FOREWORD

This manual contains maintenance and repair procedures for the 1988 CELICA ALL-TRAC/4WD.

Applicable model: ST165 series

The manual is divided into 21 sections and 4 appendixes with a thumb index for each section at the edge of the pages.

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

Manual Name	Pub. No.
• 1988 Celica Repair Manual	RM071U
• 1988 Celica Electrical Wiring Diagram Manual (Including All-Trac/4WD)	EWD036U
• Celica Collision Damaged Body Repair Manual	BRM001E
• 1988 model Celica All-Trac/4WD & Camry All-Trac/4WD New Car Features	NCF033U

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

1988 TOYOTA CELICA ALL-TRAC/4WD REPAIR MANUAL

NOTE: The following screen toning letters sections refer to the 1988 CELICA REPAIR MANUAL (Pub. No. RM071U).

INTRODUCTION

HOW TO USE THIS MANUAL

To assist you in finding your way through the manual, the Section Title and major heading are given at the top of every page.

An **INDEX** is provided on the first page of each section to guide you to the item to be repaired.

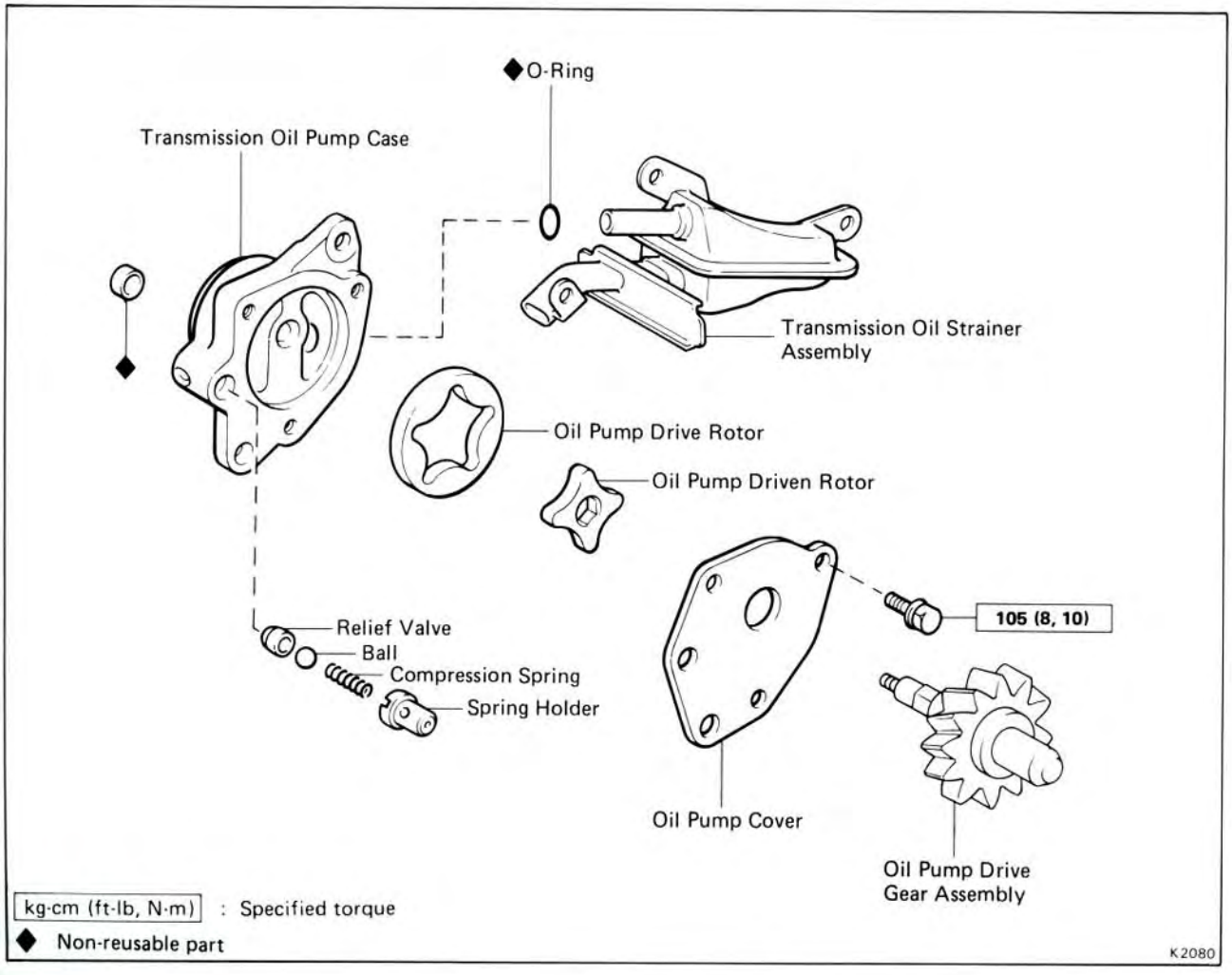
At the beginning of each section, **PRECAUTIONS** are given that pertain to *all* repair operations contained in that section. *Read these precautions before starting any repair task.*

TROUBLESHOOTING tables are included for each system to help you diagnose the system problem and find the cause. The repair for each possible cause is referenced in the remedy column to quickly lead you to the solution.

REPAIR PROCEDURES

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

Example:



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

Task heading: what to do

21. CHECK PISTON STROKE OF OVERDRIVE BRAKE

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

SST 09350-30020 (09350-06120)

Set part No. *Component part No.*

Detail text: how to do it

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

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

Specification

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 and only when necessary, the text below it provides detailed information. Important specifications and warnings always stand out in bold type.

REFERENCES

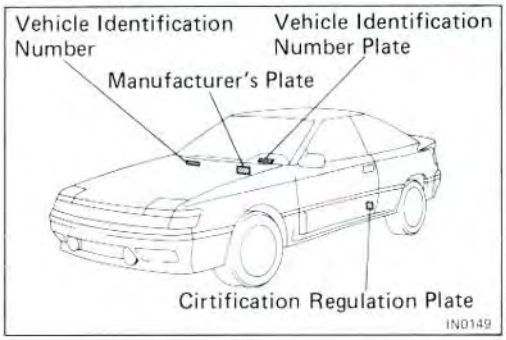
References have been kept to a minimum. However, when they are required you are given the page to go to.

SPECIFICATIONS

Specifications are presented in bold type throughout the text in the applicable step. You never have to leave the procedure to look up your specs. All specifications are also found in Appendix A, specifications, for quick reference.

WARNINGS, CAUTIONS, NOTES:

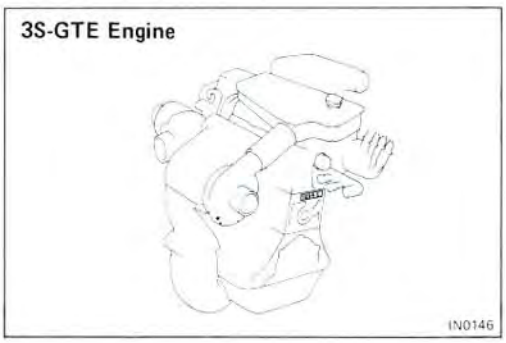
- WARNINGS are presented in bold type, and indicate there is a possibility of injury to you or other people.
- CAUTIONS are also presented in bold type, and indicate the possibility of damage to the components being repaired.
- NOTES are separated from the text but do not appear in bold. They provide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



IDENTIFICATION INFORMATION

VEHICLE IDENTIFICATION NUMBER

The vehicle identification number is stamped on the cowl panel of the engine compartment. This number is also stamped on top of the instrument panel and the driver's door panel.

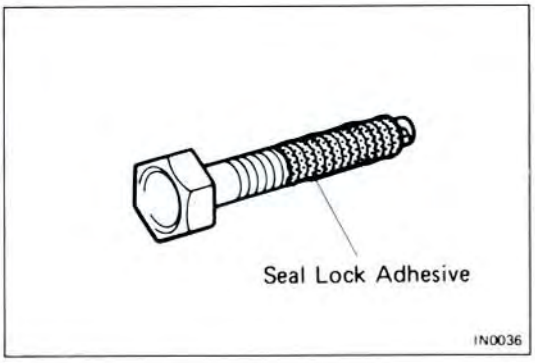


ENGINE SERIAL NUMBER

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

GENERAL REPAIR INSTRUCTIONS

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



6. Precoated parts

   Precoated parts are the bolts and nuts, which have been coated with a seal lock adhesive at the factory.

   (a) If a precoated part is tightened, loosened or caused to move in any way, it must be recoated with the specified adhesive.

   (b) Recoating of precoated parts

      (1) Clean off the old adhesive from the bolt, nut or installation part threads.

      (2) Dry with compressed air.

      (3) Apply the specified seal lock adhesive to the bolt or nut threads.

   (c) Precoated parts are indicated in the component illustrations by the "★" symbol.

7. When necessary, use a sealer on gaskets to prevent leaks.

8. Carefully observe all specifications for bolt tightening torques. Always use a torque wrench.

9. Use of special service tools (SST) and special service materials (SSM) may be required, depending on the nature of the repair. Be sure to use SST and SSM where specified and follow the proper work procedure. A list of SST and SSM can be found at the back of this manual.

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

11. Care must be taken when jacking up and supporting the vehicle. Be sure to lift and support the vehicle at the proper locations. (See page IN-16)

   (a) If the vehicle is to be jacked up only at the front or rear end, be sure to block the wheels in order to ensure safety.

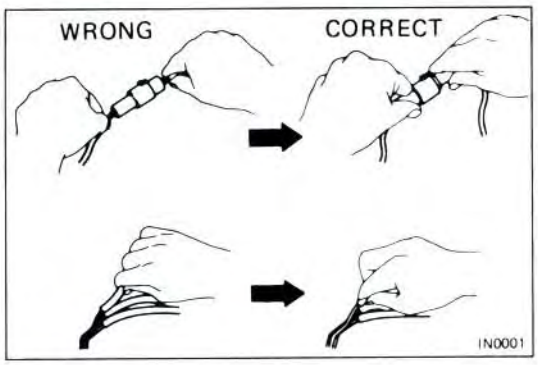
   (b) After the vehicle is jacked up, be sure to support it on stands. It is extremely dangerous to do any work on the vehicle raised on jack alone, even for a small job that can be finished quickly.

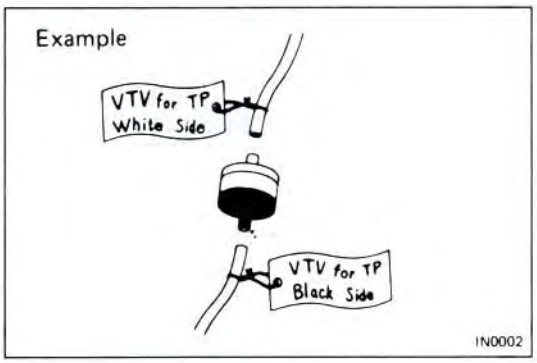
12. Observe the following precautions to avoid damage to the parts:

   (a) **Do not open the cover or the case of the ECU unless absolutely necessary.**
   (If the IC terminals are touched, the IC may be destroyed by static electricity.)

   (b) To disconnect vacuum hoses, pull on the end, not the middle of the hose.

   (c) To pull apart electrical connectors, pull on the connector itself, not the wires.





(d) Be careful not to drop electrical components, such as sensors or relays. If they are dropped on a hard floor, they should be replaced and not reused.

(e) When steam cleaning an engine, protect the distributor, coil, air filter, carburetor intake, air pump and VCV from water.

(f) Never use an impact wrench to remove or install thermo switches or thermo sensors.

(g) When checking continuity at the wire connector, insert the tester probe carefully to prevent terminals from bending.

(h) When using a vacuum gauge, never force the hose onto a connector that is too large. Use a step-down adapter instead. Once the hose has been stretched, it may leak.

13. Tag hoses before disconnecting them:

(a) When disconnecting vacuum hoses, use tags to identify how they should be reconnected.

(b) After completing a job, double check that the vacuum hoses are properly connected. A label under the hood shows the proper layout.

PRECAUTIONS FOR VEHICLES EQUIPPED WITH A CATALYTIC CONVERTER

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

1. **Use only unleaded gasoline.**

2. **Avoid prolonged idling.**

   Avoid running the engine at fast idle speed for more than 20 minutes.

3. **Avoid spark jump test.**

   (a) Spark jump test only when absolutely necessary. Perform this test as rapidly as possible.

   (b) While testing, never race the engine.

4. **Avoid prolonged engine compression measurement.**

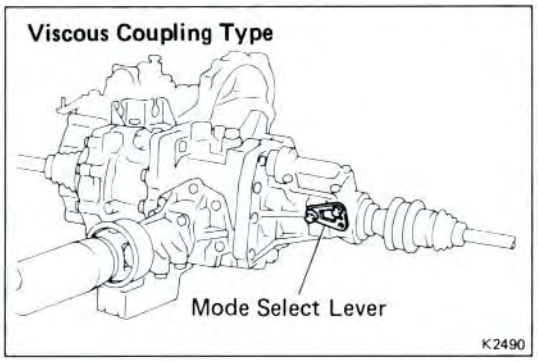
   Engine compression tests must be made as rapidly as possible.

5. **Do not run engine when fuel tank is nearly empty.**

   This may cause the engine to misfire and create an extra load on the converter.

6. **Avoid coasting with ignition turned off and prolonged braking.**

7. **Do not dispose of used catalyst along with parts contaminated with gasoline or oil.**



PRECAUTIONS WHEN SERVICING FULL-TIME 4WD VEHICLES

The full-time 4WD Celica is equipped with the viscous coupling type of center differential lock. When carrying out any kind of servicing or testing on a full-time 4WD in which the front or rear wheels are made to rotate (braking test, speedometer test, on-the-car wheel balancing, etc.), or when towing the vehicle, be sure to observe the precautions given belows. If incorrect preparations or test procedures are used, the test will not be able to be successfully carried out, and may be dangerous as well. Therefore, before beginning any such servicing or test, be sure to check the following items:

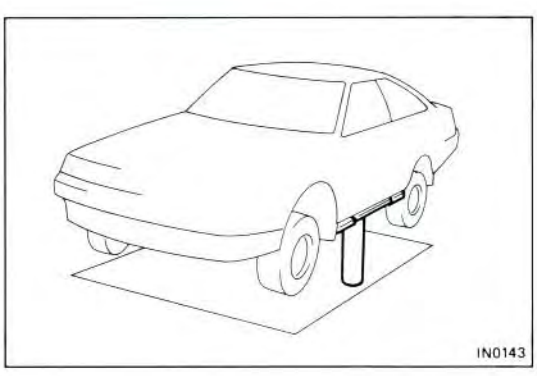
(1) Center differential lock type
(2) Center differential mode position
(3) Whether wheels should be touching ground or jacked up
(4) Transmission gear position
(5) Maximum testing vehicle speed
(6) Maximum testing time

Also be sure to observe the following cautions:

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

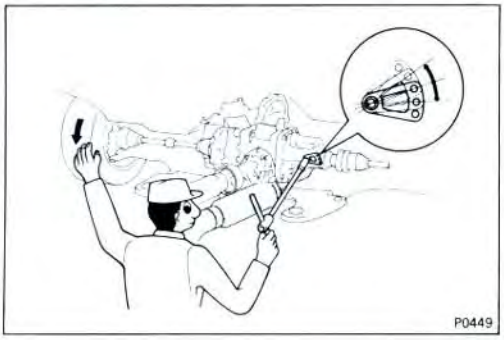
BEFORE BEGINNING TEST

During tests with a brake tester or chassis dynamometer, such as braking force tests or speedometer tests, if only the front or the rear wheels are to be rotated, it is necessary to set the Mode Select Lever on the transaxle to the Viscous Free Mode or to the FF Mode depending on the type of test being perform. In addition, after moving the lever to the position of the desired mode, be sure to check that the center differential's state has changed accordingly.



MOVING MODE SELECT LEVER

1. JACK UP VEHICLE

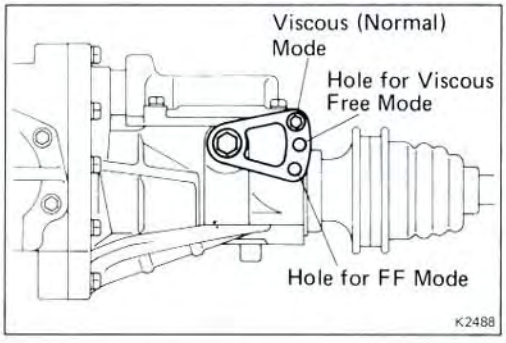


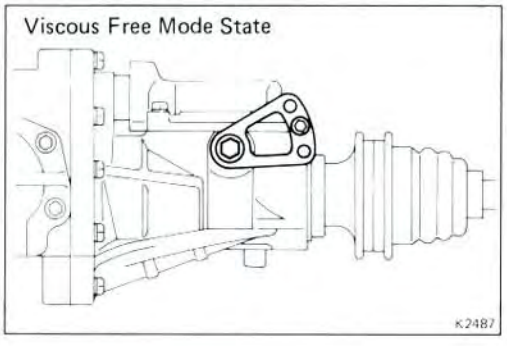
2. **REMOVE MODE SELECT LEVER SET BOLT**

3. **MOVE MODE SELECT LEVER TO DESIRED MODE POSITION**

NOTES:
1. If the mode select lever cannot be moved smoothly, shift the transmission to 1st gear, then move the lever while rotating one front wheel by hand.
2. Do not use excessive force when moving the mode select lever.

4. **LOCK MODE SELECT LEVER WITH SET BOLT**

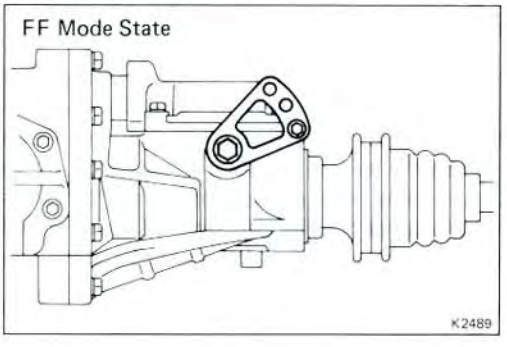




5. **CONFIRM MODE**

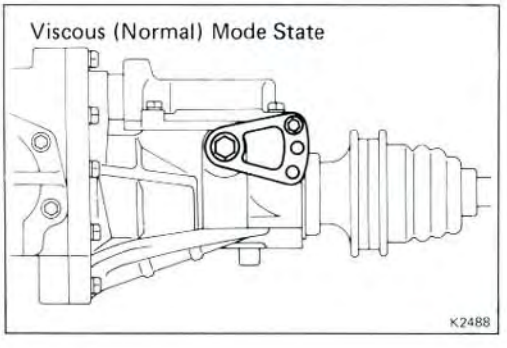
Viscous Free Mode:

Jack up one of the front wheels and check that the wheel can be rotated by hand with the transmission in neutral.



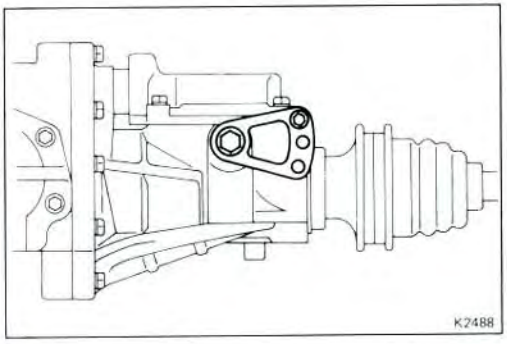
FF Mode:

Jack up one of the rear wheels and check that the wheel can be rotated by hand with the transmission in 1st gear.



Viscous (Normal) Mode:

Jack up one of the front wheels and check that the wheel resists being rotated by hand with the transmission in neutral.



6. AFTER FINISHING TEST, RETURN MODE SELECT LEVER TO "VISCOUS (NORMAL) MODE" POSITION AND INSTALL SET BOLT

CAUTION:

1. After moving the mode select lever, jack up one of the front or rear wheels and check that the wheel rotates to confirm that the mode selection has been made correctly.

2. Be sure to tighten the set bolt securely each time after moving the mode select lever.

3. Do not engage the clutch or pump the accelerator or brakes suddenly in the viscous free mode or the FF mode.

4. If either the front or the rear wheels are placed on the tester rollers in the viscous free mode, be careful not to exceed the following limits:

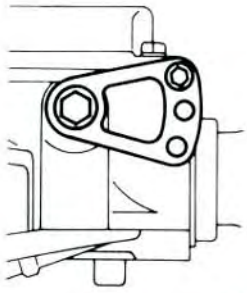
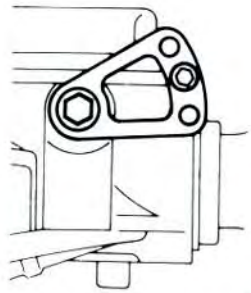
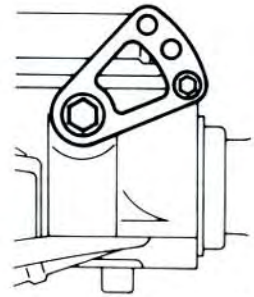
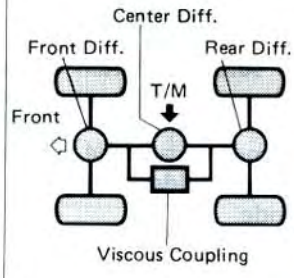
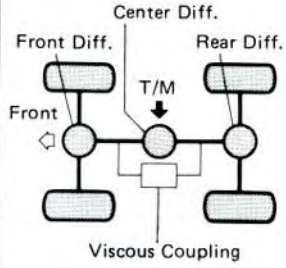
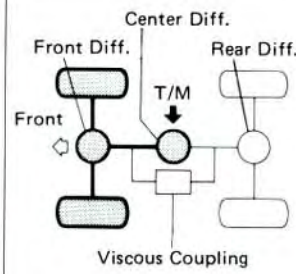
   Maximum speed:
   Speed indicated on speedometer
   Wheel speed (tester speed) 19 mph (30 km/h) or 38 mph (60 km/h)
   Maximum test time: 60 sec.

   Note that the actual wheel speed (tester speed) is twice the speed indicated by the speedometer due to center differential operation.

5. Do not drive the vehicle in 1st gear, 2nd gear or in reverse while in FF mode. If it is necessary to move the vehicle, drive it in 3rd, 4th or 5th gear. When desiring to back the vehicle, push it backwards manually.

6. After finishing the test, be sure to move the mode select lever back to the viscous (normal) mode and lock it securely with the set bolt.

STATE IN EACH MODE

Mode	Viscous (Normal) Mode	Viscous Free Mode	FF Mode
Mode Select Lever Position	 K2488	 K2487	 K2489
State in Each Mode	 CP0052	 CP0053	 CP0054
Viscous Coupling	Operating	Not Operating	Not Operating
Center Differential	Free	Free	Locked and Separated from Rear Drive
Driving Wheels	4WD	4WD	FWD
Conditions of Use	Normal Driving	• When using a brake tester Never use this mode during normal driving	• When using a chassis dynamometer • When using a combination tester Never use this mode during normal driving

BRAKING FORCE TEST

NOTES:

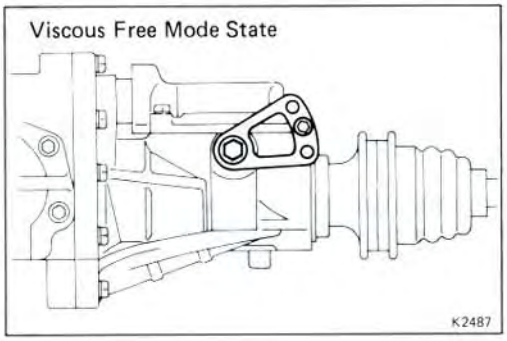
1. According to the vehicle speed during the test, select one of the two test methods described below, either A or B.
2. The mode select lever position of mode select lever differs in the two test methods, A and B, so take adequate precautions.

   Method A (Low Speed Test) : Viscous Free Mode

   Method B (High Speed Test) : FF Mode

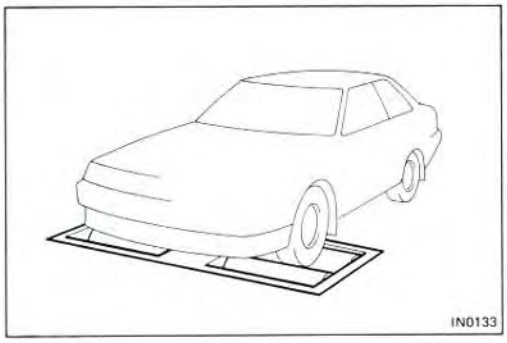
TEST METHOD A (Low Speed Test)

Speed indicated on speedometer: 19 mph (30 km/h),
Wheel speed (tester speed): 38 mph (60 km/h) and
Test time: Within 60 sec.



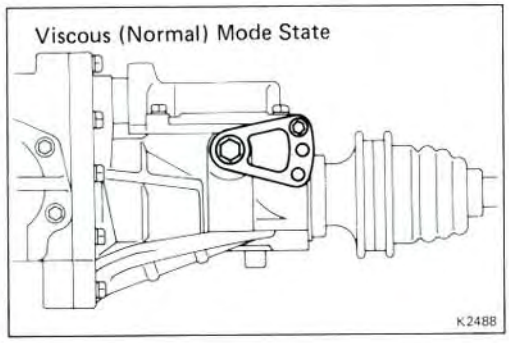
1. MOVE MODE SELECT LEVER ON TRANSAXLE TO "VISCOUS FREE MODE" AND INSTALL SET BOLT **(See page IN-7)**
2. CONFIRM MODE SELECTION **(See page IN-8)**
3. PLACE WHEELS (EITHER FRONT OR REAR) ON TESTER ROLLERS

   NOTE: The actual wheel speed (tester speed) is twice the speed indicated by the speedometer due to center differential operation, so take adequate precautions.

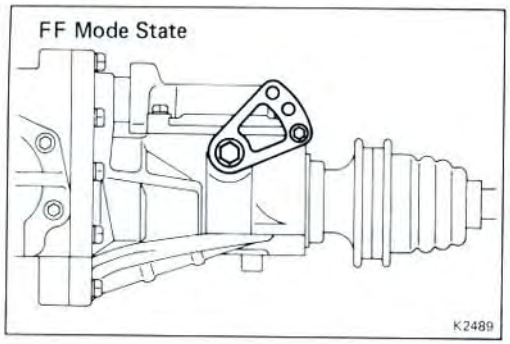


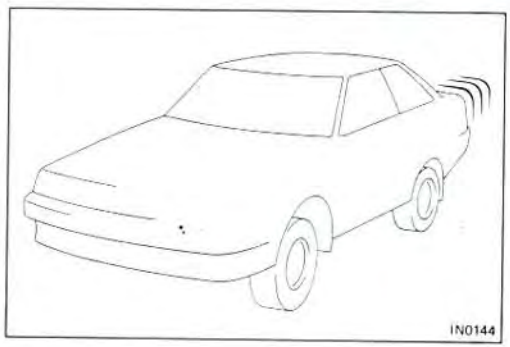
4. DISCONNECT INERTIA WEIGHT FROM TESTER ROLLER **(If equipped with it)**
5. PUT TRANSMISSION IN NEUTRAL
6. OPERATE TESTER ROLLERS AND MEASURE BRAKING FORCE

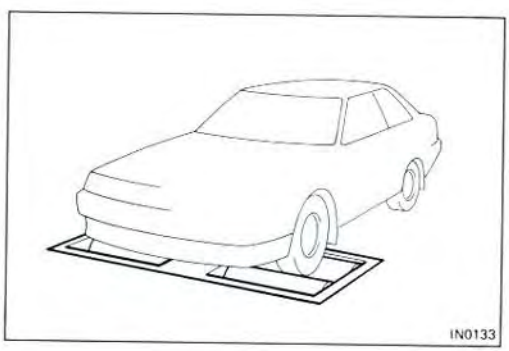
   NOTE: Since different types of tester are used, such as specialized brake testers and combination testers with built-in chassis dynamometer, speedometer tester, brake tester, etc., conduct the test in accordance with the instructions furnished for the tester model used.

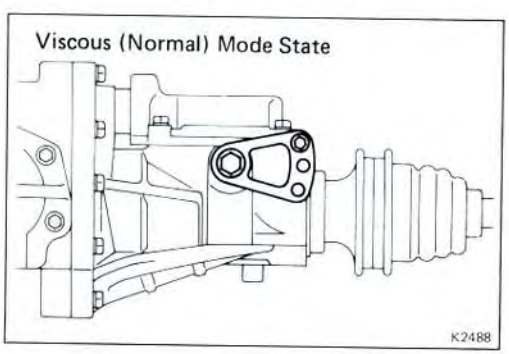


7. AFTER FINISHING TEST, BE SURE TO MOVE MODE SELECT LEVER BACK TO "VISCOUS (NORMAL) MODE" AND LOCK IT SECURELY WITH SET BOLT









TEST METHOD B (High Speed Test)

[Vehicle Speed: Over 38 mph (60 km/h)]

1. MOVE MODE SELECT LEVER TO "FF MODE" AND INSTALL SET BOLT
(See page IN-7)

2. CONFIRM MODE SELECTION
(See page IN-8)

3. PLACE WHEELS (EITHER FRONT OR REAR) TO BE TESTED ON TESTER ROLLERS

CAUTION:

1. Do not drive the vehicle in 1st gear, 2nd gear or reverse while in the FF mode.
2. If it is necessary to move the vehicle, drive it in 3rd, 4th or 5th gear.
3. When desiring to back the vehicle, push it backwards manually.
4. Do not engage the clutch or pump the accelerator or brake pedal suddenly.

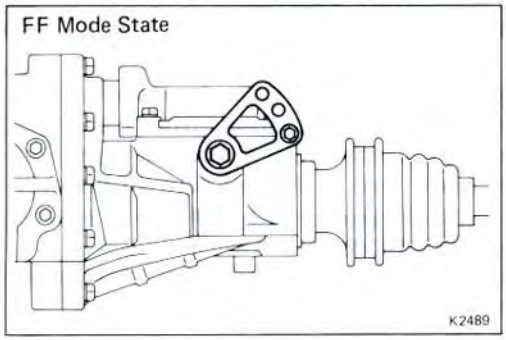
4. DISCONNECT INERTIA WEIGHT FROM TESTER ROLLER (If equipped with it)

5. PUT TRANSMISSION IN NEUTRAL

6. OPERATE TESTER ROLLERS AND MEASURE BRAKING FORCE

Tester operation differs depending on the type of tester used. Be sure to follow the procedure specified in the instructions supplied by the tester manufacturer.

7. AFTER FINISHING TEST, BE SURE TO MOVE MODE SELECT LEVER BACK TO "VISCOUS (NORMAL) MODE" AND LOCK IT SECURELY WITH SET BOLT



SPEEDOMETER TEST OR OTHER TESTS

(Using Speedometer Tester or Chassis Dynamometer)

1. MOVE MODE SELECT LEVER TO "FF MODE" AND INSTALL SET BOLT
(See page IN-7)

2. CONFIRM MODE SELECTION
(See page IN-8)

CAUTION:

1. Do not drive the vehicle in 1st gear, 2nd gear or reverse while in the FF mode.
2. If it is necessary to move the vehicle, drive it in 3rd, 4th or 5th gear.
3. When desiring to back the vehicle, push it backwards manually.
4. Do not engage the clutch or pump the accelerator or brake pedal suddenly.

3. PLACE FRONT WHEELS ON TESTER ROLLERS

4. CHOCK REAR WHEELS

5. APPLY PARKING BRAKE

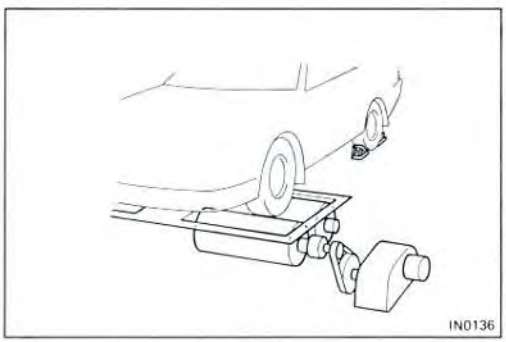
6. DISCONNECT INERTIA WEIGHT FROM TESTER ROLLER (If equipped with it)

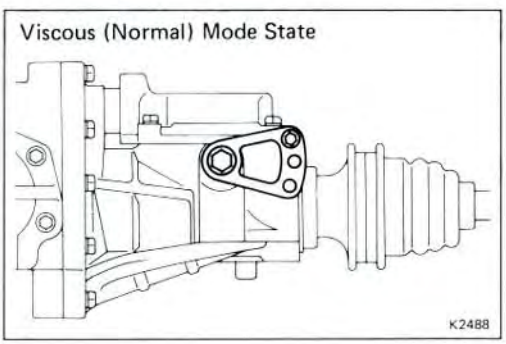
7. TEST VEHICLE
   (1) Start the engine.
   (2) Put the transmission in 3rd gear.
   (3) Engage the clutch slowly, then gradually increase the speed as the test is conducted.

   NOTE: The test should be conducted in 3rd, 4th and 5th gears.

   (4) After the test is finished, reduce the speed gradually, then stop the engine.

8. AFTER FINISHING TEST, BE SURE TO MOVE MODE SELECT LEVER BACK TO "VISCOUS (NORMAL) MODE" AND LOCK IT SECURELY WITH SET BOLT

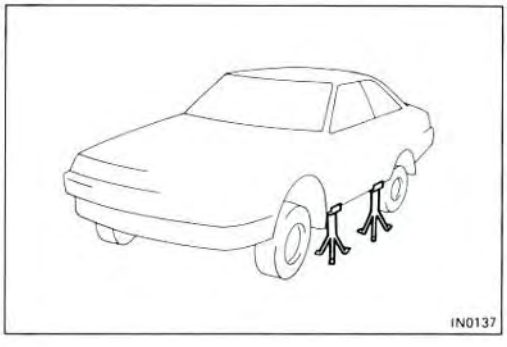




ON-THE-CAR WHEEL BALANCING

CAUTION:

1. When doing on-the-car wheel balancing on a full-time 4WD vehicle, to prevent the wheels from rotating at different speeds on indifferent directions from each other (which could lead to damage to the center differential or transaxle gears), always be sure to observe the following precautions:
   a) All four wheels should be jacked up, clearing the ground completely.
   b) The wheels be driven with both the engine and the wheel balancer.
   c) The mode select lever on the transaxle of the viscous coupling type center differential should be in the viscous (normal) mode position.
   d) The parking brake lever should be fully released.
   e) None of the brakes should be allowed to drag.
2. Avoid sudden acceleration, deceleration and braking.
3. Carry out the wheel balancing with the transmission in 3rd or 4th gear.

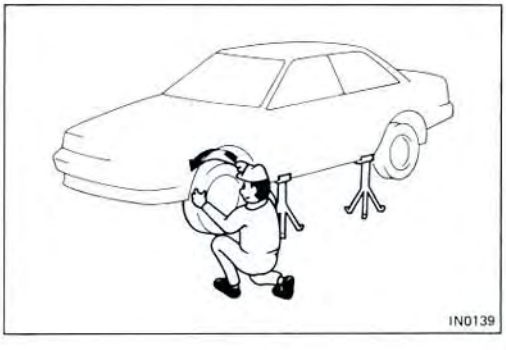

IN0137

1. JACK UP VEHICLE SO THAT ALL FOUR WHEELS CLEAR GROUND AND CAN BE ROTATED

   The wheels will be rotating fast, so make sure the vehicle is firmly supported on stands.

2. RELEASE PARKING BRAKE FULLY

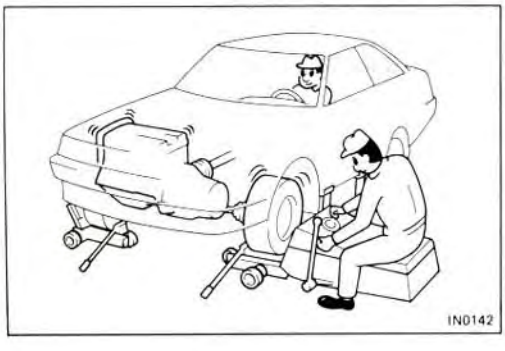
3. MAKE SURE THAT BRAKES ARE NOT DRAGGING ON ANY OF FOUR WHEELS


IN0139

4. PLACE WHEEL TO BE BALANCED ON WHEEL BALANCER

   Follow the precedure specified by the wheel balancer manufacturer.

5. START ENGINE


IN0142

6. PUT TRANSMISSION IN 3RD OR 4TH GEAR

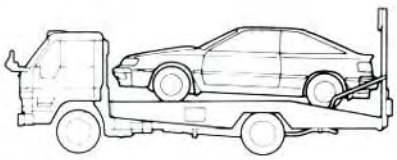
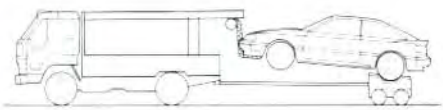
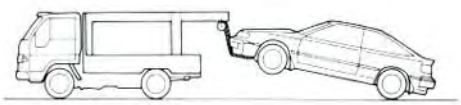
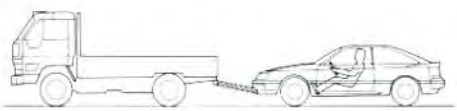
7. ENGAGE CLUTCH SLOWLY, THEN GRADUALLY INCREASE SPEED TO TEST SPEED

8. ROTATE WHEELS USING BOTH ENGINE'S DRIVING FORCE AND DRIVING FORCE OF WHEEL BALANCER AND CHECK WHEEL BALANCE

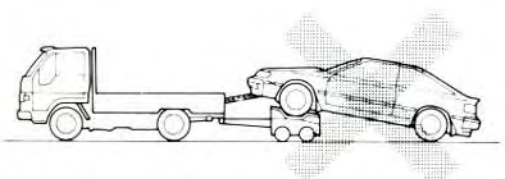
   NOTE: When doing this be careful of the other wheels, which will rotate at the same time.

PRECAUTIONS WHEN TOWING FULL-TIME 4WD VEHICLES

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

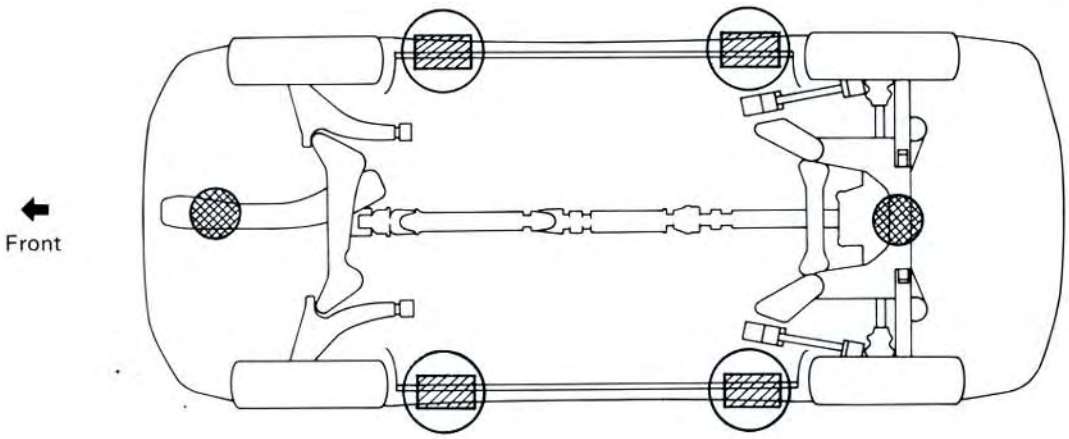
Towing Method \ Type of Center Differential	Viscous Coupling Type		
	Parking Brake	T/M Shift Lever Position	Viscous Coupling
① Flat Bed Truck  P0442	Applied	1st Gear	Normal Driving (Viscous Mode)
② Sling-Type Tow Truck with Dollies  IN0150			(No Special Operation Necessary)
③ Sling-Type Tow Truck (Front wheels must be able to rotate freely)  P0438	Released	Neutral	↑
④ Towing with a Rope  P0437	Released	Neutral	↑

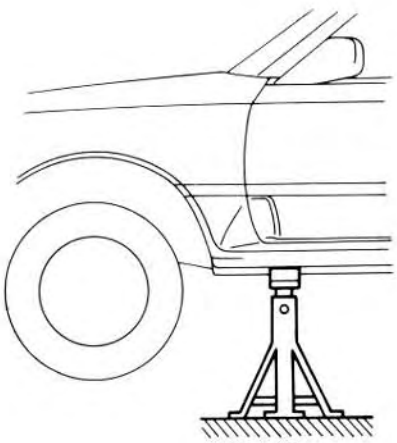
NOTE: Do not use any towing method other than those shown above.
For example, the towing method shown below is dangerous, so do not use it.

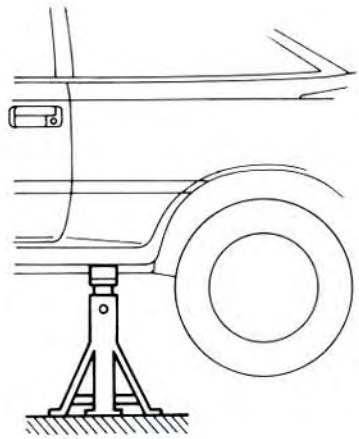

P0439

During towing with this towing method, there is a danger of the drivetrain heating up and causing a burnout malfunction, or of the front wheels flying off the dolly.

VEHICLE LIFT AND SUPPORT LOCATIONS







JACK POSITION

Front . . . . . Center of engine mounting center member

Rear . . . . . Jack up support of rear subframe

PANTOGRAPH JACK POSITION

SUPPORT POSITION

Safety stand . . . . . .

IN0124
IN0123

ABBREVIATIONS USED IN THIS MANUAL

ALR	Automatic Locking Retractor
A.B.S.	Anti-lock Brake System
A/C	Air Conditioner
BTDC	Before Top Dead Center
BVSV	Bimetal Vacuum Switching Valve
CALIF.	Vehicles Sold in California
CB	Circuit Breaker
CCS	Cruise Control System
ECU	Electronic Controlled Unit
EFI	Electronic Fuel Injection
EGR	Exhaust Gas Recirculation
ELR	Emergency Locking Retractor
EVAP	Evaporative (Emission Control)
EX	Exhaust (manifold, valve)
Ex.	Except
FIPG	Formed in Place Gasket
FL	Fusible Link
FR, Fr	Front
IN	Intake (manifold, valve)
IG	Ignition
ISC	Idle Speed Control
LH	Left-hand
Min.	Minimum
MP	Multipurpose
M/T, MTM	Manual Transaxle
OD, O/D	Overdrive
O/S	Oversize
PCV	Positive Crankcase Ventilation
PKB	Parking Brake
PS	Power Steering
RH	Right-hand
Rr	Rear
SOL.	Solenoid
SSM	Special Service Materials
SST	Special Service Tools
STD	Standard
S/W	Switch
TCCS	TOYOTA Computer Controlled System
TDC	Top Dead Center
T-VIS	TOYOTA-Variable Induction System
TWC	Three-Way Catalyst
U/S	Undersize
VSV	Vacuum Switching Valve
VTV	Vacuum Transmitting Valve
w/	With
w/o	Without

MAINTENANCE

REFER TO 1988 CELICA REPAIR MANUAL (Pub. No. RM071U)

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

MA

GENERAL NOTES:

- **Every service item in the periodic maintenance list must be performed.**
- **Failure to do even one item can cause the engine to run poorly and increase exhaust emissions.**

MAINTENANCE SCHEDULE

Maintenance operations: A = Check and adjust if necessary;
R = Replace, change or lubricate;
I = Inspect and correct or replace if necessary

NORMAL CONDITION SCHEDULE

System	Service interval (Odometer reading or months, whichever comes first) / Maintenance items	Maintenance services beyond 60,000 miles (96,000 km) should be performed at the same intervals shown in each maintenance schedule.						See page (item No.)
		Miles x 1,000	10	20	30	40	50	60	
		Km x 1,000	16	32	48	64	80	96	
		Months	12	24	36	48	60	72	
ENGINE	Valve clearance							A	MA-6 (item 13)
	Drive belts(1)							I	MA-4 (item 2)
	Engine oil and oil filter★				R(2)				MA-5 (item 6)
	Engine and intercooler coolant(3)							R	MA-5 (item 7, 8)
	Exhaust pipes and mountings				I			I	MA-6 (item 12)
FUEL	Air filter★				R			R	MA-4 (item 4)
	Fuel lines and connections				I			I	MA-6 (item 11)
	Fuel tank cap gasket							R	MA-6 (item 10)
IGNITION	Spark plugs							R	MA-5 (item 5)
EVAP	Charcoal canister							I	MA-6 (item 9)
BRAKES	Brake linings and drums			I		I		I	MA-7 (item 15)
	Brake pads and discs			I		I		I	MA-7 (item 16)
	Brake line pipes and hoses			I		I		I	MA-7 (item 14)
CHASSIS	Steering linkage			I		I		I	MA-8 (item 17)
	Drive shaft boots			I		I		I	MA-8 (item 19)
	Ball joints and dust covers			I		I		I	MA-9 (item 20)
	Transaxle, rear differential and steering gear housing(4) oil			I		I		I	MA-9 (item 21) MA-8 (item 18)
	Bolts and nuts on chassis and body			I		I		I	MA-10 (item 24)

Maintenance services indicated by a star (★) are required under the terms of the Emission Control Systems Warranty (ECSW). See Owner's Guide or Warranty Booklet for complete warranty information.

★ For vehicles sold in California

NOTE:
(1) After 60,000 miles (96,000 km), inspect every 10,000 miles (16,000 km) or 12 months.
(2) Replace every 5,000 miles (8,000 km) or 6 months, but replace oil filter every 10,000 miles (16,000 km) or 12 months.
(3) After 60,000 miles (96,000 km), replace every 30,000 miles (48,000 km) or 36 months.
(4) Inspect the steering gear housing oil for leakage only.

Follow the severe condition schedule if vehicle is operated mainly under one or more of the following severe conditions:

- Towing a trailer, using a camper or car top carrier.
- Repeat short trips less than 5 miles (8 km) and outside temperatures remain below freezing.
- Extensive idling and/or low speed driving for a long distance such as police, taxi or door-to-door delivery use.
- Operating on dusty, rough, muddy or salt spread roads.

SEVERE CONDITION SCHEDULE

System	Service interval (Odometer reading or months, whichever comes first) / Maintenance items	Maintenance services beyond 60,000 miles (96,000 km) should be performed at the same intervals shown in each maintenance schedule.												See page (item No.)
	Miles x 1,000	5	10	15	20	25	30	35	40	45	50	55	60	
	Km x 1,000	8	16	24	32	40	48	56	64	72	80	88	96	
	Months	6	12	18	24	30	36	42	48	54	60	66	72	
ENGINE	Timing belt						R(1)							MA-4 (item 1)
	Valve clearance												A	MA-6 (item 13)
	Drive belts(2)												I	MA-4 (item 2)
	Engine oil and oil filter★						R(3)							MA-5 (item 6)
	Engine and intercooler coolant(4)												R	MA-5 (item 7, 8)
	Exhaust pipes and mountings			I			I			I			I	MA-6 (item 12)
FUEL	Air filter★(5)	I	I	I	I	I	R	I	I	I	I	I	R	MA-4 (item 3, 4)
	Fuel lines and connections						I						I	MA-6 (item 11)
	Fuel tank cap gasket												R	MA-6 (item 10)
IGNITION	Spark plugs												R	MA-5 (item 5)
EVAP	Charcoal canister												I	MA-6 (item 9)
BRAKES	Brake linings and drums		I		I		I		I		I		I	MA-7 (item 15)
	Brake pads and discs		I		I		I		I		I		I	MA-7 (item 16)
	Brake line pipes and hoses				I				I				I	MA-7 (item 14)
CHASSIS	Steering linkage(6)		I		I		I		I		I		I	MA-8 (item 17)
	Drive shaft boots		I		I		I		I		I		I	MA-8 (item 19)
	Ball joints and dust covers		I		I		I		I		I		I	MA-9 (item 20)
	Transaxle, rear differential and steering gear housing(7) oil				R				R				R	MA-9 (item 22) MA-10 (item 23) MA-8 (item 18)
	Bolts and nuts on chassis and body(6)		I		I		I		I		I		I	MA-10 (item 24)

Maintenance services indicated by a star (★) are required under the terms of the Emission Control Systems Warranty (ECSW). See Owner's Guide or Warranty Booklet for complete warranty information.

★ For vehicles sold in California

NOTE:

(1) For the vehicles frquently idled for extensive periods and/or driven for long distance at low speeds such as taxi, police and door-to-door delivery, it is recommended to change at 60,000 miles (96,000 km).
(2) After 60,000 miles (96,000 km), inspect every 10,000 miles (16,000 km) or 12 months.
(3) Replace every 2,500 miles (4,000 km) or 3 months, but oil filter replace every 5,000 miles (8,000 km) or 6 months.
(4) After 60,000 miles (96,000 km), replace every 30,000 miles (48,000 km) or 36 months.
(5) Applicabel when operating mainly on dusty roads. If not, follow the normal condition schedule.
(6) Applicable when operating mainly on rough and/or muddy roads. If not, follow the normal condition schedule.
(7) Inspect the steering gear housing for oil leakage only.

MAINTENANCE OPERATIONS

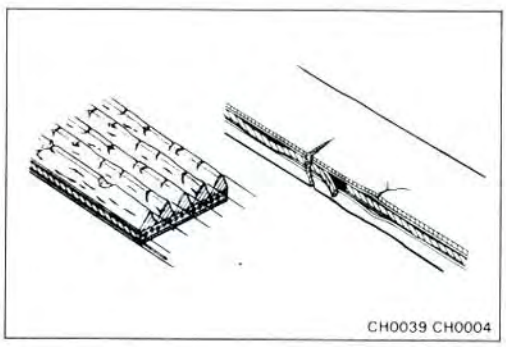
ENGINE

Cold Engine Operations

1. REPLACE TIMING BELT

(a) Remove the timing belt.
(See pages EM-11 to 14)

(b) Install the timing belt.
(See pages EM-16 to 20)


CH0039 CH0004

2. INSPECT DRIVE BELT

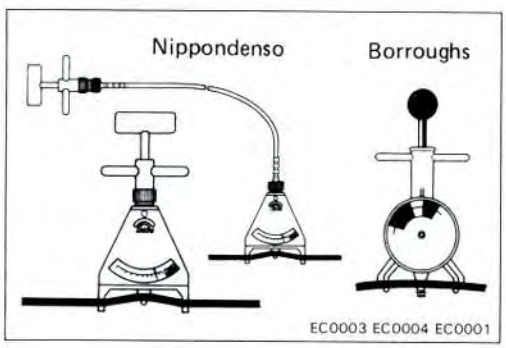
(a) Visually check the belt for separation of the adhesive rubber above and below the core, core separation from the belt side, severed core, separation of the rib from the adhesive rubber, cracking or separation of the ribs, torn or worn ribs or cracks in the inner ridges of the ribs.

If necessary, replace the drive belt.

(b) Using a belt tension gauge, measure the drive belt tension.

Belt tension gauge:

Nippondenso	**BTG-20 (95506-00020)**
Borroughs	**NO.BT-33-73F**



EC0003 EC0004 EC0001

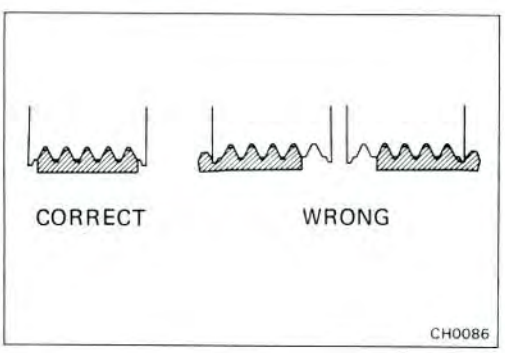
Drive belt tension:

Alternator		
w/ A/C	**New belt**	**175 ± 5 lb**
	Used belt	**115 ± 20 lb**
w/o A/C	**New belt**	**150 ± 25 lb**
	Used belt	**130 ± 25 lb**
PS pump	**New belt**	**125 ± 10 lb**
	Used belt	**80 ± 20 lb**

If necessary, adjust the drive belt tension.

NOTE:

- ''New belt'' refers to a belt which has been used 5 minutes or less on a running engine.
- ''Used belt'' refers to a belt which has been used on a running engine for 5 minutes or more.
- After installing the belt, check that it fits properly in the ribbed grooves.
- Check by hand to confirm that the belt has not slipped out of the groove on the bottom of the pulley.
- After installing a new belt, run the engine for about 5 minutes and recheck the belt tension.



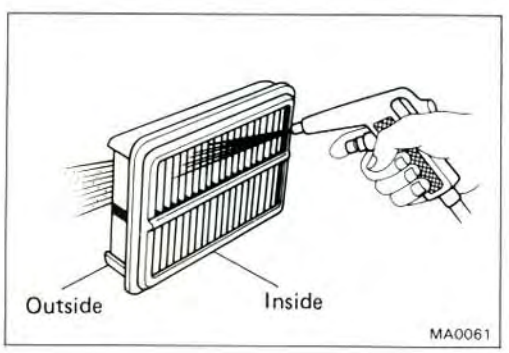
CH0086

3. INSPECT AIR FILTER

(a) Visually check that the air cleaner element is not excessively, damaged or oily.

If necessary, replace the air cleaner element.

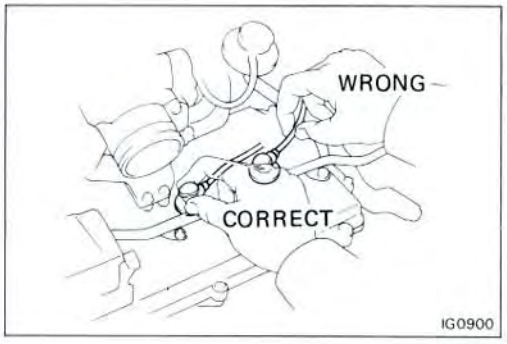
(b) Clean the element with compressed air.
First blow from the inside thoroughly, then blow off the outside of the element.



MA0061

4. REPLACE AIR FILTER

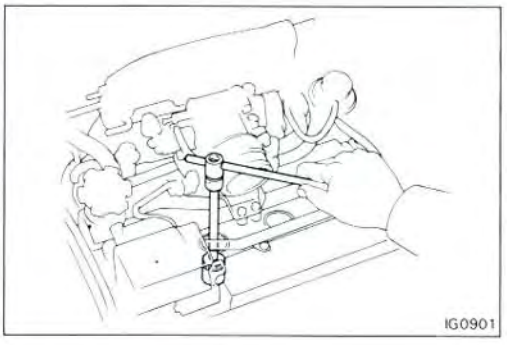
Replace the air cleaner element with a new one.



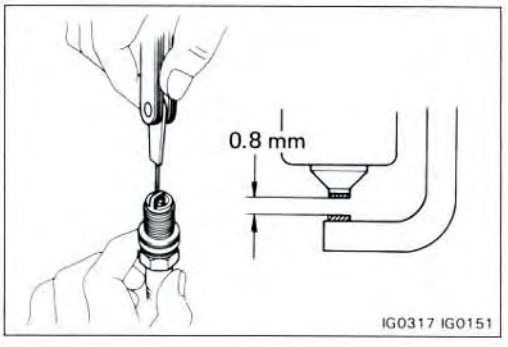
5. REPLACE SPARK PLUGS

(a) Remove the intercooler. (See page TC-9)

(b) Disconnect the spark plug cords at the rubber boot. DO NOT pull on the cords.



(c) Using a plug wrench (16 mm), remove the spark plugs.



(d) Check the electrode gap of new spark plugs.

Correct electrode gap: **0.8 mm (0.031 in.)**

Recommended spark plugs: **ND PQ16R8**
NGK BCPR5EP8

NOTE: If adjusting the gap of a new plug, bent only the base of the ground electrode. DO NOT touch the tip. Never attempt to adjust the gap on a used plug.

6. REPLACE ENGINE OIL AND OIL FILTER
(See page LU-5)

Oil grade: **API grade SF or SF/CC, multigrade viscosity and fuel-efficient oil**

Drain and refill with oil filter change capacity:
3.6 liters (3.8 US qts, 3.2 Imp. qts)

7. REPLACE ENGINE COOLANT
(See page CO-4)

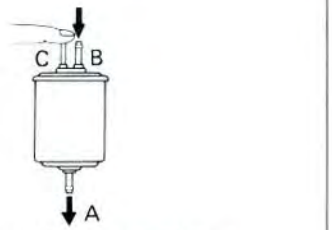
Used a good brand of ethylene-glycol base coolant, mixed according to the manufacturer's instructions.

Coolant capacity (w/ Heater):
8.0 liters (8.5 US qts, 7.0 Imp. qts)

8. REPLACE INTERCOOLER COOLANT
(See page TC-7)

Used a good brand of ethylene-glycol base coolant, mixed according to the manufacturer's instructions.

Coolant capacity:
1.7 liters (1.8 US qts, 1.5 Imp. qts)



Air should flow through freely
and no charcoal should come out.

EC1121

MA0379

9. INSPECT CHARCOAL CANISTER

(a) Disconnect the hoses to the charcoal canister. Label hoses for correct installation.

(b) Plug pipe C with your finger, and blow compressed air (3 kg/cm², 43 psi or 294 kPa) through pipe B (fuel tank side).

- Check that air comes out of the bottom pipe A without resistance.
- Check that no activated charcoal comes out.

If necessary, replace the charcoal canister.

NOTE: Do not attempt to wash the charcoal.

(c) Connect the hoses to the charcoal canister.

10. REPLACE GASKET IN FUEL TANK CAP

(a) Remove the old gasket (O-ring) from the tank cap. Do not damage the cap.

(b) Install a new gasket by hand.

(c) Check the cap for damage or cracks.

(d) Install the cap and check the torque limiter.

11. INSPECT FUEL LINES AND CONNECTIONS

Visually check the fuel lines for cracks, leakage, loose connections, deformation or tank band looseness.

12. INSPECT EXHAUST PIPES AND MOUNTINGS

Visually check the pipes, hangers and connections for severe corrosion, leaks or damage.

13. ADJUST VALVE CLEARANCE

NOTE: Check and adjust the valve clearance while the engine is cold.

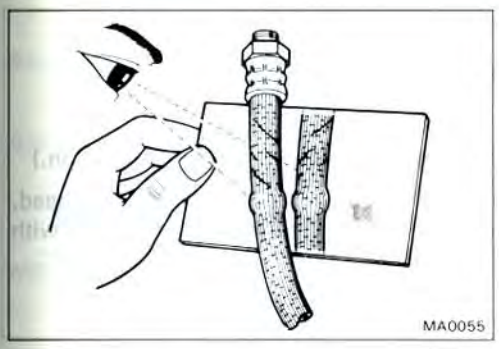
(a) Remove the cylinder head cover.

(b) Measure and adjust valve clearance.
(See page EM-8)

Valve clearance (Cold):

Intake	**0.15 — 0.25 mm (0.006 — 0.010 in.)**
Exhaust	**0.20 — 0.30 mm (0.008 — 0.012 in.)**

(c) Reinstall the cylinder head cover.


MA0055

BRAKES

14. INSPECT BRAKE LINE PIPES AND HOSES

NOTE: Check in a well lighted area. Check the entire circumference and length of the brake hoses using a mirror as required. Turn the front wheels fully right or left before checking the front brake.

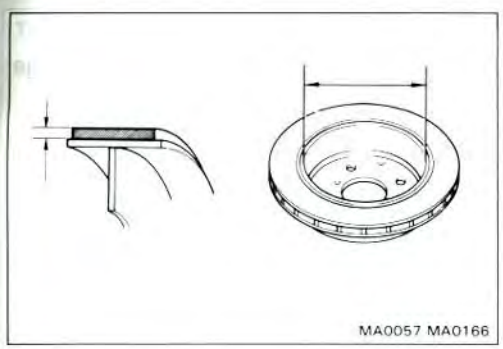
(a) Check all brake lines and hoses for:

- Damage
- Wear
- Deformation
- Cracks
- Corrosion
- Leaks
- Bends
- Twists

(b) Check all clamps for tightness and connections for leakage.

(c) Check that the hoses and lines are clear of sharp edges, moving parts and the exhaust system.

(d) Check that the lines installed in grommets pass through the center of the grommets.


MA0057 MA0166

15. INSPECT PARKING BRAKE LININGS AND DRUMS (See Pub. No. RM071U on page BR-5)

(a) Check the lining-to-drums contact condition and lining wear.

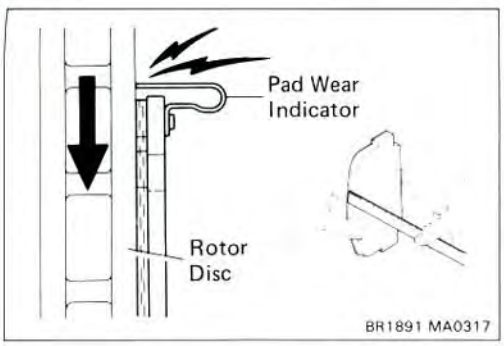
Minimum lining thickness: 1.0 mm (0.039 in.)

(b) Check the brake drums for scoring or wear.

Maximum drum inside diameter: 171.0 mm (6.732 in.)

(c) Clean the brake parts with a damp cloth.

NOTE: Do not use compressed air to clean the brake parts.



BR1891 MA0317

16. INSPECT FRONT AND REAR BRAKE PADS AND DISCS

Front (See page BR-7)

Rear (See Pub. No. RM071U on page BR-47)

(a) Check the thckness of the disc brake pads and check for irregular wear.

Minimum pad thickness: 1.0 mm (0.039 in.)

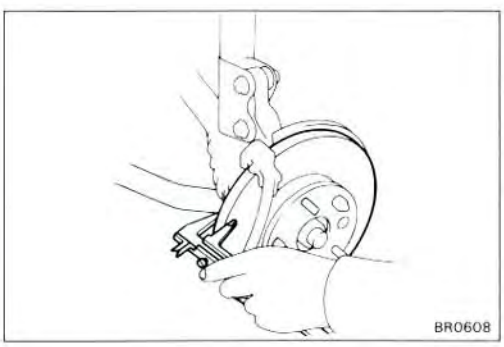
NOTE: If a squealing or scraping noise occurs from the brake during driving, check te pad wear indicator contacting the disc rotor, the disc pad should be replaced.

(b) Check the disc for wear or runout.

Minimum disc thickness:

Front	**24.0 mm (0.945 in.)**
Rear	**9.0 mm (0.354 in.)**

Maximum disc runout: 0.15 mm (0.0059 in.)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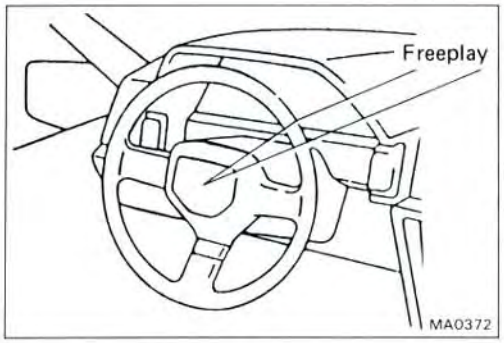


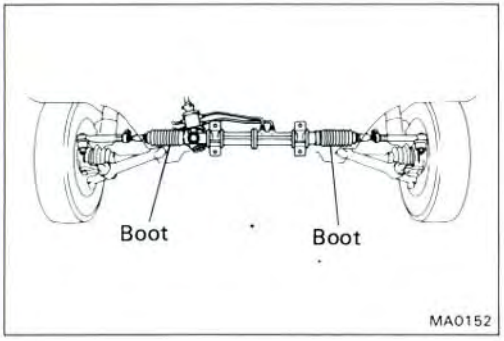
CHASSIS

17. INSPECT STEERING LINKAGE

(a) Check the steering wheel freeplay.

Maximum steering wheel freeplay: 30 mm (1.18 in.)

With the vehicle stopped and pointed straight ahead, rock the steering wheel gently back and forth with light finger pressure.



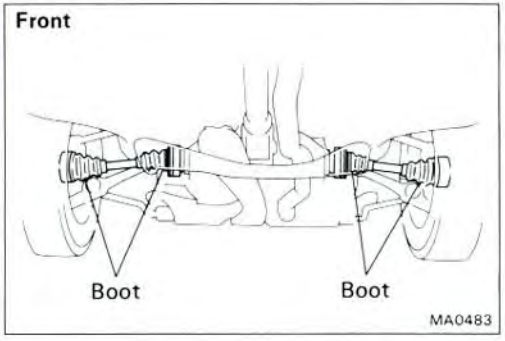
(b) Check the steering linkage for looseness or damage.

Check that:

- Tie rod ends so not have excessive play.
- Dust seals and boots are not damage.
- Boot clamps are not loose.

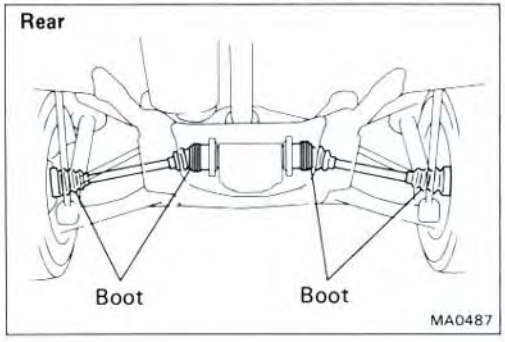
18. INSPECT STEERING GEAR HOUSING OIL

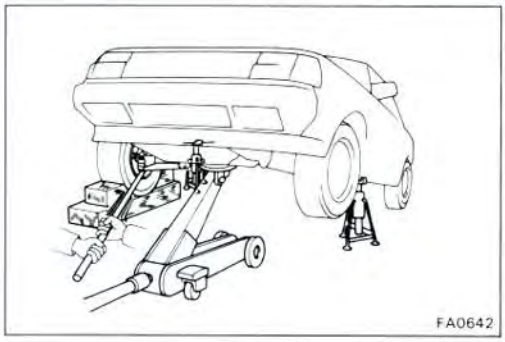
Check the steering gear box for oil leakage.



19. INSPECT FRONT AND REAR DRIVE SHAFT BOOTS

Check the drive shaft boots for clamp looseness, leakage or damage.

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20. INSPECT BALL JOINTS AND DUST COVERS

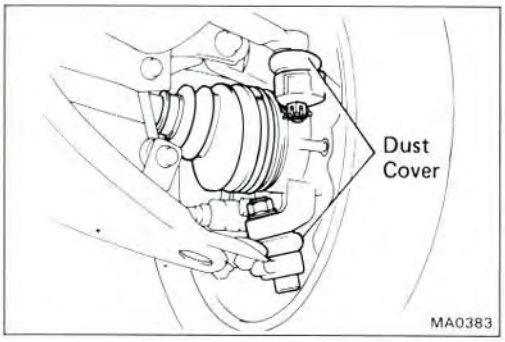
(a) Inspect the ball joints for excessive looseness.

- Jack up the front of the vehicle and place wooden blocks with a height of 180 — 200 mm (7.09 — 7.87 in.) under the front tires.
- Lower the jack until there is about half a load on the front coil springs. Place stands under the vehicle for safety.
- Check the front wheels are in a straight forward position, and block them with chocks.
- Using a lever, pry up the end of the lower arm, and check the amount of play.

Maximum ball joint vertical play: 0 mm (0 in.)

If there is play, replace the ball joint.

(b) Check the dust cover for damage.



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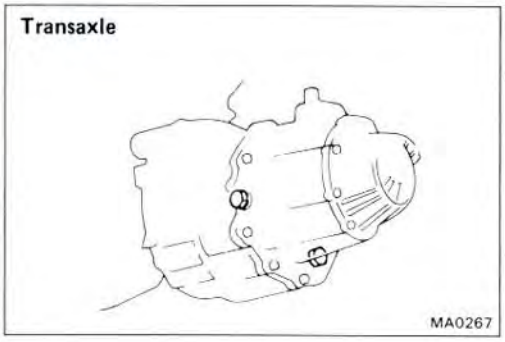


MA0267

21. CHECK TRANSAXLE AND REAR DIFFERENTIAL OIL

(a) Visually check the transaxle and rear differential for oil leakage.

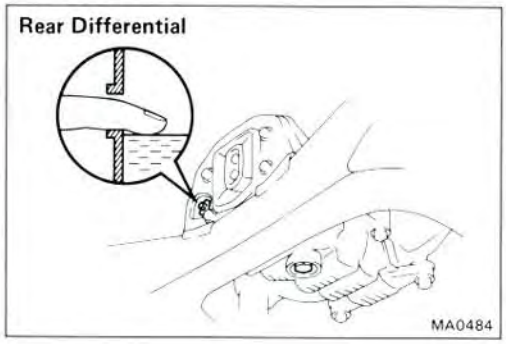
If leakage is found, check for cause and repair.

(b) Remove the filler plug and feel inside the hole with your finger. Check that the oil comes to within 5 mm (0.20 in.) of the bottom edge of the hole.

If the level is low, add oil until it begins to run out the filler hole.

Transaxle oil: See step 22

Rear differential oil: See step 23



MA0484

22. REPLACE TRANSAXLE OIL

(a) Remove the engine under cover.

(b) Remove the filler and drain plugs, and drain the oil.

(c) Reinstall the drain plug securely.

(d) Add new oil until it beings to run out of the filler hole.

Transaxle oil: Transaxle oil E50 (08885-80206) or equivalent

Recommended transaxle oil:

Oil grade API GL-5

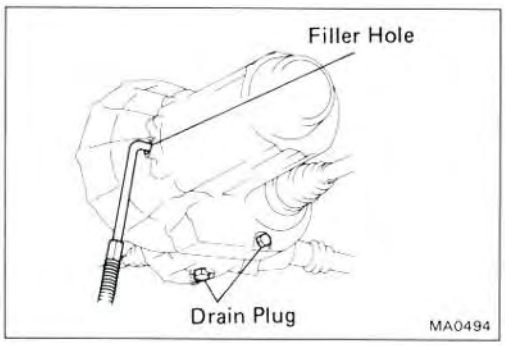
Viscosity SAE 75W-90 or 80W-90

Above −18°C (0°F) SAE 90W

Below −18°C (0°F) SAE 80W

Capacity: 4.8 liters (5.1 US qts, 4.2 Imp. qts)

(e) Reinstall the filler plug securely.



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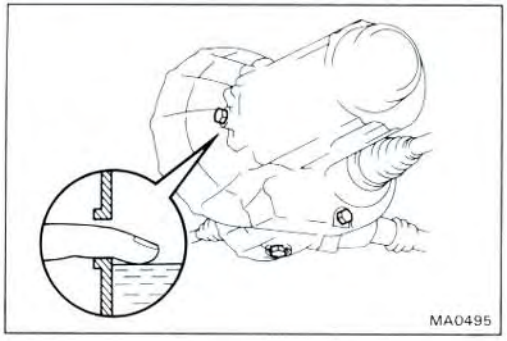

MA0495

23. REPLACE REAR DIFFERENTIAL OIL

(a) Remove the filler and drain plugs, and drain the oil.

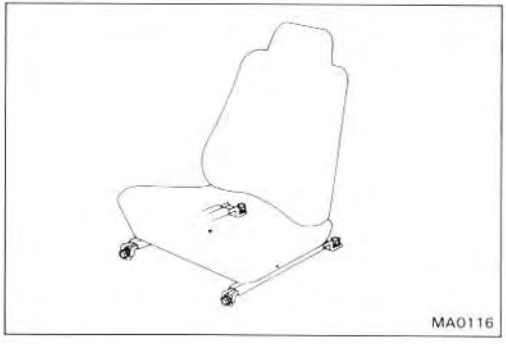
(b) Reinstall the drain plug securely.

(c) Add new oil until it beings to run out of the filler hole.

Rear differential oil:

Oil grade	**Hypoid gear oil API GL-5**
Viscosity	**Above −18°C (0°F) SAE 90**
	Below −18°C (0°F) SAE 80W-90 or 80W
Capacity:	**1.1 liters (1.2 US qts, 1.0 Imp. qts)**

(d) Reinstall the filler plug securely.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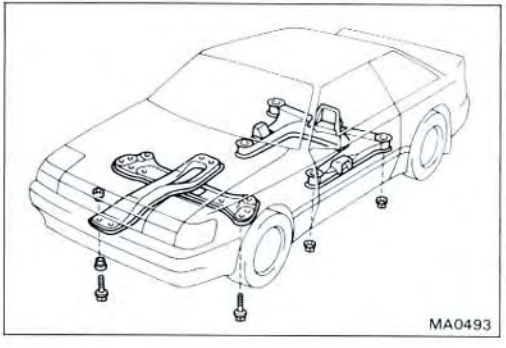
24. TIGHTEN BOLTS AND NUTS ON CHASSIS AND BODY

Tighten the following parts:

- Front seats mount bolts

Torque: 375 kg-cm (27 ft-lb, 37 N·m)


MA0493

- Engine mounting center member-to-body mount bolts

Torque: 400 kg-cm (29 ft-lb, 39 N·m)

- Front suspension lower crossmember-to-body mount bolts

Torque: 2,125 kg-cm (154 ft-lb, 208 N·m)

- Rear suspension lower crossmember-to-body mount nuts

Torque: 1,620 kg-cm (117 ft-lb, 159 N·m)

25. FINAL INSPECTION

(a) Check the operation of the body parts:

- Hood
  Auxiliary catch operation properly
  Hood locks securely when closed
- Front and rear doors
  Door locks operate properly
  Doors close properly
- Luggage compartment door and back door
  Door sock operates properly
- Seats
  Seat adjusts easily and locks securely in any position
  Front seat back locks securely in any position
  Folding-down rear seat backs lock securely

(b) Road test

- Check the engine and chassis for abnormal noises.
- Check that the vehicle does not wander or pull to one side.
- Check that the brakes work properly and do not drag.
- Perform bedding down of the parking brake shoes and drum. (See page MA-7)

(c) Be sure to deliver a clean car especially check:

- Steering wheel
- Shift lever knob
- All switch knobs
- Door handles
- Seats

GENERAL MAINTENANCE

These are maintenance and inspection items which are considered to be the owner's responsibility. They can be performed by the owner or he can have then done at a service shop. These items include those which should be checked on a daily basis, those which, in most cases, do not require (special) tools and those which are considered to be reasonable for the owner to perform.
Items and procedures for general maintenance are as follows.

OUTSIDE VEHICLE

1. TIRES

(a) Check the pressure with a gauge. Adjust if necessary.

(b) Check for cuts, damage or excessive wear.

2. WHEEL NUTS

When checking the tires, check the nuts for looseness or for missing nuts. If necessary, tighten them.

3. TIRE ROTATION

It is recommended that tires be rotated every 7,500 miles (12,000 km).

4. WINDSHIELD WIPER BLADES

Check for wear or cracks whenever they do not wipe clean. Replace if necessary.

5. FLUID LEAKS

(a) Check underneath for leaking fuel, oil, water or other fluid.

(b) If you smell gasoline fumes or notice any leak, have the cause found and corrected.

6. DOORS AND ENGINE HOOD

(a) Check that all doors including the trunk lid and back door operate smoothly, and that all latches lock securely.

(b) Check that the engine hood secondary latch secures the hood from opening when the primary latch is released.

INSIDE VEHICLE

7. LIGHTS

(a) Check that the headlights, stop lights, taillights, turn signal lights, and other lights are all working.

(b) Check the headlight aiming.

8. WARNING LIGHTS AND BUZZERS

Check that all warning lights and buzzers function properly.

9. HORN

Check that it is working.

10. WINDSHIELD GLASS

Check for scratches, pits or abrasions.

11. WINDSHIELD WIPER AND WASHER

(a) Check operation of the wipers and washer.

(b) Check that the wipers do not streak.

12. WINDSHIELD DEFROSTER

Check that air comes out from thr drfroster outlet when operating the heater or air conditioner.

13. REAR VIEW MIRROR

Check that it is mounted securely.

14. SUN VISORS

Check that they move freely and are mounted securely.

15. STEERING WHEEL

Check that it has specified freeplay. Be alert for changes in steering condition, such as hard steering, excessive freeplay or strange noise.

