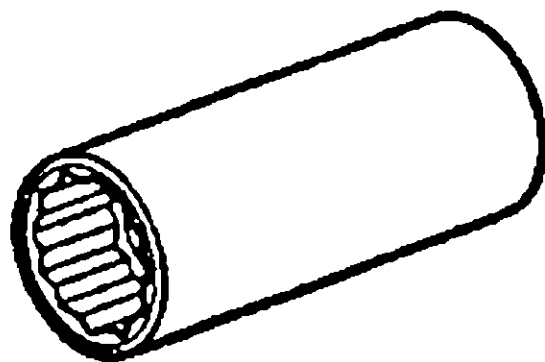
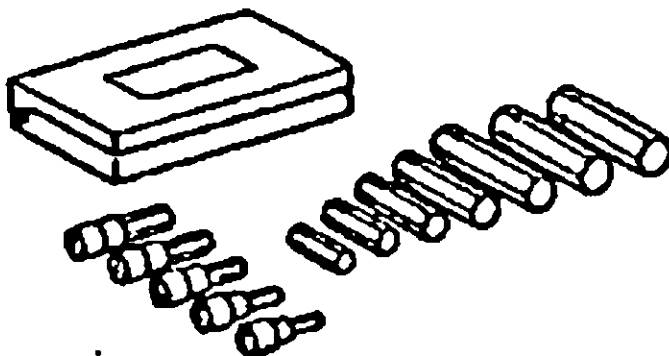
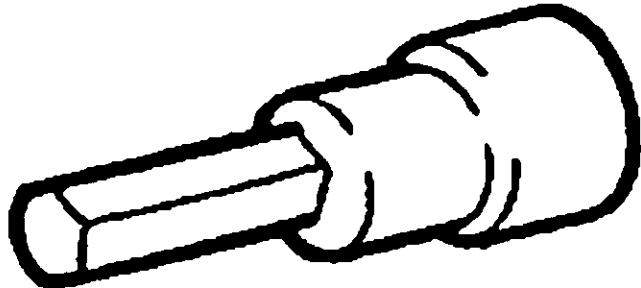
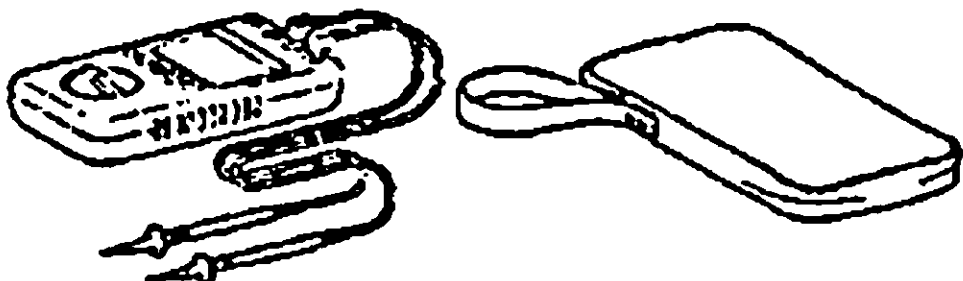
PP3FF-01

SST (Special Service Tools)

	09023-00100 Union Nut Wrench 10 mm	
	09318-12010 Transfer Bearing Adjusting Nut Wrench	
	09630-00014 Power Steering Gear Housing Overhaul Tool Set	
	(09631-00142) Overhaul Stand	
	09709-29018 LSPV Gauge Set	
	09950-60010 Replacer Set	
	(09951-00180) Replacer 18	
	(09951-00190) Replacer 19	
	09990-00150 ABS Actuator Checker and Sub-harness	
	09990-00240 ABS Actuator Checker Sheet "G"	
	09990-00480 ABS Actuator Checker Sub-harness "S"	

PP

RECOMMENDED TOOLS

	09017-12301 Deep Socket Wrench 30 mm .	
	09040-00011 Hexagon Wrench Set .	
	(09043-20050) Socket Hexagon Wrench 5.	
	09082-00040 TOYOTA Electrical Tester.	

PP

EQUIPMENT

Torque wrench	
Effort gauge	

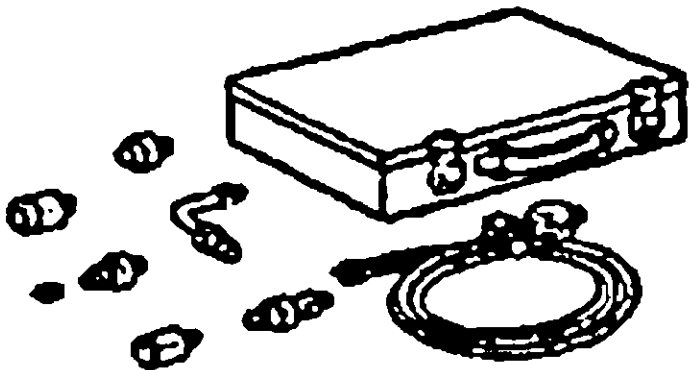
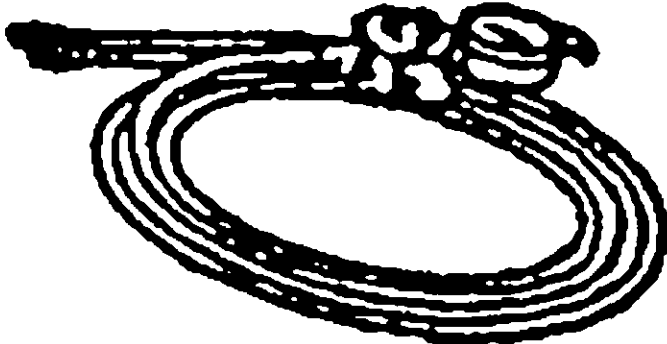
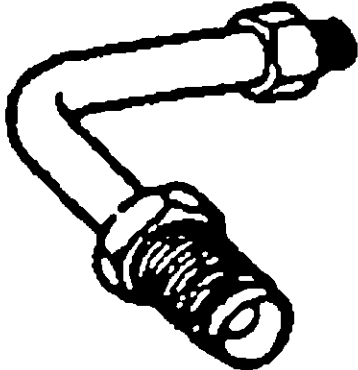
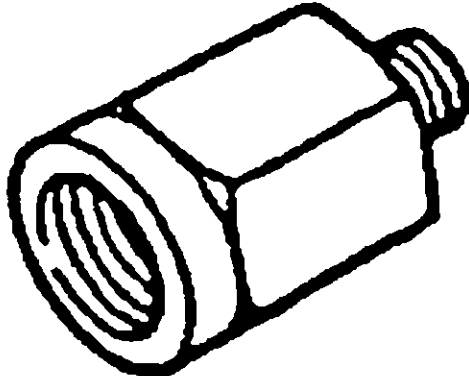
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Item	Capacity	Classification
Brake fluid	–	SAE J1703 or FMVSS No. 116 DOT 3

STEERING

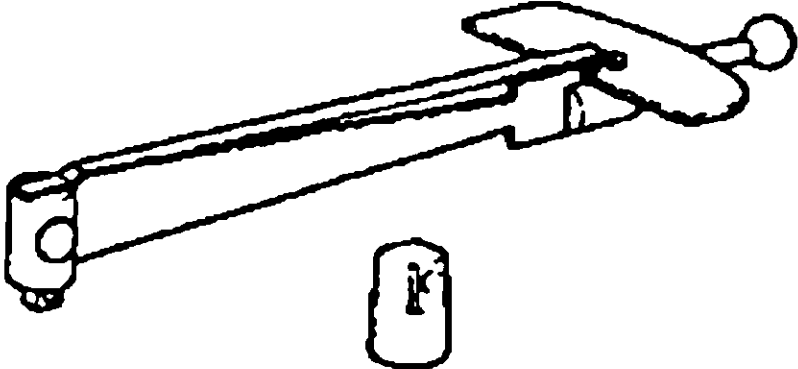
PP3G0-01

SST (Special Service Tools)

	09640-10010 Power Steering Pressure Gauge Set	Power steering fluid (1KD-FTV)
	(09641-01010) Gauge Assy	
	(09641-01030) Attachment B	
	(09641-01040) Attachment C	

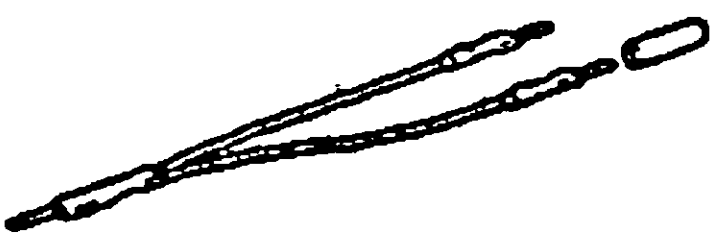
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RECOMMENDED TOOLS

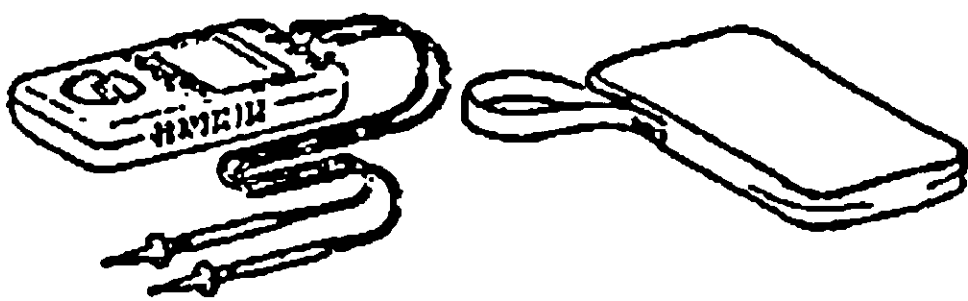
	09025-00010 Small Torque Wrench (30 kgf-cm)	PS vane pump (1KD-FTV)
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BODY ELECTRICAL
SST (Special Service Tools)

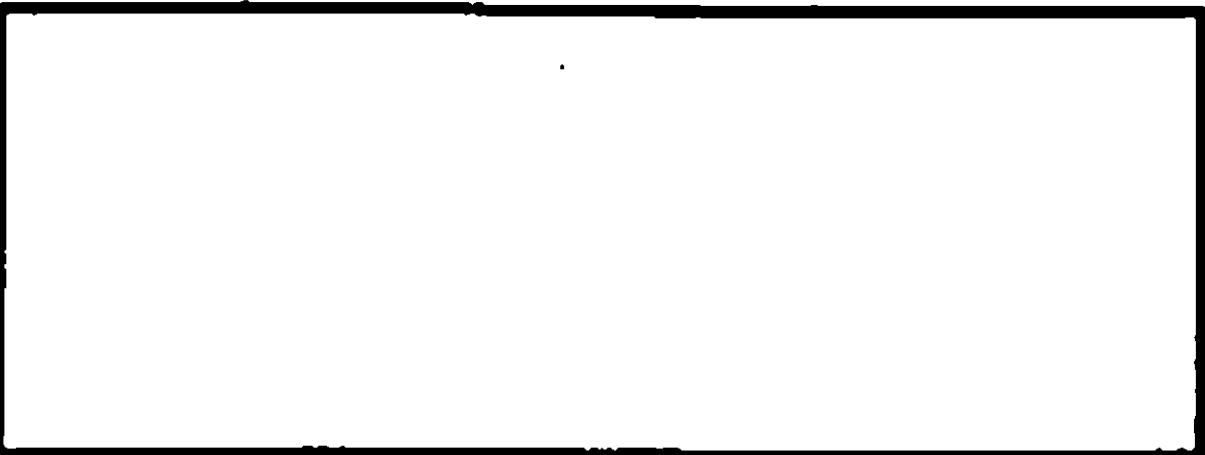
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	09843-18020 Diagnosis Check Wire	
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RECOMMENDED TOOLS



09082-00040 TOYOTA Electrical Tester.

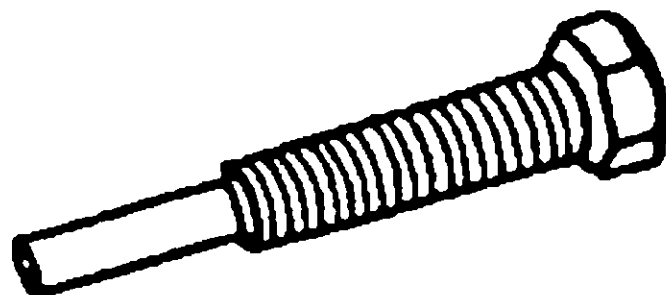
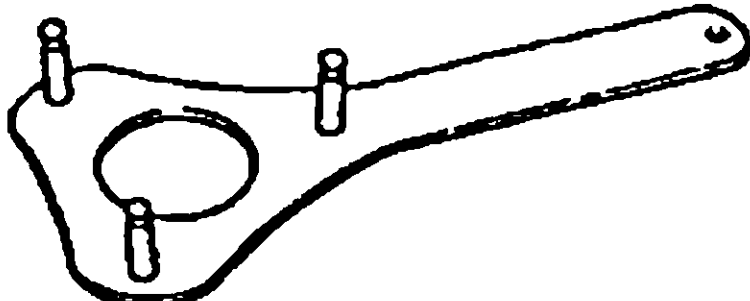
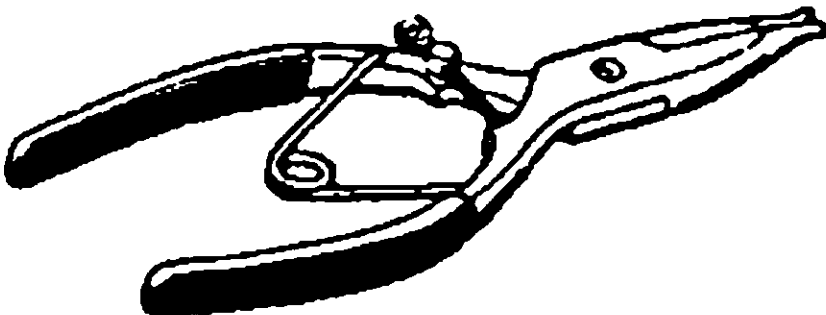


EQUIPMENT

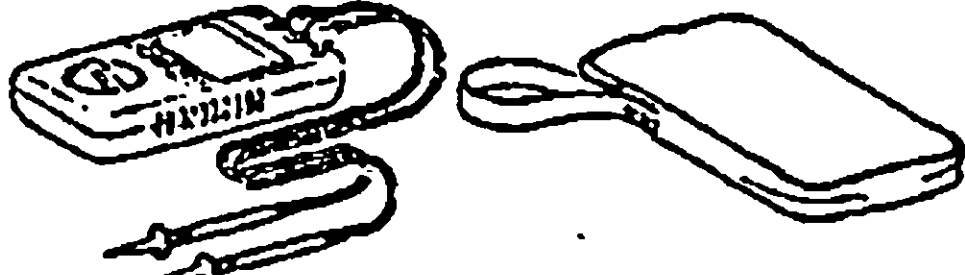
Voltmeter	
Ammeter	
Ohmmeter	
Test lead	
Dry cell battery	Height control sensor

AIR CONDITIONING
SST (Special Service Tools)

PP3FS-01

	07112-66040 Magnetic Clutch Remover	
	07112-76060 Magnetic Clutch Stopper	
	95994-10020 Snap Ring Pliers (DENSO Part No.)	

RECOMMENDED TOOLS

 09082-00040 TOYOTA Electrical Tester.	
--	--

EQUIPMENT

Voltmeter	
Ammeter	
Ohmmeter	
Test lead	
Thermometer	Sensor
Torque wrench	
Dial indicator	Magnetic clutch
Plastic hammer	Magnetic clutch

SERVICE SPECIFICATIONS

STANDARD BOLT	SS-1
MANUAL TRANSMISSION (R150F, R151F) .	SS-4
BRAKE	SS-6
STEERING	SS-7
AIR CONDITIONING	SS-9

SS

REFER TO FOLLOWING REPAIR MANUALS:

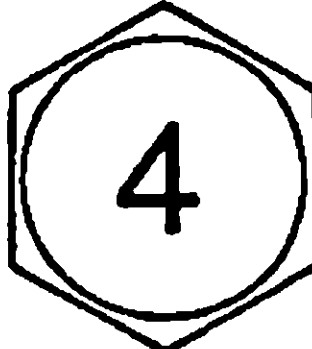
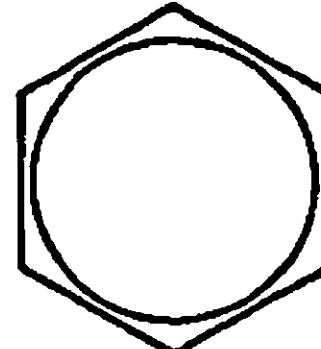
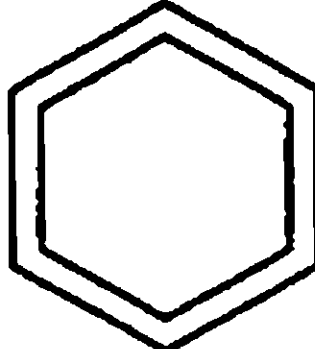
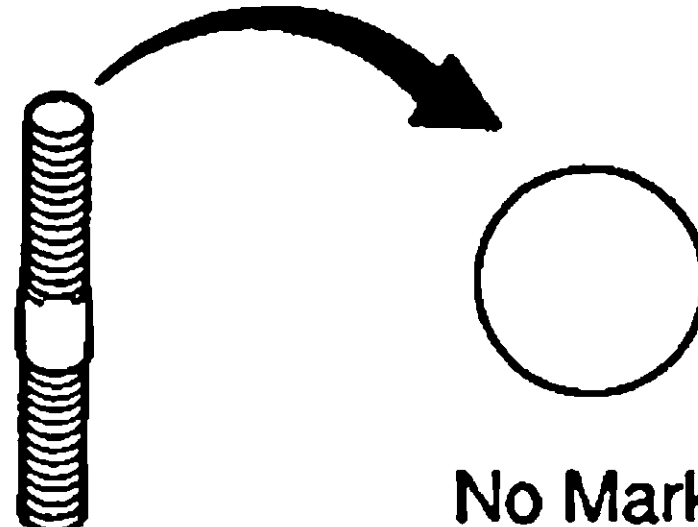
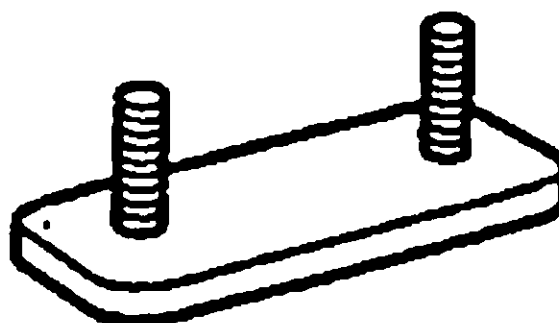
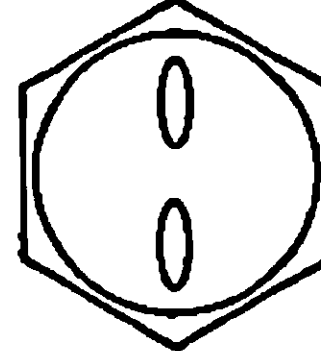
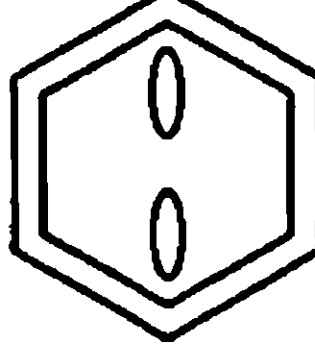
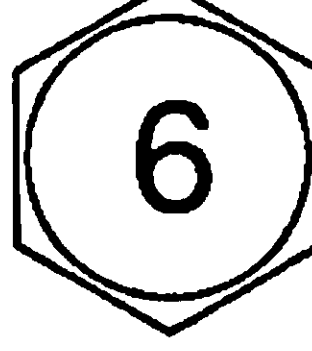
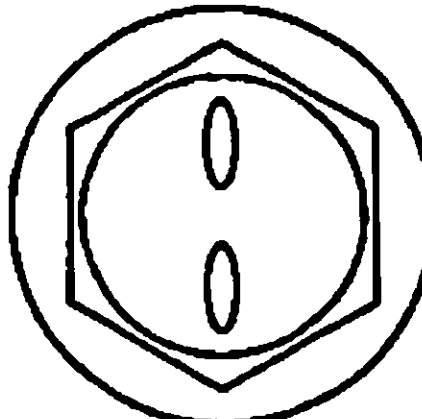
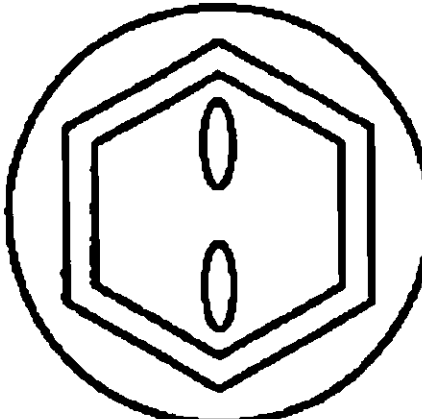
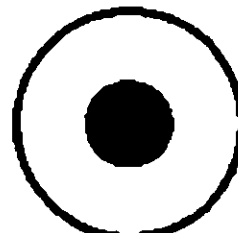
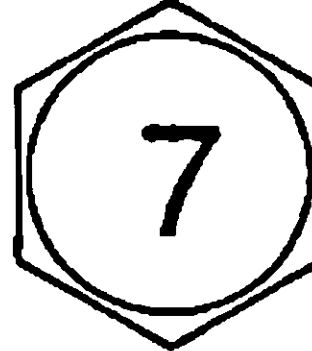
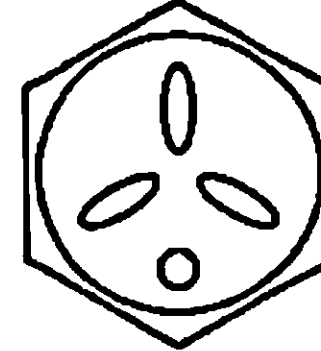
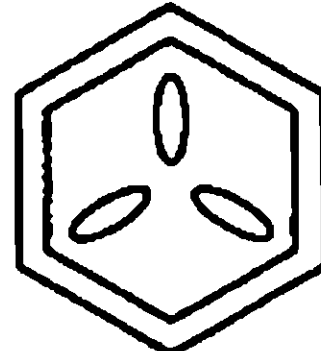
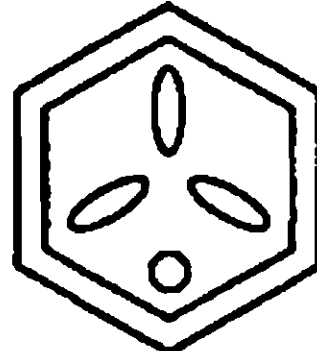
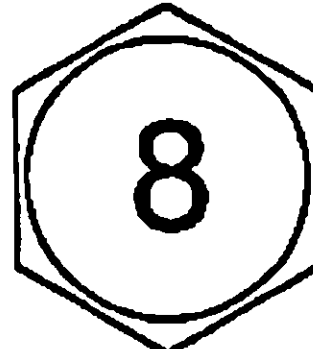
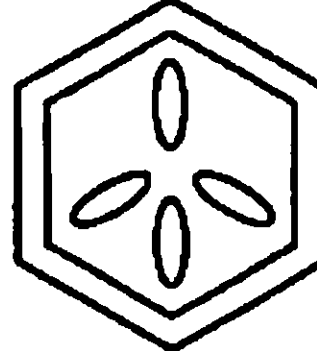
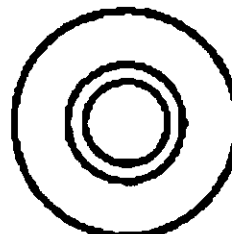
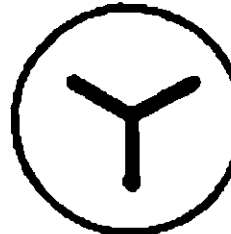
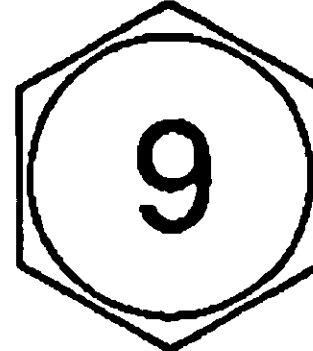
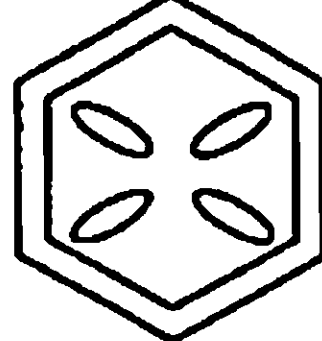
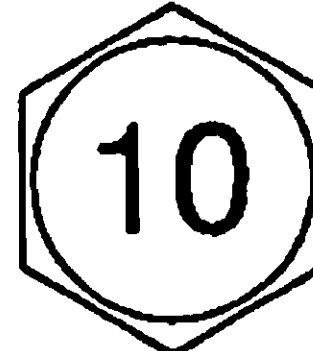
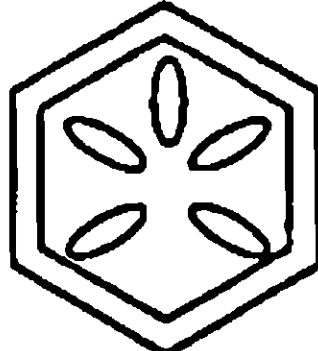
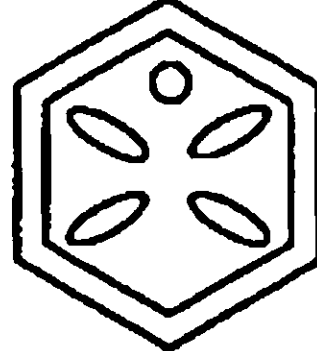
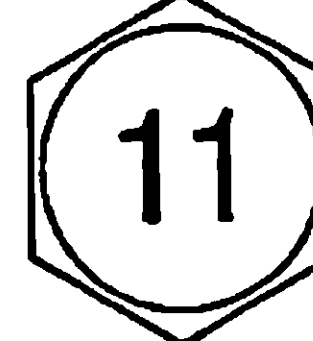
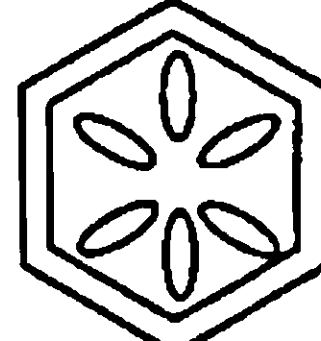
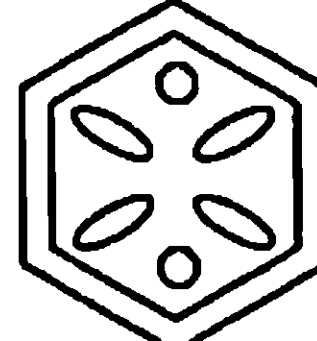
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LAND CRUISER/LAND CRUISER PRADO Chassis and Body Repair Manual Supplement (Jan., 1998)	RM627E
LAND CRUISER/LAND CRUISER PRADO Chassis and Body Repair Manual Supplement (Jun., 1999)	RM702E

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

STANDARD BOLT

HOW TO DETERMINE BOLT STRENGTH

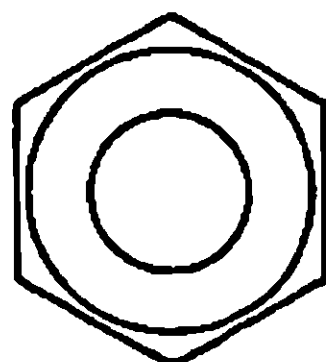
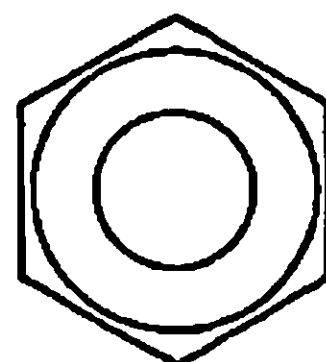
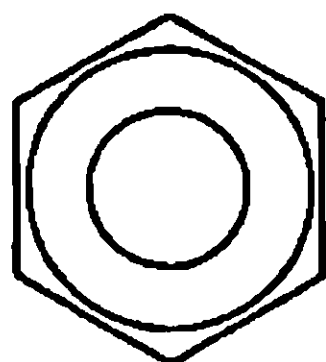
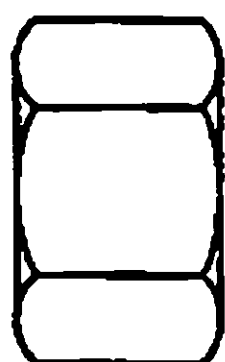
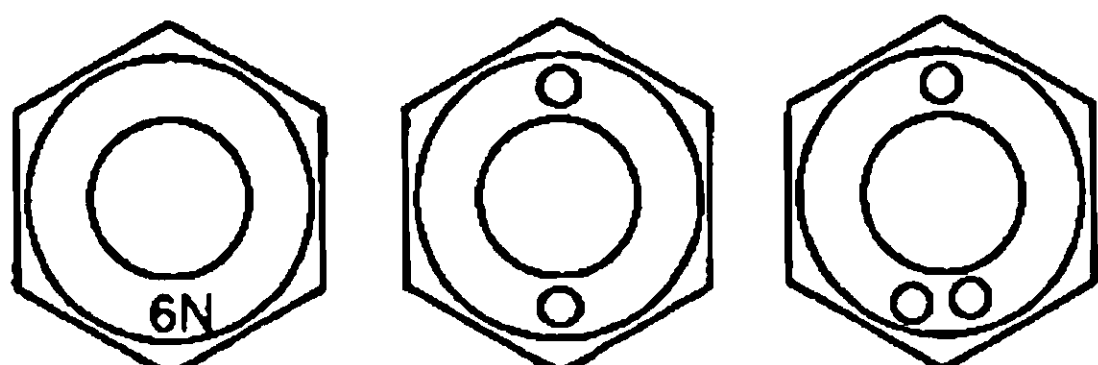
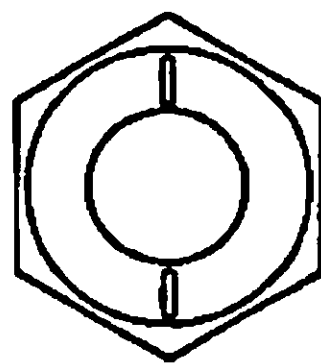
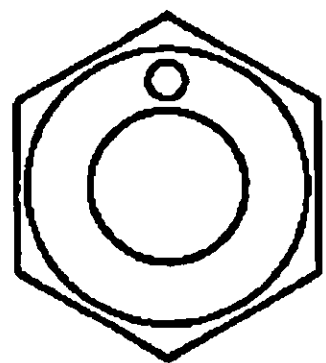
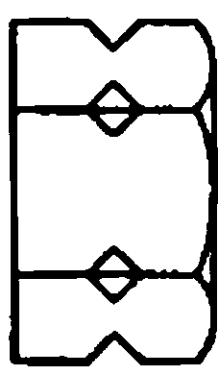
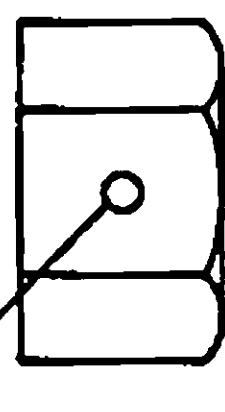
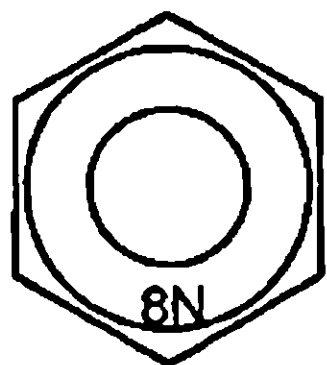
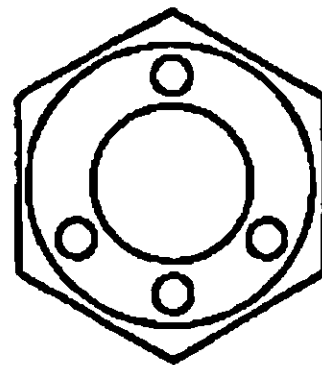
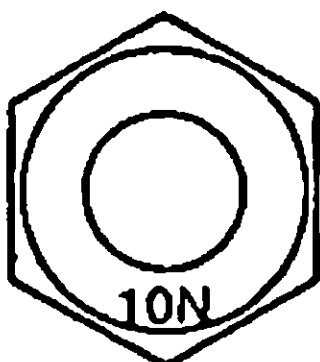
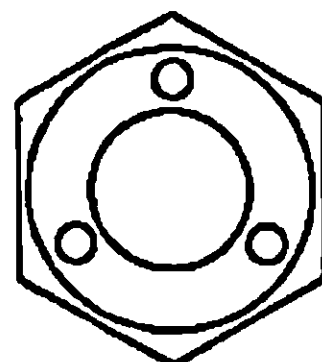
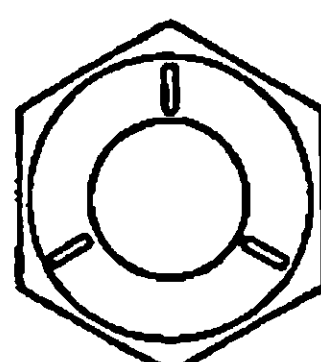
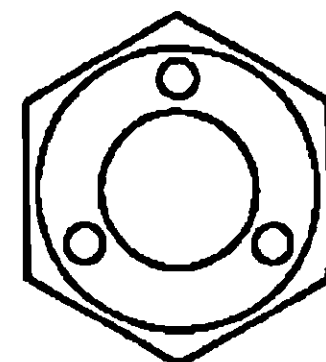
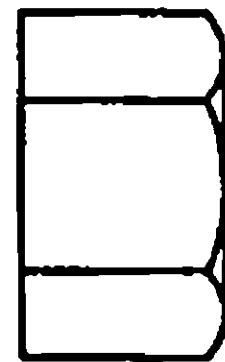
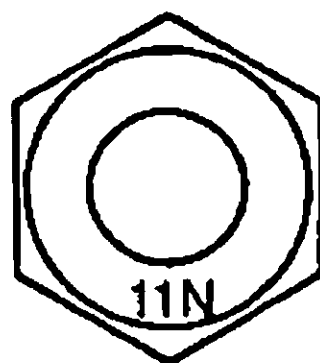
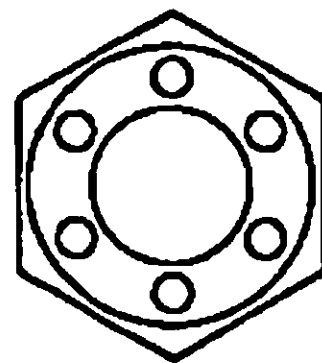
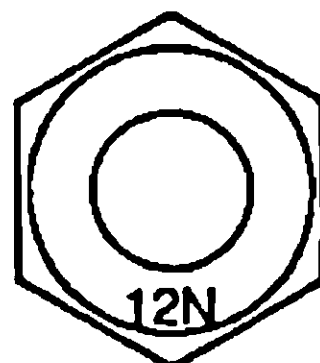
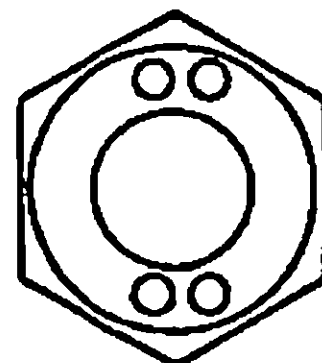
SS02S-01

Bolt Type				Class
Hexagon Head Bolt		Stud Bolt	Weld Bolt	
Normal Recess Bolt	Deep Recess Bolt			
  No Mark	 No Mark	 No Mark		4T
 				5T
  w/ Washer	 w/ Washer			6T
 	 			7T
		 		8T
				9T
	 			10T
	 			11T

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

HOW TO DETERMINE NUT STRENGTH

Nut Type			Class
Present Standard Hexagon Nut	Old Standard Hexagon Nut		
	Cold Forging Nut	Cutting Processed Nut	
 No Mark			4N
 No Mark (w/ Washer)	 No Mark (w/ Washer)	 No Mark	5N (4T)
			6N
	 	 	7N (5T)
 			8N
 	 	 No Mark	10N (7T)
 			11N
 			12N

*: Nut with 1 or more marks on one side surface of the nut.

HINT:

Use the nut with the same number of the nut strength classification or the greater than the bolt strength classification number when tightening parts with a bolt and nut.

Example: Bolt = 4T

Nut = 4N or more

MANUAL TRANSMISSION (R150F, R151F)

SS115-01

SERVICE DATA

Output shaft 1st gear journal diameter	Min.	38.979 mm (1.53460 in.)
Output shaft 2nd gear journal diameter	Min.	46.984 mm (1.84976 in.)
Output shaft 3rd gear journal diameter	Min.	37.984 mm (1.49543 in.)
Output shaft flange thickness	Min.	4.80 mm (0.1890 in.)
Output shaft runout	Max.	0.03 mm (0.0012 in.)
Gear thrust clearance 1st	STD	0.20 – 0.45 mm (0.0078 – 0.0177 in.)
	Max.	0.45 mm (0.0177 in.)
Gear thrust clearance 2nd and 3rd	STD	0.10 – 0.25 mm (0.0039 – 0.0098 in.)
	Max.	0.25 mm (0.0098 in.)
Gear radial clearance 1st	STD	0.020 – 0.073 mm (0.0008 – 0.0029 in.)
	Max.	0.073 mm (0.0029 in.)
Gear radial clearance 2nd and 3rd	STD	0.015 – 0.068 mm (0.0006 – 0.0027 in.)
	Max.	0.068 mm (0.0027 in.)
Shift fork No. 1 to reverse gear clearance	Max.	0.41 mm (0.0161 in.)
Shift fork No. 2 to hub sleeve clearance	Max.	0.35 mm (0.0138 in.)
Synchronizer ring to gear clearance 1st	Min.	0.65 mm (0.0256 in.)
Synchronizer ring to gear clearance 2nd	Min.	0.65 mm (0.0256 in.)
Synchronizer ring to gear clearance 3rd	Min.	0.75 mm (0.0295 in.)
Output shaft snap ring thickness Clutch hub No. 1	Mark A Mark B Mark C Mark D Mark E Mark F Mark G	2.30 – 2.35 mm (0.0906 – 0.0925 in.) 2.35 – 2.40 mm (0.0925 – 0.0945 in.) 2.40 – 2.45 mm (0.0945 – 0.0965 in.) 2.45 – 2.50 mm (0.0965 – 0.0984 in.) 2.50 – 2.55 mm (0.0984 – 0.1004 in.) 2.55 – 2.60 mm (0.1004 – 0.1024 in.) 2.60 – 2.65 mm (0.1024 – 0.1043 in.)
Output shaft snap ring thickness Clutch hub No. 2	Mark A Mark B Mark C Mark D Mark E Mark F Mark G	1.80 – 1.85 mm (0.0709 – 0.0728 in.) 1.85 – 1.90 mm (0.0728 – 0.0748 in.) 1.90 – 1.95 mm (0.0748 – 0.0768 in.) 1.95 – 2.00 mm (0.0768 – 0.0787 in.) 2.00 – 2.05 mm (0.0787 – 0.0807 in.) 2.05 – 2.10 mm (0.0807 – 0.0827 in.) 2.10 – 2.15 mm (0.0827 – 0.0846 in.)

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Transmission x Engine		72	730	53
Starter x Transmission		39	400	29
No. 2 rear end plate x Transmission	Bolt A	72	730	53
	Bolt B	37	380	27
Clutch release cylinder x Transmission		12	120	9
Front exhaust pipe x Exhaust manifold		62	630	46
Front exhaust pipe x Center exhaust pipe		43	440	32
No. 3 crossmember x Engine rear mounting		18	185	13
No. 3 crossmember x Frame		65	660	48
Engine rear mounting x Transmission		65	650	48
No. 4 crossmember x Frame (5 door)		65	660	48
Stiffener plate x Engine		72	730	53
Stabilizer bar bracket x Frame		25	260	19
Front differential rear mounting cushion	Bolt	108	1,100	80
	Nut	87	890	64
Transmission x Transfer		24	240	17
Filler and drain plug		37	380	27

SS

BRAKE

TORQUE SPECIFICATION

SS157-02

Part tightened	N·m	kgf·cm	ft·lbf
Brake line union nut	14	140	10
Hydraulic brake booster clevis lock nut	25	260	19
Hydraulic brake booster x Pedal bracket	15	155	11
Reservoir set screw	1.7	17.5	15.2 in.·lbf
Union bolt	32	320	23
Oil pressure sensor x Hydraulic brake booster	81	830	60
Accumulator x Booster pump motor	54	550	36
No. 1 hanger set bolt	7.8	80	69 in.·lbf
No. 2 hanger set bolt	7.8	80	69 in.·lbf
Fluid level warning switch connector clamp set bolt	7.8	80	69 in.·lbf

STEERING
SERVICE DATA

SS0MY-15

POWER STEERING FLUID		
Fluid level rise	Maximum	5 mm (0.20 in.)
Fluid pressure at idle speed with valve closed	Minimum	8,826 kPa (90 kgf/cm ² , 1,280 psi)

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
POWER STEERING VANE PUMP			
Pump assembly x Engine	39	400	30
Pressure feed tube x Pump assembly	47	475	34

AIR CONDITIONING
SERVICE DATA

SS10-01

Magnetic clutch clearance	0.5 ± 0.15 mm (0.020 ± 0.0059)
---------------------------	--------------------------------

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
VISCOUS HEATER AND MAGNETIC CLUTCH			
Viscous heater x Engine	45	459	33
Bracket x Engine	25	254	18
Pressure plate x Viscous heater	13.2	135	9

DIAGNOSTICS

ANTI-LOCK BRAKE SYSTEM	DI-1
HOW TO PROCEED WITH	
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DIAGNOSTIC TROUBLE CODE CHART	DI-2
CIRCUIT INSPECTION	DI-5
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TROUBLESHOOTING	DI-8
CUSTOMER PROBLEM ANALYSIS CHECK ...	DI-9
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TERMINALS OF ECU	DI-17
PROBLEM SYMPTOMS TABLE	DI-18
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REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
LAND CRUISER/LAND CRUISER PRADO Chassis and Body Repair Manual	RM517E
LAND CRUISER/LAND CRUISER PRADO Chassis and Body Repair Manual Supplement (Jan., 1998)	RM627E
LAND CRUISER/LAND CRUISER PRADO Chassis and Body Repair Manual Supplement (Jun., 1999)	RM702E

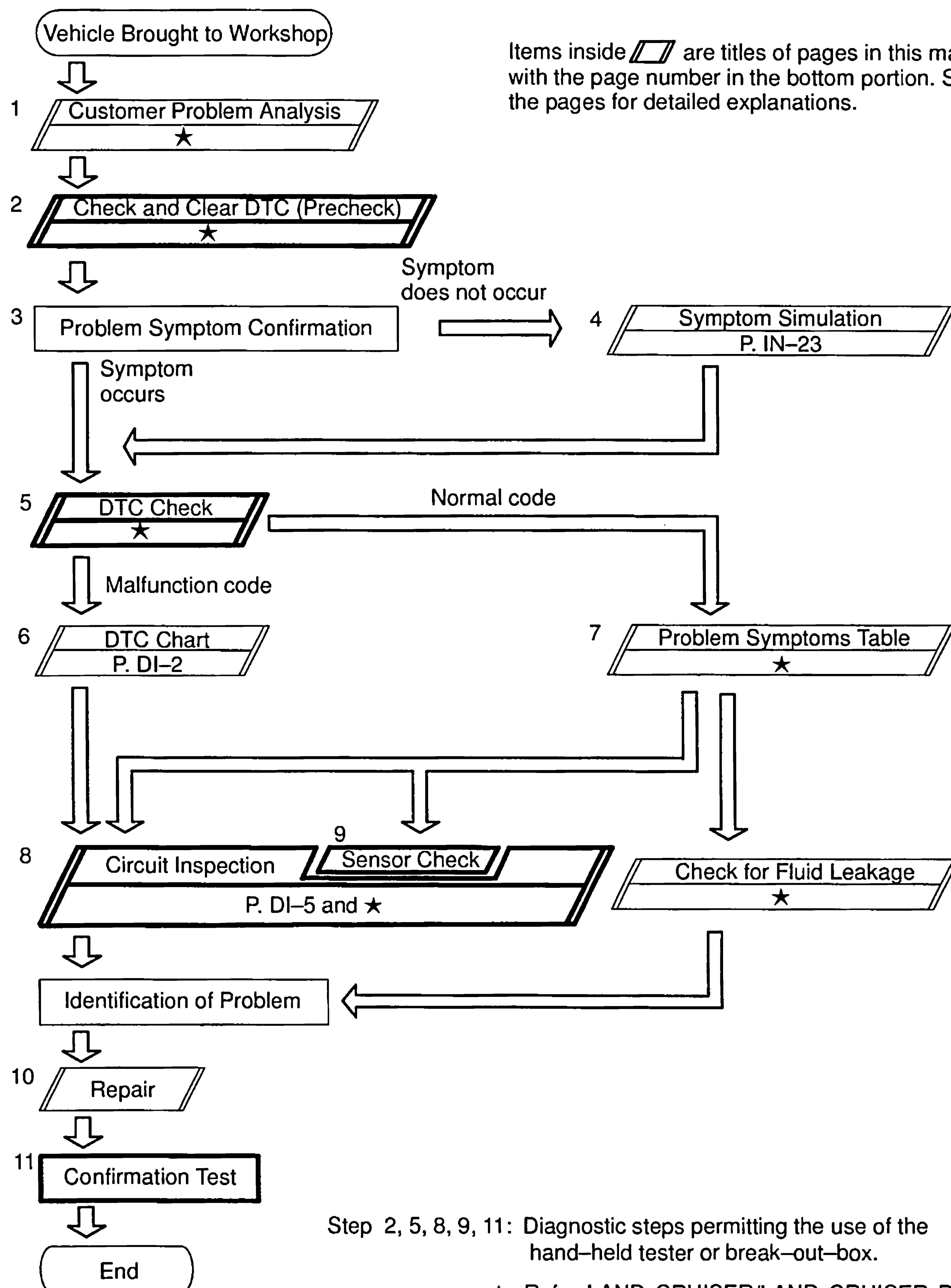
NOTE: The above pages contain only the points which differ from the above listed manuals.

ANTI-LOCK BRAKE SYSTEM

HOW TO PROCEED WITH TROUBLESHOOTING

DI6BA-02

Troubleshooting in accordance with the procedure on the following pages.



DIAGNOSTIC TROUBLE CODE CHART

NOTICE:

When removing the part, turn the ignition switch OFF.

HINT:

- Using SST 09843-18020, connect the terminals Tc and E₁ of check connector.
- If any abnormality is not found when inspecting parts, inspect the ECU.
- If a malfunction code is displayed during the DTC check, check the circuit listed that code. For details of each code, turn to the page referred to under the "See page" for respective "DTC No." in the DTC chart.
- EBD shall be checked according to the ABS trouble code chart.

Chart of ABS:

DTC No. (See Page)	Detection Item	Trouble Area
C0278 / 11 (★)	Open or short circuit in ABS solenoid relay circuit	• ABS solenoid relay • ABS solenoid relay circuit
C0279 / 12 (★)	B+ short circuit in ABS solenoid relay circuit	
C0226 / 21 (★)	Open or short circuit in hydraulic brake booster solenoid circuit (SFR circuit)	• Hydraulic brake booster • SFRR or SFRH circuit
C0236 / 22 (★)	Open or short circuit in hydraulic brake booster solenoid circuit (SFL circuit)	• Hydraulic brake booster • SFLR or SFLH circuit
C0246 / 23 (★)	Open or short circuit in hydraulic brake booster solenoid circuit (SRR circuit)	• Hydraulic brake booster • SRRR or SRRH circuit
C0256 / 24 (★)	Open or short circuit in hydraulic brake booster solenoid circuit (SRL circuit)	• Hydraulic brake booster • SRLR or SRLH circuit
C1225 / 25 (★)	Open or short circuit in hydraulic brake booster solenoid circuit (SA1 circuit)	• Hydraulic brake booster • SA1 circuit
C1226 / 26 (★)	Open or short circuit in hydraulic brake booster solenoid circuit (SA2 circuit)	• Hydraulic brake booster • SA2 circuit
C1227 / 27 (★)	Open or short circuit in hydraulic brake booster solenoid circuit (SA3 circuit)	• Hydraulic brake booster • SA3 circuit
C1228 / 28 (★)	Open or short circuit in hydraulic brake booster solenoid circuit (STR circuit)	• Hydraulic brake booster • STR circuit
C0200 / 31*1 (★)	Right front wheel speed sensor signal malfunction	• Right front, left front, right rear and left rear speed sensor • Each speed sensor circuit • Sensor rotor
C0205 / 32*1 (★)	Left front wheel speed sensor signal malfunction	
C0210 / 33*1 (★)	Right rear wheel speed sensor signal malfunction	
C0215 / 34*1 (★)	Left rear wheel speed sensor signal malfunction	
C1237 / 37 (★)	Some tire is different size from the other tires	Tire size
C1241 / 41 (★)	Low battery voltage or abnormally high battery voltage	• Battery • IC regulator • Power source circuit
C1242 / 42*2 (★)	Open circuit in IG2 circuit	• Battery • IC regulator • Power source circuit

C1243 / 43 (★)	Malfunction in deceleration sensor (constant output)	• Deceleration sensor • Wire harness for deceleration sensor system
C1244 / 44 (★)	Open or short circuit in deceleration sensor circuit	• Deceleration sensor • Deceleration sensor circuit
C1245 / 45 (★)	Malfunction in deceleration sensor	• Deceleration sensor • Wire harness for deceleration sensor system
C1246 / 46 (DI-5)	Malfunction in master cylinder pressure sensor	• Master cylinder pressure sensor • Master cylinder pressure sensor circuit
C1249 / 49 (★)	Open circuit in stop light switch circuit	Stop light switch circuit
C1251 / 51* ² (★)	Pump motor is locked Open circuit in pump motor ground	Hydraulic brake booster pump motor
C1252 / 52* ² (★)	Hydraulic brake booster pump motor malfunction	• Hydraulic brake booster pump motor • Hydraulic brake booster pump motor circuit • Pressure switch (PH or PL)
C1253 / 53* ² (★)	Hydraulic brake booster pump motor relay malfunction	• ABS or TRC motor relay • ABS or TRC motor relay circuit • Hydraulic brake booster pump motor circuit
C1254 / 54* ² (★)	Pressure switch malfunction	• Pressure switch (PH or PL) • Pressure switch circuit
C1256 / 56* ² (★)	Accumulator low pressure malfunction	• Accumulator • Pressure switch (PH or PL) • Hydraulic brake booster pump motor
C1257 / 57* ² (★)	Power supply drive circuit malfunction	• Battery • Power source circuit • ABS & BA & TRC ECU or ABS & BA & TRC & VSC ECU
C1268 / 68 (★)	Transfer L4 position signal transmission failure	• Transfer L4 position switch • Transfer L4 position switch circuit
C1269 / 69 (★)	Malfunction in neutral start switch circuit (R range)	• Neutral start switch • Neutral start switch circuit (R range)
Always ON (★)	Malfunction in ABS & BA & TRC ECU or ABS & BA & TRC & VSC ECU	• Battery • IC regulator • Power source circuit • ABS & BA & TRC ECU or ABS & BA & TRC & VSC ECU

★: Refer LAND CRUISER/LAND CRUISER PRADO Chassis and Body Repair Manual Supplement (Pub. No. RM702E).

- *¹: As the DTC cannot be erased by replacing parts alone do either of the following operations.
 - (1) Clear DTC (See Pub. No. RM702E on page DI-86).
 - (2) At the vehicle speed of 20 km/h (12 mph), drive the vehicle for 30 sec. or more.
- *²: Using the following table, troubled parts can be specified.

Table of trouble Part and DTC:

DTC		42		51		52		53		54		56		57	
Brake warning light and buzzer		Light	Buzzer	Light	Buzzer	Light	Buzzer	Light	Buzzer	Light	Buzzer	Light	Buzzer	Light	Buzzer
Pressure switch	PH					○	○			○		○	○		
	PL					○	○			○		○	○		
Pump motor circuit	Pump motor			○	○	○	○					○	○		
	MTT wire harness					○	○	○							
	MT+ wire harness			○											
	MT- wire harness			○											
Accumulator malfunction												○	○		
Motor relay circuit	MR1 open circuit							○							
	MR2 open circuit							○							
	MR1 welded contact					○	○	○							
	MR2 welded contact					○	○	○							
Hydraulic brake booster	Pressure leaks					○	○					○	○		
Power source*	IG2 open circuit	○													
ECU	Power supply circuit													○	

*: When IG1 circuit is open, ABS warning light and brake warning light come on.

CIRCUIT INSPECTION

DTC	C1246 / 46	Master Cylinder Pressure Sensor Circuit
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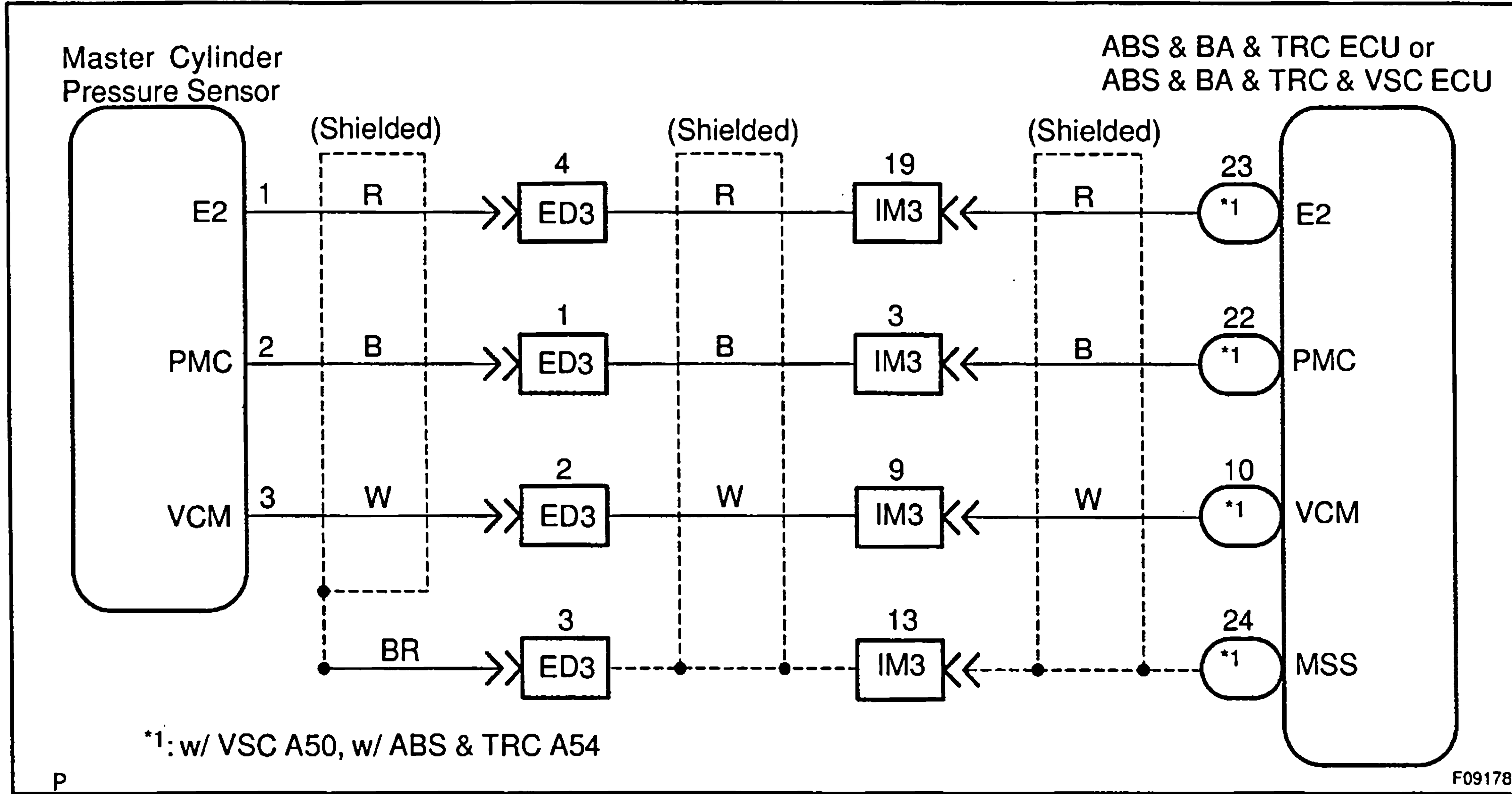
CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1246 / 46	Either of the following 1., 2., 3., 4. or 5. is detected: 1. At the vehicle speed of 7 km/h (4 mph) or more, ECU terminal PMC voltage becomes more than 0.86 V and the condition that 0.01 V or less does not change continues for 30 sec. 2. Interference occurs to ECU terminal PMC 7 times or more for 5 sec. 3. ECU terminal STP is OFF, and the condition that terminal PMC voltage becomes more than 0.86 V or less than 0.3 V continues for 5 sec. or more. 4. The condition that ECU terminal IG1 voltage is 9.5 V to 17.0 V, and terminal VCM voltage other than the range from 4.4 V to 5.6 V continues for 1.2 sec. or more. 5. The condition that ECU terminal VCM voltage is 4.4 V to 5.6 V, and terminal PMC voltage other than the range from 0.14 V to 4.85 V continues for 1.2 sec. or more.	• Master cylinder pressure sensor • Master cylinder pressure sensor circuit

Fail safe function:

If trouble occurs in the master cylinder pressure sensor circuit, the ECU cuts off current to the ABS solenoid relay and prohibits ABS & BA & TRC or ABS & BA & TRC & VSC controls and the brake system becomes normal.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1

Check output value of the master cylinder pressure sensor.

PREPARATION:

- DI
- (a)

Connect the hand-held tester to the DLC3.
- (b)

Turn the ignition switch ON and push the hand-held tester main switch ON.
- (c)

Select the DATALIST mode on the hand-held tester.

CHECK:

Check that the brake fluid pressure value of the master cylinder pressure sensor displayed on the hand-held tester is changing when depressing the brake pedal.

OK:

Brake fluid pressure value must be changing.

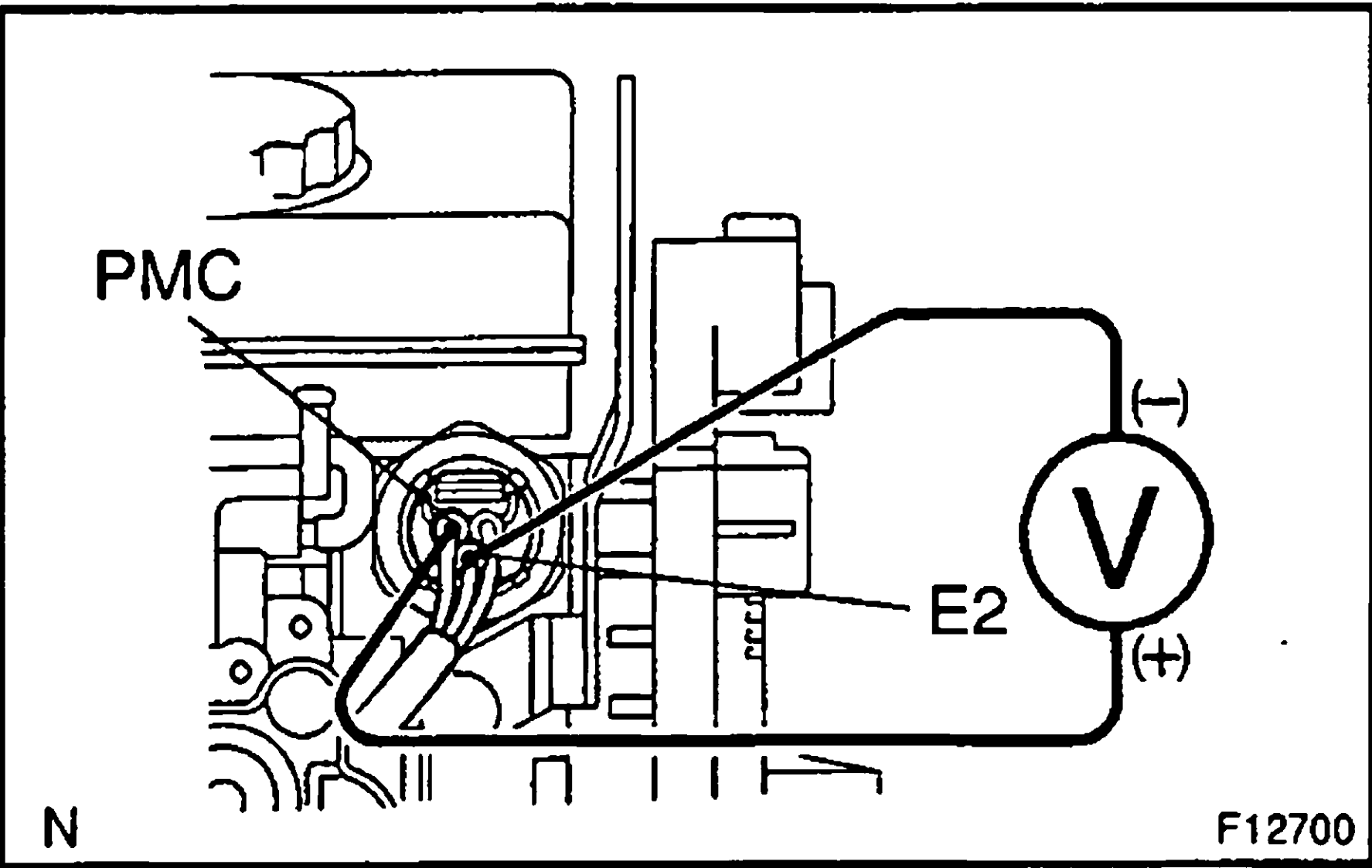
OK

Go to step 4.

NG

2

Check master cylinder pressure sensor.



PREPARATION:

- (a)

Install LSPV gauge to the front caliper bleeder plug portion, and bleed LSPV gauge.
SST 09709-29018
- (b)

Remove air cleaner inlet and battery clamp cover.

CHECK:

Start the engine and depress the brake pedal, then check the relation between the fluid pressure and voltage of PMC and E2 terminals of the master cylinder pressure sensor with connector still connected.

OK:

Front brake caliper fluid pressure	Voltage
0 kPa (0 Kgf/cm ² , 0 psi)	0.37 – 0.63 V
5,883 kPa (60 kgf/cm ² , 853 psi)	1.57 – 1.83 V
11,768 kPa (120 kgf/cm ² , 1,706 psi)	2.77 – 3.03 V

HINT:

Voltage of between terminals VCM and E2: 4.7 – 5.3 V

NG

Replace master cylinder pressure sensor.

OK

3	Check for open and short circuit in harness and connector between master cylinder pressure sensor and ABS & BA & TRC ECU or ABS & BA & TRC & VSC ECU (See page IN-33).
---	--

NG	Repair or replace harness or connector.
----	---

OK

DI

4	Check whether or not the ECU terminal STP input voltage is changed when the stop light switch is turned on and off.
---	---

NO	Check the stop light switch circuit (See Pub. No. RM517E on page BE-34).
----	--

YES

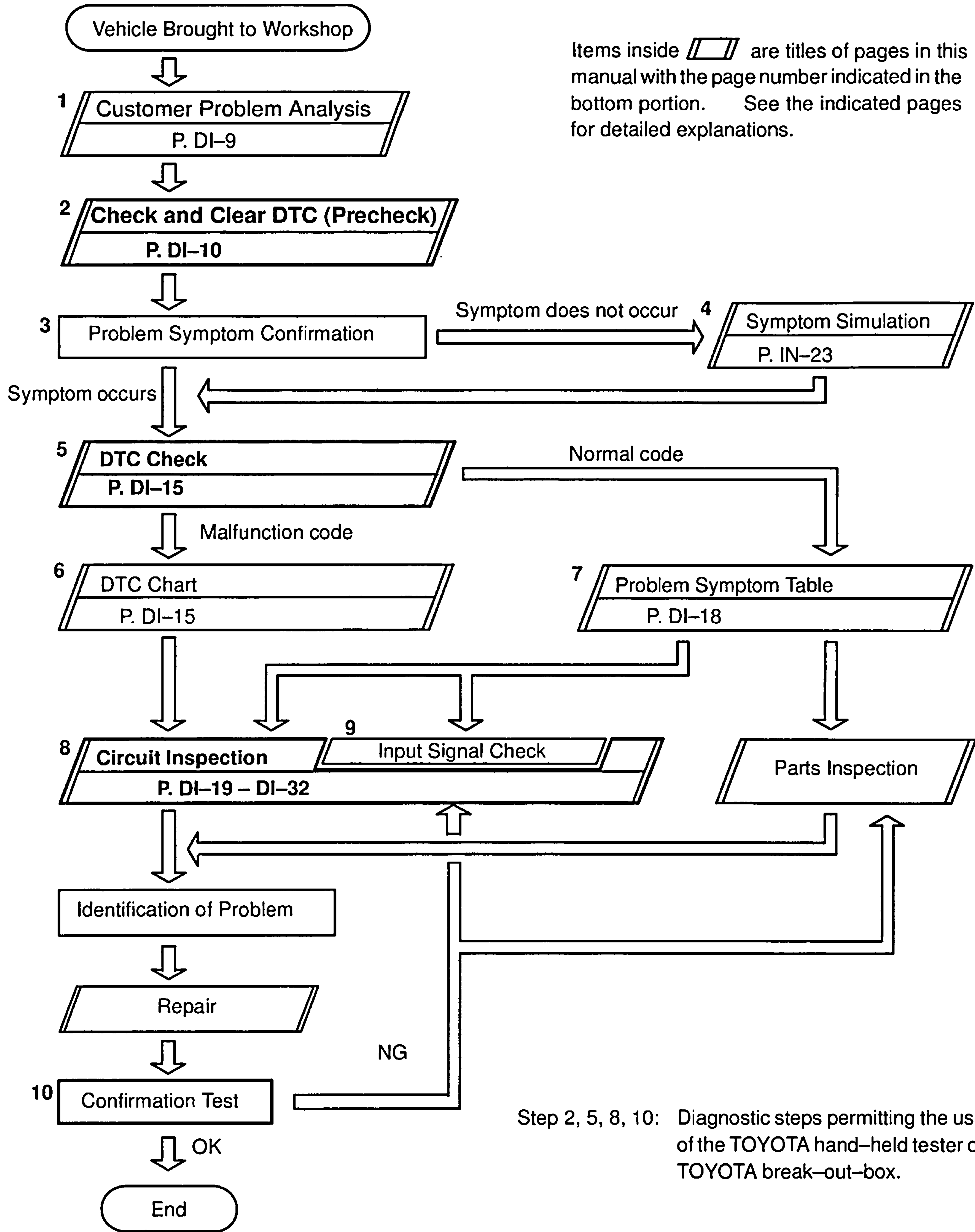
Check and replace ABS & BA & TRC ECU or ABS & BA & TRC & VSC ECU.

CRUISE CONTROL SYSTEM

HOW TO PROCEED WITH TROUBLESHOOTING

DI26R-20

Troubleshoot in accordance with the procedure on the following page.



CUSTOMER PROBLEM ANALYSIS CHECK

CRUISE CONTROL SYSTEM Check Sheet

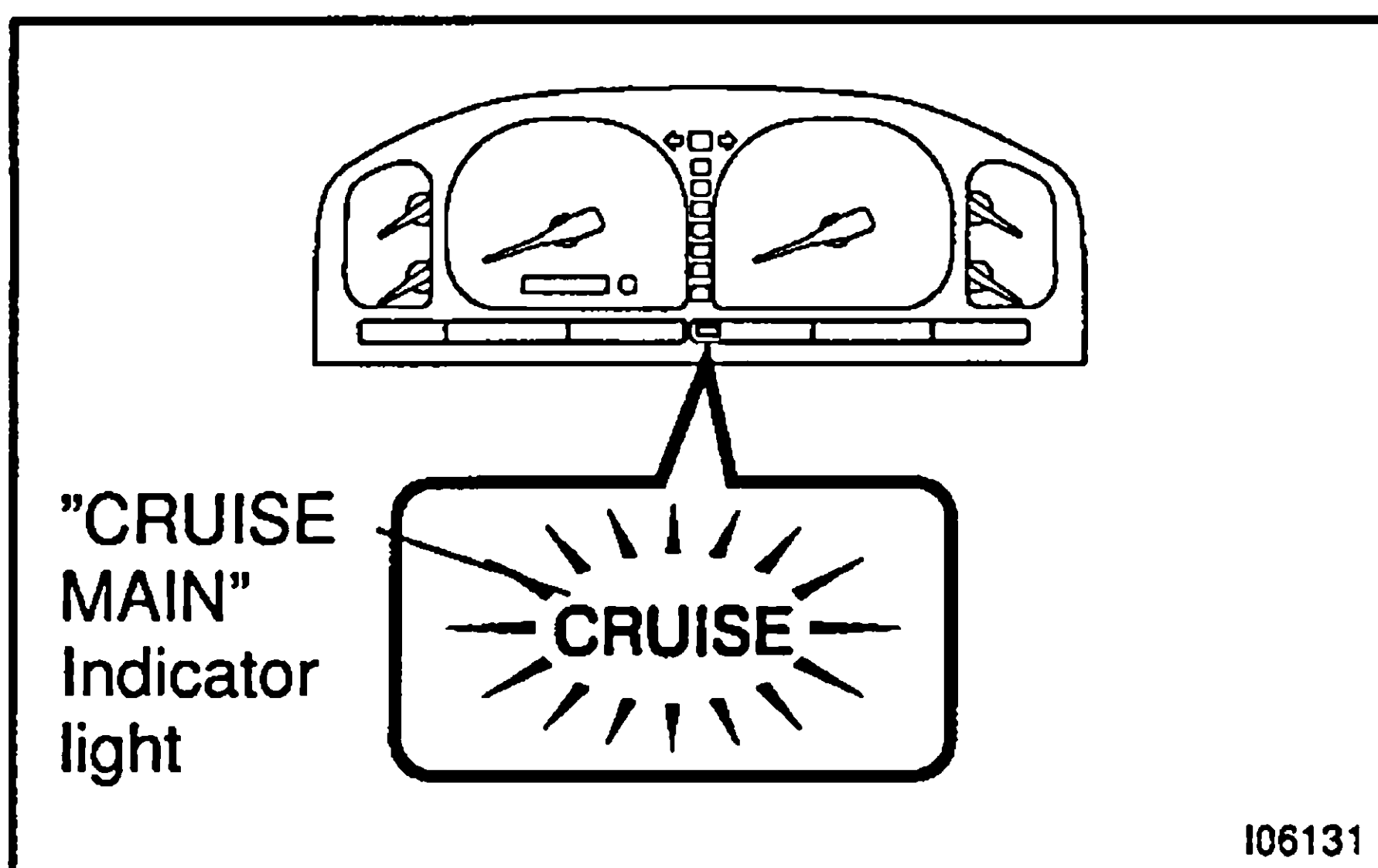
Inspector's name: _____

Customer's Name		Registration No.	
		Registration Year	
		Frame No.	
Date of Vehicle Brought in	/ /	Odometer Reading	km Mile

Condition of Problem Occurrence	Date of Problem Occurrence	/ /
	Frequency Problem Occurs?	☐ Continuous ☐ Intermittent (Times a day)
	Vehicle Speed when Problem Occurred	km Mile

Symptoms	☐ Auto cancel occurs	• Driving condition ☐ City driving ☐ Freeway ☐ Up hill ☐ Down hill • After cancel occurred, did the driver activate cruise control again? ☐ Yes ☐ No
	☐ Cancel does not occur	☐ With brake ON ☐ Except D position shift ☐ When control SW turns to CANCEL position
	☐ Cruise control malfunction	☐ Slip to acceleration side ☐ Slip to deceleration side ☐ Hunting occurs ☐ O/D cut off does not occur ☐ O/D does not return
	☐ Switch malfunction	☐ SET ☐ ACCEL ☐ COAST ☐ RESUME ☐ CANCEL
	☐	☐ Remains ON ☐ Does not light up ☐ Blinks

DTC Check	1st Time	☐ Normal Code ☐ Malfunction Code (Code)
	2nd Time	☐ Normal Code ☐ Malfunction Code (Code)



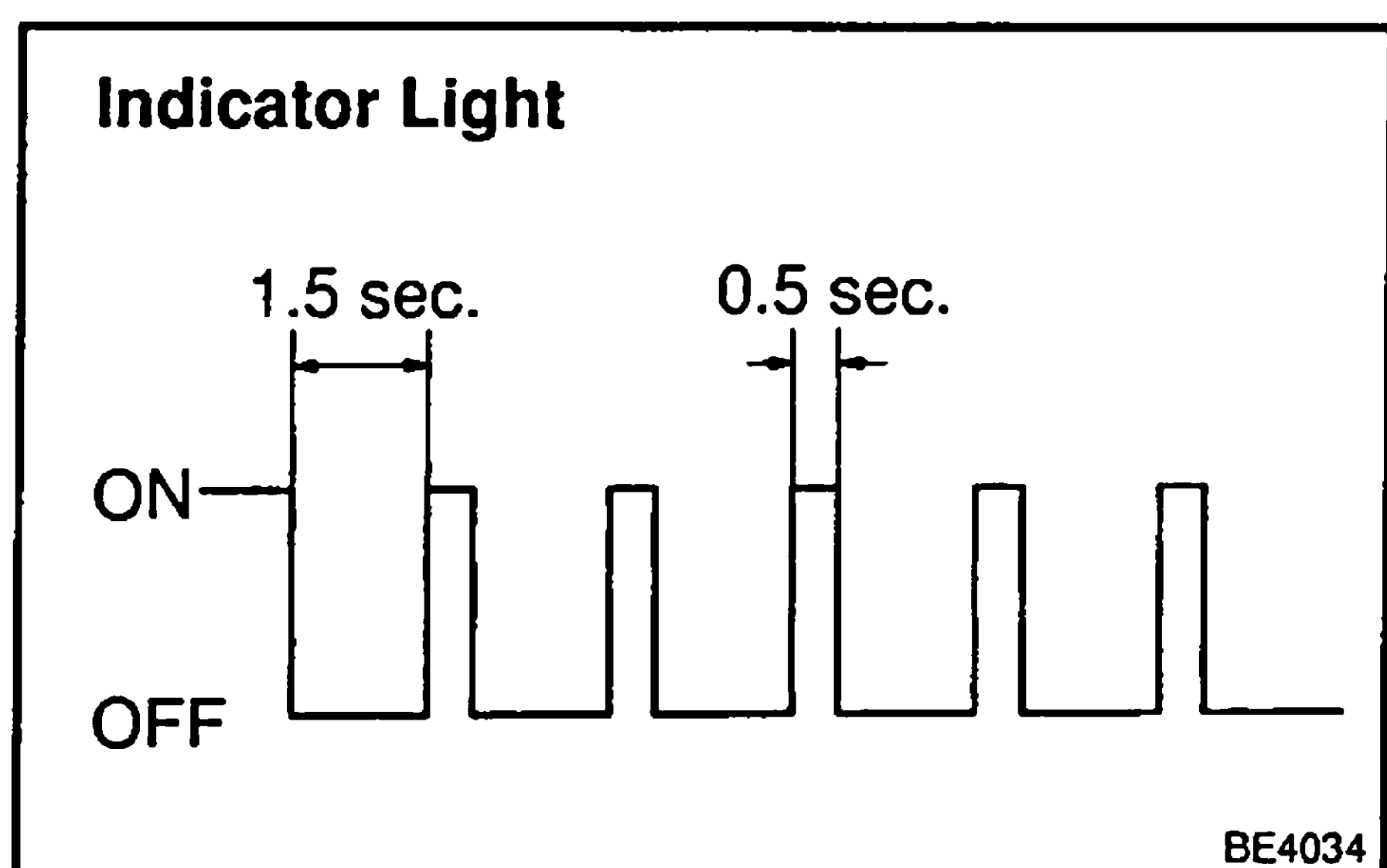
PRE-CHECK

1. DIAGNOSIS SYSTEM

- (a) Check the indicator.
 - (1) Turn the ignition switch to ON.
 - (2) Check that the CRUISE MAIN indicator light comes on when the cruise control main switch is turned ON, and that the indicator light goes off when the main switch is turned OFF.

HINT:

If the indicator check result is not normal, proceed to troubleshooting (See Pub. No. RM627E on page BE-1) for the combination meter section.



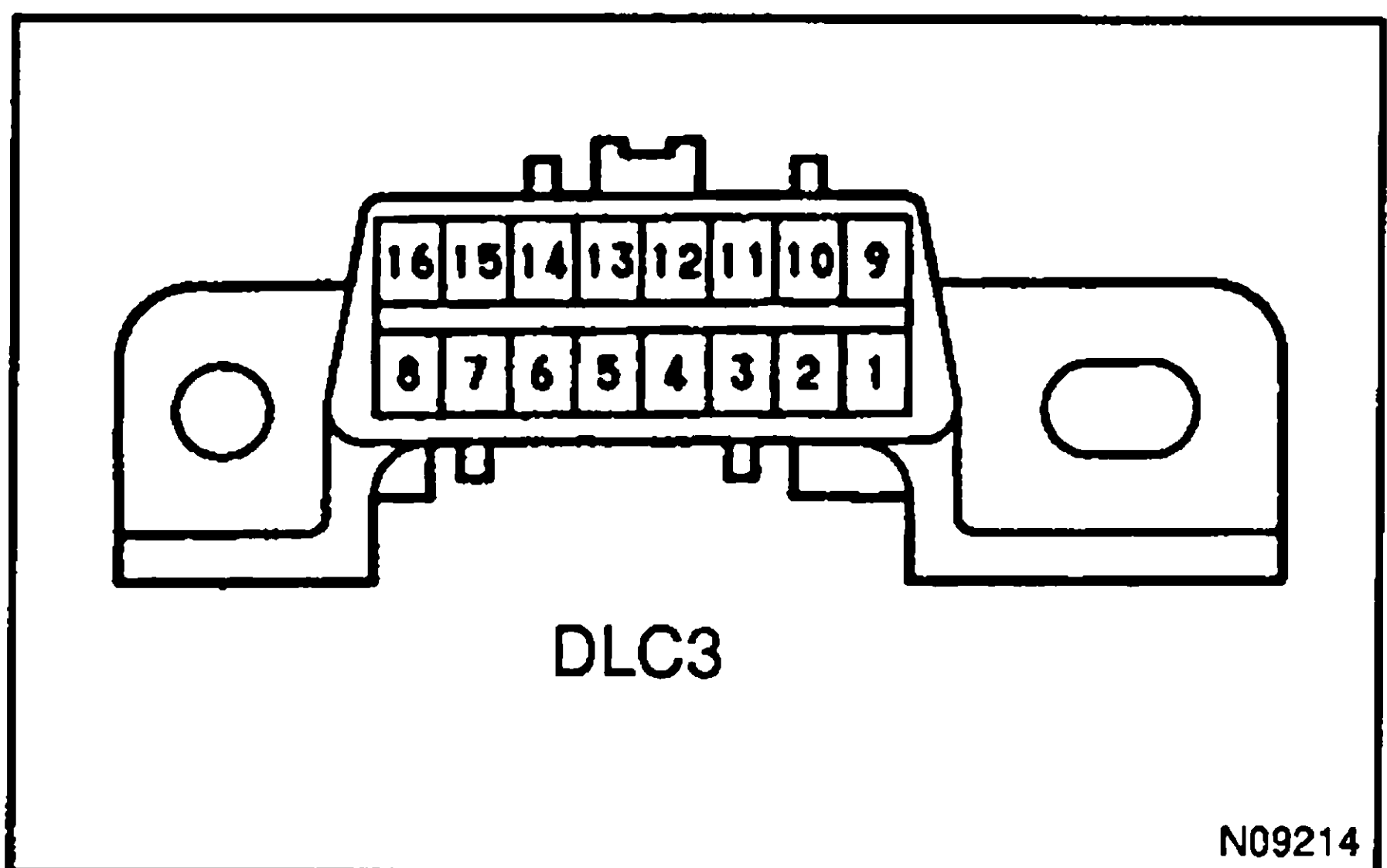
- (b) Check the DTC.

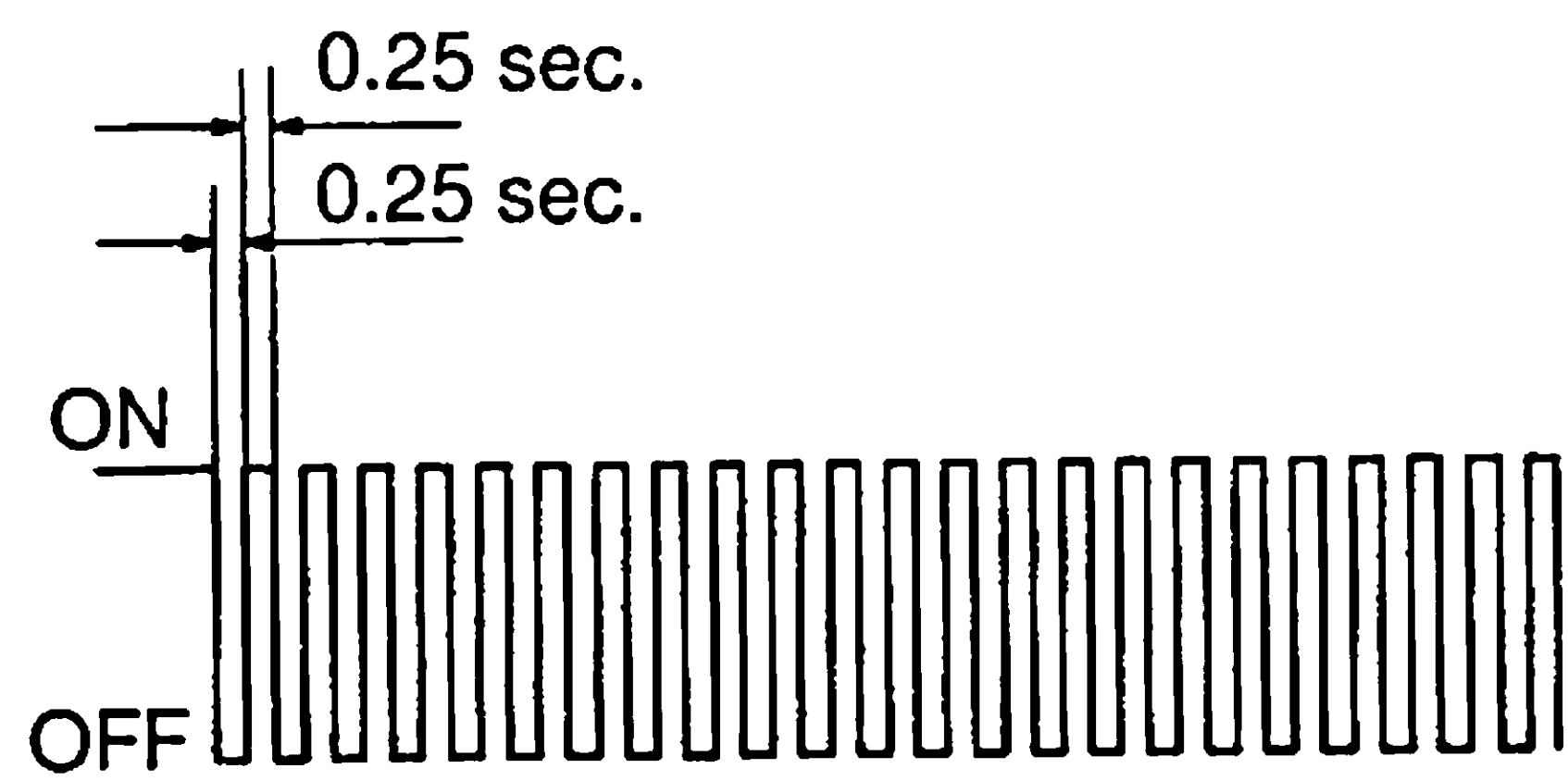
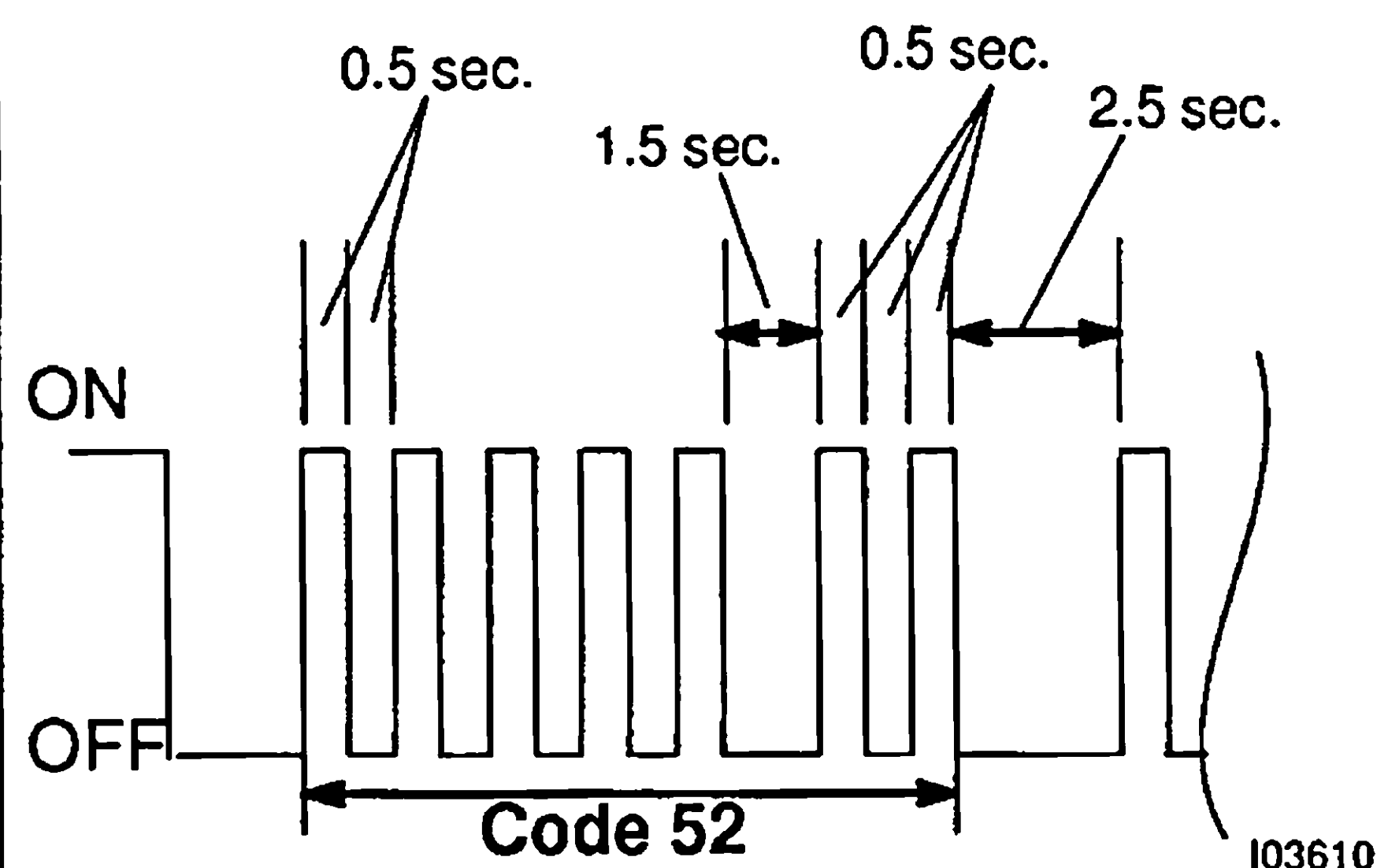
HINT:

If a malfunction occurs in the speed sensor or actuator, etc. during cruise control driving, the ECU actuates AUTO CANCEL of the cruise control and turns ON and OFF the CRUISE MAIN indicator light to inform the driver of a malfunction. At the same time, the malfunction is stored in memory as a diagnostic trouble code.

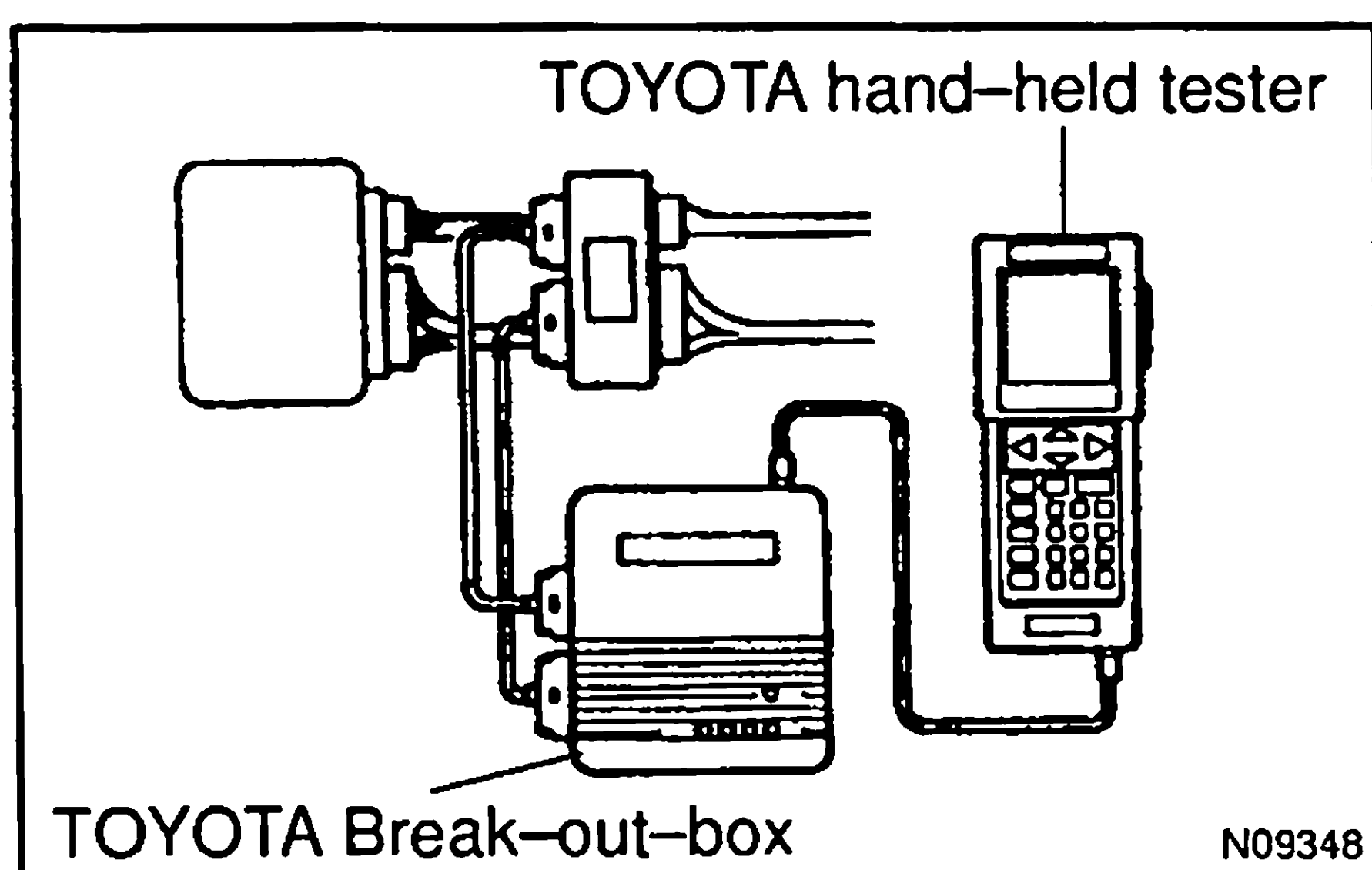
- (c) Output DTC using diagnosis check wire.

- (1) Turn the ignition switch ON.
- (2) Using SST, connect terminals Tc and E₁ of DLC3.
SST 09843-18020
- (3) Read the DTC on the CRUISE MAIN indicator light.



Normal Code**Malfunction codes 52****HINT:**

- If the DTC is not output, inspect the diagnosis circuit.
- As an example, the blinking patterns for codes; normal and 52 are shown in the illustration.



2. ECU TERMINAL VALUES MEASUREMENT BY USING TOYOTA BREAK-OUT-BOX AND TOYOTA HAND-HELD TESTER

- Hook up the TOYOTA break-out-box and TOYOTA hand-held tester to the vehicle.
- Read the ECU input/output values by following the prompts on the tester screen.
- Please refer to the TOYOTA hand-held tester has a "Snapshot" function. This records the measured data and is effective in the diagnosis of intermittent problems.

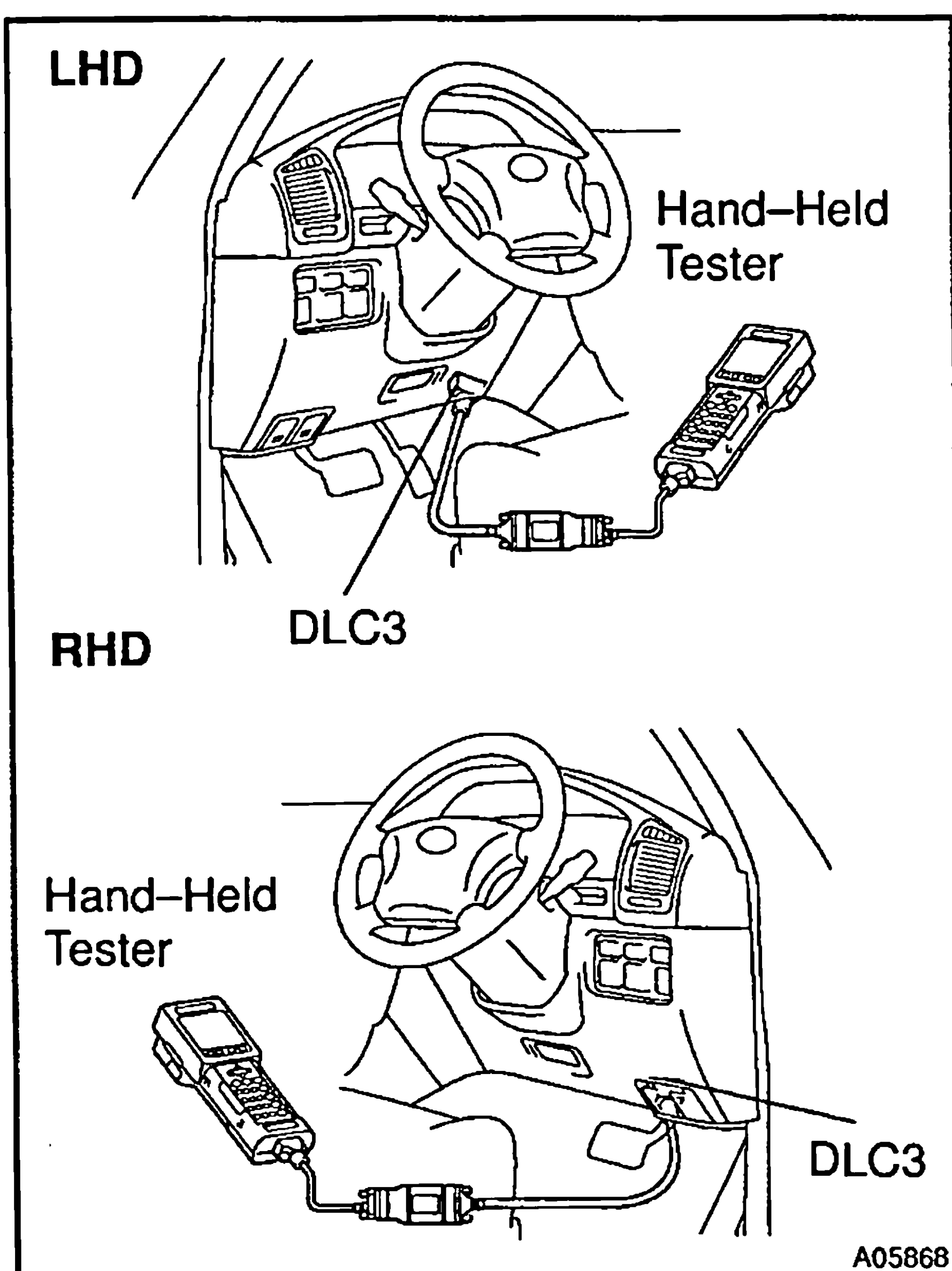
3. USING TOYOTA HAND-HELD TESTER

- Hook up the TOYOTA hand-held tester to the DLC3.
- Monitor the ECU data by following the prompts on the tester screen.

HINT:

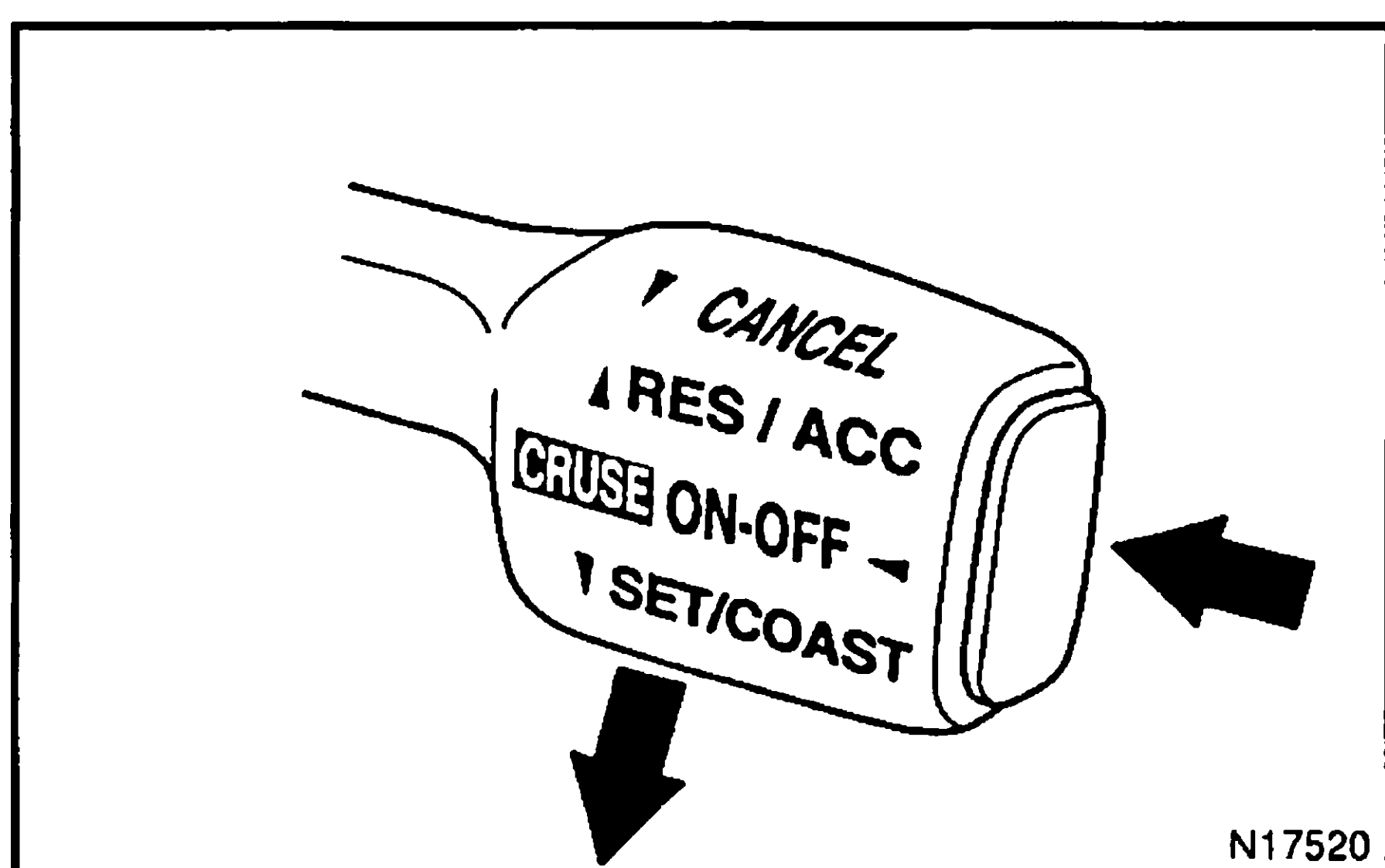
TOYOTA hand-held tester has a "Snapshot" function which records the monitored data.

Please refer to the TOYOTA hand-held tester operator's manual for further details.

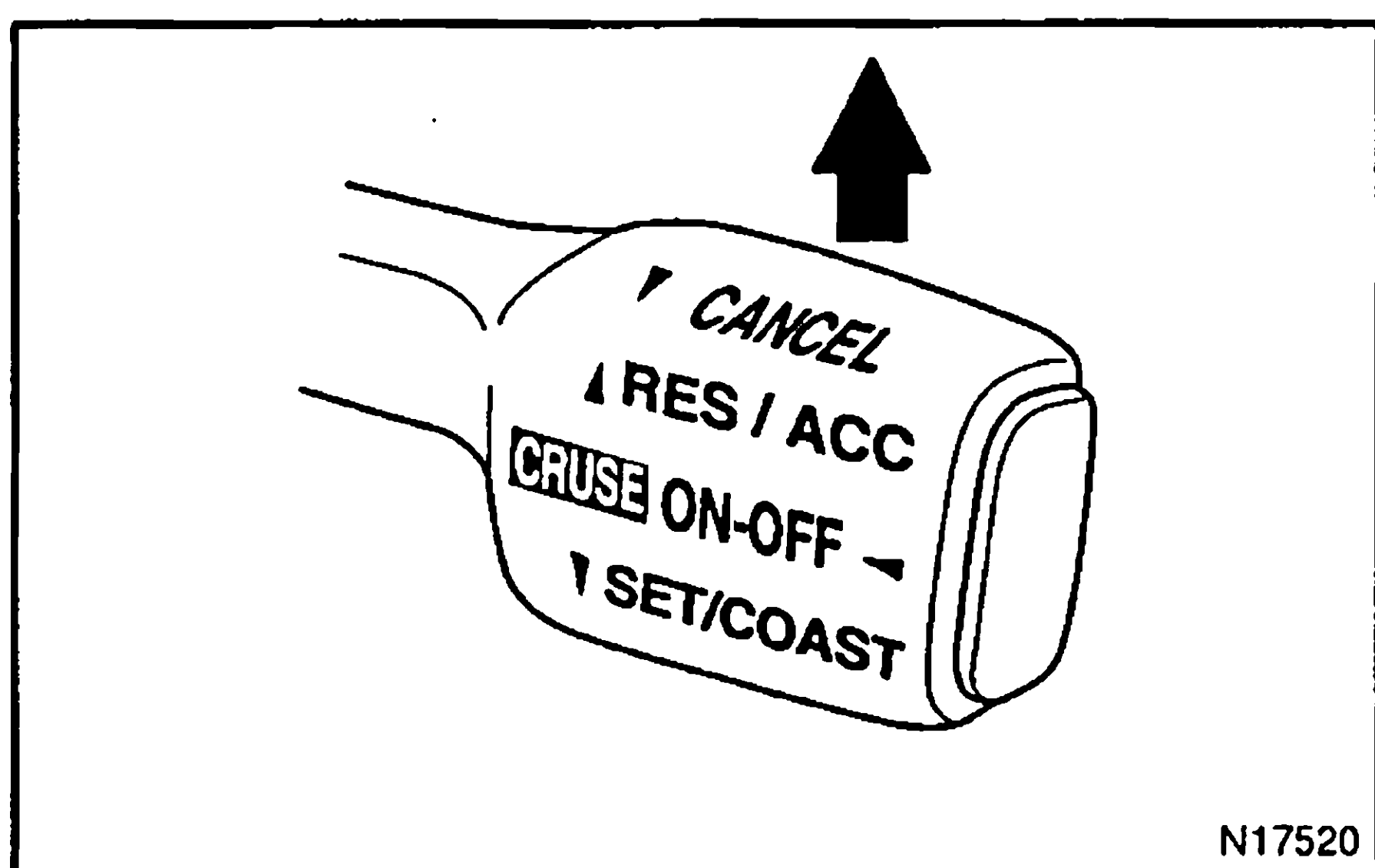


4. DTC CLEARANCE

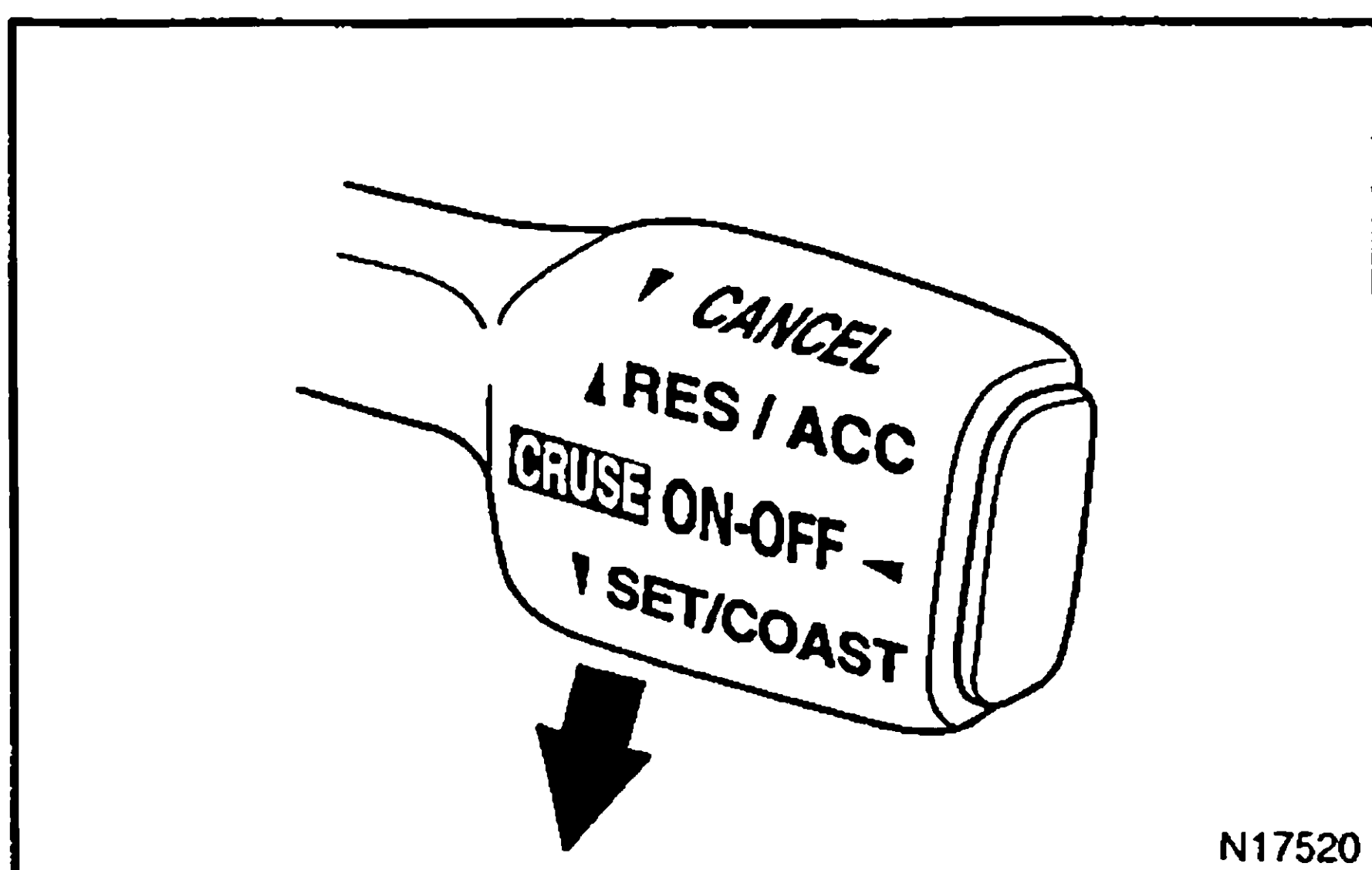
- (a) The following actions will erase the DTCs and freeze frame data.
 - (1) Operating the OBD II scan tool (complying with SAEJ1978) or TOYOTA hand-held tester to erase the codes. (See the OBD II scan tool's instruction book for operating instructions.)
 - (2) Disconnecting the battery terminals or EFI fuse.
- (b) After completing repairs, the DTC retained in memory can be cleared by removing the ECU-B fuse for 10 seconds or more with the ignition switch off.
- (c) Check that the normal code is displayed after connecting the fuse.

**5. PROBLEM SYMPTOM CONFIRMATION (ROAD TEST)**

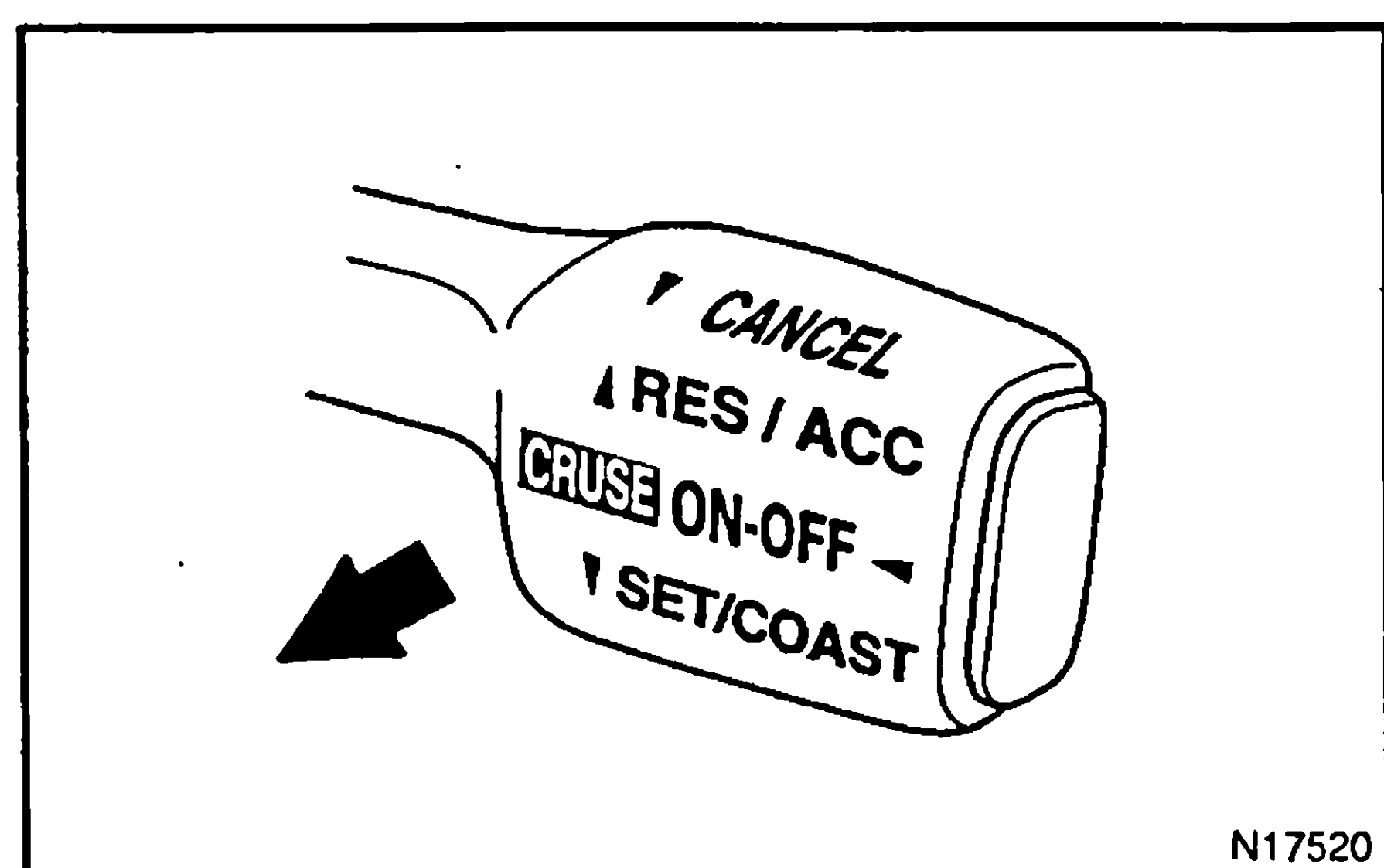
- (a) Inspect the SET switch.
 - (1) Push the main switch ON.
 - (2) Drive at a desired speed (40 km/h (25 mph) or higher).
 - (3) Press the control switch to the SET/COAST.
 - (4) After releasing the switch, check that the vehicle cruises at the desired speed.



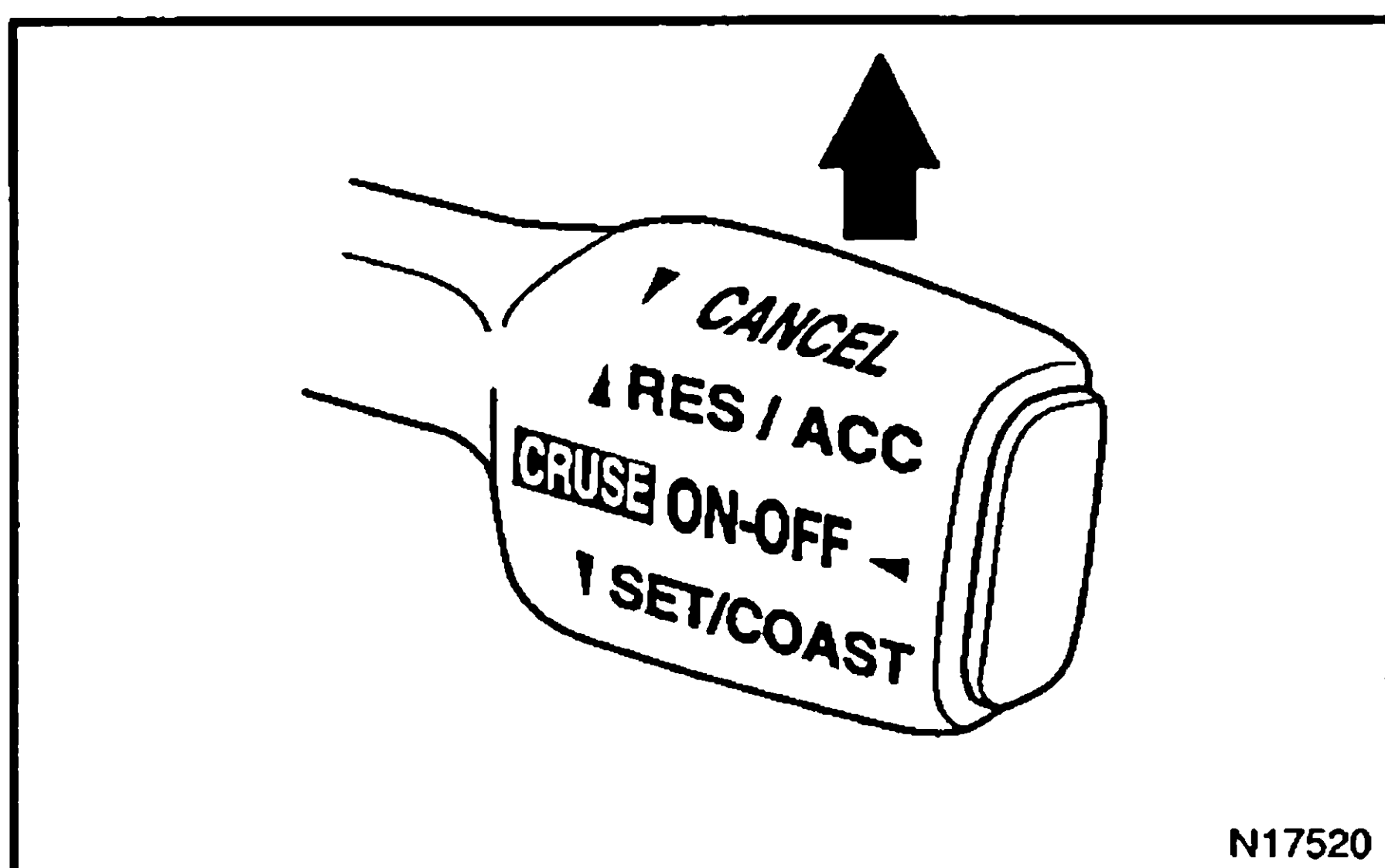
- (b) Inspect the ACCEL switch.
 - (1) Push the main switch ON.
 - (2) Drive at a desired speed (40 km/h (25 mph) or higher).
 - (3) Check that the vehicle speed increases while the control switch is turned to RES/ACC, and that the vehicle cruises at the set speed when the switch is released.
 - (4) Momentarily press the control switch upward in the RES/ACC and then immediately release it. Check that the vehicle speed increases by about 1.5 km/h (Tap-up function).



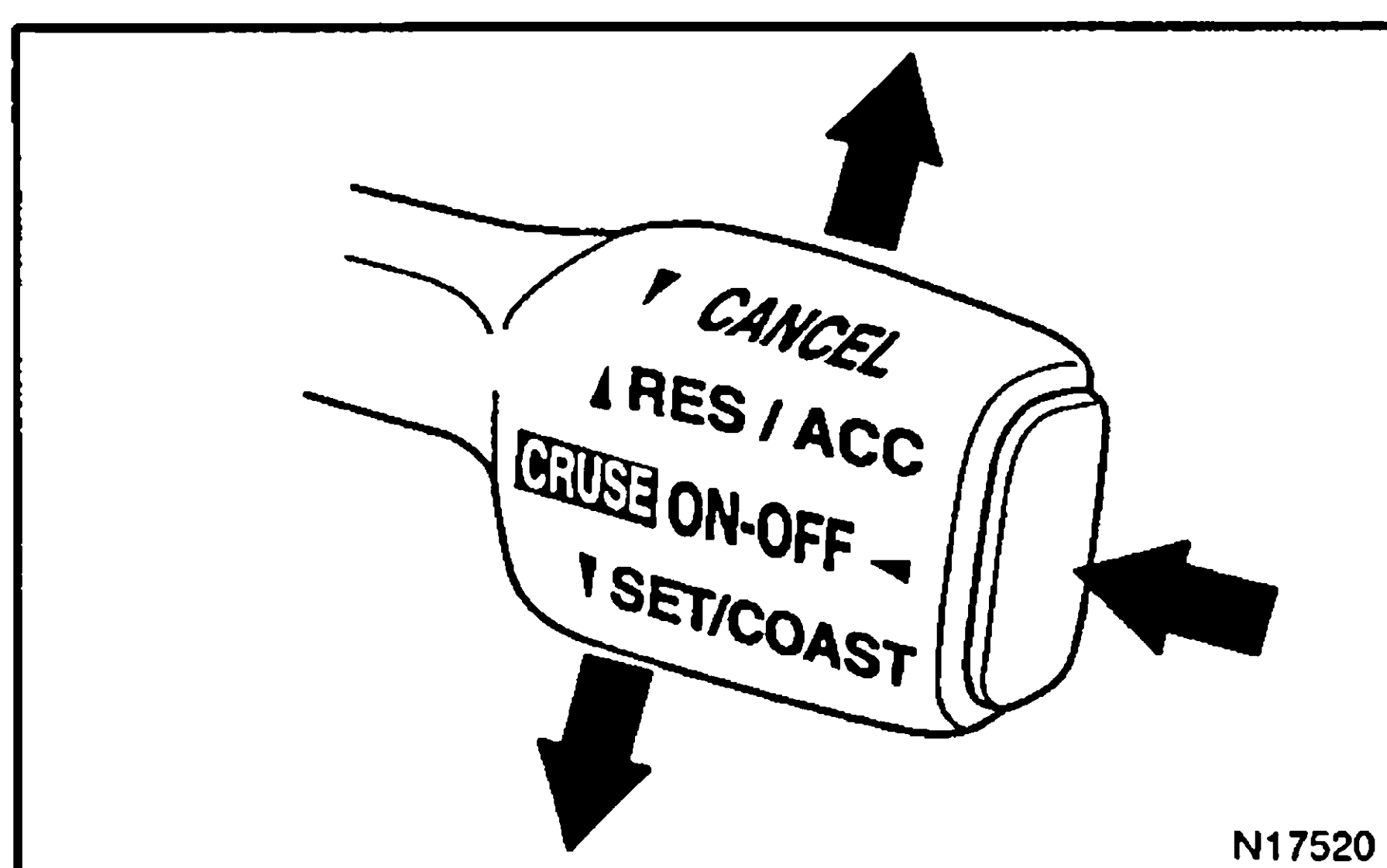
- (c) Inspect the COAST switch.
- (1) Push the main switch ON.
 - (2) Drive at a desired speed (40 km/h (25 mph) or higher).
 - (3) Check that the vehicle speed decreases while the control switch is turned to SET/COAST, and the vehicle cruises at the set speed when the switch is released.
 - (4) Momentarily press the control switch is turned to SET/COAST, and then immediately release it. Check that the vehicle speed decreases by about 1.5 km/h (Tap-down function).



- (d) Inspect the CANCEL switch.
- (1) Push the main switch ON.
 - (2) Drive at a desired speed (40 km/h (25 mph) or higher).
 - (3) When operating one of the followings, check that the cruise control system is cancelled and that the normal driving mode is reset.
 - Depress the brake pedal
 - Shift to except D position (A/T)
 - Push the main switch OFF
 - Pull the cruise control switch to CANCEL



- (e) Inspect the RESUME switch.
- (1) Push the main switch ON.
 - (2) Drive at a desired speed (40 km/h (25 mph) or higher).
 - (3) When operating one of the followings, check that the cruise control system is cancelled and that the normal driving mode is reset.
 - Depress the brake pedal
 - Shift to except D position (A/T)
 - Pull the cruise control switch to CANCEL
 - (4) After the control switch is turned to RES/ACC at the driving speed of more than 40 km/h (25 mph), check that the vehicle restores the speed prior to the cancellation.



6. INPUT SIGNAL CHECK (Using TOYOTA hand-held tester)

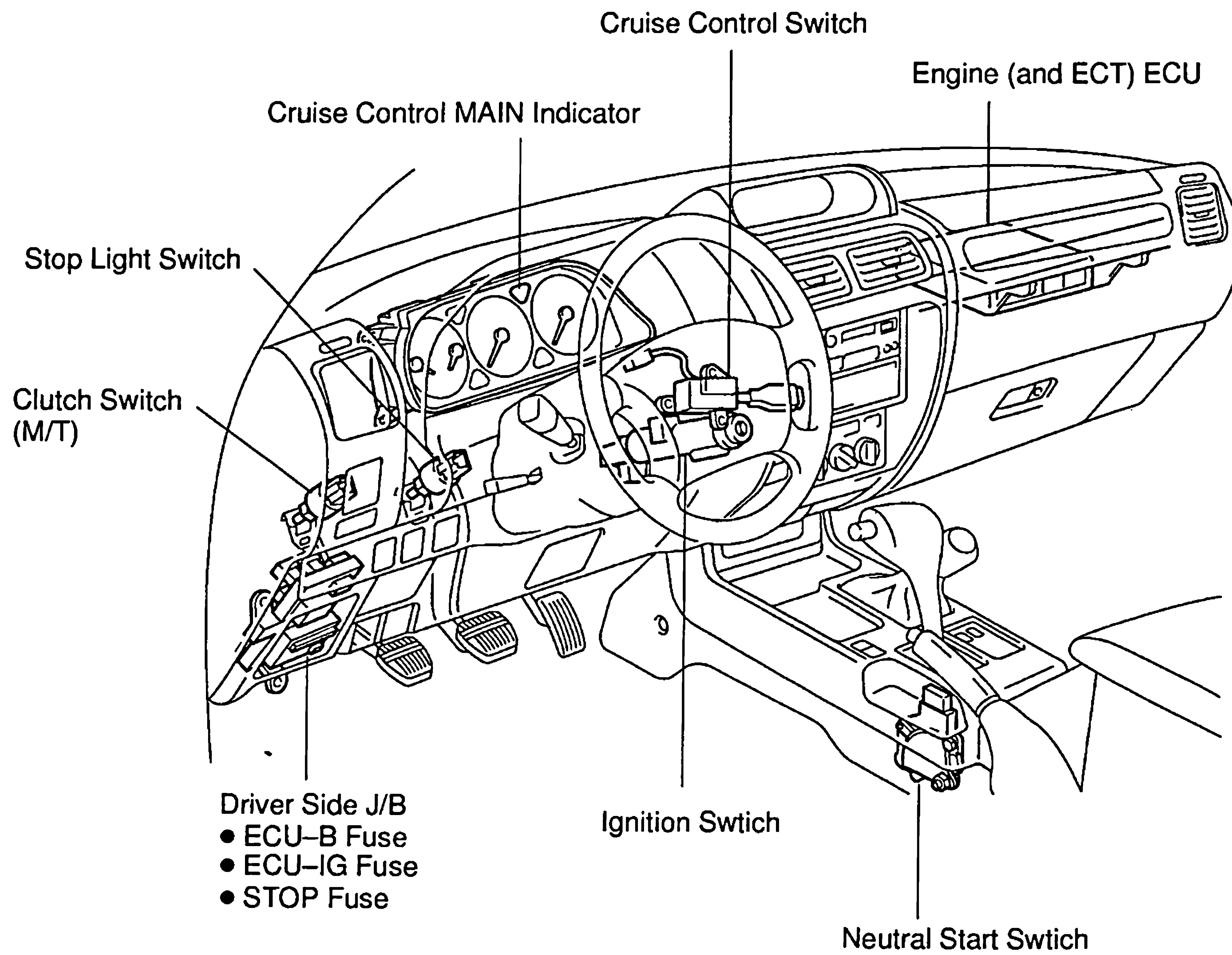
- (a) Connect the TOYOTA hand-held tester to DLC3
- (b) Check the control switch (MAIN, CANCEL, SET/COAST, RES/ACC).

DIAGNOSTIC TROUBLE CODE CHART

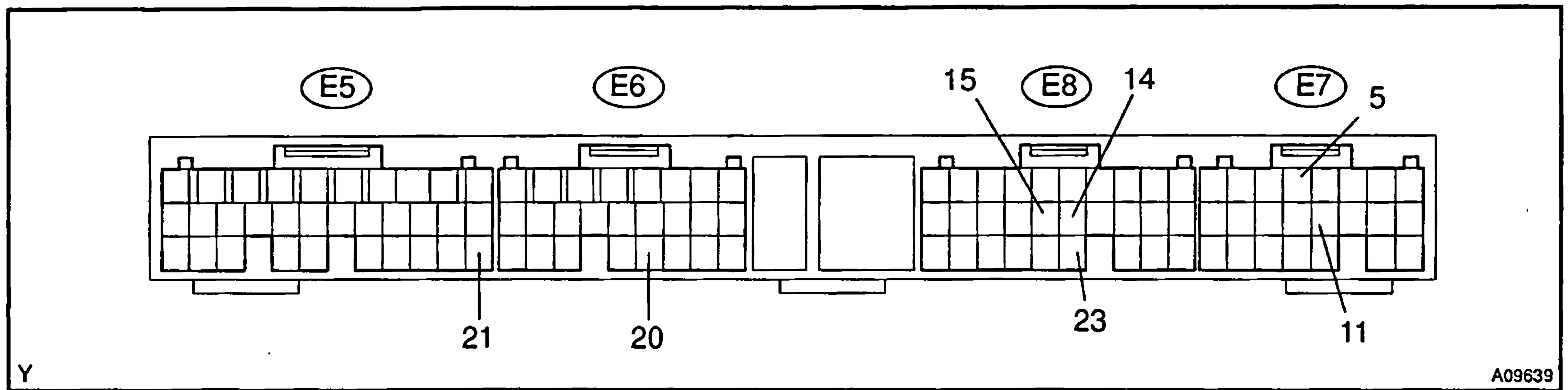
If a malfunction code is displayed during the DTC check, check the circuit listed for that code in the table below and proceed to the appropriate page.

DTC No. (See Page)	Circuit Inspection	Trouble Area
P0500/ 21,23 (DI-19)	Vehicle Speed Sensor malfunction	• Harness or connector between Engine and ECT ECU and vehicle speed sensor • Vehicle speed sensor • Engine and ECT ECU
P1520/ 52 (DI-21)	Stop Light Switch Circuit malfunction	• Stop light switch • Harness or connector between Engine and ECT ECU and stop light switch circuit • Engine and ECT ECU
P1566/ 54, 55 (DI-26)	Engine and ECT ECU malfunction (Input Signal Circuit)	• Engine and ECT ECU

PARTS LOCATION



TERMINALS OF ECU



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
STP ↔ E1 (E8-14 ↔ E5-21)	G-W ↔ BR	Depress brake pedal	10 - 14 V
		Release brake pedal	Below 1 V
CCS ↔ E2 (E7-5 ↔ E6-20)	B ↔ BR	Ignition switch ON	10 - 14 V
		Ignition switch ON CANCEL switch hold ON	3.6 - 7.2 V
		Ignition switch ON SET/COAST switch hold ON	2.1 - 4.9 V
		Ignition switch ON RES/ACC switch hold ON	0.7 - 2.6 V
		Ignition switch ON Main switch ON	10 - 14 V
PI ↔ E1 (E8-15 ↔ E8-21)	B-Y ↔ BR	Ignition switch ON Cruise control main switch ON	Below 1 V
		Ignition switch ON Cruise control main switch OFF	10 - 14 V
ST1- ↔ E1 (E8-23 ↔ E8-21)	R-G ↔ BR	Depress brake pedal	Below 1 V
		Release brake pedal	10 - 14 V
D ↔ E1 (E-11 ↔ E5-21)	G-O ↔ BR	Ignition switch ON A/T models: Shifting into D range M/T models: Clutch pedal is depressed	10 - 14 V
		Ignition switch ON A/T models: Shifting into except D range M/T models: Clutch pedal is pressed	Below 1 V

PROBLEM SYMPTOMS TABLE

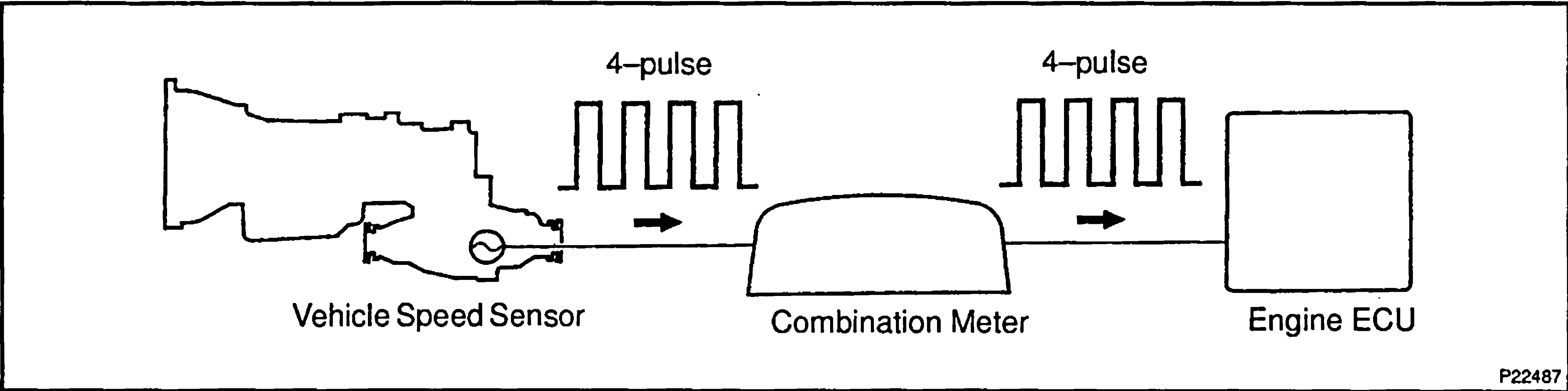
Symptom	Suspect Area	See page
SET not occurring or CANCEL occurring. (DTC is Normal)	1. Input Signal Circuit 2. Vehicle Speed Sensor Circuit 3. Stop Light Switch Circuit 4. Neutral Start Switch Circuit 5. Engine and ECT ECU	DI-26 DI-19 DI-21 DI-32 IN-33
SET not occurring or CANCEL occurring. (DTC is not output)	Engine and ECT ECU	IN-33
Actual vehicle speed deviates above or below the set speed.	1. Input Signal Circuit 2. Engine and ECT ECU	DI-26 IN-33
Gear shifting occurs frequently between 3rd and O/D when driving on uphill road. (Hurting)	Engine and ECT ECU	IN-33
Cruise control not cancelled, even when brake pedal is depressed.	1. Stop Light Switch Circuit 2. Engine and ECT ECU	DI-21 IN-33
Cruise control not cancelled, even when transmission is shifted to "N" position.	1. Neutral Start Switch Circuit 2. Engine and ECT ECU	DI-32 IN-33
Cruise control not cancelled, even when clutch pedal is depressed.	Engine and ECT ECU	IN-33
Control switch does not operate. (SET/COAST, ACC/RES, CANCEL not possible)	Engine and ECT ECU	IN-33
SET possible at 40 km/h (25 mph) or less, or CANCEL does not operate at 40 km/h (25 mph) or less.	1. Input Signal Circuit 2. Engine and ECT ECU	DI-26 IN-33
Poor response is ACCEL and RESUME modes.	Engine and ECT ECU	IN-33
O/D does not resume, even though the road is not uphill.	Engine and ECT ECU	IN-33
DTC memory is erased.	Engine and ECT ECU	IN-33
DTC is not output, or is output when should not be.	1. Diagnosis Circuit 2. Engine and ECT ECU	– IN-33
Cruise MAIN indicator light remains ON or falls to light up.	1. Input Signal Circuit 2. Engine and ECT ECU	DI-26 IN-33

CIRCUIT INSPECTION

DTC	P0500/21,23	Vehicle Speed Sensor Circuit
-----	-------------	------------------------------

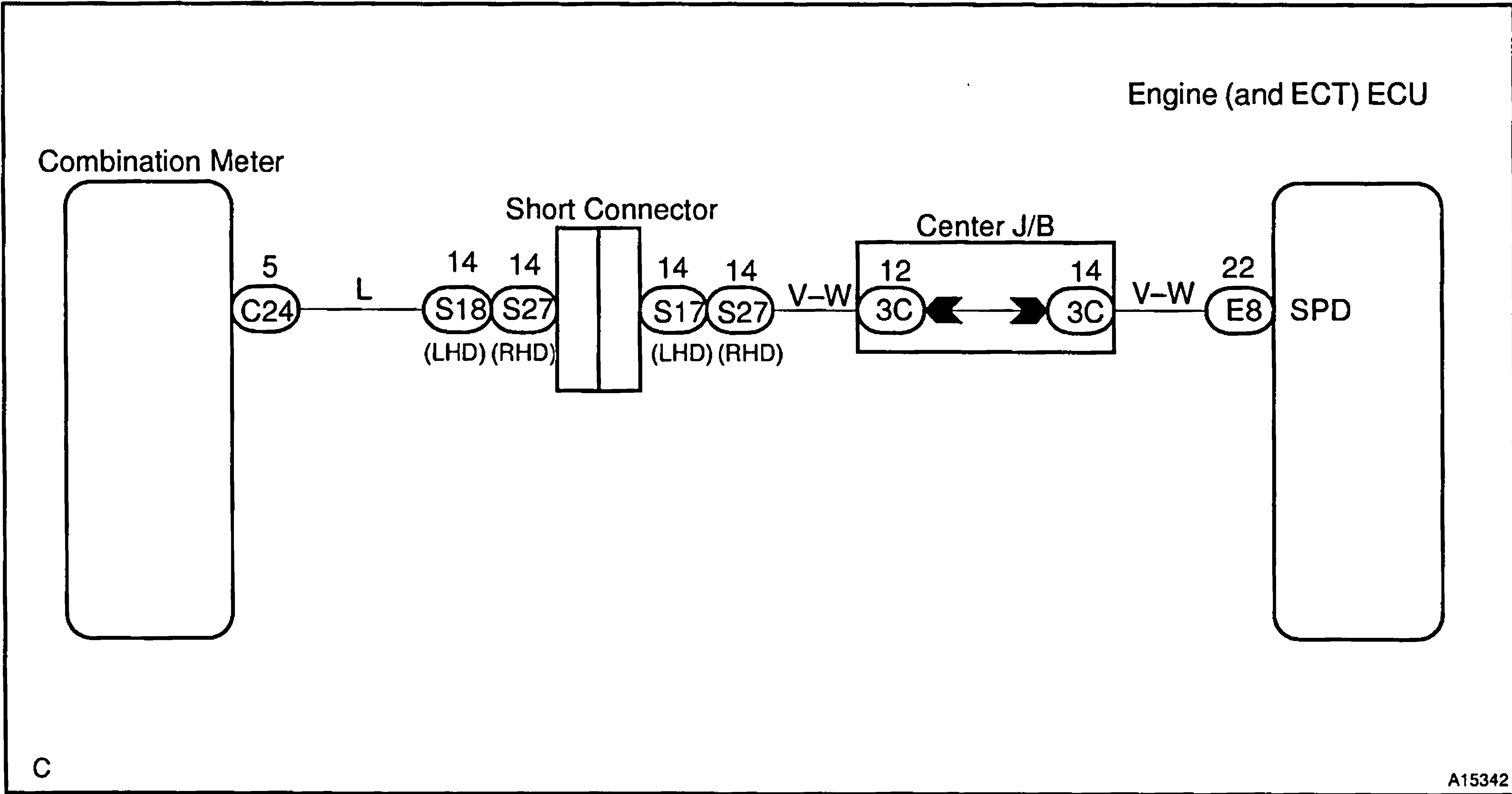
CIRCUIT DESCRIPTION

The vehicle speed sensor outputs a 4-pulse signal for every revolution of the rotor shaft, which is rotated by the transmission output shaft via the driven gear. After this signal is converted into a more precise rectangular waveform by the waveform shaping circuit inside the combination meter, it is then transmitted to the engine ECU. The engine ECU determines the vehicle speed based on the frequency of these pulse signals.