16. SEATS

(a) Check that all front seat controls such as seat adjusters, seatback recliner, etc. operate smoothly.

(b) Check that all latches lock securely in any position.

(c) Check that the locks hold securely in any latched position.

(d) Check that the head restraints move up and down smoothly and that the locks hold securely in any latched position.

(e) For folding-down rear seat backs, check that the latches lock securely.

17. SEAT BELTS

(a) Check that the seat belt system such as buckles, retractors and anchors operate properly and smoothly.

(b) Check that the belt webbing is not cut, frayed, worn or damaged.

18. ACCELERATOR PEDAL

Check the pedal for smooth operation and uneven pedal effort or catching.

19. CLUTCH PEDAL
(See Pub. No. RM071U on page CL-3)

Check the pedal for smooth operation.
Check that the pedal has the proper freeplay.

20. BRAKE PEDAL
(See Pub. No. RM071U on page BR-6)

(a) Check the pedal for smooth operation.

(b) Check that the pedal has the proper reserve distance and freeplay.

(c) Check the brake booster function.

21. BRAKES

At a safe place, check that the brakes do not pull to one side when applied.

22. PARKING BRAKE
(See Pub. No. RM071U on page BR-8)

(a) Check that the lever has the proper travel.

(b) On a safe incline, check that vehicle is held securely with only the parking brake applied.

UNDER HOOD

23. WINDSHIELD WASHER FLUID

Check that there is sufficient fluid in the tank.

24. ENGINE COOLANT LEVEL

Check that the coolant level is between the "FULL" and "LOW" lines on the see-through reservoir.

25. RADIATOR AND HOSES

(a) Check that the front of the radiator is clean and not blocked with leaves, dirt or bugs.

(b) Check the hoses for cracks, links, rot or loose connections.

26. BATTERY ELECTROLYTE LEVEL

Check that the electrolyte level of all battery cells is between the upper and lower level lines on the case. If level is low, add distilled water only.

27. BRAKE AND CLUTCH FLUID LEVELS

(a) Check that the brake fluid level is near the upper level line on the see-through reservoir.

(b) Check that the clutch fluid level is within ± 5 mm (0.20 in.) of the reservoir hem.

28. ENGINE DRIVE BELTS

Check all drive for fraying, cracks, wear or oiliness.

29. ENGINE OIL LEVEL

Check the level on the dipstick with the engine turned off.

30. POWER STEERING FLUID LEVEL

Check the level on the dipstick.
The level should be in the "HOT" or "COLD" range depending on the fluid temperature.

31. EXHAUST SYSTEM

Visually inspect for cracks, holes or supports. If any change in the sound of the exhaust or smell of the exhaust fumes is noticed, have the cause located and corrected.

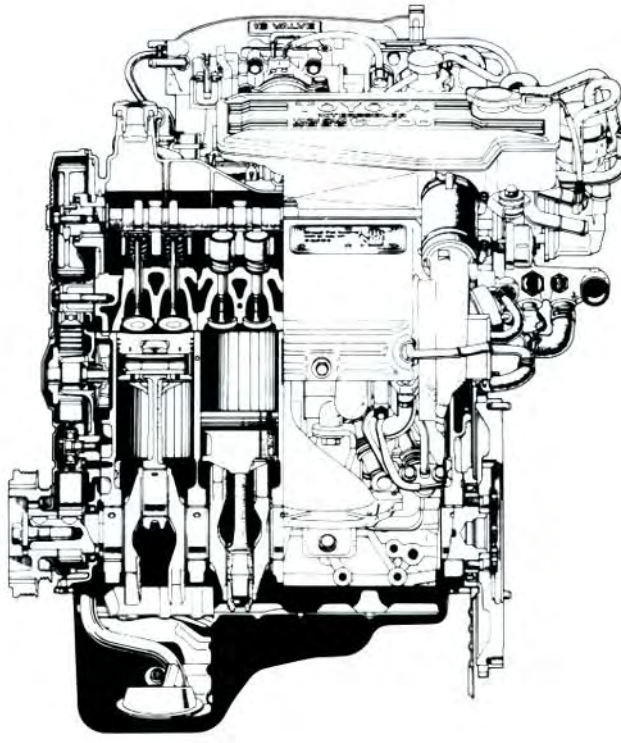
ENGINE MECHANICAL

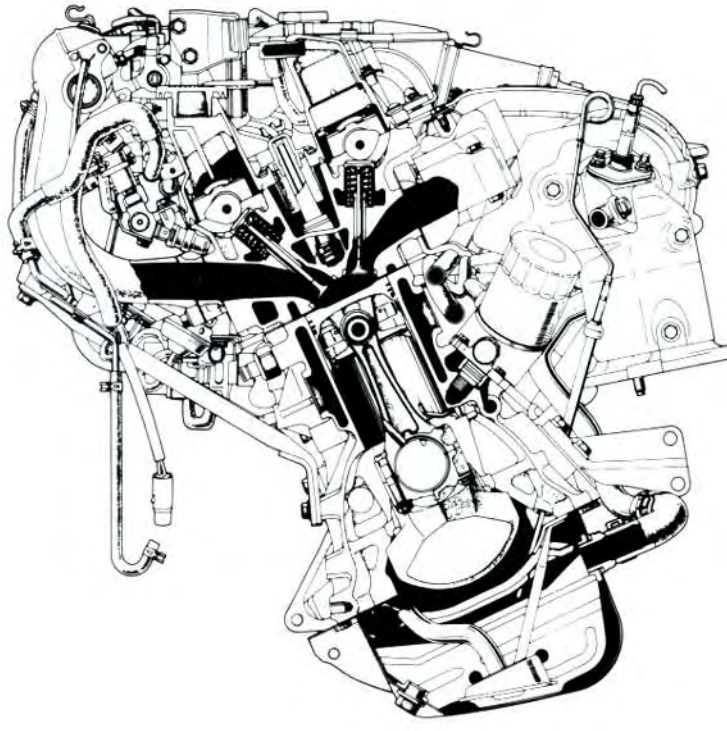
REFER TO 1988 CELICA REPAIR MANUAL (Pub. No. RM071U)

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

DESCRIPTION

The 3S-GTE engine is an in-line 4-cylinder 2.0 liter DOHC 16 valve engine.





EM4827
EM4828

The 3S-GTE engine is an in-line 4-cylinder engine with the cylinders numbered 1 — 2 — 3 — 4 from the front. The crankshaft is supported by 5 bearings specified by the inside of the crankcase. These bearings are made of aluminum alloy.

The crankshaft is integrated with 8 weights which are cast along with it for balancing. Oil holes are built into the center of the crankshaft for supplying oil to the connecting rods, pistons and other components.

This engine's ignition order is 1 — 3 — 4 — 2. The cylinder head is made of aluminum alloy, with a cross flow type intake and exhaust layout and with pent roof type combustion chambers. The spark plugs are located in the center of the combustion chambers.

The intake manifold has 8 independent long ports and utilizes the inertial super- charging effect to improve engine torque at low and medium speeds.

Exhaust and intake valves are equipped with irregular pitch springs made of oil tempered silicon chrome steel wire which are capable of following the valves even at high engine speeds.

Both the exhaust side cam shaft and the intake side cam shaft are driven by a single timing belt. The cam journal is supported at 5 places between the valve lifters of each cylinder and on the front end of the cylinder head of front end. Lubrication of the cam journal and cam is accomplished by oil being supplied through the oiler port in the center of the camshaft.

Adjustment of the valve clearance is done by means of an outer shim type system, in which valve adjusting shims are located above the valve lifters. This permits replacement of the shims without removal of the camshafts.

The resin timing belt cover is made in 2 pieces. A service hole is provided in the No.2 belt cover for adjusting the timing belt tension.

Pistons are made of highly temperature- resistant aluminum alloy, and a depression is built into the piston head to prevent interference with valves.

Piston pins are the full-floating type, with the pins fastened to neither the piston boss nor the connecting rods. Instead, snap rings are fitted on both ends of the pins, preventing the pins from falling out.

The No.1 compression ring is made of steel and the No.2 compression ring is made of cast iron. The oil ring is made of a combination of steel and stainless steel. The outer diameter of each piston ring is slightly larger than the diameter of the piston and the flexibility of the rings allows them to hug the cylinder walls when they are mounted on the piston. Compression rings No.1 and No.2 work to prevent the leakage of gas from the cylinder and the oil ring works to scrape oil off the cylinder walls to prevent it from entering the combustion chamber.

The cylinder block is made of cast iron. It has 4 cylinders which are approximately 2 times the length of the piston stroke. The top of the cylinders is closed off by the cylinder head and the lower end of the cylinders becomes the crankcase, in which the crankshaft is installed. In addition, the cylinder block contains a water jacket, through which coolant is pumped to cool the cylinders.

The oil pan is bolted onto the bottom of the cylinder block. The oil pan is an oil reservoir made of pressed steel sheet. A dividing plate is included inside the oil pan to keep sufficient oil in the bottom of the pan even when the vehicle is tilted. This dividing plate also prevents the oil from making waves when the vehicle is stopped suddenly and thus shifting the oil away from the oil pump suction pipe.

TROUBLESHOOTING

ENGINE OVERHEATING

Problem	Possible cause	Remedy	Page
Engine overheats	Cooling system faulty	Troubleshoot cooling system	*CO-4
	Incorrect ignition timing	Reset timing	IG-9

HARD STARTING

Problem	Possible cause	Remedy	Page
Engine will not crank or cranks slowly	Starting system faulty	Troubleshoot starting system	*ST-2
Engine will not start/ hard to start (cranks OK)	No fuel supply to injector	Troubleshoot EFI system	FI-4
	• No fuel in tank		
	• Fuel pump no working		
	• Fuel filter clogged		
	• Fuel line clogged or leaking		
	EFI system problems	Repair as necessary	
	Ignition problems	Perform spark test	IG-4
	• Ignition coil		
	• Igniter		
	• Distributor		
	Spark plug faulty	Inspect plugs	IG-5
	High-tension cord disconnected or broken	Inspect cords	IG-5
	Vacuum leaks	Repair as necessary	
	• PCV line		
	• EGR line		
	• Intake manifold		
	• Intake air control valve		
	• Throttle body		
	• ISC valve		
	• Brake booster line		
	Pulling in air between air flow meter and throttle body	Repair as necessary	
	Low compression	Check compression	EM-10

ROUGH IDLING

Problem	Possible cause	Remedy	Page
Rough idle, stalls or misses	Spark plug faulty	Inspect plugs	IG-5
	High-tension cords faulty	Inspect cords	IG-5
	Ignition problems		
	• Ignition coil	Inspect coil	IG-7
	• Igniter	Inspect igniter	IG-7
	• Distributor	Inspect distributor	IG-7
	Incorrect ignition timing	Reset timing	IG-9
	Vacuum leaks	Repair as necessary	
	• PCV line		
	• EGR line		
	• Intake manifold		

*See Pub. No. RM071U

ROUGH IDLING (Cont'd)

Problem	Possible cause	Remedy	Page
Rough idle, stalls or misses (Cont'd)	Vacuum leaks (Cont'd) • Intake air control valve • Throttle body • ISC valve • Brake booster line		
	Pulling in air between air flow meter and throttle body		
	Incorrect idle speed	Check ISC system	FI-44
	Incorrect valve clearance	Adjust valve clearance	EM-15
	EFI system problems	Repair as necessary	
	Engine overheats	Check cooling system	*CO-4
	Low compression	Check compression	EM-10

ENGINE HESITATES/POOR ACCELERATION

Problem	Possible cause	Remedy	Page
Engine hesitates/ poor acceleration	Spark plug faulty	Inspect plugs	IG-5
	High-tension cord faulty	Inspect cords	IG-5
	Vacuum leaks • PCV line • EGR line • Intake manifold • Intake air control valve • Throttle body • ISC valve • Brake booster line	Repair as necessary	
	Pulling in air between air flow meter and throttle body	Repair as necessary	
	Incorrect ignition timing	Reset timing	IG-9
	Incorrect valve clearance	Adjust valve clearance	EM-15
	Fuel system clogged	Check fuel system	
	Air cleaner clogged	Check air cleaner	MA-4
	EFI system problems	Repair as necessary	
	Emission control system problem (cold engine) • EGR system always on	Check EGR system	EC-8
	Engine overheats	Check cooling system	*CO-4
	Low compression	Check compression	EM-10

*See Pub. No. RM071U

ENGINE DIESELING

Problem	Possible cause	Remedy	Page
Engine diesels (runs after ignition switch is turned off)	EFI system problems	Repair as necessary	
	Incorrect ignition timing	Reset timing	IG-9
	EGR system faulty	Check EGR system	EC-8

AFTER FIRE, BACKFIRE

Problem	Possible cause	Remedy	Page
Muffler explosion (after fire) on deceleration only	Deceleration fuel cut system always off	Check EFI (fuel cut) system	
Muffler explosion (after fire) all the time	Air cleaner clogged	Check air cleaner	MA-4
	EFI system problem	Repair as necessary	
	Incorrect ignition timing	Reset timing	IG-9
Engine backfires	EFI system problem	Repair as necessary	
	Vacuum leak • PCV line • EGR line • Intake manifold • Intake air control valve • Throttle body • ISC valve • Brake booster line	Check hoses and repair as necessary	
	Pulling in air between air flow meter and throttle body	Repair as necessary	
	Insufficient fuel flow	Trobleshoot fuel system	FI-4
	Incorrect ignition timing	Reset timing	IG-9
	Incorrect valve clearance	Adjust valve clearance	*EM-15
	Carbon deposits in combustion chambers	Inspect cylinder head	*EM-85

EXCESSIVE OIL CONSUMPTION

Problem	Possible cause	Remedy	Page
Excessive oil consumption	Oil leak	Repair as necessary	
	PCV line clogged	Check PCV system	
	Piston ring worn or damaged	Check rings	*EM-119
	Valve stem and guide bushing worn	Check valves and guide bushing	*EM-86
	Valve stem oil seal worn	Check seals	

*See Pub. No. RM071U

EXCESSIVE FUEL CONSUMPTION

Problem	Possible cause	Remedy	Page
Poor gasoline mileage	Fuel leak	Repair as necessary	
	Air cleaner clogged	Check air cleaner	MA-4
	Incorrect ignition timing	Reset timing	IG-9
	EFI system problems • Injector faulty • Deceleration fuel cut system faulty	Repair as necessary	
	Idle speed too high	Check ISC system	FI-44
	Spark plug faulty	Inspect plugs	IG-5
	EGR system always on	Check EGR system	EC-8
	Low compression	Check compression	EM-10
	Tires improperly inflated	Inflate tires to proper pressure	
	Clutch slips	Troubleshoot clutch	
	Brakes drag	Troubleshoot brakes	

UNPLEASANT ODOR

Problem	Possible cause	Remedy	Page
Unpleasant odor	Incorrect idle speed	Check ISC system	FI-44
	Incorrect ignition timing	Reset timing	IG-9
	Vacuum leaks • PCV line • EGR line • Intake manifold • Intake air control valve • Throttle body • ISC valve • Brake booster line	Repair as necessary	
	EFI system problems	Repair as necessary	

ENGINE TUNE-UP

INSPECTION OF ENGINE COOLANT

(See steps 1 and 2 on page CO-4)

INSPECTION OF INTERCOOLER COOLANT

(See steps 1 and 2 on page TC-7)

INSPECTION OF ENGINE OIL

(See steps 1 and 2 on page LU-4)

INSPECTION OF BATTERY

(See Pub. No. RM071U, steps 1 and 2 on page CH-3)

Standard specific gravity:

1.25 — 1.27 when fully charged at 20°C (68°F)

INSPECTION OF AIR FILTER

(See step 3 on page MA-4)

INSPECTION OF HIGH-TENSION CORDS

(See page IG-5)

Maximum resistance: 25 kΩ per cord

INSPECTION OF SPARK PLUGS

(See page IG-5)

Correct electrode gap of new plug:
0.8 mm (0.031 in.)
Maximum electrode gap: 1.0 mm (0.039 in.)

Recommended spark plugs:
ND PQ16R8
NGK BCPR5EP8

INSPECTION OF ALTERNATOR DRIVE BELT

(See Pub. No. RM071U, step 3 on page CH-3)

Drive belt tension:

w/ A/C	New belt	175 ± 5 lb
	Used belt	115 ± 20 lb
w/o A/C	New belt	150 ± 25 lb
	Used belt	130 ± 25 lb

ADJUSTMENT OF VALVE CLEARANCE

(See Pub. No. RM071U on pages EM-11 and 14)

Valve clearance (Cold):

Intake	0.15 — 0.25 mm (0.006 — 0.010 in.)
Exhaust	0.20 — 0.30 mm (0.008 — 0.012 in.)

ADJUSTMENT OF IGNITION TIMING

(See steps 7 to 10 on pages IG-9 and 10)

Ignition timing:
10° BTDC @ idle
(w/ Terminals T and E1 short-circuited)

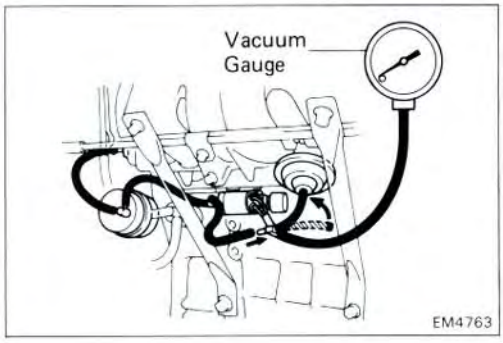
INSPECTION OF IDLE SPEED

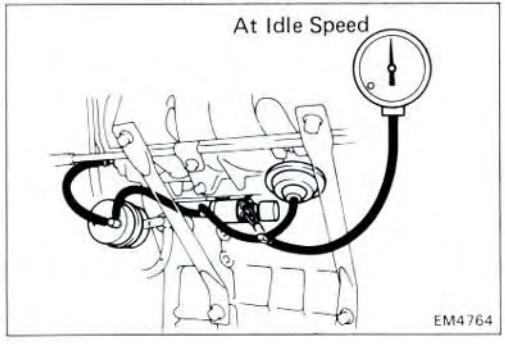
(See page FI-44)

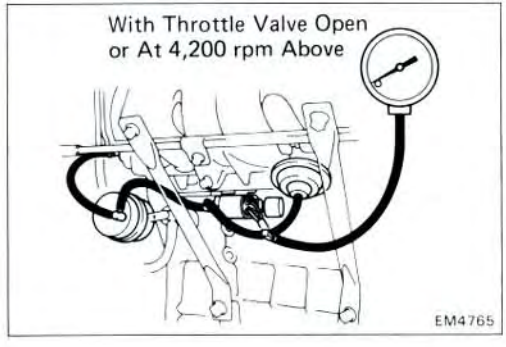
Idle speed: 750 ± 50 rpm

IDLE HC/CO CONCENTRATION CHECK METHOD

(See Pub. No. RM071U on pages EM-21 and 22)







INSPECTION OF TOYOTA-VARIABLE INDUCTION SYSTEM (T-VIS)

1. **WARM UP AND STOP ENGINE**

   Allow the engine to reach normal operating temperature.

2. **CONNECT TACHOMETER (See page IG-9)**

3. **CONNECT VACUUM GAUGE**

   Using a 3-way connector, connect the vacuum gauge to the hose between the VSV and actuator.

4. **INSPECT T-VIS OPERATION**

   (a) Check that the vacuum gauge indicates vacuum at idle speed.

   (b) (w/ Regular Gasoline)
   Check that the vacuum gauge indicates zero with throttle valve open.

   (c) (w/ Premium Gasoline)
   Check that the vacuum gauge indicates zero at 4,200 rpm above.

COMPRESSION CHECK

NOTE: If there is lack of power, excessive oil consumption or poor fuel economy, measure the compression pressure.

1. **WARM UP AND STOP ENGINE**

   Allow the engine to reach normal operating temperature.

2. **REMOVE INTERCOOLER**
   (See steps 3 and 7 on pages TC-9 and 10)

3. **DISCONNECT SOLENOID RESISTOR CONNECTOR**

4. **DISCONNECT COLD START INJECTOR CONNECTOR**

5. **DISCONNECT DISTRIBUTOR CONNECTOR**

6. **REMOVE SPARK PLUGS (See page IG-6)**

7. **CHECK CYLINDER COMPRESSION PRESSURE**

   (a) Insert a compression gauge into the spark plug hole.

   (b) Fully open the throttle.

   (c) While cranking the engine, measure the compression pressure.

   NOTE: Always use a fully charged battery to obtain engine revolution of 250 rpm or more.

   (d) Repeat steps (a) through (c) for each cylinder.

   CAUTION: This measurement must be done in as short a time as possible.

   Compression pressure:
   12.5 kg/cm² (178 psi, 1,226 kPa) or more

   Minimum pressure:
   9.0 kg/cm² (128 psi, 883 kPa)

   Difference between each cylinder:
   1.0 kg/cm² (14 psi, 98 kPa) or less

   (e) If the cylinder compression in one or more cylinders is low, pour a small amount of engine oil into the cylinder through the spark plug hole and repeat steps (a) through (c) for the cylinder with low compression.

   - If adding oil helps the compression chances are that the piston rings and/or cylinder bore are worn or damaged.
   - If pressure stays low, a valve may be sticking or seating improperly, or there may be leakage past the gasket.

8. **REINSTALL SPARK PLUGS (See page IG-6)**

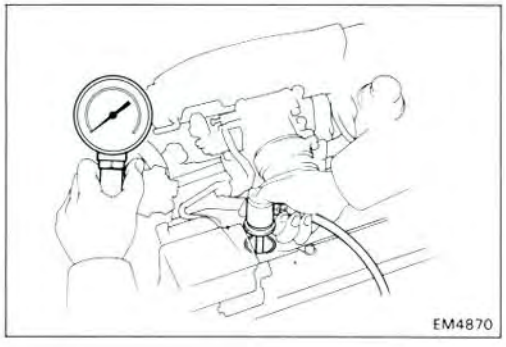
   Torque: 180 kg-cm(13 ft-lb, 18 N·m)

9. **RECONNECT DISTRIBUTOR CONNECTOR**

10. **RECONNECT COLD START INJECTOR CONNECTOR**

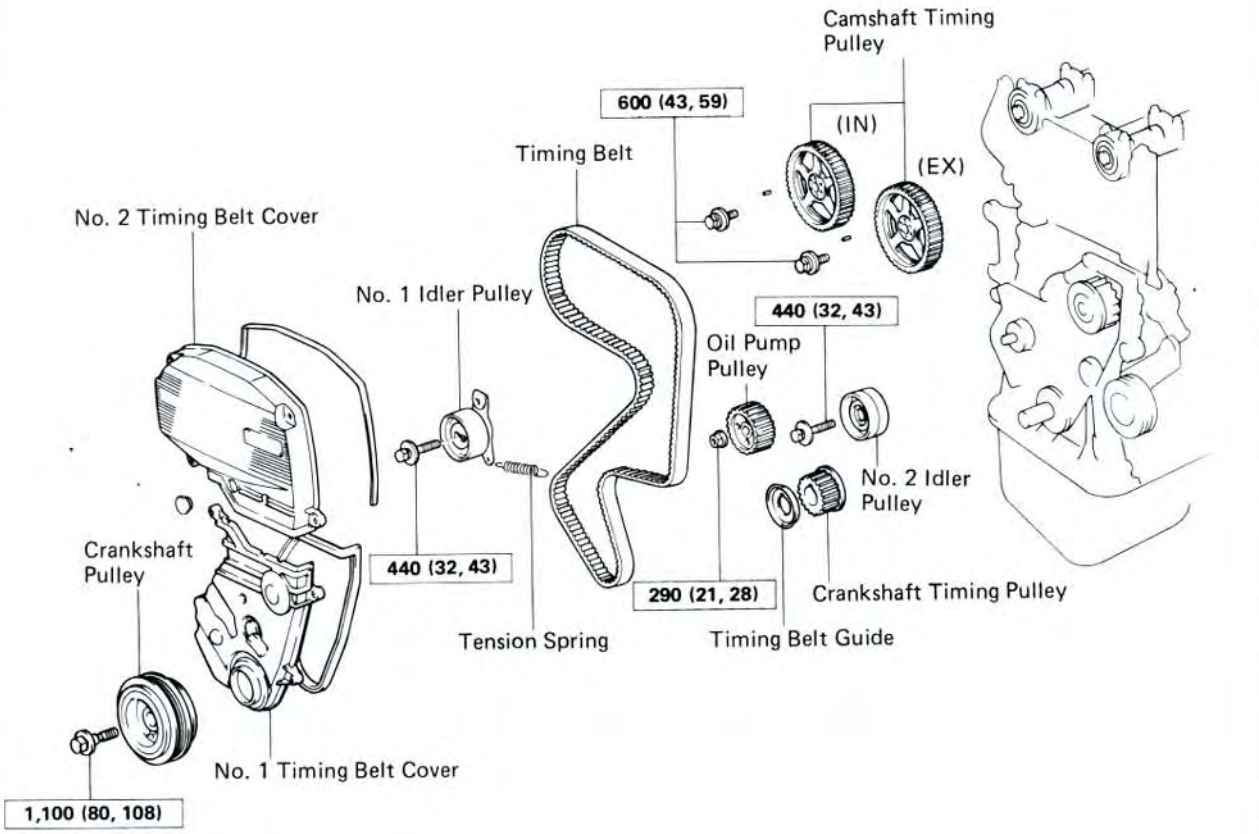
11. **RECONNECT SOLENOID RESISTOR CONNECTOR**

12. **REINSTALL INTERCOOLER**
    (See steps 11, 16 and 18 on page TC-14)


EM4870

TIMING BELT

COMPONENTS

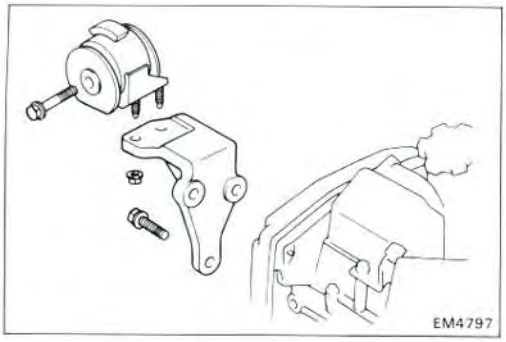


REMOVAL OF TIMING BELT

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY
2. REMOVE RH FRONT WHEEL
3. REMOVE ENGINE RH UNDER COVER
4. REMOVE RADIATOR RESERVOIR TANK
5. LOOSEN POWER STEERING OIL RESERVOIR TANK

   Remove the two bolts and reservoir tank without disconnecting the hoses.
6. REMOVE DRIVE BELTS
7. REMOVE ALTERNATOR
8. REMOVE ALTERNATOR BRACKETS

   (See steps 15 on page EM-28)



9. JACK UP ENGINE SLIGHTLY

Raise the engine enough to remove the weight from the engine mounting on the right side.

10. REMOVE ENGINE RH MOUNTING INSULATOR AND BRACKET

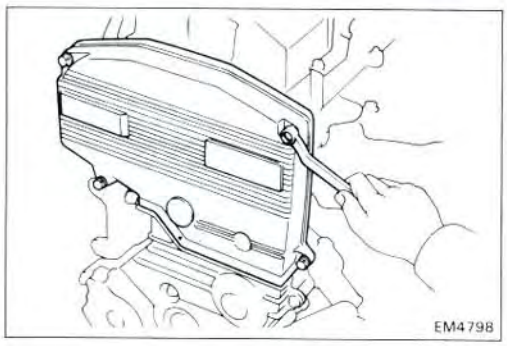
(a) Remove the through bolt, two nuts and mounting insulator.

(b) Remove the three bolts and bracket.

11. REMOVE THROTTLE BODY
(See steps 1 to 10 on page FI-41)

12. REMOVE NO.2 TIMING BELT COVER

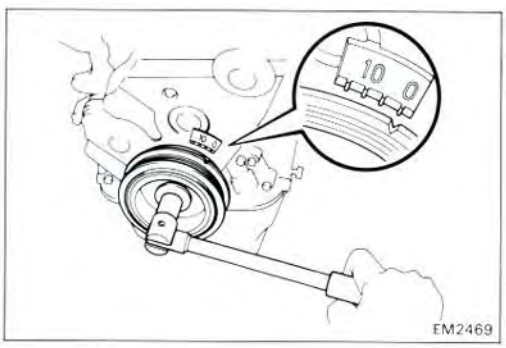
Remove the five screws, belt cover and gasket.



13. REMOVE SPARK PLUGS (See page IG-6)

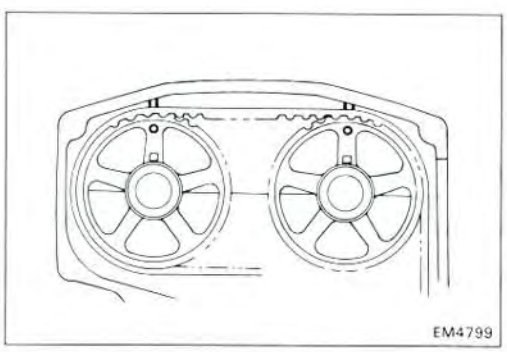
14. SET NO.1 CYLINDER TO TDC/COMPRESSION

(a) Turn the crankshaft pulley and align its groove with mark "0" of the No.1 timing belt cover.



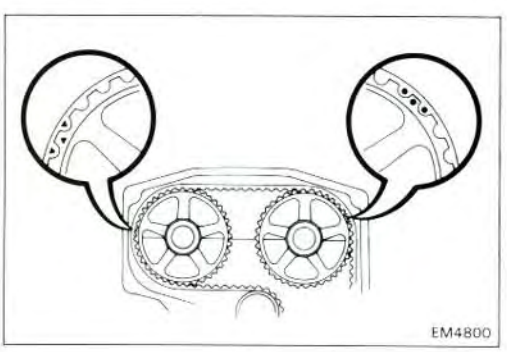
(b) Check that the alignment marks of the camshaft timing pulleys and No.3 timing belt cover are aligned.

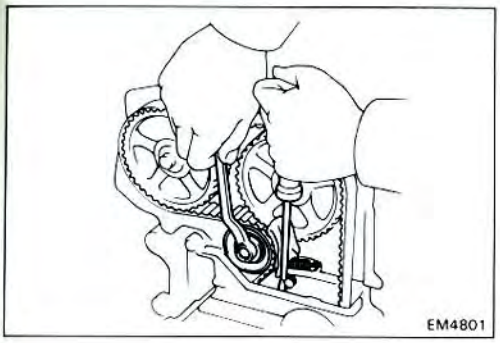
If not, turn the crankshaft one revolution (360°).



15. REMOVE TIMING BELT FROM CAMSHAFT TIMING PULLEYS

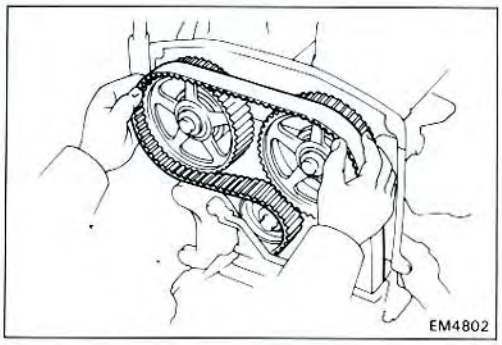
NOTE: If reusing the timing belt, place matchmarks on the camshaft timing pulleys and belt.





(a) Loosen the No.1 idler pulley bolt and shift it left as far as it will go.

(b) Temporarily tighten the pulley bolt and then relieve the timing belt tension.

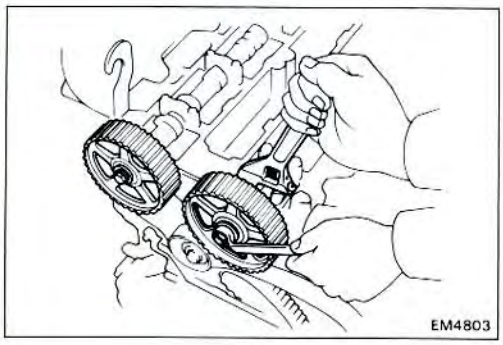


(c) Remove the timing belt from the camshaft timing pulley.

NOTE:

- Support the belt so the meshing of the crankshaft timing pulley and timing belt does not shift.
- Be careful not to drop anything inside the timing belt cover.
- Do not allow the belt to come into contact with oil, water and dust.

16. REMOVE CYLINDER HEAD COVER
(See steps 39 on page EM-31)

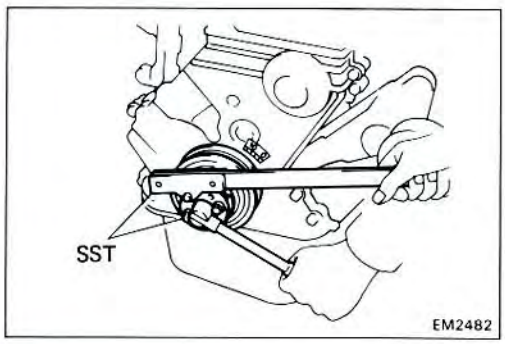


17. REMOVE CAMSHAFT TIMING PULLEYS

(a) Hold the hexagonal wrench head portion of the camshaft with a wrench, and remove the pulley mount bolts.

(b) Remove the camshaft pulleys and pins.

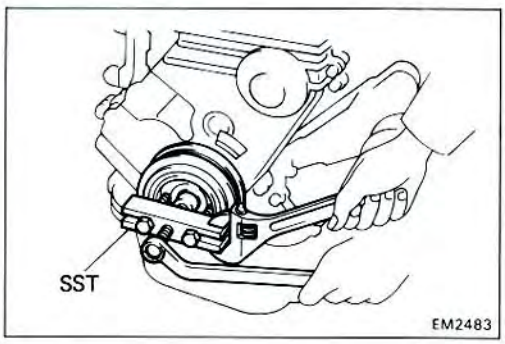
NOTE: Arrange the intake and exhaust pulleys.



18. REMOVE CRANKSHAFT PULLEY

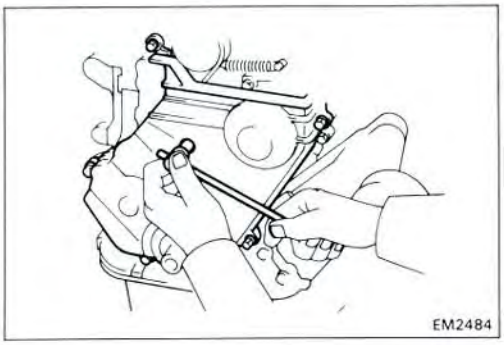
(a) Using SST, remove the pulley bolt.

SST 09213-14010 and 09330-00021



(b) Using SST, remove the pulley.

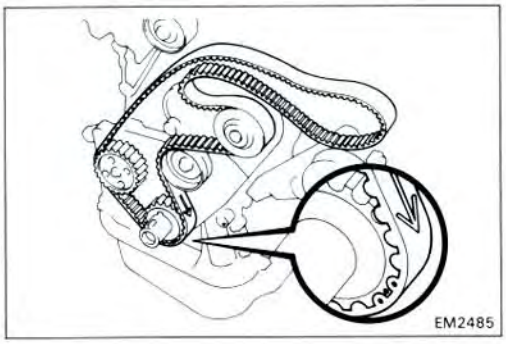
SST 09213-31021


EM2484

19. REMOVE NO.1 TIMING BELT COVERS

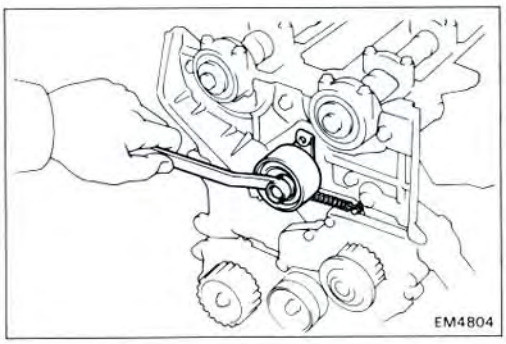
Remove the six bolts, belt cover and gaskets.

20. REMOVE TIMING BELT GUIDE


EM2485

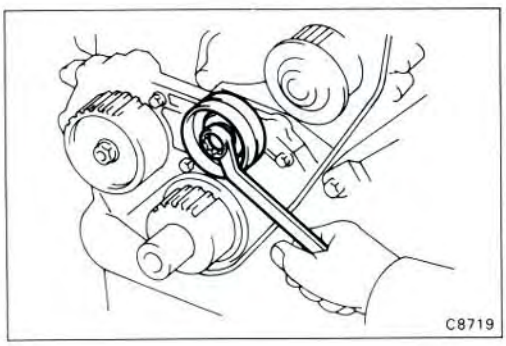
21. REMOVE TIMING BELT

NOTE: If reusing the timing belt, draw a direction arrow on the timing belt (in direction of engine revolution), and place matchmarks on the timing belt and crankshaft timing pulley.


EM4804

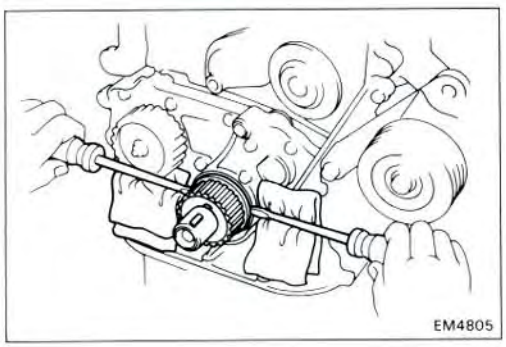
22. REMOVE NO.1 IDLER PULLEY AND TENSION SPRING

Remove the bolt, pulley and tension spring.


C8719

23. REMOVE NO.2 IDLER PULLEY

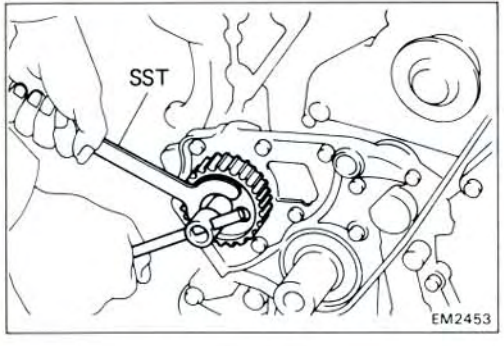
Remove the bolt and pulley.


EM4805

24. REMOVE CRANKSHAFT TIMING PULLEY

If the pulley cannot be removed by hand, use two screwdrivers.

NOTE: Position shop rags as shown to prevent damage.



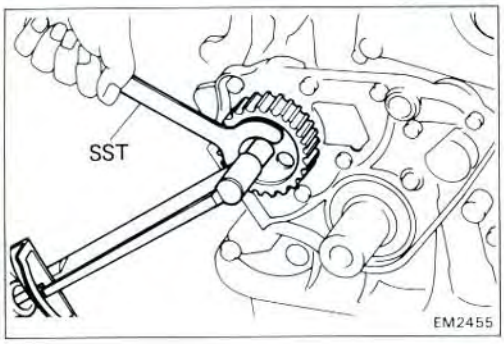
25. REMOVE OIL PUMP PULLEY

Using SST, remove the nut and pulley.

SST 09616-30011

INSPECTION OF COMPONENTS

(See Pub. No. RM071U on pages EM-40 and 41)



INSTALLATION OF TIMING BELT

(See page EM-11)

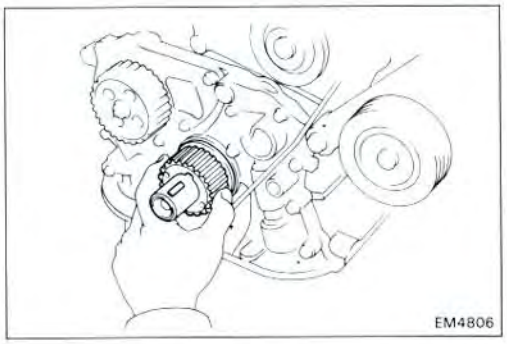
1. INSTALL OIL PUMP PULLEY

(a) Align the cutouts of the pulley and shaft, and slide the pulley.

(b) Using SST, install and torque the nut.

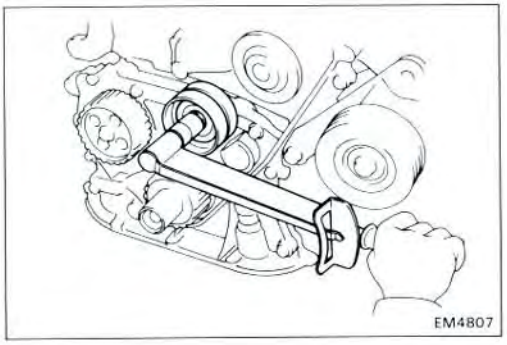
SST 09616-30011

Torque: 290 kg-cm (21 ft-lb, 28 N·m)



2. INSTALL CRANKSHAFT TIMING PULLEY

Align the pulley set key with the key groove of the pulley, slide the pulley.

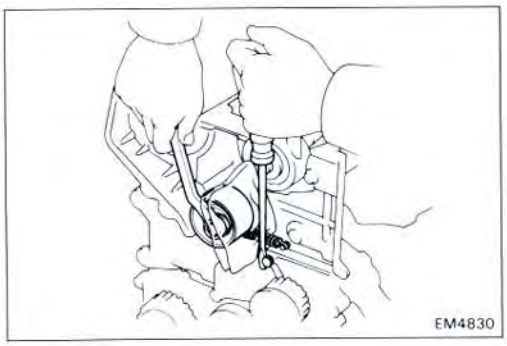


3. INSTALL NO.2 IDLER PULLEY

(a) Install the pulley with the bolt. Torque the bolt.

Torque: 440 kg-cm (32 ft-lb, 43 N·m)

(b) Check that the pulley moves smoothly.



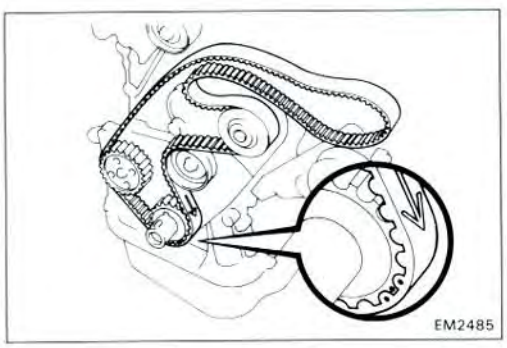
4. TEMPORARILY INSTALL NO.1 IDLER PULLEY AND TENSION SPRING

(a) Install the pulley with the bolt. Do not tighten the bolt yet.

(b) Install the tension spring.

(c) Pry the pulley toward the left as far as it will go and tighten it.

NOTE: Remove any oil or water on the idler pulley and keep it clean.

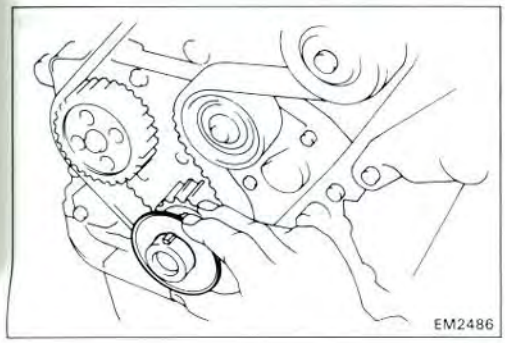


5. TEMPORARILY INSTALL TIMING BELT

CAUTION: The engine should be cold.

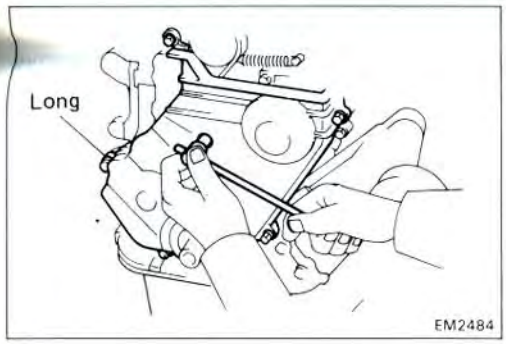
Install the timing belt on the crankshaft timing, oil pump, No.2 idler and water pump pulleys.

NOTE: If reusing the timing belt, align the points marked during removal, and install the belt with the arrow pointing in the direction of engine revolution.



6. INSTALL TIMING BELT GUIDE

Install the guide, facing the cup side outward.

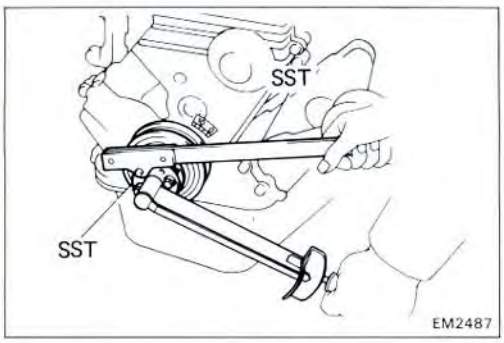


7. INSTALL NO.1 TIMING BELT COVER

(a) Install the gasket to the belt cover.

(b) Install the belt cover with the six bolts.

Torque: 90 kg-cm (78 in.-lb, 8.8 N·m)



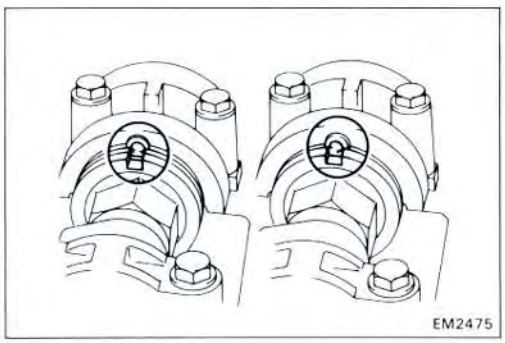
8. INSTALL CRANKSHAFT PULLEY

(a) Align the pulley set key with the key groove of the pulley, slide the pulley.

(b) Using SST, install and torque the bolt.

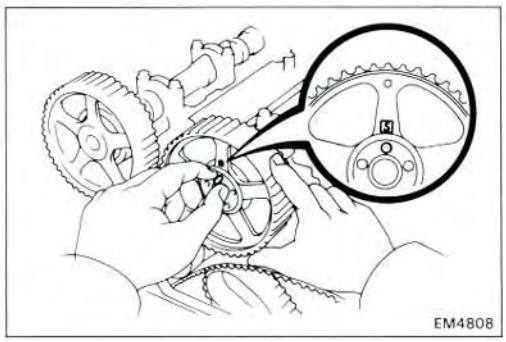
SST 09213-14010 and 09330-00021

Torque: 1,100 kg-cm (80 ft-lb, 108 N·m)



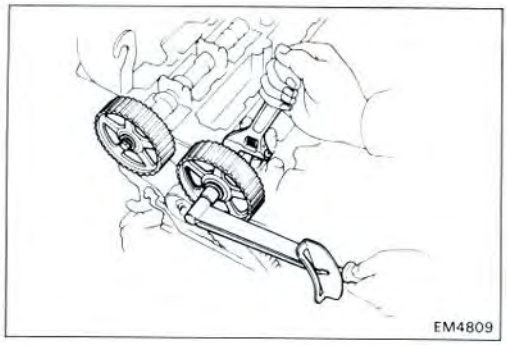
9. INSTALL CAMSHAFT TIMING PULLEYS

(a) Using a wrench, turn and align the groove of the camshaft with the drilled mark of the No.1 camshaft bearing cap.



(b) Slide the timing pulley onto the camshaft, facing mark "S" upward.

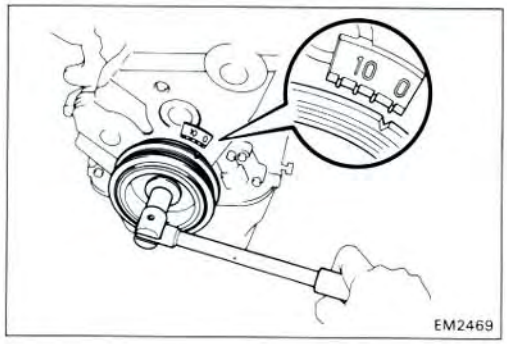
(c) Align the pin holes of the camshaft and timing pulley, insert the knock pin.


EM4809

(d) Hold the hexagonal wrench head portion of the camshaft with a wrench, and tighten the bolts.

Torque: 600 kg-cm (43 ft-lb, 59 N·m)

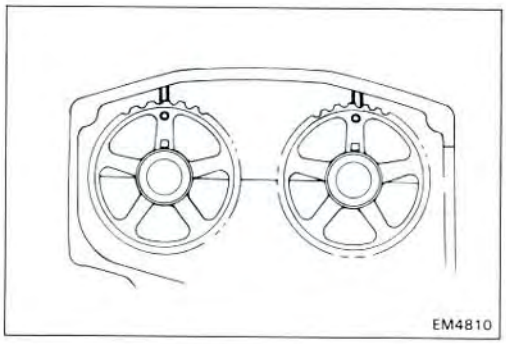
10. INSTALL CYLINDER HEAD COVER
(See step 7 on page EM-36)



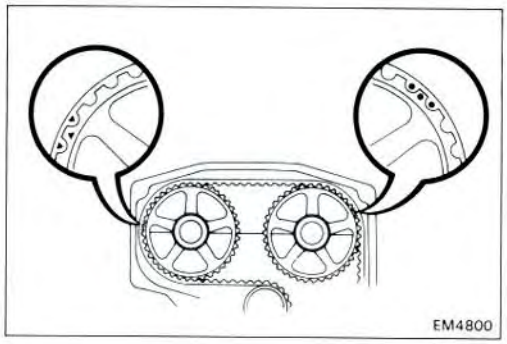
EM2469

11. SET NO.1 CYLINDER TO TDC/COMPRESSION

(a) Turn the crankshaft pulley, and align the its groove with mark "0" of the No.1 timing belt cover.

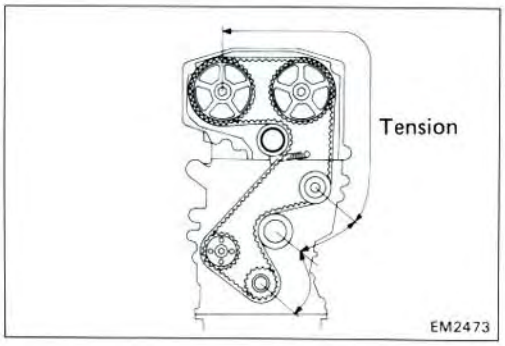

EM4810

(b) Turn the camshaft, and align the alignment marks of the camshaft timing pulley and cylinder head cover.


EM4800

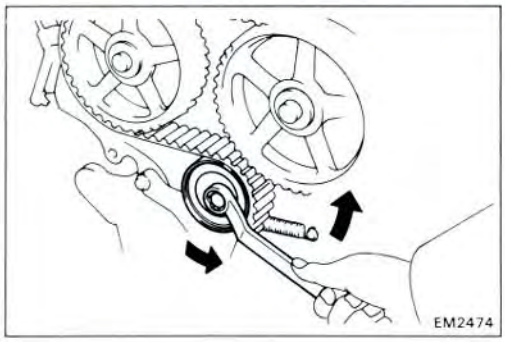
12. INSTALL TIMING BELT

NOTE: If reusing the timing belt, first align the matchmarks of the camshaft timing pulleys and belt.



EM2473

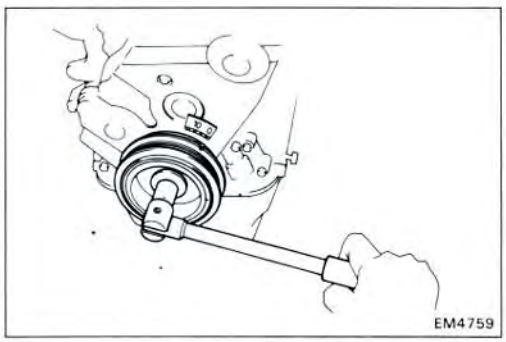
Install the timing belt, insuring the tension between the crankshaft and intake camshaft timing pulleys.



13. CHECK VALVE TIMING

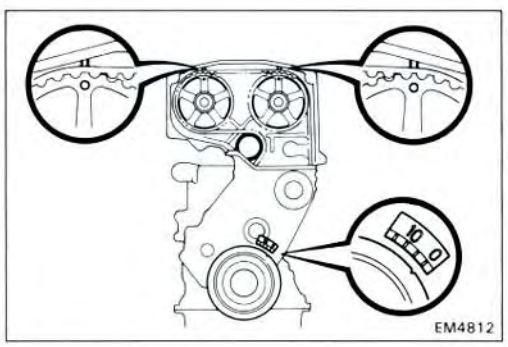
(a) Loosen the No.1 idler pulley bolt and stretch the timing belt.

NOTE: Do not loosen the pulley bolt further than the point where the idler returns.



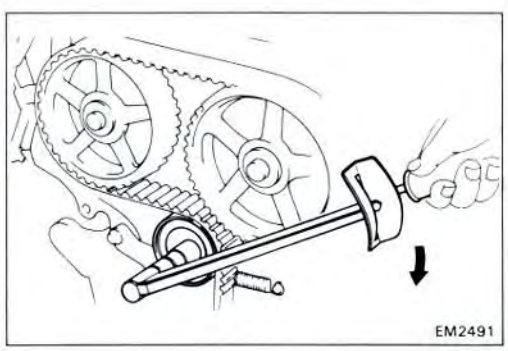
(b) Slowly turn the crankshaft pulley two revolutions from TDC to TDC.

NOTE: Always turn the crankshaft clockwise.



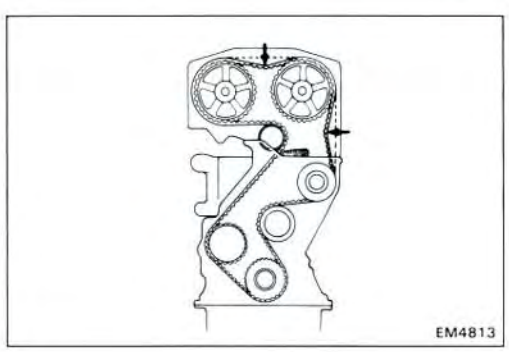
(c) Check that each pulley aligns with the timing marks as shown in the figure.

If the marks do not align, remove the timing belt and reinstall it.

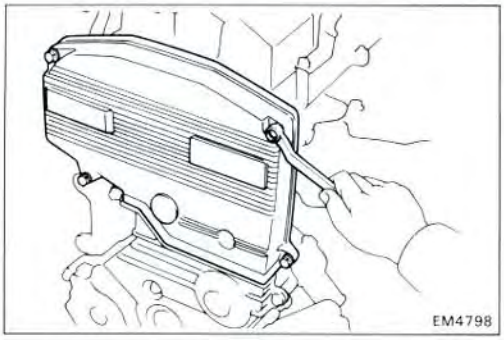


(d) Torque the No.1 idler pulley bolt.

Torque: 440 kg-cm (32 ft-lb, 43 N·m)



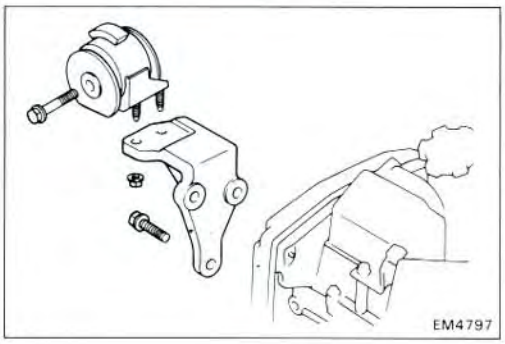
(e) Check that the belt has tension between the crankshaft and intake camshaft timing pulleys.



14. **INSTALL NO.2 TIMING BELT COVER**
    (a) Install the gasket to the belt cover.
    (b) Install the belt cover with the five bolts.

15. **INSTALL SPARK PLUGS (See page IG-6)**
    Torque: 180 kg-cm (13 ft-lb, 18 N·m)

16. **INSTALL THROTTLE BODY**
    (See steps 2 to 12 on page FI-43)



17. **INSTALL ENGINE RH MOUNTING INSULATOR AND BRACKET**
    (a) Install the bracket with the three bolts.
    Torque the bolts.
    Torque: 530 kg-cm (38 ft-lb, 52 N·m)
    (b) Install the mounting insulator with the two nuts and through bolt.
    Torque:
    Bolt 800 kg-cm (58 ft-lb, 78 N·m)
    Nut 530 kg-cm (38 ft-lb, 52 N·m)

18. **LOWER ENGINE**

19. **INSTALL POWER STEERING PUMP**

20. **INSTALL ALTERNATOR BRACKETS**
    (See step 15 on page EM-28)
    Torque: 400 kg-cm (29 ft-lb, 39 N·m)

21. **INSTALL ALTERNATOR**

22. **INSTALL DRIVE BELTS**
    Adjust the drive belts.
    (See Pub. No. RM071U on page CH-3 or AC-19)
    Drive belt tension:

Alternator		
w/ Air con.	**New belt**	**175 ± 5 lb**
	Used belt	**115 ± 20 lb**
w/o Air con.	**New belt**	**150 ± 25 lb**
	Used belt	**130 ± 25 lb**
PS pump	**New belt**	**125 ± 25 lb**
	Used belt	**80 ± 20 lb**

23. **INSTALL POWER STEERING OIL RESERVOIR TANK**

24. **INSTALL RADIATOR RESERVOIR TANK**

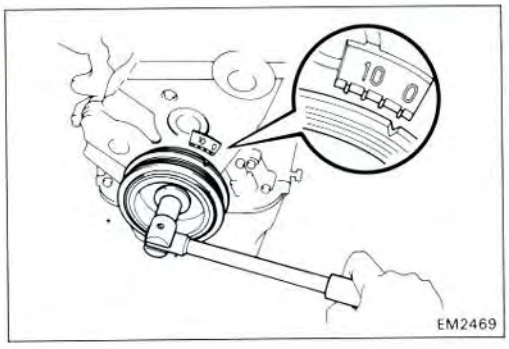
25. **INSTALL ENGINE RH UNDER COVER**

26. **INSTALL RH FRONT WHEEL**

27. **CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY**

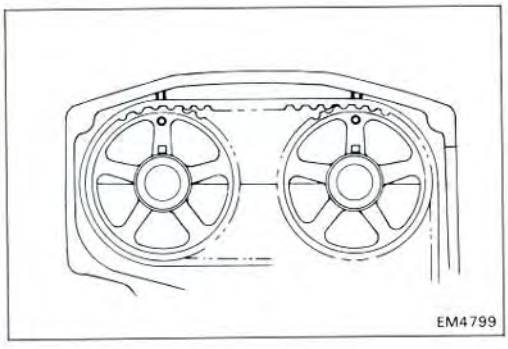
ADJUSTMENT OF VALVE TIMING

1. **DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY**
2. **REMOVE RH FRONT WHEEL**
3. **REMOVE ENGINE RH UNDER COVER**
4. **REMOVE SPARK PLUGS (See page IG-6)**
5. **REMOVE INTERCOOLER**
   (See steps 3 and 7 on pages TC-9 and 10)
6. **REMOVE NO.2 TIMING BELT COVER**
   (See step 12 on page EM-12)
7. **CHECK CAMSHAFT TIMING PULLEY MARKS**

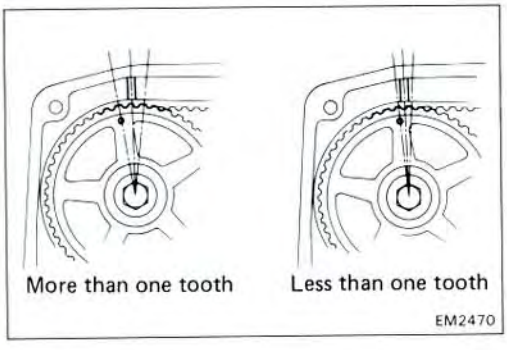


EM2469

(a) Turn the crankshaft pulley and align its groove with mark "0" of the No.1 timing belt cover.


EM4799

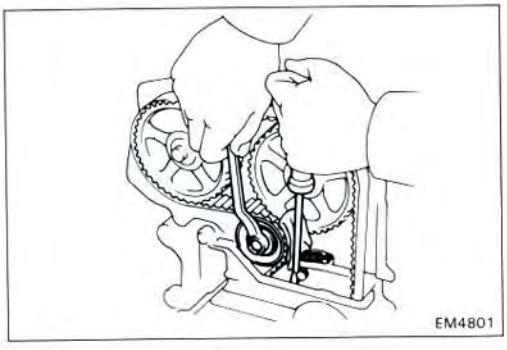
(b) Check that the alignment marks of the camshaft timing pulleys are aligned with the those of the No.3 timing belt cover.



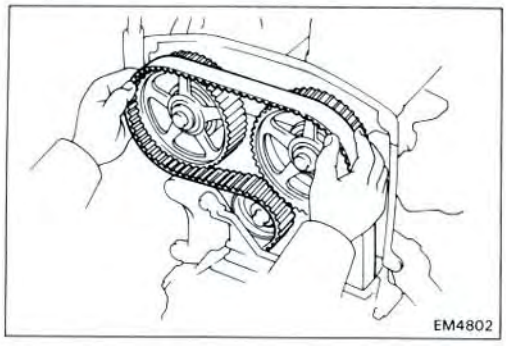
EM2470

- If there is more than one timing pulley tooth between the alignment marks, realign the alignment marks in accordance with step 8.
- If the alignment marks are aligned or the difference is less than one timing pulley tooth, proceed to step 9.

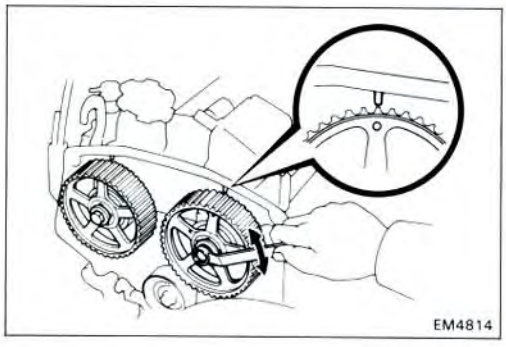
8. **ADJUST CAMSHAFT TIMING PULLEY ALIGNMENT MARKS**


EM4801

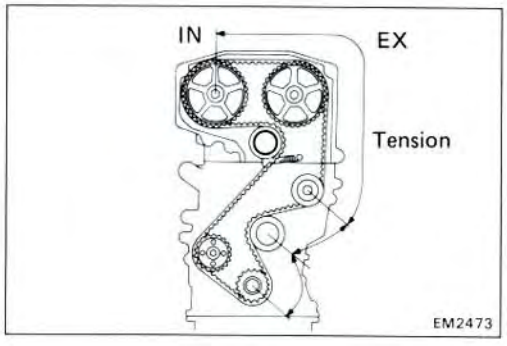
(a) Loosen the No.1 idler pulley bolt and shift the pulley toward the left as far as it will go, and temporarily tighten it.



(b) Remove the timing belt from the camshaft timing pulleys.

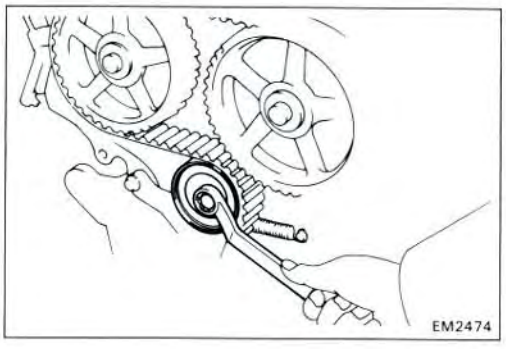


(c) Rotate the camshaft with a wrench and align the alignment marks of the camshaft and cylinder head cover.



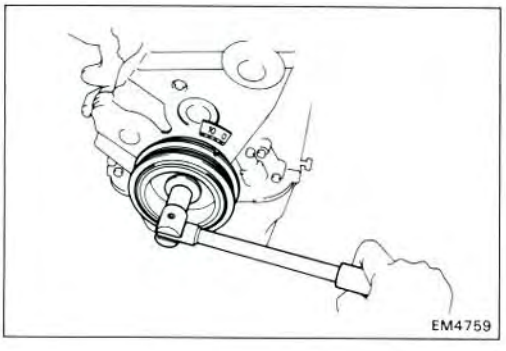
(d) Install the timing belt, insuring the tension between the crankshaft and intake camshaft timing pulleys.

CAUTION: Install the timing belt when the engine is cold.



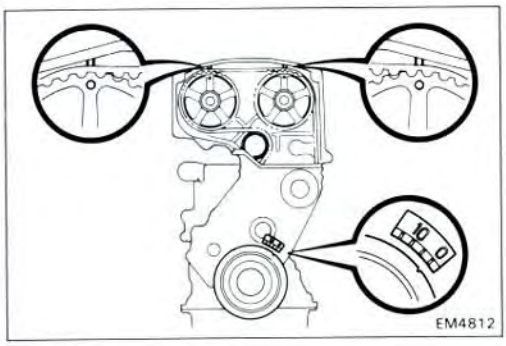
(e) Loosen the No. 1 idler pulley bolt and stretch the timing belt.

NOTE: Do not loosen the bolt further than the point where the idler returns.

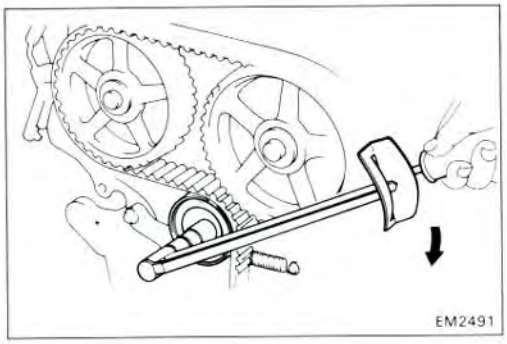


(f) Turn the crankshaft pulley two revolutions from TDC to TDC.

NOTE: Always turn the crankshaft clockwise.



(g) Check that each pulleys with the timing marks as shown in the figure.

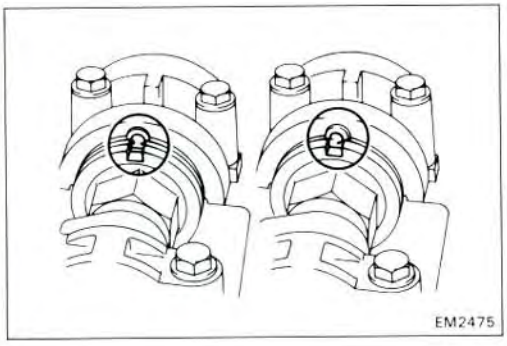


(h) Tighten the No.1 idler pulley bolt.

Torque: 440 kg-cm (32 ft-lb, 43 N·m)

9. **REMOVE THROTTLE BODY**
(See steps 1 to 10 on page FI-41)

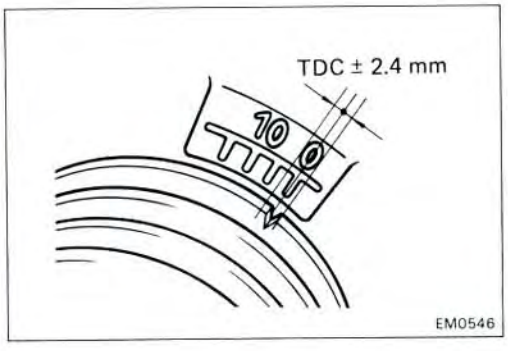
10. **REMOVE CYLINDER HEAD COVER**
(See step 39 on page EM-31)



11. **CHECK VALVE TIMING**

(a) Using a wrench, turn and align the groove of the camshaft with the drilled mark of the No.1 camshaft bearing cap.

NOTE: Always turn the crankshaft clockwise.

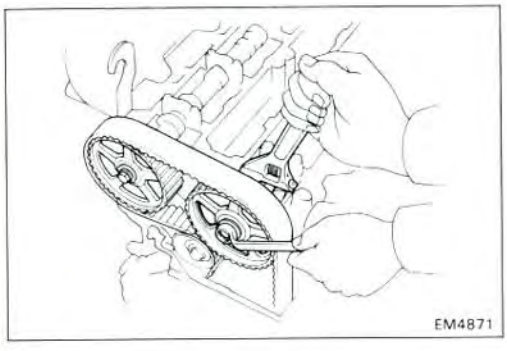


(b) Next make a note of the crankshaft pulley angle on the No.1 timing belt cover.

NOTE: Perform this check separately for the IN and EX sides.

If the crankshaft pulley movement is within ± 2.4 mm (0.094 in.) of TDC it is correct.

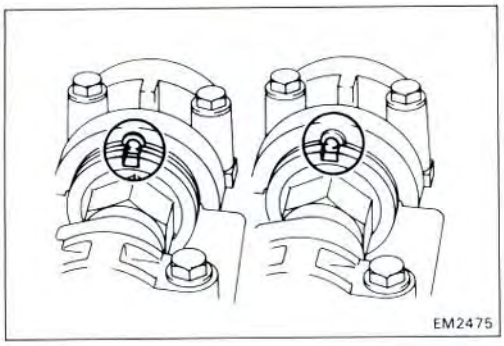
If it is greater than 2.4 mm (0.094 in.), go back to step 7.



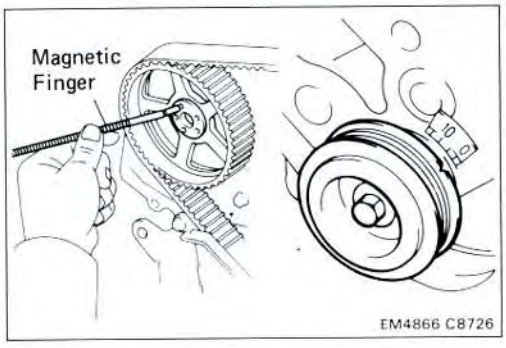
12. **ADJUST VALVE TIMING**

(a) Hold the of the hexagonal wrench head portion of the camshaft with a wrench, and remove the pulley mount bolts.

CAUTION: Do not make use of the timing belt tension when loosening the bolt.

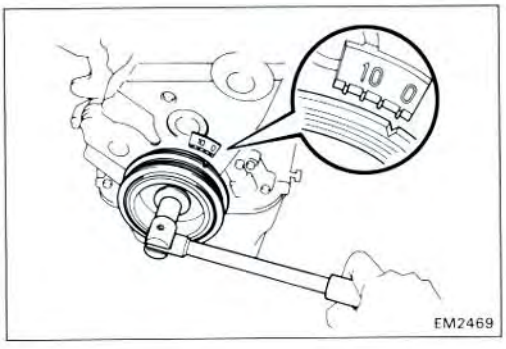

EM2475

(b) Check that the camshaft grooves are aligned with the drilled mark of the No.1 camshaft bearing cap.



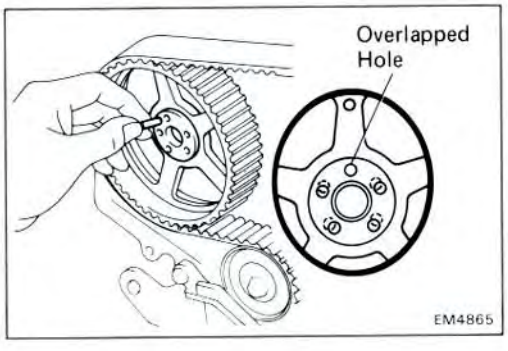
EM4866 C8726

(c) Using a magnetic finger, remove the knock pin from the pin hole of camshaft timing pulley.



EM2469

(d) Turn the crankshaft pulley and align its groove with mark ''0'' of the No.1 timing belt cover.

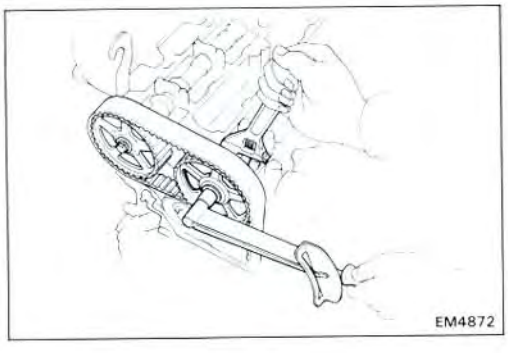


EM4865

(e) There are five pin holes of the camshaft and timing pulley.
Select one overlapped hole and insert the match pin into it.

NOTE:

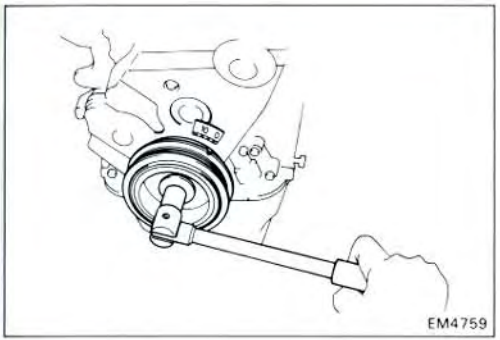
- If there is not an overlapped hole, rotate the crankshaft a little and insert the pin into the hole nearly overlapped.
- By changing the pin hole to the next one, the crankshaft pulley angle can be adjusted by approx. 2°.
- By changing the pin hole to the next two, the crankshaft pulley angle can be adjusted by approx. 5°.


EM4872

(f) Hold the hexagonal wrench head portion of the camshaft with a wrench, and install the pulley bolt.

Torque: 600 kg-cm (43 ft-lb, 59 N·m)

CAUTION: Do not make use of the timing belt tension when tightening the bolt.



(g) Turn the crankshaft clockwise two revolutions from TDC to TDC.