DTC No.	Detection Item	Trouble Area
P0500/21,23	Speed signal is not input to the Engine and ECT ECU while cruise control is set.	• Combination meter • Harness or connector between Engine and ECT ECU and vehicle speed sensor • Vehicle speed sensor • Engine and ECT ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using hand-held tester. Because freeze frame records the engine conditions when the malfunction is detected. When troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1

Check operation of speedometer.

CHECK:
Drive the vehicle and check if the operation of the speedometer in the combination meter is normal.

HINT:
The vehicle speed sensor is operating normally if the speedometer display is normal.

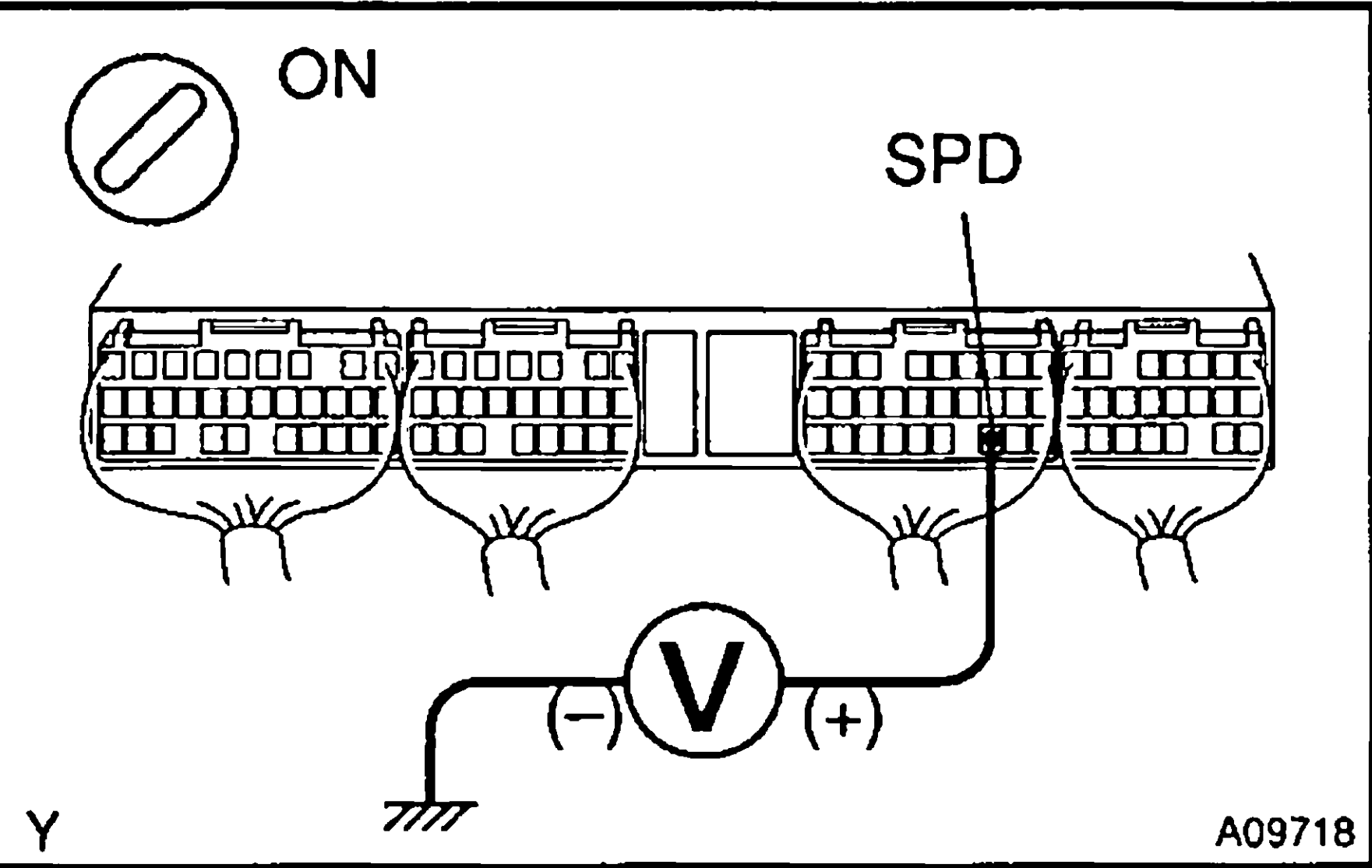
NG

Check speedometer.

OK

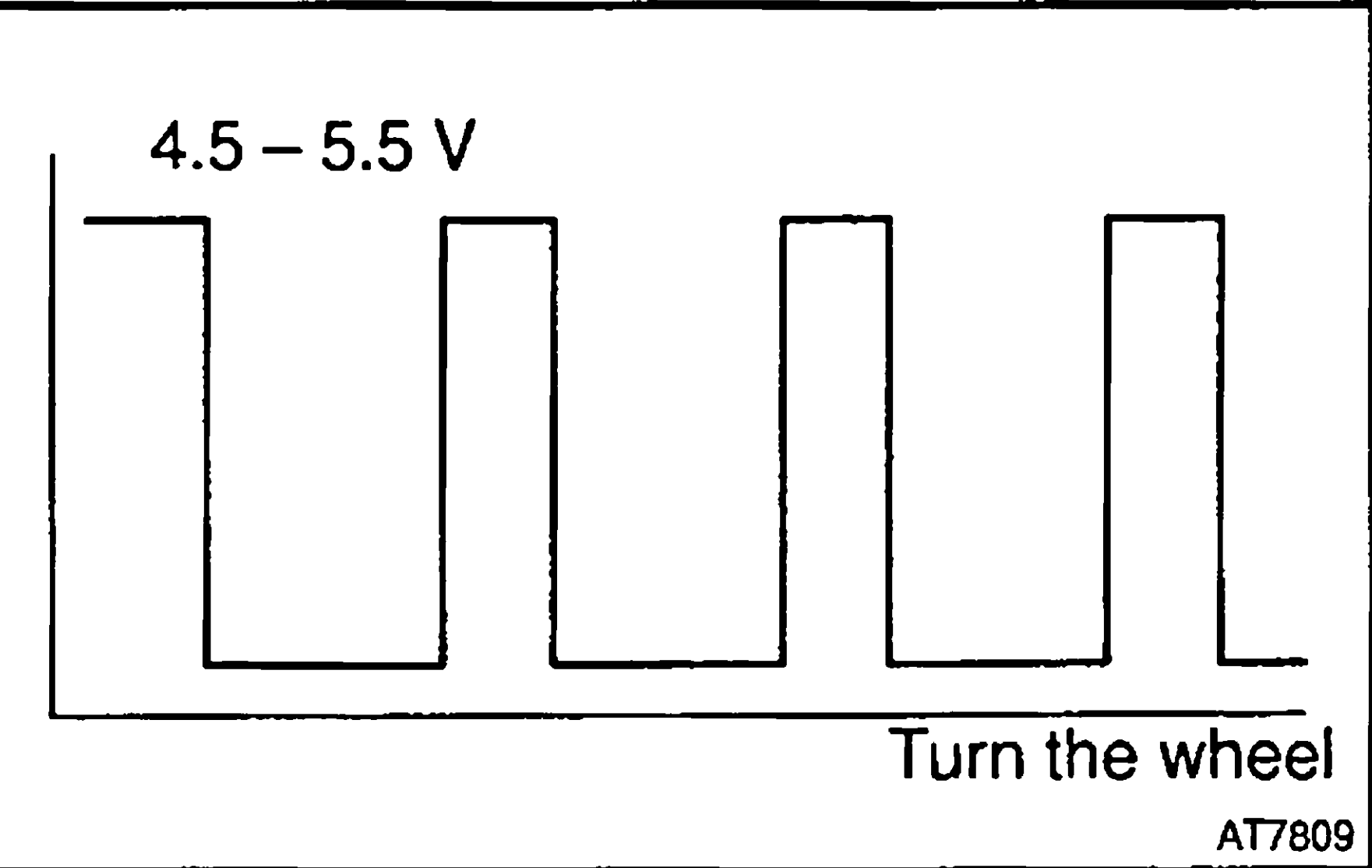
2

Check voltage between terminal SPD of engine (and ECT) ECU connector and body ground.



- PREPARATION:**
- (a) Remove the glove compartment.
 - (b) Shift the shift lever to the neutral.
 - (c) Jack up one of the front wheels.
 - (d) Turn the ignition switch ON.

CHECK:
Measure the voltage between terminal SPD of the engine (and ECT) ECU connector and body ground when the wheel is turned slowly.



OK:
Voltage is generated intermittently.

NG

Check and repair harness and connector between combination meter and engine (and ECT) ECU (See page IN-33).

OK

Check and replace engine (and ECT) ECU (See page IN-33).

DTC	P1520/52	Stop light switch circuit
-----	----------	---------------------------

CIRCUIT DESCRIPTION

When the brake pedal is depressed, the stop light switch sends a signal to the Engine and ECT ECU. When the Engine and ECT ECU receives this signal, it cancels the cruise control.

A fail–safe function is provided so that the cancel functions normally, even if there is a malfunction in the stop light signal circuit.

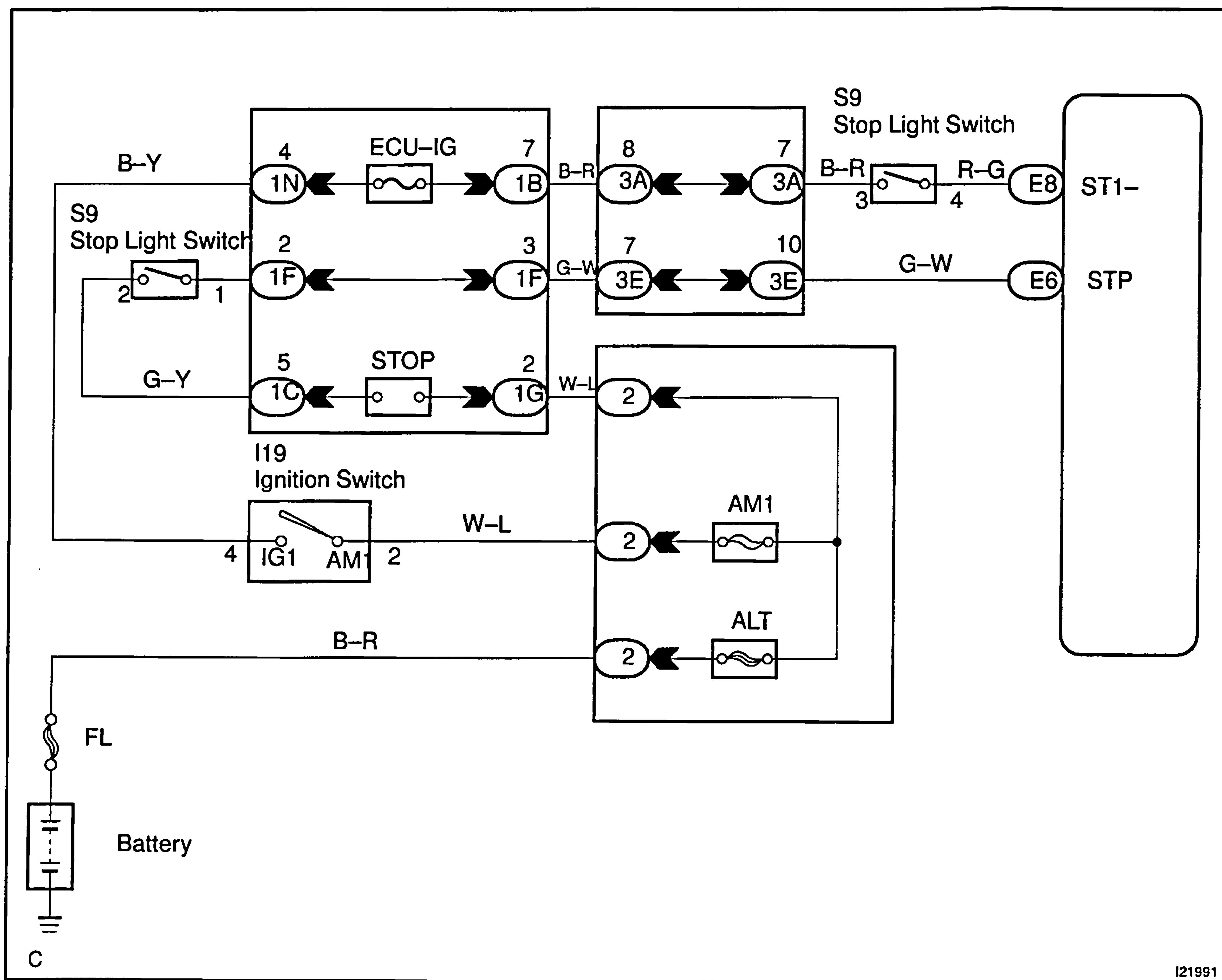
The cancel condition is that battery positive voltage is supplied to terminal STP.

When the brake is on, battery positive voltage is normally applied through the STOP fuse and stop light switch to terminal STP of the Engine and ECT ECU, and the Engine and ECT ECU turns the cruise control OFF.

If the harness connected to terminal STP has an open circuit, terminal STP will have battery positive voltage and the cruise control will be turned OFF.

DTC No.	Detection Item	Trouble Area
52	Stop light switch circuit.	• Stop light switch • Harness or connector between Engine and ECT ECU and stop light switch circuit • Engine and ECT ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
In case of using the TOYOTA hand-held tester, start the inspection from step 1 and in case of not using the TOYOTA hand-held tester, start from step 2.

1	Check stop light switch using TOYOTA hand-held tester.
---	--

PREPARATION:

Connect the TOYOTA hand-held tester to the DLC3.

CHECK:

Check the stop light switch using DATALIST.

OK:

Condition	Stop light switch 1 (Sub CPU)	Stop light switch 2 (Sub CPU)	Stop light switch 2 (Main CPU)
Depressed	ON	ON	ON
Released	OFF	OFF	OFF

- HINT:
- Stop light SW 1 has a function to disconnect the connection (OFF) when depressing the pedal, however, Engine and ECT ECU controls by the logic reverse, so with the TOYOTA hand-held tester, it displays ON.
 - Stop light SW 1 indicates the input of ST1-terminal and Stop light SW 2 indicates the input of STP terminal.

OK

Proceed to next circuit inspection shown in problem symptom table (See page DI-18).

NG

2	Check operation of stop light.
---	--------------------------------

CHECK:

Check that stop light comes on when brake pedal is depressed, and turns off when brake pedal is released.

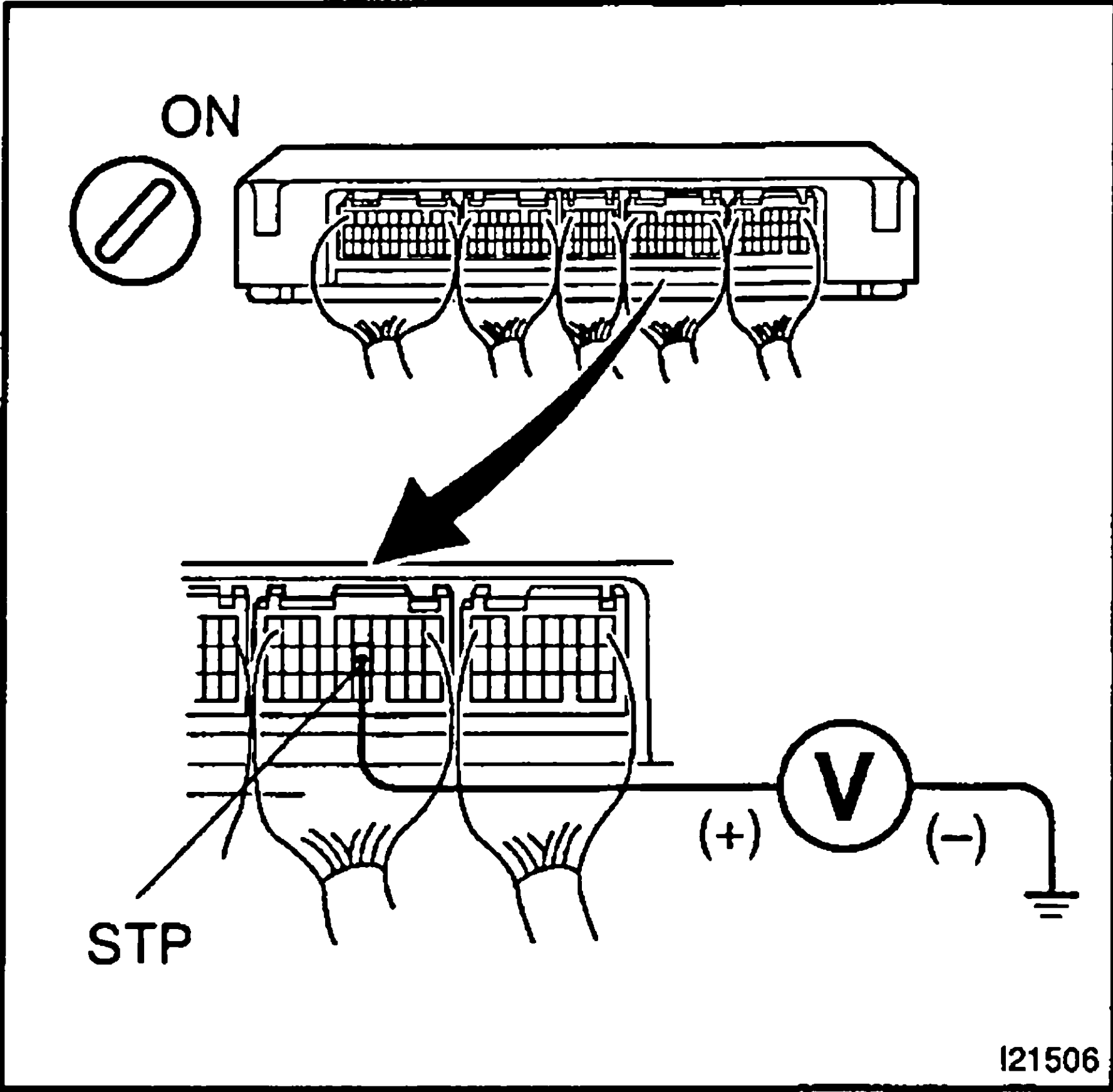
NG

Check stop light system (See Pub. No. RM517E on page BE-34).

OK

3

Check voltage between terminal STP of Engine and ECT ECU connector and body ground.



PREPARATION:

- (a) Remove the Engine and ECT ECU with connectors still connected.
- (b) Turn ignition switch ON.

CHECK:

Measure voltage between terminal STP of Engine and ECT ECU connector and body ground, when the brake pedal is depressed and released.

OK:

Depressed	10 – 14 V
Released	Below 1 V

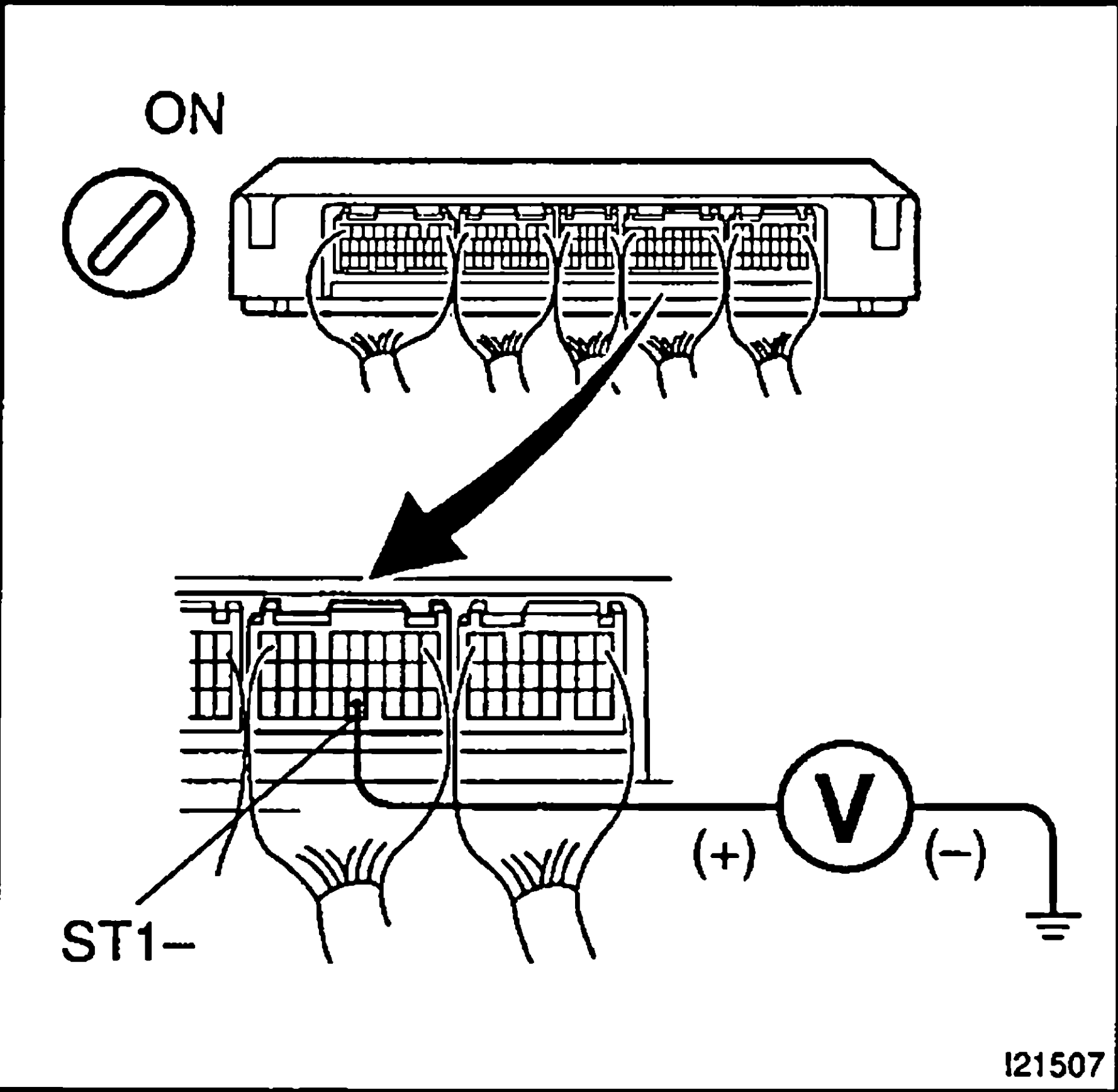
OK

Proceed to next circuit inspection shown in problem symptom table (See page DI-18).

NG

4

Check voltage between terminal ST1- of Engine and ECT ECU connector and body ground.



PREPARATION:

- (a) Remove the Engine and ECT ECU with connectors still connected.
- (b) Turn ignition switch ON.

CHECK:

Measure voltage between terminal ST1- of Engine and ECT ECU connector and body ground, when the brake pedal is depressed and released.

OK:

Depressed	Below 1 V
Released	10 – 14 V

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI-18).

NG

- | | |
|---|--|
| 5 | Check wire harness and connector between terminal STP of Engine and ECT ECU and stop light switch, and terminal ST1– of Engine and ECT ECU and stop light switch (See page IN-33). |
|---|--|

NG

Repair or replace harness or connector.

OK

Check and replace Engine and ECT ECU (See page IN-33).

DTC	P1566/54, 55	Engine and ECT ECU circuit
-----	--------------	----------------------------

CIRCUIT DESCRIPTION

DTC No.	Detection Item	Trouble Area
P1566/54, 55	• Engine and ECT ECU abnormal.	• Engine and ECT ECU

INSPECTION PROCEDURE

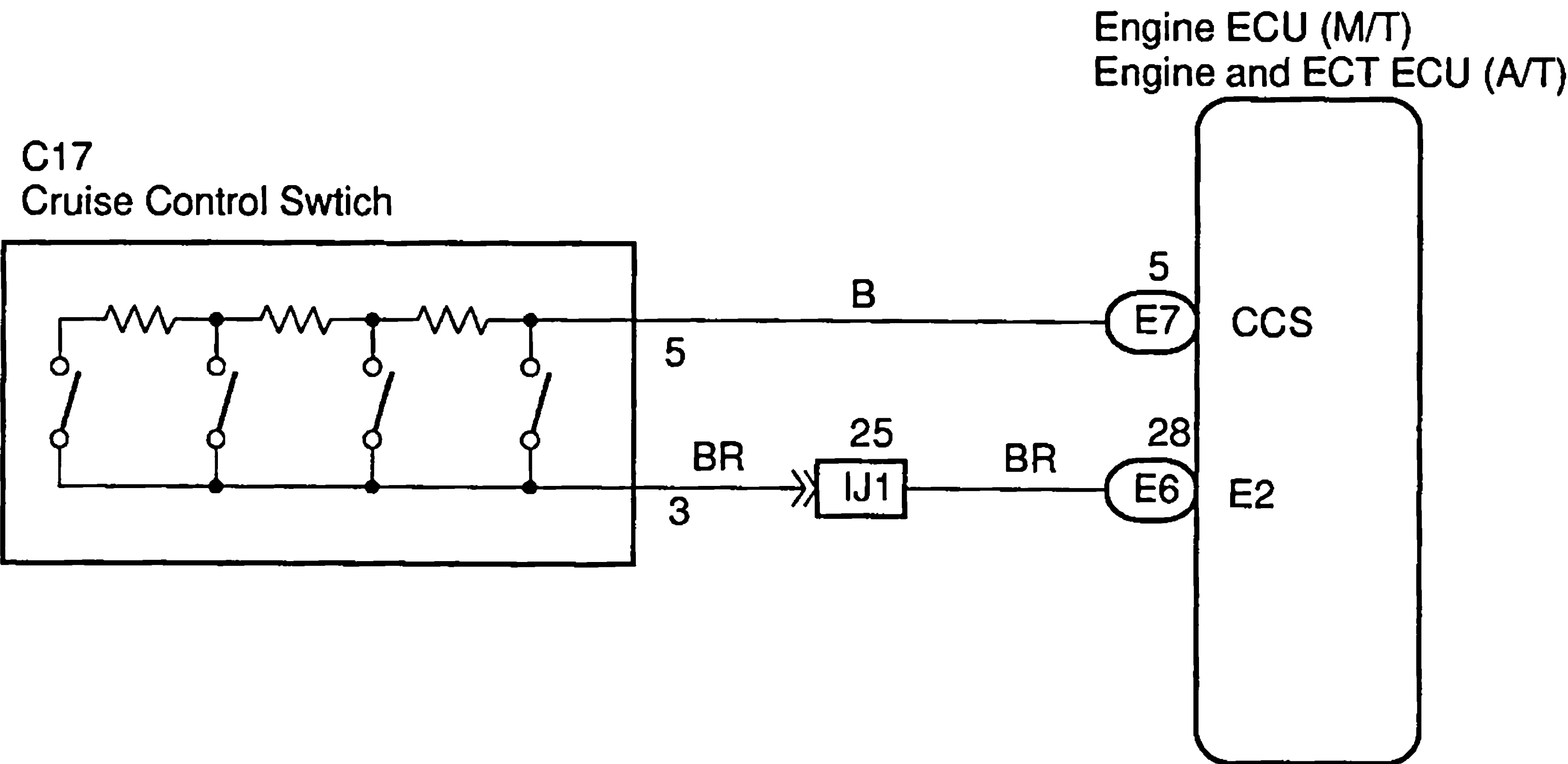
Check and replace Engine and ECT ECU (See page IN-33).

Main Switch Circuit (Cruise Control Switch)

CIRCUIT DESCRIPTION

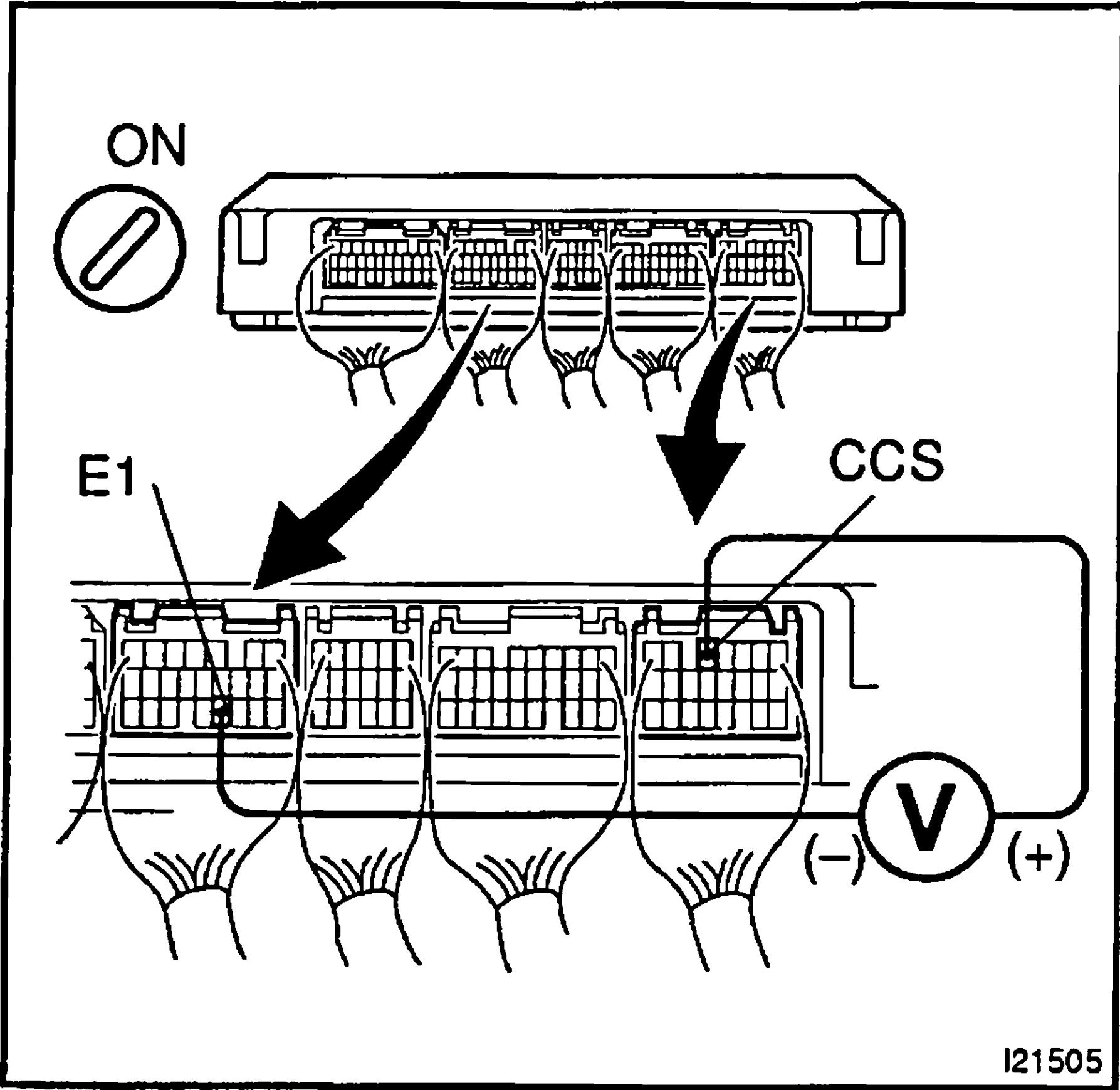
When the cruise control main switch is turned off, the cruise control does not operate.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminal CMS of Engine and ECT ECU connector and body ground.
---	---



PREPARATION:

- (a) Remove the Engine and ECT ECU with connector still connected.
- (b) Turn ignition switch ON.

CHECK:

Measure voltage between terminal CMS of Engine and ECT ECU connector when main switch is held on and off.

OK:

Main switch	Voltage
OFF	10 – 14 V
ON	Below 0.5 V

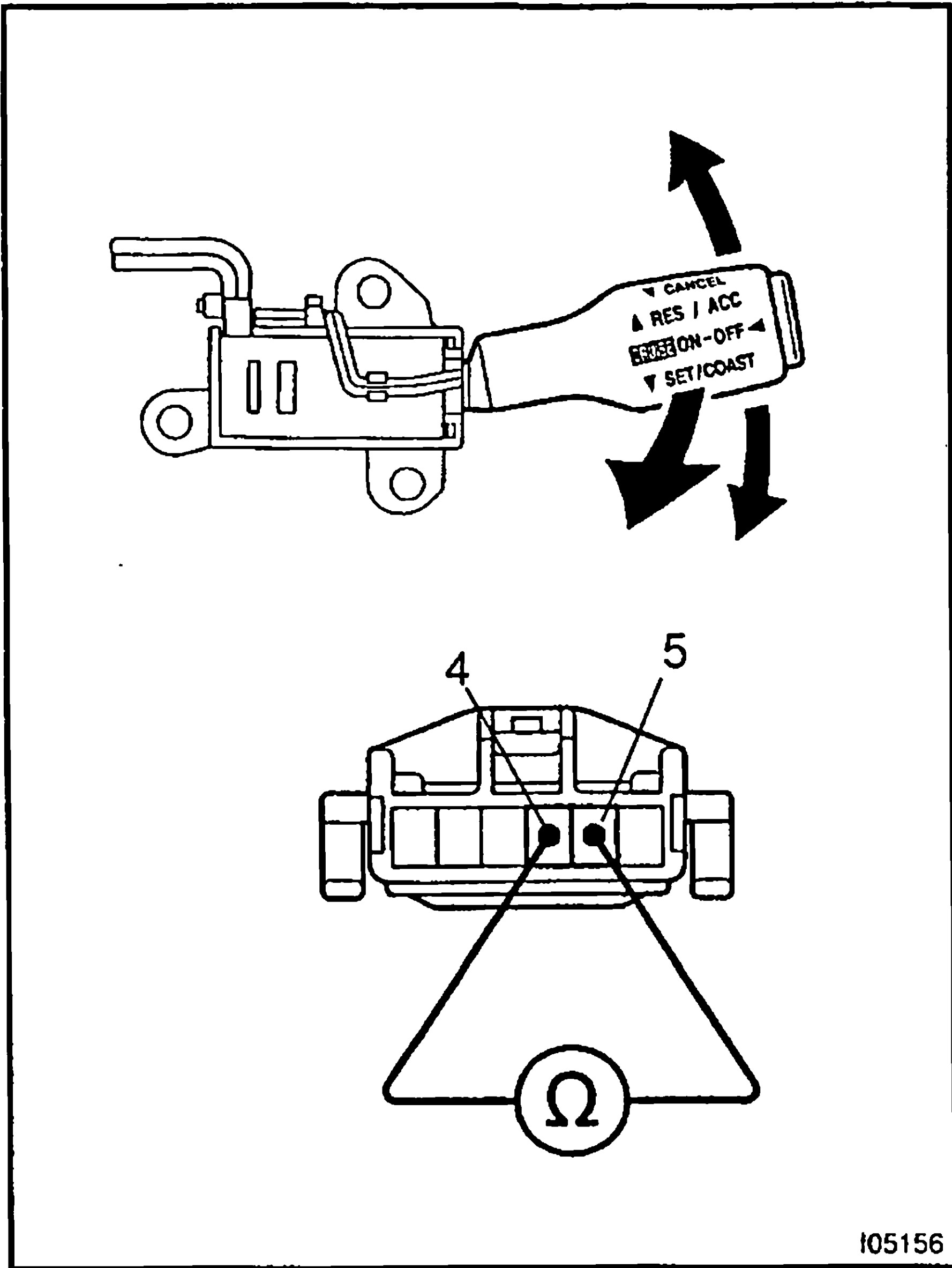
OK

Proceed to next circuit inspection shown on problem symptom table (See page DI-18).

NG

2

Check main switch continuity.



PREPARATION:

- (a) Remove steering wheel center pad. (See Pub. No. RM672E on page SR-1)
- (b) Disconnect the control switch connector.

CHECK:

Check continuity between terminals 4 and 5 of control switch connector when main switch is held on and off.

OK:

Switch position	Tester connection	Specified condition
OFF	4 – 5	No continuity
Hold ON	4 – 5	Continuity

NG

Replace control switch.

OK

3

Check harness and connector between Engine and ECT ECU and main switch (See page IN-23).

NG

Repair or replace harness or connector.

OK

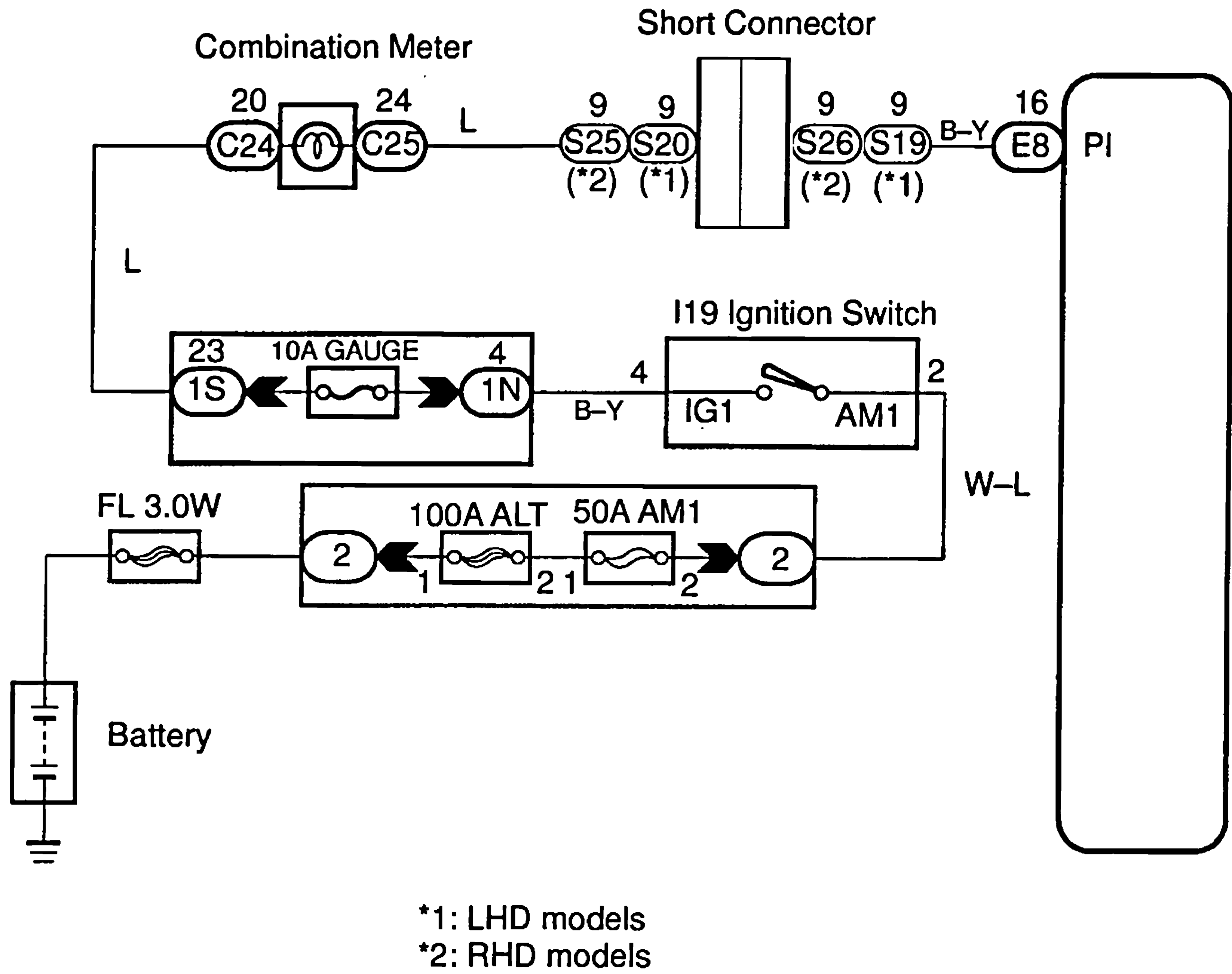
Check and replace Engine and ECT ECU (See page IN-33).

CRUISE MAIN Indicator Light Circuit

CIRCUIT DESCRIPTION

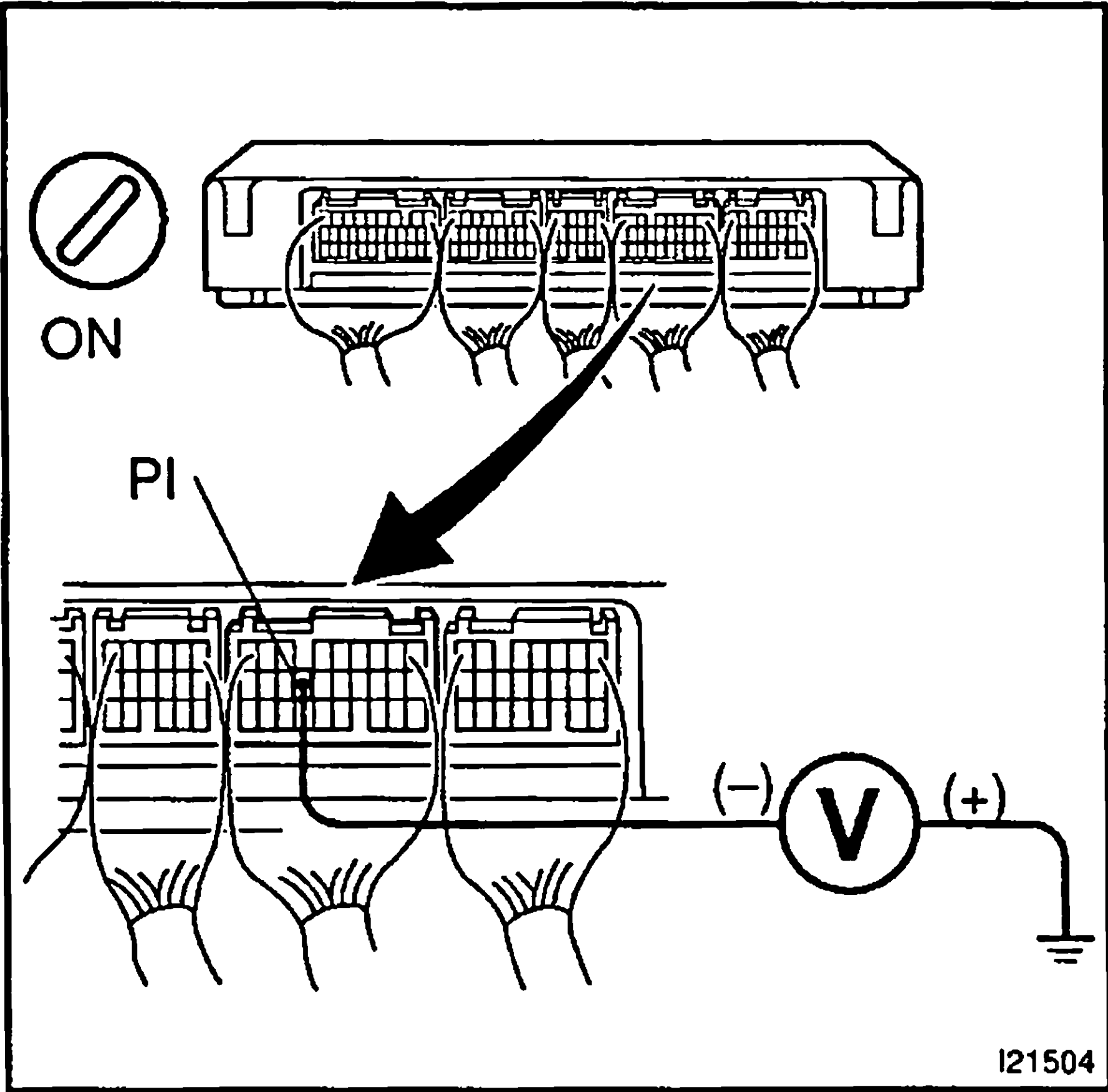
When the cruise control main switch is turned ON, CRUISE MAIN indicator light lights up.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminals PI and GND of Engine and ECT ECU connector.
---	---



PREPARATION:

Tun ignition switch ON.

CHECK:

Measure voltage between terminals PI and GND of Engine and ECT ECU connector when main switch on and off.

OK:

Switch position	Voltage
OFF	10 - 16 V
ON	Below 1.2 V

OK	Proceed to next circuit inspection shown on problem symptom table (See page DI-18).
----	---

NG

2	Check combination meter (See page BE-1).
---	--

NG	Replace combination meter.
----	----------------------------

OK

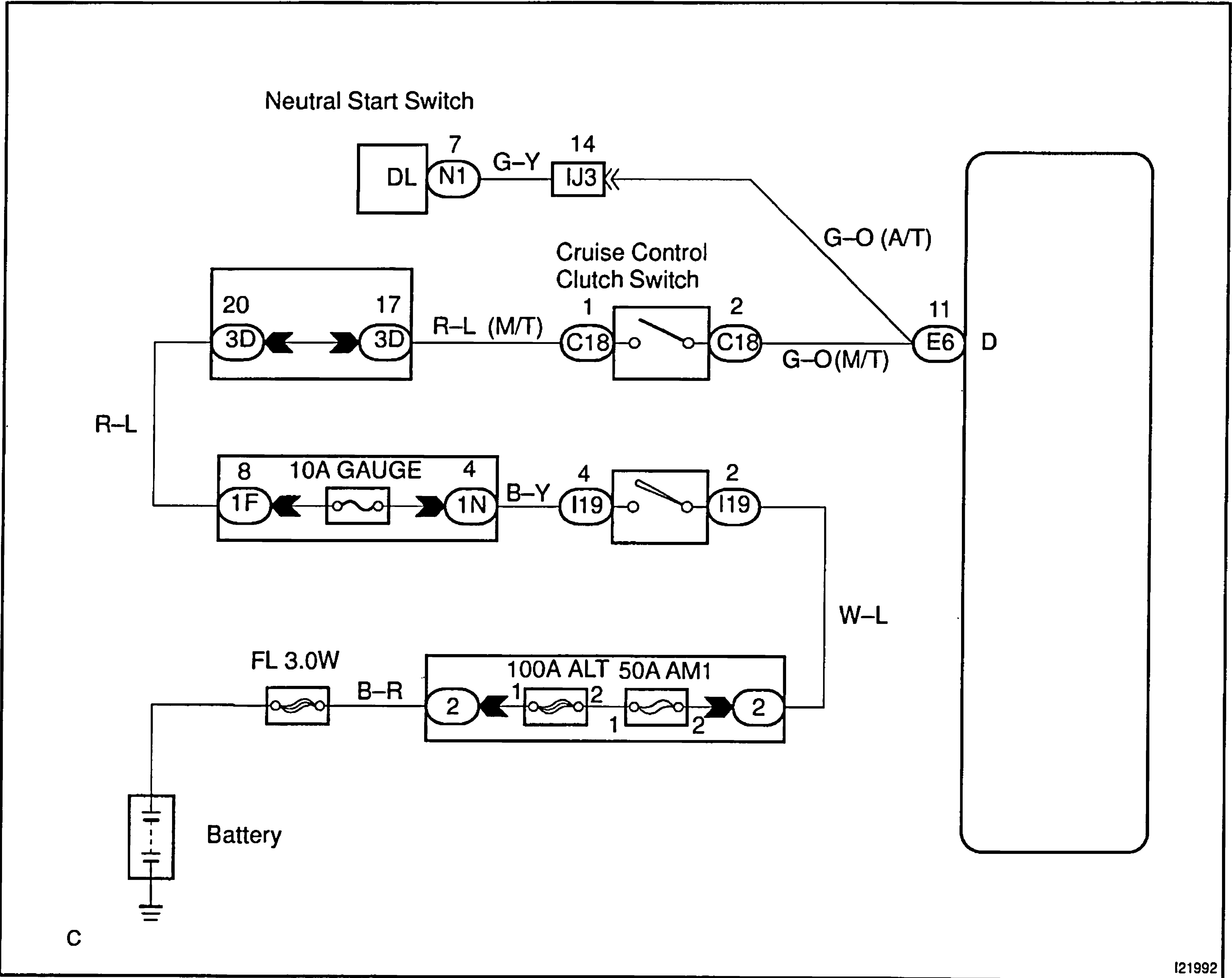
Check and replace Engine and ECT ECU (See page IN-33).

Neutral Start Switch Circuit

CIRCUIT DESCRIPTION

When the shift position is put in except D range, a signal is set from the neutral start switch to the ECU. When this signal is input during cruise control driving the ECU cancels the cruise control.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check starter operation.
---	--------------------------

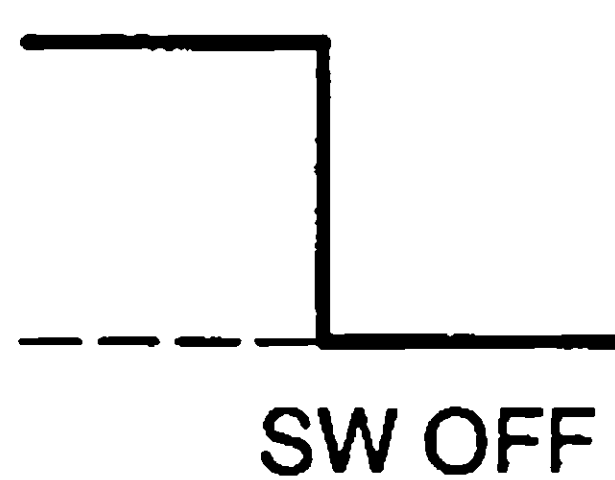
CHECK:
Check that the starter operates normally and that the engine start.

OK

Proceed to engine troubleshooting.

NG

2	Input signal check.
---	---------------------

Input Signal	Indicator Light Blinking Pattern
Turn neutral start switch OFF (Shift to except D range)	ON Light OFF SW ON SW OFF 

PREPARATION:
See the input signal check on page DI-10.
CHECK:
Check the indicator light when shifting into except D range.
OK:
The indicator light goes off when shifting into except D range.

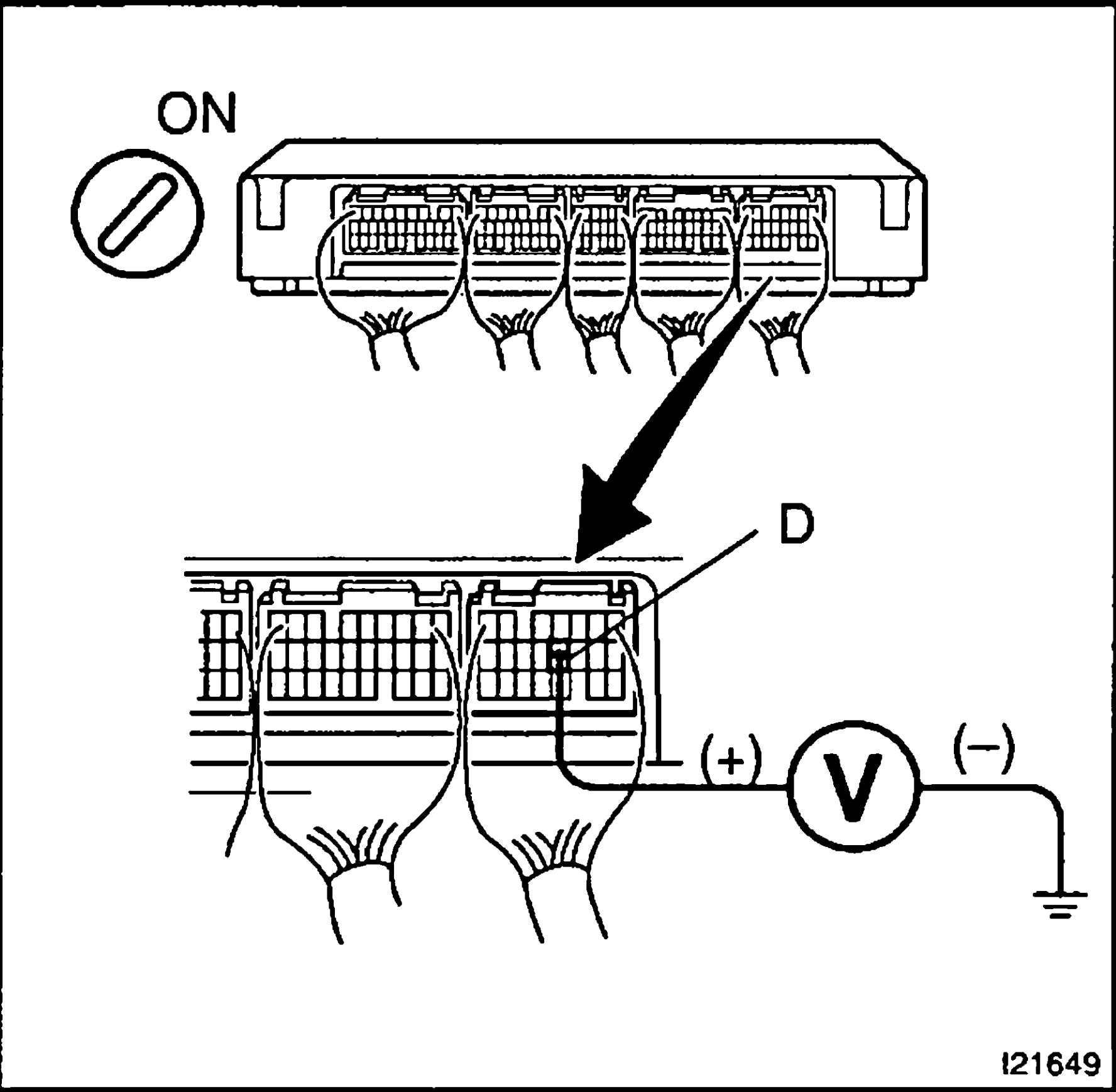
OK

Proceed to next curcuit inspection shown on problem symptoms table (See page DI-18).

NG

3

Check voltage between terminal D of engine and ECT ECU and body ground.



PREPARATION:

- (a) Remove the engine and ECT ECU with connectors still connected.
- (b) Turn ignition switch ON.

CHECK:

- (a) A/T models:
Measure the voltage between terminal D of engine and ECT ECU connector and body ground when shifting into D range and other range.
- (b) M/T models:
Measure the voltage between terminal D of engine and ECT ECU connector and body ground when press the clutch pedal and depress clutch pedal.

OK:

Shifting Position (clutch operation)	Voltage
D range (Clutch pedal is depressed)	10 – 14 V
Other range (Clutch pedal is pressed)	Below 1 V

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI-18).

NG

4

Check wire harness and connector between neutral start switch (or clutch switch) and engine and ECT ECU (See page IN-33).

OK

Repair or replace wire harness and connector.

NG

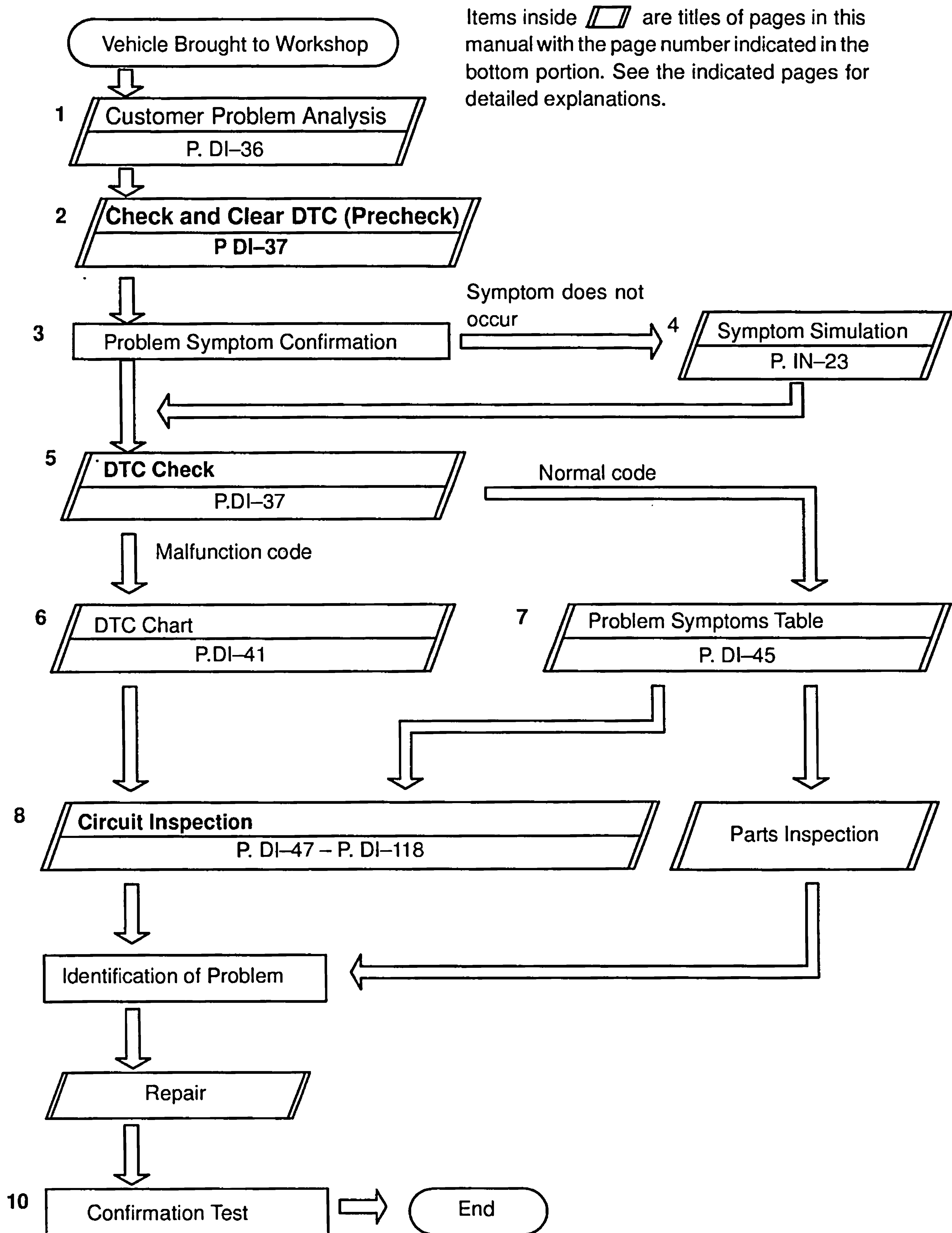
Check and replace engine and ECT ECU (See page IN-33).

AIR CONDITIONING SYSTEM

HOW TO PROCEED WITH TROUBLESHOOTING

DI261-05

Perform troubleshooting in accordance with the procedure on the following page.



CUSTOMER PROBLEM ANALYSIS CHECK

AIR CONDITIONING SYSTEM Check Sheet

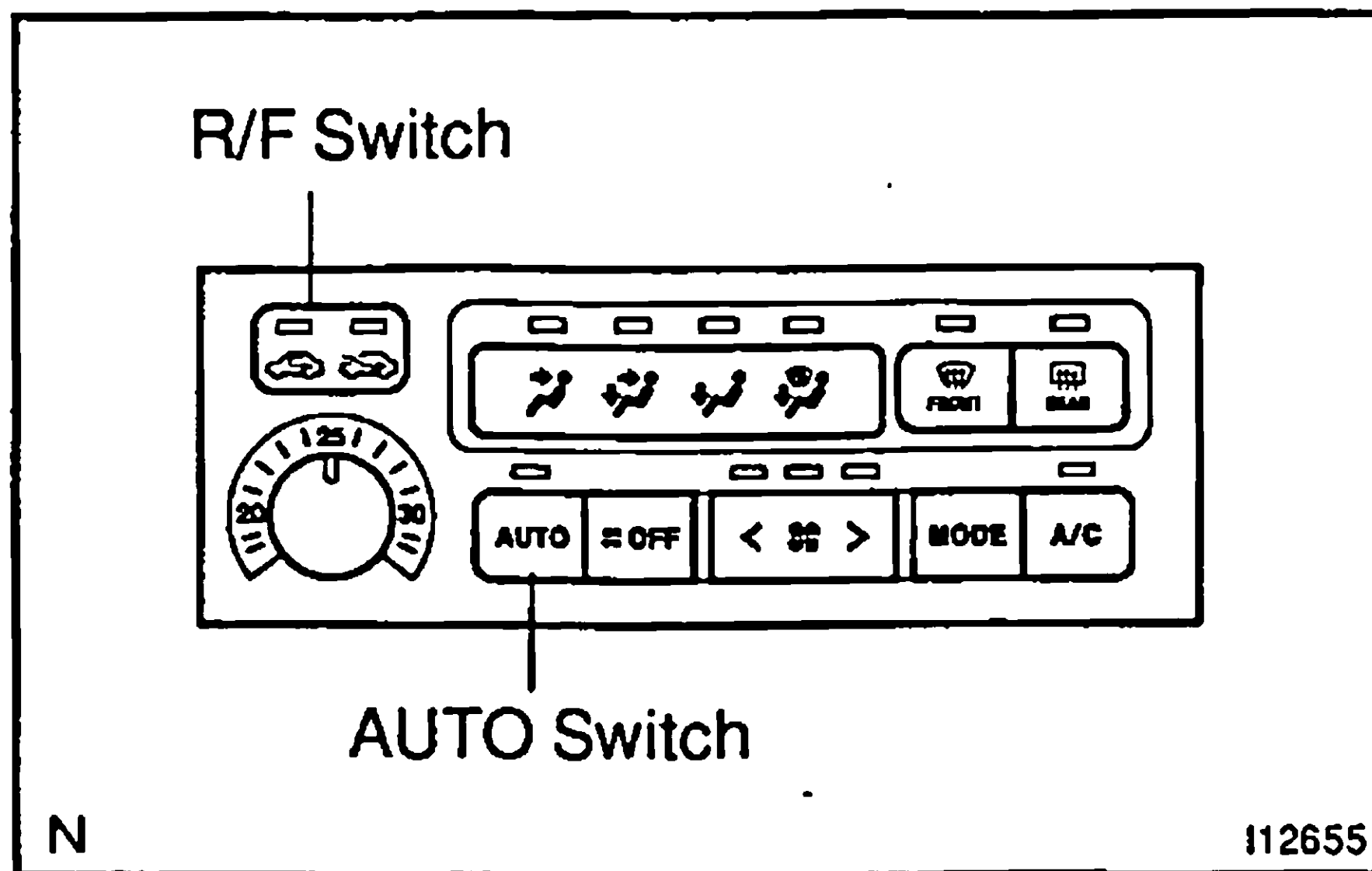
Inspector's name: _____

Customer's Name		Registration No.	
		Registration Year	
		Frame No.	
Date vehicle Brought In	/ /	Odometer Reading	km Miles

Date of Problem Occurrence	/ /
How Often does Problem Occur?	☐ Continuous ☐ Intermittent (times a day)
Weather	☐ Fine ☐ Cloudy ☐ Snowy ☐ Various / Other
Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (Approx. °F °C)

Symptoms	Air Flow Control is Faulty	☐ Blower motor does not operation ☐ Blower motor speed does not change (Always Hi, Always Med, Always Lo)
	Temperature Control is Faulty	☐ Cabin temperature does not go down ☐ Cabin temperature does not rise ☐ Response is slow
	Air Inlet Control is Faulty	☐ Cannot change between FRS and REC (Always Fresh or always Recirculating)
	Vent Control is Faulty	☐ Mode will not chage ☐ Will not enter the desired mode

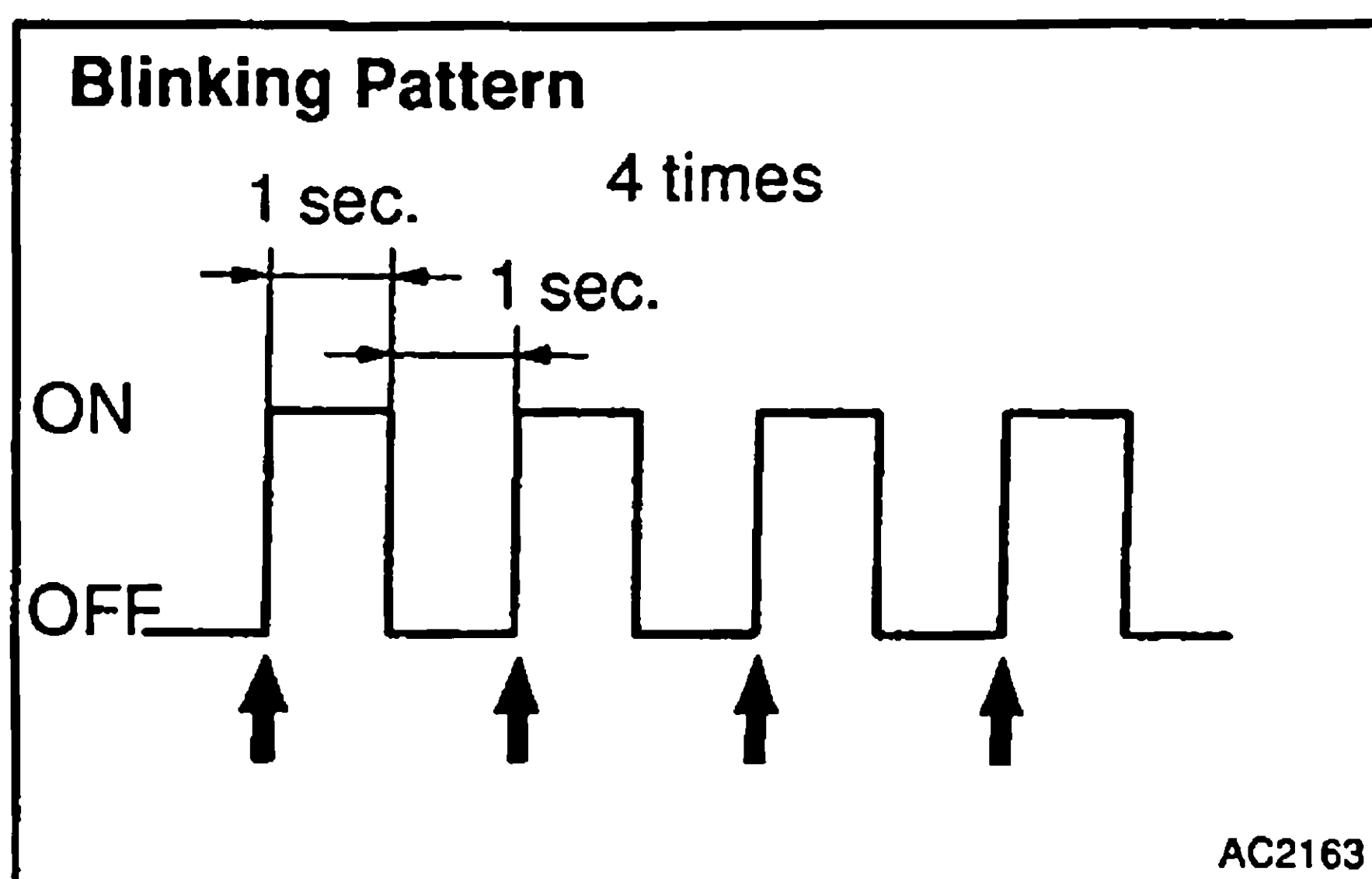
DTC Check	1st Time	☐ Normal Code ☐ Malfunction Code (Code)
	2nd Time	☐ Normal Code ☐ Malfunction Code (Code)



PRE-CHECK

1. INDICATOR CHECK

- (a) Turn the ignition switch on while pressing the AUTO switch and R/F switch simultaneously.



- (b) Check that all the indicators light up and go off at 1 second intervals 4 times in succession.

HINT:

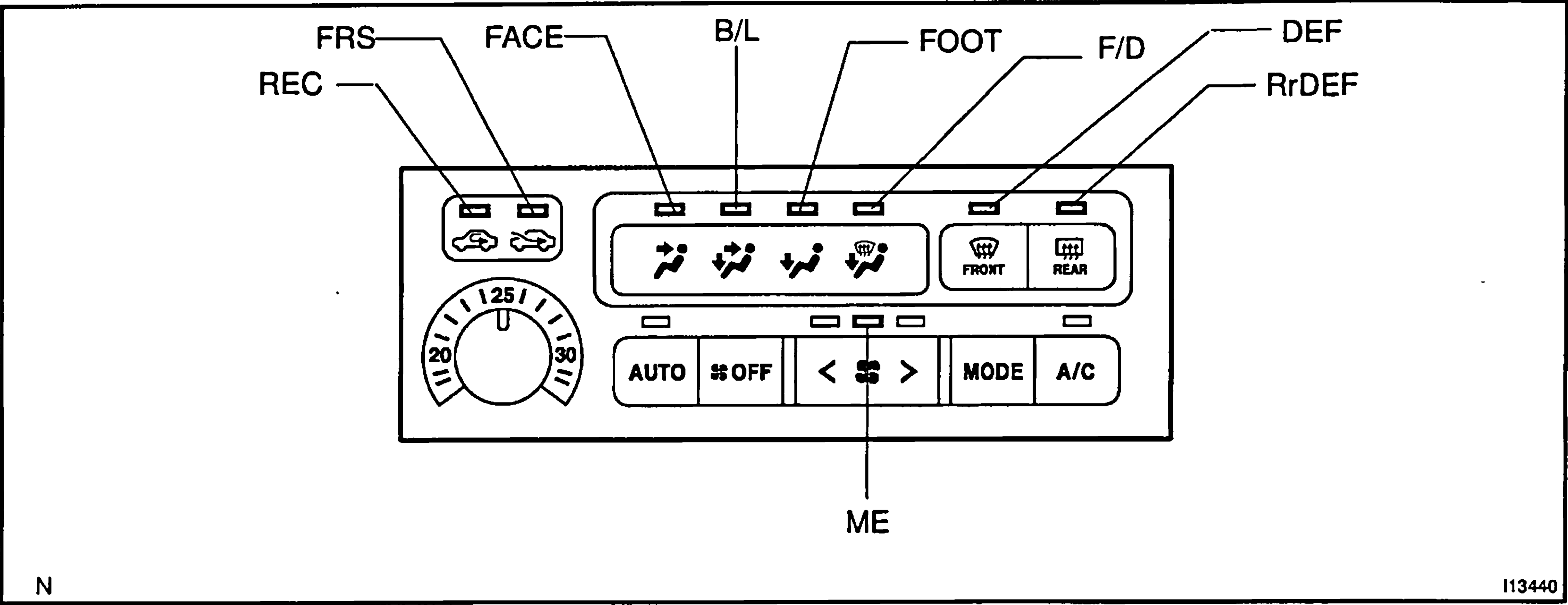
- After the indicator check is ended, the diagnostic sensor check begins automatically.
- Press the OFF switch when cancelling the check mode.

2. PANEL DIAGNOSIS SYSTEM

If a trouble occurs in A/C system, the specified lamp on the control panel starts blinking during the diagnostic sensor check.

During system diagnosis, a trouble is indicated on the panel by the blinking of a specified light instead of a code display (See TROUBLE CODE CHART).

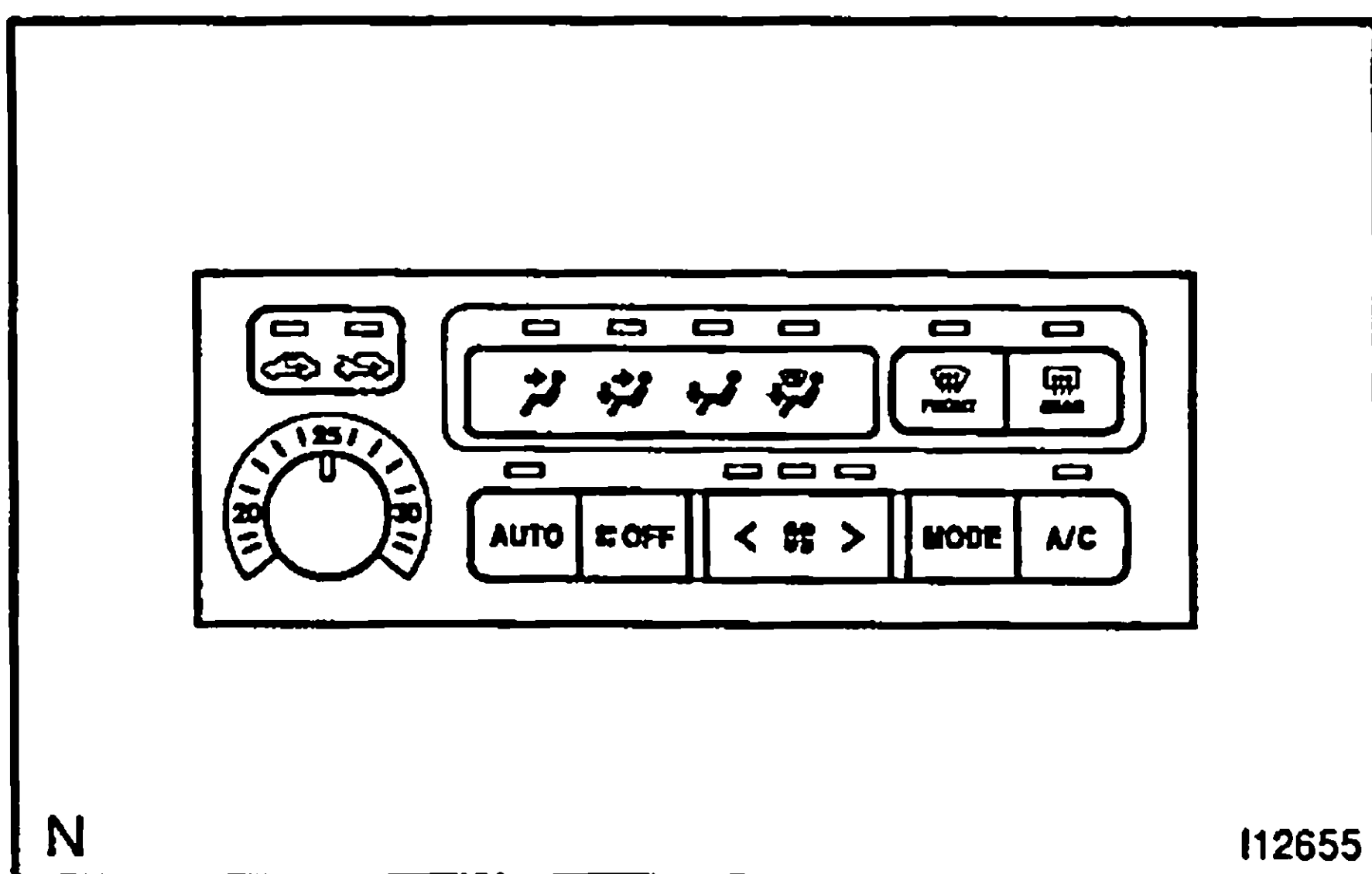
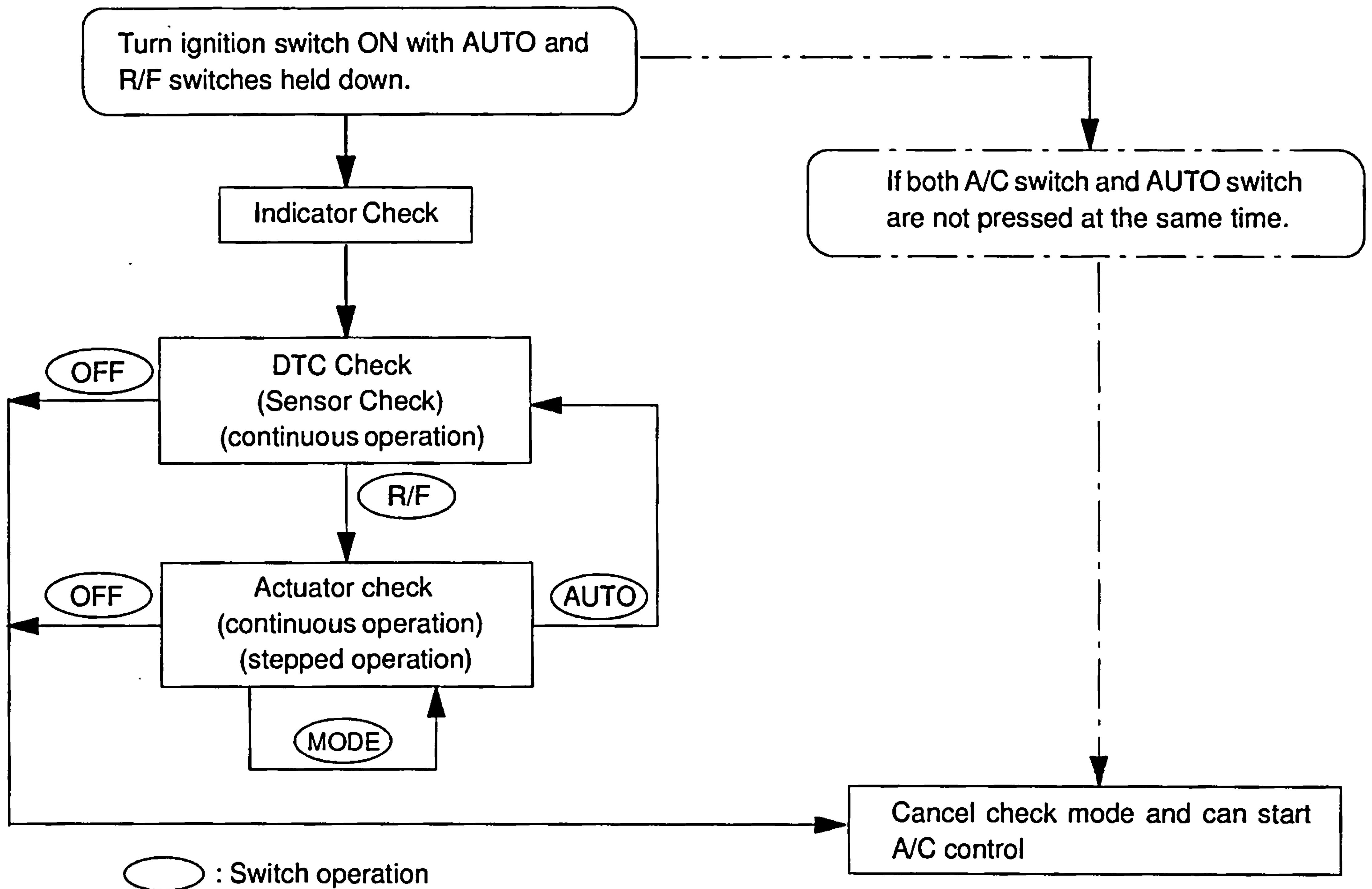
For example, when a trouble occurs in solar sensor circuit, the DEF mode indicator will be blinking during the diagnostic sensor check.



No.	Indicator name	Symbol
1	Rear window defogger switch indicator light	RrDEF
2	Air flow selector: FACE	FACE
3	Air flow selector: BI-LEVEL	B/L
4	Air flow selector: FOOT	FOOT
5	Air flow selector: FOOT and DEFROSTER	F/D
6	Air flow selector: DEFROSTER	DEF
7	Air inlet selector: FRESH	FRS
8	Air inlet selector: RECIRCULATE	REC
9	Fan Speed Selector: ME	ME

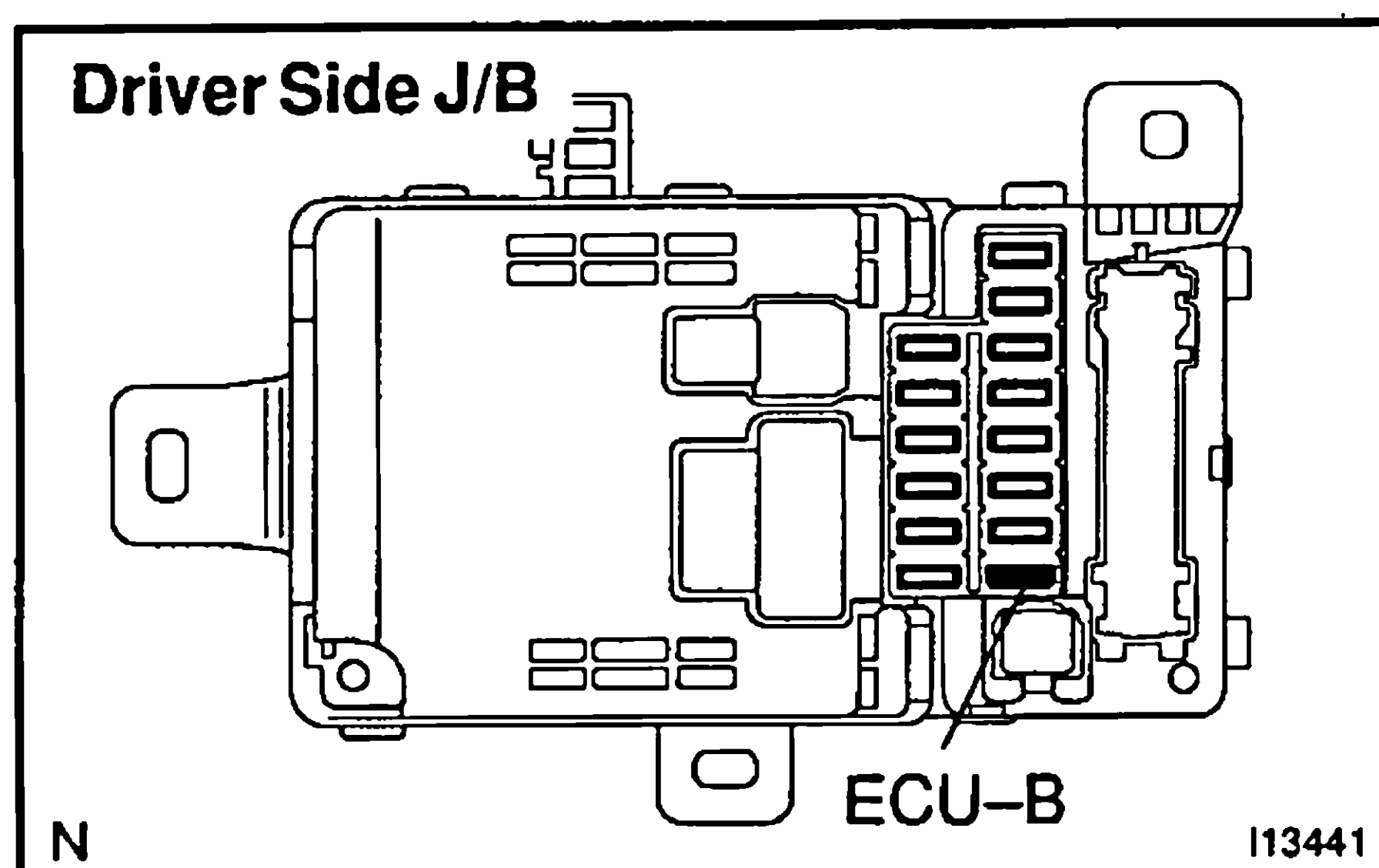
3. LIST OF OPERATION METHODS

By operating each of the A/C control switches as shown in the diagram below, it is possible to enter the diagnosis check mode.



4. DIAGNOSTIC SENSOR CHECK

- Perform an indicator check. After the indicator check is completed, the system enters the diagnostic sensor check mode automatically.
- Check the LED blinking on the panel. Refer to the list of codes on page DI-41 when translating the trouble code from the LED blinking.



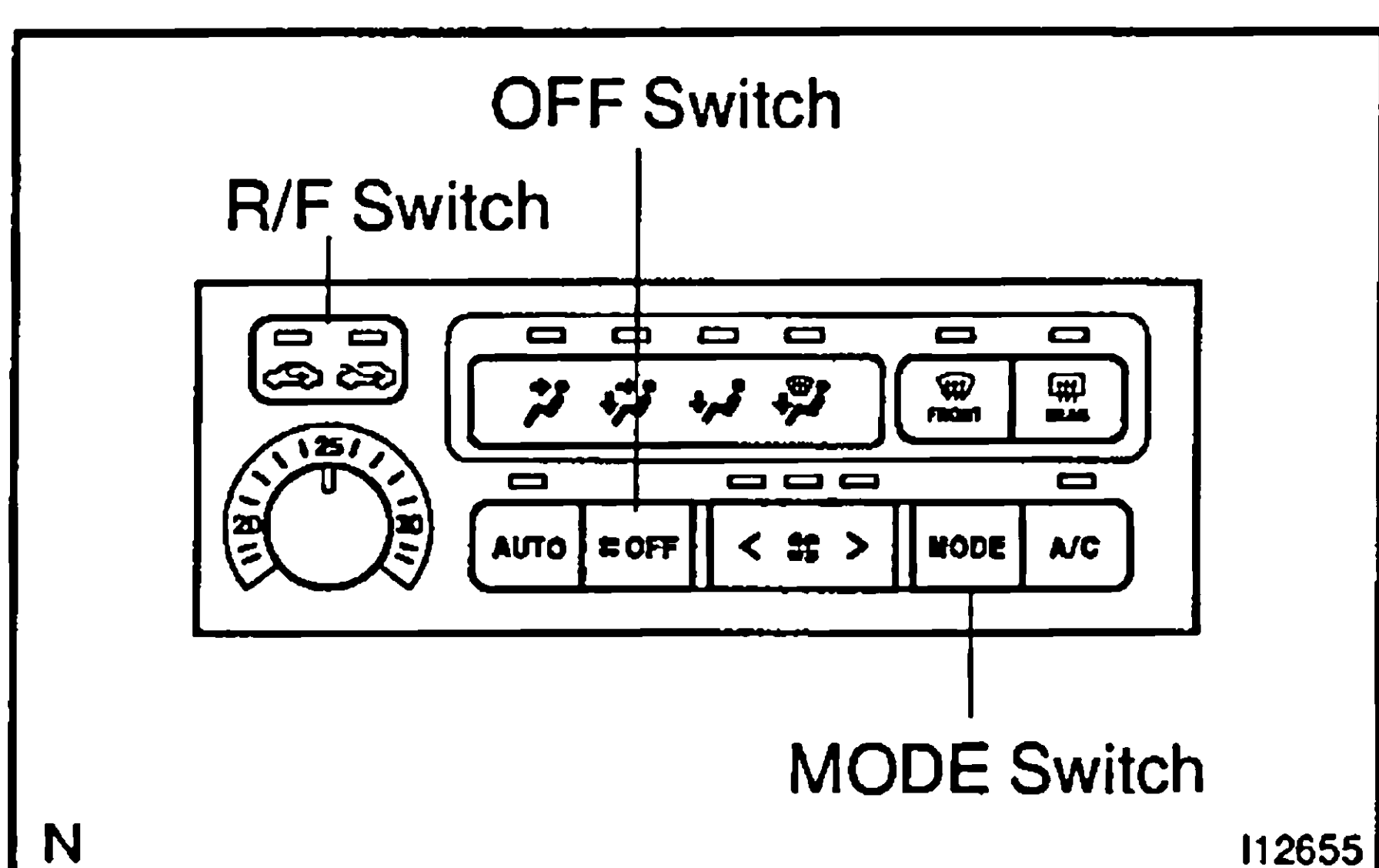
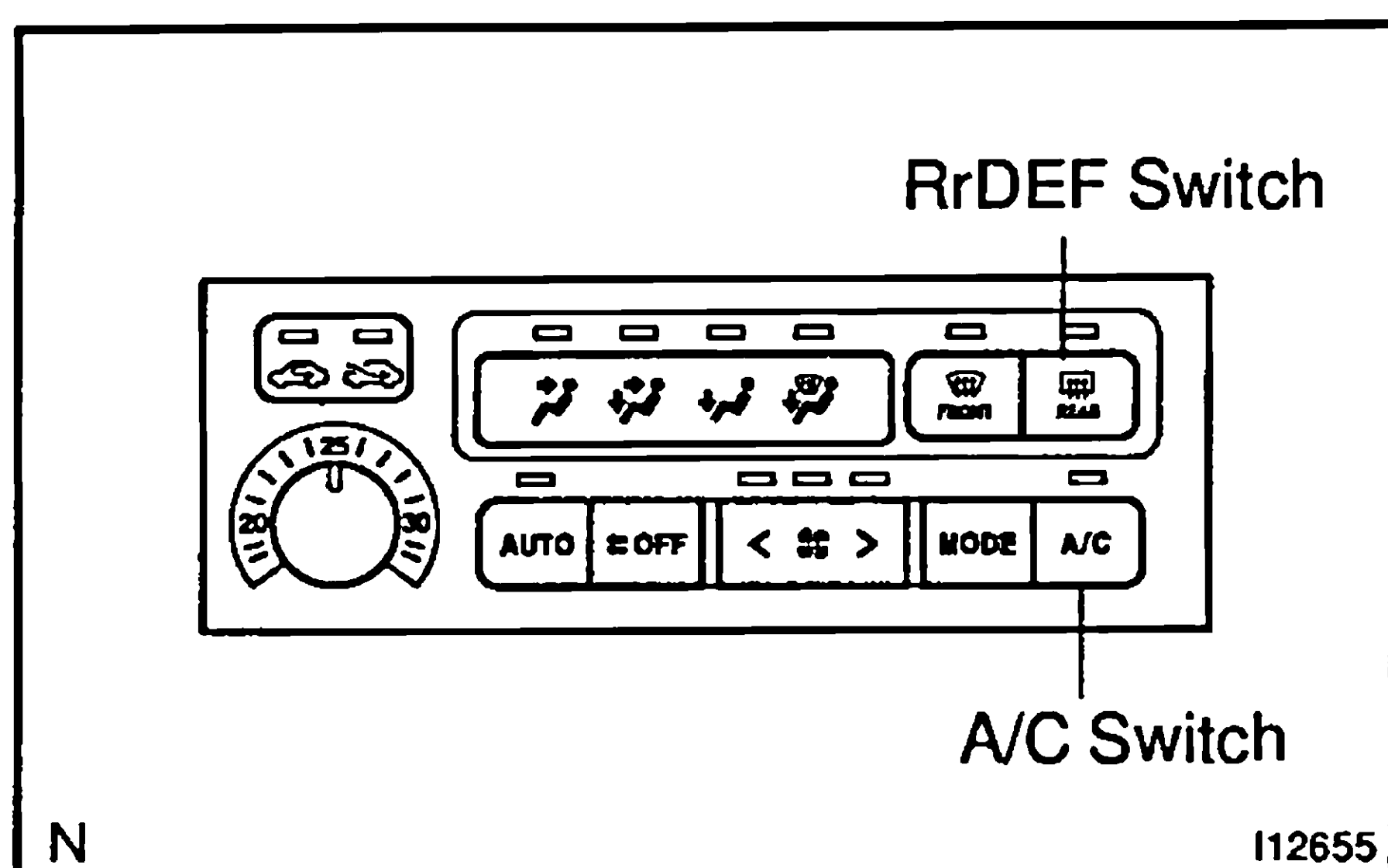
5. CLEARING DTC

(a) Method 1:

- (1) Pull out the ECU-B fuse in driver side J/B for 10 sec. or longer to clear the trouble code's memory.
- (2) After reinserting the fuse, check that the normal code is output.

(b) Method 2:

Press the RrDEF switch while pushing the A/C switch during the sensor check mode.



6. ACTUATOR CHECK

- (a) After entering the sensor check mode, press the R/F switch.
- (b) Push mode switch and change it to step operation. Each time the mode switch is pressed, the actuator operation changes by 1 step.

HINT:

- Check the change of actuator operation visually and by hand.
- To cancel the check mode, press the OFF switch.

Step No.	Condition						
	Blower Vent	Air flow Vent	Air inlet damper	Magnetic clutch	Air mix damper	Rr. A/C blower vent	Rr. A/C
1	0	FACE	REC	OFF	Cool side (-14.0 %)	0	OFF
2	1	B/L	↑	↑	Cool/ Hot (50.0 %)	1	↑
3	13	FOOT	FRS	Fr. A/C ON	Hot side (100 %)*1 (113.5 %)*2	6	Rr. A/C ON
4	↑	F/D	↑	↑	↑	↑	↑
5	31	DEF	↑	↑	↑	15	↑

*1: Europe models

*2: G.C.C. Countries models

DIAGNOSTIC TROUBLE CODE CHART

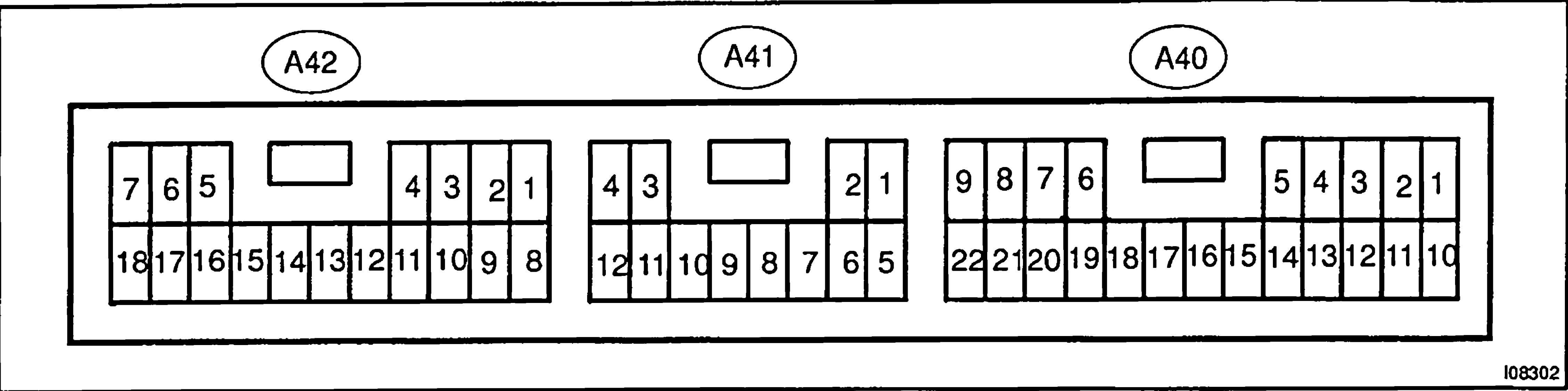
If malfunction code is displayed during the DTC check, check the circuit listed for that code in the table below (Proceed to the page given for that circuit.)

Blinking light	Detection Item	Trouble Area	Memory
AUTO	Normal	–	–
FACE *1 (DI-47)	Room temperature sensor circuit	• Room temp. sensor • Harness or connector between room temp. sensor and A/C amplifier • A/C amplifier	○ (8.5 min. or more)
B/L *2 (DI-50)	Ambient temperature sensor circuit	• Ambient temp. sensor • Harness or connector between ambient temp. sensor and A/C amplifier • A/C amplifier	○ (8.5 min. or more)
FOOT (DI-53)	Front evaporator temperature sensor circuit	• Front evaporator temp. sensor • Harness or connector between front evaporator temp. sensor and A/C amplifier • A/C amplifier	○ (8.5 min. or more)
RrDEF (DI-56)	Rear evaporator temperature sensor circuit	• Rear evaporator temp. sensor • Harness or connector between rear evaporator temp. sensor and A/C amplifier • A/C amplifier	○ (8.5 min. or more)
F/D (DI-59)	Water temperature sensor circuit	• Water temp. sensor • Harness or connector between water temp. sensor and A/C amplifier • A/C amplifier	–
DEF *3 (DI-62)	Solar sensor circuit (Open)	• Solar sensor • Harness or connector between solar sensor and A/C amplifier • A/C amplifier	–
	Solar sensor circuit (Short)		○ (8.5 min. or more)
FRS (DI-65)	Open in pressure sensor circuit Abnormal refrigerant pressure [below 196 kPa (2.0 kgf/cm ² , 28 psi) over 3,140 kPa (32.0 kgf/cm ² , 455 psi)]	• Pressure switch • Harness or connector between pressure switch and A/C amplifier • Refrigerant pipe line • A/C amplifier	–
REC (DI-68)	Air mix damper control servomotor circuit	• Air mix damper position sensor • A/C amplifier • Harness or connector between air mix damper position sensor and A/C amplifier	○ (1 min. or more)
ME (DI-68, DI-71)	Air mix damper control servomotor circuit	• Air mix damper control servomotor • Air mix damper position sensor • Harness and connector between A/C amplifier and air mix position sensor • Harness and connector between A/C amplifier and air mix damper control servomotor • A/C amplifier	○ (15secs. or more)

HINT:

- *1 If the room temp. is approx. –20°C (–4°F) or lower, RrDEF and FACE indicator may be light up even though the system is normal.
- *2 If the ambient temperature is approx. –50°C (–58°F) or lower, a DTC may be output even though the system is normal.
- *3 If the check is being performed in a dark place, RrDEF and DEF (solar sensor circuit abnormal) could be light up. In this case, perform DTC check again while shining a light, such as an inspection light, on the solar sensor. If RrDEF and DEF is still light up, there could be trouble in the solar sensor circuit.

TERMINALS OF ECU



I08302

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
HR ↔ GND (A40 -1 ↔ A42 -18)	L-Y ↔ W-B	IG ON. Front blower motor: Operate	Below 1.0 V
		IG ON. Front blower motor : OFF	10 – 14 V
VM ↔ GND (A40 -2 ↔ A42 -18)	L-B ↔ W-B	IG ON. Front blower switch: LO	9.7 V
		IG ON. Front blower switch: ME	6.3 V
		IG ON. Front blower switch: HI	Below 1.0 V
RHR ↔ GND (A40 -3 ↔ A42 -18)	W-R ↔ W-B	IG ON. Rear blower motor: Operate	Below 1.0 V
		IG ON. Rear blower motor: OFF	10 – 14 V
RVM ↔ GND (A40 -4 ↔ A42 -18)	Y-B ↔ W-B	IG ON. Rear A/C blower switch: LO	9.5 V
		IG ON. Rear A/C blower switch: ME	6.4 V
		IG ON. Rear A/C blower switch: HI	Below 1.0 V
MGC ↔ GND (A40 -5 ↔ A42 -18)	L ↔ W-B	Start engine and push AUTO switch. A/C switch: ON	Below 1.0 V
		A/C switch: OFF	10 – 14 V
AIF ↔ GND (A40 -8 ↔ A42 -18)	G-B ↔ W-B	IG ON. Air inlet selector: FRESH	Below 1.0 V
		IG ON. Air inlet selector: RECIRCULATE	10 – 14 V
AIR ↔ GND (A40 -9 ↔ A42 -18)	LG-B ↔ W-B	IG ON. Air inlet selector: RECIRCULATE	Below 1.0 V
		IG ON. Air inlet selector: FRESH	10 – 14 V
FR ↔ GND (A40 -10 ↔ A42 -18)	G-W ↔ W-B	IG ON. Front blower switch: HI	Below 1.0 V
		IG ON. Front blower switch: Except HI	10 – 14 V
BLW ↔ GND (A40 -11 ↔ A42 -18)	Y ↔ W-B	IG ON. Front blower motor: OFF	10 – 14 V
		IG ON. Front blower motor: Operate	Below 1.0 V
RBLR ↔ GND (A40 -13 ↔ A42 -18)	R ↔ W-B	IG ON. Rear A/C blower motor: Operate	Below 1.0 V
		IG ON. Rear A/C blower motor: OFF	10 – 14 V
RMGV ↔ GND (A40 -14 ↔ A42 -18)	LG-R ↔ W-B	Start engine. Rear A/C switch: ON	Below 1.0 V
		Start engine. Rear A/C switch: OFF	10 – 14 V
FACE ↔ GND (A40 -15 ↔ A42 -18)	GR ↔ W-B	IG ON. Mode selector: FACE	Below 1.0 V
		IG ON. Mode selector: Except FACE	10 – 14 V
B/L ↔ GND (A40 -16 ↔ A42 -18)	BR-W ↔ W-B	IG ON. Mode selector: B/L	Below 1.0 V
		IG ON. Mode selector: Except B/L	10 – 14 V
FOOT ↔ GND (A40 -17 ↔ A42 -18)	BR-Y ↔ W-B	IG ON. Mode selector: FOOT	Below 1.0 V
		IG ON. Mode selector: Except FOOT	10 – 14 V
F/D ↔ GND (A40 -18 ↔ A42 -18)	R-Y ↔ W-B	IG ON. Mode selector: F/D	Below 1.0 V
		IG ON. Mode selector: Except F/D	10 – 14 V
DEF ↔ GND (A40 -19 ↔ A42 -18)	B-W ↔ W-B	IG ON. Mode selector: DEF	Below 1.0 V
		IG ON. Mode selector: Except DEF	10 – 14 V

DIAGNOSTICS – AIR CONDITIONING SYSTEM

MC ↔ GND (A40 -21 ↔ A42 -18)	P-G ↔ W-B	IG ON. Temp. control dial: MAX. COOL	Below 1.0 V
		IG ON. Temp. control dial: MAX. HOT	10 – 14 V
MH ↔ GND (A40 -22 ↔ A42 -18)	P-B ↔ W-B	IG ON. Temp. control dial: MAX. HOT	Below 1.0 V
		IG ON. Temp. control dial: MAX. COOL	10 – 14 V
RDEF ↔ GND (A41 -1 ↔ A42 -18)	L-O ↔ W-B	IG ON. Rear defogger switch: ON	Below 1.0 V
		IG ON. Rear defogger switch: OFF	10 – 14 V
A.C ↔ GND (A41 -2 ↔ A42 -18)	B-Y ↔ W-B	Start engine and push AUTO switch. Magnetic clutch: ON	Below 1.0 V
		Magnetic clutch: OFF	10 – 14 V
RRAC ↔ GND (A41 -3 ↔ A42 -18)	B-W ↔ W-B	IG ON. Rear A/C main switch: ON	Below 1.0 V
		IG ON. Rear A/C main switch: OFF	10 – 14 V
RRHI ↔ GND (A41 -4 ↔ A42 -18)	Y-B ↔ W-B	IG ON. Rear A/C blower switch: HI	Below 1.0 V
		IG ON. Rear A/C blower switch: Except HI	10 – 14 V
PSW ↔ GND (A41 -5 ↔ A42 -18)	W ↔ W-B	IG ON.	Below 1.0 V
		IG ON. Disconnect pressure switch connector	10 – 14 V
ACT ↔ GND (A41 -6 ↔ A42 -18)	L-B ↔ W-B	Start engine (idling). Operate compressor	10 – 14 V
		Start engine (idling). Does not operate compressor	Below 1.5 V
RRAT ↔ GND (A41 -11 ↔ A42 -18)	W-L ↔ W-B	IG ON. Rear A/C blower switch: AUTO	Below 1.0 V
		IG ON. Rear A/C blower switch: Except AUTO	10 – 14 V
RMI ↔ GND (A41 -12 ↔ A42 -18)	Y ↔ W-B	IG ON. Rear A/C blower switch: ME	Below 1.0 V
		IG ON. Rear A/C blower switch: Except ME	10 – 14 V
IG+ ↔ GND (A42 -1 ↔ A42 -18)	R-L ↔ W-B	IG ON.	10 – 14 V
		IG OFF.	No voltage
B ↔ GND (A42 -2 ↔ A42 -18)	W-R ↔ W-B	Constant	10 – 14 V
S5 ↔ GND (A42 -3 ↔ A42 -18)	LG ↔ W-B	Constant	4.5 – 5.5 V
ILL ↔ GND (A42 -4 ↔ A42 -18)	W-B ↔ W-B	Constant	Continuity
TP ↔ SG (A42 -5 ↔ A42 -7)	P ↔ Y-G	IG ON. Temp. control dial: MAX. COOL	4.0 V
		IG ON. Temp. control dial: MAX. HOT	1.0 V
RTB ↔ SG (A42 -6 ↔ A42 -7)	L-O ↔ Y-G	IG ON. Rear A/C temp. control dial: MAX. COOL	0.8 V
		IG ON. Rear A/C temp. control dial: MAX. HOT	2.2 V
SG ↔ GND (A42 -7 ↔ A42 -18)	Y-G ↔ W-B	Constant	Continuity
ILL+ ↔ GND (A42 -9 ↔ A42 -18)	G ↔ W-B	Taillight control switch: TAIL	10 – 14 V
RTE ↔ SG (A42 -12 ↔ A42 -7)	Y ↔ Y-G	IG ON. Rear A/C evaporator temp.: 0 °C (32 °F)	2.0 – 2.4 V
		IG ON. Rear A/C evaporator temp.: 15 °C (59 °F)	1.4 – 1.8 V
TE ↔ SG (A42 -13 ↔ A42 -7)	W-L ↔ Y-G	IG ON. Front evaporator temp.: 0 °C (32 °F)	2.0 – 2.4 V
		IG ON. Front evaporator temp.: 15 °C (59 °F)	1.4 – 1.8 V
TW ↔ SG (A42 -14 ↔ A42 -7)	Y-B ↔ Y-G	IG ON. Water temp.: 40 °C (104 °F)	1.8 – 2.2 V
		IG ON. Water temp.: 70 °C (158 °F)	0.9 – 1.3 V
TAM ↔ SG (A42 -15 ↔ A42 -7)	W ↔ Y-G	IG ON. Ambient temp.: 25 °C (77 °F)	1.3 – 1.8 V
		IG ON. Ambient temp.: 40 °C (104 °F)	0.7 – 1.3 V
TR ↔ SG (A42 -16 ↔ A42 -7)	B ↔ Y-G	IG ON. Cabin temp.: 25 °C (77 °F)	1.8 – 2.2 V
		IG ON. Cabin temp.: 40 °C (104 °F)	1.2 – 1.6 V

TS ↔ SG (A42 –17 ↔ A42 –7)	G–R ↔ Y–G	IG ON. Solar sensor subject to electric light	1.0 V or more
		IG ON. Solar sensor covered by a cloth	Below 1.0 V
GND ↔ Body ground (A42 –18 ↔ Body ground)	W–B ↔ Body ground	Constant	Continuity

PROBLEM SYMPTOMS TABLE

FRONT A/C

Symptom	Suspect Area	See page
Whole functions of the A/C system does not operate	1. A/C amplifier 2. Back-up power source circuit	IN-33 DI-82
Air Flow Control: No blower operation	1. Back-up power source circuit 2. Heater main relay 3. Blower motor circuit 4. A/C amplifier	DI-82 DI-87 DI-90 IN-33
Air Flow Control: No blower control	1. Heater main relay 2. Extra-Hi relay circuit 3. Blower motor circuit 4. A/C amplifier 5. Solar sensor circuit	DI-87 DI-94 DI-90 IN-33 DI-62
Air Flow Control: Insufficient air flow	1. Blower motor circuit	DI-90
Temperature Control: No cool air comes out	1. Refrigerant volume 2. Drive belt tension 3. Refrigeration system inspection with manifold gauge set 4. Compressor circuit 5. Pressure switch circuit 6. Air mix damper position sensor circuit 7. Air mix damper control servomotor circuit 8. Room temp. sensor circuit 9. Ambient temp. sensor circuit 10. A/C amplifier	AC-21(*) AC-22(*) AC-16(*) DI-104 DI-65 DI-68 DI-71 DI-47 DI-50 IN-33
Temperature Control: No warm air comes out	1. Air mix damper position sensor circuit 2. Air mix damper control servomotor circuit 3. Room temp. sensor circuit 4. Ambient temp. sensor circuit 5. Front evaporator temp. sensor circuit 6. A/C amplifier	DI-68 DI-71 DI-47 DI-50 DI-53 IN-33
Temperature Control: Output air is warmer or cooler than the set temperature or response is slow	1. Refrigerant volume 2. Drive belt tension 3. Refrigeration system inspection with manifold gauge set 4. Cooling fan system 5. Solar sensor circuit 6. Room temp. sensor circuit 7. Ambient temp. sensor circuit 8. Front evaporator temp. sensor circuit 9. Air mix damper position sensor circuit 10. Air mix damper control servomotor circuit 11. Air inlet damper control servomotor circuit 12. Condenser 13. Evaporator 14. Heater radiator 15. Expansion valve 16. A/C amplifier	AC-21(*) AC-22(*) AC-16(*) AC-72(*) DI-62 DI-47 DI-50 DI-53 DI-68 DI-71 DI-75 AC-59(*) AC-62(*) AC-61(*) AC-62(*) IN-33

Symptom	Suspect Area	See page
Temperature Control: No temperature control (only Max. cool or Max. warm)	1. Room temp. sensor circuit 2. Ambient temp. sensor circuit 3. Air mix damper position sensor circuit 4. Air mix damper control servomotor circuit 5. A/C amplifier	DI-47 DI-50 DI-68 DI-71 IN-33
No air inlet control	1. Air inlet damper control servomotor circuit 2. A/C amplifier	DI-75 IN-33
No air flow mode	1. Air outlet damper control servomotor 2. A/C amplifier	DI-79 IN-33
Engine idle up does not occur, or is continuous	1. Compressor circuit 2. A/C amplifier	DI-104 IN-33

REAR A/C

Symptom	Suspect Area	See page
Whole functions of the rear A/C system does not operate	1. A/C amplifier	IN-33
Air Flow Control: No blower operation	1. Rear A/C relay circuit 2. Rear blower motor circuit 3. Rear power transistor 4. A/C amplifier	DI-97 DI-100 DI-100 IN-33
Air Flow Control: No blower control	1. Rear blower motor circuit 2. A/C amplifier	DI-100 IN-33
Air Flow Control: Insufficient air flow	1. Rear blower motor circuit	DI-100
Temperature Control: No cool air comes out	1. Refrigerant volume 2. Drive belt tension 3. Refrigeration system inspection with manifold gauge set 4. Compressor circuit 5. Pressure switch circuit 6. Rear A/C magnetic valve circuit 7. A/C amplifier	AC-21(*) AC-22(*) AC-16(*) DI-104 DI-65 DI-109 IN-33
Temperature Control: No temperature control (only Max. cool or Max. warm)	1. Rear A/C temperature set lever circuit 2. Rear A/C amplifier	DI-118 IN-33

(*): See Pub. No. RM517E

CIRCUIT INSPECTION

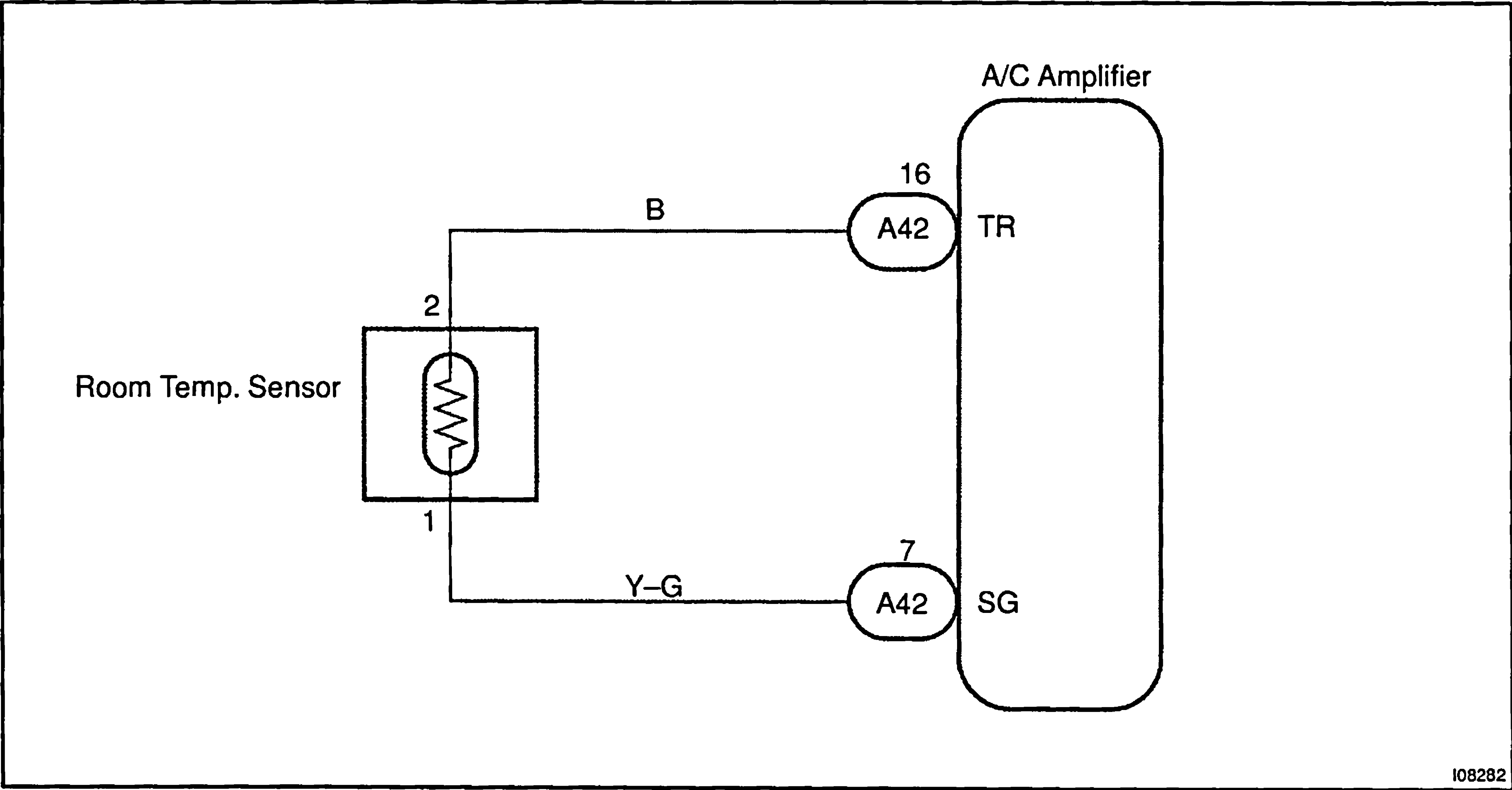
DTC	FACE	Room Temperature Sensor Circuit
-----	------	---------------------------------

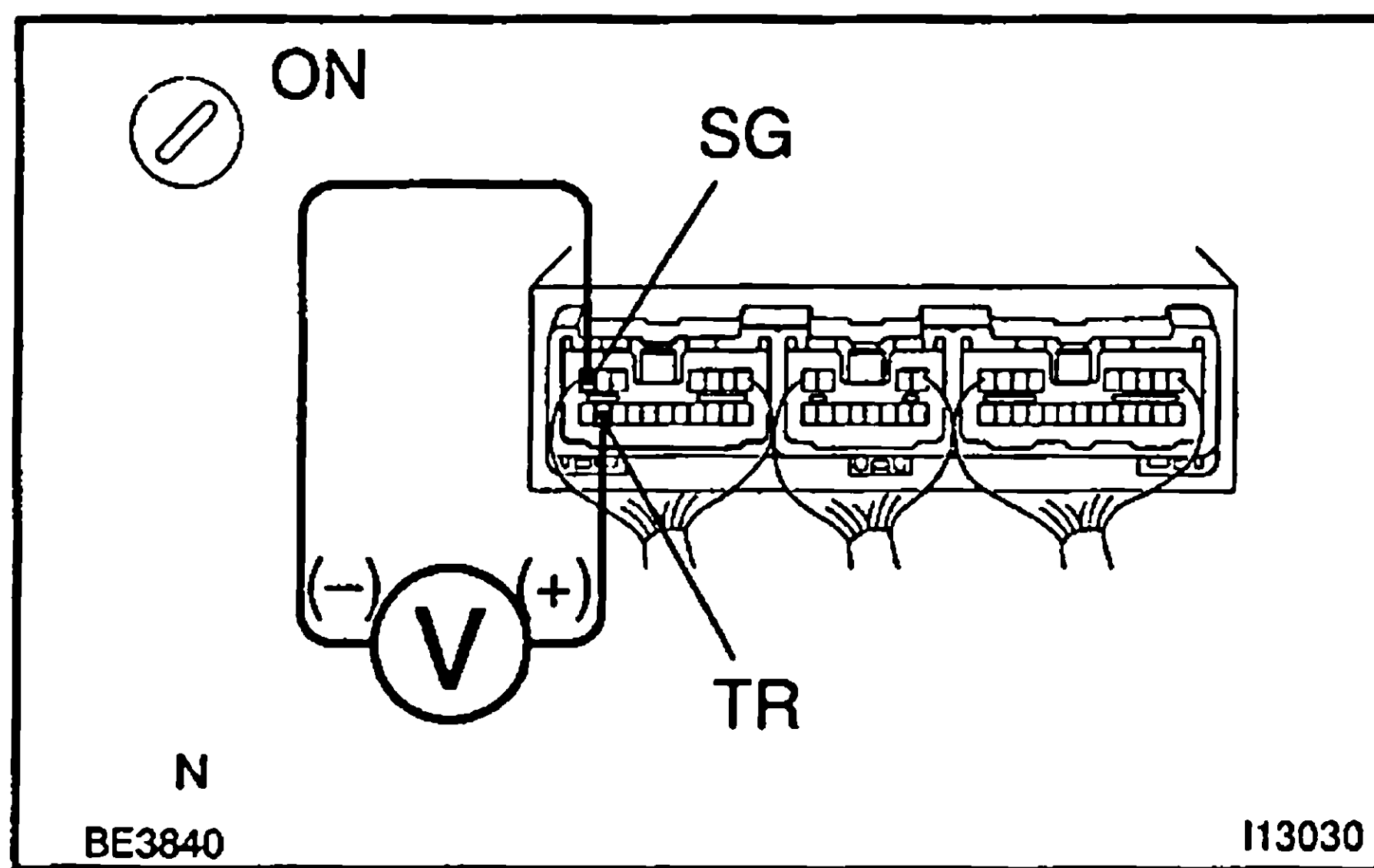
CIRCUIT DESCRIPTION

This sensor detects the temperature inside the cabin and sends the appropriate signals to the A/C amplifier.

Blinking light	Detection Item	Trouble Area
FACE	Open or short in room temperature sensor circuit.	• Room temperature sensor • Harness or connector between room temperature sensor and A/C amplifier • A/C amplifier

WIRING DIAGRAM



INSPECTION PROCEDURE**1****Check voltage between terminals TR and SG of A/C amplifier connector.****PREPARATION:**

Remove A/C control assembly with connectors still connected.

CHECK:

- (a) Turn ignition switch to ON.
- (b) Measure voltage between terminals TR and SG of A/C amplifier connector at each temperature.

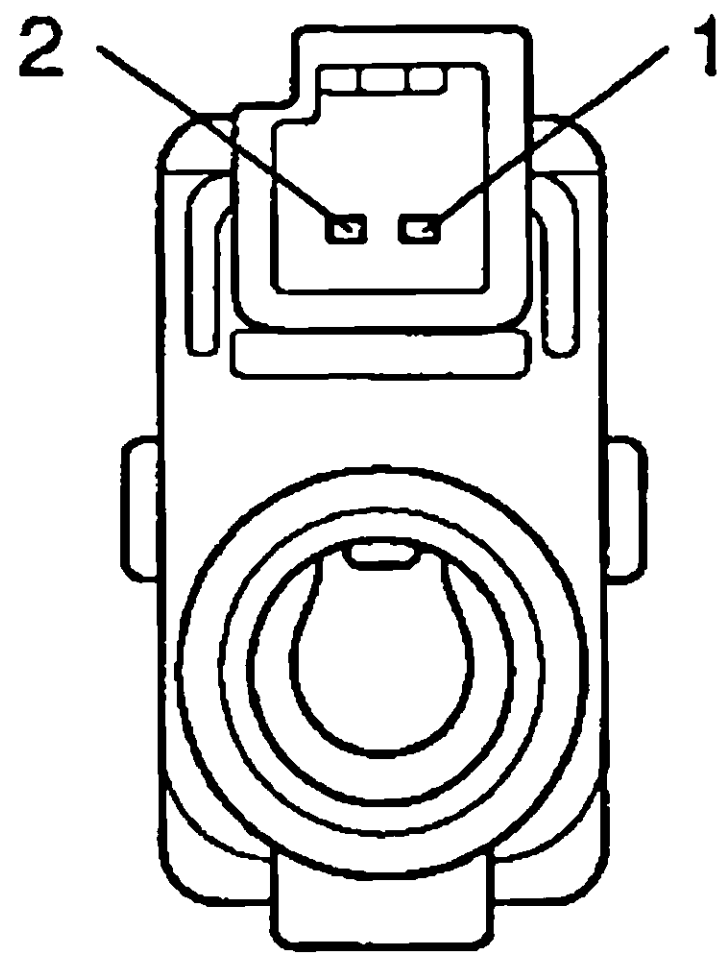
OK:**Voltage :****at 25°C (77°F) : 1.8 – 2.2 V****at 40°C (104°F) : 1.2 – 1.6 V****HINT:**

As the temperature increases, the voltage decreases.

NG**Go to step 2.****OK**

Proceed to next circuit inspection shown on problem symptoms table (See page DI-45). However, if FACE indicator light up, check and replace A/C amplifier.

2 Check room temperature sensor.



I08310

PREPARATION:

Remove room temperature sensor.

CHECK:

Measure resistance between terminals 1 and 2 of room temperature sensor connector at each temperature.

OK:

Resistance :

at 25°C (77°F) : 1.65 – 1.75 kΩ

at 50°C (122°F) : 0.55 – 0.65 kΩ

HINT:

As the temperature increases, the resistance decreases.

NG

Replace room temperature sensor.

OK

3 Check harness and connector between A/C amplifier and room temperature sensor (See page IN-33).

NG

Repair or replace harness or connector.

OK

Check and replace A/C amplifier.

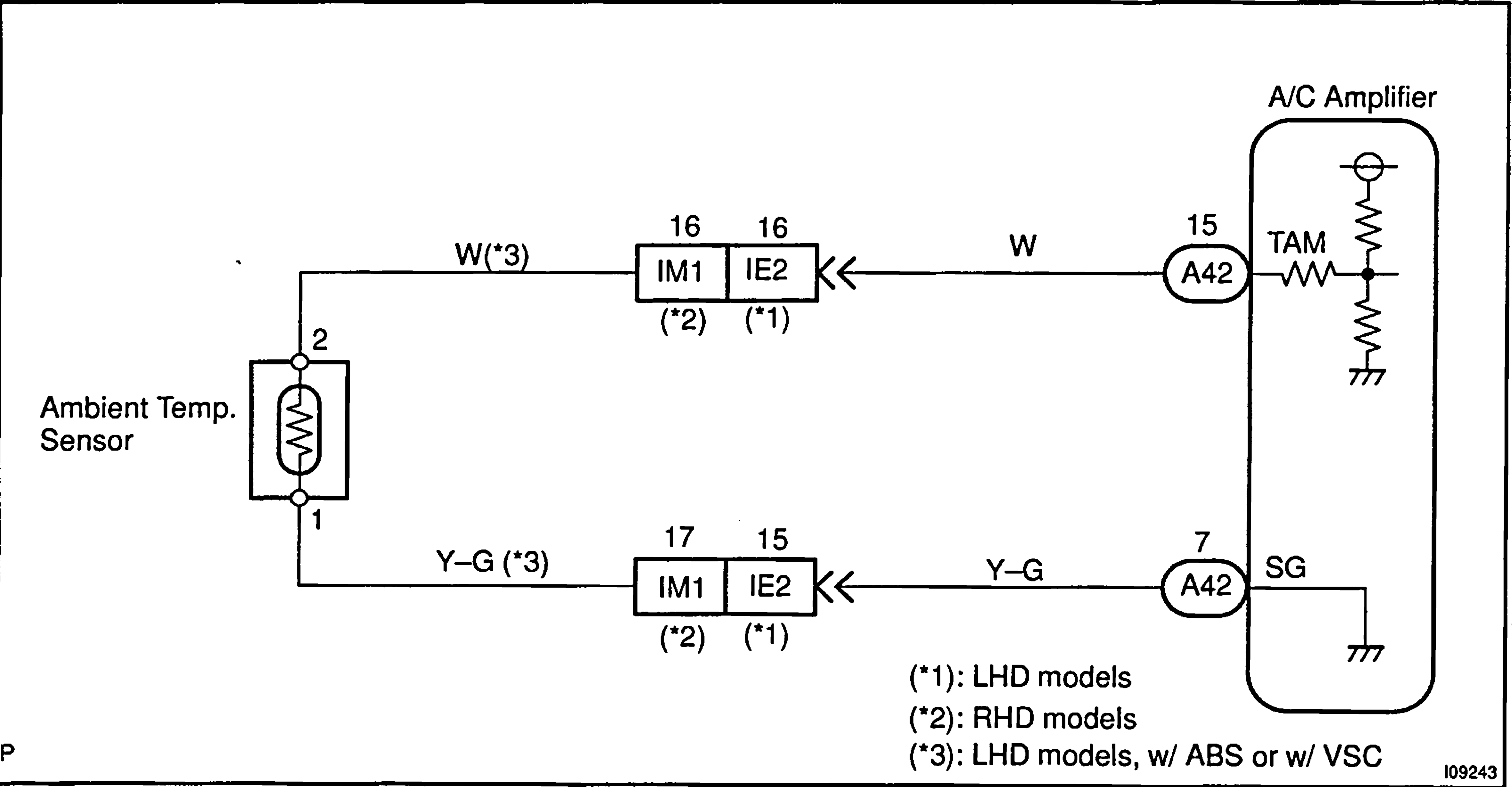
DTC	B/L	Ambient Temperature Sensor Circuit
-----	-----	------------------------------------

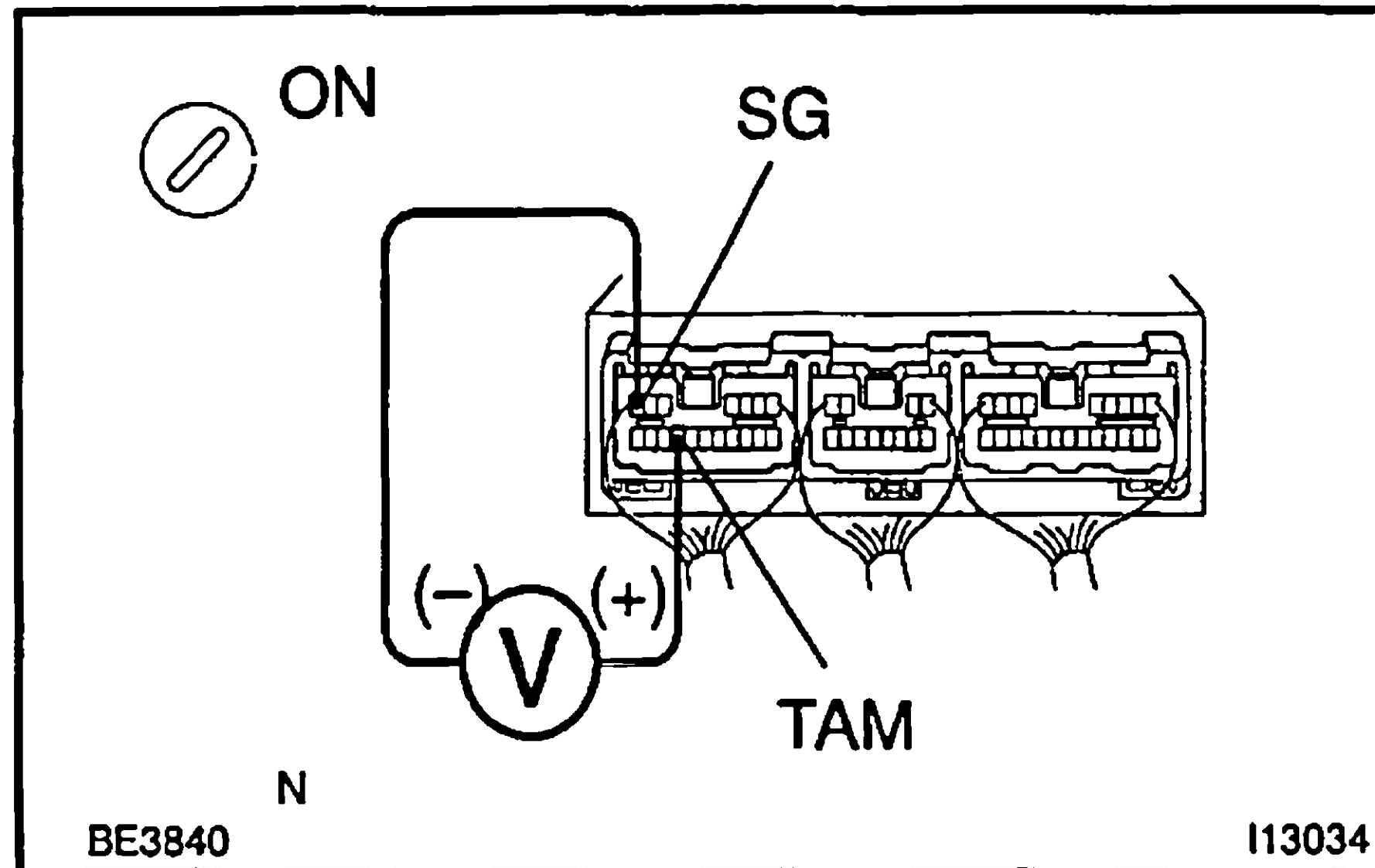
CIRCUIT DESCRIPTION

This sensor detects the ambient temperature and sends the appropriate signals to the A/C amplifier.

Blinking light	Detection Item	Trouble Area
B/L	Open or short in ambient temperature sensor circuit.	• Ambient temperature sensor • Harness or connector between ambient temperature sensor and A/C amplifier • A/C amplifier

WIRING DIAGRAM



INSPECTION PROCEDURE**1****Check voltage between terminals TAM and SG of A/C amplifier.****PREPARATION:**

Remove A/C control assembly with connectors still connected.

CHECK:

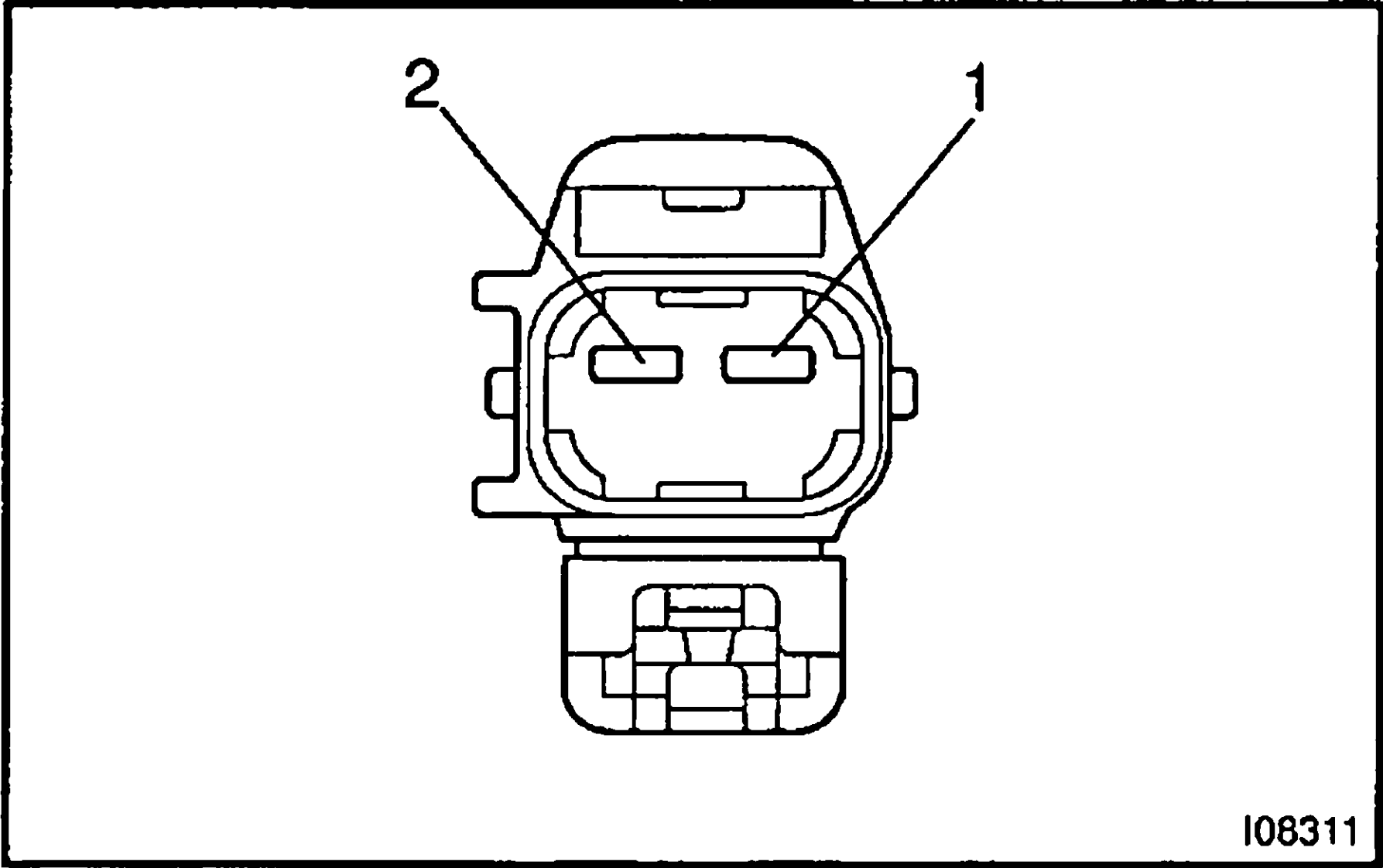
- (a) Turn ignition switch to ON.
- (b) Measure voltage between terminals TAM and SG of A/C amplifier connector at each temperature.

OK:**Voltage :****at 25°C (77°F) : 1.35 – 1.75 V****at 40°C (104°F) : 0.85 – 1.25 V****HINT:**

As the temperature increases, the voltage decreases.

NG**Go to step 2.****OK****Proceed to next circuit inspection shown on problem symptoms table (See page DI-45). However, if B/L indicator light up, check and replace A/C amplifier.**

2	Check ambient temperature sensor.
---	-----------------------------------



PREPARATION:

Remove ambient temperature sensor.

CHECK:

Measure resistance between terminals 1 and 2 of ambient temperature sensor connector at each temperature.

OK:

Resistance :

at 25° C (77° F) : 1.6 – 1.8 kΩ

at 50° C (122° F) : 0.5 – 0.7 kΩ

HINT:

As the temperature increases, the resistance decreases.

NOTICE:

When installing the ambient temperature sensor, be sure to connect the sensor connector before connecting the battery.

NG	Replace ambient temperature sensor.
----	-------------------------------------

OK

3	Check harness and connector between ambient temperature sensor and A/C amplifier (See page IN-33).
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NG	Repair or replace harness or connector.
----	---

OK

Check and replace and A/C amplifier.