(h) Recheck the valve timing.
(See step 10 on page EM-23)

13. **REINSTALL NO.2 TIMING BELT COVER**
(See step 20 page EM-20)

14. **REINSTALL SPARK PLUGS (See page IG-6)**
Torque: 180 kg-cm (13 ft-lb, 18 N·m)

15. **REINSTALL CYLINDER HEAD COVER**
(See step 7 on page EM-36)

16. **REINSTALL THROTTLE BODY**
(See steps 2 to 12 on page FI-41)

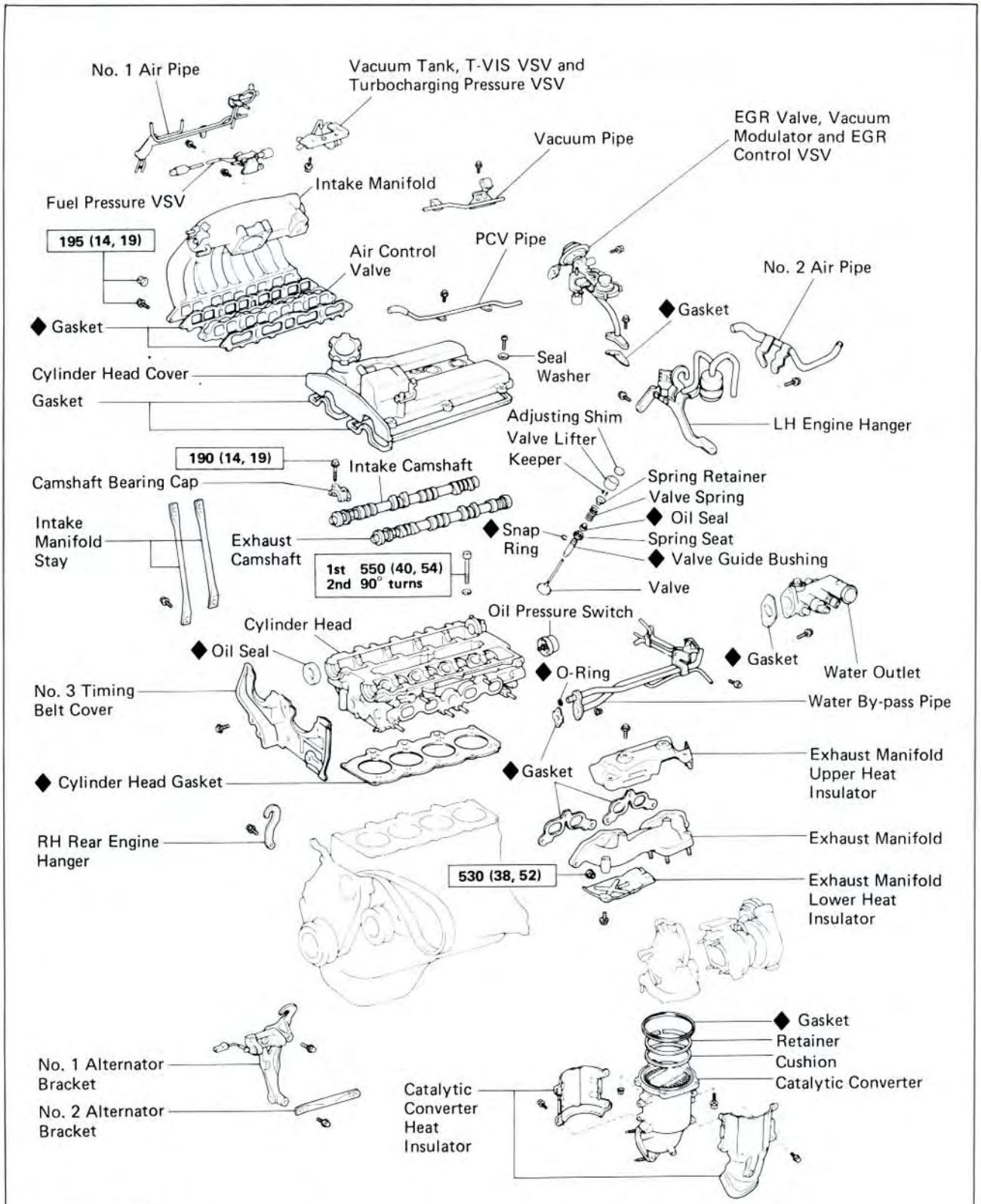
17. **REINSTALL ENGINE RH UNDER COVER**

18. **REINSTALL RH FRONT WHEEL**

19. **RECONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY**

CYLINDER HEAD

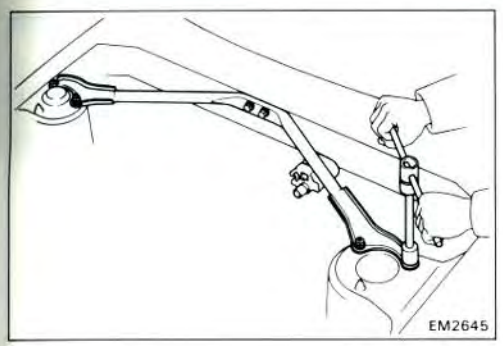
COMPONENTS



kg-cm (ft-lb, N·m) : Specified torque

◆ Non-reusable part

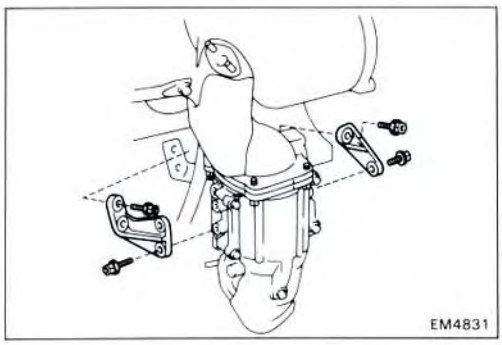
EM4840


EM2645

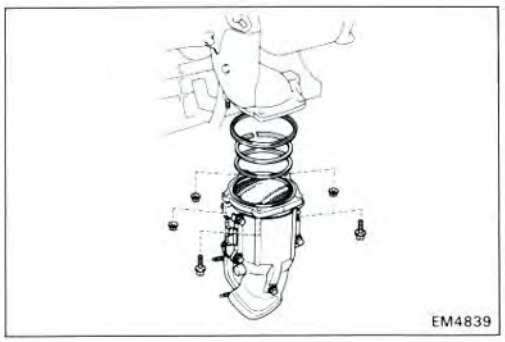
REMOVE OF CYLINDER HEAD

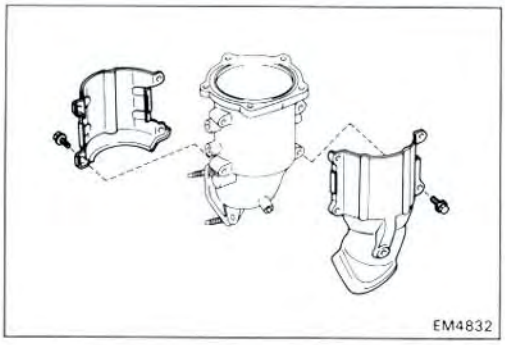
(See page EM-26)

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY
2. DRAIN ENGINE COOLANT (See page CO-4)
3. DRAIN INTERCOOLER COOLANT (See page TC-7)
4. REMOVE SUSPENSION UPPER BRACE
   (a) Disconnect the ignition coil connector and high-tension cord from the ignition coil.
   (b) Remove the four nuts, two bolts and upper brace.
5. DISCONNECT ACCELERATOR CABLE FROM THROTTLE BODY
6. REMOVE RADIATOR RESERVOIR TANK
7. REMOVE AIR CLEANER ASSEMBLY
   (See step 11 on page EM-43)
8. REMOVE ALTERNATOR
9. RAISE VEHICLE
   CAUTION: Be sure the vehicle is securely supported.
10. REMOVE RH FRONT WHEEL
11. REMOVE ENGINE UNDER COVERS
12. REMOVE SUSPENSION LOWER CROSSMEMBER
    (See step 21 on page EM-44)
13. REMOVE FRONT EXHAUST PIPE
    (See step 25 on page EM-45)
14. REMOVE CATALYTIC CONVERTER
    (a) Remove the six bolts and two converter stays.

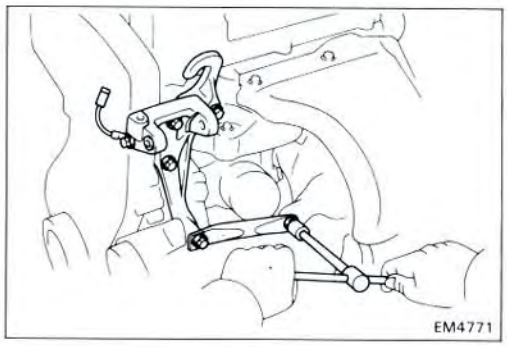

EM4831

(b) Remove the three bolts, two nuts and catalytic converter. Remove the gasket, retainer and cushion.


EM4839



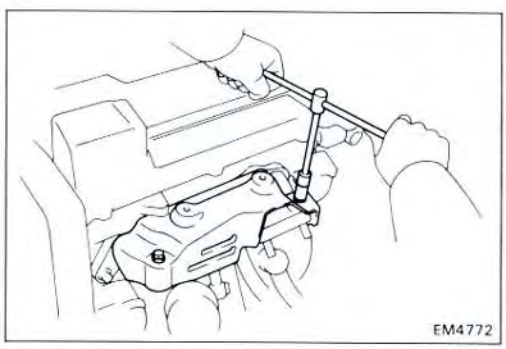
(c) Remove the nine bolts and two heat insulators.



15. REMOVE ALTERNATOR BRACKETS

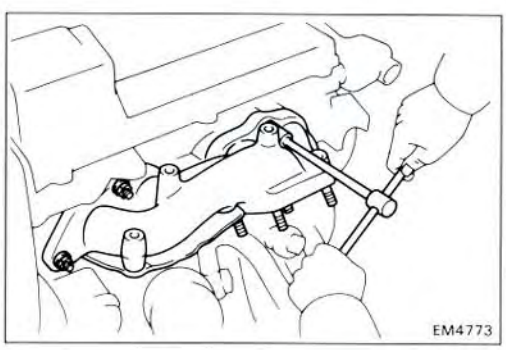
Remove the five bolts, No.1 and No.2 brackets.

16. REMOVE TURBOCHARGER
(See steps 6, 7 to 14 on pages TC-9 to 11)

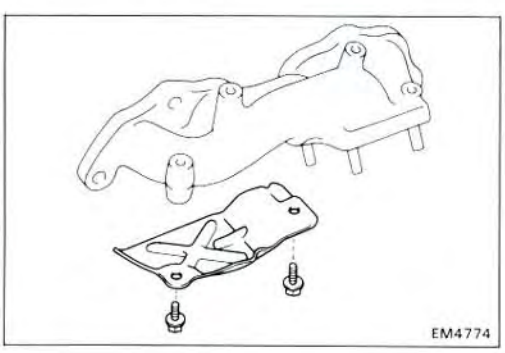


17. REMOVE EXHAUST MANIFOLD

(a) Remove the two bolts and upper heat insulator.

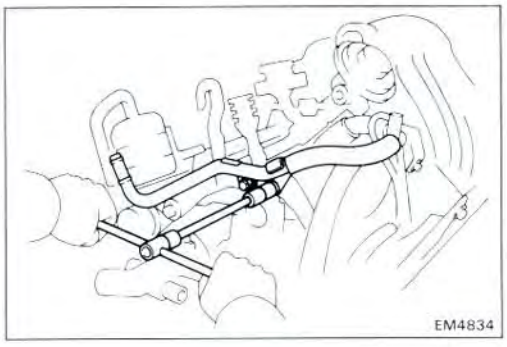


(b) Remove the six nuts, exhaust manifold and two gasket.



(c) Remove the two bolts and lower heat insulator.

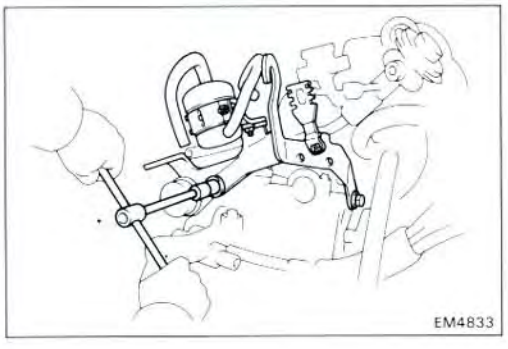
18. REMOVE DISTRIBUTOR (See page IG-8)



19. REMOVE NO.2 AIR PIPE

(a) Disconnect the air hose.

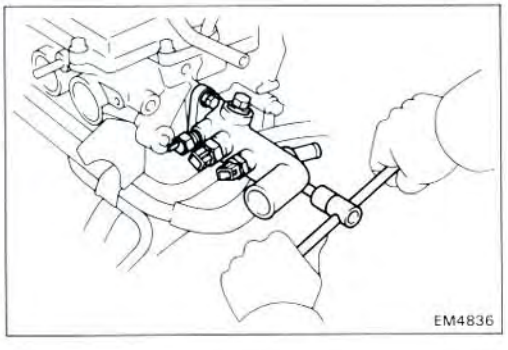
(b) Remove the two bolts and air pipe.



20. REMOVE LH ENGINE HANGER

Remove the two bolts and engine hanger together with the reservoir tank.

21. REMOVE OIL PRESSURE SWITCH



22. REMOVE WATER OUTLET

(a) Disconnect the following connectors and hoses:

(1) Water temperature sender gauge connector

(2) Water temperature sensor connector

(3) Cold start injector time switch connector

(4) No.1 air pipe water by-pass hose

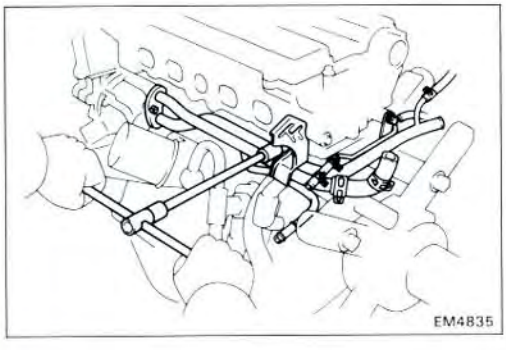
(5) Radiator upper hose

(6) Water by-pass pipe hose

(7) Heater water by-pass hose

(8) Emission control vacuum hoses

(b) Remove the two bolts, water outlet and gasket.



23. REMOVE WATER BY-PASS PIPE

(a) Disconnect the following hoses:

(1) Oil cooler water by-pass hoses

(2) Heater water by-pass hose

(3) No.1 air pipe water by-pass hose

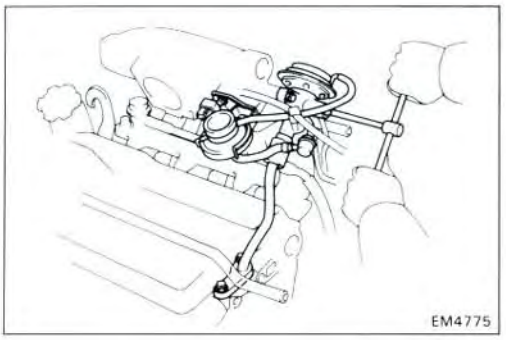
(4) Water by-pass hose from cylinder block

(5) Turbocharging pressure VSV vacuum hose

(b) Remove the two bolts, nuts, water by-pass pipe, gasket and O-ring.

24. REMOVE THROTTLE BODY
(See steps 6 to 10 on page FI-41)

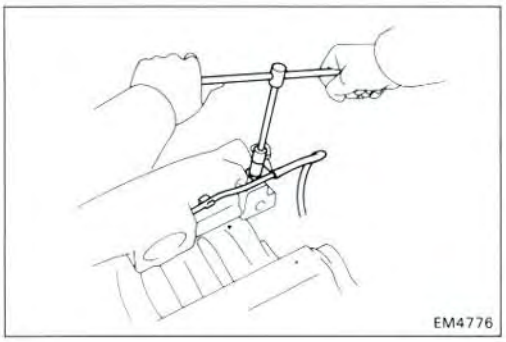
25. DISCONNECT COLD START INJECTOR CONNECTOR



26. REMOVE EGR VALVE, VACUUM MODULATOR AND EGR CONTROL VSV

Remove the five bolts, the EGR valve, pipe, vacuum modulator and control VSV assembly.

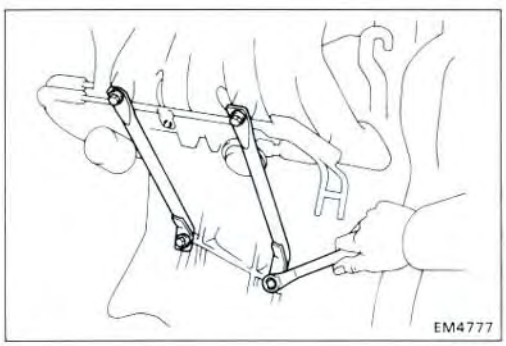
27. REMOVE DELIVERY PIPE AND INJECTORS
(See steps 4 to 6 on page FI-35)



28. REMOVE VACUUM PIPE

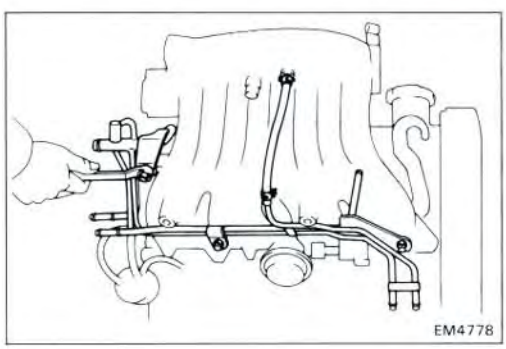
(a) Disconnect the vacuum hose from the EGR vacuum modulator.

(b) Remove the bolt and vacuum pipe.



29. REMOVE INTAKE MANIFOLD STAYS

Remove the four bolts and two manifold stays.



30. REMOVE NO.1 AIR PIPE

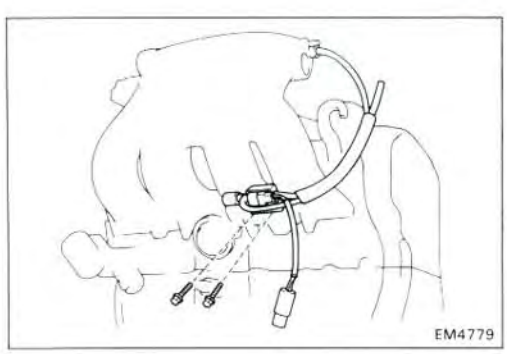
(a) Disconnect the following hoses:

(1) Intake manifold vacuum hose

(2) Turbocharging pressure VSV vacuum hose

(3) Two PS pump vacuum hoses

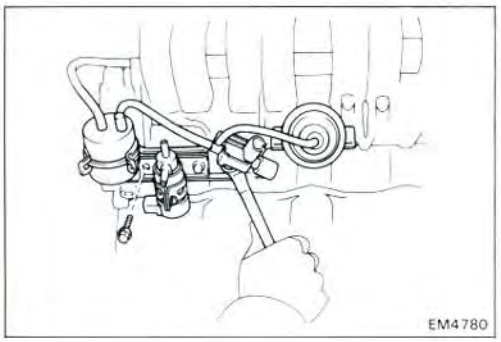
(b) Remove the three bolts and air pipe.



31. REMOVE FUEL PRESSURE VSV

(a) Disconnect the vacuum hose from the intake manifold.

(b) Remove the two bolts and VSV together with hoses.



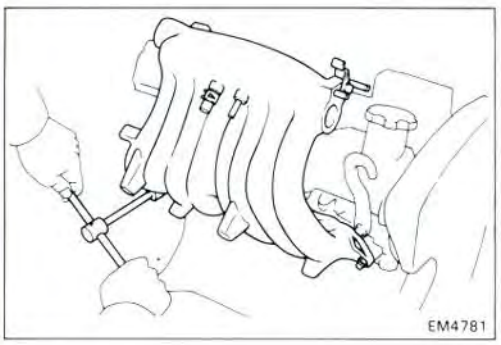
32. REMOVE T-VIS VSV, VACUUM TANK AND TURBOCHARGING PRESSURE VSV

(a) Disconnect the following hoses:

(1) Intake manifold vacuum hose

(2) T-VIS actuator vacuum hose

(b) Remove the two bolts, the T-VIS VSV, vacuum tank and turbocharging pressure VSV assembly.



33. REMOVE INTAKE MANIFOLD AND AIR CONTROL VALVE

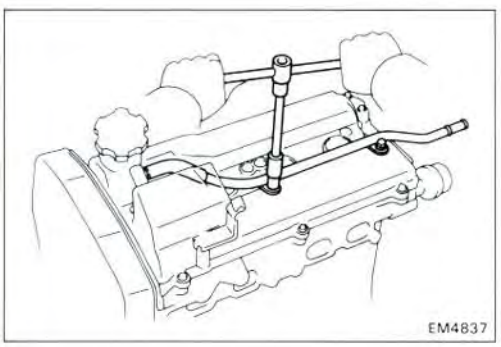
Remove the four bolts and three nuts, intake manifold, gasket, air control valve and gasket.

34. REMOVE POWER STEERING OIL RESERVOIR TANK WITHOUT DISCONNECTING HOSES

35. REMOVE SPARK PLUGS (See page IG-6)

36. REMOVE NO.2 TIMING BELT COVER (See step 12 on page EM-12)

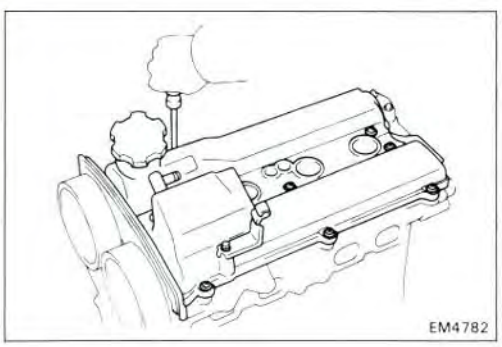
37. REMOVE TIMING BELT (See steps 14 and 15 on pages EM-12 and 13)



38. REMOVE PCV PIPE

(a) Disconnect the air hose from the cylinder head cover.

(b) Remove the two bolts and PCV pipe.

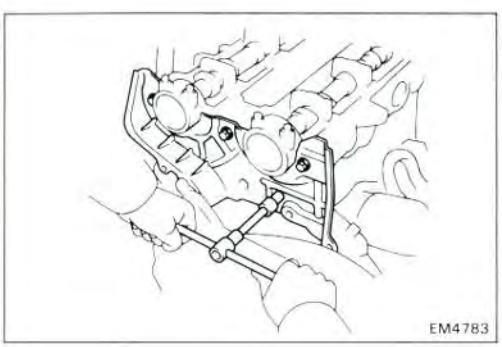


39. REMOVE CYLINDER HEAD COVER

Remove the twelve screws, seal washers, head cover and two gaskets.

40. REMOVE CAMSHAFT TIMING PULLEYS (See step 17 on page EM-13)

41. REMOVE NO.1 IDLER PULLEY AND TENSION SPRING (See step 22 on page EM-14)

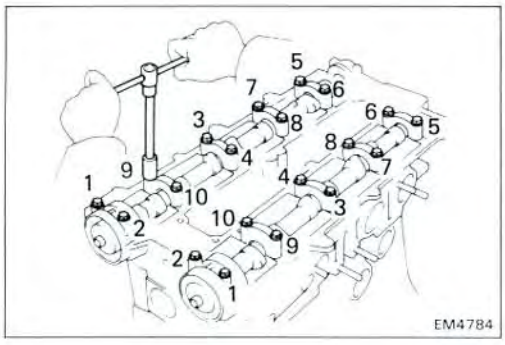


42. REMOVE NO.3 TIMING BELT COVER

Remove the five bolts and timing belt cover.

NOTE:

- Support the belt so the meshing of the crankshaft timing pulley and timing belt does not shift.
- Be careful not to drop anything inside the timing belt cover.
- Do not allow the belt to come into contact with oil, water or dust.



EM4784

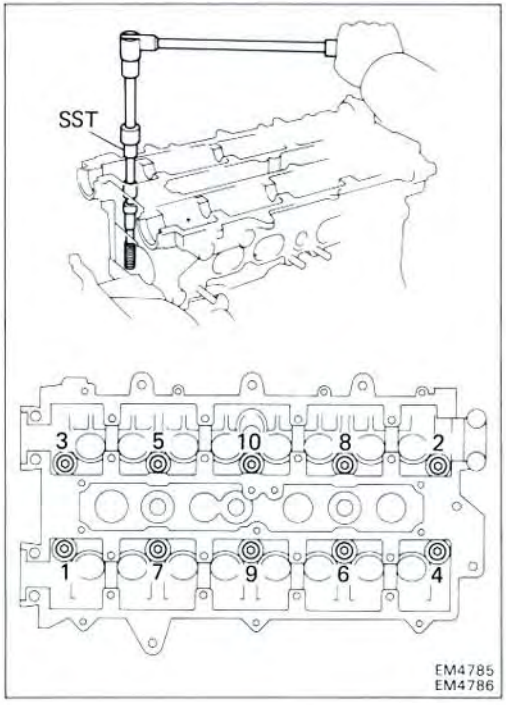
43. REMOVE INTAKE AND EXHAUST CAMSHAFTS

(a) Uniformly loosen and remove the twenty bearing cap bolts in several passes, in the sequence shown.

(b) Remove the ten bearing caps, two oil seal and two camshafts.

NOTE: Arrange the intake and exhaust camshafts.

44. REMOVE RH REAR ENGINE HANGER



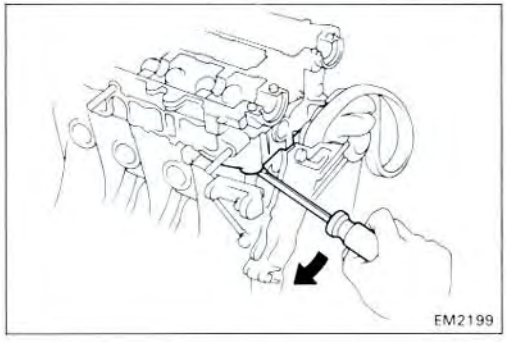
EM4785
EM4786

45. REMOVE CYLINDER HEAD

(a) Using SST, uniformly loosen and remove the ten cylinder head bolts in several passes, in the sequence shown.

SST 09043-38100

CAUTION: Head warpage or cracking could result from removing the bolts in incorrect order.


EM2199

(b) Lift the cylinder head from the dowels on the cylinder block and place it on wooden blocks on a bench.

NOTE: If the cylinder head is difficult to lift off, pry with a screwdriver between the cylinder head and block saliences.

CAUTION: Be careful not to damage the cylinder head and block surface on the cylinder and head gasket sides.

DISASSEMBLY OF CYLINDER HEAD

(See Pub. No. RM071U on page EM-84)

INSPECTION, CLEANING AND REPAIR OF CYLINDER HEAD COMPONENTS

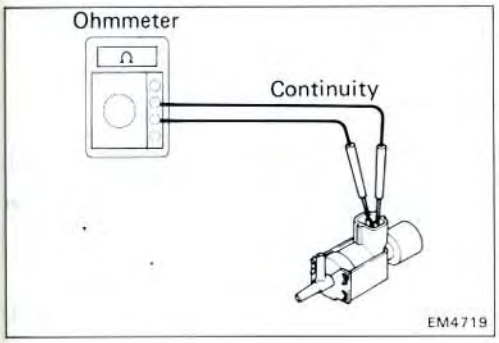
(See Pub. No. RM071U on pages EM-85 to 93)

INSPECTION OF TOYOTA – VARIABLE INDUCTION SYSTEM (T-VIS)

1. **INSPECT AIR CONTROL VALVE**
(See Pub. No.RM071U, step 1 on page EM-93)

2. **INSPECT VACUUM TANK**
(See Pub. No. RM071U, step 2 on page EM-93)

3. **INSPECT VACUUM SWITCHING VALVE (VSV)**

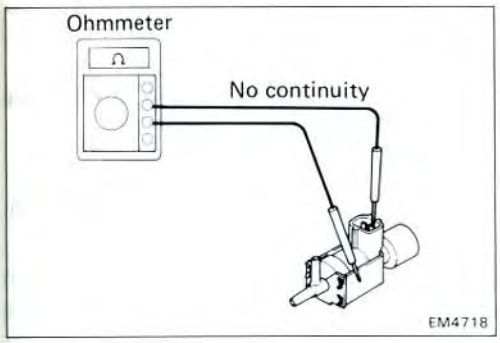


A. Inspect VSV for open circuit

Using an ohmmeter, check that there is continuity between the terminals.

Resistance (Cold): 33 – 39 Ω

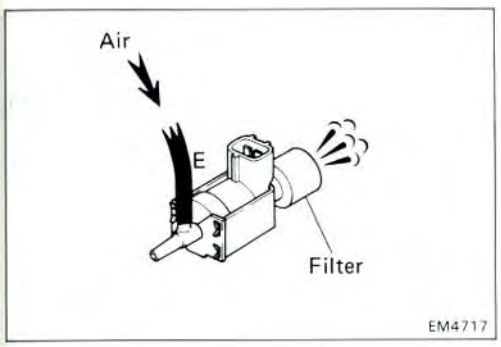
If there is no continuity, replace the VSV.



B. Inspect VSV for ground

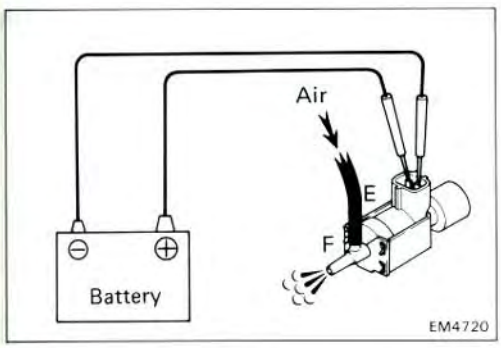
Using an ohmmeter, check that there is no continuity between each terminal and the VSV body.

If there is continuity, replace the VSV.



C. Inspect VSV operation

(a) Check that air flows from pipe E to the filter.



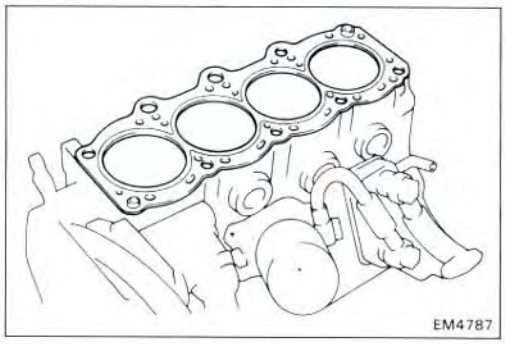
(b) Apply battery voltage across the terminals.

(c) Check that air flows from pipes E to F.

If operation is not as specified, replace the VSV.

ASSEMBLY OF CYLINDER HEAD

(See Pub. No. RM071U on pages EM-85 and 96)



INSTALLATION OF CYLINDER HEAD

(See page EM-26)

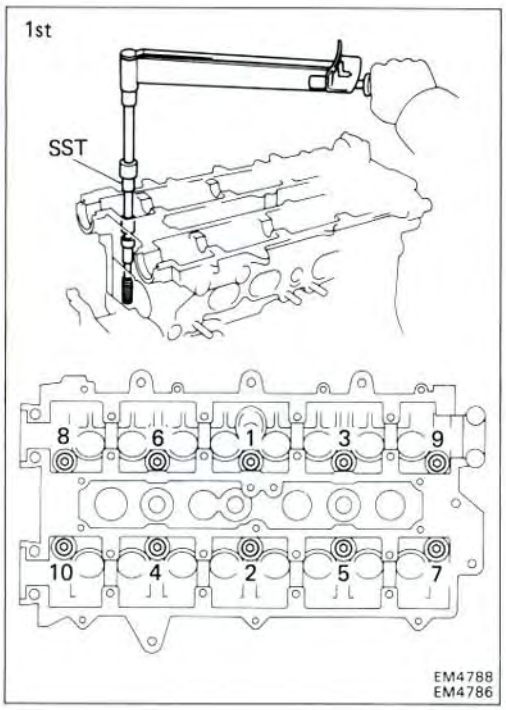
1. INSTALL CYLINDER HEAD

A. Place cylinder head on cylinder block

(a) Place a new cylinder head gasket on the cylinder block.

CAUTION: Be careful of the installation.

(b) Place the cylinder head on the cylinder head gasket.



B. Tighten cylinder head bolts

NOTE:

- The cylinder head bolts are tighten in two progressive steps.
- If any of bolts break or deform, replace them.

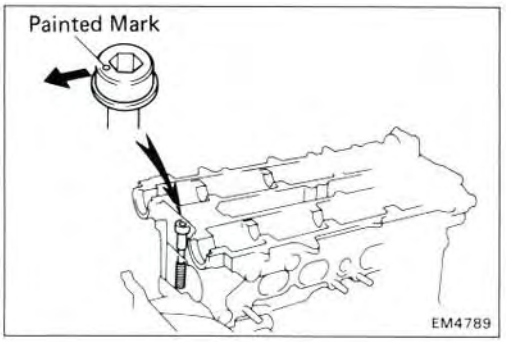
(a) Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts.

(b) First, using SST, install and uniformly tighten the ten cylinder head bolts in several passes, in the sequence shown.

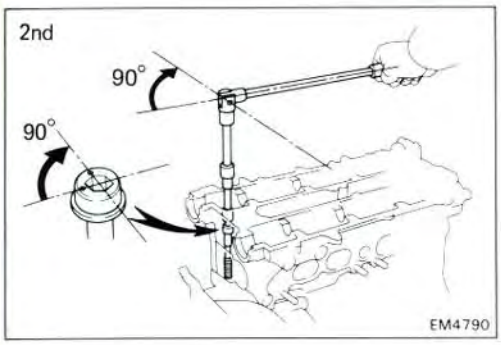
SST 09043-38100

Torque: 550 kg-cm (40 ft-lb, 54 N·m)

If any one of the bolts not meet the torque specification, replace the bolt.



(c) Mark the front of the cylinder head bolt head with paint.

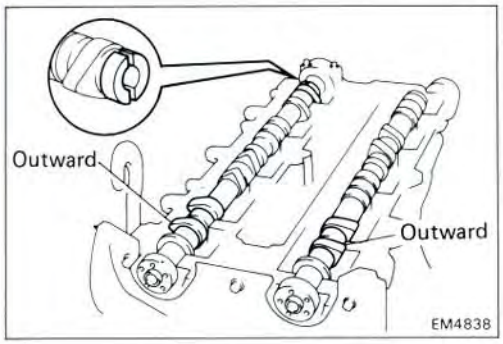


(d) Second, retighten the ten cylinder head bolts 90° in the numerical order shown.

(e) Check that the painted mark is now at a 90° angle to the front.

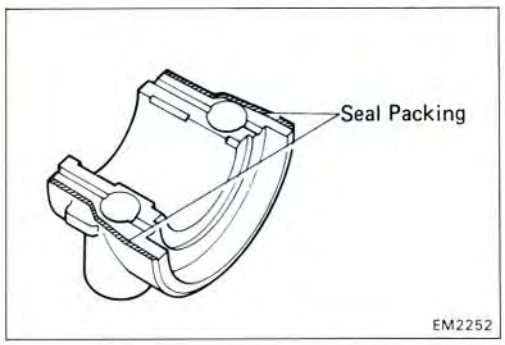
2. **INSTALL RH REAR ENGINE HANGER**

Torque: 195 kg-cm (14 ft-lb, 19 N·m)



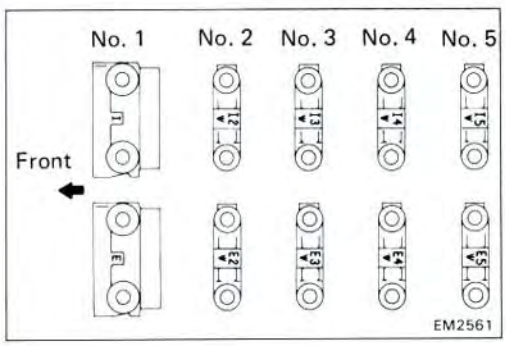
3. **INSTALL INTAKE AND EXHAUST CAMSHAFTS**

(a) Place the camshaft on the cylinder head with the No.1 cam lobe facing outward as shown.



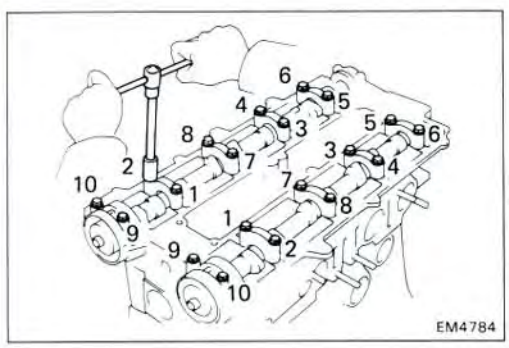
(b) Apply seal packing to the No.1 bearing cap as shown.

Seal packing: Part No.08826-00080 or equivalent



(c) Install the bearing caps in the their proper locations.

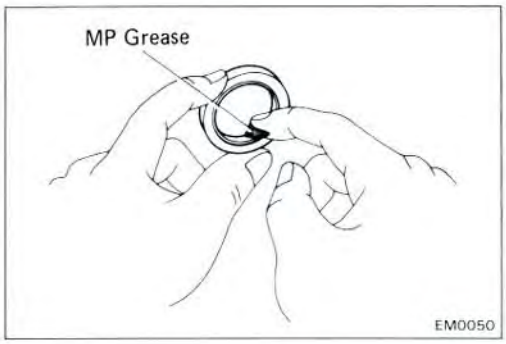
NOTE: Each bearing cap has a number and front mark.



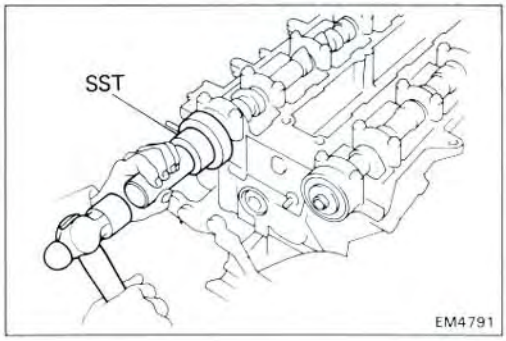
(d) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts.

(e) Install and uniformly tighten the twenty bearing cap bolts in several passes, in the sequence shown.

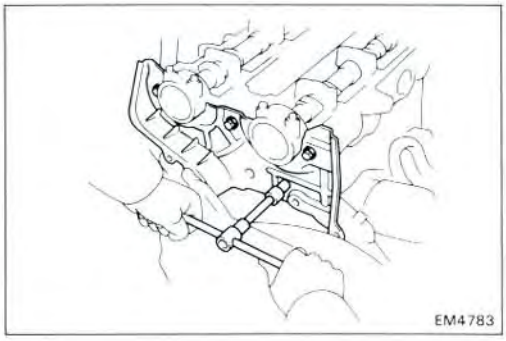
Torque: 190 kg-cm (14 ft-lb, 19 N·m)



(f) Apply MP grease to a new oil seal lip.



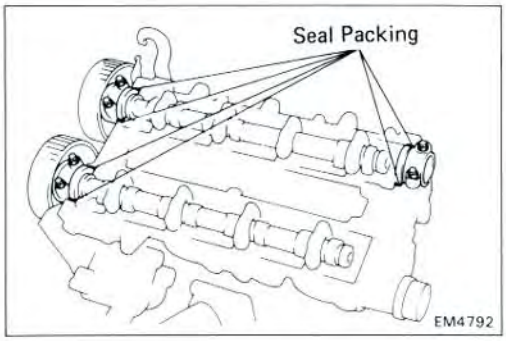
(g) Using SST, tap in the two camshaft oil seals.
SST 09223-50010



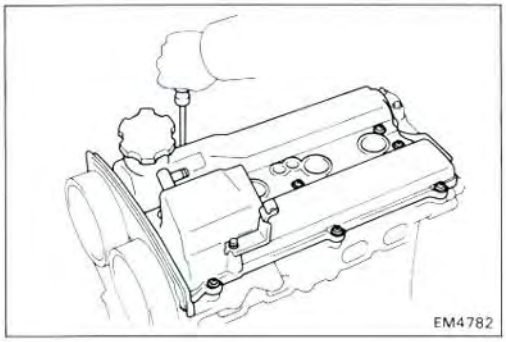
4. **INSTALL NO.3 TIMING BELT COVER**
Install the No.3 belt cover with the five bolts.

5. **INSTALL NO.1 IDLER PULLEY AND TENSION SPRING**
(See step 4 on page EM-16)

6. **INSTALL CAMSHAFT TIMING PULLEYS**
(See step 9 on page EM-17)



7. **INSTALL CYLINDER HEAD COVERS**
(a) Apply seal packing to the cylinder head as shown in the figure.
Seal packing: Part No.08826-00080 or equivalent



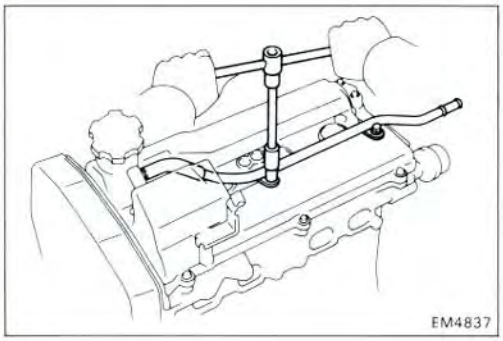
(b) Install the two gaskets to the head cover.
(c) Install the head cover with the twelve seal washers and screws.
Torque: 25 kg-cm (21 in.-lb, 2.5 N)

8. **INSTALL TIMING BELT**
(See steps 11 to 13 on pages EM-18 and 19)

9. **INSTALL NO.2 TIMING BELT COVER**
(See page 14 on page EM-20)

10. **INSTALL SPARK PLUGS (See page IG-6)**
Torque: 180 kg-cm (13 ft-lb, 18 N·m)

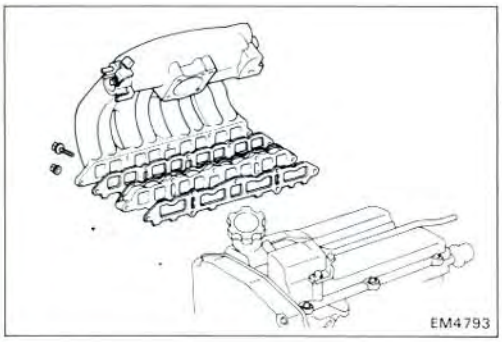
11. **INSTALL POWER STEERING OIL RESERVOIR TANK**



12. INSTALL PCV PIPE

(a) Connect the hose to the cylinder head cover.

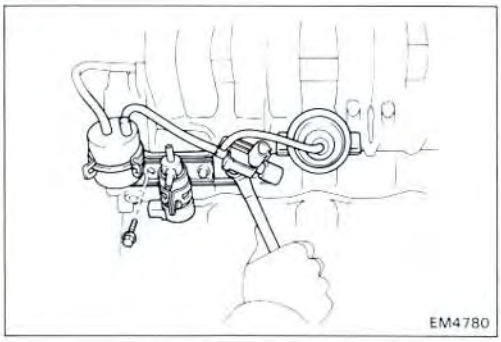
(b) Install the PCV pipe with the two bolts.



13. INSTALL AIR CONTROL VALVE AND INTAKE MANIFOLD

Install a new gasket, the air control valve, a new gasket and the intake manifold with the four bolts and three nuts.

Torque: 195 kg-cm (14 ft-lb, 19 N·m)



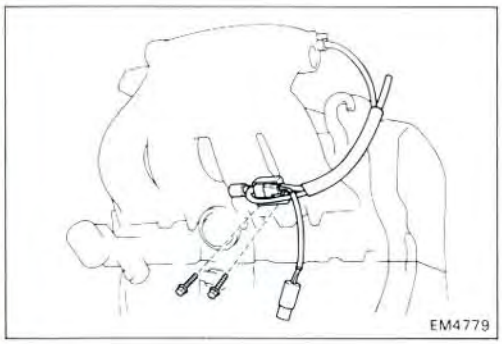
14. INSTALL T-VIS VSV, VACUUM TANK AND TURBOCHARGING PRESSURE VSV

(a) Install the T-VIS, vacuum tank and turbocharging pressure VSV assembly with the two bolts.

(b) Connect the hoses:

(1) Intake manifold vacuum hose

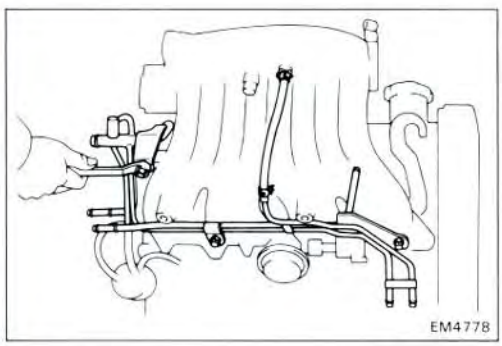
(2) T-VIS actuator vacuum hose



15. INSTALL FUEL PRESSURE VSV

(a) Install the VSV with the two bolts.

(b) Connect the vacuum hose to the intake manifold:



16. INSTALL NO.1 AIR PIPE

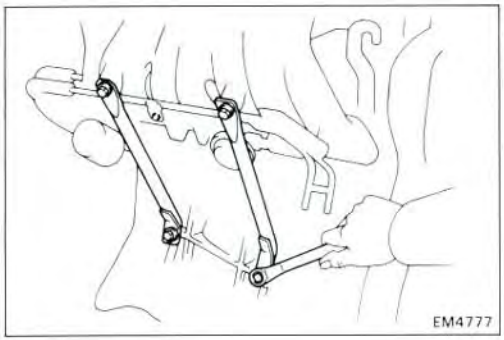
(a) Install the air pipe with the two bolts.

(b) Connect the hose:

(1) Intake manifold vacuum hose

(2) Turbocharging pressure VSV vacuum hose

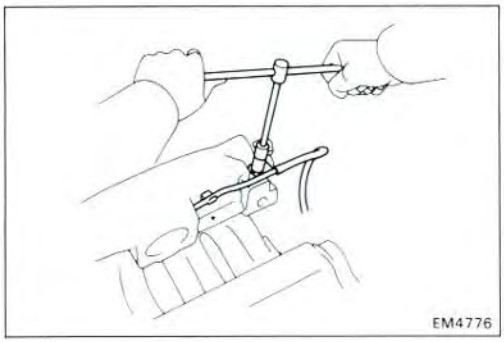
(3) Two PS pump vacuum hoses



17. INSTALL INTAKE MANIFOLD STAYS

Install the two manifold stays with the four bolts.

Torque: 260 kg-cm (19 ft-lb, 25 N·m)

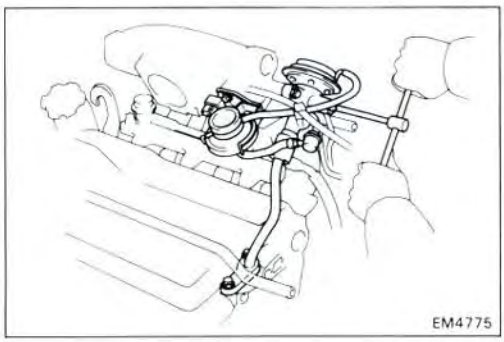


18. INSTALL VACUUM PIPE

(a) Install the vacuum pipe with the bolt.

(b) Connect the vacuum hose to the EGR vacuum modulator.

19. INSTALL DELIVERY PIPE AND INJECTORS
(See steps 2 to 4 on page FI-37 and 38)



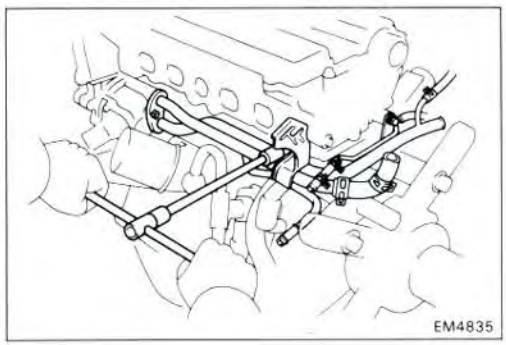
20. INSTALL EGR VALVE, VACUUM MODULATOR AND EGR CONTROL VSV

Install the EGR valve, pipe, vacuum modulator and control VSV assembly with the five bolts.

Torque: 195 kg-cm (14 ft-lb, 19 N·m)

21. CONNECT COLD START INJECTOR CONNECTOR

22. INSTALL THROTTLE BODY
(See steps 2 to 6 on page FI-43)



23. INSTALL WATER BY-PASS PIPE

(a) Install a new O-ring to the pipe.

(b) Install a new gasket to the water pump.

(c) Install the water by-pass pipe with the two bolts and nuts.

(d) Connect the following hoses:

(1) Oil cooler water by-pass hoses

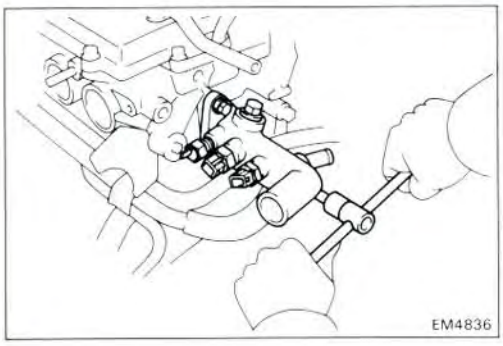
(2) Heater water by-pass hose

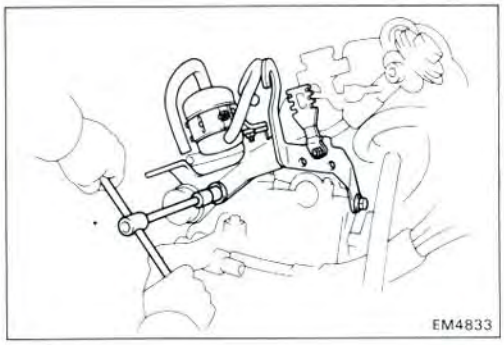
(3) No.1 air pipe water by-pass hose

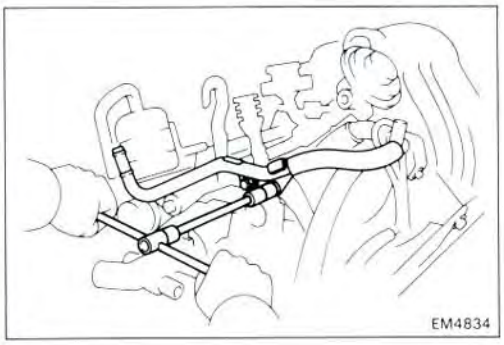
(4) Water by-pass hose to cylinder block

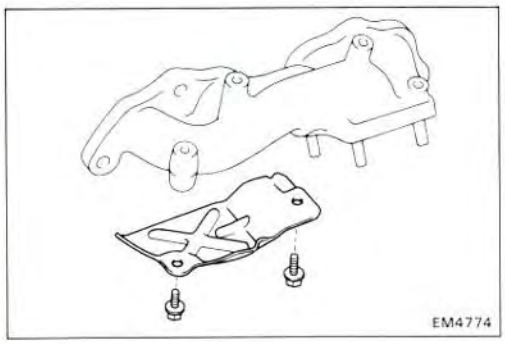
(5) Turbocharging pressure VSV vacuum hose

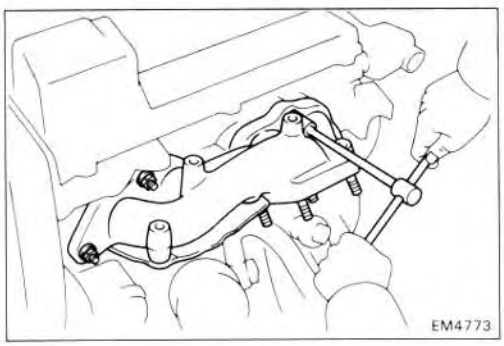
Torque (Nuts): 80 kg-cm (69 in.-lb, 7.8 N·m)











24. INSTALL WATER OUTLET

(a) Install a new gasket and water outlet with the two bolts.

Torque: 130 kg-cm (9 ft-lb, 13 N·m)

(b) Connect the following connectors and hoses:

(1) Water temperature sender gauge connector
(2) Water temperature sensor connector
(3) Cold start injector time switch connector
(4) No.1 air pipe water by-pass hose
(5) Radiator upper hose
(6) Water by-pass pipe hose
(7) Heater water by-pass hose
(8) Emission control vacuum hoses

25. INSTALL OIL PRESSURE SWITCH

26. INSTALL LH ENGINE HANGER

Install the LH engine hanger and reservoir tank with the two bolts.

Torque:
12 mm bolt head 130 kg-cm (9 ft-lb, 13 N·m)
14 mm bolt head 195 kg-cm (14 ft-lb, 19 N·m)

27. INSTALL NO.2 AIR PIPE

(a) Install the air pipe with the two bolts.

(b) Connect the air hose.

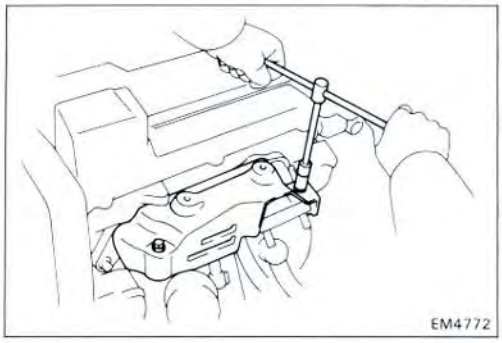
28. INSTALL DISTRIBUTOR (See page IG-9)

29. INSTALL EXHAUST MANIFOLD

(a) install the lower heat insulator with the two bolts.

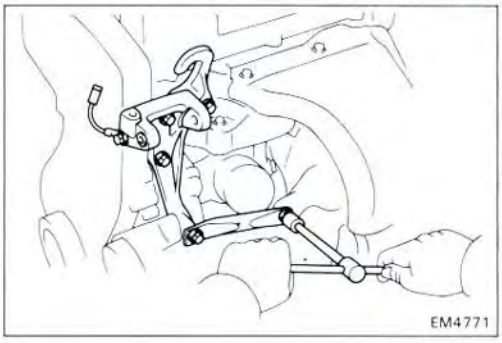
(b) Install new two gaskets and the exhaust manifold with the six nuts.

Torque: 530 kg-cm (38 ft-lb, 52 N·m)



(c) Install the upper heat insulator with the two bolts.

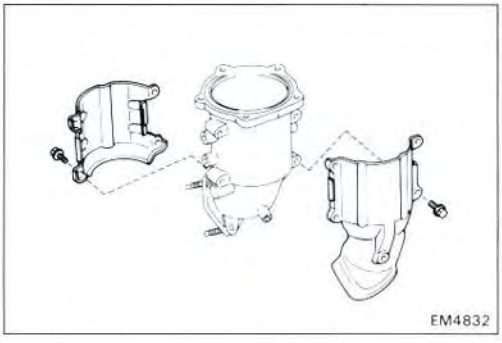
30. INSTALL TURBOCHARGER
(See steps 4 to 11 on pages TC-13 and 14)



31. INSTALL ALTERNATOR BRACKETS

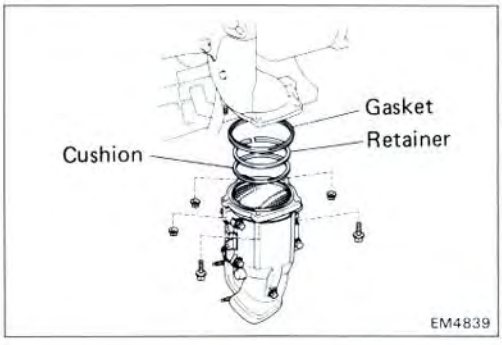
Install the No.1 and No.2 brackets with the five bolts.

Torque:
To turbine outlet elbow
440 kg-cm (32 ft-lb, 43 N·m)
Others 400 kg-cm (29 ft-lb, 39 N·m)



32. INSTALL CATALYTIC CONVERTER

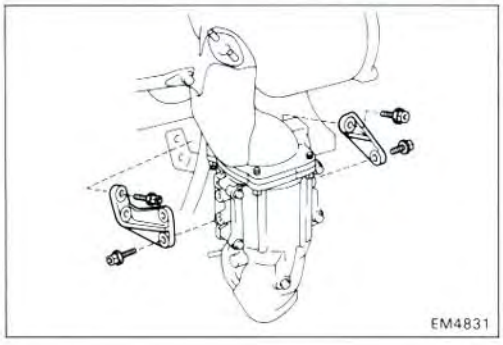
(a) Install the two heat insulator with the nine bolts.



(b) Install new cushion, the retainer and gasket to the catalytic converter.

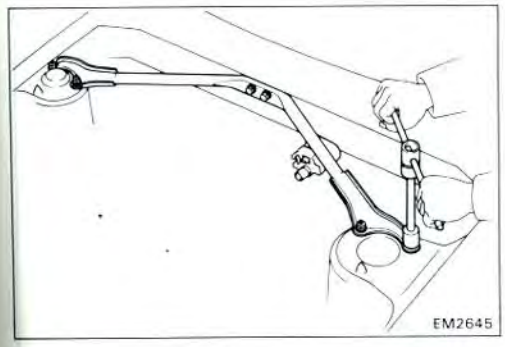
(c) Install the catalytic converter with the three bolts and two nuts.

Torque: 300 kg-cm (22 ft-lb, 29 N·m)



(d) Install the two converter stays with the six bolts.

Torque: 650 kg-cm (47 ft-lb, 64 N·m)



33. **INSTALL EXHAUST FRONT PIPE**
(See step 7 on page EM-50)

34. **INSTALL SUSPENSION LOWER CROSSMEMBER**
(See step 6 page EM-50)

35. **INSTALL ENGINE UNDER COVER**

36. **INSTALL RH FRONT WHEEL**

37. **LOWER VEHICLE**

38. **INSTALL ALTERNATOR**

39. **INSTALL AIR CLEANER ASSEMBLY**
(See step 21 on page EM-51)

40. **INSTALL CRUISE CONTROL ACTUATOR**
(See step 51 on page EM-22)

41. **INSTALL RADIATOR RESERVOIR TANK**

42. **INSTALL ACCELERATOR CABLE AND ADJUST IT**

43. **INSTALL SUSPENSION UPPER BRACE**
(a) Install the upper brace with the four nuts and two bolts.
(b) Connect the ignition coil connector and high-tension cord.

44. **FILL ENGINE WITH COOLANT (See page CO-4)**
Capacity (w/ Heater):
8.0 liters (8.5 US qts, 7.0 Imp. qts)

45. **FILL INTERCOOLER WITH COOLANT (See page TC-7)**
Capacity:
1.7 liters (1.8 US qts, 1.5 Imp. qts)

46. **CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY**

47. **START ENGINE AND FOR LEAKS**

48. **PERFORM ENGINE ADJUSTMENT**
(a) Adjust the valve clearance.
(See Pub. No. RM071U on page EM-15)
Valve clearance (Cold):
Intake 0.15 — 0.25 mm (0.006 — 0.010 in.)
Exhaust 0.20 — 0.30 mm (0.008 — 0.012 in.)
(b) Adjust the ignition timing.
(See steps 7 to 10 on pages IG-9 and 10)
Ignition timing:
10° BTDC @ idle
(w/ Terminals T and E1 short-circuited)

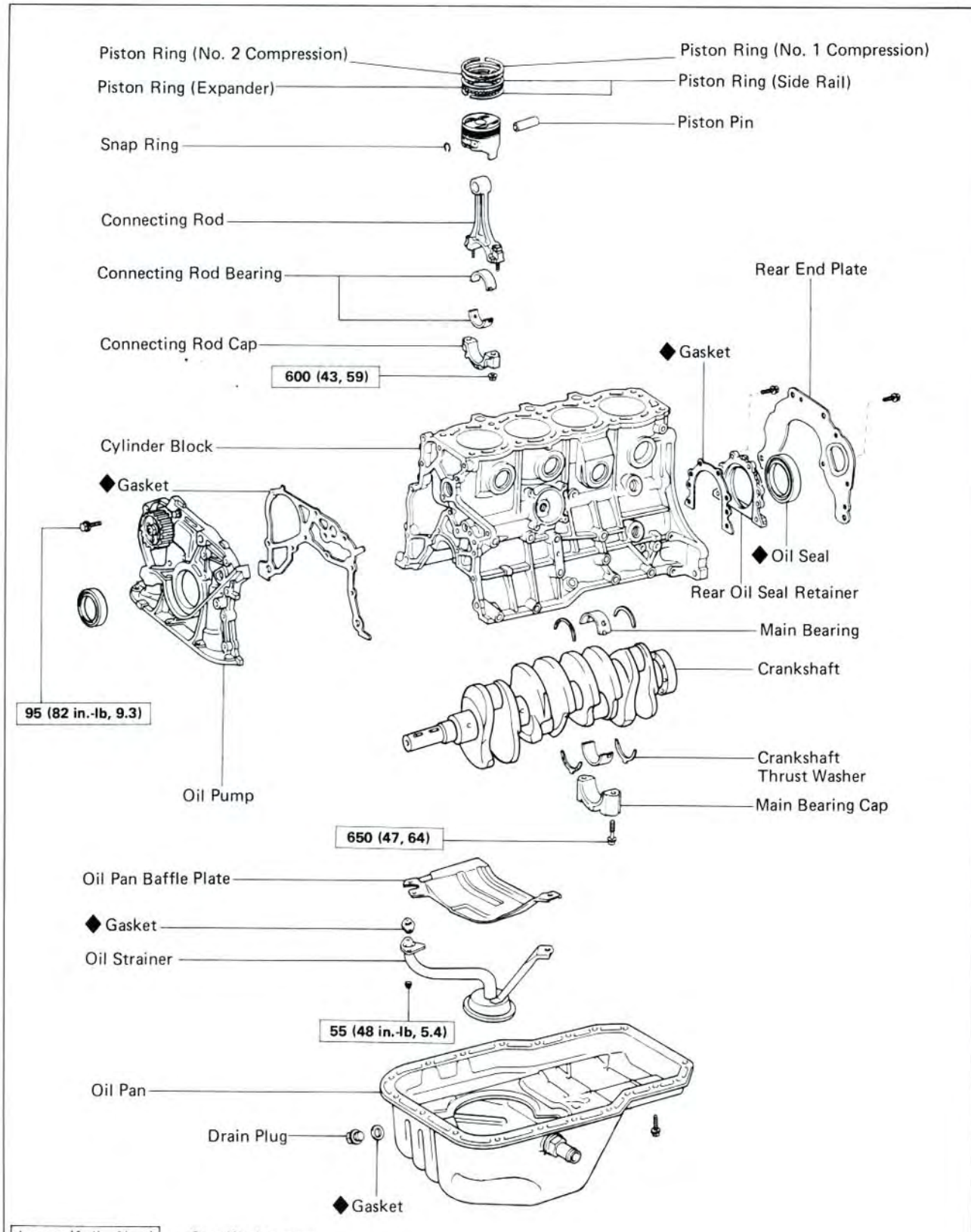
49. **CHECK TOE-IN**

50. **PERFORM ROAD TEST**
Check for abnormal noise, shock, slippage, correct shift points and smooth operation.

51. **RECHECK ENGINE, INTERCOOLER COOLANT AND OIL LEVELS**

CYLINDER BLOCK

COMPONENTS



kg-cm (ft-lb, N·m) : Specified torque

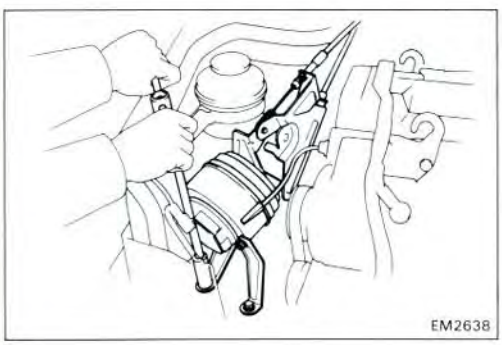
◆ Non-reusable part

EM4903

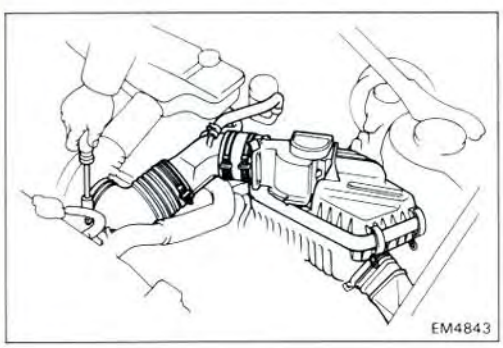
REMOVAL OF ENGINE

1. REMOVE BATTERY
2. DRAIN ENGINE COOLANT (See page CO-4)
3. DRAIN INTERCOOLER COOLANT (See page TC-7)
4. REMOVE HOOD
5. DISCONNECT ACCELERATOR CABLE FROM THROTTLE BODY
6. REMOVE ENGINE RADIATOR
   (See Pub. No. RM071U on page CO-11)
7. DISCONNECT INTERCOOLER WATER HOSES
8. DISCONNECT HEATER HOSES
9. DISCONNECT FUEL HOSES
   (a) Disconnect the inlet hose from the fuel filter.
   (b) Disconnect the return hose from the fuel return pipe.

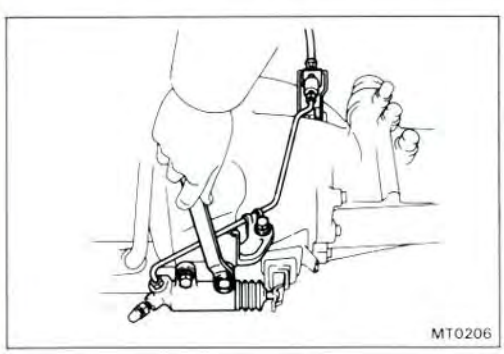
   CAUTION: Catch leaking fuel in a container.
10. REMOVE CRUISE CONTROL ACTUATOR
    (a) Disconnect the ground strap connector.
    (b) Remove the actuator cover.
    (c) Disconnect the actuator vacuum hose.
    (d) Disconnect the actuator connector.
    (e) Remove the actuator together with the bracket.

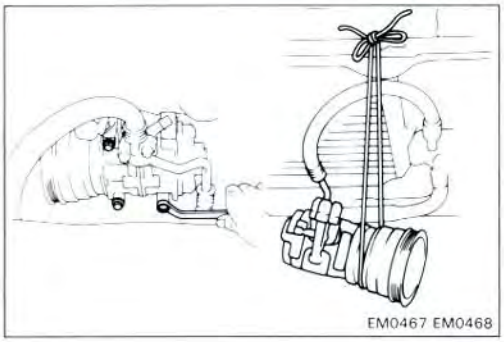

EM2638

11. REMOVE AIR CLEANER ASSEMBLY
    (a) Disconnect the air flow meter connector.
    (b) Disconnect the two air hoses.
    (c) Disconnect the four clips of the air cleaner cap.
    (d) Loosen the hose clamp and disconnect the air cleaner hose from the turbocharger, and remove the air cleaner cap together with the air cleaner hoses, air connector pipe and air flow meter.
    (e) Remove the air cleaner element.
    (f) Remove the three bolts and air cleaner case.


EM4843

12. REMOVE CLUTCH RELEASE CYLINDER AND HOSE BRACKET WITHOUT DISCONNECTING TUBE AND HOSE
13. DISCONNECT SPEEDOMETER CABLE
14. DISCONNECT TRANSAXLE CONTROL CABLES
15. REMOVE ALTERNATOR


MT0206


EM0467 EM0468

16. REMOVE A/C COMPRESSOR WITHOUT DISCONNECTING HOSES

(a) Disconnect the two connectors.

(b) Loosen the adjusting bolt for alternator drive belt, and remove the drive belt.

(c) Remove the three compressor mounting bolts.

(d) Put aside the compressor, and suspend it to the radiator support with string.

17. DISCONNECT WIRE, CONNECTORS AND VACUUM HOSES:

(a) Check connector

(b) Ground straps from LH fender apron

(c) Connectors from No.2 junction block

(d) Ignition coil connector and high-tension cord

(e) Solenoid resistor connector

(f) Fuel pump relay connector

(g) Fuel pump resistor connector

(h) Brake booster vacuum hose

(i) A/C idle-up vacuum hoses

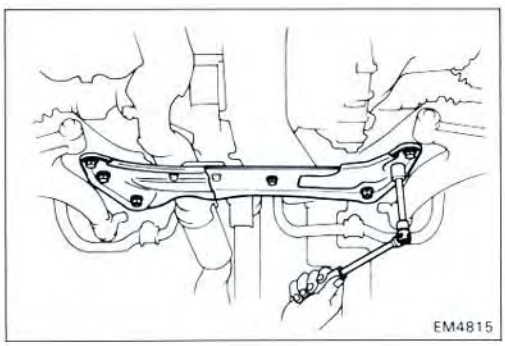
(j) Charcoal canister vacuum hose

18. RAISE VEHICLE

CAUTION: Be sure the vehicle is securely supported.

19. DRAIN ENGINE OIL

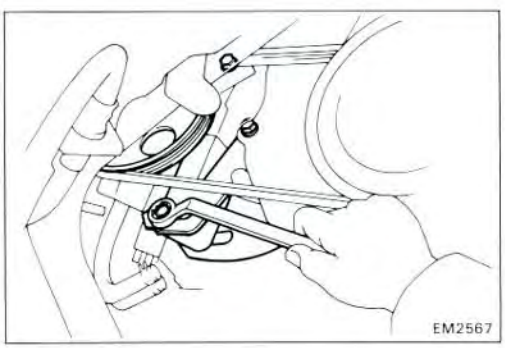
20. REMOVE ENGINE UNDER COVERS


EM4815

21. REMOVE SUSPENSION LOWER CROSSMEMBER

22. REMOVE FRONT DRIVE SHAFTS (See page FA-8)

23. REMOVE PROPELLER SHAFT (See page PR-4)


EM2567

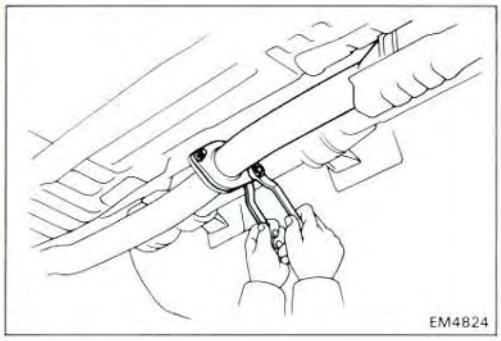
24. REMOVE POWER STEERING PUMP FROM BRACKET WITHOUT DISCONNECTING HOSES

(a) Disconnect the two vacuum hoses.

(b) Remove the drive belt.

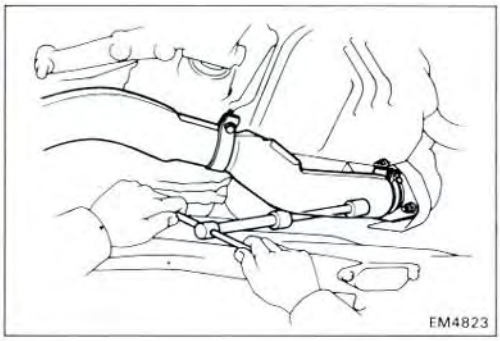
(c) Remove the three bolts and PS pump.

(d) Put aside the pump and suspend it to the cowl with the string.



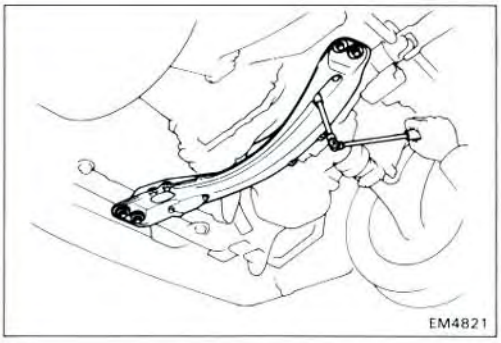
25. REMOVE FRONT EXHAUST PIPE

(a) Remove the two bolts, and disconnect the front exhaust pipe from the rear exhaust pipe.



(b) Loosen the bolt and nut, and disconnect the clamp from the bracket.

(c) Remove the three nuts and the front exhaust pipe.



26. REMOVE ENGINE MOUNTING CENTER MEMBER

27. LOWER VEHICLE

28. PULL OUT TCCS ECU CONNECTORS AT ENGINE COMPARTMENT

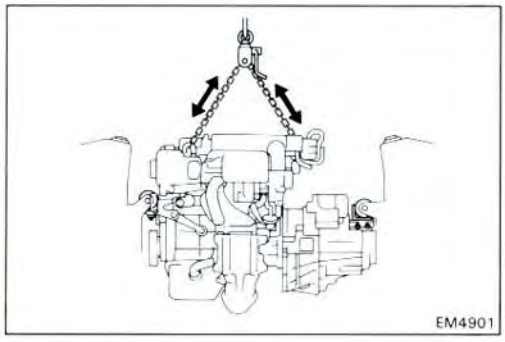
(a) Disconnect the three connectors from the TCCS ECU.

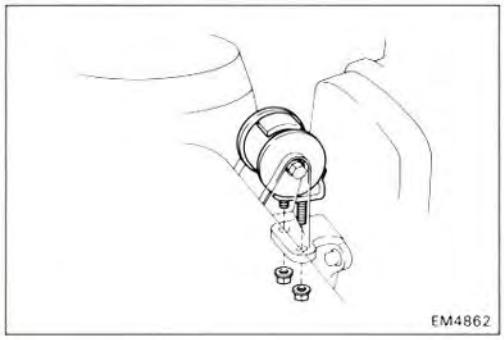
(b) Remove the two screws and pull out the TCCS ECU connectors from cowl panel.

29. REMOVE POWER STEERING PUMP RESERVOIR TANK MOUNTING BOLTS

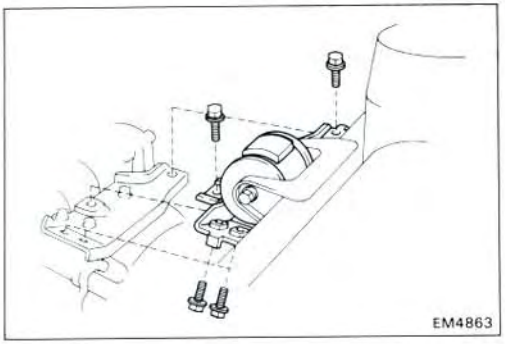
30. REMOVE ENGINE AND TRANSAXLE ASSEMBLY FROM VEHICLE

(a) Attach the engine hoist chain to the lift brackets on the engine.

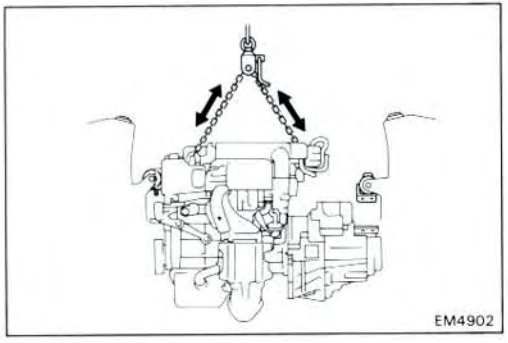




(b) Remove the two bolts holding the RH mounting insulator to the mounting bracket.



(d) Remove the four bolt holding the LH mounting insulator to the mounting bracket.



(e) Lower the engine out of the vehicle slowly and carefully.

CAUTION: Be careful not to hit the power steering gear housing.

(f) Make sure the engine is clear of all wiring, hoses and cables.

(g) Place the engine and transaxle assembly onto the stand.

31. REMOVE TRANSAXLE FROM ENGINE
(See page MT-7)

PREPARATION FOR DISASSEMBLY

1. REMOVE CLUTCH COVER AND DISC
2. REMOVE FLYWHEEL
3. REMOVE REAR END PLATE
4. INSTALL ENGINE TO ENGINE STAND FOR DISASSEMBLY
5. REMOVE ALTERNATOR
6. REMOVE TURBOCHARGER (See page TC-9)
7. REMOVE DISTRIBUTOR (See page IG-8)
8. REMOVE TIMING BELT AND PULLEYS (See page EM-17)
9. REMOVE CYLINDER HEAD (See page EM-34)
10. REMOVE WATER PUMP (See Pub. No. RM071U on page CO-6)
11. REMOVE OIL PAN AND OIL PUMP (See Pub. No. RM071U on page LU-7)

DISASSEMBLY OF CYLINDER BLOCK

(See Pub. No. RM071U on pages EM-110 to 115)

INSPECTION OF CYLINDER BLOCK

(See Pub. No. RM071U on pages EM-110 to 115)

DISASSEMBLY OF PISTON AND CONNECTING ROD ASSEMBLIES

(See Pub. No. RM071U, for 3S-GE on pages EM-116 and 117)

INSPECTION AND REPAIR OF PISTON AND CONNECTING ROD ASSEMBLIES

(See Pub. No. RM071U, for 3S-GE on pages EM-118 to 121)

INSPECTION OF CRANKSHAFT

(See Pub. No. RM071U, for 3S-GE on pages EM-122)

REPLACEMENT OF CRANKSHAFT OIL SEALS

(See Pub. No. RM071U on pages EM-123 and 124)

ASSEMBLY OF PISTON AND CONNECTING ROD ASSEMBLIES

(See Pub. No. RM071U, for 3S-GE on pages EM-125 and 126)

ASSEMBLY OF CYLINDER BLOCK

(See Pub. No. RM071U on pages EM-127 to 129)

POST ASSEMBLY

1. INSTALL OIL PUMP AND OIL PAN
   (See Pub. No. RM071U on page LU-12)

2. INSTALL WATER PUMP
   (See Pub. No. RM071U on page CO-8)

3. INSTALL CYLINDER HEAD
   (See page EM-34)

4. INSTALL PULLEYS AND TIMING BELT
   (See page EM-16)

5. INSTALL DISTRIBUTOR (See page IG-9)

6. INSTALL ALTERNATOR

7. REMOVE ENGINE STAND

8. INSTALL REAR END PLATE

   Torque: 95 kg-cm (82 ft-lb, 9.3 N·m)

9. iNSTALL FLYWHEEL
   (See Pub. No. RM071U, for 3S-GE on page EM-130)

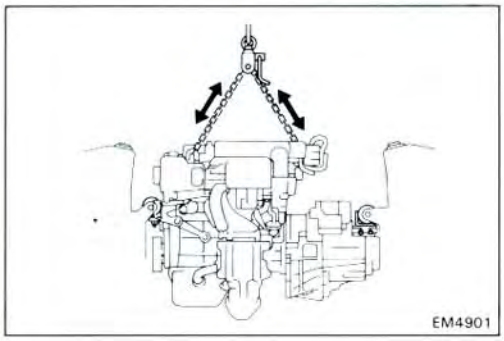
   Torque:

New bolt	900 kg-cm (65 ft-lb, 88 N·m)
Reused bolt	950 kg-cm (69 ft-lb, 93 N·m)

10. INSTALL CLUTCH DISC AND COVER

INSTALLATION OF ENGINE

1. **INSTALL TRANSAXLE TO ENGINE**
(See page MT-7)

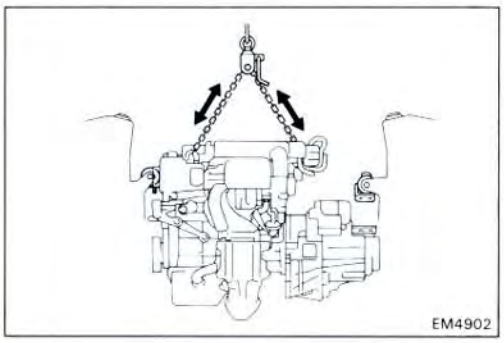

EM4901

2. **INSTALL ENGINE AND TRANSAXLE ASSEMBLY IN VEHICLE**

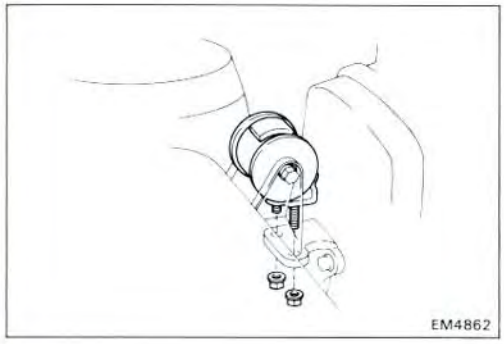
(a) Attach the engine hoist chain to the lifting brackets on the engine.

(b) Raise the engine into the engine compartment.

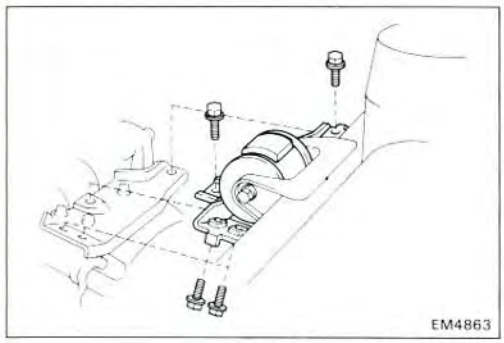
CAUTION: Be careful not to hit the power steering gear housing.


EM4902

(c) Keep the engine level, and align each mounting with the bracket.


EM4862

(d) Attach the RH mounting bracket to the mounting insulator, and temporarily install the two bolts.

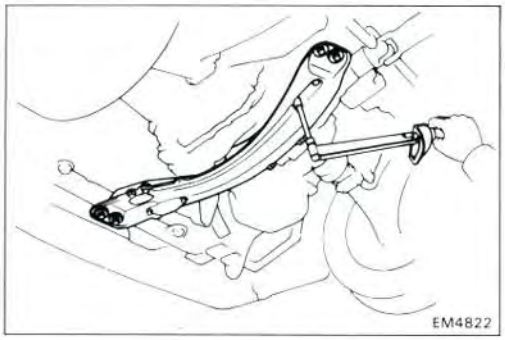

EM4863

(e) Attach the LH mounting bracket to the mounting insulator, and temporarily install the four bolts.

(f) Torque the RH and LH mounting bracket bolts and nuts.

Torque: 530 kg-cm (38 ft-lb, 52 N·m)

(g) Remove the hoist chain from the engine.



3. **INSTALL POWER STEERING PUMP RESERVOIR TANK MOUNTING BOLTS**

4. **CONNECT TCCS ECU CONNECTORS**

5. **RAISE VEHICLE**

   CAUTION: Be sure the vehicle is securely supported.

6. **INSTALL ENGINE MOUNTING CENTER MEMBER**

   Torque:

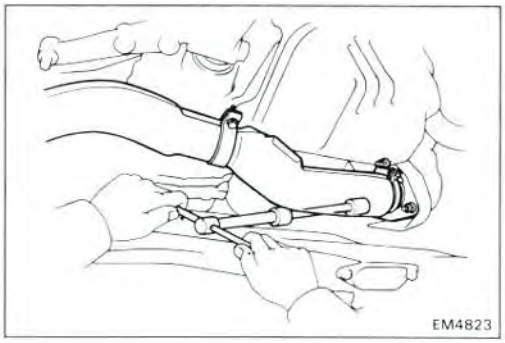
To body	**400 kg-cm (29 ft-lb, 39 N·m)**
Others	**530 kg-cm (38 ft-lb, 52 N·m)**

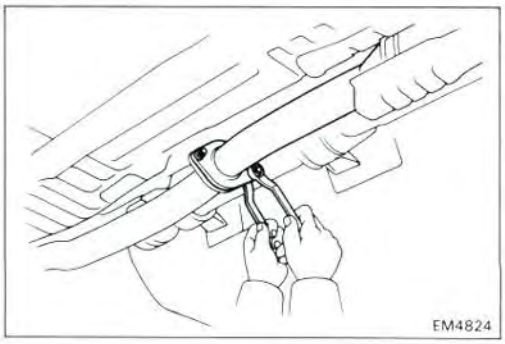
7. **INSTALL FRONT EXHAUST PIPE**

   (a) Place new gaskets on the exhaust pipe.

   (b) Connect the exhaust pipe with new three nuts.

   Torque: 630 kg-cm (46 ft-lb, 62 N·m)





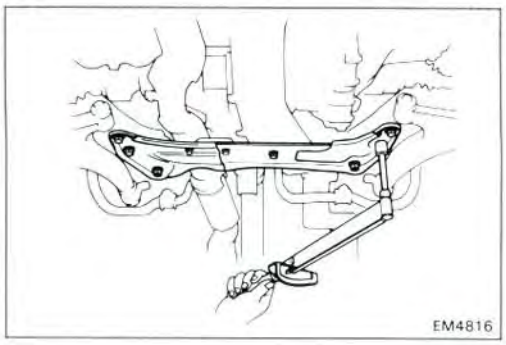
   (c) Install the clamp with the bolt and nut.

8. **INSTALL POWER STEERING PUMP TO BRACKET**

   Install the pump onto the bracket with the adjusting stay at the lower position.

9. **INSTALL PROPELLER SHAFT (See page PR-16)**

10. **INSTALL FRONT DRIVE SHAFTS (See page FA-15)**



11. **INSTALL SUSPENSION LOWER CROSSMEMBER**

    Torque:

To body	**2,125 kg-cm (154 ft-lb, 208 N·m)**
Others	**400 kg-cm (29 ft-lb, 39 N·m)**

12. **INSTALL ENGINE UNDER COVERS**

13. **LOWER VEHICLE**

14. **CONNECT VACUUM HOSES, WIRE AND CONNECTOR**

    (a) Check connector

    (b) Ground straps to the LH fender apron

    (c) Connectors to No.2 junction block

    (d) Ignition coil connector and high-tension cord

    (e) Solenoid resistor connector

    (f) Fuel pump relay connector

    (g) Fuel pump resistor connector

    (h) Brake booster vacuum hose

    (i) A/C idle-up vacuum hoses

    (j) Charcoal canister vacuum hose

15. INSTALL A/C COMPRESSOR

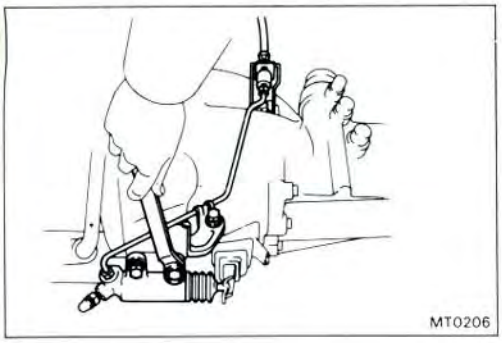
(a) Install the compressor with the three bolts.

(b) Install the drive belt.

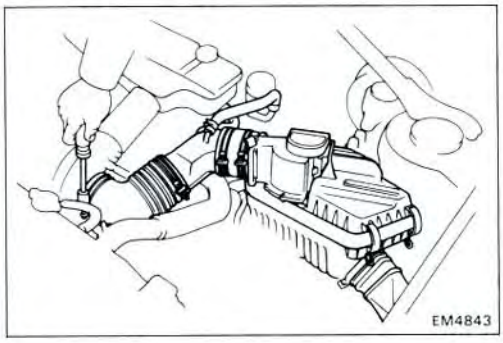
16. INSTALL ALTERNATOR

17. CONNECT TRANSAXLE CONTROL CABLE

18. CONNECT SPEEDOMETER CABLE



19. INSTALL CLUTCH RELEASE CYLINDER AND HOSE BRACKET



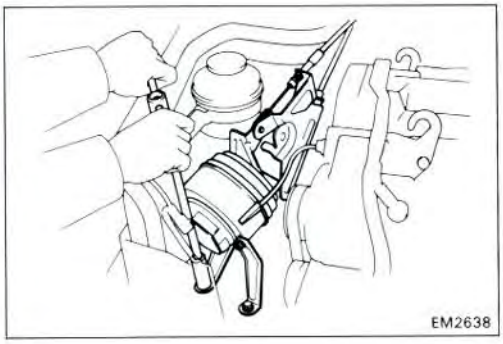
20. INSTALL AIR CLEANER ASSEMBLY

(a) Install the air cleaner case with the three bolts.

(b) Install air cleaner element.

(c) Install the air cleaner cap, air flow meter, air connector pipe and air cleaner hoses.

(d) Connect the air flow meter connector.



21. INSTALL CRUISE CONTROL ACTUATOR

(a) Install the actuator and the bracket.

(b) Connect the actuator connector.

(c) Connect the actuator vacuum hose.

(d) Install the actuator cover.

(e) Connect the ground strap connector.

22. CONNECT FUEL HOSES

(a) Fuel inlet hose

(b) Fuel return hose

23. CONNECT HEATER WATER HOSES

24. CONNECT INTERCOOLER WATER HOSES

25. INSTALL ENGINE RADIATOR
(See Pub. No. RM071U on page CO-15)

26. INSTALL ACCELERATOR CABLE AND ADJUST IT

27. INSTALL BATTERY

28. **FILL ENGINE WITH COOLANT** (See page CO-4)

Capacity (w/ Heater):
8.0 liters (8.5 US qts, 7.0 Imp. qts)

29. **FILL INTERCOOLER WITH COOLANT** (See page TC-7)

Capacity: 1.7 liters (1.8 US qts, 1.5 Imp. qts)

30. **FILL WITH ENGINE OIL** (See page LU-5)

Capacity:
Drain and refill
w/ Oil filter change
3.6 liters (3.8 US qts, 3.2 Imp. qts)
w/o Oil filter change
3.3 liters (3.6 US qts, 2.9 Imp. qts)
Dry fill 4.6 liters (4.9 US qts, 4.0 Imp. qts)

31. **START ENGINE AND CHECK FOR LEAKS**

32. **PERFORM ENGINE ADJUSTMENT**

(a) Adjust the drive belt.
(See Pub. No. RM071U on page CH-3 and AC-19)

Drive belt tension:

Alternator		
w/ Air con.	**New belt**	**175 ± 5 lb**
	Used belt	**115 ± 20 lb**
w/o Air con.	**New belt**	**150 ± 25 lb**
	Used belt	**130 ± 25 lb**
PS pump	**New belt**	**125 ± 25 lb**
	Used belt	**80 ± 20 lb**

(b) Adjust valve clearance.
(See Pub. No. RM071U on page EM-15)

Valve clearance:

Intake	**0.15 — 0.25 mm (0.006 — 0.010 in.)**
Exhaust	**0.20 — 0.30 mm (0.008 — 0.012 in.)**

(c) Adjust ignition timing.
(See steps 7 to 10 on pages IG-9 and 10)

Ignition timing:
10° BTDC @ idle
(w/ Terminals T and E1 short-circuited)

33. **INSTALL HOOD**

34. **CHECK TOE-IN**

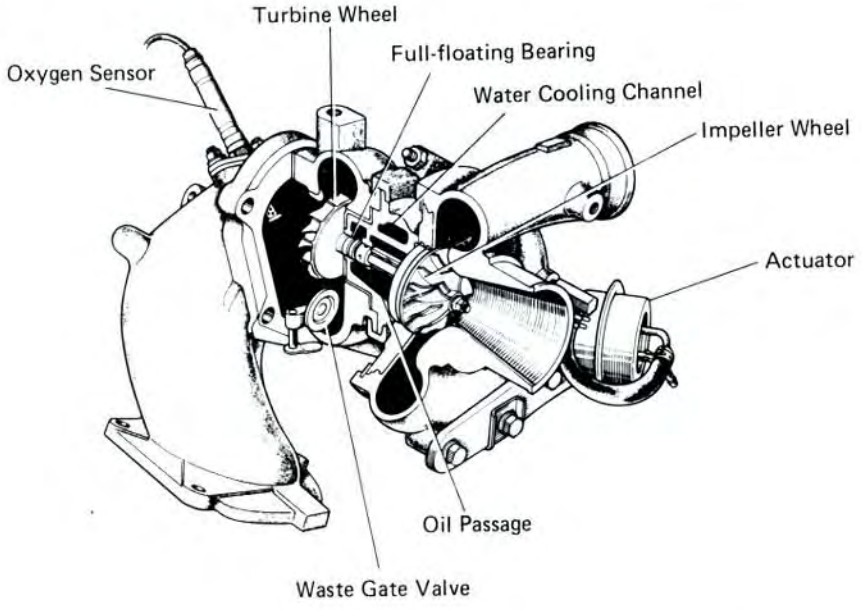
35. **PERFORM ROAD TEST**

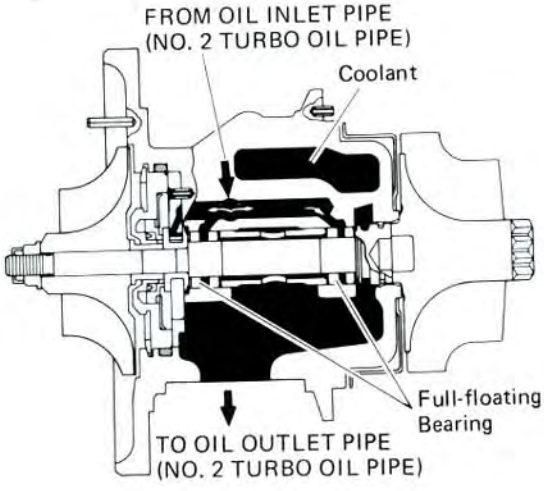
Check for abnormal noise, shock, slippage, correct shift points and smooth operation.

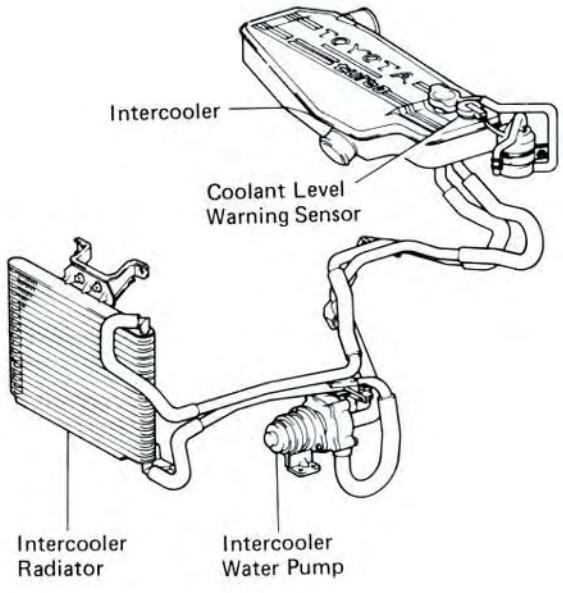
36. **RECHECK ENGINE, INTERCOOLER COOLANT AND ENGINE OIL LEVELS**

TURBOCHARGER SYSTEM

DESCRIPTION







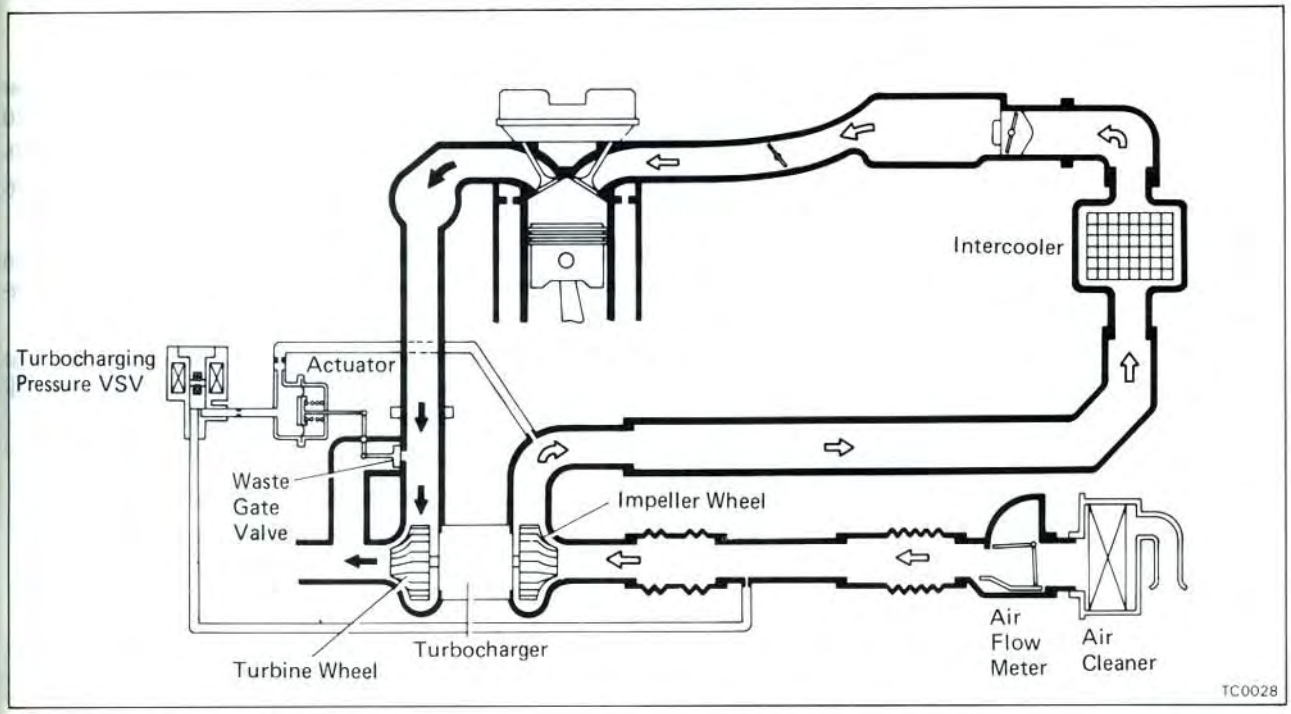
TC0018
TC0036 TC0020

Systems which increase the amount of air sent to the engine are either turbocharger type (using exhaust gas to turn the turbine) or supercharger type (using the engine crankshaft, etc. to mechanically turn the pump, etc.). For CELICA 3S-GTE engine, the turbocharger type has been adopted.

The turbocharger is a device which increases engine output by sending a greater amount of air-fuel mixture to the engine than under normal conditions.

Engine output depends upon the volume of the air-fuel mixture ignited per unit of time. Therefore, to increase engine output, the most effective method is to send a greater amount of air-fuel mixture into the cylinder.

In other words, by installing a special turbocharger and providing a higher air-fuel mixture than usual, engine output can be increased by increasing the average combustion pressure without increasing the engine speed.



Operation of Turbocharger

Exhaust gas acts on the turbine wheel inside the turbine housing, causing it to revolve. When the turbine wheel revolves, the impeller which is located on the same shaft also revolves, compressing the intake air which has passed through the air flow meter from the air cleaner. When expelled from the compressor housing the compressed air is supplied to the cylinders. When the engine speed increases, the exhaust gas volume increases and the turbine wheel revolutions increase (approx. 20,000 — 110,000 rpm), thus the turbocharged air pressure grows greater and engine output increases.

Waste Gate Valve

Although on the one hand high output is achieved by turbo-charging, if the turbocharged air pressure becomes too high, knocking occurs and, on the contrary, a reduction in engine output is caused. If the turbocharged air pressure exceeds the prescribed air pressure, the flow of exhaust gas by-passes the turbine, controlling turbine wheel revolutions and turbocharged air pressure. This by-pass valve which controls the quantity of exhaust gas flowing to the turbine is called the waste gate valve. When the turbocharged air pressure exceeds the prescribed pressure, the actuator operates, the waste gate valve opens and part of the exhaust gas by-passes the turbine. This causes a drop in the turbine revolution rate and controls the turbocharged air within the prescribed limits.

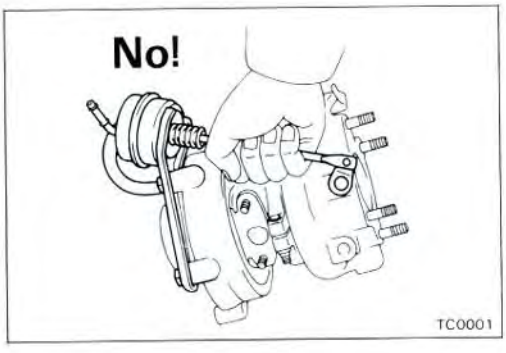
Intercooler

The intercooler cools the turbocharged air (intake air) put out by the turbocharger, thereby increasing the air density. As the air intake efficiency increases, the gas temperature in the combustion chamber falls and the occurrence of knocking is suppressed, giving an increase in engine output.

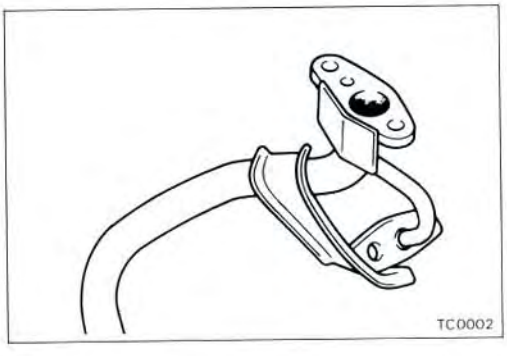
The Celica 3S-GTE intercooler is an water cooling type located at the front of the vehicle, utilizing the vehicle windstream to cool the turbocharged air.

PRECAUTIONS

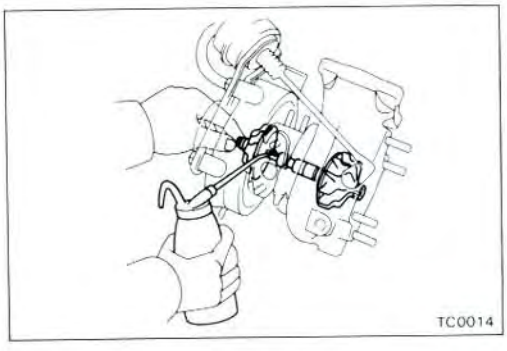
1. Do not stop the engine immediately after pulling a trailer or high speed or uphill driving. Idle the engine 20 — 120 seconds, depending on the severity of the driving condition.
2. Avoid sudden racing or acceleration immediately after starting a cold engine.
3. If the engine is run with the air cleaner removed, foreign material entering will damage the wheels which run at extremely high speed.
4. If the turbocharger is defective and must be replaced, first check for the cause of the defect in reference to the following items and replace parts if necessary:
   - Engine oil level and quality
   - Conditions under which the turbocharger was used
   - Oil lines leading to the turbocharger



5. Use caution when removing and reinstalling the turbocharger assembly. Do not drop it or bang it against anything or grasp it by easily-deformed parts, such as the actuator or rod, when moving it.
6. Before removing the turbocharger, plug the intake and exhaust ports and oil inlet to prevent entry of dirt or other foreign material.



7. If replacing the turbocharger, check for accumulation of sludge particles in the oil pipes and, if necessary, replace the oil pipes.
8. Completely remove the gasket adhered to the lubrication oil pipe flange and turbocharger oil flange.
9. If replacing bolts or nuts, do so only with the specified new ones to guard against breakage or deformation.



10. If replacing the turbocharger, put 20 cc (1.2 cu in.) of oil into the turbocharger oil inlet and turn the impeller wheel by hand to spread oil to the bearing.
11. If overhauling or replacing the engine, cut the fuel supply after reassembly and crank the engine for 30 seconds to distribute oil throughout the engine. Then allow the engine to idle for 60 seconds.

TROUBLESHOOTING

NOTE: Before troubleshooting the turbocharger, first check the engine itself. (Valve clearance, engine compression, ignition timing etc.)

INSUFFICIENT ACCELERATION, LACK OF POWER OR EXCESSIVE FUEL CONSUMPTION

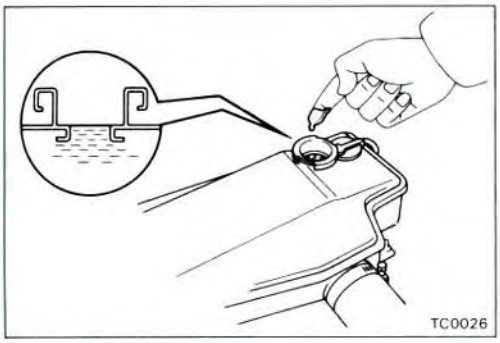
(Possible Cause)	(Check Procedure and Correction Method)
1. TURBOCHARGING PRESSURE TOO LOW	Check turbocharging pressure. (See page TC-8) **Turbocharging pressure:** **0.40 – 0.70 kg/cm²** **(5.7 – 10.0 psi, 39 – 69 kPa)** If the pressure is below specification, begin diagnosis from item 2.
2. RESTRICTED INTAKE AIR SYSTEM	Check intake air system, and repair or replace parts as necessary. (See page TC-8)
3. LEAK IN INTAKE AIR SYSTEM	Check intake air system, and repair or replace parts as necessary. (See page TC-8)
4. RESTRICTED EXHAUST SYSTEM	Check exhaust system, and repair or replace parts as necessary. (See page TC-8)
5. LEAK IN EXHAUST SYSTEM	Check exhaust system, and repair or replace parts as necessary. (See page TC-8)
6. ERRATIC TURBOCHARGER OPERATION	Check rotation of impeller wheel. If it does not turn or turns with a heavy drag, replace the turbocharger assembly. Check axial play of impeller wheel. (See page TC-12) **Axial play: 0.13 mm (0.0051 in.) or less** If not within specification, replace the turbocharger assembly.

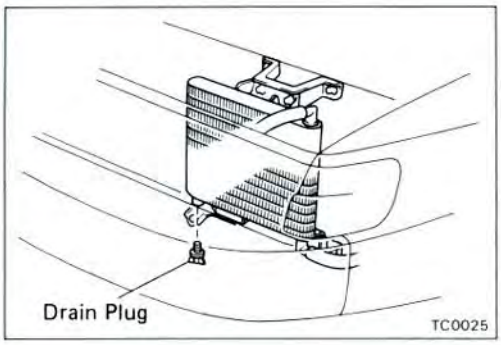
ABNORMAL NOISE

(Possible Cause)	(Check Procedure and Correction Method)
1. TURBOCHARGING HEAT INSULATOR RESONNANCE	Check for loose, improperly installed or deformed insulator mount bolts, and repair or replace as necessary.
2. EXHAUST PIPE LEAKING OR VIBRATING	Check for deformed exhaust pipe, loose mount bolts or damaged gasket, and repair or replace as necessary.
3. ERRATIC TURBOCHARGER OPERATION	Refer to Item 6 of INSUFFICIENT ACCELERATION, LACK OF POWER OR EXCESSIVE FUEL CONSUMPTION.

EXCESSIVE OIL CONSUMPTION OR WHITE EXHAUST

(Possible Cause)	(Check Procedure and Correction Method)
FAULTY TURBOCHARGER SEAL	Check for oil leakage in exhaust system. • Remove the turbine elbow from the turbocharger and check for excessive carbon deposits on the turbine wheel. Excessive carbon deposits indicate a faulty turbocharger. Check for oil leakage in intake air system. • Check for axial play in impeller wheel, and replace the turbocharger if necessary. (See page TC-12) **Axial play: 0.13 mm (0.0051 in.) or less** **CAUTION: There is some oil mist from the PCV in the blowby gas so care must be taken not to diagnosis this as an oil leakage from the turbocharger.**





CHECK AND REPLACEMENT OF INTERCOOLER COOLANT

CHECK OF INTERCOOLER COOLANT

1. CHECK INTERCOOLER COOLANT LEVEL

Check whether the intercooler (tank) is filled with coolant. If not, add coolant.

2. CHECK INTERCOOLER COOLANT QUALITY

There should not be any excessive deposits of rust or scales around the intercooler (tank) cap or intercooler filler hole, and the coolant should be free from oil.
If excessively dirty, replace the coolant.

REPLACEMENT OF INTERCOOLER COOLANT

1. DRAIN INTERCOOLER COOLANT

(a) Remove the filler cap.

(b) Loosen the drain cock and drain coolant from the intercooler and radiator.

2. FILL INTERCOOLER WITH COOLANT

CAUTION:

- **If the intercooler is not filled to capacity, its performance decreases, so check that air is removed from the system.**
- **There is no need to pour coolant into the reservoir tank.**
- **Do not reuse in the intercooler coolant which has already been poured into the engine.**
- **A reduction in the strength of the coolant can result in rust occurring, so add coolant until the coolant and water are equal in volume.**

(a) Close the drain cock.

(b) Fill with coolant.

Use a good brand of ethylene-glycol base coolant, mixed according to the manufacturer's directions.

Capacity: 1.7 liters (1.8 US qts, 1.5 Imp. qts)

(c) Turn the ignition switch ON.

(d) Open the throttle valve, which causes the intercooler water pump to operate.

(e) Check and refill with coolant.

When the water pump operates the coolant level drops, so add coolant when the water pump is stopped.

NOTE: When the coolant level falls more than 33 mm (1.29 in.) below the full tank level, the coolant level switch turns ON and the water pump stops.

(f) Repeat steps (d) and (e), and add coolant until the intercooler (tank) remains full when the water pump is switched from OFF to ON.

(g) Install the filler cap.

(h) Start the engine and race the engine a few times at approx. 3,000 rpm. Then stop the engine.

(i) Recheck and refill with coolant.

(j) Leave the engine and water pump stopped for approx. 20 minutes. Then repeat steps (c) to (f). Recheck the coolant level.

TURBOCHARGER

ON-VEHICLE INSPECTION OF TURBOCHARGER

1. INSPECT INTAKE AIR SYSTEM

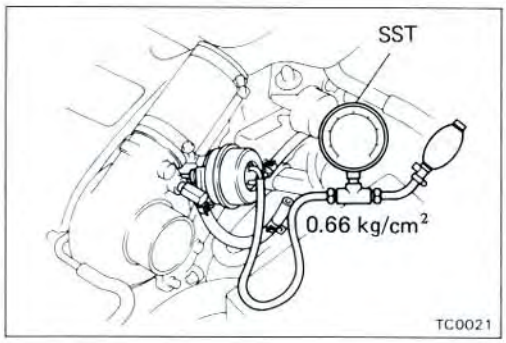
Check for leakage or clogging between the air cleaner and turbocharger inlet and between the turbocharger outlet and cylinder head.

- Clogged air cleaner .... Clean or replace the element
- Hoses collapsed or deformed ....Check each connection and repair
- Cracks in components .... Check and replace

2. INSPECT EXHAUST SYSTEM

Check for leakage or clogging between the cylinder head and turbocharger inlet and between the turbocharger outlet and exhaust pipe.

- Deformed components .... Repair or replace
- Foreign material in passages .... Remove
- Leakage from components .... Repair or replace
- Cracks in components .... Check and replace



3. INSPECT ACTUATOR OPERATION

(a) Remove the air cleaner assembly (from the turbocharger).
(See step 11 on page EM-43)

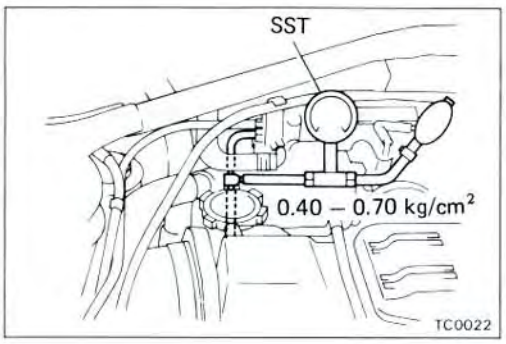
(b) Disconnect the actuator hose.

(c) Using SST (turbocharger pressure gauge), apply approx. 0.66 kg/cm² (9.4 psi, 65 kPa) of pressure to the actuator and check that the rod moves.

If the rod does not move, replace the turbocharger assembly.

SST 09992-00241

CAUTION: Never apply more than 0.8 kg/cm² (11.4 psi 78 kPa) of pressure to the actuator.



4. CHECK TURBOCHARGING PRESSURE

(a) Using a 3-way connector, connect SST (turbocharger pressure gauge) to the hose leading to the intake manifold.

SST 09992-00241

(b) While driving with the engine running at 2,800 rpm or more with the throttle valve fully open in the second gear, check the turbocharging pressure.

Standard pressure: 0.40 – 0.70 kg/cm²
(5.7 – 10.0 psi, 39 – 69 kPa)

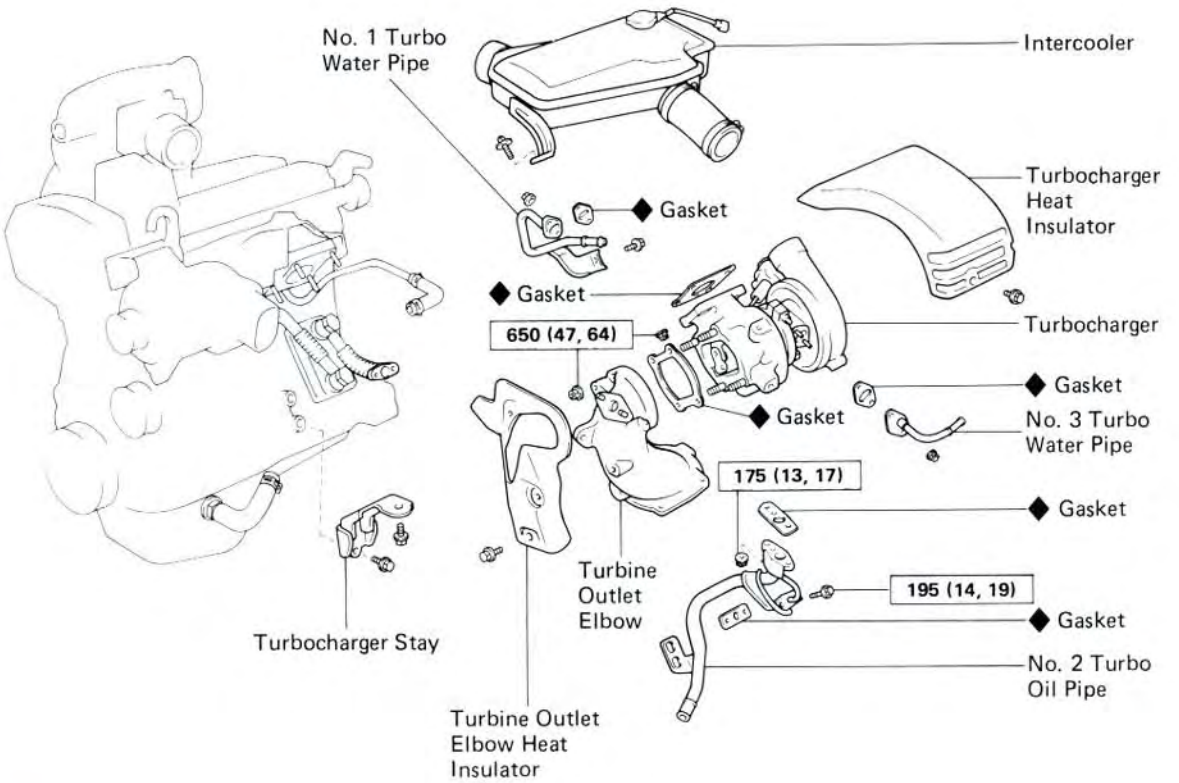
If the pressure is less than that specified, check the intake air and exhaust systems for leakage. If there is no leakage, replace the turbocharger assembly.

If the pressure is above specification, check if the actuator hose is disconnected or cracked. If not, replace the turbocharger assembly.

5. INSPECT IMPELLER WHEEL ROTATION

(See step 1 on page TC-12)

COMPONENTS



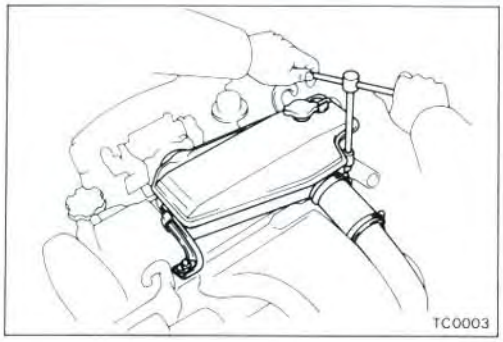
kg·cm (ft·lb, N·m) : Specified torque

◆ Non-reusable part

TC0019

REMOVAL OF TURBOCHARGER

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY
2. DRAIN ENGINE COOLANT (See page CO-4)
3. DRAIN INTERCOOLER COOLANT (See page TC-7)
4. REMOVE AIR CLEANER ASSEMBLY (See step 11 on page EM-43)
5. REMOVE CATALYTIC CONVERTER (See steps 11 to 14 on page EM-27)
6. REMOVE OXYGEN SENSOR

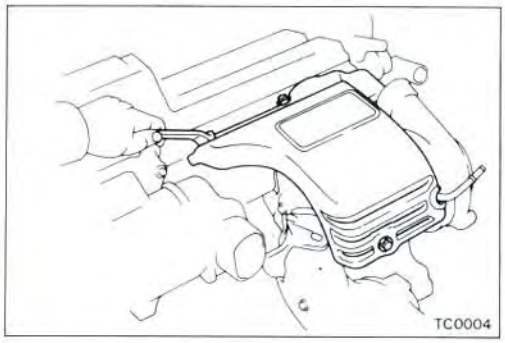


7. REMOVE INTERCOOLER

(a) Disconnect the following hoses and connector:
  (1) Two intercooler radiator water hoses
  (2) Reservoir tank water hose
  (3) Intercooler coolant level warning sensor connector

(b) Loosen the two hose clamps, and remove the three bolts.

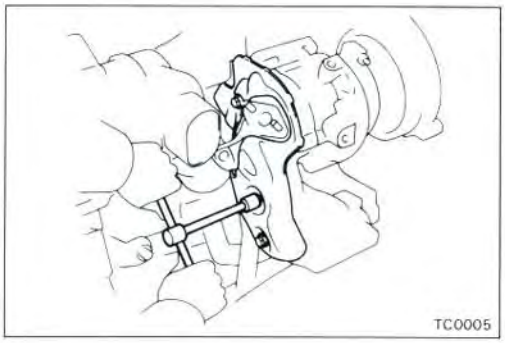
(c) Disconnect the air hoses, and remove the intercooler together with the hose.



8. REMOVE ALTERNATOR DUCT

9. REMOVE NO.2 ALTERNATOR BRACKET
(See step 15 on page EM-28)

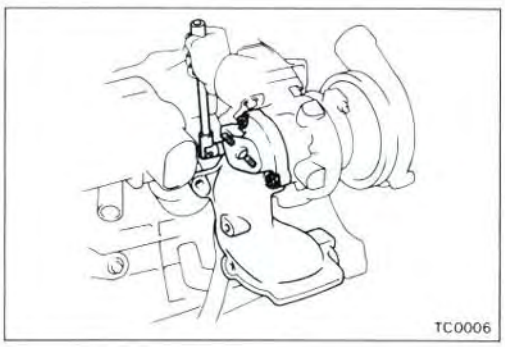
10. REMOVE TURBOCHARGER HEAT INSULATOR
Remove the three bolts and heat insulator.



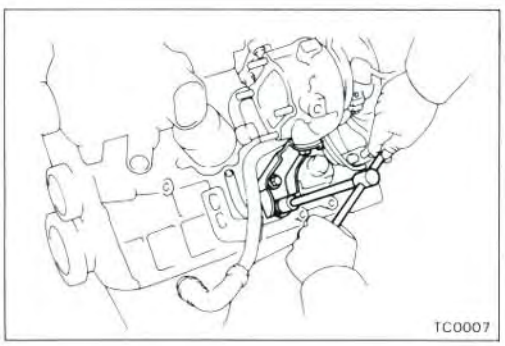
11. REMOVE HEAT INSULATOR OF TURBINE OUTLET ELBOW

(a) Remove the oil dipstick.

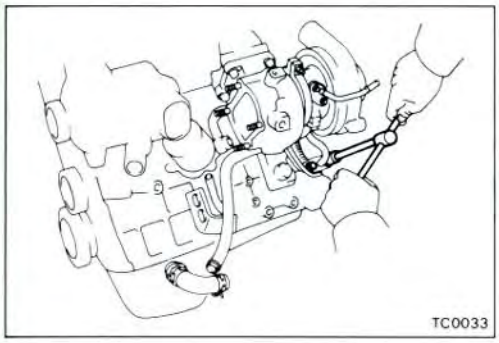
(b) Remove the three bolts and heat insulator.



12. REMOVE TURBINE OUTLET ELBOW
Remove the four nuts, turbine outlet elbow and gasket.

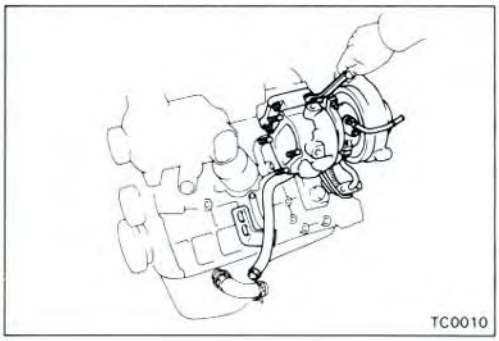


13. REMOVE TURBOCHARGER STAY
Remove the three bolts and turbocharger stay.

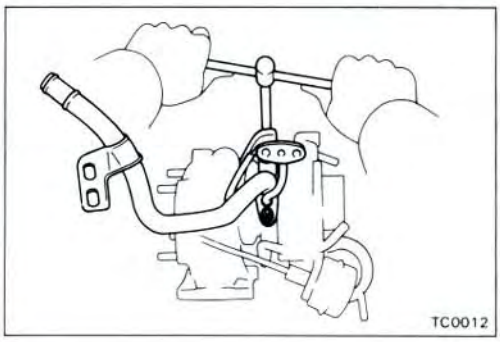


14. REMOVE TURBOCHARGER

(a) Remove the two bolts holding the No.1 turbo oil pipe to the No.2 oil pipe.

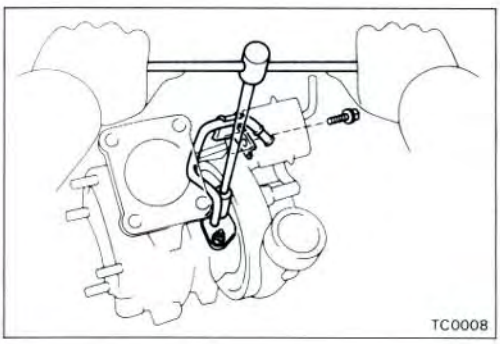


(b) Remove the four nuts, turbocharger and two gaskets.



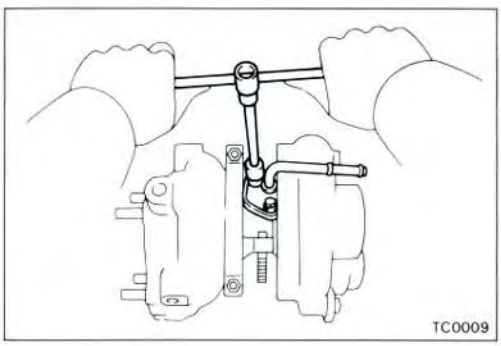
15. REMOVE NO.2 TURBO OIL PIPE

Remove the two nuts, oil pipe and gasket.



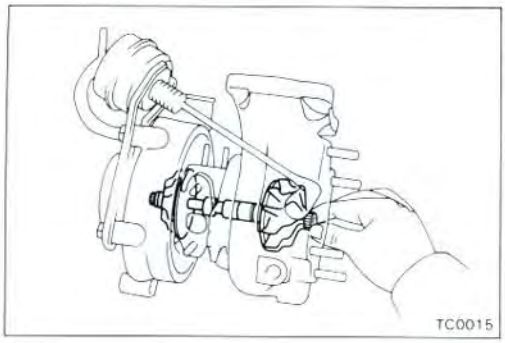
16. REMOVE NO.1 TURBO WATER PIPE

Remove the two nuts, bolt, water pipe and gasket.



17. REMOVE NO.3 TURBO WATER PIPE

Remove the two nuts, water pipe and gasket.

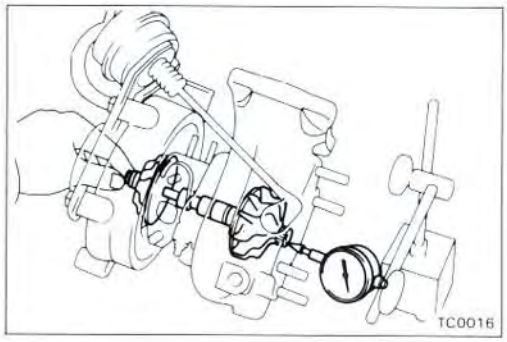


INSPECTION OF TURBOCHARGER

1. **INSPECT IMPELLER WHEEL ROTATION**

Grasp the edge of the turbine wheel and turn it. Check that the impeller wheel turns smoothly.

If the impeller wheel does not turn or if it turns with a drag, replace the turbocharger assembly.



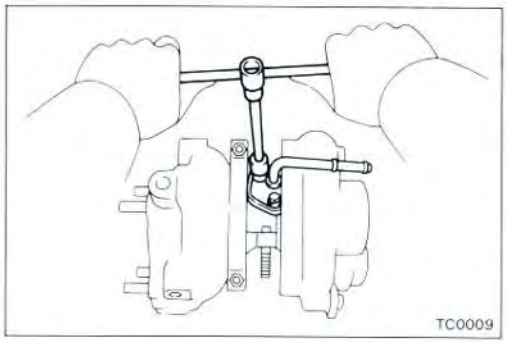
2. **INSPECT AXIAL PLAY OF IMPELLER WHEEL**

Insert a dial indicator into the intake side hole the turbine wheel edge by and check the axial play.

Axial play: 0.13 mm (0.0051 in.) or less

If the axial play is not as specified, replace the turbocharger assembly.

3. **INSPECT TURBOCHARGER PRESSURE VSV**
(See page FI-54)



INSTALLATION OF TURBOCHARGER

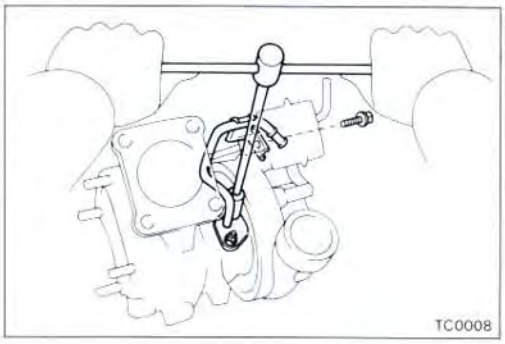
(See page TC-9)

CAUTION: After replacing the turbocharger assembly, pour approx. 20 cc (1.2 cu in.) of new oil into the oil inlet and turn the impeller wheel by hand to splash oil on the bearing.

1. **INSTALL NO.3 TURBO WATER PIPE**

Install a new gasket and the water pipe with the two nuts.

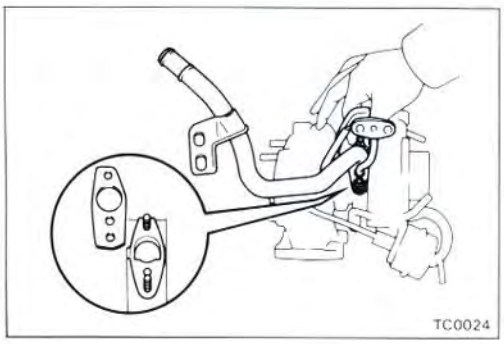
Torque: 120 kg-cm (9 ft-lb, 11 N·m)



2. **INSTALL NO.1 TURBO WATER PIPE**

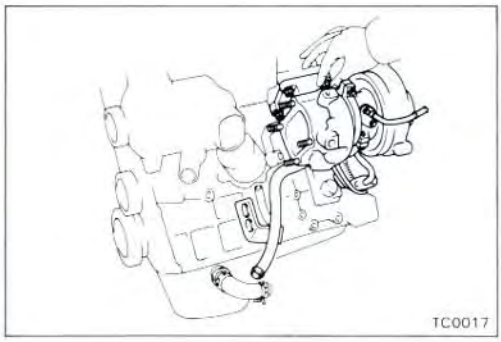
Install a new gasket and the water pipe with the two nuts and bolt.

Torque: 120 kg-cm (9 ft-lb, 11 N·m)



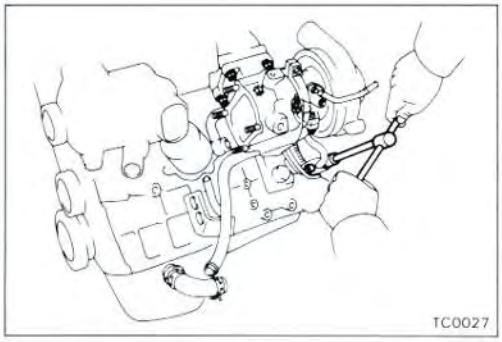
3. **INSTALL NO.2 TURBO OIL PIPE**

Install a new gasket and the oil pipe with the two nuts. Do not torque the nuts yet.



4. **INSTALL TURBOCHARGER**

(a) Install a new gasket and the turbocharger with the four nuts. Do not torque the nuts.



(b) Install the oil pipe with the two bolts and nuts.

(c) Torque the bolts and nuts.

Torque:

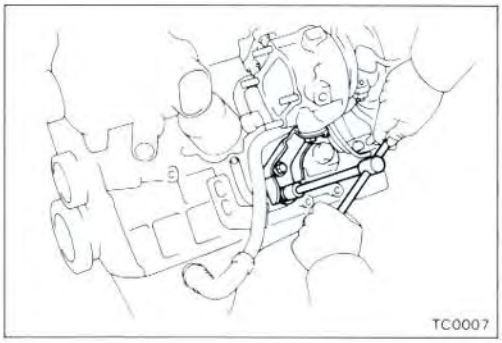
Turbocharger to exhaust manifold
650 kg-cm (47 ft-lb, 64 N·m)
No.2 oil pipe to turbocharger
175 kg-cm (13 ft-lb, 17 N·m)
No.2 oil pipe to No.1 oil pipe
195 kg-cm (14 ft-lb, 19 N·m)

(d) Connect the following hoses:

(1) Oil hose

(2) Water hoses

(3) Vacuum hose

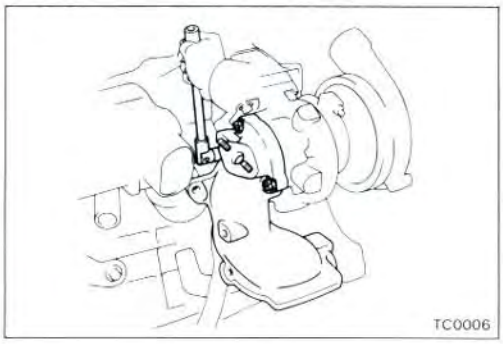


5. **INSTALL TURBOCHARGER STAY**

Install the turbocharger stay with the three bolts.

Torque:

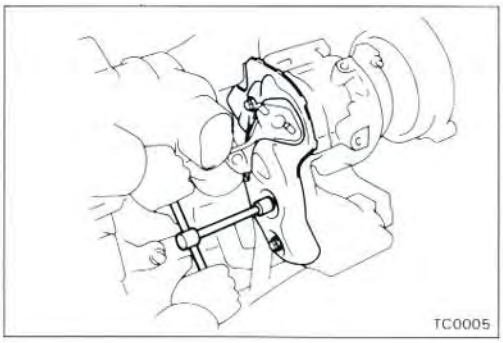
To turbocharger	**810 kg-cm (59 ft-lb, 79 N·m)**
To cylinder block	**530 kg-cm (38 ft-lb, 52 N·m)**



6. **INSTALL TURBINE OUTLET ELBOW**

Install a new gasket and the turbine outlet elbow with the four nuts.

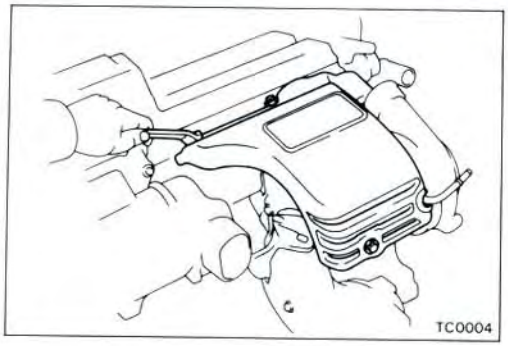
Torque: 650 kg-cm (47 ft-lb, 64 N·m)



7. **INSTALL HEAT INSULATOR OF TURBINE OUTLET ELBOW**

(a) Install the heat insulator with the three bolt.

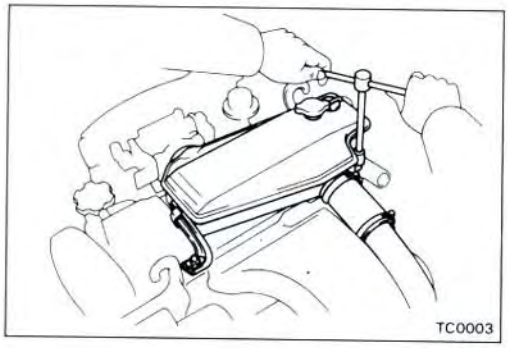
(b) Install the oil dipstick gauge.



8. **INSTALL TURBOCHARGER HEAT INSULATOR**
   Install the heat insulator with the three bolt.

9. **INSTALL NO.2 ALTERNATOR BRACKET**
   (See step 32 on page EM-40)

10. **INSTALL ALTERNATOR DUCT**



11. **INSTALL INTERCOOLER**
    (a) Connect the air hoses, and install the intercooler with the three bolts.
    (b) Connect the following hoses and connector:
        (1) Two intercooler radiator water hoses
        (2) Reservoir tank water hose
        (3) Intercooler coolant level warning sensor connector

12. **INSTALL OXYGEN SENSOR**

13. **INSTALL CATALYTIC CONVERTER**
    (See steps 33 to 36 on pages EM-40 and 41)

14. **INSTALL AIR CLEANER ASSEMBLY**
    (See step 21 on page EM-51)

15. **FILL ENGINE WITH COOLANT (See page CO-4)**
    Capacity (w/ Heater):
    8.0 liters (8.5 US qts, 7.0 Imp. qts)

16. **FILL INTERCOOLER WITH COOLANT (See page TC-7)**
    Capacity: 1.7 liters (1.8 US qts, 1.5 Imp. qts)

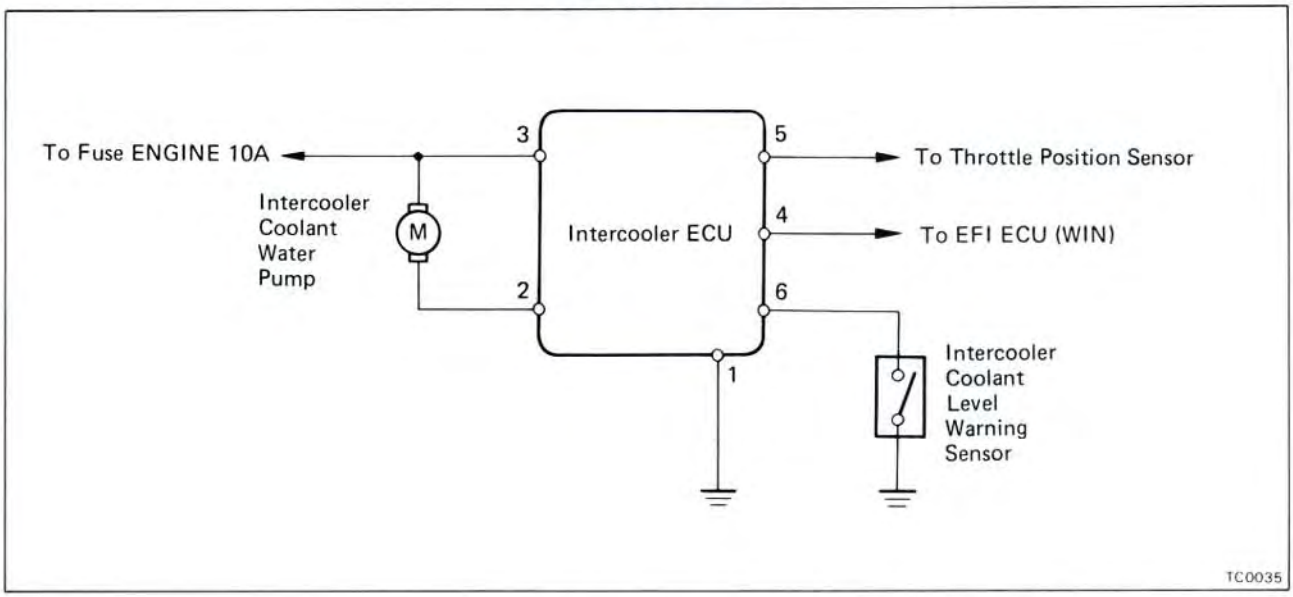
17. **CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY**

18. **START ENGINE AND CHECK FOR LEAKS**

19. **CHECK ENGINE OIL LEVEL**

INTERCOOLER

SYSTEM CIRCUIT



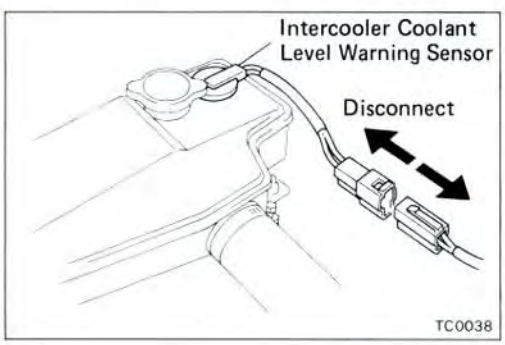
ON-VEHICLE INSPECTION OF INTERCOOLER

1. INSPECT OPERATION OF CHECK ENGINE WARNING LIGHT

(a) Turn the ignition switch ON.

(b) Check that the warning light comes on.

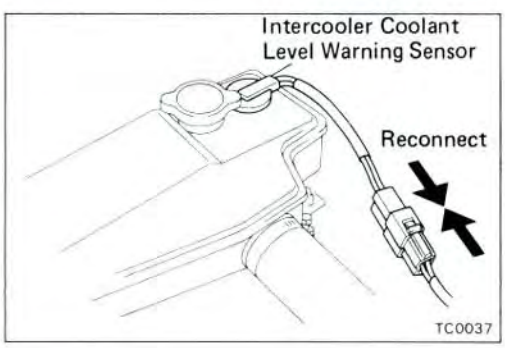
(c) When the engine is started, check that the warning light goes out.



(d) Disconnect the intercooler coolant level warning sensor connector.

(e) Check that the warning light does not light up.

(f) Open the throttle valve, and check that the warning light comes on after approx. 20 seconds.



(g) Reconnect the intercooler coolant level warning sensor connector.

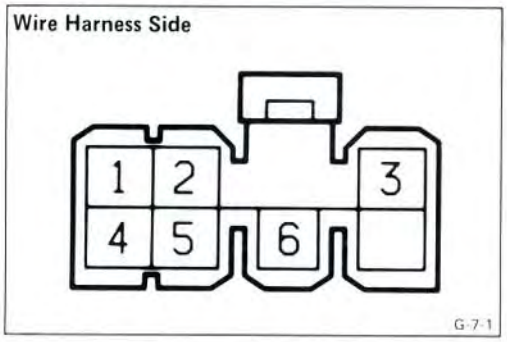
(h) Check that the warning light goes out.

2. INSPECT OPERATION OF INTERCOOLER WATER PUMP

(a) Turn the ignition switch ON.

(b) Open the throttle valve, and check that the water pump rotates.

(c) When the throttle valve is closed, check that the water pump stops after approx. 30 seconds.



INSPECTION OF INTERCOOLER ECU CIRCUIT

INSPECT INTERCOOLER ECU FOR CIRCUIT

LOCATION (ECU): Under the instrument panel on the passenger side.

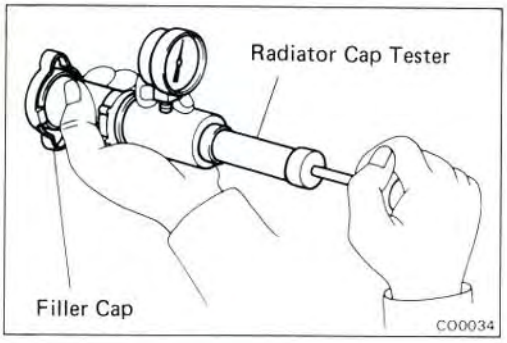
Disconnect the connector from the intercoller ECU, and check the connector on the wiring harness side as shown in the chart below.

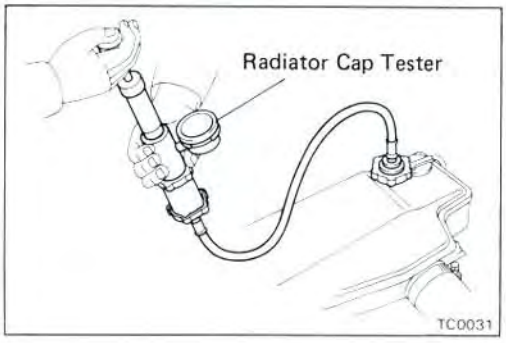
Check for	Tester connection	Condition	Specified value
Continuity	1 — Ground	—	Continuity
Voltage	2 — Ground	Ignition S/W ON	Battery voltage
	3 — Ground		
Continuity	6 — Ground	Level warning sensor ON (float up)	Continuity
		Level warning sensor OFF (float down)	No continuity

CLEANING OF INTERCOOLER RADIATOR

Using water or a steam cleaner, remove any mud and dirt from the radiator core.

CAUTION: If using a high pressure type cleaner, be careful not to deform the fins of the radiator core. If the cleaner nozzle pressure is 30 — 35 kg/cm² (427 — 498 psi, 2,942 — 3,432), keep a distance of at least 40 — 50 cm (15.75 — 19.69 in.) between the radiator core and cleaner nozzle.





INSPECTION OF INTERCOOLER RADIATOR

1. INSPECT INTERCOOLER COOLANT FILLER CAP

Using a radiator cap tester, pump the tester and measure the relief valve opening pressure.

Standard opening pressure:
0.75 — 1.05 kg/cm² (10.7 — 14.9 psi, 74 — 103 kPa)

Minimum opening pressure:
0.6 kg/cm² (8.5 psi, 59 kPa)

If the opening pressure is less than minimum, replace the filler cap.

2. INSPECT INTERCOOLER COOLING SYSTEM FOR LEAKS

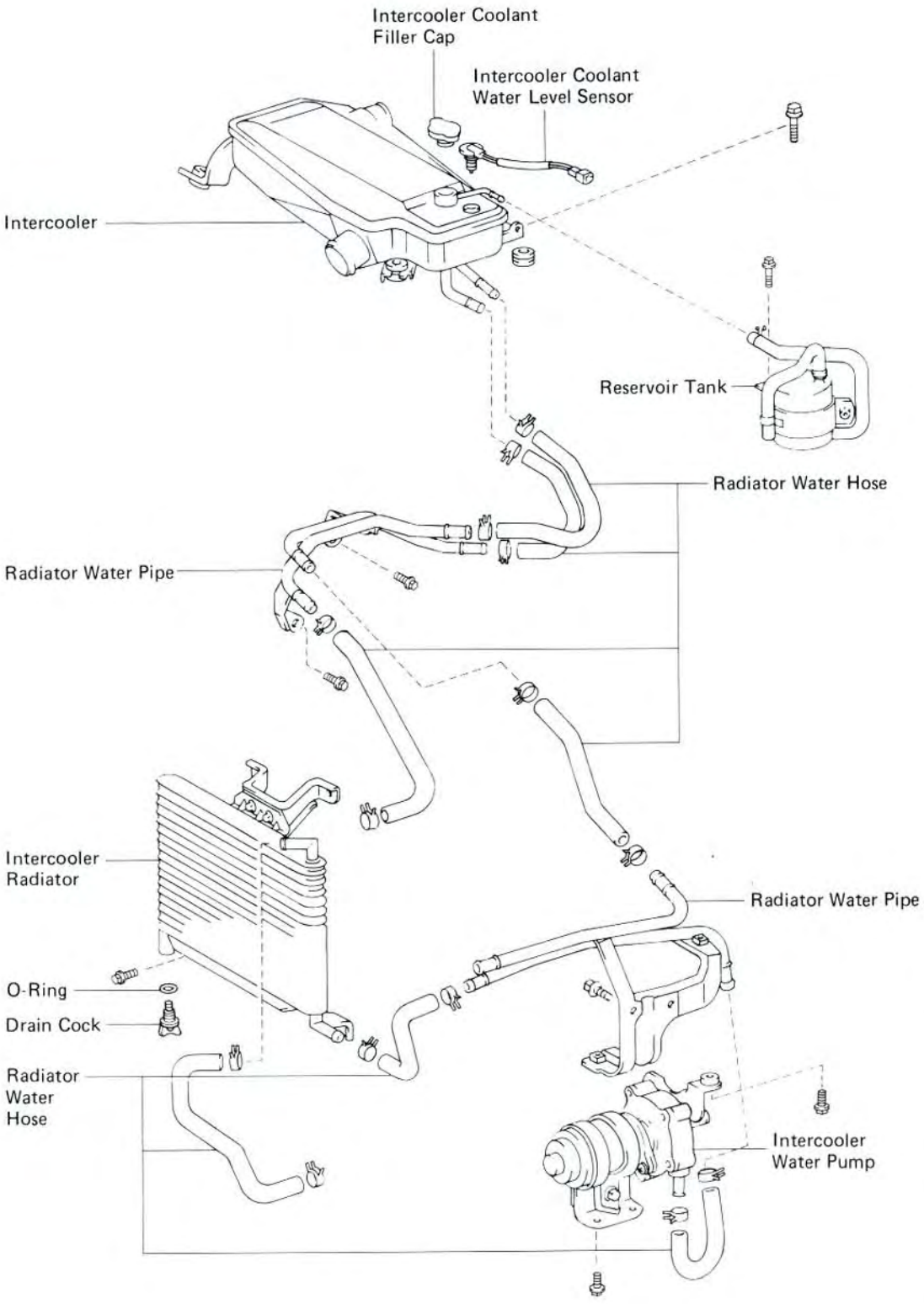
(a) Fill the cooling system with coolant and attach a radiator cap tester.

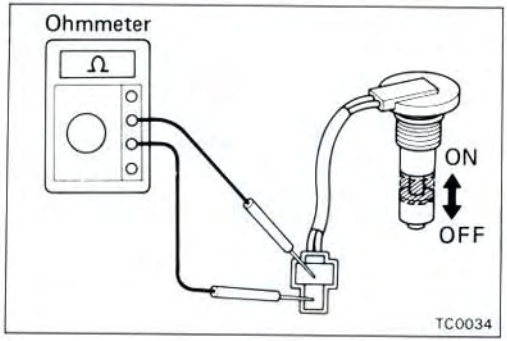
(b) Warm up the engine.

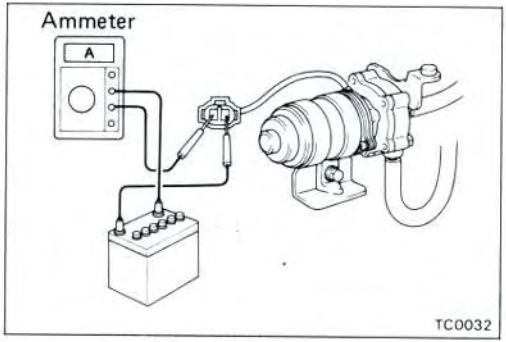
(c) Pump it to 1.2 kg/cm² (17.1 psi, 118 kPa), check that pressure does not drop.

If the pressure drops, check for leaks the hoses, radiator or water pump.

COMPONENTS


Intercooler Coolant Filler Cap
Intercooler Coolant Water Level Sensor
Intercooler
Reservoir Tank
Radiator Water Hose
Radiator Water Pipe
Intercooler Radiator
Radiator Water Pipe
O-Ring
Drain Cock
Radiator Water Hose
Intercooler Water Pump
TC0023





INSPECTION OF INTERCOOLER COMPONENTS

1. INSPECT INTERCOOLER COOLANT LEVEL WARNING SENSOR

(a) Check that there is continuity between the terminals with the switch ON (float up).

(b) Check that there is no continuity between the terminals with the switch OFF (float down).

If operation is not as specified, replace the sensor.

2. INSPECT INTERCOOLER WATER PUMP

(a) Connect the battery and ammeter to the water pump connector.

(b) Check that the pump rotates smoothly, and check the reading on the ammeter.

Standard amperage: 1.5 — 2.1 A

EMISSION CONTROL SYSTEMS

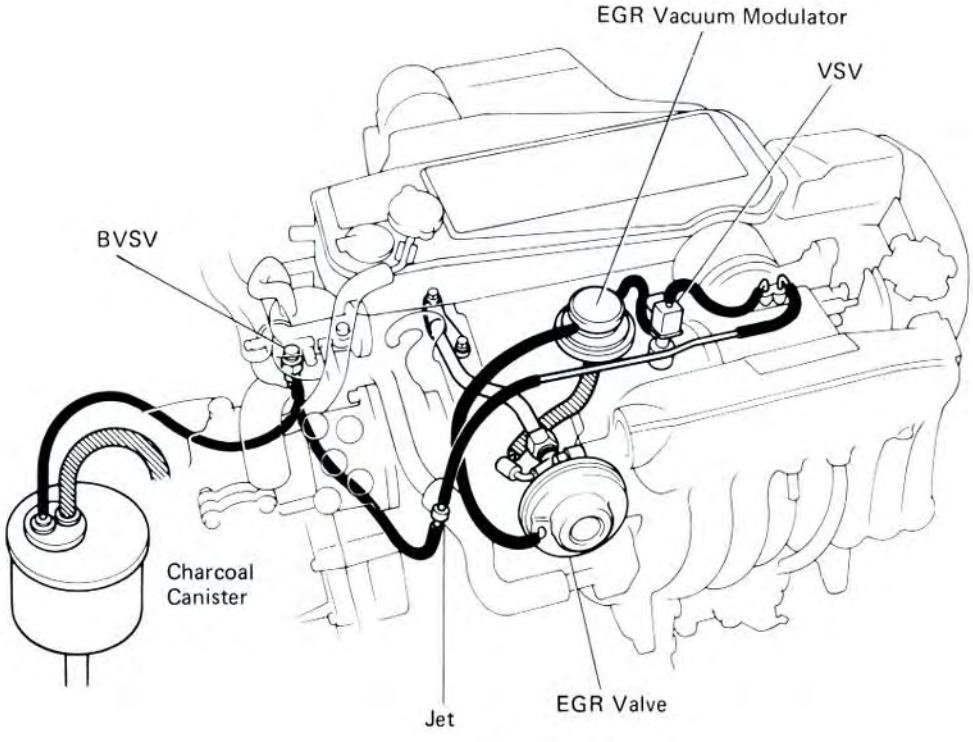
NOTE: TROUBLESHOOTING (See pages EM-4 to 7)

SYSTEM PURPOSE

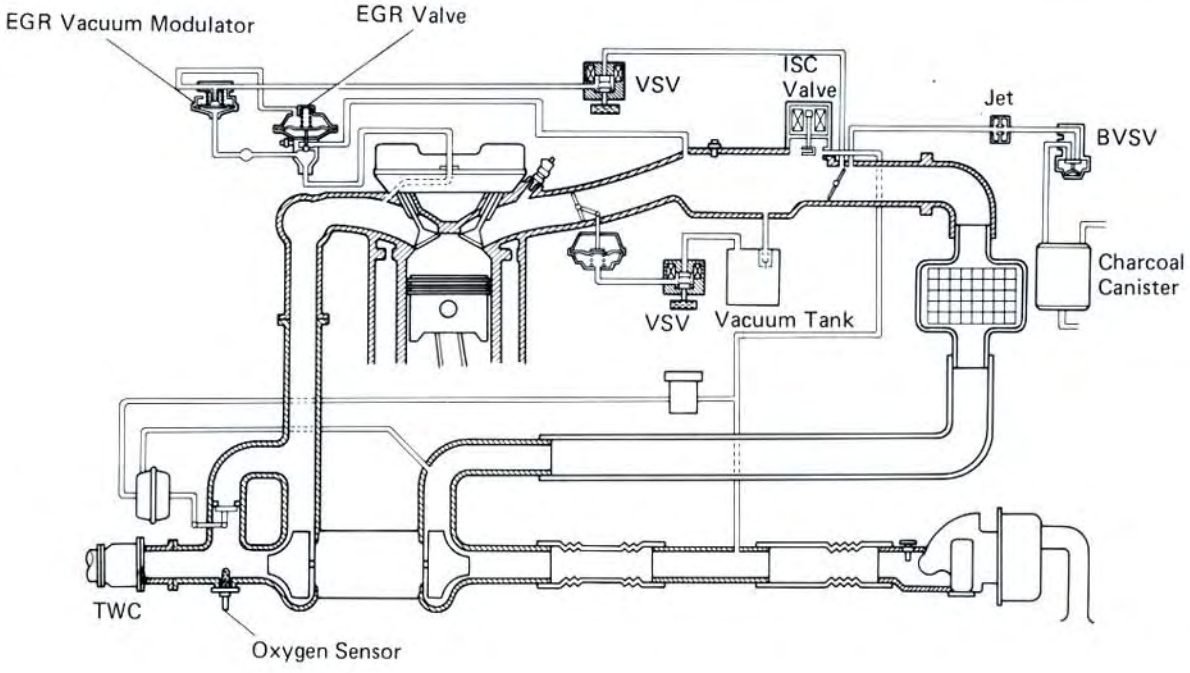
System	Abbreviation	Purpose
Positive crankcase ventilation	PCV	Reduced blow-by gas (HC)
Fuel evaporative emission control	EVAP	Reduced evaporative HC
Exhaust gas recirculation	EGR	Reduces NOx
Three-way catalyst	TWC	Reduces HC, CO and NOx
Electronic fuel injection*	EFI	Regulates all engine conditions for reduction of exhaust emissions.

Remarks * For inspection and repair of the EFI system, refer to the EFI section of this manual.

COMPONENT LAYOUT AND SCHEMATIC DRAWING

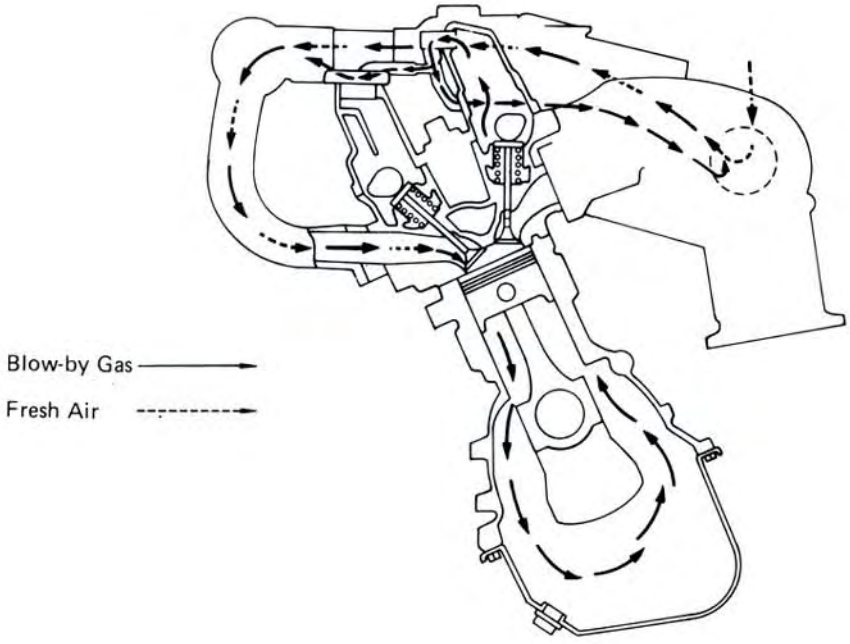


EC2826



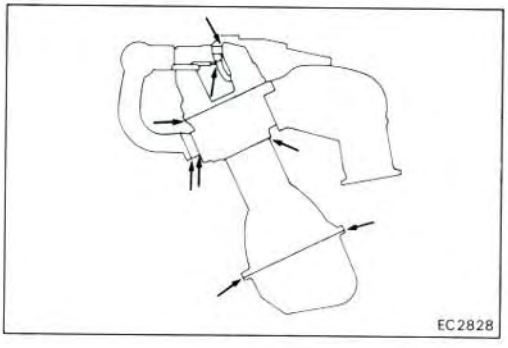
EC2827

POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM



EC2829

To reduce HC emissions, crankcase blow-by gas (HC) is routed to the intake manifold for combustion in the cylinders.