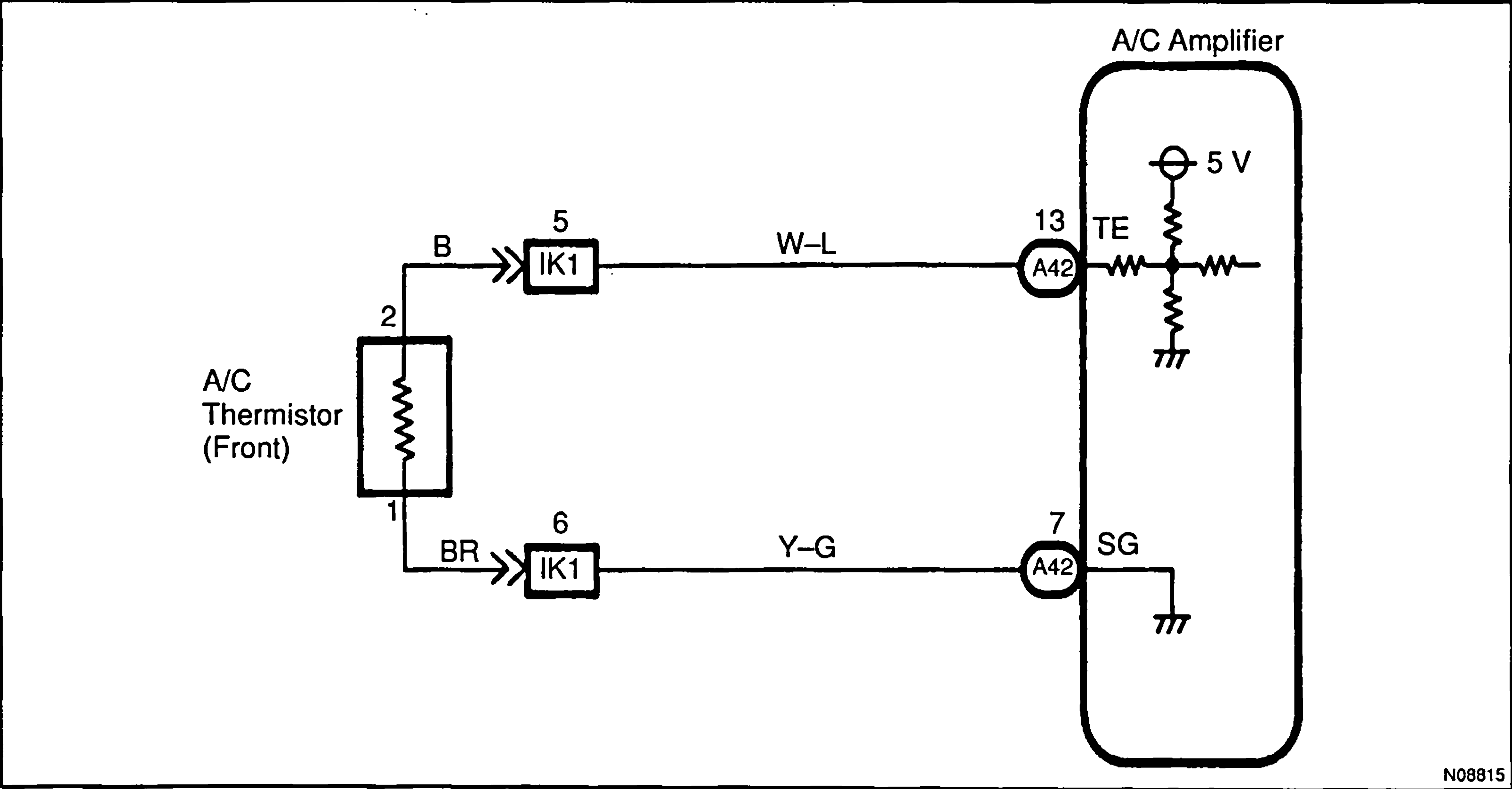
DTC	FOOT	Front Thermistor Circuit
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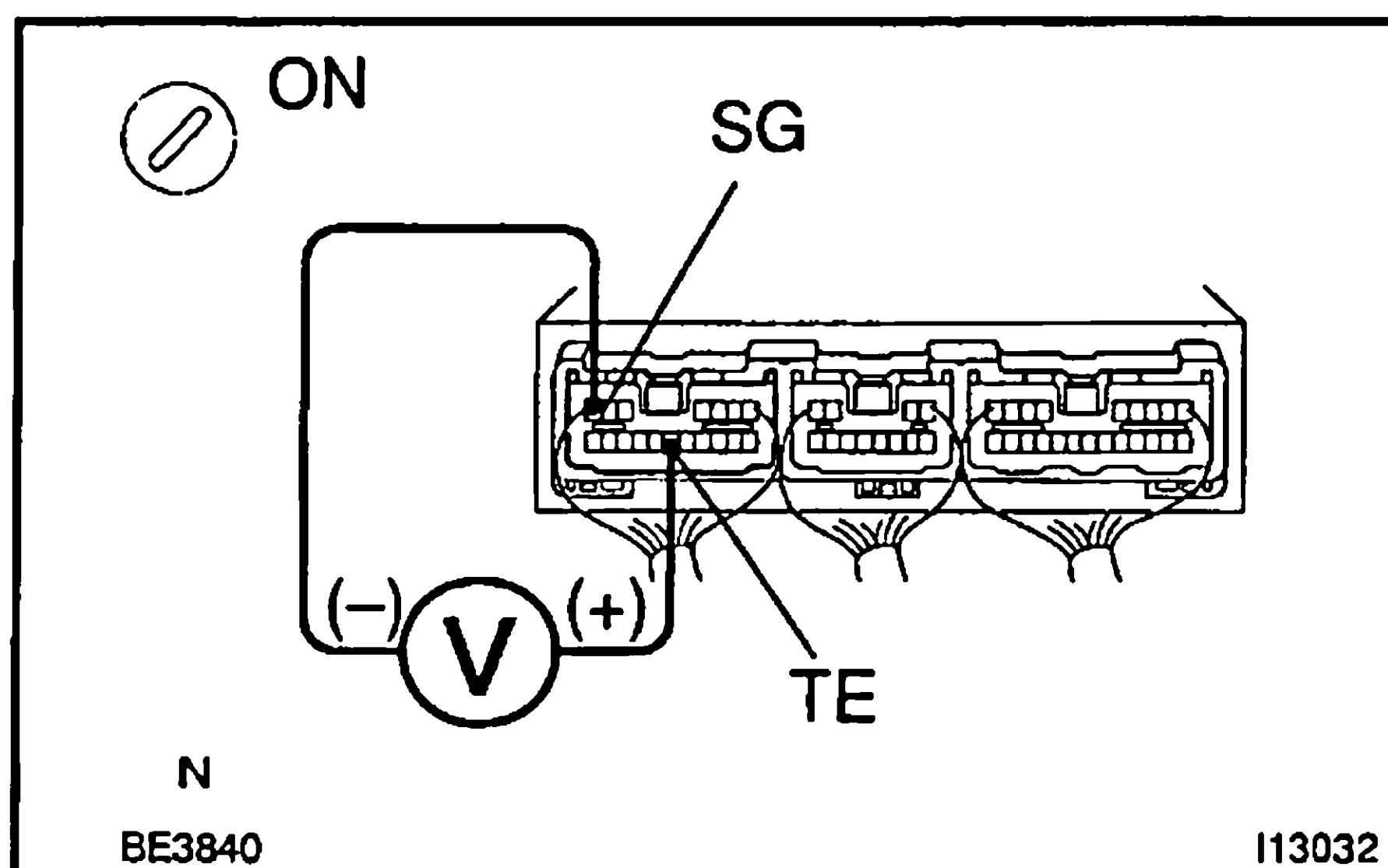
CIRCUIT DESCRIPTION

This sensor detects the temperature inside the front cooling unit and sends the appropriate signals to the A/C amplifier.

Blinking light	Detection Item	Trouble Area
FOOT	Open or short in front thermistor circuit.	• Front thermistor • Harness or connector between front thermistor and A/C amplifier • A/C amplifier

WIRING DIAGRAM



INSPECTION PROCEDURE**1****Check voltage between terminals TE and SG of A/C amplifier connector.****PREPARATION:**

Remove A/C amplifier with connectors still connected.

CHECK:

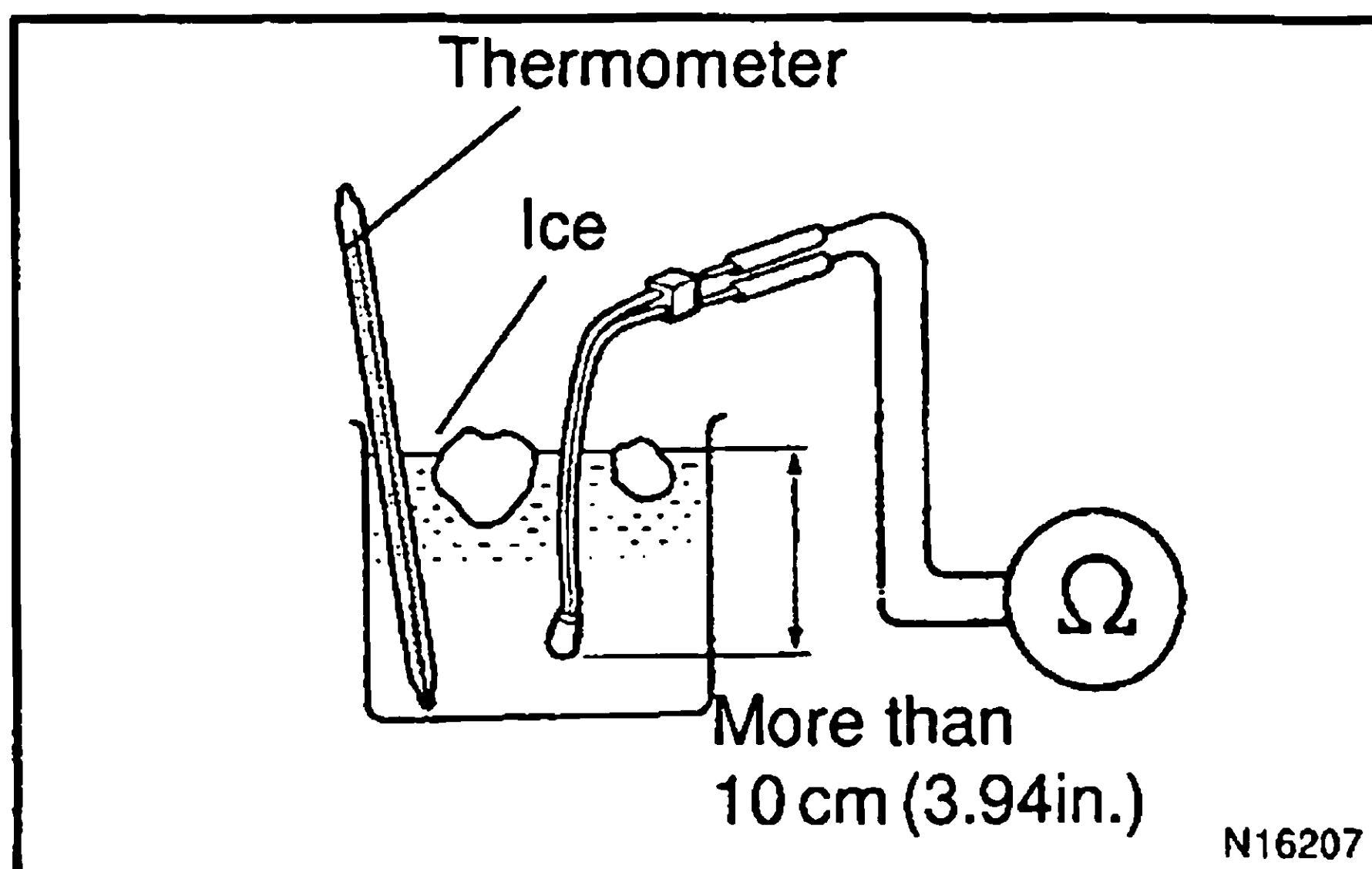
- (a) Turn ignition switch to ON.
- (b) Measure voltage between terminals TE and SG of A/C amplifier connector at each temperature.

OK:**Voltage :****at 0°C (32°F) : 2.0 – 2.4 V****at 15°C (59°F) : 1.4 – 1.8 V****HINT:**

As the temperature increases, the voltage decreases.

NG**Go to step 2.****OK****Proceed to next circuit inspection shown on problem symptoms table (See page DI-45). However, if FOOT indicator light up, check and replace A/C amplifier.**

2 Check front evaporator temperature sensor.



PREPARATION:

Remove front evaporator temperature sensor
(See Pub. No. RM702E on page AC-4).

CHECK:

Measure resistance between terminals 1 and 2 of front evaporator temperature sensor connector at each temperature.

OK:

Resistance :

at 0°C (32°F) : 4.5 – 5.2 kΩ

at 15°C (59°F) : 2.0 – 2.7 kΩ

HINT:

As the temperature increases, the resistance decreases.

NG

Replace front evaporator temperature sensor.

OK

3 Check harness and connector between A/C amplifier and front evaporator temperature sensor (See page IN-33).

NG

Repair or replace harness or connector.

OK

Check and replace A/C amplifier.

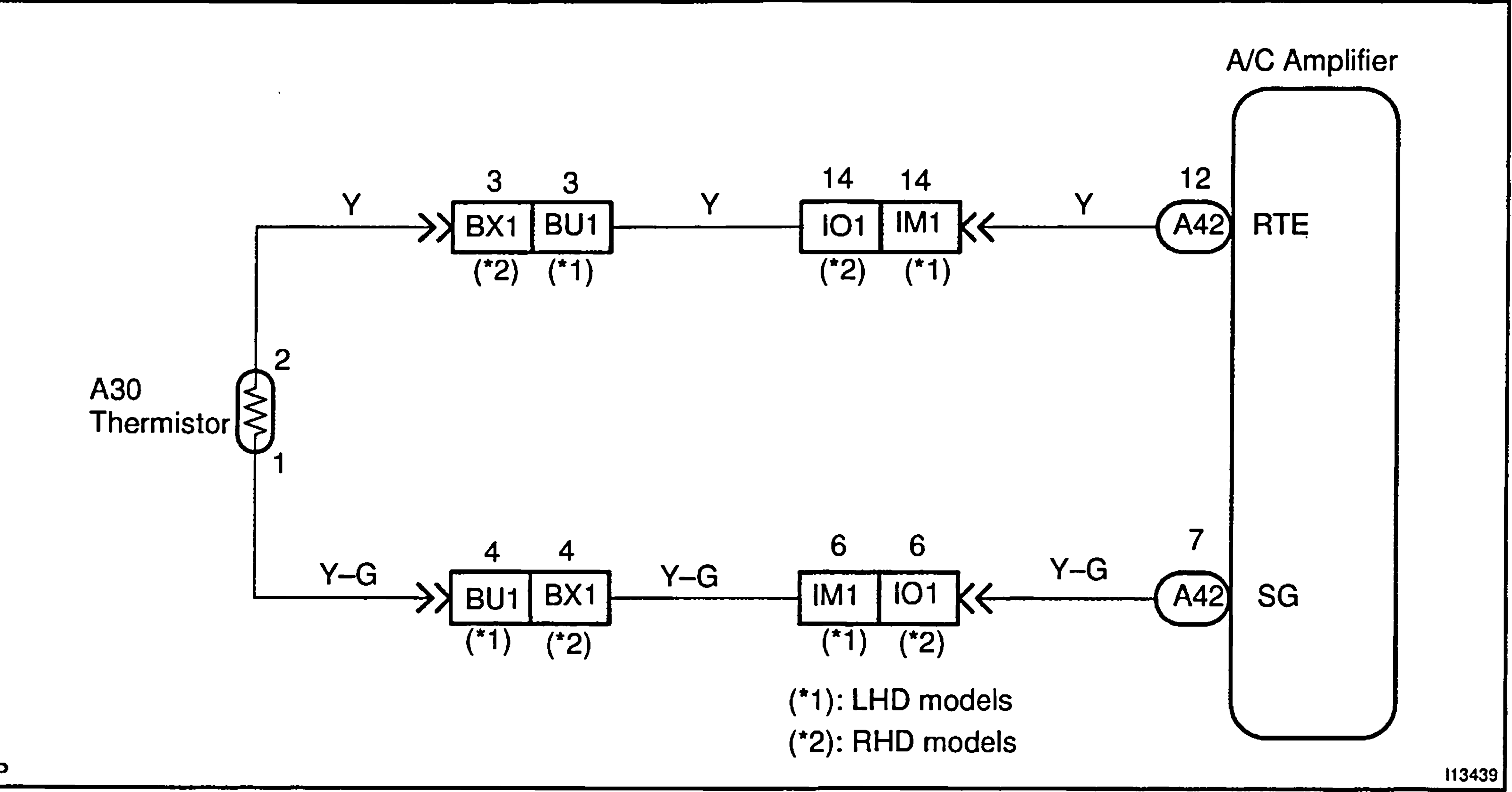
DTC	RrDEF	Rear Thermistor circuit
-----	-------	-------------------------

CIRCUIT DESCRIPTION

This sensor detects the temperature inside the rear cooling unit and sends the appropriate signals to the A/C amplifier.

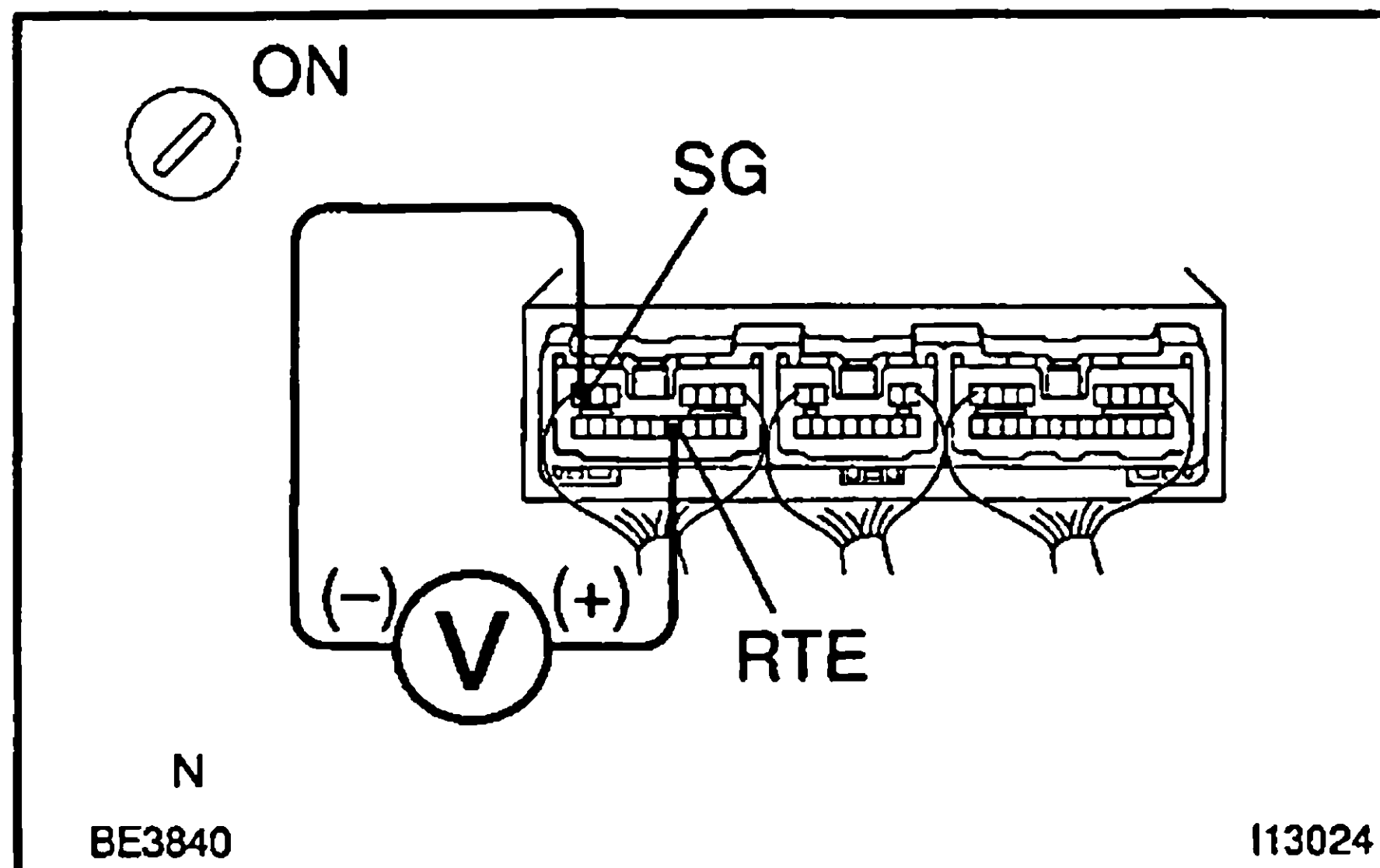
Blinking light	Detection Item	Trouble Area
RrDEF	Open or short in rear thermistor circuit.	•Rear thermistor. •Harness or connector between front thermistor and A/C amplifier. •A/C amplifier.

WIRING DIAGRAM



INSPECTION PROCEDURE

1

Check voltage between terminals RTE and SG of A/C amplifier connector.**PREPARATION:**

Remove A/C amplifier with connectors still connected.

CHECK:

- Turn ignition switch ON.
- Measure voltage between terminals RTE and SG of A/C amplifier connector at each temperature.

OK:**Voltage :**

at 0°C (32°F) : 2.0 – 2.4 V

at 15°C (59°F) : 1.4 – 1.8 V

HINT:

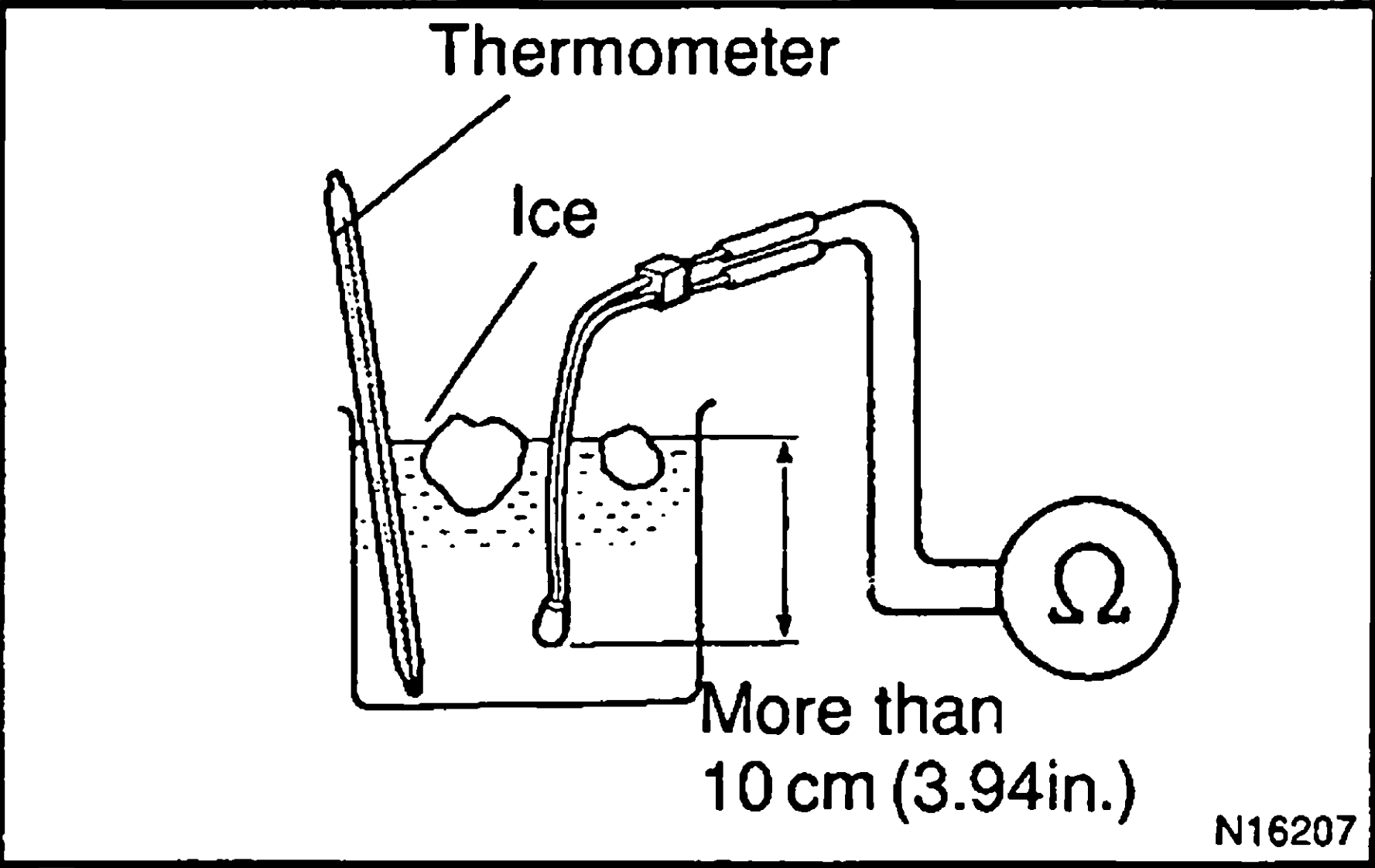
As the temperature increases, the voltage decreases.

NG**Go to step 2.****OK**

Proceed to next circuit inspection shown on problem symptoms table (See page DI-45). However, if RrDEF is light up, check and replace A/C amplifier.

2

Check rear evaporator temperature sensor.



PREPARATION:

Remove rear evaporator temperature sensor
(See Pub. No. RM702E on page AC-8).

CHECK:

Measure resistance between terminals 1 and 2 of front evaporator temperature sensor connector at each temperature.

OK:

Resistance :
at 0°C (32°F) : 4.5 – 5.2 kΩ
at 15°C (59°F) : 2.0 – 2.7 kΩ

HINT:

As the temperature increases, the resistance decreases.

NG

Replace rear evaporator temperature sensor.

OK

3

Check harness and connector between A/C amplifier and rear evaporator temperature sensor (See page IN-33).

NG

Repair or replace harness or connector.

OK

Check and replace A/C amplifier.

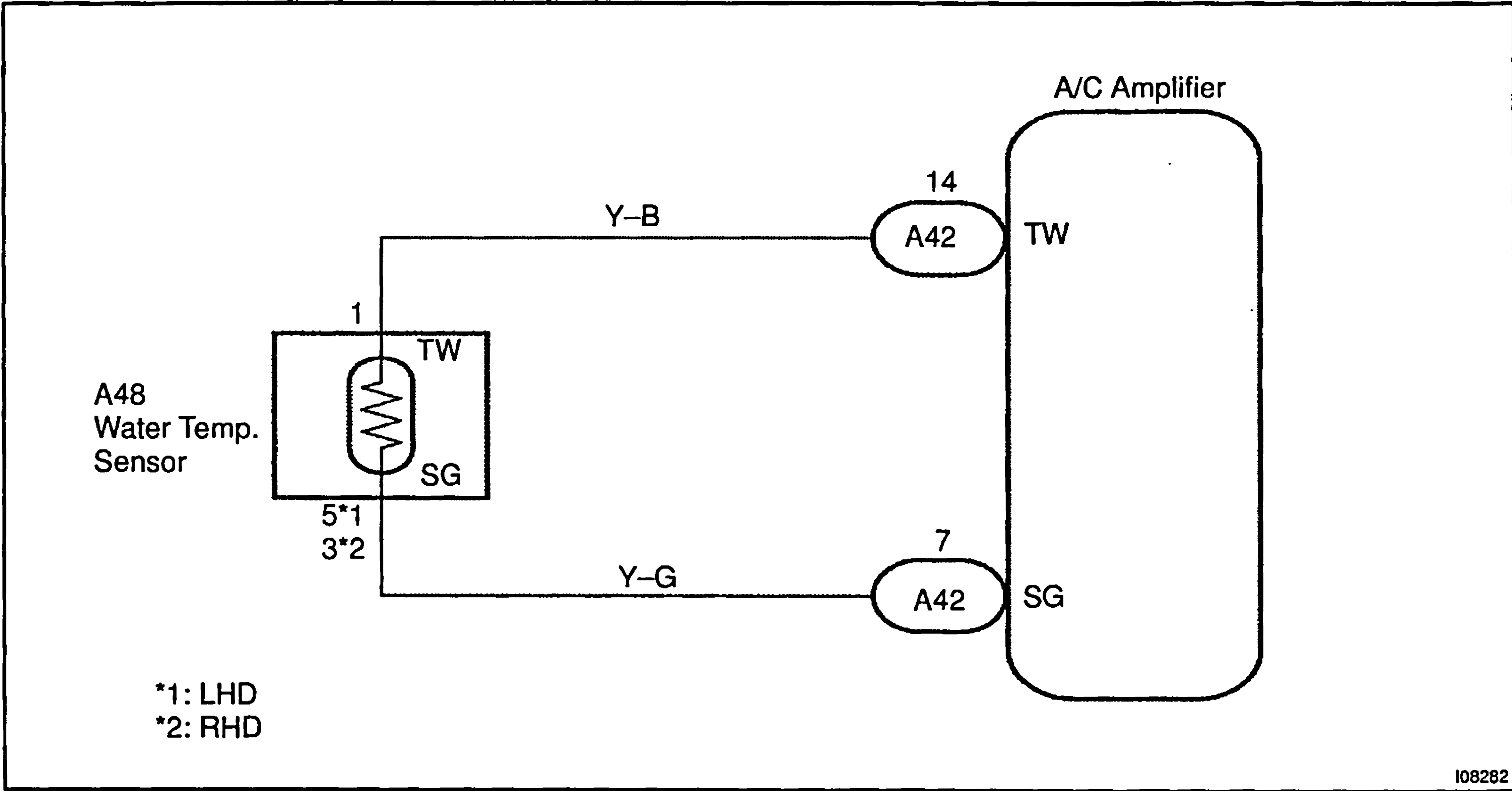
DTC	F/D	Water Temperature Sensor Circuit
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CIRCUIT DESCRIPTION

This sensor detects the water temperature and sends the appropriate signals to the A/C amplifier.

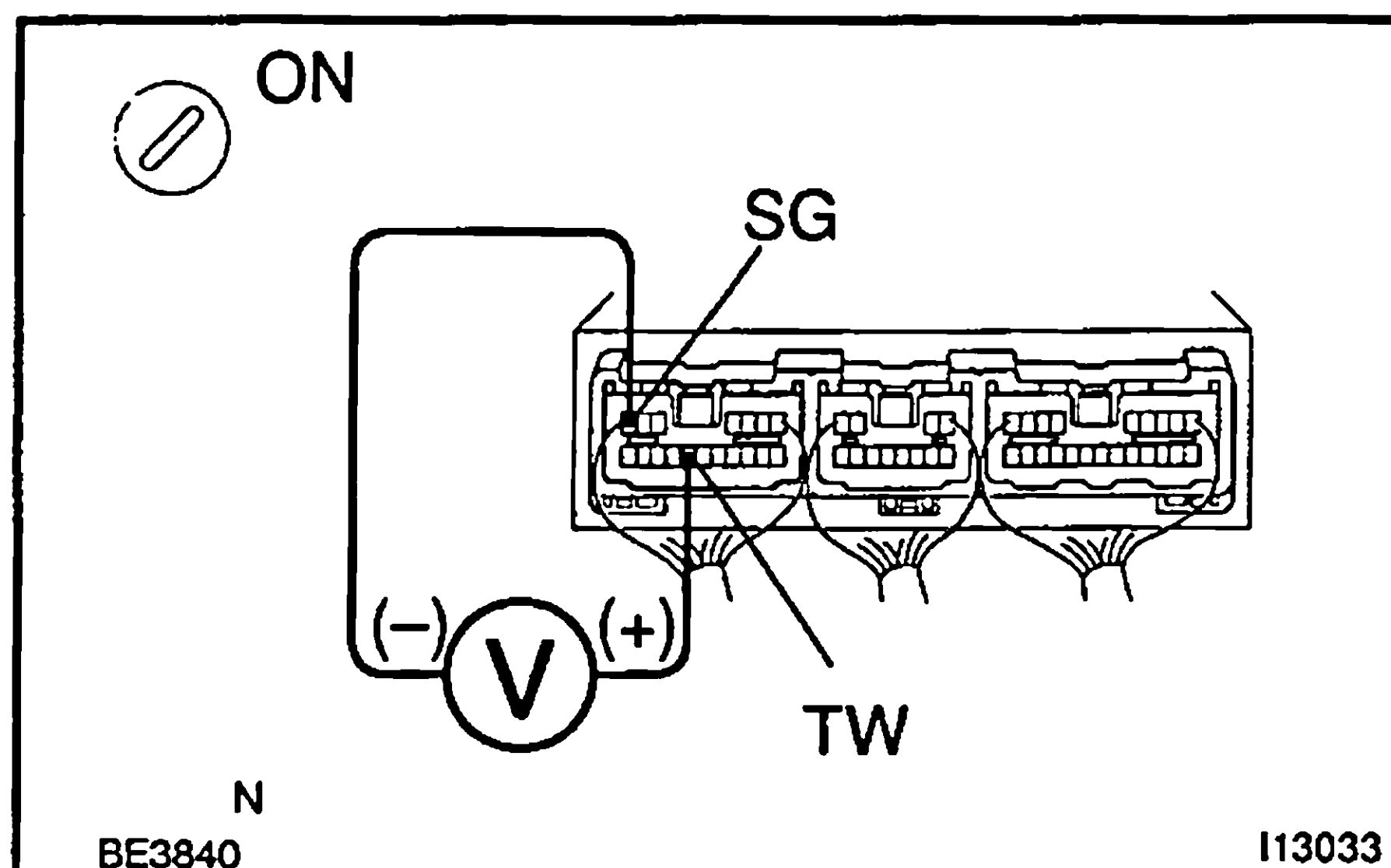
Blinking light	Detection Item	Trouble Area
F/D	Open or short in engine coolant temperature sensor circuit.	• Water temperature sensor • Harness or connector between engine coolant temperature sensor and A/C amplifier • A/C amplifier

WIRING DIAGRAM



INSPECTION PROCEDURE

- | | |
|----------|---|
| 1 | Check voltage between terminals TW and SG of A/C control assembly connector. |
|----------|---|

**PREPARATION:**

- (a) Remove A/C control assembly with connectors still connected.
- (b) Turn ignition switch to ON.

CHECK:

Measure voltage between terminals TW and SG of A/C control assembly connector at each engine coolant temperature.

OK:**Voltage :**

- at 0°C (32°F) : 2.8 – 3.2 V
- at 40°C (104°F) : 1.8 – 2.2 V
- at 70°C (158°F) : 0.9 – 1.3 V

HINT:

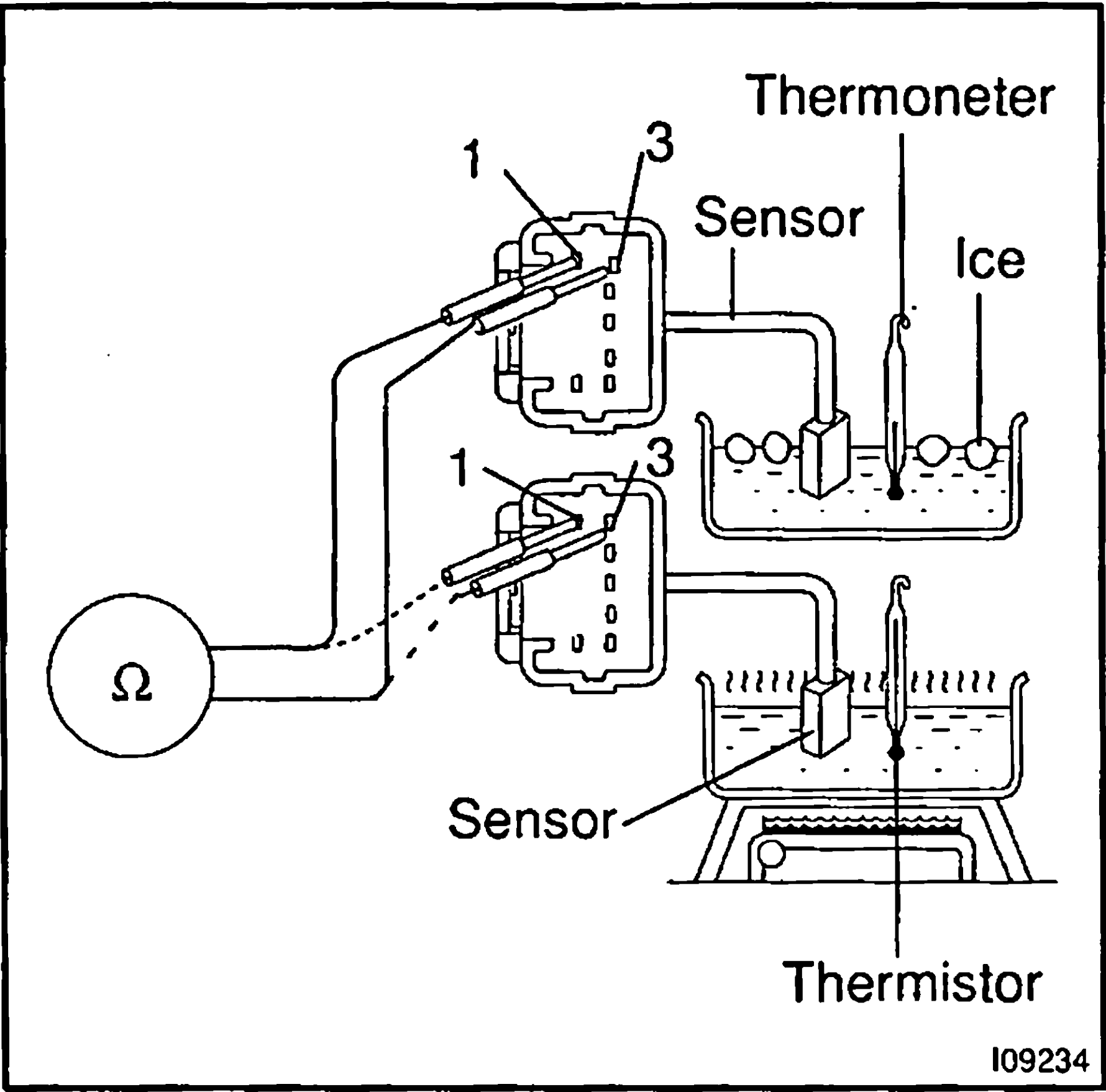
As the temperature increases, the voltage decreases.

NG**Go to step 2.****OK**

Proceed to next circuit inspection shown on problem symptoms table (See page DI-45). However, if DTC 14 is displayed, check and replace A/C control assembly.

2

Check engine coolant temperature sensor.



PREPARATION:

Remove engine coolant temperature sensor
(See Pub. No. RM702E on page AC-13).

CHECK:

Measure resistance between terminals 1 and 3 of engine coolant temperature sensor connector at each temperature.

OK:

Resistance :

at 0°C (32°F) : Below 50 kΩ

at 40°C (104°F) : 2.5 – 2.7 kΩ

at 100°C (212°F) : Over 0.3 kΩ

HINT:

As the temperature increases, the resistance decreases gradually.

NG

Replace engine coolant temperature sensor.

OK

3

Check harness and connector between A/C control assembly and engine coolant temperature sensor (See page IN-33).

NG

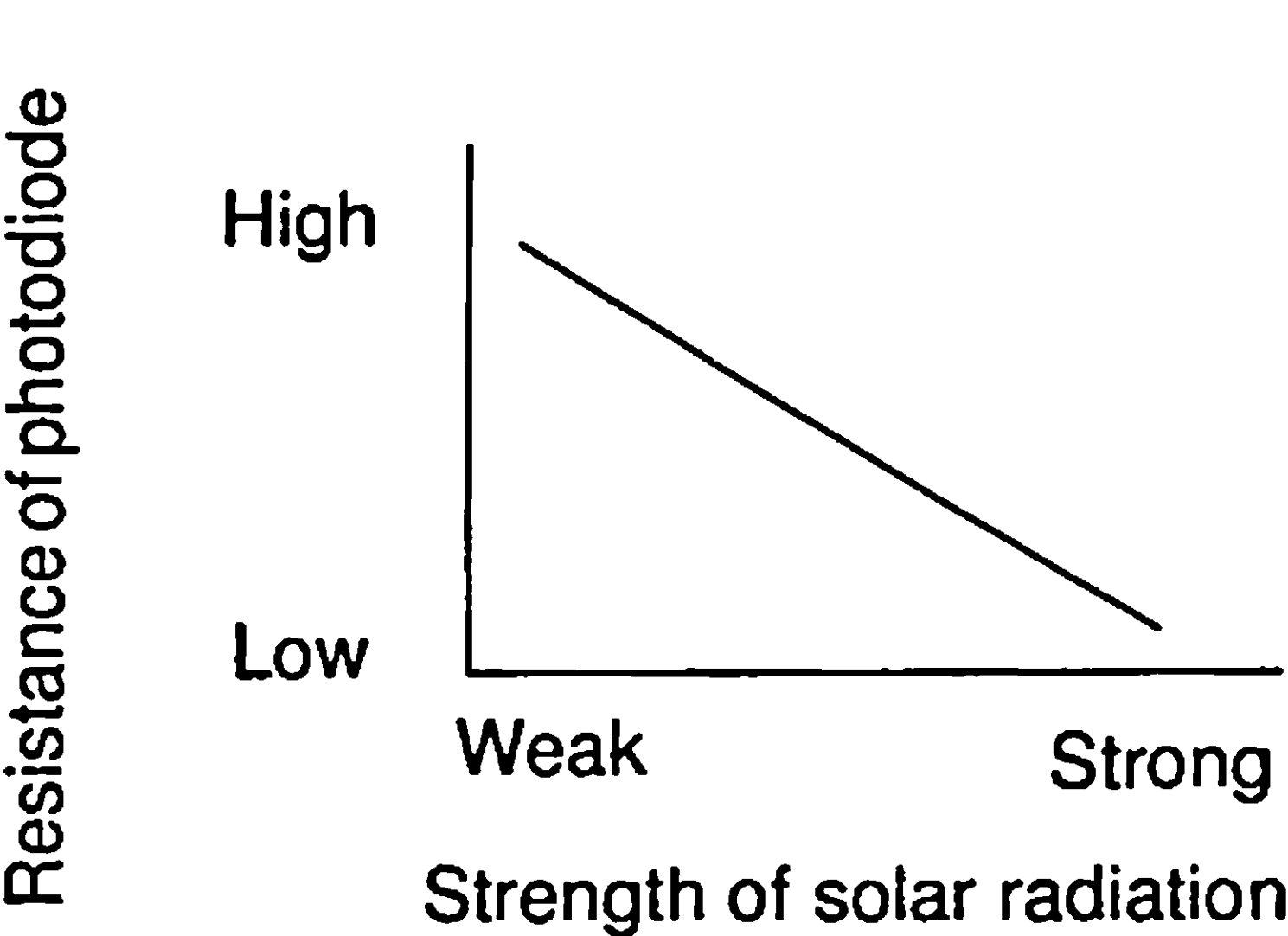
Repair or replace harness or connector.

OK

Check and replace A/C control assembly.

DTC	DEF	Solar Sensor Circuit
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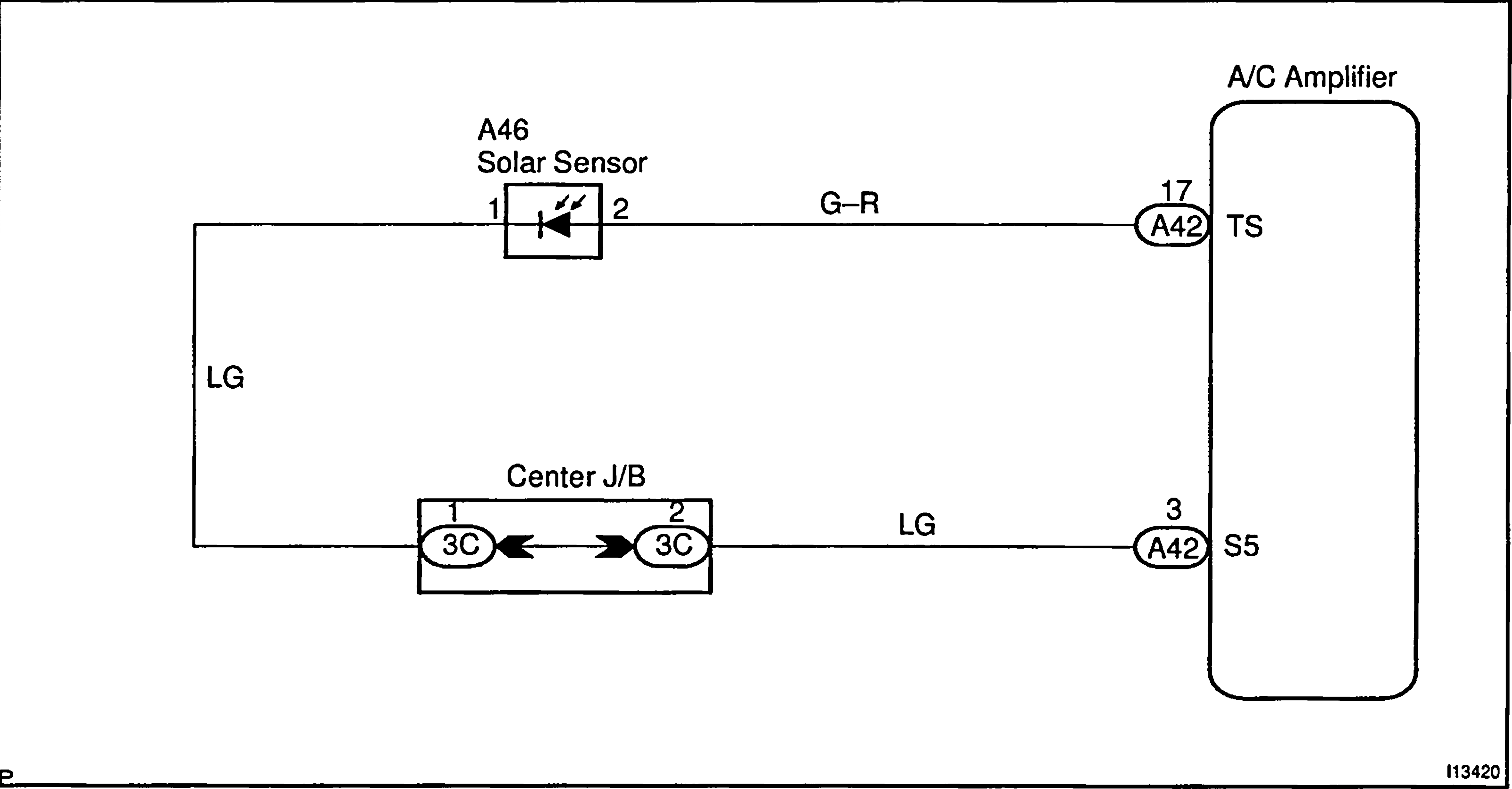
CIRCUIT DESCRIPTION



A photo diode in the solar sensor detects solar radiation and sends signals to the A/C control assembly.

Blinking light	Detection Item	Trouble Area
DEF	Open or short in solar sensor circuit. Please note that display of diagnostic trouble code DEF is not abnormal when the sensor is not receiving solar radiation.	•Solar sensor •Harness or connector between solar sensor and A/C amplifier •A/C amplifier

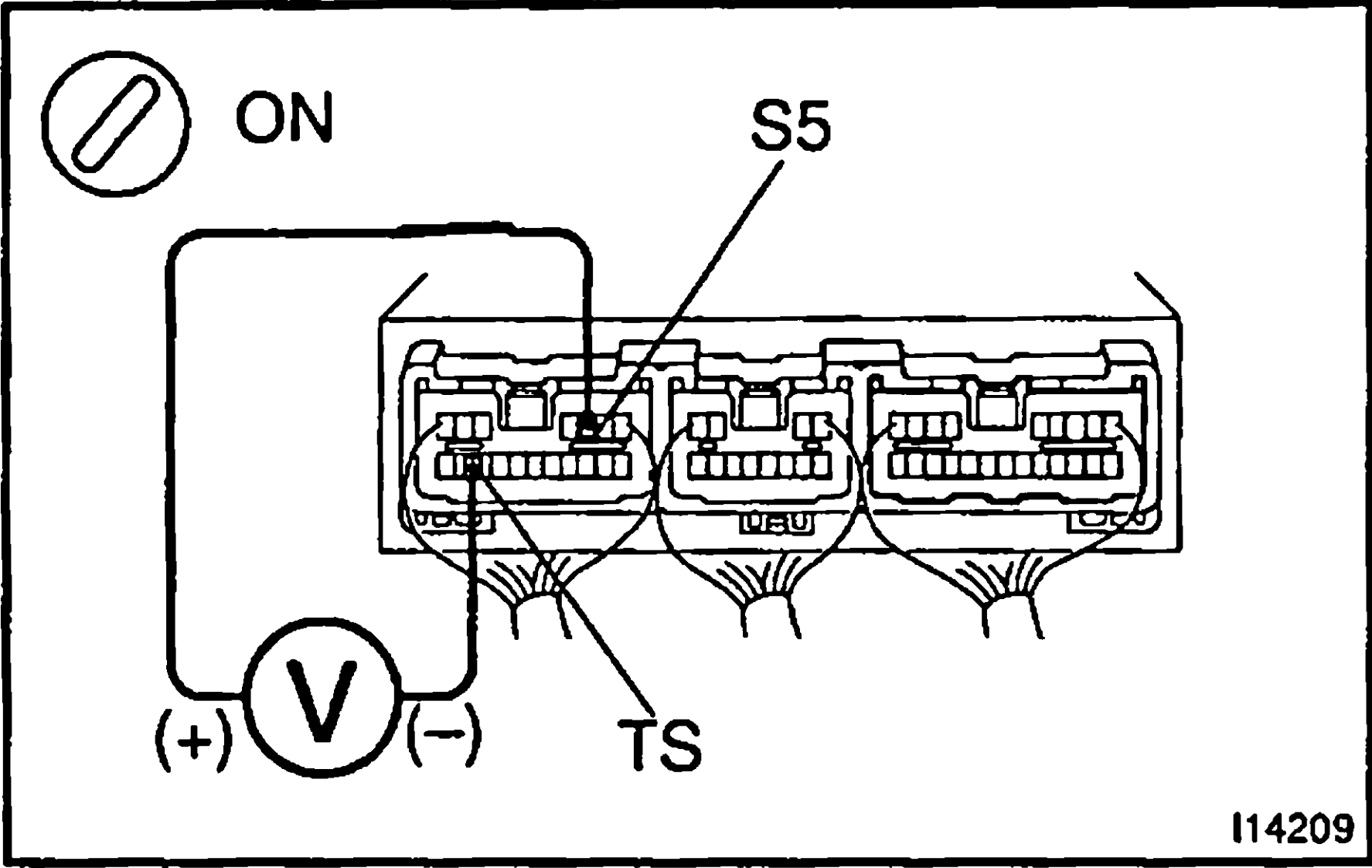
WIRING DIAGRAM



INSPECTION PROCEDURE

1

Check voltage between terminals TS and S5 of A/C amplifier connector.



- PREPARATION:**
Remove A/C control assembly with connectors still connected.
- CHECK:**
- (a) Turn ignition switch to ON.
 - (b) Measure voltage between terminals S5 and TS of A/C amplifier connector when the solar sensor is subjected to an electric light, and when the sensor is covered by a cloth.

OK:

Condition	Voltage
Sensor subjected to electric light	0.8 – 4.3 V
Sensor covered by a cloth	Below 0.8 V

HINT:
As the inspection light is moved away from the sensor, the voltage increases.

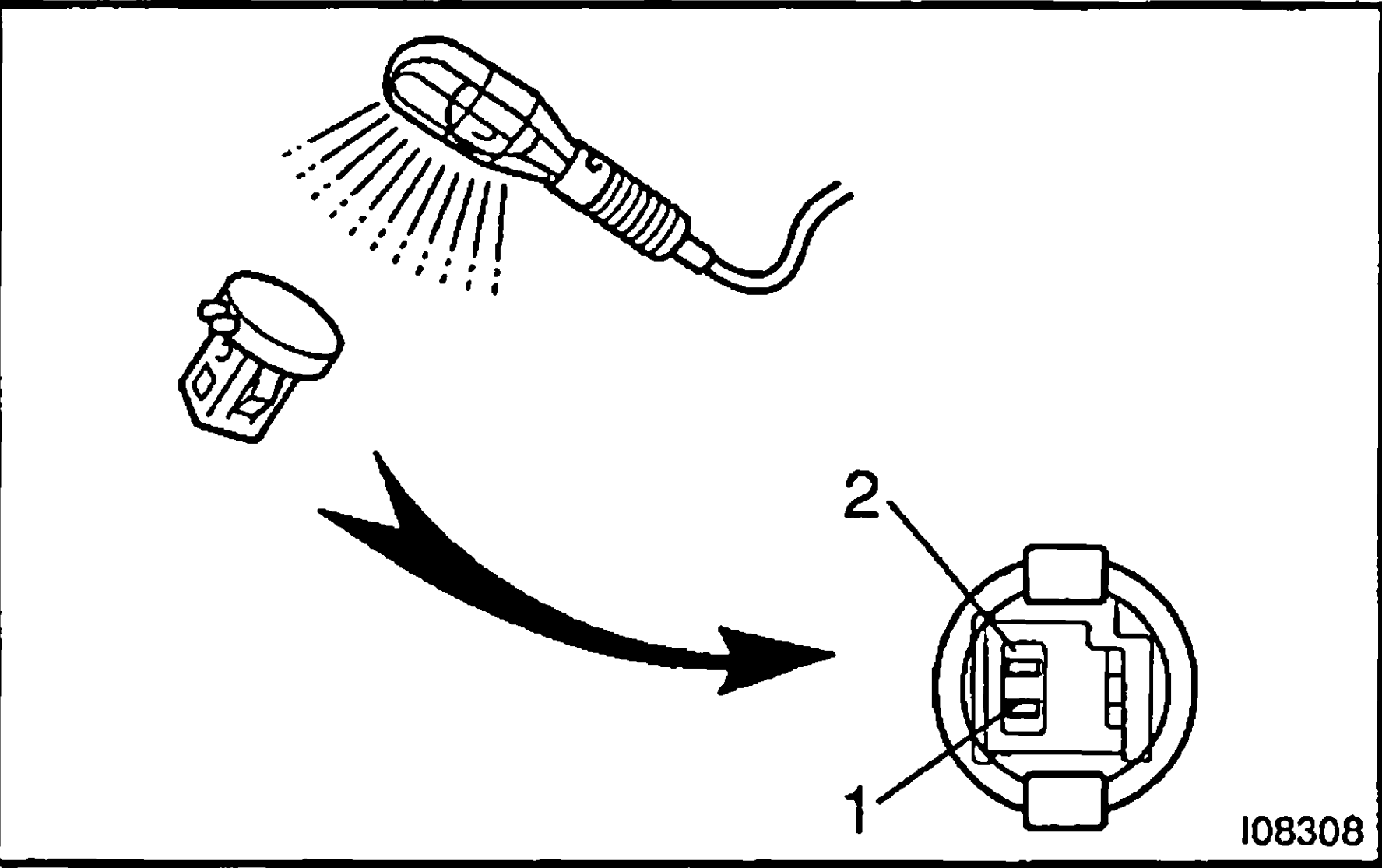
NG

Go to step 2.

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI-45). However, if DEF indicators light up, check and replace A/C amplifier.

2	Check solar sensor.
---	---------------------



PREPARATION:

Remove solar sensor (See Pub. No. RM702E on page AC-23).

CHECK:

- (a) Cover the sensor with a cloth.
- (b) Measure resistance between terminals 1 and 2 of solar sensor connector.

HINT:

Connect positive (+) lead of ohmmeter to terminal 2 and negative (–) lead to terminal 1 of the solar sensor.

OK:

Resistance : $\infty \Omega$ (no continuity)

PREPARATION:

- (a) Remove the cloth from the solar sensor and subject the sensor to electric light.
- (b) Measure resistance.

OK:

Resistance : Approx. 4 k Ω (continuity)

HINT:

As the electric light is moved away from the sensor, the resistance increases.

NG

Replace solar sensor.

OK

3	Check harness and connector between A/C amplifier and solar sensor (See page IN-33).
---	--

NG

Repair or replace harness or connector.

OK

Check and replace A/C control assembly.

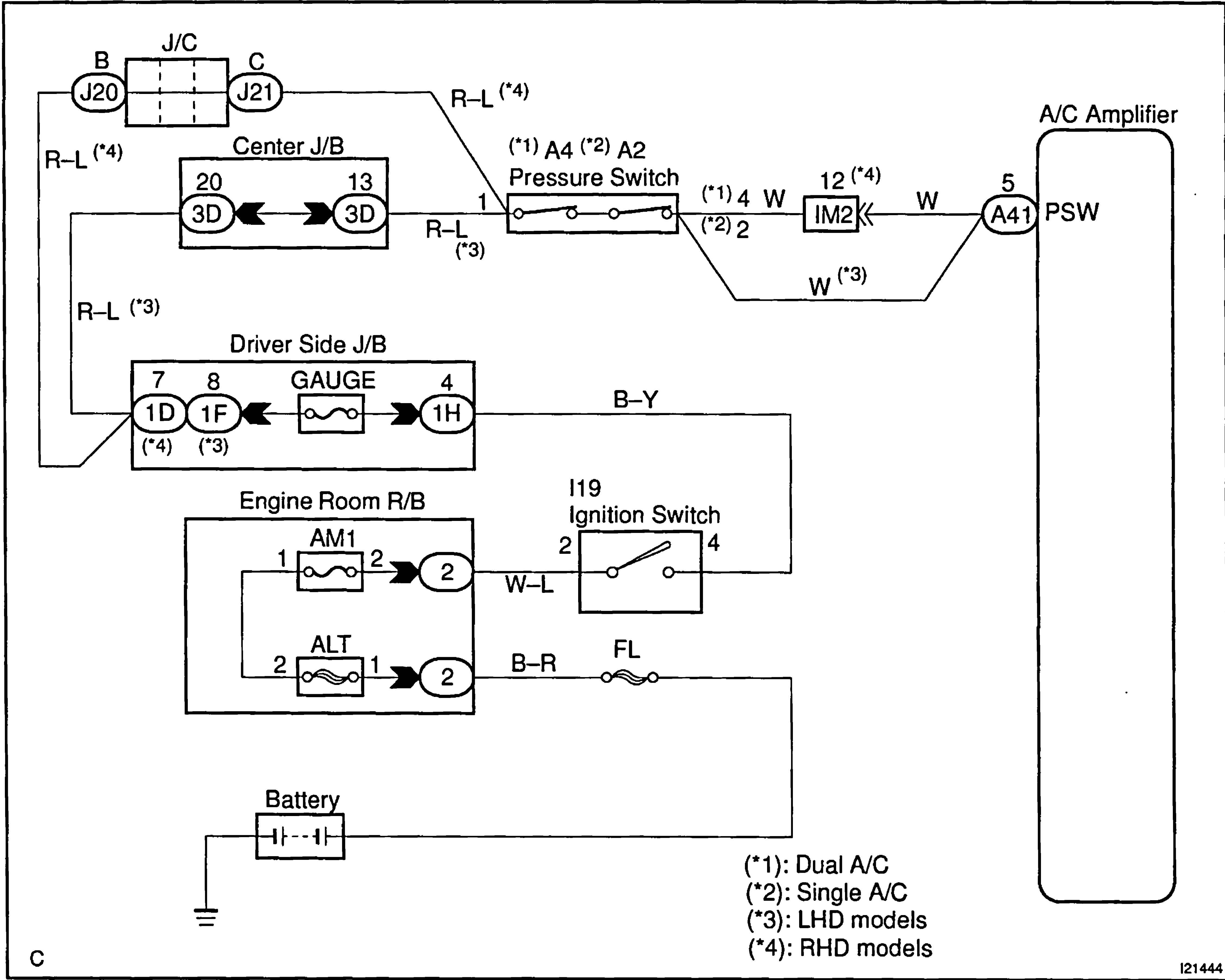
DTC	FRS	Pressure Switch Circuit
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CIRCUIT DESCRIPTION

The pressure switch sends the appropriate signals to the A/C amplifier when the A/C refrigerant pressure drops too low or rises too high. When the A/C amplifier receives these signals, it outputs signals via the A/C amplifier to switch OFF the compressor relay and turns the magnetic clutch OFF.

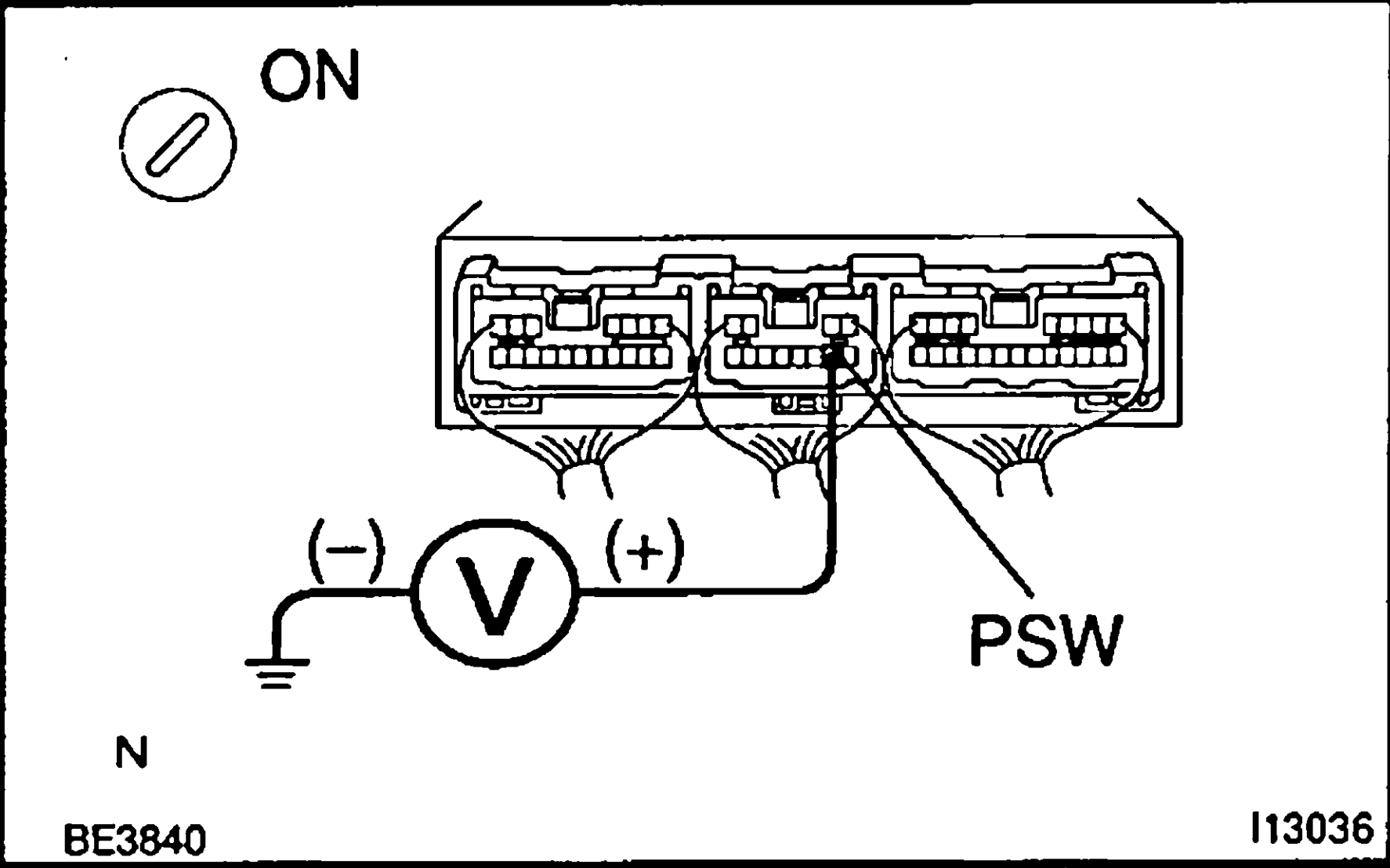
Blinking light	Detection Item	Trouble Area
FRS	• Open in pressure sensor circuit. • Abnormal refrigerant pressure. below 196 kPa (2.0 kg/cm², 28 psi) over 3,140 kPa (32.0 kgf/cm², 455 psi)	• Pressure switch • Harness or connector between pressure switch and A/C amplifier • Refrigerant pipe line • A/C amplifier

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminals PSW and GND of A/C amplifier.
---	---



PREPARATION:

- (a) Install the manifold gauge set.
- (b) Remove A/C control assembly with connectors still connected.

CHECK:

- (a) Turn ignition switch to ON.
- (b) Check voltage between terminal PSW of A/C amplifier connector and body ground when refrigerant pressure is changed.

OK:

The voltage changes with refrigerant pressure, as shown in the diagram below.

Low Pressure Cut Side	Reference : High Pressure Cut Side
ON (12V) 196 kPa OFF (0V)	ON (12V) 2,550 kPa OFF (0V)

NG	Go to step 2.
----	---------------

OK

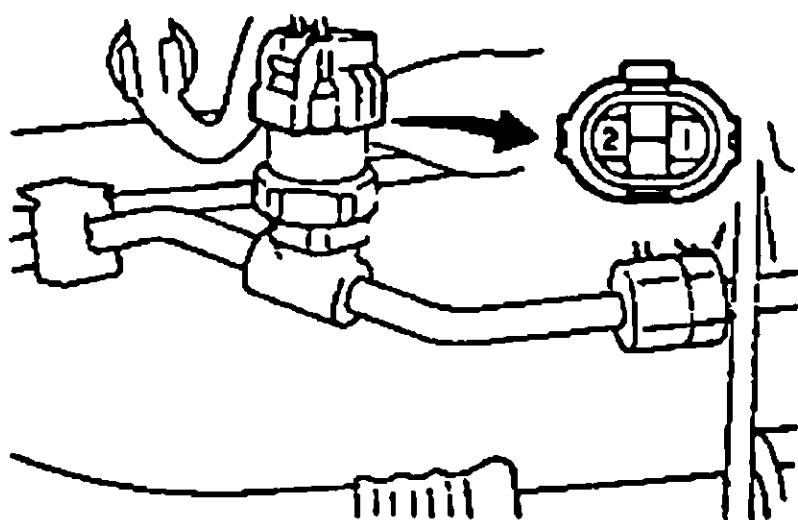
Proceed to next circuit inspection shown on problem symptoms table (See page DI-45). However, if FRS indicator light is light up, check and replace A/C amplifier.

2

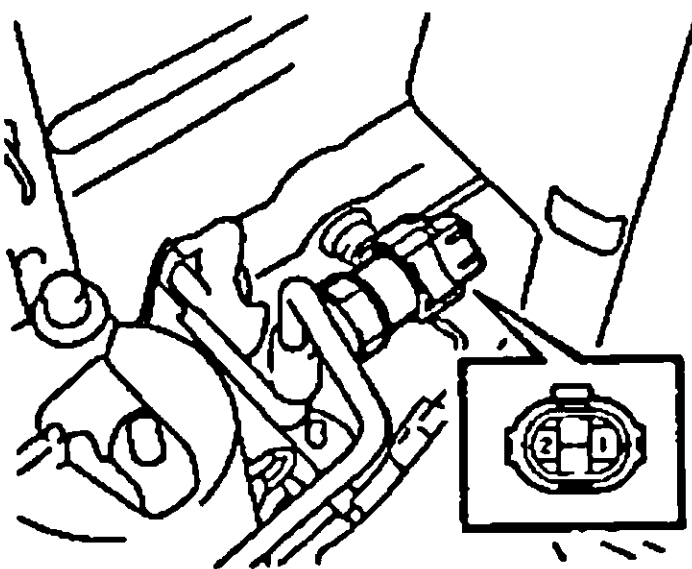
Check pressure switch.

Single A/C:

LHD models:

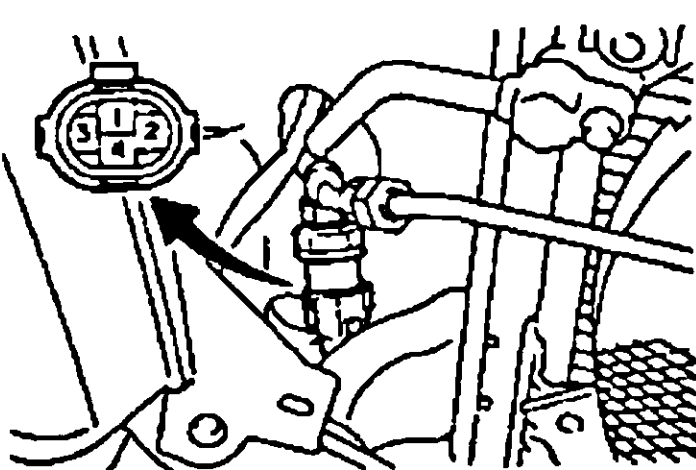


RHD models:

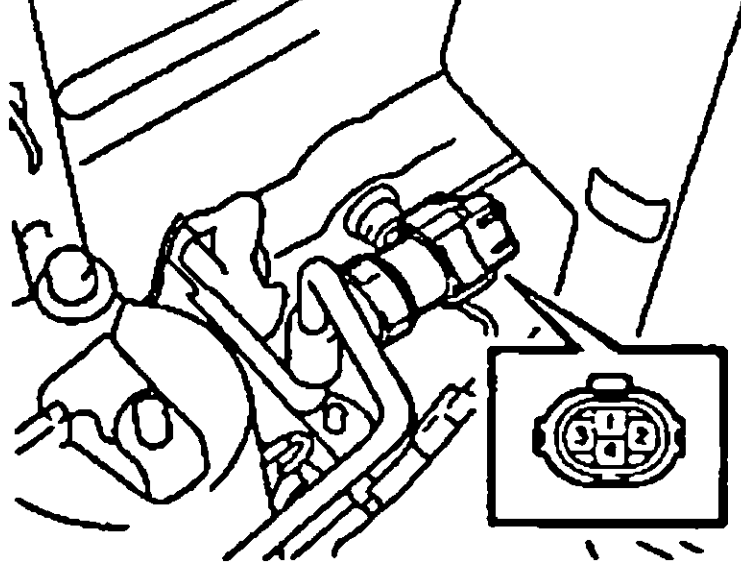


Dual A/C:

LHD models:



RHD models:



114202

PREPARATION:

Disconnect pressure switch connector.

CHECK:

- (a) Turn ignition switch to ON.
- (b) Check continuity between terminals 1 and 2 of pressure switch when refrigerant pressure is changed.

OK:

The continuity changes with refrigerant pressure as shown below.

Low Pressure Cut Side	Reference : High Pressure Cut Side
ON (continuity) 196 kPa ↓ ↑ 211 kPa OFF (No continuity)	ON (continuity) 2,550kPa ↑ ↓ 3,140kPa OFF (No continuity)

NG

Replace pressure switch.

OK

3

Check harness and connector between A/C amplifier and pressure switch
(See page IN-33).

NG

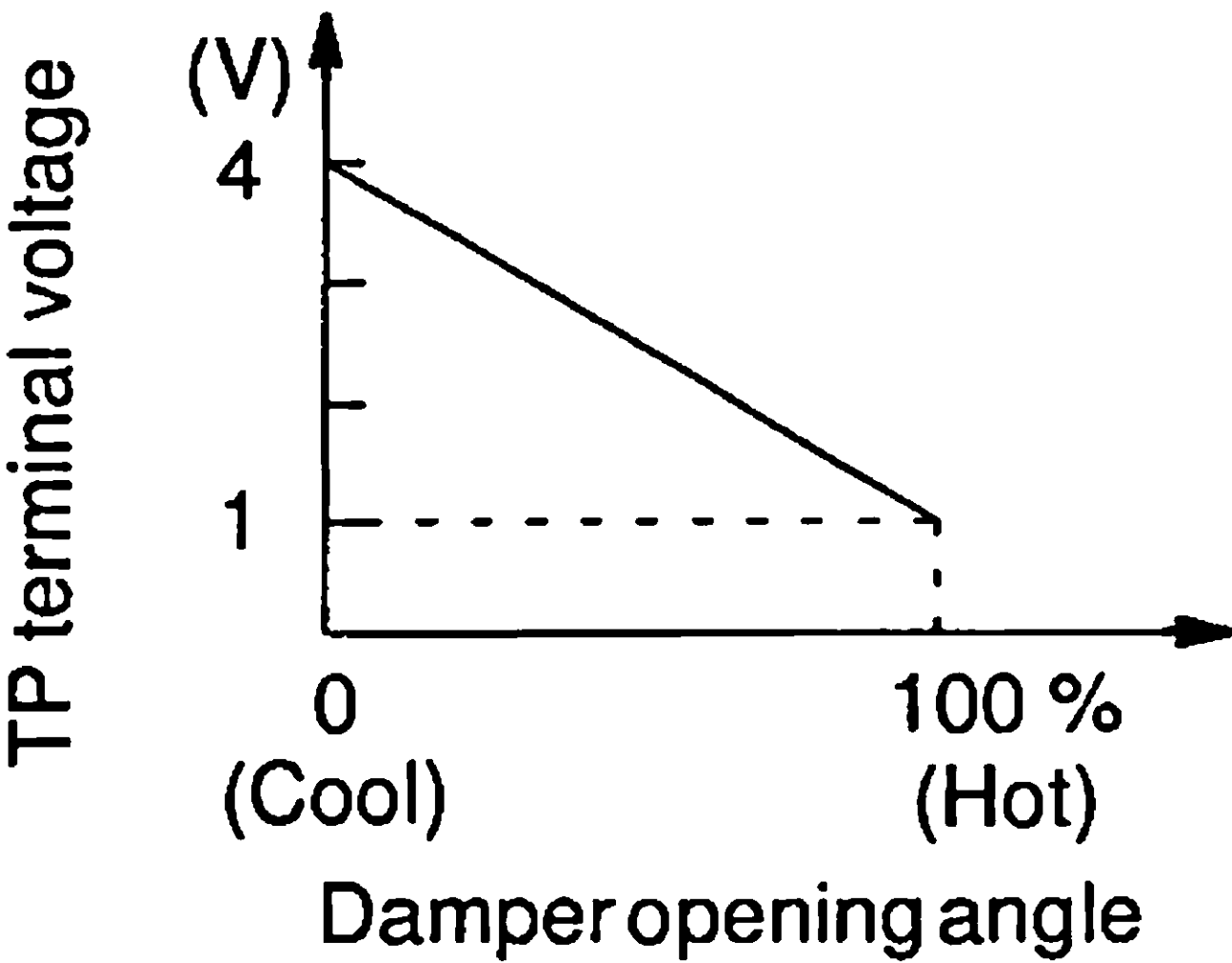
Repair or replace harness or connector.

OK

Check and replace A/C amplifier.

DTC	REC, ME	Air Mix Damper Position Sensor Circuit
-----	---------	--

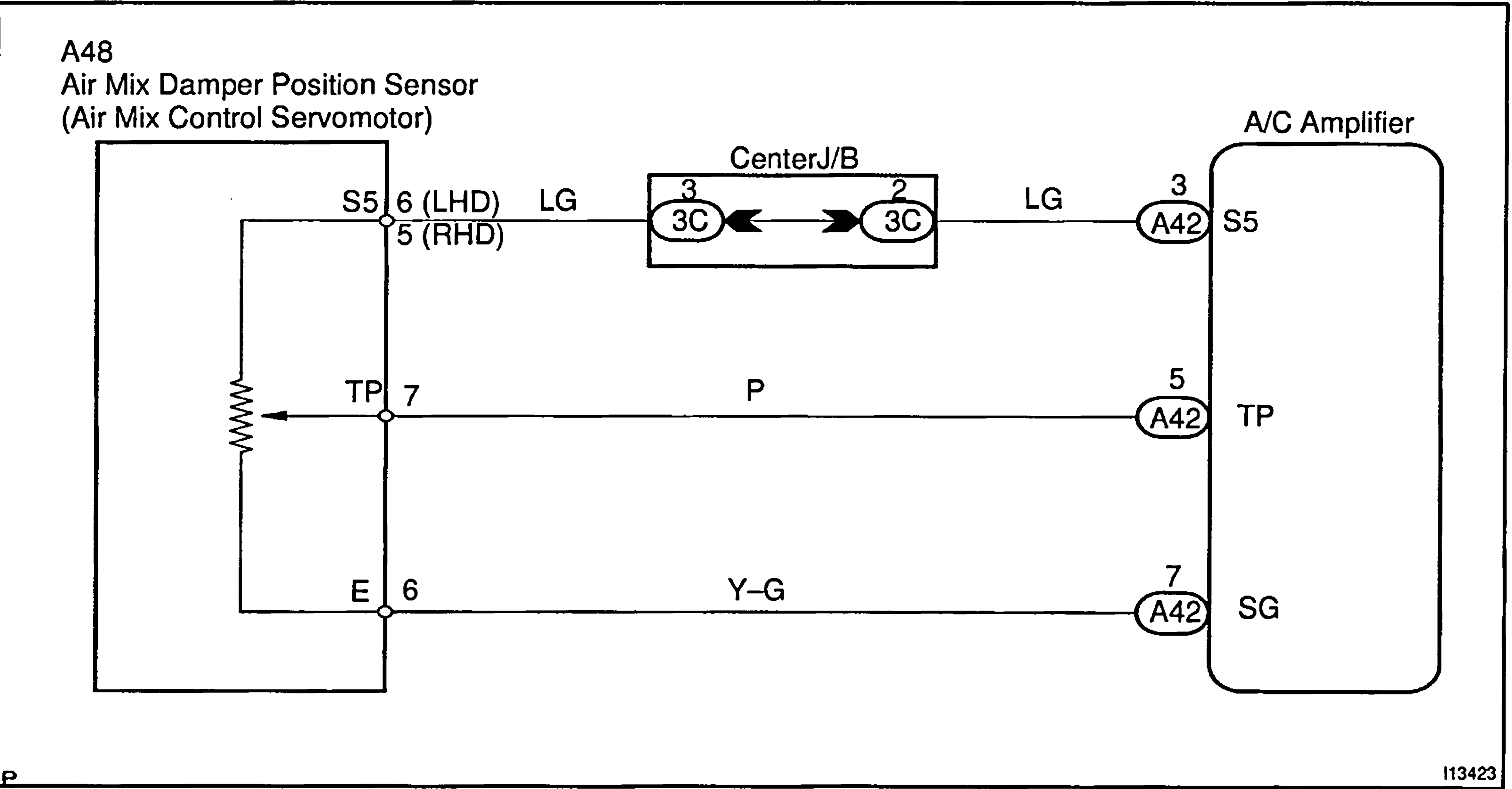
CIRCUIT DESCRIPTION



This sensor detects the position of the air mix damper and sends the appropriate signals to the A/C amplifier. The position sensor is built into the air mix damper control servomotor assembly.

Blinking light	Detection Item	Trouble Area
REC	Short to ground or power source circuit in air mix damper position sensor circuit.	• Air mix damper position sensor • Harness or connector between air mix damper control servomotor assembly and A/C amplifier • A/C amplifier
ME	Air mix damper position sensor value does not change even if A/C amplifier operates Air mix damper control servomotor.	

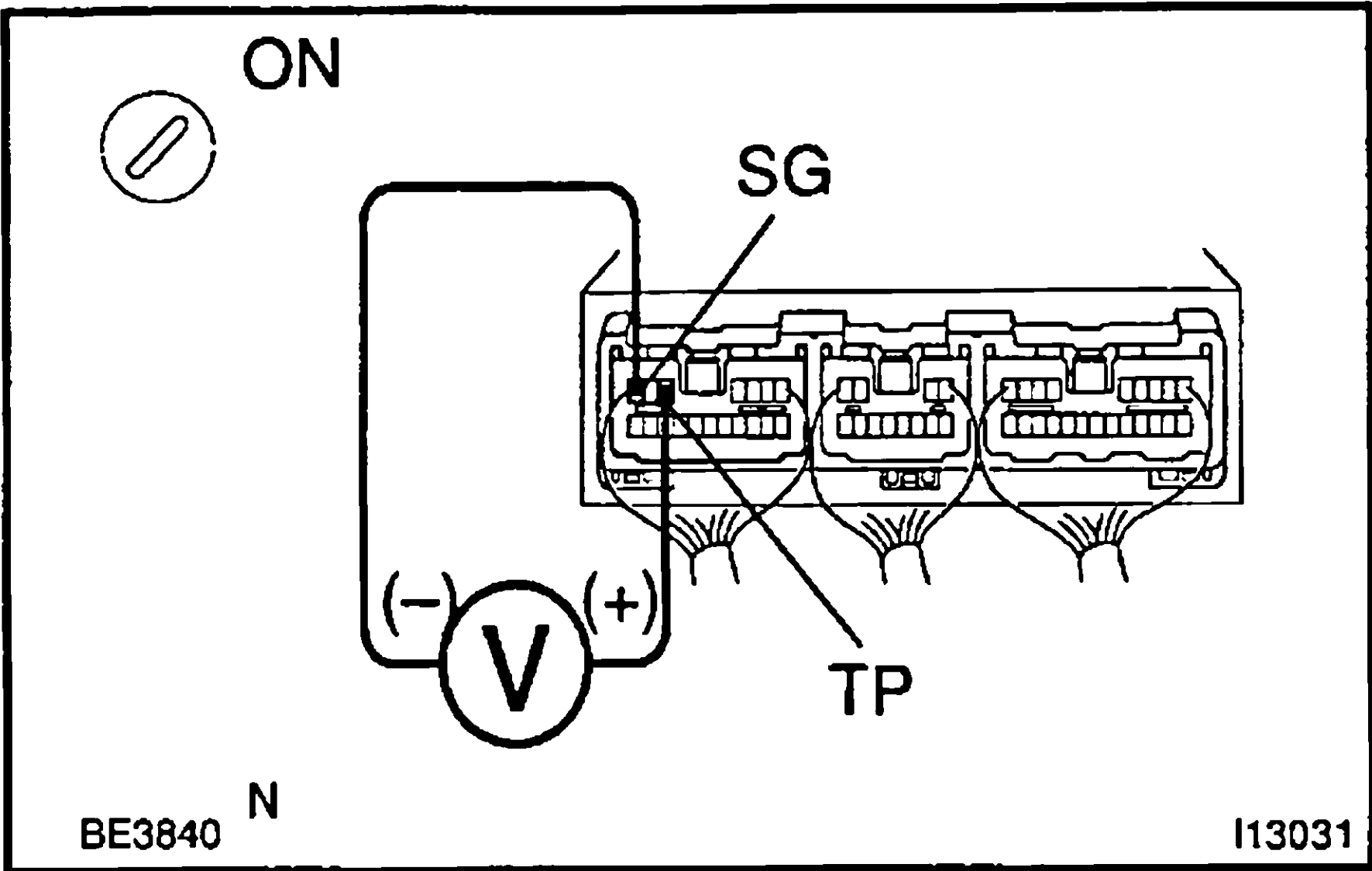
WIRING DIAGRAM



INSPECTION PROCEDURE

1

Check voltage between terminals TP and SG of A/C amplifier connector.



- PREPARATION:**
Remove A/C control assembly with connectors still connected.
- CHECK:**
- (a) Turn ignition switch to ON.
 - (b) Change the set temperature to activate the air mix damper control servomotor and measure the voltage between terminals TP and SG of A/C amplifier connector each time when the set temperature is changed.

OK:

Set Temperature	Voltage
Max. cool	3.5 – 4.5 V
Max. hot	0.5 – 1.5 V

HINT:
As the set temperature increases, the voltage decreases.

NG

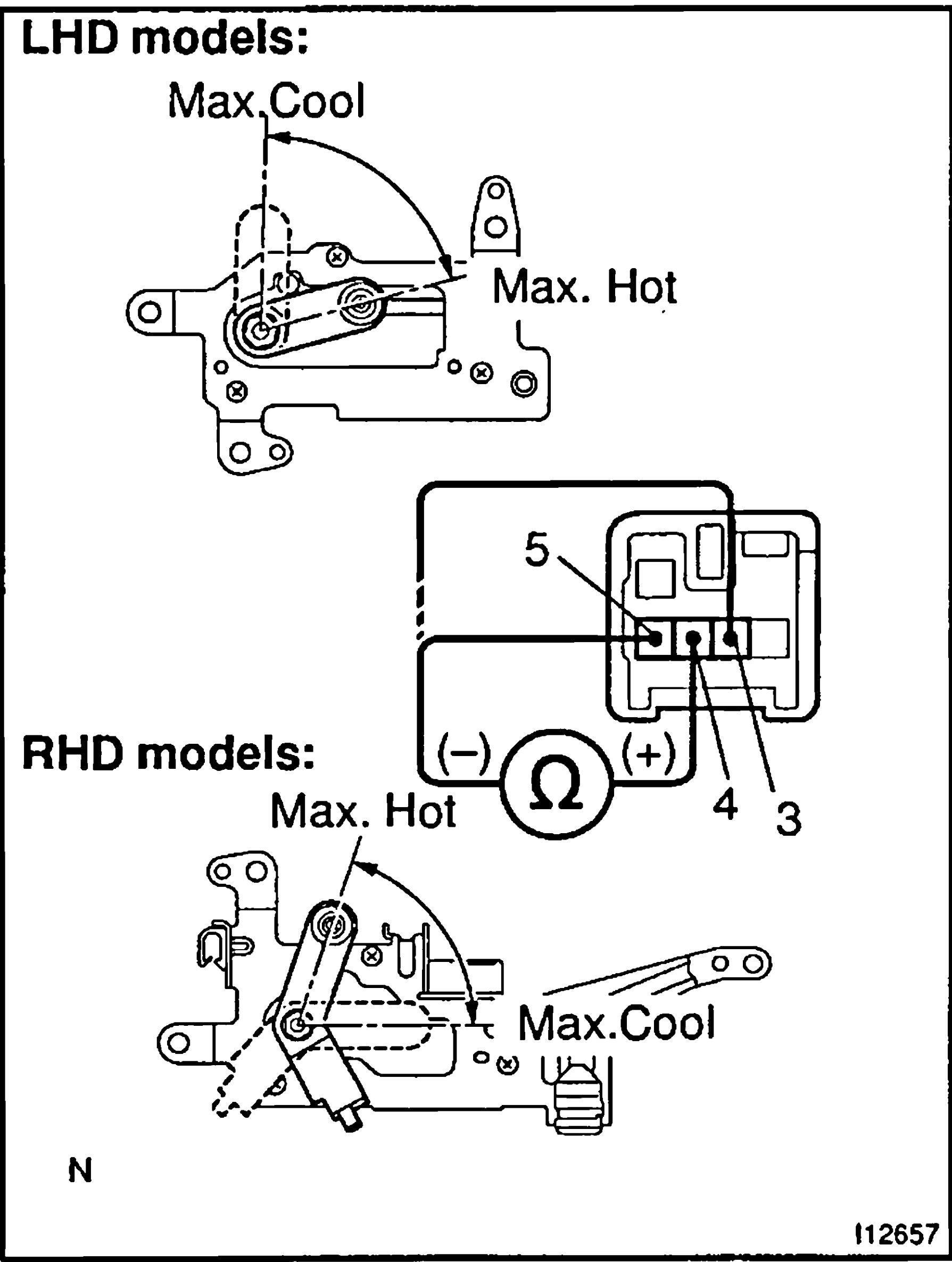
Go to step 2.

Ok

Proceed to next circuit inspection shown on problem symptoms table (See page DI-45). However, if REC or M1 indicators light up, check and replace A/C amplifier.

2

Check air mix damper position sensor.



PREPARATION:
Remove air mix servomotor (See Pub. No. RM702E on page AC-12).

CHECK:
Measure resistance between terminals 4 and 5 of air mix damper control servomotor assembly connector.

OK:
Resistance : 4.2 – 7.8 kΩ

CHECK:
While operating air mix damper control servomotor, following the procedure, measure resistance between terminals 3 and 4 of air mix damper control servomotor assembly connector.

OK:

Position	Resistance
Max. cool	3.6 – 6.8 kΩ
Max. hot	0.5 – 1.1 kΩ

HINT:
As the air mix damper control servomotor moves from cool side to hot side, the resistance decreases.

NG

Replace air mix damper control servomotor assembly.

OK

3

Check harness and connector between A/C amplifier and air mix damper control servomotor assembly (See page IN-33).

NG

Repair or replace harness or connector.

OK

Check and replace A/C amplifier.

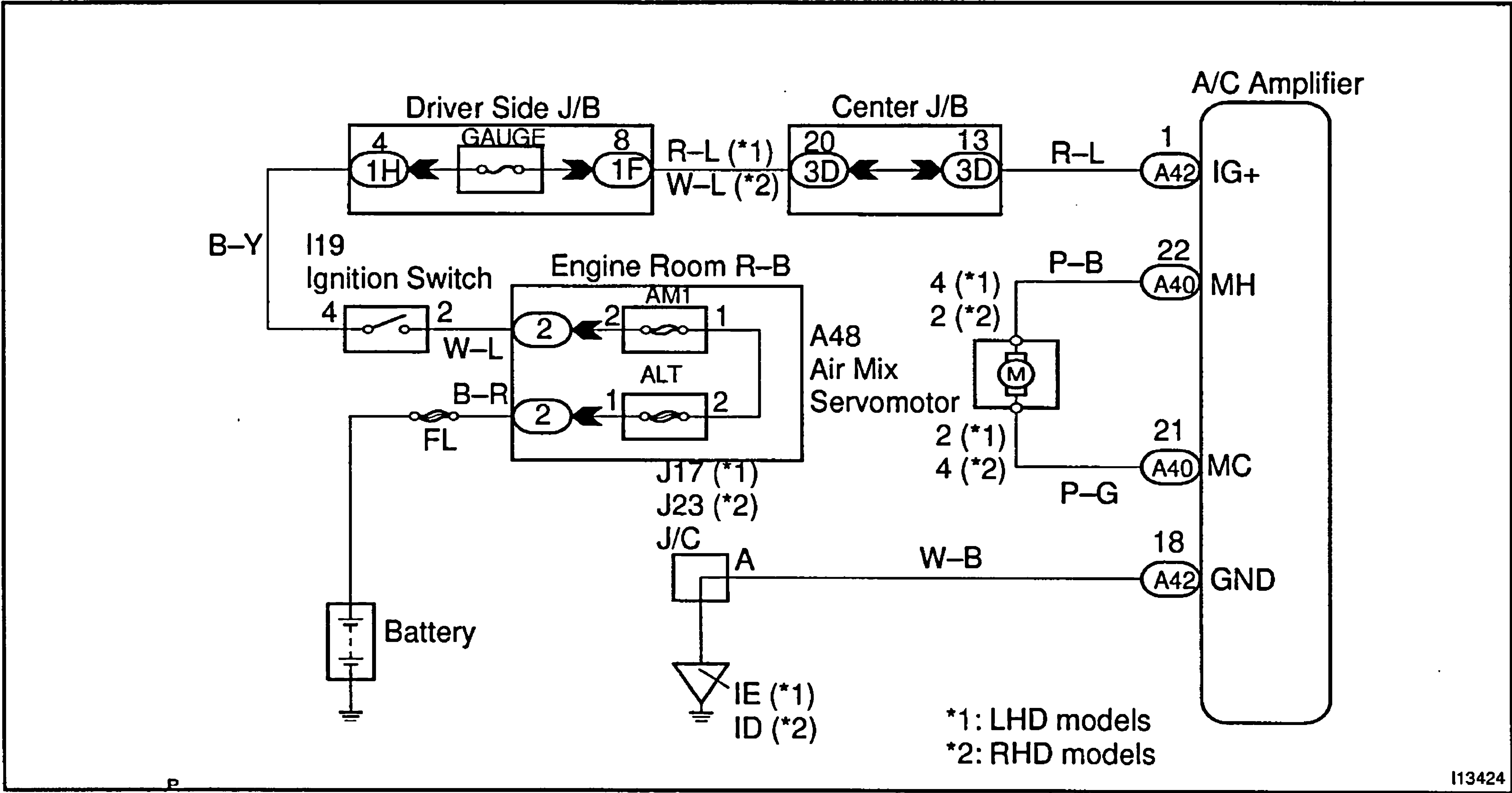
DTC	ME	Air Mix Damper Control Servomotor Circuit
-----	----	---

CIRCUIT DESCRIPTION

The air mix damper control servomotor is controlled by the A/C control assembly and moves the air mix damper to the desired position.

Blinking light	Detection Item	Trouble Area
ME	Air mix damper position sensor value does not change even if A/C control assembly operates air mix damper control servomotor.	• Air mix damper control servomotor • Air mix damper position sensor • Harness or connector between air mix control servomotor and A/C amplifier • A/C amplifier

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Actuator check.
---	-----------------

PREPARATION:

- (a) Warm up the engine.
- (b) Set to the actuator check mode (See page DI-37).
- (c) Press the MODE switch and change it to step operation.

CHECK:

Press the DEF switch and check the operation of the air mix damper and the condition of the blower by hand.

OK:

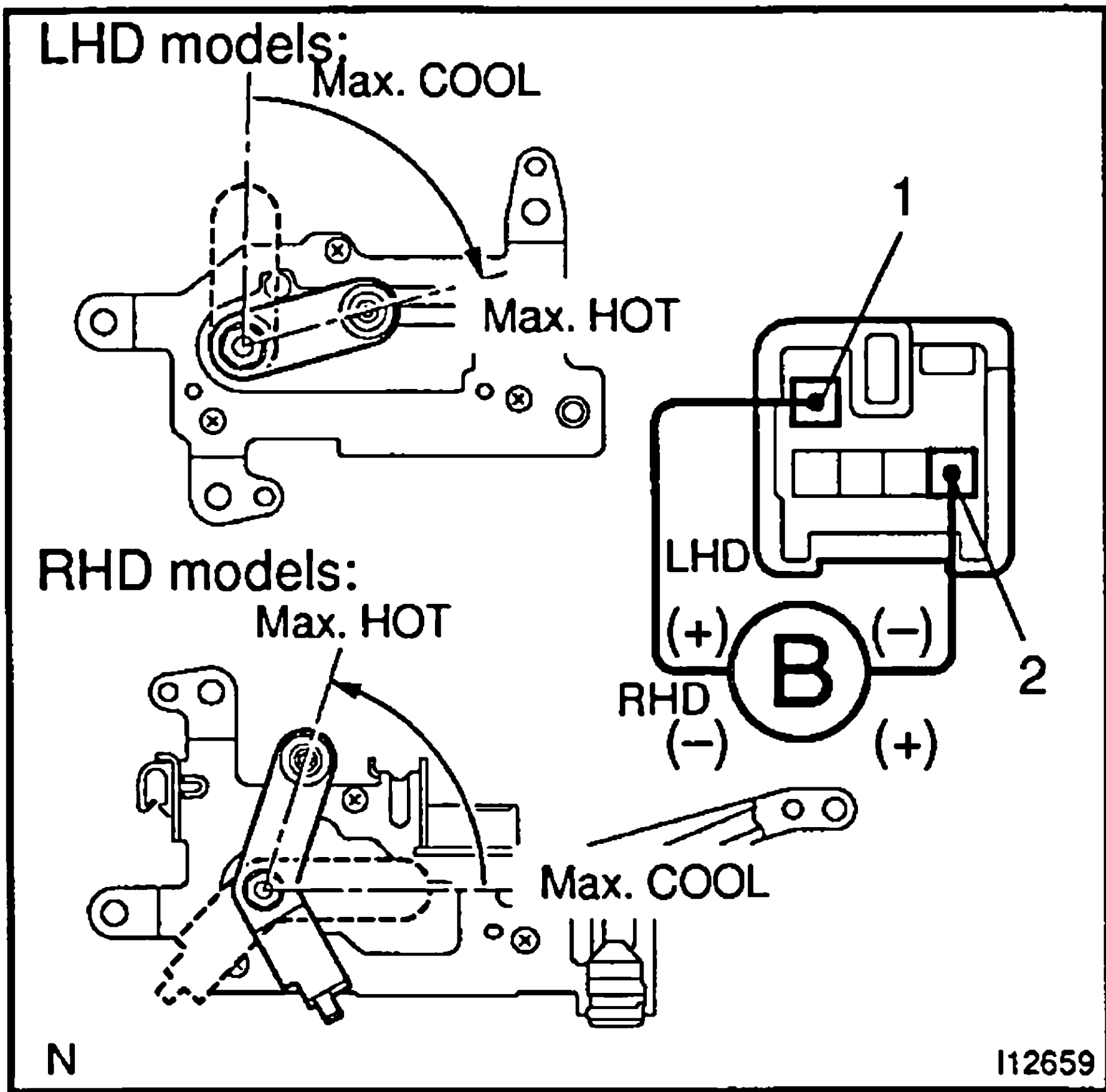
Step No.	Air Mix Damper	Condition
1	0 % (Fully closed)	Cool air comes out
2	(50 %)	
3 – 5	100 % (Fully opened)	Warm air comes out

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI-45).

NG

2	Check air mix damper control servomotor.
---	--



PREPARATION:

Remove air mix servomotor (See Pub. No. RM702E on page AC-12).

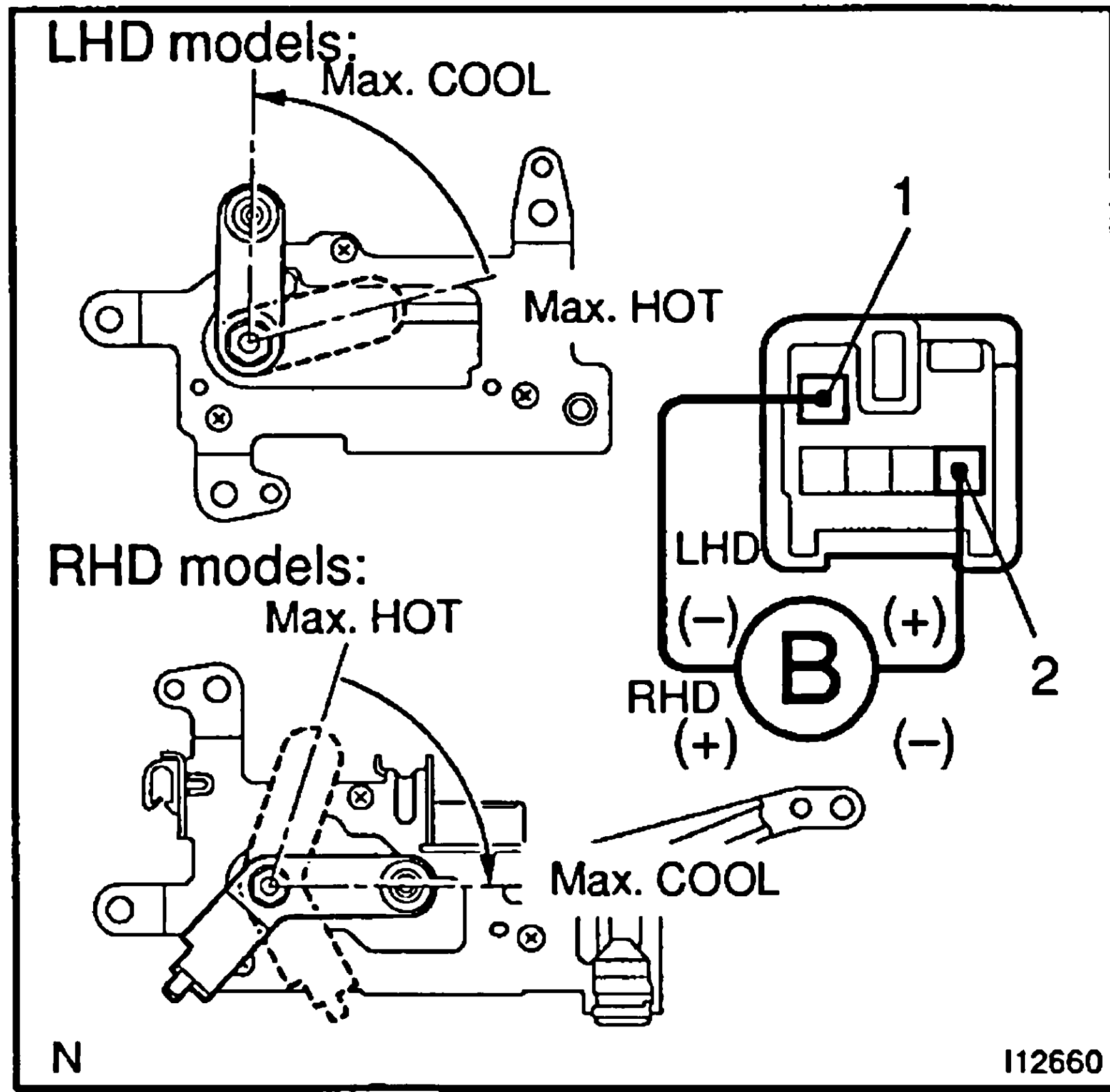
CHECK:

(terminal No.): RHD models

Connect positive (+) lead to terminal 1 (2) and negative (-) lead to terminal 2 (1).

OK:

The lever turns smoothly to Hot side.



CHECK:

(terminal No.): RHD models

Connect positive (+) lead to terminal 2 (1) and negative (-) lead to terminal 1 (2).

OK:

The lever turns smoothly to Cool side.

NG	Replace air mix damper control servomotor assembly.
----	---

OK

3	Check harness and connector between A/C amplifier and air mix damper control servomotor assembly (See page IN-33).
---	--

NG

Repair or replace harness or connector.

OK

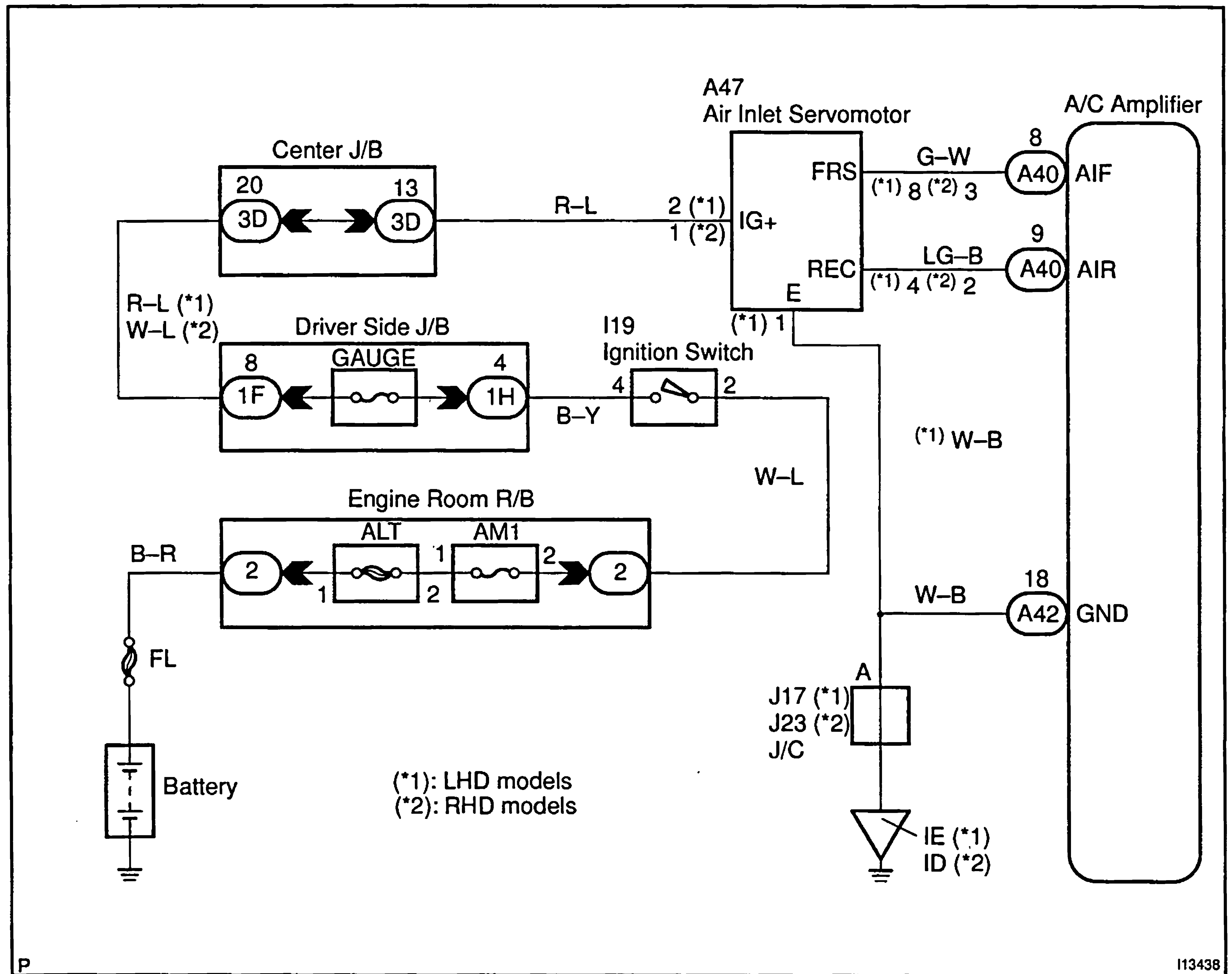
Check and replace A/C amplifier.

Air Inlet Damper Control Servomotor Circuit

CIRCUIT DESCRIPTION

The air inlet damper control servomotor is controlled by the A/C amplifier and moves the air inlet damper to the desired position.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Actuator check.
---	-----------------

PREPARATION:

- (a) Remove glove compartment to see and check the air inlet damper operation.
- (b) Set to the actuator check mode (See page DI-37).
- (c) Press the MODE switch and change it to step operation.

CHECK:

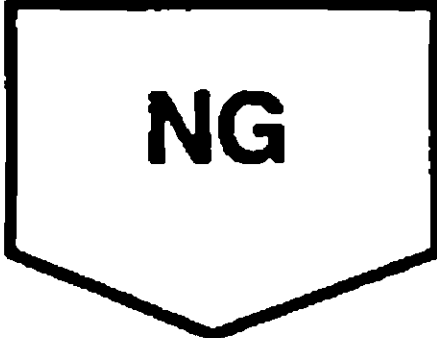
Press the MODE switch and check the air inlet damper operation visually.

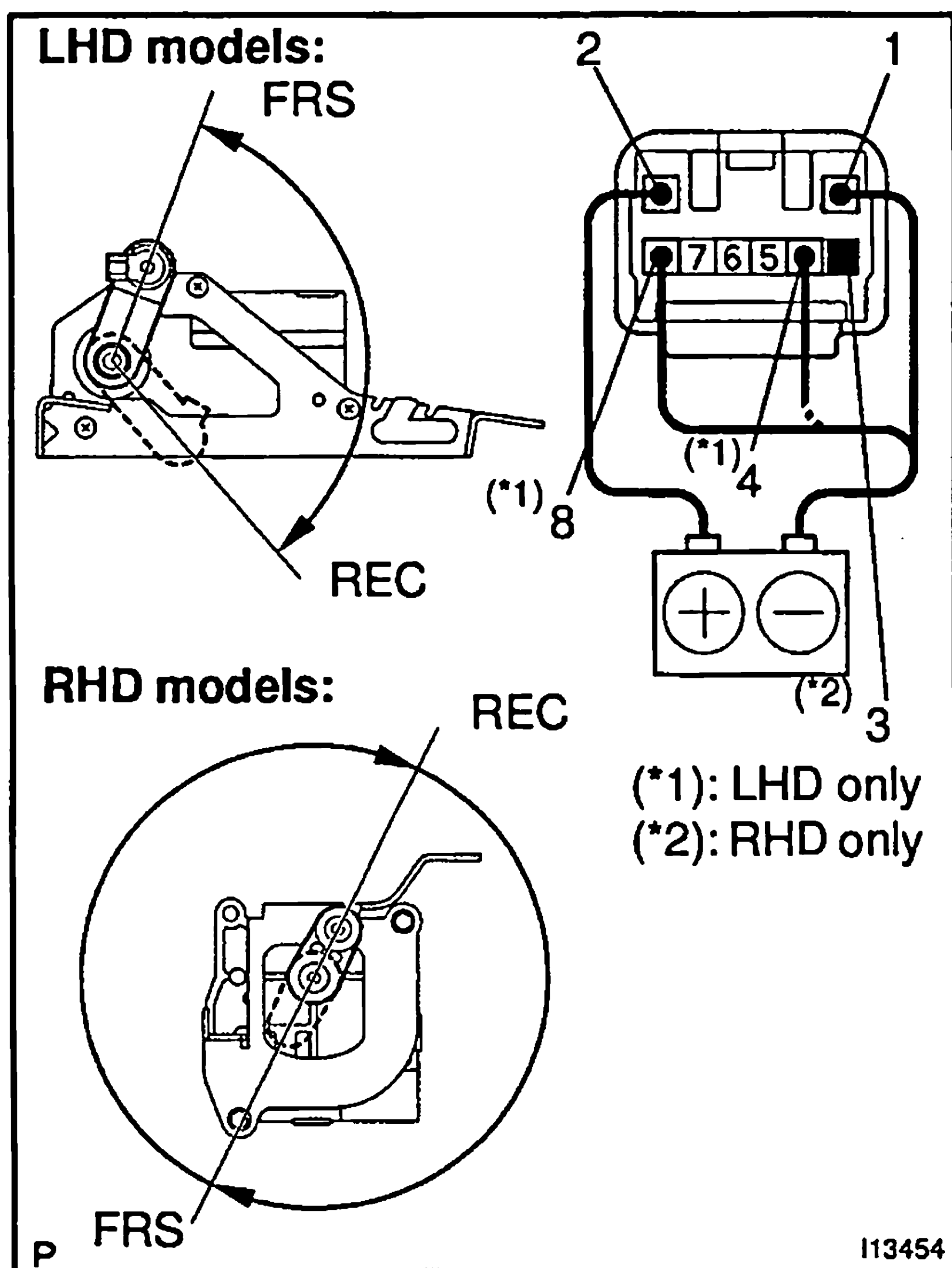
OK:

Step No.	Air Inlet Damper
1 - 2	REC
3 - 5	FRS

OK

Proceed to next circuit inspection shoen on problem symptoms table (See page DI-45).



2**Check air inlet control servomotor.****PREPARATION:**

Remove air inlet control servomotor (See Pub. No. RM702E on page AC-16).

CHECK:

- (a) LHD models:
Connect positive (+) lead to terminal 2 and negative (-) lead to terminal 1 and 8.
- (b) RHD models:
Connect positive (+) lead to terminal 2 and negative (-) lead to terminal 1.

OK:

LHD models:

The lever turns to FRS position.

RHD models:

The lever rotates clockwise and stop to REC position.

CHECK:

- (a) LHD models:
Connect positive (+) lead to terminal 2 and negative (-) lead to terminal 1 and 4.
- (b) RHD models:
Connect positive (+) lead to terminal 2 and negative (-) lead to terminal 3.

OK:

LHD models:

The lever turns to REC position.

RHD models:

The lever rotates clockwise and stop to FRS position.

NG

Replace air inlet control servomotor.

OK

3	Check harness and connector between A/C amplifier and air inlet damper control servomotor (See page IN-33).
---	---

NG

Repair or replace harness or connector.

OK

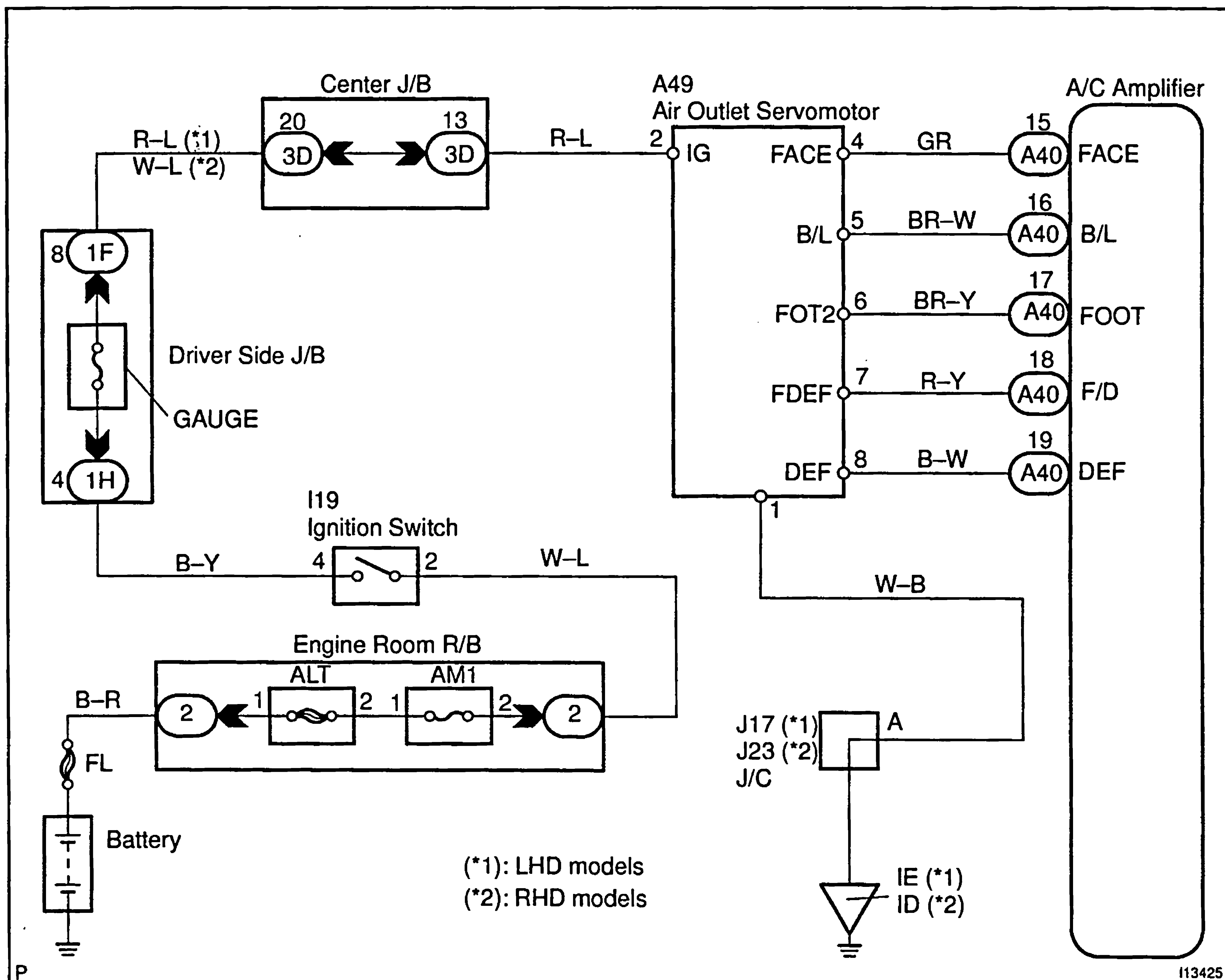
Check and replace A/C amplifier.

Air Outlet Control Servomotor Circuit

CIRCUIT DESCRIPTION

This circuit turns the servomotor and changes each mode damper position by signals from the A/C control assembly. When the AUTO switch is ON, the A/C control assembly changes the mode automatically between FACE, BI-LEVEL and FOOT according to the temperature setting.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Actuator check.
---	-----------------

Step No.	Air Flow Mode
1	FACE
2	B/L
3	FOOT
4	F/D
5	DEF

PREPARATION:

- (a) Set to the actuator check mode (See page DI-37).
- (b) Press the MODE switch and change to step operation.

CHECK:

Press the MODE switch in order and check the condition of air flow mode.

OK:

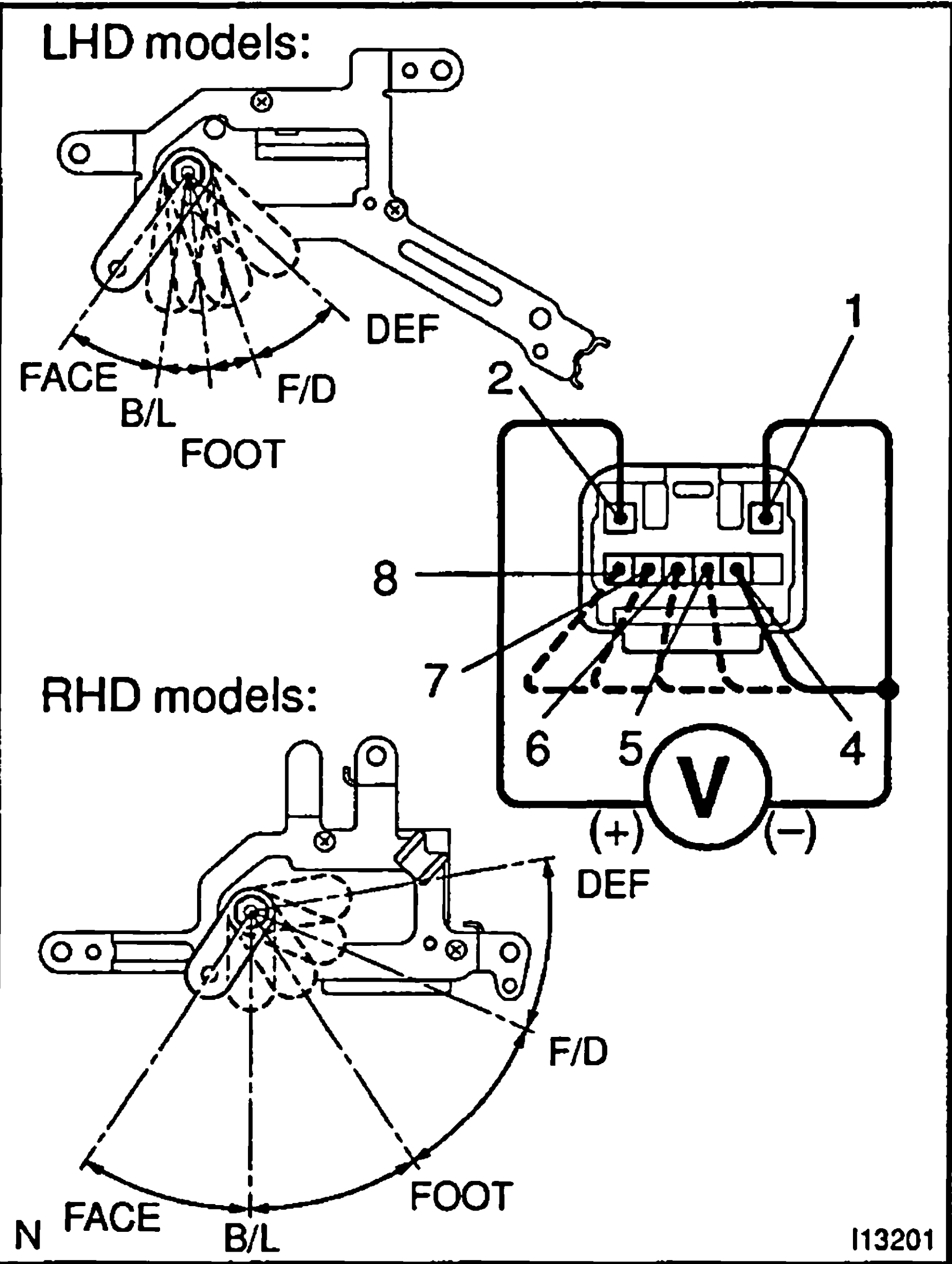
The mode changes with the change in the temperature display as shown in the table.

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI-45).

NG

2	Check air outlet control servomotor.
---	--------------------------------------



PREPARATION:

Remove air outlet control servomotor (See Pub. No. RM702E on page AC-22).

CHECK:

- (a) Connect positive (+) lead to terminal 2 and negative (-) lead to terminal 1.
- (b) Check the lever operation when the negative (-) lead is connected to the terminals shown below.

OK:

The lever moves smoothly to the position for each mode.

Ground Terminals	Mode
4	FACE
5	B/L
6	FOOT
7	F/D
8	DEF.

NG

Replace air outlet control servomotor.

OK

3	Check harness and connector between A/C control amplifier and air outlet control servomotor, air outlet control servomotor and battery, air outlet control servomotor and body ground (See page IN-33).
---	---

NG

Repair or replace harness or connector.

OK

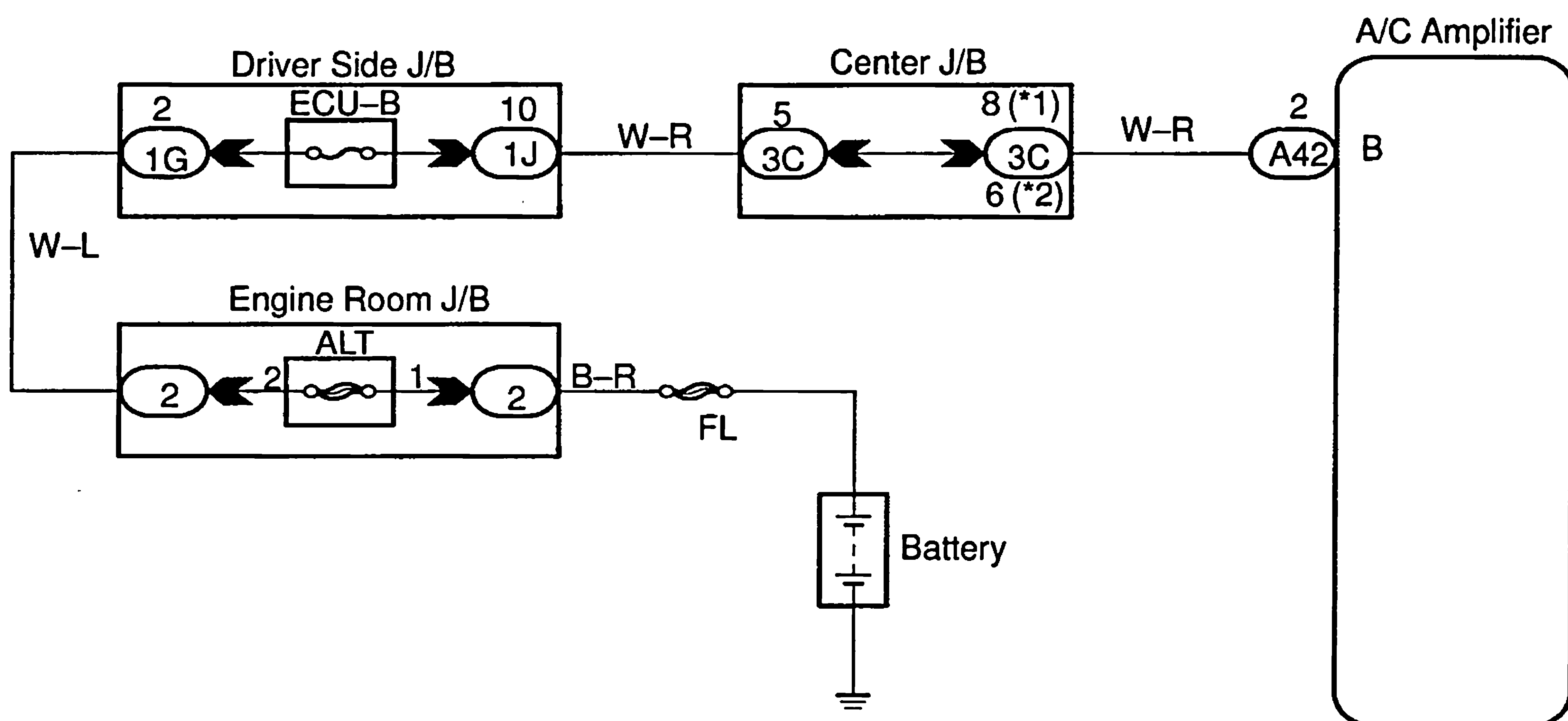
Repair or replace A/C amplifier.

Back Up Power Source Circuit

CIRCUIT DESCRIPTION

This is the back up power source for the A/C control assembly. Power is supplied even when the ignition switch is off and is used for diagnostic trouble code memory, etc.

WIRING DIAGRAM

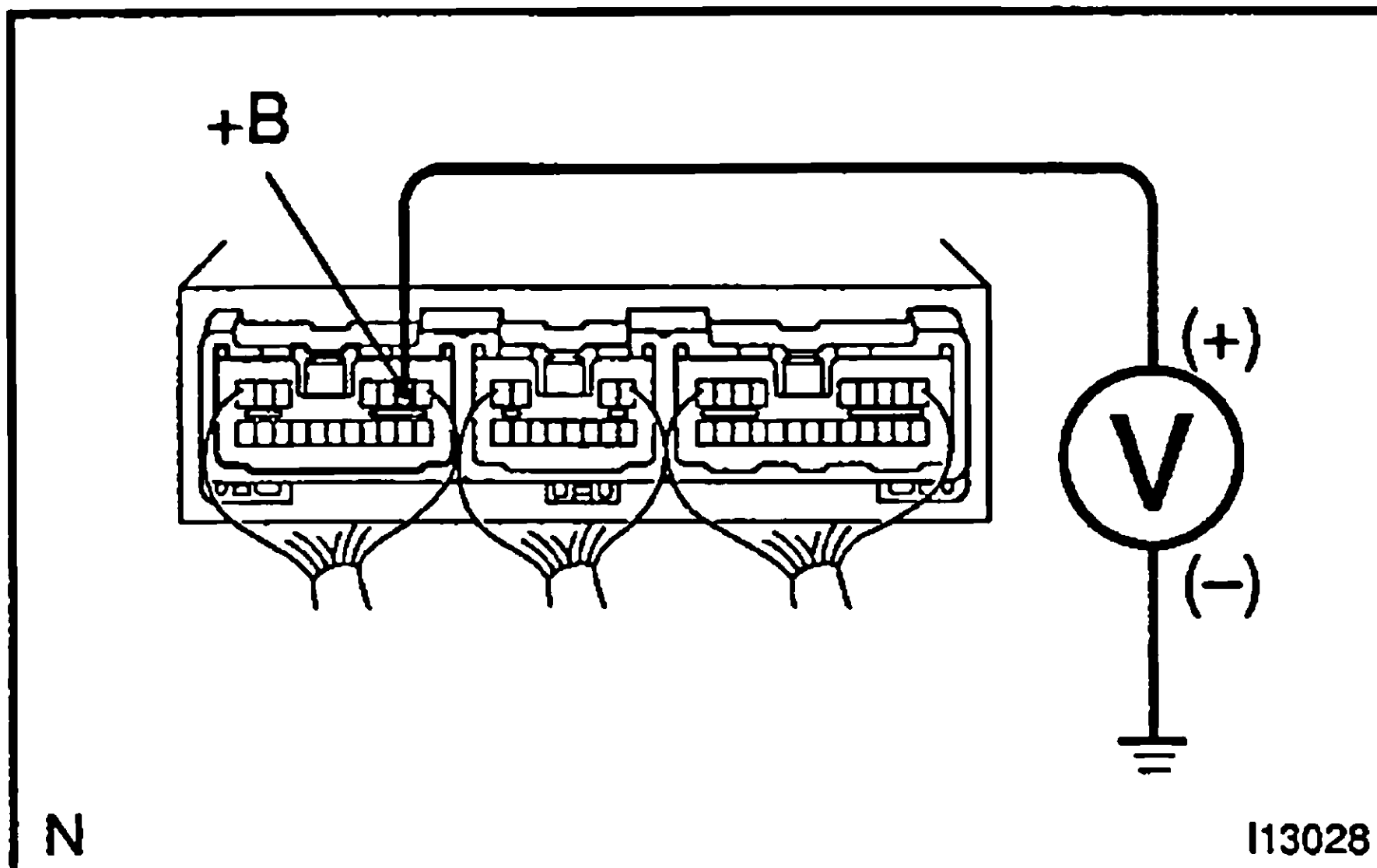


(*1): LHD models

(*2): RHD models

INSPECTION PROCEDURE

- 1 Check voltage between terminal +B of A/C amplifier assembly connector and body ground.



PREPARATION:

Remove the A/C amplifier with connector still connected.

CHECK:

Measure voltage between terminal +B of A/C amplifier connector and body ground.

OK:

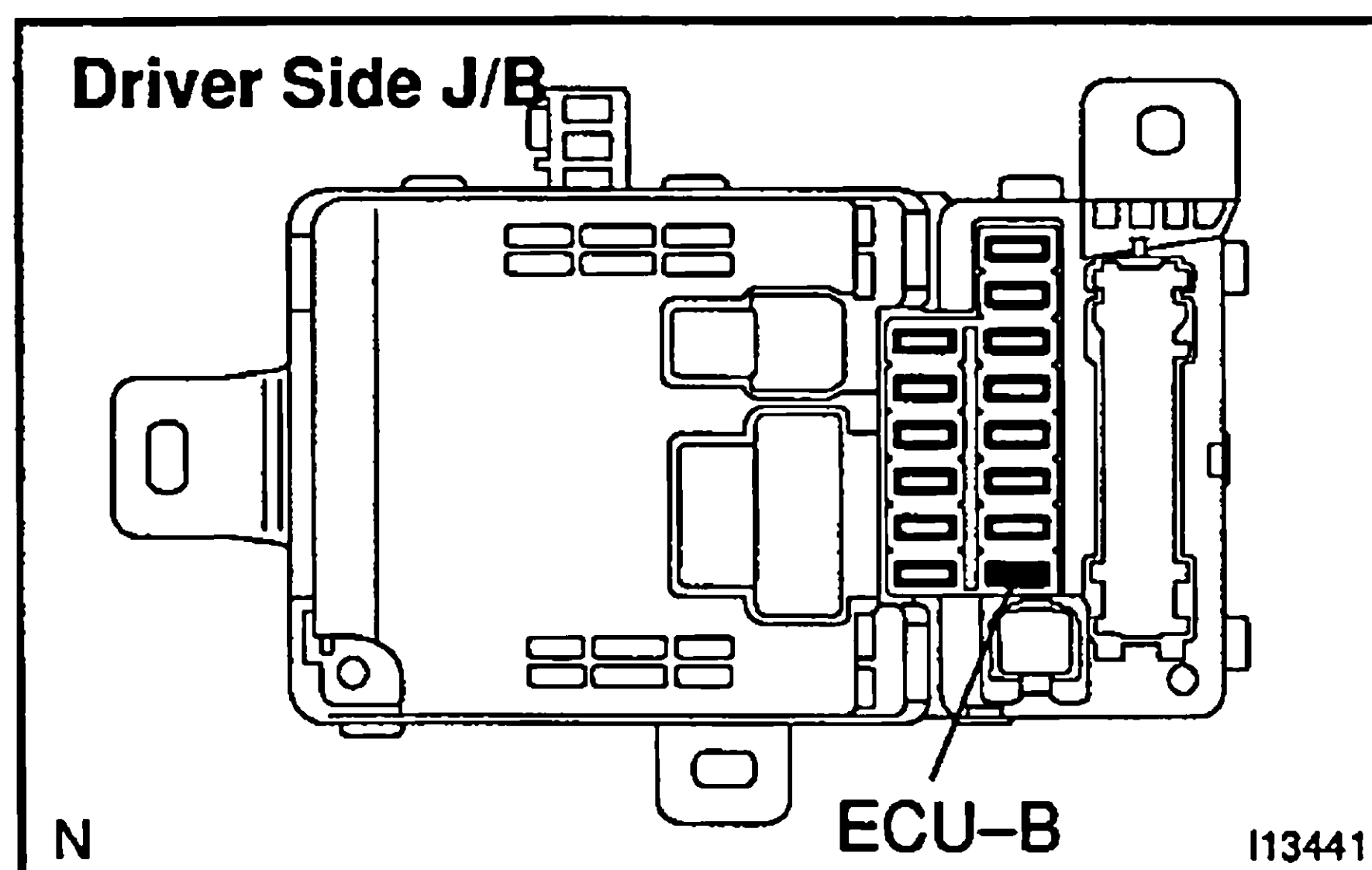
Voltage : Battery voltage

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI-45).

NG

- 2 Check ECU-IG fuse.



PREPARATION:

Remove ECU-B fuse from driver side J/B.

CHECK:

Check continuity of ECU-B fuse.

OK:

Continuity

NG

Check for short in all the harness and components connected to the ECU-IG fuse (See attached wiring diagram).

OK

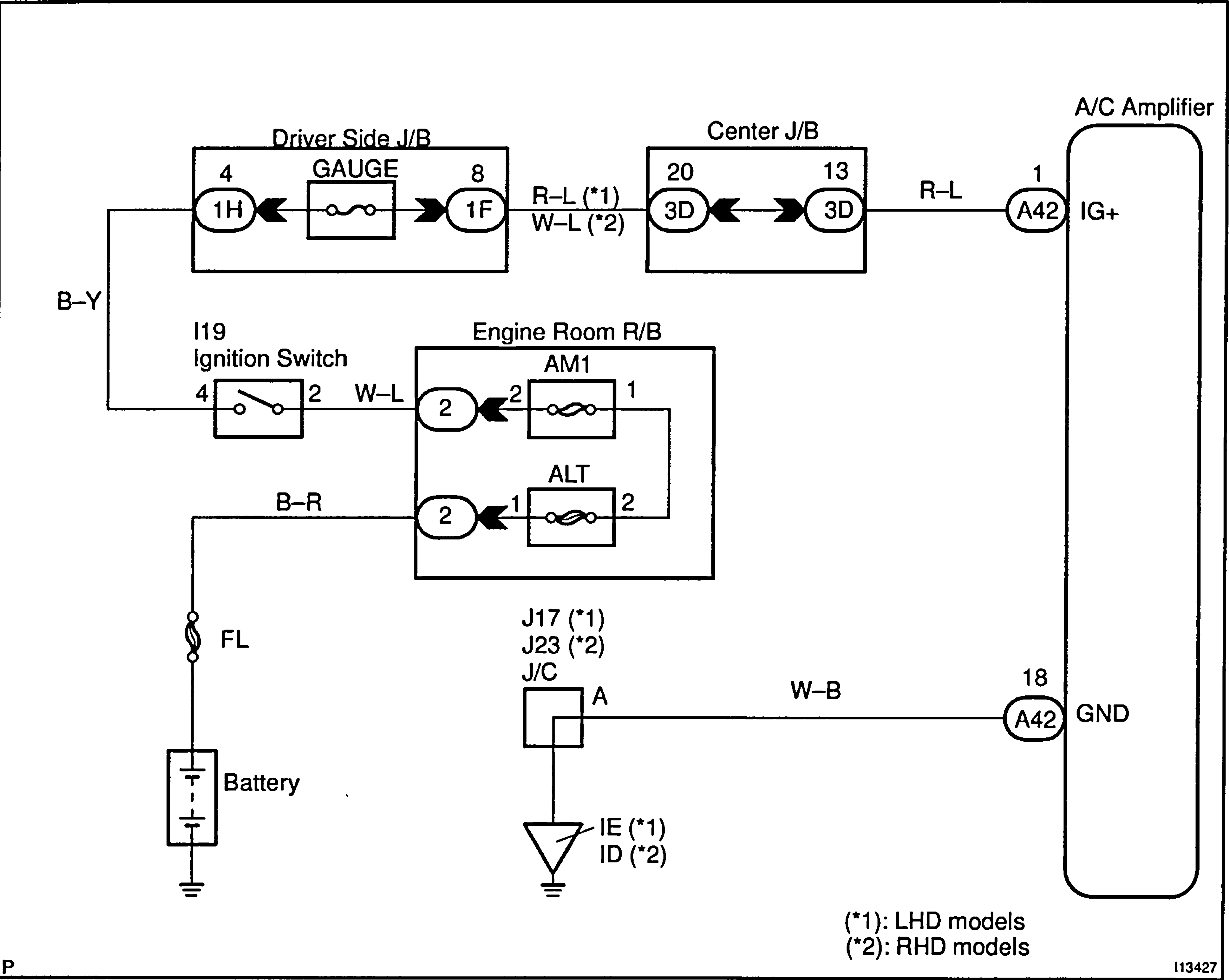
Check and repair harness and connector between A/C amplifier.

IG Power Source Circuit

CIRCUIT DESCRIPTION

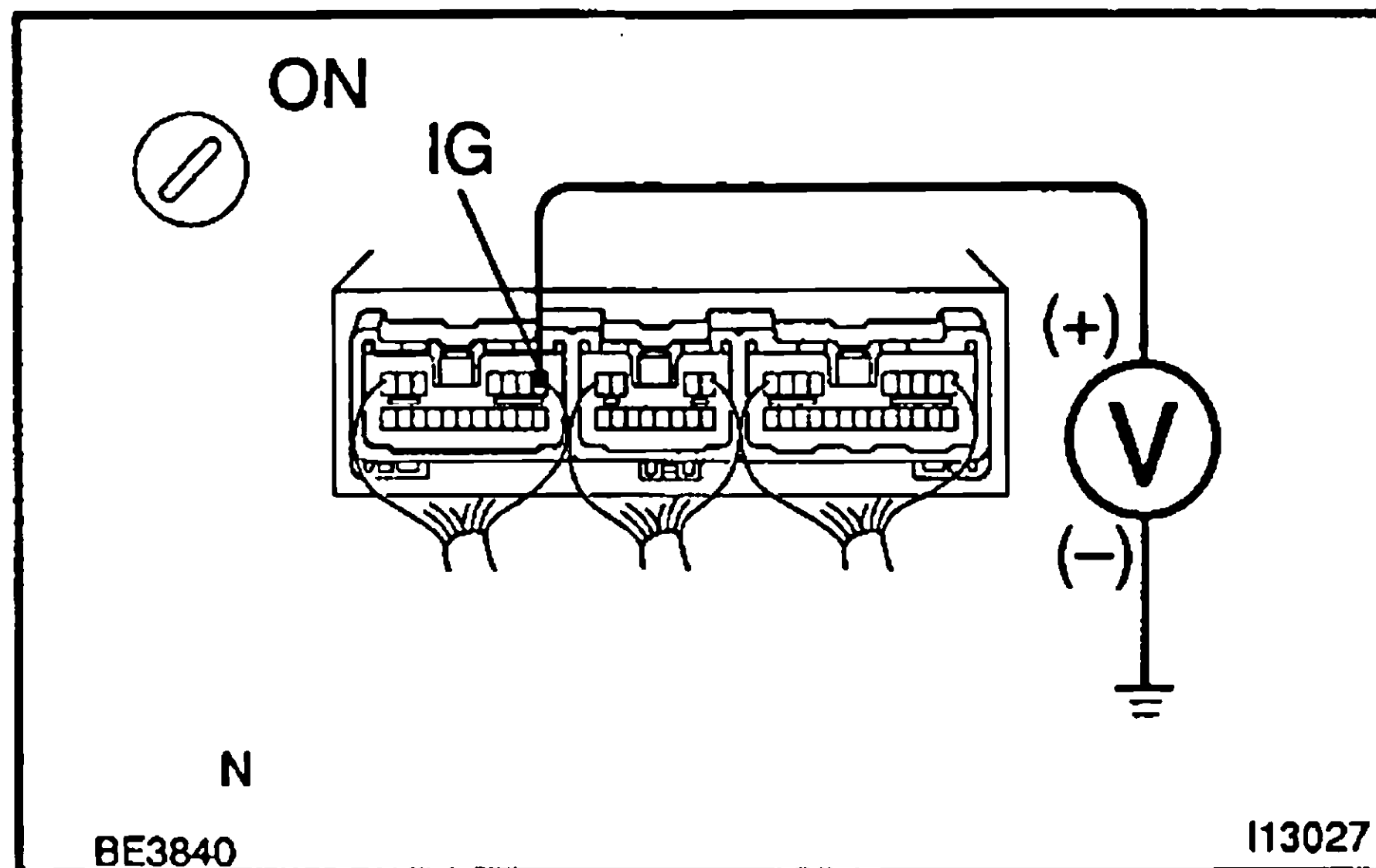
This is the power source for the A/C control assembly (contains the ECU) and servomotors, etc.

WIRING DIAGRAM



INSPECTION PROCEDURE

- | | |
|----------|--|
| 1 | Check voltage between terminals IG and GND of A/C control assembly connector. |
|----------|--|



PREPARATION:

- Remove A/C control assembly with connectors still connected.
- Turn ignition switch to ON.

CHECK:

Measure voltage between terminals IG and GND of A/C control assembly.