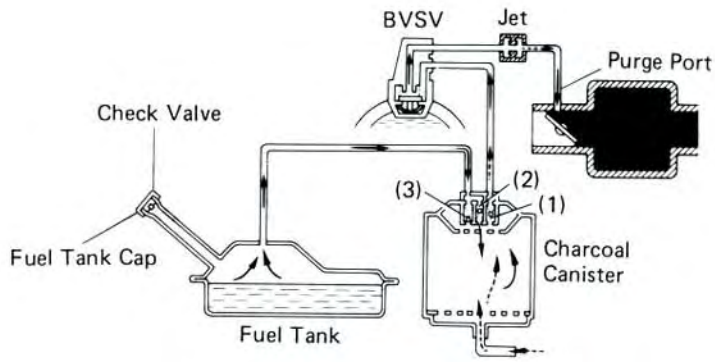
EC2828

INSPECTION OF PCV HOSE AND CONNECTIONS

VISUALLY INSPECT HOSE AND CONNECTIONS

Check for cracks, leaks, or damage.

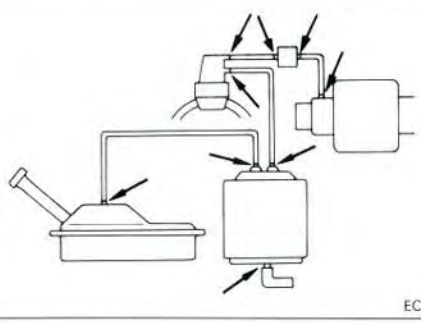
FUEL EVAPORATIVE EMISSION CONTROL (EVAP) SYSTEM



EC1572

To reduce HC emission, evaporated fuel from the fuel tank is routed through the charcoal canister to the intake manifold for combustion in the cylinders.

Coolant Temp.	BVSV	Throttle Valve Opening	Canister Check Valve			Check Valve in Cap	Evaporated Fuel (HC)
			(1)	(2)	(3)		
Below 35°C (95°F)	CLOSED	–	–	–	–	–	HC from tank is absorbed into the canister.
Above 54°C(129°F)	OPEN	Positioned below purge port	CLOSED	–	–	–	
		Positioned above purge port	OPEN	–	–	–	HC from canister is led into air intake chamber.
High pressure in tank	–	–	–	OPEN	CLOSED	CLOSED	HC from tank is absorbed into the canister.
High vacuum in tank	–	–	–	CLOSED	OPEN	OPEN	Air is led into the fuel tank.



EC1573

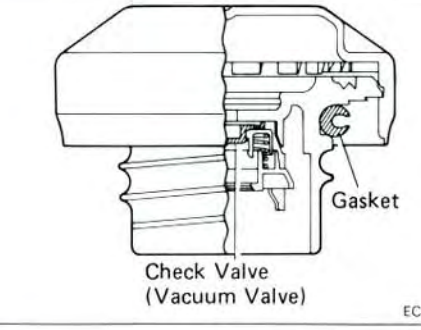
INSPECTION OF FUEL VAPOR LINES, FUEL TANK AND TANK CAP

1. VISUALLY INSPECT LINES AND CONNECTIONS

Look for loose connections, sharp bends or damage.

2. VISUALLY INSPECT FUEL TANK

Look for deformation, cracks or fuel leakage.

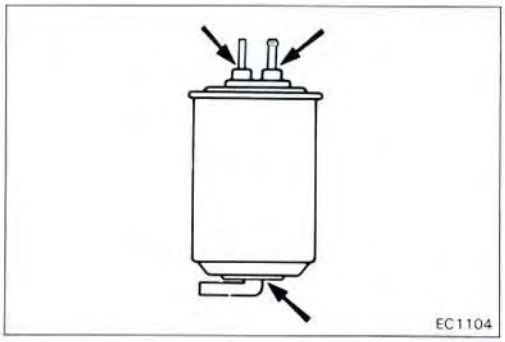


EC3069

3. VISUALLY INSPECT FUEL TANK CAP

Check if the cap and/or gasket are deformed or damaged.

If necessary, repair or replace the cap.

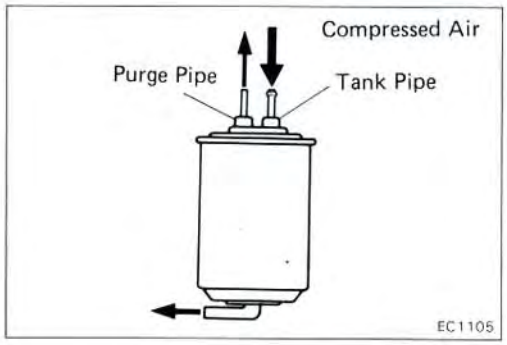


INSPECTION OF CHARCOAL CANISTER

1. **REMOVE CHARCOAL CANISTER**

2. **VISUALLY INSPECT CHARCOAL CANISTER**

   Look for cracks or damage.

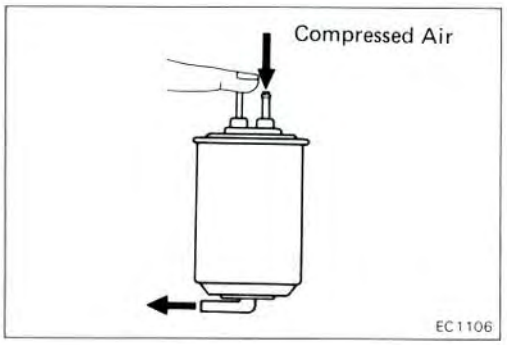


3. **CHECK FOR CLOGGED FILTER AND STUCK CHECK VALVE**

   (a) Using low pressure compressed air, blow into the tank pipe and check that air flows without resistance from the other pipes.

   (b) Blow into the purge pipe and check that air does not flow from the other pipes.

   If a problem is found, replace the charcoal canister.



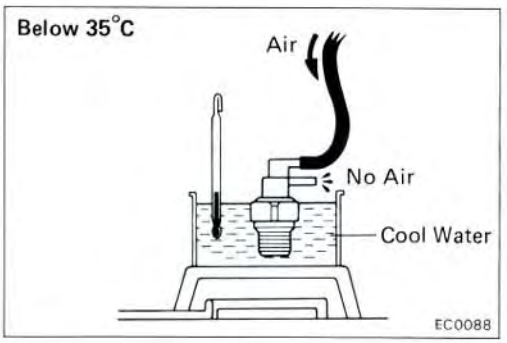
4. **CLEAN FILTER IN CANISTER**

   Clean the filter by blowing 3 kg/cm² (43 psi, 294 kPa) of compressed air into the tank pipe while holding the other upper canister pipe closed.

   NOTE:

   - Do not attempt to wash the canister.
   - No activated carbon should come out.

6. **REINSTALL CHARCOAL CANISTER**



INSPECTION OF BVSV

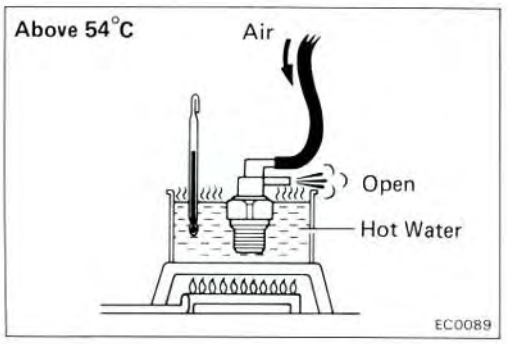
CHECK BVSV BY BLOWING AIR INTO PIPE

(a) Drain the coolant from the radiator into a suitable container.

(b) Remove the BVSV.

(c) Cool the BVSV to below 35°C (95°F) with cool water.

(d) Blow air into a pipe and check that the BVSV is closed.



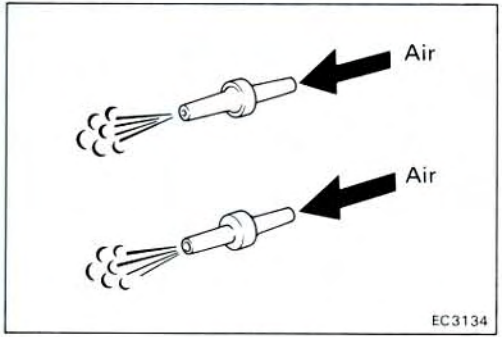
(e) Heat the BVSV to above 54°C (129°F) with hot water.

(f) Blow air into a pipe and check that the BVSV is open.

If a problem is found, replace the BVSV.

(g) Apply liquid sealer to the threads of the BVSV and reinstall.

(h) Refill the radiator with coolant.

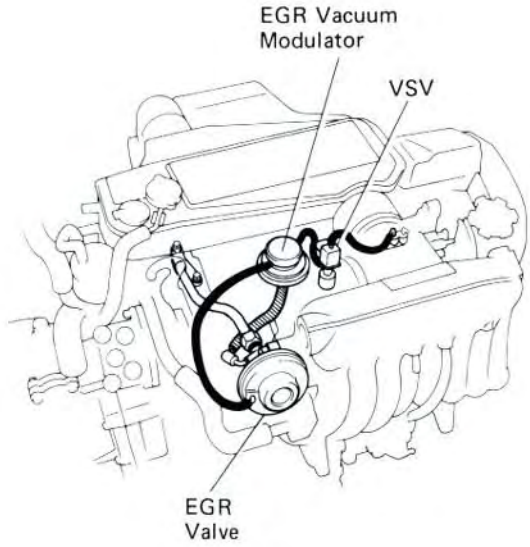


INSPECTION OF JET

CHECK JET BY BLOWING AIR FROM EACH SIDE

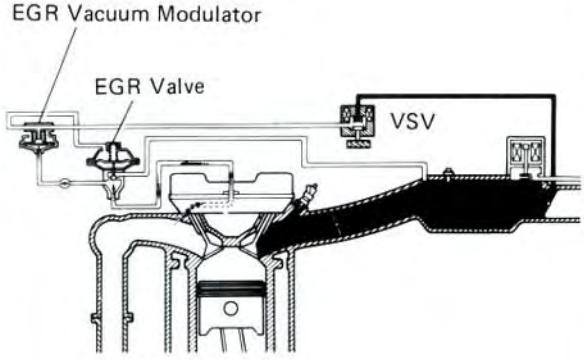
Check for stoppage.

EXHAUST GAS RECIRCULATION (EGR) SYSTEM



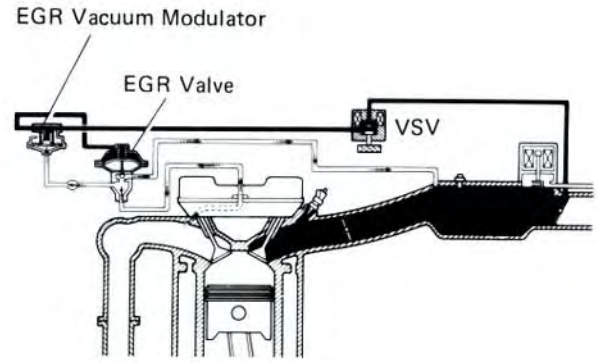
EC2832

(1)



EC2834

(2)

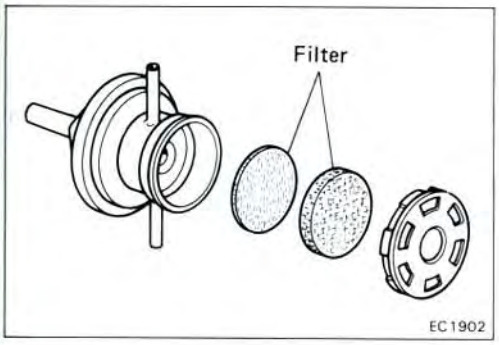


EC2833

To reduce NOx emissions, part of the exhaust gases are recirculated through the EGR valve to the intake manifold to lower the maximum combustion temperature.

Coolant Temp.	VSV	Throttle Valve Opening Angle	Pressure in the EGR Valve Pressure Chamber		EGR Vacuum Modulator	EGR Valve	Exhaust Gas
Below 54°C (129°F)	CLOSED	–	–		–	CLOSED	Not recirculated
Above 60°C (140°F)	OPEN	Positioned below EGR port	(1)	–	–	CLOSED	Not recirculated
		Positioned above EGR port	(2)	*	CLOSED passage to atmosphere	OPEN	Recirculated (increase)

Remarks: *When the throttle valve is positioned above the EGR port, the EGR vacuum modulator will close the atmosphere passage and open the EGR valve to increase the EGR gas, even if the exhaust pressure is insufficiently low.

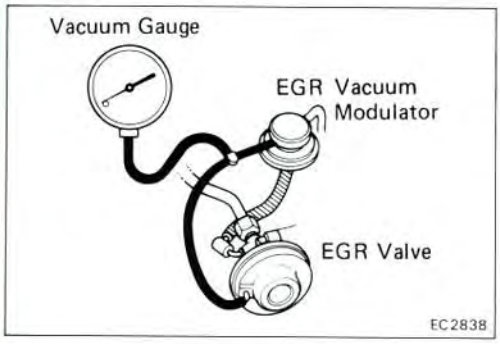


INSPECTION OF EGR SYSTEM

1. CHECK AND CLEAN FILTERS IN EGR VACUUM MODULATOR

(a) Check the filters for contamination or damage.

(b) Using compressed air, clean the filters.

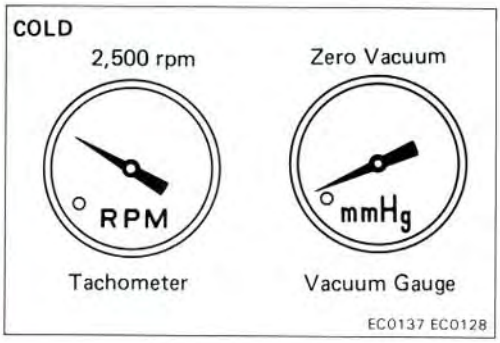


2. PREPARATION

Using a 3-way connector, connect a vacuum gauge to the hose between the EGR valve and vacuum pipe.

3. CHECK SEATING OF EGR VALVE

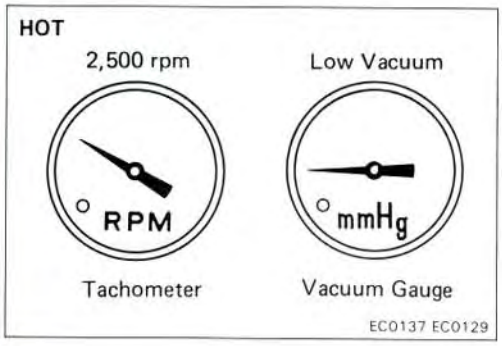
Start the engine and check that the engine starts and runs at idle.



4. CHECK VSV WITH COLD ENGINE

(a) The coolant temperature should be below 54°C (129°F).

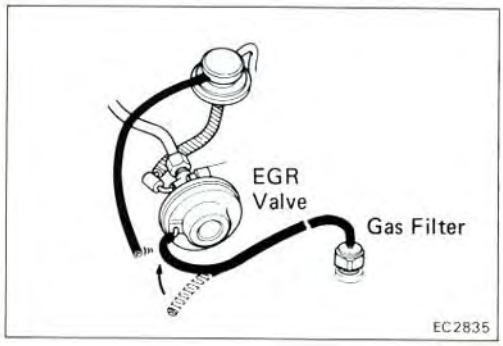
(b) Check that the vacuum gauge indicates zero at 2,500 rpm.



5. CHECK VSV AND EGR VACUUM MODULATOR WITH HOT ENGINE

(a) Warm up the engine.

(b) Check that the vacuum gauge indicates low vacuum at 2,500 rpm.



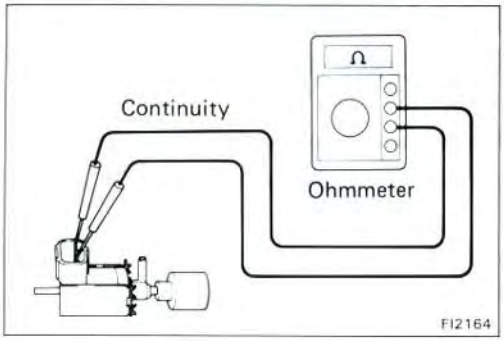
6. CHECK EGR VALVE

(a) Apply vacuum directly to the EGR valve with the engine.

(b) Check that the engine runs rough or dies.

(c) Reconnect the vacuum hoses to the proper locations.

IF NO PROBLEM IS FOUND WITH THIS INSPECTION, SYSTEM IS OKEY; OTHERWISE INSPECT EACH PART



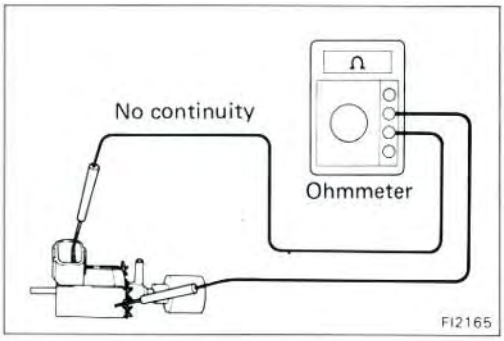
INSPECTION OF VSV

1. CHECK VSV FOR OPEN CIRCUIT

Using an ohmmeter, check that there is continuity between the terminals.

Resistance (Cold): 33 — 39 Ω

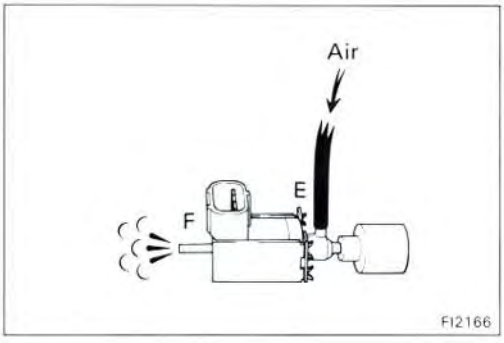
If there is no continuity, replace the VSV.



2. CHECK VSV FOR GROUND

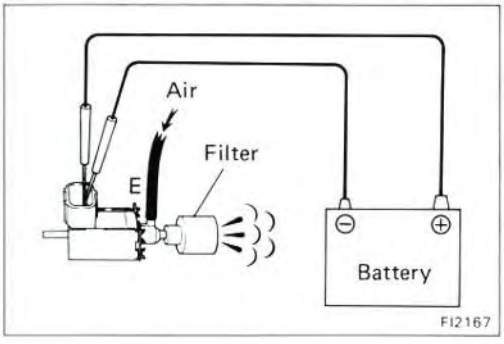
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



3. CHECK VSV OPERATION

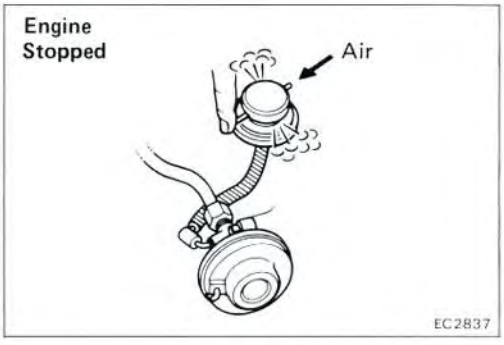
(a) Check that air flows from pipe E to pipe F.



(b) Apply battery voltage across the terminals.

(c) Check that air flows from pipe E to the filter.

If operation is not as specified, replace the VSV.



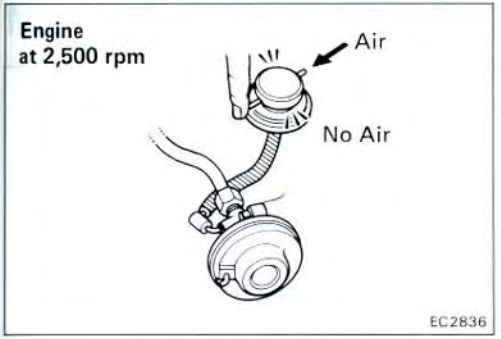
INSPECTION OF EGR VACUUM MODULATOR

CHECK EGR VACUUM MODULATOR OPERATION

(a) Disconnect the vacuum hoses from the ports of the EGR vacuum modulator.

(b) Block the port with your finger.

(c) Blow air into another port and check that the air passes through to the air filter side freely.



(d) Start the engine and maintain speed at 2,500 rpm.

(e) Repeat the above test. Check that there is a strong resistance to air flow.

(f) Reconnect the vacuum hoses to the proper locations.

INSPECTION OF EGR VALVE

1. **REMOVE EGR VALVE**

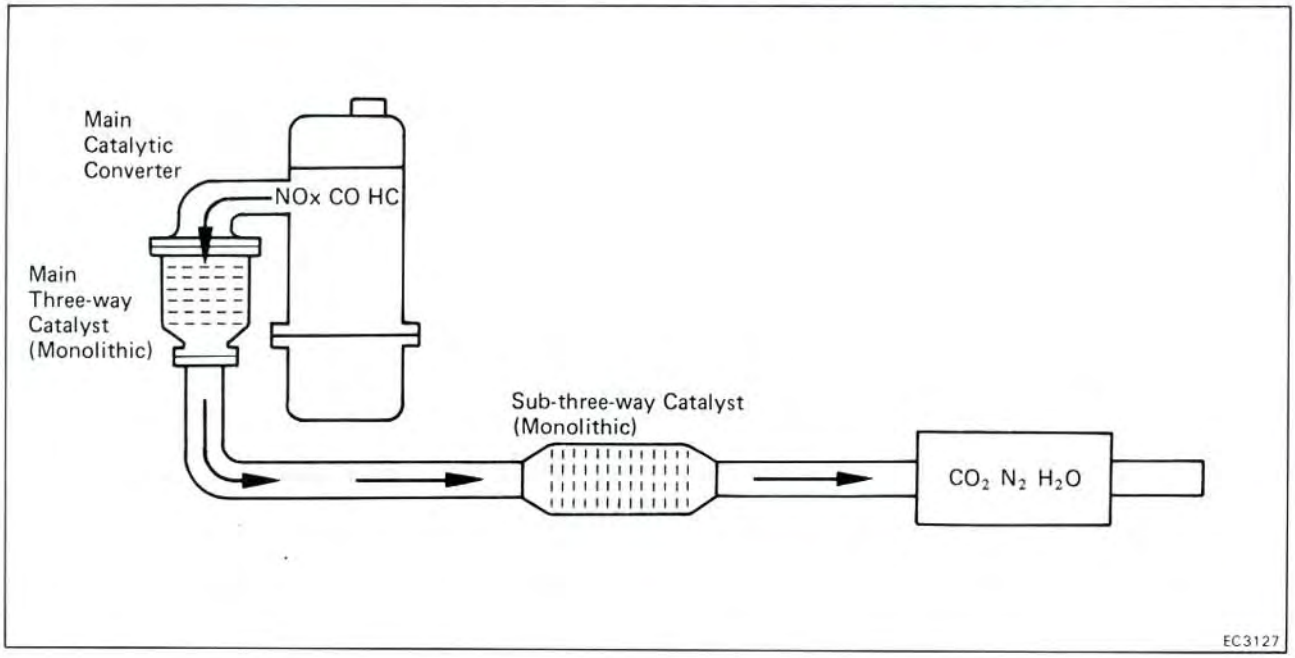
   Check for sticking and heavy carbon deposits.

   If a problem is found, replace the valve.

2. **REINSTALL EGR VALVE**

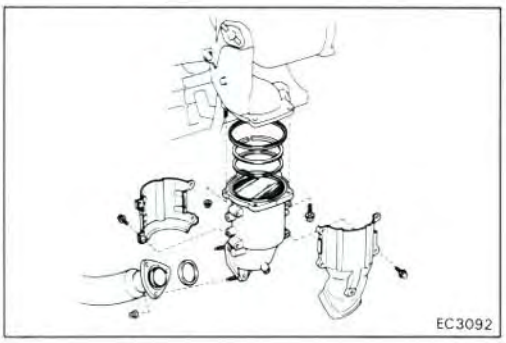
   Install a new gasket.

THREE-WAY CATALYST (TWC) SYSTEM



To reduce HC, CO and NOx emissions, they are oxidized, reduced and converted to nitrogen (N_2), carbon dioxide (CO_2) and water (H_2O) by the catalyst.

Exhaust Port		Main TWC		Sub-TWC		Exhaust Gas
HC, CO AND NOx	⇒	OXIDATION AND REDUCTION	⇒	OXIDATION AND REDUCTION	⇒	CO_2 H_2O N_2



INSPECTION OF EXHAUST PIPE ASSEMBLY

CHECK CONNECTIONS FOR LOOSENESS OR DAMAGE

REPLACEMENT OF CATALYTIC CONVERTERS

1. REMOVE CONVERTERS

(a) Jack up the vehicle.

(b) Check that the converter is cool.

(c) Remove the suspension lower crossmember. (See page EM-44)

(d) Remove the front exhaust pipe (Sub-converter).

- Loosen the bolt, and disconnect the clamp the exhaust pipe bracket.
- Remove the three nuts, and remove the exhaust pipe. Remove the gasket.

(e) Remove the six bolts, two nuts and two converter stays.

(f) Remove the three bolts, two nuts, gasket, retainer, cushion and main converter.

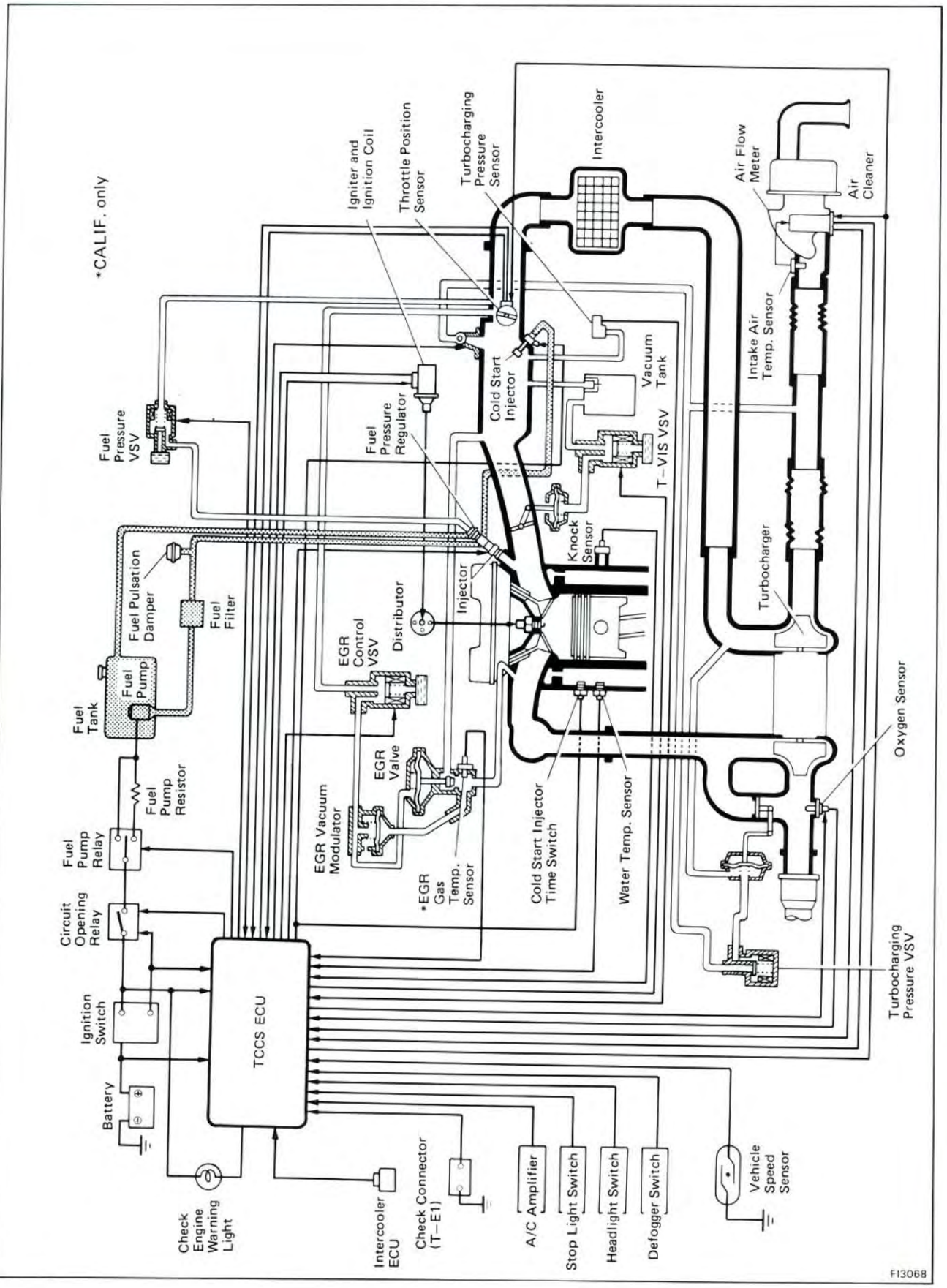
(g) Remove the nine bolts and two heat insulators from the main converter.

EFI SYSTEM

REFER TO 1988 CELICA REPAIR MANUAL (Pub. No. RM071U)

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

SYSTEM DESCRIPTION



The EFI system is composed of three basic subsystems: Fuel Induction, Air Induction and Electronic Control Systems.

FUEL SYSTEM

Fuel is supplied under constant pressure to the EFI injectors by an electric fuel pump. The injectors inject a metered quantity of fuel into the intake manifold in accordance with signals from the ECU (Electronic Control Unit).

AIR INDUCTION SYSTEM

The air induction system provides sufficient air for engine operation.

ELECTRONIC CONTROL SYSTEM

The Celica 3S-GTE engine is equipped with a Toyota Computer Control System (TCCS) which centrally controls the EFI, ESA, ISC, Diagnosis systems, etc. by means of an Electronic Control Unit (ECU — formerly EFI computer) employing a microcomputer.

By means of the ECU, the TCCS controls the following functions:

1. Electronic Fuel Injection (EFI)

   The ECU receives signals from various sensors indicating changing engine operating conditions such as:

   Intake air volume
   Intake air temperature
   Coolant temperature
   Engine rpm
   Acceleration/deceleration
   Exhaust oxygen content etc.

   These signals are utilized by the ECU to determine the injection duration necessary for an optimum air-fuel ratio.

2. Electronic Spark Advance (ESA)

   The ECU is programmed with data for optimum ignition timing under any and all operating conditions. Using data provided by sensors which monitor various engine functions (rpm, coolant temperature, etc.), the microcomputer (ECU) triggers the spark at precisely the right instant. (See IG section)

3. Idle Speed Control (ISC)

   The ECU is programmed with target idling speed values to respond to different engine conditions (coolant temperature, air conditioner on/off, etc.). Sensors transmit signals to the ECU which control the flow of air through the by-pass of the throttle valve and adjust idle speed to the target value. (See page FI-44)

4. Diagnosis

   The ECU detects any malfunctions or abnormalties in the sensor network and lights a check engine warning light on the instrument panel. At the same time, the trouble is identified and a diagnostic code is recorded by the ECU. The diagnostic code can be read by the number of blinks of the check engine warning light when terminals T and E1 are short-circuited. The diagnostic codes are refer to the later page. (See page FI-14)

5. Fail-Safe Function

   In the event of the sensor malfanctioning, a back-up circuit will take over to provide minimal driveability, and the check engine warning light will light.

TROUBLESHOOTING

TROUBLESHOOTING PROCEDURES

SYMPTOM — DIFFICULT TO START OR NO START (ENGINE WILL NOT CRANK OR CRANKS SLOWLY)

CHECK ELECTRONIC SOURCE → BAD →
1. Battery
   (1) Connections
   (2) Gravity — Drive belt — Charging system
   (3) Voltage
2. Fusible links

OK ↓

CHECK STARTING SYSTEM → BAD →
1. Ignition switch
2. Clutch start switch
3. Starter relay
4. Starter
5. Wiring/Connection

SYMPTOM — DIFFICULT TO START OR NO START (CRANKS OK)

CHECK DIAGNOSIS SYSTEM
Check for output of diagnostic code.
*(See page FI-22)
→ Malfunction code → Diagnostic code(s) (See page FI-14)

Normal code ↓

CHECK FOR VACUUM LEAKS IN AIR INTAKE LINE → BAD →
1. Oil filler cap
2. Oil dipstick
3. Hose connections
4. PCV hoses
5. EGR system — EGR valve stays open

OK ↓

CHECK IGNITION SPARK
(See page IG-4)
→ BAD →
1. High-tension cords
2. Distributor
3. Ignition coil
4. Igniter

OK ↓

CHECK IGNITION TIMING
1. Short terminals T and E1 of the check connector.
2. Check ignition timing.
   Standard: 10° BTDC @ idle
→ NO → Ignition timing — Adjust (See page IG-9)

OK ↓

CHECK FUEL SUPPLY TO INJECTOR
1. Fuel in tank
2. Fuel pressure in fuel line
   (1) Short terminals +B and FP of the check connector.
   (2) Fuel pressure at fuel hose of fuel filter can be felt. (See page FI-24)
→ BAD →
1. Fusel lines — Leakage — deformation
2. Fuses
3. Circuit opening relay (See page FI-47)
4. Fuel pump (See page FI-23)
5. Fuel filter
6. Fuel pressure regulator (See page FI-32)

OK ↓ CONTINUED ON PAGE FI-5

* See Pub. No. RM071U

OK CONTINUED FROM PAGE FI-4

CHECK FUEL PUMP SWITCH IN AIR FLOW METER
Check continuity between terminals FC and E1 while measuring plate of air flow meter is open.

BAD → Air flow meter *(See page FI-84)

OK

CHECK SPARE PLUGS
Maximum: 1.0 mm (0.039 in.)
NOTE: Check compression pressure and valve clearance if necessary.

NO →
1. Spark plugs
2. Compression pressure
   Minimum: 9.0 kg/cm² (128 psi, 883 kPa) at 250 rpm
3. Valve clearance
   Standard: IN 0.15 – 0.25 mm (0.006 – 0.010 in.)
   EX 0.20 – 0.30 mm (0.008 – 0.012 in.)

BAD (All Plugs WET) →
1. Injector(s) – shorted or leaking
2. Injector wiring – short circuited
3. Cold start injector – leakage (See page FI-29)
4. Cold start injector time switch (See page FI-50)

OK

CHECK EFI ELECTRONIC CIRCUIT USING VOLT/OHMMETER
(See page FI-16)

BAD →
1. Wiring connections
2. Power to ECU
   (1) Fusible links
   (2) Fuses
   (3) EFI main relay *(See page FI-97)
3. Air flow meter *(See page FI-84)
4. Water temp. sensor *(See page FI-100)
5. Air temp. sensor *(See page FI-84)
6. Injection signal circuit
   (1) Injector wiring
   (2) Solenoid resistor (See page FI-49)
   (3) ECU (See page FI-56)

* See Pub. No. RM071U

SYMPTOM — ENGINE OFTEN STALLS

CHECK DIAGNOSIS SYSTEM
Check for output of diagnostic code.
*(See page FI-22)

Malfunction code(s) → Diagnostic code(s) (See page FI-14)

Normal code ↓

CHECK FOR VACUUM LEAKS IN AIR INTAKE LINE

BAD →
1. Oil filler cap
2. Oil dipstick
3. Hose connections
4. PCV hoses
5. EGR system — EGR valve stays open

OK ↓

CHECK FUEL SUPPLY TO INJECTOR
1. Fuel in tank
2. Fuel pressure fuel line
   (1) Short terminals FP and +B of the check connector.
   (2) Feel pressure at fuel hose of fuel filter. (See page FI-24)

BAD →
1. Fuel line — Leakage — Deformation
2. Fuses
3. Circuit opening relay (See page FI-47)
4. Fuel pump (See page FI-23)
5. Fuel filter
6. Fuel pressure regulator (See page FI-32)

OK ↓

CHECK AIR FILTER ELEMENT

BAD → Element — Clean or replace

OK ↓

CHECK IDLE SPEED
Standard: 750 ± 50 rpm

BAD →
1. Wiring connections
2. ISC valve (See page FI-44)
3. ECU (test by substitution)

OK ↓

CHECK IGNITION TIMING
1. Short terminals T and E1 of the service connector.
2. Check ignition timing.
   Standard: 10° BTDC @ idle

NO → Ignition system

OK ↓

CHECK SPARK PLUGS
Maximum: 1.0 mm (0.039 in.)

NOTE: Check compression pressure and valve clearance if necessary.

NO →
1. Spark plugs
2. Compression pressure
   Minimum: 9.0 kg/cm² (128 psi, 883 kPa) at 250 rpm
3. Valve Clearance (Cold)
   Standard: IN 0.15 — 0.25 mm (0.006 — 0.010 in.)
   EX 0.20 — 0.30 mm (0.008 — 0.012 in.)

OK CONTINUED ON PAGE FI-7

* See Pub. No. RM071U

OK CONTINUED FROM PAGE FI-6

CHECK COLD START INJECTOR
(See page FI-29)

BAD →
1. Cold start injector (See page FI-29)
2. Cold start injector time switch (See page FI-50)

OK

RECHECK FUEL PRESSURE
(See page FI-24)

BAD →
1. Fuel pump (See page FI-23)
2. Fuel filter
3. Fuel pressure regulator (See page FI-32)

OK

CHECK INJECTORS
(See page FI-34)

BAD → Injection condition

OK

CHECK EFI ELECTRONIC CIRCUIT USING VOLT/OHMMETER
(See page FI-16)

BAD →
1. Wiring connections
2. Power to ECU
   (1) Fusible links
   (2) Fuses
   (3) EFI main relay *(See page FI-97)
3. Air flow meter *(See page FI-84)
4. Water temp. sensor *(See page FI-100)
5. Air temp. sensor *(See page FI-84)
6. Injection signal circuit
   (1) Injector wiring
   (2) Solenoid resistor (See page FI-49)
   (3) ECU (See page FI-56)

SYMPTOM — ENGINE SOMETIMES STALLS

CHECK DIAGNOSIS SYSTEM
Check for output of diagnostic code.
*(See page FI-22)

Malfunction code → Diagnostic code(s) (See page FI-14)

Normal code

CHECK AIR FLOW METER
*(See page FI-84)

BAD → Air flow meter

OK

CHECK WIRING CONNECTORS AND RELAYS
Check for a signal change when the connector or relay is slightly tapped or wiggled.

BAD →
1. Connectors
2. EFI main relay (See page FI-97)
3. Circuit opening relay (See page FI-47)

* See Pub. No. RM071U

SYMPTOM – ROUGH IDLING AND/OR MISSING

CHECK DIAGNOSIS SYSTEM
Check for output of diagnostic code.
*(See page FI-22)

Malfunction code → Diagnostic code(s) (See page FI-14)

Normal code ↓

CHECK FOR VACUUM LEAKS IN AIR INTAKE LINE

BAD →
1. Oil filler cap
2. Oil dipstick
3. Hose connections
4. PCV hoses
5. EGR system – EGR valve stays open

OK ↓

CHECK AIR FILTER ELEMENT

BAD → Element – Clean or replace

OK ↓

CHECK IDLE SPEED
Standard: 750 ± 50 rpm

NO →
1. Wiring connections
2. ISC valve (See page FI-44)
3. ECU (test by substitution)

OK ↓

CHECK IGNITION TIMING
1. Short terminals T and E1 of the check connector.
2. Check ignition timing.
   Standard: 10° BTDC @ idle

NO → Ignition system

OK ↓

CHECK SPARK PLUGS
Maximum: 1.0 mm (0.039 in.)

NOTE: Check compression pressure and valve clearance if necessary.

BAD →
1. Spark plugs and high-tension cords
2. Compression pressure
   Minimum: 9.0 kg/cm² (128 psi, 883 kPa) at 250 rpm
3. Valve clearance (Cold)
   Standard: IN 0.15 – 0.25 mm (0.006 – 0.010 in.)
   EX 0.20 – 0.30 mm (0.008 – 0.012 in.)

OK ↓

CHECK INTAKE AIR CONTROL VALVE
Check that the air control valve is closed.

BAD →
1. VSV for intake air control valve
2. Vacuum leaks

OK ↓

CHECK COLD START INJECTOR
(See page FI-29)

BAD →
1. Cold start injector (See page FI-29)
2. Cold start injector time switch. (See page FI-50)

OK ↓ CONTINUED ON PAGE FI-9

* See Pub. No. RM071U

OK CONTINUED FROM PAGE FI-8

CHECK FUEL PRESSURE
(See page FI-24)

BAD →
1. Fuel pump (See page FI-23)
2. Fuel filter
3. Fuel pressure regulator (See page FI-32)

OK

CHECK INJECTORS
(See page FI-34)

BAD → Injection condition

OK

CHECK EFI ELECTRONIC CIRCUIT USING VOLT/OHMMETER
(See page FI-16)

BAD →
1. Wiring connections
2. Power to ECU
   (1) Fusible links
   (2) Fuses
   (3) EFI main relay *(See page FI-97)
3. Air flow meter *(See page FI-84)
4. Water temp. sensor *(See page FI-100)
5. Air temp. sensor *(See page FI-84)
6. Injection signal circuit
   (1) Injector wiring
   (2) Solenoid resistor (See page FI-49)
   (3) ECU (See page FI-56)
7. Oxygen sensor *(See page FI-102)

SYMPTOM — HIGH ENGINE IDLE SPEED (NO DROP)

CHECK ACCELERATOR LINKAGE

BAD → Linkage — Stuck

OK

CHECK AIR CONDITIONER IDLE-UP CIRCUIT

BAD → Air valve for air conditioner — Leakage.

OK

CHECK DIAGNOSIS SYSTEM
Check for output of diagnostic code.
*(See page FI-22)

Malfunction code → Diagnostic code(s) (See page FI-14)

Normal code

CHECK ISC SYSTEM

BAD →
1. Wiring connections
2. ISC valve (See page FI-44)
3. Air conditioner switch

OK

CHECK THROTTLE POSITION SENSOR
(See page FI-40)

BAD → Throttle body

OK

CHECK FUEL PRESSURE
(See page FI-24)

BAD → Fuel pressure regulator — High pressure

OK CONTINUED ON PAGE FI-10

* See Pub. No. RM071U

OK CONTINUED FROM PAGE FI-9

CHECK COLD START INJECTOR
(See page FI-29)
BAD → Cold start injector — linkage

OK

CHECK INJECTORS (See page FI-34)
BAD → Injectors — Leakage, Injection quantity

OK

CHECK EFI ELECTRONIC CIRCUIT USING VOLT/OHMMETER
(See page FI-16)
BAD →
1. Wiring connections
2. Power to ECU
   (1) Fusible links
   (2) Fuses
   (3) EFI main relay *(See page FI-97)
3. Air flow meter *(See page FI-84)
4. Water temp. sensor *(See page FI-100)
5. Air temp. sensor *(See page FI-84)
6. Injection signal circuit
   (1) Injector wiring
   (2) Solenoid resistor (See page FI-49)
   (3) ECU (See page FI-56)

SYMPTOM — ENGINE BACKFIRES-Lean Fuel Mixture

CHECK DIAGNOSIS SYSTEM
Check for output of diagnostic code.
*(See page FI-22)
Malfunction code(s) → Diagnostic code(s) (See page FI-14)

Normal code

CHECK FOR VACUUM LEAKS IN AIR INTAKE LINE
BAD →
1. Oil filler cap
2. Oil dipstick
3. Hose connections
4. PCV hose(s)
5. EGR system — EGR valve stays open

OK

CHECK IGNITION TIMING
1. Short terminals T and E1 of the check connector.
2. Check ignition timing.
   Standard: 10° BTDC @ idle
NO → Ignition timing — Adjust (See page IG-9)

OK

CHECK COLD START INJECTOR
(See page FI-29)
BAD →
1. Cold start injector (See page FI-29)
2. Cold start injector time switch (See page FI-50)

OK

CHECK FUEL PRESSURE
(See page FI-24)
BAD →
1. Fuel pump (See page FI-23)
2. Fuel filter
3. Fuel pressure regulator (See page FI-32)

OK CONTINUED ON PAGE FI-11

* See Pub. No. RM071U

OK CONTINUED FROM PAGE FI-10

CHECK INJECTORS
(See page FI-34)
BAD → Injectors — Clogged

OK

CHECK EFI ELECTRONIC CIRCUIT USING VOLT/OHMMETER
(See page FI-16)
BAD →
1. Wiring connection
2. Power to ECU
   (1) Fusible links
   (2) Fuses
   (3) EFI main relay *(See page FI-97)
3. Air flow meter *(See page FI-84)
4. Water temp. sensor *(See page FI-100)
5. Air temp. sensor *(See page FI-84)
6. Throttle position sensor (See page FI-40)
7. Injection signal circuit
   (1) Injector wiring
   (2) Fuel cut RPM (See page FI-59)
   (3) Solenoid resistor (See page FI-49)
   (4) ECU (See page FI-56)
8. Oxygen sensor *(See page FI-102)

SYMPTOM — MUFFLER EXPLOSION (AFTER FIRE)-Rich Fuel Mixture-Misfire

CHECK DIAGNOSIS SYSTEM
Check for output of diagnostic code.
(See page FI-20)
Malfunction code(s) → Diagnostic code(s) (See page FI-14)

Normal code

CHECK IGNITION TIMING
1. Short terminals T and E1 of the check connector.
2. Check ignition timing.
   Standard: 10° BTDC @ idle

BAD → Ignition timing — Adjust (See page IG-9)

OK

CHECK COLD START INJECTOR
(See page FI-29)
BAD →
1. Cold start injector (See page FI-29)
2. Cold start injector time switch. (See page FI-50)

OK

CHECK FUEL PRESSURE
(See page FI-24)
BAD → Fuel pressure regulator (See page FI-32)

OK

CHECK INJECTORS
(See page FI-34)
BAD → Injectors — Leakage

OK CONTINUED ON PAGE FI-12

* See Pub. No. RM071U

OK CONTINUED FROM PAGE FI-11

CHECK SPARK PLUGS
Maximum: 1.0 mm (0.039 in.)
NOTE: Check compression pressure and valve clearance if necessary.

NO →
1. Spark plugs
2. Compression pressure
   Minimum: 9.0 kg/cm² (128 psi, 883 kPa) at 250 rpm
3. Valve clearance (cold)
   Standard: IN 0.15 – 0.25 mm (0.006 – 0.010 in.)
   EX 0.20 – 0.30 mm (0.008 – 0.012 in.)

OK

CHECK EFI ELECTRONIC CIRCUIT USING VOLT/OHMMETER
(See page FI-16)

BAD →
1. Throttle position sensor (See page FI-40)
2. Injection signal circuit
   (1) Injector wiring
   (2) Fuel cut RPM (See page FI-59)
   (3) Solenoid resistor (See page FI-49)
   (4) ECU (See page FI-56)
3. Oxygen sensor (See page FI-102)

SYMPTOM – ENGINE HESITATES AND/OR POOR ACCELERATION

CHECK CLUTCH OR BRAKES

BAD →
1. Clutch – Slips
2. Brakes – Drag

OK

CHECK FOR VACUUM LEAKS IN AIR INTAKE LINE

BAD →
1. Oil filler cap
2. Oil dipstick
3. Hose connections
4. PCV hose(s)
5. EGR system – EGR valve stays open

OK

CHECK AIR FILTER ELEMENT

BAD → Element – Clean or replace

OK

CHECK DIAGNOSIS SYSTEM
Check for output of diagnostic code.
*(See page FI-22)

Malfunction code(s) → Diagnostic code(s) (See page FI-14)

Normal code

CHECK IGNITION SPARK
(See page IG-4)

BAD →
1. High-tension cords
2. Distributor
3. Ignition coil
4. Igniter

OK CONTINUED ON PAGE FI-13

* See Pub. No. RM071U

OK CONTINUED FROM PAGE FI-12

CHECK IGNITION TIMING
1. Short terminals T and E1 of the check connector.
2. Check ignition timing.
   Standard: 10° BTDC @ idle

NO → Ignition timing – Adjust (See page IG-9)

OK

CHECK FUEL PRESSURE
(See page FI-24)

BAD →
1. Fuel pump (See page FI-23)
2. Fuel filter
3. Fuel pressure regulator (See page FI-32)

OK

CHECK INJECTORS
(See page FI-34)

BAD → Injection condition

OK

CHECK SPARK PLUGS
Standard: 1.0 mm (0.039 in.)

NOTE: Check compression pressure and valve clearance if necessary.

NO →
1. Spark plugs
2. Compression pressure
   Minimum: 9.0 kg/cm² (128 psi, 883 kPa) at 250 rpm
3. Valve clearance (Cold)
   Standard: IN 0.15 – 0.25 mm (0.006 – 0.010 in.)
   EX 0.20 – 0.30 mm (0.008 – 0.012 in.)

OK

CHECK INTAKE AIR CONTROL VALVE
Check if air control valve is open with engine running with throttle valve open (w/ Regular Gasoline), or at 4,200 rpm above (w/ Premium Gasoline).

BAD →
1. VSV for intake air control valve
2. Vacuum leaks

OK

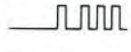
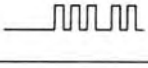
CHECK EFI ELECTRONIC CIRCUIT USING VOLT/OHMMETER
(See page FI-16)

BAD →
1. Wiring connections
2. Power to ECU
   (1) Fusible links
   (2) Fuses
   (3) EFI main relay *(See page FI-97)
3. Air flow meter *(See page FI-84)
4. Water temp. sensor *(See page FI-100)
5. Air temp. sensor *(See page FI-84)
6. Throttle position sensor (See page FI-40)
7. Injection signal circuit
   (1) Injector wiring
   (2) Solenoid resistor (See page FI-49)
   (3) ECU (See page FI-56)

* See Pub. No. RM071U

DIAGNOSIS SYSTEM

DIAGNOSTIC CODES

Code No.	Number of check engine blinks	System	Diagnosis	Trouble area	See page
–	 ON OFF FI1401	Normal	This appears when none of the other codes are identified.	–	–
11	 FI1388	ECU (+B)	Momentary interruption in power supply to ECU.	• IG switch circuit • IG switch • Main relay circuit • Main relay • ECU	* FI-46
12	 FI1389	RPM Signal	No "NE" or "G" signal to ECU within 2 seconds after engine has been cranked.	• Distributor circuit • Distributor • Starter signal circuit • ECU	IG-3
13	 FI1390	RPM Signal	No "NE" signal to ECU when engine speed is above 1,000 rpm.	• Distributor circuit • Distributor • ECU	–
14	FI1391	Ignition Signal	No "IGF" signal to ECU 8 – 11 times in succession.	• Igniter and ignition coil circuit • Igniter and ignition coil • ECU	* FI-50
21	FI1400	Oxygen Sensor Signal	Detection of oxygen sensor detrioration.	• Oxygen sensor circuit • Oxygen sensor • ECU	* FI-58
		Oxygen Sensor Heater Circuit	Open or short circuit in oxygen sensor heater.	• Oxygen sensor heater circuit • Oxygen sensor heater • ECU	* FI-58
22	 FI1392	Water Temp. Sensor Signal	Open or short circuit in water temp. sensor signal (THW).	• Water temp. sensor circuit • Water temp. sensor • ECU	* FI-56
24	FI1611	Intake Air Temp. Sensor Signal	Open or short circuit in intake air temp. sensor signal (THA).	• Intake air temp. sensor circuit • Intake air temp. sensor • ECU	* FI-55
25	 FI2562	Air-fuel Ratio Lean Malfunction	(1) When oxygen sensor signal at the upper (rich) or lower (lean) limit for a certain period of time during feedback condition. (2) When air-fuel ratio feedback compensation value or adaptive control value continues at the upper (rich) or lower (rich) limit renewed for a certain period of time. (3) When air-fuel ratio feedback compensation value or adaptive control value feedback frequency is abnormally high during feedback condition. NOTE: For conditions (3), since neither a lean (code No. 25) nor a rich (code No. 26) diagnosis displayed consecutively.	• Injector circuit • Injector • Oxygen sensor circuit • Oxygen sensor • ECU • Fuel line pressure • Air flow meter • Air intake system • Ignition system	* FI-58
26	 FI2563	Air-fuel Ratio Rich Malfunction		• Injector circuit • Injector • Fuel line pressure • Cold start injector • Air flow meter • ECU	* FI-58
31	 FI1394	Air-flow Meter Signal	Open circuit in VC signal or short circuit between VC and E2 when idle contacts are closed.	• Air flow meter circuit • Air flow meter • ECU	* FI-54
32	 FI1395	Air-flow Meter Signal	Open circuit in E2 or short circuit between VC and VS.	• Air flow meter circuit • Air flow meter • ECU	* FI-54

* See Pub. No. RM071U

DIAGNOSTIC CODES (Cont'd)

Code No.	Number of check Engine blinks	System	Diagnosis	Trouble area	See page
34	 FI3047	Turbocharging Pressure Signal	When the fuel cut-off due to high turbocharging pressure is occured.	• Turbocharger • Turbocharging pressure sensor circuit • Turbocharging pressure sensor • ECU	—
35	 FI3048	Turbocharging Pressure Sensor Signal	Open or short circuit in turbocharging sensor pressure sensor signal (PIM).	• Turbocharging pressure sensor circuit • Turbocharging pressure sensor • ECU	FI-21
41	 FI1396	Throttle Position Sensor Signal	Open or short circuit in throttle position sensor signal (VTA).	• Throttle position sensor circuit • Throttle position sensor • ECU	* FI-48
42	 FI1397	Vehicle Speed Sensor Signal	No "SPD" signal for 8 seconds when engine speed is between 2,500 rpm and 6,000 rpm and coolant temp. is below 80°C (176°F) except when racing the engine.	• Vehicle speed sensor circuit • Vehicle speed sensor • ECU	—
43	 FI1398	Starter Signal	No "STA" signal to ECU unit engine speed reaches 800 rpm with vehicle not moving.	• Ignition switch circuit • Ignition switch • ECU	* FI-51
52	 FI1618	Knock Sensor Signal	Open or short circuit in knock sensor signal (KNK).	• Knock sensor circuit • Knock sensor • ECU	—
53	 FI1619	Knock Control Signal in ECU	Knock control in ECU faulty	• ECU	—
54	 FI3049	Intercooler ECU Signal	(1) When coolant level for intercooler is lower than standard. (2) When water pump motor for intercooler locked or opened.	• Intercooler coolant • Coolant level sensor circuit • Coolant level sensor • Intercooler water pump circuit • Intercooler water pump • Intercooler ECU circuit • Intercooler ECU • ECU	—
71	GALIF. only  FI2622	EGR Malfunction	EGR gas temp. below predetermined level for during EGR control.	• EGR system (EGR valve, EGR hose etc.) • EGR gas temp. sensor circuit • EGR gas temp. sensor • EGR control VSV • EGR control VSV circuit • ECU	FI-22
51	 FI1399	Switch Signal	No IDL signal or A/C signal to ECU, with the check terminals T and E1 shorted.	• A/C switch circuit • A/C amplifire • Throttle position sensor circuit • Throttle position sensor • Accelerator pedal and cable • ECU	—

* See Pub. No. RM071U

TROUBLESHOOTING WITH VOLT/OHMMETER

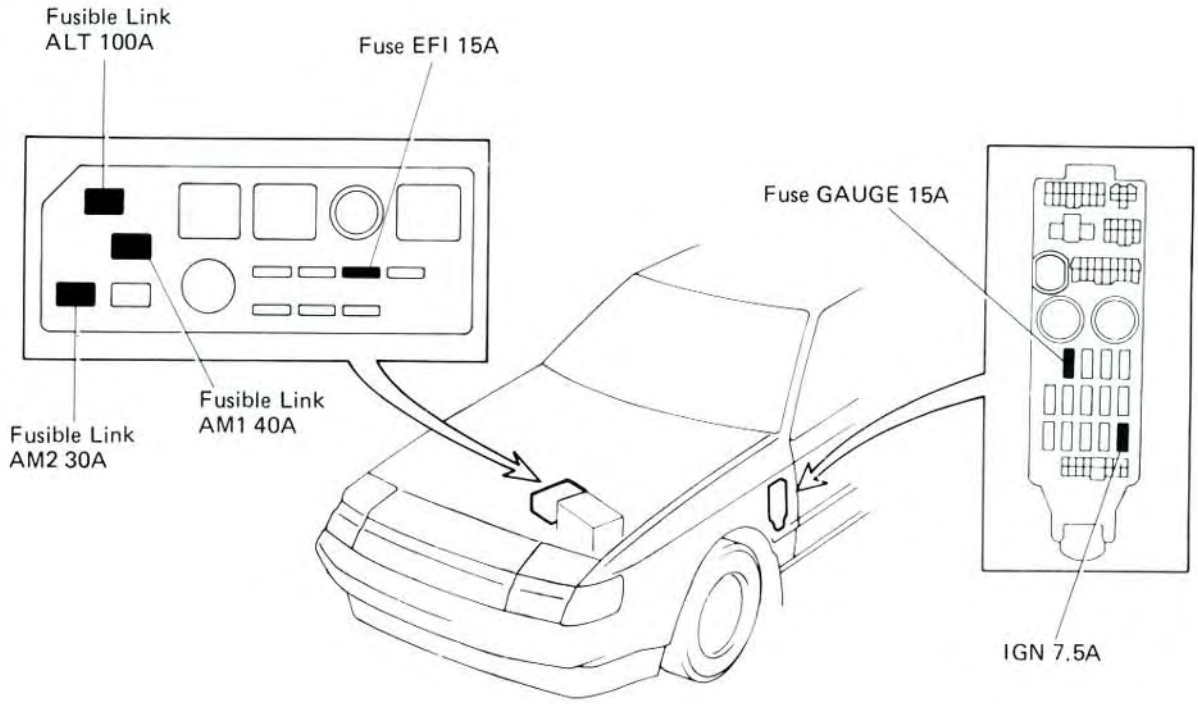
NOTE: The following troubleshooting procedures are designed for inspection of each separate system, and therefore the actual procedure may vary somewhat. However, troubleshooting should be performed refering to the inspection methods described in this manual.

Before beginning inspection, it is best to first make a simple check of the fuses, fusible links and the condition of the connectors.

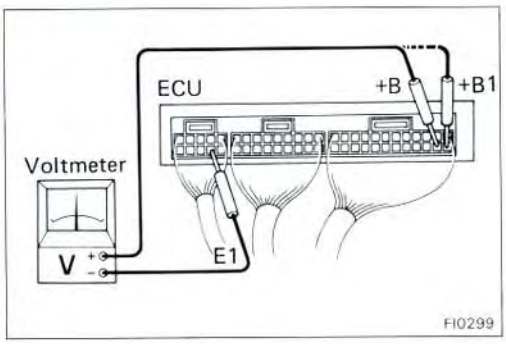
The following troubleshooting procedures are based on the supposition that the trouble lies in either a short or open circuit in a component outside the computer or a short circuit within the computer.

If engine trouble occurs even though proper operating voltage is detected in the computer connector, then it can be assumed the ECU is faulty and should be replaced.

LOCATION OF FUSES AND FUSIBLE LINKS



FI3070



EFI SYSTEM CHECK PROCEDURE

NOTE:

- Perform all voltage measurements with the connectors connected.
- Verity that the battery voltage is 11 V or more when the ignition switch is at ''ON''.

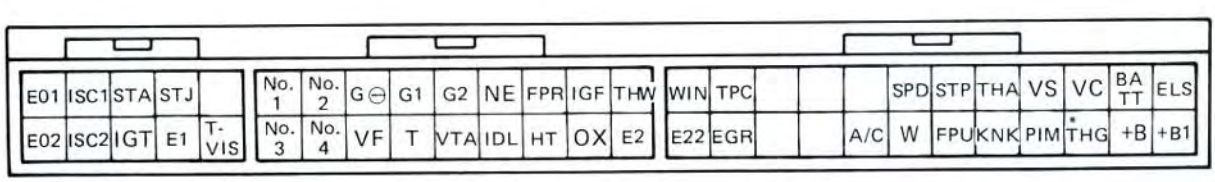
Using a voltmeter with high impedance (10 kΩ/V minimum), measure the voltage at each terminal of the wiring connectors.

Terminals of ECU

Symbol	Terminal name	Symbol	Terminal name	Symbol	Terminal name
E01	ENGINE GROUND	T	CHECK CONNECTOR	A/C	A/C MAGNET SWITCH
E02	ENGINE GROUND	G2	DISTRIBUTOR	SPD	SPEED SENSOR
ISC1	ISC VALVE	VTA	THROTTLE POSITION SENSOR	W	WARNING LIGHT
ISC2	ISC VALVE	NE	DISTRIBUTOR	STP	STOP LIGHT SWITCH
STA	STARTER SWITCH	IDL	THROTTLE POSITION SENSOR	FPU	FUEL PRESSURE VSV
IGT	IGNITER	FPR	FUEL PUMP RELAY	THA	AIR TEMP. SWITCH
STJ	COLD START INJECTOR	HT	OXYGEN SENSOR HEATER	KNK	KNOCK CONTROL SENSOR
E1	ENGINE GROUND	IGF	IGNITER	VS	AIR FLOW METER
T-VIS	T-VIS VSV	OX	OXYGEN SENSOR	PIM	TURBOCHARGING PRESSURE SENSOR
No. 1	No. 1 INJECTOR	THW	WATER TEMP. SENSOR	VC	AIR FLOW METER
No. 2	No. 2 INJECTOR	E2	SENSOR GROUND	*THG	EGR GAS TEMP. SENSOR
No. 3	No. 3 INJECTOR	WIN	INTERCOOLER ECU	BATT	BATTERY
No. 4	No. 4 INJECTOR	E22	SENSOR GROUND	+B	MAIN RELAY
G⊖	DISTRIBUTOR	TPC	TURBOCHARGING PRESSURE VSV	ELS	HEADLIGHT and DEFOGGER
VF	CHECK CONNECTOR	EGR	EGR CONTROL VSV	+B1	MAIN RELAY
G1	DISTRIBUTOR				

*CALIF. only

ECU Terminals

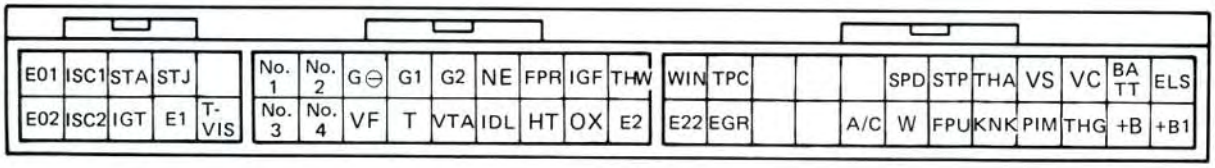


Voltage at ECU Wiring Connectors

No.	Terminals	STD voltage (V)	Condition		See page
1	+B, +B1 – E1	10 – 14	Ignition S/W ON		*FI-46
2	BATT – E1	10 – 14	–		*FI-47
3	IDL – E2	4 – 6	Ignition S/W ON	Throttle valve open	*FI-48
	VTA – E2	0.1 – 1.0		Throttle valve fully closed	
		3 – 4.5		Throttle valve open	
	VC – E2	4 – 6		–	
4	IGT – E1	0.7 – 1.0	Cranking or idling		*FI-50
5	STA – E1	6 – 14	Cranking		*FI-51
6	No. 1, No. 2, No. 3, No. 4 – E01, E02	10 – 14	Ignition S/W ON		FI-19
7	W – E1	8 – 14	No trouble (Check engine warning light off) and engine running		*FI-53
8	VC – E2	4 – 6	Ignition S/W ON	–	*FI-54
	VS – E2	4 – 6		Measuring plate fully closed	
		1.0 or less		Measuring plate fully open	
		2 – 4	Idling		
9	THA – E2	1 – 3	Ignition S/W ON	Intake air temp. 20°C (68°F)	*FI-55
10	THW – E2	0.1 – 1.0		Coolant temp. 80°C (176°F)	*FI-56
11	ISC1, ISC2 – E1	9 – 14	Ignition S/W ON		FI-20
12	PIM – E2	2.5 – 4.5			FI-21
	VC – E2	4 – 6			
13	A/C – E1	8 – 14	Ignition S/W ON	Air conditioning ON	*FI-57

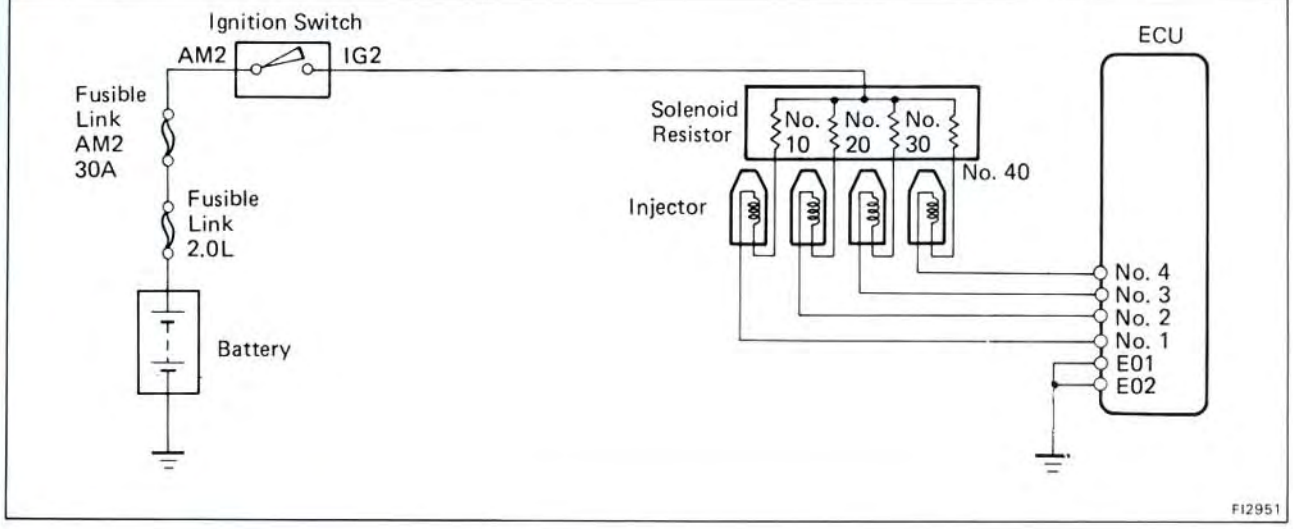
ECU Terminals

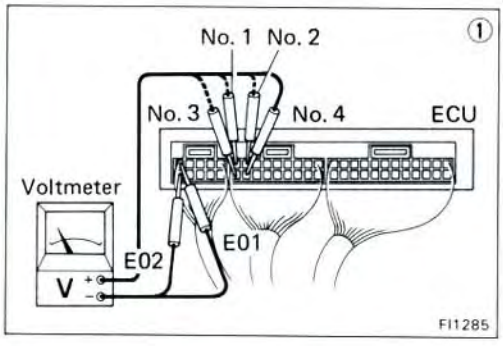
* See Pub. No. RM071U

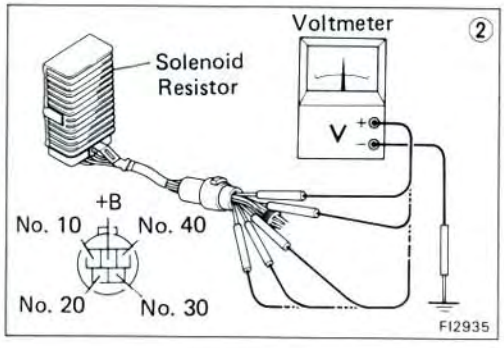


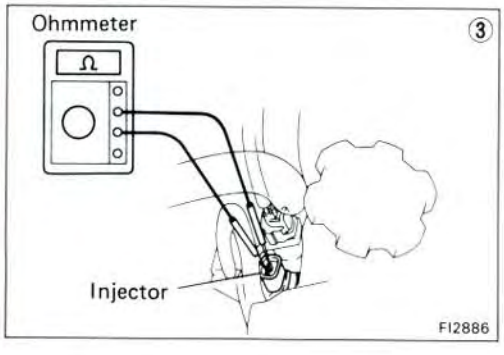
FI0574

No.	Terminals	Trouble	Condition	STD voltage
6	No. 1 No. 2 No. 3 No. 4 – E01 E02	No voltage	IG S/W ON	10 – 14 V









① No voltage between ECU terminals No. 1, No. 2, No. 3 and/or No. 4 and E01 and/or E02. **(IG S/W ON)**

↓

② Check that there is specified voltage between solenoid resistor terminal +B and body ground. **STD voltage: 10 – 14 V**

OK ↓ NO → Check fusible link, wiring and ignition switch. → BAD → Repair or replace.

↓

② Check that there is specified voltage between resistor terminals (No. 10, No. 20, No. 30 or No. 40) and body ground. **STD voltage: 10 – 14V**

OK ↓ NO → Replace resistor.

↓

③ Check resistance of each injector. **STD resistance: 2 – 4 Ω**

OK ↓ BAD → Replace injector.

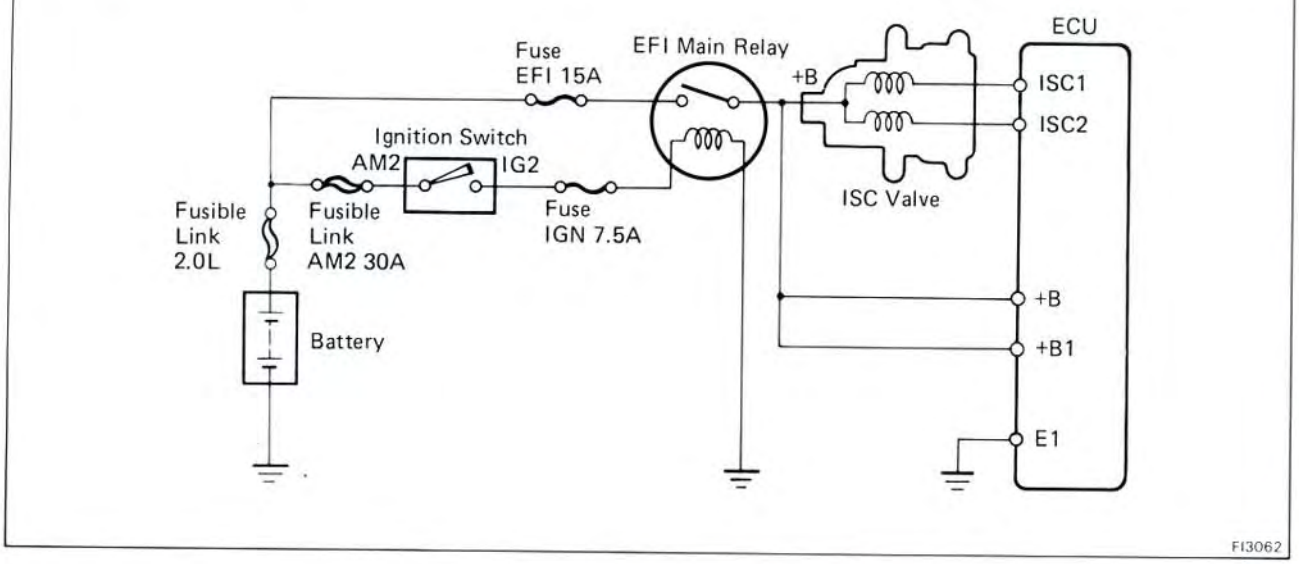
↓

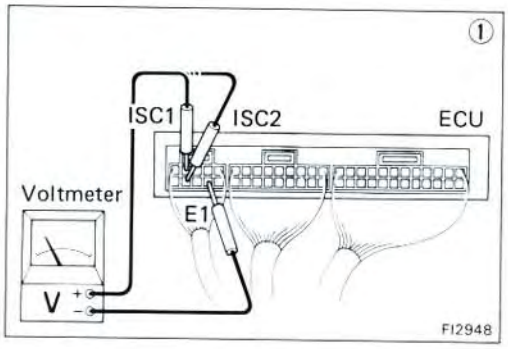
Check wiring between ECU and resistor. → BAD → Repair or replace wiring.

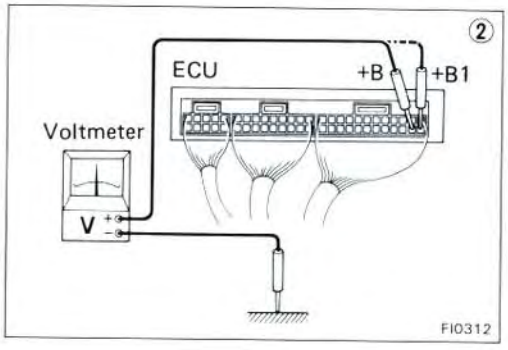
↓ OK

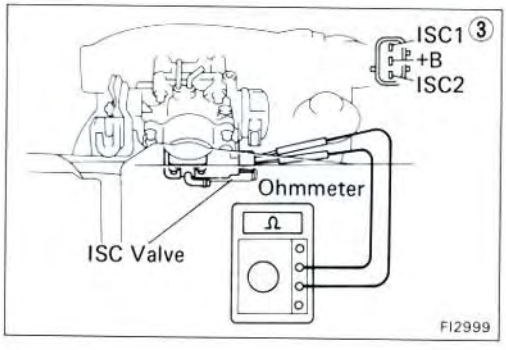
Try another ECU.

No.	Terminals	Trouble	Condition	STD voltage
11	ISC1, ISC2 — E1	No voltage	IG S/W ON	9 – 14 V









① There is no voltage between ECU terminals ISC1 or ISC2 and E1. **(IG S/W ON)**

② Check that there is voltage between ECU terminal +B or +B1 and body ground. **(IG S/W ON)**

OK

NO → Refer to No. 1. *(See page FI-46)

③ Check resistance between ISC valve terminals +B and ISC1 or ISC2. **STD resistance: 16.0 – 17.0 Ω**

BAD → Replace ISC valve.

OK

Check wiring between ECU and ISC valve.

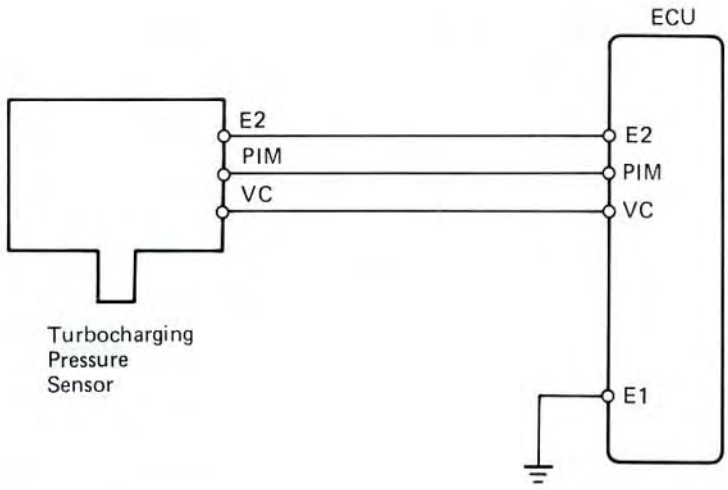
BAD → Repair or replace wiring.

OK

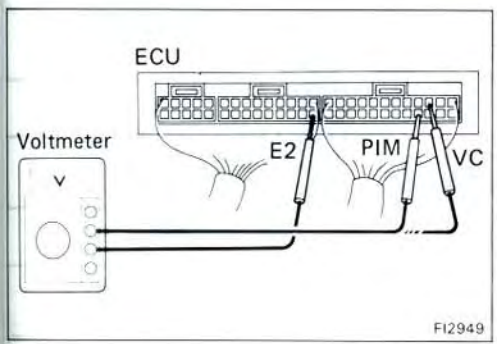
Try another ECU.

*See Pub. No. RM071U

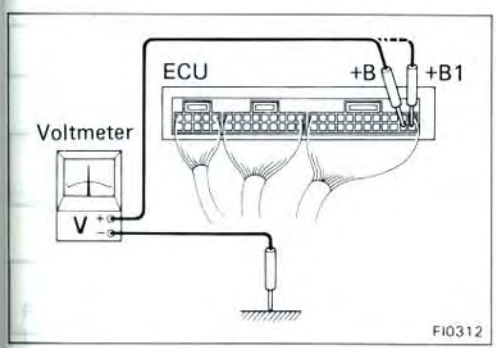
No.	Terminals	Trouble	Condition	STD voltage
8	PIM – E2	No voltage	IG S/W ON	2.5 – 4.5 V
	VC – E2			4 – 6 V



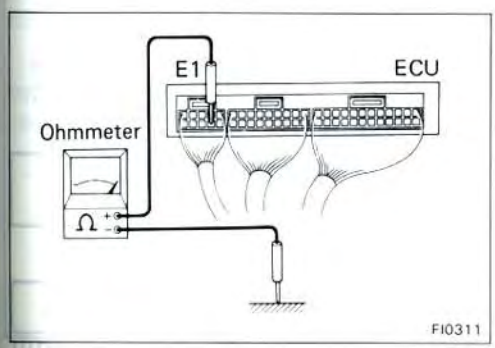
FI1226



FI2949



FI0312



FI0311

① No voltage at ECU terminals PIM or VC and E2. **(IG S/W ON)**

② Check that there is voltage between ECU terminal +B or +B1 and body ground. **(IG S/W ON)**

NO

OK

③ Check wiring between ECU terminal E1 and body ground.

BAD

Repair or replace.

Check turbocharging pressure sensor. (See page FI-53)

BAD

Repair or replace.

OK

Check wiring between ECU and vacuum sensor.

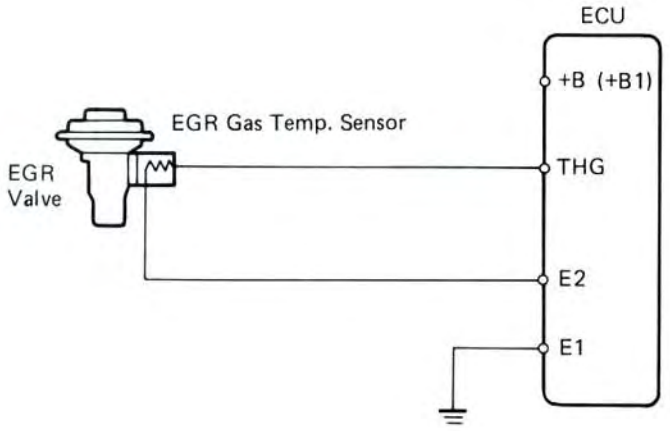
BAD

Repair or replace.

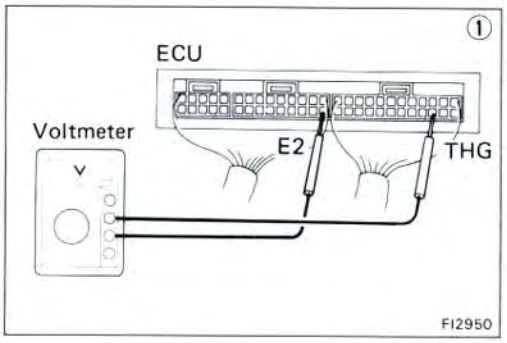
OK

Try another ECU.

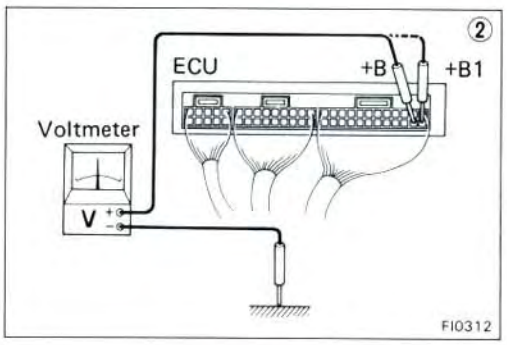
CALIF. only



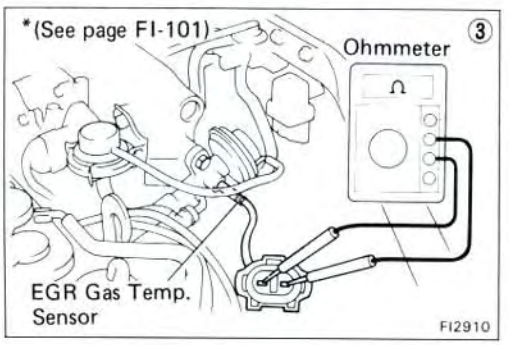
FI2680



FI2950



FI0312



FI2910

① No voltage between ECU terminals THG and E2. **(IG S/W ON)**

② Check that there is voltage between ECU terminal +B or +B1 and body ground. **(IG S/W ON)**

OK

NO

Refer to No. 1. *(See page FI-46)

Check wiring between ECU terminal E1 and body ground.

OK

BAD

Repair or replace.

Check EGR system. (See page EC-19)

BAD

Repair or replace.

OK

③ Check EGR gas temp. sensor. *(See page FI-101)

BAD

OK

Replace EGR gas temp. sensor.

Check wiring between ECU and EGR gas temp. sensor.

OK

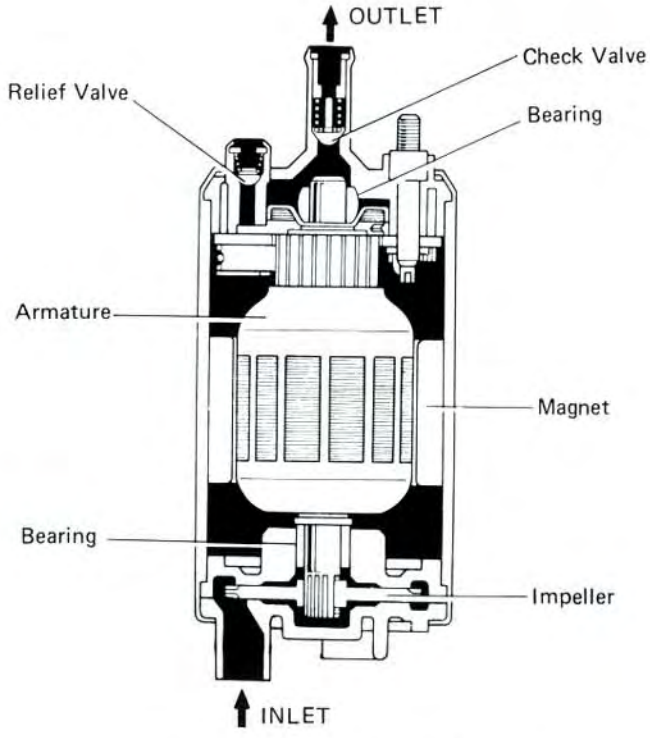
BAD

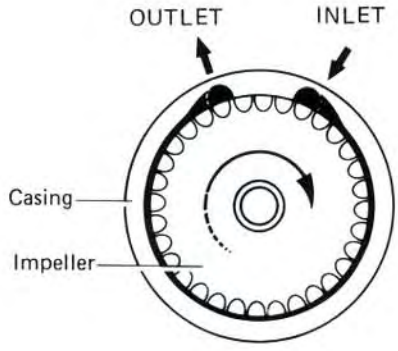
Try another ECU.

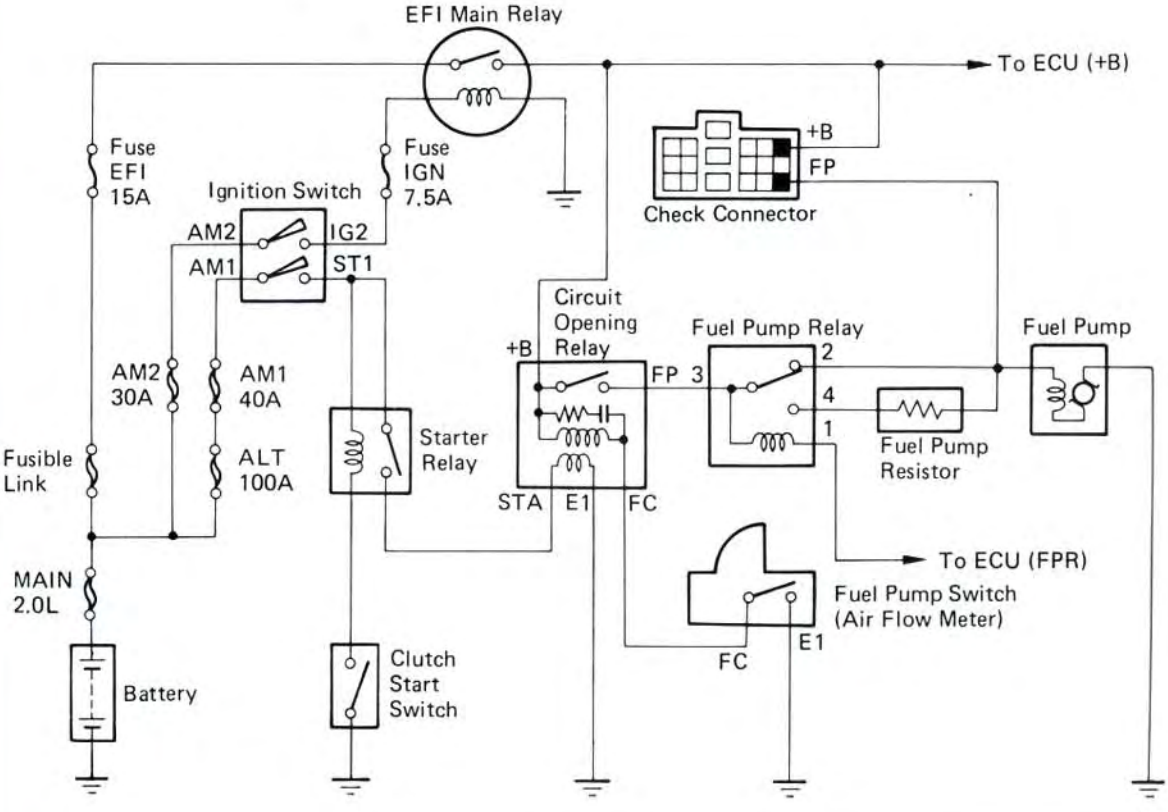
Repair or replace.

*See Pub. No. RM071U

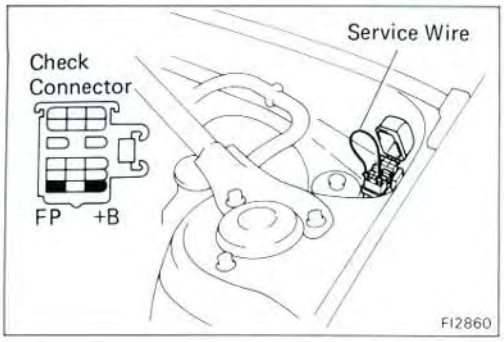
FUEL SYSTEM
Fuel Pump







FI0530 FI1479
FI3045



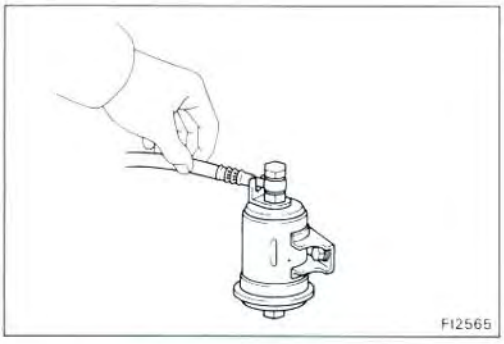
ON-VEHICLE INSPECTION

1. INSPECT FUEL PUMP OPERATION

(a) Using a service wire, short terminals +B and FP of the check connector.

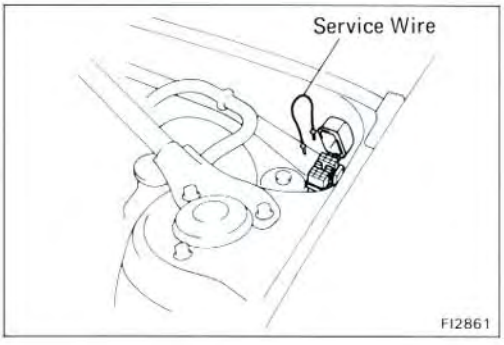
(b) Turn the ignition switch ON.

NOTE: Do not start the engine.



(c) Check that there is pressure in the hose from the fuel filter.

NOTE: At this time, you will hear fuel return noise.



(d) Remove the service wire.

(e) Turn the ignition switch OFF.

If there is no pressure, check the following parts:

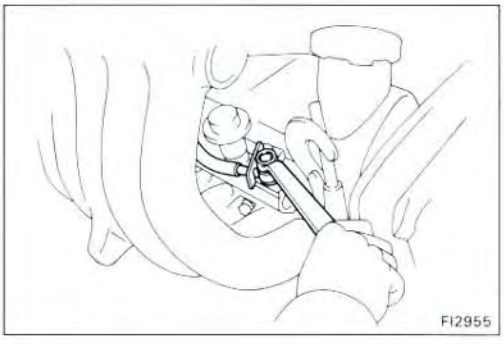
- Fusible links
- Fuses (EFI 15A, IGN 7.5A)
- EFI main relay
- Circuit opening relay
- Fuel pump
- Fuel pump relay
- Fuel pump resistor
- Wiring connections

2. INSPECT FUEL PRESSURE

(a) Check the battery voltage above 12 volts.

(b) Disconnect the cable from the negative (⊖) terminal of the battery.

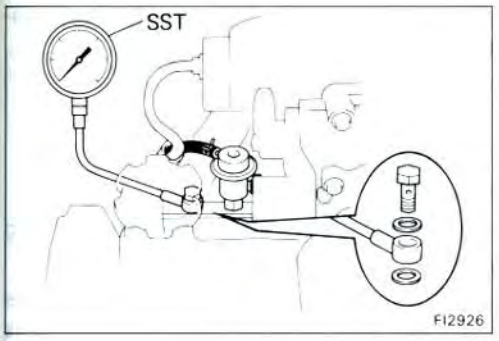
(c) Disconnect the cold start injector connector.



(d) Put a suitable container or shop towel under the cold start injector pipe.

(e) Remove the union bolt, two gaskets and disconnect the cold start injector pipe from the delivery pipe.

NOTE: Slowly loosen the union bolt.



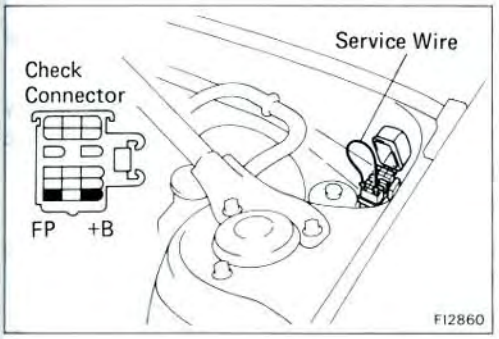
(f) Install SST (pressure gauge) to the delivery pipe with new two gaskets and union bolt.

SST 09268-45012

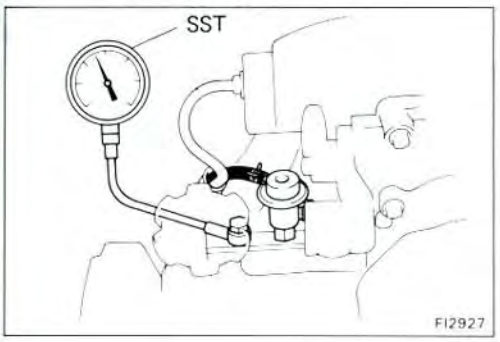
Torque: 180 kg-cm (13 ft-lb, 18 N·m)

(g) Wipe off any splattered gasoline.

(h) Reconnect the battery negative (⊖) cable.



(i) Using a service wire, short terminals +B and FP of the check connector.



(j) Turn the ignition switch ON.

(k) Measure the fuel pressure.

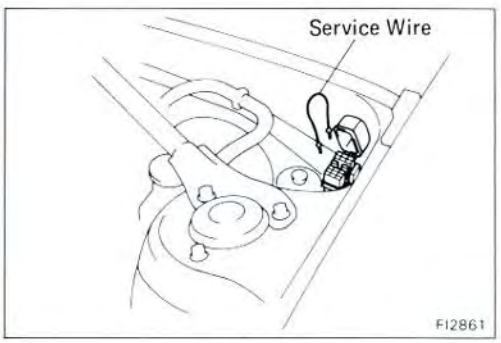
Fuel pressure:
2.3 – 2.7 kg/cm²
(33 – 38 psi, 226 – 265 kPa)

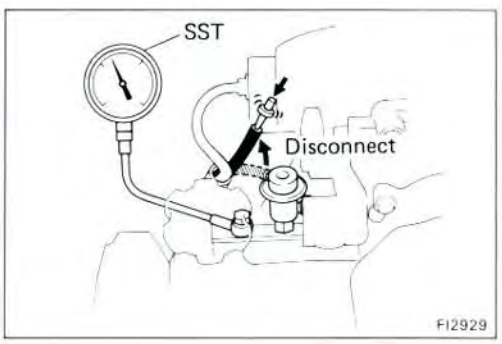
If pressure is high, replace the fuel pressure regulator.

If pressure is low, check the following parts:

- Fuel hoses and connection
- Fuel pump
- Fuel filter
- Fuel pressure regulator

(l) Remove the service wire.



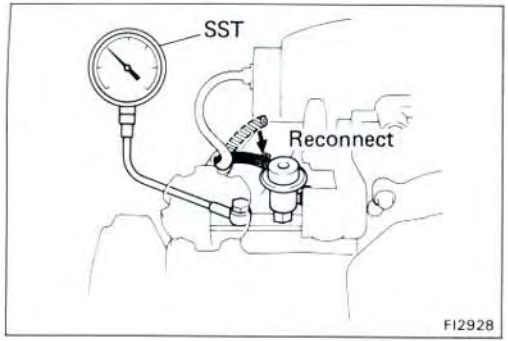


(m) Start the engine.

(n) Disconnect the vacuum sensing hose from the fuel pressure regulator.

(o) Measure the fuel pressure at idling.

Fuel pressure:
2.3 – 2.7 kg/cm²
(33 – 38 psi, 226 – 265 kPa)



(p) Reconnect the vacuum sensing hose to the fuel pressure regulator.

(q) Measure the fuel pressure at idling.

Fuel pressure:
1.9 — 2.2 kg/cm² (27 — 31 psi, 186 — 216 kPa)

If pressure is not as specified, check the vacuum sensing hose and fuel pressure regulator.

(r) Stop the engine. Check that the fuel pressure remains 1.5 kg/cm² (21 psi, 147 kPa) or more for 5 minutes after the engine is turned off.

If pressure is not as specified, check the fuel pump, fuel pressure regulator and/or injector.

(s) After checking fuel pressure, disconnect the battery negative (⊖) cable and carefully remove the SST to prevent gasoline from splashing.

SST 09268-45012

(t) Install the cold start injector pipe with new two gaskets and union bolt.

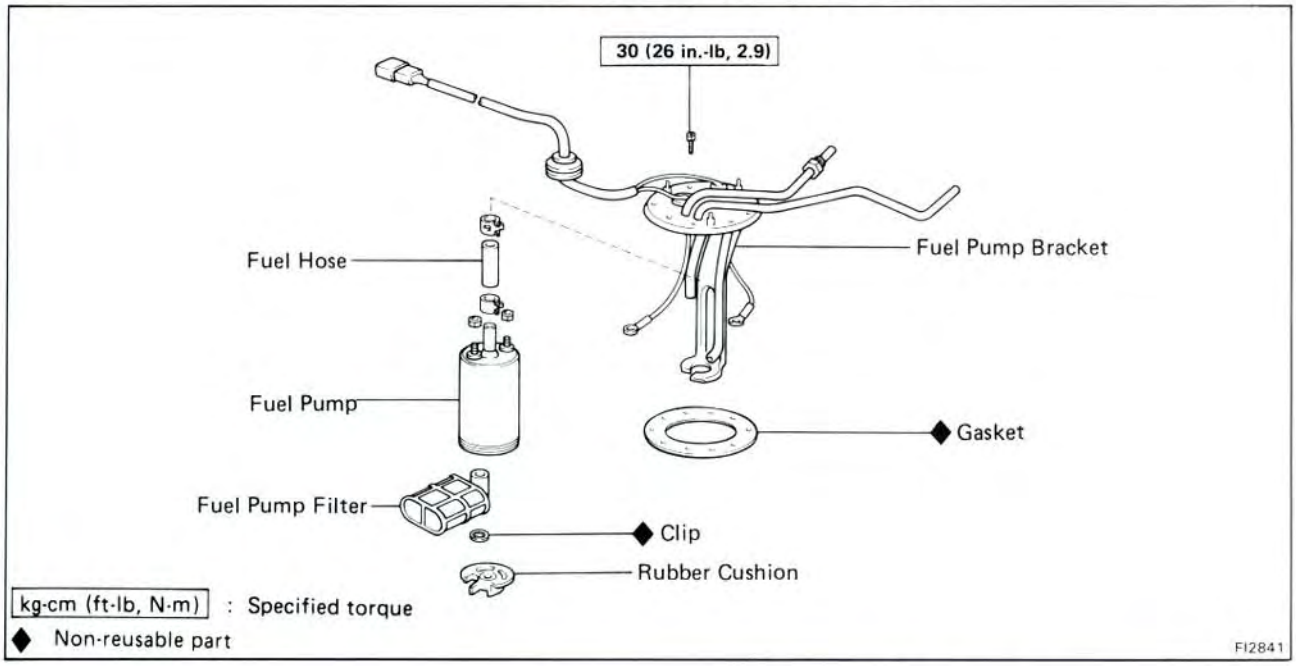
Torque: 180 kg-cm (13 ft-lb, 18 N·m)

(u) Reconnect the cold start injector connector.

(v) Reconnect the cable to the negative (⊖) terminal of the battery.

(w) Check for fuel leakage.

REMOVAL OF FUEL PUMP

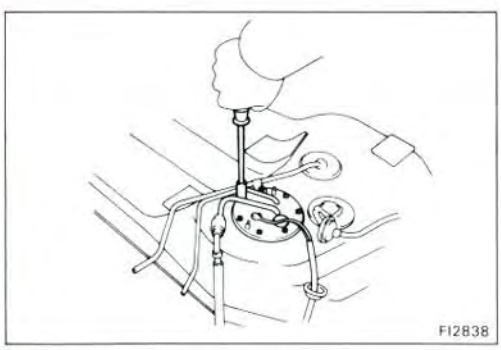


1. **DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY**

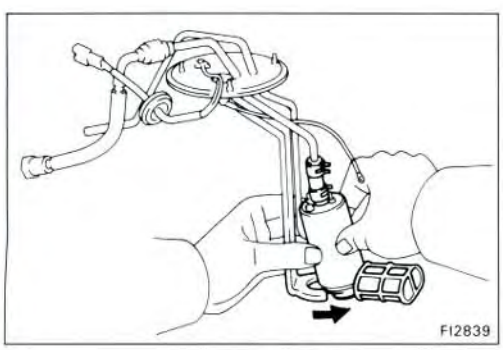
2. **DRAIN FUEL FROM FUEL TANK**

   WARNING: Do not smoke or work near an open flame when working on the fuel pump.

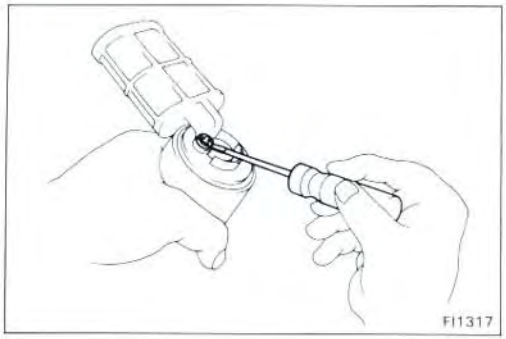
3. **REMOVE FUEL TANK**



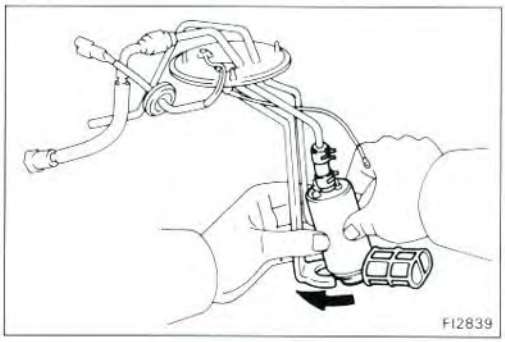
4. **REMOVE FUEL PUMP BRACKET FROM FUEL TANK**
   (a) Remove the seven bolts.
   (b) Pull out the pump bracket.



5. **REMOVE FUEL PUMP FROM FUEL PUMP BRACKET**
   (a) Remove the two nuts, and disconnect the wires from the fuel pump.
   (b) Pull off the lower side of the fuel pump from the bracket.
   (c) Disconnect the fuel hose from the fuel hose.


FI1317

6. **REMOVE FUEL PUMP FILTER FROM FUEL PUMP**
   (a) Remove the rubber cushion.
   (b) Using a small screwdriver, remove the clip.
   (c) Pull out the pump filter.

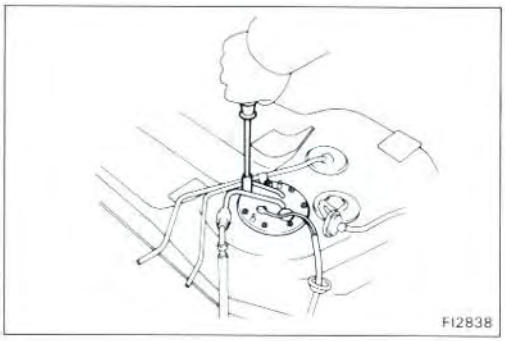

FI2839

INSTALLATION OF FUEL PUMP

(See page FI-27)

1. **INSTALL FUEL PUMP FILTER TO FUEL PUMP**
   (a) Install the pump filter with the clip.
   (b) Install the rubber cushion.

2. **INSTALL FUEL PUMP TO FUEL PUMP BRACKET**
   (a) Connect the fuel hose to the outlet port of the fuel pump.
   (b) Push the lower side of the fuel pump, and install the fuel pump.

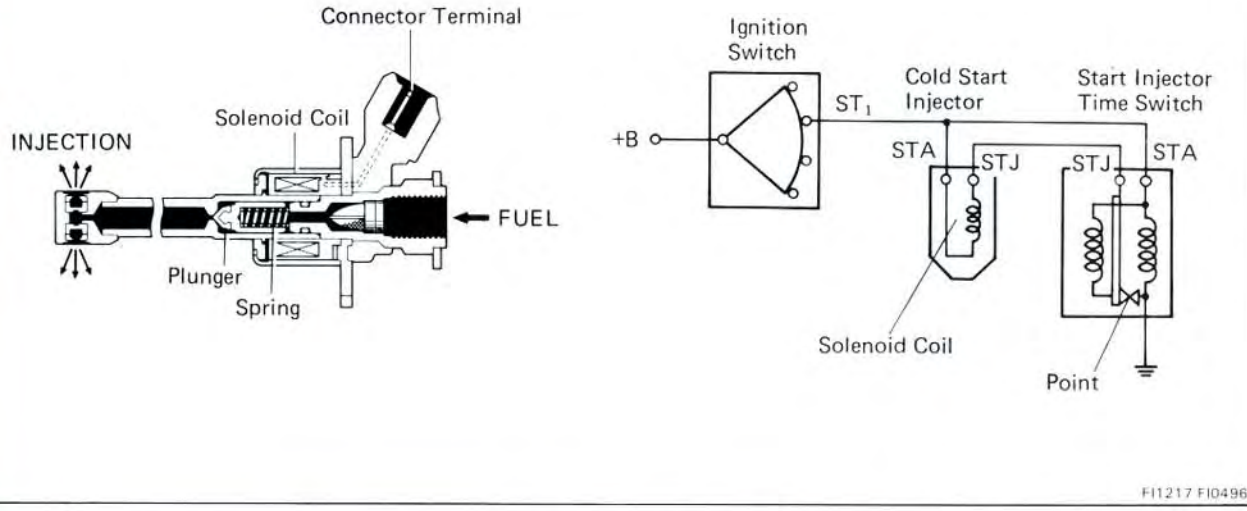

FI2838

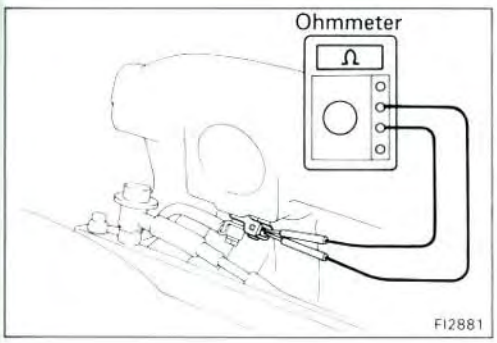
3. **INSTALL FUEL PUMP BRACKET TO FUEL TANK**
   Install a new gasket and the pump bracket with the seven bolts.
   Torque: 30 kg-cm (26 in.-lb, 2.9 N·m)

4. **INSTALL FUEL TANK**
   When installing the fuel tank, refer to FI-39 for the installation position of the cushion and the tightening torque.

5. **CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY**

Cold Start Injector





ON-VEHICLE INSPECTION

INSPECT RESISTANCE OF COLD START INJECTOR

(a) Remove the throttle body.
(See steps 1 to 10 on page FI-41)

(b) Disconnect the cold start injector connector.

(c) Using an ohmmeter, measure the resistance between the terminals.

Resistance: 2 – 4 Ω

If the resistance is not as specified, replace the injector.

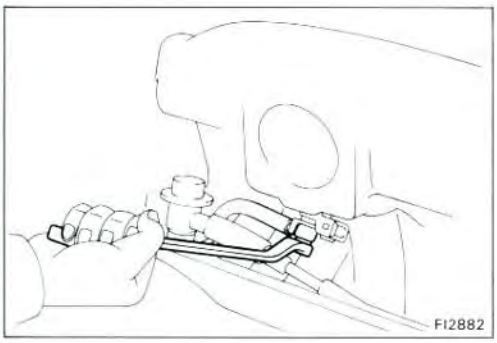
(d) Reconnect the cold start injector connector.

(e) Reinstall the throttle body.
(See steps 2 to 12 on page FI-43)

REMOVAL OF COLD START INJECTOR

1. **REMOVE THROTTLE BODY**
(See steps 1 to 10 on page FI-41)

2. **DISCONNECT COLD START INJECTOR CONNECTOR**

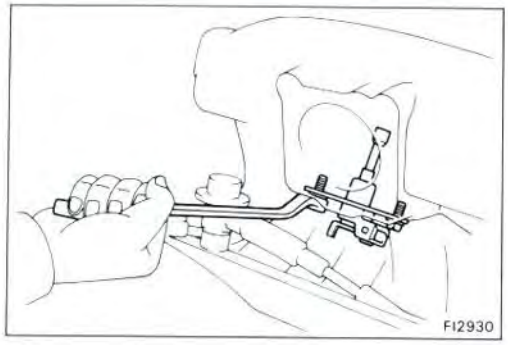


3. **REMOVE COLD START INJECTOR PIPE**

(a) Put a suitable container or shop towel under the injector pipe.

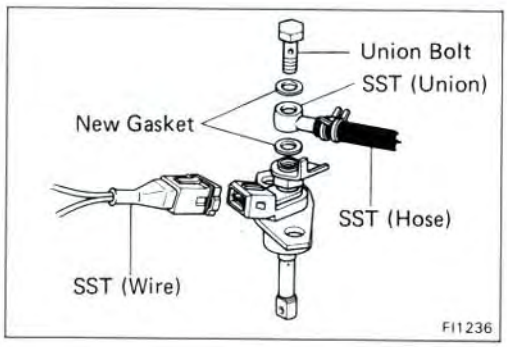
(b) Remove the two union bolts, four gaskets and injector pipe.

NOTE: Slowly loosen the union bolts.



5. **REMOVE COLD START INJECTOR**

Remove the two bolts, injector and gasket.



INSPECTION OF COLD START INJECTOR

1. **INSPECT INJECTION OF COLD START INJECTOR**

WARNING: Keep clear of sparks during the test.

(a) Install SST (union) to the injector and delivery pipe with new gaskets and the union bolts.

SST 09268-41045

(b) Connect the unions with SST (hose).

SST 09268-41045

(c) Connect SST (wire) to the injector.

SST 09842-30050

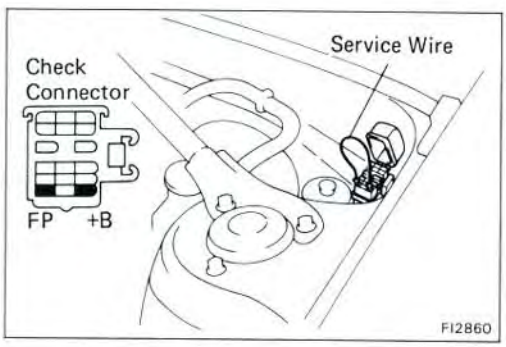
(d) Put a container under the injector.

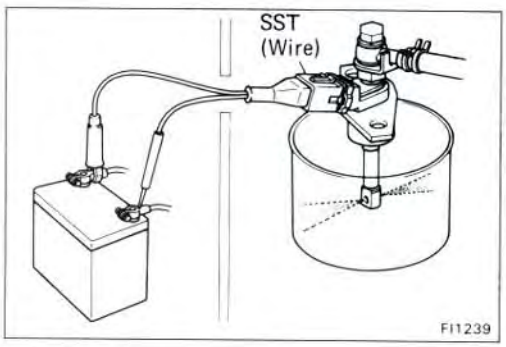
(e) Reconnect the battery negative (⊖) cable.

(f) Using a service wire, short terminals +B and FP of the check connector.

(g) Turn the ignition switch ON.

NOTE: Do not start the engine.

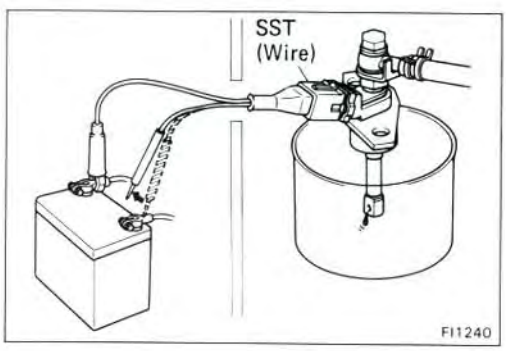




(h) Connect the test probes of the SST (wire) to the battery, and check that the fuel spray is as shown.

SST 09842-30050

CAUTION: Perform this within the shortest possible time.



2. **INSPECT LEAKAGE**

(a) In the condition above, disconnect the test probes of SST (wire) from the battery and check fuel leakage from the injector.

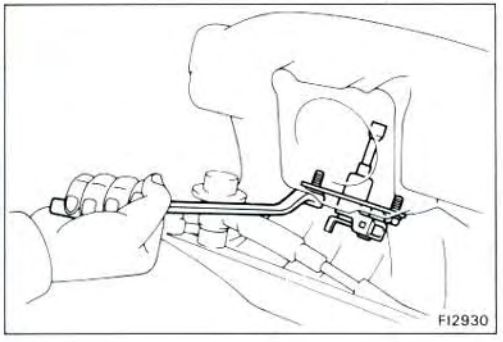
SST 09842-30050

Fuel drop: One drop or less per minute

(b) Disconnect the battery negative (⊖) cable.

(c) Remove SST and the service wire.

SST 09268-41045 and 09842-30050

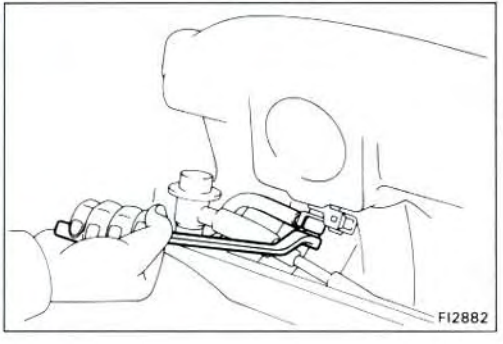


INSTALLATION OF COLD START INJECTOR

1. **INSTALL COLD START INJECTOR**

   Install a new gasket and the injector with the two bolts.

   Torque: 60 kg-cm (52 in.-lb, 5.9 N·m)



2. **INSTALL COLD START INJECTOR PIPE**

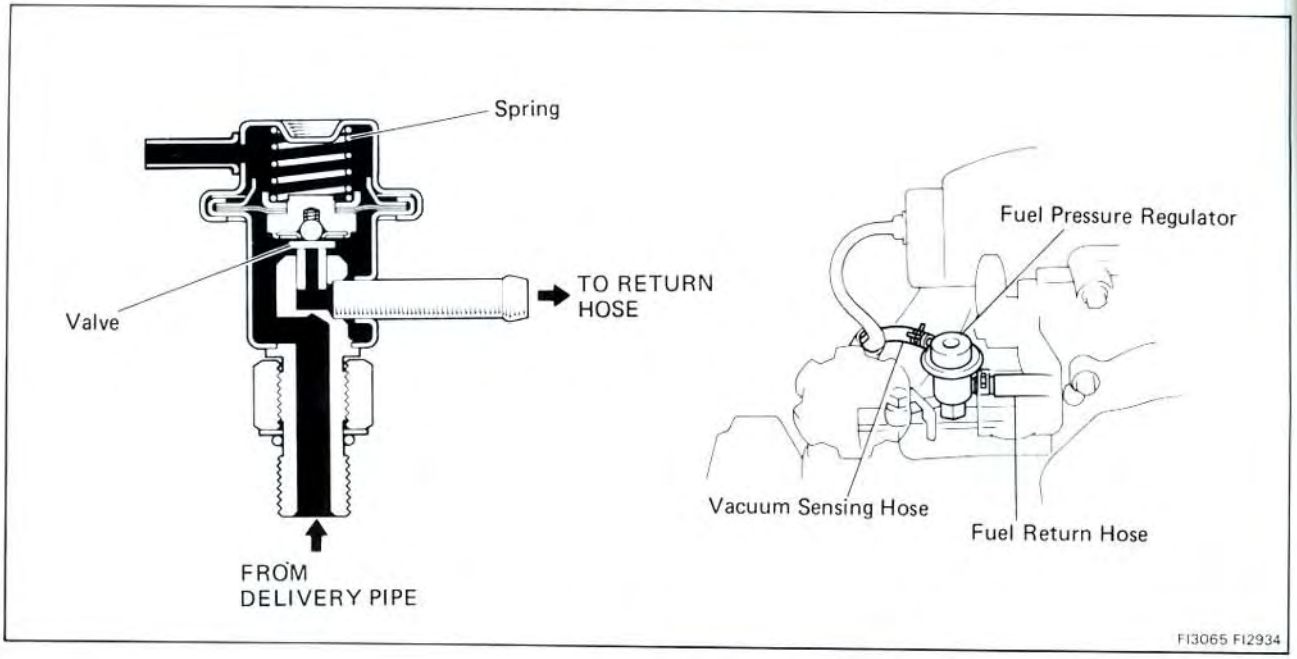
   Install the injector pipe with new four gaskets and the two union bolts.

   Torque: 180 kg-cm (13 ft-lb, 18 N·m)

3. **CONNECT COLD START INJECTOR CONNECTOR**

4. **INSTALL THROTTLE BODY**
   (See steps 2 to 12 on page FI-43)

Fuel Pressure Regulator



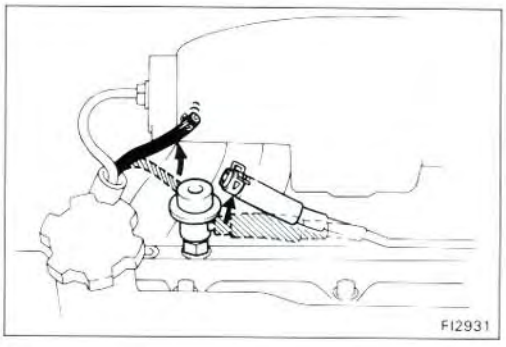
ON-VEHICLE INSPECTION

INSPECT FUEL PRESSURE (See page FI-24)

REMOVAL OF FUEL PRESSURE REGULATOR

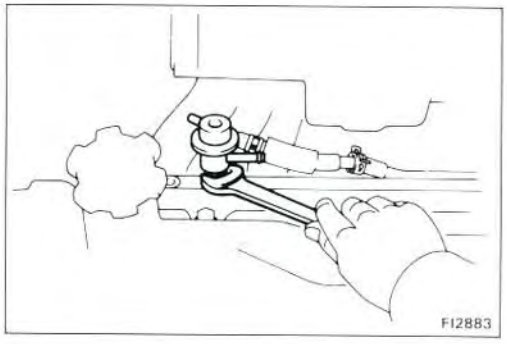
1. **REMOVE THROTTLE BODY**
   (See steps 2 to 10 on page FI-41)

2. **DISCONNECT COLD START INJECTOR PIPE**
   (See step 3 on page FI-29)

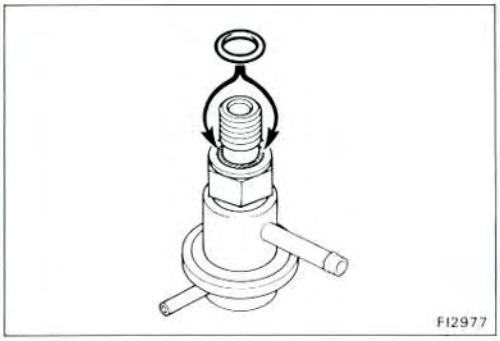


3. **DISCONNECT VACUUM SENSING HOSE**

4. **DISCONNECT FUEL RETURN HOSE**
   (a) Put a suitable container or shop towel under the pressure regulator.
   (b) Disconnect the return hose.

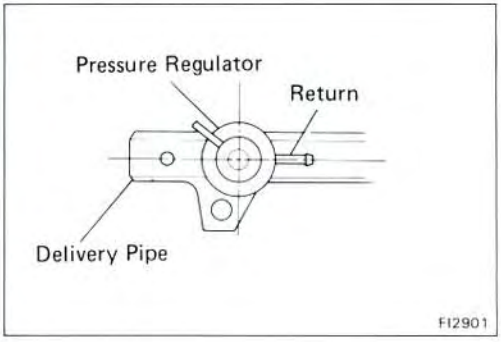


5. **REMOVE FUEL PRESSURE REGULATOR**
   Loosen the lock nut, and remove the pressure regulator.


FI2977

INSTALLATION OF FUEL PRESSURE REGULATOR

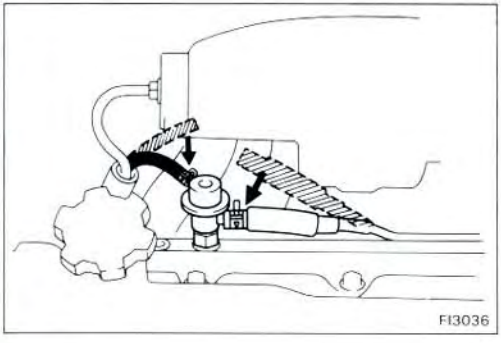
1. INSTALL FUEL PRESSURE REGULATOR
   (a) Fully loosen the lock nut of the pressure regulator.
   (b) Apply a light coat of gasoline to a new O- ring, and install it to the pressure regulator.



FI2901

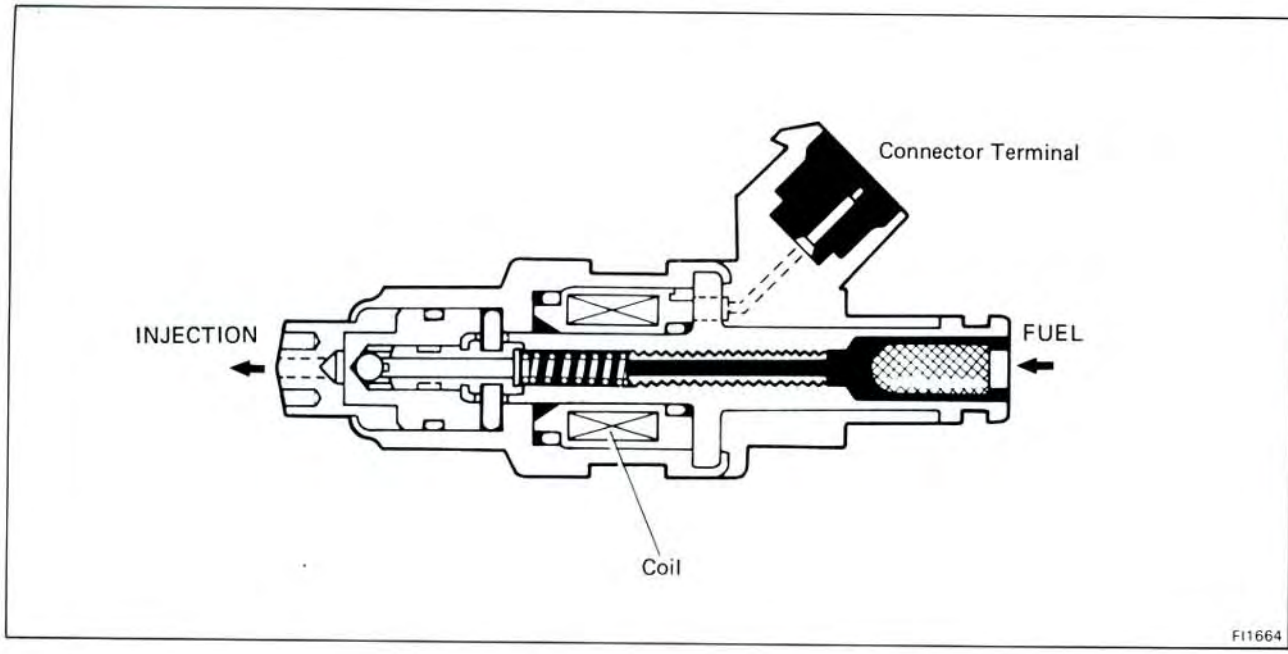
   (c) Thrust the pressure regulator completely into the delivery pipe by hand.
   (d) Turn the pressure regulator counterclockwise until the outlet faces in the direction indicated in the figure.
   (e) Torque the lock nut.

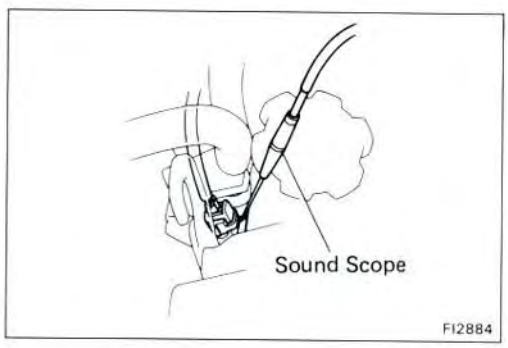
   Torque: 300 kg-cm (22 ft-lb, 29 N·m)

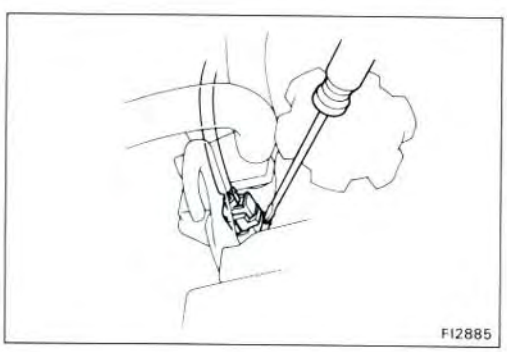

FI3036

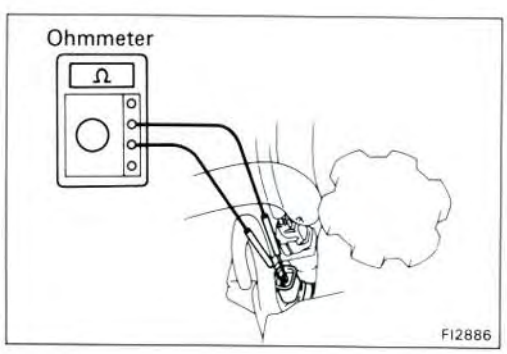
2. CONNECT FUEL RETURN HOSE
3. CONNECT VACUUM SENSING HOSE
4. CONNECT COLD START INJECTOR PIPE
   (See step 2 on page FI-31)
5. INSTALL THROTTLE BODY
   (See steps 2 to 12 on page FI-43)

Injectors









ON-VEHICLE INSPECTION

1. INSPECT INJECTOR OPERATION

Check operation sound from each injector.

(a) With the engine running or cranking, use a sound scope to check that there is normal operating noise in proportion to engine rpm.

(b) If you have no sound scope, you can check the injector transmission operation with a screwdriver.

If no sound or an unusual sound is heard, check the wiring connector, injector, resistor, or injection signal from ECU.

2. INSPECT INJECTOR RESISTANCE

(a) Remove the throttle body.
(See steps 1 to 10 on page FI-41)

(b) Disconnect the injector connector.

(c) Using an ohmmeter, measure the resistance between the terminals.

Resistance: 2 – 4 Ω

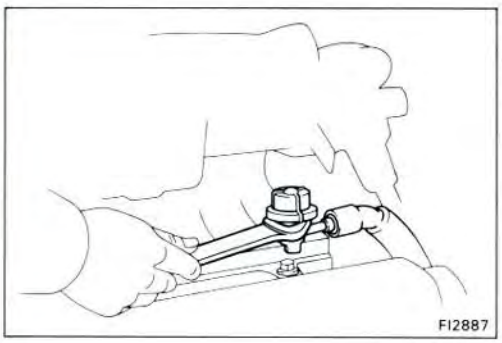
If resistance is not as specified, replace the injector.

(d) Reconnect the injector connector.

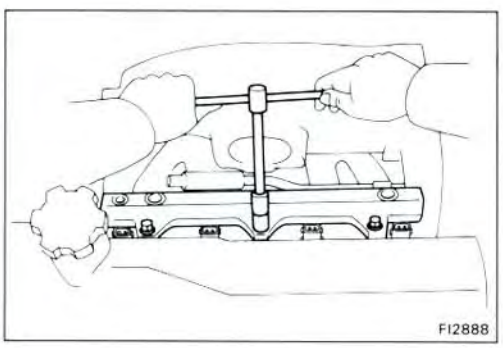
(e) Reinstall the throttle body.
(See steps 2 to 12 on page FI-43)

REMOVAL OF INJECTORS

1. **REMOVE THROTTLE BODY**
   (See steps 1 and 10 on page FI-41)
2. **REMOVE FUEL PRESSURE REGULATOR**
   (See steps 3 to 5 on page FI-54)
3. **REMOVE EGR VACUUM MODULATOR**
4. **DISCONNECT INJECTOR CONNECTORS**


FI2887

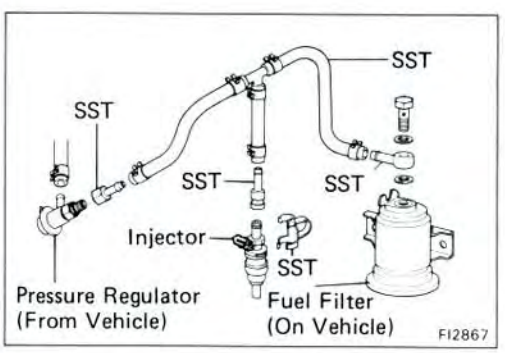
5. **DISCONNECT FUEL INLET HOSE**
   Remove the pulsation damper and two gaskets.
6. **DISCONNECT FUEL RETURN HOSE**
   Disconnect the fuel hose from the return pipe.


FI2888

7. **REMOVE DELIVERY PIPE AND INJECTORS**
   (a) Remove the three bolts and delivery pipe together with the four injectors.

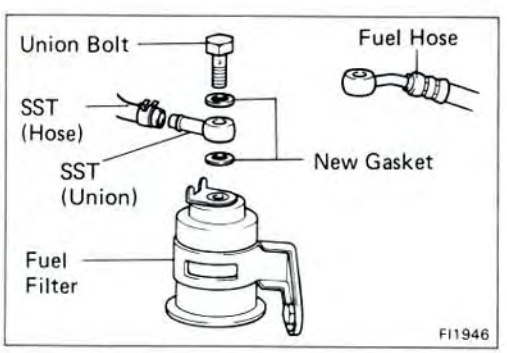
   CAUTION: Be careful not to drop the injectors, when the removing the delivery pipe.

   (b) Remove the three spacers and four insulators from the cylinder head.
   (c) Pull out the four injectors from the delivery pipe.
8. **REMOVE FUEL RETURN PIPE FROM DELIVERY PIPE**



INSPECTION OF INJECTORS

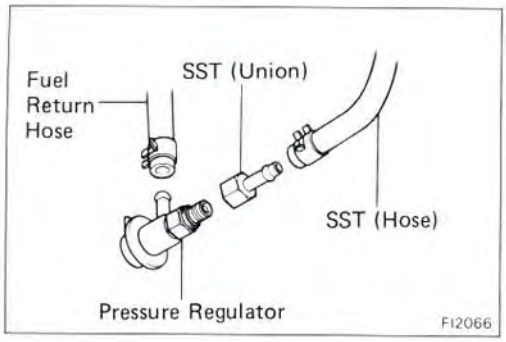
1. **INSPECT INJECTOR INJECTION**
   WARNING: Keep clear of sparks during the test.



   (a) Disconnect the fuel hose from the fuel filter outlet.
   (b) Connect the SST (union and hose) to the fuel filter outlet two new gaskets and the union bolt.

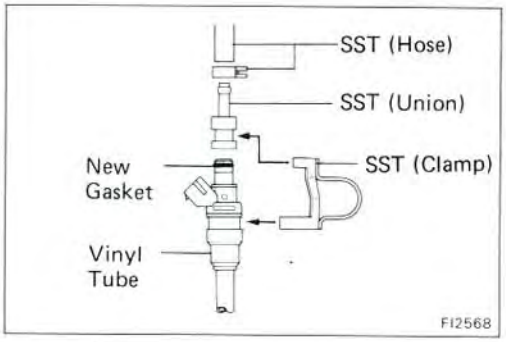
   SST 09268-41045

   NOTE: Use the vehicle's fuel filter.



(c) Connect the fuel return hose and SST (union) to the pressure regulator with SST (union).

SST 09268-41045

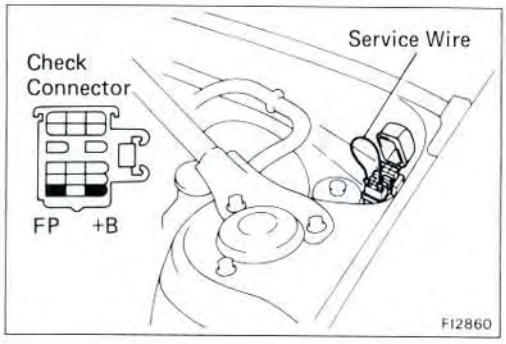


(d) Connect SST (union and hose) to the injector, and hold the injector and SST (union) with SST (clamp).

SST 09268-41045

(e) Put the injector into the graduated cylinder.

NOTE: Install the a suitable vinyl hose onto the injector to prevent gasoline from splashing out.

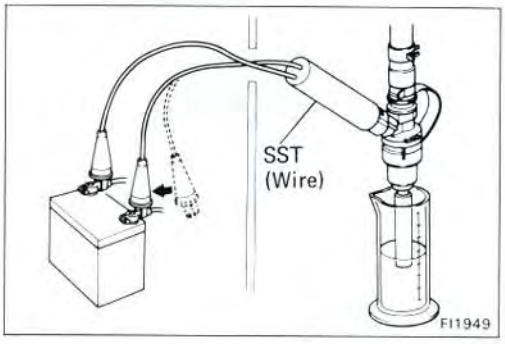


(f) Reconnect the battery negative (⊖) cable.

(g) Using a service wire, short terminals +B and FP of the check connector.

(h) Turn the ignition switch ON.

NOTE: Do not start the engine.



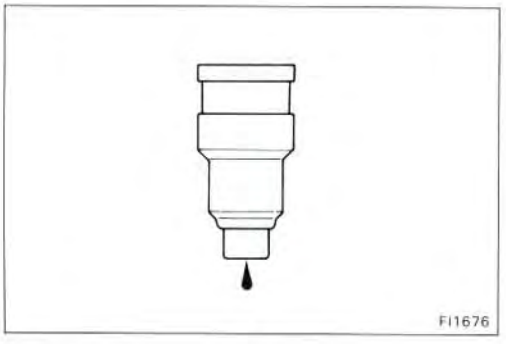
(i) Connect SST (wire) to the injector and battery for 15 seconds, and measure the injection volume with a graduated cylinder. Test each injector two or three times.

SST 09842-30060

Volume: 104 – 110 cc (6.3 – 6.7 cu in.) per 15 sec.

Difference between each injector:
5 cc (0.31 cu in.) or less

If the injection volume is not as specified, replace the injector.



2. INSPECT LEAKAGE

(a) In the condition above, disconnect the test probes of SST (wire) from the battery and check the fuel leakage from the injector.

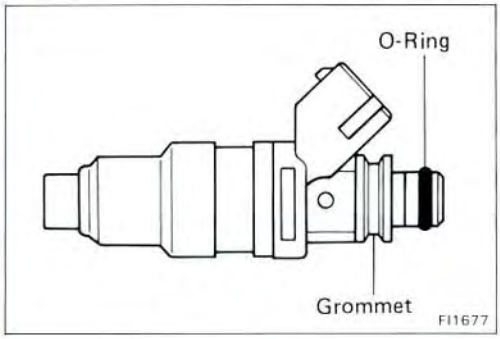
SST 09842-30060

Fuel drop: One drop or less per minute

(b) Disconnect the battery negative (⊖) cable.

(c) Remove SST and the service wire.

SST 09268-41045



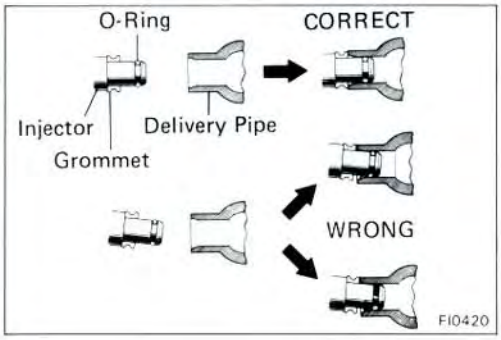
INSTALLATION OF INJECTORS

1. INSTALL FUEL RETURN PIPE TO DELIVERY PIPE

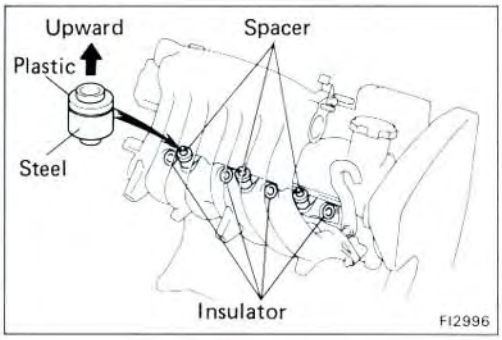
2. INSTALL INJECTORS AND DELIVERY PIPE

(a) Install a new grommet to the injector.

(b) Apply a light coat of gasoline to a new O-ring and install it to the injector.

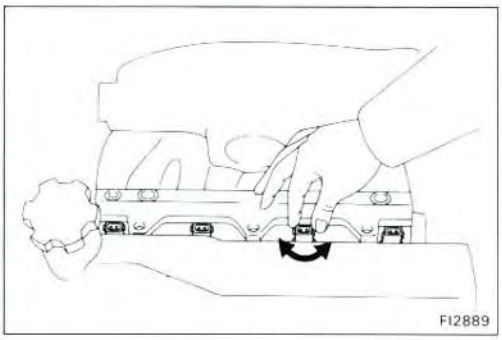


(c) While turning the injector left and right, install it to the delivery pipe. Install the four injectors.



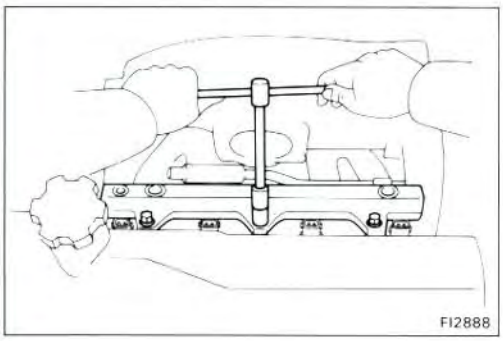
(d) Place the four insulators and three spacers in position on the cylinder head.

(e) Place the injectors together with the delivery pipe in position on the cylinder head.



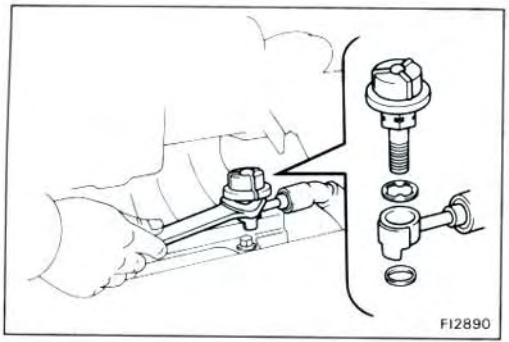
(f) Check that the injectors rotate smoothly.

NOTE: If the injectors do not rotate smoothly, the probable cause is incorrect installation of O-rings. Replace the O-rings.



(g) Install and torque the three bolts.

Torque: 195 kg-cm (14 ft-lb, 19 N·m)



3. **CONNECT FUEL INLET HOSE**

   Connect the inlet hose with new two gaskets and pulsation damper.

   Torque: 300 kg-cm (22 ft-lb, 29 N·m)

4. **CONNECT FUEL RETURN HOSE**

   Connect the fuel hose to the return pipe.

5. **CONNECT INJECTOR CONNECTORS**

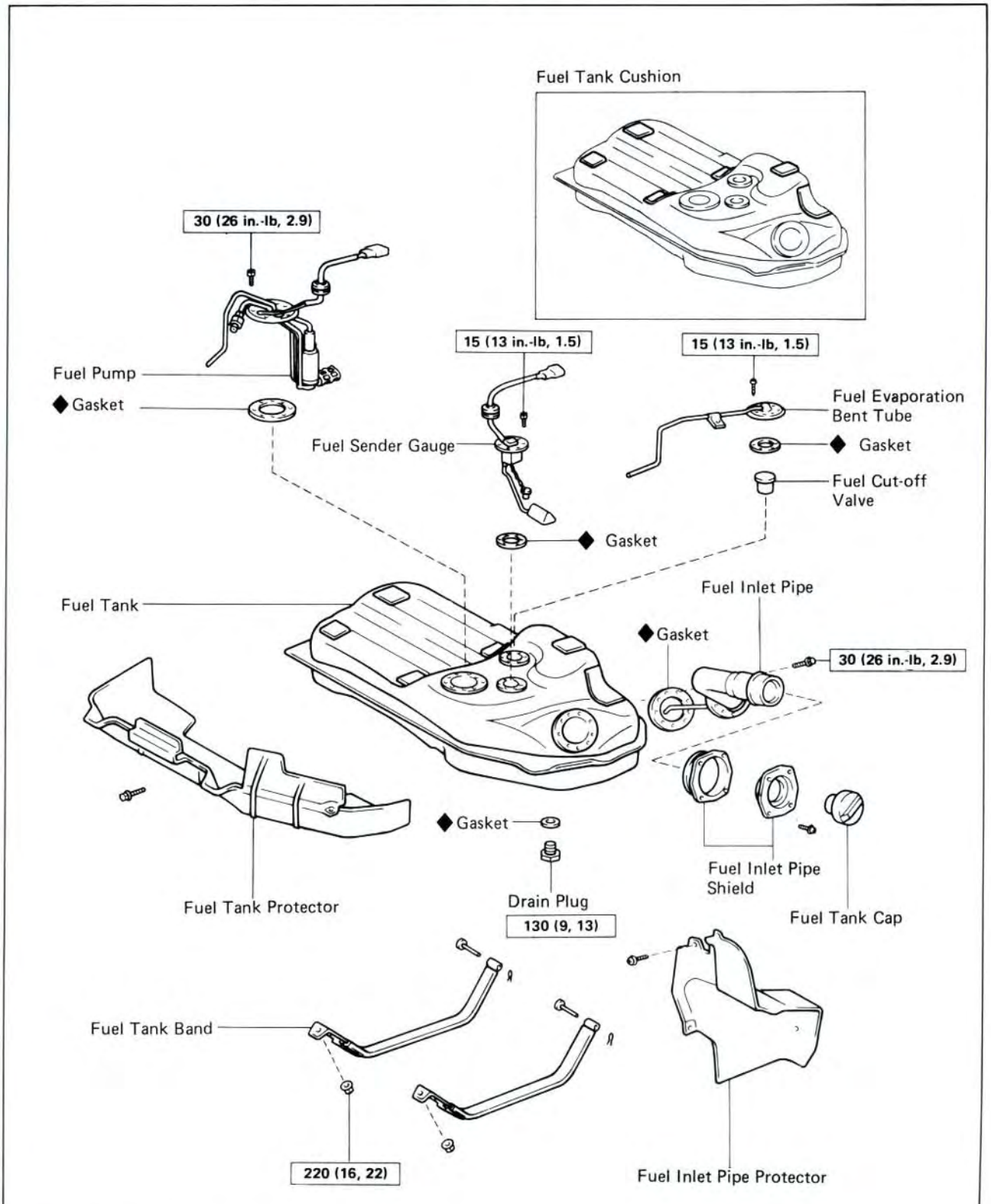
6. **INSTALL EGR VACUUM MODULATOR**

7. **INSTALL FUEL PRESSURE REGULATOR**
   (See steps 1 to 3 on page FI-33)

8. **INSTALL THROTTLE BODY**
   (See steps 2 and 12 on page FI-43)

Fuel Tank and Lines

COMPONENTS

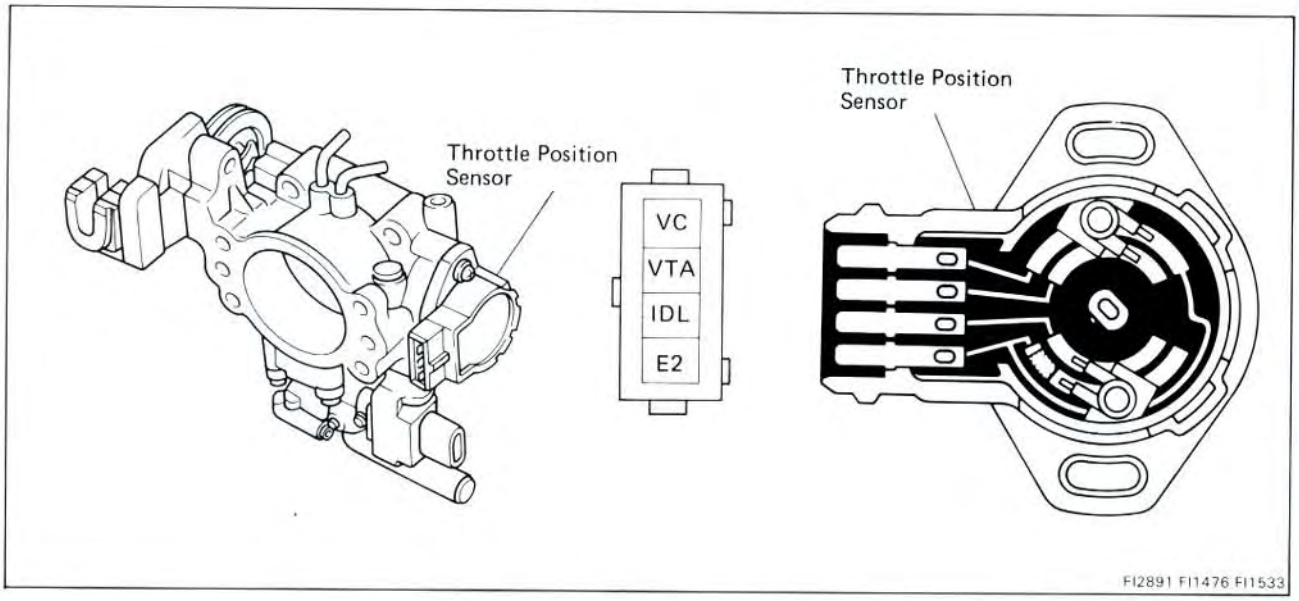


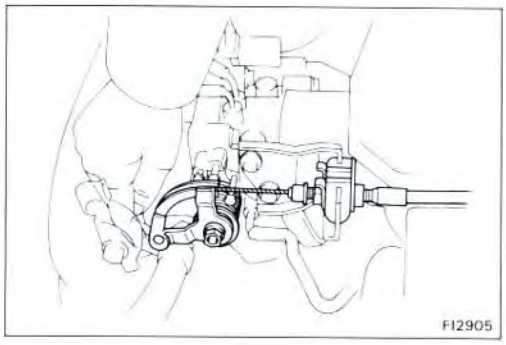
kg-cm (ft-lb, N·m) : Specified torque

◆ Non-reusable part

FI2842

AIR INDUCTION SYSTEM
Throttle Body

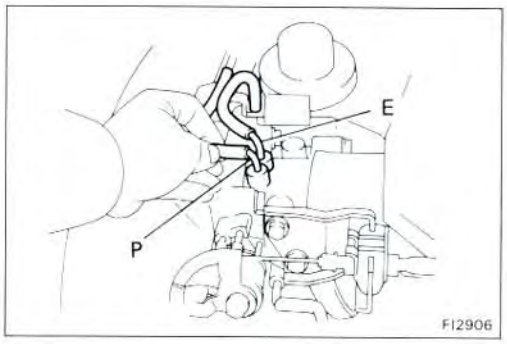




ON-VEHICLE INSPECTION

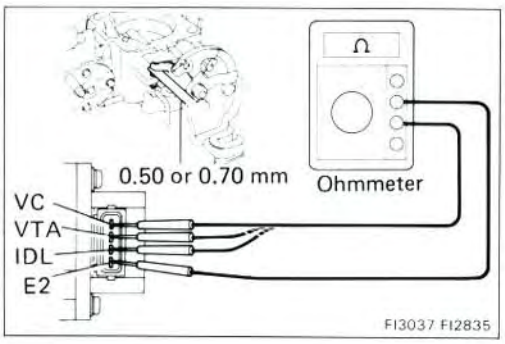
1. INSPECT THROTTLE BODY

(a) Check that the throttle linkage moves smoothly.



(b) Check the vacuum at each port.
- Start the engine.
- Check the vacuum with your finger.

Port No.	At idling	Other than idling
E	No vacuum	Vacuum
P	No vacuum	Vacuum

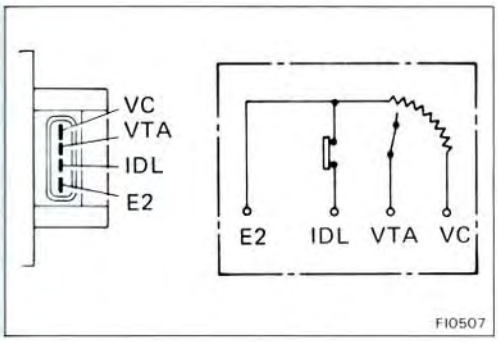


2. INSPECT THROTTLE POSITION SENSOR

(a) Disconnect the sensor connector.

(b) Insert a feeler gauge between the throttle stop screw and stop lever.

(c) Using an ohmmeter, measure the resistance between each terminal.

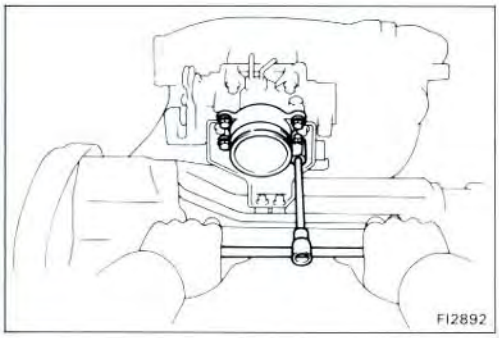


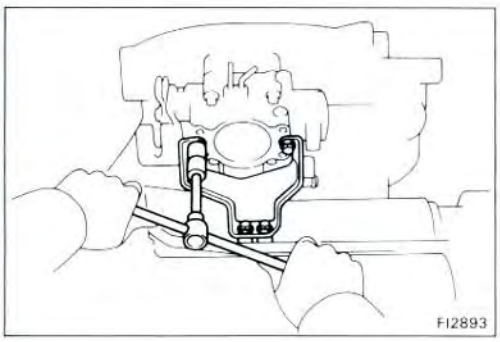
Clearance between lever and stop screw	Between terminals	Resistance
0 mm (0 in.)	VTA – E2	0.2 – 0.8 kΩ
0.50 mm (0.020 in.)	IDL – E2	2.3 kΩ or less
0.70 mm (0.028 in.)	IDL – E2	Infinity
Throttle valve fully opened	VTA – E2	3.3 – 10.3 kΩ
–	VC – E2	3 – 8.3 kΩ

(d) Reconnect the sensor connector.

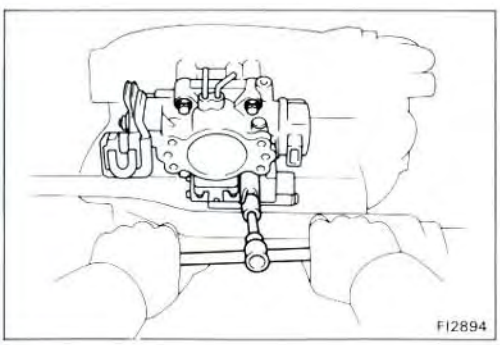
REMOVAL OF THROTTLE BODY

1. **DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY**
2. **DRAIN ENGINE COOLANT (See page CO-4)**
3. **DRAIN INTERCOOLER COOLANT (See page TC-7)**
4. **DISCONNECT ACCELERATOR CABLE FROM THROTTLE LINKAGE**
5. **REMOVE INTERCOOLER (See step 7 on page TC-10)**
6. **REMOVE AIR CONNECTOR**
   Remove the four bolts and air connector.



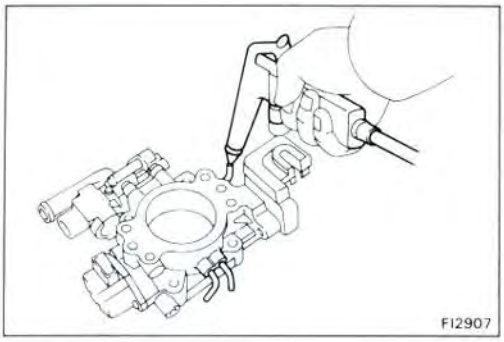


7. **REMOVE AIR CONNECTOR STAY**
   Remove the four bolts, air connector stay and two spacers.
8. **DISCONNECT THROTTLE POSITION SENSOR CONNECTOR**
9. **DISCONNECT ISC VALVE CONNECTOR**



10. **REMOVE THROTTLE BODY**
    (a) Remove the following hoses:
    - Water hoses
    - Air hose
    - Emission control vacuum hoses

    (b) Remove the four bolts, throttle body and gasket.
11. **IF NECESSARY, REMOVE ISC VALVE FROM THROTTLE BODY (See step 2 on page FI-45)**



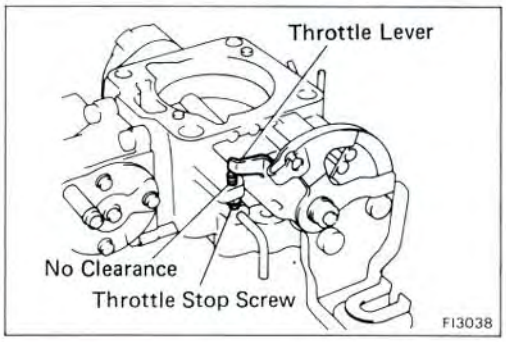
INSPECTION OF THROTTLE BODY

1. CLEAN THROTTLE BODY

(a) Using a soft brush and carburetor cleaner, clean the cast parts.