OK:

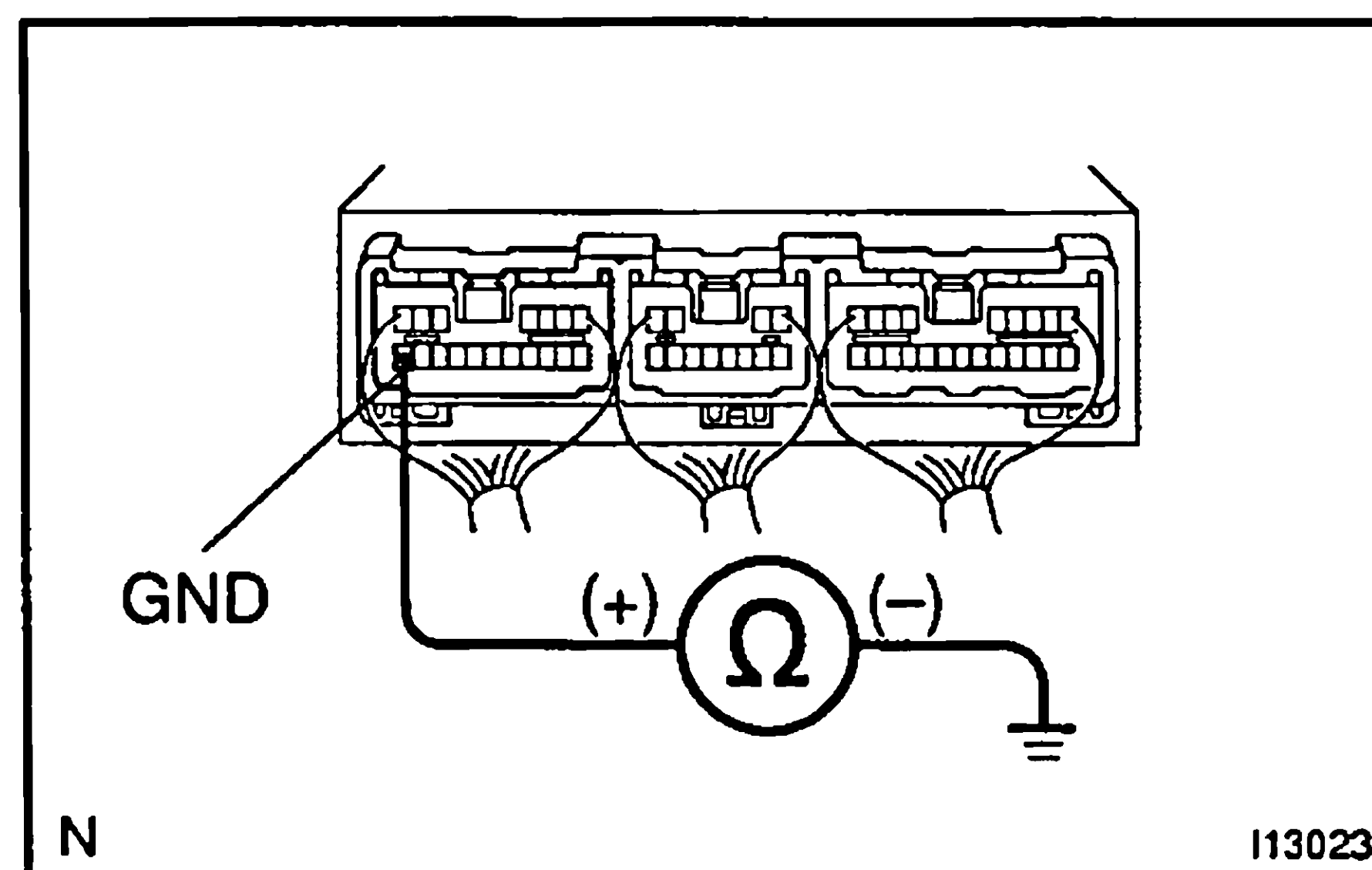
Voltage : 10 – 14 V

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI-45).

NG

- | | |
|----------|---|
| 2 | Check continuity between terminal GND of A/C control assembly and body ground. |
|----------|---|



PREPARATION:

Turn ignition switch to LOCK or ACC.

CHECK:

Measure resistance between terminal GND of A/C control assembly and body ground.

OK:

Resistance : Below 1 Ω

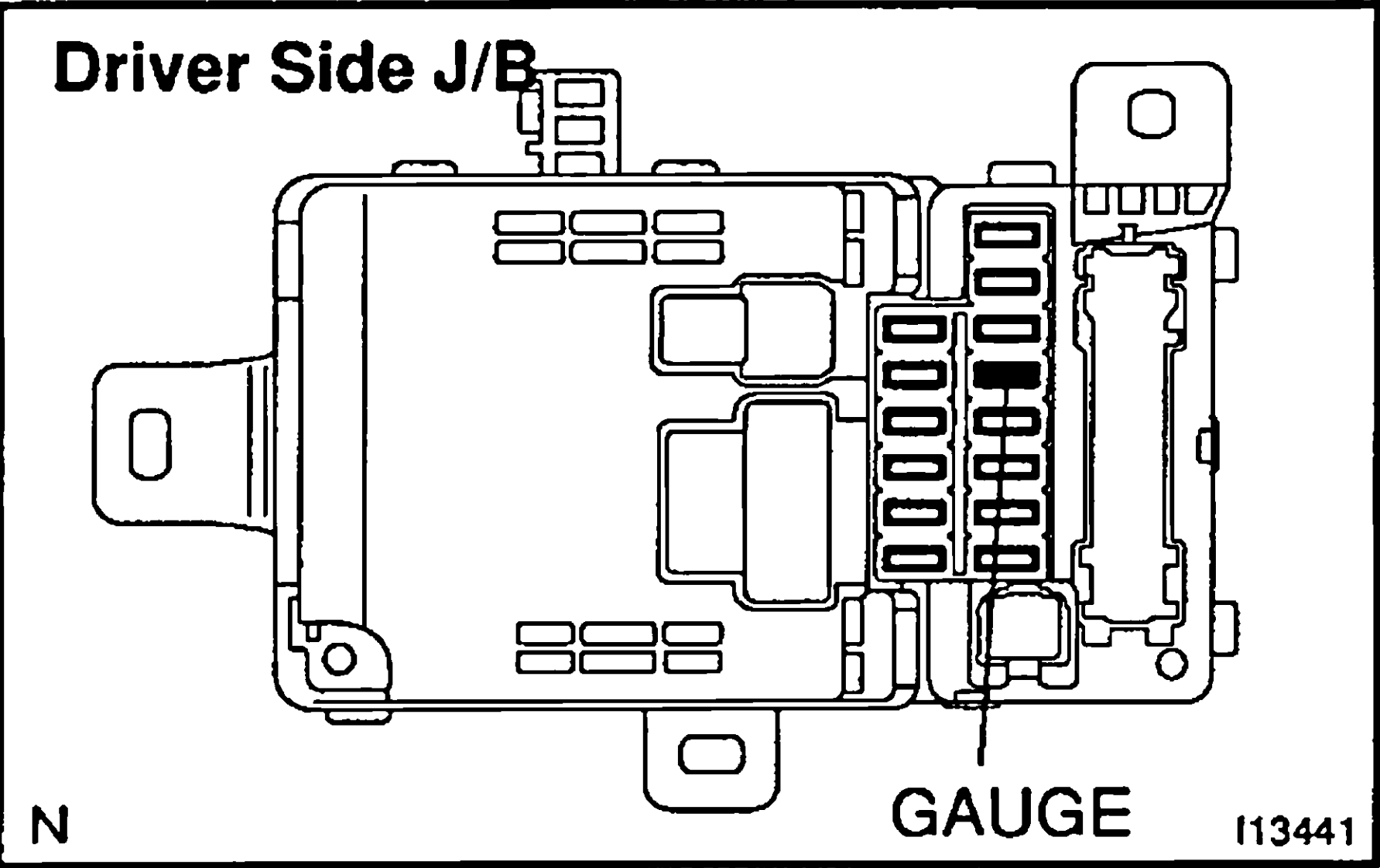
NG

Repair or replace harness or connector.

OK

3

Check GAUGE fuse.



PREPARATION:
Remove GAUGE fuse from driver side J/B.

CHECK:
Check continuity of GAUGE fuse.

OK:
Continuity exists.

NG

Check for short in all the harness and components connected to the GAUGE fuse
(See page IN-33).

OK

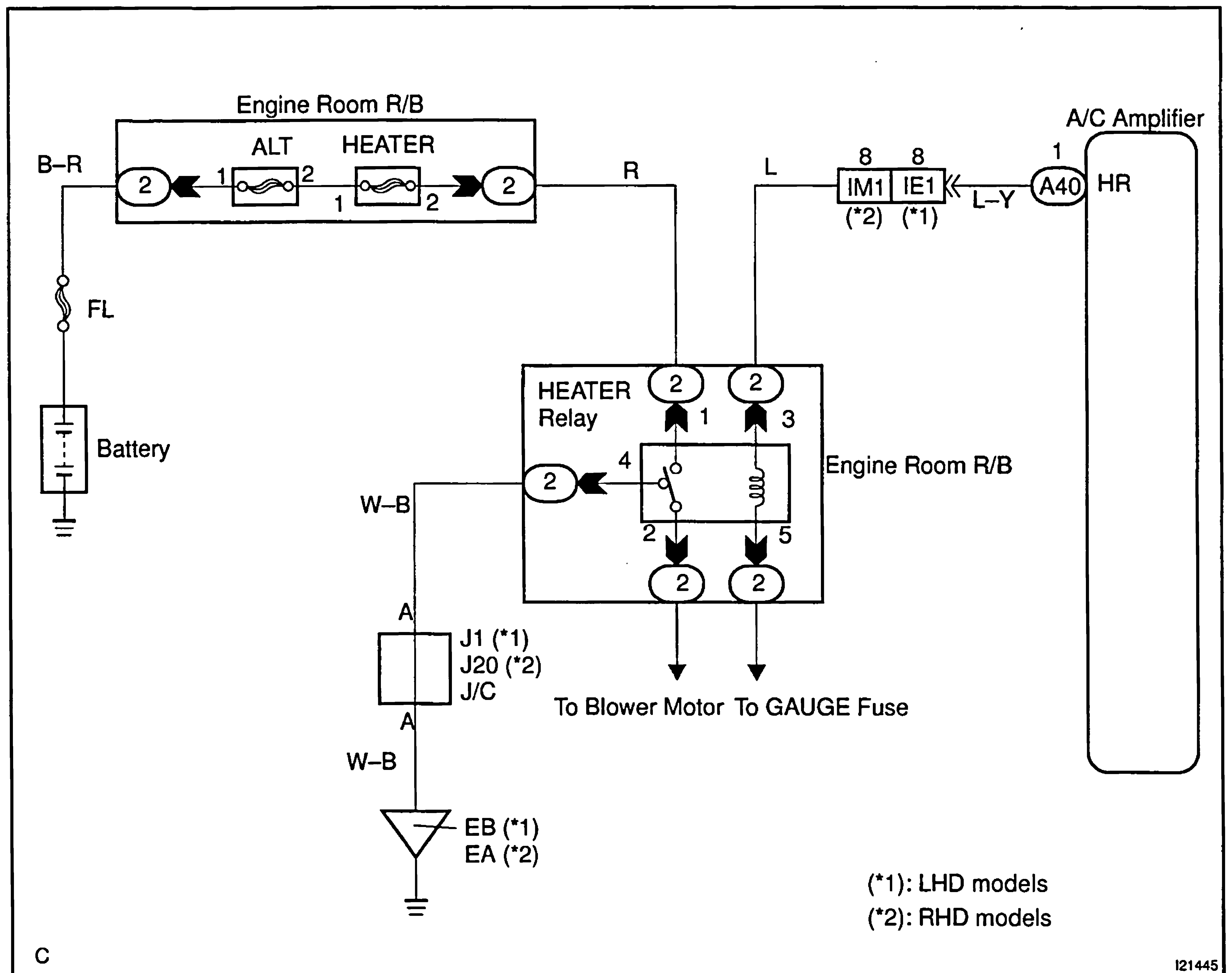
Check and repair harness and connector between A/C control assembly and battery.

Heater Main Relay Circuit

CIRCUIT DESCRIPTION

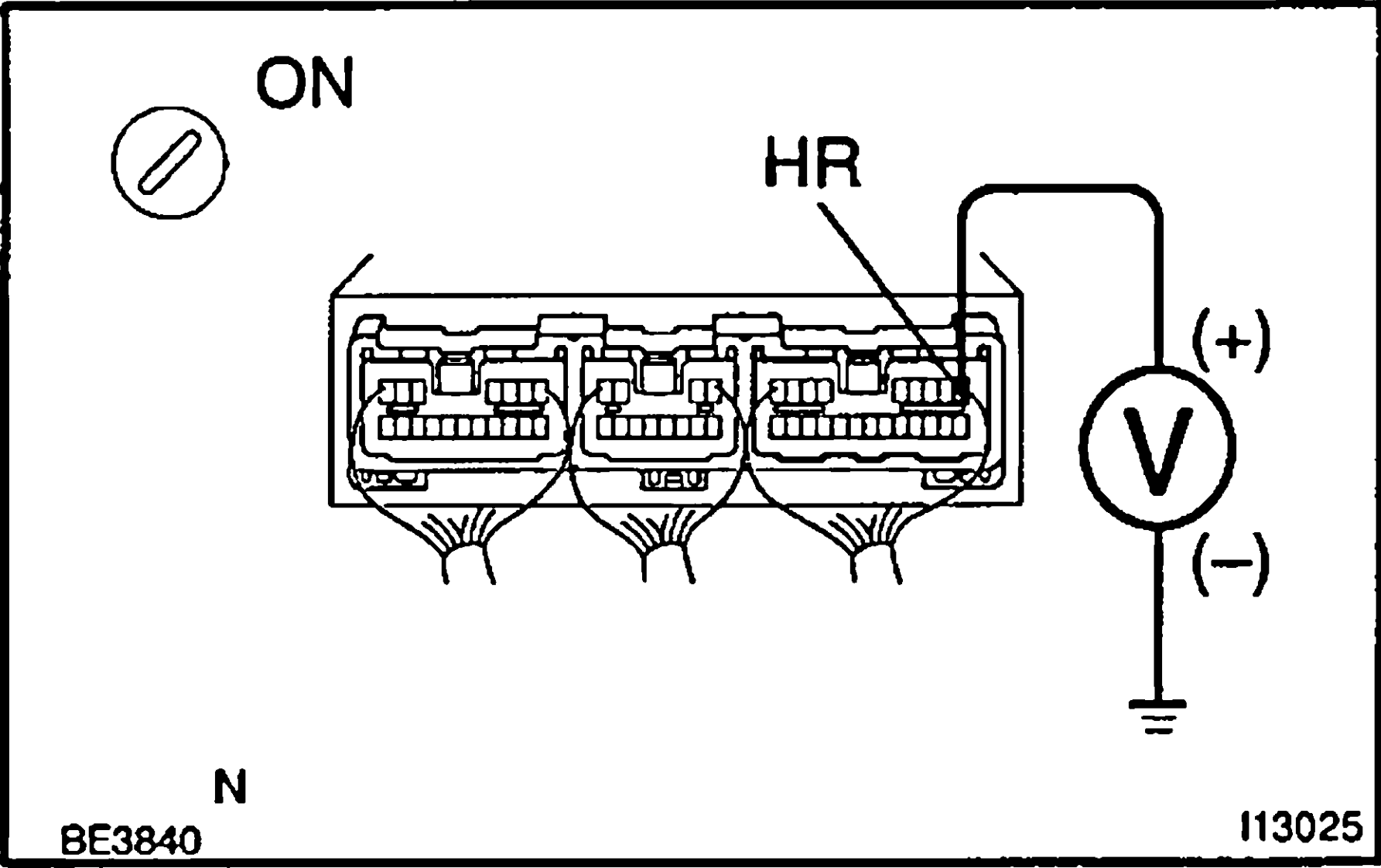
The heater main relay is switched on by signals from the A/C control assembly. It supplies power to the blower motor.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminal HR of A/C control assembly connector and body ground.
---	--



PREPARATION:

Remove A/C control assembly with connectors still connected.

CHECK:

Measure voltage between terminal HR of A/C control assembly and body ground when ignition switch is ON and OFF.

OK:

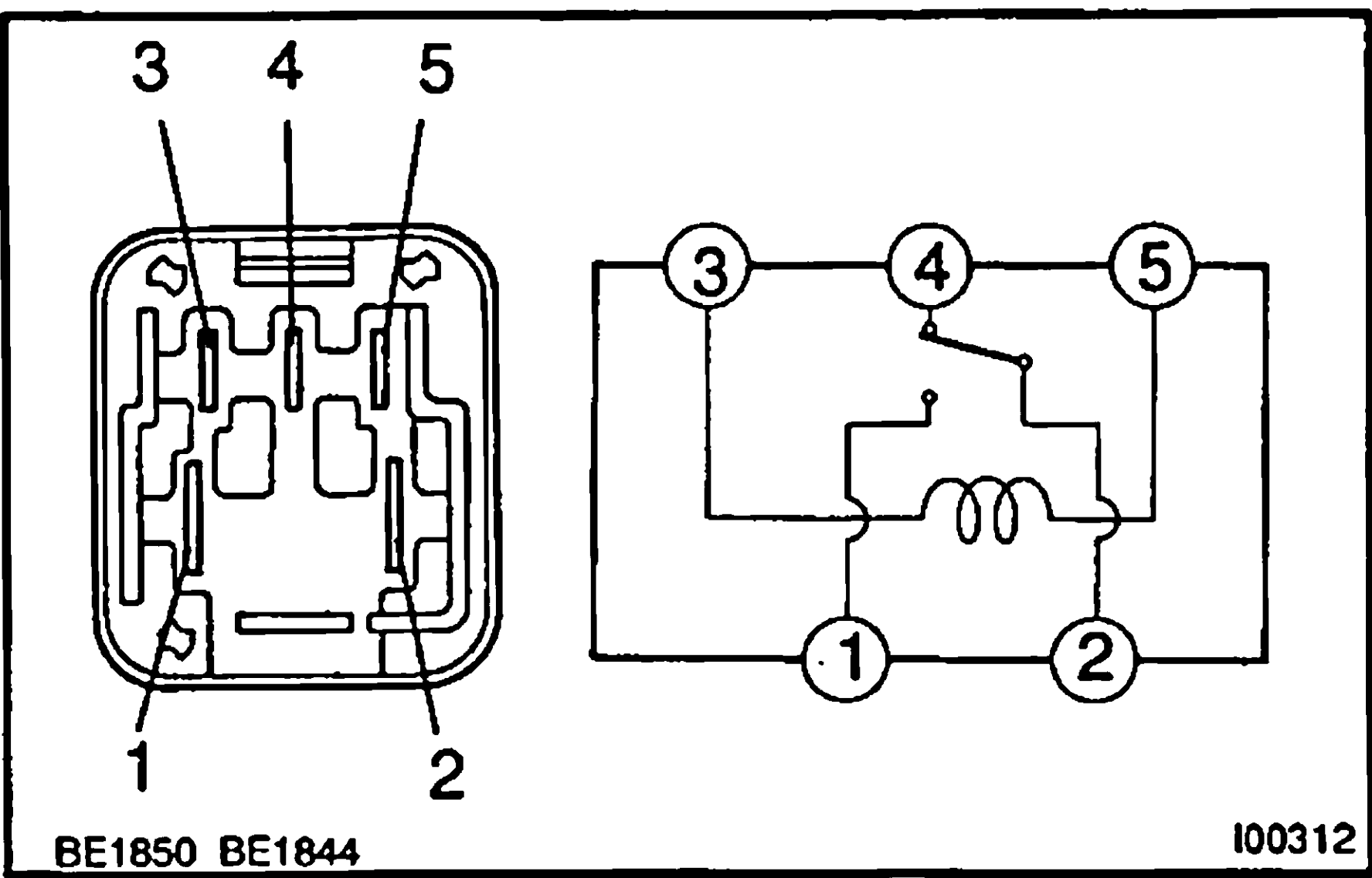
Ignition Switch	Voltage	
OFF	0 V	
ON	Blower ON	0 V
	Blower OFF	10 – 14 V

OK	Proceed to next circuit inspection shown on problem symptoms table (See page DI-45).
----	--

NG

2

Check heater main relay.



PREPARATION:

Remove heater main relay engine room R/B.

CHECK:

Check continuity between each pair of terminals of heater main relay shown below.

OK:

Tester connection	Specified condition
1 – 4	No continuity
2 – 4	Continuity
3 – 5	62.5 – 90.9 Ω

PREPARATION:

Apply battery voltage between terminals 3 and 5.

CHECK:

Check continuity between each pair of terminal shown below.

OK:

Tester connection	Specified condition
1 – 2	Continuity
2 – 4	No continuity

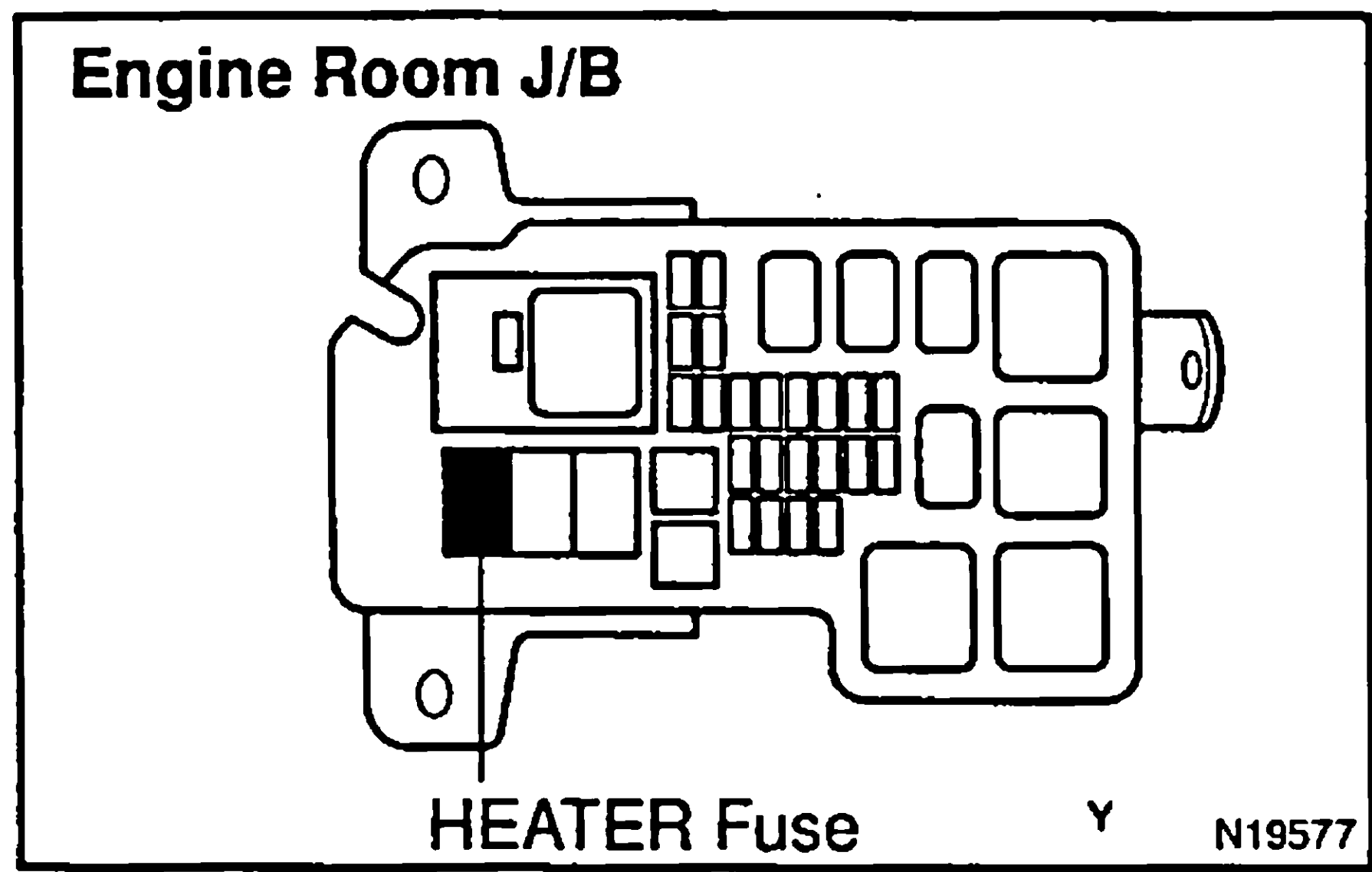
NG

Replace hater main relay.

OK

3

Check HEATER fuse.



PREPARATION:

Remove HEATER fuse engine room R/B.

CHECK:

Check continuity of HEATER fuse.

OK:

Continuity exists.

NG

Check for short in all the harness and components connected to the HEATER fuse (See attached wiring diagram).

OK

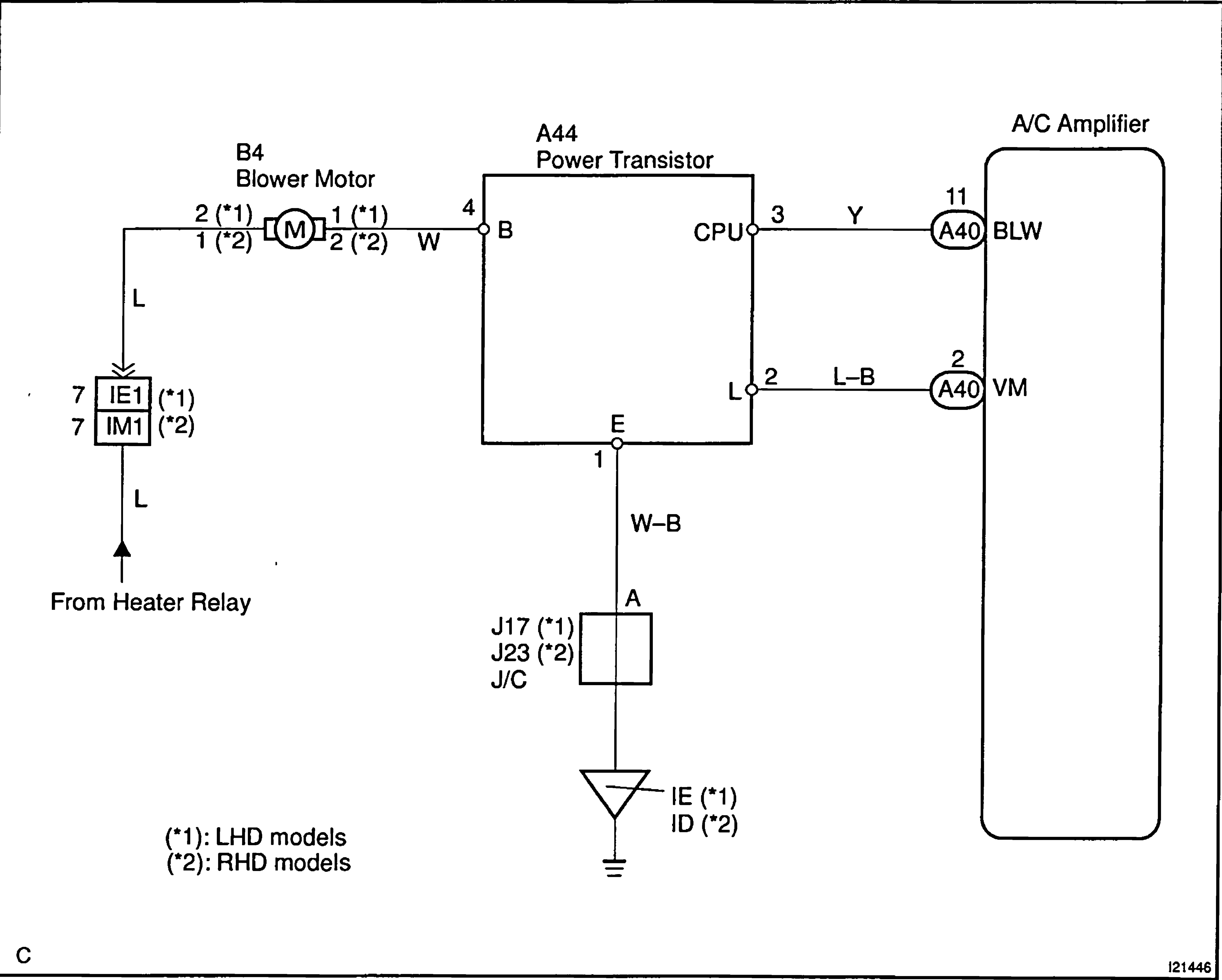
Check and repair harness and connector between A/C control assembly and battery.

Front A/C Blower Motor Circuit

CIRCUIT DESCRIPTION

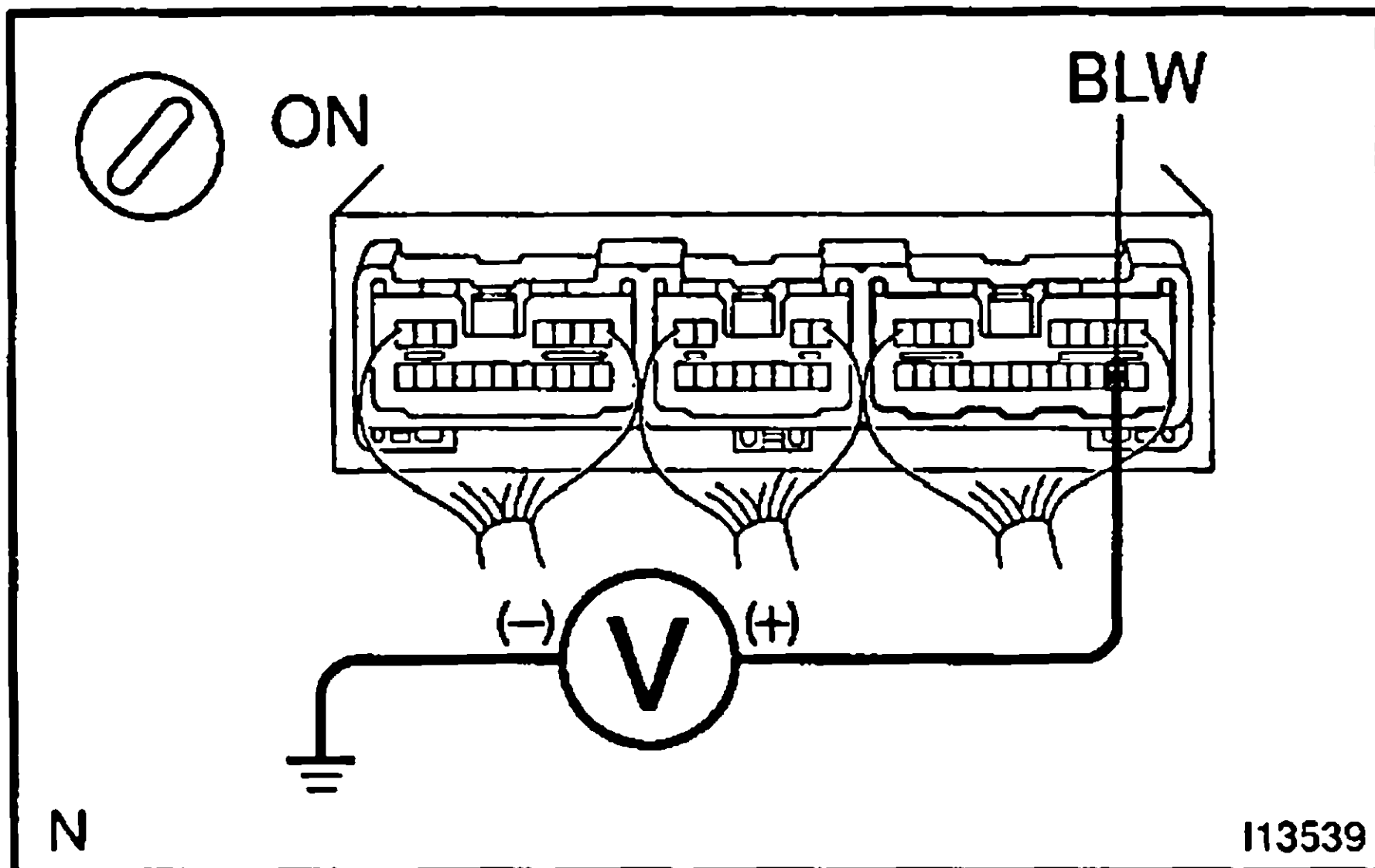
This is the power source for the blower motor.

WIRING DIAGRAM



INSPECTION PROCEDURE

- 1 Check voltage between terminal BLW of A/C amplifier connector and body ground.**

**PREPARATION:**

Remove the A/C amplifier with connector still connected.

CHECK:

- (a) Turn ignition switch to ON.
- (b) Operate blower motor.
- (c) Measure voltage between terminal BLW of A/C amplifier and body ground.

OK:

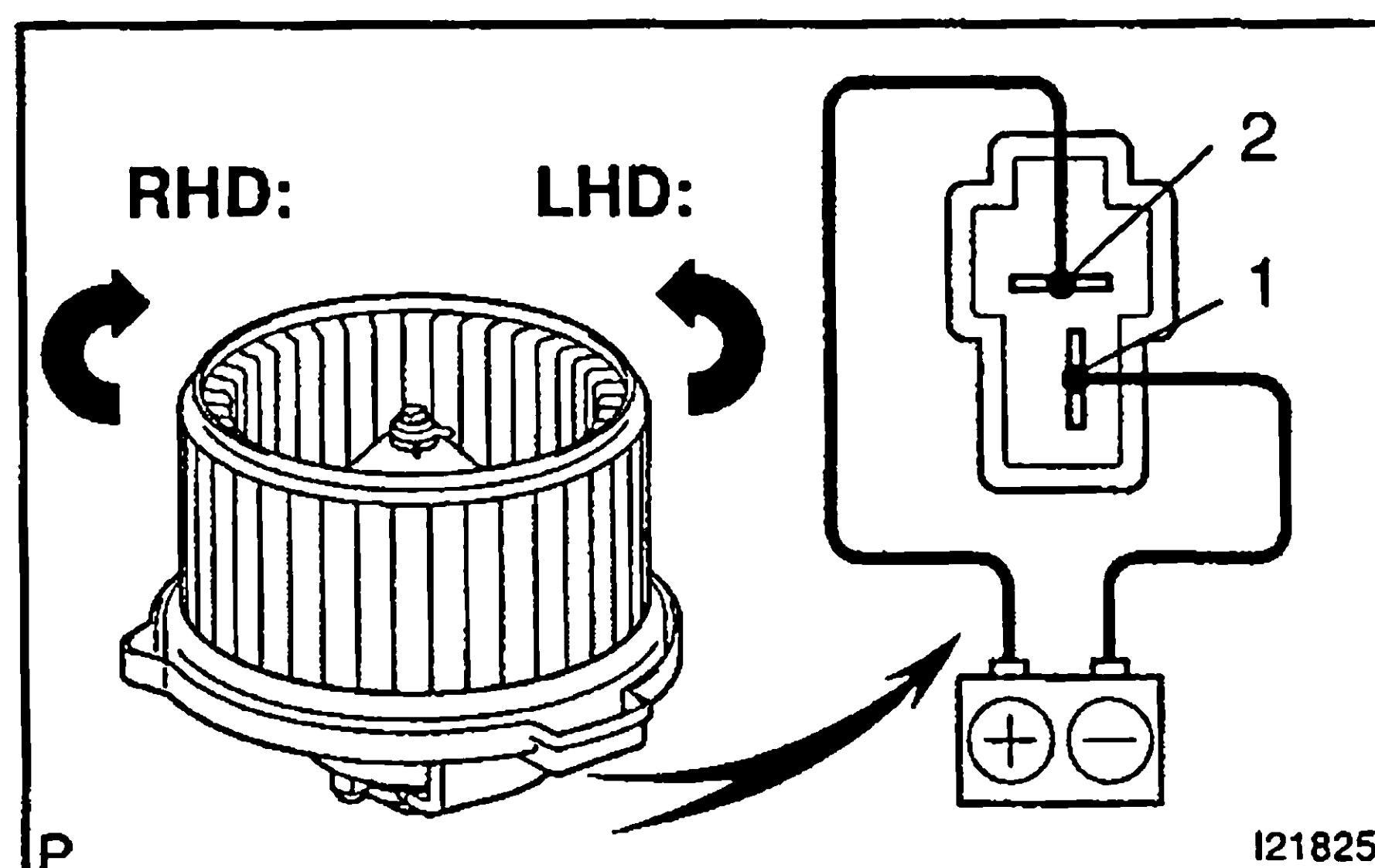
Voltage : 1 – 3 V

OK

Go to Step 6.

NG

- 2 Check blower motor.**

**PREPARATION:**

Remove blower motor.

CHECK:

Connect the positive (+) lead from the battery to terminal 2 of blower motor connector and the negative (-) lead to terminal 1.

OK:

Blower motor operates smoothly.

NG

Replace blower motor.

OK

- 3 Check harness and connector between A/C amplifier, blower motor and body ground (See page IN-33).**

NG

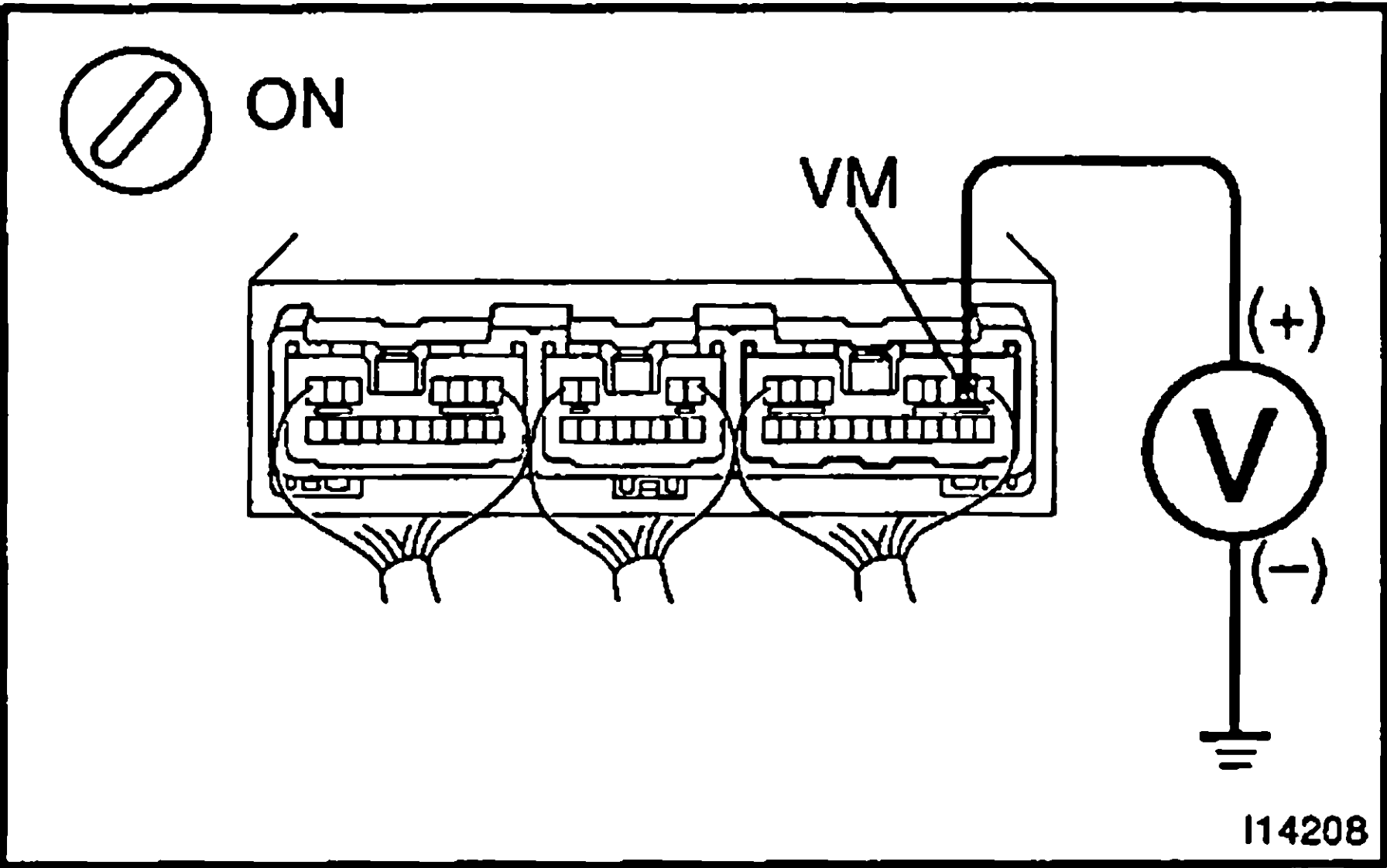
Repair or replace harness or connector.

OK

Check and replace A/C control assembly
(See page IN-33).

4

Check voltage between terminal VM of A/C amplifier and body ground.



PREPARATION:
Remove the A/C amplifier with connector still connected.

CHECK:

- (a) Turn ignition switch to ON.
- (b) Operate blower motor.
- (c) Measure voltage between terminal VM of A/C amplifier and body ground, when blower switch is operated to following positions.

OK:

Blower speed	Voltage
LO	9.5 V
ME	6.3 V
HI	Below 1.0 V

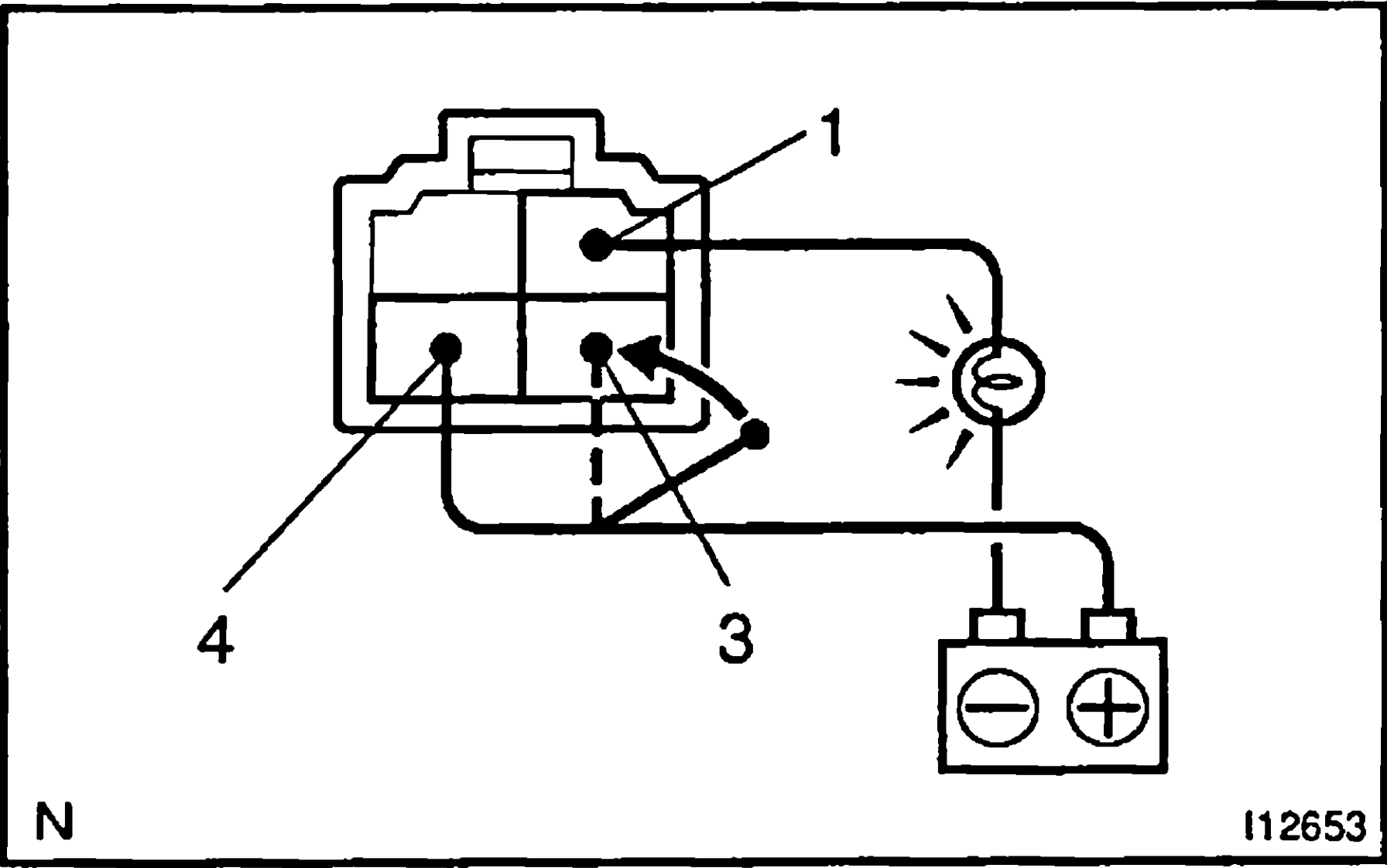
OK

Proceed to next circuit inspection shown on problem symptoms table 'See page DI-45).

NG

5

Check power transistor.



PREPARATION:
Remove power transistor
(See Pub. No. RM702E on page AC-20).

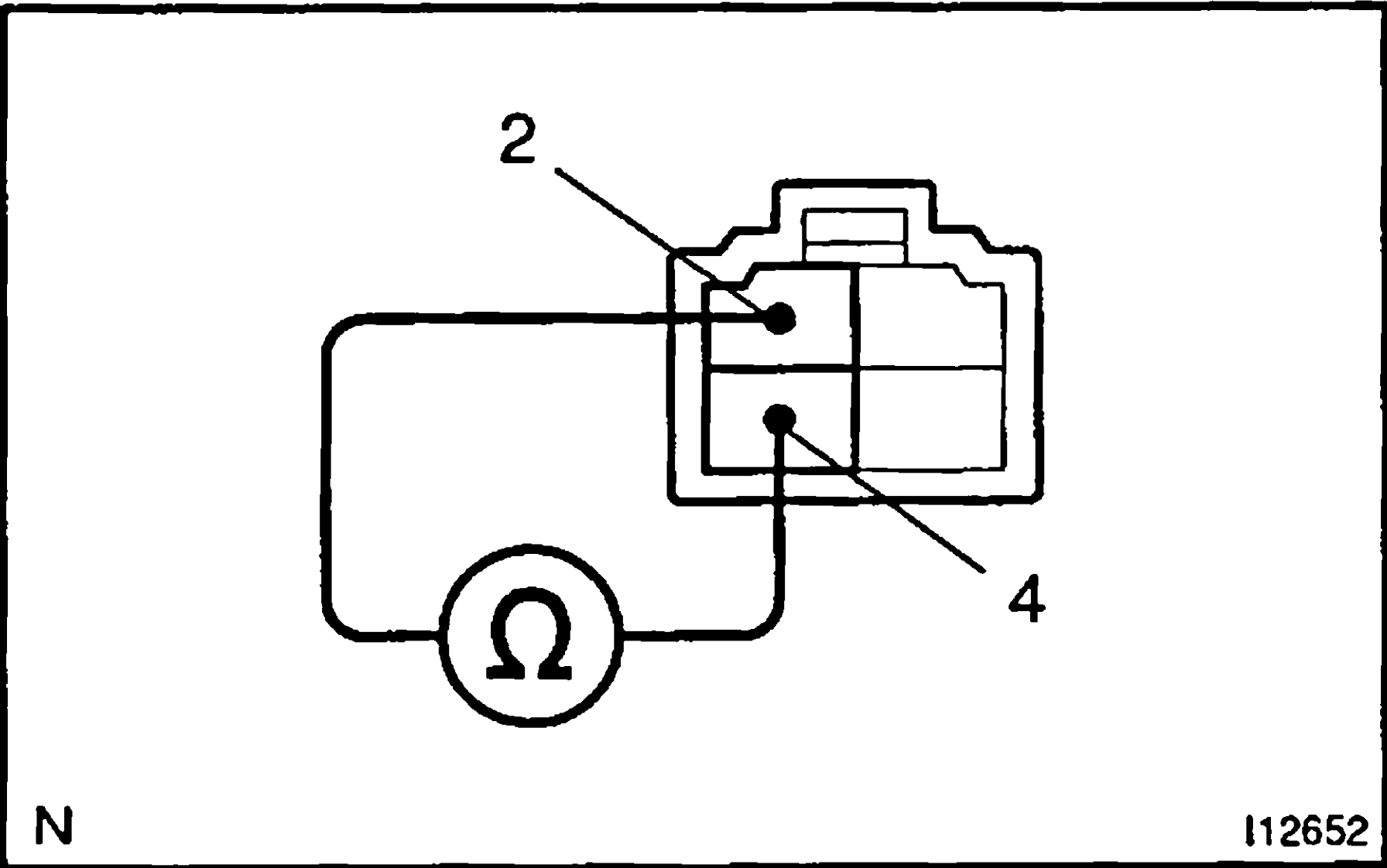
CHECK:

- (a) Connect the positive (+) lead from the battery to terminal 4 and negative (-) lead to terminal 1 through a 12 V – 3.4 W test bulb.
- (b) Check the test bulb lights up when positive (+) lead is connected to terminal 3.

OK:
Test bulb lights up.

CHECK:
Measure resistance between terminals 2 and 4.

OK:
2.0 – 2.4 kΩ



NG

Replace power transistor

OK

6	Check harness and connector between A/C amplifier and power transistor, power transistor and body ground (See page IN-33).
---	--

NG

Repair or replace harness or connector.

OK

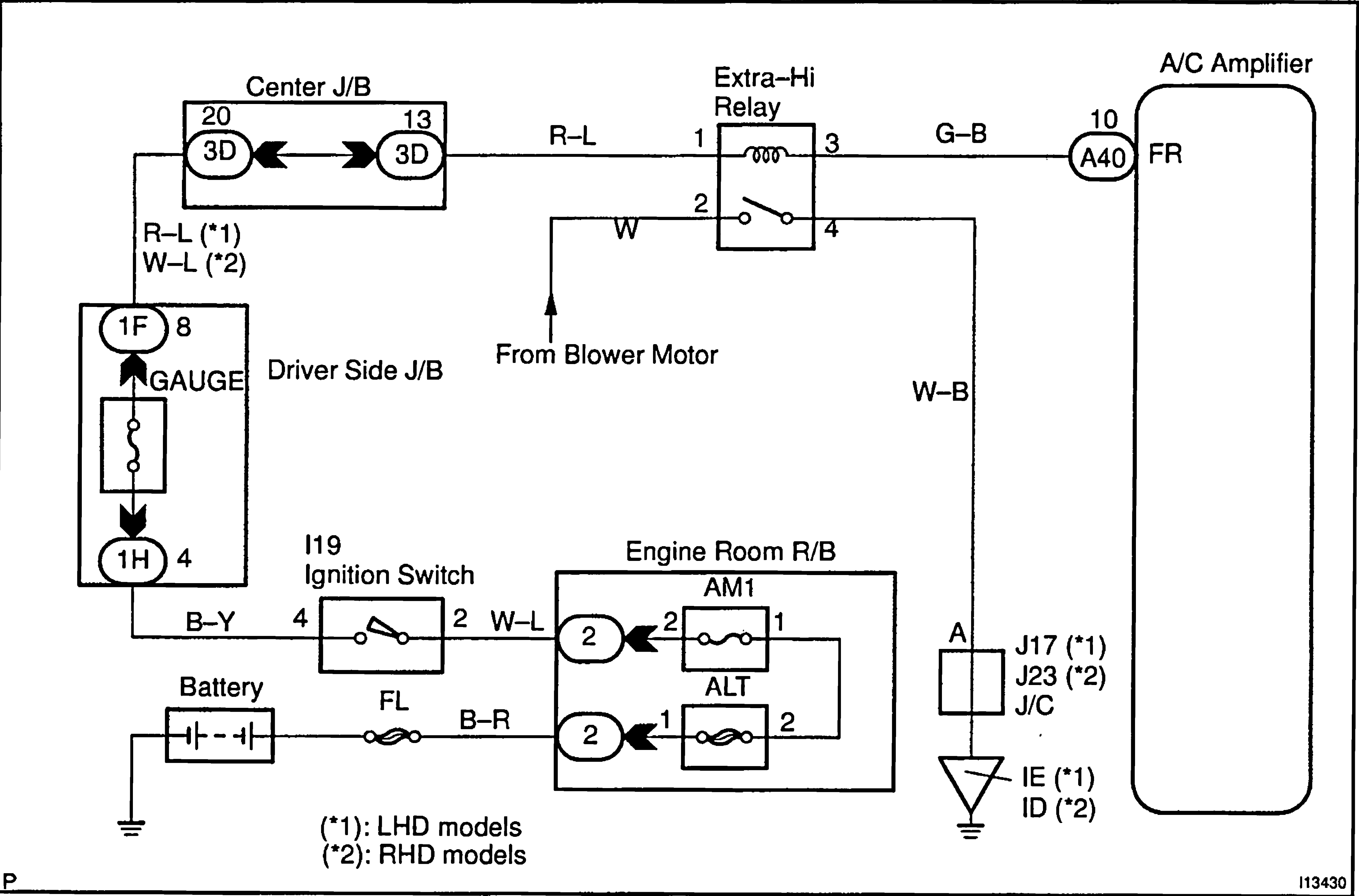
Check and replace A/C control assembly
(See page IN-33).

Extra-Hi Relay Circuit (Front A/C)

CIRCUIT DESCRIPTION

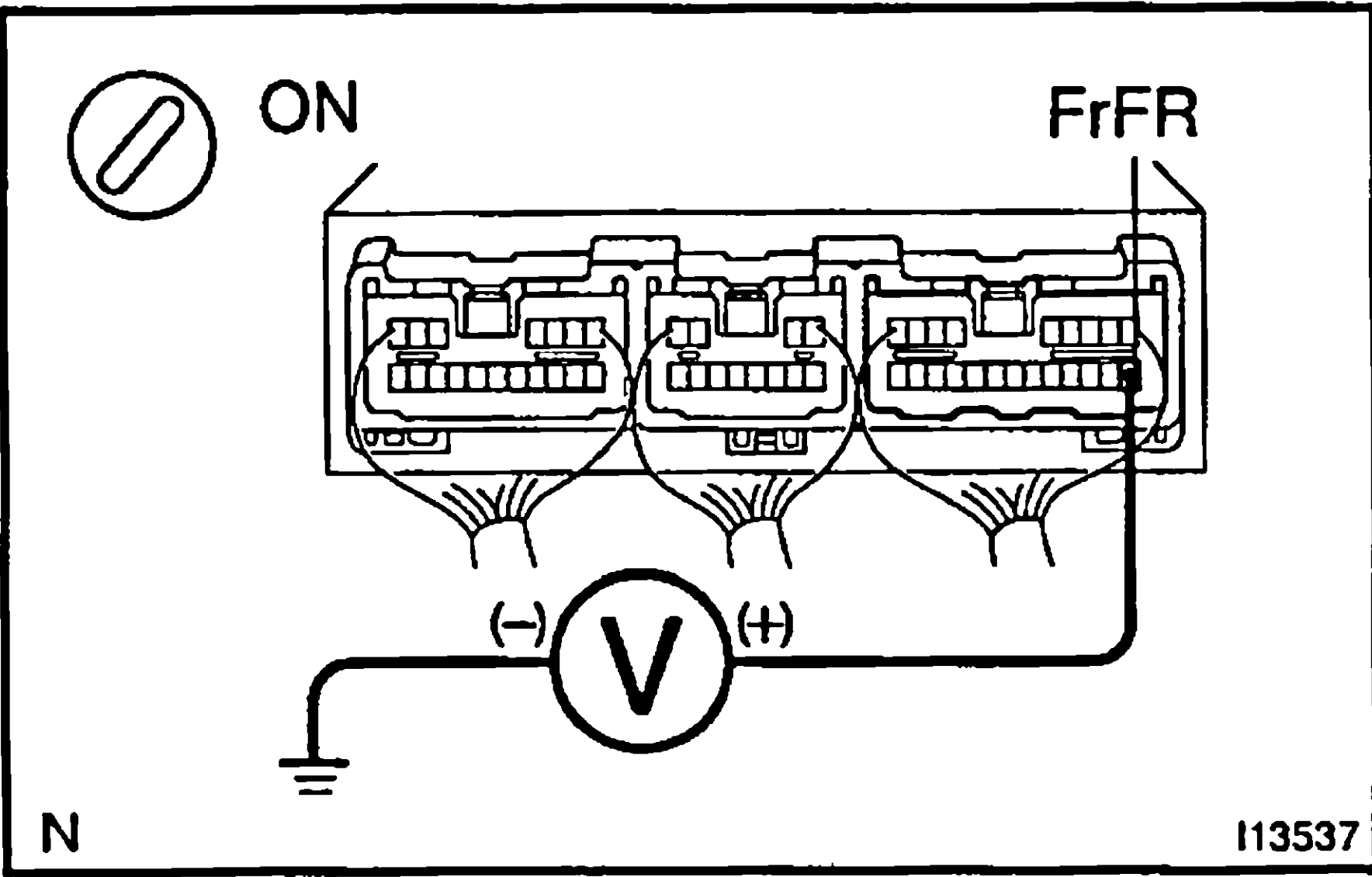
The extra-hi relay is switched on by signals from the A/C control assembly.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminal FR of A/C amplifier connector and body ground.
---	---



- PREPARATION:**
Remove the A/C control assembly with connectors still connected.
- CHECK:**
- (a) Turn ignition switch ON.
 - (b) Measure voltage between terminal FR of A/C amplifier connector and body ground when blower speed condition as shown in the chart.

OK:

Blower speed	Standard voltage (V)
HI	Below 1.0 V
Except HI	10 – 14 V

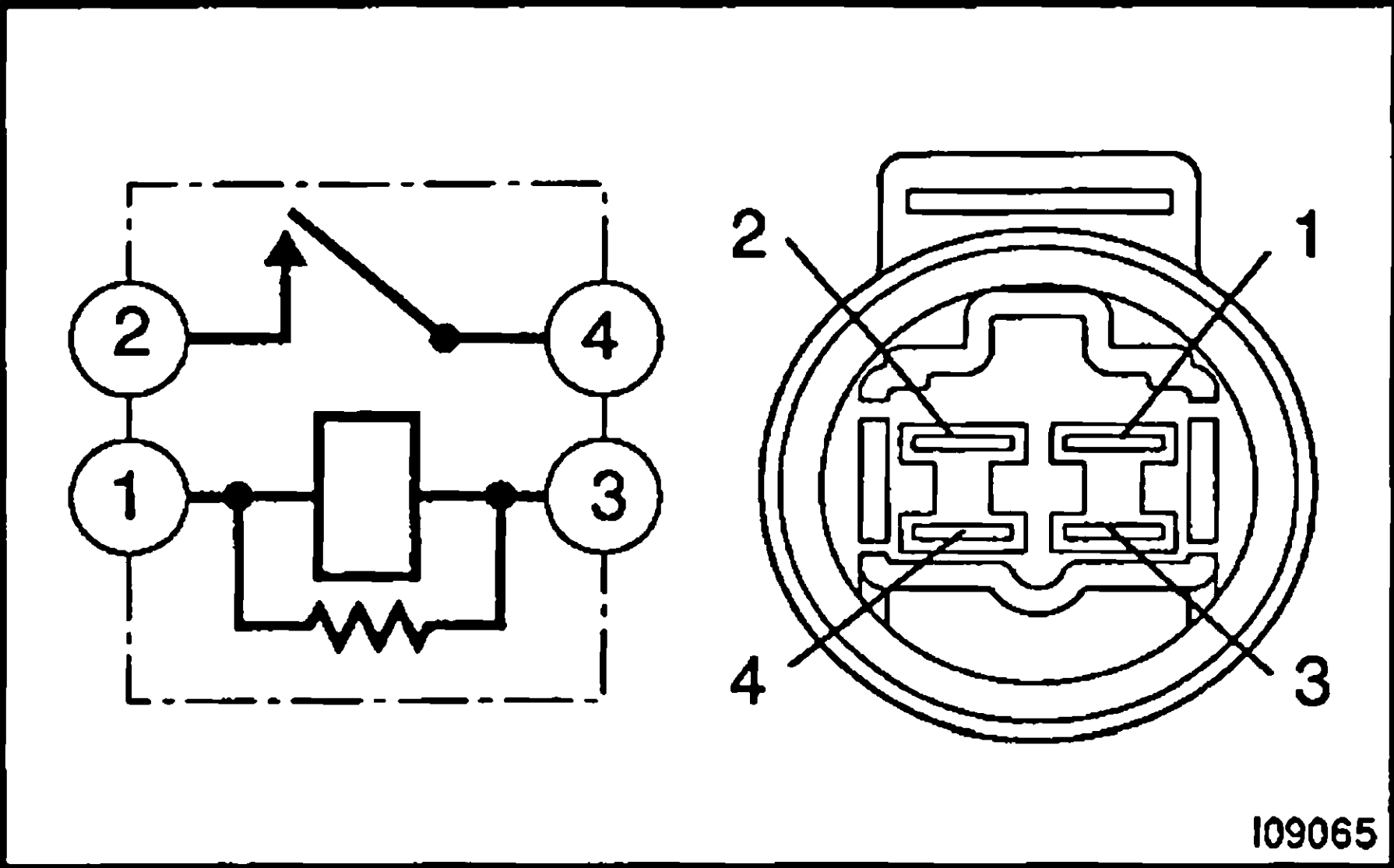
OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI-45).

NG

2

Check extra-hi relay.



PREPARATION:
Remove extra-hi relay (See Pub. No. RM702E on page AC-27).

CHECK:
Check continuity between each pair of terminals of heater main relay shown below.

OK:

Tester connection	Specified condition
2 – 4	No continuity
1 – 3	Continuity
1 – 3	62.5 – 90.9 Ω

PREPARATION:
Apply battery voltage between terminals 1 and 2.

CHECK:
Check continuity between each pair of terminal shown below.

OK:

Tester connection	Specified condition
2 – 4	Continuity

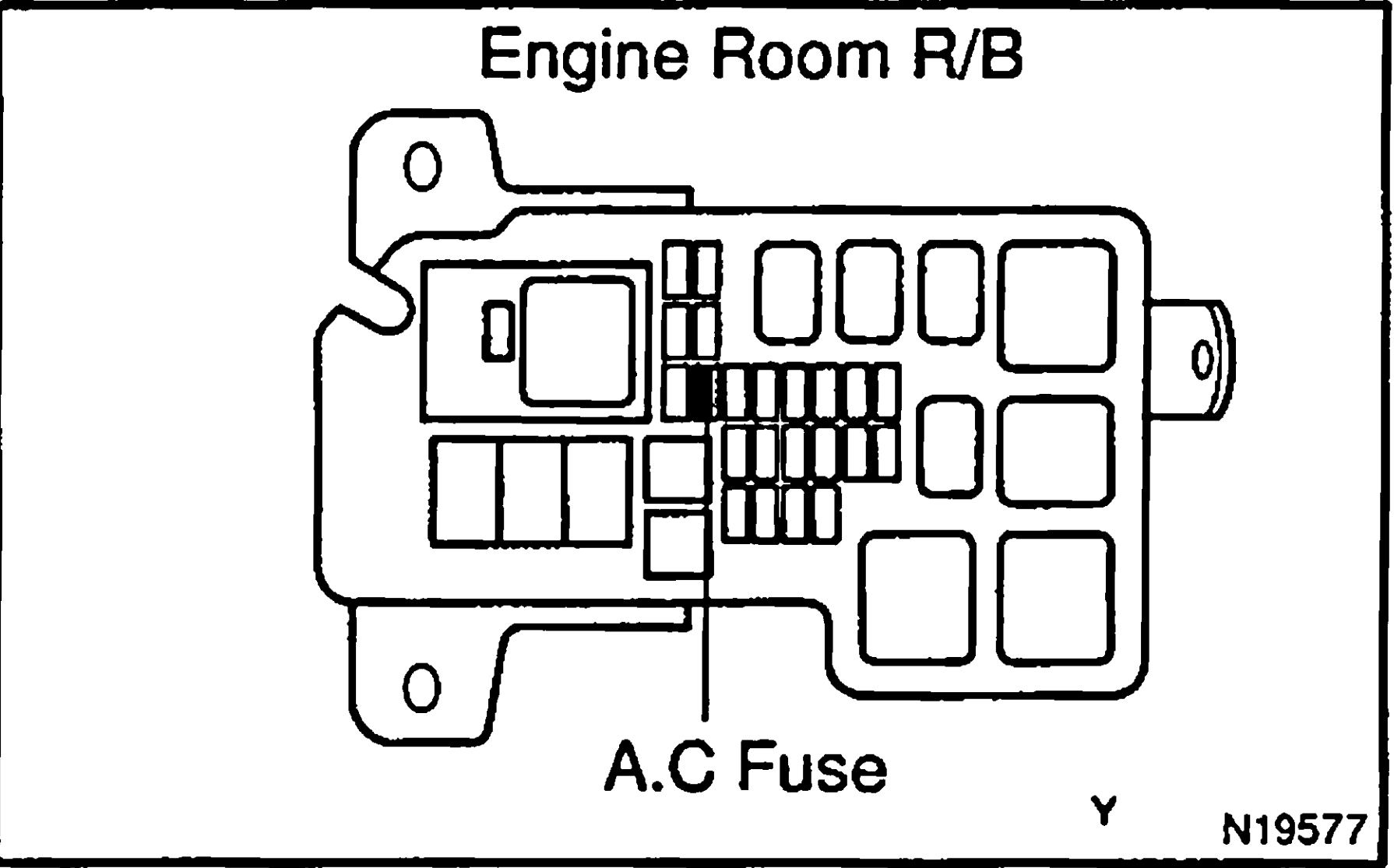
NG

Replace extra-hi relay.

OK

3

Check A/C fuse.



PREPARATION:
Remove A/C fuse engine room R/B.

CHECK:
Check continuity of A/C fuse.

OK:
Continuity exists.

NG

Check for short in all the harness and components connected to the A/C fuse (See attached wiring diagram).

OK

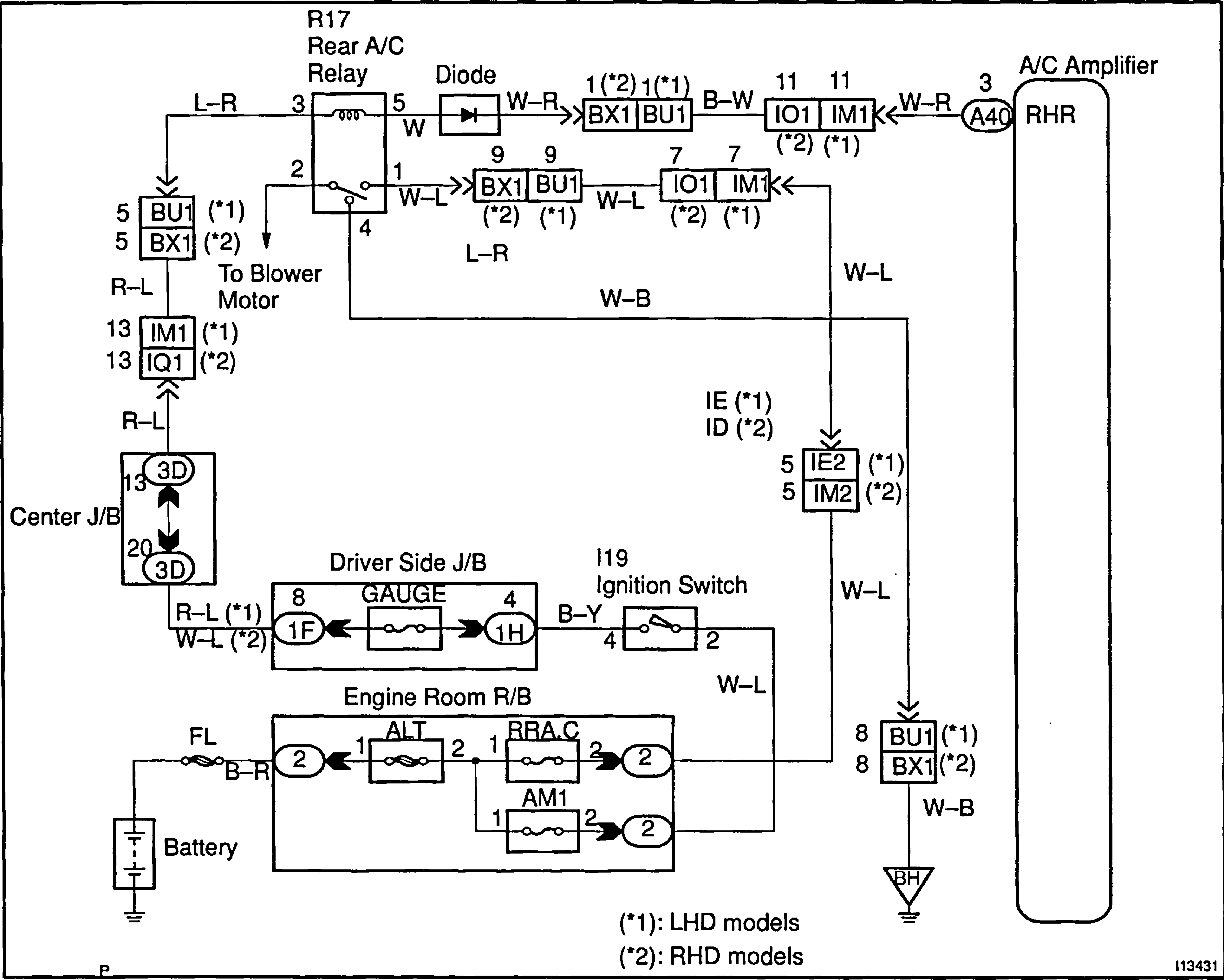
Check and repair harness and connector between A/C control assembly and A.C Fuse.

Rear A/C Relay Circuit

CIRCUIT DESCRIPTION

The rear A/C relay is switched on by signals from the A/C amplifier. It supplies power to the rear A/C blower motor.

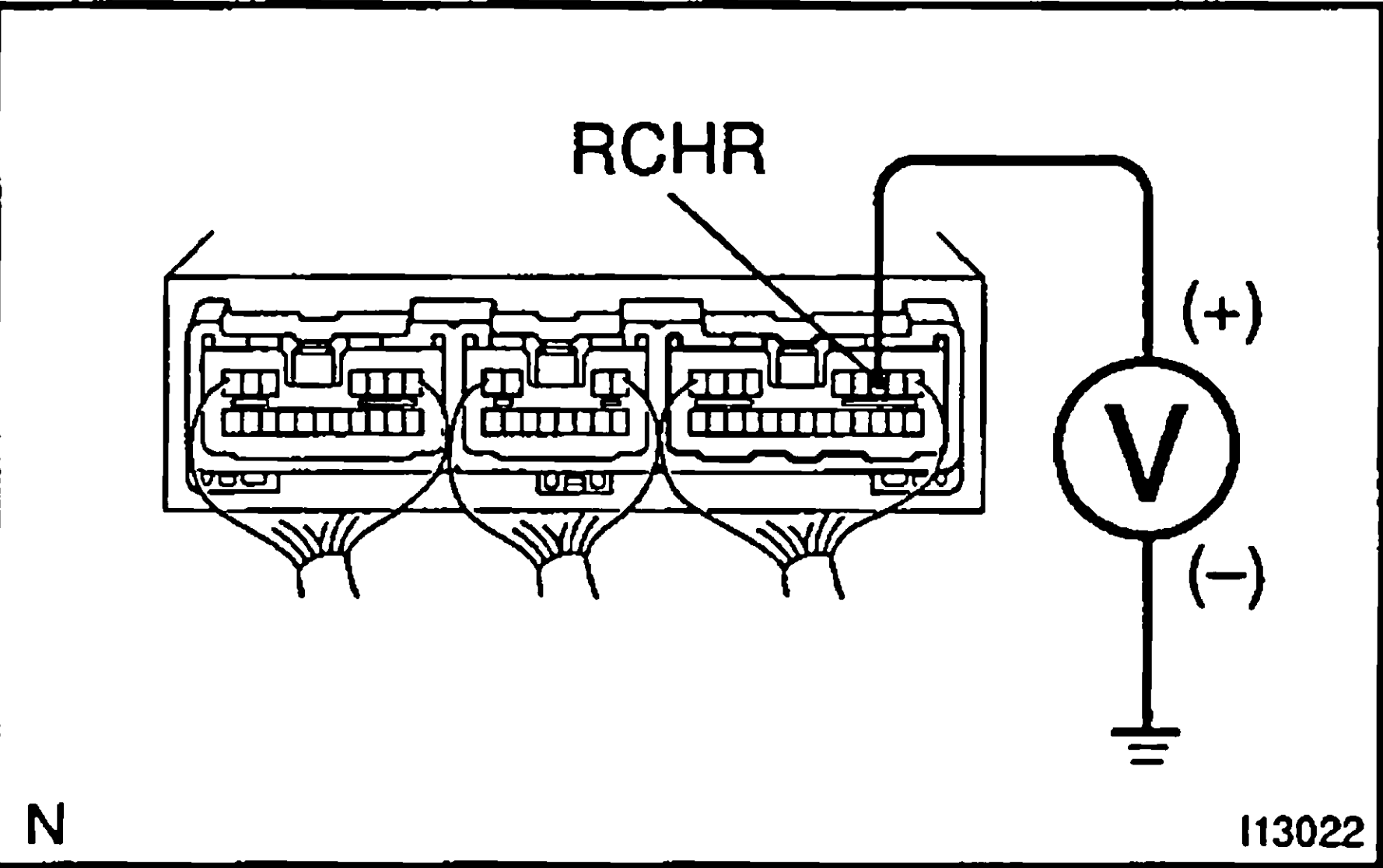
WIRING DIAGRAM



INSPECTION PROCEDURE

- 1

Check voltage between terminal RCHR of A/C control assembly connector and body ground.



PREPARATION:
Remove A/C control assembly with connectors still connected.

CHECK:
Measure voltage between terminal RCHR of A/C control assembly and body ground when ignition switch is ON and OFF.

OK:

Ignition Switch	Voltage	
OFF	0 V	
ON	Blower ON	0 V
	Blower OFF	10 – 14 V

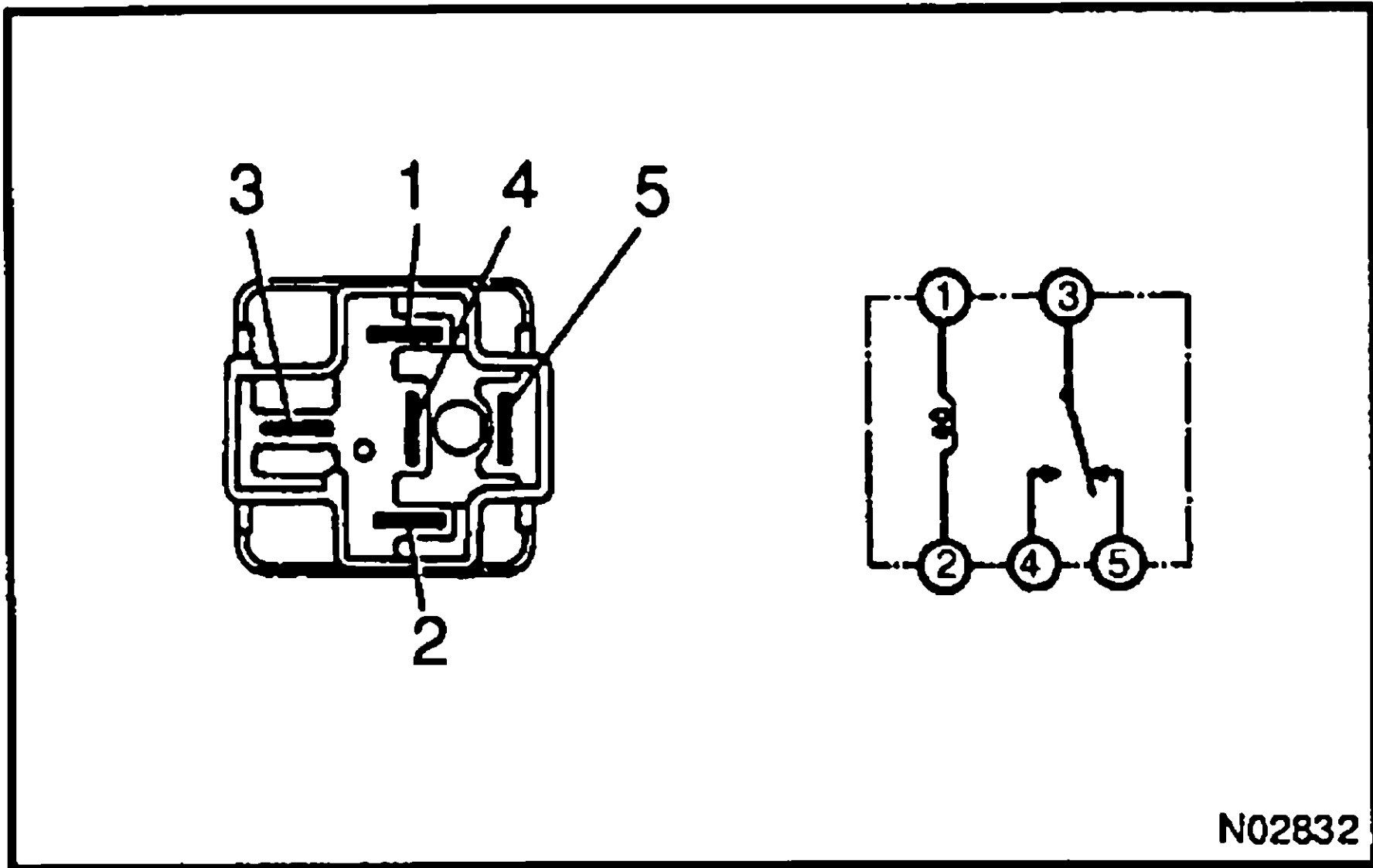
OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI-45).

NG

2

Check rear A/C relay.



PREPARATION:

Remove rear A/C relay.

CHECK:

Check continuity between each pair of terminals of heater main relay shown below.

OK:

Tester connection	Specified condition
1 – 4	No continuity
2 – 4	Continuity
3 – 5	62.5 – 90.9 Ω

PREPARATION:

Apply battery voltage between terminals 3 and 5.

CHECK:

Check continuity between each pair of terminal shown below.

OK:

Tester connection	Specified condition
1 – 2	Continuity
2 – 4	No continuity

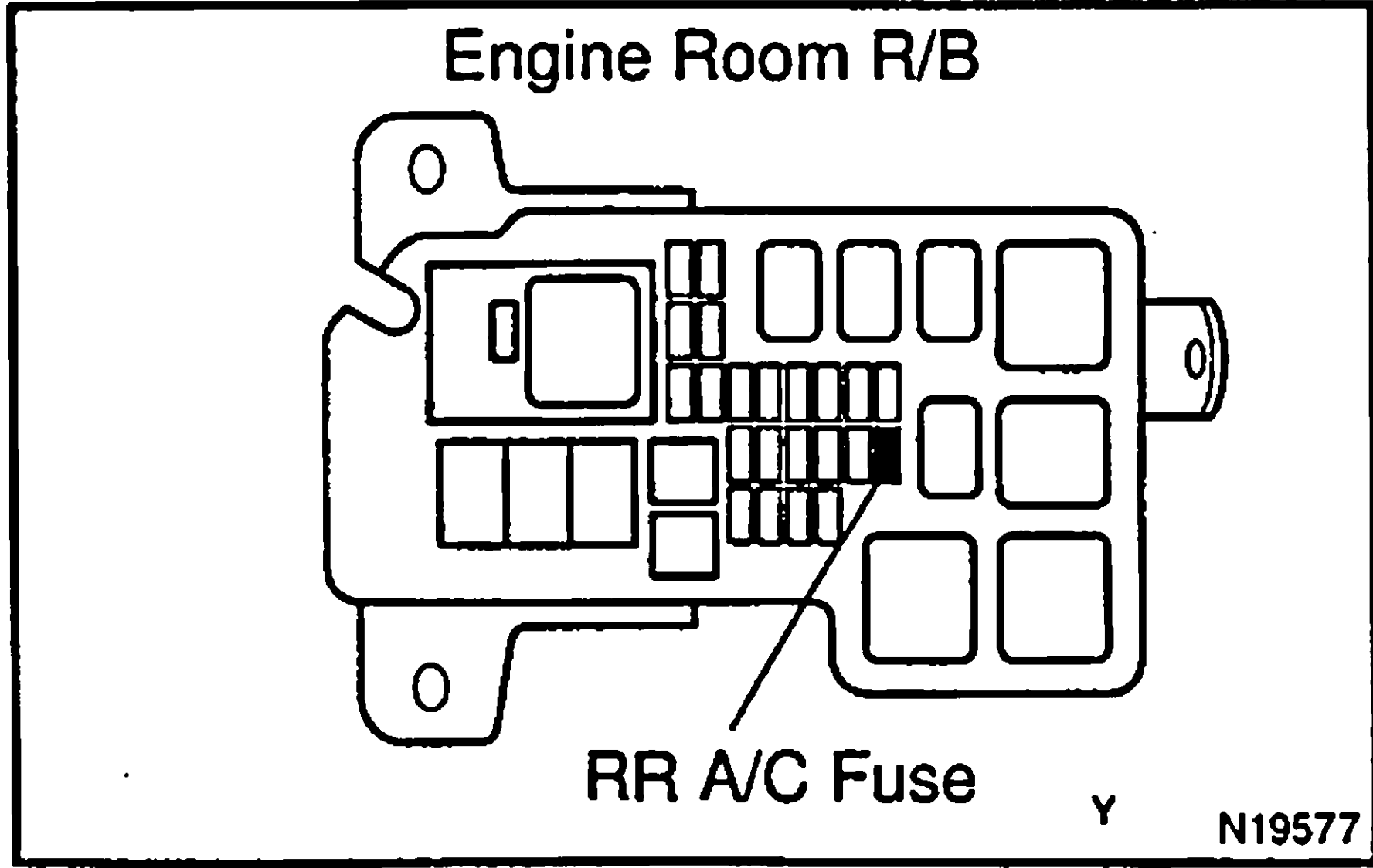
NG

Replace hater main relay.

OK

3

Check RR A/C fuse.



PREPARATION:

Remove RR A/C fuse engine room R/B.

CHECK:

Check continuity of RR A/C fuse.

OK:

Continuity exists.

NG

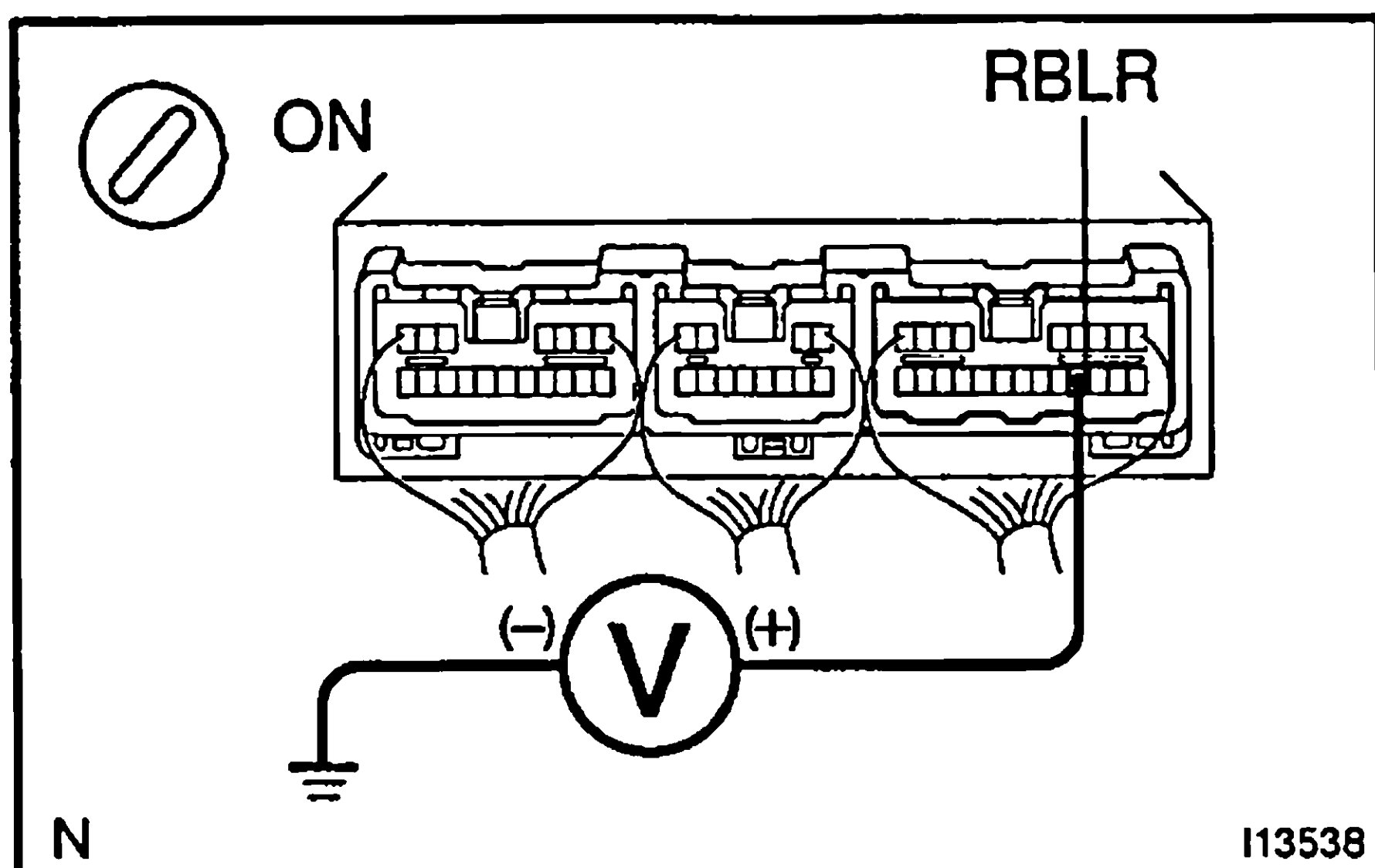
Check for short in all the harness and components connected to the RR A/C fuse (See attached wiring diagram).

OK

Check and repair harness and connector between A/C control assembly and battery.

INSPECTION PROCEDURE

- | | |
|----------|--|
| 1 | Check voltage between terminal RBLR of A/C amplifier connector and body ground. |
|----------|--|

**PREPARATION:**

Remove the A/C amplifier with connector still connected.

CHECK:

- (a) Turn ignition switch to ON.
- (b) Operate blower motor.
- (c) Measure voltage between terminal RBLR of A/C amplifier and body ground.

OK:

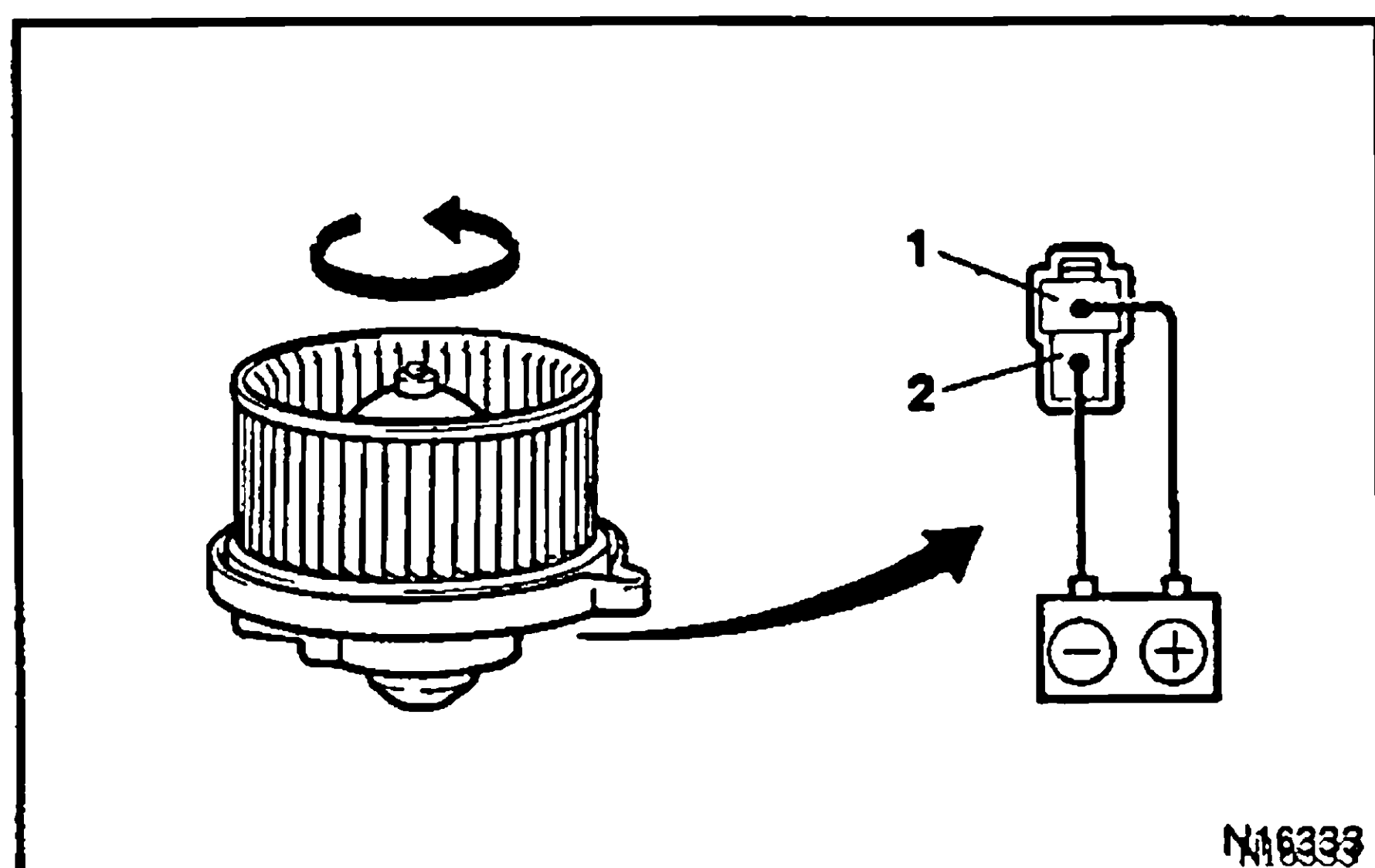
Voltage: 1 ± 3 V

OK

Proceed to next circuit inspection shown of problem symptoms table (See page DI-45).

NG

- | | |
|----------|----------------------------|
| 2 | Check blower motor. |
|----------|----------------------------|

**PREPARATION:**

Remove blower motor.

CHECK:

Connect the positive (+) lead from the battery to terminal 2 of blower motor connector and the negative (-) lead to terminal 1.

OK:

Blower motor operates smoothly.

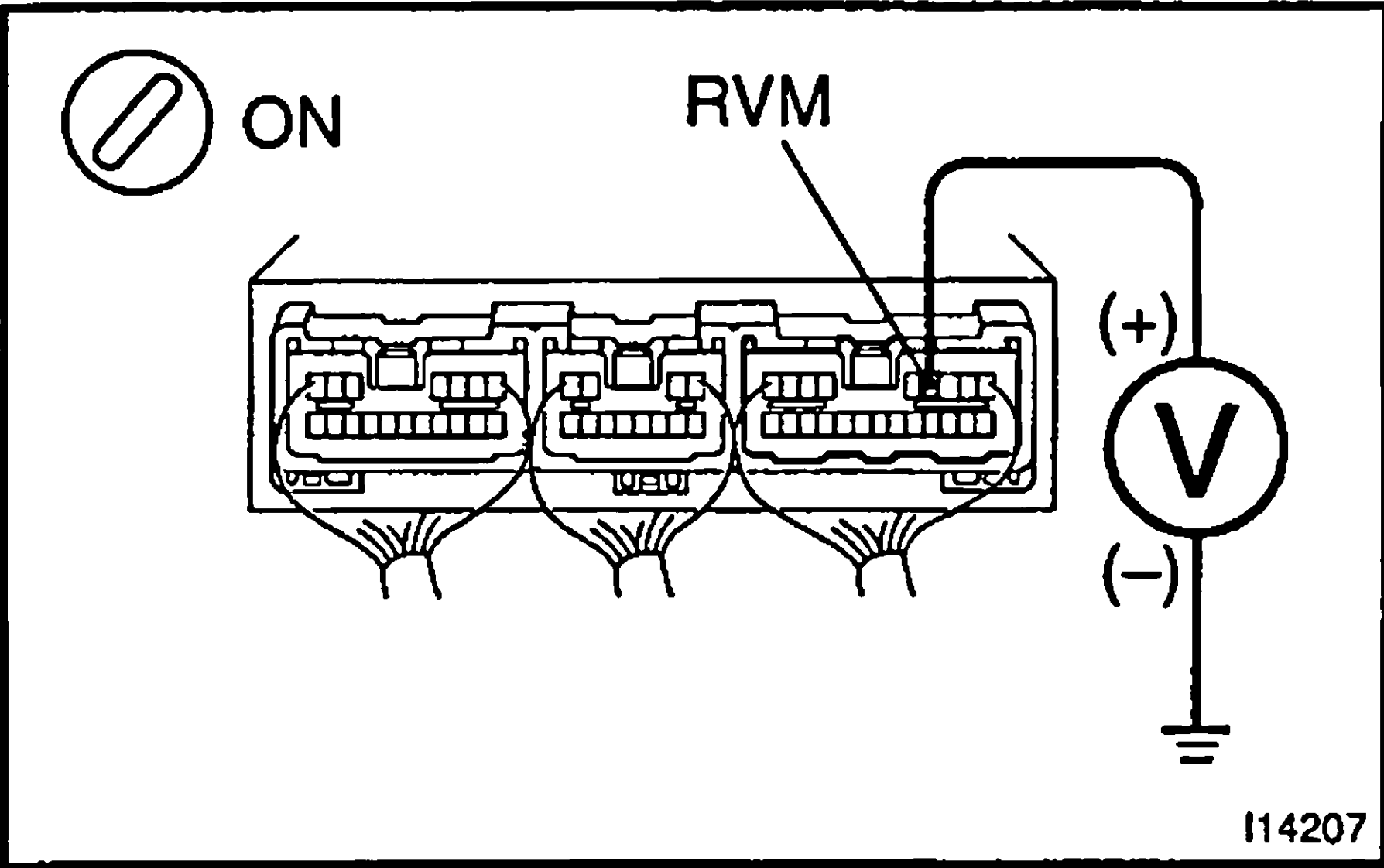
NG

Replace blower motor.

OK

3

Check voltage between terminal RVM of A/C amplifier and body ground.



PREPARATION:

Remove the A/C amplifier with connector still connected.

CHECK:

- (a) Turn ignition switch to ON.
- (b) Operate rear A/C blower motor.
- (c) Measure voltage between terminal RVM of A/C amplifier and body ground, when blower switch is operated to following positions.

OK:

Blower speed	Voltage
LO	9.5 V
ME	6.4 V
HI	Below 1.0 V

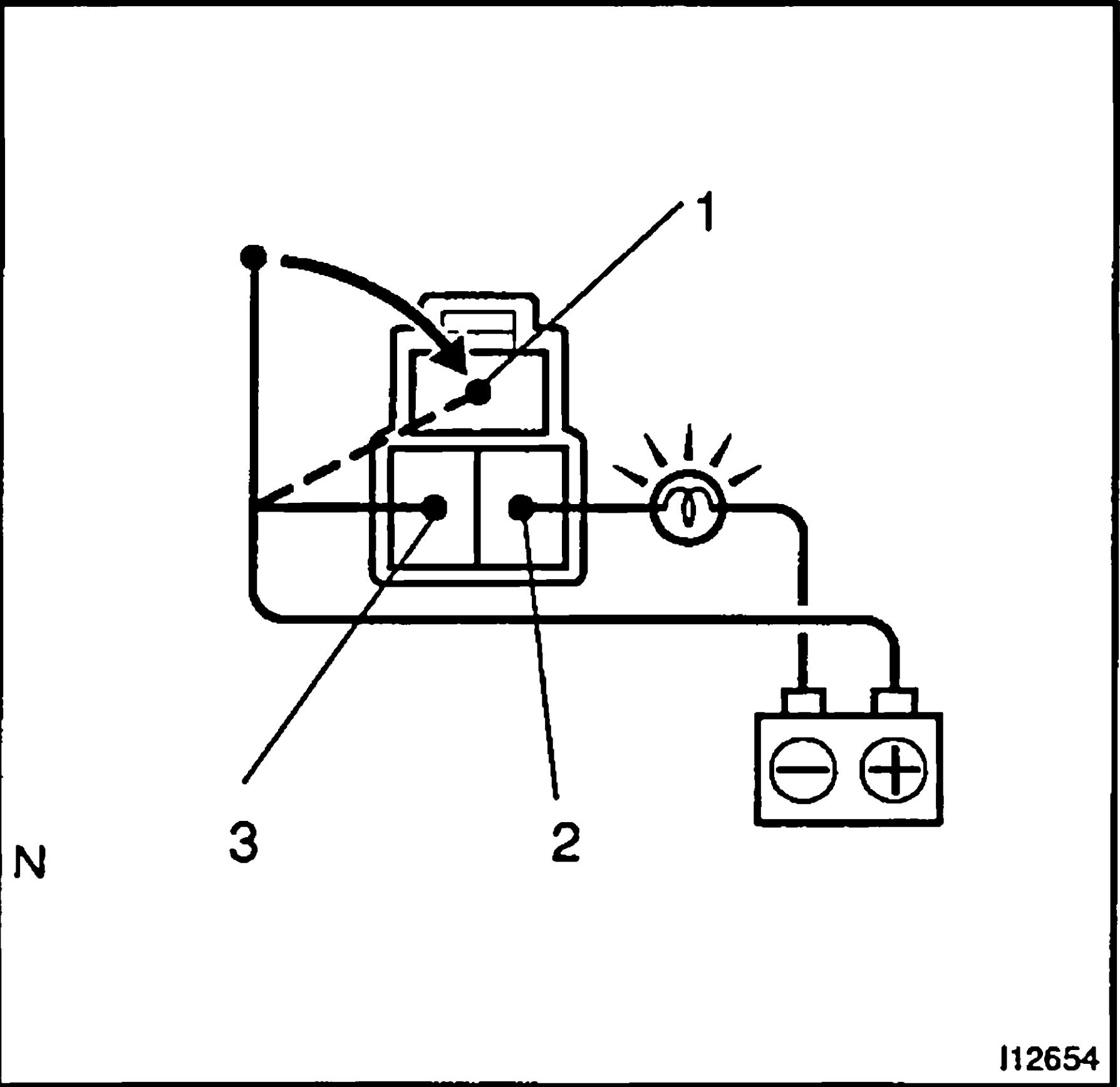
OK

Proceed to next circuit inspection shown on problem symptoms table See page DI-45).

NG

4

Check power transistor.



PREPARATION:

Remove power transistor (See Pub. No. RM702E on page AC-20).

CHECK:

- (a) Connect the positive (+) lead from the battery to terminal 3 and negative (-) lead to terminal 2 through a 12 V – 3.4 W test bulb.
- (b) Check the test bulb lights up when positive (+) lead is connected to terminal 1.

OK:

Test bulb lights up.

NG

Replace power transistor.

OK

5	Check harness and connector between A/C amplifier, motor power transistor and body ground (see page IN-33).
---	---

NG

Repair or replace harness or connector.

OK

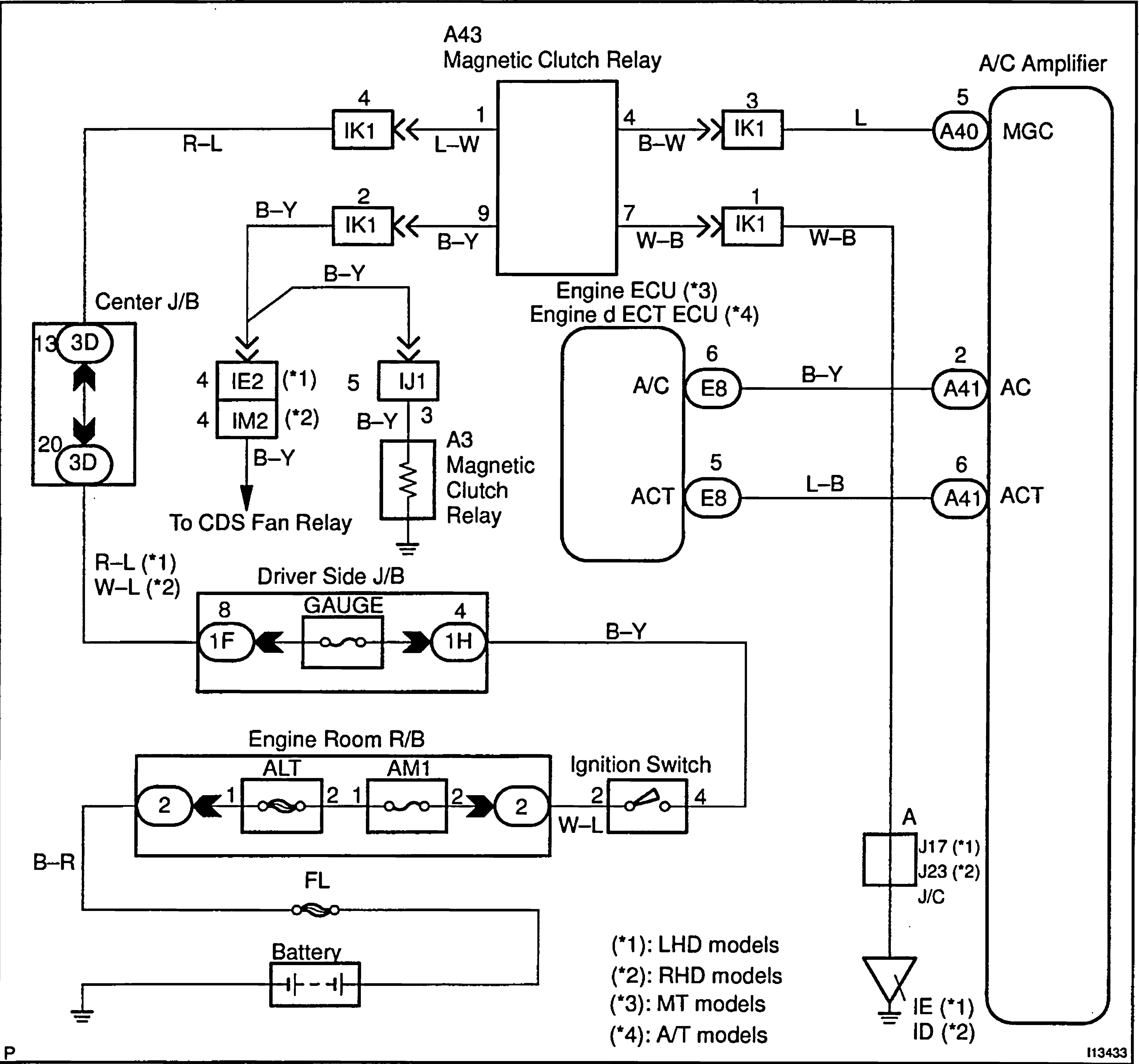
Check and replace A/C control assembly
(See page IN-33).

Compressor Circuit

CIRCUIT DESCRIPTION

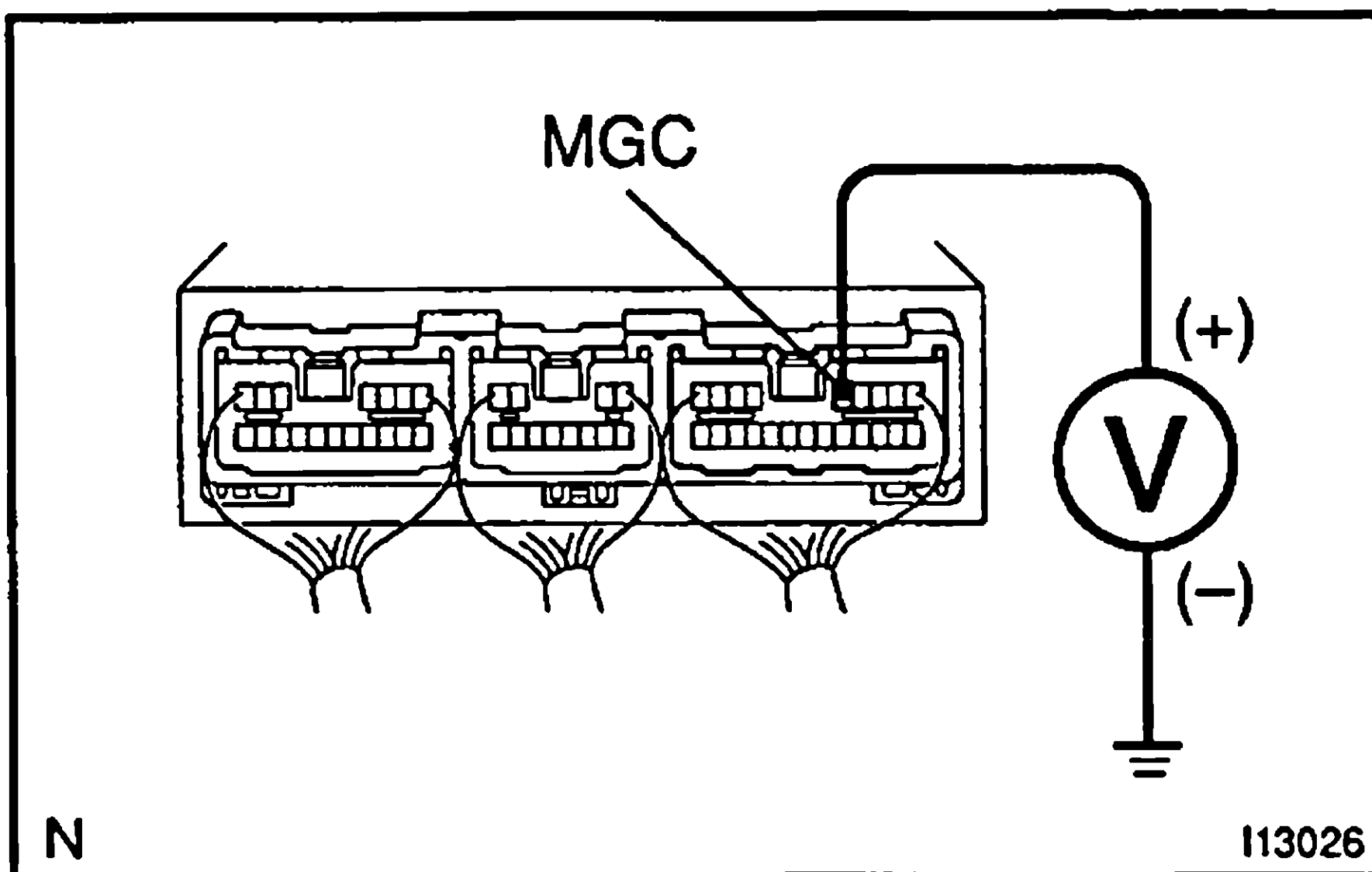
The A/C control assembly outputs the magnetic clutch ON signal from terminal AC to the engine (and ECT) ECU. When the engine (and ECT) ECU receives this signal, it sends a signal from terminal ACT and switches the A/C magnetic clutch relay ON, thus turning on the A/C magnetic clutch.

WIRING DIAGRAM



INSPECTION PROCEDURE

- 1 Check voltage between terminal MGC of A/C control assembly connector and body ground.**



PREPARATION:

- (a) Remove A/C control assembly with connectors still connected.
 (b) Start the engine and push AUTO switch.

CHECK:

Check voltage between terminal MGC of A/C control assembly connector and body ground when magnetic clutch is ON and OFF by A/C switch.

OK:

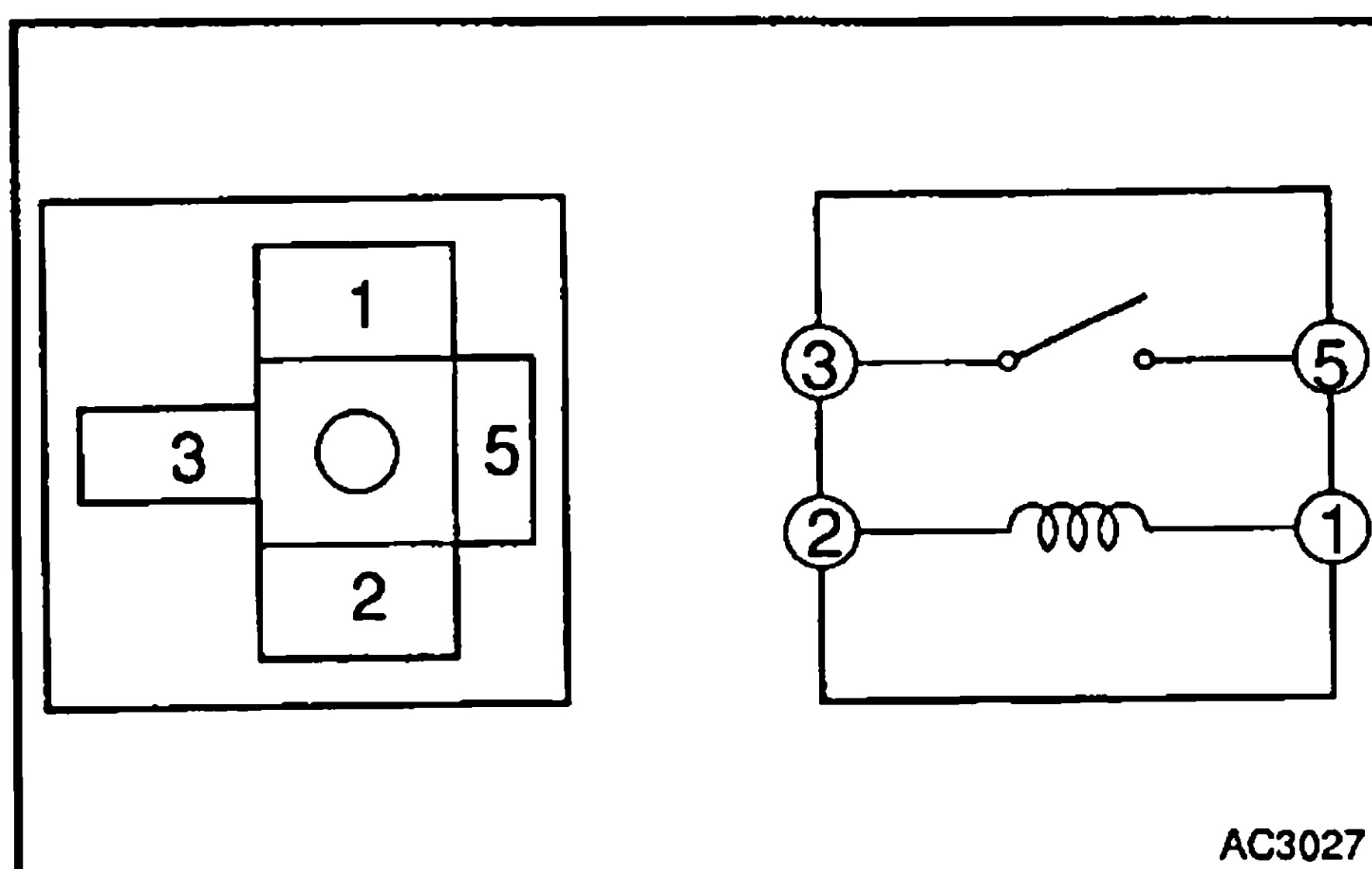
A/C switch	Voltage
ON	Below 1 V
OFF	10 - 14 V

NG

Go to step 5.

OK

- 2 Check magnetic clutch relay.**



PREPARATION:

Remove magnetic clutch relay from R/B No.5.

CHECK:

Check continuity between each pair of terminals shown below of magnetic clutch relay.

OK:

Tester connection	Specified condition
1 - 2	62.5 - 90.9 Ω
3 - 5	No continuity

PREPARATION:

Apply battery positive (+) voltage between terminals 1 and 2.

CHECK:

Check continuity between terminals 3 and 5.

OK:

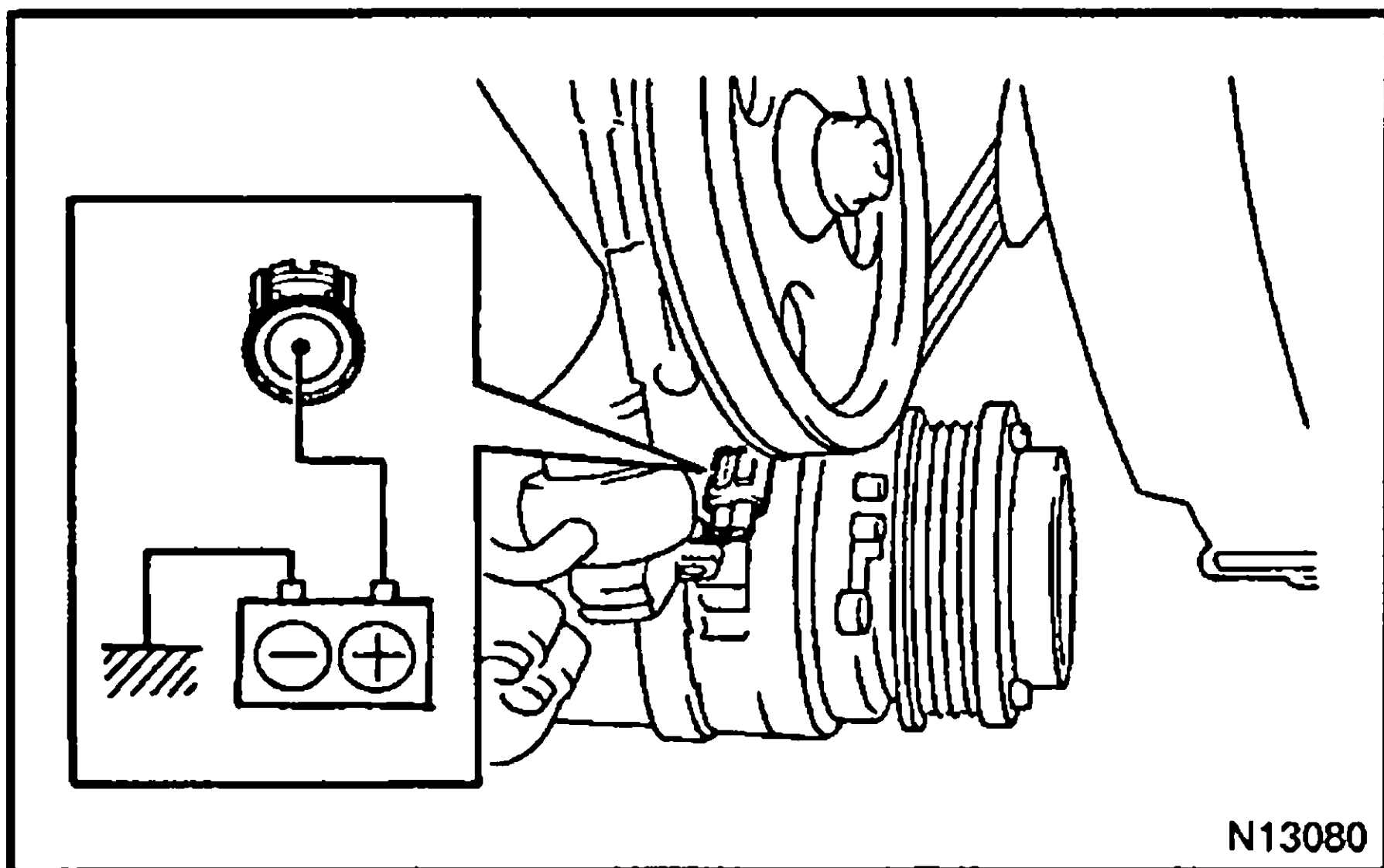
Continuity exists.

NG

Replace magnetic clutch relay.

OK

3 Check A/C magnetic clutch.



PREPARATION:

Disconnect magnetic clutch connector.

CHECK:

Connect positive (+) lead connected to battery to magnetic clutch connector terminal 1 and negative lead to the body ground.

OK:

Magnetic clutch is energized.

NG

Repair A/C magnetic clutch.

OK

4 Check harness and connector between magnetic clutch relay and A/C compressor, A/C compressor and body ground (See page IN-33).

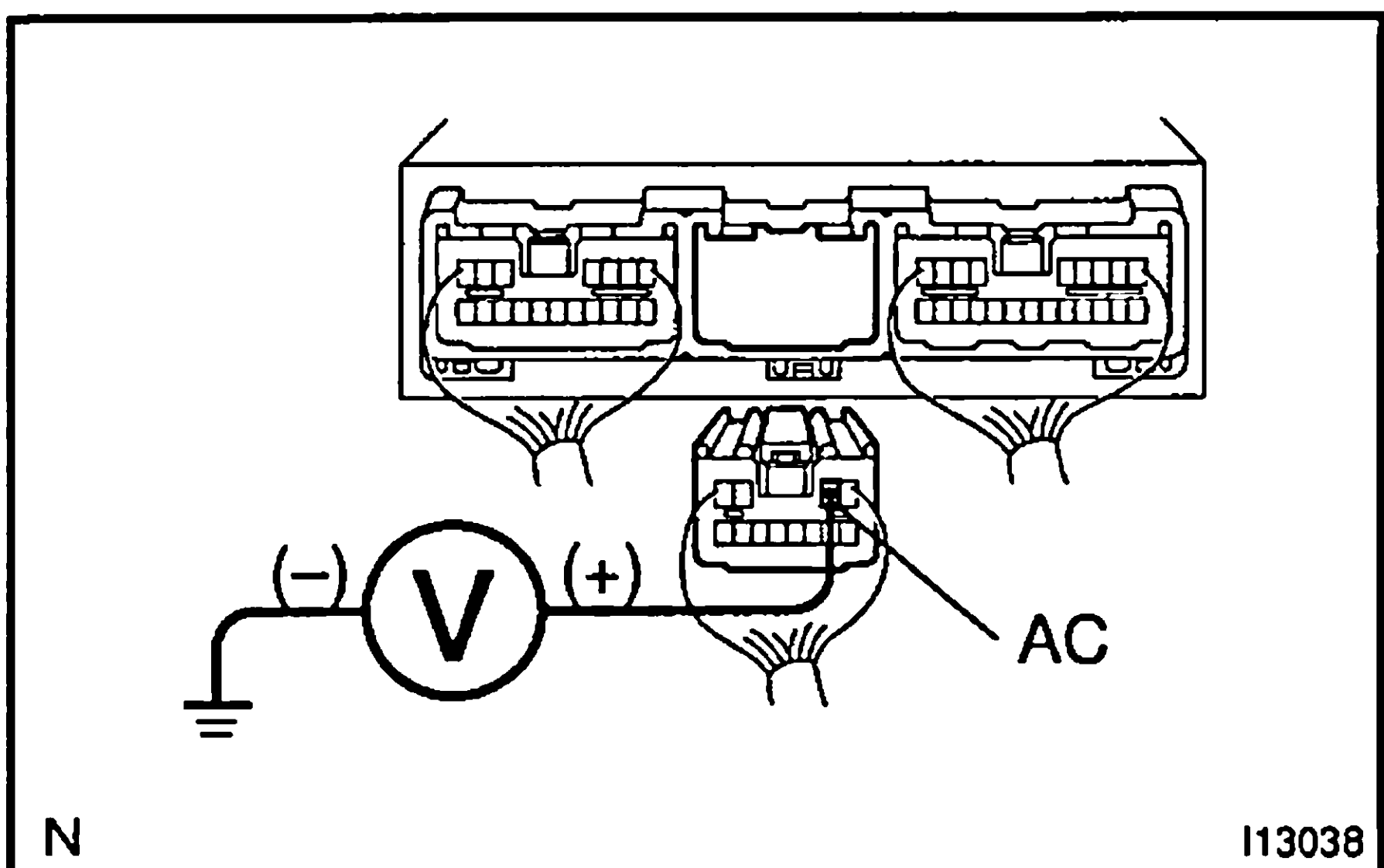
NG

Repair or replace harness or connector.

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI-45).

5 Check voltage between terminal AC of A/C amplifier connector side and body ground.



PREPARATION:

(a) Disconnect A/C control connector.

(b) Turn ignition switch to ON.

CHECK:

Check voltage between terminal AC of A/C amplifier harness side connector.

OK:

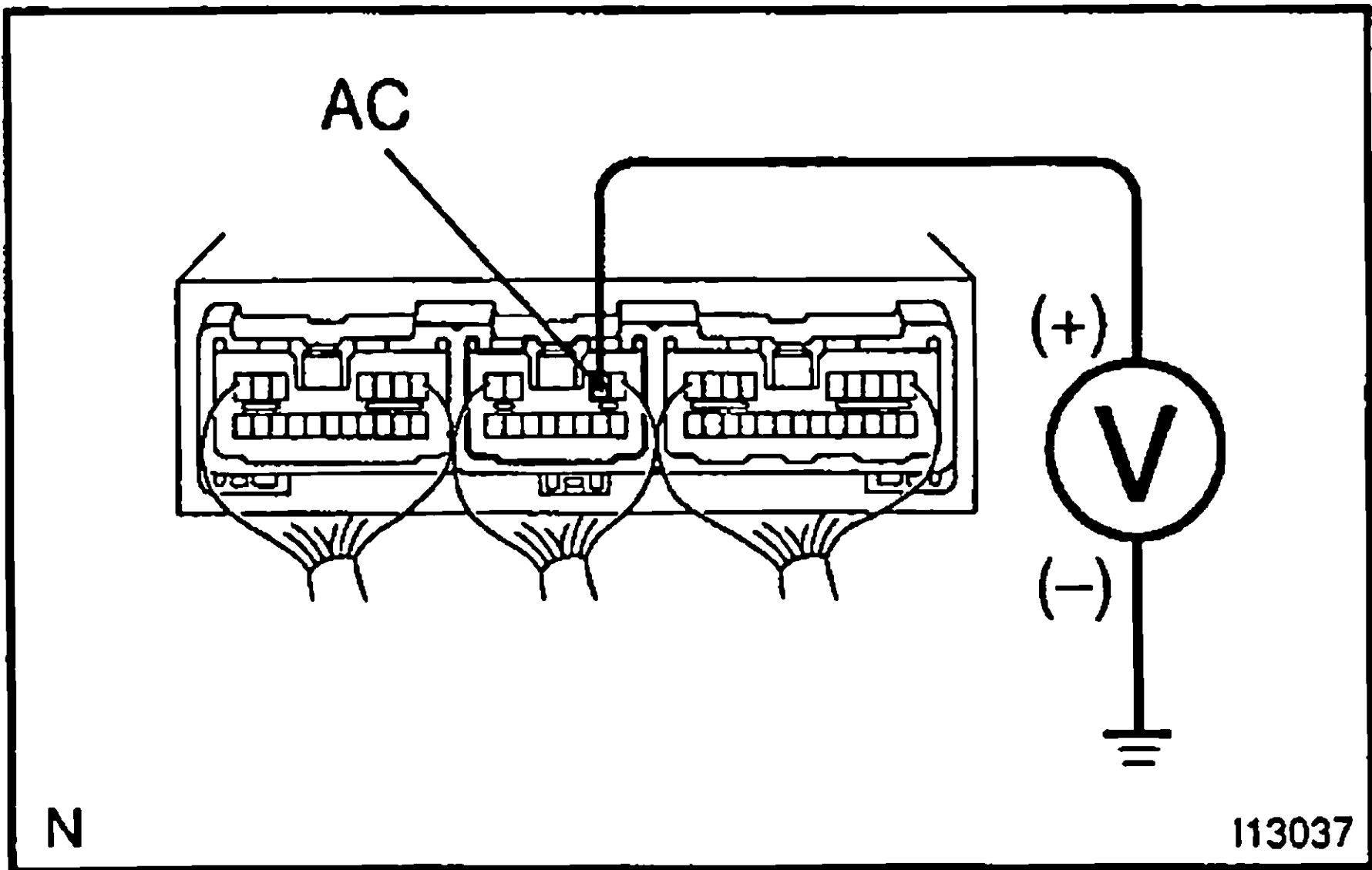
Voltage : 10 – 14 V

NG

Check and replace engine (and ECT) ECU.

OK

6 Check voltage between terminal AC of A/C control amplifier connector and body ground.



PREPARATION:

- (a) Remove A/C control assembly with connector still connected.
- (b) Start the engine and push AUTO switch.

CHECK:

Check the voltage between terminal AC of A/C amplifier connector and body ground when magnetic clutch is ON and OFF by A/C switch.

OK:

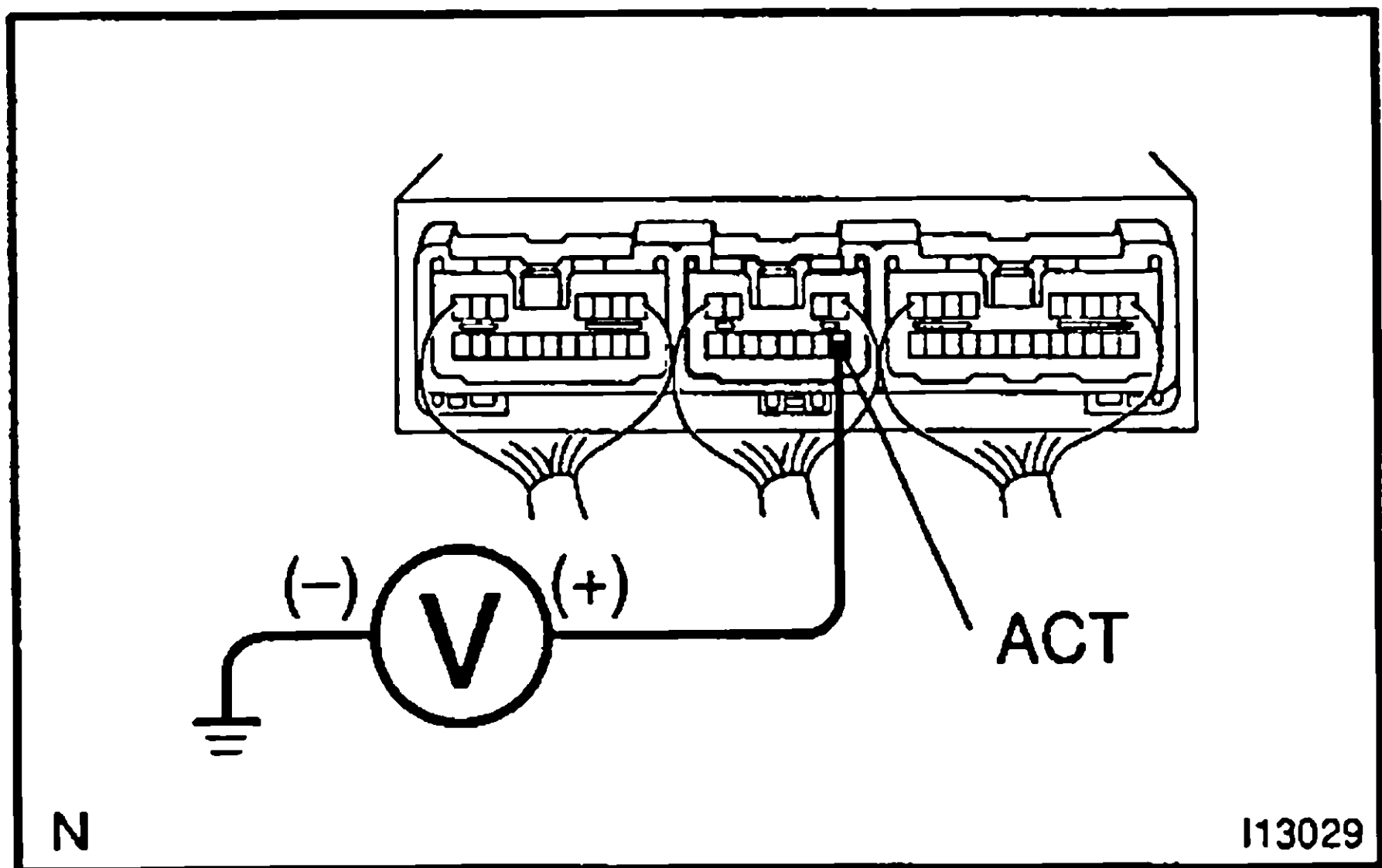
Magnetic clutch	Voltage
ON	Below 1 V
OFF	10 – 14 V

NG

Check and replace A/C amplifier.

OK

7 Check voltage between terminal ACT of A/C amplifier and body ground.



PREPARATION:

- (a) Remove A/C control assembly with connectors still connected.
- (b) Start the engine and push AUTO switch.

CHECK:

Check the voltage between terminal ACT of A/C amplifier and body ground.

OK:

A/C switch	Voltage
ON	10 – 14 V
OFF	Below 1.5 V

NG

Check and replace engine (and ECT) ECU.

OK

8	Check voltage between terminal ACT of engine (and ECT) ECU connector and body ground (See page IN-33).
---	--

NG

Check and replace engine (and ECT) ECU.

OK

9	Check harness and connector between A/C control assembly and engine (and ECT) ECU (See page IN-33).
---	---

NG

Repair or replace harness or connector.

OK

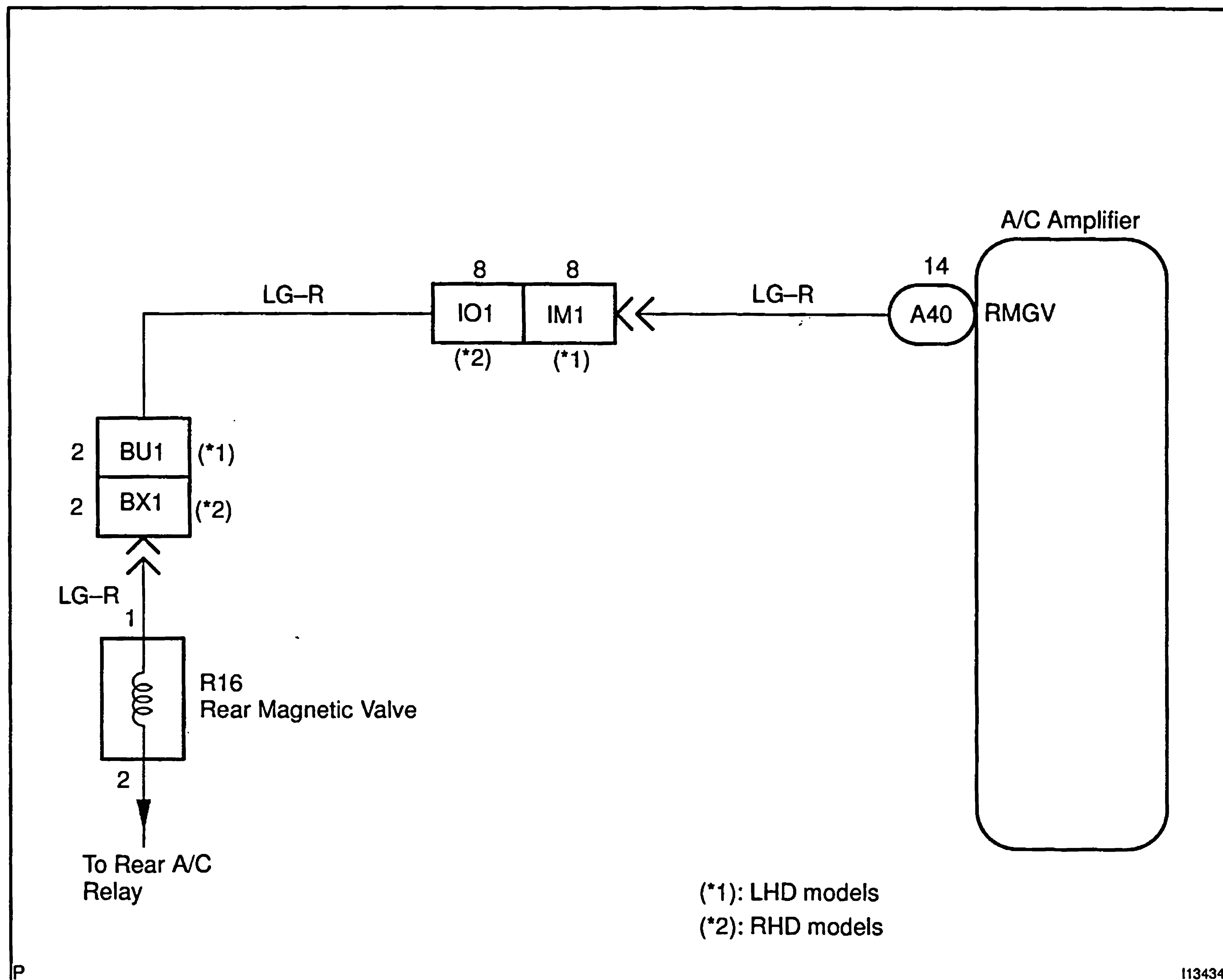
Proceed to next circuit inspection shown on problem symptoms table (See page DI-45).

Rear Magnetic Valve Circuit

CIRCUIT DESCRIPTION

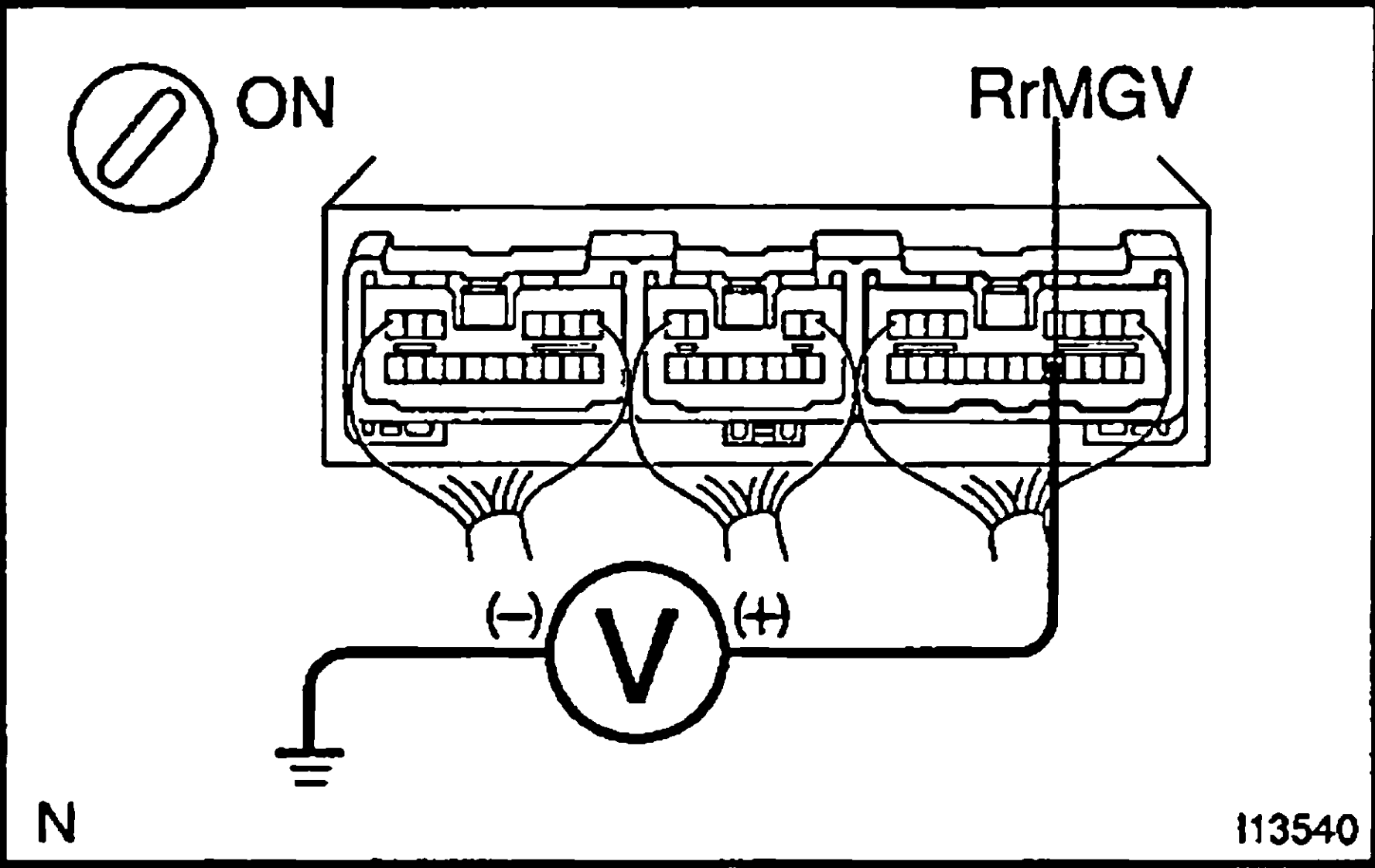
The rear magnetic valve is controlled by A/C amplifier and rear A/C switch operation.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminals RMGV of A/C amplifier and body ground.
---	--



PREPARATION:

Remove the rear A/C amplifier with still connected.

CHECK:

- (a) Turn ignition switch to ON.
- (b) Push in rear A/C switch.
- (c) Set rear temperature control to "MAX. COOL".
- (d) Measure voltage between terminals RMGV of A/C amplifier and body ground.