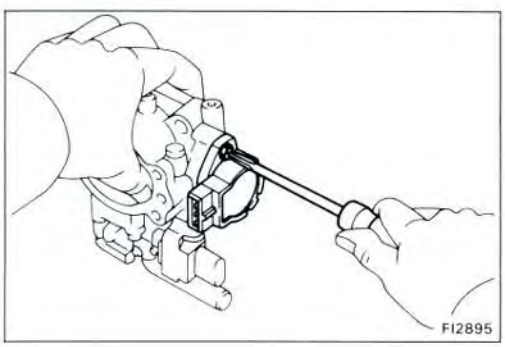
(b) Using compressed air, clean all the passages and apertures.

CAUTION: To prevent deterioration, do not clean the throttle position sensor.



2. INSPECT THROTTLE VALVE

Check that there is no clearance between the throttle stop screw and throttle lever when the throttle valve is fully closed.

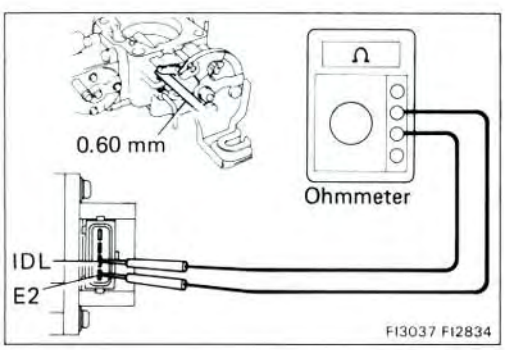


3. INSPECT THROTTLE POSITION SENSOR

(See page 2 on page FI-40)

4. IF NECESSARY, ADJUST THROTTLE POSITION SENSOR

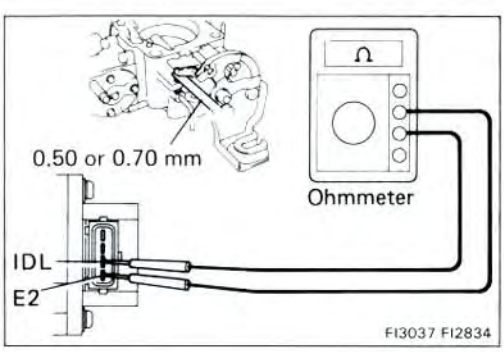
(a) Loosen the two mount screws of the sensor.



(b) Insert a feeler gauge 0.60 mm (0.024 in.) between the throttle stop screw and throttle lever.

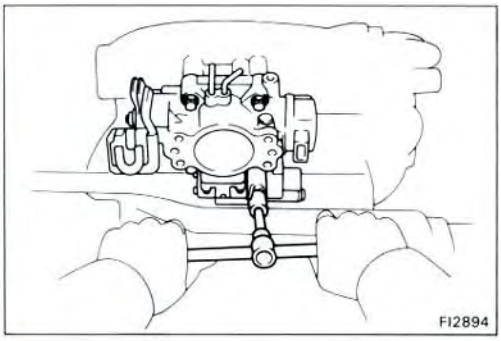
(c) Connect the test probe of an ohmmeter to the terminals IDL and E2 of the sensor.

(d) Gradually turn the sensor clockwise until the ohmmeter deflects, and secure it with the screws.



(e) Recheck the continuity between terminals IDL and E2.

Clearance between lever and stop screw	Continuity (IDL – E2)
0.50 mm (0.020 in.)	Continuity (2.3 kΩ or less)
0.70 mm (0.028 in.)	No continuity



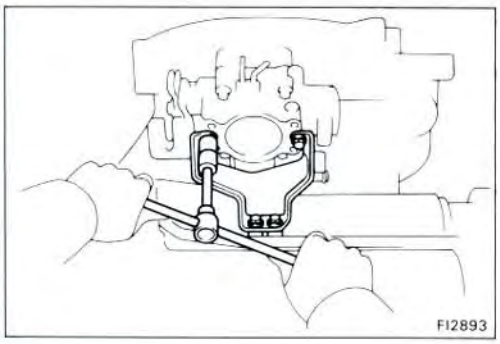
INSTALLATION OF THROTTLE BODY

1. **INSTALL ISC VALVE TO THROTTLE BODY**
   (See step 1 on page FI-45)

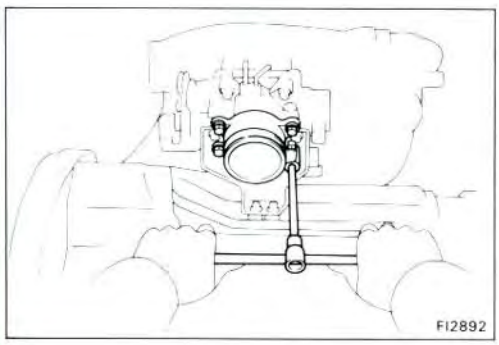
2. **INSTALL THROTTLE BODY**
   (a) Install a new gasket and the throttle body with the four bolts.
   Torque: 195 kg-cm (14 ft-lb, 19 N·m)
   (b) Connect the following hoses:
   - Water hoses
   - Air tube hose
   - Emission control vacuum hoses

3. **CONNECT ISC VALVE CONNECTOR**

4. **CONNECT THROTTLE POSITION SENSOR CONNECTOR**



5. **INSTALL AIR CONNECTOR STAY**
   Install the air connector stay with the two spacers and four bolts.
   Torque:
   10 mm bolt head 80 kg-cm (69 in.-lb, 7.8 N·m)
   12 mm bolt head 195 kg-cm (14 ft-lb, 19 N·m)



6. **INSTALL AIR CONNECTOR**
   Install the air connector with the four bolts.
   Torque: 195 kg-cm (14 ft-lb, 19 N·m)

7. **INSTALL INTERCOOLER**
   (See step 11 on page TC-14)

8. **CONNECT ACCELERATOR CABLE, AND ADJUST IT**

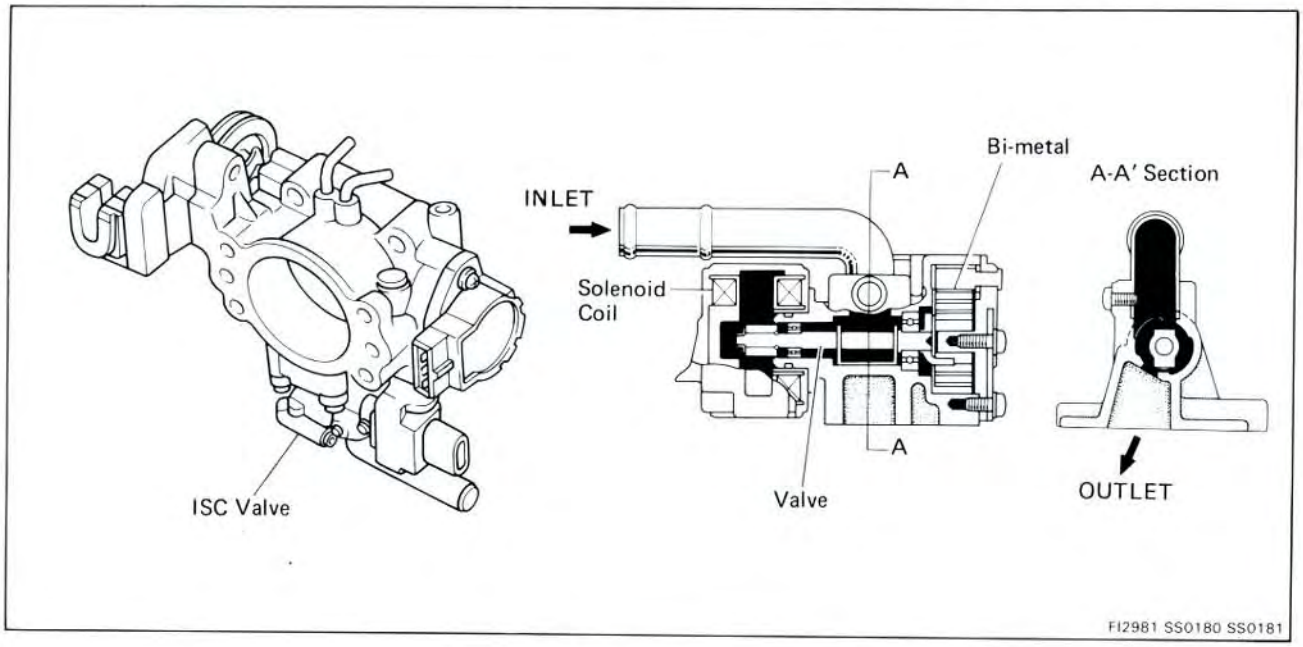
9. **CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY**

10. **FILL ENGINE WITH COOLANT (See page CO-4)**

11. **FILL INTERCOOLER WITH COOLANT (See page TC-7)**

12. **CHECK FOR FUEL LEAKAGE**
    (See Pub. No. RM071U on page FI-7)

Idle Speed Control (ISC) Valve

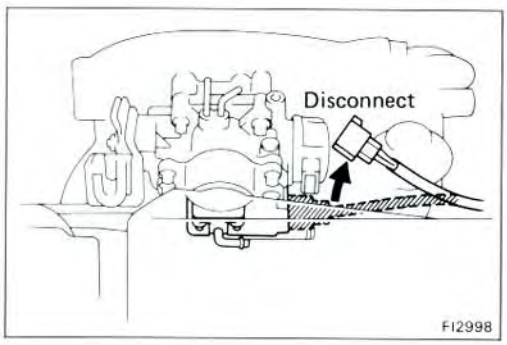


ON-VEHICLE INSPECTION

1. INSPECT ISC VALVE OPERATION

(a) Initial conditions

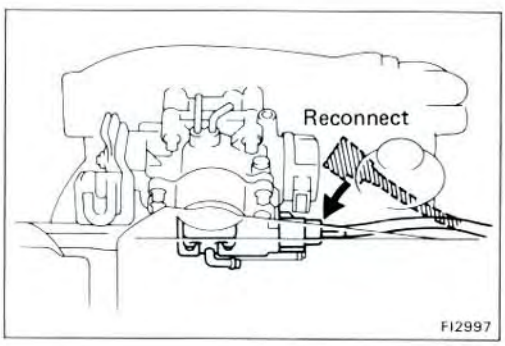
- Engine at reach normal operating temperature
- Idle speed set correctly



(b) Disconnect the ISC valve connector.

(c) Check the engine rpm.

Engine rpm: 1,000 rpm or more

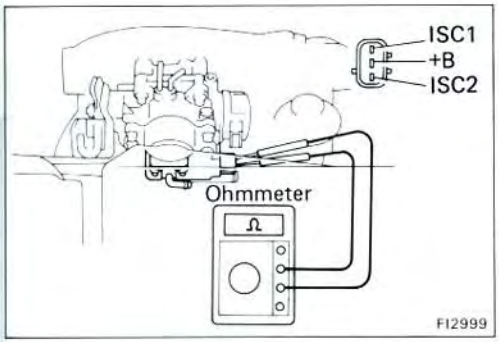


(c) Reconnect the ISC valve connector.

(e) Check that they return to the idle speed.

Idle speed: 750 ± 50 rpm

If the rpm operation is not as specified, check the ISC valve, wiring and ECU.



2. INSPECT ISC VALVE RESISTANCE

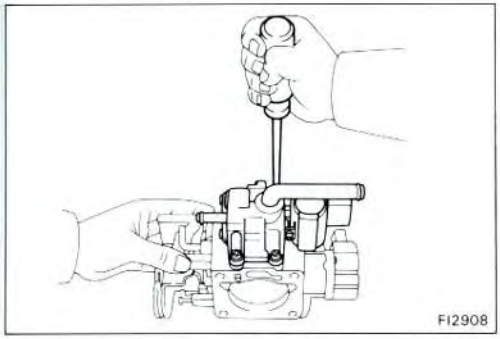
(a) Disconnect the ISC valve connector.

(b) Measure the resistance between the terminal +B and other terminals (ISC1, ISC2).

Resistance: 16.0 – 17.0 Ω each

If the resistance is not as specified, replace the valve.

(c) Reconnect the ISC valve connector.

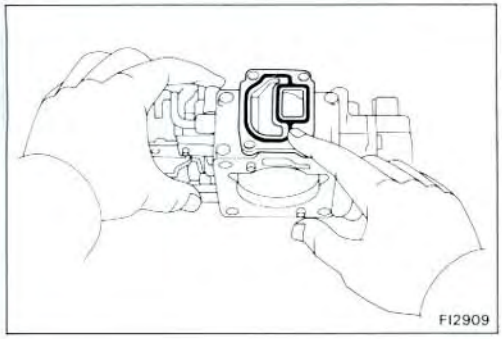


REMOVAL OF ISC VALVE

1. REMOVE THROTTLE BODY
(See steps 1 to 10 on page FI-41)

2. REMOVE ISC VALVE FROM THROTTLE BODY

Remove the four screws, ISC valve and gasket.



INSTALLATION OF ISC VALVE

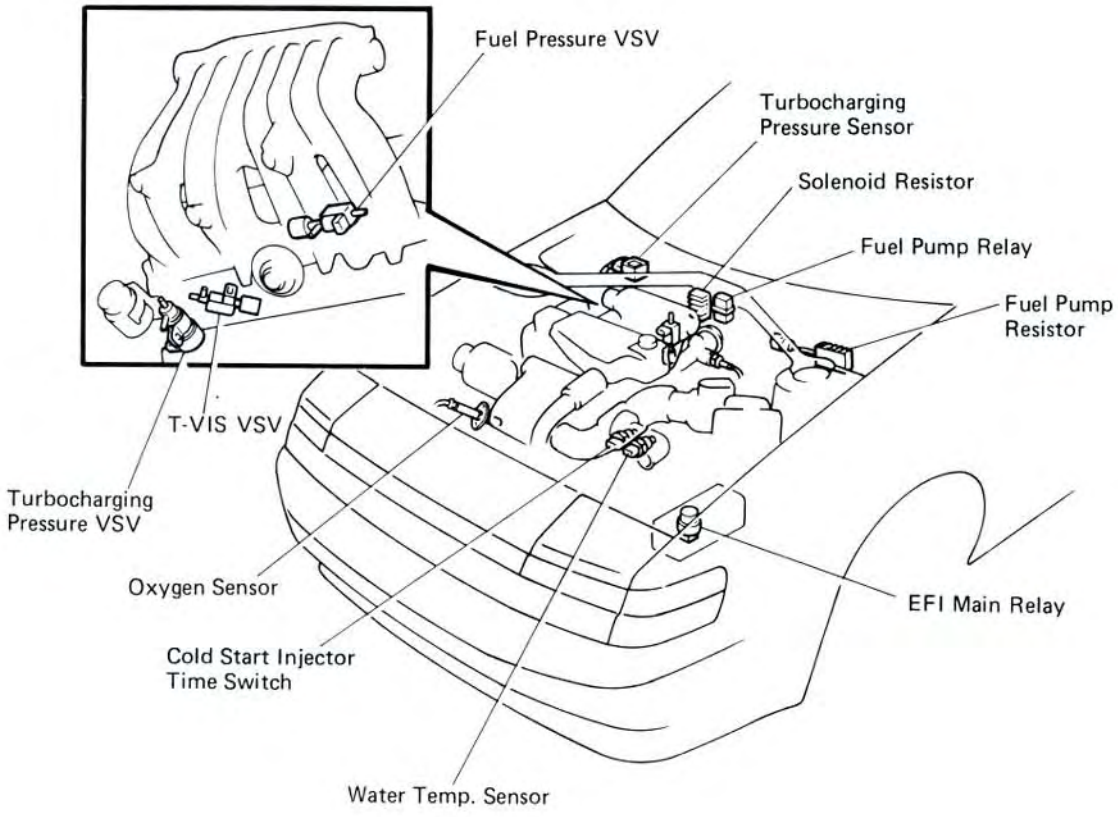
1. INSTALL ISC VALVE TO THROTTLE BODY

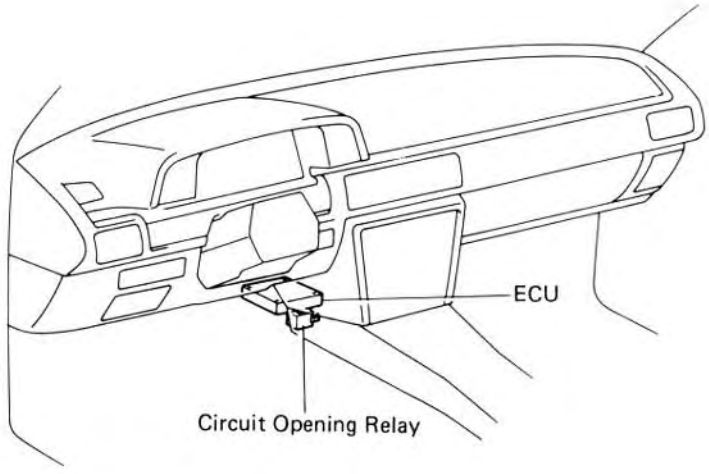
(a) Place a new gasket on the throttle body.

(b) Install the ISC valve with the four screws.

2. INSTALL THROTTLE BODY
(See steps 2 to 12 on page FI-43)

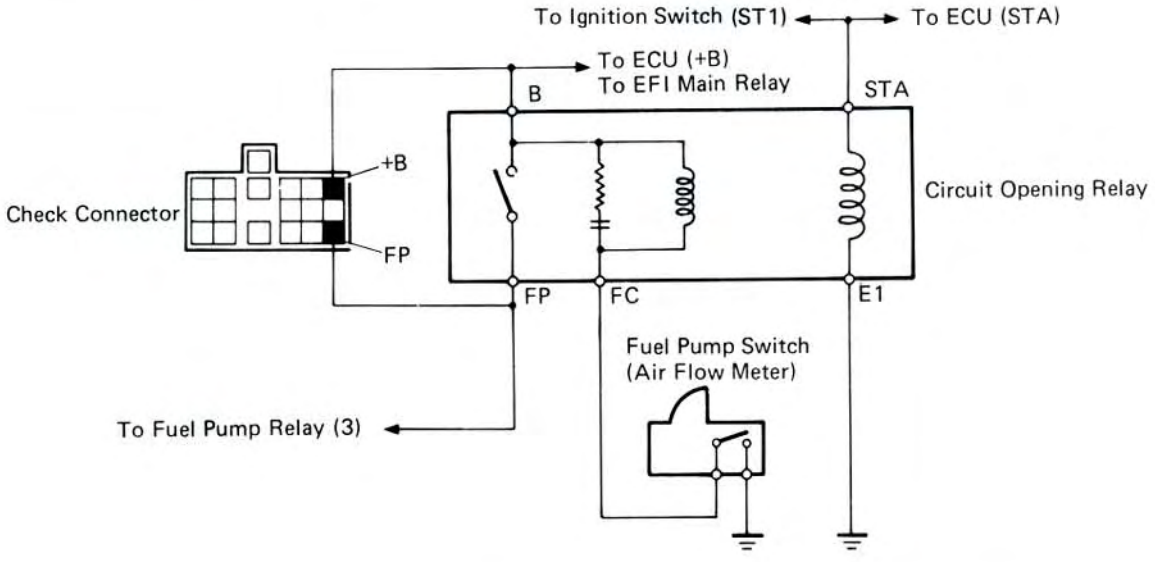
ELECTRONIC CONTROL SYSTEM
Location of Electronic Control Parts





FI3000
FI1969

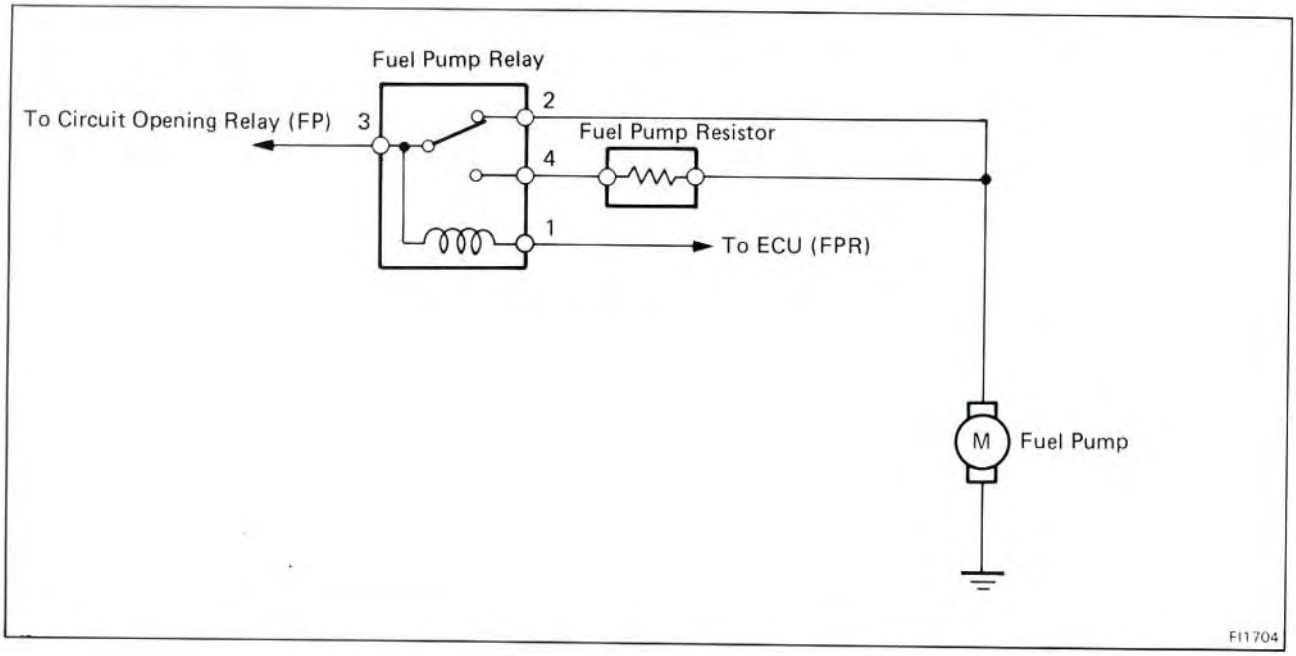
Circuit Opening Relay

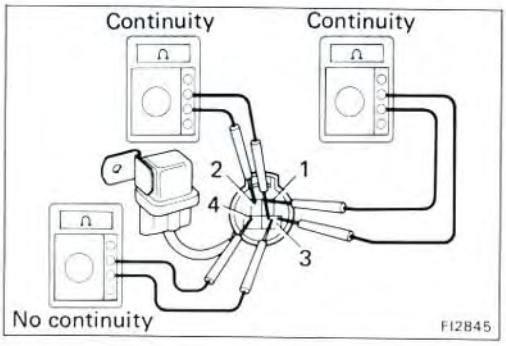


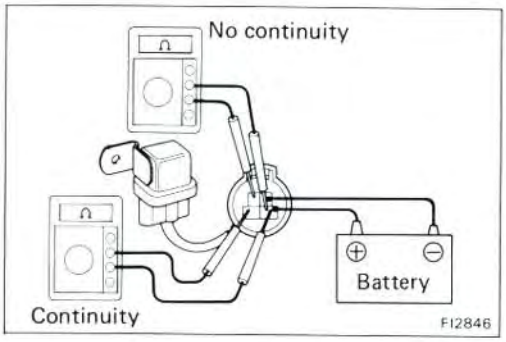
INSPECTION OF CIRCUIT OPENING RELAY

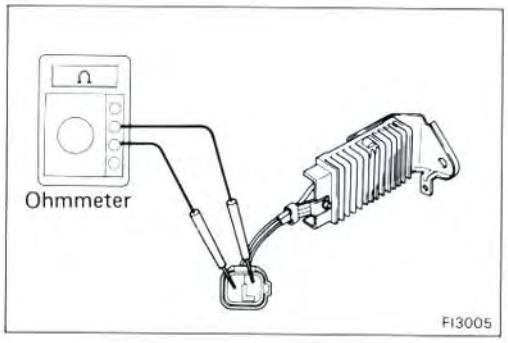
(See Pub. No. RM071U on page FI-98)

Fuel Pump Relay and Resistor









INSPECTION OF FUEL PUMP RELAY AND RESISTOR

1. INSPECT FUEL PUMP RELAY

A. Inspect relay continuity

(a) Using an ohmmeter, check that there is continuity between terminals 1 and 3.

(b) Check that there is continuity between terminals 2 and 3.

(c) Check that there is no continuity between terminals 3 and 4.

If continuity is not as specified, replace the relay.

B. Inspect relay operation

(a) Apply battery voltage across terminals 1 and 3.

(b) Using an ohmmeter, check that there is no continuity between terminals 2 and 3.

(c) Check that there is continuity between terminals 3 and 4.

If operation is not as specified, replace the relay.

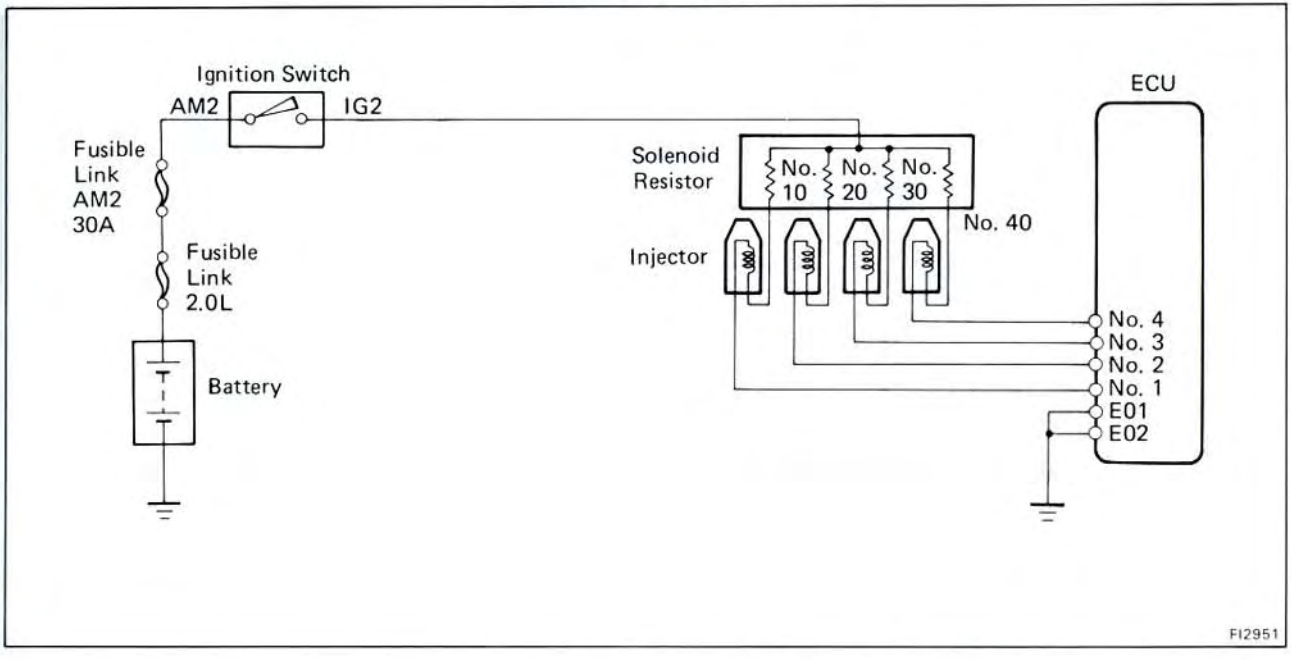
2. INSPECT FUEL PUMP RESISTOR

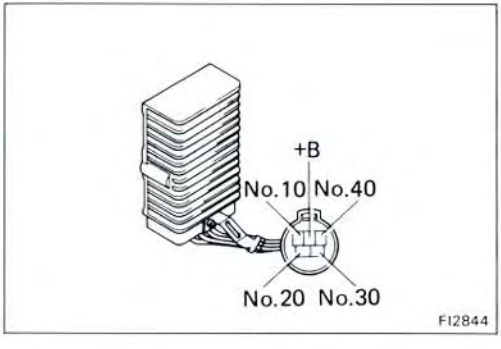
Using an ohmmeter, measure the resistance between terminals.

Resistance: Approx. 0.73 Ω

If the resistance is not as specified, replace the resistor.

Solenoid Resistor





INSPECTION OF SOLENOID RESISTOR

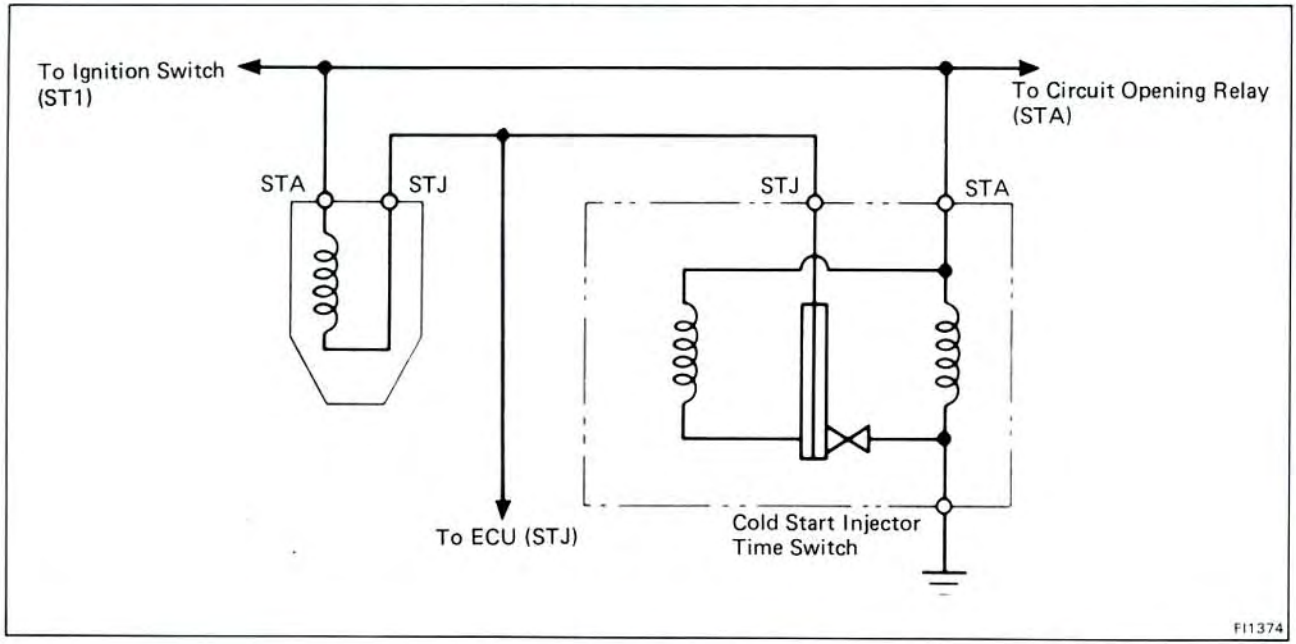
INSPECT SOLENOID RESISTOR

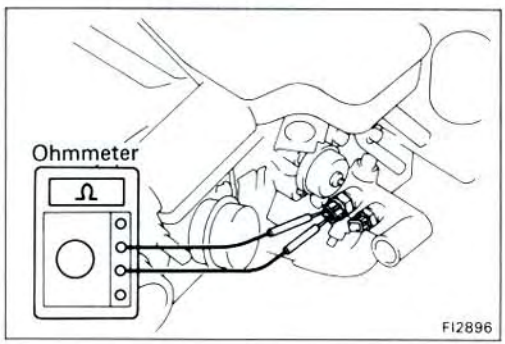
Using an ohmmeter, measure the resistance between terminal +B and other terminals.

Resistance: 5 — 7 Ω each

If the resistance is not as specified, replace the resistor.

Cold Start Injector Time Switch





INSPECTION OF COLD START INJECTOR TIME SWITCH

INSPECT COLD START INJECTOR TIME SWITCH

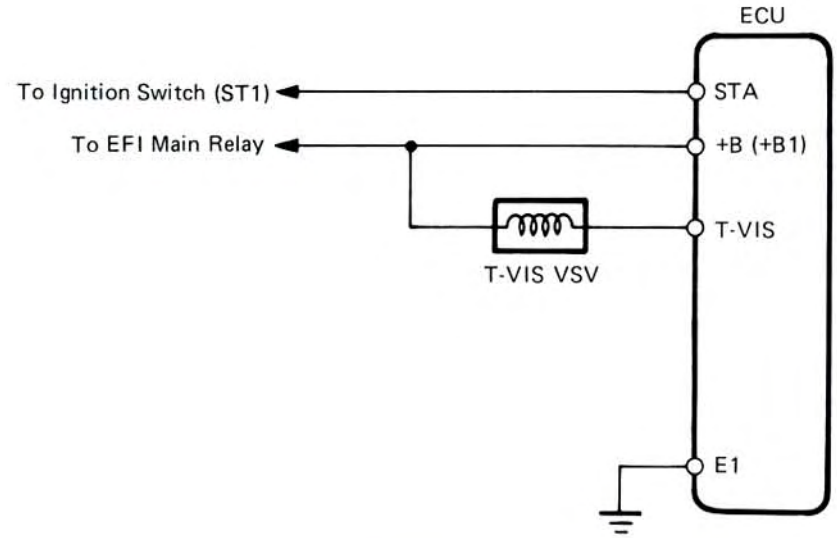
Using an ohmmeter, measure the resistance between each terminal.

Resistance:

STA — STJ	**30 — 50 Ω below 10°C (50°F)**
	70 — 90 Ω above 25°C (77°F)
STA — Ground	**30 — 90 Ω**

If the resistance is not as specified, replace the switch.

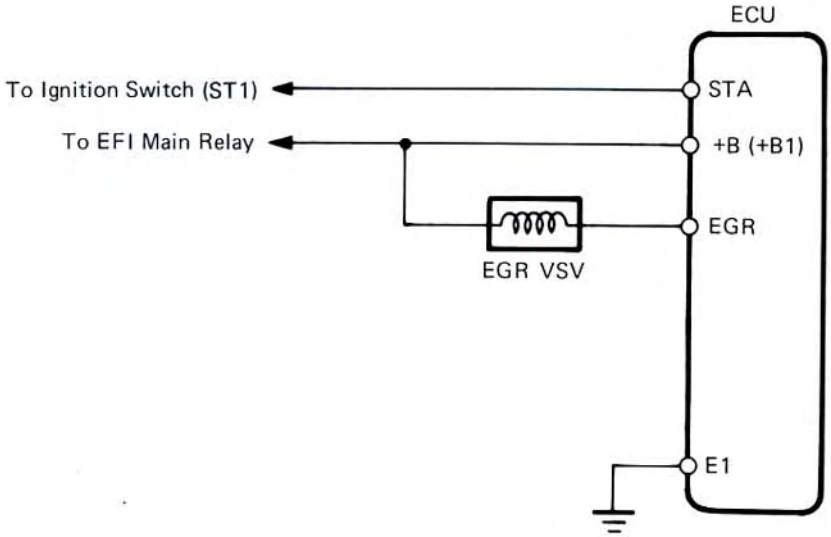
T-VIS VSV



INSPECTION OF T-VIS VSV

(See page EM-33)

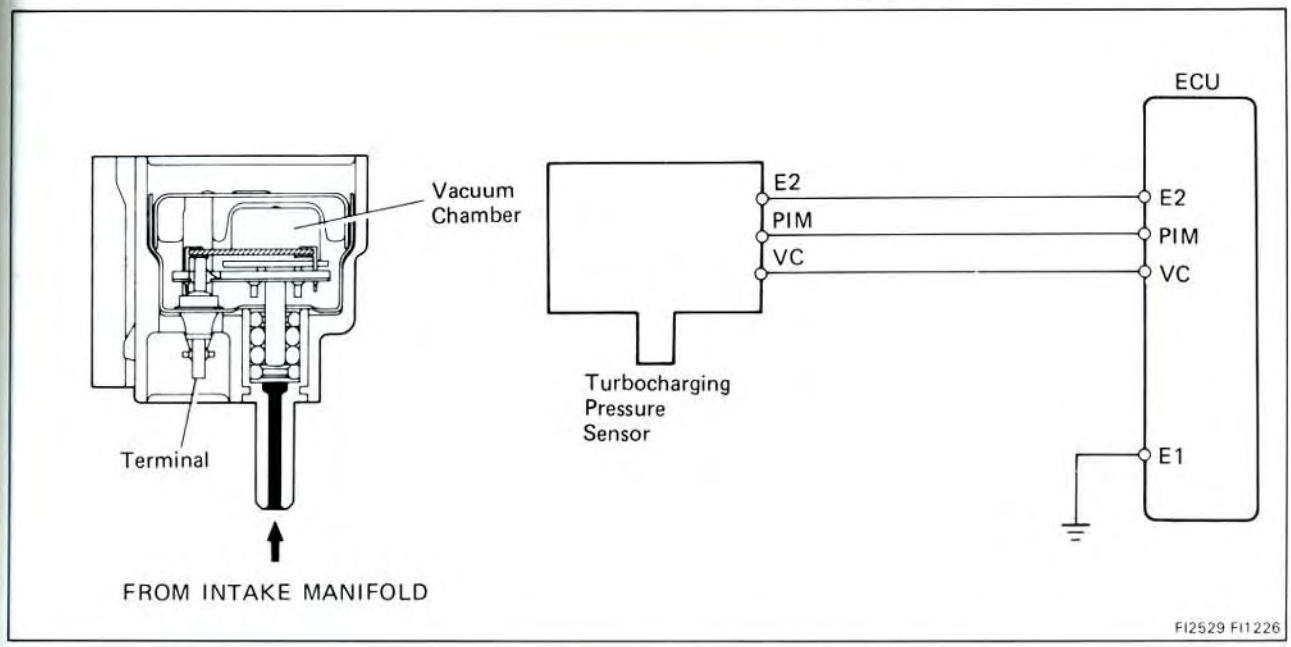
EGR Control VSV

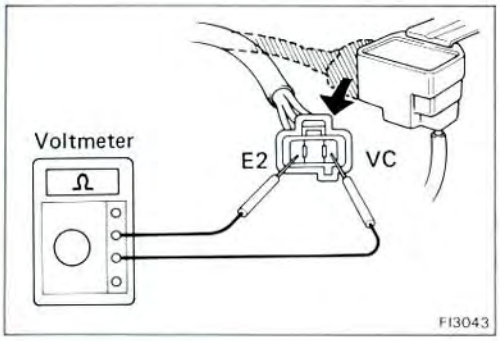


INSPECTION OF EGR CONTROL VSV

(See page EC-10)

Turbocharging Pressure Sensor





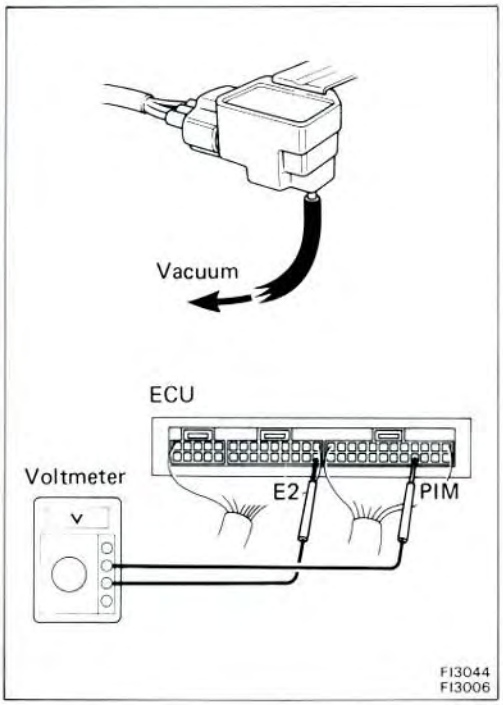
INSPECTION OF TURBOCHARGING PRESSURE SENSOR

1. INSPECT POWER SOURCE VOLTAGE OF TURBOCHARGING PRESSURE SENSOR

(a) Turn the ignition switch ON.

(b) Using a voltmeter, measure the voltage between terminals VC and E2.

Voltage: 4 — 6 V



2. INSPECT POWER OUTPUT OF TURBOCHARGING PRESSURE SENSOR

(a) Turn the ignition switch ON.

(b) Disconnect the vacuum hose of the intake manifold (chamber) side.

(c) Connect a voltmeter to terminals PIM and E2 of the pressure sensor, and measure and record the output voltage under ambient atmospheric pressure.

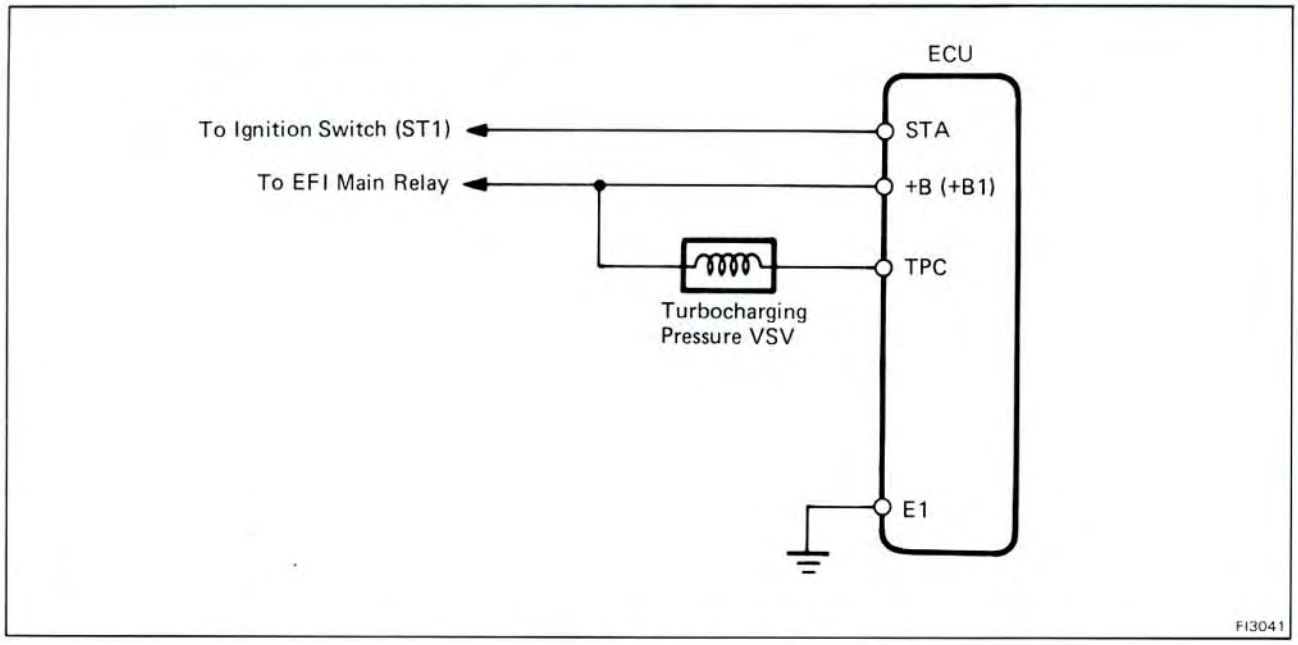
(d) Apply vacuum to the pressure sensor in 100 mmHg (3.94 in.Hg, 13.3 kPa) segments to 500 mmHg (19.69 in.Hg, 66.7 kPa).

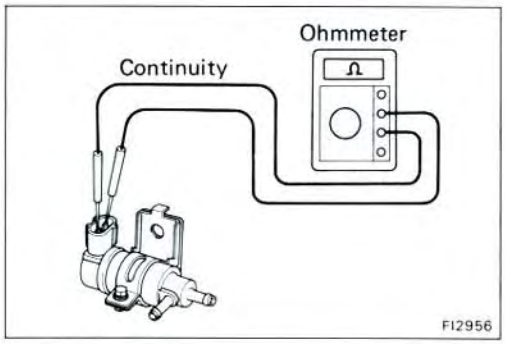
(e) Measure voltage drop from step (c) above for each segment.

Voltage drop

Applied Vacuum mmHg (in.Hg, kPa)	100 (3.94 13.3)	200 (7.87 26.7)	300 (11.81 40.0)	400 (15.75 53.3)	500 (19.69 66.7)
Voltage drop V	0.15— 0.35	0.4— 0.6	0.65— 0.85	0.9— 1.1	1.15— 1.35

Turbocharging Pressure VSV





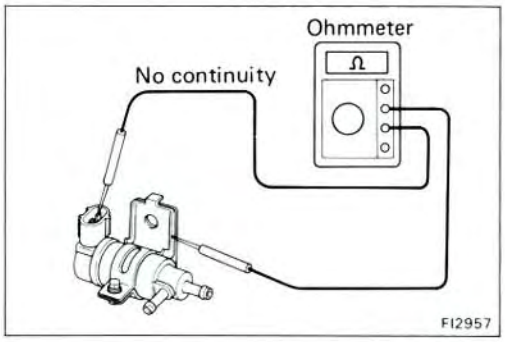
INSPECTION OF TURBOCHARGING PRESSURE VSV

1. INSPECT VSV FOR OPEN CIRCUIT

Using an ohmmeter, check that there is continuity between the terminals.

Resistance (Cold): 24 – 30 Ω

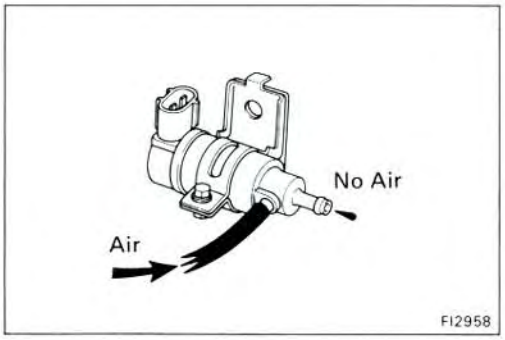
If there is no continuity, replace the VSV.



2. INSPECT VSV FOR GROUND

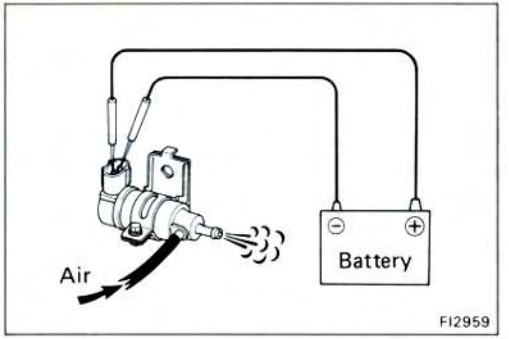
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



3. INSPECT VSV OPERATION

(a) Check that air does not flow from pipe E to pipe F.



(b) Apply battery voltage across the terminals.

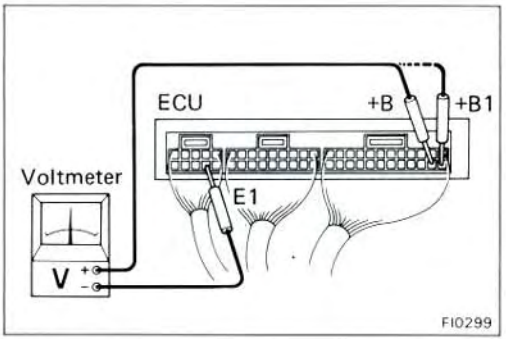
(c) Check that air flows from pipe E to F.

If operation is not as specified, replace the VSV.

Electronic Controlled Unit (ECU)

INSPECTION OF ECU

NOTE: The EFI circuit can be checked by measuring the resistance and voltage at the wiring connectors of the ECU.



1. INSPECT VOLTAGE OF ECU

Check the voltage between each terminal of the wiring connectors.

- Turn the ignition switch ON.
- Measure the voltage at each terminal.

NOTE:

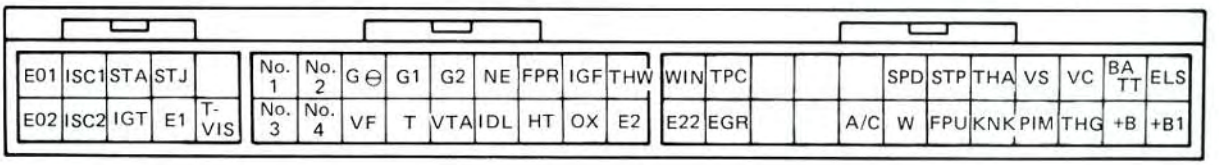
- Perform all voltage measurements with the connectors connected.
- Verify that the battery voltage is 11 V or more when the ignition switch is ON.

Voltage at ECU Wiring Connectors

Terminals	Condition		STD voltage (V)
+B, +B1 — E1	Ignition S/W ON		10 – 14
BATT — E1	–		10 – 14
IDL — E2	Ignition S/W ON	Throttle valve open	4 – 6
VTA — E2		Throttle valve fully closed	0.1 – 1.0
		Throttle valve open	3 – 4.5
VC — E2		–	4 – 6
IGT — E1	Cranking or idling		0.7 – 1.0
STA — E1	Cranking		6 – 14
No. 1, No. 2, No. 3, No. 4 — E01, E02	Ignition S/W ON		10 – 14
W — E1	No trouble (Check engine warning light off) and engine running		8 – 14
VS — E2	Ignition S/W ON	Measuring plate fully closed	4 – 6
		Measuring plate fully open	1.0 or less
	Idling		2 – 4
THA — E2	Ignition S/W ON	Intake air temp. 20°C (68°F)	1 – 3
THW — E2		Coolant temp. 80°C (176°F)	0.1 – 1.0
ISC1, ISC2 — E1	Ignition S/W ON		9 – 14
PIM — E2			2.5 – 4.5
A/C — E1	Ignition S/W ON	Air conditioning ON	8 – 14
*1 T-VIS — E1		Throttle valve fully closed	2 or less
		Throttle valve open	10 – 14
*2 T-VIS — E1	Idling		2 or less
	4,200 rpm or more		10 – 14
T — E1	Ignition S/W ON	Check connector T — E1 not short	10 – 14
		Check connector T — E1 short	0.5 or less

ECU Terminals

*1 w/ Regular Gasoline
*2 w/ Premium Gasoline



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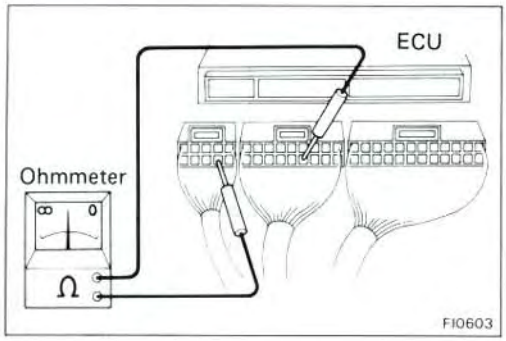


2. INSPECT RESISTANCE OF ECU

CAUTION:

- **Do not touch the ECU terminals.**
- **The tester probe should be inserted into the wiring connector from the wiring side.**

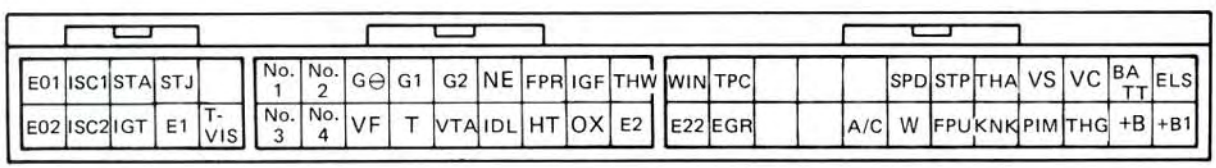
Check the resistance between each terminal of the wiring connectors.

- Disconnect the connectors from the ECU.
- Measure the resistance at each terminal.

Resistance of ECU Wiring Connectors

Terminals	Condition	Resistance (Ω)
IDL – E2	Throttle valve open	Infinity
	Throttle valve fully closed	2,300 or less
VTA – E2	Throttle valve fully open	3,300 – 10,000
	Throttle valve fully closed	200 – 800
VS – E2	Measuring plate fully closed	200 – 600
	Measuring plate fully open	20 – 1,000
THA – E2	Intake air temp. 20°C (68°F)	2,000 – 3,000
THW – E2	Coolant temp. 80°C (176°F)	200 – 400
G1, G2 – G⊖, NE	–	140 – 180

ECU Terminals



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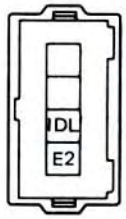
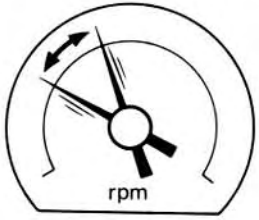


J-4-1



Tachometer

FI1142

Fuel Cut RPM

INSPECTION OF FUEL CUT RPM

1. WARM UP ENGINE

Allow the engine to reach normal operating temperature.

2. INSPECT FUEL CUT RPM

(a) Disconnect the connector from the throttle position sensor.

(b) Short terminals IDL and E2 of the wiring connector.

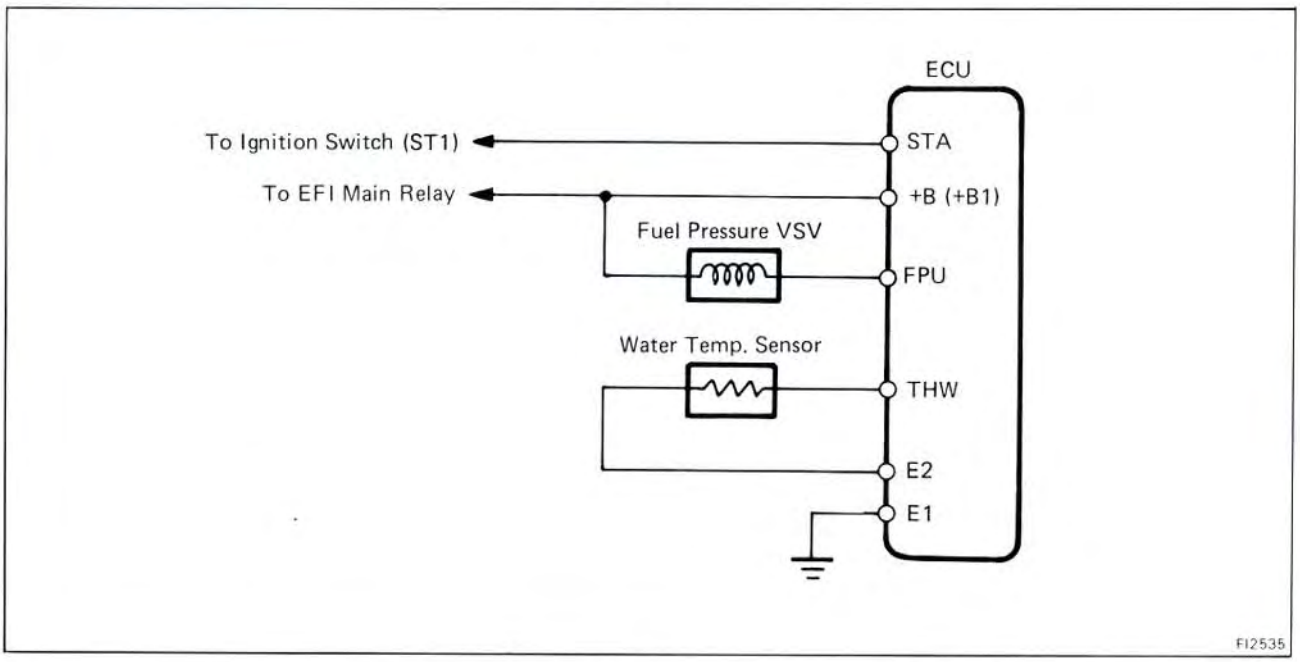
(c) Gradually raise the engine rpm and check that there is fluctuation between the fuel cut and fuel return points.

NOTE: The vehicle should be stopped.

Fuel cut rpm: 2,000 rpm

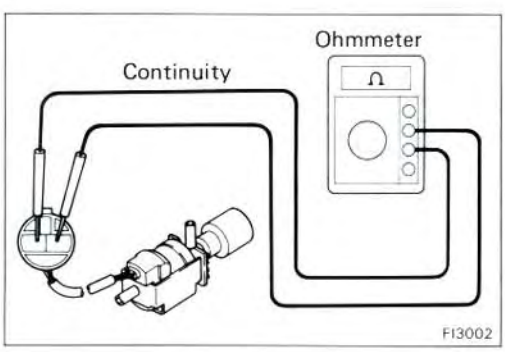
Fuel return rpm: 1,600 rpm

High-temperature Line Pressure Up System



INSPECTION OF HIGH-TEMPERATURE LINE PRESSURE UP SYSTEM

1. **INSPECT WATER TEMPERATURE SENSOR**
(See Pub. No.RM071U on page FI-100)



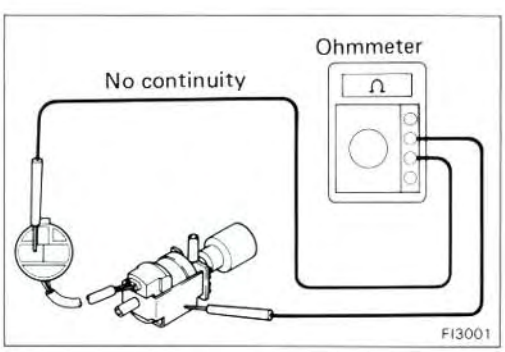
2. **INSPECT FUEL PRESSURE VSV**

A. **Inspect VSV for open circuit**

Using an ohmmeter, check that there is continuity between the terminals.

Resistance (Cold): 33 — 39 Ω

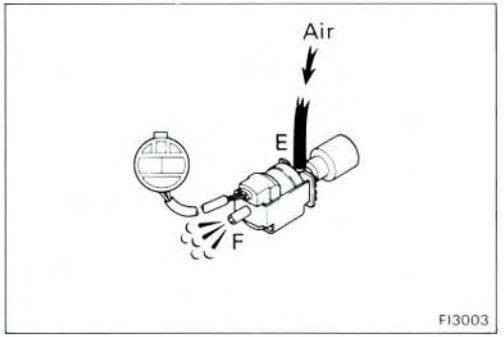
If there is no continuity, replace the VSV.



B. **Inspect VSV for ground**

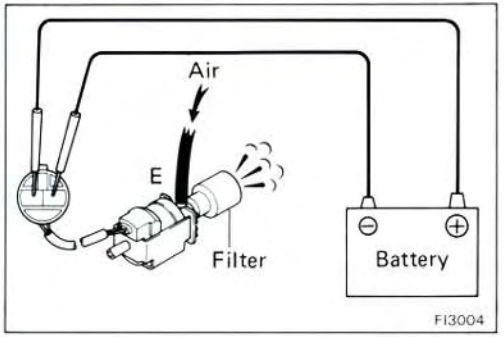
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



C. Inspect VSV operation

(a) Check that air flows from pipe E to pipe F.



(b) Apply battery voltage across the terminals.

(c) Check that air flows from pipe E to the filter.

If operation is not as specified, replace the VSV.

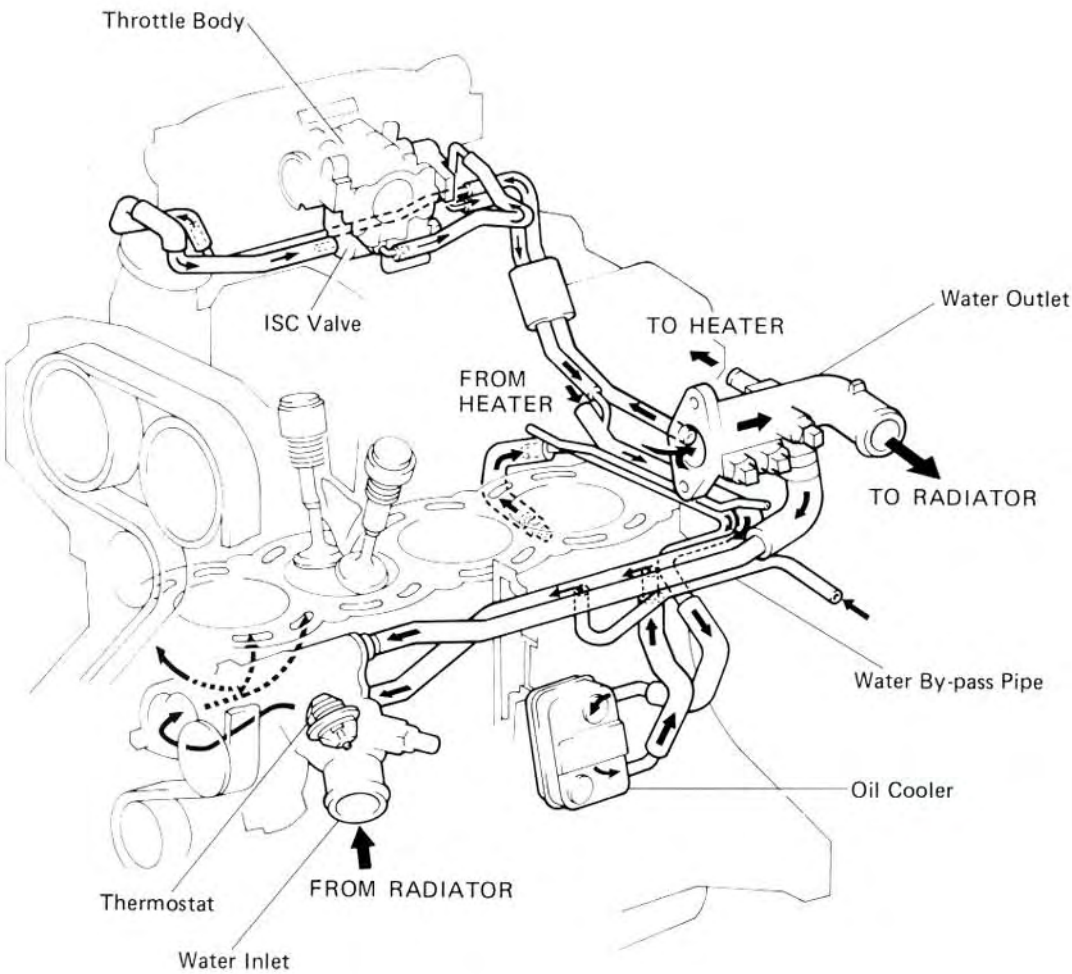
COOLING SYSTEM

REFER TO 1988 CELICA REPAIR MANUAL (Pub. No. RM071U)

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

DESCRIPTION

This engine utilizes a pressurized water forced circulation cooling system which includes a thermostat equipped with a bypass valve mounted on the inlet side.



CO0558

The cooling system is composed of the water jacket (inside the cylinder block and cylinder head), radiator, water pump, thermostat, electric fan, hoses and other components.

Coolant which is heated in the water jacket is pumped to the radiator, through which an electric fan blows air to cool the coolant as it passes through. Coolant which has been cooled is then sent back to the engine by the water pump, where it cools the engine.

The water jacket is a network of channels in the shell of the cylinder block and cylinder head through which coolant passes. It is designed to provide adequate cooling of the cylinders are combustion chambers which become the hottest during engine operation.

RADIATOR

The radiator performs the function of cooling the coolant which has passed through the water jacket and become hot, and is mounted in the front of the vehicle. The radiator consists of an upper tank and lower tank, and a core which connects the two tanks. The upper tank contains the inlet for coolant from the water jacket and the filler inlet. It also has a hose attached through which excess coolant or steam can flow. The lower tank contains the outlet for coolant and the drain cock. The core contains many tubes through which coolant flows from the upper tank to the lower tank as well as cooling fins which radiate heat away from the coolant in the tubes. The air sucked through the radiator by the electric fan, as well as the wind generated by the vehicle's travel, passes through the radiator, cooling it. Models with automatic transmissions include an automatic transmission fluid cooler built into the lower tank of the radiator. A fan with an electric motor is mounted behind radiator to assist the flow of air through the radiator. The fan operates when the coolant temperature becomes high in order to prevent it from becoming too high.

RADIATOR CAP

The radiator cap is a pressure type can which seals the radiator, resulting in pressurization of the radiator as the coolant expands. The pressurization prevents the coolant from boiling even when the coolant temperature exceeds 100°C (212°F). A relief valve (pressurization valve) and a vacuum valve (negative pressure valve) are built into the radiator cap. The relief valve opens and lets steam escape through the overflow pipe when the pressure generated inside the cooling system exceeds the limit (coolant temperature: 110 — 120°C, 230 — 248°F, pressure; 0.3 — 1.0 kg/cm^2, 4.3 — 14.2 psi, 29.4 — 98.1 kPa). The vacuum valve opens to alleviate the vacuum which develops in the coolant system after the engine is stopped and the coolant temperature drops. The valve's opening allows the pressure in the cooling system to return to the coolant in the reservoir tank.

RESERVOIR TANK

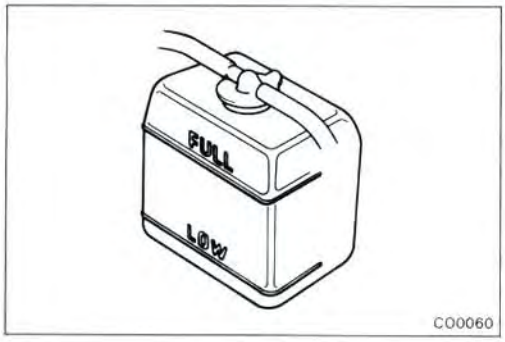
The reservoir tank is used to catch coolant which overflows the cooling system as a result of volumetric expansion when the coolant is heated. The coolant in the reservoir tank returns to the radiator when the coolant temperature drops, thus keeping the radiator full at all times and avoiding needless coolant loss. Check the reservoir tank level to learn if the coolant needs to be replenished.

WATER PUMP

The water pump is used for forced circulation of coolant through the cooling system. It is mounted on the front of the cylinder block and driven by a timing belt.

THERMOSTAT

The thermostat has a wax type bypass valve and is mounted in the water inlet housing. The thermostat includes a type of automatic valve operated by fluctuations in the coolant temperature. This valve closes when the coolant temperature drops, preventing the circulation of coolant through the engine and thus permitting the engine to warm up rapidly. The valve opens when the coolant temperature has risen, allowing the circulation of coolant. Wax inside the thermostat expands when heated and contracts when cooled. Heating the wax thus generates pressure which overpowers the force of the spring which keeps the valve closed, thus opening the valve. When the wax cools, its contraction causes the force of the spring to take effect once more, closing the valve. The thermostat in this engine operates at a temperature of 82°C (180°F).

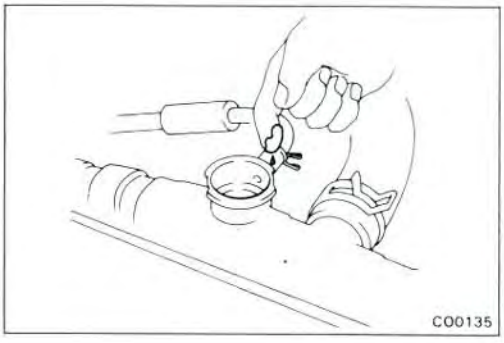


CHECK AND REPLACEMENT OF ENGINE COOLANT

1. CHECK ENGINE COOLANT LEVEL AT RESERVE TANK

The coolant level should be between the "LOW" and "FULL" lines.

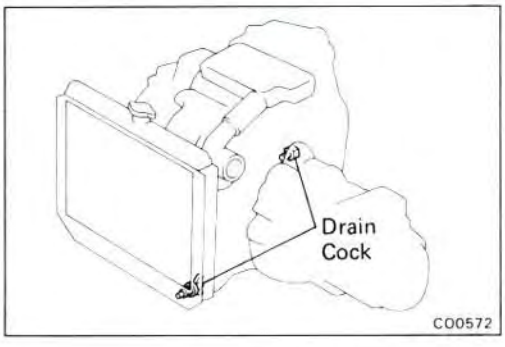
If low, check for leaks and add coolant up to the "FULL" line.



2. CHECK ENGINE COOLANT QUALITY

There should not be any excessive deposits of rust or scales around the radiator cap or radiator filler hole, and the coolant should be free from oil.

If excessively dirty, replace the coolant.



3. REPLACE ENGINE COOLANT

(a) Remove the radiator cap.

(b) Drain the coolant from the radiator and engine drain cocks. (Engine drain cock at the right rear of engine block.)

(c) Close the drain cocks.

Torque (Engine drain cock):
130 kg-cm (9 ft-lb, 13 N·m)

(d) Fill the system with coolant.

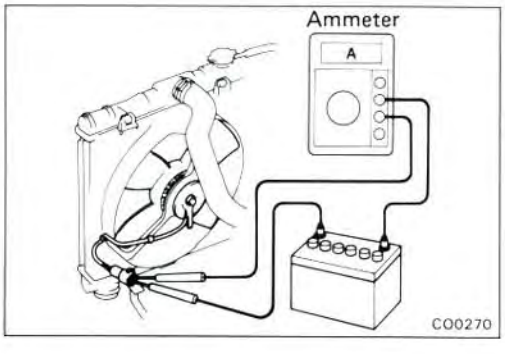
Use a good brand of ethylene-glycol base coolant, mixed according to the manufacturer's directions.

Capacity (w/ Heater):
8.0 liters (8.5 US qts, 7.0 Imp. qts)

(e) Install the radiator cap.

(f) Start the engine and check for leaks.

(g) Recheck the coolant level and refill as necessary.



ELECTRIC COOLING FAN

INSPECTION OF ELECTRIC COOLING FAN COMPONENTS

INSPECT COOLING FAN MOTOR

(a) Connect battery and ammeter to the fan motor connector.

(b) Check that the fan motor rotates smoothly, and check the reading on the ammeter.

Standard amperage: 8.8 – 10.8 A

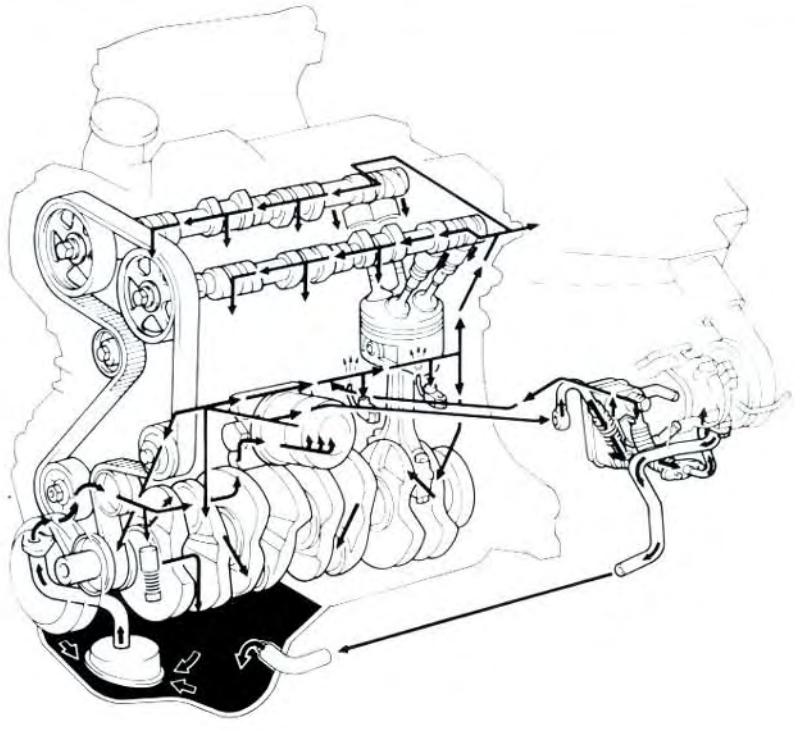
LUBRICATION SYSTEM

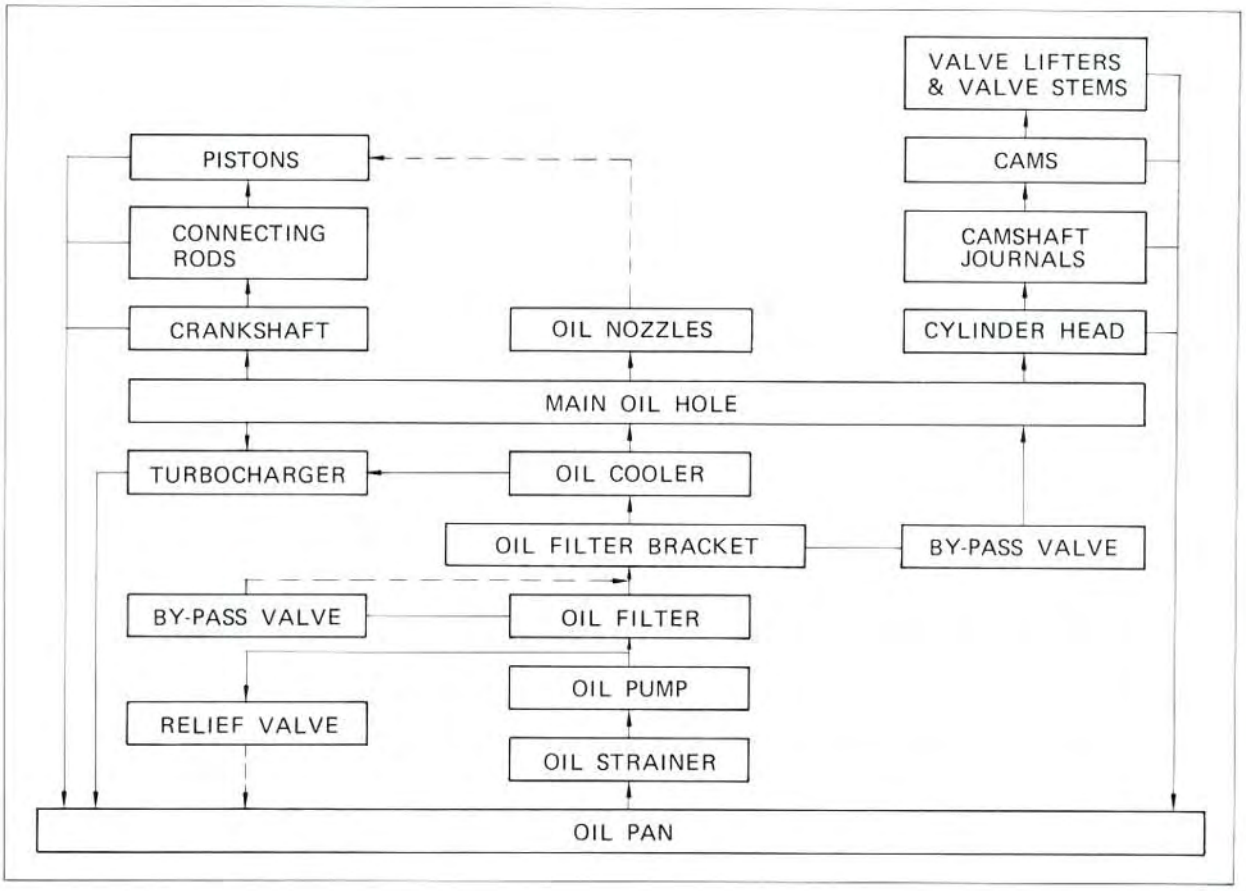
REFER TO 1988 CELICA REPAIR MANUAL (Pub. No. RM071U)

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

DESCRIPTION

A fully pressurized, fully filtered lubrication system has been adopted for this engine.





LU0578

A pressure feeding lubrication system has been adopted to supply oil to the moving parts of this engine. The lubrication system consists of an oil pan, oil pump, oil filter and other external parts which supply oil to the moving parts in the engine block. The oil circuit is shown in the illustration at the top of the previous page. Oil from the oil pan is pumped up by the oil pump. After it passes through the oil filter, it is fed through the various oil holes in the crankshaft and cylinder block. After passing through the cylinder block and performing its lubricating function, the oil is returned by gravity to the oil pan. A dipstick on the center left side of the cylinder block is provided to check the oil level.