OK:

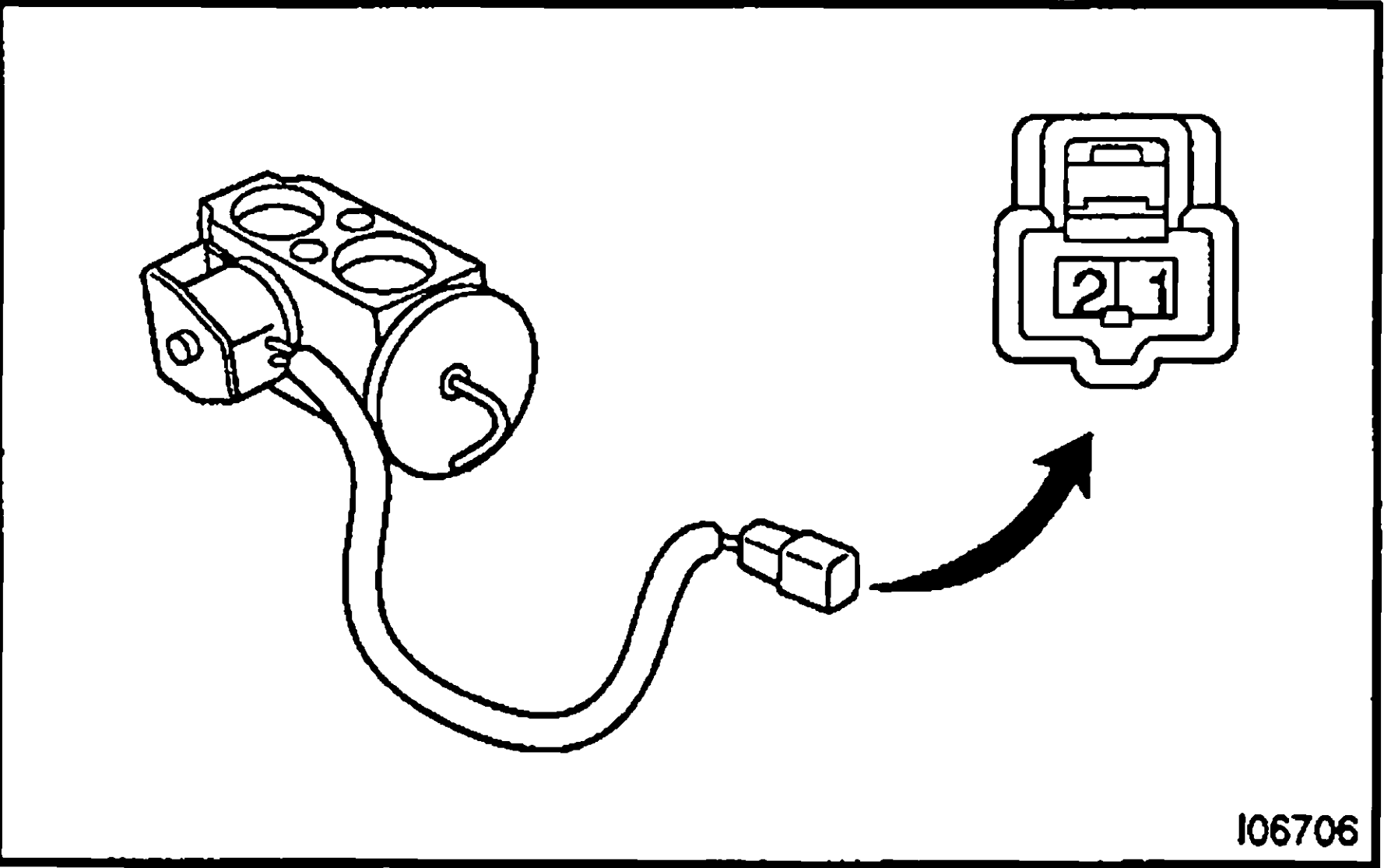
Voltage: Below 1.0 V

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI-45).

NG

2	Check magnetic valve.
---	-----------------------



PREPARATION:

Remove the magnetic valve (See Pub. No. RM702E on page AC-3).

CHECK:

Check the air passage through the valve with and without the battery positive voltage applied between terminals as shown in the chart.

OK:

Condition	Air passage
Apply B+ between terminals	Free passage
Not apply B+ between terminals	No passage

NG

Replace rear magnetic valve.

OK

3	Check harness and connector between rear magnetic valve and A/C amplifier (See page IN-33).
---	--

NG

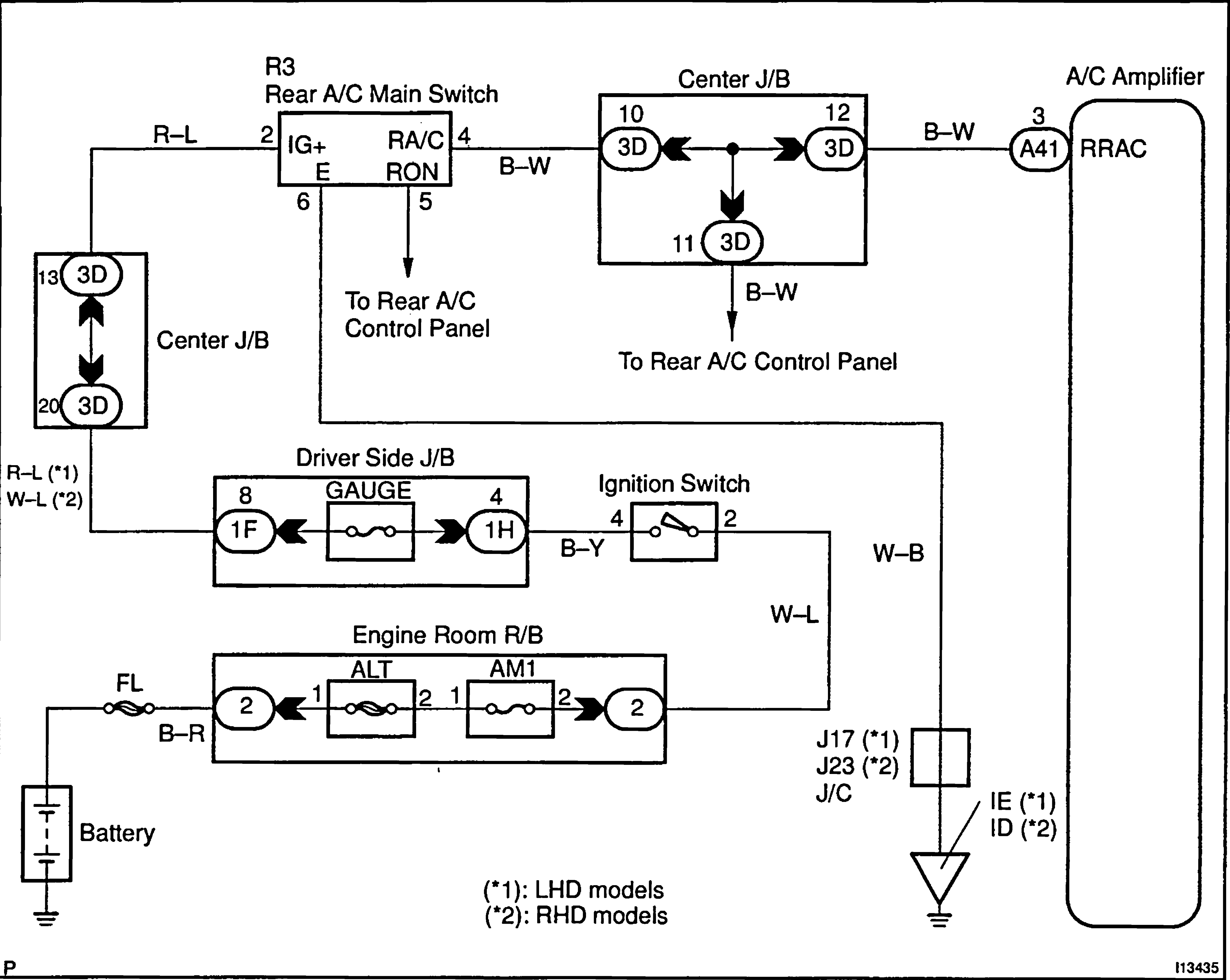
Repair or replace harness or connector.

OK

Repair or replace A/C control assembly.

Rear A/C Main Switch Circuit

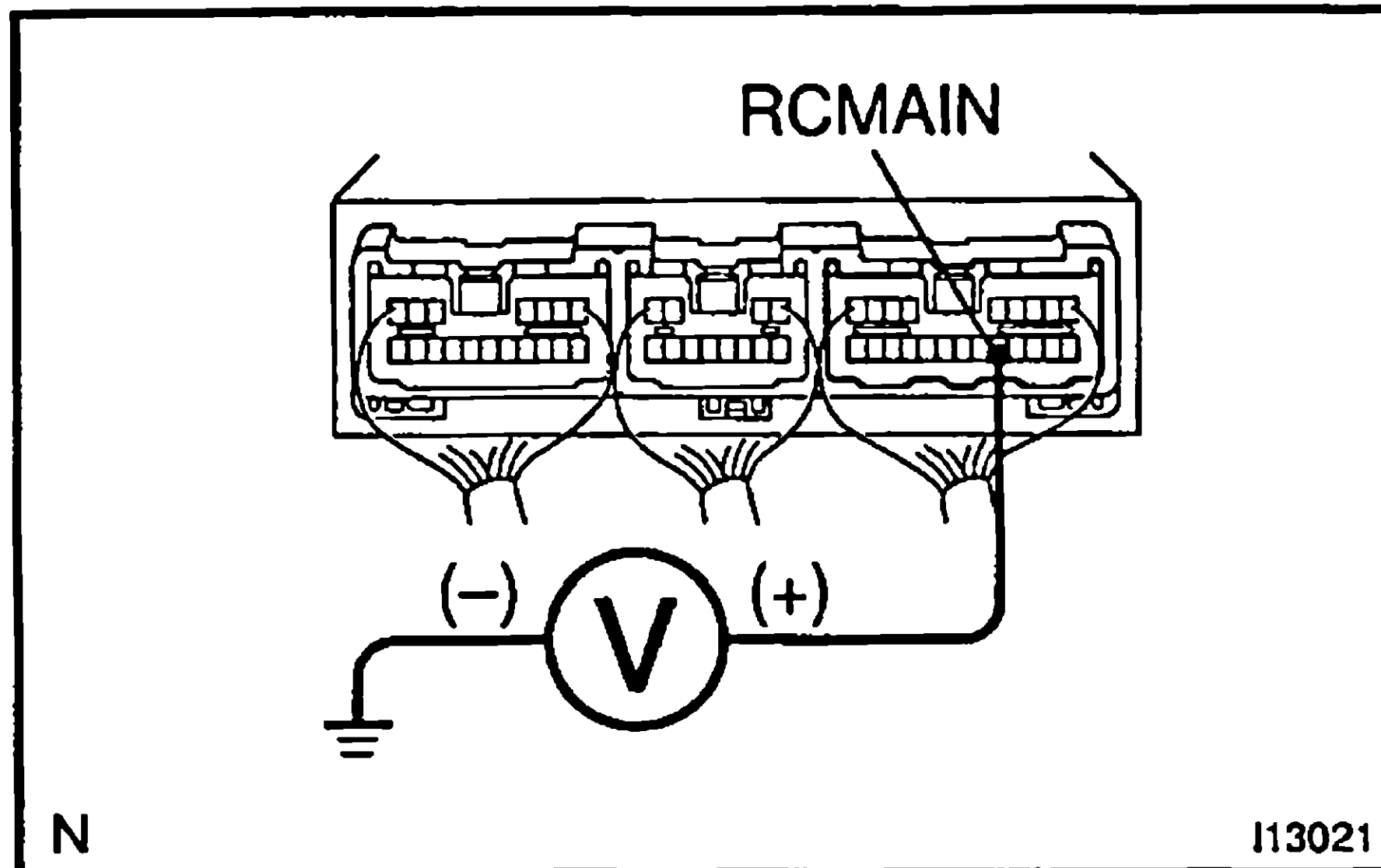
WIRING DIAGRAM



INSPECTION PROCEDURE

1

Check voltage between terminals RCMAN of A/C amplifier and body ground.

**PREPARATION:**

Remove A/C control assembly with connectors still connected.

CHECK:

- (a) Turn ignition switch to ON.
- (b) Measure voltage between terminal RCMAN of A/C amplifier and body ground.

OK:

Rear A/C main switch	Voltage
ON	Below 1.0 V
OFF	10 – 14 V

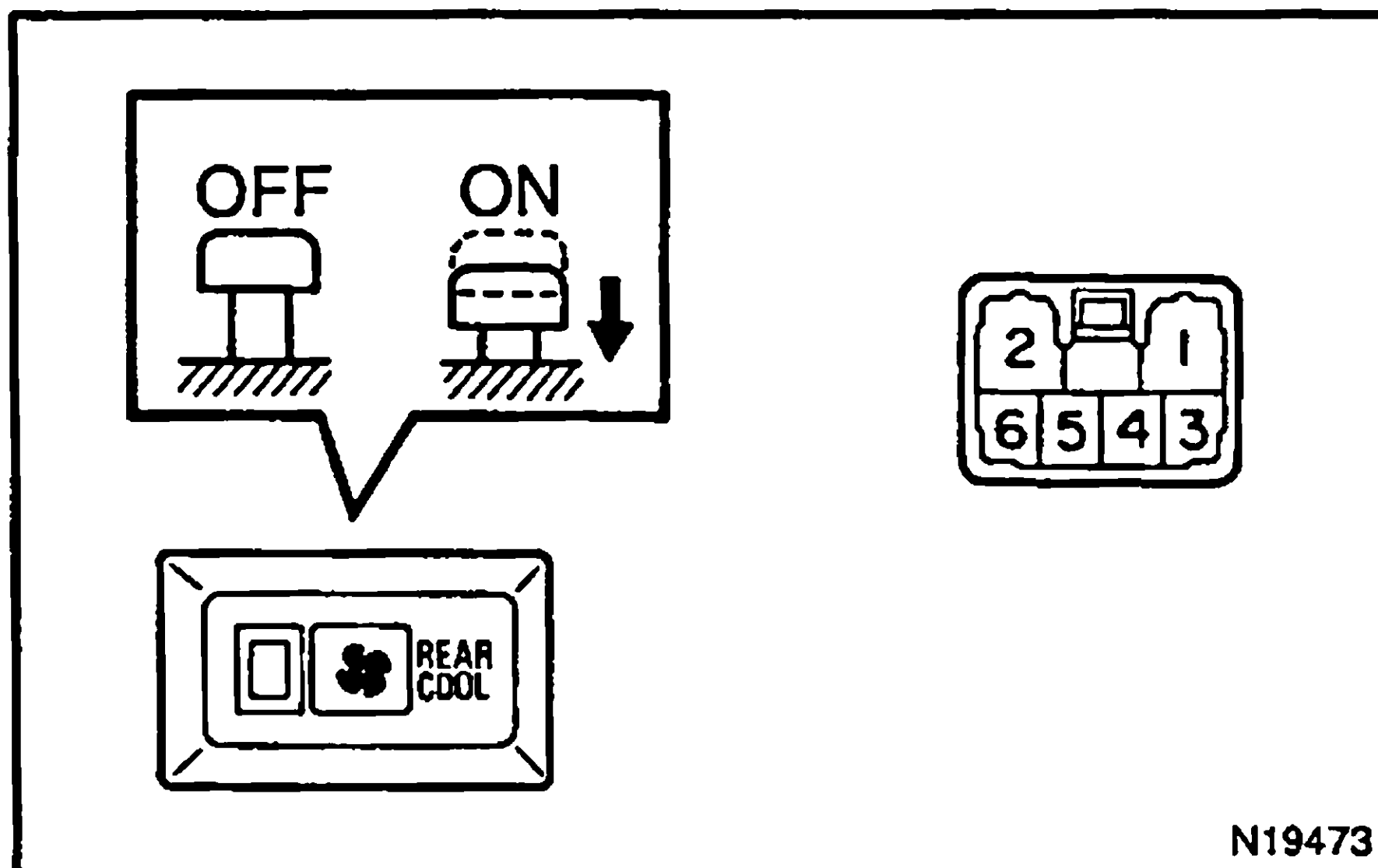
OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI-45).

NG

2

Check rear A/C main switch.

**PREPARATION:**

Remove rear A/C main switch.

CHECK:

Check continuity between terminals of rear A/C main switch when switch operation as shown in the chart.

OK:

Switch position	Tester connection	Specified condition
OFF	10 – 11	Continuity
ON	8 – 11	Continuity

NG

Replace rear A/C main switch.

OK

3	Check harness and connector between A/C amplifier and rear A/C main switch (See page IN-33).
---	---

NG

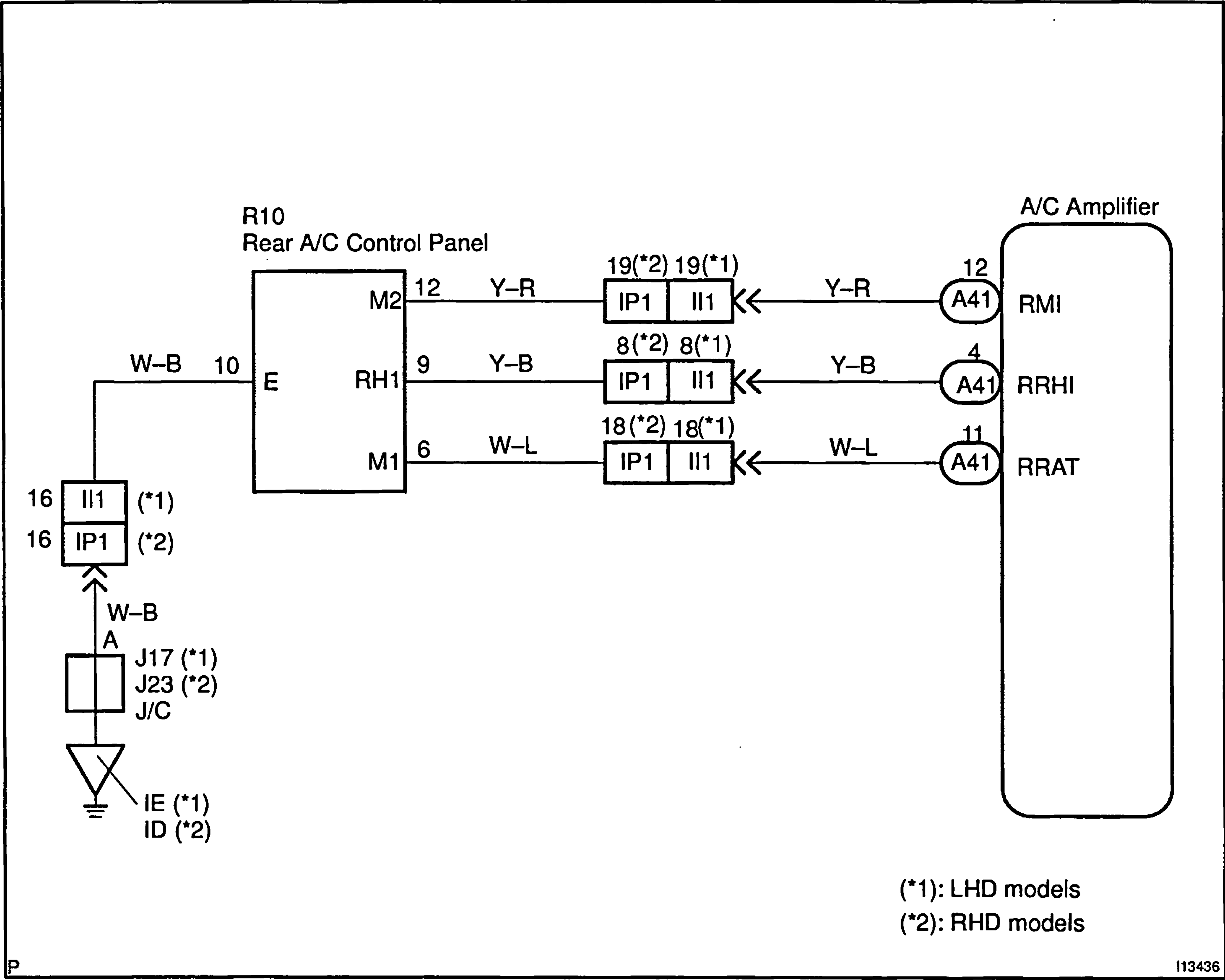
Repair or replace harness or connector.

OK

Check and replace A/C amplifier.
(See page IN-33)

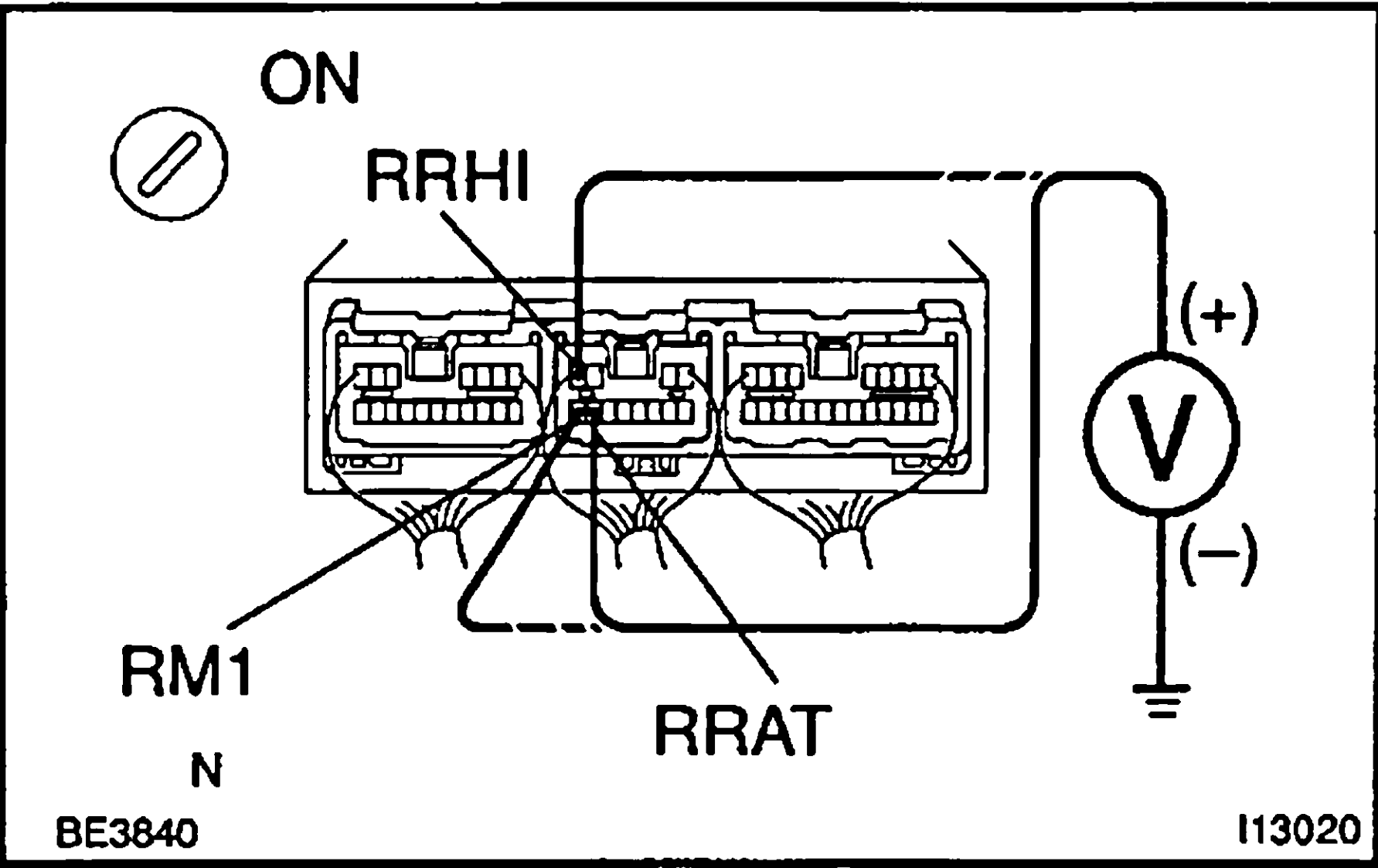
Rear A/C Control Panel Circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminals RRHI, RM1, RRAT of A/C amplifier and body ground.
---	---



PREPARATION:

Remove A/C control assembly with connectors with still connected.

CHECK:

- (a) Turn ignition switch to ON.
- (b) Push in rear A/C main switch.
- (c) Measure voltage between terminals RRHI, RM1 and RRAT of A/C amplifier and body ground when the rear A/C blower switch is operated to following positions.

OK:

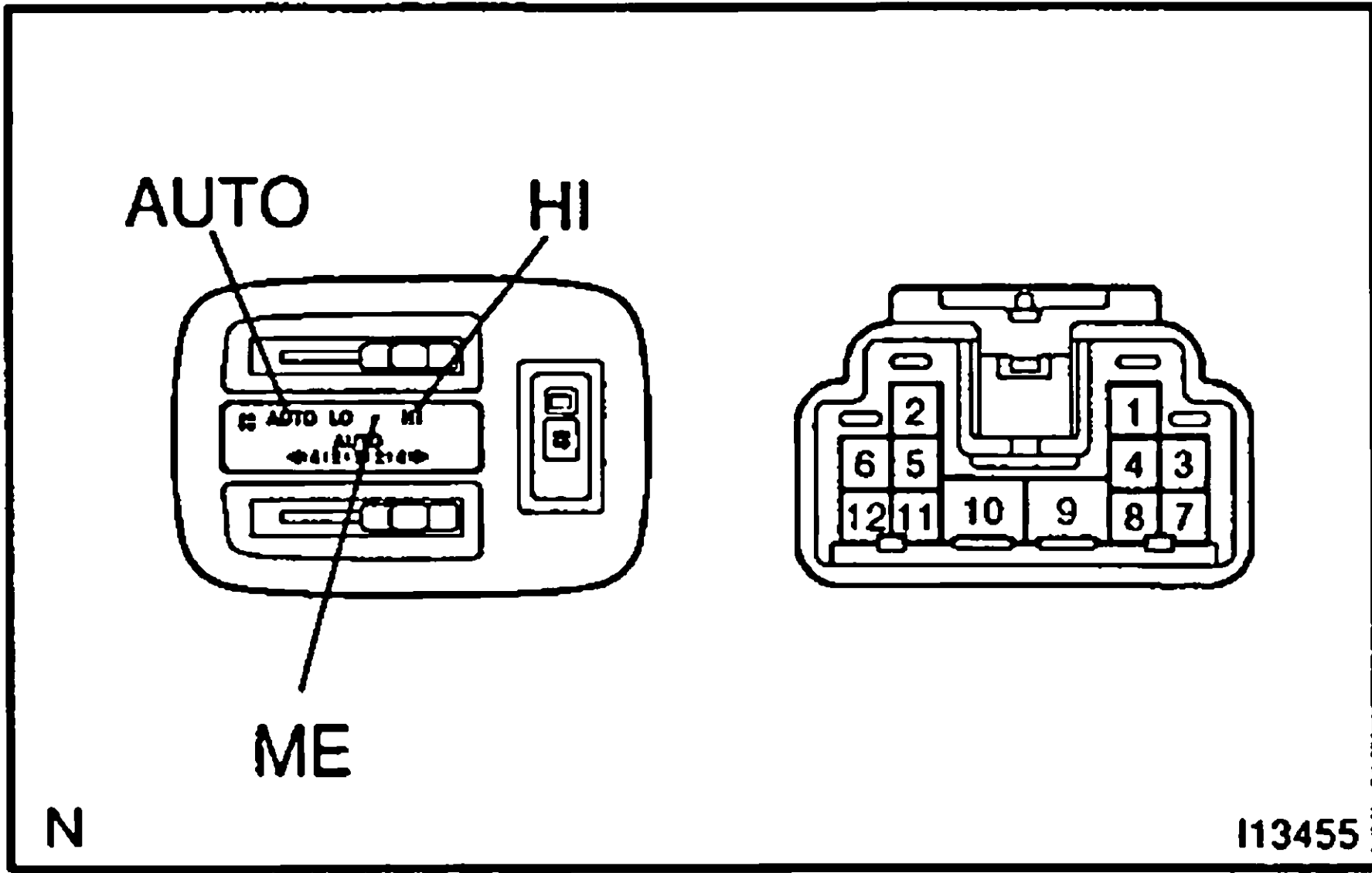
Position	RRAT–Body ground	RM1–Body ground	RRHI–Body ground
Auto	Below 1.0 V	10 – 14V	10 – 14 V
ME	10 – 14 V	Below 1.0 V	10 – 14 V
HI	10 – 14V	10 – 14 V	Below 1.0 V

OK	Proceed to next circuit inspection shown on problem symptoms table (See page DI-45).
----	--

NG

2

Check rear A/C control panel.



PREPARATION:

Remove rear A/C control panel.

CHECK:

Check continuity between terminals of rear A/C control panel when switch is operated as shown in the chart.

OK:

Switch position	Tester connection	Specified condition
AUTO	6 – 10	Continuity
ME	10 – 12	Continuity
HI	9 – 10	Continuity

NG

Replace rear A/C control panel.

OK

3

Check harness and connector between A/C amplifier and rear A/C control panel
(See page IN-33).

NG

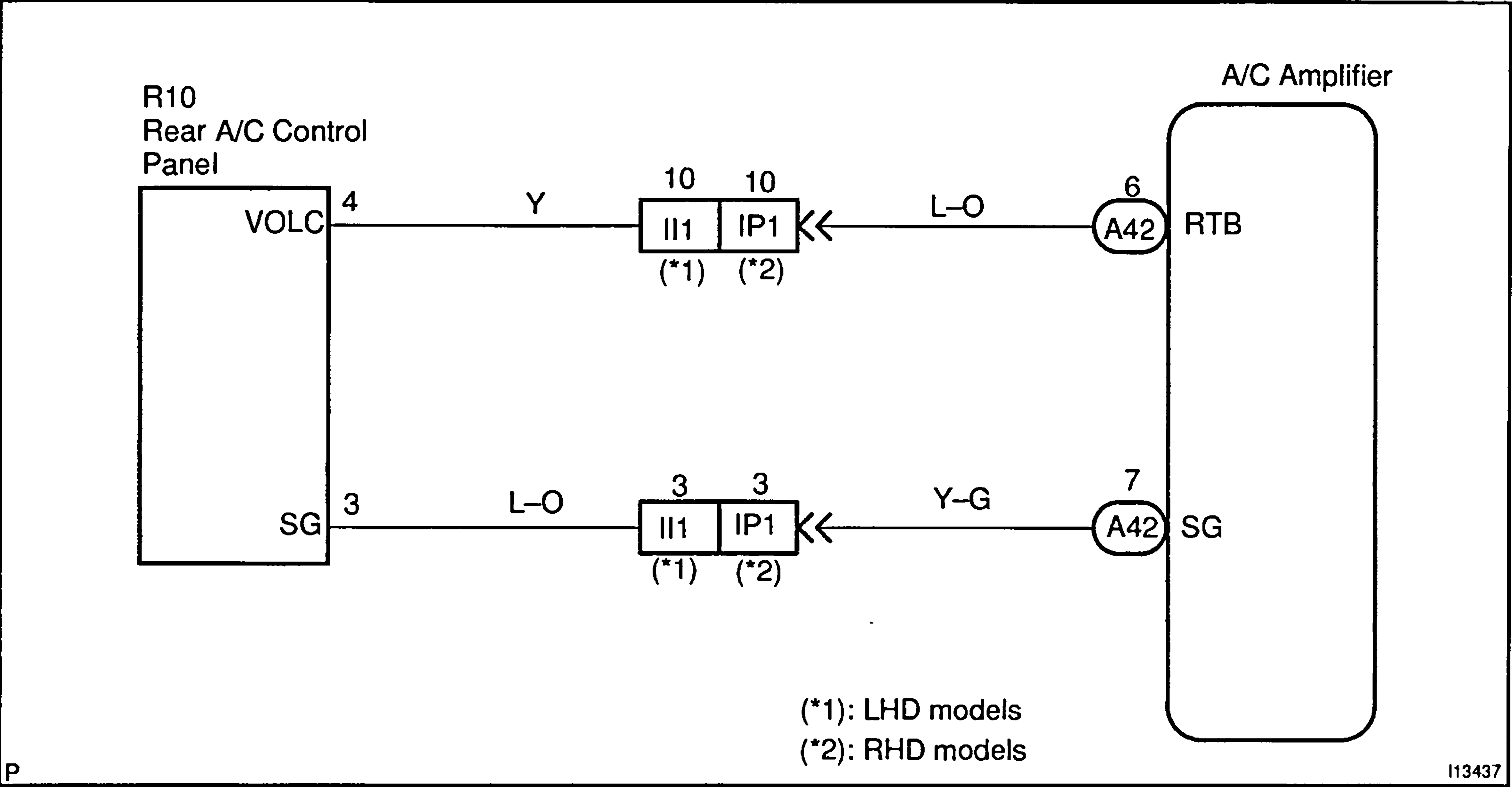
Repair or replace harness or connector.

OK

Check and replace A/C amplifier
(See page IN-33).

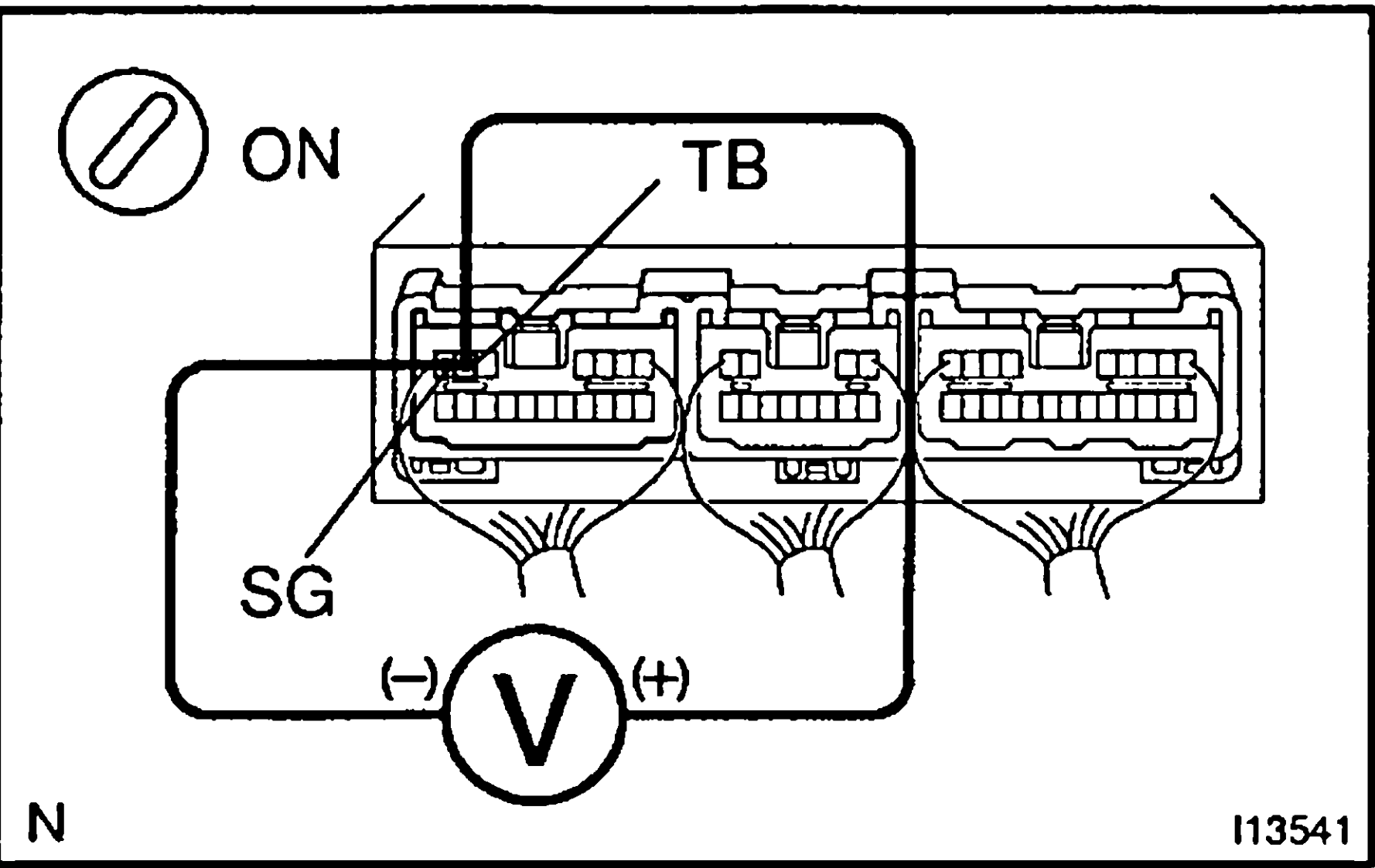
Rear A/C Temperature Set Lever Circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

- 1
- Check voltage between terminals TB and SG of A/C amplifier.



- PREPARATION:**
Remove A/C control assembly with connectors with still connected.
- CHECK:**
- (a) Turn ignition switch to ON.
- (b) Measure voltage between terminals TB and SG of A/C amplifier when operate rear A/C temperature set lever as shown in the chart.

OK:

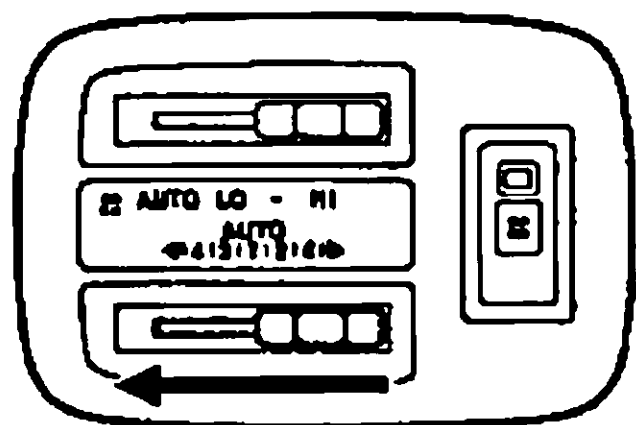
Lever Position	Voltage
MAX. COOL	Approx. 0.8 V
MAX. HOT	Approx. 2.2 V

OK

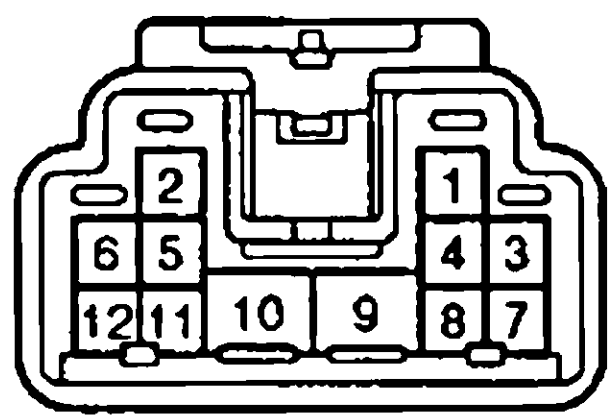
Proceed to next circuit inspection shown on problem symptoms table (See page IN-33).

NG

2 Check rear A/C temperature set lever.



TO COOL Side



N

I13456

PREPARATION:

Remove rear A/C control panel.

CHECK:

Measure resistance between terminals 3 and 4 when operate the lever, as shown in the chart.

OK:

MAX. COOL: 0 Ω

MAX. HOT: 2.4 – 3.6 k Ω

NG

Replace rear A/C control panel.

OK

3 Check harness and connector between A/C amplifier and rear A/C control panel (See page IN-33).

NG

Repair or replace harness or connector.

OK

Check and replace A/C amplifier
(See page IN-33).

MANUAL TRANSMISSION (R150F, R151F)

MANUAL TRANSMISSION UNIT	MT-1
OUTPUT SHAFT	MT-6

REFER TO LAND CRUISER/LAND CRUISER PRADO RE-PAIR MANUAL FOR CHASSIS AND BODY (Pub. No. RM517E)

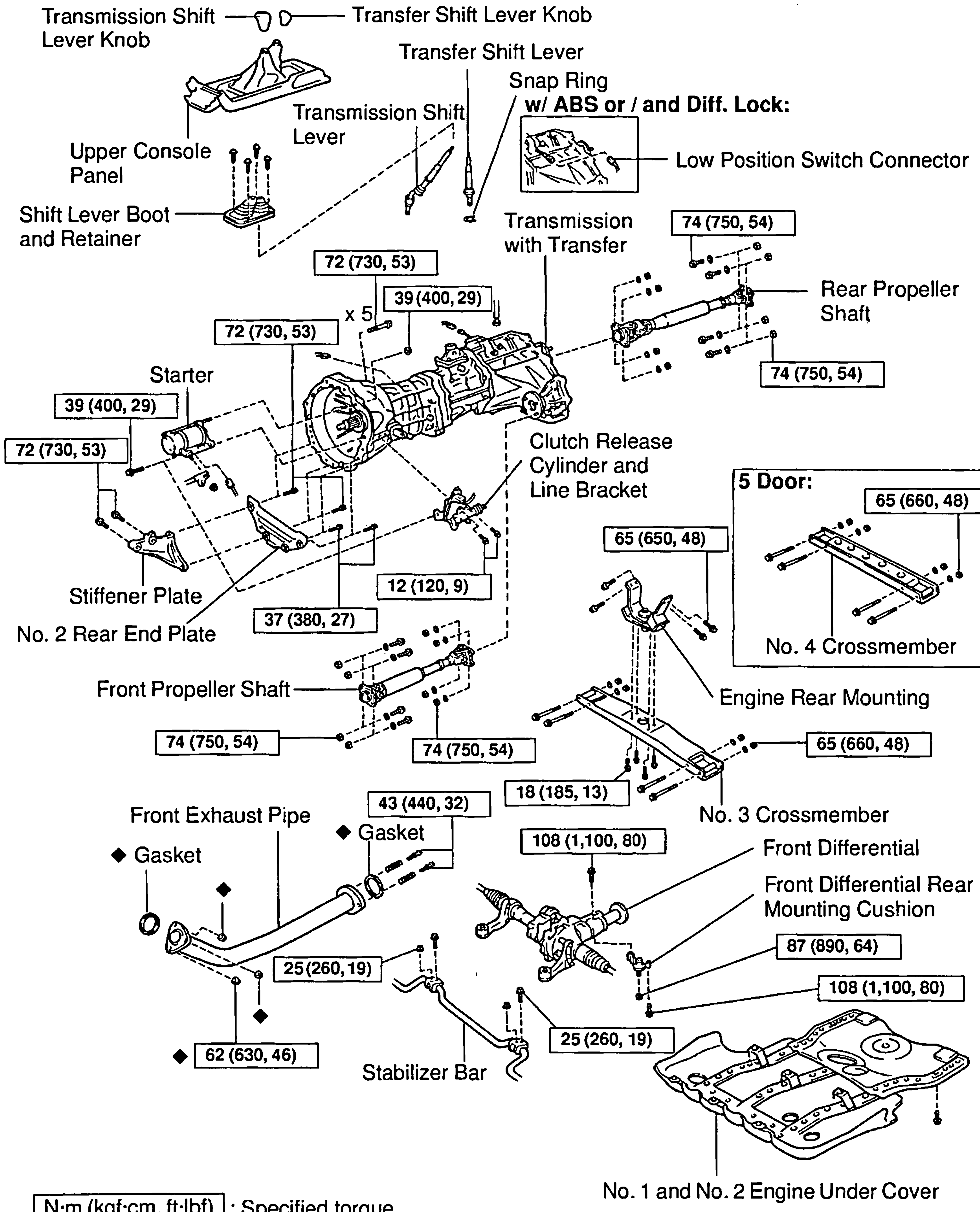
NOTE: The above pages contain only the points which differ from the above listed manual.

MANUAL TRANSMISSION UNIT

COMPONENTS

MT0E7-01

1KD-FTV Engine:

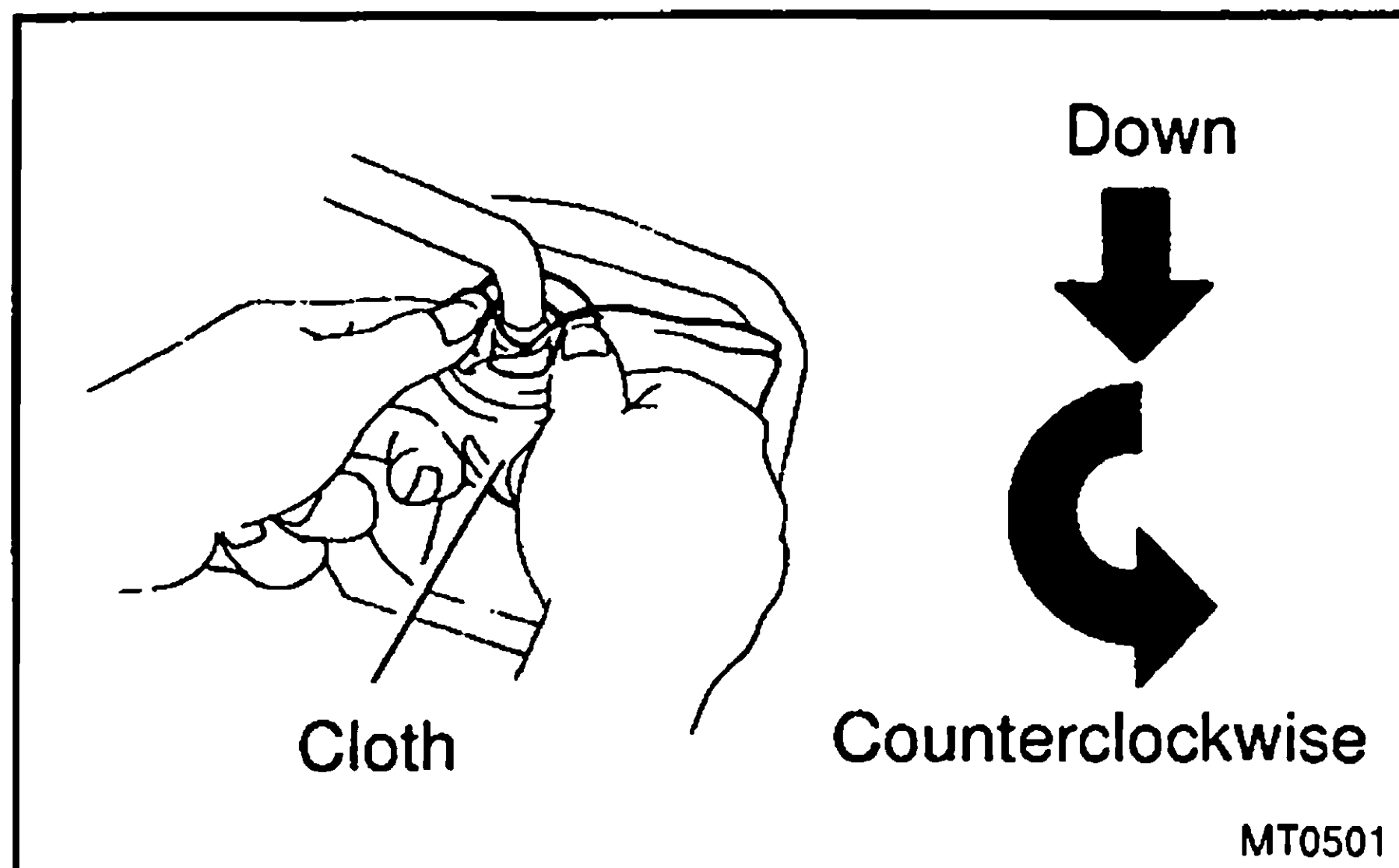


N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

N

D10533



REMOVAL

1. REMOVE TRANSMISSION SHIFT LEVER

- Remove the upper console panel.
- Remove the 4 screws, shift lever boot and retainer.
- Cover the shift lever cap with a cloth.
- Pressing down on the shift lever cap and rotate it counter-clockwise to remove.
- Pull out the shift lever.

HINT:

At the time of installation, please refer to the following item.
Apply MP grease to the tip of the shift lever.

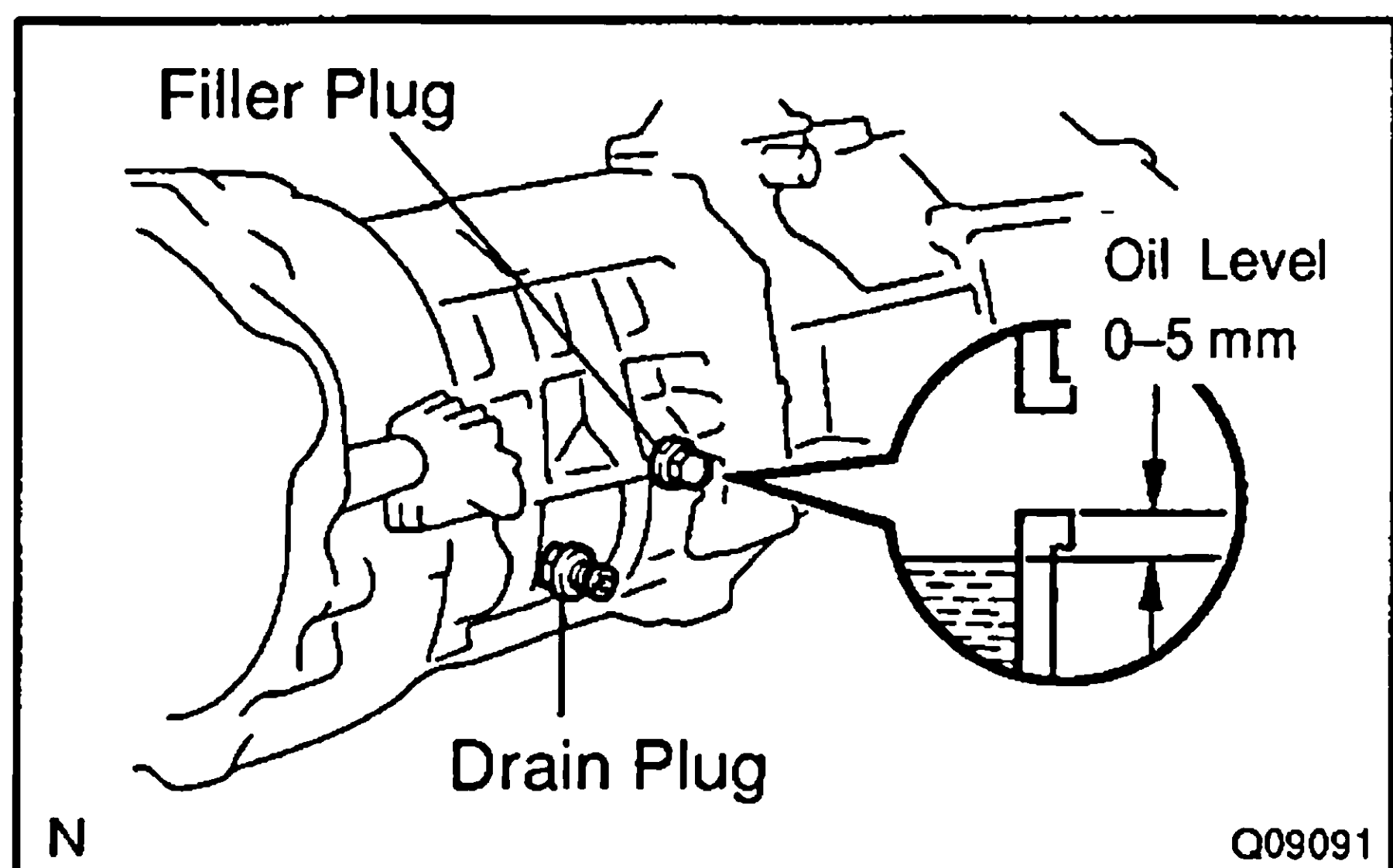
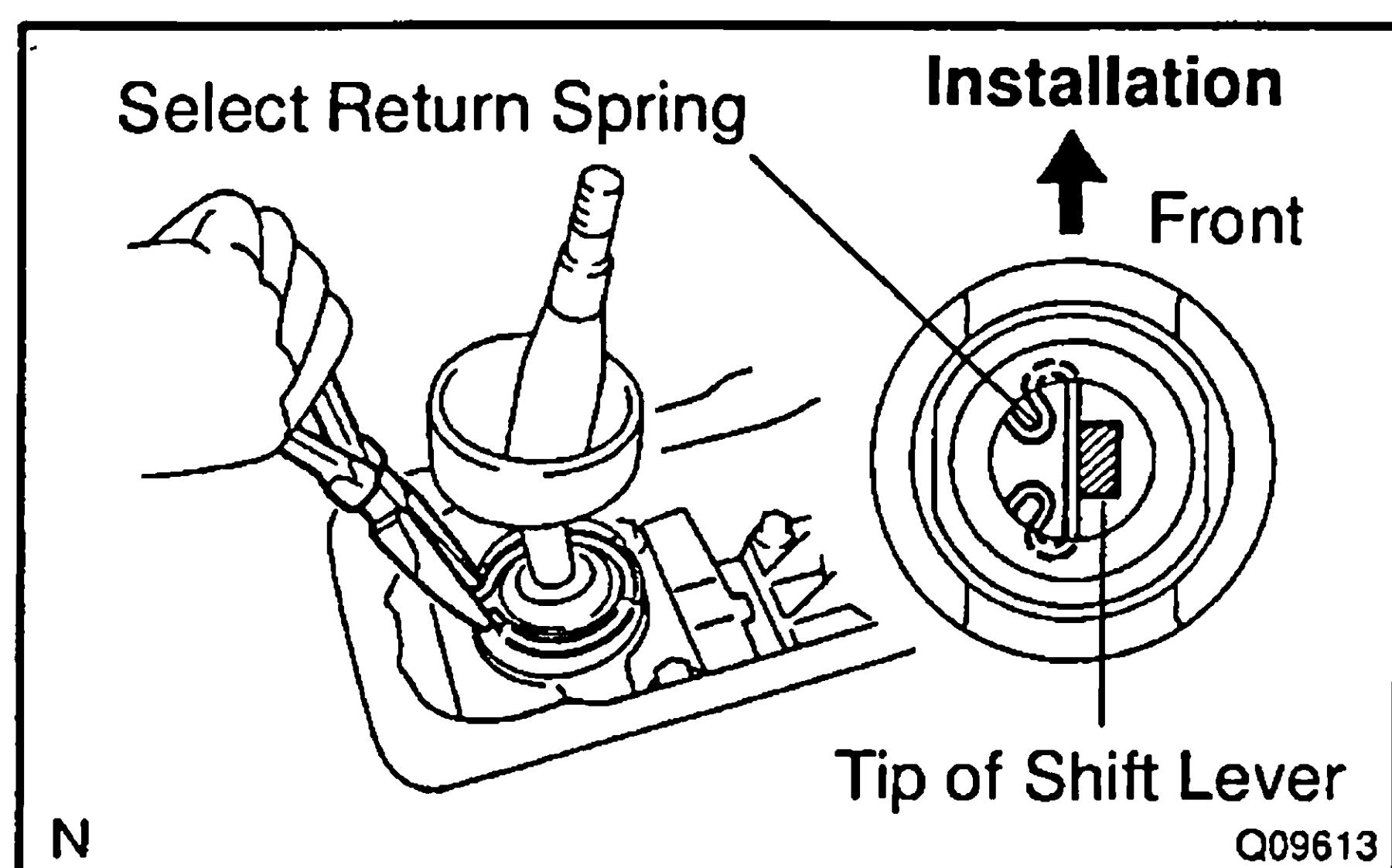
2. REMOVE TRANSFER SHIFT LEVER

Using pliers, remove the snap ring and pull out the shift lever.

HINT:

- Shift the transfer shift lever to the "HL" position.
- At the time of installation, please refer to the following item.

Apply MP grease to the tip of the shift lever.



3. RAISE VEHICLE AND DRAIN TRANSMISSION OIL

Oil grade: API GL-4 or GL-5

Viscosity: SAE 75W-90

Capacity: 2.2 liters (2.3 US qts, 1.9 Imp. qts)

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

4. REMOVE FRONT AND REAR PROPELLER SHAFTS

(See Pub. No. RM517E on page PR-10)

5. REMOVE CLUTCH RELEASE CYLINDER

Remove the 2 bolts and release cylinder.

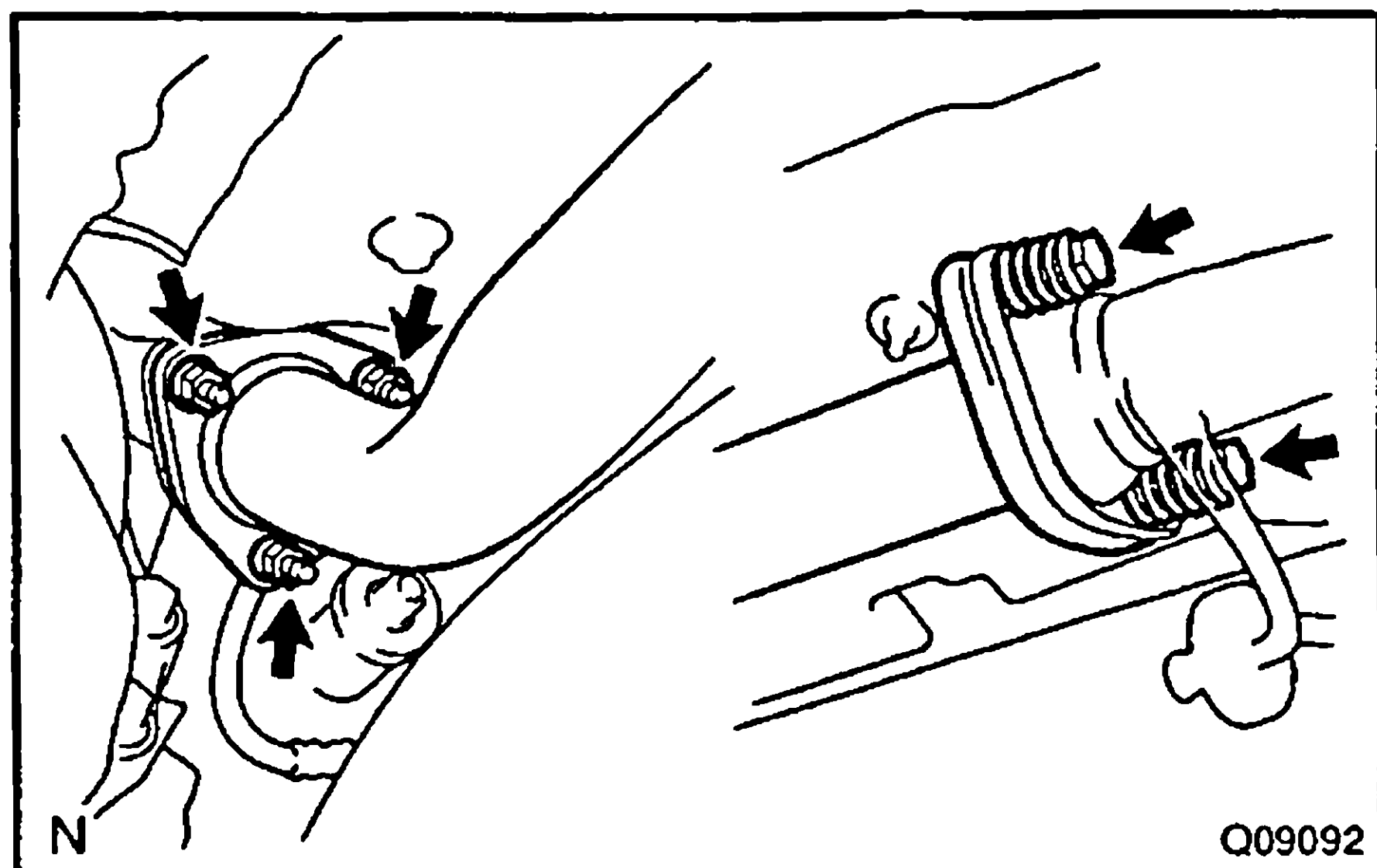
Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)

6. REMOVE NO. 1 AND NO. 2 ENGINE UNDER COVERS

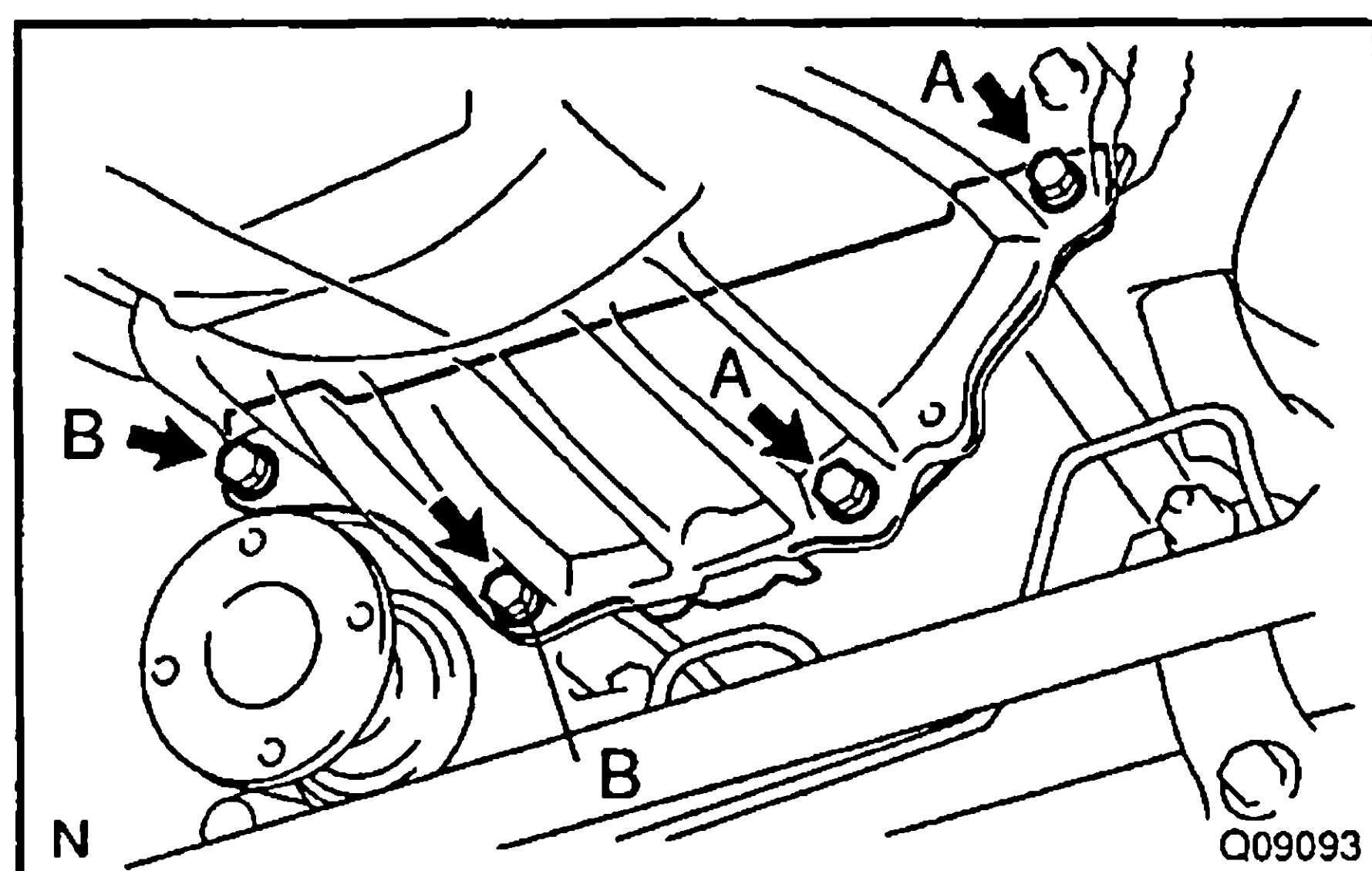
7. REMOVE BACK-UP LIGHT SWITCH, SPEED SENSOR, CENTER DIFF. LOCK POSITION SWITCH CONNECTORS

8. w/ ABS OR/AND DIFF. LOCK:

REMOVE LOW POSITION SWITCH CONNECTOR

**9. REMOVE FRONT EXHAUST PIPE**

- (a) Remove the 3 nuts and gasket from the exhaust manifold.
Torque: 62 N·m (630 kgf·cm, 46 ft·lbf)
- (b) Remove the 2 bolts, springs, gasket and pipe.
Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)

**10. REMOVE NO. 2 REAR END PLATE**

Remove the 4 bolts and No. 2 rear end plate.

Torque:

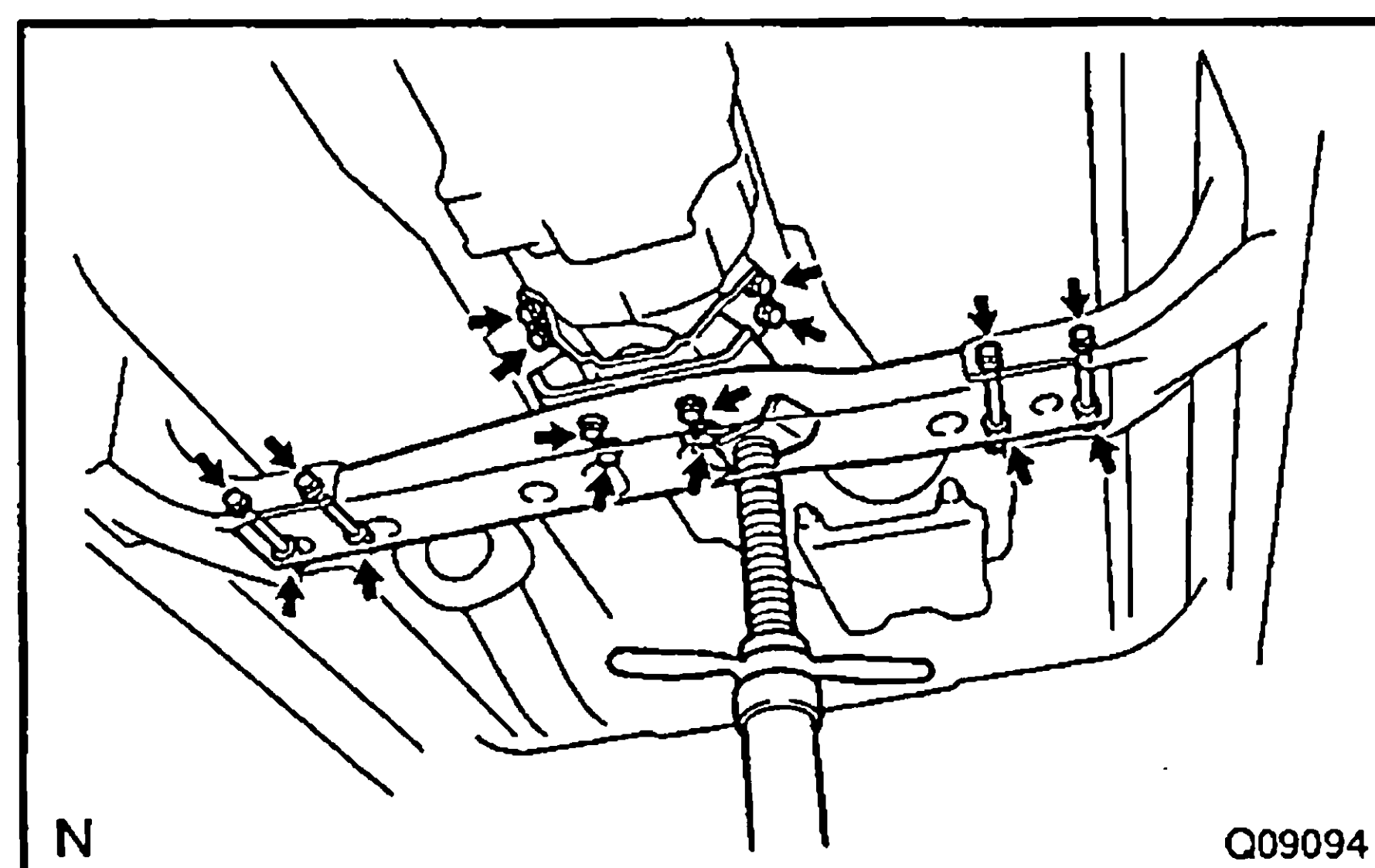
Bolt A: 72 N·m (730 kgf·cm, 53 ft·lbf)

Bolt B: 37 N·m (380 kgf·cm, 27 ft·lbf)

11. REMOVE STIFFENER PLATE

Remove the 2 bolts and stiffener plate.

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

**12. REMOVE NO. 3 CROSSMEMBER**

- (a) Support the transmission rear side.
- (b) Remove the 4 set bolts of the engine rear mounting.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)
- (c) Remove the 4 bolts, nuts and crossmember.
Torque: 65 N·m (660 kgf·cm, 48 ft·lbf)

13. REMOVE ENGINE REAR MOUNTING

Remove the 4 bolts and engine rear mounting from the transmission.

Torque: 65 N·m (650 kgf·cm, 48 ft·lbf)

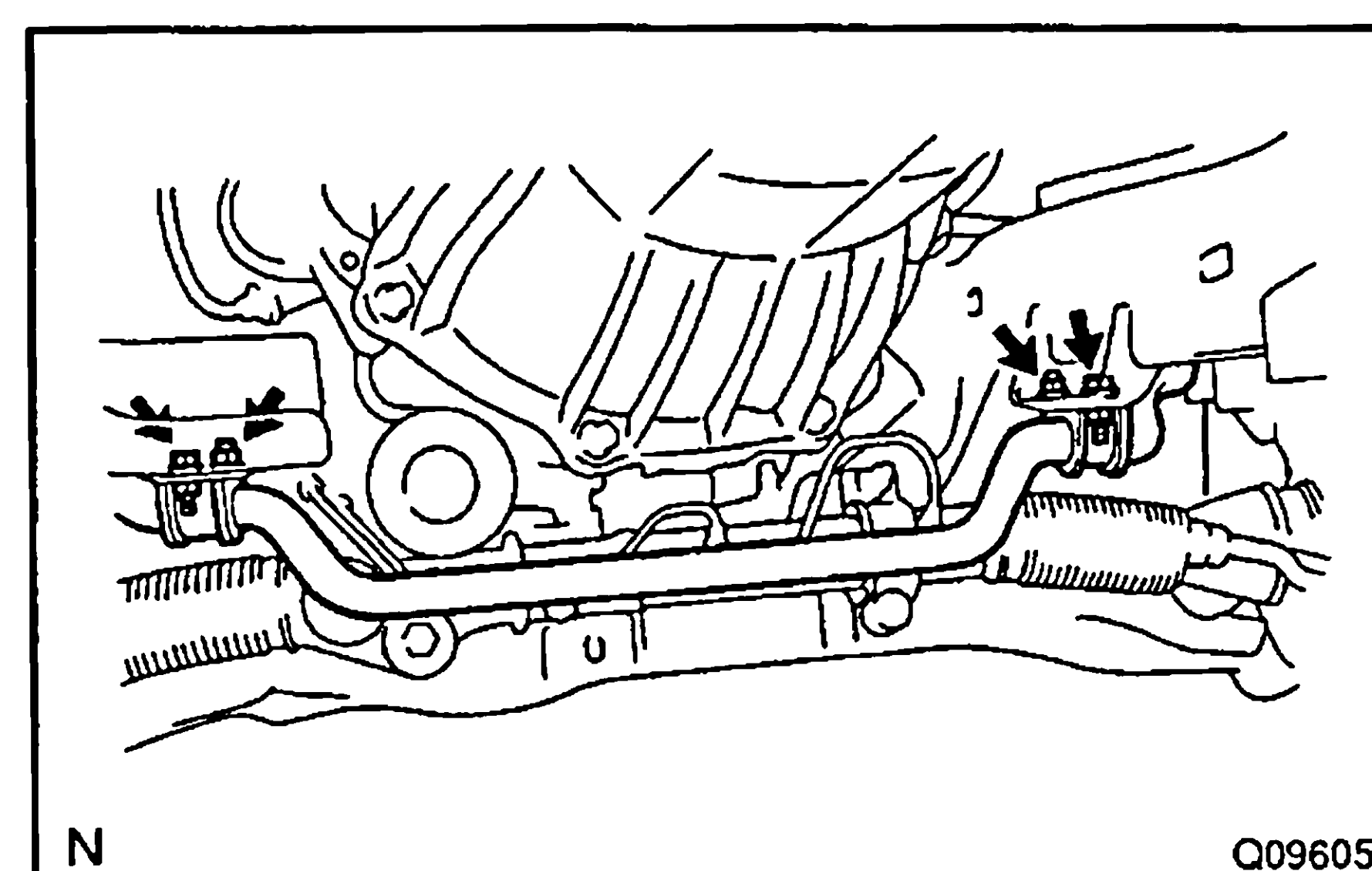
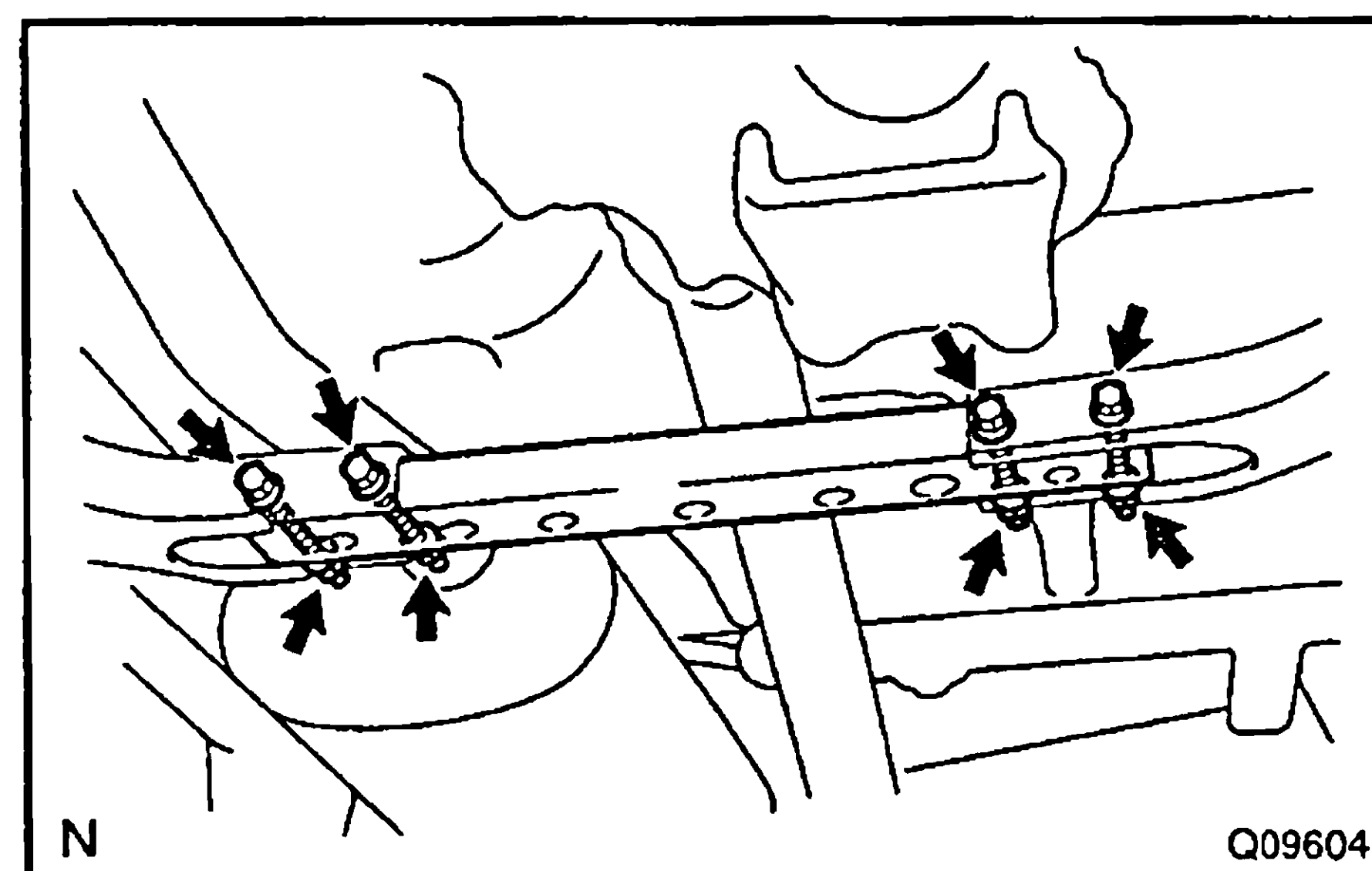
14. 5 Door:**REMOVE NO. 4 CROSSMEMBER**

Remove the 4 bolts, nuts and crossmember.

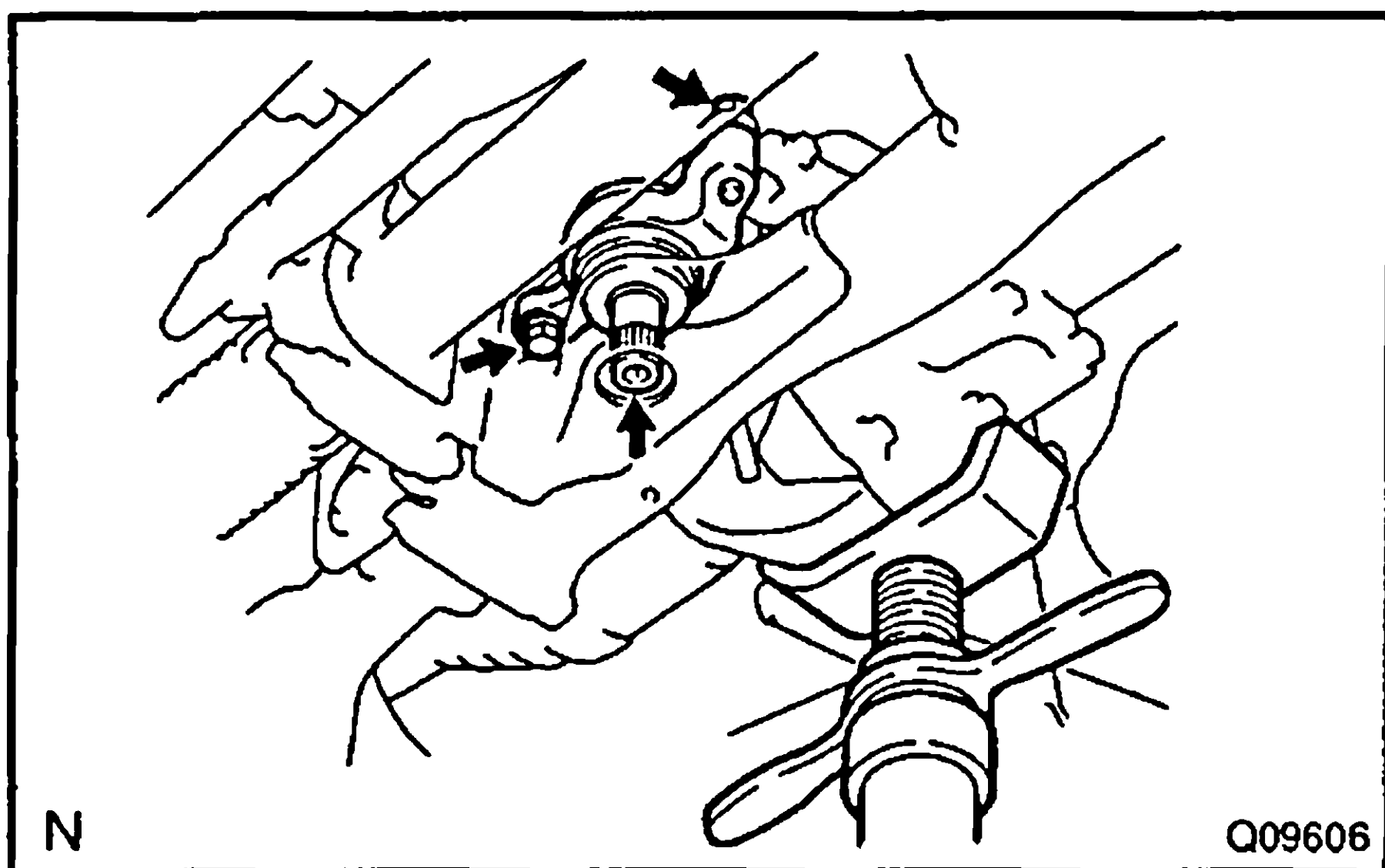
Torque: 65 N·m (660 kgf·cm, 48 ft·lbf)

15. JACK UP TRANSMISSION SLIGHTLY

Using a transmission jack, support the transmission.

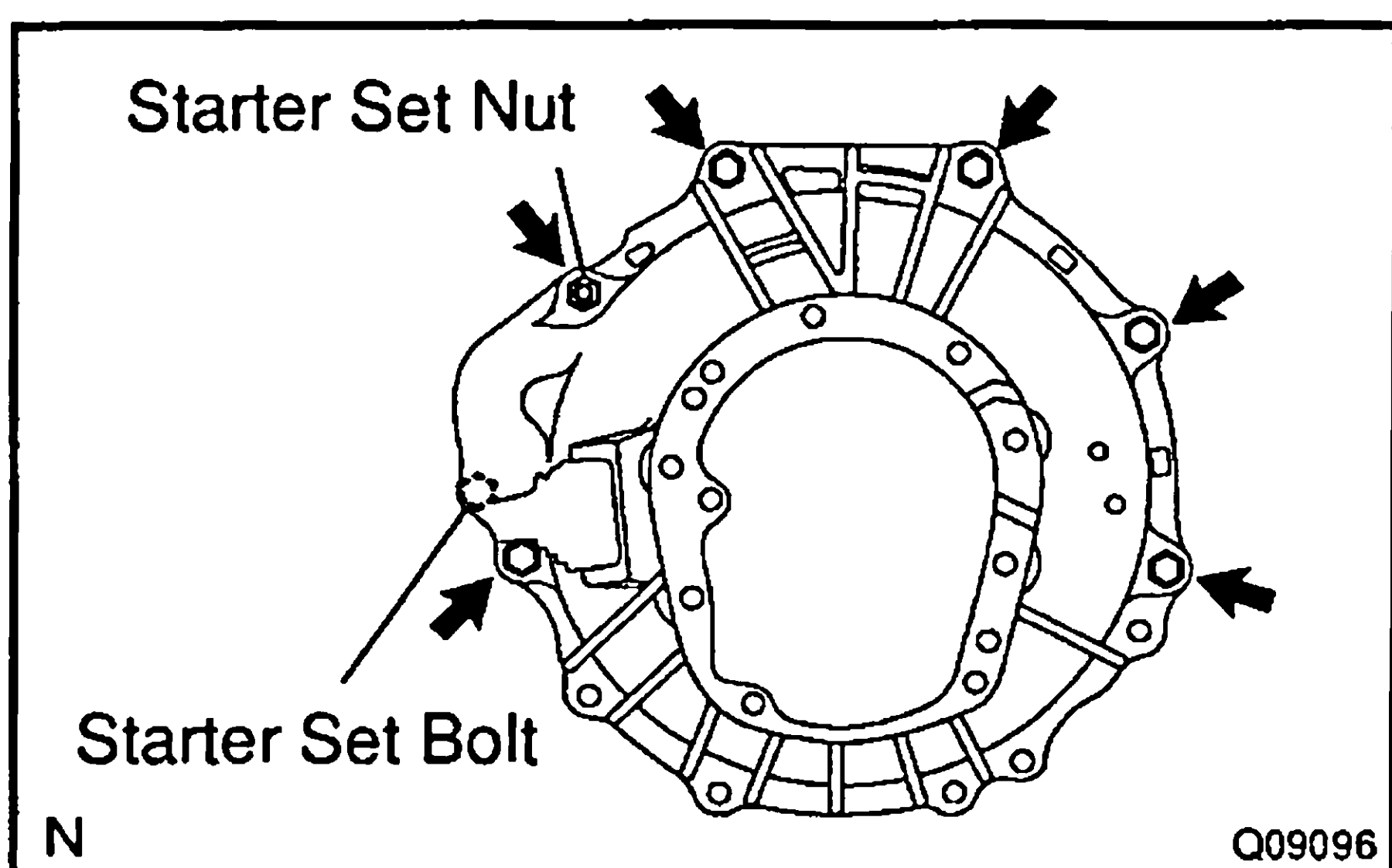
**16. DISCONNECT STABILIZER BAR**

- (a) Remove the 2 set bolts and nuts of the stabilizer bar bracket.
Torque: 25 N·m (260 kgf·cm, 19 ft·lbf)
- (b) Disconnect the stabilizer bar.



17. REMOVE FRONT DIFFERENTIAL REAR MOUNTING CUSHION

- Using a hexagon wrench, remove the nut.
Torque: 87 N·m (890 kgf·cm, 64 ft·lbf)
- Remove the 2 bolts and rear mounting cushion.
Torque: 108 N·m (1,100 kgf·cm, 80 ft·lbf)
- Lift up the front differential to lower the companion flange side.

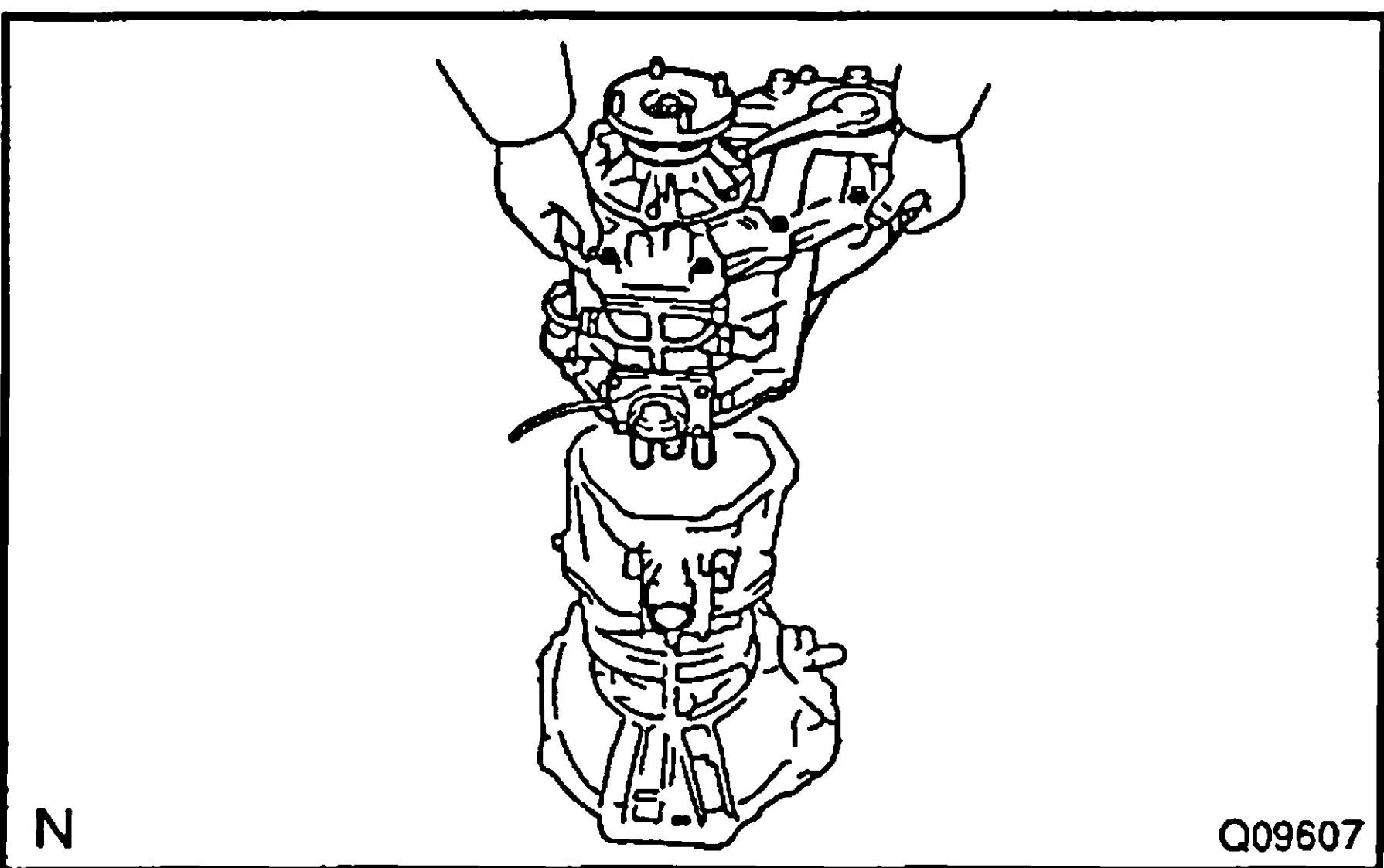


18. REMOVE STARTER

- Remove the set bolt of the starter lower side with the clutch line bracket.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)
- Disconnect the connector and wire, and remove the set nut of the starter upper side and starter.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

19. REMOVE TRANSMISSION WITH TRANSFER

- Disconnect the wire harness from the transmission.
- Remove the 5 transmission mounting bolts from the engine.
Torque: 72 N·m (730 kgf·cm, 53 ft·lbf)
- Pull out the transmission with the transfer down and toward the rear.



20. REMOVE TRANSFER FROM TRANSMISSION

- Disconnect the breather hose and remove the 8 transfer adaptor rear mounting bolts.
Torque: 24 N·m (240 kgf·cm, 17 ft·lbf)
- Pull the transfer straight up and remove it from the transmission.

HINT:

- Take care not to damage the transfer adaptor oil seal with the transfer input gear spline.
- At the time of installation, apply MP grease to the tip of the shift lever.

INSTALLATION

Installation is in the reverse order of removal (See page MT-2).

HINT:

After installation, do the road test.

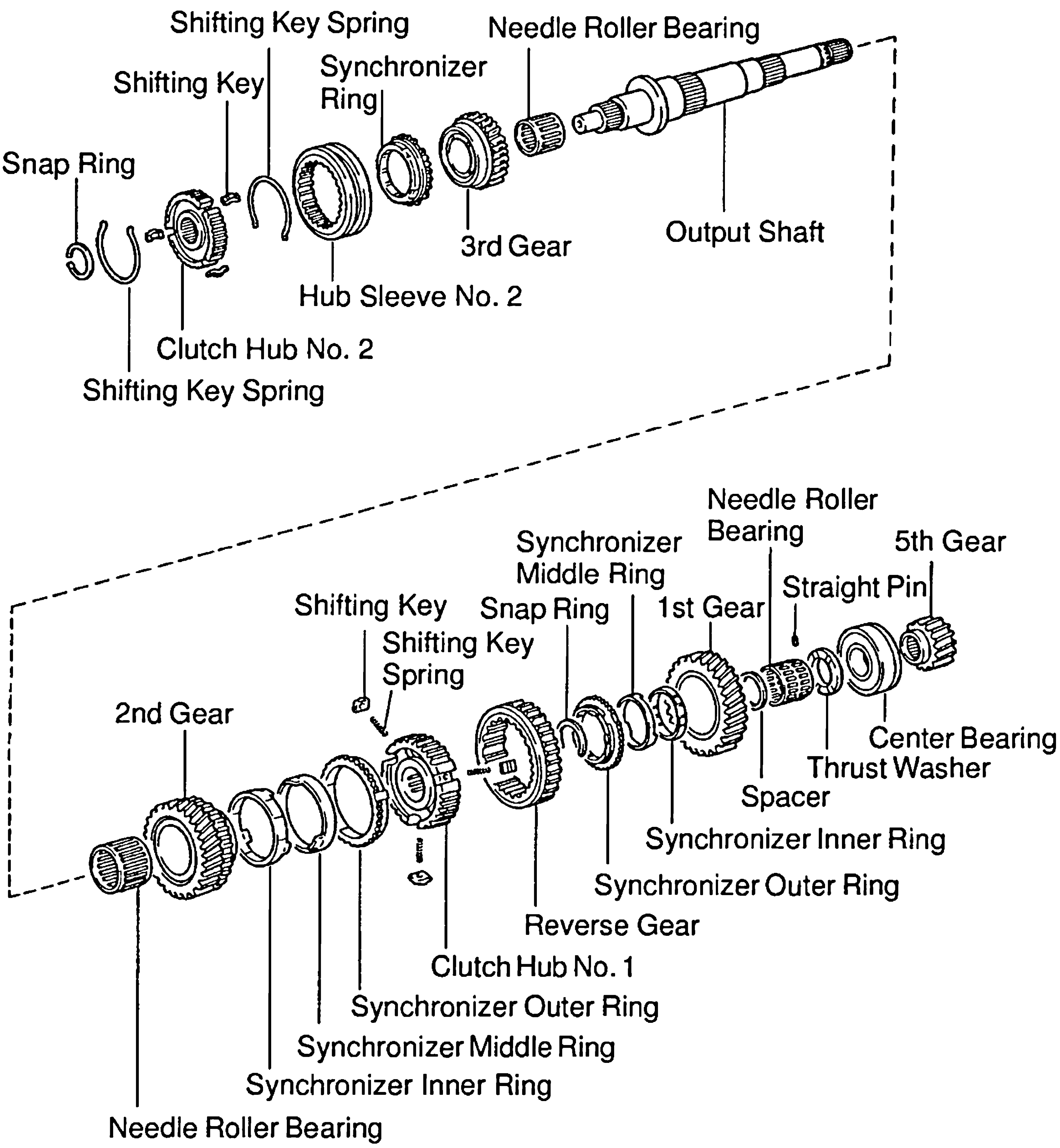
MT

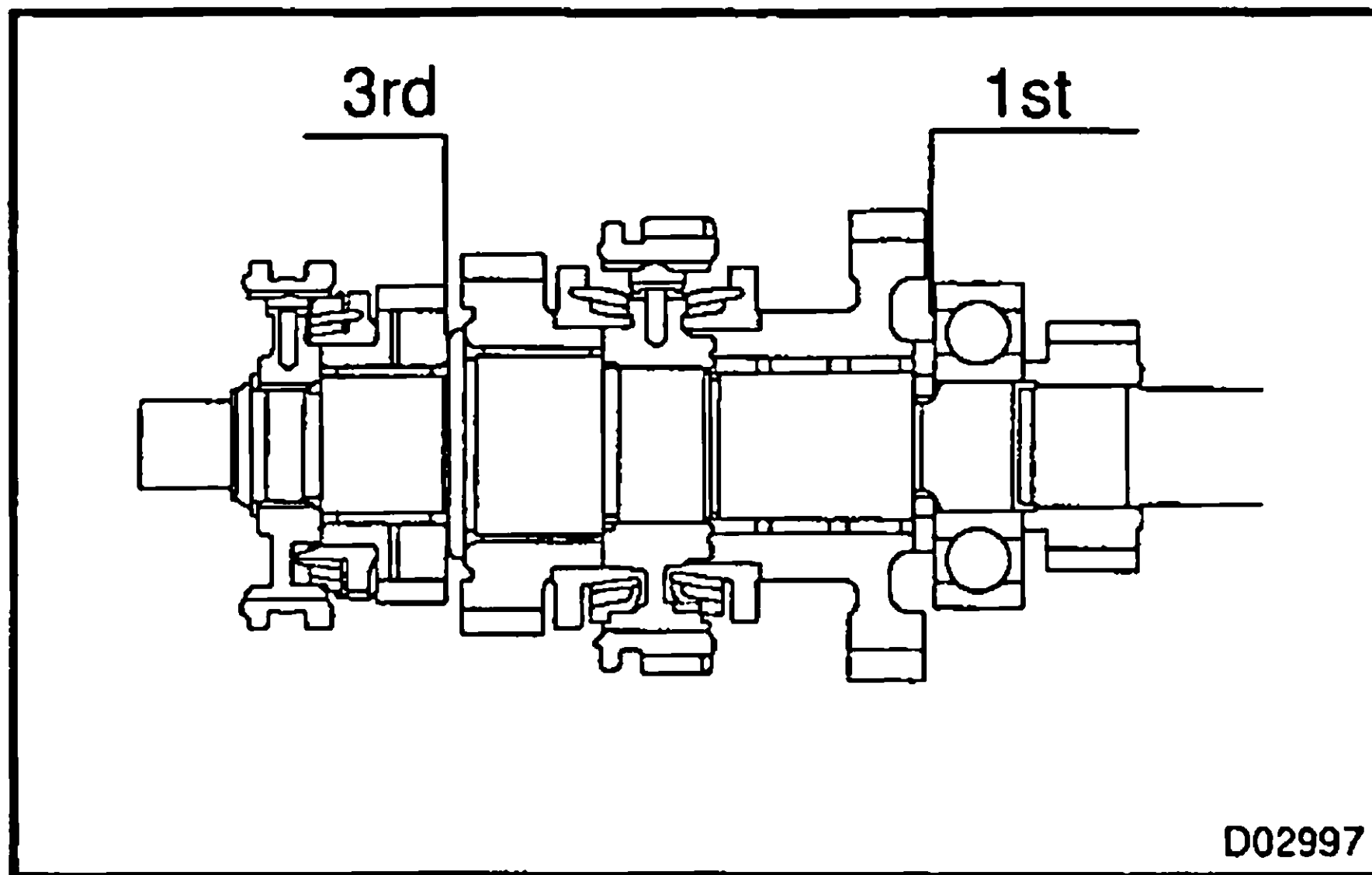
MT

OUTPUT SHAFT COMPONENTS

MT04W-04

MT





DISASSEMBLY

1. **INSPECT EACH GEAR THRUST CLEARANCE**
 - (a) Using a feeler gauge, measure the thrust clearance of 1st and 3rd gear.

Standard clearance:

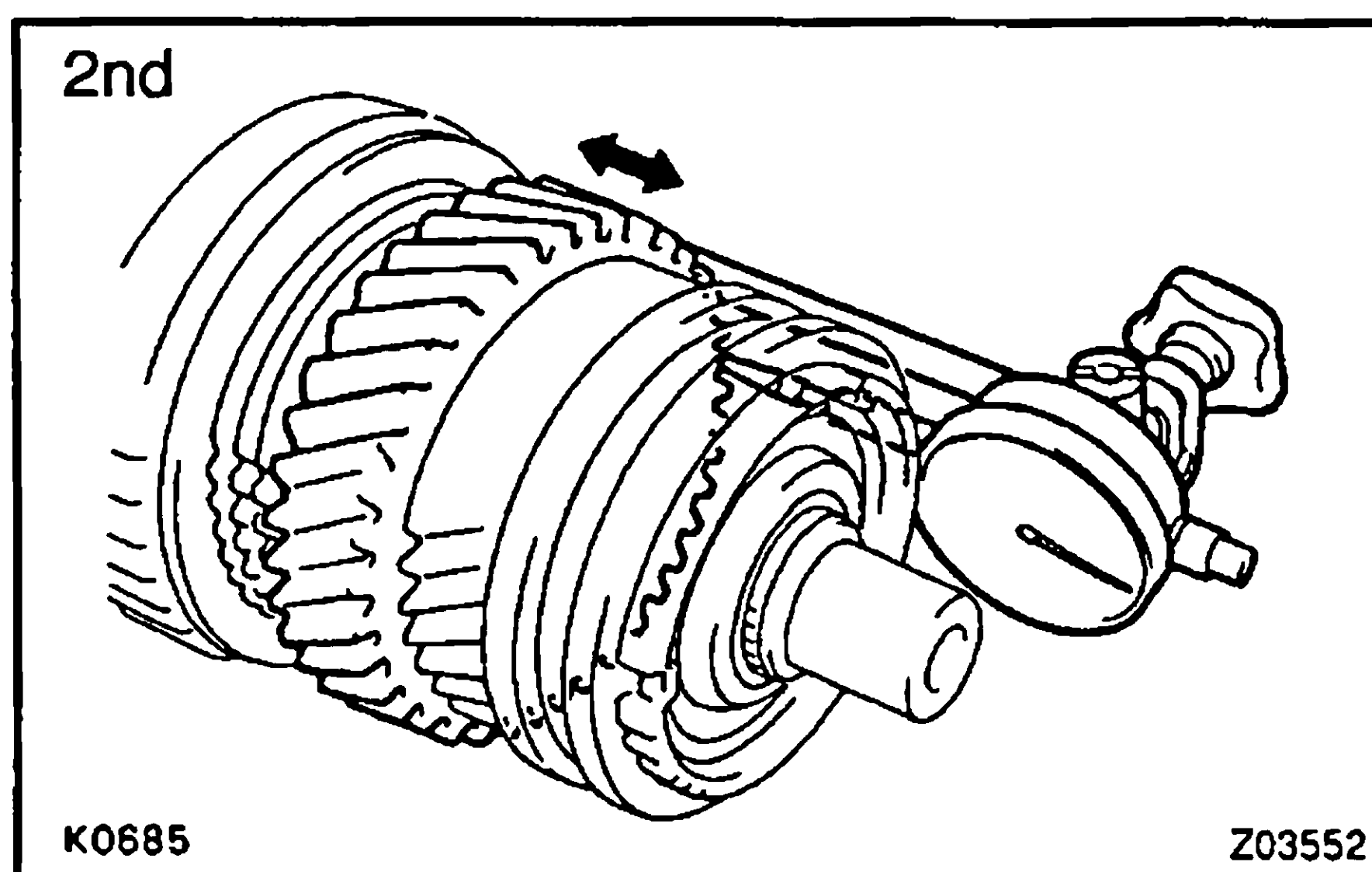
1st gear: 0.20 – 0.45 mm (0.0078 – 0.0177 in.)

3rd gear: 0.10 – 0.25 mm (0.0039 – 0.0098 in.)

Maximum clearance:

1st gear: 0.45 mm (0.0177 in.)

3rd gear: 0.25 mm (0.0098 in.)



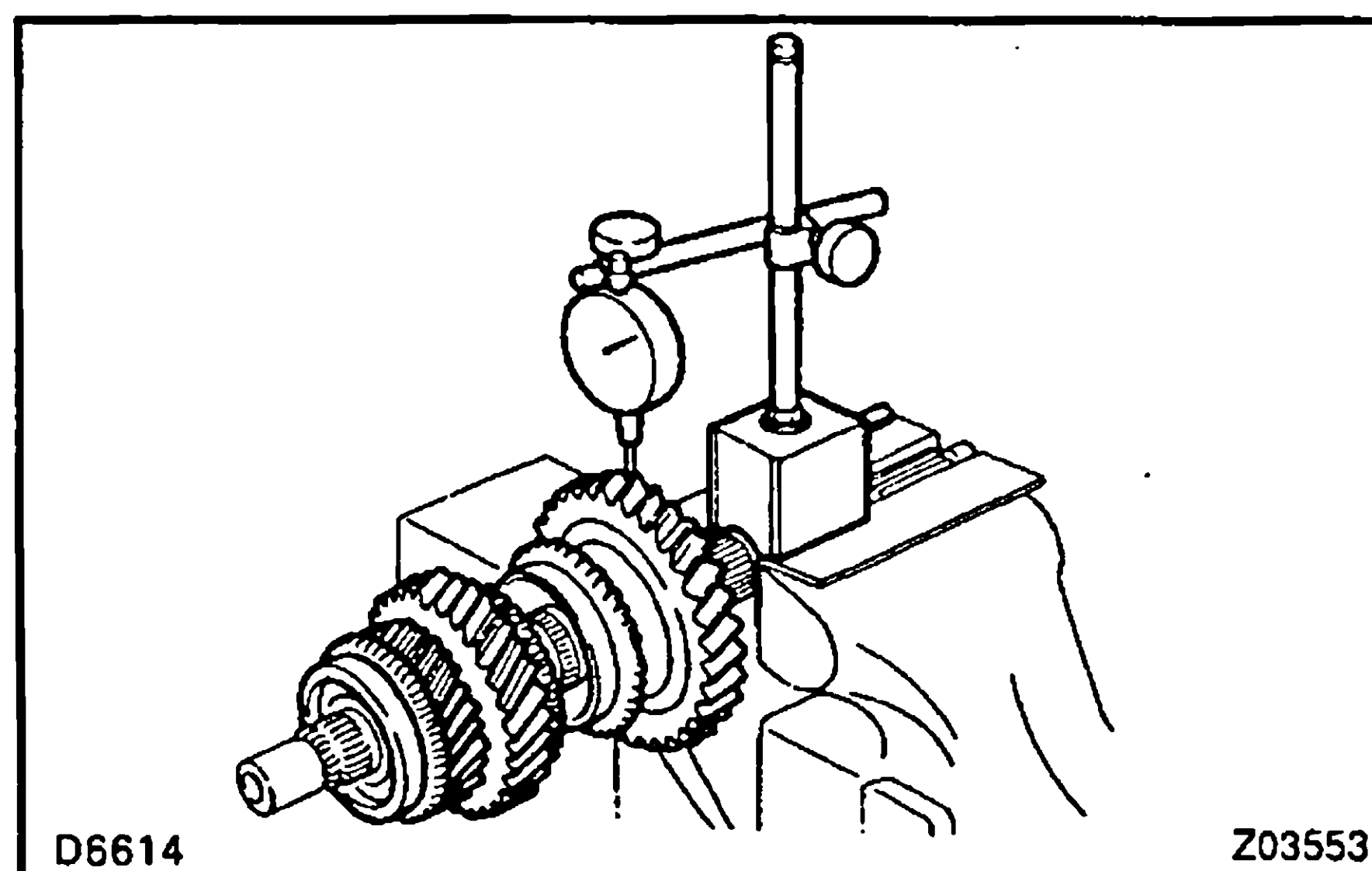
- (b) Using a dial indicator, measure the thrust clearance of 2nd gear.

Standard clearance:

2nd gear: 0.10 – 0.25 mm (0.0039 – 0.0098 in.)

Maximum clearance:

2nd gear: 0.25 mm (0.0098 in.)



2. INSPECT EACH GEAR RADIAL CLEARANCE

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

Standard clearance:

1st gear: 0.020 – 0.073 mm (0.0008 – 0.0029 in.)

2nd and 3rd gears:

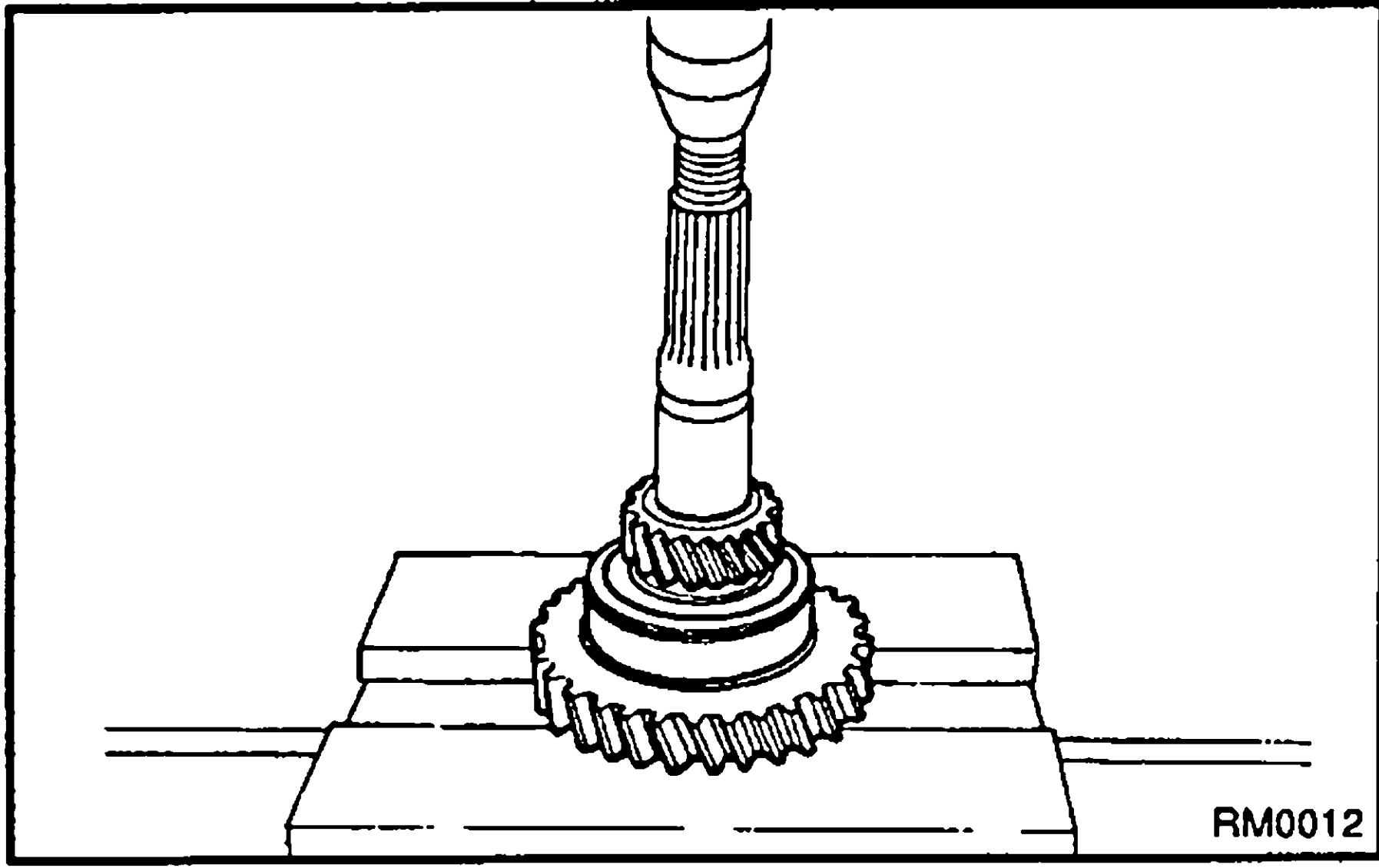
0.015 – 0.068 mm (0.0006 – 0.0027 in.)

Maximum clearance:

1st gear: 0.073 mm (0.0029 in.)

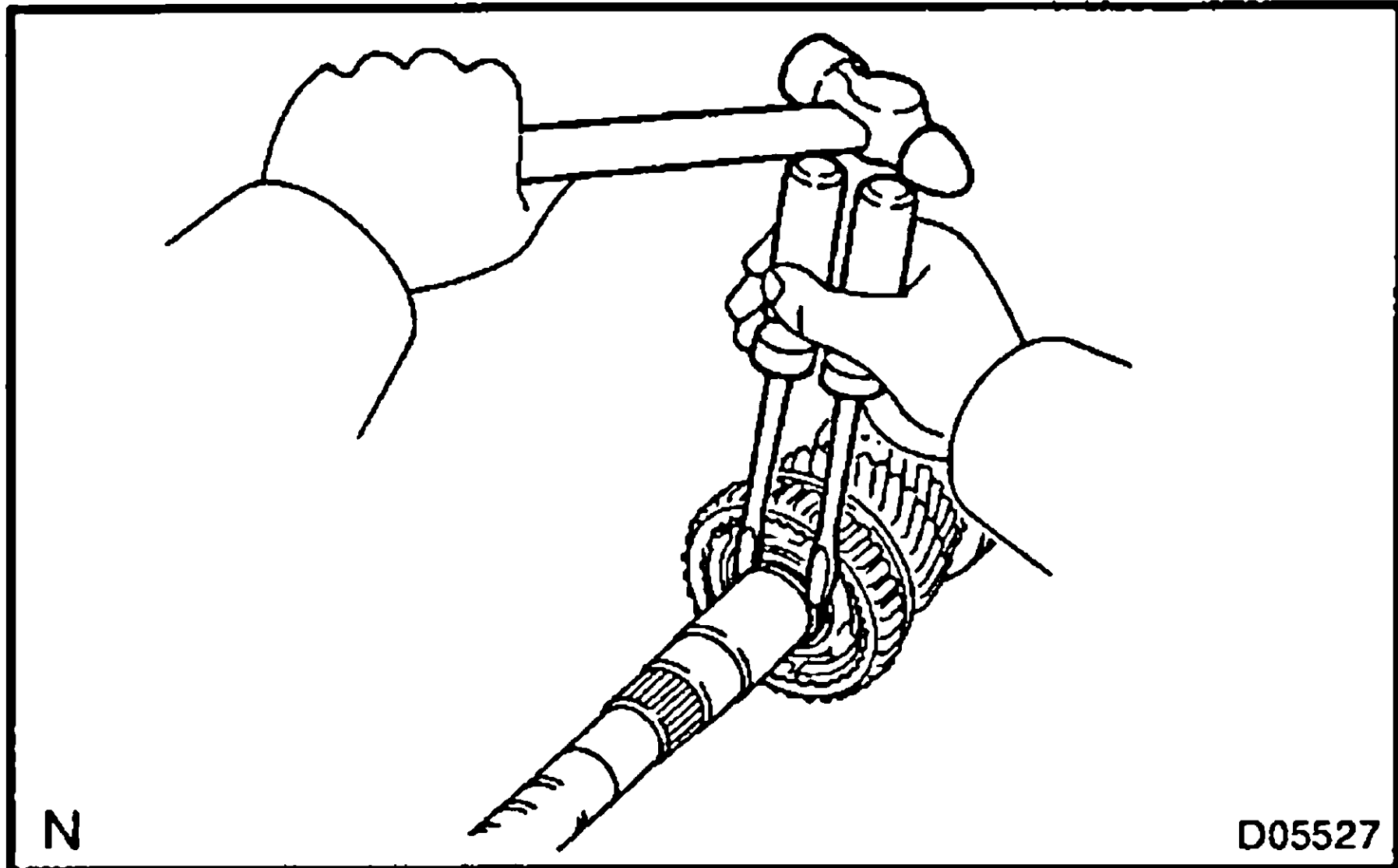
2nd and 3rd gears: 0.068 mm (0.0027 in.)

If the clearance exceeds the maximum, replace the gear, needle roller bearing or shaft.



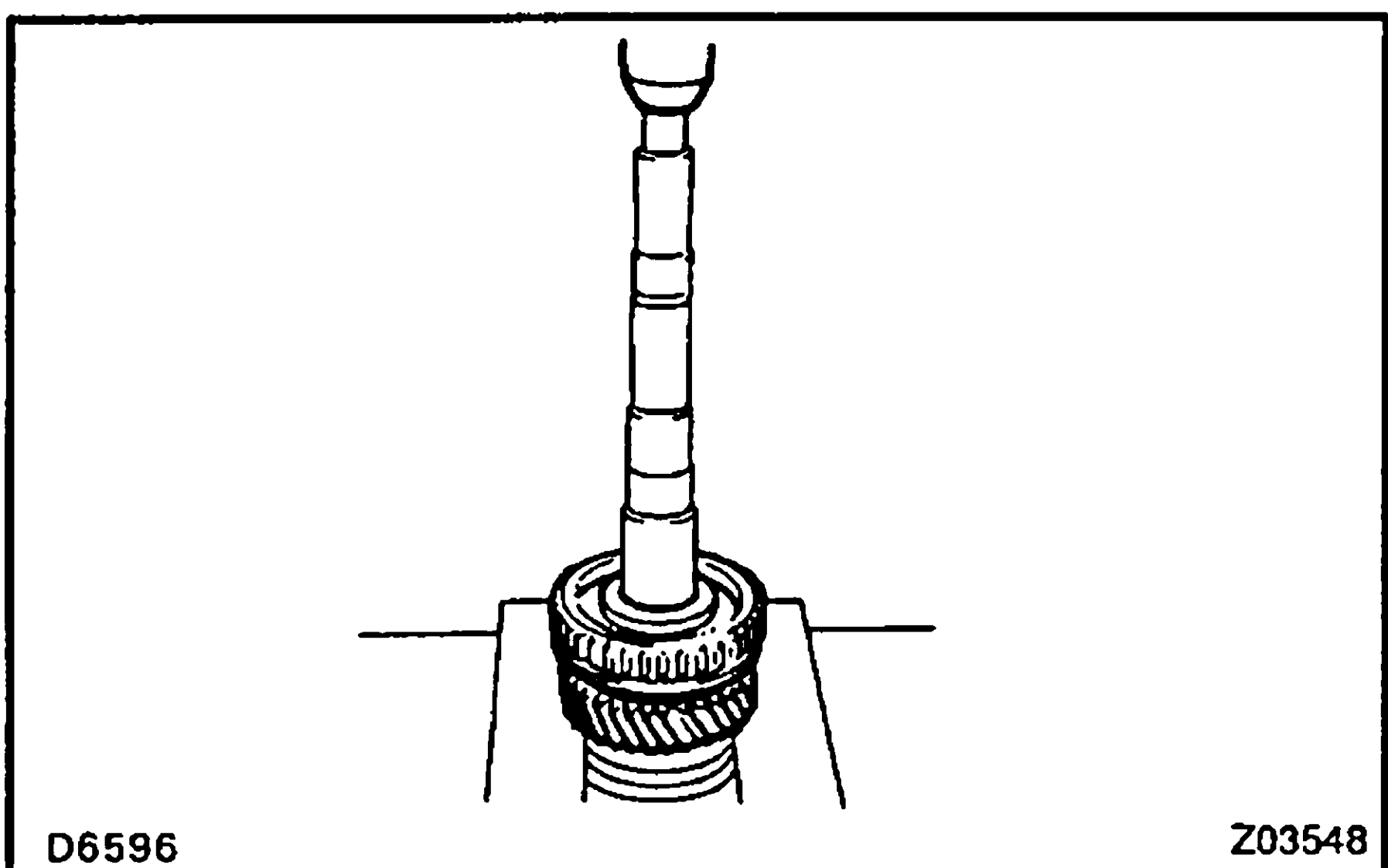
3. REMOVE 5TH GEAR, OUTPUT SHAFT CENTER BEARING AND 1ST GEAR ASSEMBLY

- (a) Using a press, remove the 5th gear, center bearing, thrust washer and 1st gear.
- (b) Remove the synchronizer inner ring, middle ring and outer ring from the 1st gear.
- (c) Remove the straight pin and needle roller bearing.
- (d) Remove the spacer.

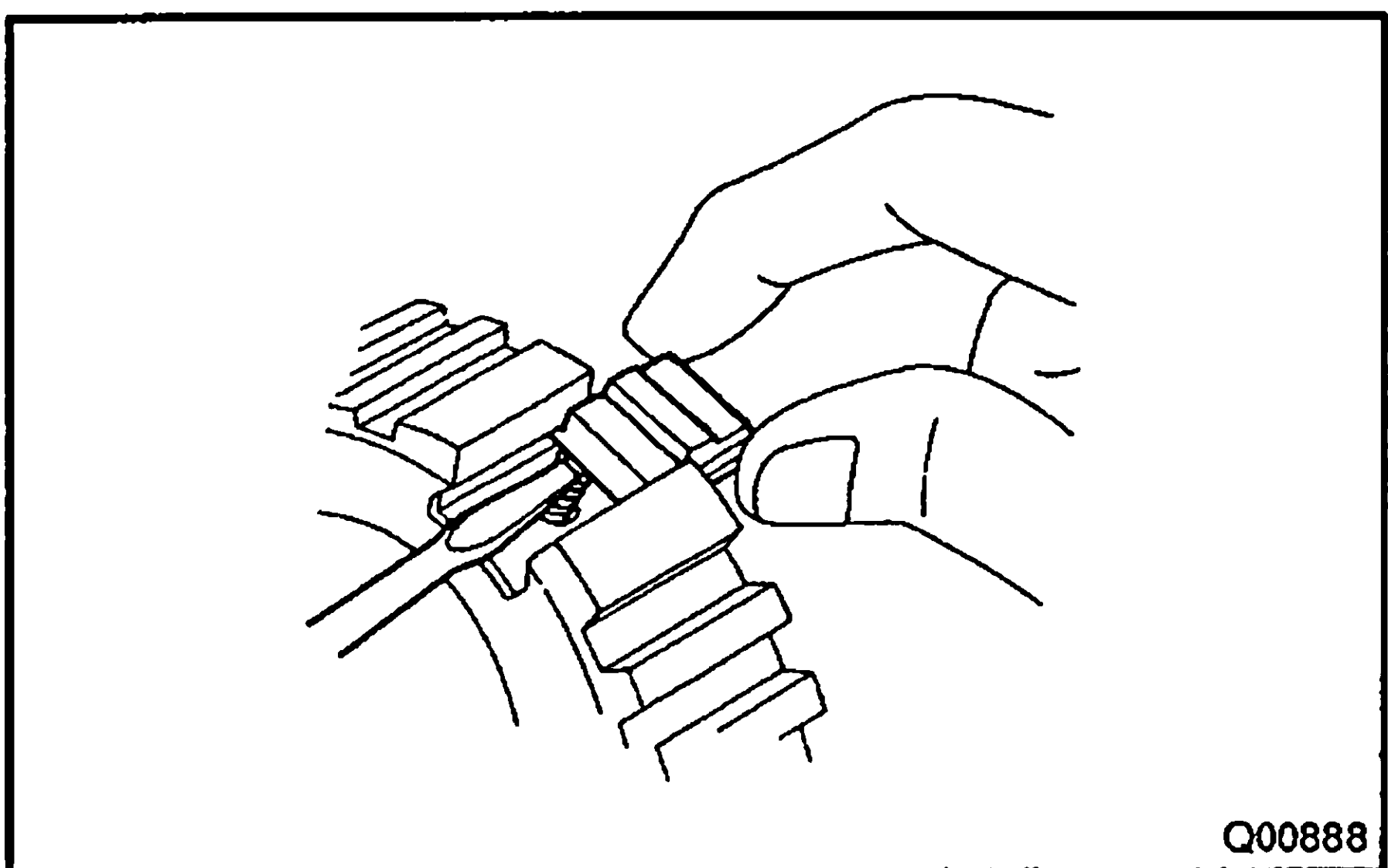


4. REMOVE REVERSE GEAR ASSEMBLY AND 2ND GEAR ASSEMBLY

- (a) Using 2 screwdrivers and a hammer, tap out the snap ring.

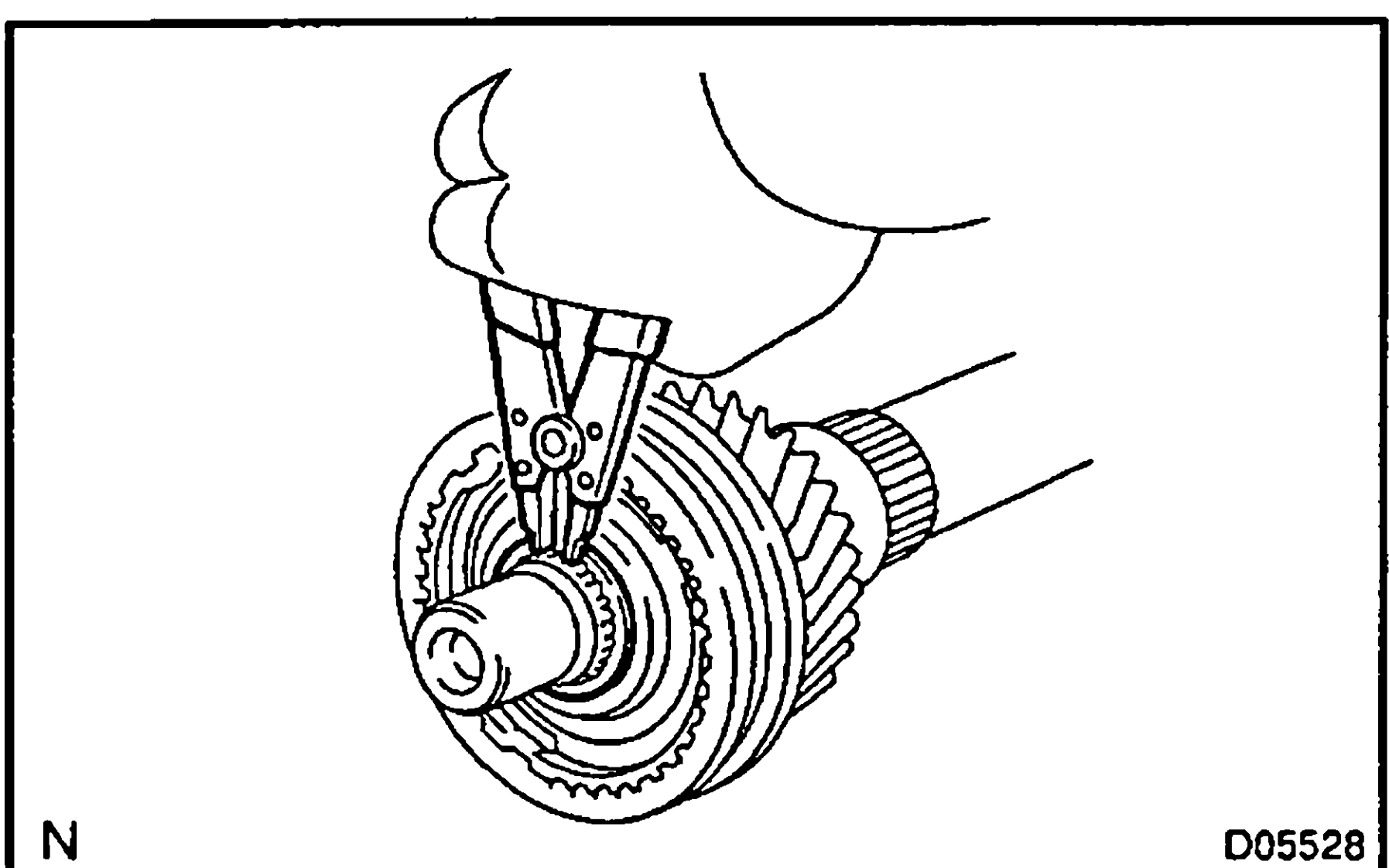


- (b) Using a press, remove the reverse gear assembly and 2nd gear assembly from the output shaft.
- (c) Remove the needle roller bearing from the output shaft.
- (d) Remove the synchronizer inner ring, middle ring and outer ring from the 2nd gear.



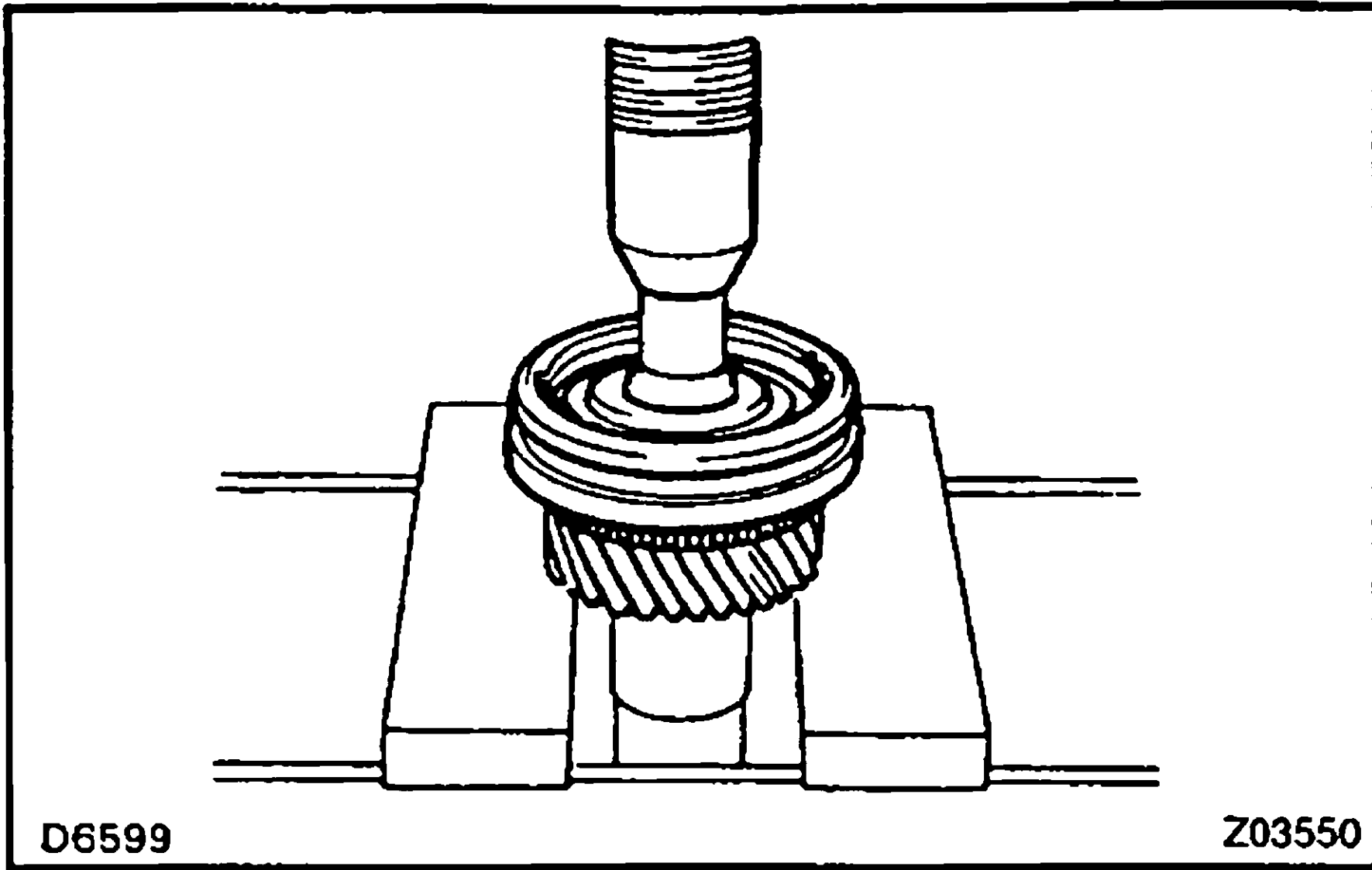
5. REMOVE REVERSE GEAR, SHIFTING KEY AND SPRING FROM CLUTCH HUB NO. 1

- (a) Remove the reverse gear from the clutch hub No. 1.
- (b) Using a screwdriver, push the shifting key spring, remove the 3 shifting keys and key springs from the clutch hub No. 1.



6. REMOVE HUB SLEEVE NO. 2 ASSEMBLY AND 3RD GEAR ASSEMBLY

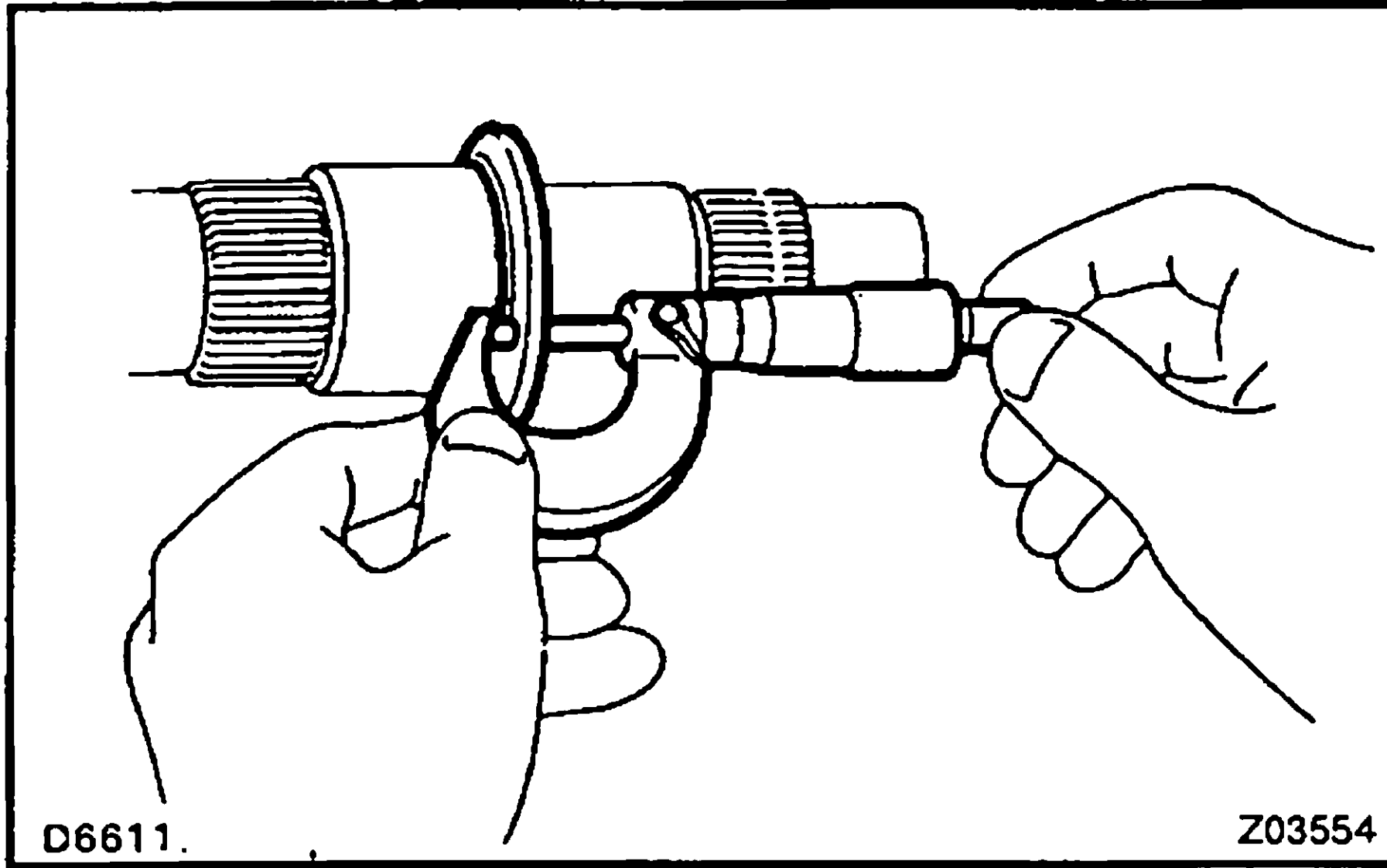
- (a) Using a snap ring expander, remove the snap ring.



- (b) Using a press, remove the hub sleeve No. 2 assembly and 3rd gear assembly from the output shaft.
- (c) Remove the needle roller bearing from the output shaft.
- (d) Remove the synchronizer ring from the 3rd gear.

7. REMOVE HUB SLEEVE NO. 2, SHIFTING KEY AND SPRING FROM CLUTCH HUB NO. 2

- (a) Remove the hub sleeve No. 2 from the clutch hub No. 2.
- (b) Using a screwdriver, push the shifting key spring, and remove the 3 shifting keys and 2 key springs from the clutch hub No. 2.



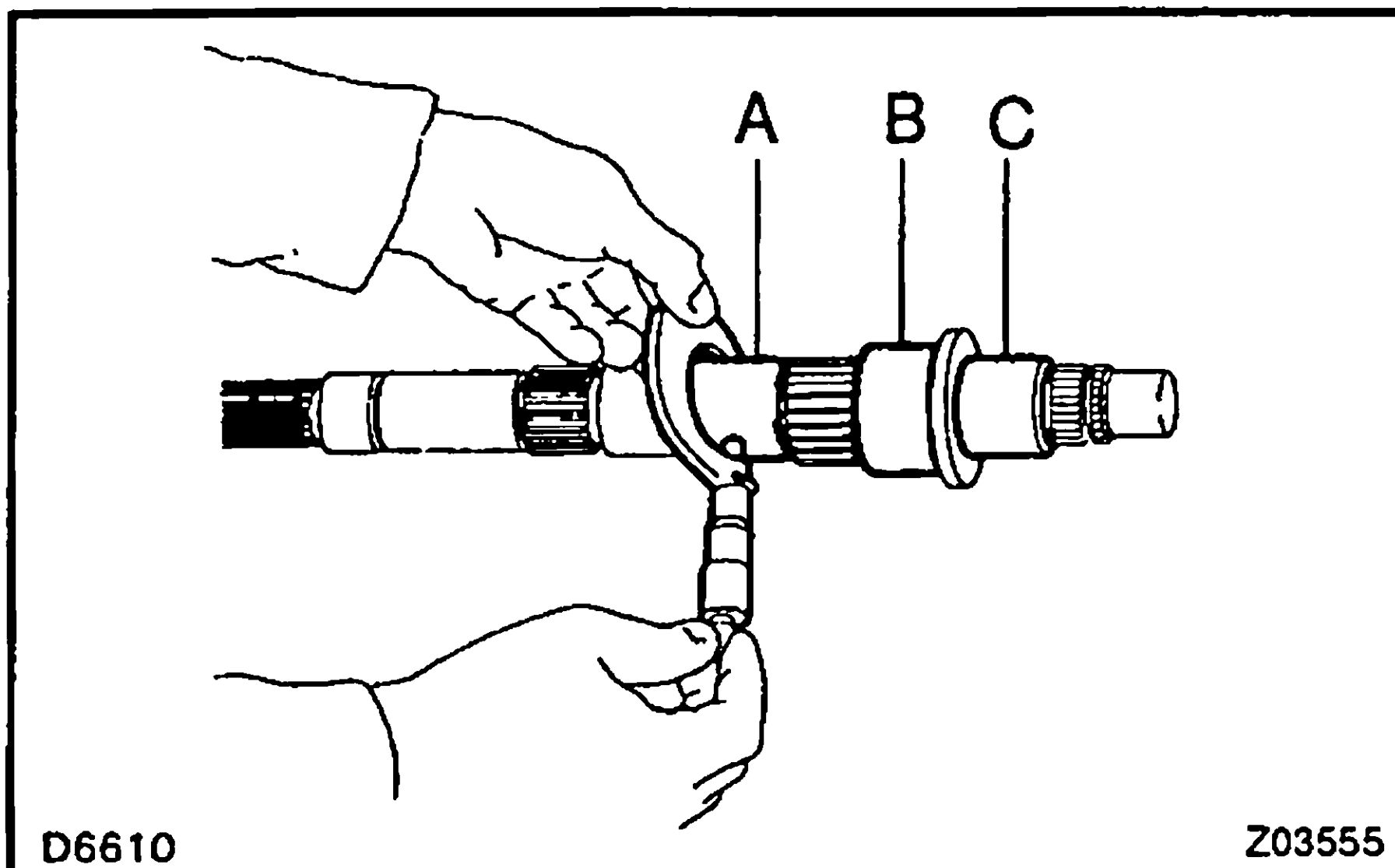
INSPECTION

1. INSPECT OUTPUT SHAFT

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

Minimum thickness: 4.80 mm (0.1890 in.)

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



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

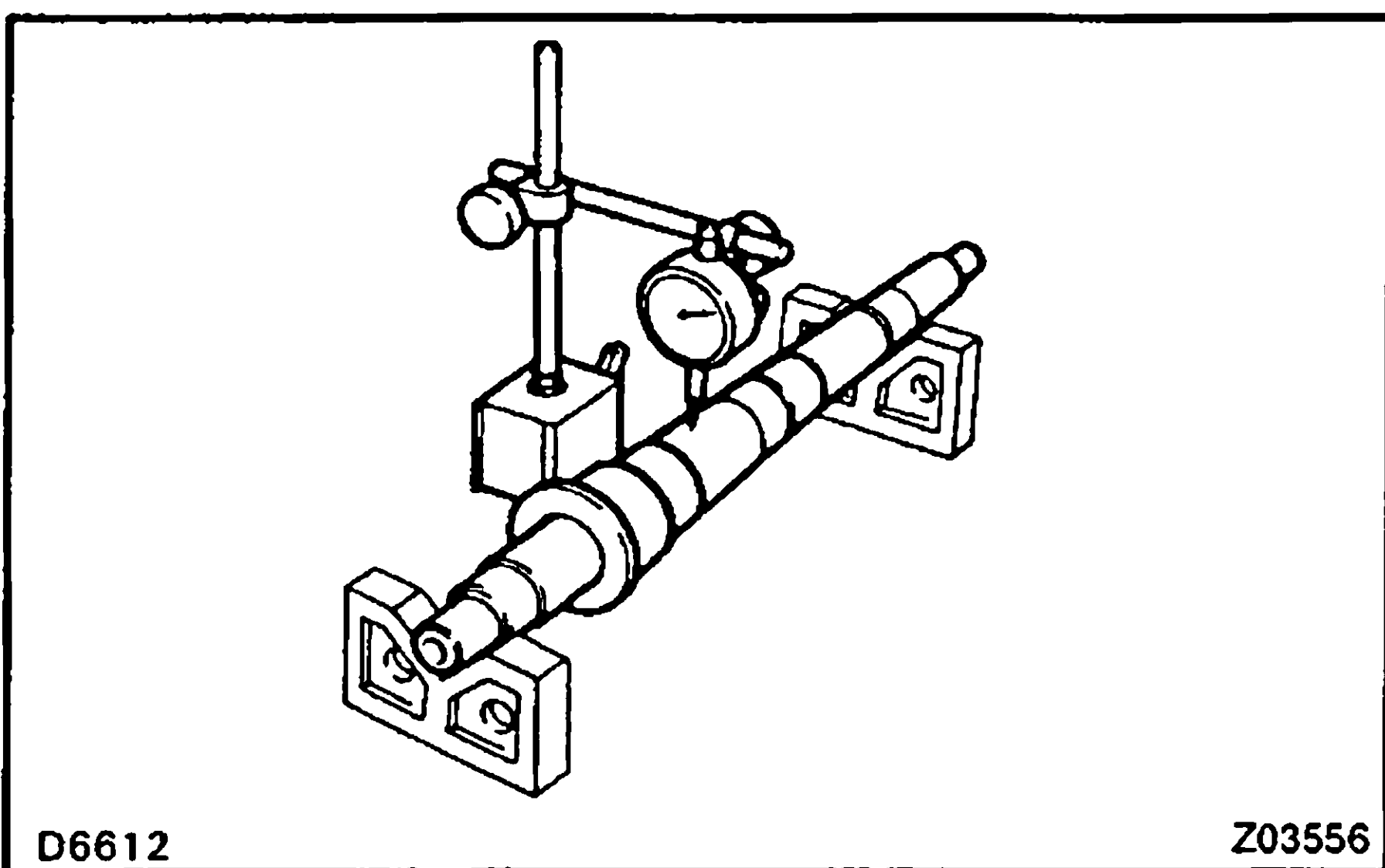
Minimum diameter:

A 1st gear: 38.979 mm (1.53460 in.)

B 2nd gear: 46.984 mm (1.84976 in.)

C 3rd gear: 37.984 mm (1.49543 in.)

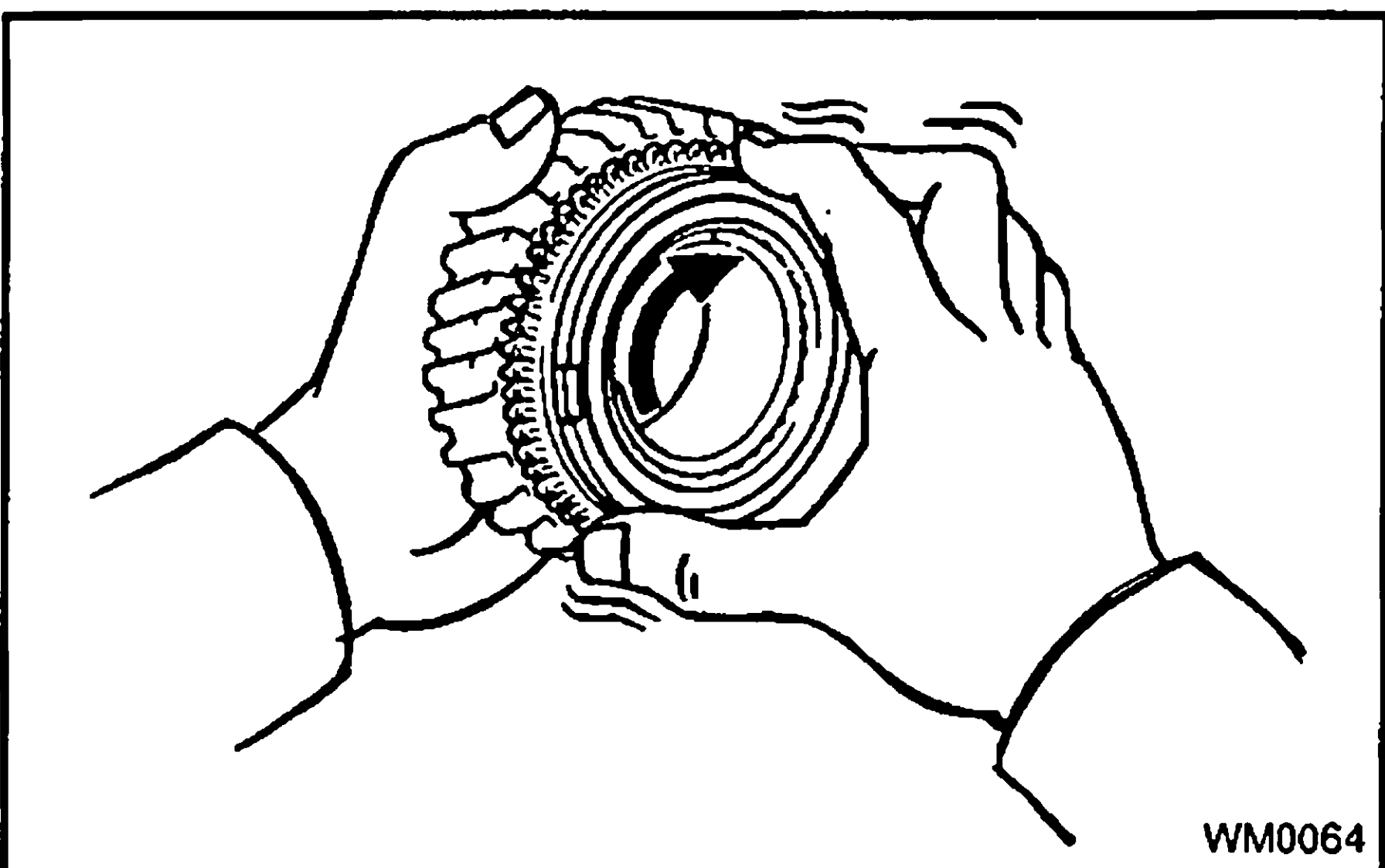
If the outer diameter is less than the minimum, replace the output shaft.



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

Maximum runout: 0.03 mm (0.0012 in.)

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



2. INSPECT 3RD GEAR SYNCHRONIZER RING

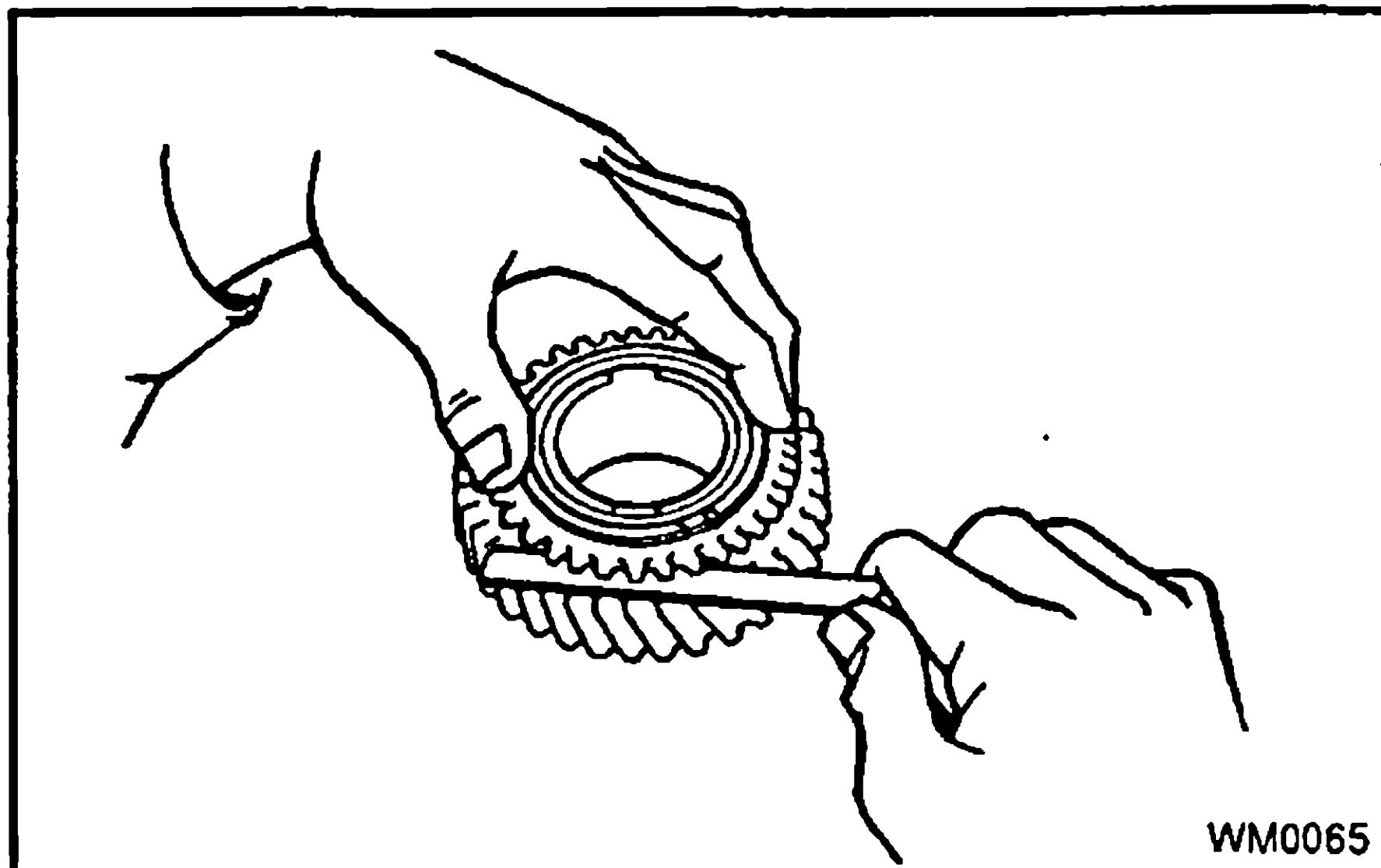
- (a) Check for wear or damage.
 (b) Check the braking effect of the synchronizer ring.
 (c) Turn the synchronizer ring in one direction while pushing it to the gear cone. Check that the ring locks.

If the braking effect is insufficient, apply a small amount of the fine lapping compound between the synchronizer ring and gear cone. Lightly rub the synchronizer ring and gear cone together.

NOTICE:

Ensure the fine lapping compound is completely washed off after rubbing.

- (d) Check again the braking effect of the synchronizer ring.



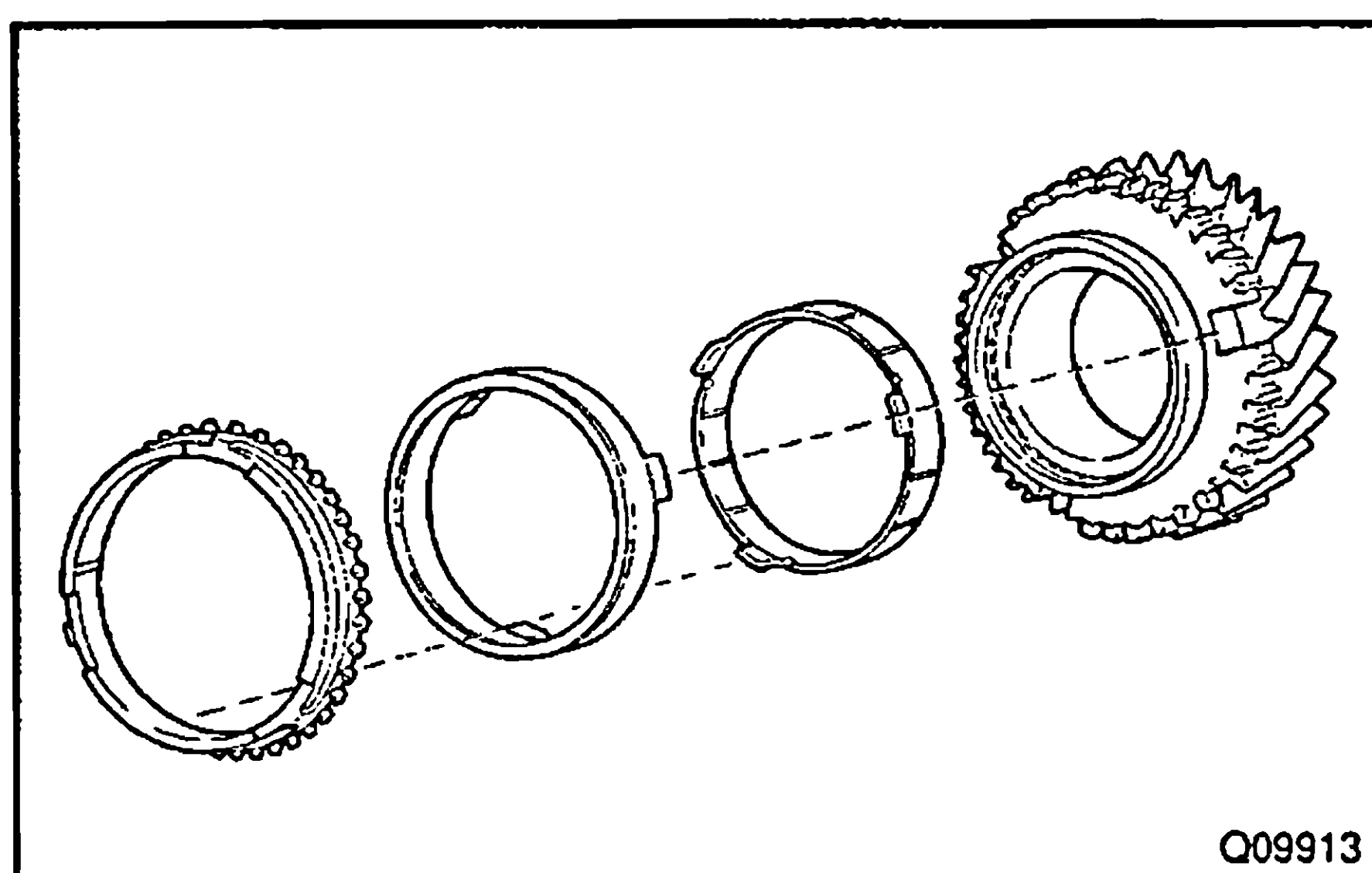
- (e) Using a feeler gauge, measure the clearance between the synchronizer ring back and gear spline end.

Minimum clearance: 0.75 mm (0.0295 in.)

If the clearance is less than the minimum, replace the synchronizer ring, and apply a small amount of the fine lapping compound on the gear cone.

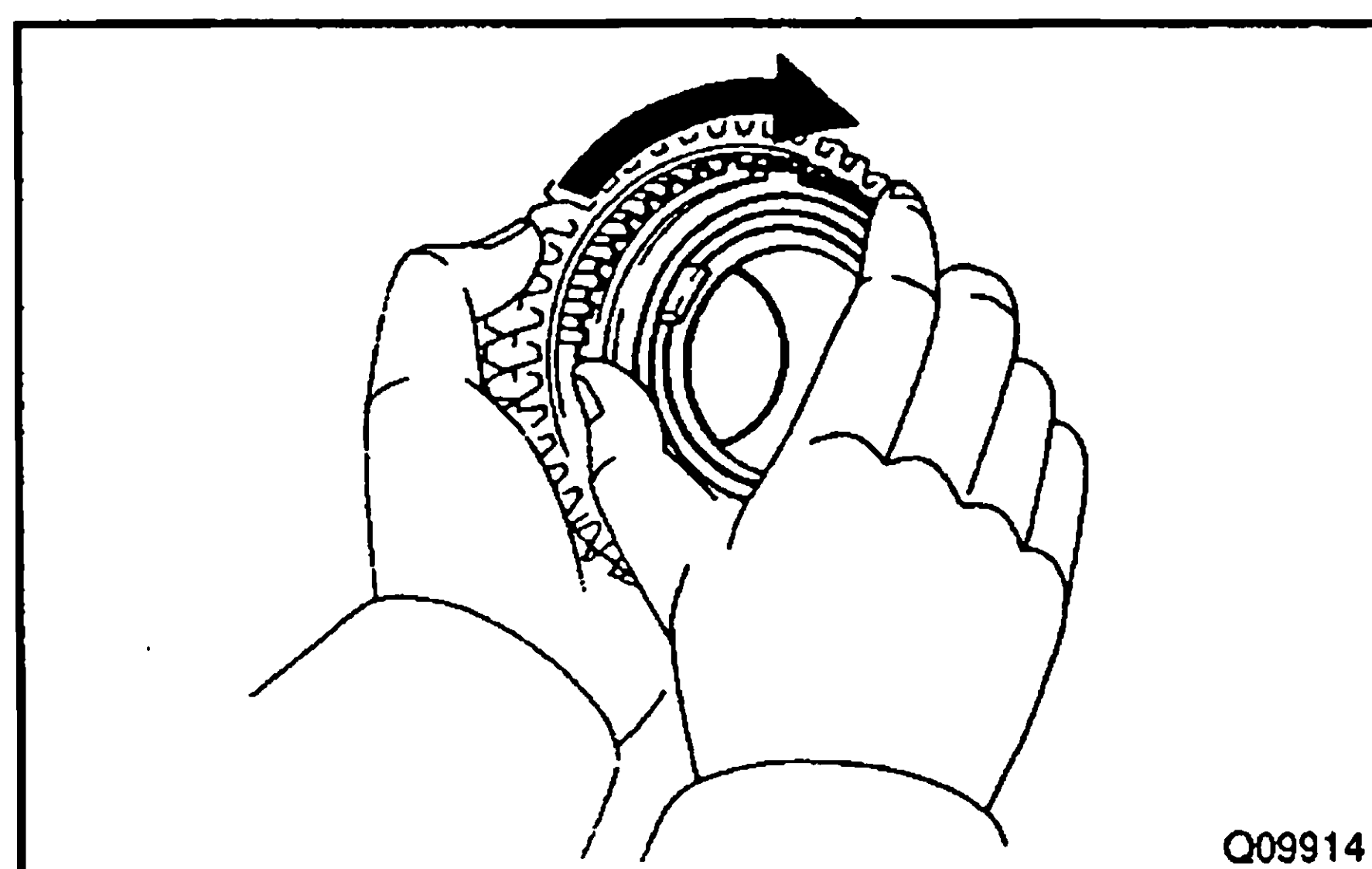
NOTICE:

Ensure the fine lapping compound is completely washed off after rubbing.



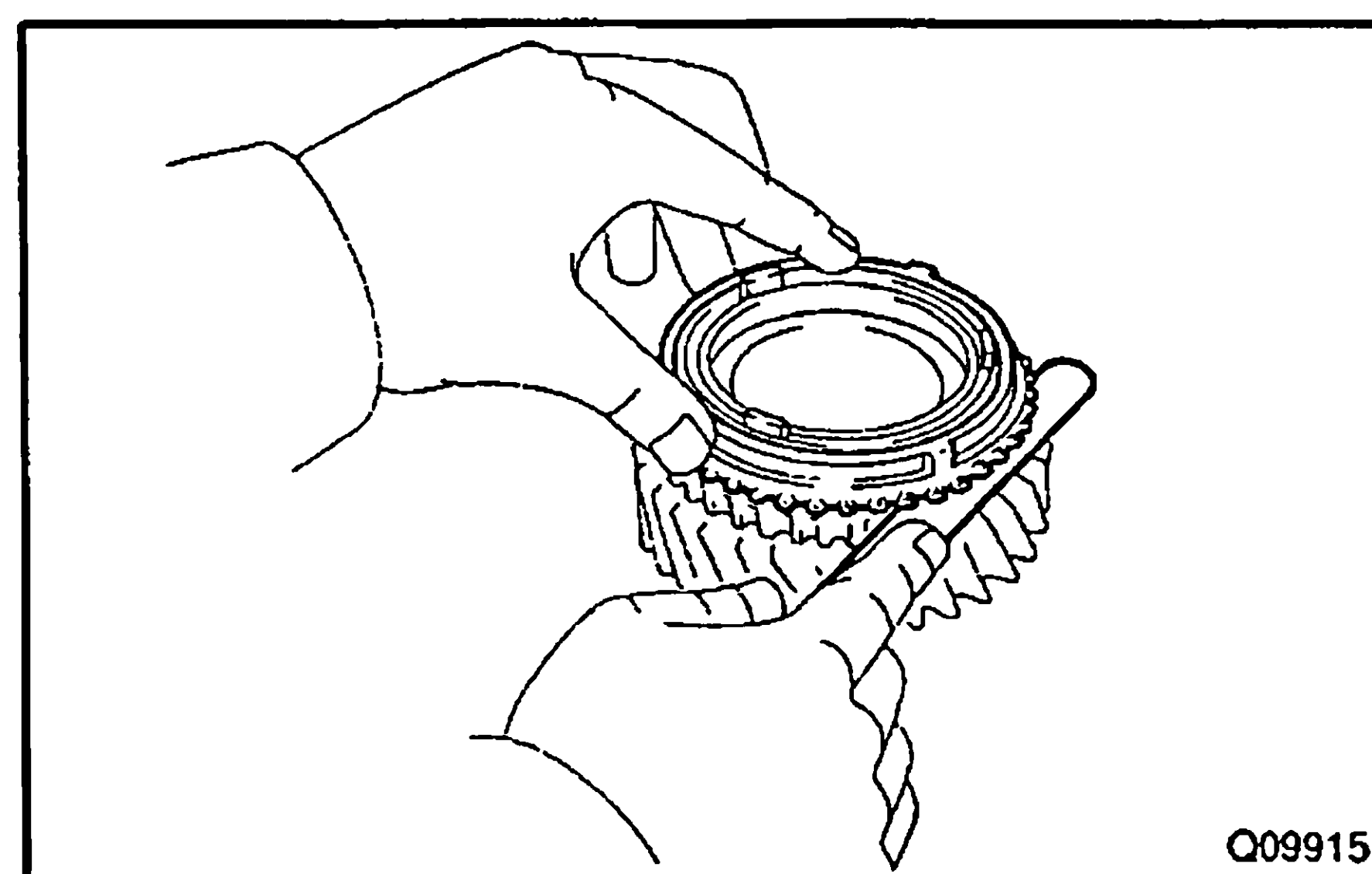
3. INSPECT 1ST AND 2ND GEARS SYNCHRONIZER RING

- (a) Check for wear or damage.
 (b) Install the synchronizer inner ring, middle ring and outer ring to each gear.



- (c) Check the braking effect of the synchronizer ring. Turn the synchronizer ring in one direction while pushing it to the gear cone. Check that the ring locks.

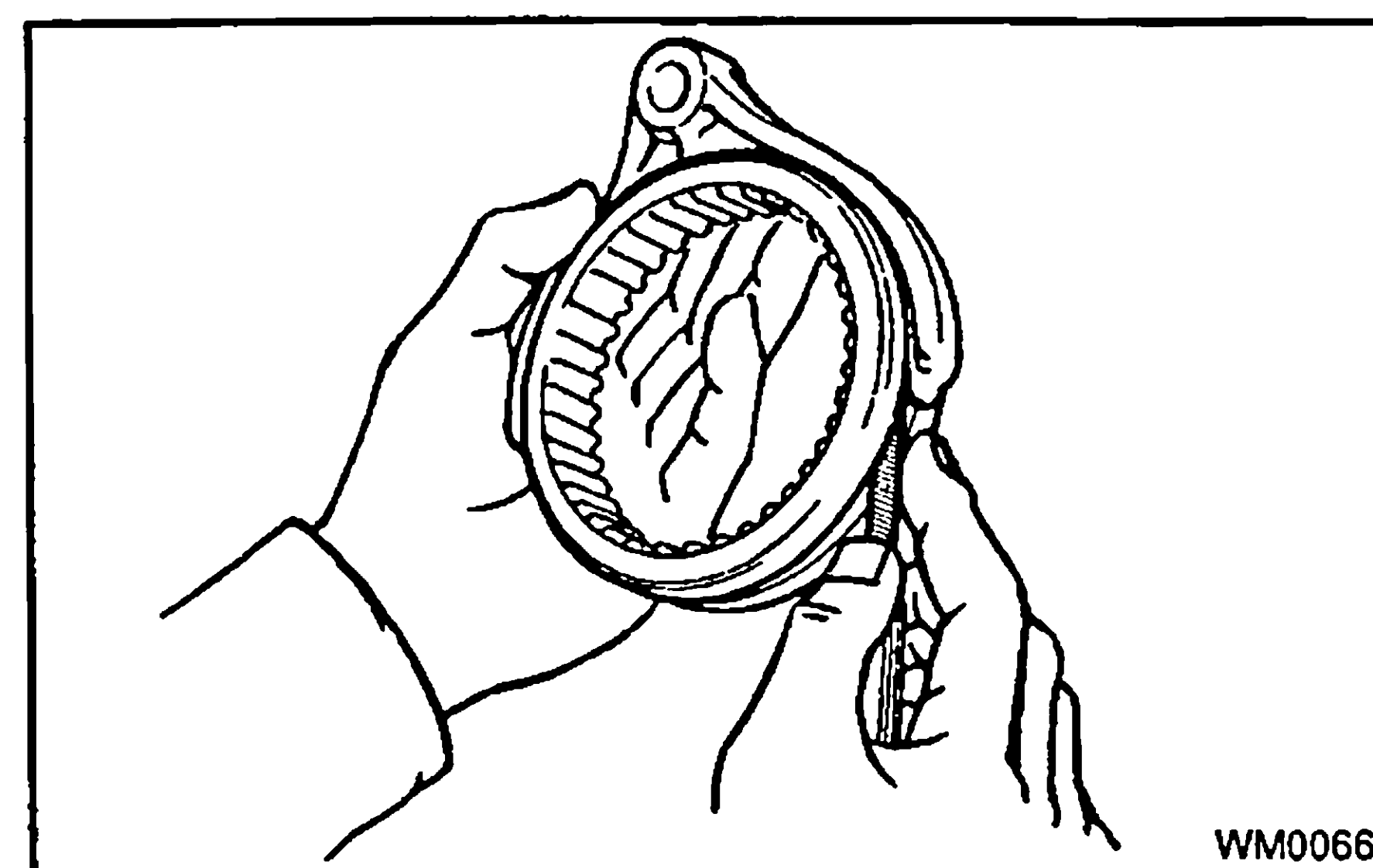
If it does not lock, replace the synchronizer ring.



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

Minimum clearance: 0.65 mm (0.0256 in.)

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



4. INSPECT SHIFT FORK AND HUB SLEEVE/REVERSE GEAR CLEARANCE

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

Maximum clearance:

Hub sleeve: 0.35 mm (0.0138 in.)

Reverse gear: 0.41 mm (0.0161 in.)

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

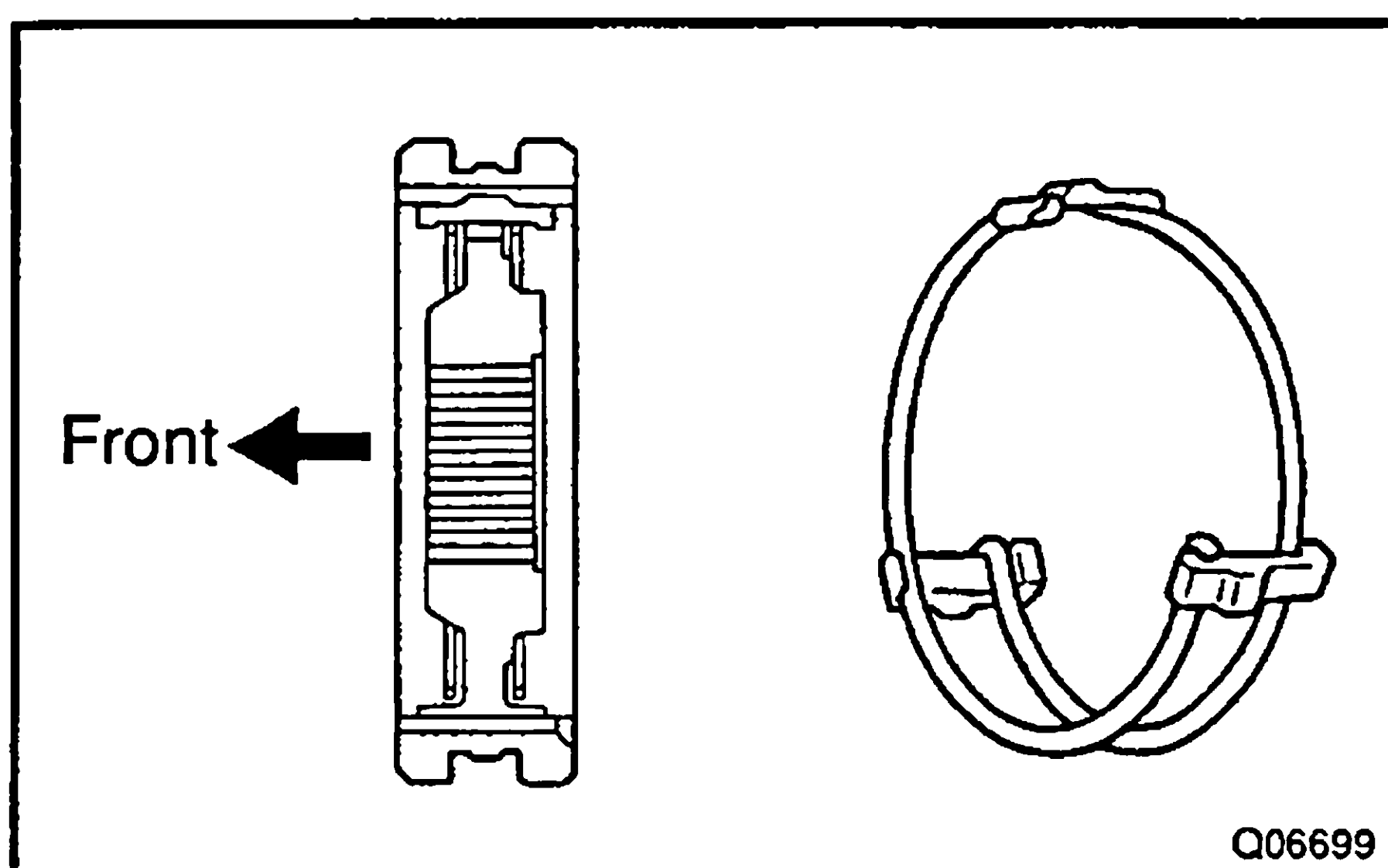
REASSEMBLY

HINT:

Coat all of the sliding and rotating surfaces with gear oil before reassembly.

1. INSTALL CLUTCH HUB NO. 2 INTO HUB SLEEVE NO. 2

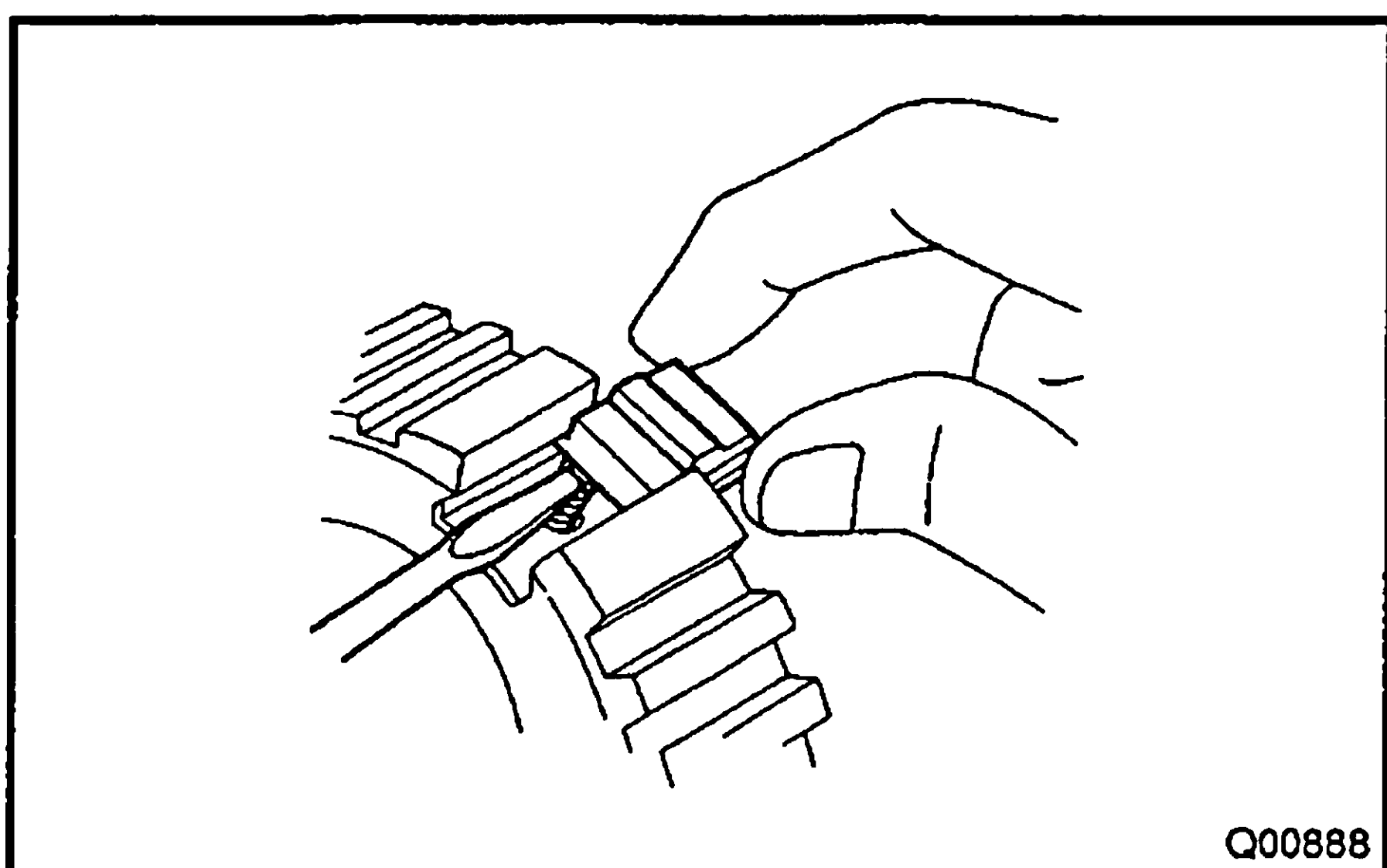
- (a) Install the clutch hub No. 2 and 3 shifting keys to the hub sleeve No. 2.



- (b) Install the 2 shifting key springs under the shifting keys.

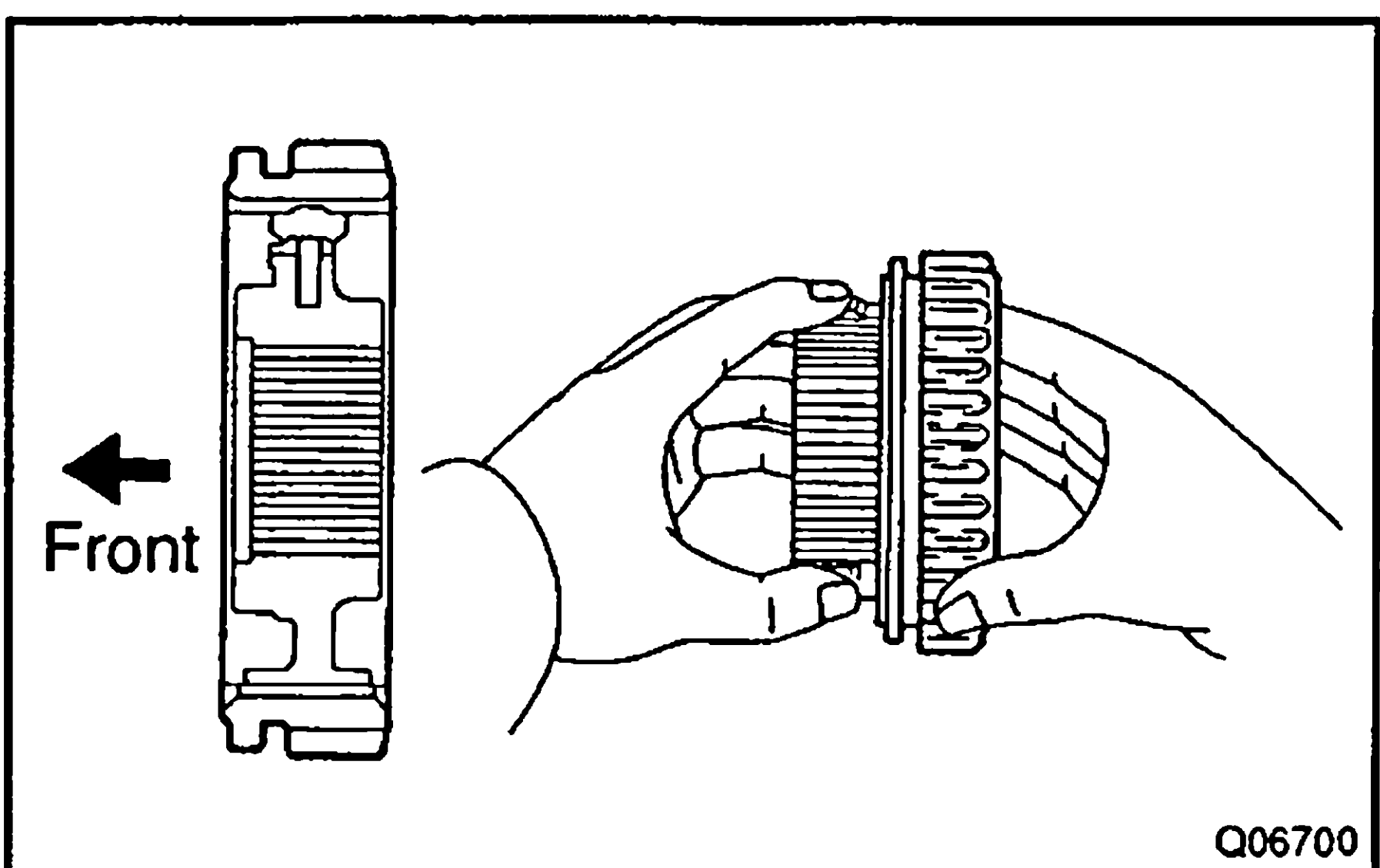
NOTICE:

Position the key springs so that their end gaps are not aligned.

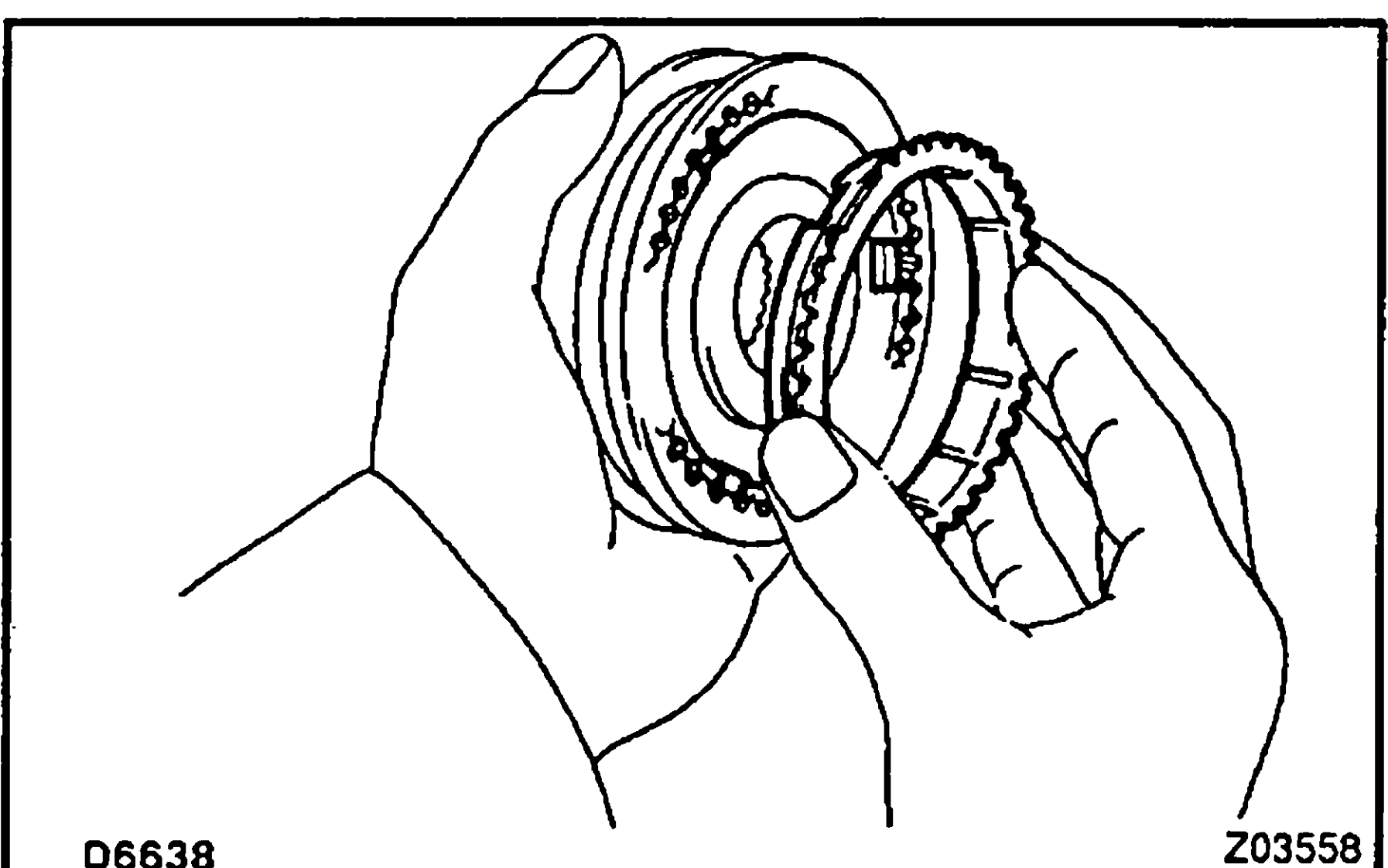


2. INSTALL CLUTCH HUB NO. 1 INTO REVERSE GEAR

- (a) Install the 3 shifting key springs to the clutch hub No. 1.
 (b) While pushing the shifting key spring with a screwdriver, install the 3 shifting keys.

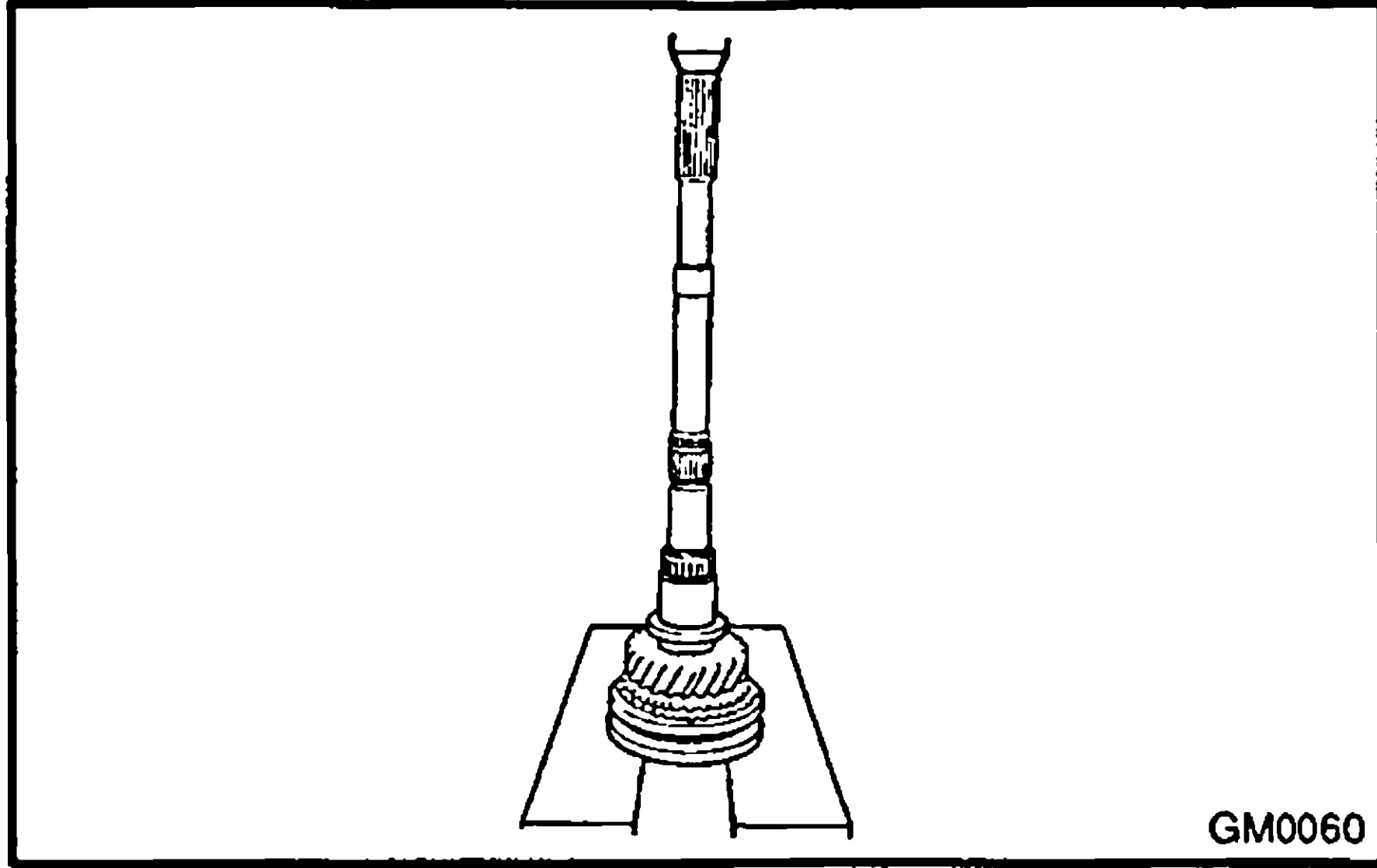


- (c) While pushing the 3 shifting keys, install the clutch hub No. 1 to the reverse gear, as shown.

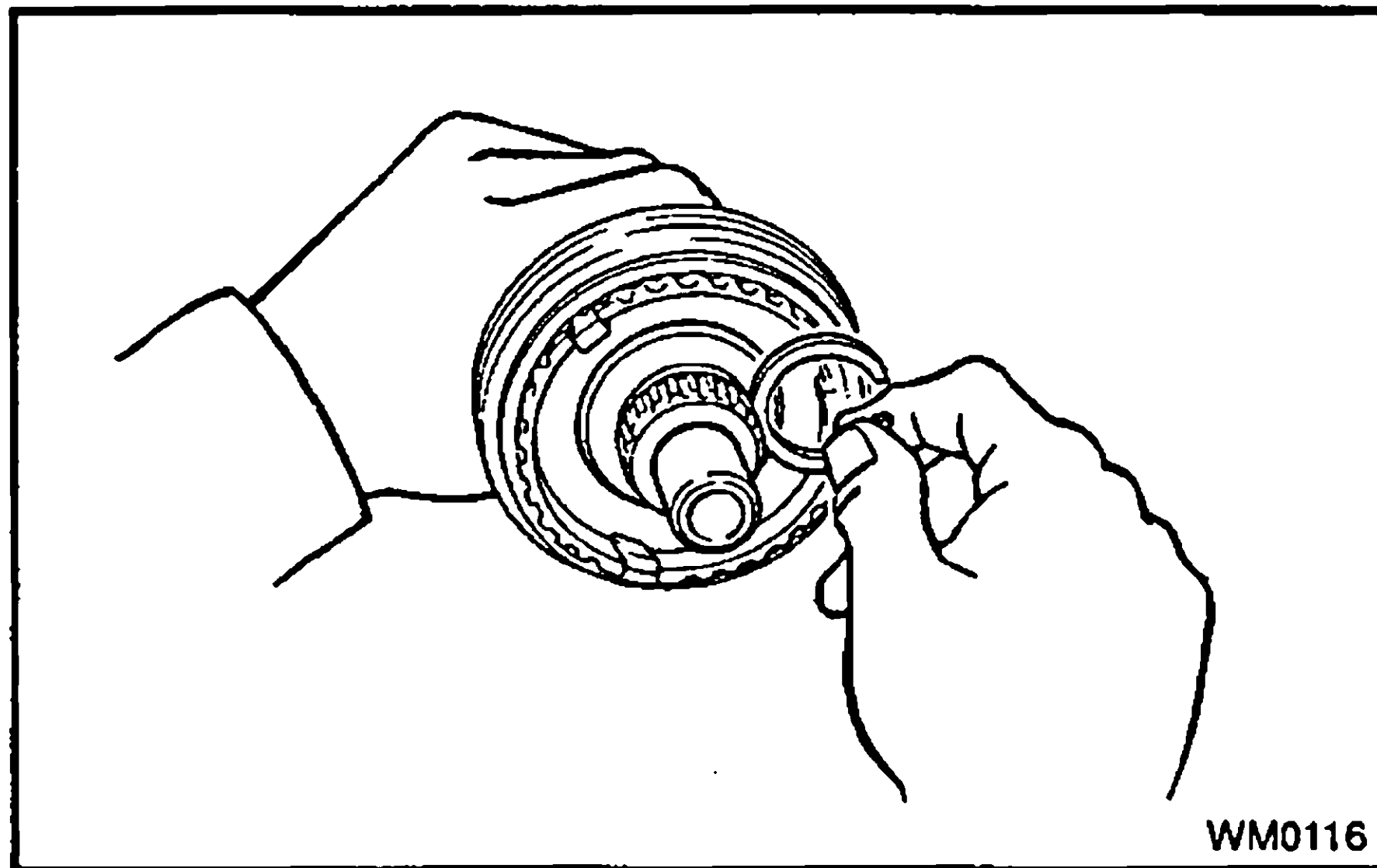


3. INSTALL 3RD GEAR AND HUB SLEEVE NO. 2 ON OUTPUT SHAFT

- (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 3rd gear.



- (d) Using a press, install the 3rd gear assembly and hub sleeve No. 2 assembly.



4. INSTALL SNAP RING

- (a) Select a snap ring that allows the minimum axial play.

Mark	Thickness mm (in.)
A	1.80 – 1.85 (0.0709 – 0.0728)
B	1.85 – 1.90 (0.0728 – 0.0748)
C	1.90 – 1.95 (0.0748 – 0.0768)
D	1.95 – 2.00 (0.0768 – 0.0787)
E	2.00 – 2.05 (0.0787 – 0.0807)
F	2.05 – 2.10 (0.0807 – 0.0827)
G	2.10 – 2.15 (0.0827 – 0.0846)

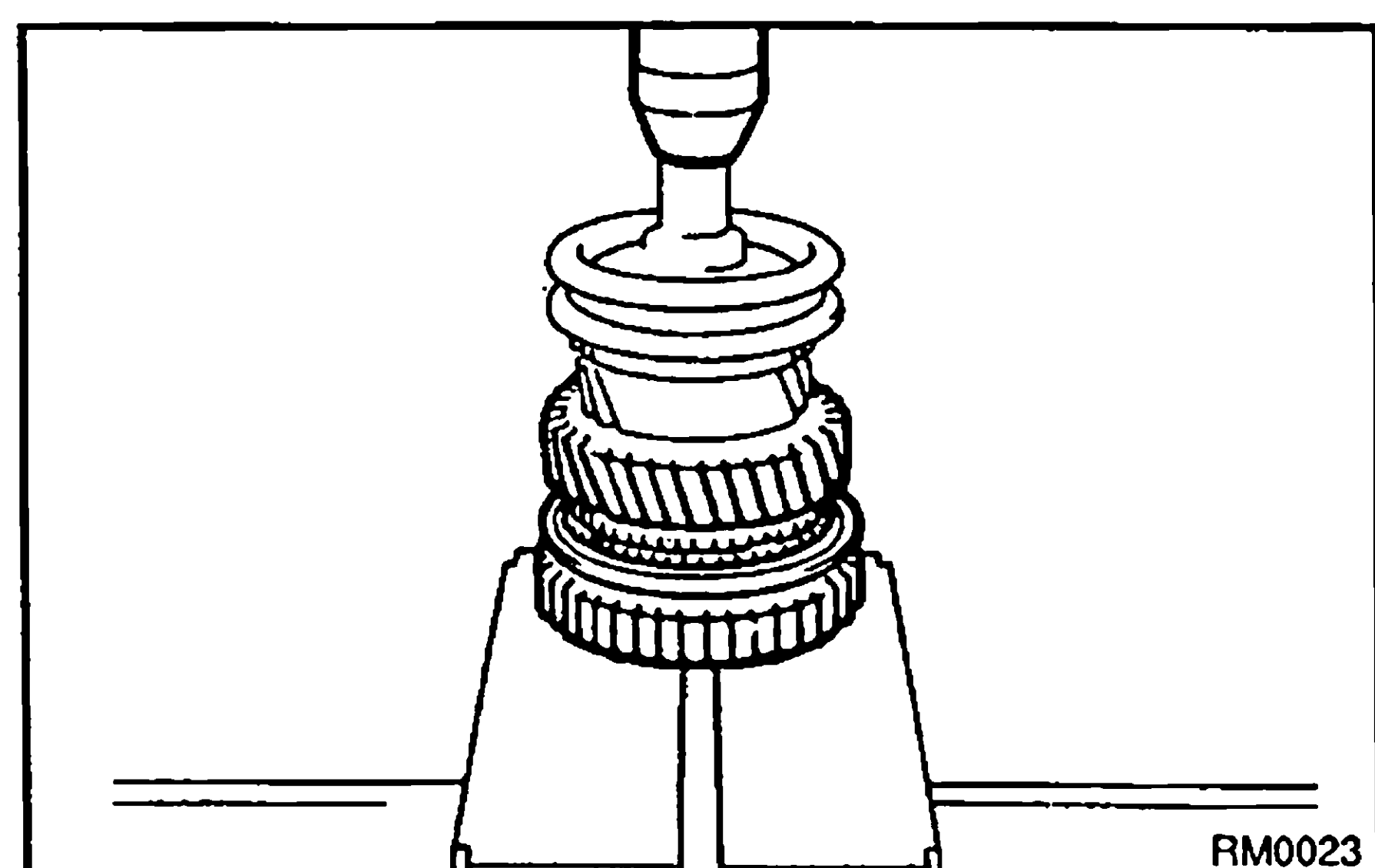
- (b) Using a snap ring expander, install the snap ring.

5. INSPECT 3RD GEAR THRUST CLEARANCE

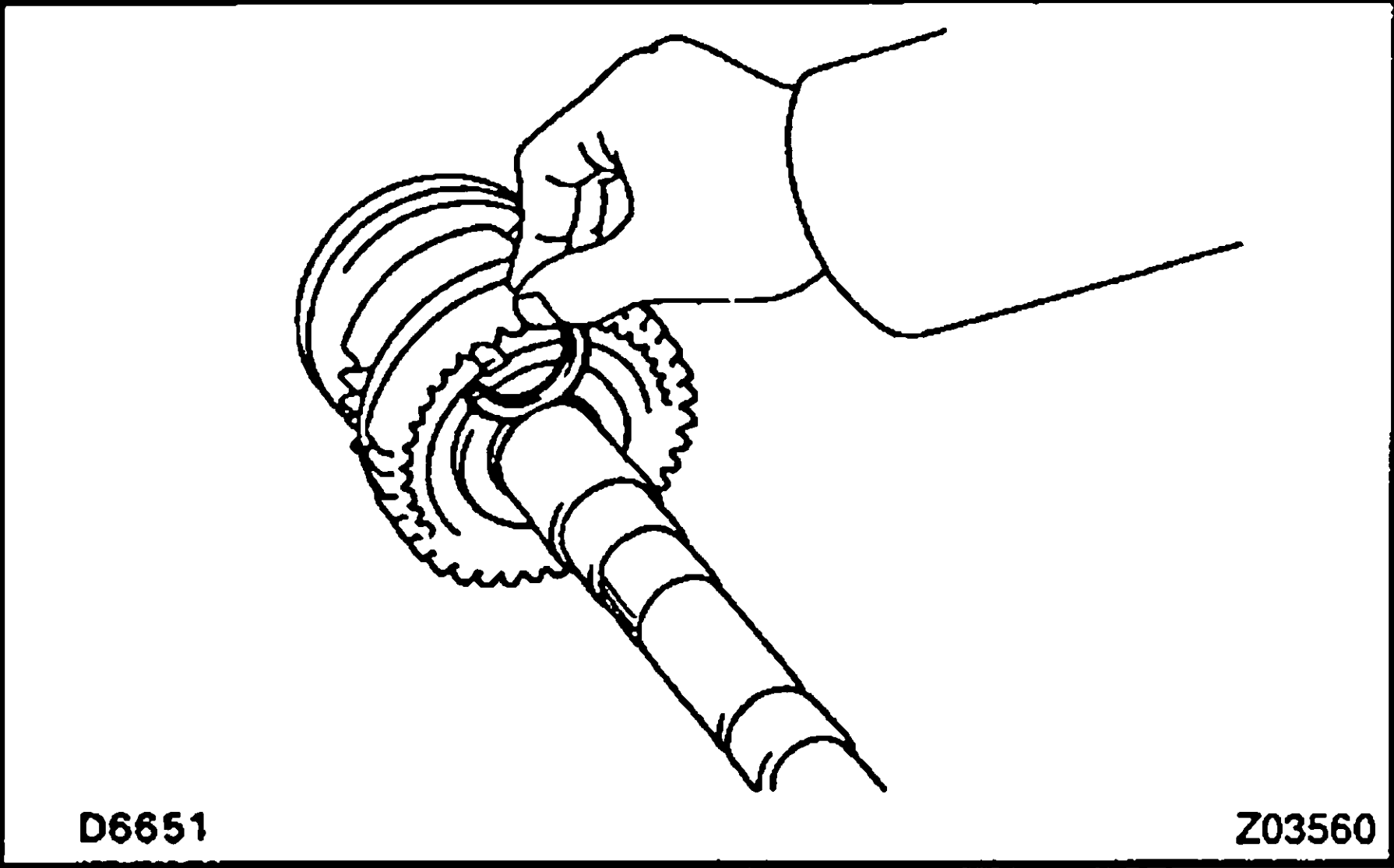
(See page MT-10)

6. INSTALL 2ND GEAR AND REVERSE GEAR

- (a) Apply gear oil to the shaft and needle roller bearing.
 (b) Place the synchronizer inner ring, middle ring and outer ring on the 2nd gear and align the ring slots with the shifting keys.
 (c) Align the projection of the synchronizer inner ring with the slots of the clutch hub No. 1.
 (d) Install the needle roller bearing in the 2nd gear.



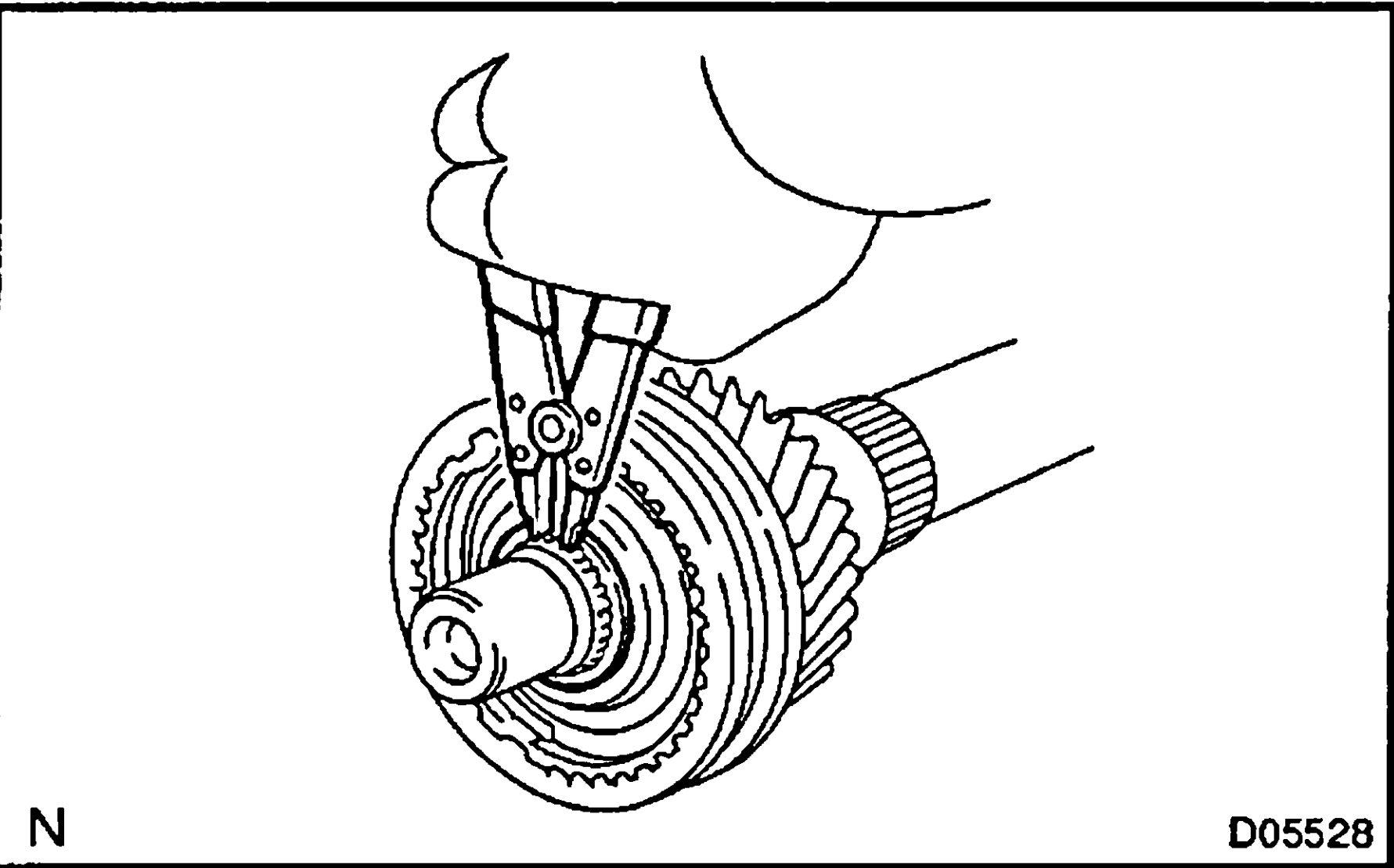
- (e) Using a press, install the 2nd gear assembly and reverse gear assembly.



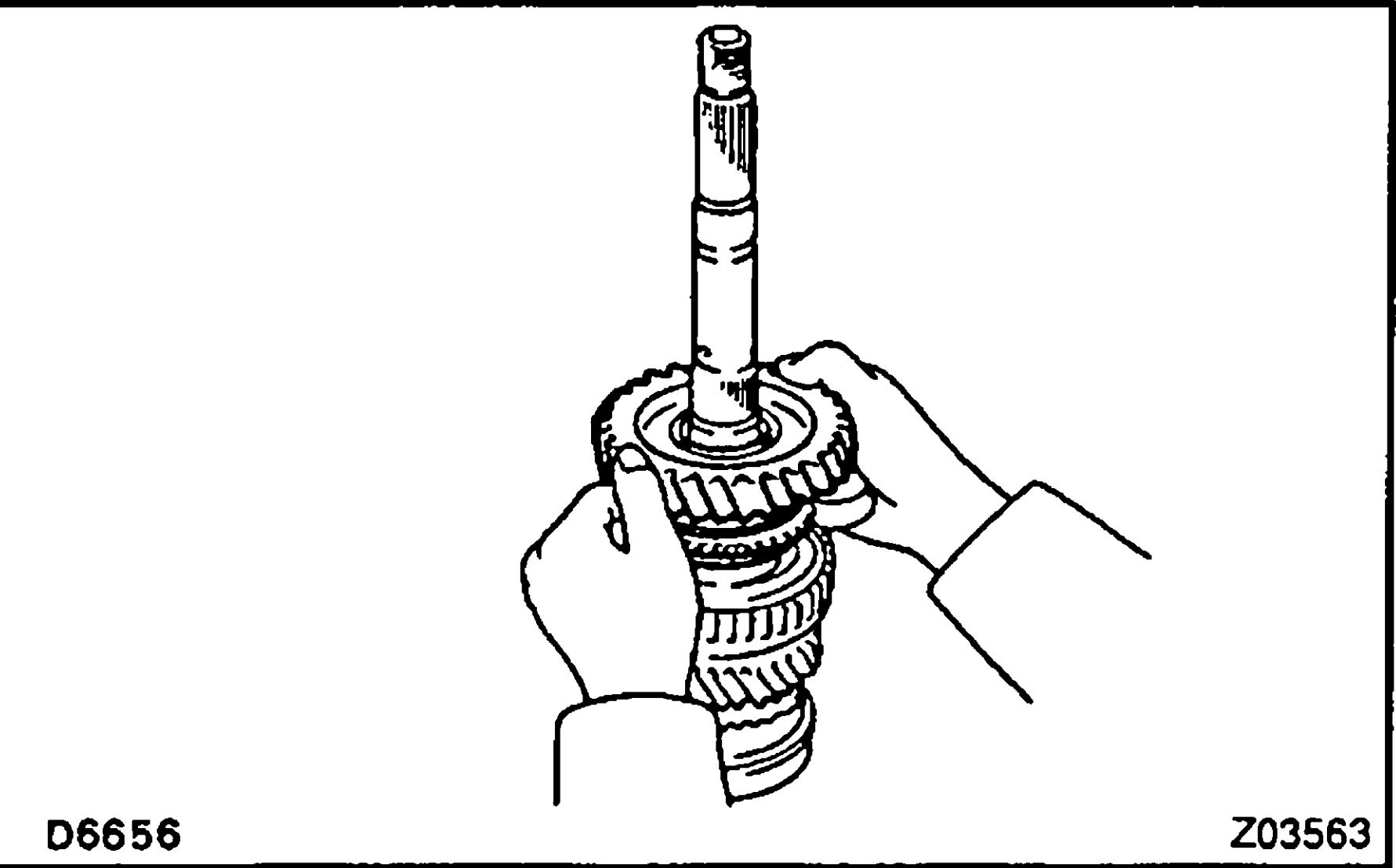
7. INSTALL SNAP RING

- (a) Select a snap ring that allows the minimum axial play.

Mark	Thickness mm (in.)
A	2.30 – 2.35 (0.0906 – 0.0925)
B	2.35 – 2.40 (0.0925 – 0.0945)
C	2.40 – 2.45 (0.0945 – 0.0965)
D	2.45 – 2.50 (0.0965 – 0.0984)
E	2.50 – 2.55 (0.0984 – 0.1004)
F	2.55 – 2.60 (0.1004 – 0.1024)
G	2.60 – 2.65 (0.1024 – 0.1043)

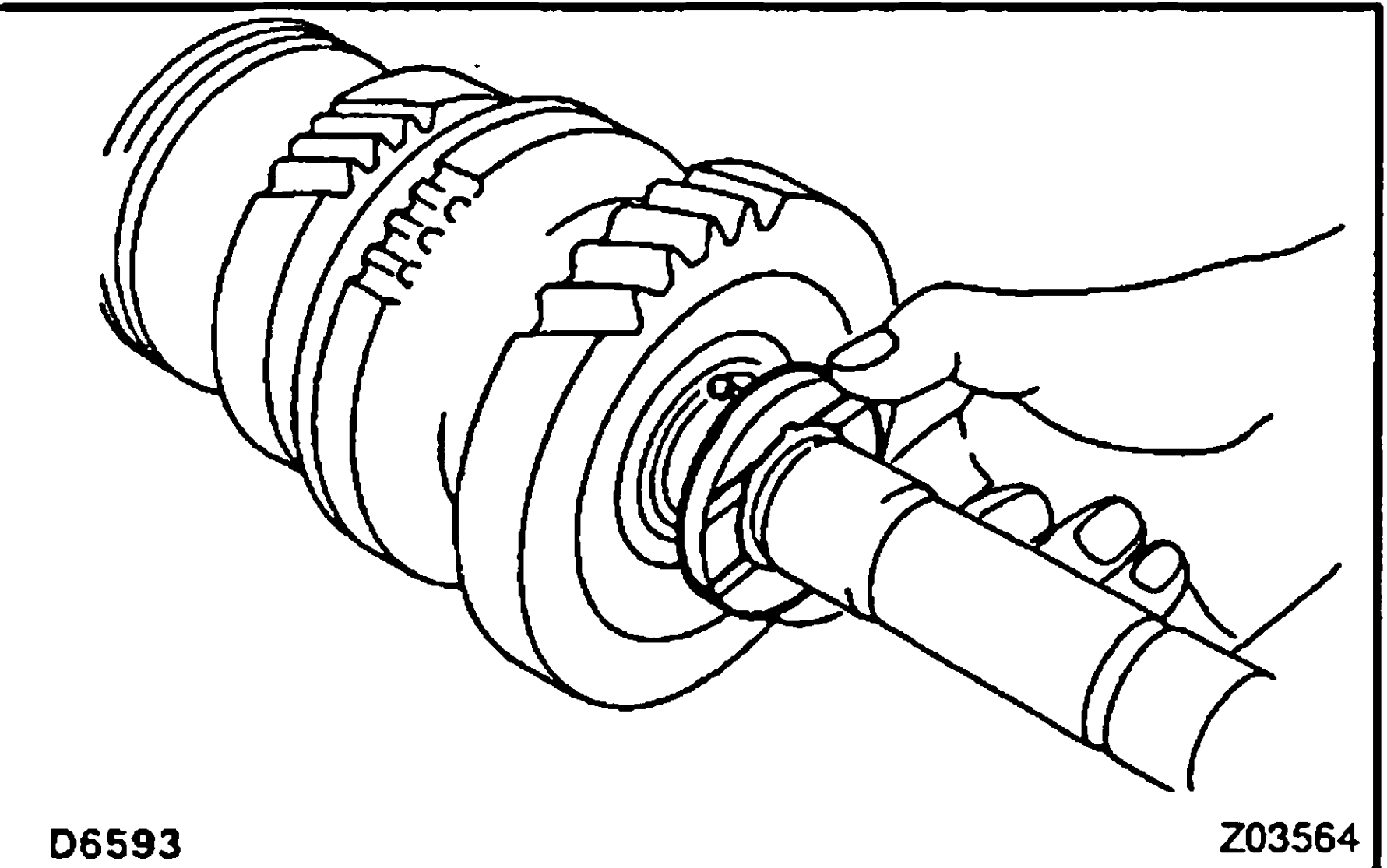


- (b) Using a snap ring expander, install the snap ring.



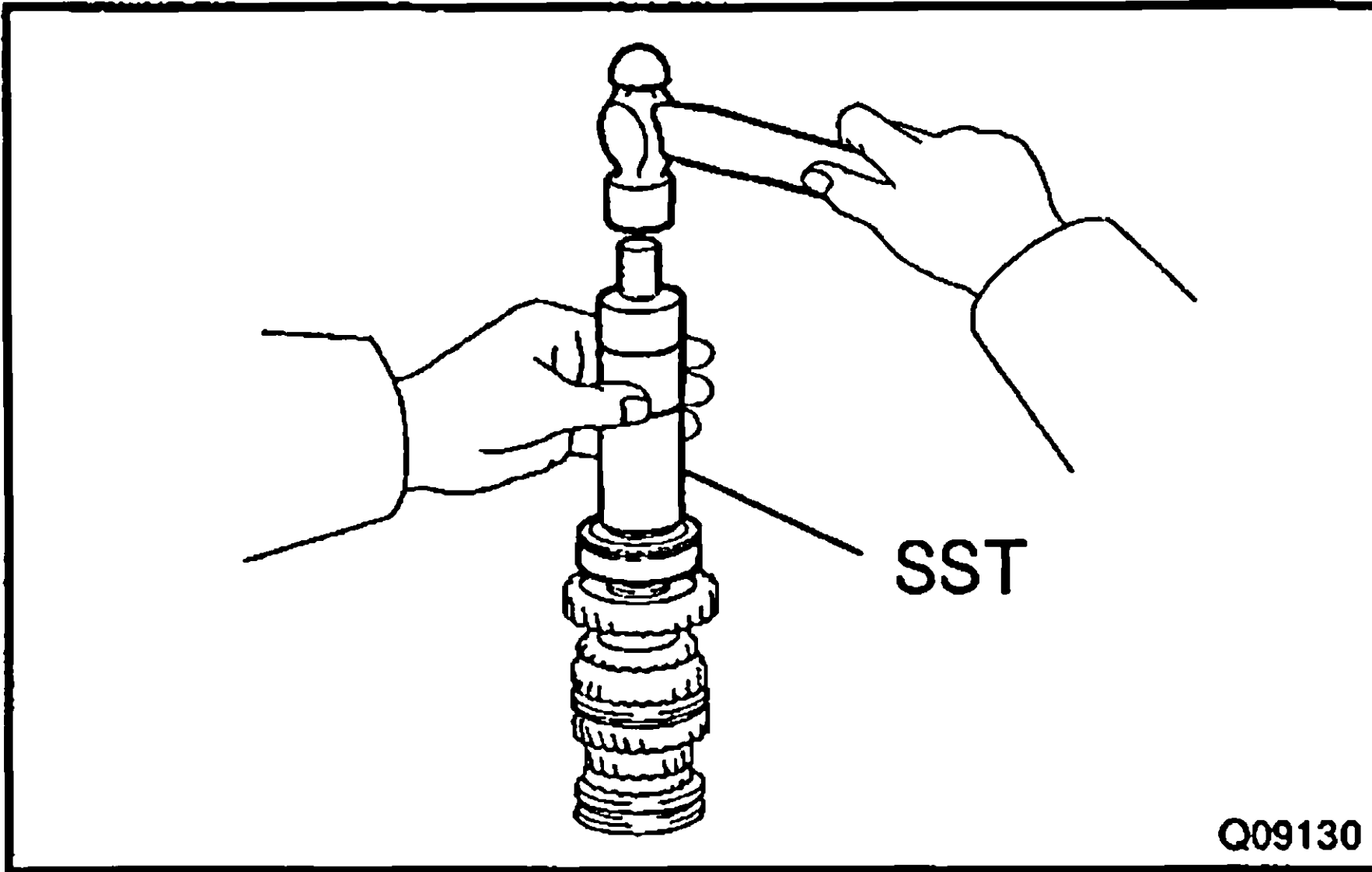
8. INSTALL SPACER AND 1ST GEAR ASSEMBLY

- (a) Install the spacer on the output shaft.
(b) Apply gear oil to the needle roller bearing.
(c) Assemble the 1st gear, synchronizer inner ring, middle ring and outer ring and needle roller bearing.
(d) Install the 1st gear assembly on the output shaft with the synchronizer inner ring slots aligned with the shifting keys.



9. INSTALL STRAIGHT PIN AND 1ST GEAR THRUST WASHER

Install the 1st gear thrust washer onto the output shaft with the straight pin aligned with the 1st gear thrust washer.

**10. INSTALL OUTPUT SHAFT CENTER BEARING**

Using SST and a hammer, drive in the bearing with the outer race snap ring groove toward the rear.

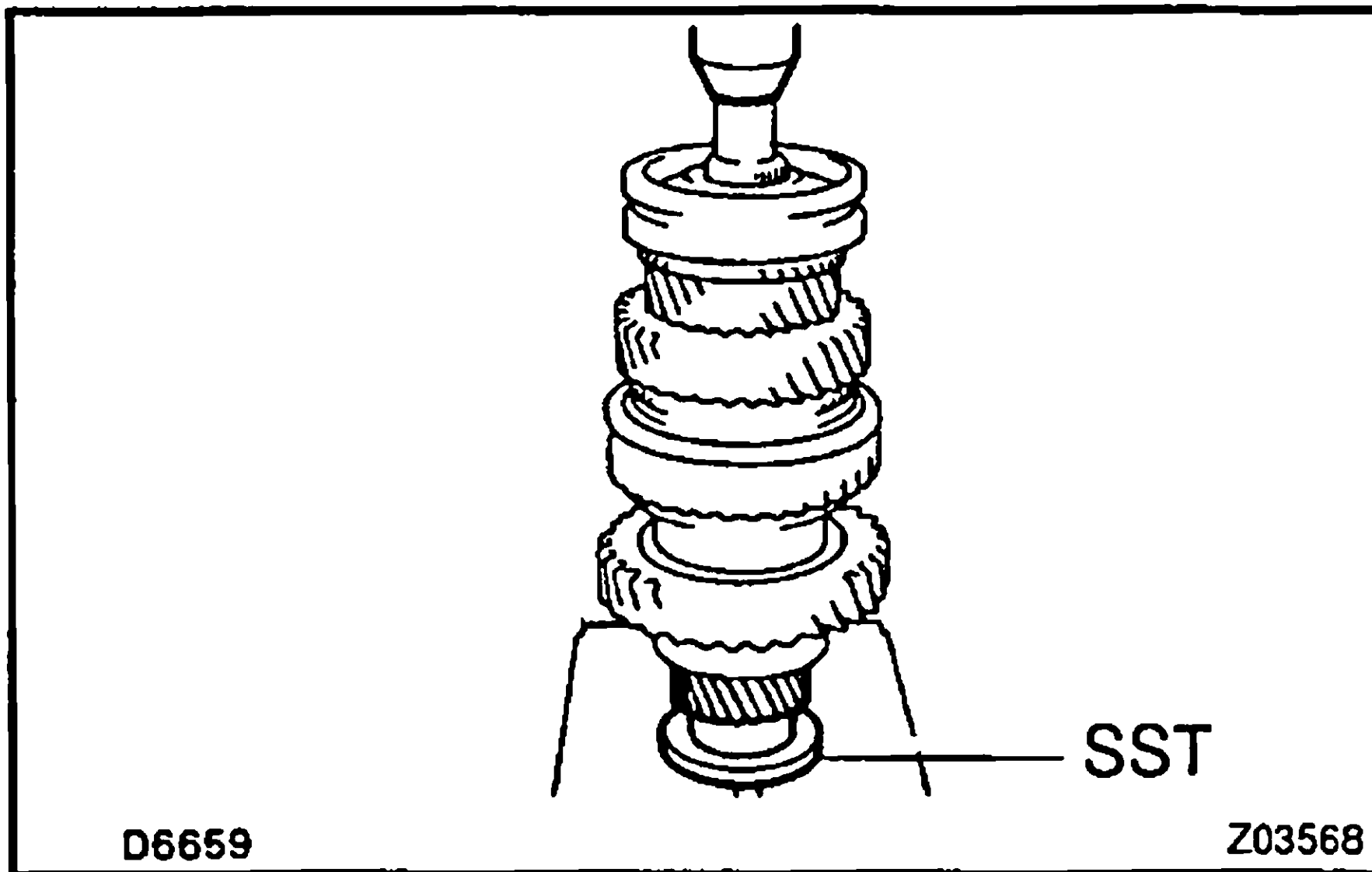
SST 09316-60011 (09316-00011, 09316-00071)

11. INSPECT 1ST GEAR THRUST CLEARANCE

(See page MT-10)

12. INSPECT 2ND GEAR THRUST CLEARANCE

(See page MT-10)

**13. INSTALL 5TH GEAR**

Using SST and a press, install the 5th gear.

SST 09316-60011 (09316-00031)

BRAKE

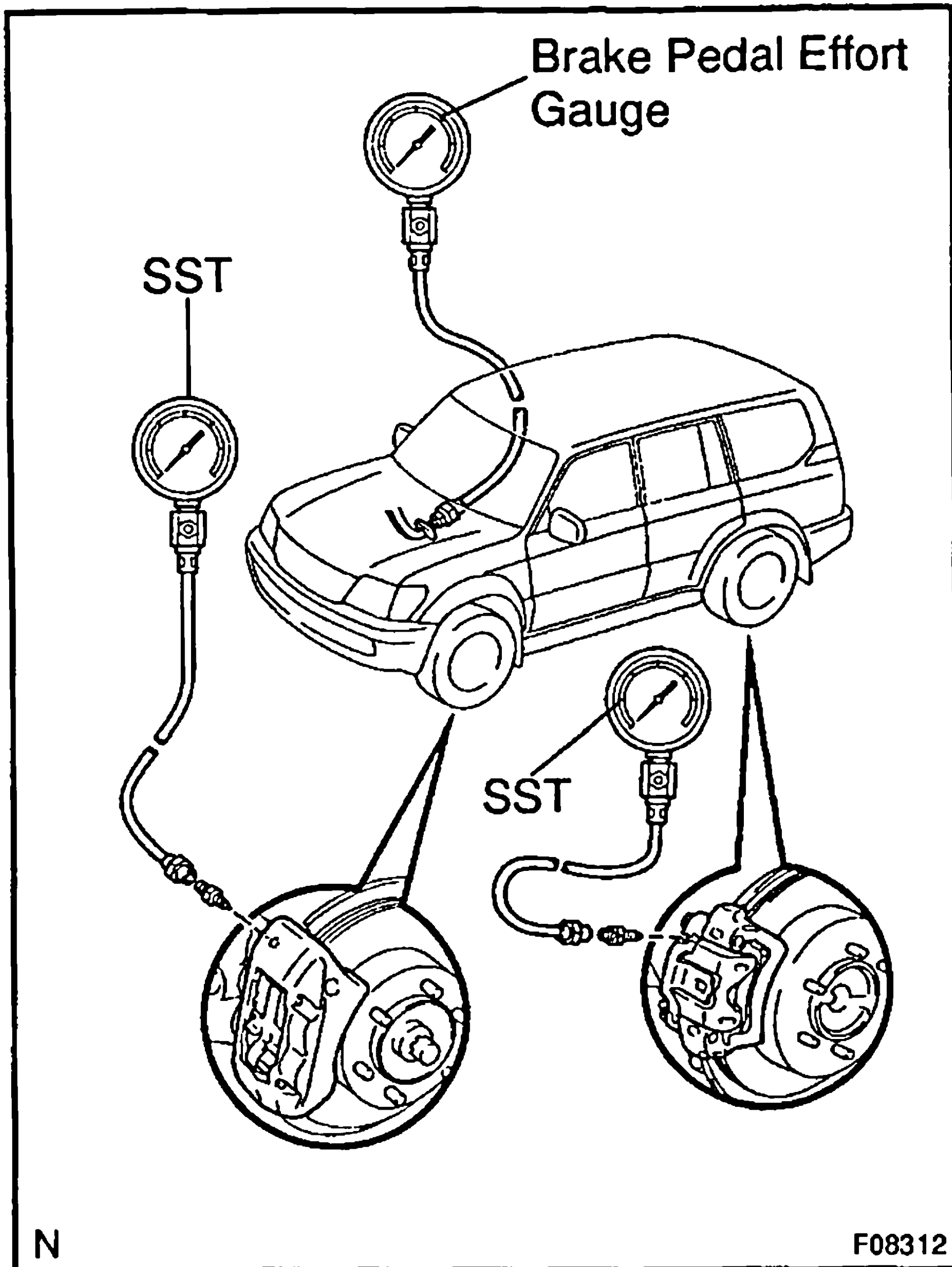
HYDRAULIC BRAKE BOOSTER BR-1

REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
LAND CRUISER/LAND CRUISER PRADO Chassis and Body Repair Manual	RM517E
LAND CRUISER/LAND CRUISER PRADO Chassis and Body Repair Manual Supplement (Jun., 1999)	RM702E

BR

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



HYDRAULIC BRAKE BOOSTER ON-VEHICLE INSPECTION

BR123-02

1. CHECK HYDRAULIC BRAKE BOOSTER FLUID PRESSURE CHANGE

- Inspect the battery voltage.
Battery voltage: 10 – 14 V
- Turn the ignition switch OFF, depress the brake pedal more than 40 times.

HINT:

When a pressure in power supply system is released, reaction force becomes heavy and stroke becomes shorter.

- Install LSPV gauge (SST) and brake pedal effort gauge, bleed air.

SST 09709-29018

- When booster does not operate:
Depress the brake pedal and check fluid pressure.

At 245 N (25 kgf, 55 lbf):

Front brake pressure	Rear brake pressure
1,471 kPa (15 kgf/cm ² , 213 psi) or more	0 kPa (0 kgf/cm ² , 0 psi)

At 343 N (35 kgf, 77 lbf):

Front brake pressure	Rear brake pressure
2,059 kPa (21 kgf/cm ² , 299 psi) or more	0 kPa (0 kgf/cm ² , 0 psi)

- When booster operate:
 - Turn the ignition switch ON and wait until the pump motor has stopped.
 - Depress the brake pedal and check fluid pressure.

At 49 N (5 kgf, 11 lbf):

Front brake pressure	Rear brake pressure
1,324 – 2,501 kPa (13.5 – 25.5 kgf/cm ² , 192 – 363 psi)	1,569 – 2,746 kPa (16 – 28 kgf/cm ² , 228 – 398 psi)

At 98 N (10 kgf, 22 lbf):

Front brake pressure	Rear brake pressure
3,285 – 4,462 kPa (33.5 – 45.5 kgf/cm ² , 476 – 647 psi)	3,579 – 4,756 kPa (36.5 – 48.5 kgf/cm ² , 519 – 690 psi)

At 147 N (15 kgf, 33 lbf):

Front brake pressure	Rear brake pressure
5,296 – 6,472 kPa (54 – 66 kgf/cm ² , 768 – 939 psi)	5,541 – 6,718 kPa (56.5 – 68.5 kgf/cm ² , 804 – 974 psi)

At 196 N (20 kgf, 44 lbf):

Front brake pressure	Rear brake pressure
7,257 – 8,434 kPa (74 – 86 kgf/cm ² , 1,053 – 1,223 psi)	7,551 – 8,728 kPa (77 – 89 kgf/cm ² , 1,095 – 1,266 psi)

2. In case of using hand-held tester: INSPECT HYDRAULIC BRAKE BOOSTER OPERATION

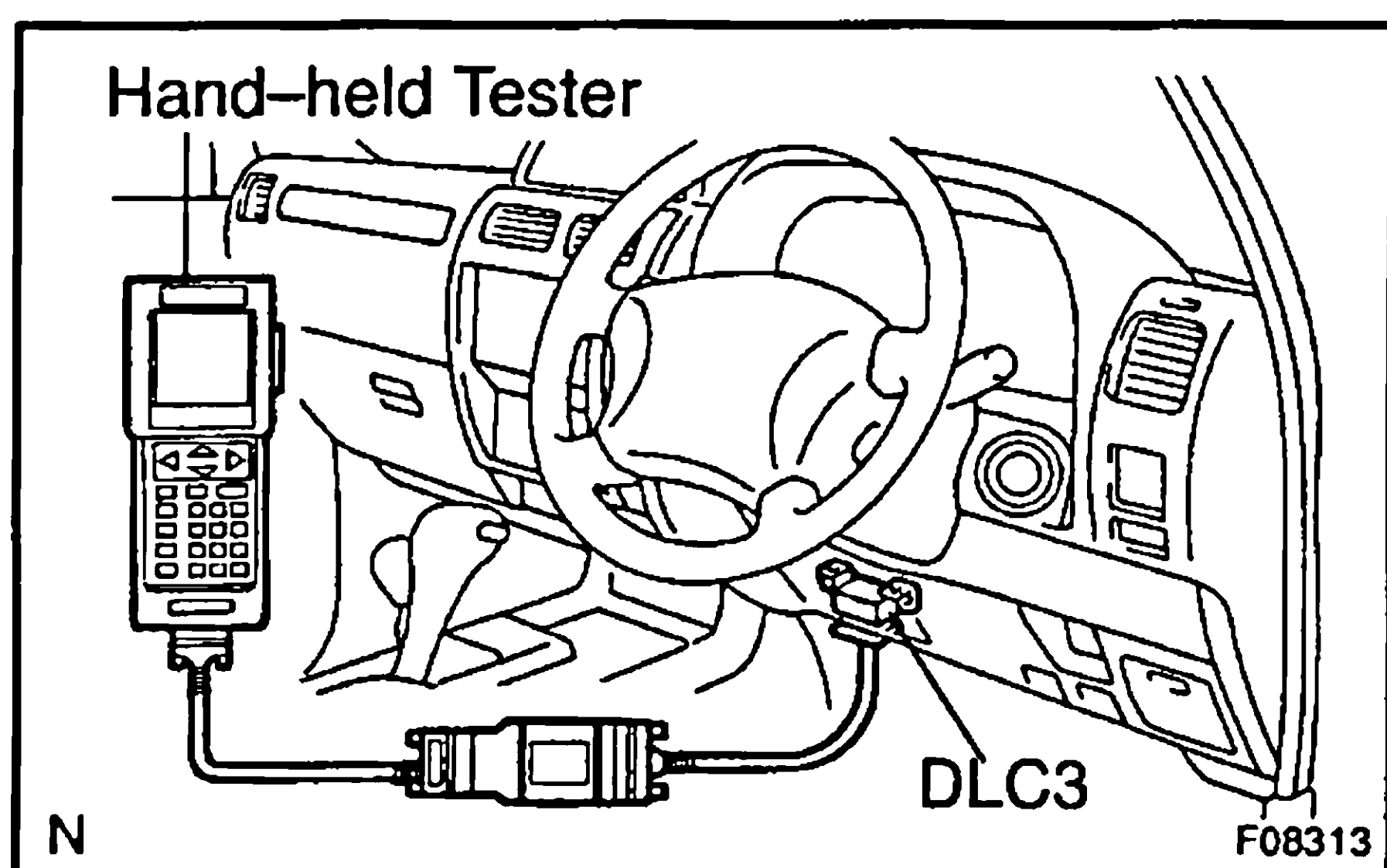
- (a) Inspect the battery voltage.
Battery voltage: 10 – 14 V
- (b) Turn the ignition switch OFF, depress the brake pedal more than 40 times.

HINT:

When a pressure in power supply system is released, reaction force becomes heavy and stroke becomes shorter.

- (c) Check that the brake pedal becomes heavy to depress. If the pedal does not become to be heavy to depress, check and replace the brake line and hydraulic brake booster.
- (d) Turn the ignition switch ON, check the pump motor operation noise.

If the pump motor does not operate, check and replace the wire harness and pump motor (See page BR-18).



- (e) Connect the hand-held tester.
 - (1) Connect the hand-held tester to the DLC3.
 - (2) Turn the ignition switch ON.
 - (3) Select the "ACTIVE TEST" mode on the hand-held tester.

HINT:

- Please refer to the hand-held tester operator's manual for further details.
 - To protect the solenoids, hand-held tester turns OFF automatically 2 sec. after every solenoid has been turned ON.
- (f) Inspect the front TRC or front TRC & VSC solenoid operation.
 - (1) Select "SA1" and "SA2" on the hand-held tester.
 - (2) With "SA1" and "SA2" turned ON simultaneously with the hand-held tester, depress the brake pedal with stable force and check that the pedal cannot be depressed.

HINT:

To protect the solenoids, hand-held tester turns OFF automatically 2 sec. after every solenoid has been turned ON.

If the pedal can be depressed, replace the hydraulic brake booster.

NOTICE:

When operating it continuously, set the interval of more than 20 sec.

- (3) Once, release the brake pedal.

- (4) When the solenoids are OFF, after depressing the brake pedal again and check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

- (g) Inspect the front ABS solenoid operation.
 - (1) Select "SFRH" and "SFLH" on the hand-held tester.
 - (2) With "SFRH" and "SFLH" turned ON simultaneously with the hand-held tester, depress the brake pedal with stable force and check that the brake pedal cannot be depressed.

HINT:

To protect the solenoids, hand-held tester turns OFF automatically 2 sec. after every solenoid has been turned ON.

If the pedal can be depressed, replace the hydraulic brake booster.

- (3) Once, release the brake pedal when the solenoids are OFF, check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

- (4) Once, release the brake pedal. After depressing and holding the brake pedal with stable force, turn the SFRH and SFRR solenoids ON simultaneously.

HINT:

To protect the solenoids, hand-held tester turns OFF automatically 2 sec. after every solenoid has been turned ON.

- (5) When the solenoids are OFF, check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

- (6) Once, release the brake pedal. After depressing and holding the brake pedal with stable force, turn the SFLH and SFLR solenoids ON simultaneously.

HINT:

To protect the solenoids, hand-held tester turns OFF automatically 2 sec. after every solenoid has been turned ON.

- (7) When the solenoids are OFF, check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

- (h) Jack up and support the vehicle.
- (i) Release the parking brake lever.
- (j) Shift the transfer shift lever to "N" position and check that the rear wheels by rotating them by hand.
- (k) Inspect the rear TRC or rear TRC & VSC solenoid operation.
 - (1) Select the "SA3" and "STR" on the hand-held tester.

- (2) Turn the "SA3" and "STR" ON simultaneously with the hand-held tester, and check that the rear wheels does not rotate by hand.

HINT:

When rotating the wheel fast, the fail-safe function is activated and judgement cannot be made properly. So rotate the wheel as slowly as possible.

If the rear wheels rotate, replace the hydraulic brake booster.

- (3) Turn the "SA3" and "STR" OFF simultaneously, and check that the rear wheels by rotating them by hand.

HINT:

- To protect the solenoids, hand-held tester turns OFF automatically 2 sec. after every solenoid has been turned ON.
- When rotating the wheel fast, the fail-safe function is activated and judgement cannot be made properly. So rotate the wheel as slowly as possible.

NOTICE:

When operating it continuously, set the interval of more than 20 sec.

If the rear wheels stop, replace the hydraulic brake booster.

- (I) Inspect the right rear ABS solenoid.

- (1) Select the "SA3", "STR" and "SRRH", on the hand-held tester.
- (2) Turn the "SA3", "STR" and "SRRH" ON simultaneously with the hand-held tester, and check that the right rear wheel by rotating it by hand.

HINT:

- To protect the solenoids, hand-held tester turns OFF automatically 2 sec. after every solenoid has been turned ON.
- When rotating the wheel fast, the fail-safe function is activated and judgement cannot be made properly. So rotate the wheel as slowly as possible.
- When solenoid is OFF, the wheel might stop temporarily. However if the wheel rotates again, the function works normally.

If the rear wheels stop, replace the hydraulic brake booster.

- (3) Turn the "SA3", "STR" and "SRRH" OFF, and check that the right rear wheel by rotating it by hand.

HINT:

- To protect the solenoids, hand-held tester turns OFF automatically 2 sec. after every solenoid has been turned ON.
- When rotating the wheel fast, the fail-safe function is activated and judgement cannot be made properly. So rotate the wheel as slowly as possible.

If the right rear wheel stop, replace the hydraulic brake booster.

- (4) Depress the pedal with stable force, then turn the "SRRH" and "SRRR" ON simultaneously.
- (5) When the solenoids are ON, check that the right rear wheel by rotating it by hand.
- (m) Inspect the left rear ABS solenoid operation.
 - (1) Select the "SA3", "STR" and "SRLH" on the hand-held tester.
 - (2) Turn the "SA3", "STR" and "SRLH" ON with hand-held tester, and check that the left rear wheel by rotating it by hand.

HINT:

When rotating the wheel fast, the fail-safe function is activated and judgement cannot be made properly. So rotate the wheel as slowly as possible.

If the rear wheels stop, replace the hydraulic brake booster.

- (3) Turn the "SA3", "STR" and "SRLH" OFF and check that the left rear wheel by rotating it by hand.

HINT:

- To protect the solenoids, hand-held tester turns OFF automatically 2 sec. after every solenoid has been turned ON.
- When rotating the wheel fast, the fail-safe function is activated and judgement cannot be made properly. So rotate the wheel as slowly as possible.
- When solenoid is OFF, the wheel might stop temporarily. However if the wheel rotates again, the function works normally.

If the left rear wheel stop, replace the hydraulic brake booster.

- (4) Depress the pedal with stable force, then turn the "SRLH" and "SRLR" ON simultaneously.

HINT:

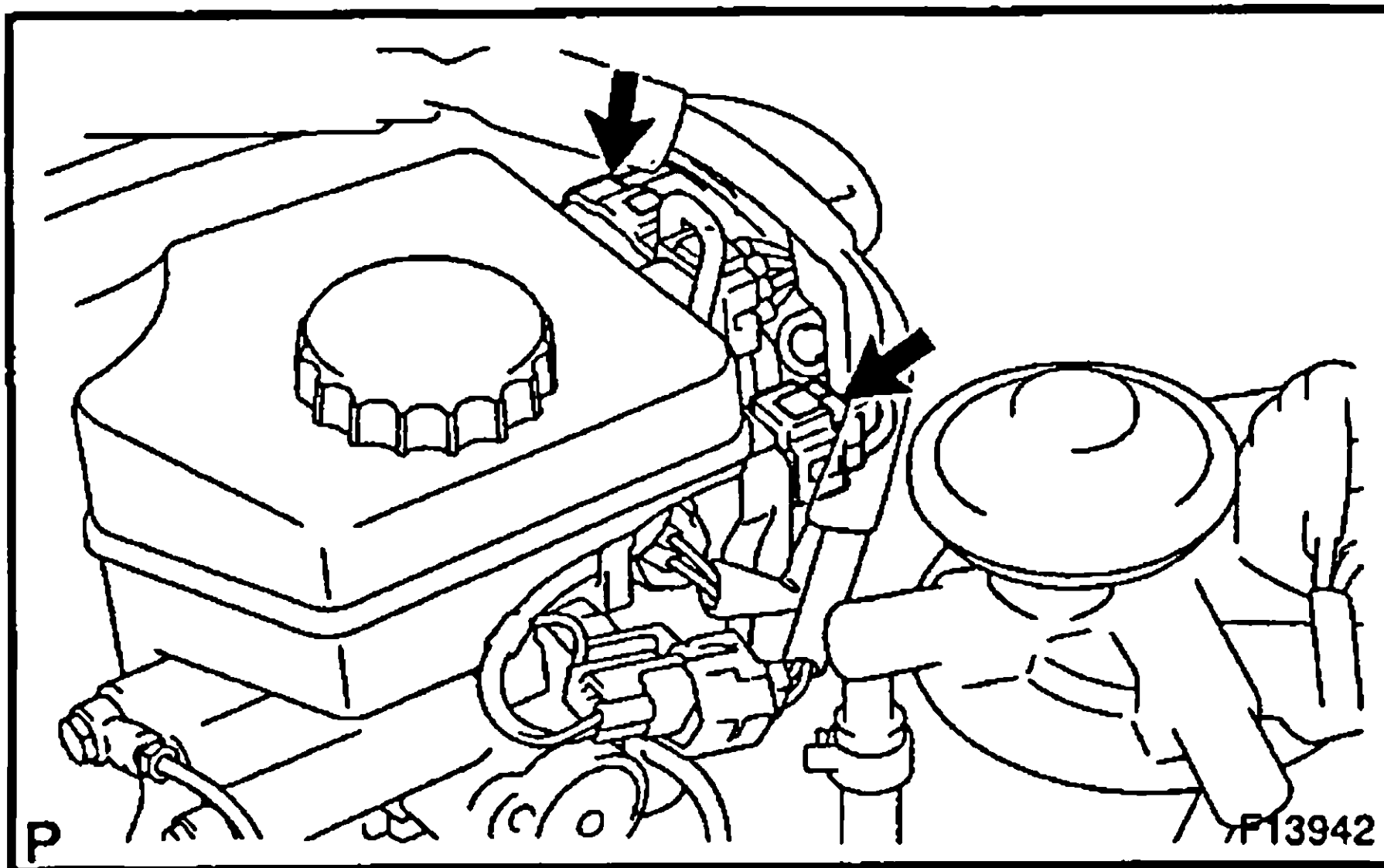
To protect the solenoids, hand-held tester turns OFF automatically 2 sec. after every solenoid has been turned ON.

- (5) When the solenoids are ON, check that the left rear wheel by rotating it by hand.

HINT:

When rotating the wheel fast, the fail-safe function is activated and judgement cannot be made properly. So rotate the wheel as slowly as possible.

- (n) Lower the vehicle.
- (o) Disconnect the hand-held tester.



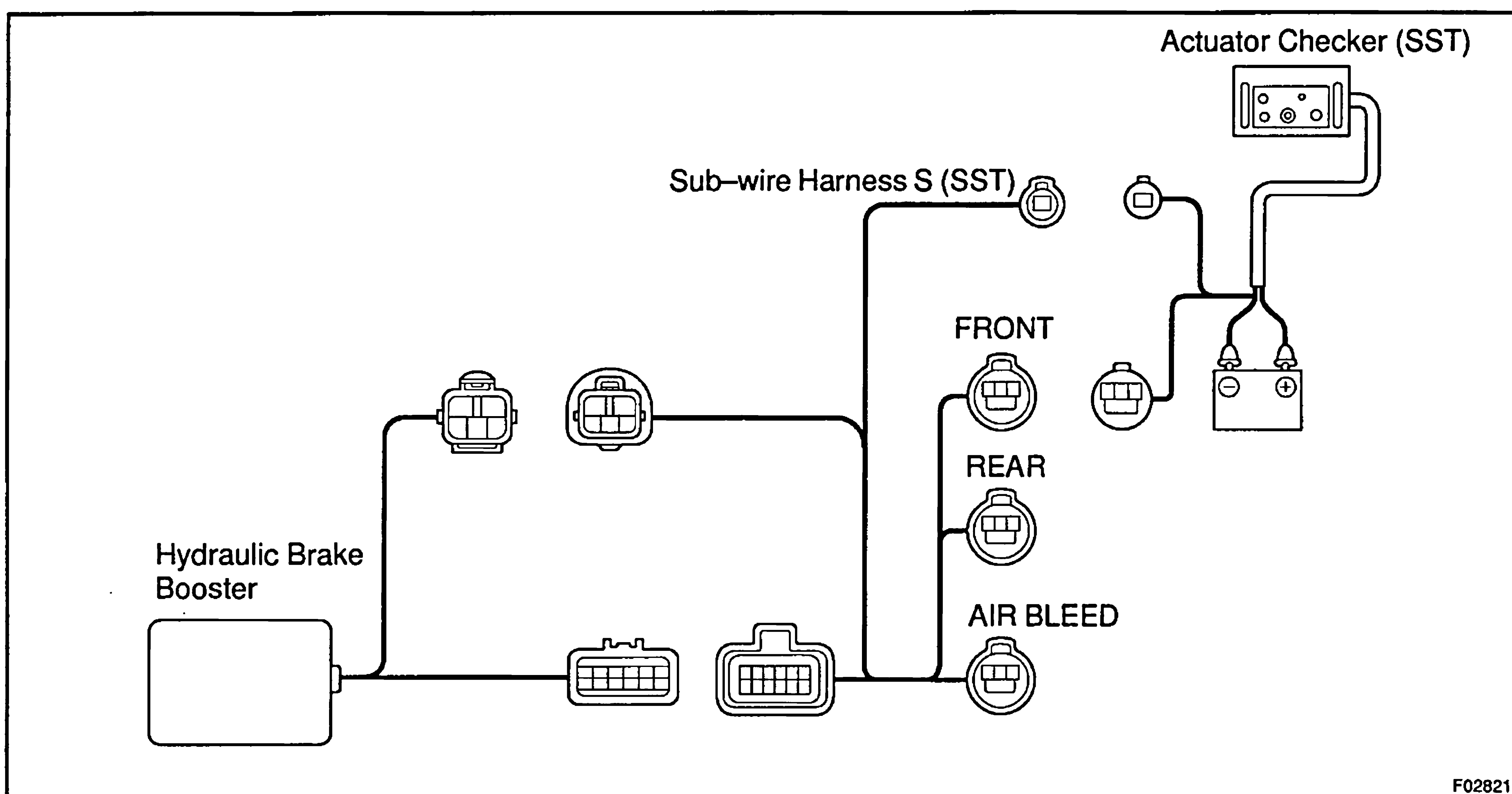
3. In case of using ABS actuator checker (SST):
INSPECT HYDRAULIC BRAKE BOOSTER OPERATION

- (a) Inspect the battery voltage.
Battery voltage: 10 – 14 V
- (b) Disconnect the 2 connectors from hydraulic brake booster.
- (c) Connect the actuator checker (SST) to the hydraulic brake booster side wire harness via the sub-wire harness S (SST), as shown in the following chart.
SST 09990-00150, 09990-00480

HINT:

Connect the connector with the label of "FRONT" attached to the connector of actuator checker.

- (d) Connect the red cable of the checker to the battery positive (+) terminal and the black cable to the negative (-) terminal.



- (e) Place "SHEET G" (SST) of "FRONT" on actuator checker.
SST 09990-00240
- (f) Turn the ignition switch OFF, depress the brake pedal more than 40 times.

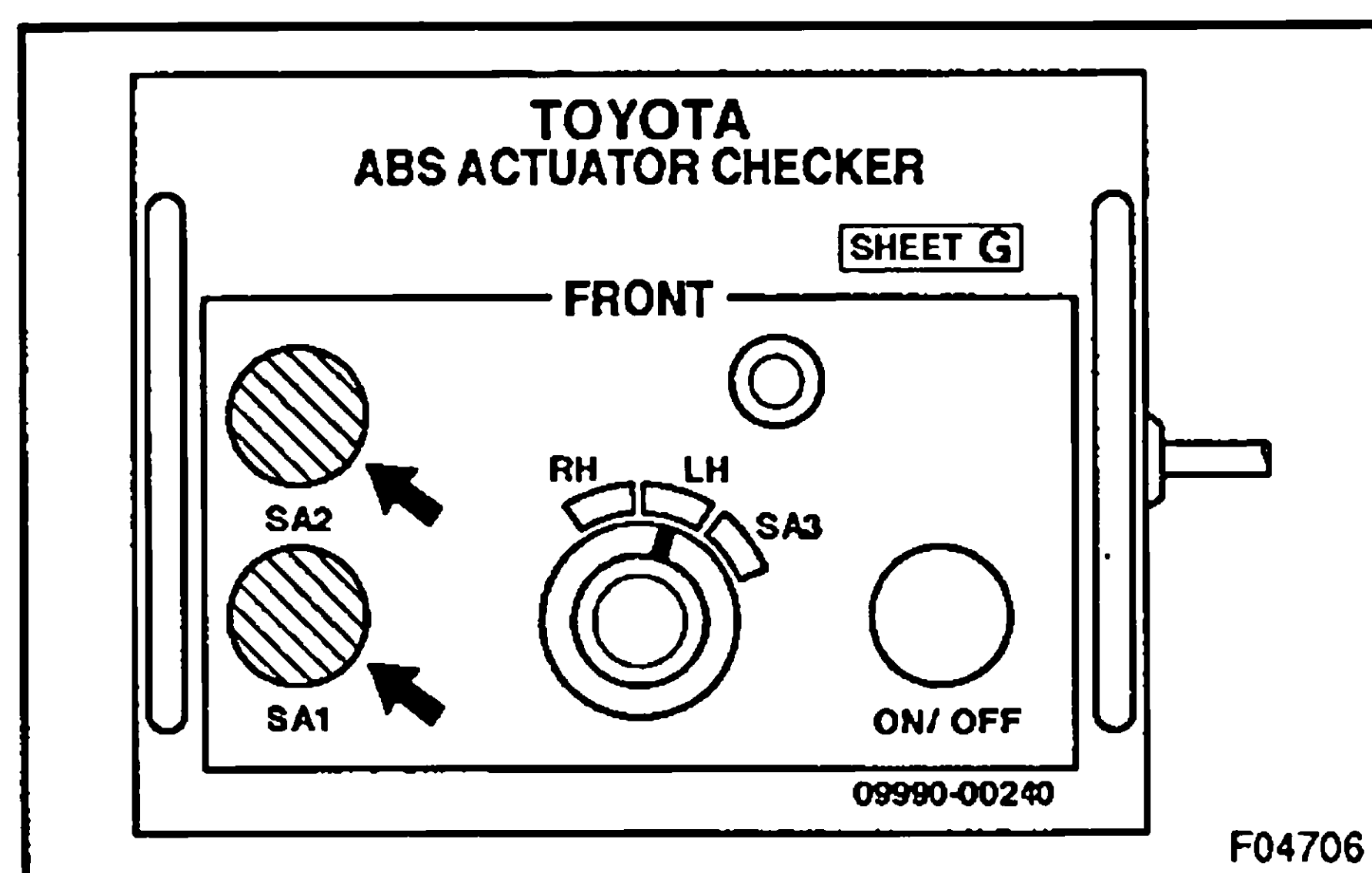
HINT:

When a pressure in power supply system is released, reaction force becomes heavy and stroke becomes shorter.

- (g) Check that the brake pedal becomes heavy to depress. If the pedal does not become to be heavy to depress, check and replace the brake line and hydraulic brake booster.

- (h) Turn the ignition switch ON, check the pump motor operation noise.

If the pump motor does not operate, check and replace the wire harness and pump motor (See page BR-18).



- (i) Inspect the front TRC or front TRC & VSC solenoid operation.

- (1) Push in and hold the "SA1" and "SA2" switches simultaneously, depress strongly and hold the brake pedal with stable force.

NOTICE:

Do not keep the "SA1" and "SA2" pushed down for more than 10 sec. When operating it continuously, set the interval of more than 20 sec.

- (2) Check that the brake pedal cannot be depressed. If the pedal can be depressed, replace the hydraulic brake booster.

- (3) Release the "SA1" switch and check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

- (4) Release the "SA2" switch and check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

- (j) Inspect the right front ABS solenoid operation.

- (1) Turn the selector switch to "RH" position.
(2) Push and hold in the MAIN push switch and "SA2" switch simultaneously, depress and hold the brake pedal with stable force.

NOTICE:

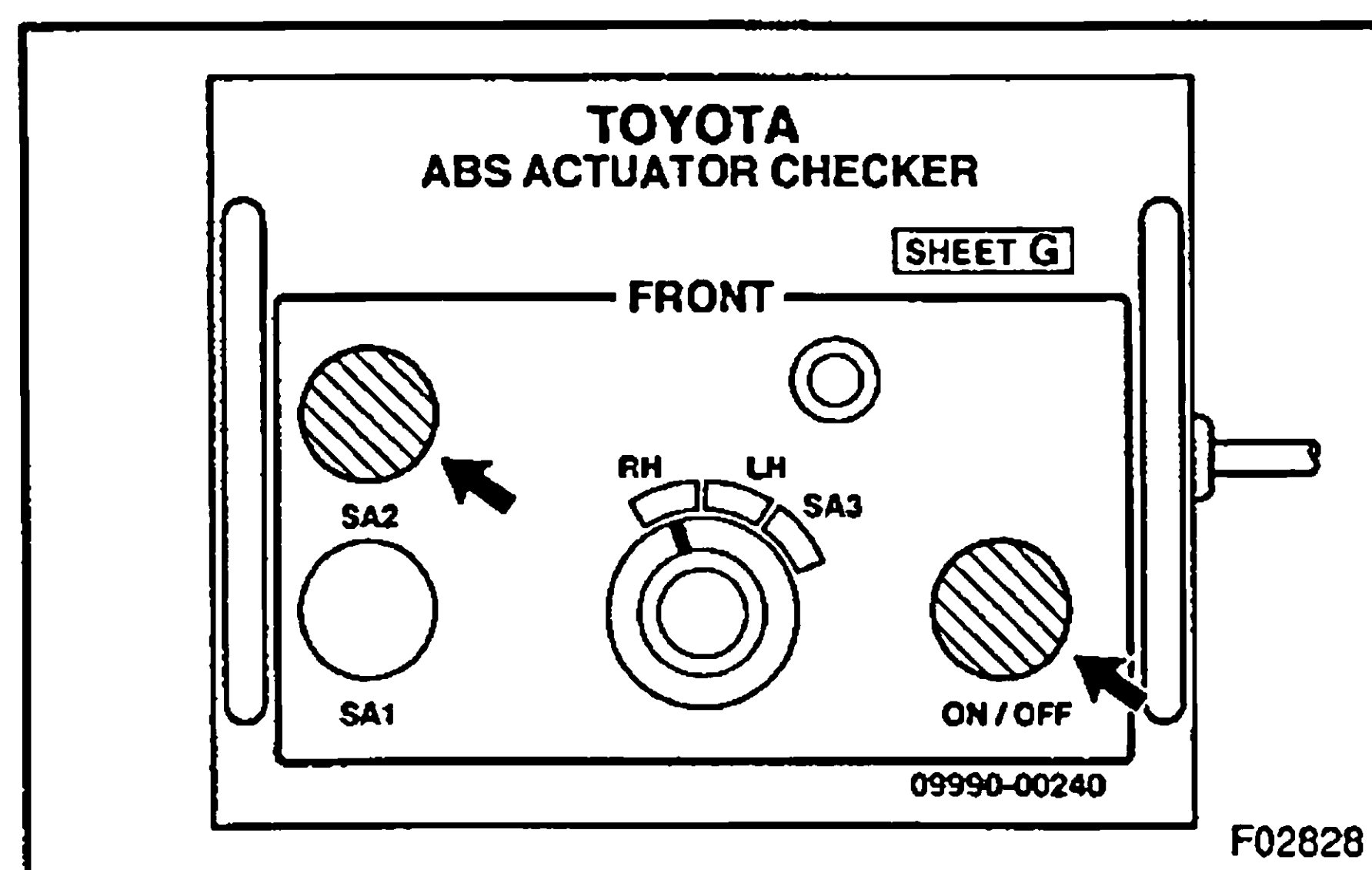
Do not keep the MAIN push switch and "SA2" switch pushed down for more than 10 sec. When operating it continuously, set the interval of more than 20 sec.

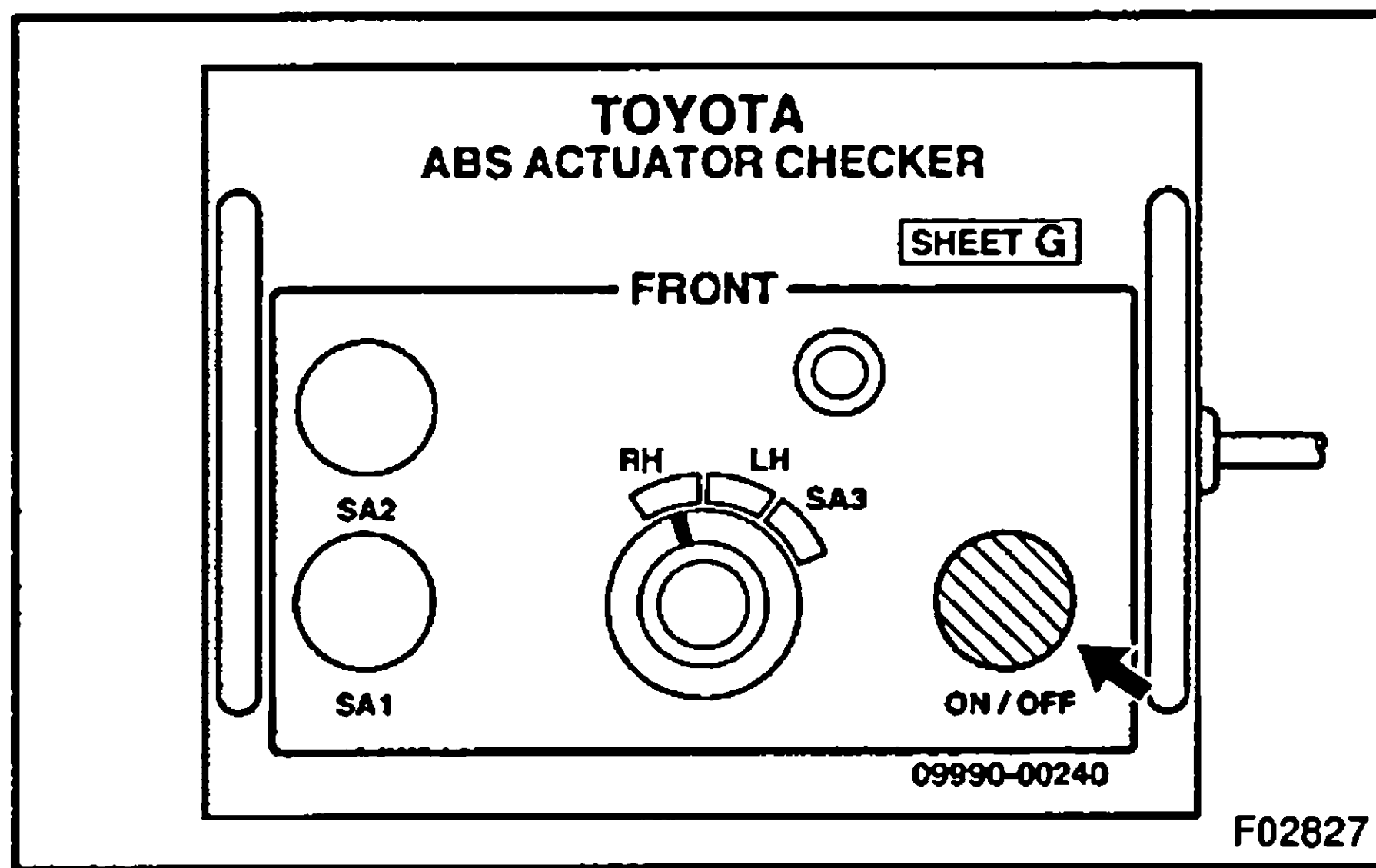
- (3) Check that the brake pedal cannot be depressed. If the pedal can be depressed, replace the hydraulic brake booster.

- (4) Release the MAIN push switch and "SA2" switch simultaneously and check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

- (5) Release the brake pedal.





- (6) Depress and hold the brake pedal with stable force, push and hold in MAIN push switch.

NOTICE:

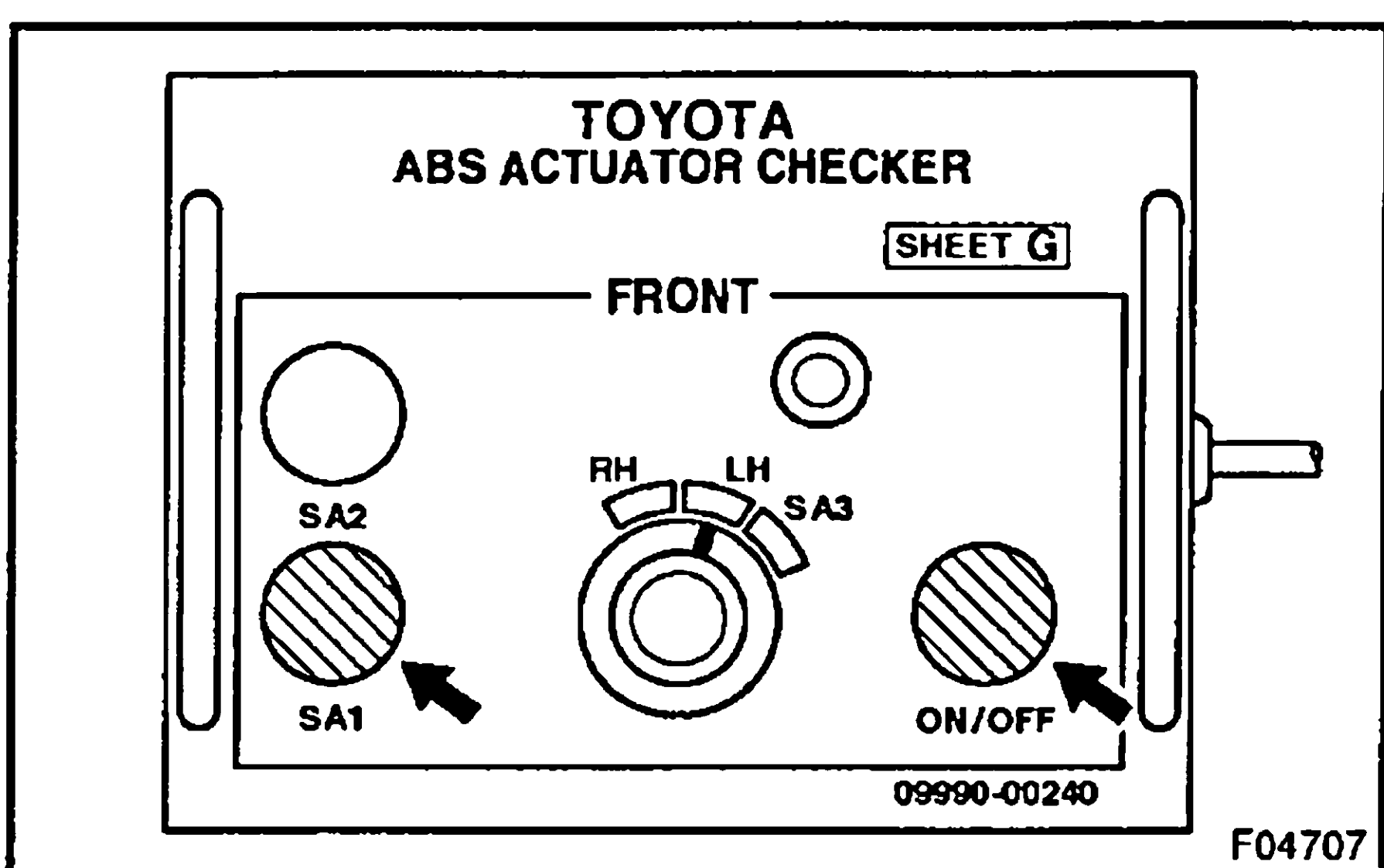
Do not keep the MAIN push switch pushed down for more than 10 sec. When operating it continuously, set the interval of more than 20 sec.

- (7) Check that the brake pedal cannot be depressed. If the pedal can be depressed, replace the hydraulic brake booster.

- (8) Release the MAIN push switch, and check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

- (9) Release the brake pedal.



- (k) Inspect the left front ABS solenoid operation.

- (1) Turn the selector switch to "LH" position.
(2) Push and hold in the MAIN push switch and "SA1" switch simultaneously, depress and hold the brake pedal with stable force.

NOTICE:

Do not keep the MAIN push switch and "SA1" switch pushed down for more than 10 sec. When operating it continuously, set the interval of more than 20 sec.

- (3) Check that the brake pedal cannot be depressed. If the pedal can be depressed, replace the hydraulic brake booster.

- (4) Release the MAIN push switch and "SA1" switch simultaneously, and check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

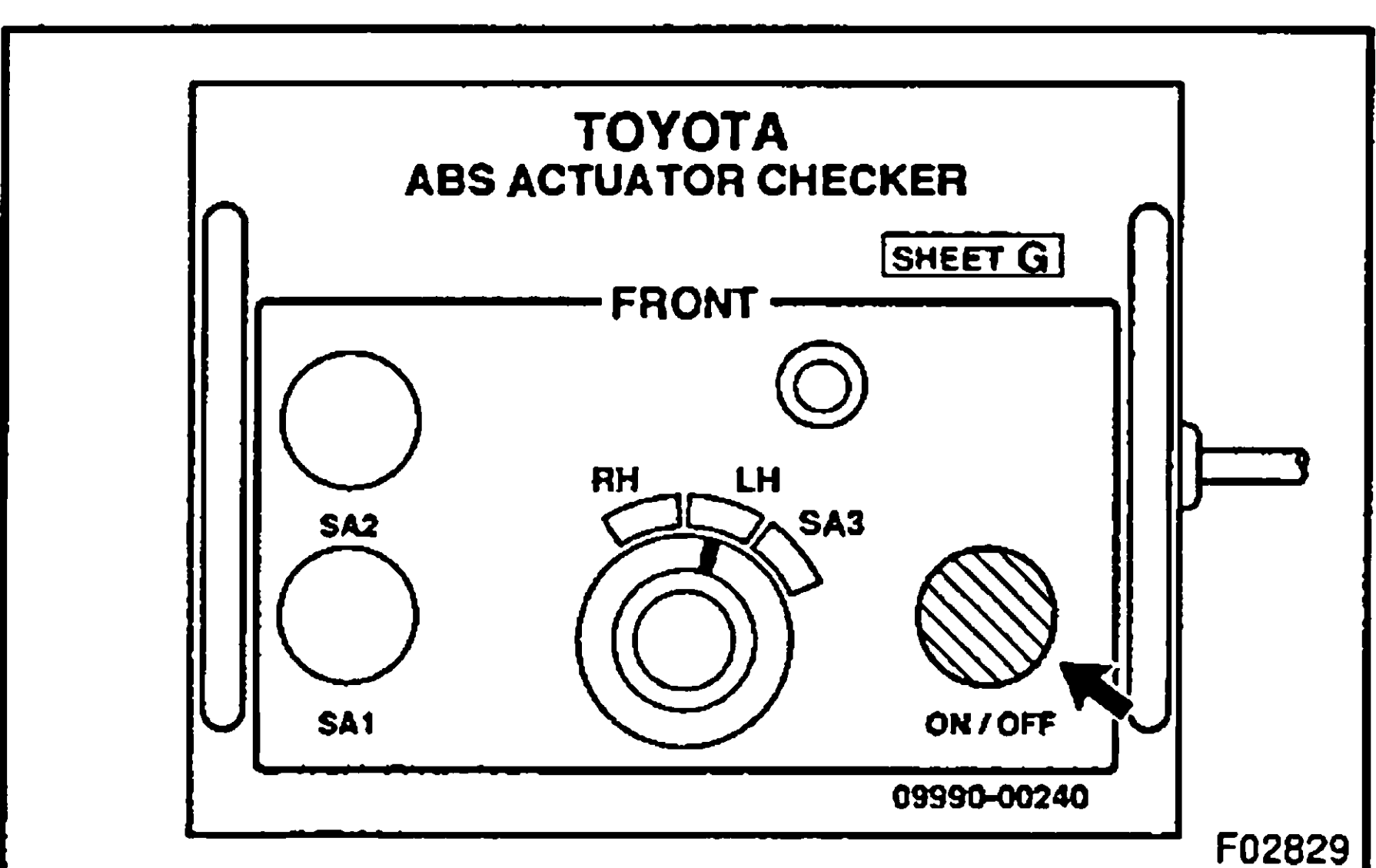
- (5) Release the brake pedal.

- (6) Depress and hold the brake pedal with stable force, push and hold in MAIN push switch.

NOTICE:

Do not keep the MAIN push switch pushed down for more than 10 sec. When operating it continuously, set the interval of more than 20 sec.

- (7) Check that the brake pedal cannot be depressed. If the pedal can be depressed, replace the hydraulic brake booster.

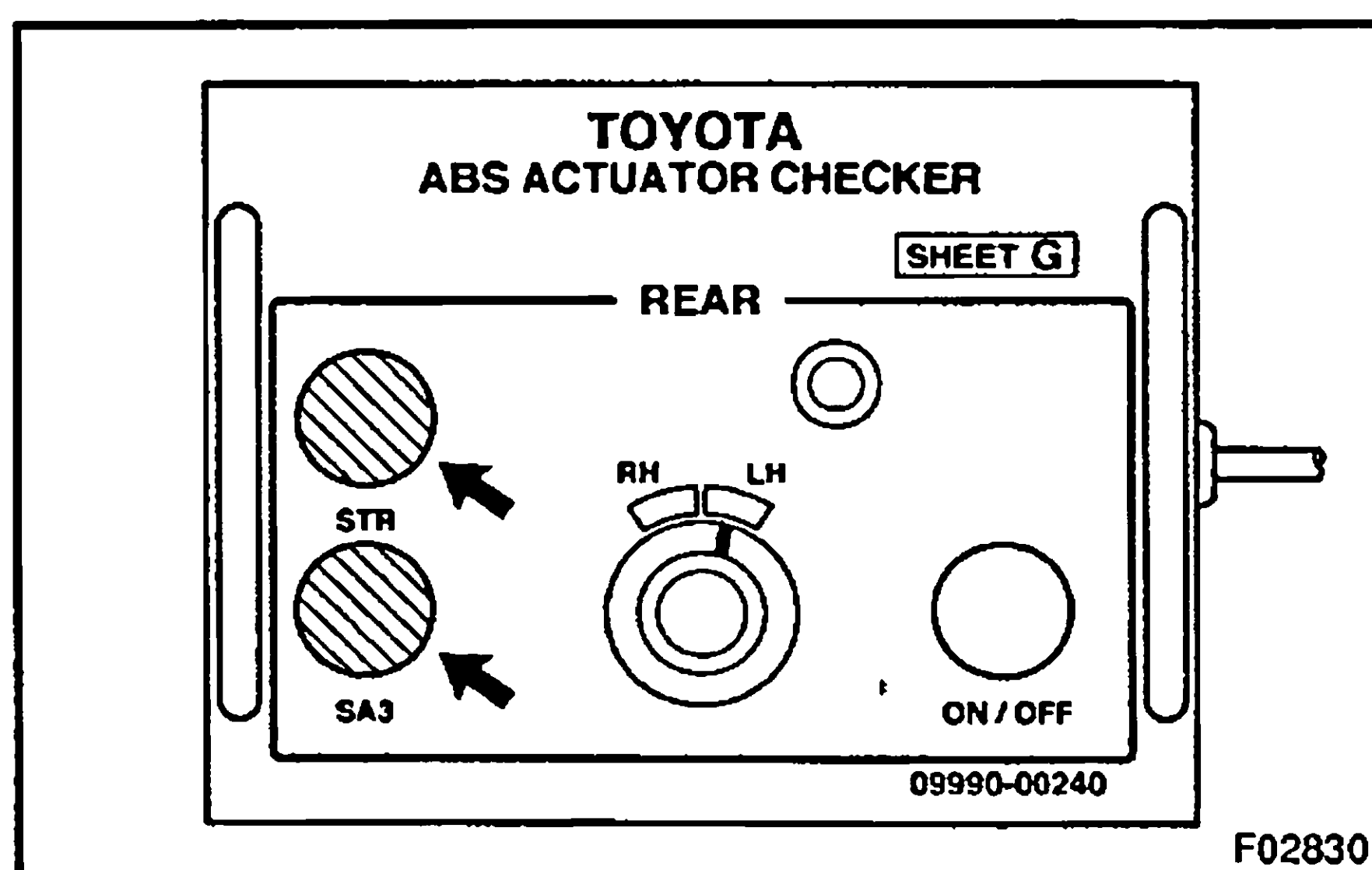


- (8) Release the MAIN push switch, and check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

- (9) Release the brake pedal.
- (l) Turn the ignition switch OFF, then reconnect the connector of sub-wire harness from the one with label of "FRONT" to "REAR".
- (m) Place "SHEET G" of "REAR" on the actuator checker.
- (n) Jack up and support the vehicle.
- (o) Start the engine and run it at idle.

BR



- (p) Inspect the rear TRC or rear TRC & VSC solenoid.
- (1) Release the parking brake lever and shift the shift lever to "L" position.
- (2) Push and hold the "SA3" switch and "STR" switch simultaneously.

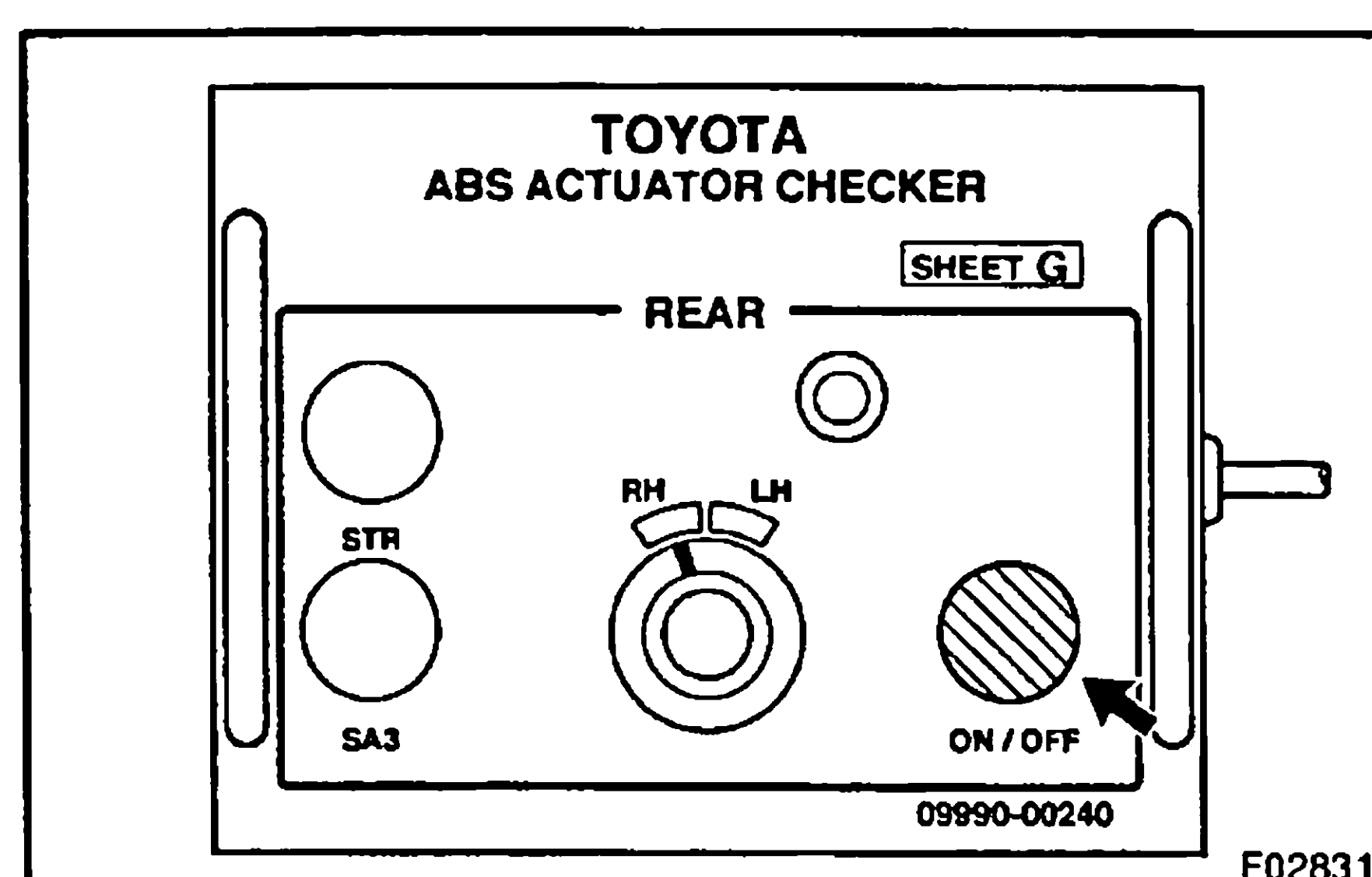
NOTICE:

- Do not keep the "STR" switch pushed down for more than 10 sec.
 - Do not keep the "SA3" switch pushed down for more than 5 sec.
 - When operating it continuously, set the interval of more than 20 sec.
- (3) Check that the rear wheels stop.

If the rear wheels rotate, replace the hydraulic brake booster.

- (4) Release the "SA3" switch and "STR" switch simultaneously.
- (5) Check that the rear wheels rotate.

If the rear wheels stop, replace the hydraulic brake booster.



- (q) Inspect the right rear ABS solenoid.
- (1) Turn the selector switch to "RH" position.
- (2) Depress the brake pedal several times and release the brake pedal when the pump begins rotating. Wait until the pump stops.
- (3) Turn the ignition switch OFF.
- (4) Depress the brake pedal with a force of 490 N (50 kgf, 110 lbf), record the fluid surface in the reservoir tank of the hydraulic brake booster.

- (5) Press the MAIN push switch for 10 sec., and check that the fluid surface in the reservoir tank of the hydraulic brake booster does not rise up at this time.

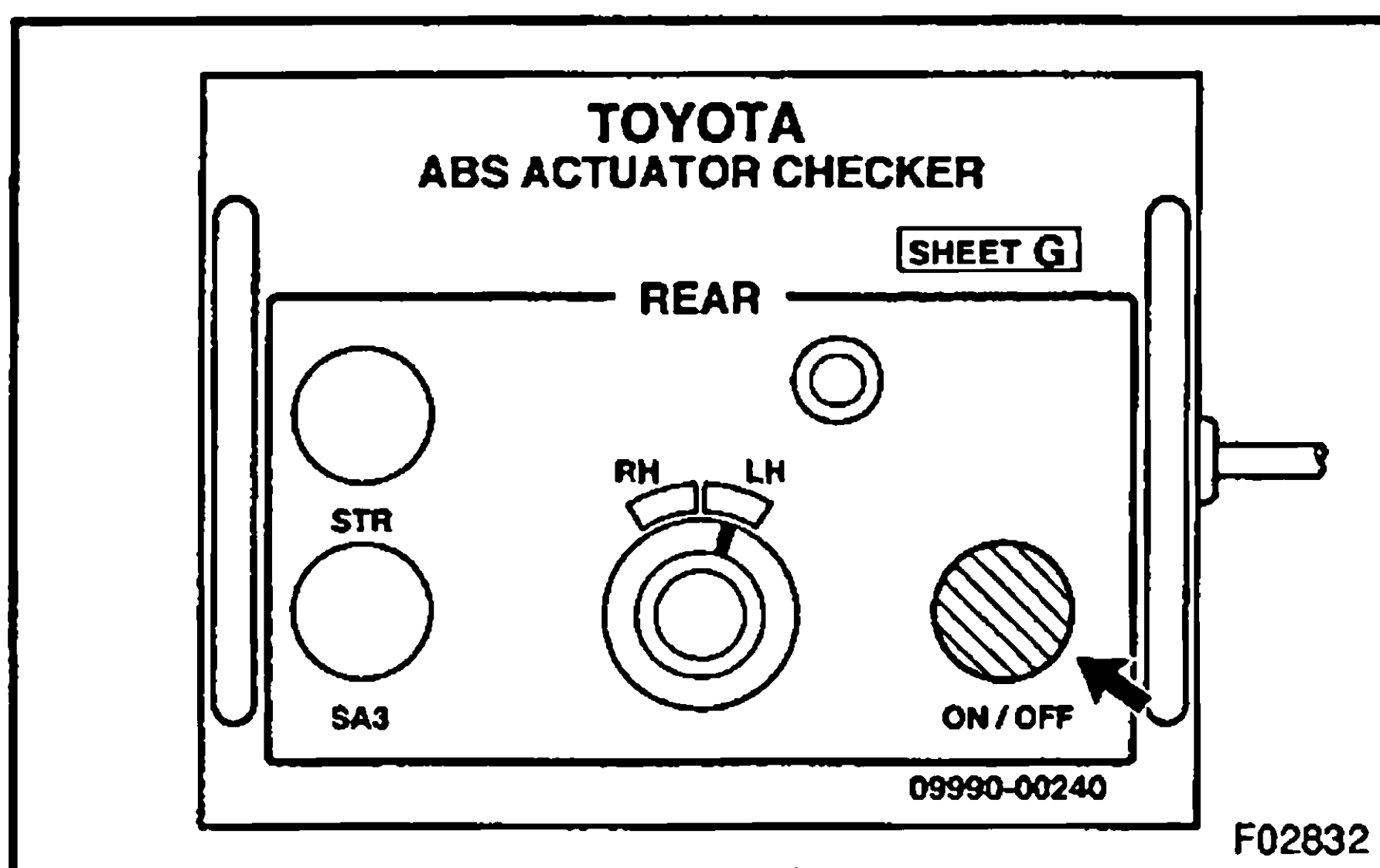
If the fluid surface level rises up, replace the hydraulic brake booster.

NOTICE:

Do not press MAIN push switch for more than 10 sec. When operating the switch continuously, do it an interval of more than 20 sec.

- (6) Start the engine and run it at idle.
- (7) Depress the brake pedal.
- (8) Release the parking brake lever and shift the shift lever to "L" position.
- (9) Once, release the brake pedal. After depressing the brake pedal with stable force, then push and hold MAIN push switch.
- (10) Check that the right rear wheel rotates.

If the right rear wheel stops, replace the hydraulic brake booster.



- (r) Inspect the left rear ABS solenoid.
 - (1) Turn the selector switch to "LH" position.
 - (2) Depress the brake pedal several times and release the brake pedal when the pump begins rotating. Wait until the pump stops.
 - (3) Turn the ignition switch OFF.
 - (4) Depress the brake pedal with a force of 490 N (50 kgf, 110 lbf), record the fluid surface in the reservoir tank of the hydraulic brake booster.
 - (5) Press the MAIN push switch for 10 sec., and check that the fluid surface in the reservoir tank of the hydraulic brake booster does not rise up at this time.

If the fluid surface level rises up, replace the hydraulic brake booster.

NOTICE:

Do not press MAIN push switch for more than 10 sec. When operating the switch continuously, do it an interval of more than 20 sec.

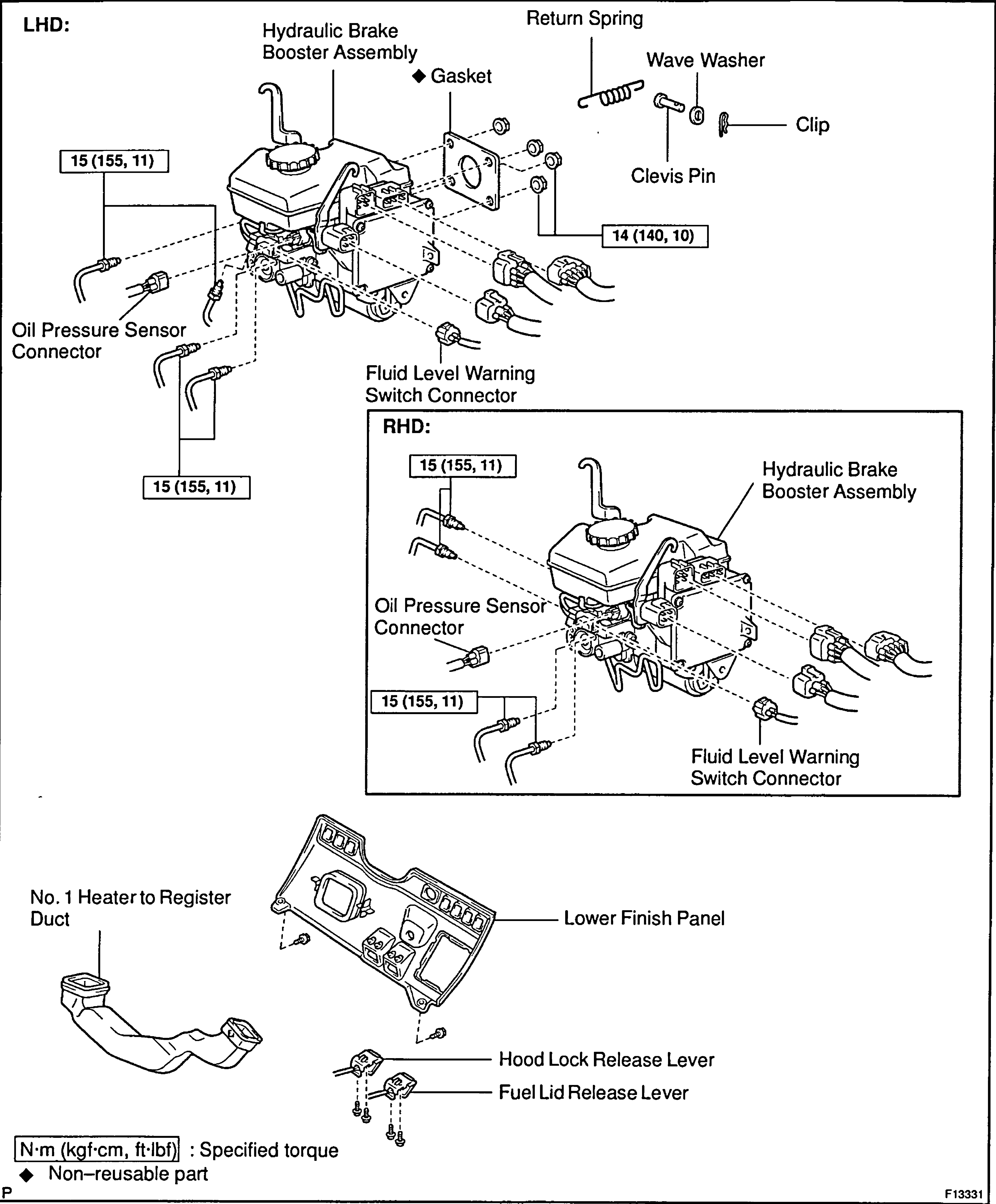
- (6) Start the engine and run it at idle.
- (7) Depress the brake pedal.
- (8) Release the parking brake lever and shift the shift lever to "L" position.
- (9) Once, release the brake pedal. After depressing the brake pedal with stable force, then push and hold MAIN push switch.
- (10) Check that the left rear wheel rotates.

If the left rear wheel stops, replace the hydraulic brake booster.

- (s) Stop the engine and lower the vehicle.

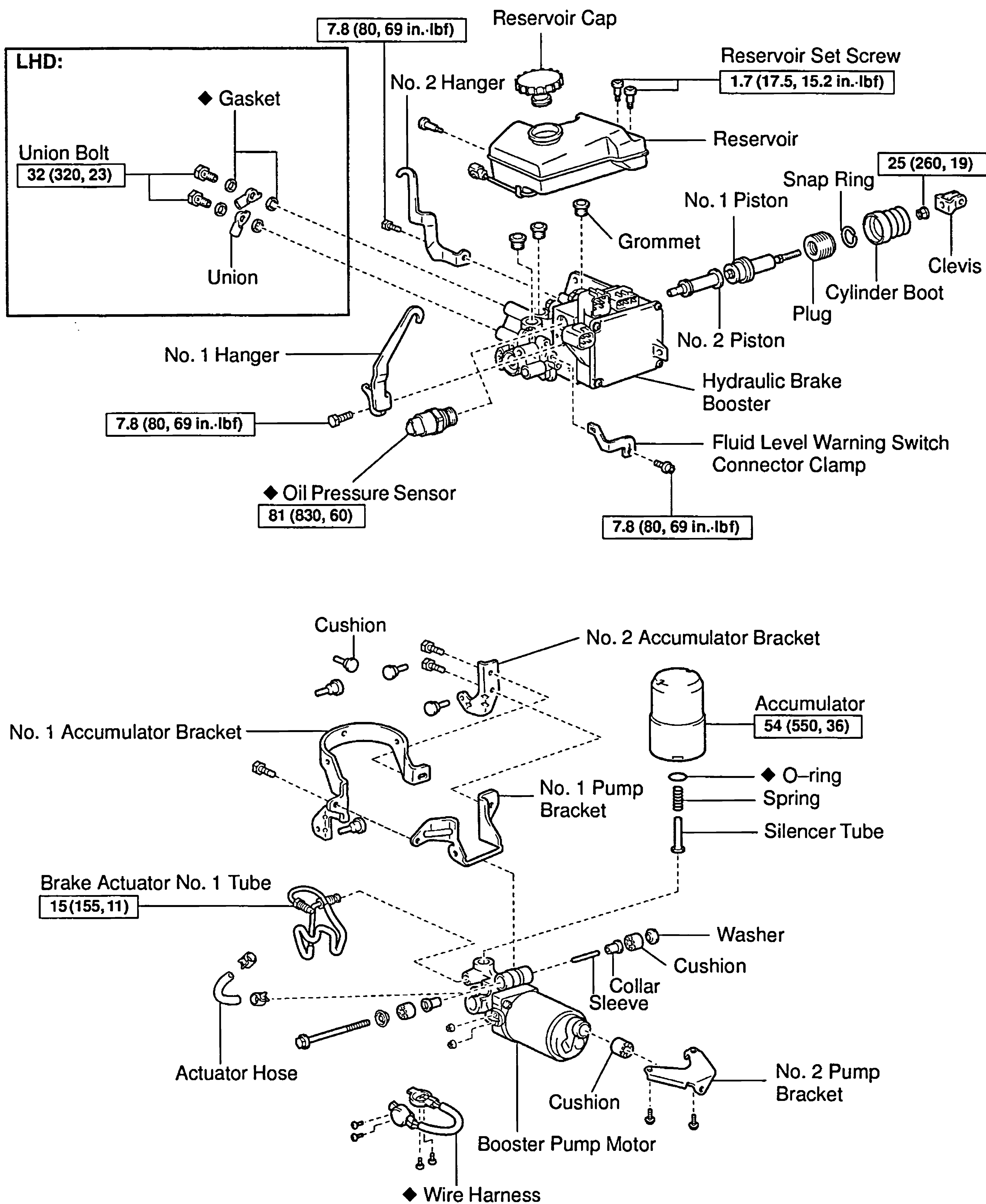
- (t) Remove the "SHEET G" (SST) and disconnect the actuator checker (SST) and sub-wire harness S (SST) from the hydraulic brake booster.
- (u) Connect the 2 connectors to the actuator.
- (v) Clear the DTC (See Pub. No. RM702E on page DI-86).

COMPONENTS



RHD:

LHD:



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

◆ Non-reusable part

REMOVAL

NOTICE:

Before starting the work, make sure that the ignition switch is OFF and depress the brake pedal more than 40 times.

HINT:

When a pressure in power supply system is released, reaction force becomes heavy and stroke becomes shorter.

NOTICE:

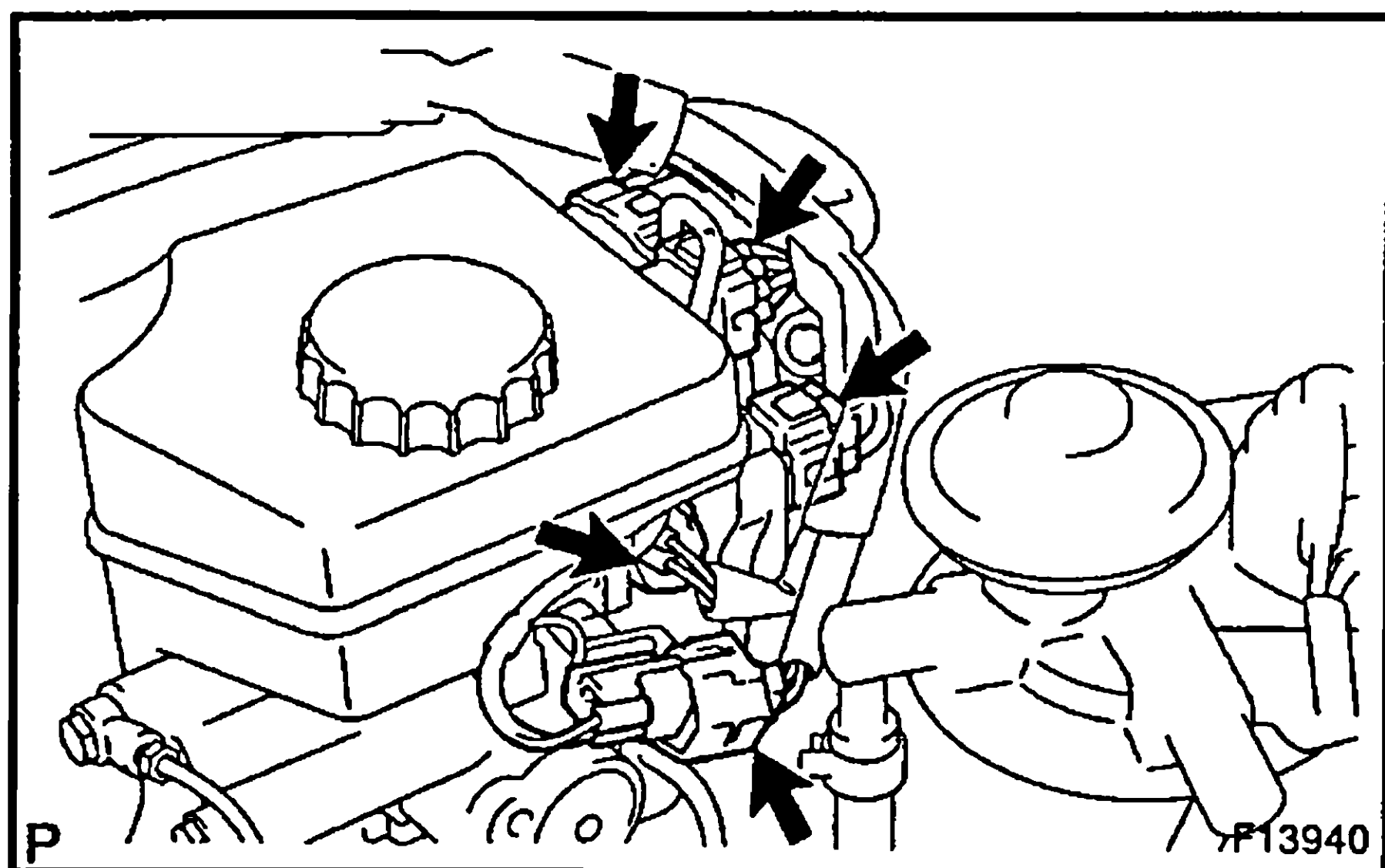
- As high pressure is applied to the brake actuator No. 1 tube, never deform it.
- Until the work is over, do not turn the ignition switch ON.

1. DRAW OUT FLUID WITH SYRINGE

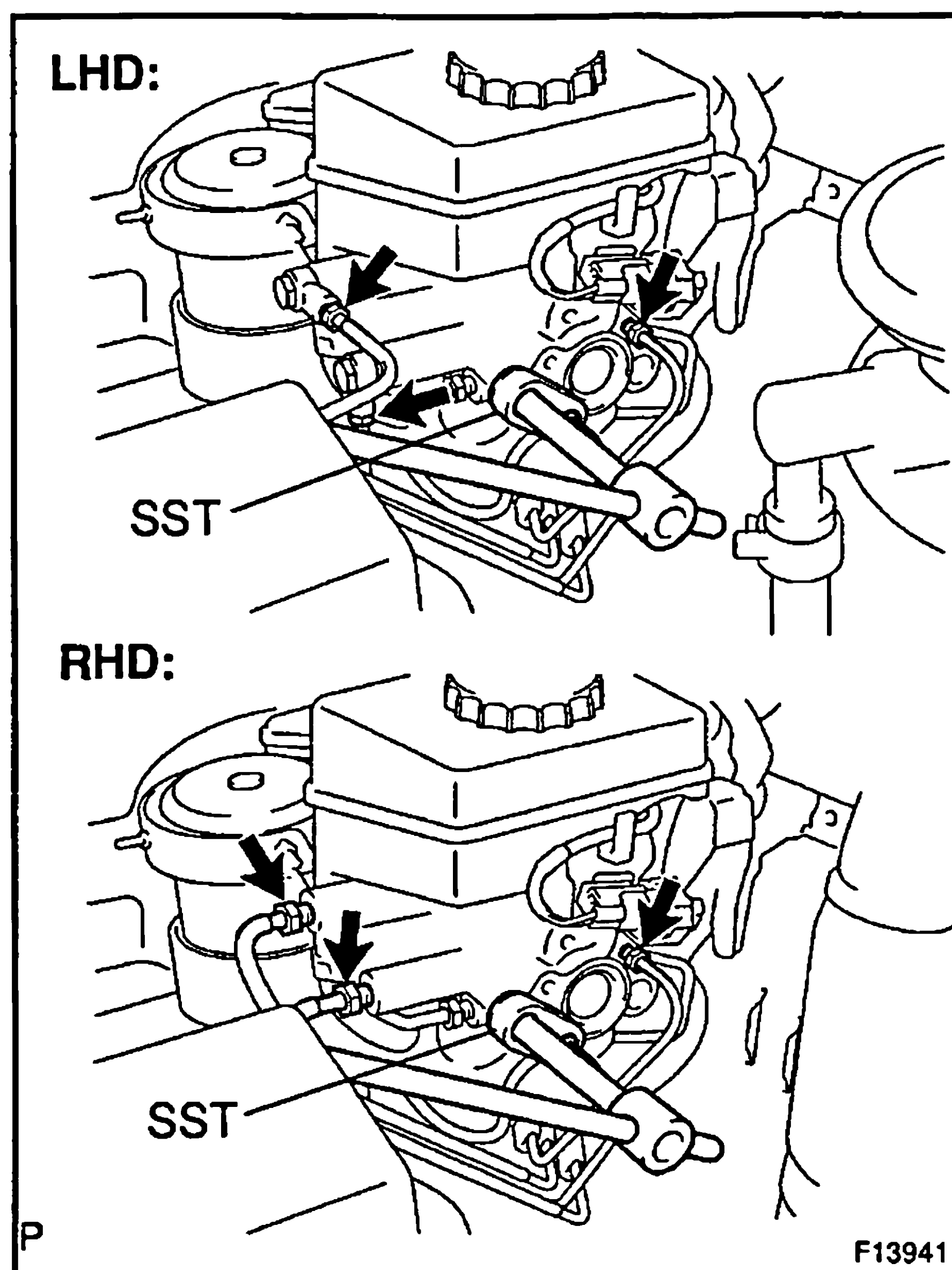
NOTICE:

Do not let brake fluid remain on a painted surface. Wash it off immediately.

- ### 2. REMOVE LOWER FINISH PANEL, HOOD LOCK RELEASE LEVER, FUEL LID RELEASE LEVER AND NO. 1 HEATER TO REGISTER DUCT
- (See Pub. No. RM 702E on page BO-14)



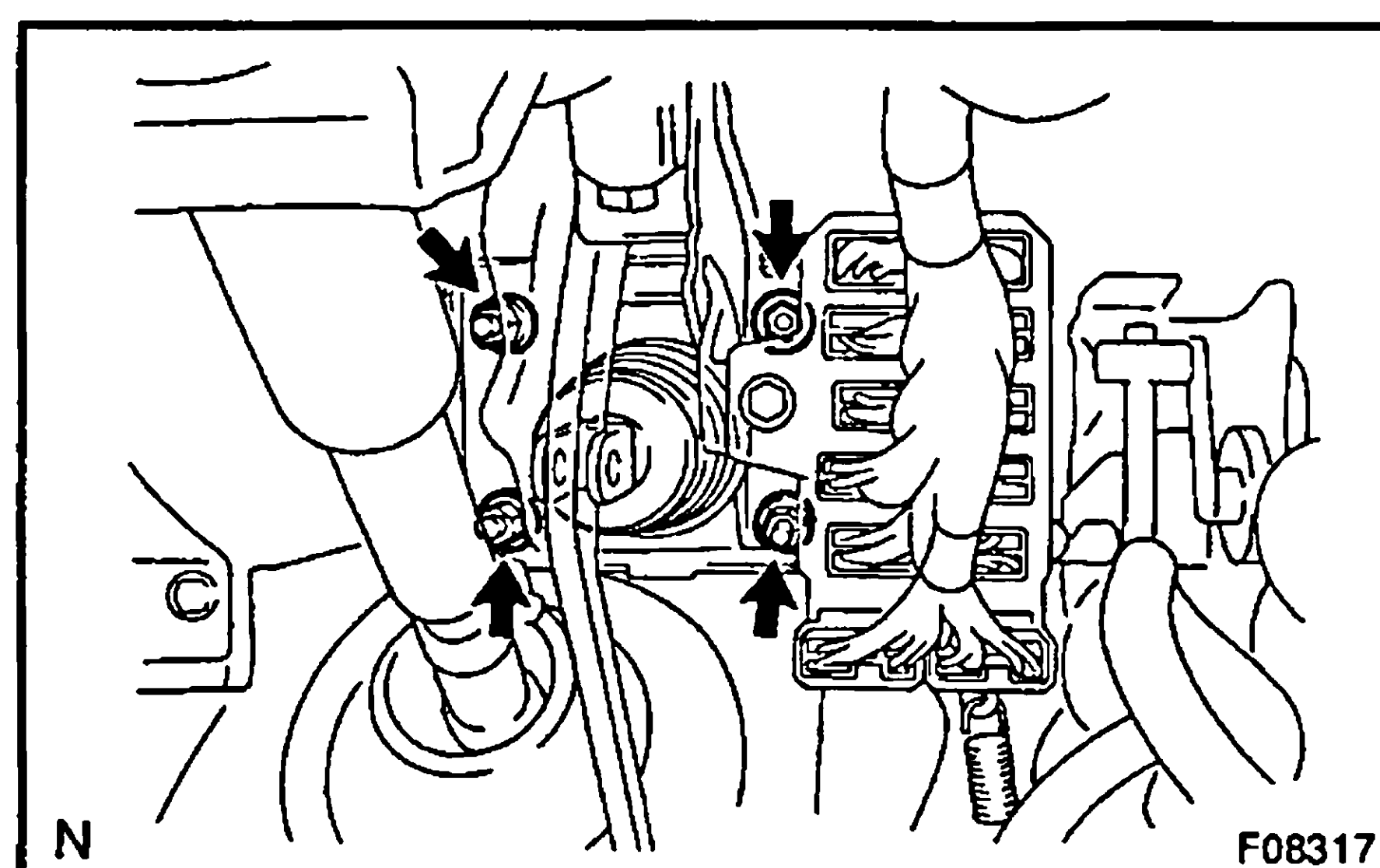
3. DISCONNECT 5 CONNECTORS

**4. DISCONNECT BRAKE LINES**

Using SST, disconnect the 4 brake lines.

SST 09023-00100

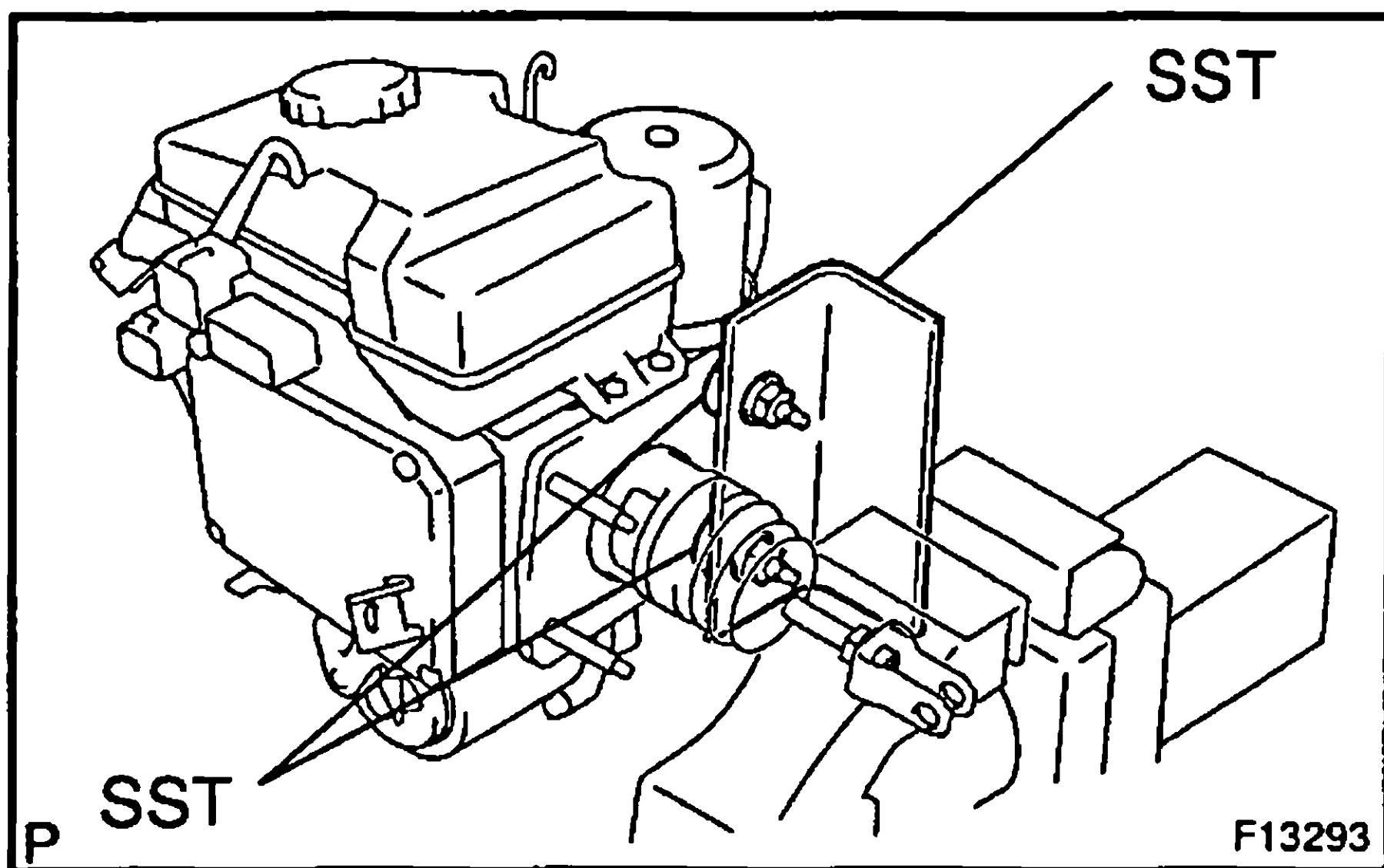
Torque: 15 N·m (155 kgf·cm, 11 ft·lbf)

5. REMOVE RETURN SPRING, CLIP, WAVE WASHER AND CLEVIS PIN**6. REMOVE HYDRAULIC BRAKE BOOSTER ASSEMBLY**

(a) Remove the 4 booster installation nuts.

Torque: 14 N·m (140 kgf·cm, 10 ft·lbf)

(b) Remove the booster assembly and gasket.



DISASSEMBLY

1. PLACE HYDRAULIC BRAKE BOOSTER IN VISE

Using SST, set the hydraulic brake booster in vise.

SST 09630-00014 (09631-00142),
09950-60010 (09951-00180, 09951-00190)

2. REMOVE FLUID LEVEL WARNING SWITCH CONNECTOR CLAMP

- Disconnect the connector.
- Using 5 mm socket hexagon wrench, remove the bolt and fluid level warning switch connector clamp.

Torque: 7.8 N·m (80 kgf·cm, 69 in·lbf)

3. REMOVE RESERVOIR AND GROMMETS

- Remove reservoir cap.
- Remove the 3 set screws and pull out the reservoir.

Torque: 1.7 N·m (17.5 kgf·cm, 15.2 in·lbf)

- Remove the 3 grommets.

4. REMOVE CLEVIS AND CYLINDER BOOT

- Loosen the lock nut, then remove the clevis and lock nut.

Torque: 25 N·m (260 kgf·cm, 19 ft·lbf)

- Remove the cylinder boot.

5. REMOVE 2 BOLTS AND NO. 1 AND NO. 2 HANGERS

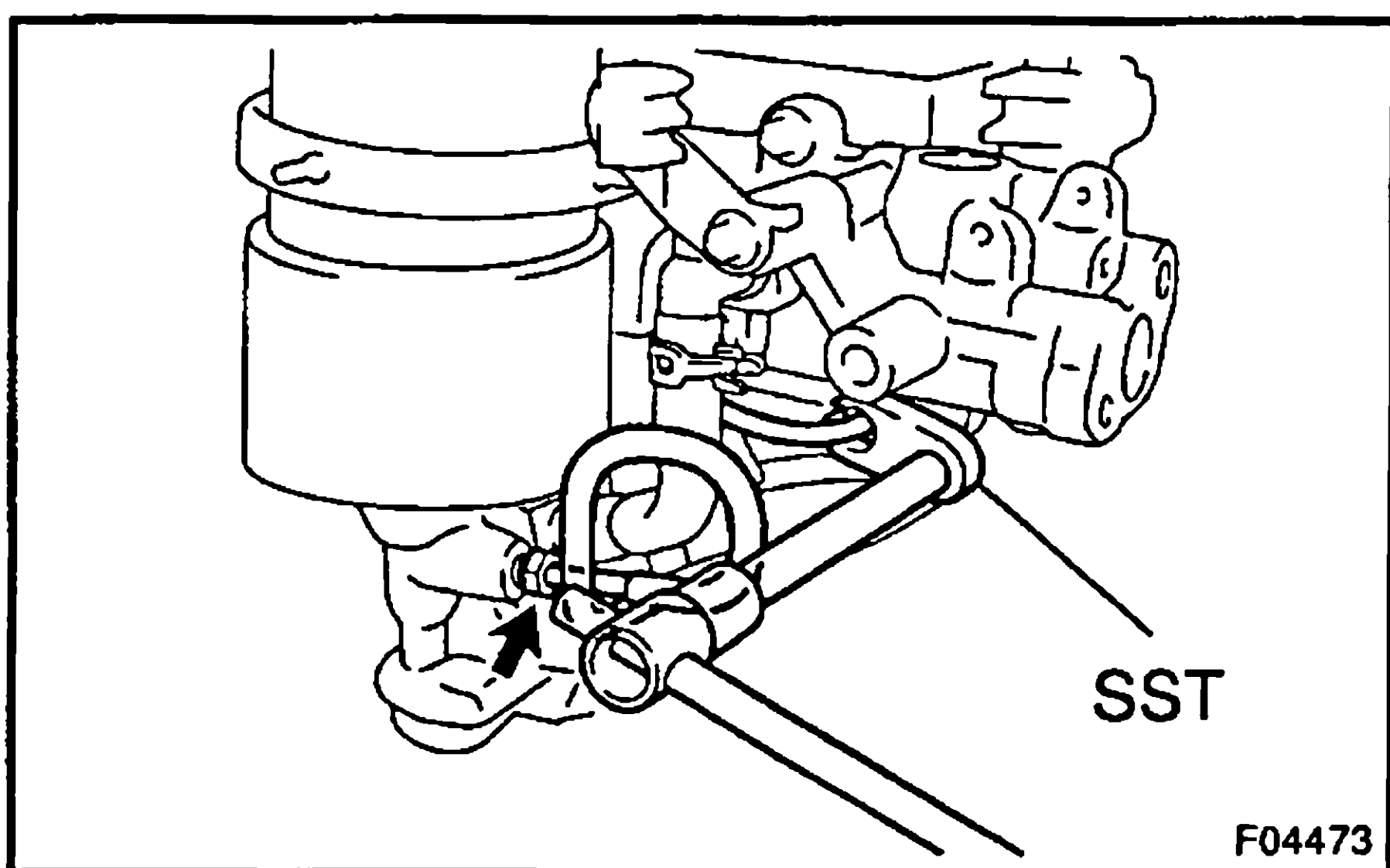
Torque: 7.8 N·m (80 kgf·cm, 69 in·lbf)

6. LHD:

REMOVE 2 UNIONS

Remove the 2 union bolts, 4 gaskets and 2 unions.

Torque: 32 N·m (320 kgf·cm, 23 in·lbf)



7. REMOVE BRAKE ACTUATOR NO. 1 TUBE

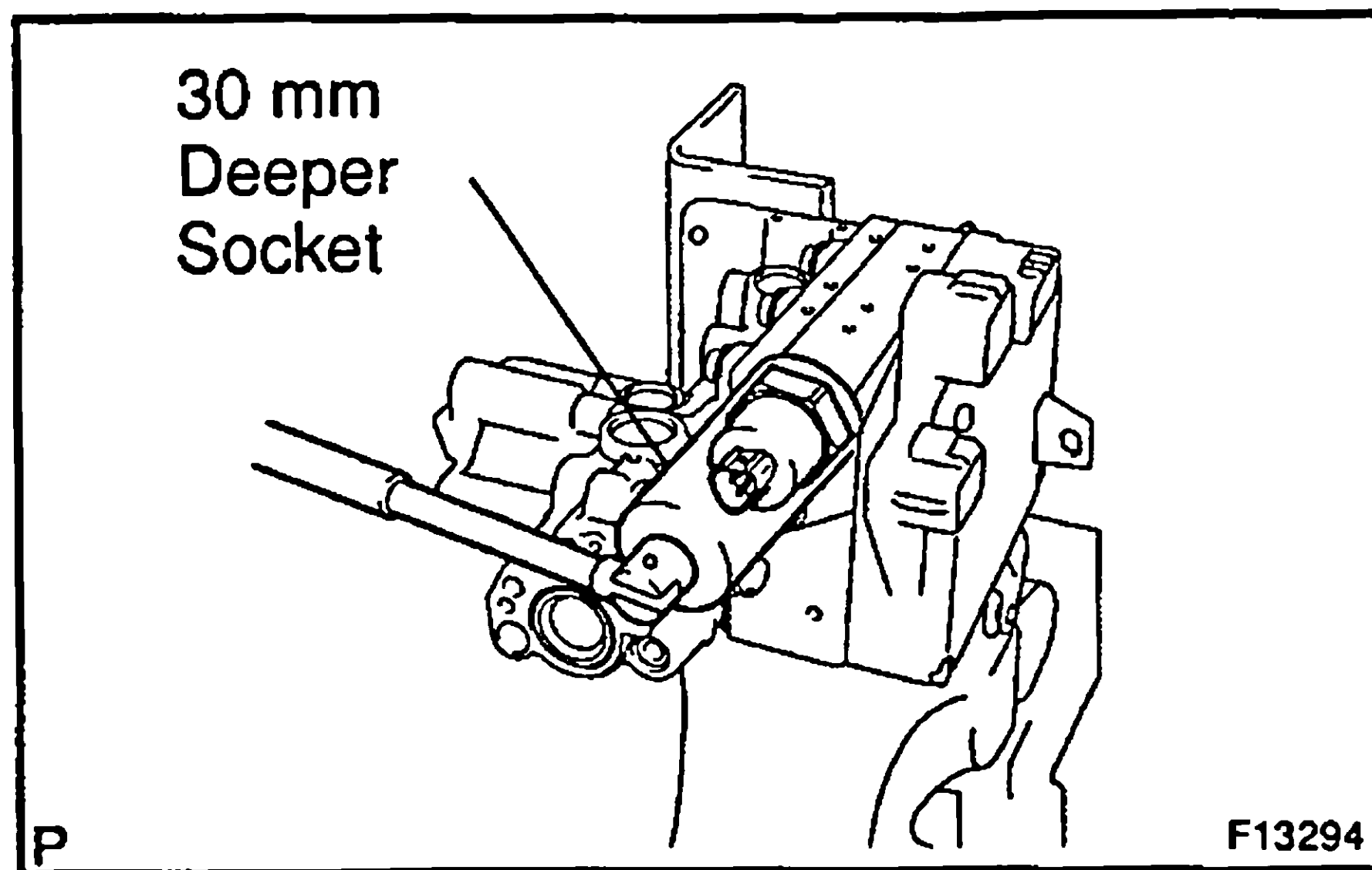
Using SST, remove the brake actuator No. 1 tube.

SST 09023-00100

Torque: 15 N·m (155 kgf·cm, 11 ft·lbf)

8. REMOVE BOOSTER PUMP AND ASSEMBLY

- Remove the actuator hose and 2 clips.
- Remove the 4 screws and wire harness from the booster and pump.
- Remove the 3 bolts and No. 1 and No. 2 accumulator brackets.
- Remove the bolt and No. 1 pump bracket.
- Remove the 2 washers, 2 cushions, 2 collars and sleeve.
- Remove the 2 bolts and No. 2 pump bracket.
- Remove the cushion from No. 2 pump bracket.



9. REMOVE OIL PRESSURE SENSOR

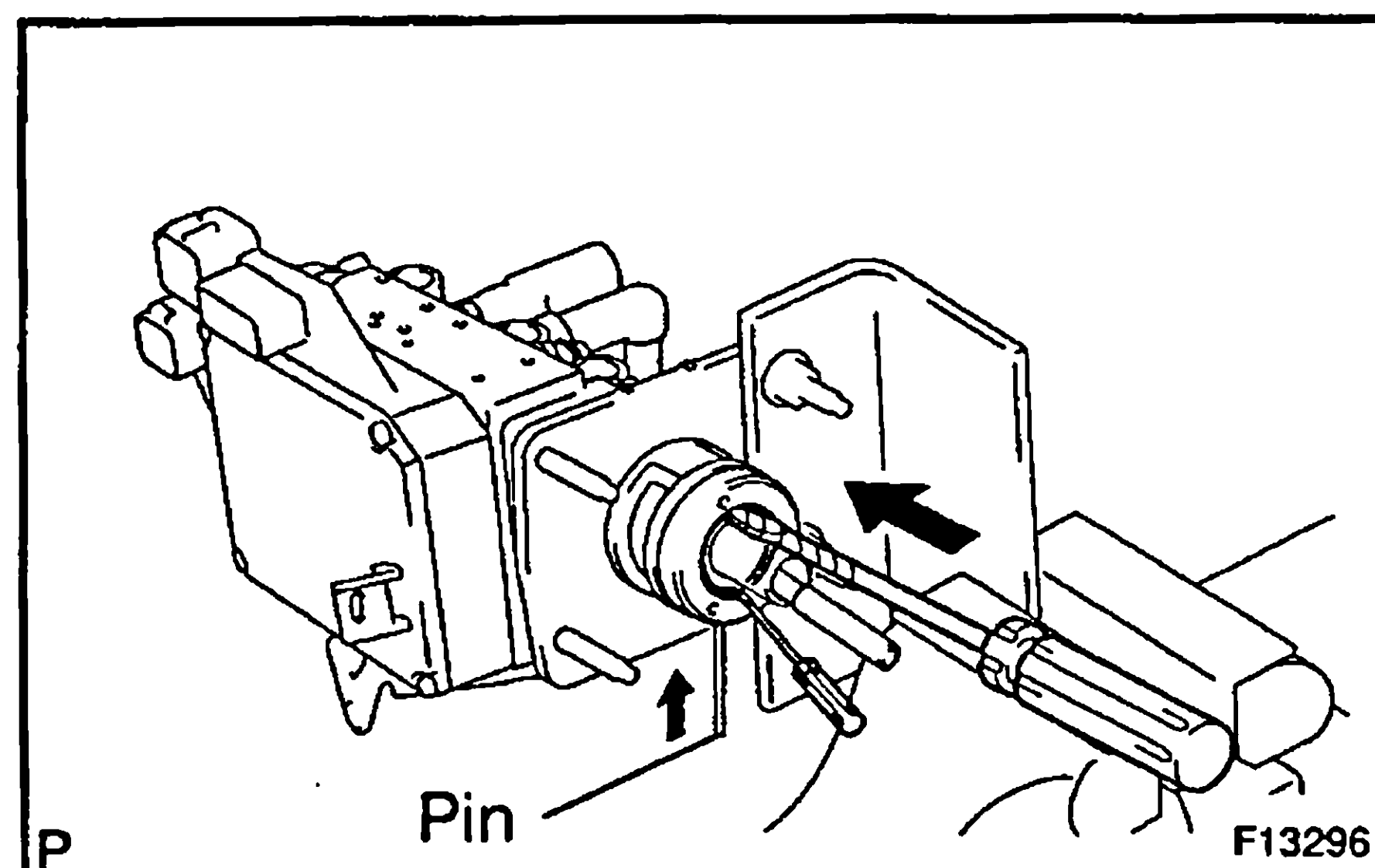
Using 30 mm deeper socket wrench and remove the oil pressure sensor.

Torque: 81 N·m (830 kgf·cm, 60 ft·lbf)

NOTICE:

If replacing the master cylinder pressure sensor, since the sensor is non-reusable, use a sensor of the supply part No shown below.

Part No: 89637-30050

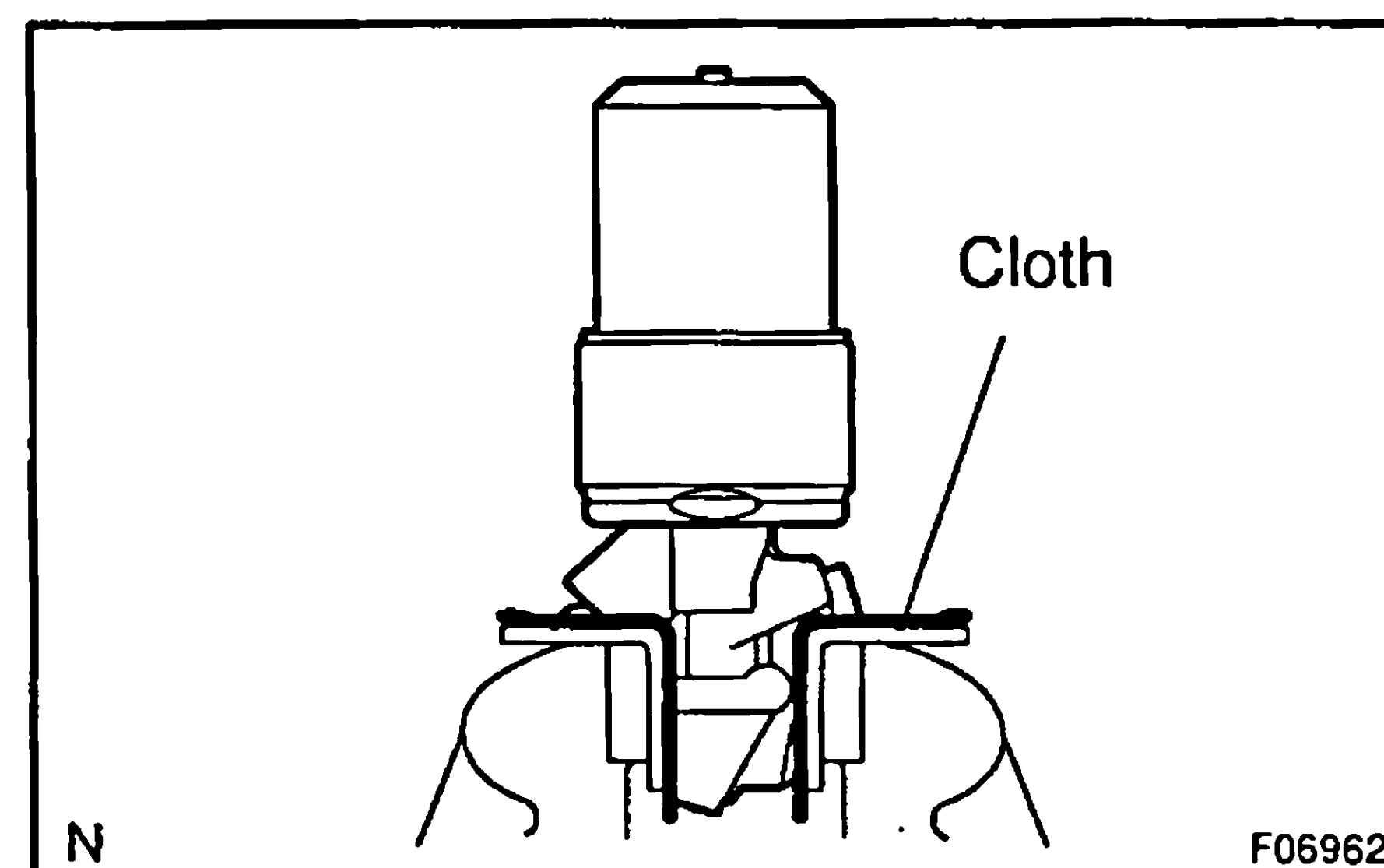


10. REMOVE PISTONS

- (a) Pressing the piston in with a screwdriver, use a pin or an equivalent to push the snap ring from the hole in the body then remove it with another screwdriver.
- (b) Remove the No. 1, No. 2 pistons and plug, pulling straight out, not at an angle.

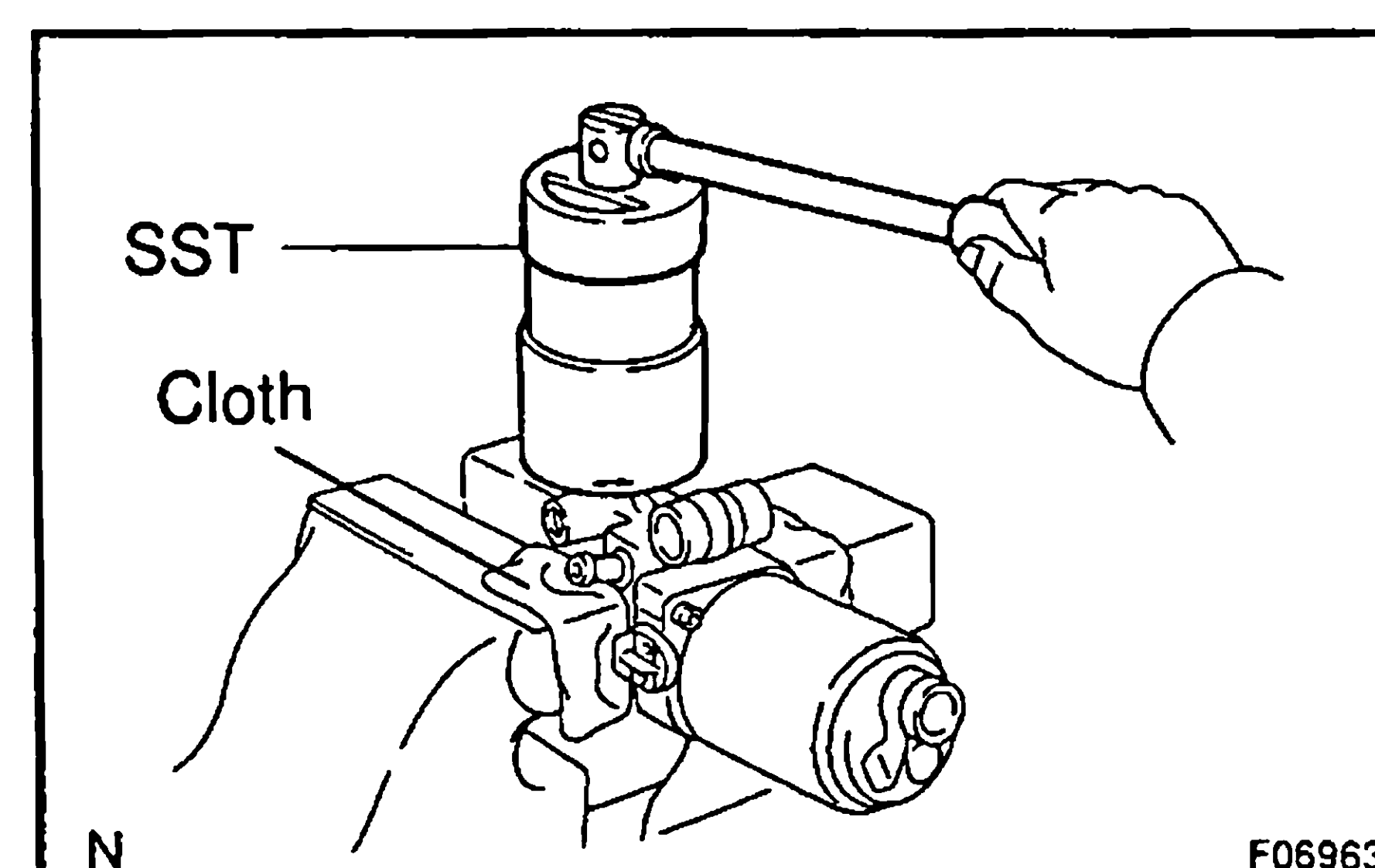
NOTICE:

- If pulled out and installed at an angle, there is a possibility that the cylinder bore could be damaged.
- At the time of reassembly, be careful not to damage the rubber lips on the pistons.



11. PLACE BOOSTER PUMP IN VISE

Place the booster pump with a cloth shown in the illustration on the left.



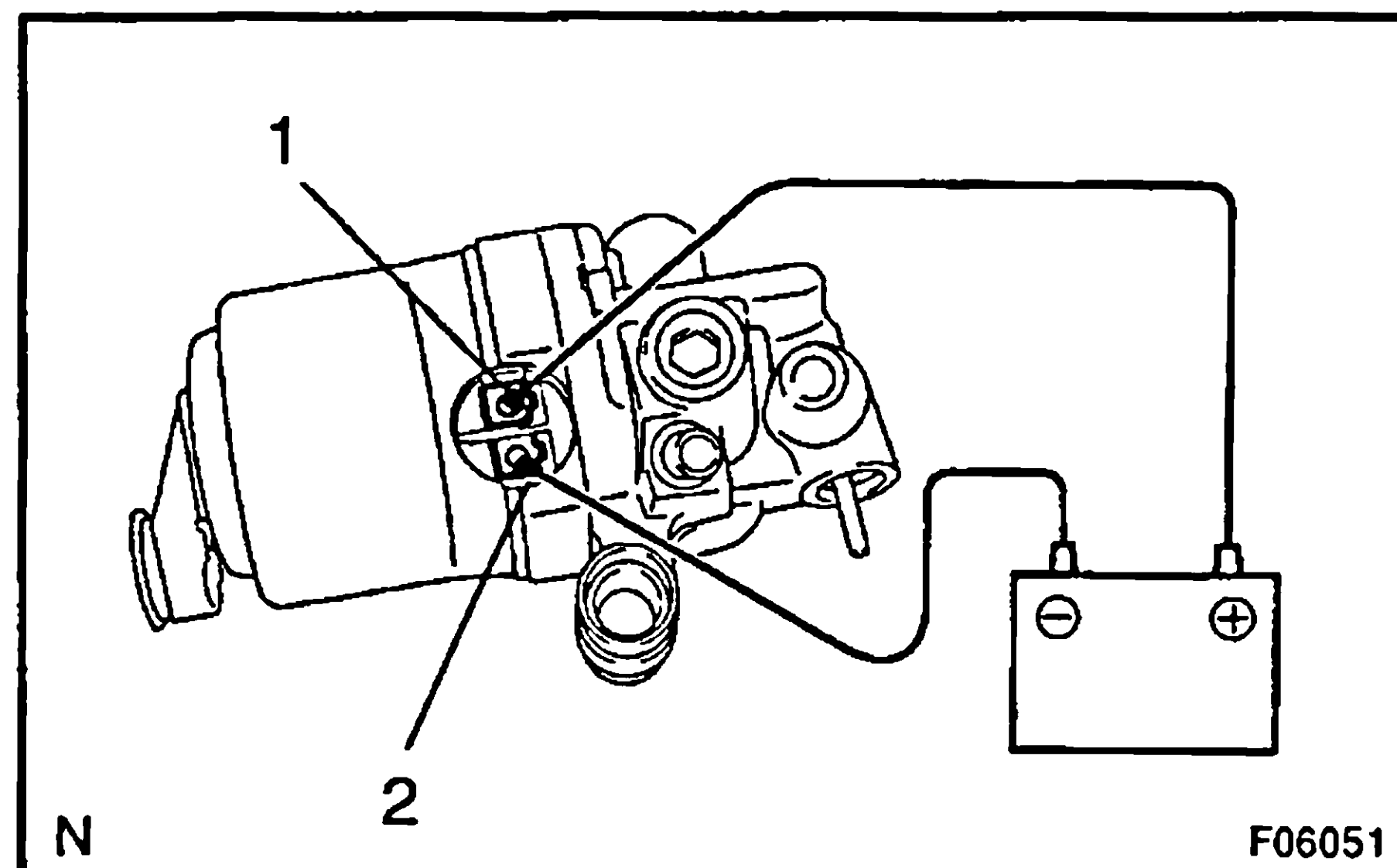
12. REMOVE ACCUMULATOR FROM BOOSTER PUMP

- (a) Using SST, remove the accumulator.

SST 09318-12010

Torque: 54 N·m (550 kgf·cm, 36 ft·lbf)

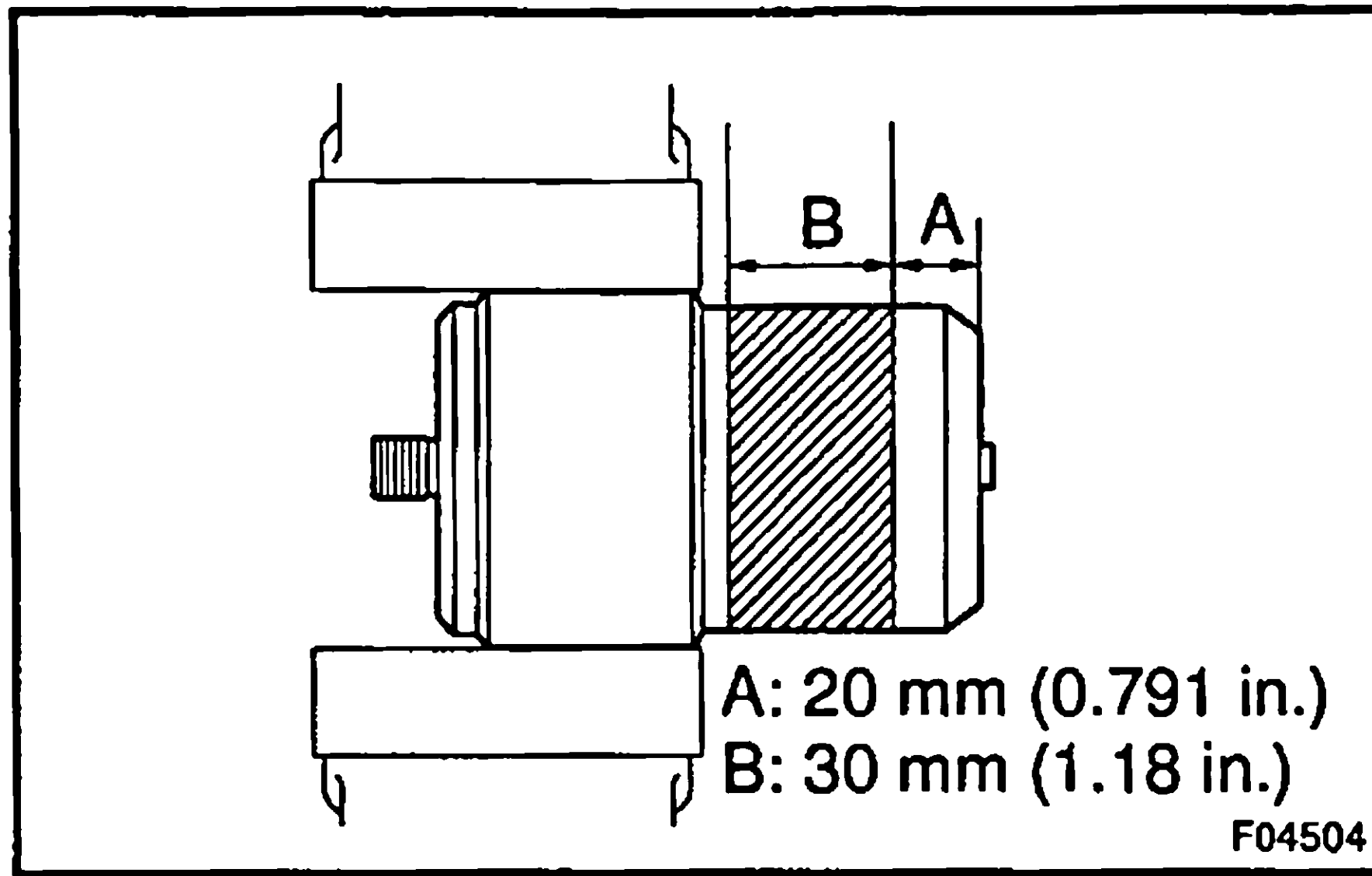
- (b) Remove the silencer tube, spring and O-ring.



INSPECTION

INSPECT HYDRAULIC BRAKE BOOSTER PUMP MOTOR OPERATION

- (a) Connect the positive (+) lead from the battery to terminal 1 of pump motor, and the negative (-) lead to terminal 2.
- (b) Check that the pump motor operation.



DISPOSAL

DISPOSAL METHOD OF ACCUMULATOR

- Follow the procedures described below and drain the high pressure gas from the accumulator.
- Place the accumulator in a vise, cover it with a cloth over a saw then cut the accumulator body slowly.

CAUTION:

Never cut at a stretch.

- When the outer body of the accumulator is cut, gas discharges.

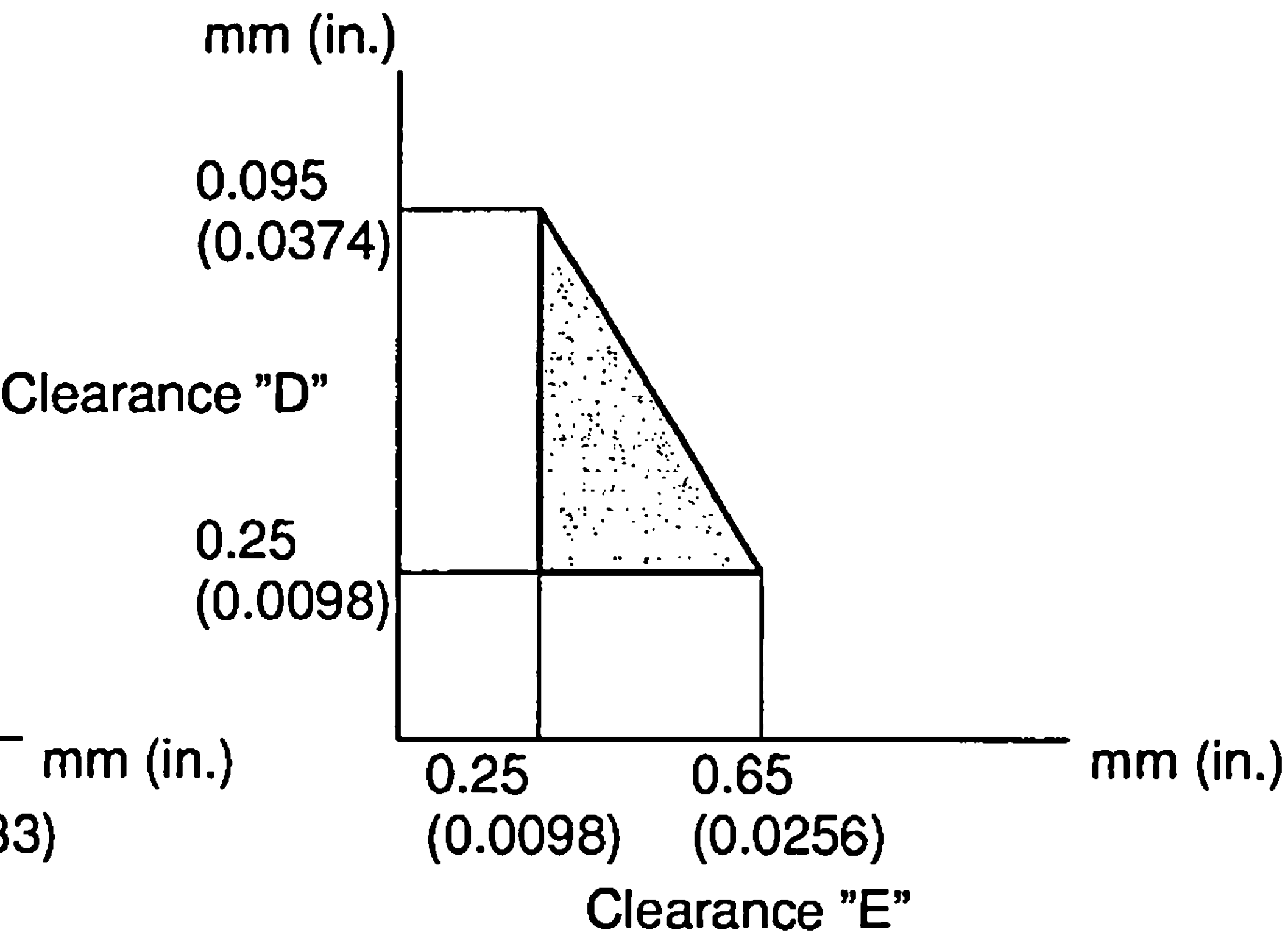
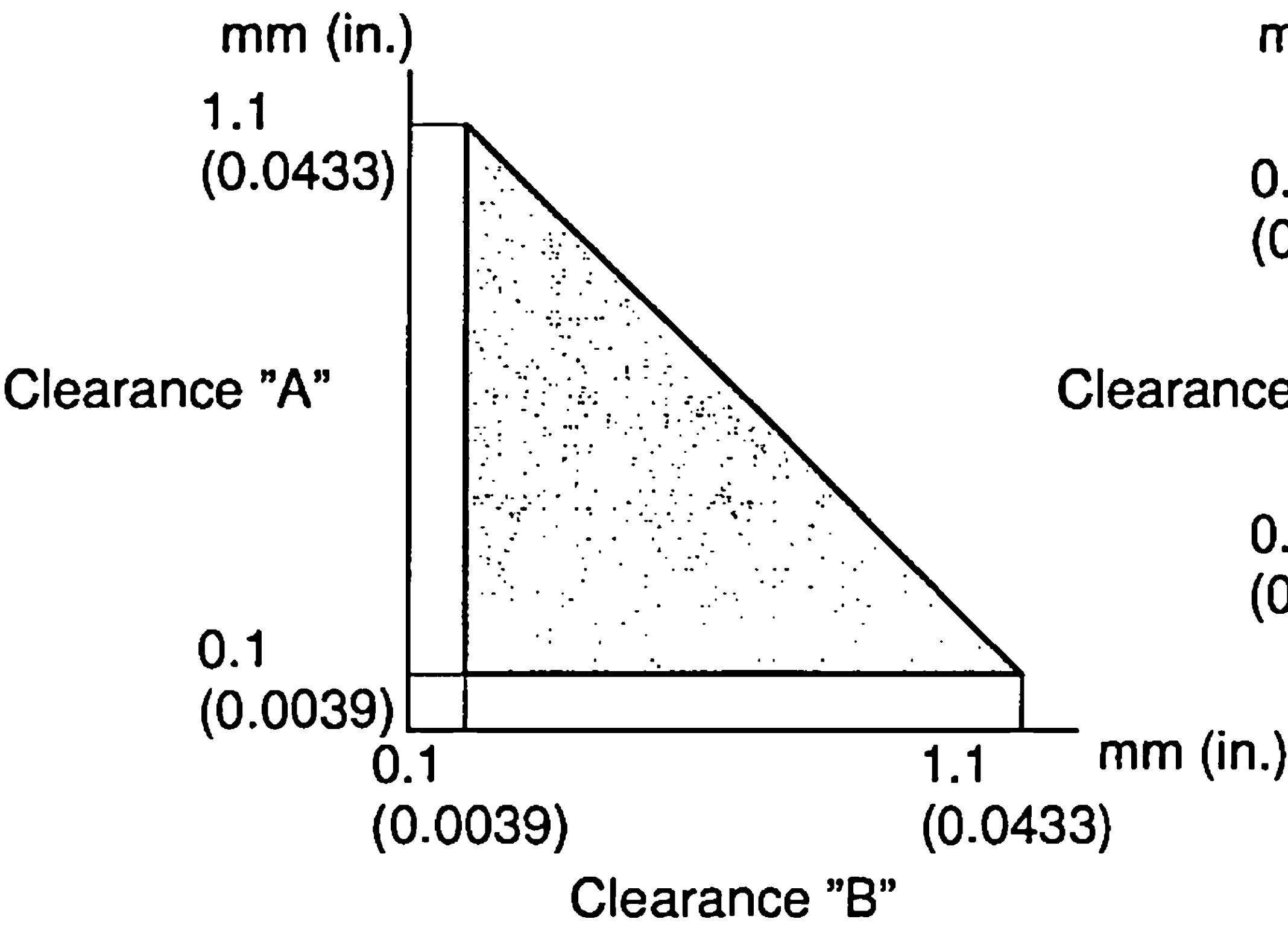
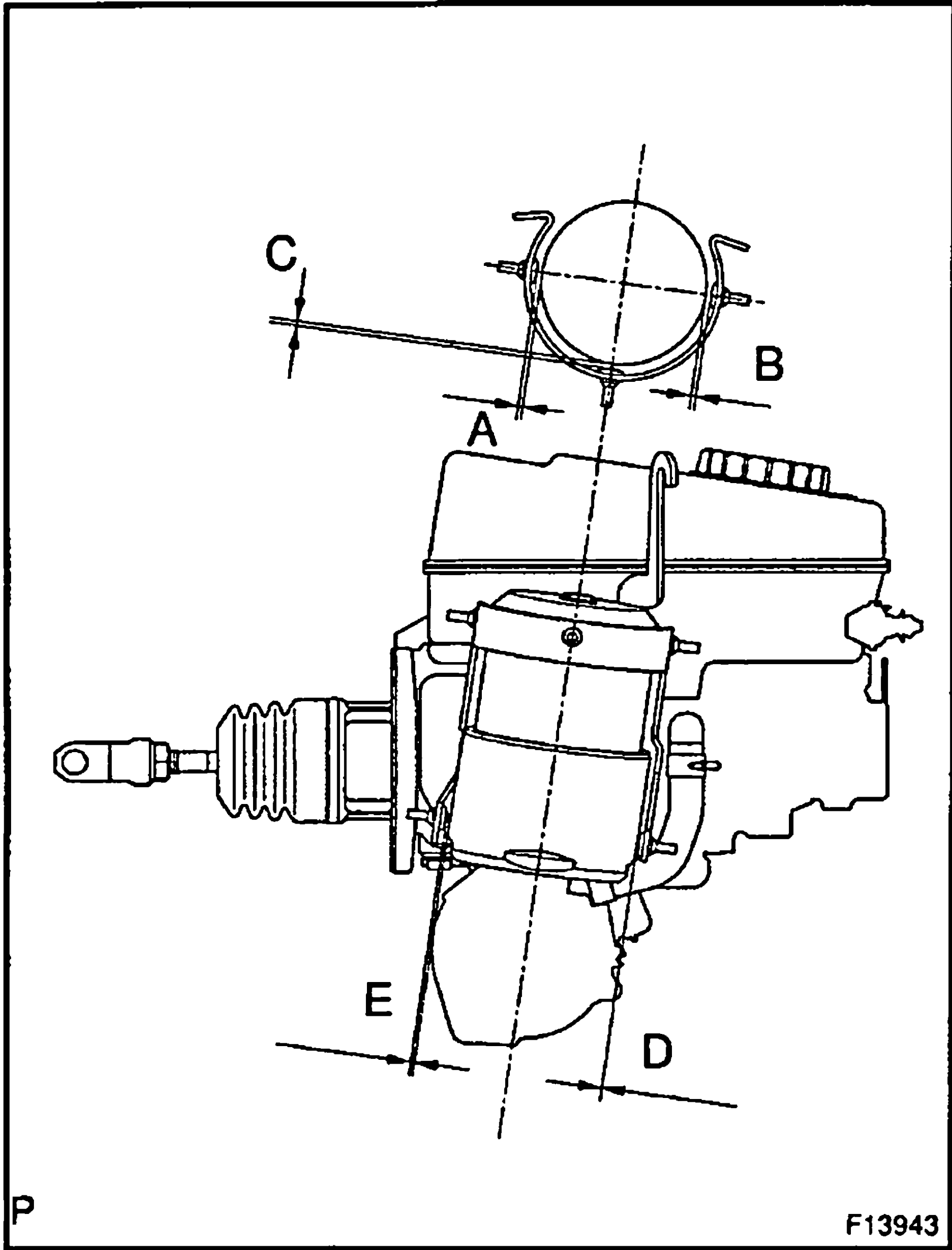
REASSEMBLY

Reassembly is in the reverse order of disassembly
(See page BR-16).

INSTALL ACCUMULATOR BRACKET

When installing the accumulator bracket, adjust to ensure that clearance (A, B, D and E) shown in the illustration on the left corresponds to each value in the graphs below and are within the C range, using a thickness gauge.

C range: 0.1 – 0.4 mm (0.004 – 0.016 in.)



INSTALLATION

Installation is in the reverse order of removal (See page BR-14).

HINT:

- After installation, fill the brake reservoir with brake fluid and bleed brake system (See Pub. No. RM702E on page BR-1).
- Check for leaks.

STEERING

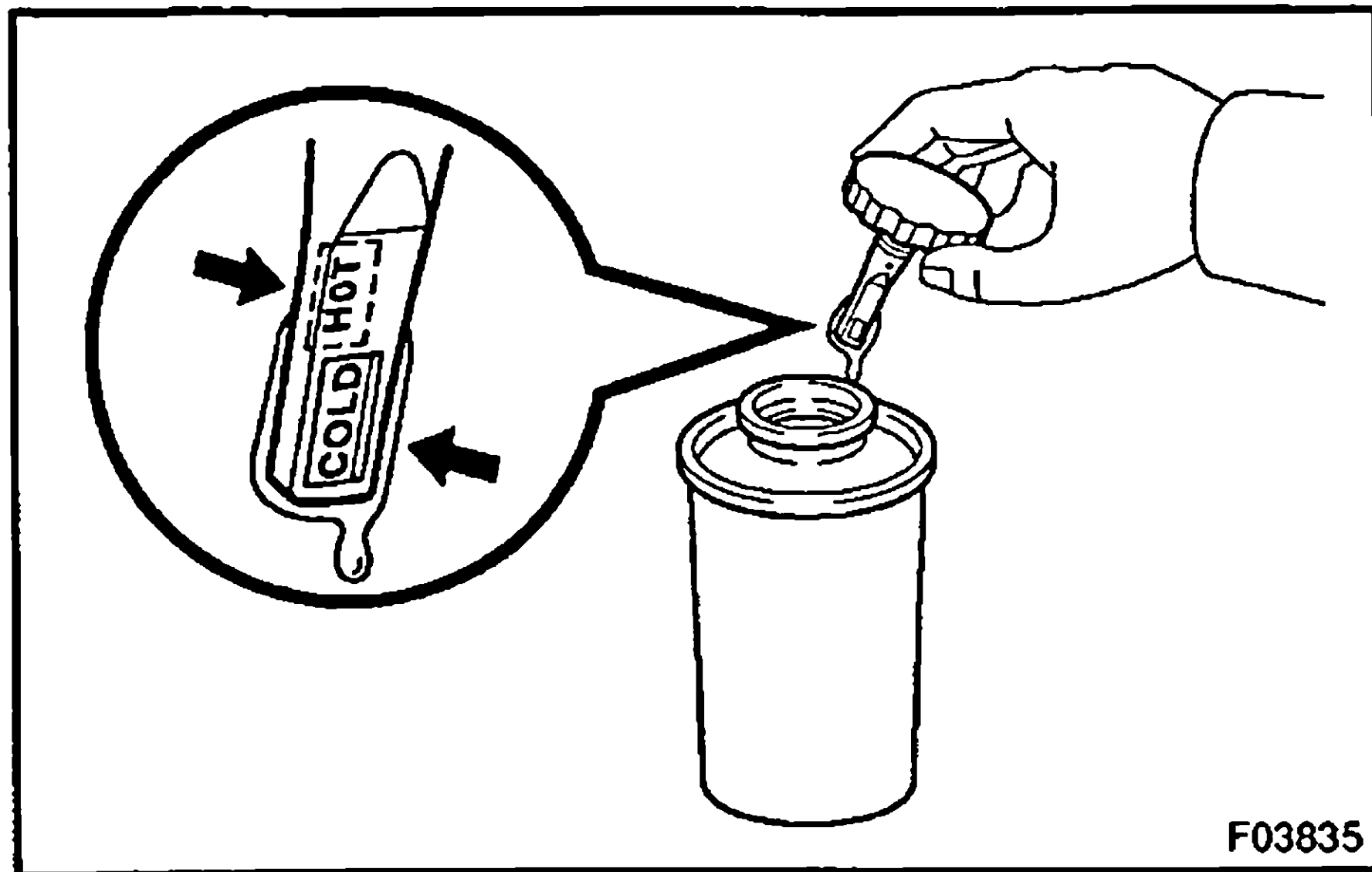
POWER STEERING FLUID (1KD-FTV)	SR-1
POWER STEERING VANE PUMP (1KD-FTV)	SR-4

REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
LAND CRUISER/LAND CRUISER PRADO Chassis and Body Repair Manual	RM517E
LAND CRUISER/LAND CRUISER PRADO Chassis and Body Repair Manual Supplement (Jan., 1998)	RM627E

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

SR



F03835

POWER STEERING FLUID (1KD-FTV) INSPECTION

SR05Q-16

1. CHECK FLUID LEVEL

- (a) Keep the vehicle level.
- (b) With the engine stopped, check the fluid level in the oil reservoir.

If necessary, add fluid.

Fluid: ATF DEXRON® II or III

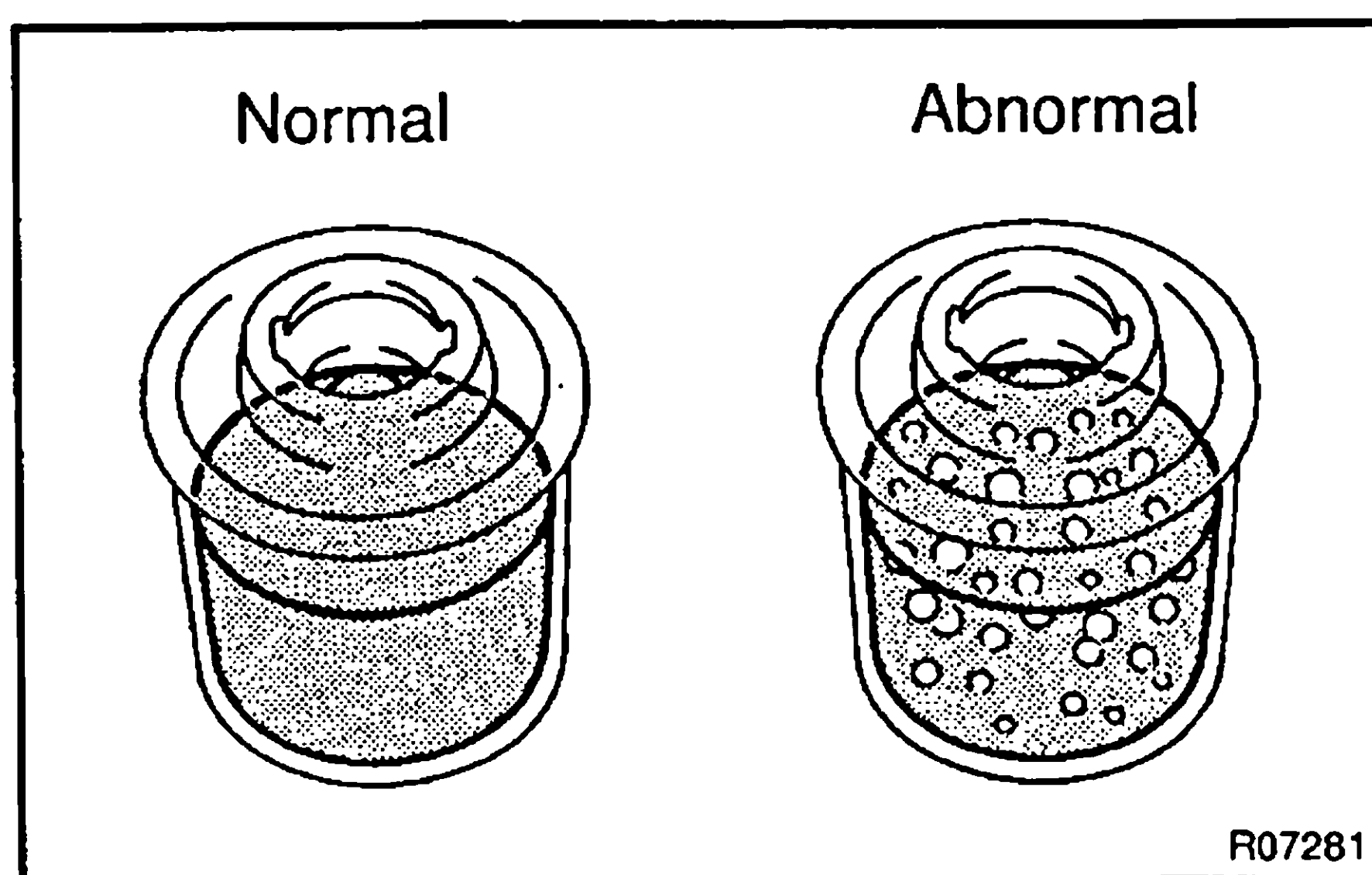
HINT:

Check that the fluid level is within the HOT LEVEL range on the reservoir cap dipstick. If the fluid is cold, check that it is within the COLD LEVEL range.

- (c) Start the engine and run it at idle.
- (d) Turn the steering wheel from lock to lock several times to boost fluid temperature.

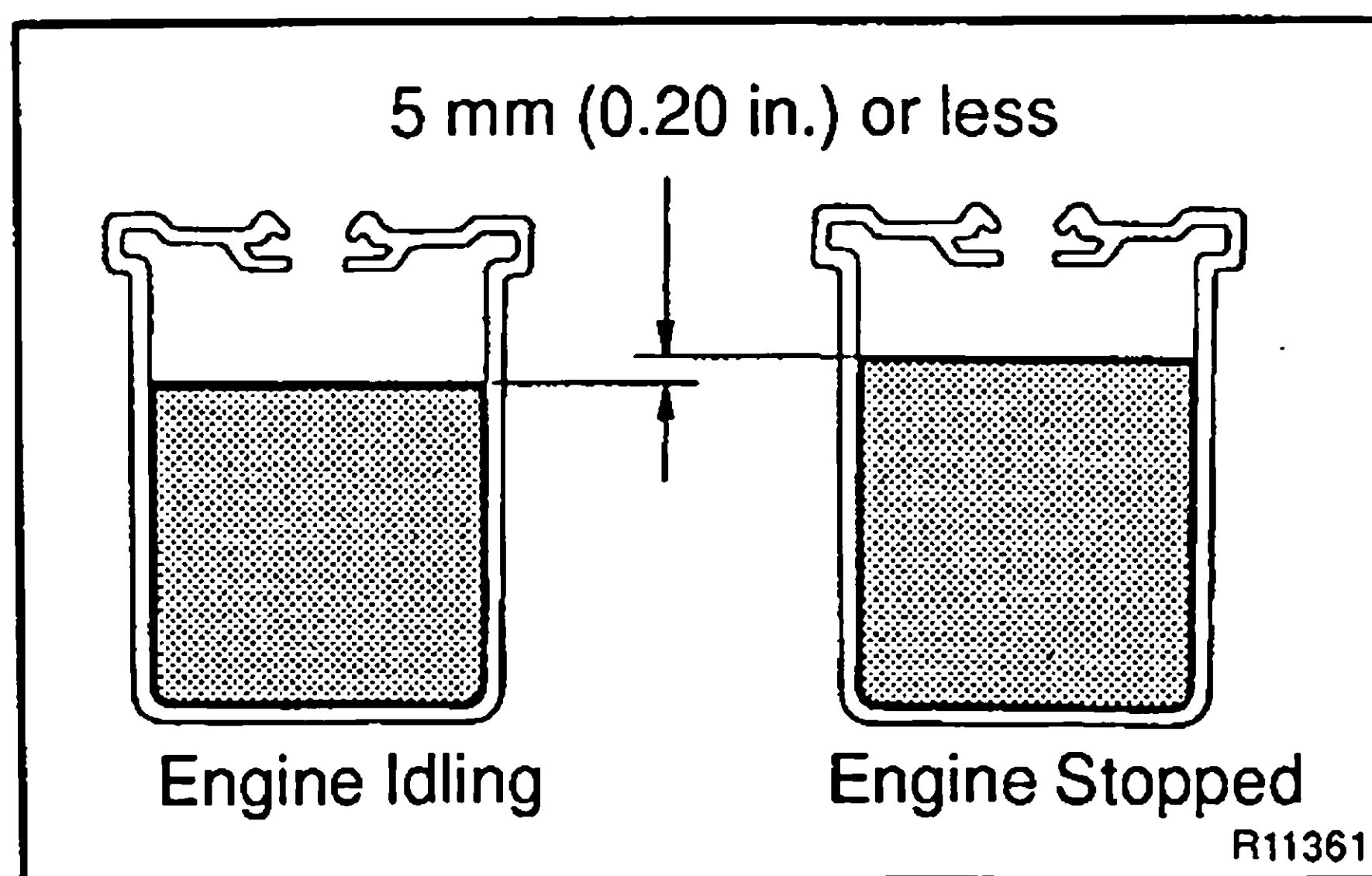
Fluid temperature: 80°C (176°F)

SR



R07281

- (e) Check for foaming or emulsification.
- If there is foaming or emulsification, bleed power steering system (See Pub. No. RM517E on page SR-11).



R11361

- (f) With the engine idling, measure the fluid level in the oil reservoir.
- (g) Stop the engine.
- (h) Wait a few minutes and remeasure the fluid level in the oil reservoir.

Maximum fluid level rise: 5 mm (0.20 in.)

If a problem is found, bleed power steering system (See Pub. No. RM517E on page SR-11).

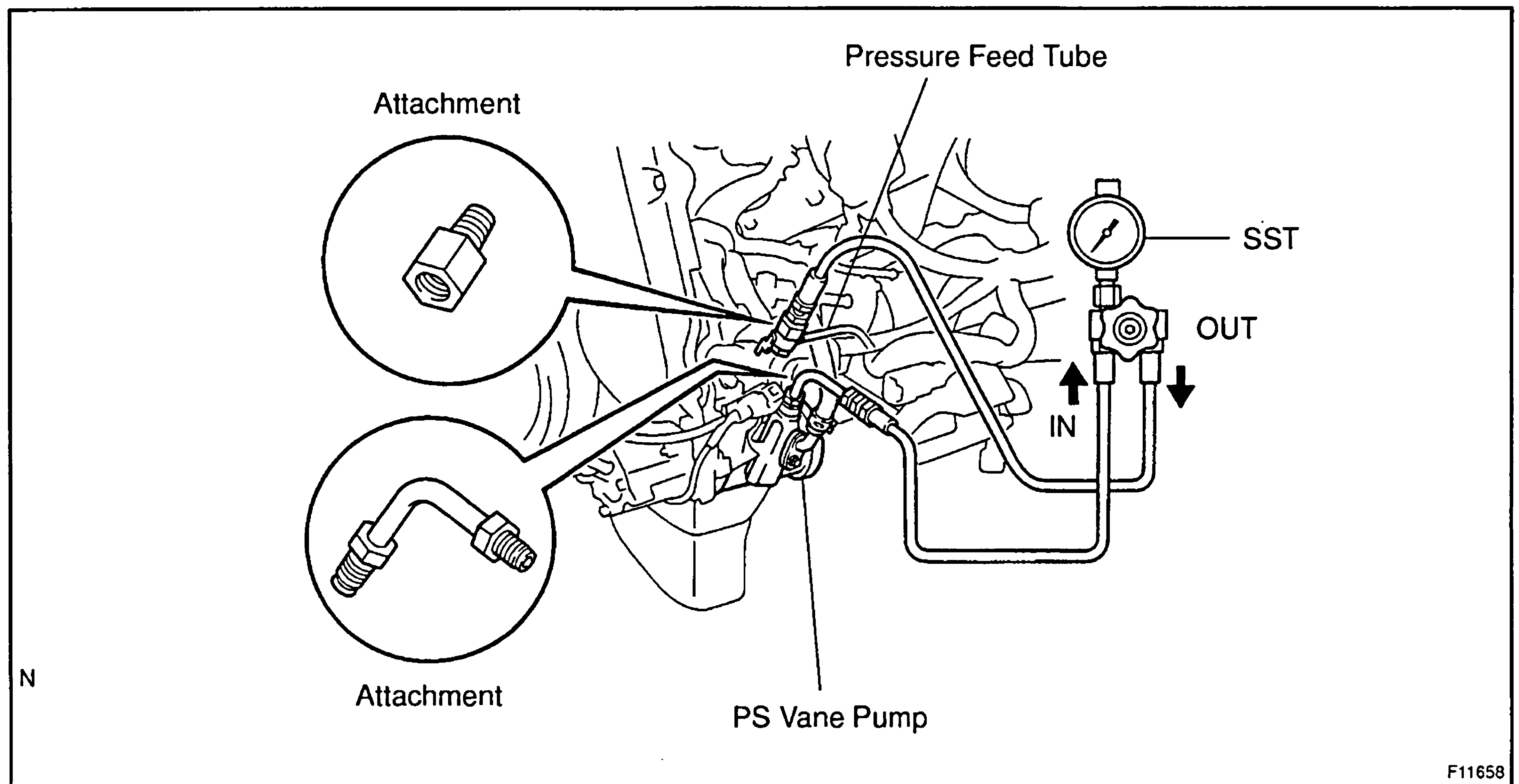
- (i) Check the fluid level.

2. CHECK STEERING FLUID PRESSURE

- (a) Disconnect the pressure feed tube from the PS vane pump (See page SR-5).
- (b) Connect SST, as shown in the illustration below.
SST 09640-10010 (09641-01010, 09641-01030, 09641-01040)

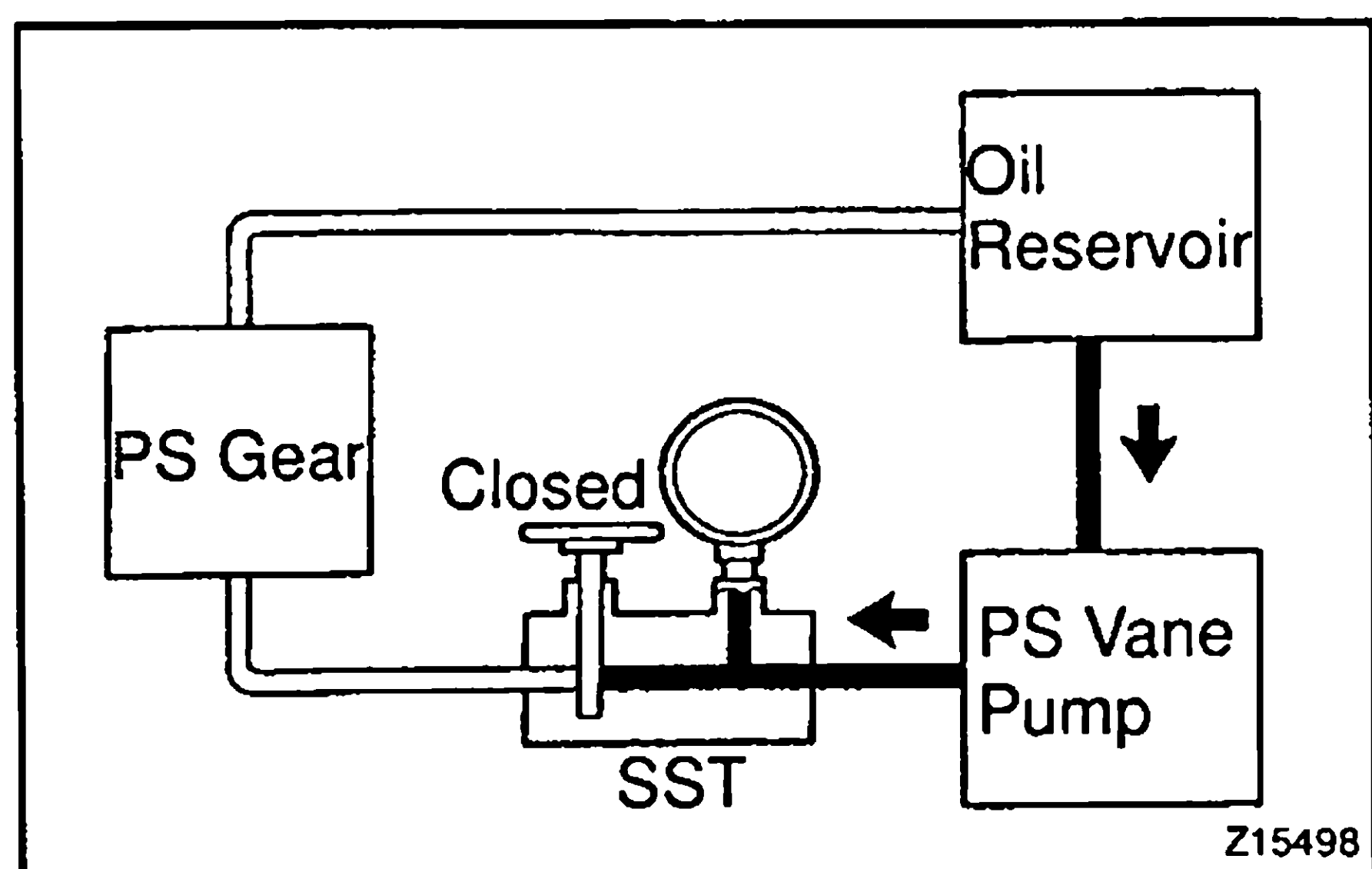
NOTICE:

Check that the valve of the SST is in the open position.



- (c) Bleed the power steering system (See Pub. No. RM517E on page SR-11).
- (d) Start the engine and run it at idle.
- (e) Turn the steering wheel from lock to lock several times to boost fluid temperature.

Fluid temperature: 80 °C (176 °F)



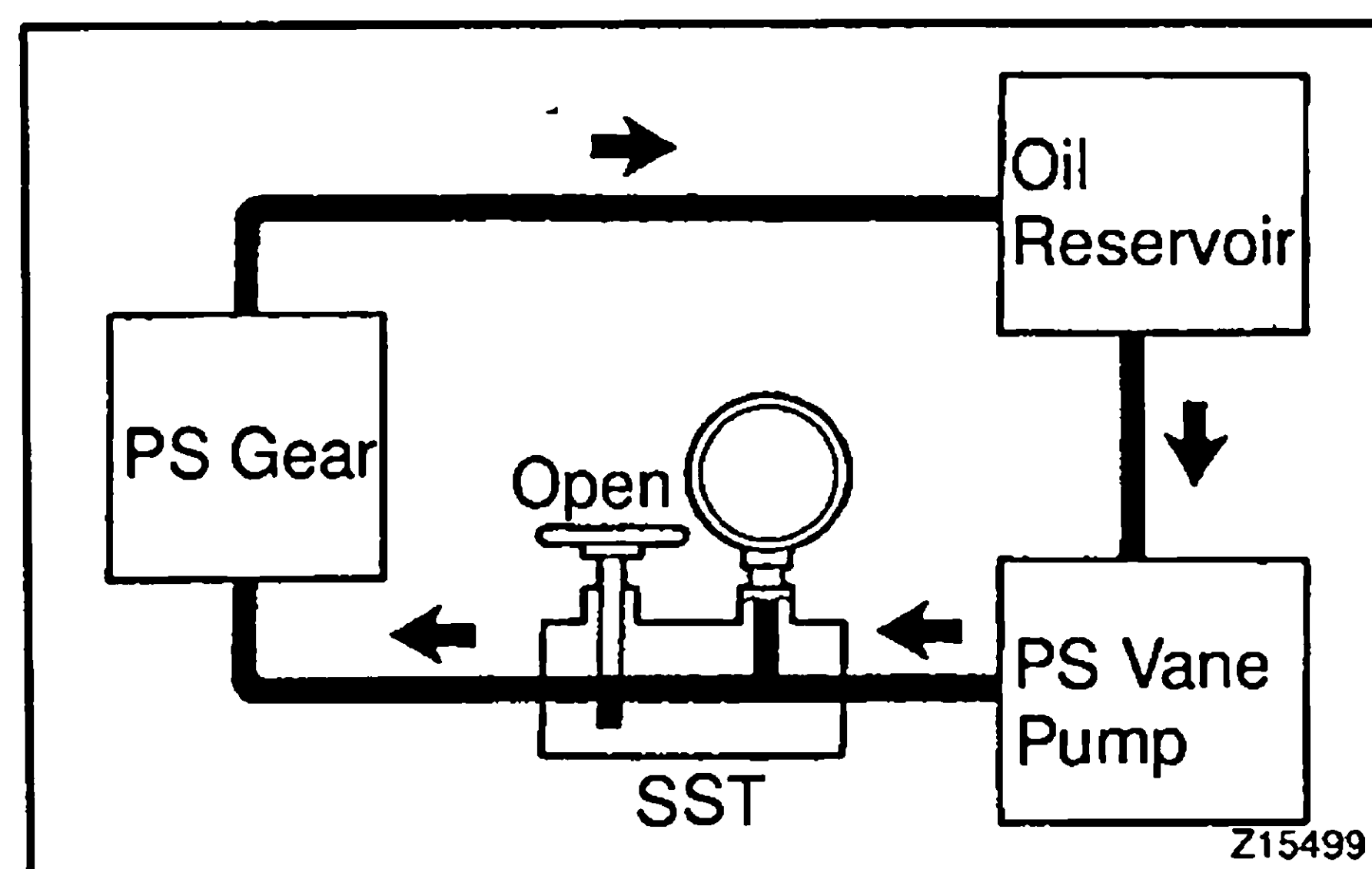
- (f) With the engine idling, close the valve of the SST and observe the reading on the SST.

Minimum fluid pressure:

8,826 kPa (90 kgf/cm², 1,280 psi)

NOTICE:

- Do not keep the valve closed for more than 10 seconds.
- Do not let the fluid temperature become too high.



- (g) With the engine idling, open the valve fully.

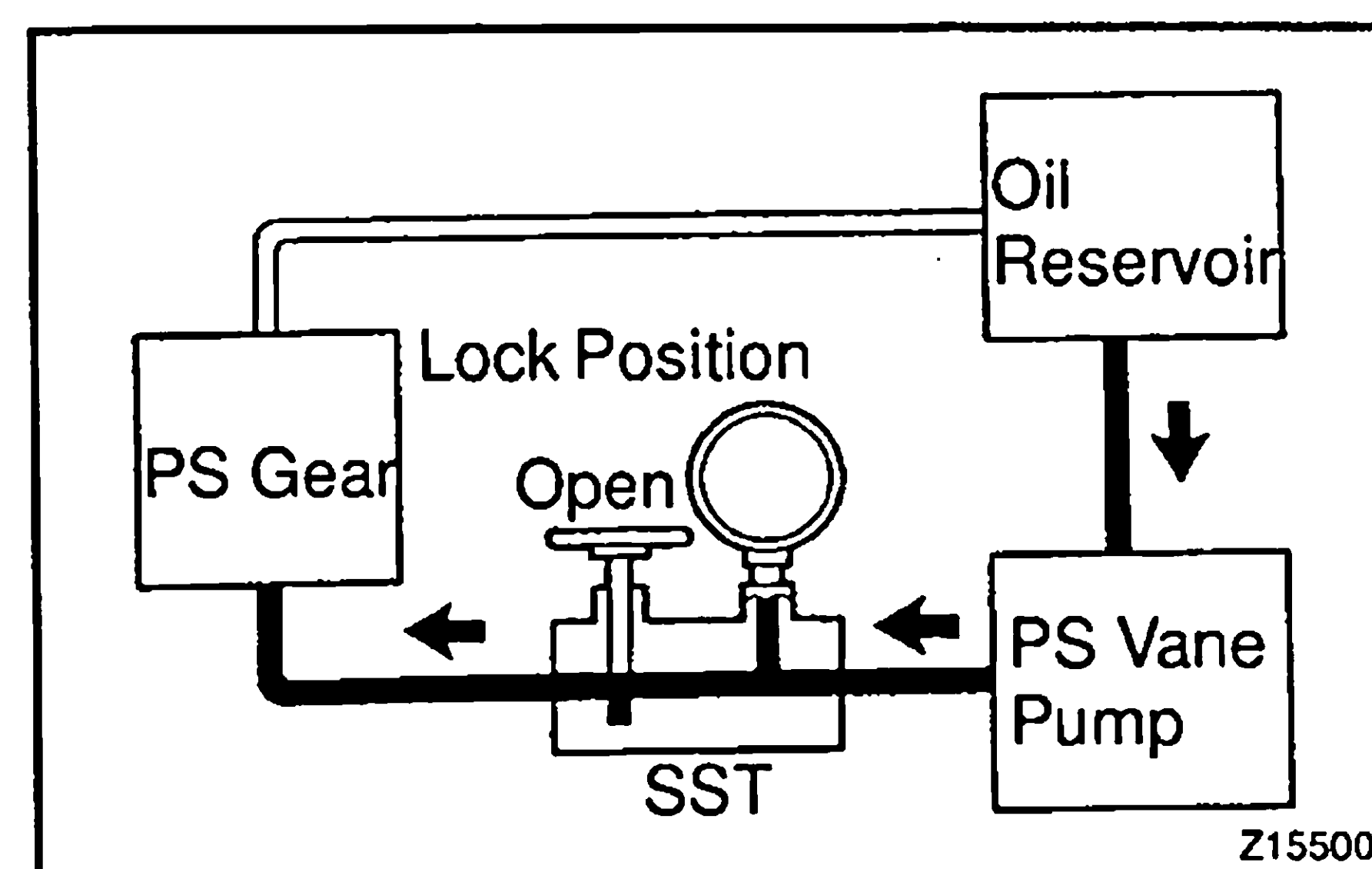
- (h) Measure the fluid pressure at engine speeds of 1,000 rpm and 3,000 rpm.

Difference fluid pressure:

490 kPa (5 kgf/cm², 71 psi) or less

NOTICE:

Do not turn the steering wheel.



- (i) With the engine idling and valve fully opened, turn the steering wheel to full lock position.

Minimum fluid pressure:

8,826 kPa (90 kgf/cm², 1,280 psi)

NOTICE:

- Do not maintain lock position for more than 10 seconds.
- Do not let the fluid temperature become too high.

- (j) Disconnect the SST.

SST 09640-10010 (09641-01010, 09641-01030, 09641-01040)

- (k) Connect the pressure feed tube to the PS vane pump (See page SR-6).

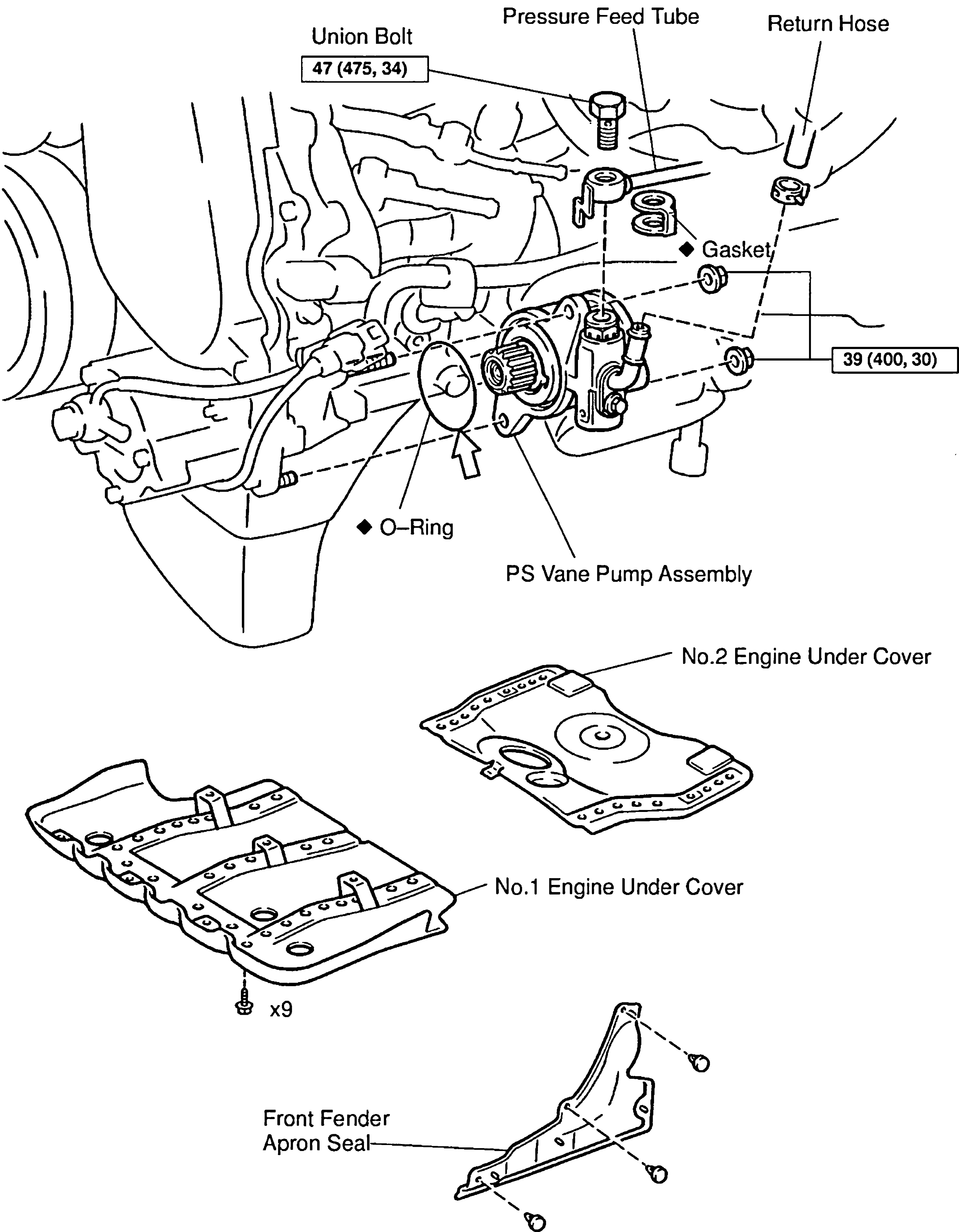
- (l) Bleed the power steering system (See Pub. No. RM517E on page SR-11).

POWER STEERING VANE PUMP (1KD-FTV)

SR1DV-01

COMPONENTS

Disassembly, inspection, replacement and assembly of PS vane pump assembly shall be performed in the same way as that of 1KZ-TE Engine (See Pub. No. RM517E).



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

◆ Non-reusable part

↶ Power steering fluid

REMOVAL

1. REMOVE NO. 1 AND NO. 2 ENGINE UNDER COVERS

Remove the 9 bolts, No. 1 and No. 2 engine under covers.

2. REMOVE FRONT FENDER APRON SEAL

Remove the 3 clips and front fender apron seal.

3. DISCONNECT RETURN HOSE

Remove the clip and disconnect the return hose.

4. DISCONNECT PRESSURE FEED TUBE

Remove the union bolt and gasket, and disconnect the pressure feed tube.

5. REMOVE PS VANE PUMP ASSEMBLY

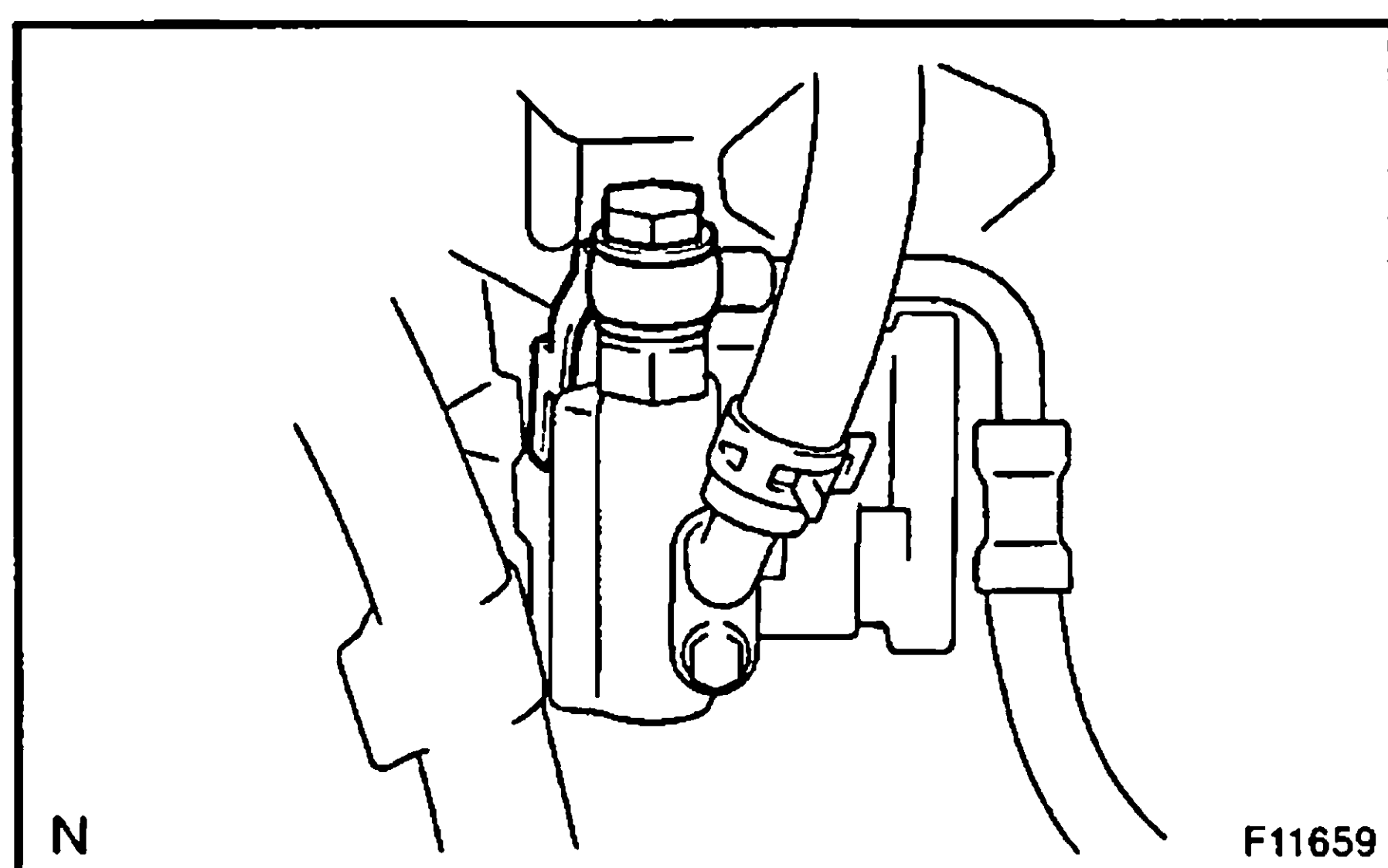
(a) Remove the 2 nuts and PS vane pump assembly.

(b) Remove the O-ring from the PS vane pump assembly.

INSTALLATION

1. INSTALL PS VANE PUMP ASSEMBLY

- (a) Coat a new O-ring with power steering fluid and install it to the PS vane pump assembly.
- (b) Install the PS vane pump assembly with the 2 nuts.
Torque: 39 N·m (400 kgf·cm, 30 ft·lbf)



2. CONNECT PRESSURE FEED TUBE

Install a new gasket and connect the pressure feed tube with the union bolt.

Torque: 47 N·m (475 kgf·cm, 34 ft·lbf)

HINT:

Make sure that the stopper of the pressure feed tube touches the PS vane pump body as shown in the illustration, then torque the union bolt.

3. CONNECT RETURN HOSE

Connect the return hose with the clip.

4. INSTALL FRONT FENDER APRON SEAL

Install the front fender apron seal with the 3 clips.

5. INSTALL NO. 1 AND NO. 2 ENGINE UNDER COVERS

Install the No. 1 and No. 2 engine under covers with the 9 bolts.

6. BLEED POWER STEERING SYSTEM

(See Pub. No. RM517E on page SR-11)

BODY ELECTRICAL

COMBINATION METER	BE-1
ENGINE IMMOBILISER SYSTEM	BE-11

REFER TO FOLLOWING REPAIR MANUALS:

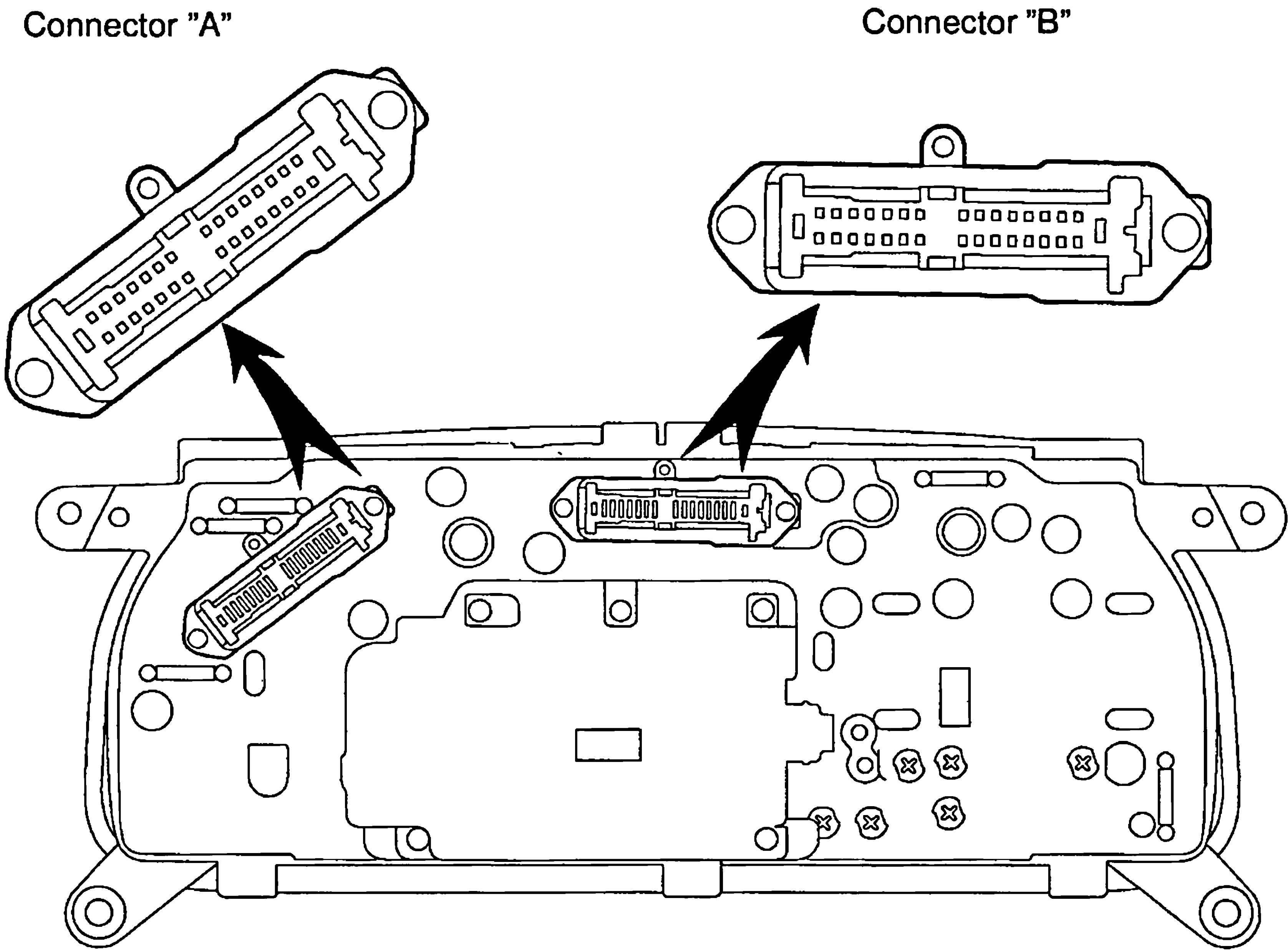
Manual Name	Pub. No.
LAND CRUISER/LAND CRUISER PRADO Chassis and Body Repair Manual	RM517E
LAND CRUISER/LAND CRUISER PRADO Chassis and Body Repair Manual Supplement (Jan., 1998)	RM627E
LAND CRUISER/LAND CRUISER PRADO Chassis and Body Repair Manual Supplement (Jun., 1999)	RM702E

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

BE

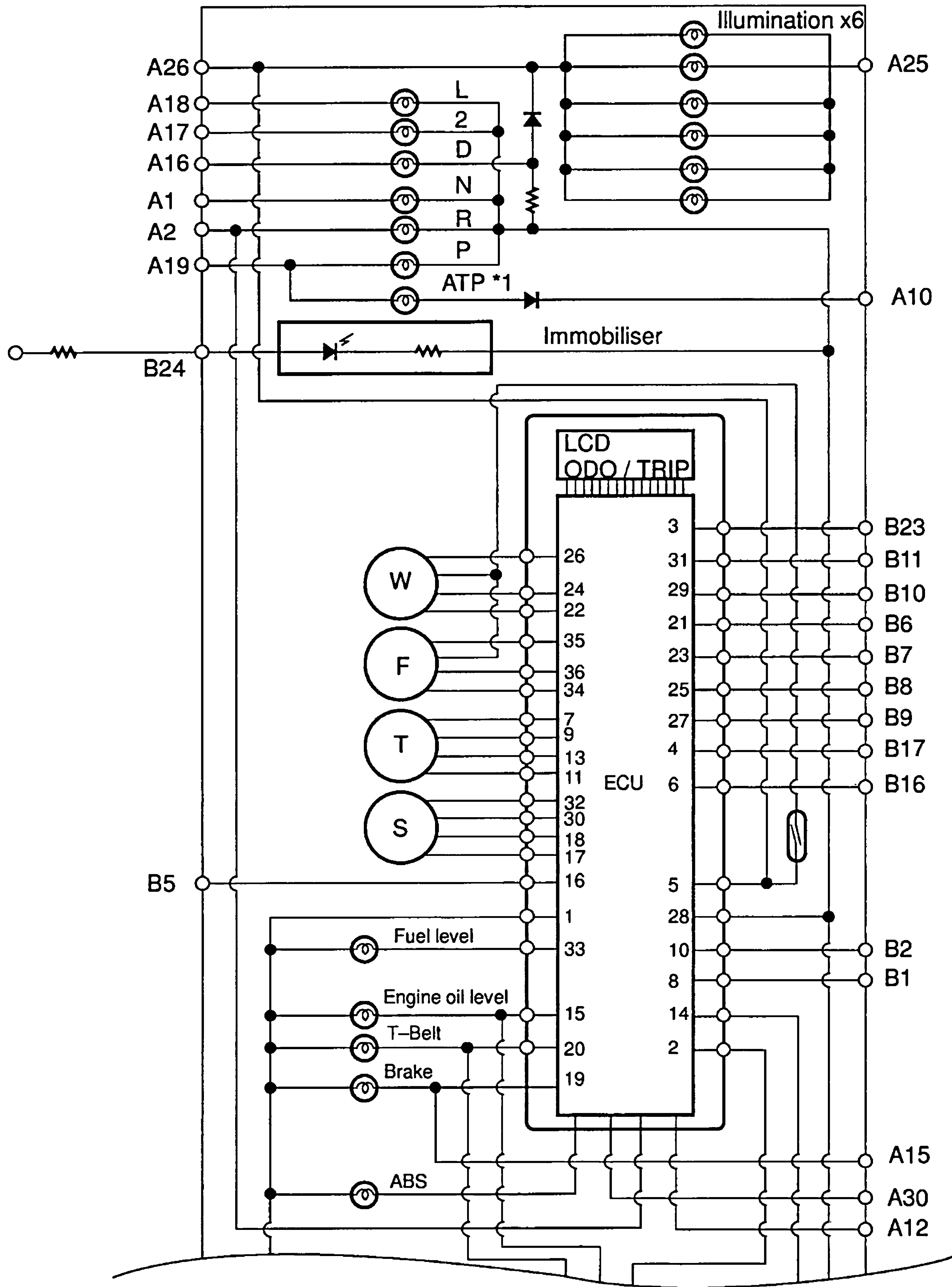
COMBINATION METER CIRCUIT

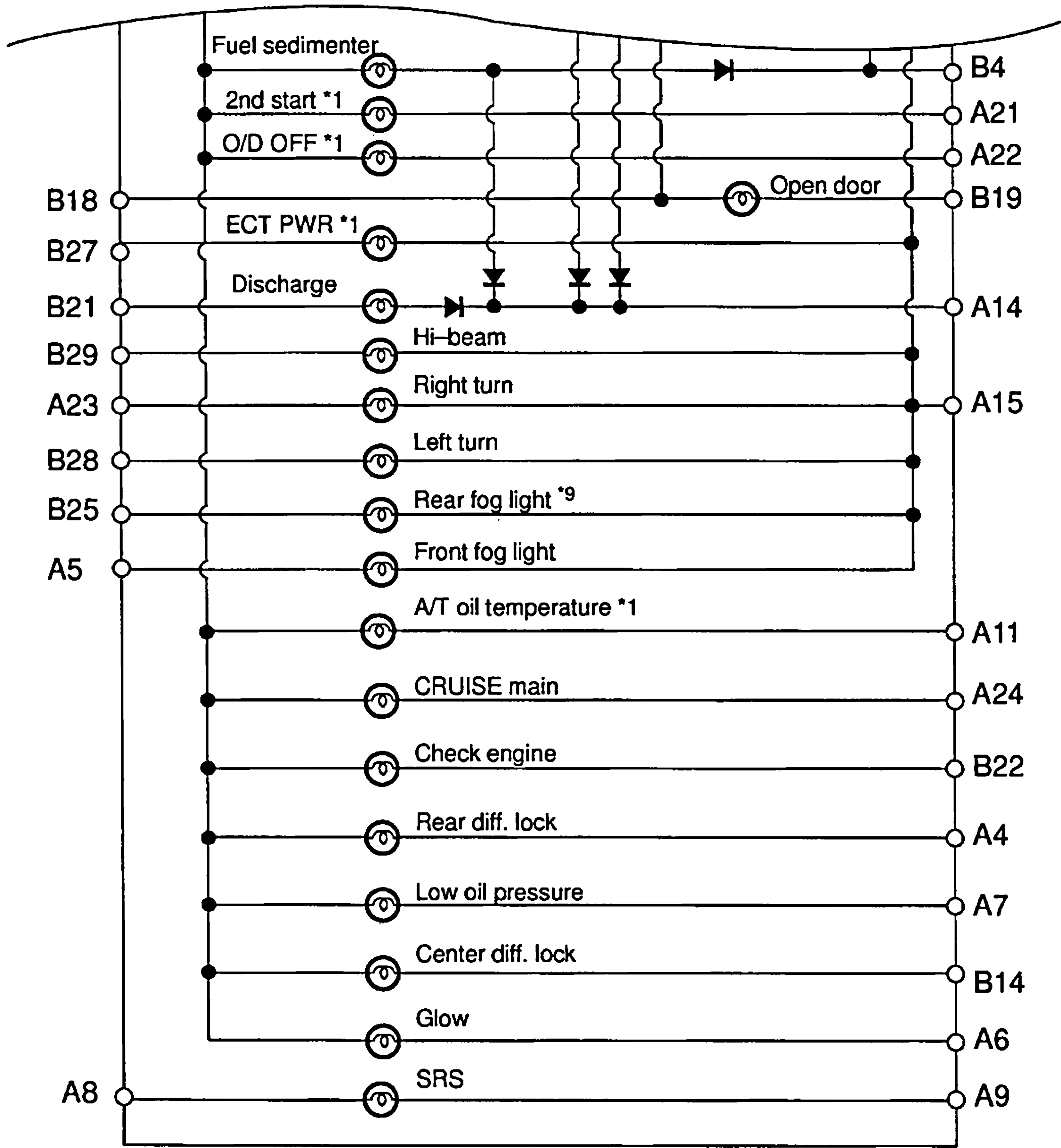
BE1AY-02



BE

w/o VSC: *1: A/T

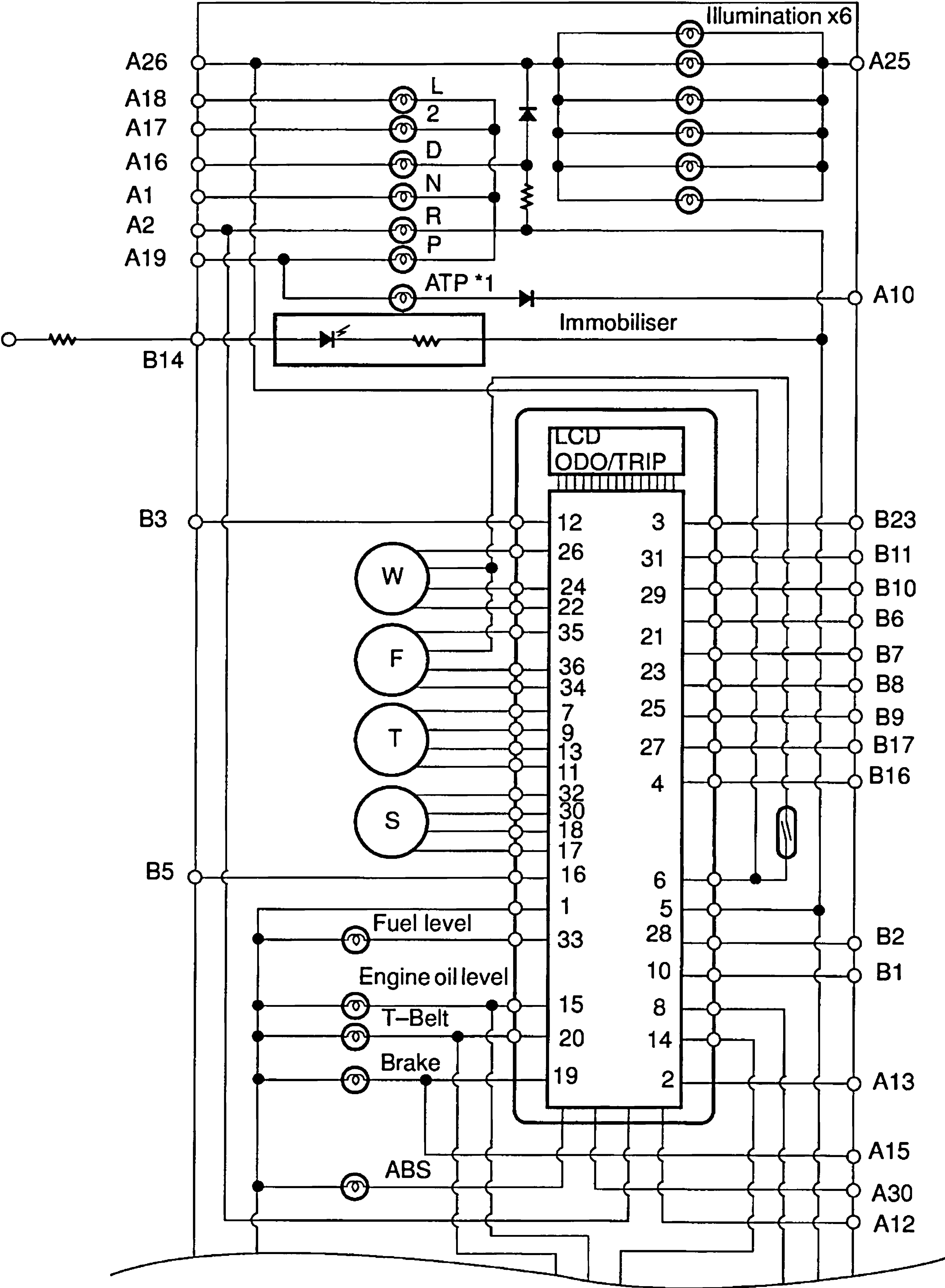




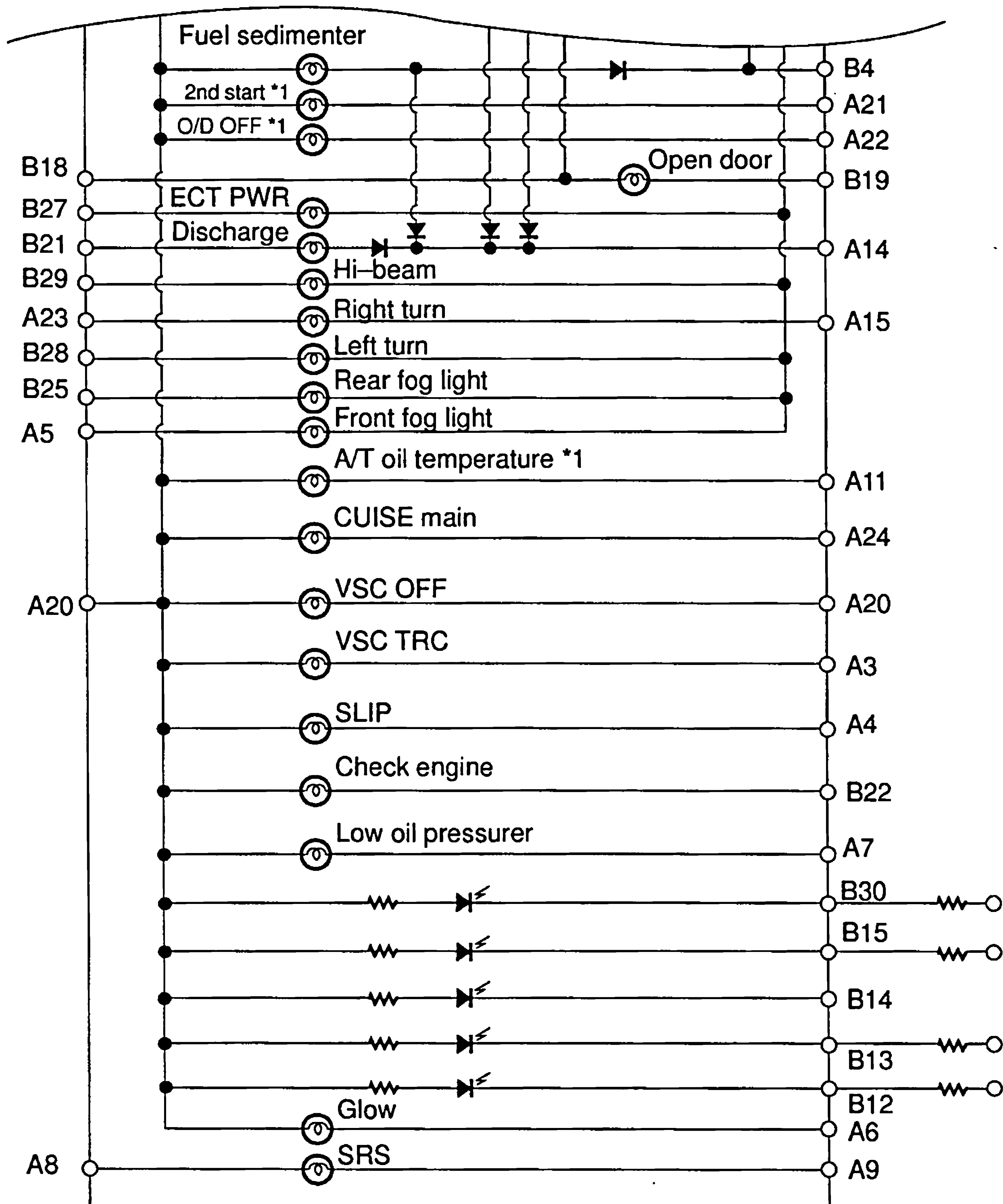
BE

w/ VSC:

*1: A/T



BE



BE

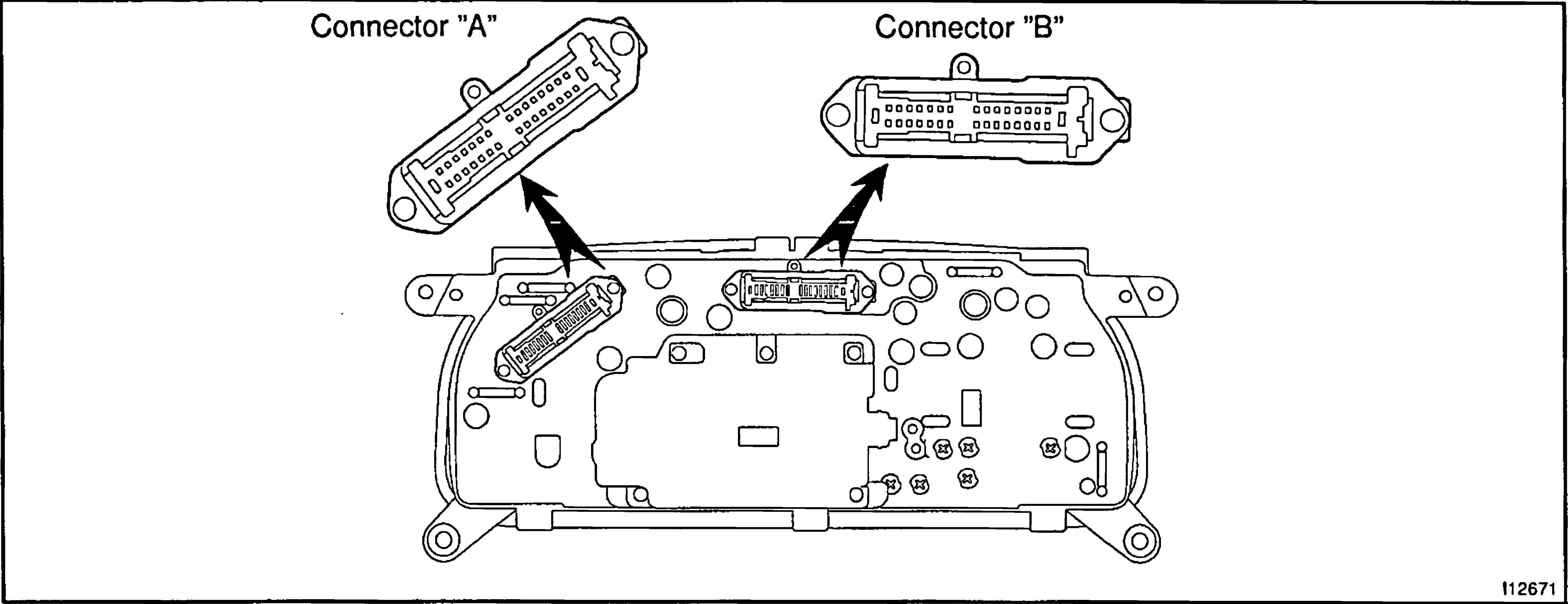
Connector "A"		Connector "B"	
No.	Wiring connector side	No.	Wiring connector side
1	Neutral start switch (N position)	1	Driver door courtesy switch
2	Neutral start switch(R position)	2	Key unlock warning switch
3	ABS & TRC & VSC ECU	3	Passenger seat belt warning light
4	ABS & TRC & VSC ECU	4	Fuel sedimenter switch
5	Front fog light switch	5	Engine ECU *1
6	Engine ECU *1		Engine and ECT ECU *2
	Engine and ECT ECU *2	6	Engine oil level warning switch
7	Low oil pressure warning switch	7	A/C amplifier
8	ECU-B Fuse	8	Vehicle speed sensor
9	Airbag sensor assembly	9	Ground
10	Center diff. lock control motor	10	Water temperature sender gauge
11	Engine and ECT ECU	11	Fuel sender gauge
12	ABS & TRC & VSC ECU	12	ABS & TRC & VSC ECU
13	ABS & TRC & VSC ECU	13	ABS & TRC & VSC ECU
14	Alternator	14	Center diff. lock ECU
15	Brake fluid level warning switch	15	ABS & TRC & VSC ECU
16	Neutral start switch (D position)	16	Driver's seat belt buckle switch
17	Neutral start switch (2 position)	17	Passenger's seat belt buckle switch
18	Neutral start switch (L position)	18	DOME Fuse
19	Neutral start switch (P position)	19	Door courtesy switch
20	ABS & TRC & VSC ECU	20	IGN Fuse
21	Engine and ECT ECU	21	IGN Fuse
22	O/D main switch	22	Engine and ECT ECU
23	Turn signal switch (Right)	23	Ground
24	Engine ECU *1	24	Transponder key computer
	Engine and ECT ECU *2	25	Rear fog light switch
25	Light control rheostat	26	Ground
26	Taillight control relay	27	ECT Pattern select switch
30	Ground	28	Turn signal Switch (Left)
		29	Headlight dimmer switch
		30	ABS & TRC & VSC ECU

*1: M/T
*2: A/T

INSPECTION

INSPECT COMBINATION METER CIRCUIT

Connect the connector "A" and "B" to the combination meter and inspect the wire harness side connectors from the back side as shown in the table.



BE

Tester connection	Condition	Specified condition
A1 – Ground	Ignition switch ON and except A/T shift N position	No voltage
	Ignition switch ON and A/T shift N position	Battery voltage
A2 – Ground	Ignition switch ON and except A/T shift R position	No voltage
	Ignition switch ON and A/T shift R position	Battery voltage
A3 – Ground* ¹	Ignition switch ON and transfer H _L or L _L position	No voltage
	Ignition switch ON and except transfer H _L or L _L position	Battery voltage
A3 – Ground* ²	Ignition switch ON and VSC TRC warning light ON	No voltage
	Ignition switch ON and VSC TRC warning light OFF	Battery voltage
A3 – Ground*	Ignition switch ON and TRC warning light ON	No voltage
	Ignition switch ON and TRC warning light OFF	Battery voltage
A4 – Ground*	Ignition switch ON and rear diff. lock switch ON	No voltage
	Ignition switch ON and rear diff. lock switch OFF	Battery voltage
A4 – Ground*	Ignition switch ON and SLIP warning light ON	No voltage
	Ignition switch ON and SLIP warning light OFF	Battery voltage
A5 – Ground	Ignition switch ON and front fog light switch OFF	No voltage
	Ignition switch ON and front fog light switch ON	Battery voltage
A6 – Ground	Ignition switch ON and glow indicator light lights up	No voltage
	Ignition switch ON and glow indicator does not light up	Battery voltage
A7 – Ground	Ignition switch ON and engine is stopped	No voltage
	Ignition switch ON and engine is running	Battery voltage
A8 – Ground	Constant	Battery voltage

A9 – Ground	Ignition switch ON and SRS indicator light lights up	No voltage
	Ignition switch ON and SRS indicator does not light up	Battery voltage
A10 – Ground	Ignition switch ON and A/T shift P indicator lights up	No voltage
	Ignition switch ON and A/T shift P indicator does not light up	Battery voltage
A11 – Ground	Ignition switch ON and A/T oil temperature indicator lights up	No voltage
	Ignition switch ON and A/T oil temperature indicator does not light up	Battery voltage
A12 – Ground*6	Ignition switch ON and ABS warning light lights up	No voltage
	Ignition switch ON and ABS warning light does not light up	Battery voltage
A13 – Ground	Ignition switch ON and parking brake lever is pulled	No voltage
	Ignition switch ON and parking brake lever is released	Battery voltage
A14 – Ground	Ignition switch ON and engine is stopping	No voltage
	Ignition switch ON and engine is running	Battery voltage
A15 – Ground	Ignition switch ON and brake fluid level warning switch float DOWN	No voltage
	Ignition switch ON and brake fluid level warning switch float UP	Battery voltage
A16 – Ground	Ignition switch ON and except A/T shift D position	No voltage
	Ignition switch ON and A/T shift D position	Battery voltage
A17 – Ground	Ignition switch ON and except A/T shift 2nd position	No voltage
	Ignition switch ON and A/T shift 2nd position	Battery voltage
A18 – Ground	Ignition switch ON and except A/T shift L position	No voltage
	Ignition switch ON and A/T shift L position	Battery voltage
A19 – Ground	Ignition switch ON and except A/T shift P position	No voltage
	Ignition switch ON and A/T shift P position	Battery voltage
A20 – Ground	Ignition switch ON and VSC OFF switch OFF	No voltage
	Ignition switch ON and VSC OFF switch ON	Battery voltage
A21 – Ground	Ignition switch ON and pattern select switch NORM	No voltage
	Ignition switch ON and pattern select switch 2nd start	Battery voltage
A22 – Ground	Ignition switch ON and O/D off switch ON	No voltage
	Ignition switch ON and O/D off switch OFF	Battery voltage
A23 – Ground	Ignition switch ON and turn signal switch OFF or LEFT	No voltage
	Ignition switch ON and turn signal switch RIGHT	Battery voltage
A24 – Ground	Ignition switch ON and cruise control switch ON	No voltage
	Ignition switch ON and cruise control switch OFF	Battery voltage

BE

BODY ELECTRICAL – COMBINATION METER

A25 (w/ rheostat) – Ground	Ignition switch ON and light control rheostat volume maximum	No voltage
	Ignition switch ON and light control rheostat volume maximum	Battery voltage
A25 (w/o rheostat) – Ground	Constant	Continuity
A26 – Ground	Headlight control switch TAIL or HEAD	Battery voltage
	Headlight control switch OFF	No voltage
B1 – Ground	Ignition switch ON and driver door is opened	No voltage
	Ignition switch ON and driver door is closed	Battery voltage
B2 – Ground	Key unlock warning switch ON(Key is inserted)	No voltage
	Key unlock warning switch OFF(Key is removed)	Battery voltage
B3 – Ground	Passenger seat belt warning light ON	Battery voltage
	Passenger seat belt warning light OFF	No voltage
B4 – Ground	Fuel sedimenter switch ON	No voltage
	Fuel sedimenter switch OFF	Battery voltage
B5 – Ground	Ignition switch ON and slowly move the wheel	Pulse signal is output below 1.5 V ↔ aprox. 5 V or below 1.5 V ↔ battery voltage
B6 – Ground	Ignition switch ON and engine oil level warning lights up	No voltage
	Ignition switch ON and engine oil level warning does not light up	Battery voltage
B8 – Ground	Ignition switch ON and slowly move the wheel	Pulse signal is output below 1.5 V ↔ battery voltage
B9 – Ground	Constant	Continuity
B10 – Ground	Ignition switch ON and engine coolant temperature 90 °C	Battery voltage
B11 – Ground	Ignition switch ON and fuel sender gauge float UP	Approx. 0.2 V
	Ignition switch ON and fuel sender gauge float DOWN	Approx. 3.2 V
B12 – Ground	Left rear A-TRC indicator ON	6.5 – 10.5 V
B13 – Ground	Left rear A-TRC indicator ON	6.5 – 10.5 V
B14 – Ground	Center diff. A-TRC indicator ON	6.5 – 10.5 V
B15 – Ground	Right front A-TRC indicator ON	6.5 – 10.5 V
B16 – Ground	Ignition switch ON and driver seat belt is unfastened	No voltage
	Ignition switch ON and driver seat belt is fastened	Battery voltage
B17 – Ground	Ignition switch ON and passenger seat belt is unfastened	No voltage
	Ignition switch ON and passenger seat belt is fastened	Battery voltage
B18 – Ground	Constant	Battery voltage
B19 – Ground	Either door is opened	No voltage
	Either door is closed	Battery voltage
B20 – Ground	Ignition switch OFF	No voltage
	Ignition switch ON	Battery voltage

BE

B21 – Ground	Ignition switch OFF	No voltage
	Ignition switch ON	Battery voltage
B22 – Ground*7	Ignition switch ON and engine is stopped	No voltage
	Ignition switch ON and engine is running	Battery voltage
B23 – Ground	Constant	Continuity
B24 – Ground	Key unlock warning switch ON(Key is inserted)	No voltage
	Key unlock warning switch OFF(Key is removed)	No voltage ↔ Battery voltage
B22 – Ground	Ignition switch ON and air filter switch ON	No voltage
	Ignition switch ON and air filter switch OFF	Battery voltage
B22 – Ground*9	Ignition switch ON and rear foglight switch ON	No voltage
	Ignition switch ON and rear foglightt switch OFF	Battery voltage
B26 – Ground	Constant	Continuity
B28 – Ground	Ignition switch ON and turn signal switch OFF or RIGHT	No voltage
	Ignition switch ON and turn signal switch LEFT	Battery voltage
B29 – Ground	Headlight dimmer switch HI or flash	Battery voltage
B30 – Ground	Left front A–TRC indicator light ON	6.5 – 10.5 V

- *1: w/ VSC
- *2: w/o VSC
- *3: w/ Rear diff. lock
- *4:w/ ABS
- *5: w/ Rear fog light

If circuit is not as specified, wiring diagram and inspect the cir-
cuits connected to other parts.

ENGINE IMMOBILISER SYSTEM

TROUBLESHOOTING

BE0YJ-05

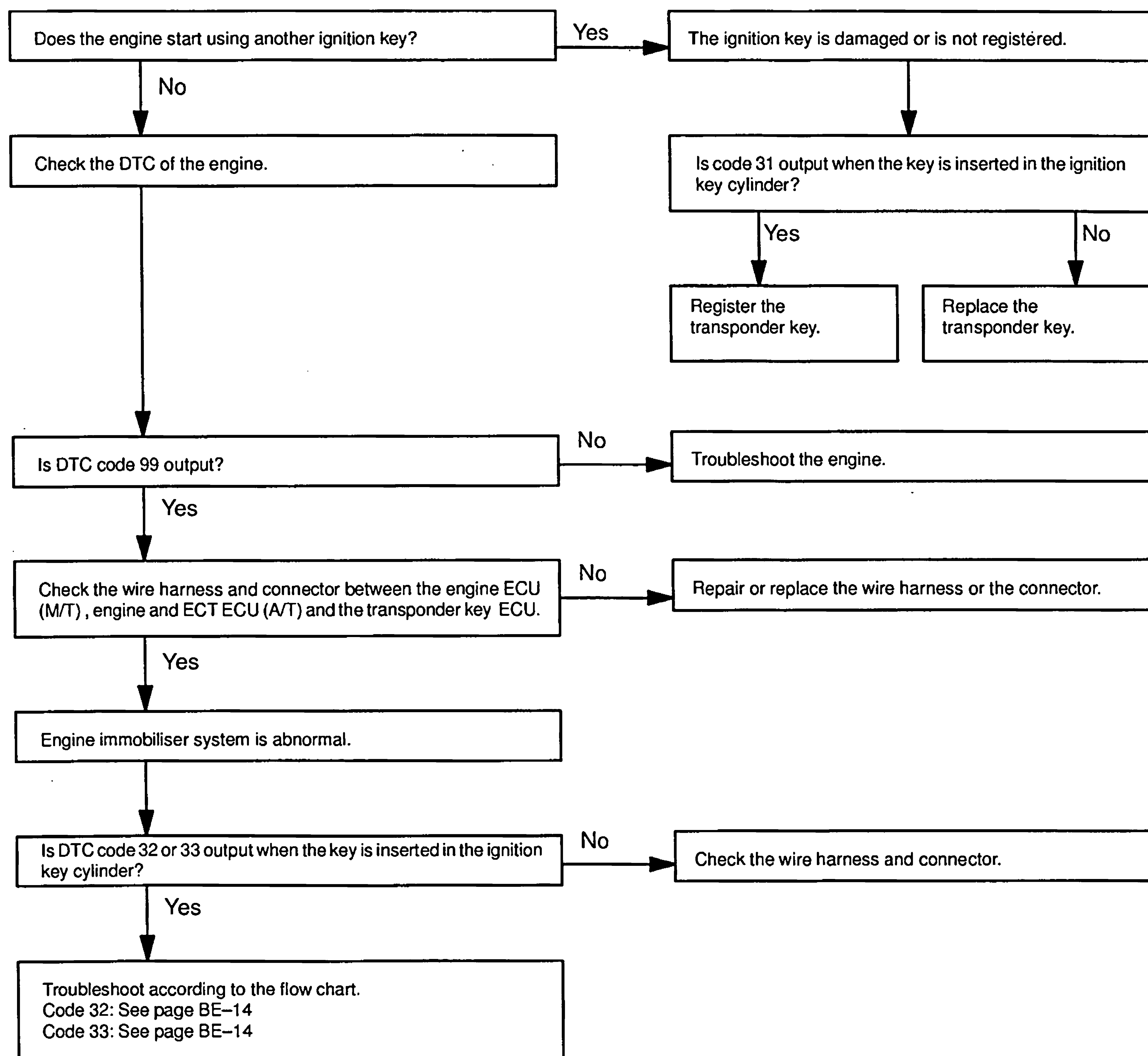
HINT:

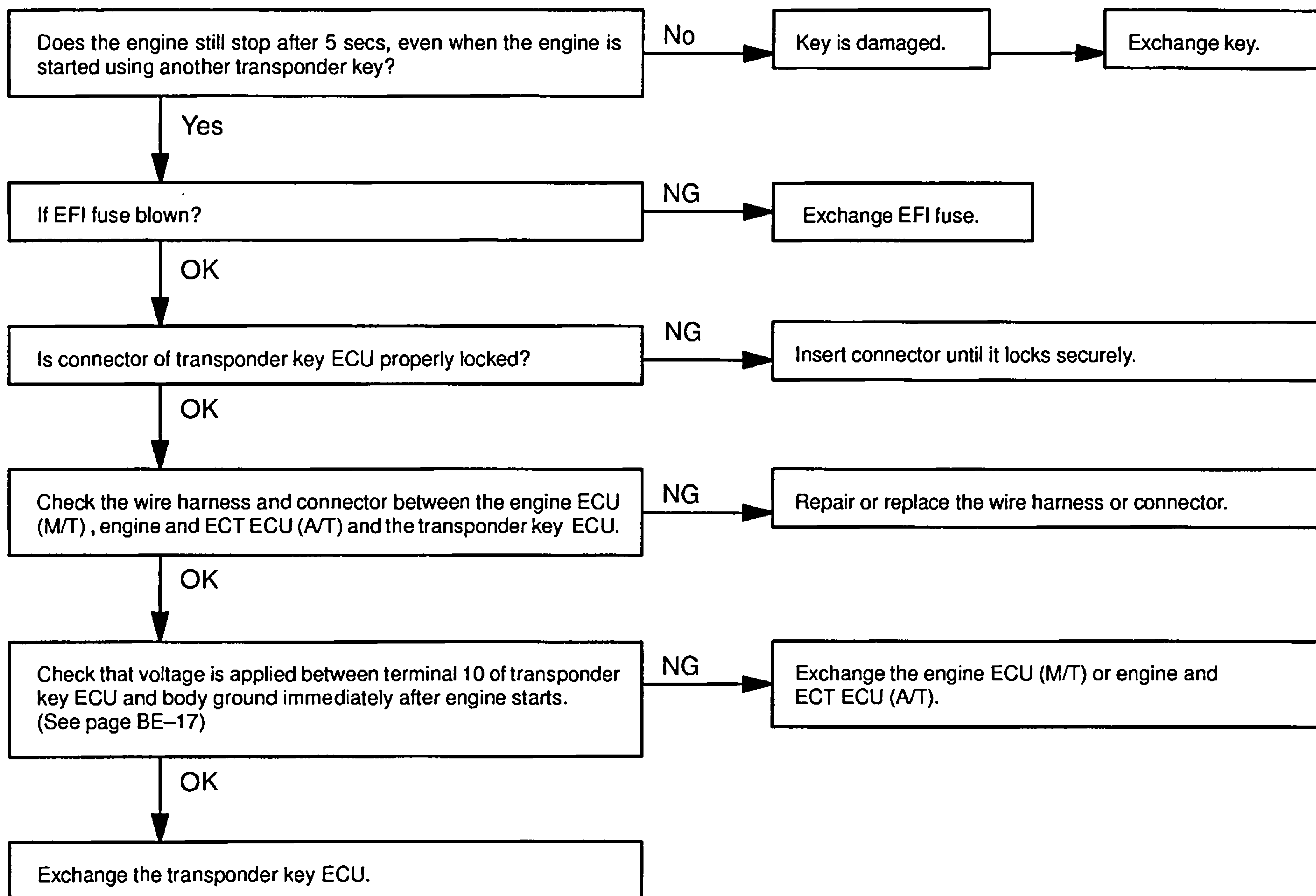
If a malfunction occurs in the engine immobiliser system, either of the following symptoms occurs:

- Cranking occurs, but the engine does not start.
- The engine starts, but stops after 5 seconds.

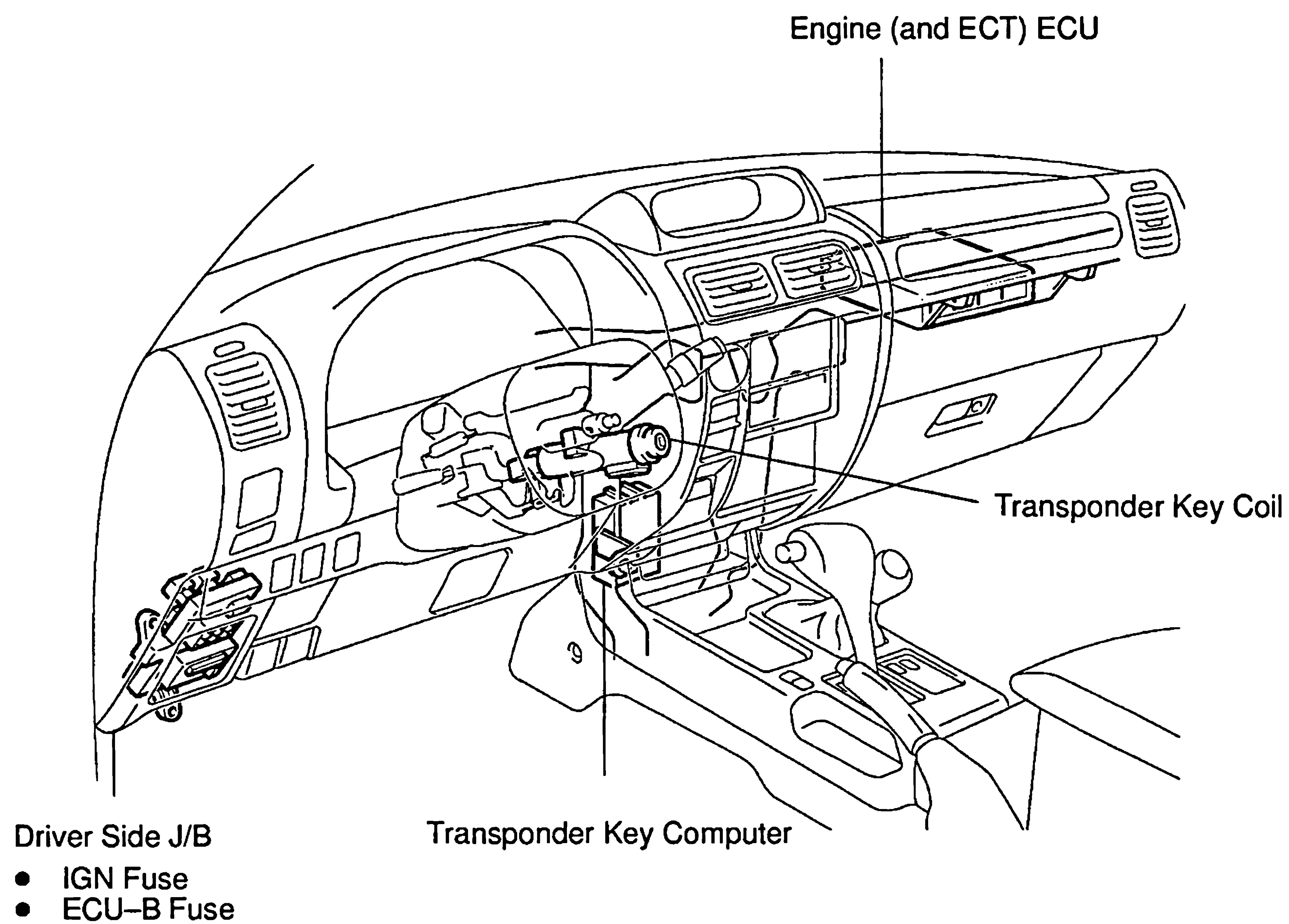
If either or these symptoms occurs, do troubleshooting to the following flow chart.

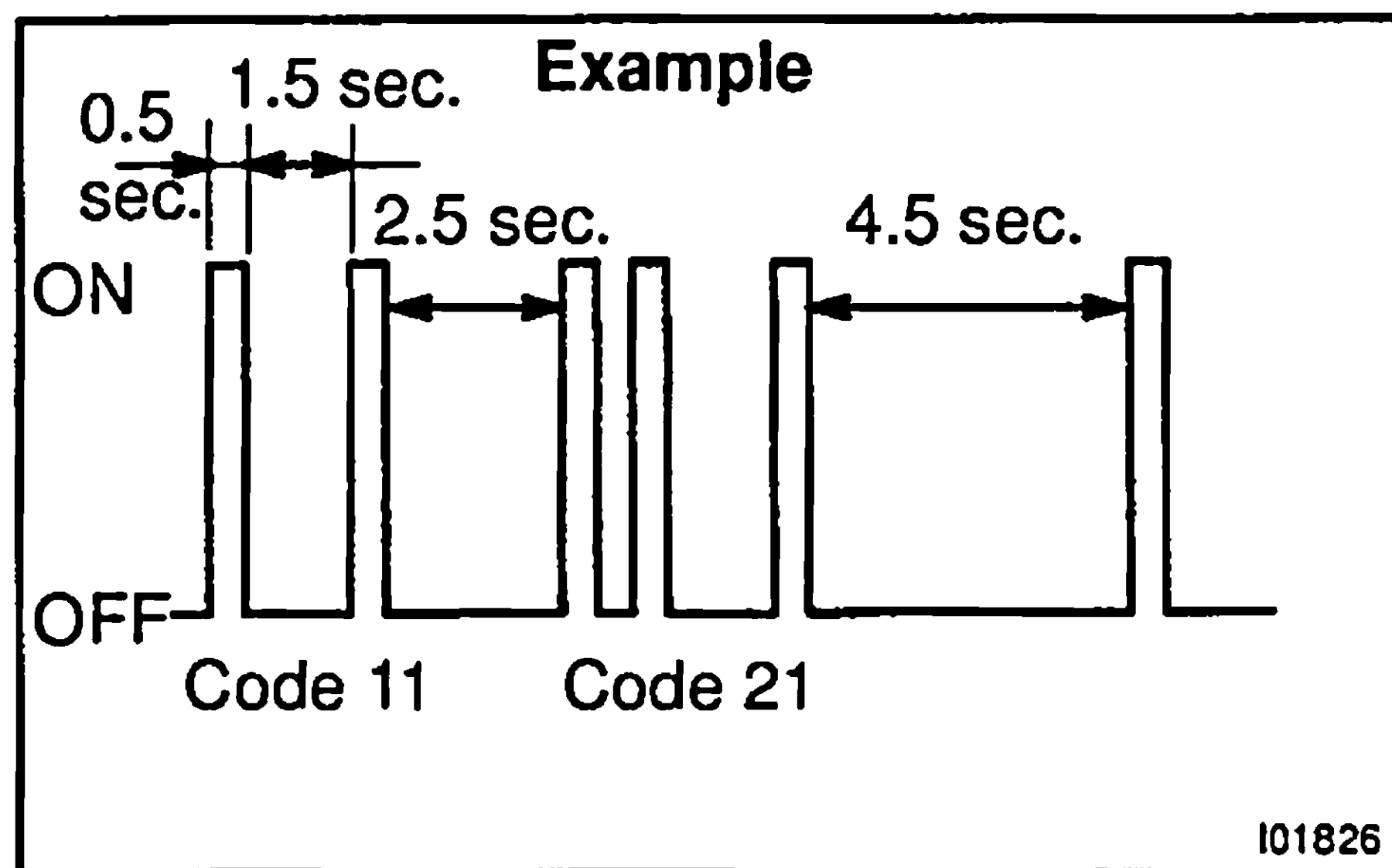
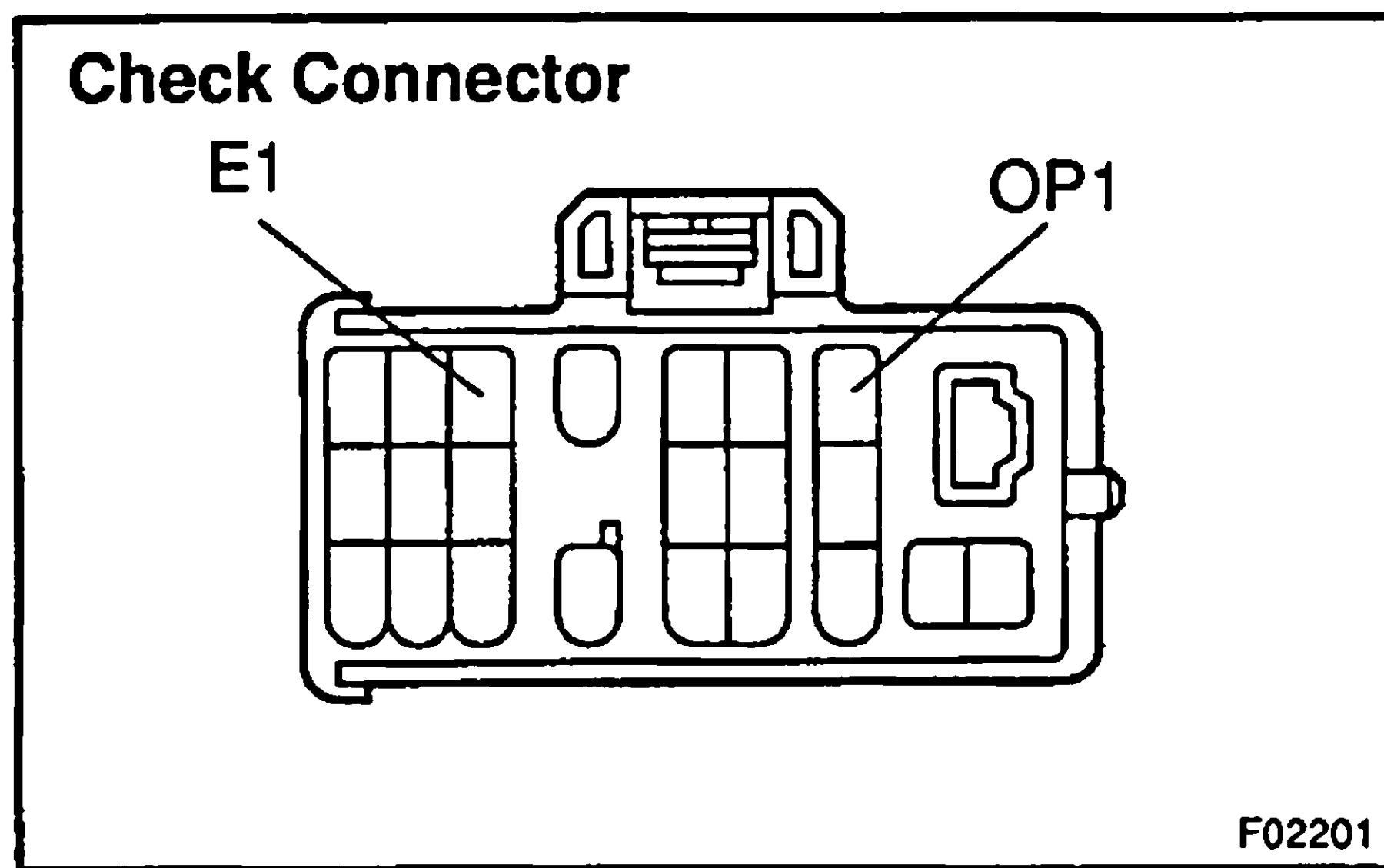
1. CRANKING OCCURS, BUT THE ENGINE DOES NOT START



2. ENGINE STARTS, BUT STOPS AFTER 5 SECONDS

LOCATION





PRE-CHECK

1. TRANSPONDER KEY ECU INPUT CONDITION DISPLAY READ CODE

- (a) Connect the positive (+) lead from the volt meter (Analog Type) to OP1 of the check connector and the negative (–) lead to E1 of the check connector.

- (b) Insert the ignition key in the key cylinder.

- (c) Read the code from the movement of the tester needle.

If no code is output, turn the ignition switch ON.

If a code is now output, check if the DOME fuse is blown.

HINT:

- The code can be read using a luminous diode (Recommend activation current 10 – 20 mA) instead of a tester.
- A digital tester can also be used.

Display condition:

- When there are multiple codes, they are output in order starting from the lowest code.
- After all the codes are output, Lo is displayed for 4.5 secs., then all the code are output again starting from the lowest code.
- If the situation changes during code output, Lo is output for 4.5 secs. after output of the current code ceases, then the codes are output again starting from the lowest code. E.g. while 11 (out of 11 and 21) is being output, conditions change and 12 is added. So after 11 is output, Lo is output for 4.5 secs., then 11, 12 and 21 are output.

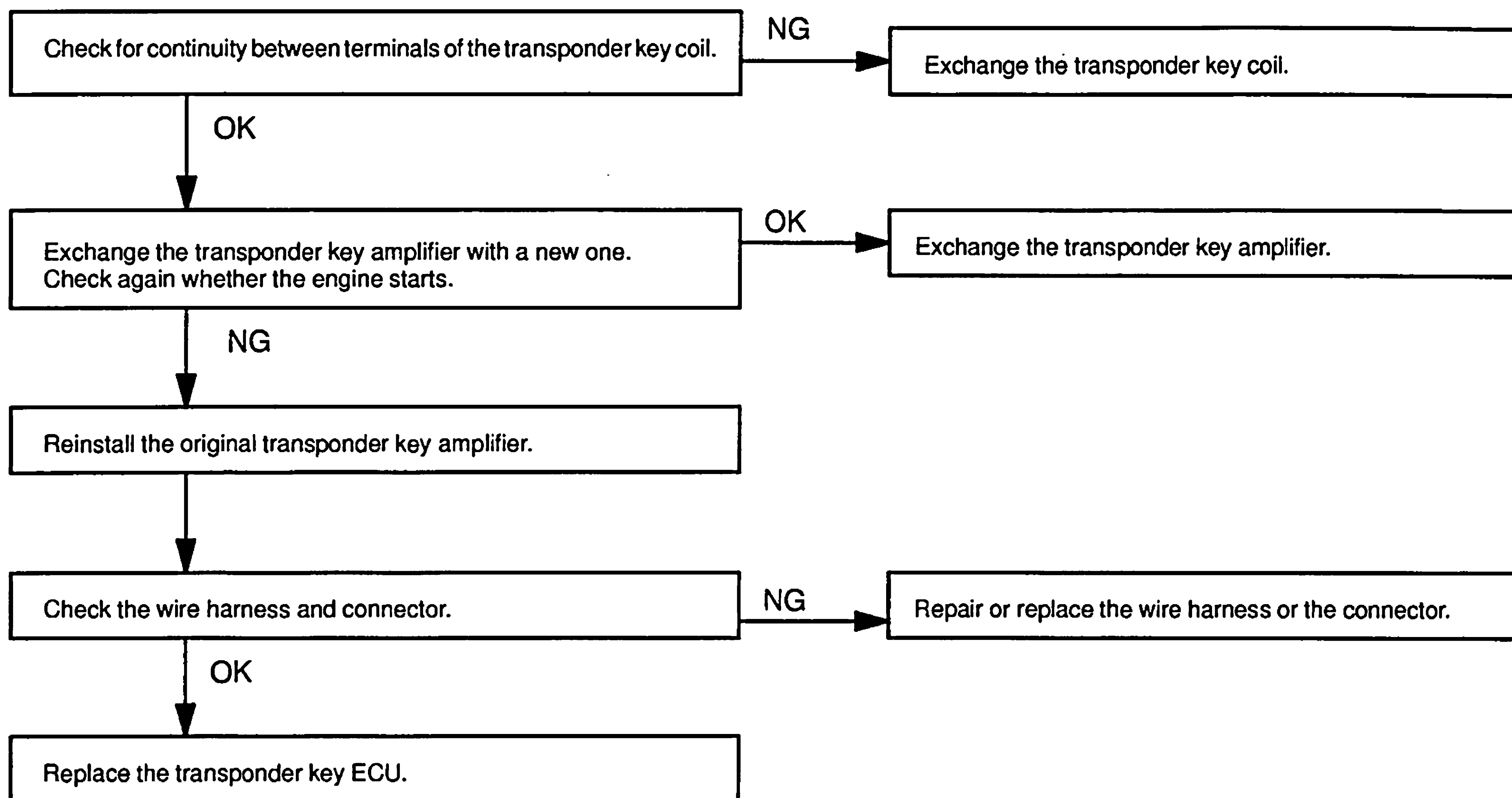
2. TRANSPONDER KEY ECU INPUT CONDITION DISPLAY CODE LIST

Code	Output condition
11	Key unlock warning switch ON (Ignition key inserted)
12	Any door is open. (Door courtesy switch ON)
13	Ignition switch at ON position
21	Master key is inserted in key cylinder and the immobiliser system is OFF.
22	Sub key is inserted in key cylinder and immobiliser system is OFF.
31	Key code recorded in transponder key ECU differs from code of key inserted in key cylinder.
32	Transponder key code cannot be read.
33	Key code cannot be read because format of chip inside key is wrong.
34	Transponder key ECU has no memory space to register key code.
51	FCVC code is learned.
52	FCVC is unlocked.
53	FCVC code is error.
54	FCVC is check-sum error.
55	FCVC is factory code initialling
56	FCVC code line trouble
57	FCVC trouble
58	While ignition switch ON, no response from FCVC for 5 consecutive sec,

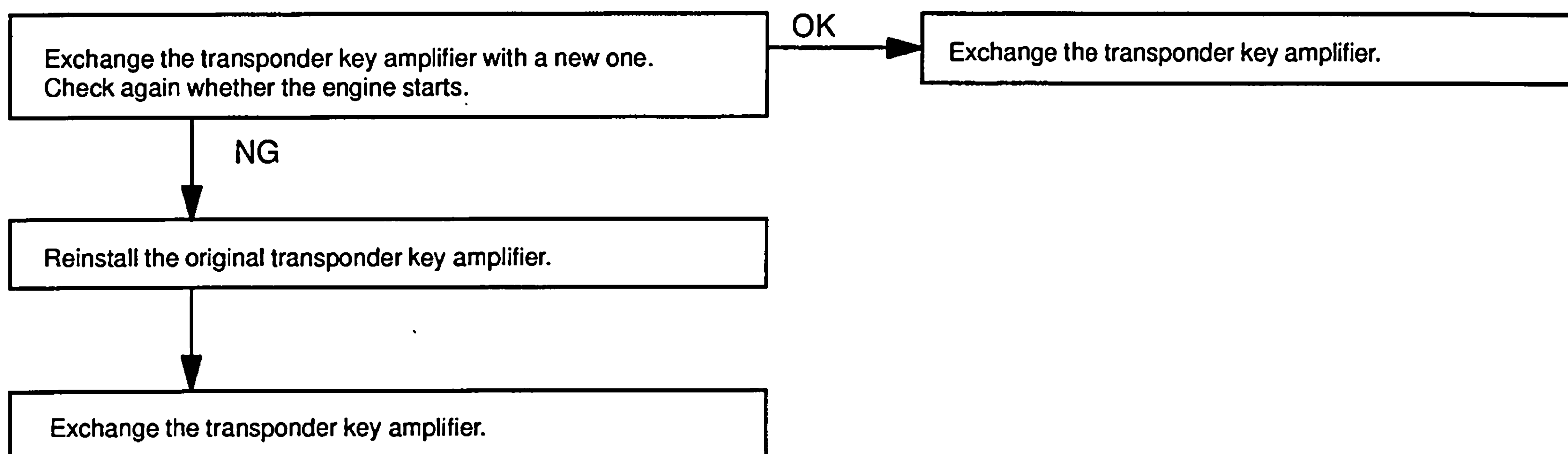
3. TRANSPONDER KEY ECU INPUT CONDITION DISPLAY MALFUNCTION LIST

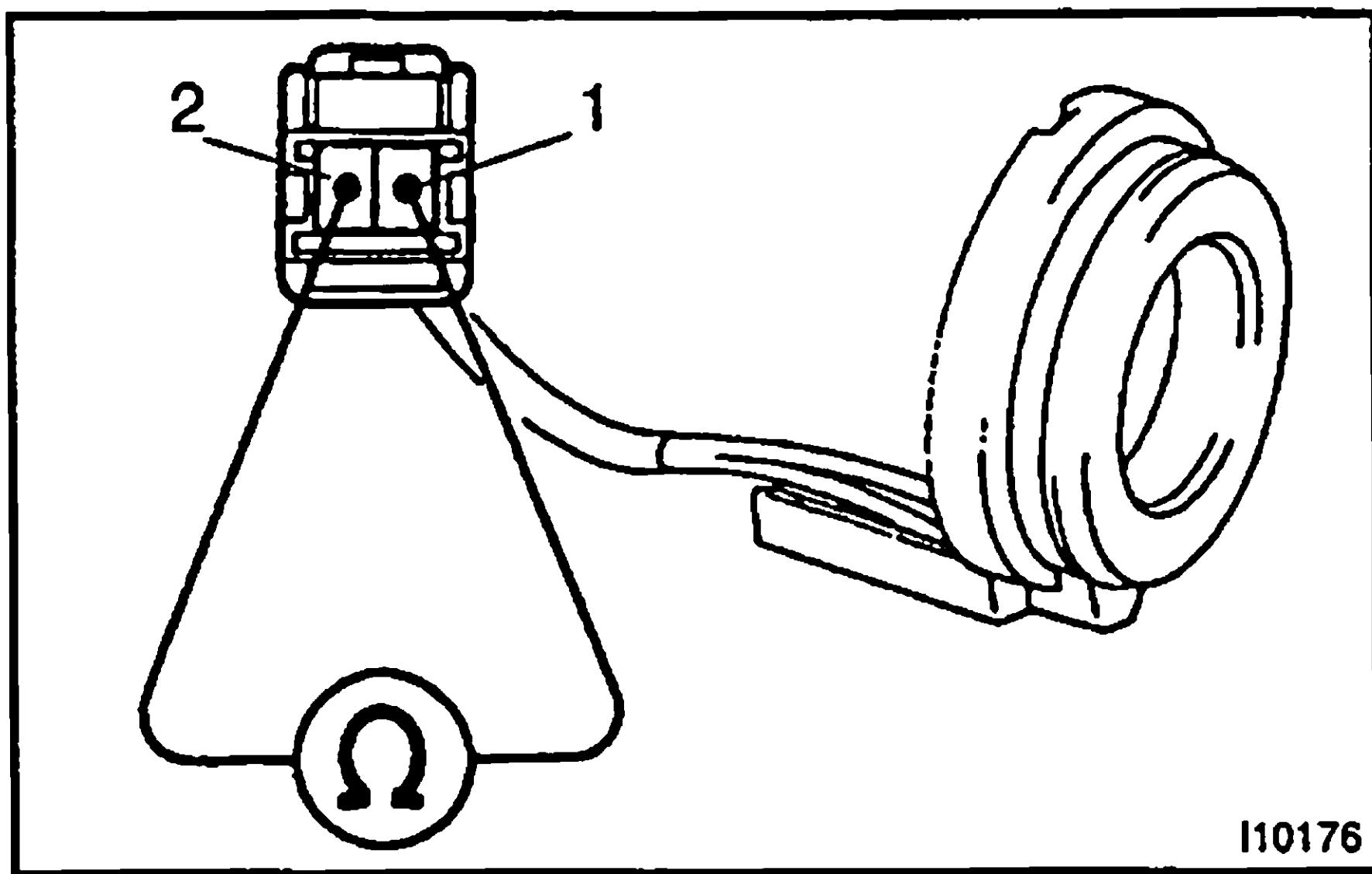
Symptom	Cause
No code is output.	1. DOME Fuse 2. Wire harness or connector 3. Transponder key ECU
Even when key is inserted in key cylinder, Code 11 is not output.	1. Key unlock warning switch 2. Wire harness or connector 3. Transponder key ECU
Code 12 is not output when the door is open.	1. Door courtesy switch 2. Wire harness or connector 3. Transponder key ECU
Code 13 is not output when ignition switch ON.	1. IGN Fuse 2. Wire harness or connector 3. Transponder key ECU
Code 31 is output when key is inserted in key cylinder.	Key code is not registered.
Code 32 is output.	1. Transponder key coil 2. Transponder key ECU 3. Transponder key amplifier 4. Wire harness or connector
Code 33 is output.	1. Transponder key ECU 2. Transponder key amplifier
Code 34 is output.	Transponder key ECU has no memory space to register key code.

- If code 32 is output, troubleshoot according to this flow chart.



- If code 33 is output, troubleshoot according to this flow chart.





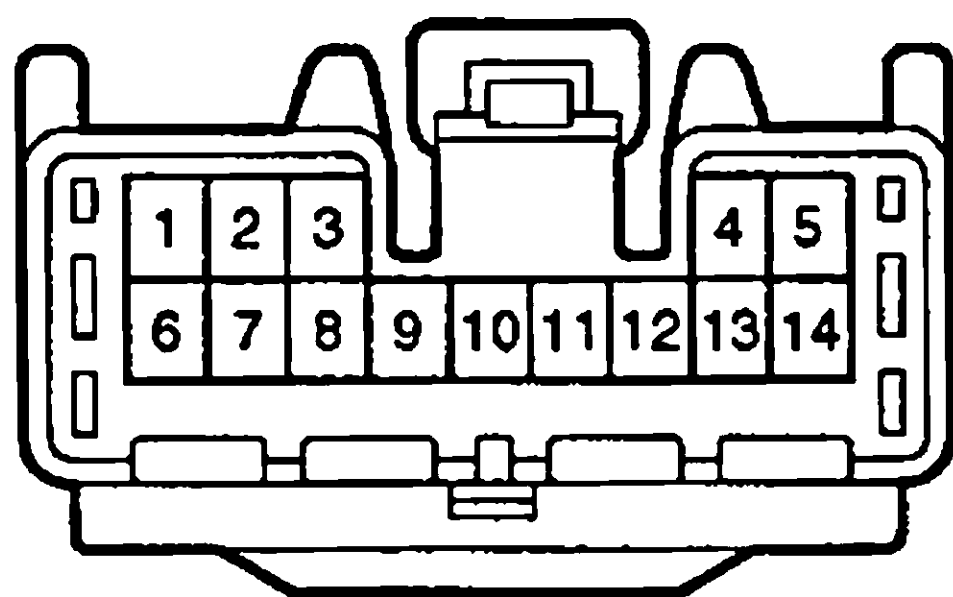
INSPECTION

1. INSPECT TRANSPONDER KEY COIL CONTINUITY

Check that continuity exists between terminal 1 and 2.

If continuity is not as specified, replace the coil.

Wire Harness Side



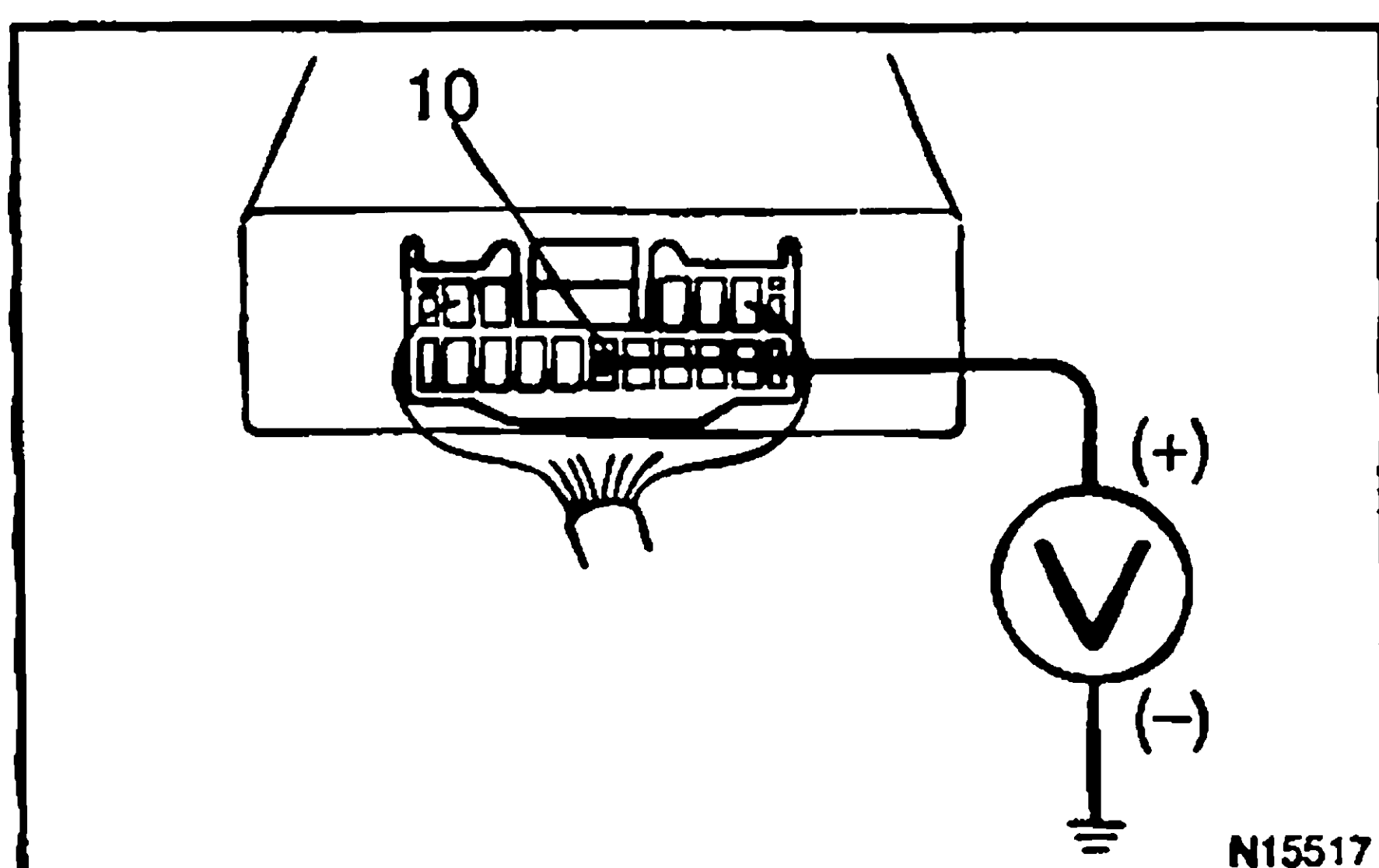
2. INSPECT TRANSPONDER KEY ECU CIRCUIT

Disconnect the connector from the ECU and inspect the connector on the wire harness side, as shown in the table below.

Tester connection	Condition	Specified condition
1 – Ground	Constant	Battery voltage
2 – Ground	Ignition switch ON	Battery voltage
8 – Ground	All doors closed	No continuity
8 – Ground	All doors open	Continuity
9 – Ground	Key unlock warning switch OFF (key removed)	No continuity
9 – Ground	Key unlock warning switch ON (key inserted)	Continuity
14 – Ground	Constant	Continuity

If the circuit is not as specified, try replacing the ECU with a new one.

If the circuit is not as specified, inspect the circuits connected to other parts.



3. INSPECT TRANSPONDER KEY ECU

- With the connector connected, connect the positive (+) lead from the analog type tester to terminal 10 and the negative (–) lead to the body ground.
- Check that there is battery voltage when the ignition switch turned ON.
- Check that the tester needle swings strongly for approx. 1 sec. when the engine is started using the ignition key.

AIR CONDITIONING

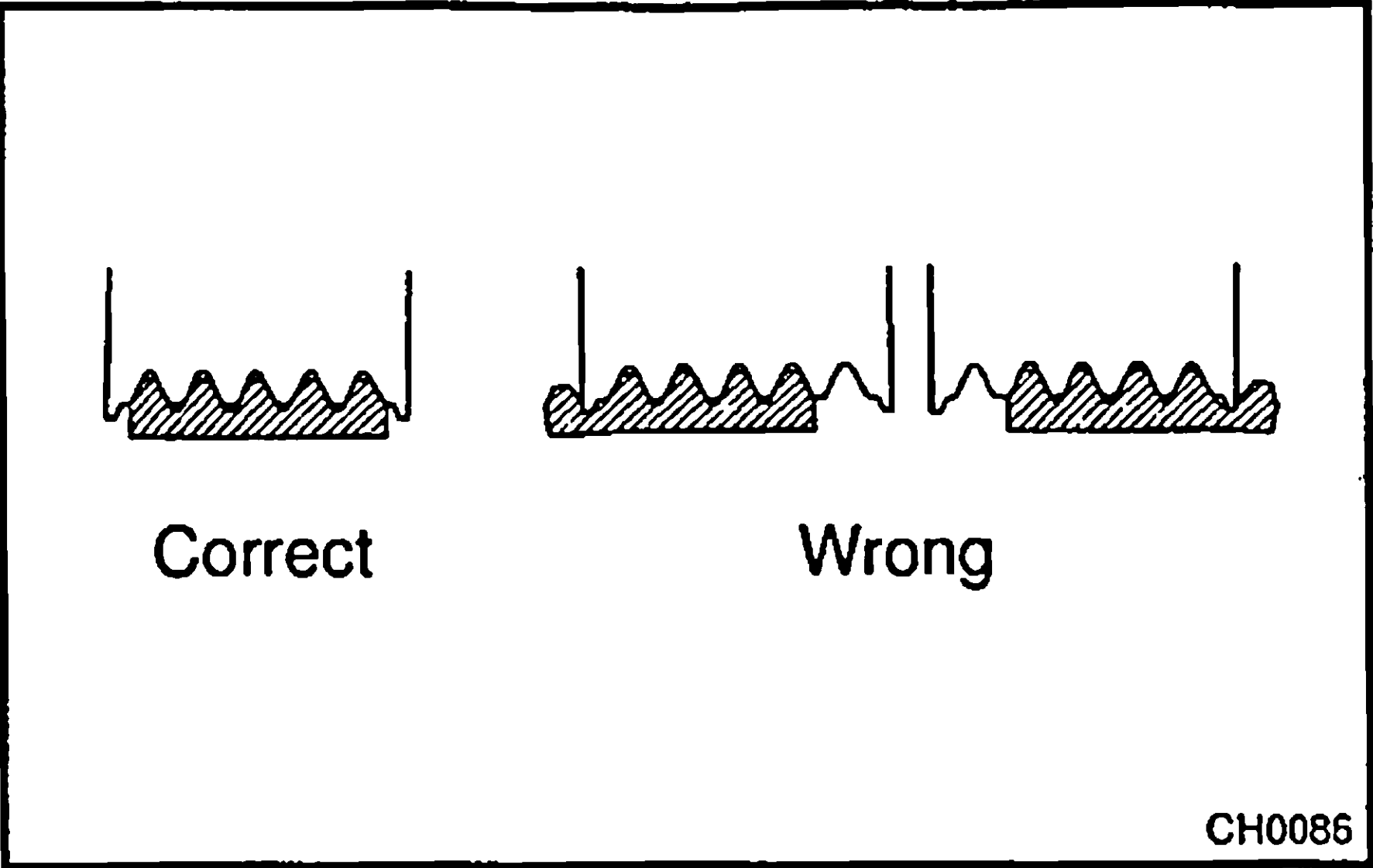
DRIVE BELT	AC-1
VISCOUS HEATER AND MAGNETIC CLUTCH	AC-2
HEATER AMPLIFIER (w/ Viscous Heater) ...	AC-10
POWER HEATER SWITCH	AC-11

REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
LAND CRUISER/LAND CRUISER PRADO Chassis and Body Repair Manual	RM517E
LAND CRUISER/LAND CRUISER PRADO Chassis and Body Repair Manual Supplement (Jun., 1999)	RM702E

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

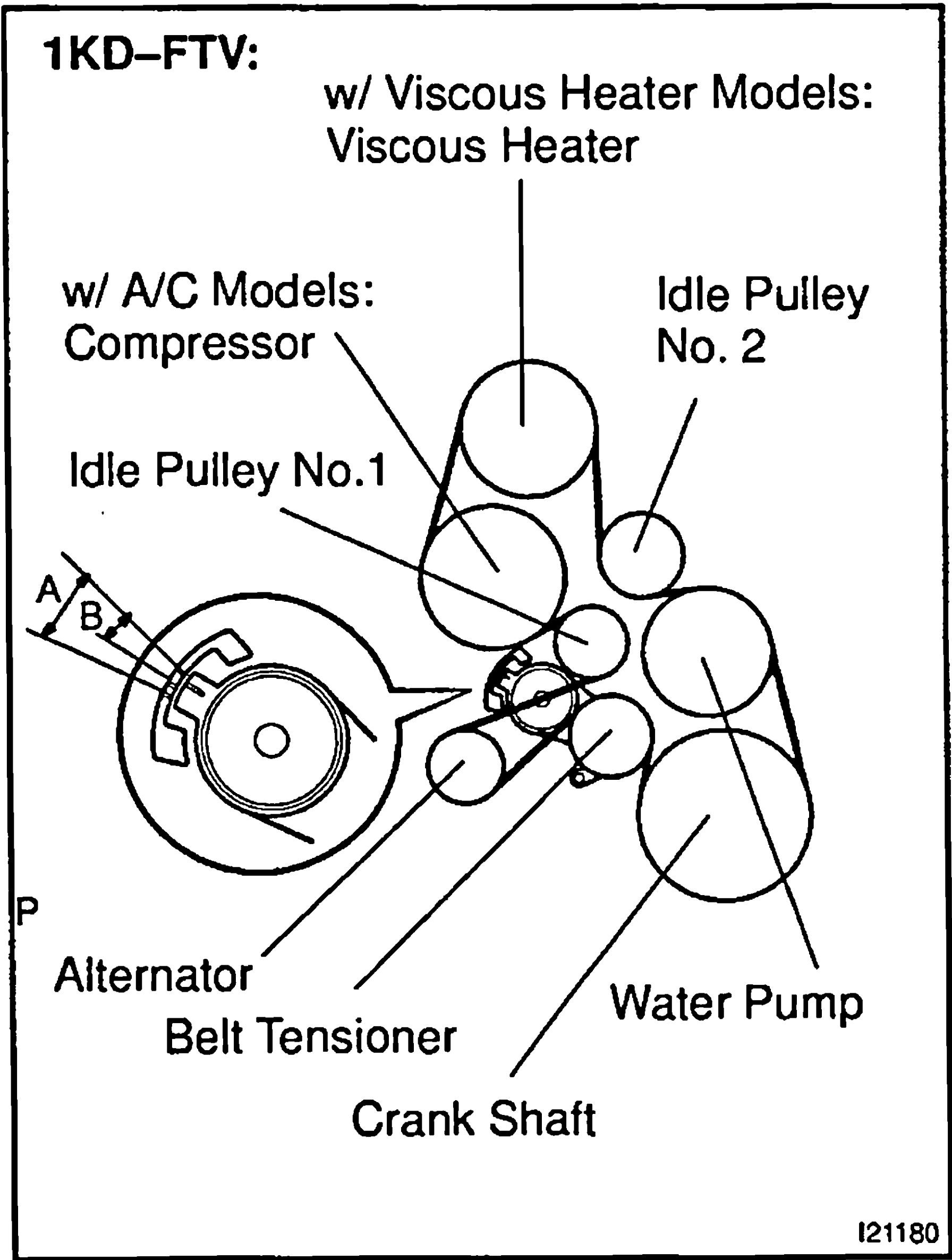
AC



DRIVE BELT ON-VEHICLE INSPECTION

AC3EU-01

1. **INSPECT DRIVE BELT'S INSTALLATION CONDITION**
Check that the drive belt fits properly in the ribbed grooves.



2. **INSPECT DRIVE BELT TENSION**
Check that the tension is within A range on the auto tensioner scale.
If the tension is not within the A range on the scale, replace the belt with a new one.
HINT:
When replacing the drive belt with a new one, the belt's tension should be within the B range on the belt tensioner scale.

AC

VISCOUS HEATER AND MAGNETIC CLUTCH ON-VEHICLE INSPECTION

AC1SY-02

1. MAKE THESE VISUAL CHECKS:

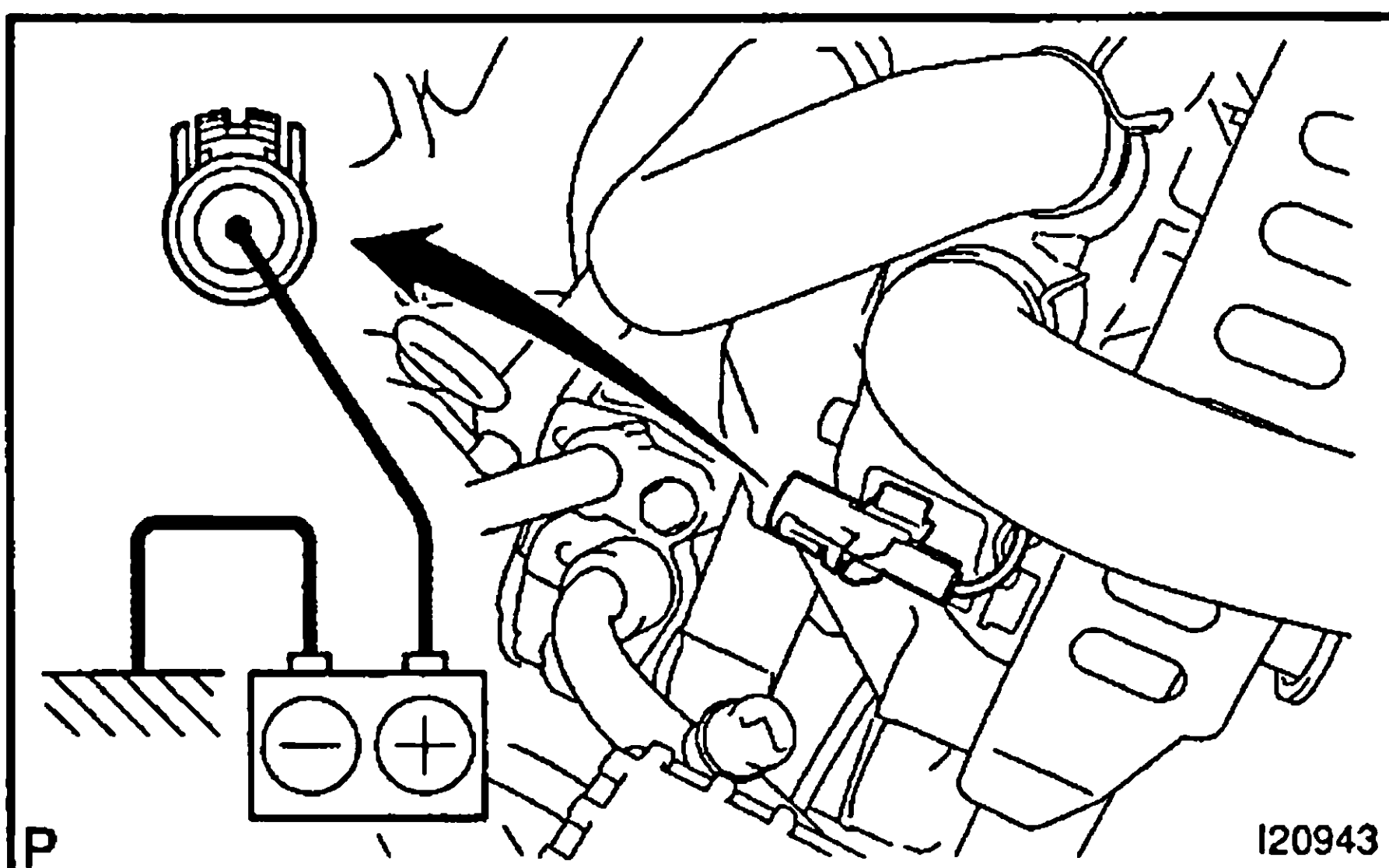
- (a) Leakage of grease from the clutch bearing
- (b) Signs of oil on the pressure plate or rotor

2. INSPECT MAGNETIC CLUTCH BEARING FOR NOISE

- (a) Start engine.
- (b) Check for abnormal noise form the viscous heater when the power heater switch is OFF.

If abnormal noise is being emitted, replace the magnetic clutch.

AC

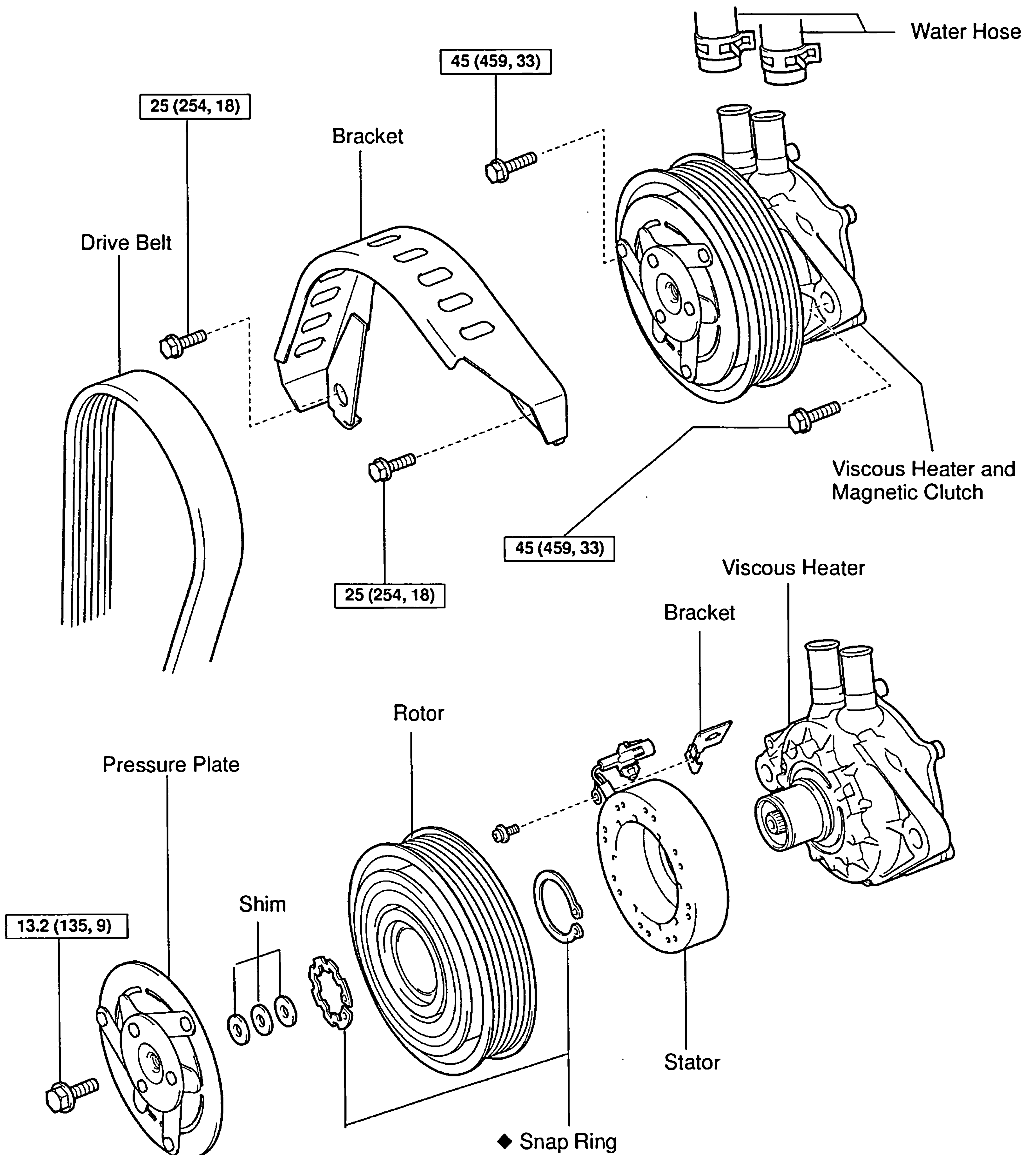


3. INSPECT MAGNETIC CLUTCH OPERATION

- (a) Disconnect the connector.
- (b) Connect the positive (+) lead from the battery to terminal on the magnetic clutch connector and the negative (-) lead to the body ground.
- (c) Check that the magnetic clutch is energized.

If operation is not as specified, replace the magnetic clutch.

COMPONENTS



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

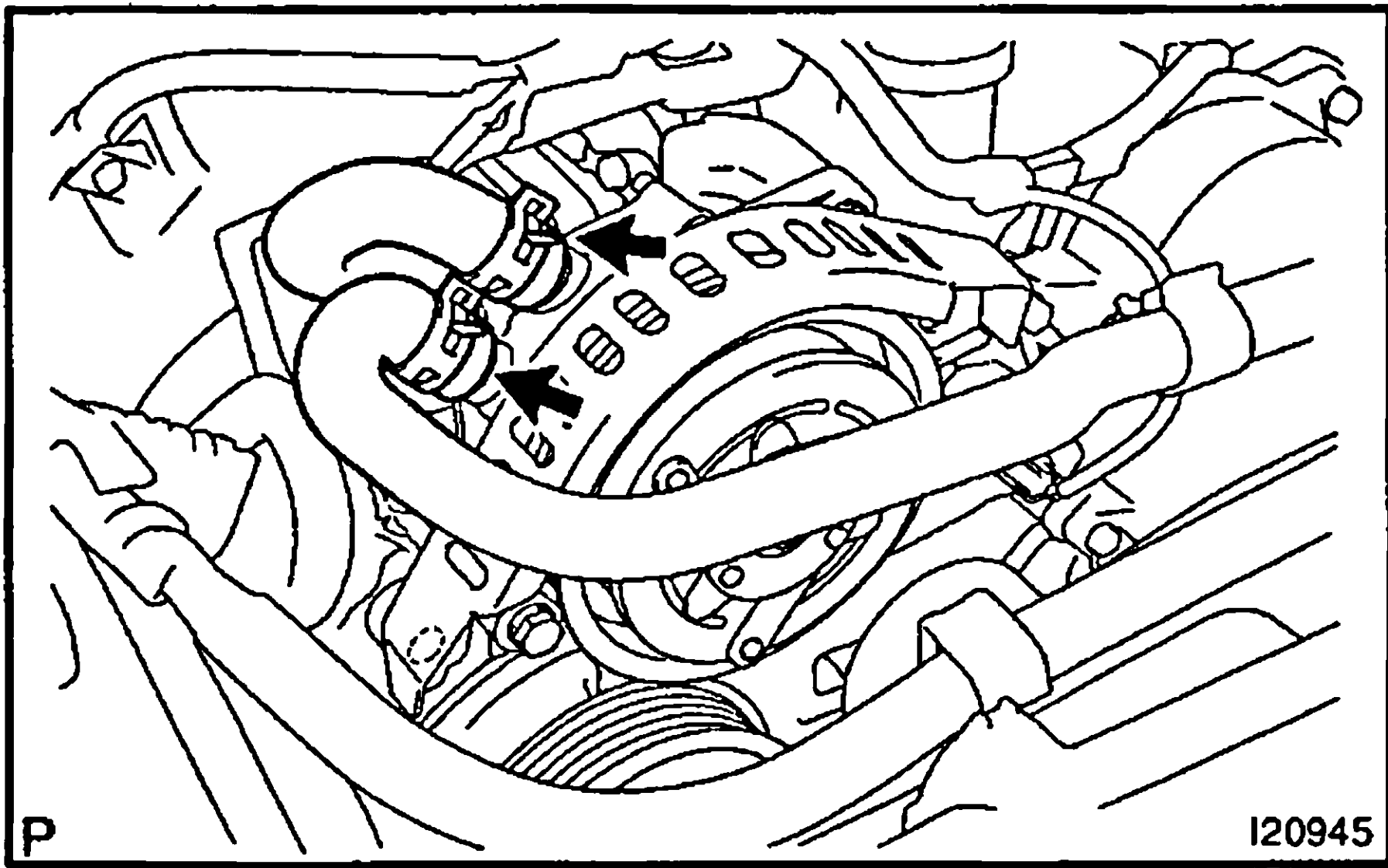
◆ Non-reusable part

REMOVAL

1. DRAIN ENGINE COOLANT FROM RADIATOR

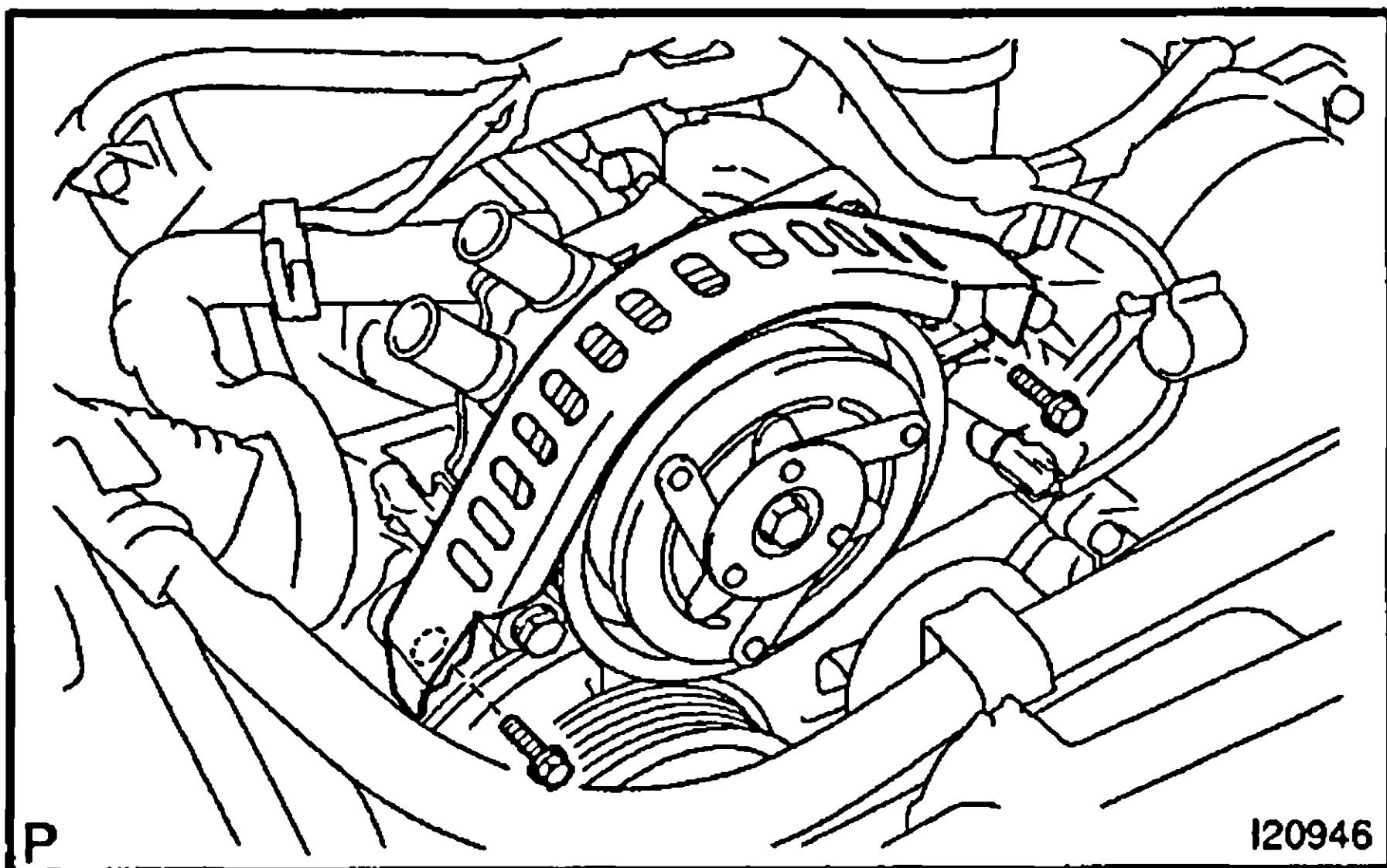
HINT:

It is not necessary to drain out all the coolant.



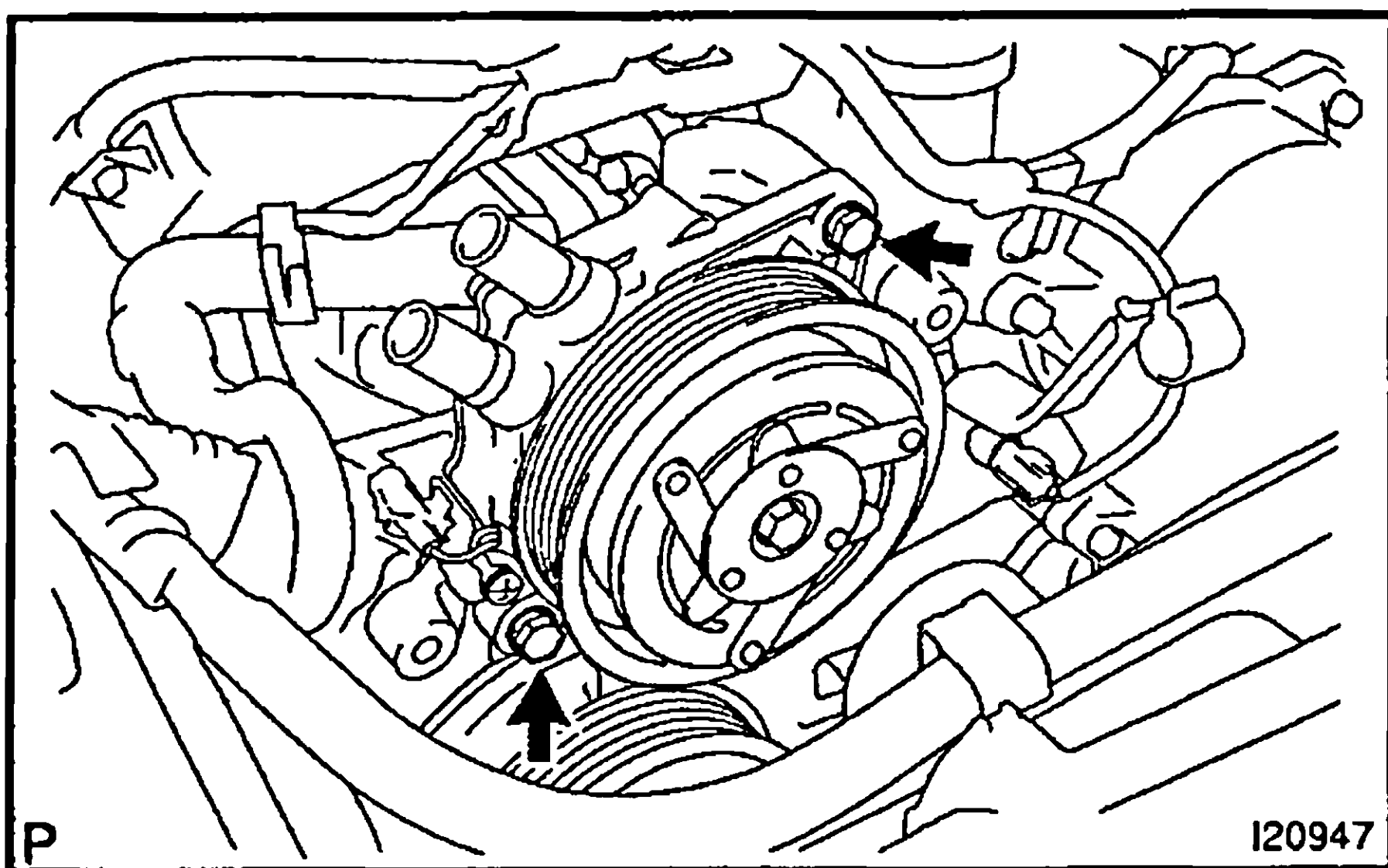
2. DISCONNECT WATER HOSES FROM VISCOUS HEATER

- (a) Using pliers, grip the claw of the hose clip and slide the clip along the hose.
- (b) Disconnect the water hoses from viscous heater.

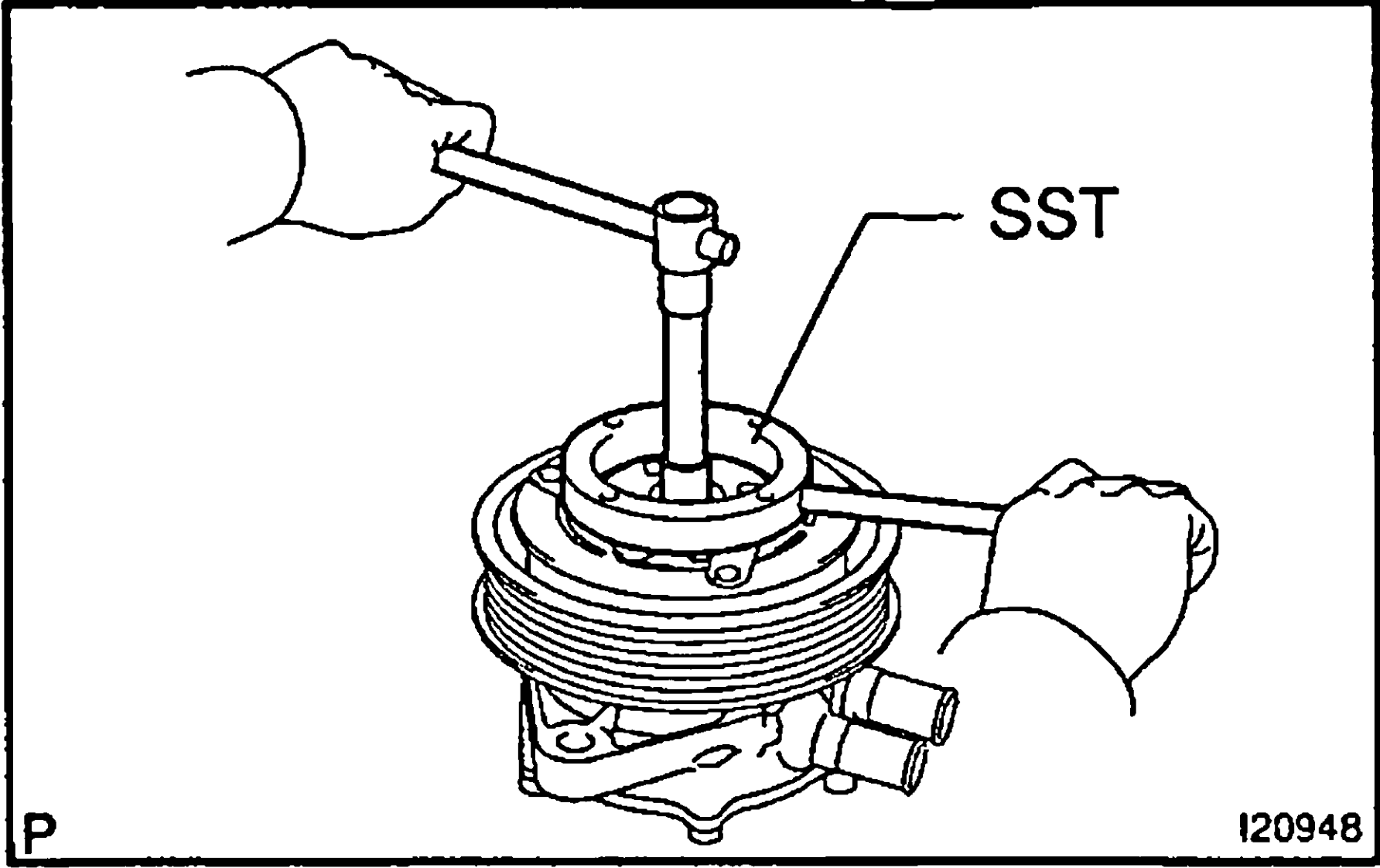


3. REMOVE VISCOUS HEATER

- (a) Disconnect the connector.
- (b) Remove the 2 bolts and heater bracket.
Torque: 25 N·m (254 kgf·cm, 18 ft·lbf)



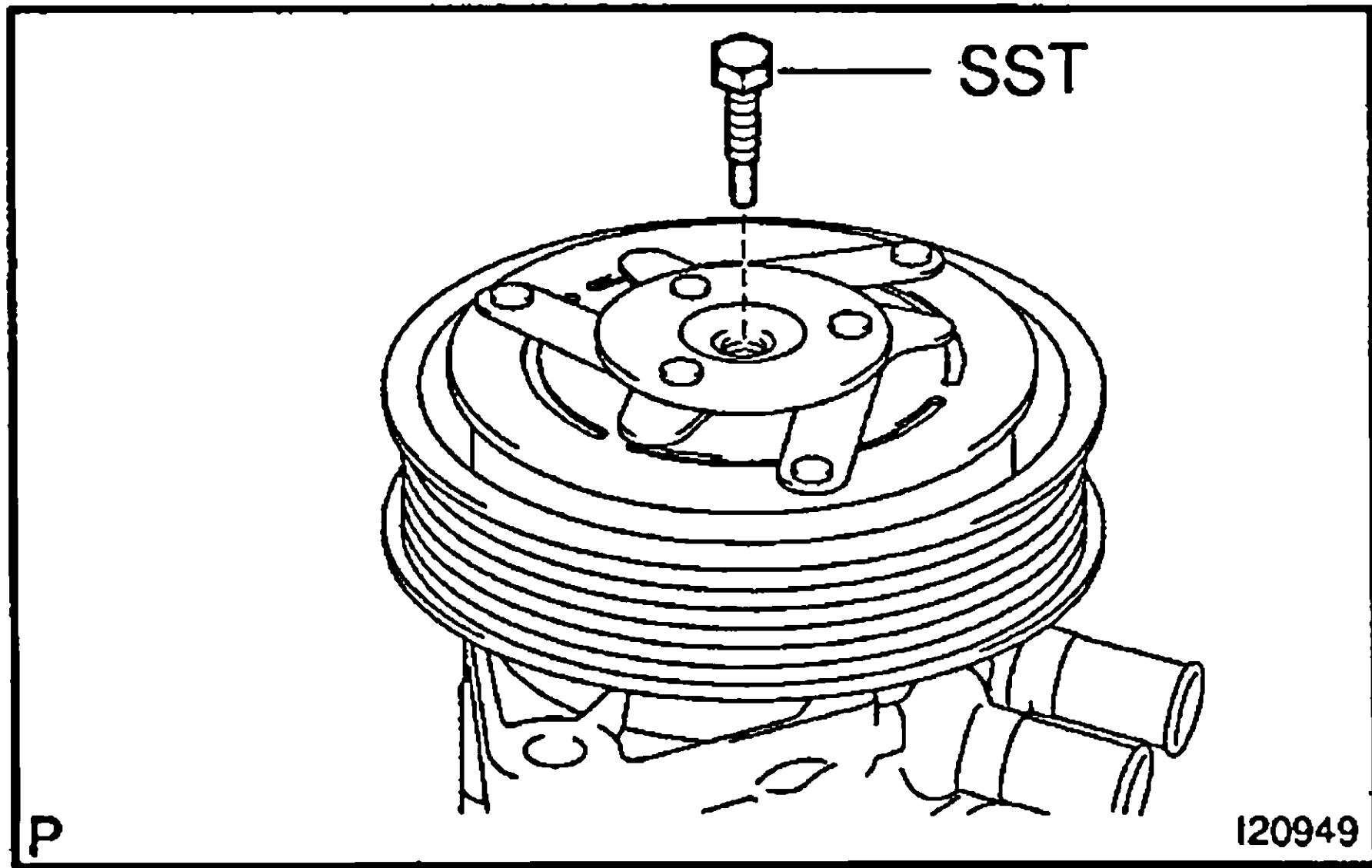
- (c) Remove the 2 bolts and viscous heater.
Torque: 45 N·m (459 kgf·cm, 33 ft·lbf)



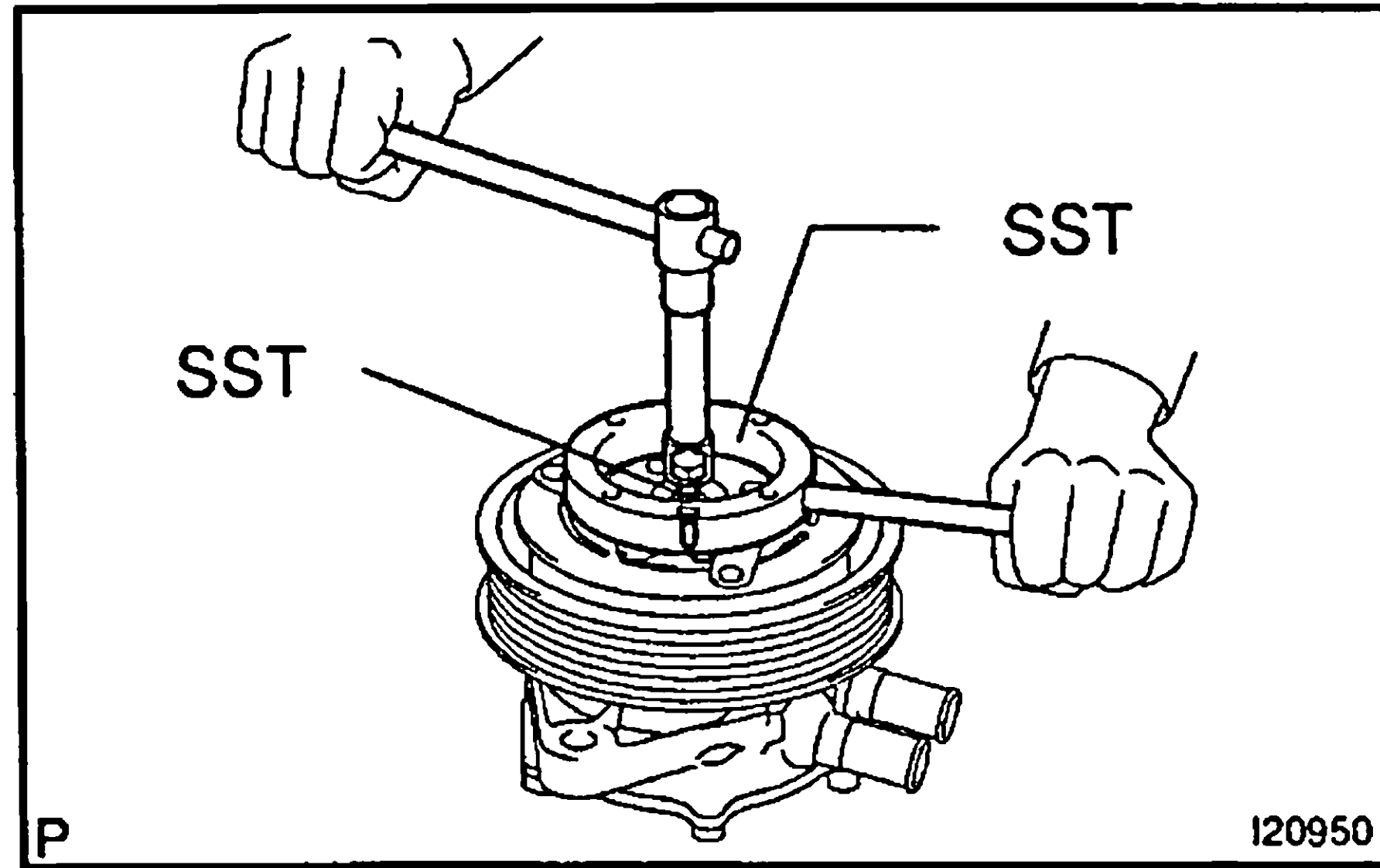
DISASSEMBLY

1. REMOVE PRESSURE PLATE

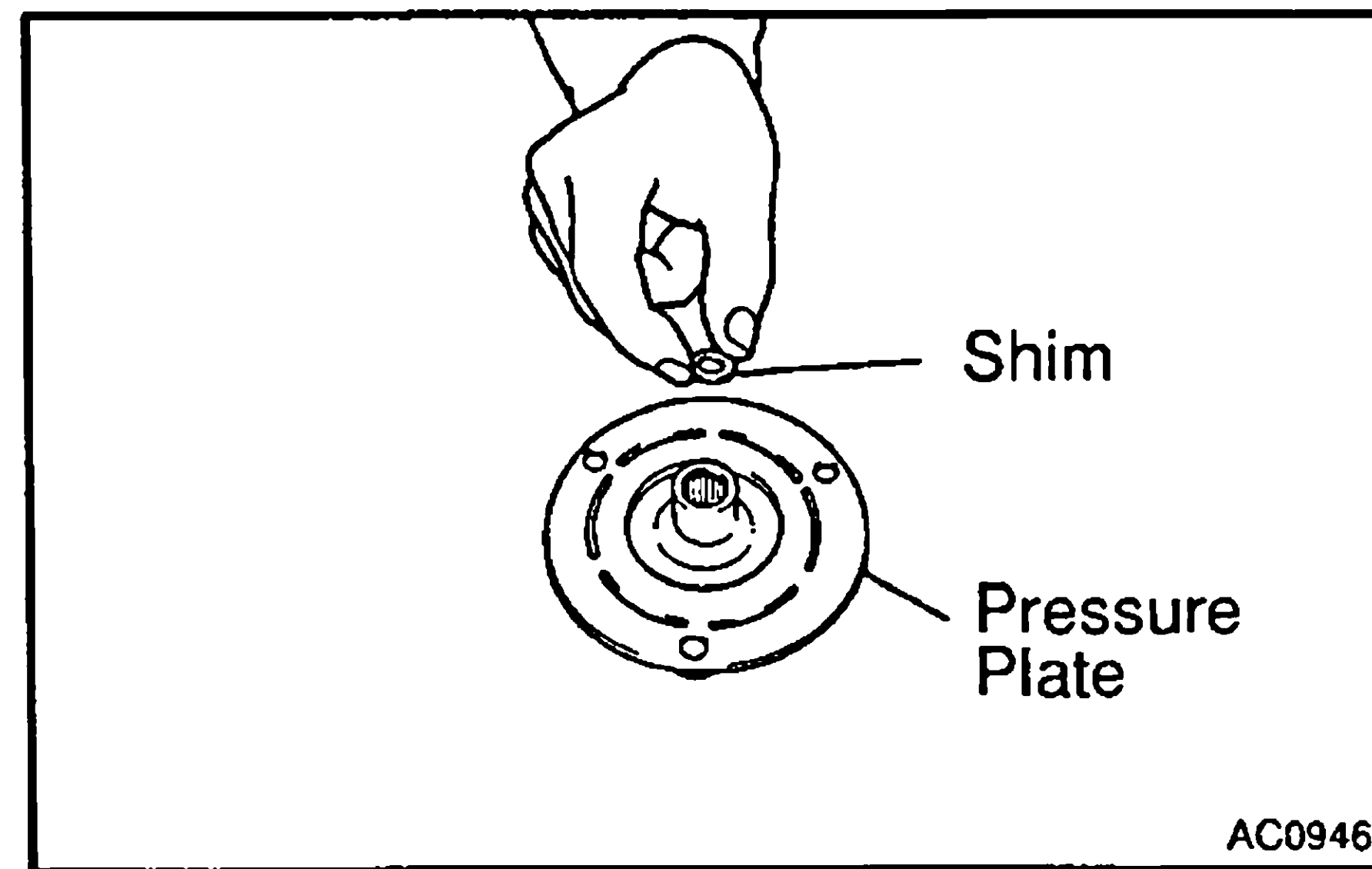
- (a) Using SST and a socket wrench, remove the shaft bolt.
Torque: 13.2 N·m (135 kgf·cm, 9 ft·lbf)
SST 07112-76050



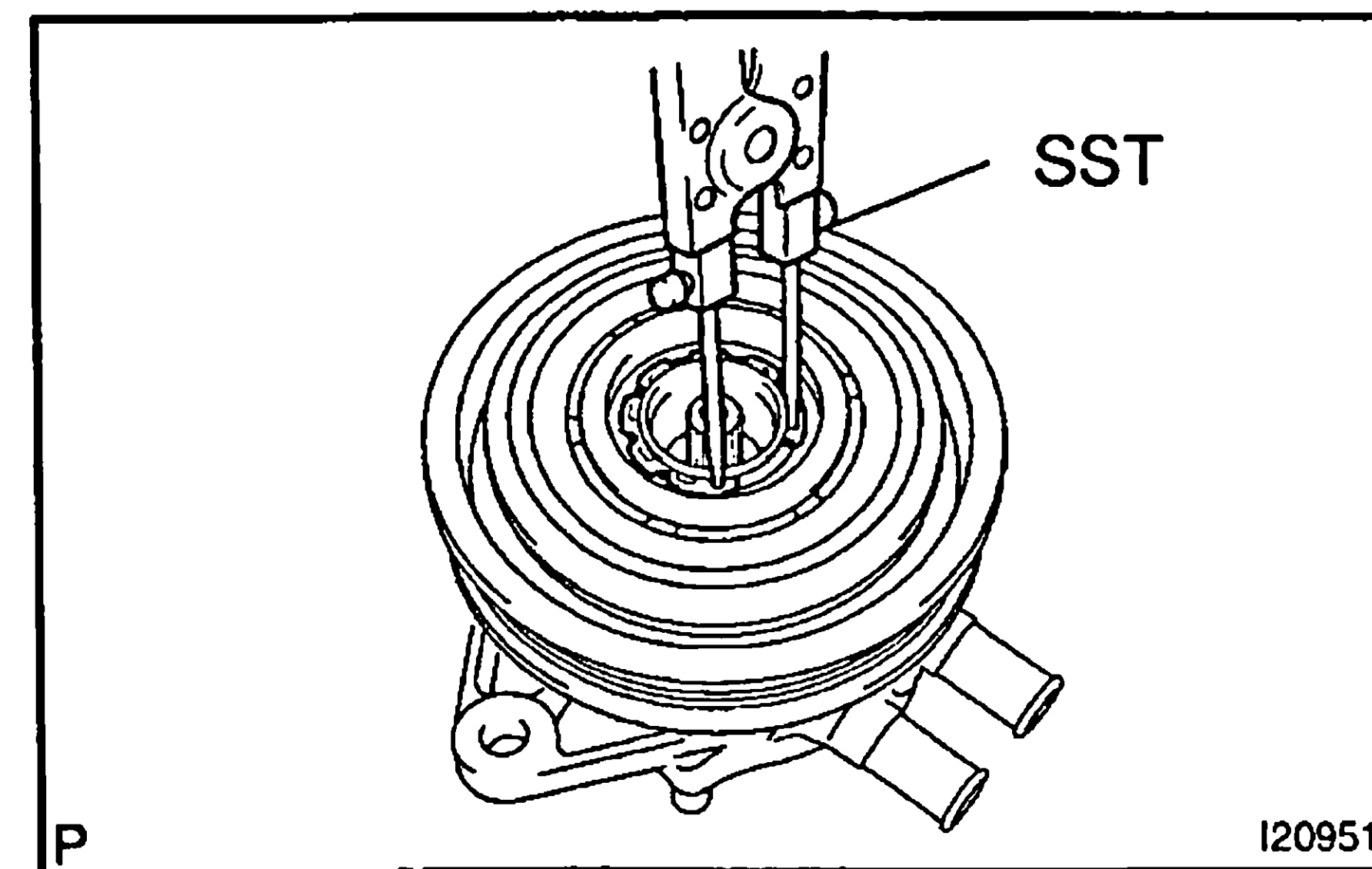
- (b) Install SST on the pressure plate.
SST 07112-66040



- (c) Using SST and a socket wrench, remove the pressure plate.
SST 07112-66040, 07112-76050

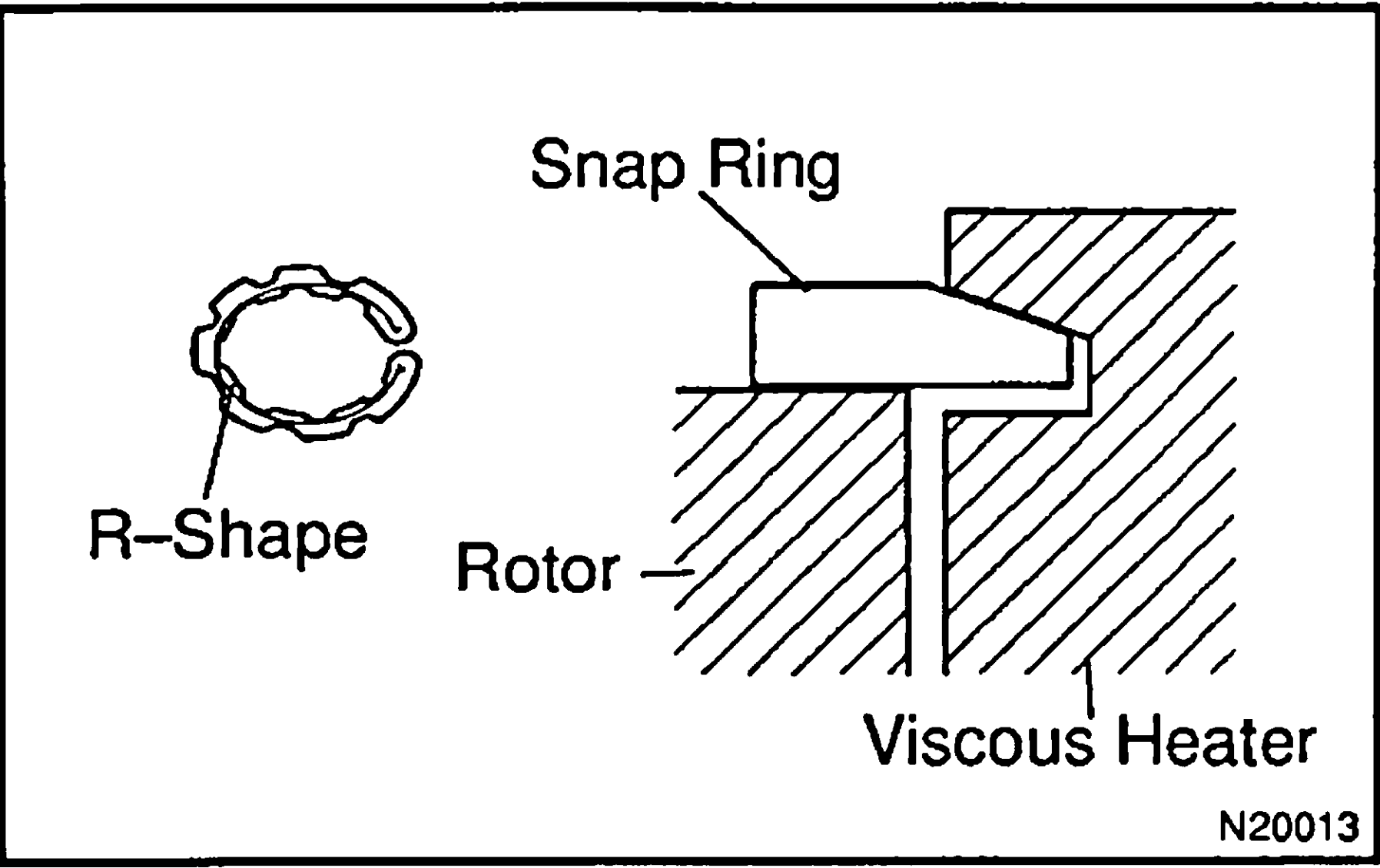


- (d) Remove the shims from the pressure plate.

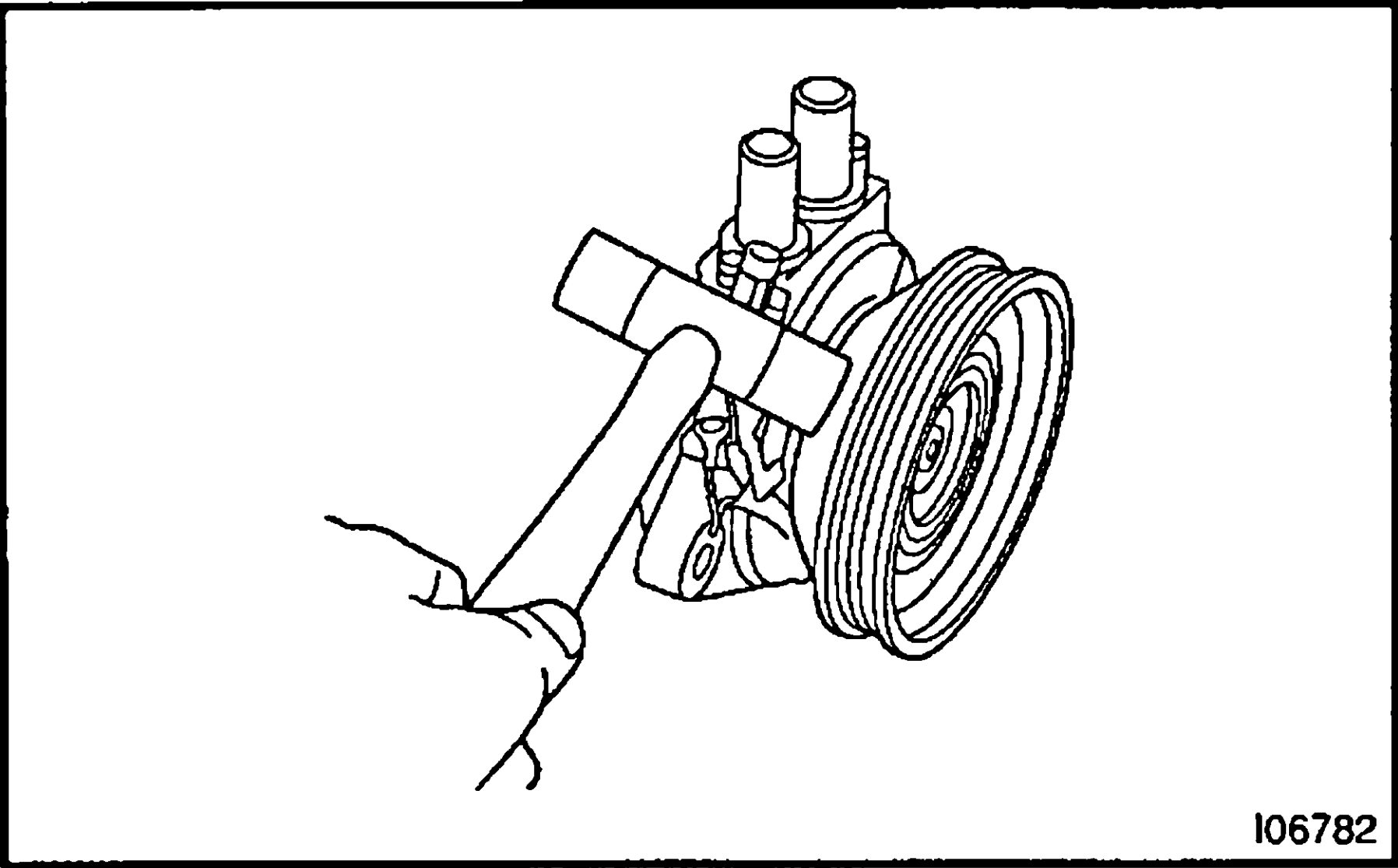


2. REMOVE ROTOR

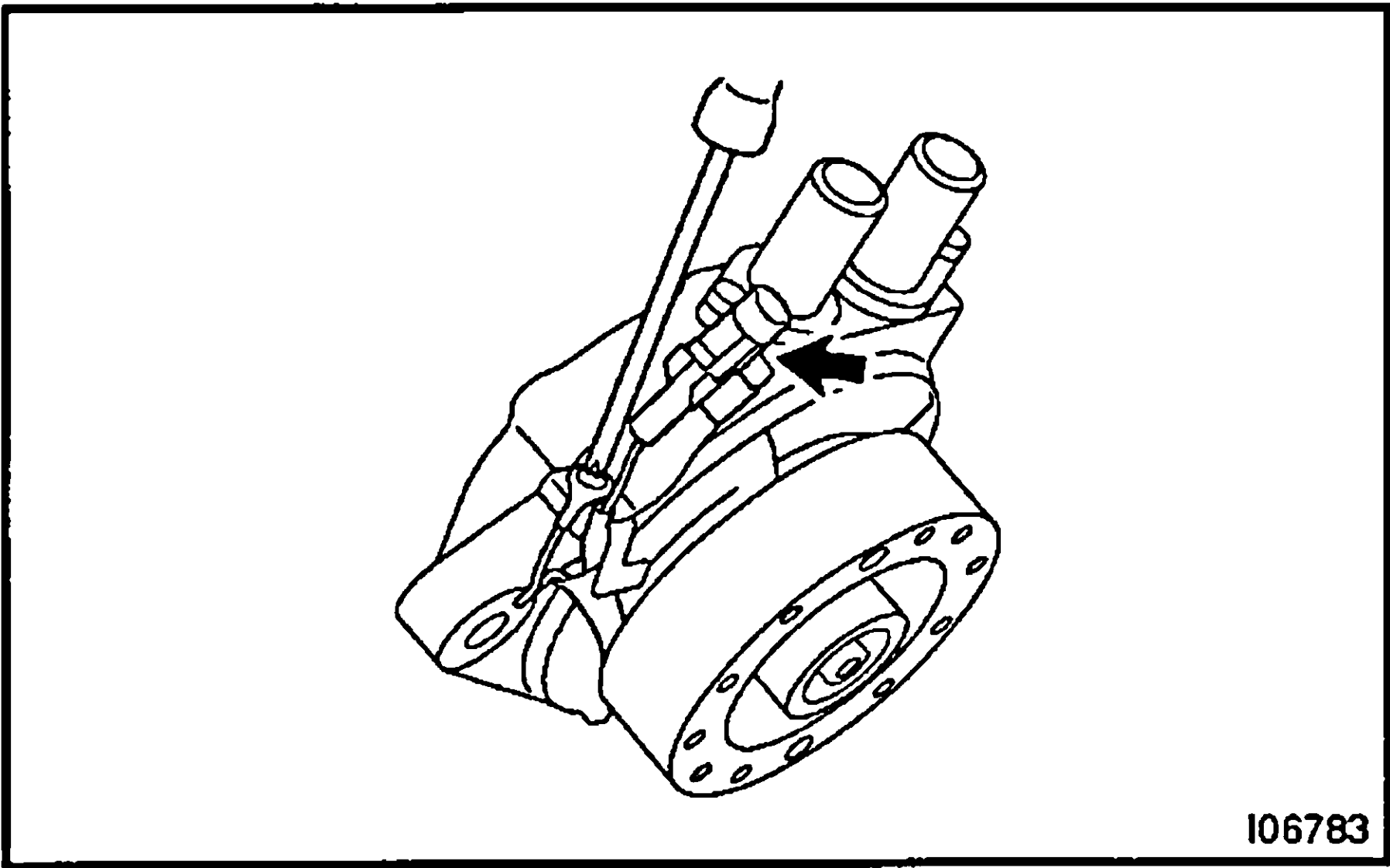
- (a) Remove the snap ring.
SST 95994-10020



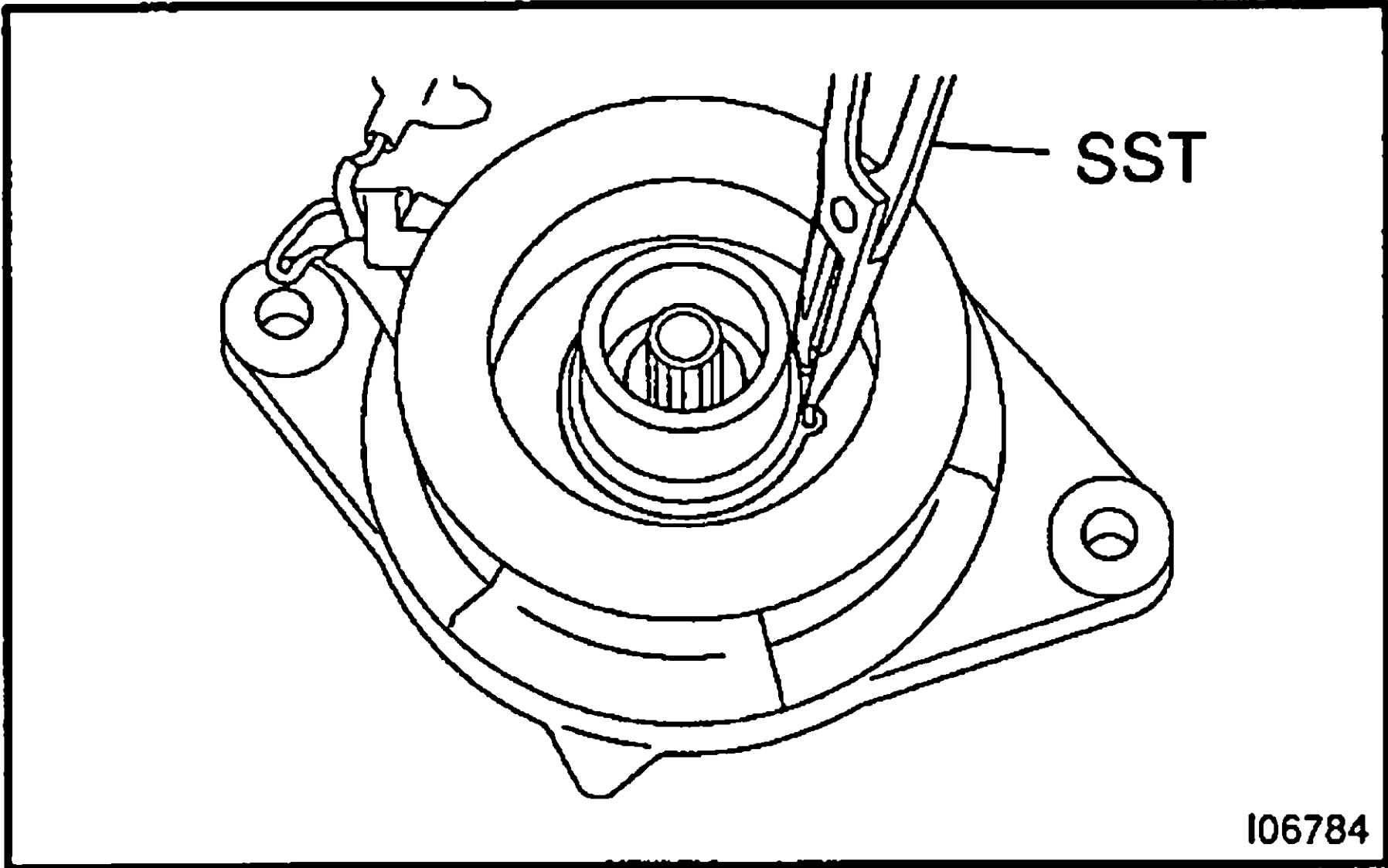
NOTICE:
At the time of reassembly, please refer to the following item.
The snap ring should be installed so that beveled side faces up.



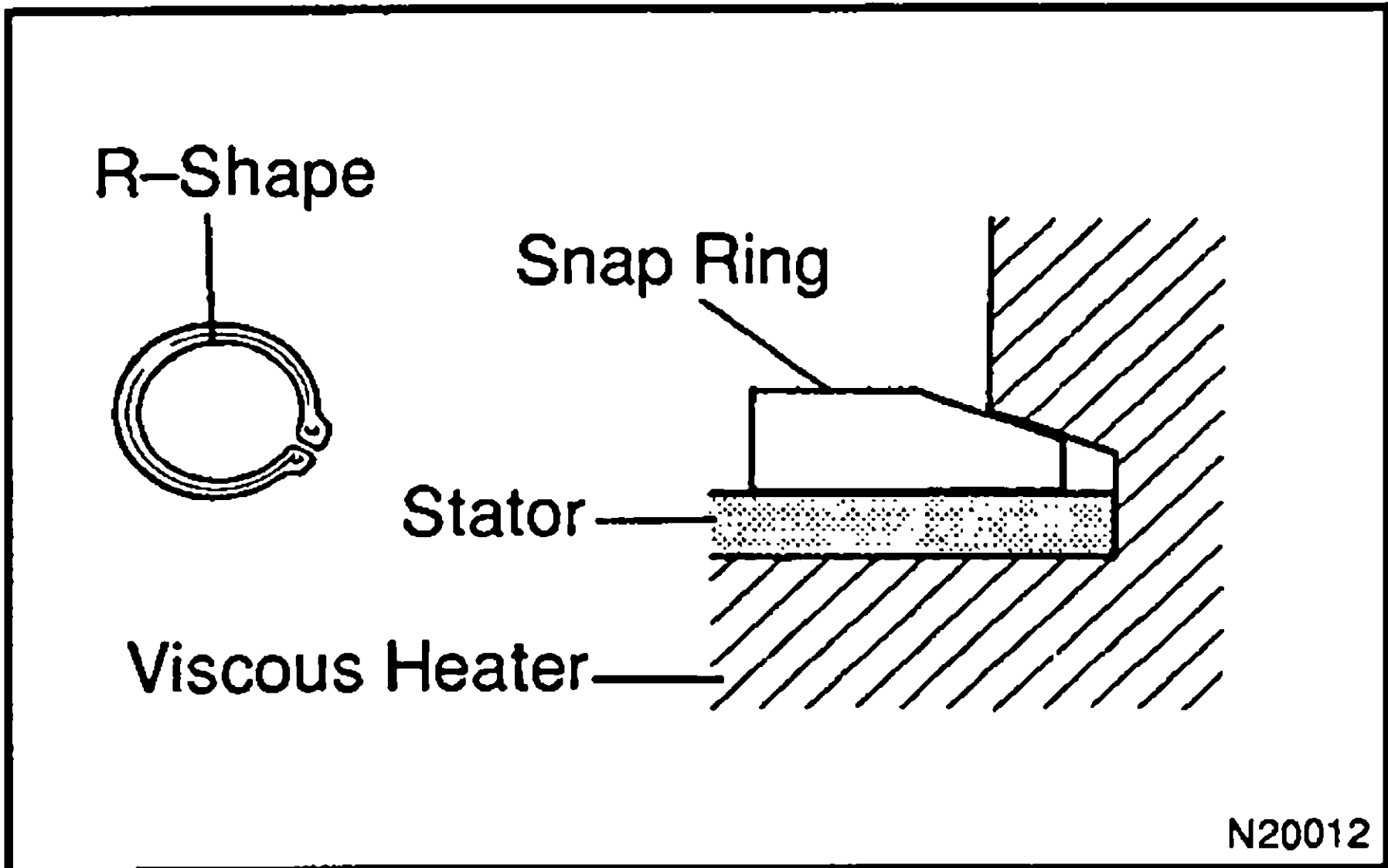
(b) Using a plastic hammer, tap the rotor off the shaft.
NOTICE:
Be careful not to damage the pulley when tapping on the rotor.



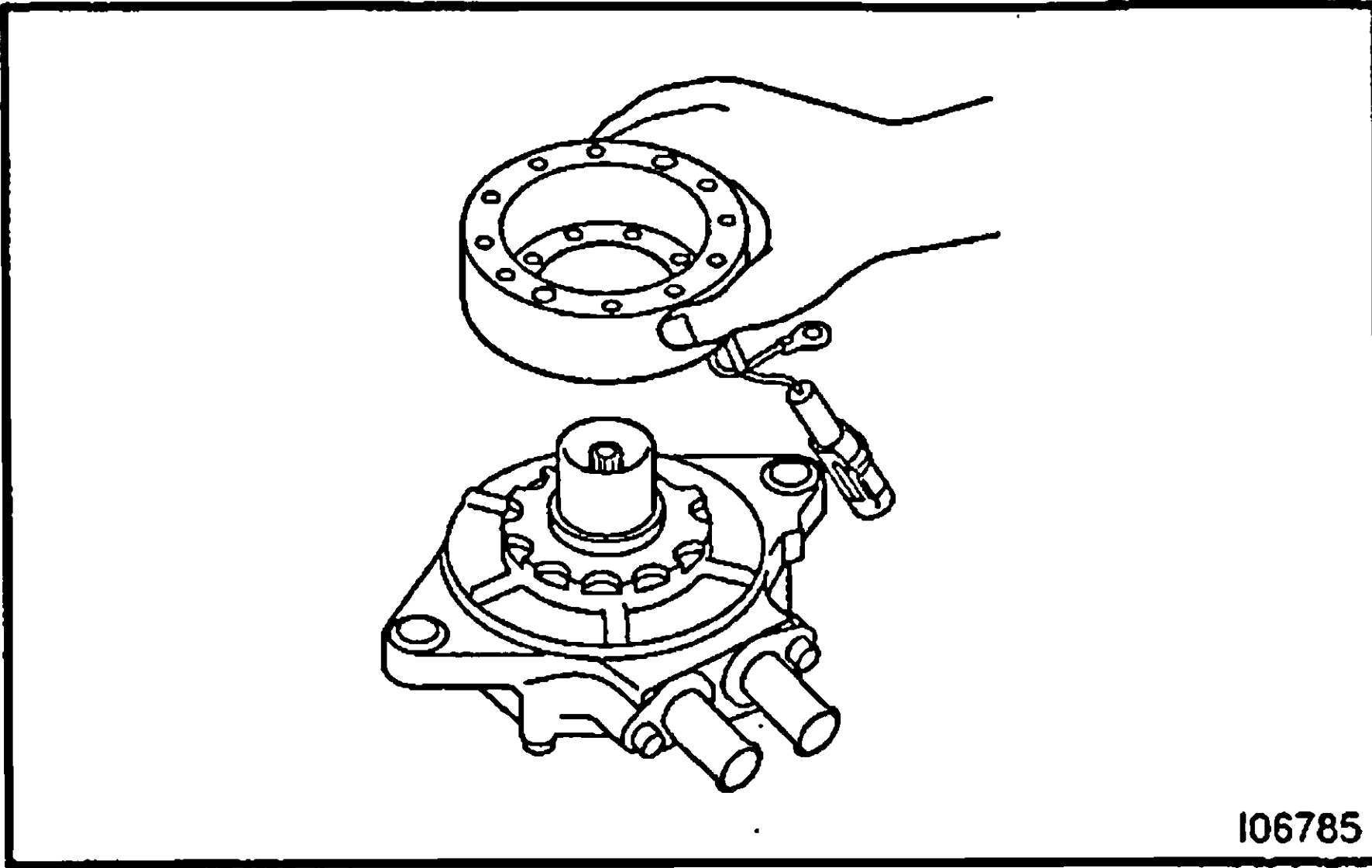
3. REMOVE STATOR
(a) Disconnect the stator lead wire from the viscous heater.



(b) Remove the snap ring.
SST 95994-10020



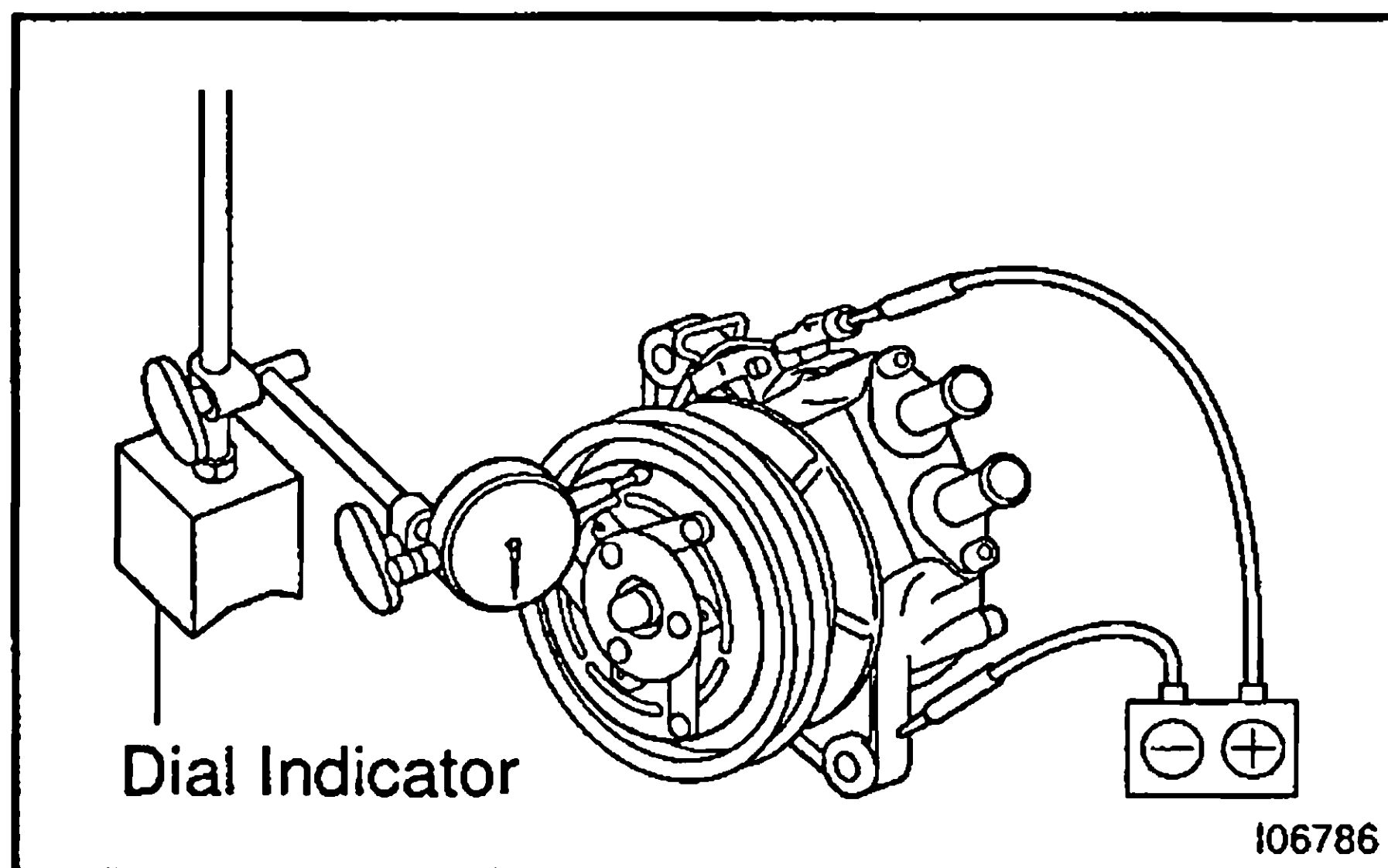
NOTICE:
At the time of reassembly, please refer to the following item.
The snap ring should be installed so that its beveled side faces up.



(c) Remove the stator.

REASSEMBLY

Reassembly is in the reverse order of disassembly
(See page AC-5).



AFTER REASSEMBLY, INSPECT MAGNETIC CLUTCH CLEARANCE

- Set the dial indicator to the pressure plate of the magnetic clutch.
- Connect the magnetic clutch lead wire to the positive (+) terminal of the battery.
- Check the clearance between the pressure plate and rotor when connecting the negative (-) terminal from the battery to viscous heater body.

Standard clearance:

$0.5 \pm 0.15 \text{ mm}$ ($0.020 \pm 0.0059 \text{ in.}$)

If the clearance is not within the standard clearance, adjust the clearance using shims to obtain the standard clearance.

Shim thickness:

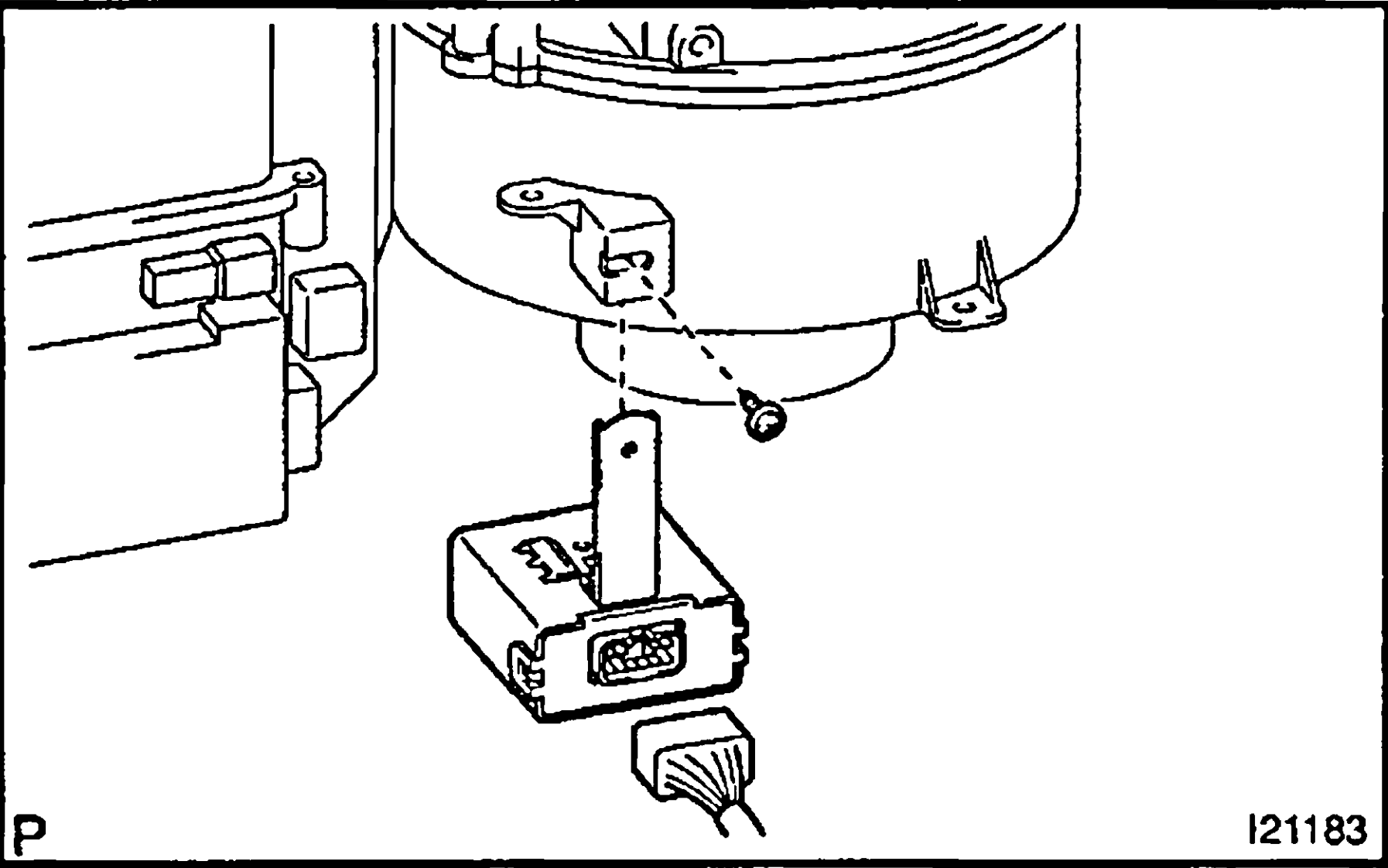
0.1 mm (0.004 in.)

0.3 mm (0.012 in.)

0.5 mm (0.020 in.)

INSTALLATION

Installation is in the reverse order of removal (See page AC-4).



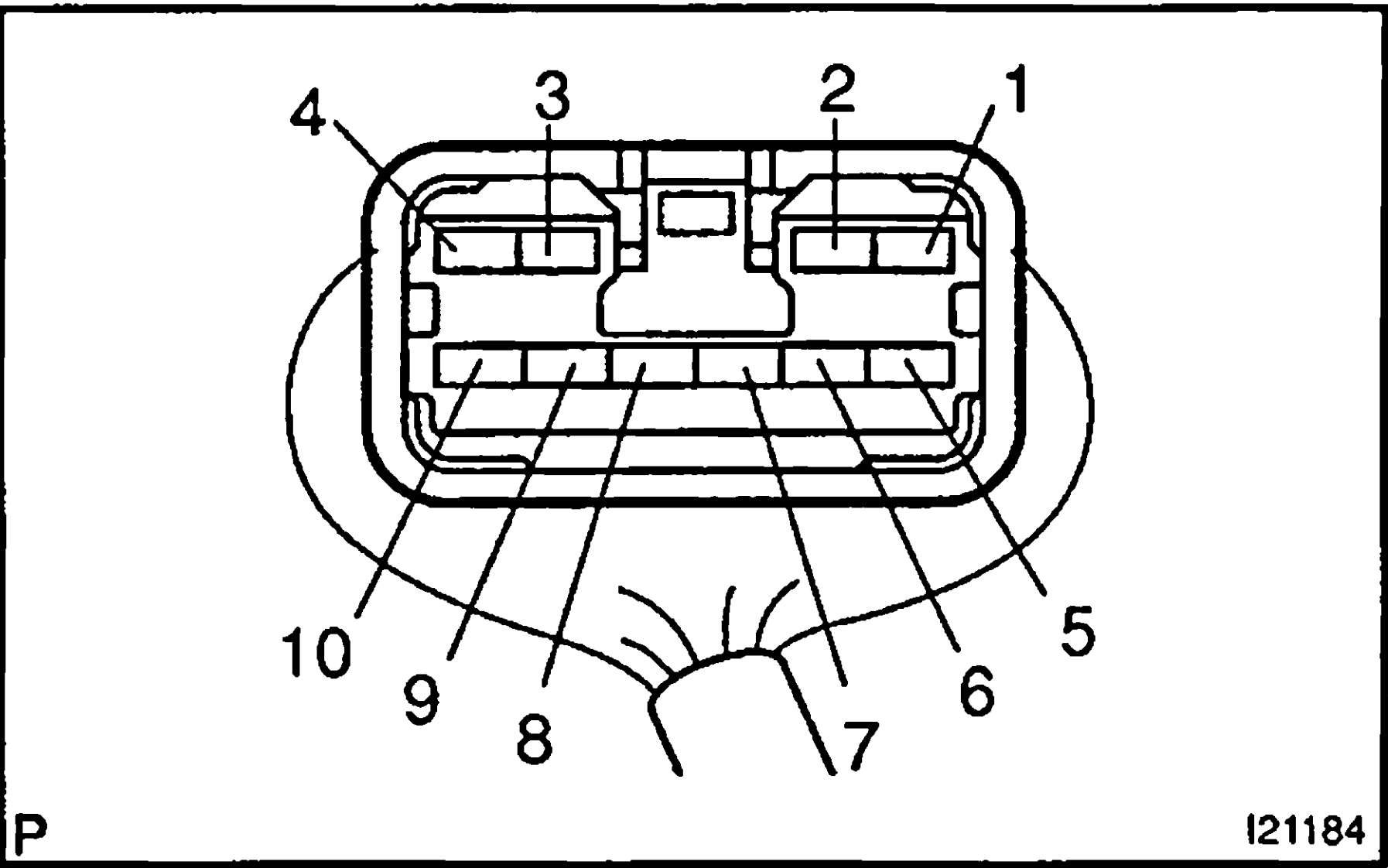
HEATER AMPLIFIER (w/ Viscous Heater)

INSPECTION

AC3EV-01

1. REMOVE HEATER AMPLIFIER

- (a) Remove glove compartment door.
- (b) Disconnect the connector.
- (c) Remove the screw and amplifier.



2. INSPECT AMPLIFIER CIRCUIT

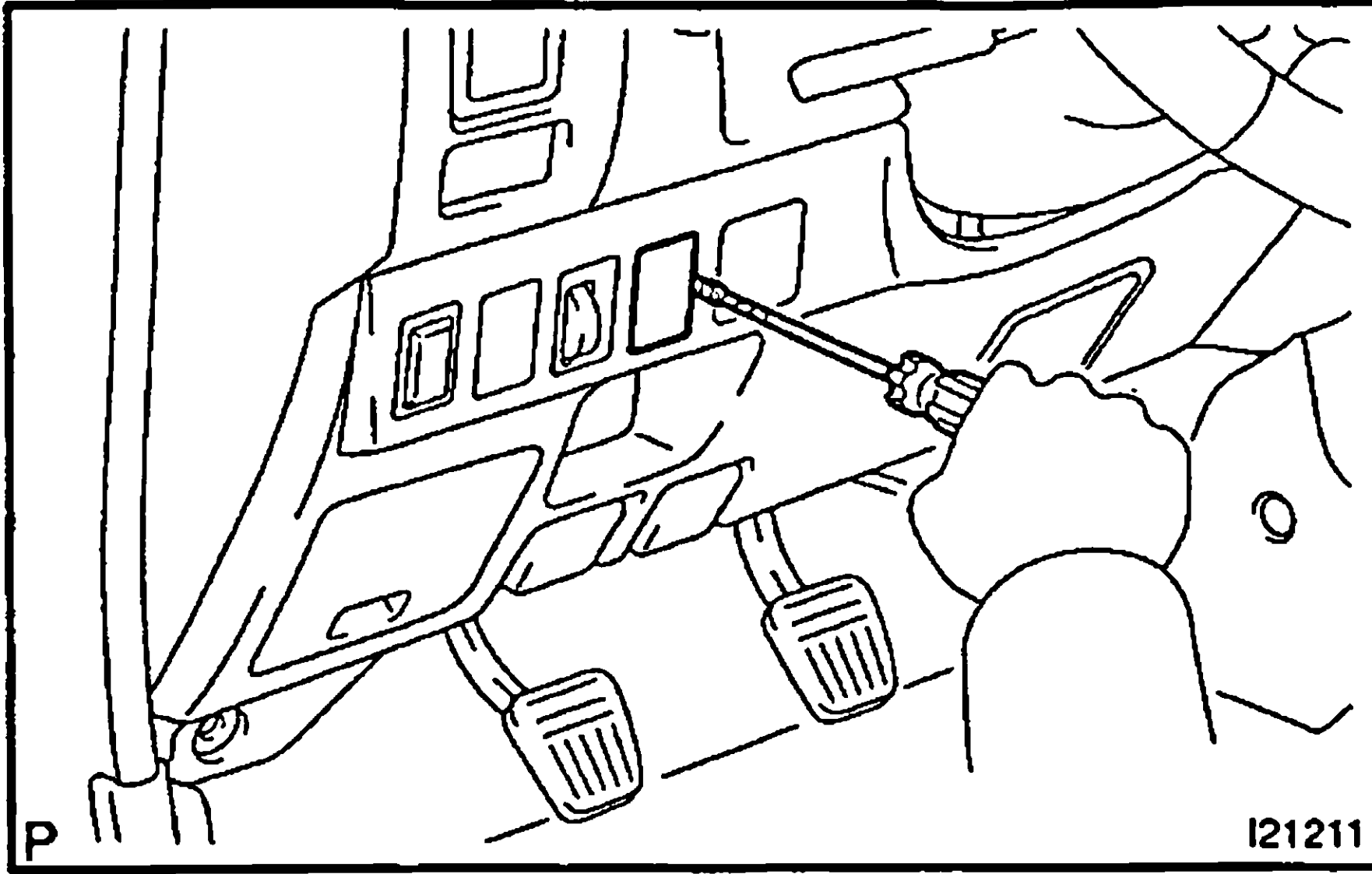
Connect the connector to amplifier and inspect the wire harness connector from the back side, as shown in the chart.

Test conditions:

- Running engine at idle speed
- A/C switch ON

Tester connection	Condition	Specified condition
1 – Ground	Constant	Battery voltage
	Turn ignition switch to LOCK or ACC	No voltage
2 – Ground	Viscous heater magnetic clutch ON	Battery voltage
	Viscous heater magnetic clutch OFF	No voltage
3 – Ground	Power heater switch ON Water temperature at Below 69 °C (156 °F) Engine speed: Idle speed	Below 1.0 V
	Power heater switch OFF	No voltage
4 – Body ground	Constant	Continuity
5 – Ground	Power heater switch ON	Below 1.0 V
	Power heater switch OFF	Battery voltage
8 – Ground	Power heater switch ON	Above 4.0 V
	Power heater switch OFF	Below 1.0 V
9 – Ground	Viscous heater magnetic clutch ON	Above 4.0 V
	Viscous heater magnetic clutch OFF	Below 1.0 V

If the circuits is as specified, replace the amplifier. If the circuits is not as specified, inspect the circuits connected to other parts.



POWER HEATER SWITCH INSPECTION

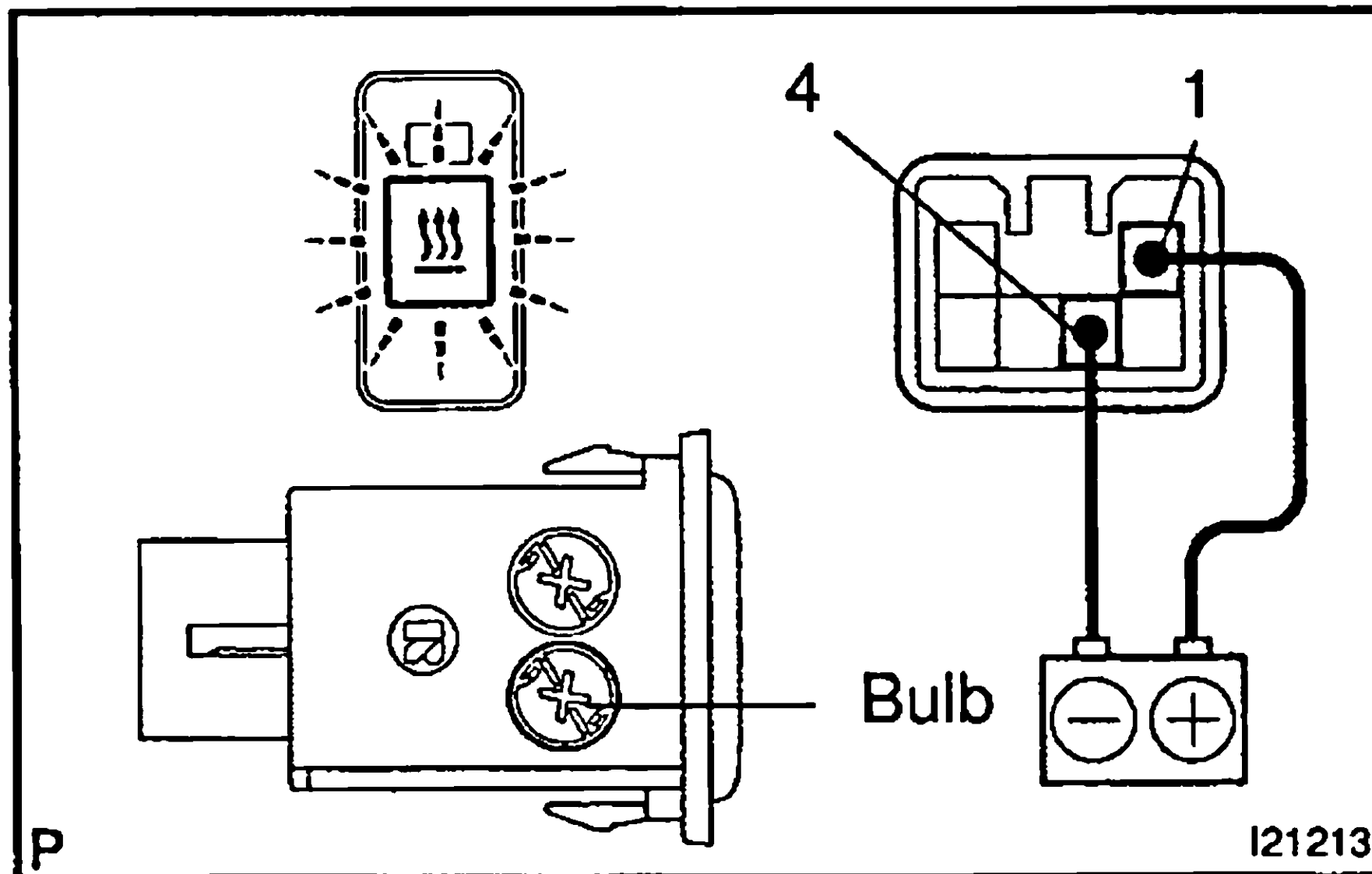
AC3EW-01

1. REMOVE POWER HEATER SWITCH

Using a screwdriver, pullout the switch then disconnect the connector.

HINT:

Tape the screwdriver tip before use.

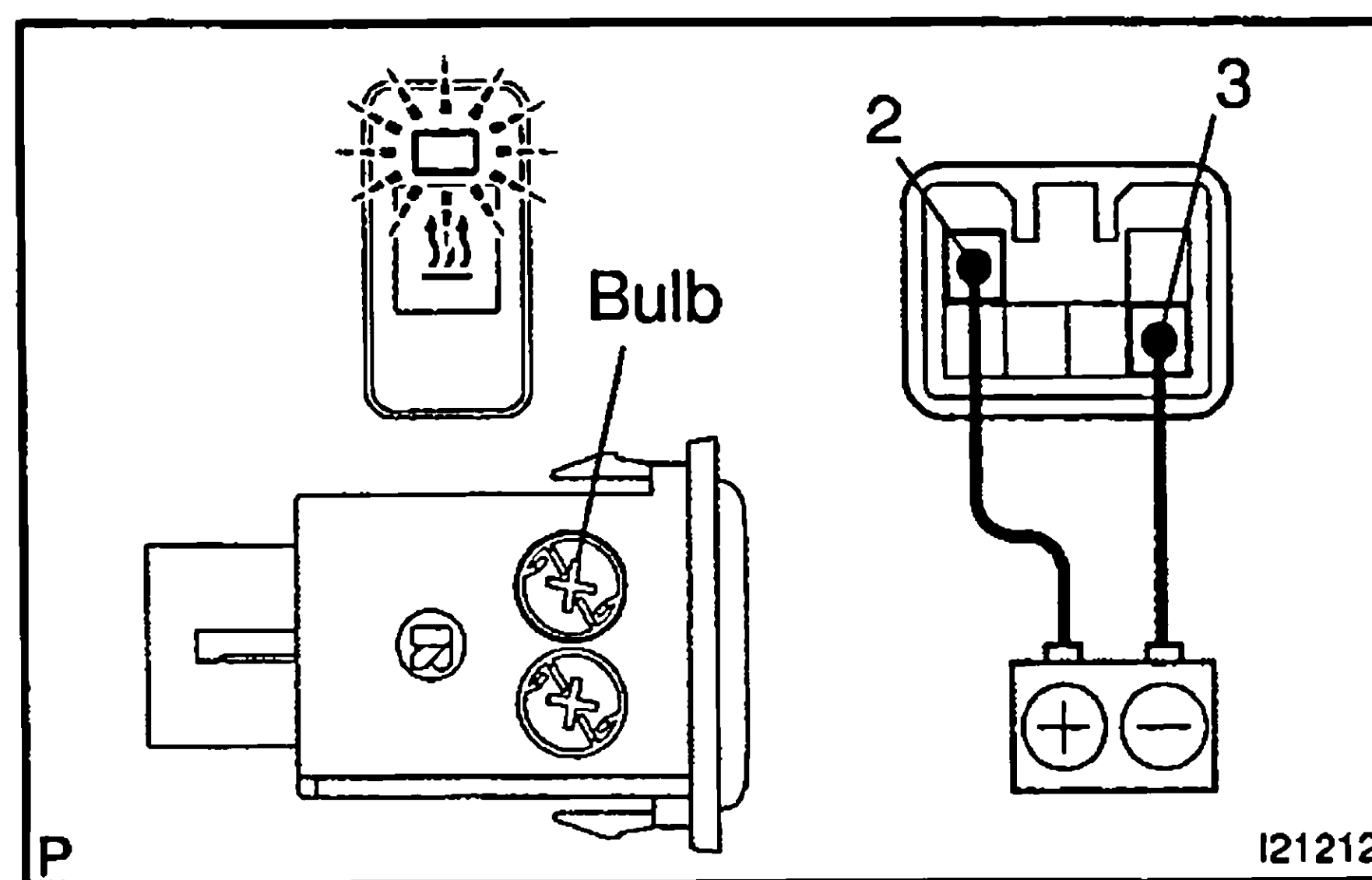


2. INSPECT POWER HEATER SWITCH

(a) Inspect the illumination operation.

Connect the positive (+) lead from the battery to terminal 1 and negative (-) lead to terminal 4 then check that the illumination lights up.

If operation is not as specified, check the bulb.



(b) Inspect indicator operation.

Connect the positive (+) lead from the battery to terminal 2 and negative (-) lead to terminal 3 then check that the indicator lights up.

If operation is not as specified, check the bulb.

3. INSTALL POWER HEATER SWITCH

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