OIL PUMP

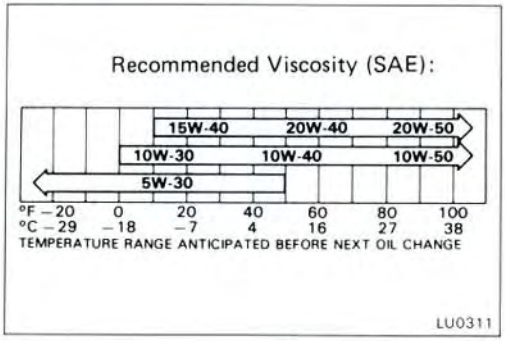
The oil pump pumps up oil from the oil pan and sends it under pressure to the various parts of the engine. An oil strainer is mounted in front of the inlet to the oil pump. The oil pump itself is a trochoid type pump, inside of which is a drive rotor and a driven rotor. When the drive rotor rotates, the driven rotor rotates in the same direction, and since the axis of the driven rotor shaft is different from the center of the driven rotor, the space between the two rotors is changed as they rotate. Oil is drawn in when the space is wide and is discharged when the space in narrow.

OIL PRESSURE REGULATOR

At high engine speeds, the engine oil supplied by the oil pump exceeds the capacity of the engine to utilize it. For that reason, the oil pressure regulator works to prevent an oversupply of oil. During normal oil supply, a coil spring and valve keep the bypass closed, but when too much oil is being fed, the pressure become extremely high, overpowering the force of the spring and opening the valves. This allows the excess oil to flow through the valve and return to the oil pan.

OIL FILTER

The oil filter is a full flow type filter with a built-in paper filter element. Particles of metal from wear, airborn dirt, carbon and other impurities can get in the oil during use and could cause accelerated wear or siezing if allowed to circulate through the engine. The oil filter, integrated into the oil line, removes these impurities as the oil passes through it. The filter is mounted outside the engine to simplify replacement of the filter element. A relief valve is also included ahead of the filter element to relieve the high oil pressure in case the filter element becomes clogged with impurities. The relief valve opens when the oil pressure overpowers the force of the spring. Oil passing through the relief valve by-passes the oil filter and flows directly into the main oil hole in the engine.



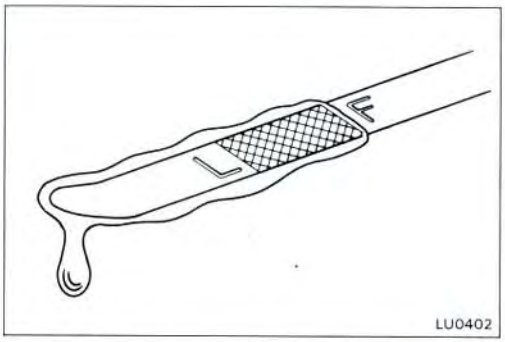
OIL PRESSURE CHECK

1. CHECK ENGINE OIL QUALITY

Check the oil for deterioration, entry of water, discoloring or thinning.

If the quality is poor, replace the oil.

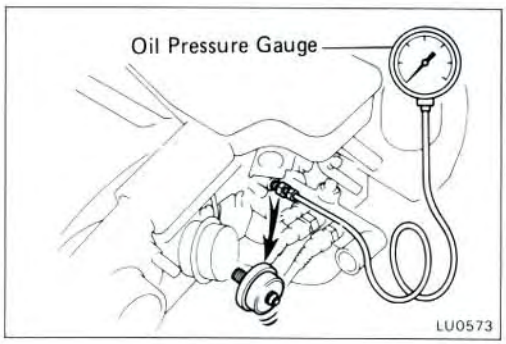
Use API grade SF or SF/CC, multigrade, fuel- efficient and recommended viscosity oil.



2. CHECK ENGINE OIL LEVEL

The oil level should be between the "L" and "F" marks on the dipstick.

If low, check the for leakage and add oil up to "F" mark.



3. REMOVE OIL PRESSURE SWITCH

4. INSTALL OIL PRESSURE GAUGE

5. WARM UP ENGINE

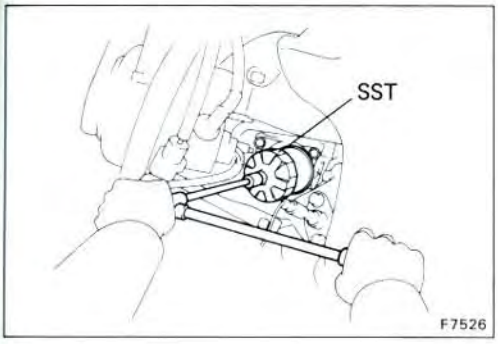
Allow the engine to reach normal operating temperature.

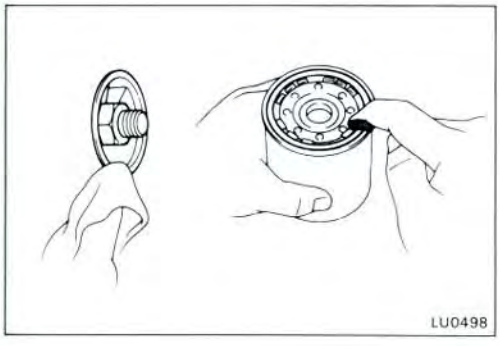
6. CHECK OIL PRESSURE

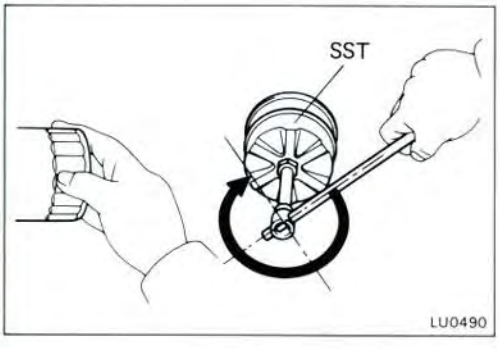
Oil pressure:

At idling	**0.3 kg/cm² (4.3 psi, 29 kPa) or more**
At 3,000 rpm	**2.5 — 5.0 kg/cm² (36 — 71 psi, 245 — 490 kPa)**

NOTE: Check for oil leakage after reinstalling the oil pressure switch.







REPLACEMENT OF ENGINE OIL AND OIL FILTER

1. DRAIN ENGINE OIL

(a) Remove the oil filler cap.

(b) Remove the oil drain plug, and drain the oil into a container.

2. REPLACE OIL FILTER

(a) Remove the alternator air duct.

(b) Using SST, remove the oil filter.

SST 09228-07500

(c) Check and clean the oil filter installation surface.

(d) Apply clean engine oil to the gasket of a new oil filter.

(e) Lightly screw the oil filter into place, and tighten it until the gasket contacts the seat.

(f) Using SST, tighten it additional 3/4 turn.

SST 09228-07500

(g) Reinstall the alternator air duct.

3. FILL WITH ENGINE OIL

(a) Clean and install the oil drain plug with a new gasket.

Torque: 250 kg-cm (18 ft-lb, 25 N·m)

(b) Fill with new engine oil (API grade SF or SF/CC, multigrade, fuel-efficient and recommended viscosity oil).

Capacity:

Drain and refill

w/ Oil filter change
3.6 liters (3.8 US qts, 3.2 Imp. qts)

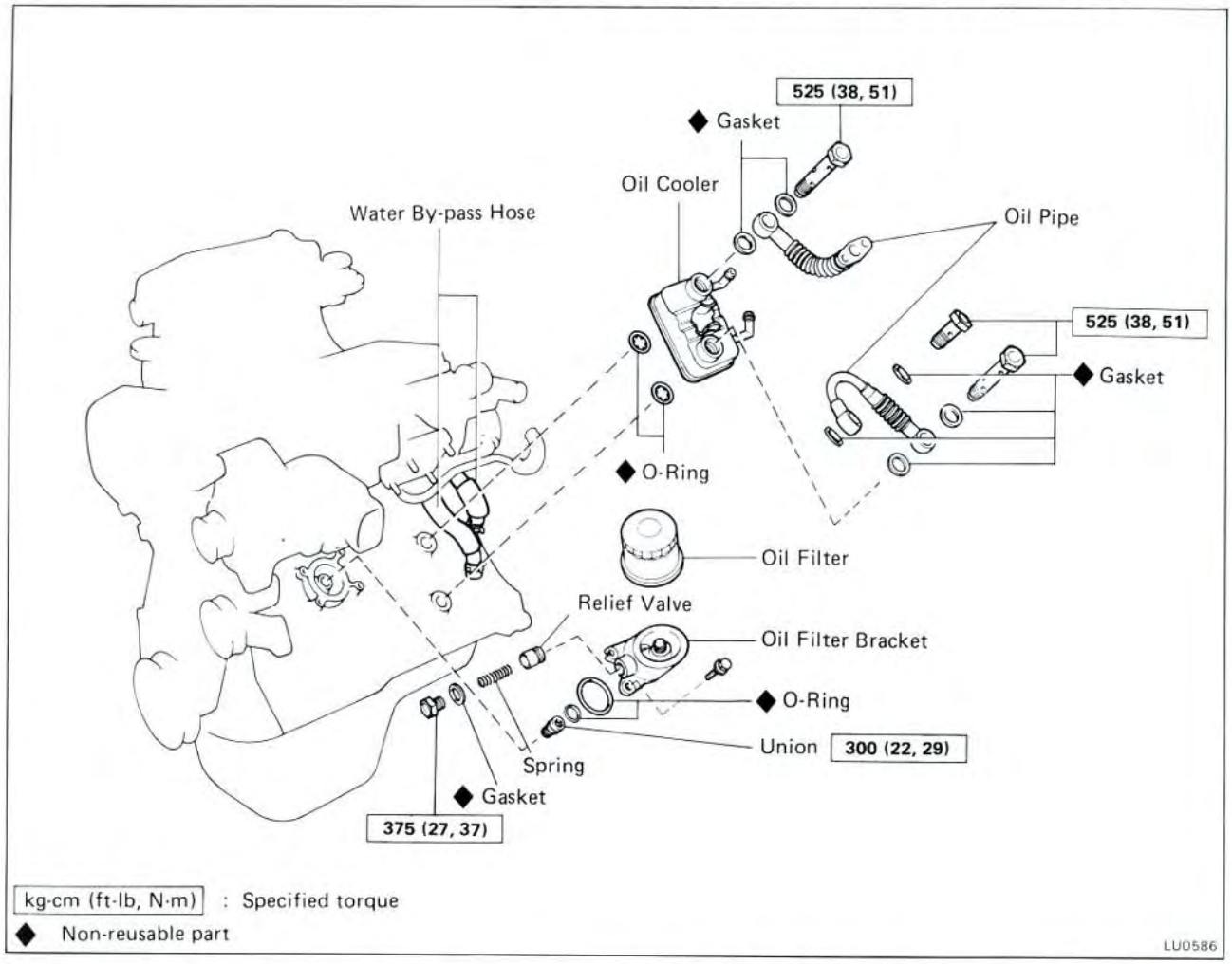
w/o Oil filter change
3.3 liters (3.6 US qts, 2.9 Imp. qts)

Dry fill 4.6 liters (4.9 US qts, 4.0 Imp. qts)

4. START ENGINE AND CHECK FOR LEAKS

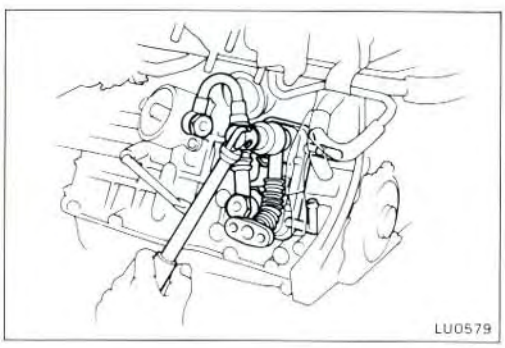
5. RECHECK ENGINE OIL LEVEL (See page LU-4)

OIL COOLER AND RELIEF VALVE



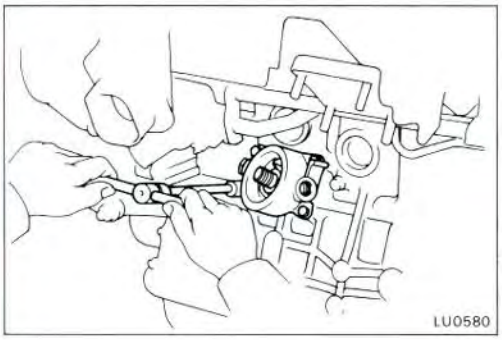
REMOVAL OF OIL COOLER AND RELIEF VALVE

1. **REMOVE TURBOCHARGER**
   (See steps 1 to 14 on pages TC-9 to 11)
2. **REMOVE OIL FILTER (See page LU-5)**
3. **DISCONNECT WATER BY-PASS HOSES FROM OIL COOLER**



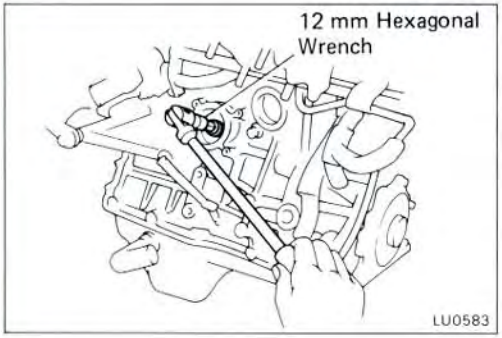
4. **REMOVE OIL COOLER**

   Remove the three union bolts, six gaskets, oil cooler and two O-rings.

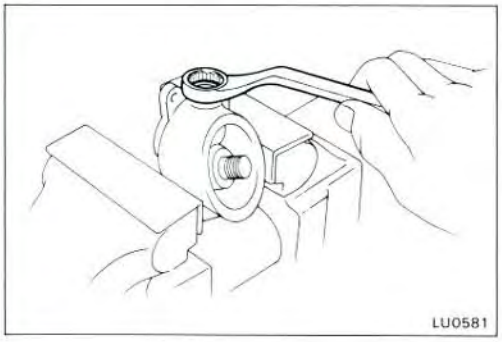


5. REMOVE OIL FILTER BRACKET

(a) Remove the four bolts, filter bracket and O-ring.



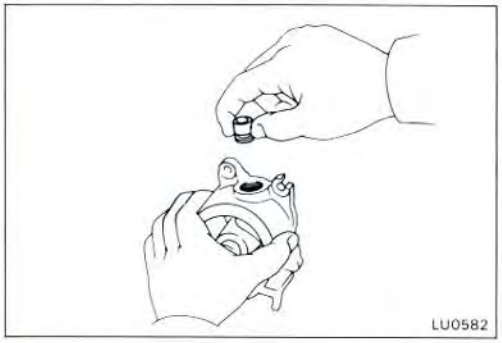
(b) Using a 12 mm hexagonal wrench, remove the union and O-ring.



6. REMOVE RELIEF VALVE FROM OIL FILTER BRACKET

(a) Mount the filter bracket in a soft jaw vise.

(b) Remove the plug, gasket, spring and relief valve.



INSPECTION OF OIL COOLER AND RELIEF VALVE

1. INSPECT RELIEF VALVE

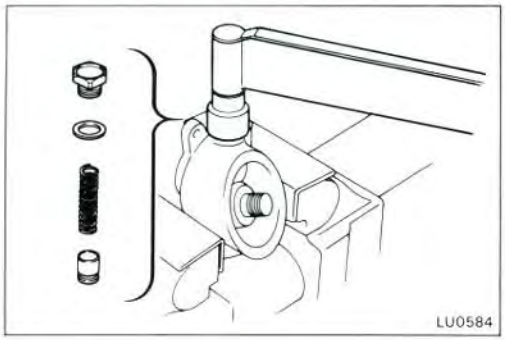
Coat the valve with engine oil and check that it falls smoothly into the valve hole by its own weight.

If is not, replace the relief valve. If necessary, replace the oil filter bracket and relief valve as a set.

2. INSPECT OIL COOLER

Check the oil cooler for clogging.

If abnormal, replace the oil cooler.

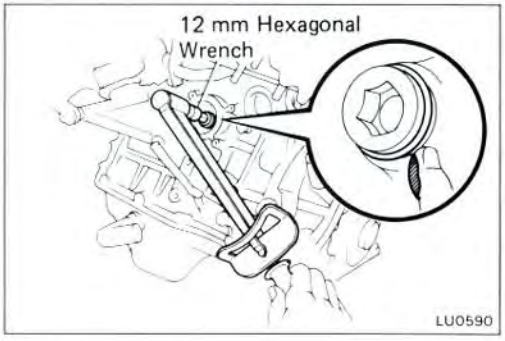


INSTALLATION OF OIL COOLER AND RELIEF VALVE

(See page LU-6)

1. **INSTALL RELIEF VALVE TO OIL FILTER BRACKET**
   (a) Mount the oil filter bracket in a soft jaw vise.
   (b) Install the relief valve and spring with a new gasket and the plug. Torque the plug.

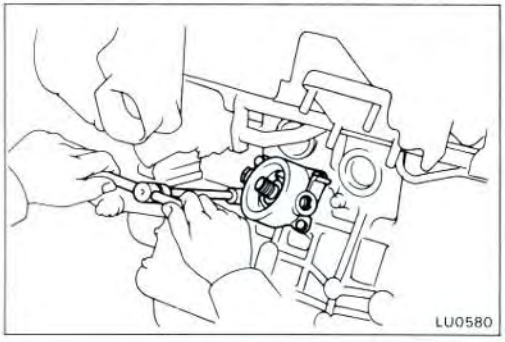
   Torque: 375 kg-cm (27 ft-lb, 37 N·m)



2. **INSTALL OIL FILTER BRACKET**
   (a) Using a 12 mm hexagonal wrench, install and torque the union.

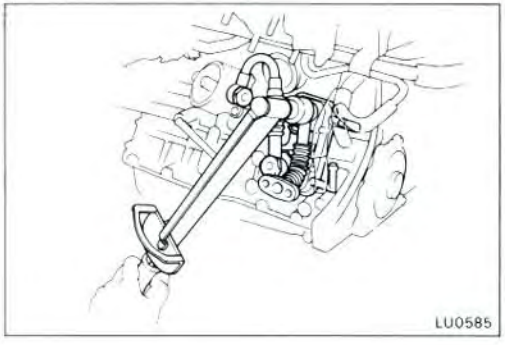
   Torque: 300 kg-cm (22 ft-lb, 29 N·m)

   (b) Install a new O-ring to the union, and apply small amount of engine oil to the O-ring.



   (c) Install a new O-ring and the oil filter bracket with the four bolts.

   Torque: 80 kg-cm (69 in.-lb, 7.8 N·m)

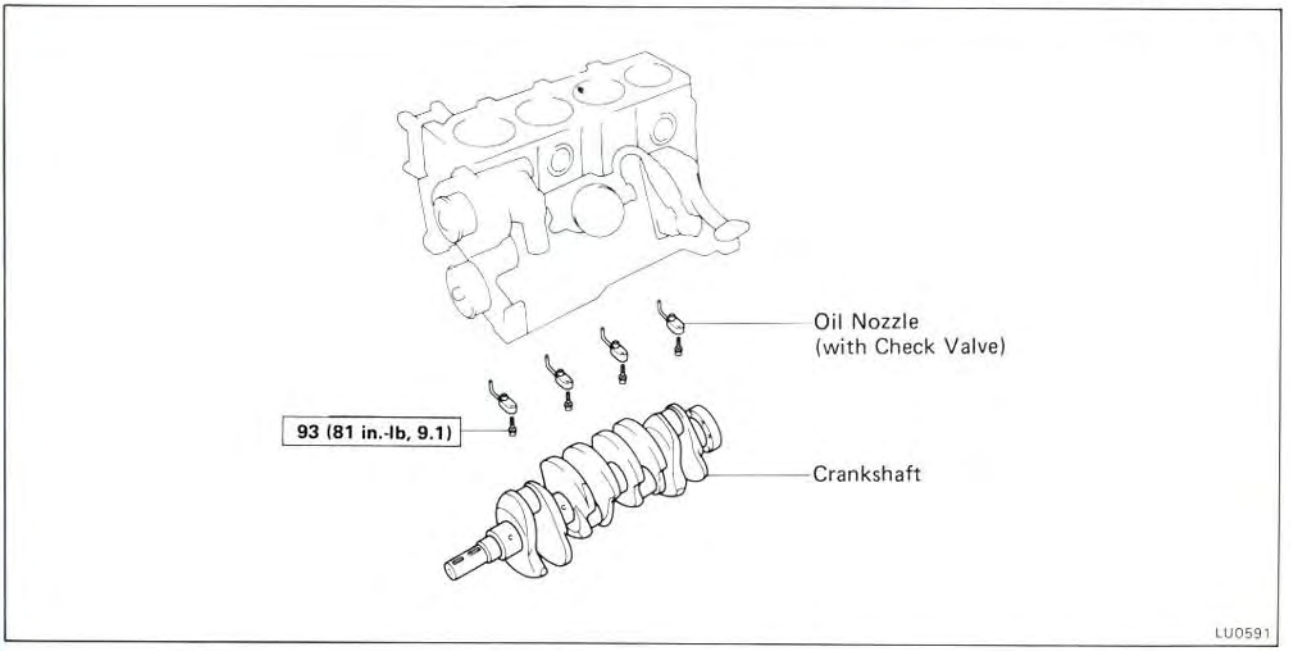


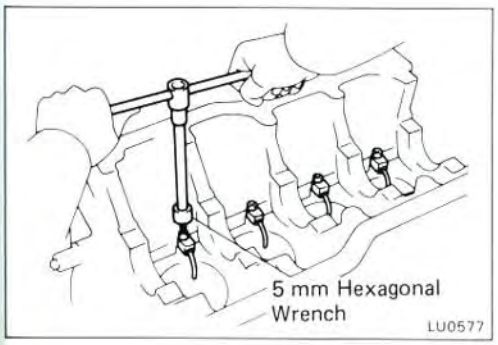
3. **INSTALL OIL COOLER**
   (a) Install new two O-rings to the oil cooler.
   (b) Install the oil cooler and two oil pipes with new six gaskets and three union bolts. Torque the union bolts.

   Torque: 525 kg-cm (38 ft-lb, 51 N·m)

4. **CONNECT WATER BY-PASS HOSES**
5. **INSTALL OIL FILTER** **(See page LU-5)**
6. **INSTALL TURBOCHARGER**
   (See step 4 to 19 pages TC-13 and 14)

OIL NOZZLES AND CHECK VALVES



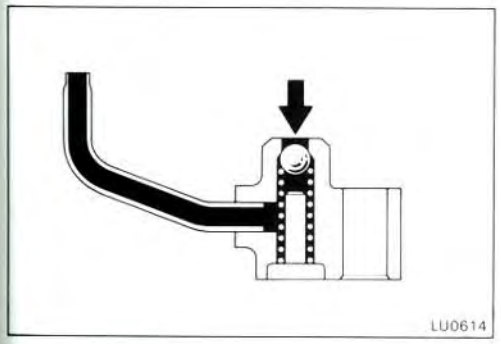


REMOVAL OF OIL NOZZLES AND CHECK VALVES

1. **REMOVE CRANKSHAFT (See pages EM-43 to 47)**

2. **REMOVE OIL NOZZLES (WITH CHECK VALVES)**

   Using 5 mm hexagonal wrench, remove the four bolts and oil nozzles.



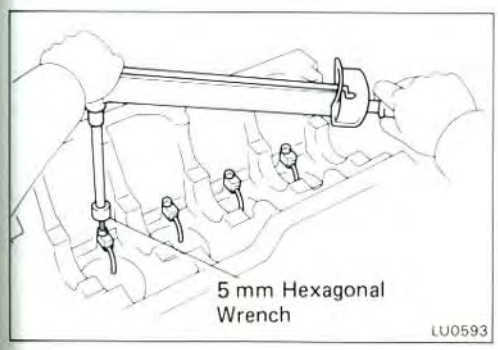
INSPECTION OF OIL NOZZLES AND CHECK VALVES

INSPECT OIL NOZZLES (WITH CHECK VALVES)

(a) Check the oil nozzles for clogging.

(b) Push the steel ball with a wooden stick to check if it is struck.

If abnormal, replace the oil nozzles.



INSTALLATION OF OIL NOZZLES AND CHECK VALVES

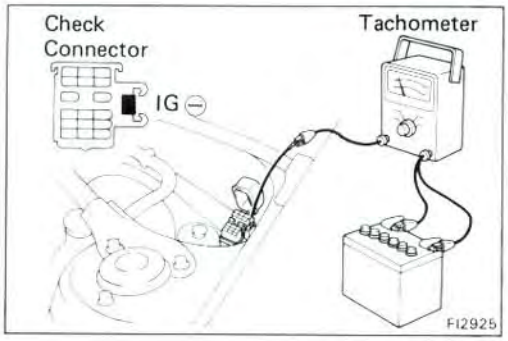
1. **INSTALL OIL NOZZLES (WITH CHECK VALVES)**

   Using 5 mm hexagonal wrench, install the nozzle with the bolt. Install the four oil nozzles. Torque the bolts.

   Torque: 93 kg-cm (81 in.-lb, 9.1 N·m)

2. **INSTALL CRANKSHAFT (See pages EM-48 to 52)**

IGNITION SYSTEM



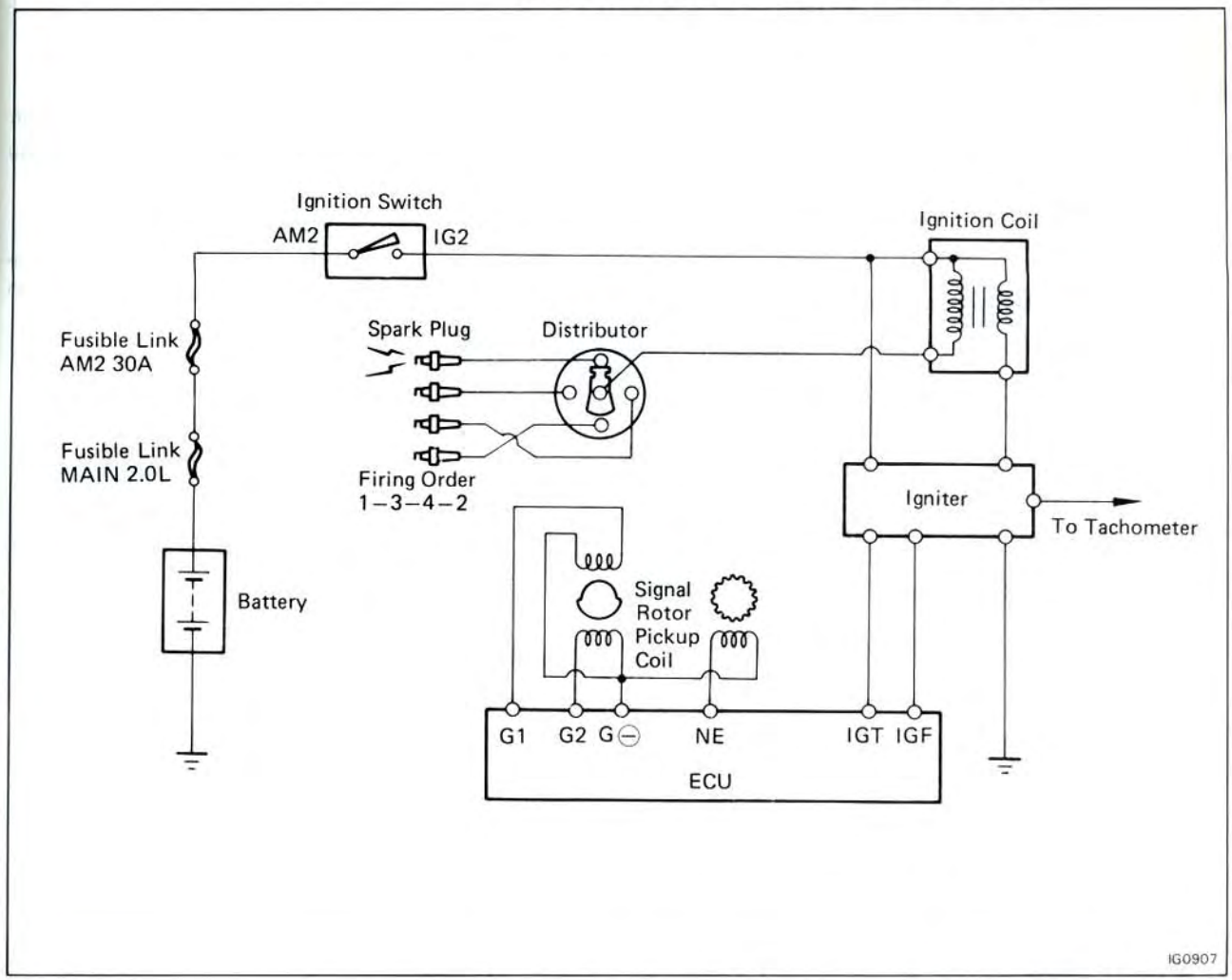
PRECAUTIONS

1. **Do not leave the ignition switch on for more than 10 minutes if the engine will not start.**
2. **When a tachometer is connected to the system, connect the test probe of the tachometer to terminal IG ⊖ of the check connector.**
3. **As some tachometer are not compatible with this ignition system, we recommend that you confirm the compatibility of your unit before using.**
4. **NEVER allow the tachometer terminal to touch ground as this could damage the igniter and/or ignition coil.**
5. **Do not disconnect the battery when the engine is running.**
6. **Check that the igniter is properly grounded to the body.**

TROUBLESHOOTING

Problem	Possible cause	Remedy	Page
Engine will not start/ hard to start (cranks OK)	Incorrect ignition timing	Reset timing	IG-9
	ECU problem	Inspect ECU	
	Ignition problems		
	• Ignition coil	Inspect coil	IG-7
	• Igniter	Inspect igniter	IG-7
	• Distributor	Inspect distributor	IG-7
	• High-tension cords	Inspect high-tension cords	IG-5
	Ignition wiring disconnected or broken	Inspect wiring	
Rough idle or stalls	Spark plug faulty	Inspect plugs	IG-5
	Ignition wiring faulty	Inspect wiring	
	Incorrect ignition timing	Reset timing	IG-9
	Ignition problems		
	• Ignition coil	Inspect coil	IG-7
	• Igniter	Inspect igniter	IG-7
	• Distributor	Inspect distributor	IG-7
	• High-tension cords	Inspect high-tension cords	IG-5
Engine hesitates/ poor acceleration	Spark plug faulty	Inspect plugs	IG-5
	Ignition wiring faulty	Inspect wiring	
	Incorrect ignition timing	Reset timing	IG-9
Engine dieseling (runs after ignition switch is turned off)	Incorrect ignition timing	Reset timing	IG-9
Muffler explosion (after fire) all the time	Incorrect ignition timing	Reset timing	IG-9
Engine backfires	Incorrect ignition timing	Reset timing	IG-9
Poor gasoline mileage	Spark plug faulty	Inspect plugs	IG-5
	Incorrect ignition timing	Reset timing	IG-9
Engine overheats	Incorrect ignition timing	Reset timing	IG-9

IGNITION SYSTEM CIRCUIT



ELECTRONIC SPARK ADVANCE (ESA)

The ECU is programmed with data for optimum ignition timing under any and all operating conditions. Using data provided by sensors which monitor various engine functions (rpm, intake air volume, eng. temperature, etc.) the microcomputer (ECU) triggers the spark at precisely the right instant.

ON-VEHICLE INSPECTION

SPARK TEST

CHECK THAT SPARK OCCURS

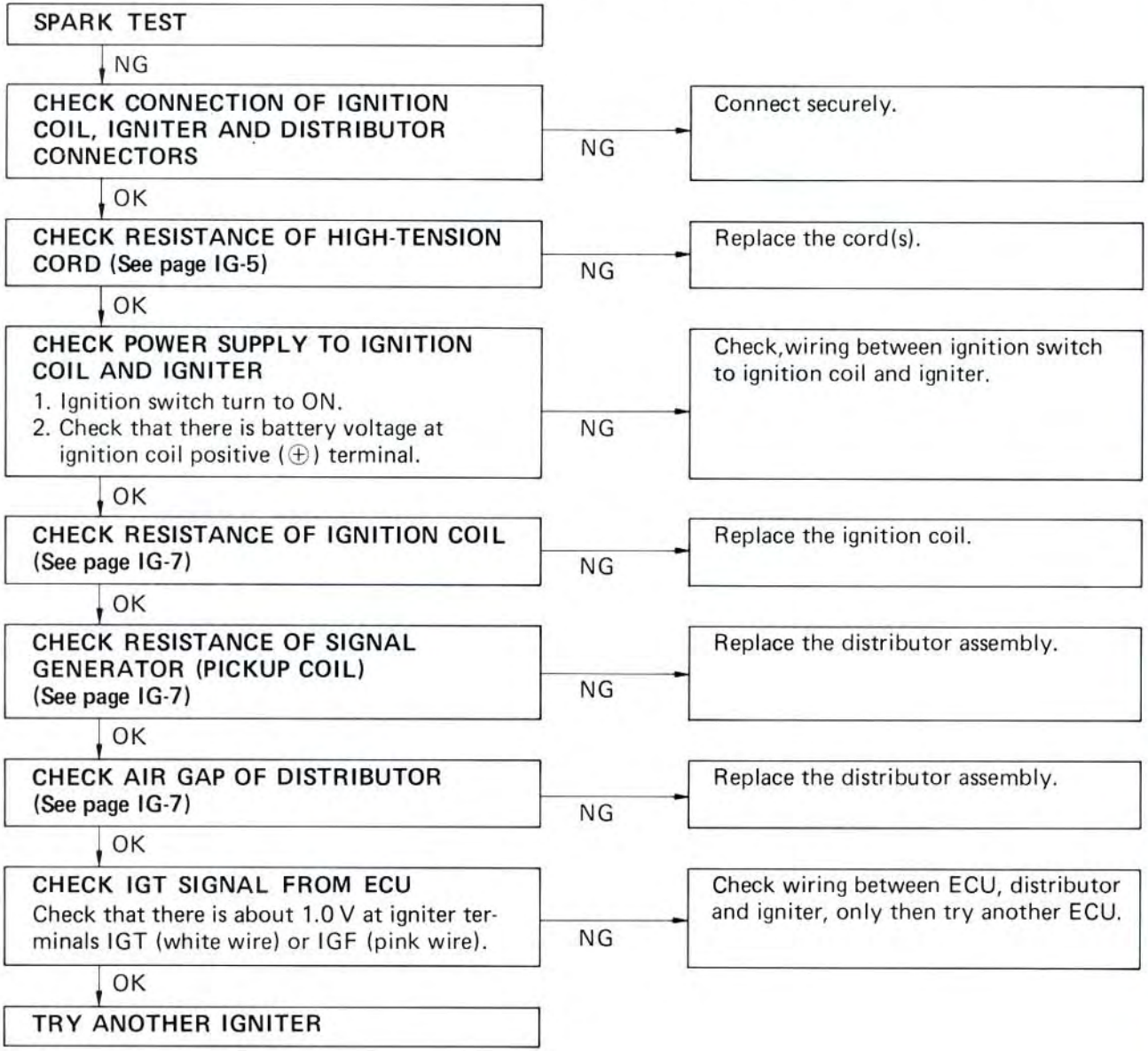
(a) Disconnect the high-tension cord from the distributor.

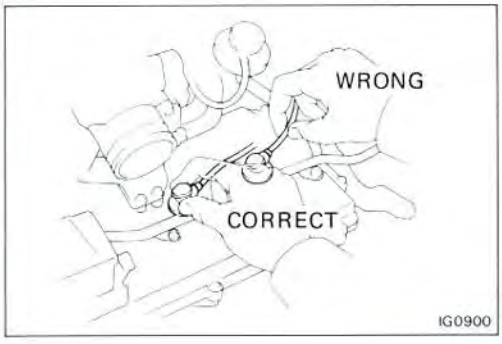
(b) Hold the end about 12.5 mm (0.492 in.) from body of car.

(c) See if spark occurs while engine is being cranked.

NOTE: To prevent gasoline from being injected from injectors during this test, crank the engine for no more than 1 — 2 seconds at a time.

If the spark does not occurs, perform the test as follows:



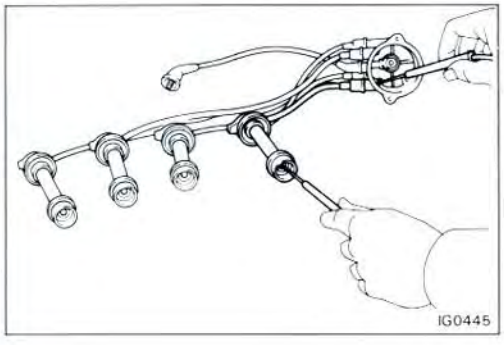


INSPECTION OF HIGH-TENSION CORDS

1. **REMOVE INTERCOOLER**
(See steps 1, 3 and 7 on page TC-10)

2. **CAREFULLY REMOVE HIGH-TENSION CORDS BY THEIR RUBBER BOOTS FROM SPARK PLUGS**

CAUTION: Pulling on or bending the cords may damage the conductor inside.



3. **INSPECT HIGH-TENSION CORD RESISTANCE**

Using an ohmmeter, measure the resistance without disconnecting the distributor cap.

Maximum resistance: 25 kΩ per cord

If the resistance is greater than maximum, check the terminals. If necessary, replace the high-tension cord and/or distributor cap.

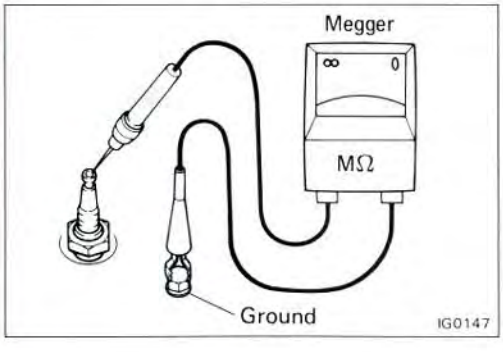
4. **INSTALL INTERCOOLER**
(See steps 11, 16 to 18 on page TC-14)

INSPECTION OF SPARK PLUGS

CAUTION:

- **Never use a wire brush for cleaning.**
- **Never attempt to adjust the electrode gap on used spark plug.**
- **Spark plug should be replaced every 100,000 km (60,000 miles).**

1. **REMOVE INTERCOOLER**
(See steps 1, 3 and 7 on page TC-10)



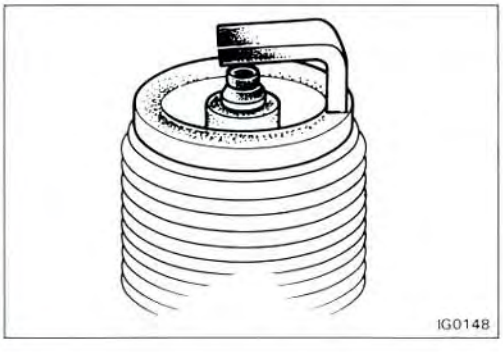
2. **INSPECT ELECTRODE**

A. **If using a megger (insulation resistance meter):**

Measure the insulation resistance.

Correct insulation resistance: 10 MΩ or more

If the resistance is less than specified, proceed to step 3.

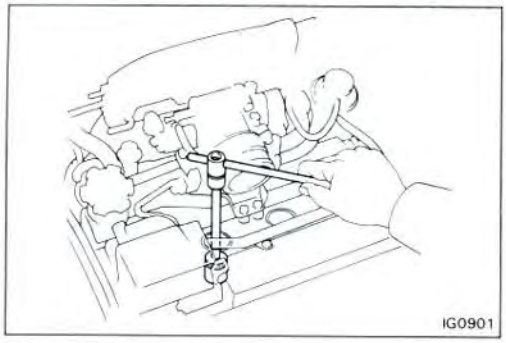


B. **If not using a megger:**

(a) Quickly race the engine to 4,000 rpm five times.

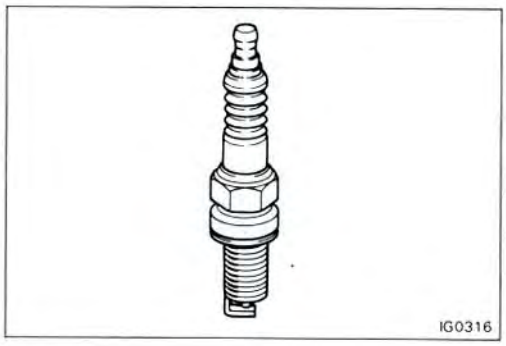
(b) Remove the spark plug.
(See step 3 on page IG-6)

(c) Visually check the spark plug.
If the electrode is dry ... Okey
If the electrode is wet ... Proceed to step 3


IG0901

3. REMOVE SPARK PLUGS

Using a plug wrench (16 mm), remove the spark plug.

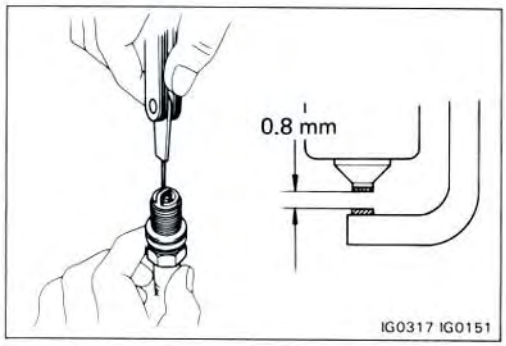

IG0316

4. VISUALLY INSPECT SPARK PLUGS

Check the spark plug for thread or insulation damage.

If abnormal, replace the spark plug.

Recommended spark plug: ND PQ16R8
NGK BCPR5EP8



IG0317 IG0151

5. INSPECT ELECTRODE GAP

Maximum electrode gap: 1.0 mm (0.039 in.)

If the gap is greater than maximum, replace the spark plug.

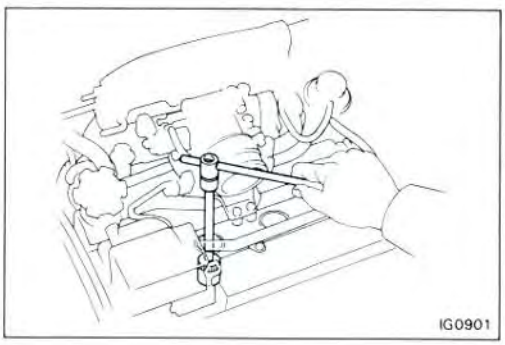
Correct electrode gap of new spark plug:
0.8 mm (0.031 in.)

If adjusting the gap of a new spark plug, bend only the base of the ground electrode. Do not touch the tip.

IG0152

6. CLEAN SPARK PLUGS

If the electrode has traces of wet carbon, allow it to dry and then clean with a spark plug cleaner.


IG0901

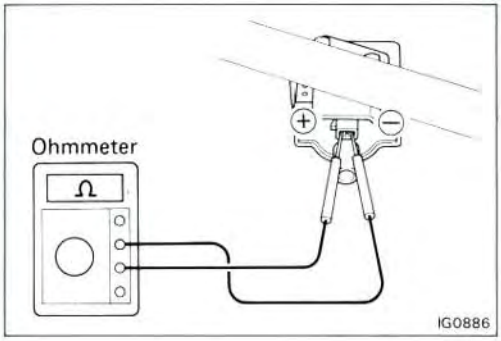
7. INSTALL SPARK PLUGS

Using a plug wrench (16 mm), install the spark plug.

Torque: 180 kg-cm (13 ft-lb, 18 N·m)

8. INSTALL INTERCOOLER

(See steps 11, 16 to 18 on page TC-14)



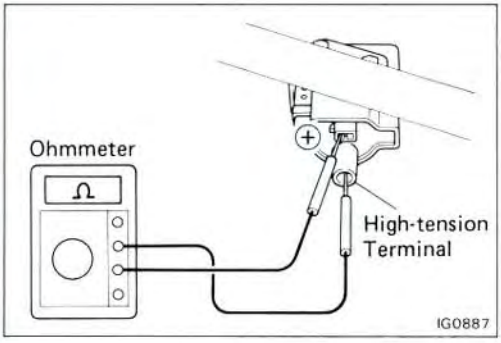
INSPECTION OF IGNITION COIL

1. INSPECT PRIMARY COIL RESISTANCE

Using an ohmmeter, measure the resistance between positive (⊕) and negative (⊖) terminals.

Primary coil resistance (Cold): 0.40 — 0.50 Ω

If the resistance is not as specified, replace the ignition coil.

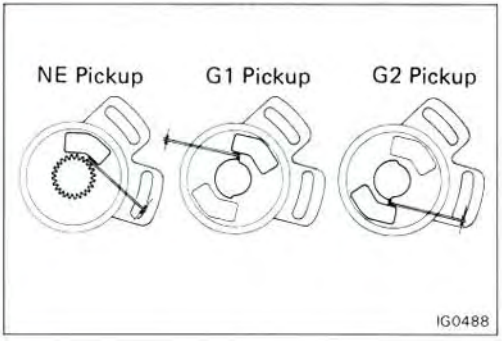


2. INSPECT SECONDARY COIL RESISTANCE

Using an ohmmeter, measure the resistance between positive (⊕) and high-tension terminals.

Secondary coil resistance (Cold): 10.2 — 13.8 kΩ

If the resistance is not as specified, replace the ignition coil.



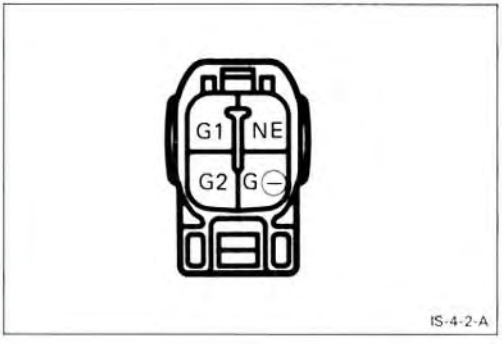
DISTRIBUTOR

1. INSPECT AIR GAP

Using a feeler gauge, measure the gap between the signal rotor and pickup coil projection.

Air gap: 0.2 — 0.4 mm (0.008 — 0.016 in.)

If the air gap is not as specified, replace the distributor.



2. INSPECT PICKUP COIL RESISTANCE

Using an ohmmeter, measure the resistance between terminals.

G1 pickup coil resistance (G1 to G ⊖): 140 — 180 Ω

G2 pickup coil resistance (G2 to G ⊖): 140 — 180 Ω

NE pickup coil resistance (NE to G ⊖): 140 — 180 Ω

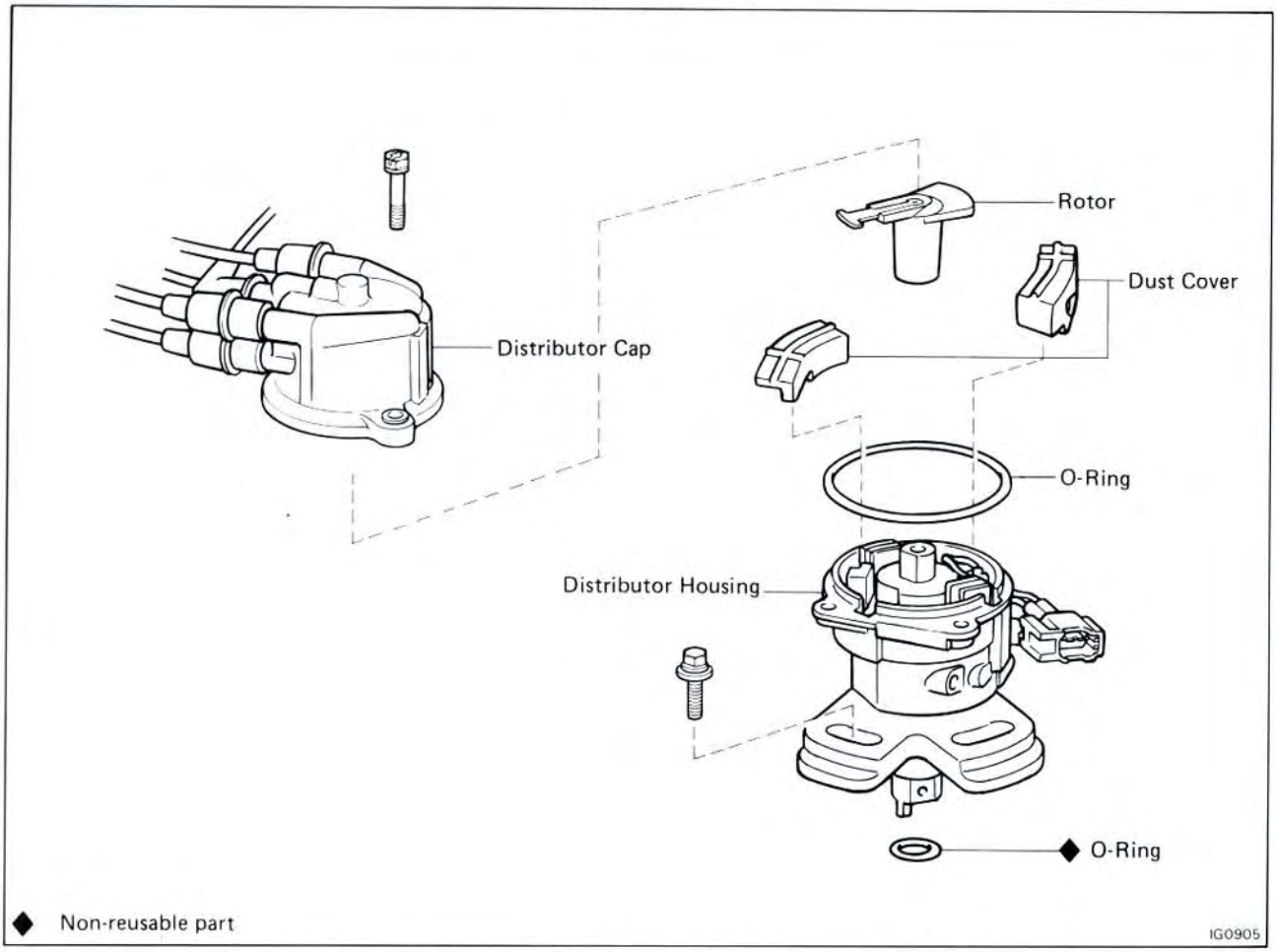
If the resistance is not as specified, replace the distributor.

INSPECTION OF IGNITER

(See procedure Spark Test on page IG-4)

DISTRIBUTOR

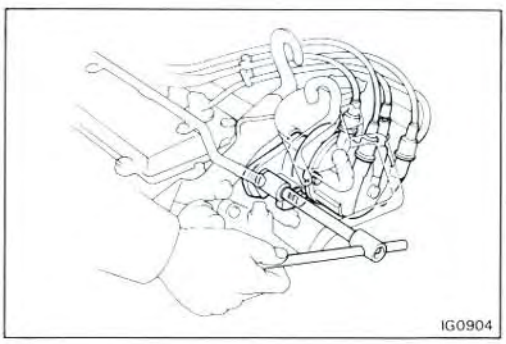
COMPONENTS

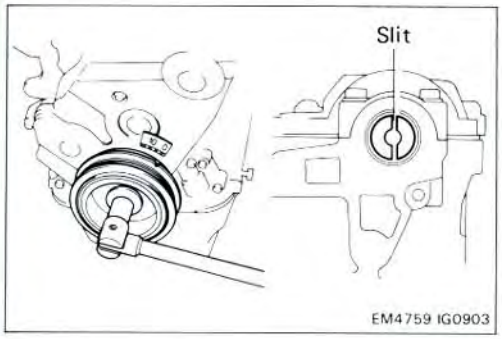


REMOVAL OF DISTRIBUTOR

1. **DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY**
2. **REMOVE INTERCOOLER**
   (See steps 3 and 7 on page TC-10)
3. **DISCONNECT DISTRIBUTOR CONNECTOR**
4. **DISCONNECT HIGH-TENSION CORDS FROM SPARK PLUGS AND IGNITION COIL**
5. **REMOVE DISTRIBUTOR**

   Remove the two hold-down bolts and pull out the distributor. Remove the O-ring.

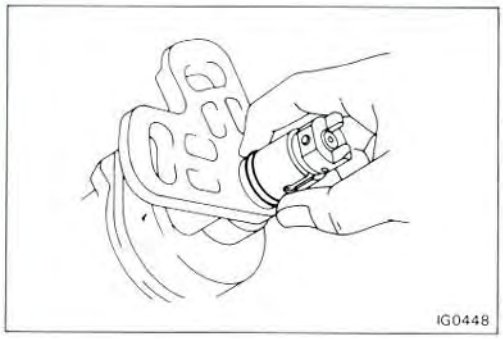




INSTALLATION OF DISTRIBUTOR

1. SET NO.1 CYLINDER TO TDC/COMPRESSION

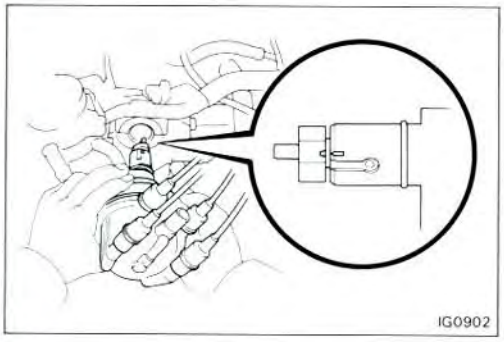
Turn the crankshaft clockwise, and position the slit of the intake camshaft as shown.



2. INSTALL DISTRIBUTOR

(a) Install a new O-ring to the housing.

(b) Apply a light coat of engine oil on the O-ring.



(c) Align the cutout of the coupling with the groove mark of the housing.

(d) Insert the distributor, aligning the center of the flange with that of the bolt hole on the cylinder head.

(e) Lightly tighten the two hold-down bolts.

(f) Install the high-tension cord clamp with the bolt.

3. CONNECT HIGH-TENSION CORDS

Firing order: 1 — 3 — 4 — 2

4. CONNECT DISTRIBUTOR CONNECTOR

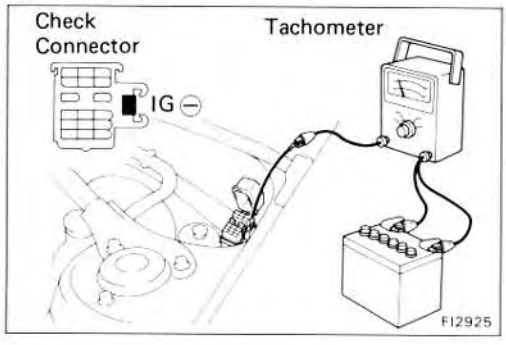
5. INSTALL INTERCOOLER

(See steps 11 and 16 on page TC-14)

6. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

7. WARM UP ENGINE

Allow the engine to reach normal operating temperature.

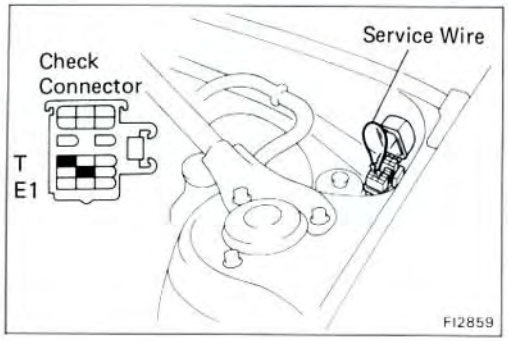


8. CONNECT TACHOMETER

Connect the test probe of a tachometer to terminal IG⊖ of the check connector.

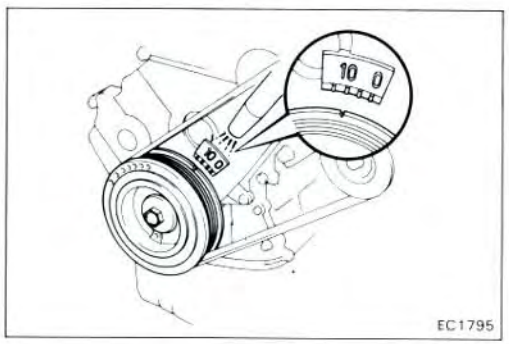
CAUTION:

- **NEVER allow the tachometer terminal to touch ground as it could result in damage to the igniter and/or ignition coil.**
- **As some tachometers are not compatible with this ignition system, we recommend that you confirm the compatibility of your until before using.**



9. ADJUST IGNITION TIMING

(a) Using a service wire, short terminals T and E1 of the check connector.



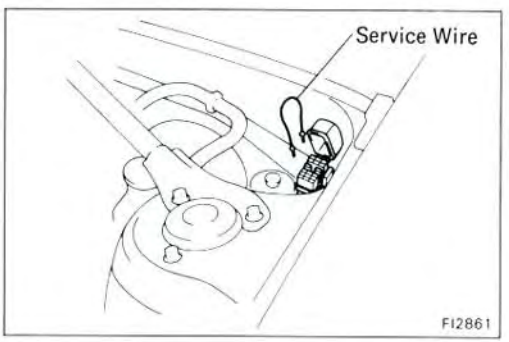
(b) Using a timing light, check the ignition timing.

Ignition timing: 10° BTDC @ idle

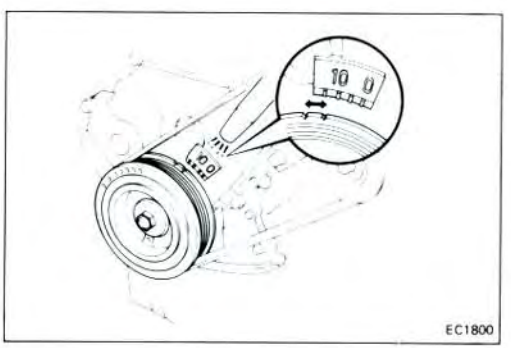
(c) Loosen the two hold-down bolts, and adjust by turning the distributor.

(d) Tighten the hold-down bolts, and recheck the ignition timing.

Torque: 400 kg-cm (29 ft-lb, 39 N·m)



(e) Remove the service wire.



10. FURTHER CHECK IGNITION TIMING

Ignition timing: 14 — 19° BTDC @ idle

NOTE: The timing mark moves in a range between 14° and 19°.

STARTING SYSTEM

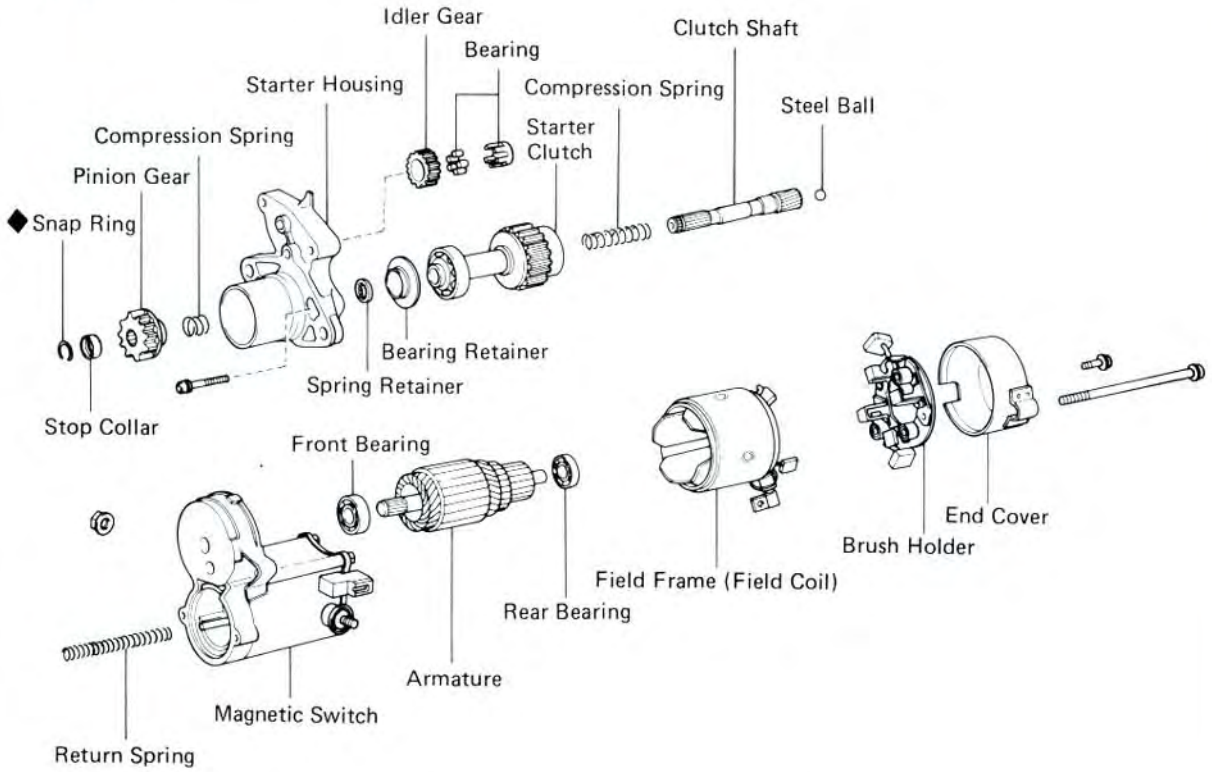
REFER TO 1988 CELICA REPAIR MANUAL (Pub. No. RM071U)

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

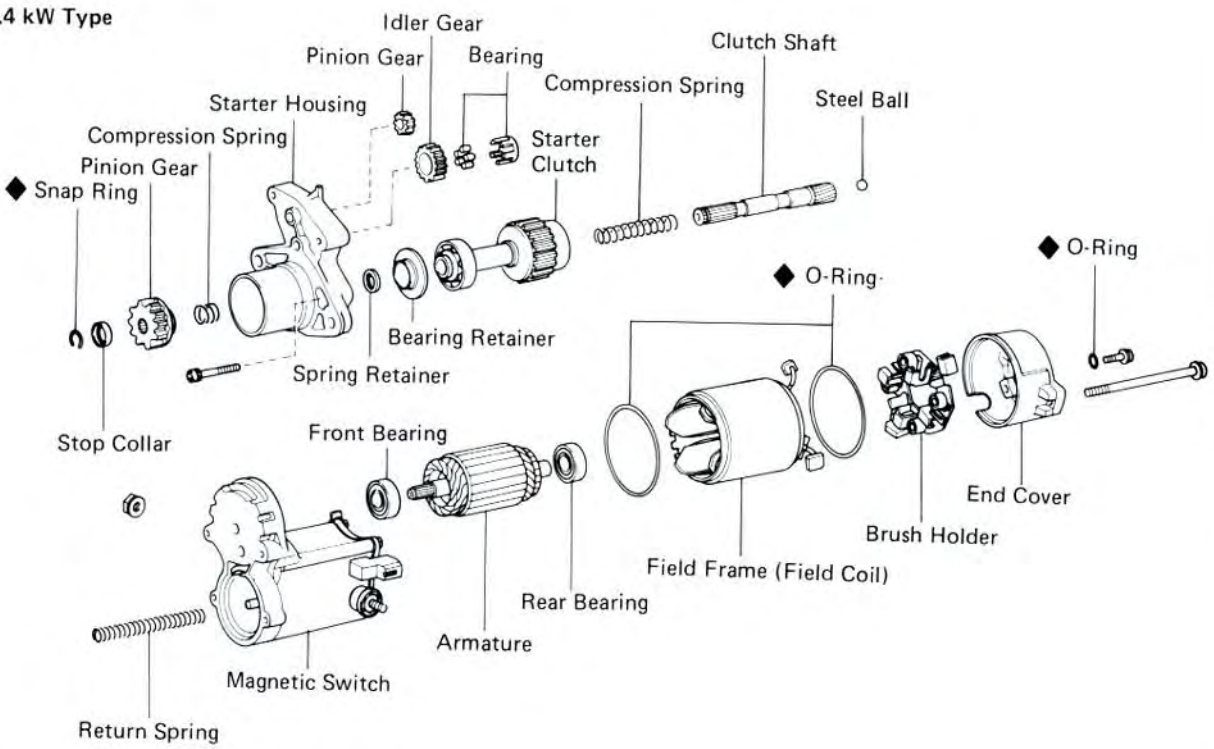
STARTER

COMPONENTS

1.0 kW Type

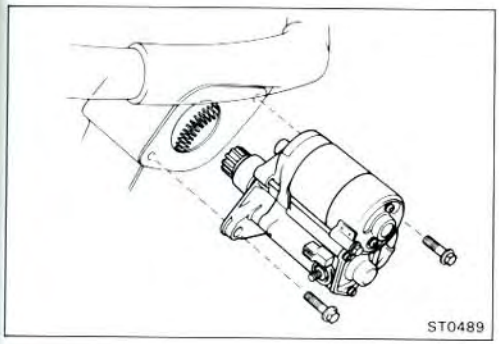


1.4 kW Type



◆ : Non-reusable part

ST0421
ST0422



REMOVAL OF STARTER

1. REMOVE BATTERY
2. REMOVE AIR CLEANER ASSEMBLY
   (See step 11 page EM-43)
3. DISCONNECT CONNECTOR AND WIRE FROM STARTER
4. REMOVE STARTER
   Remove the two bolts and starter.

DISASSEMBLY OF STARTER

(See Pub. No. RM071U, for 3S-FE Starter on pages ST-5 to 7)

INSPECTION AND REPAIR OF STARTER

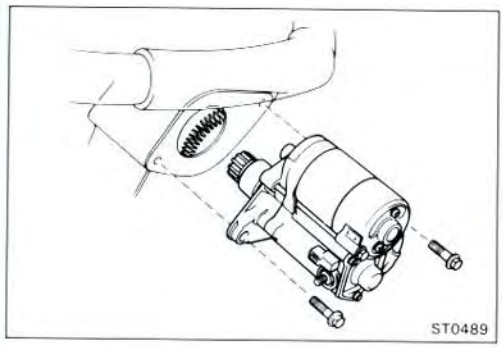
(See Pub. No. RM071U, for 3S-FE Starter on pages ST-7 to 12)

ASSEMBLY OF STARTER

(See Pub. No. RM071U, for 3S-FE Starter on pages ST-13 to 17)

PERFORMANCE OF STARTER

(See Pub. No. RM071U on pages ST-16 and 17)



INSTALLATION OF STARTER

1. INSTALL STARTER
   Install the starter with the two bolts.
   Torque: 400 kg-cm (29 ft-lb, 39 N·m)
2. CONNECT CONNECTOR AND WIRE TO STARTER
3. INSTALL AIR CLEANER ASSEMBLY
   (See step 21 on page EM-51)
4. INSTALL BATTERY
5. CHECK THAT ENGINE STARTS

CLUTCH

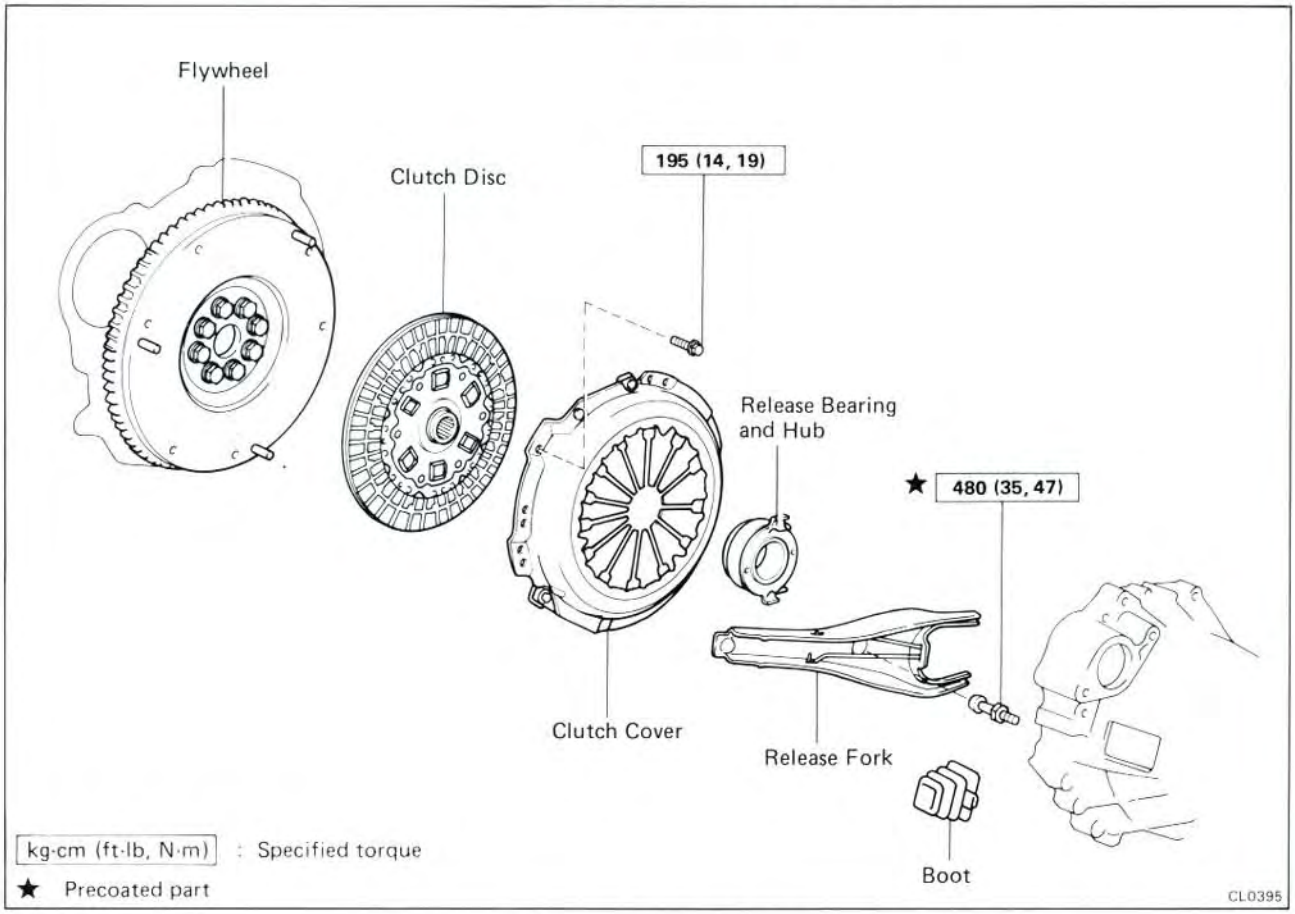
REFER TO 1988 CELICA REPAIR MANUAL (Pub. No. RM071U)

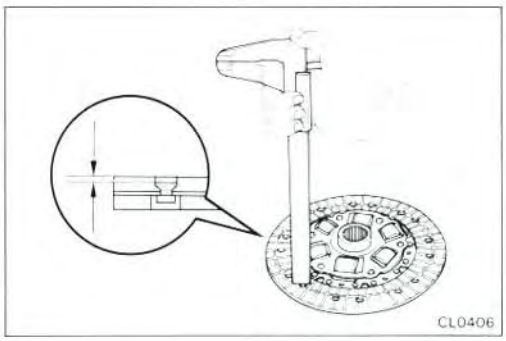
NOTE: The following pages contain only the points which differ from the above listed manual.

CLUTCH UNIT

REMOVAL OF CLUTCH UNIT

Remove the parts as shown.





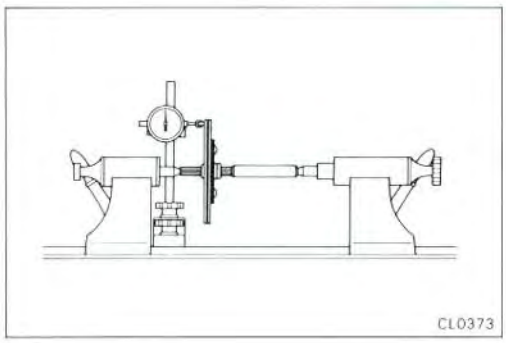
INSPECTION OF CLUTCH PARTS

1. **INSPECT CLUTCH DISC FOR WEAR OR DAMAGE**

   Using calipers, measure the rivet head depth.

   Maximum rivet depth: 0.3 mm (0.012 in.)

   If a problem is found, replace the clutch disc.

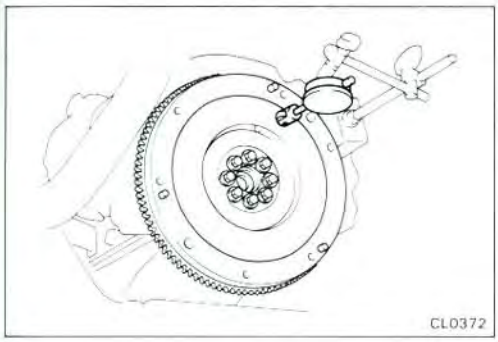


2. **INSPECT CLUTCH DISC RUNOUT**

   Using a dial indicator, check the disc runout.

   Maximum runout: 0.8 mm (0.031 in.)

   If runout is excessive, replace the clutch disc.

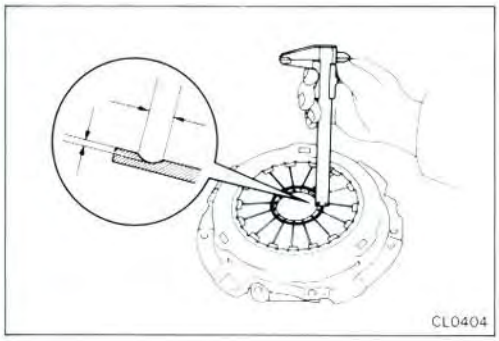


3. INSPECT FLYWHEEL RUNOUT

Using a dial indicator, check the flywheel runout.

Maximum runout: 0.1 mm (0.004 in.)

If runout is excessive, replace the flywheel.

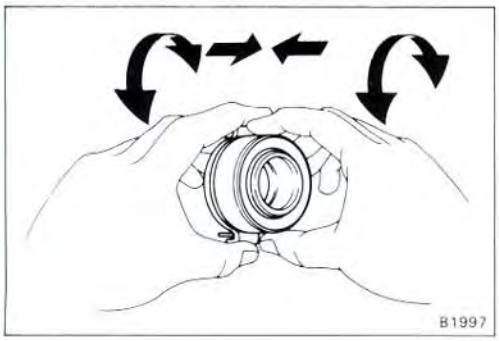


4. INSPECT DIAPHRAGM SPRING FOR WEAR

Using calipers, measure the diaphragm spring for depth and width of wear.

Maximum: Depth 0.6 mm (0.024 in.)
Width 5.0 mm (0.197 in.)

If necessary, replace the clutch cover.



5. INSPECT RELEASE BEARING

Turn the bearing by hand while applying force in the axial direction.

NOTE: The bearing is permanently lubricated and requires no cleaning or lubrication.

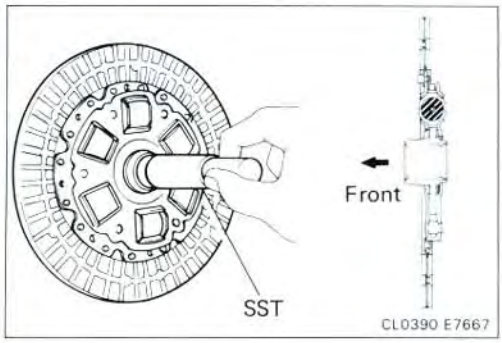
If a problem is found, replace the bearing together with the hub.

INSTALLATION OF CLUTCH UNIT (MAIN POINT OF INSTALLATION)

1. INSTALL CLUTCH DISC AND COVER ON FLYWHEEL

(a) Insert the SST in the clutch disc, and then set them and the cover in position.

SST 09301-17010

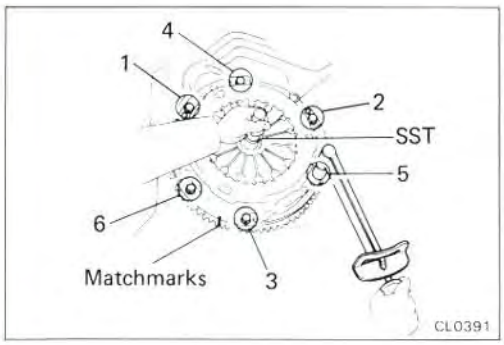


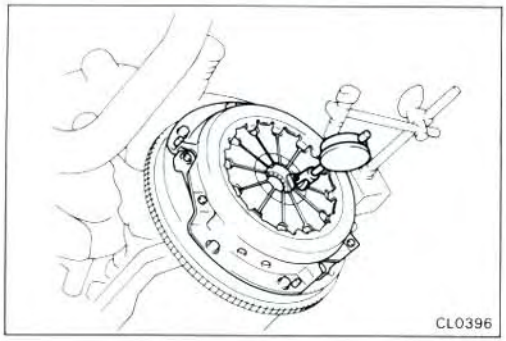
(b) Tighten the bolts evenly and gradually while pushing the SST. Make several passes around the cover until it is snug. Torque the bolts.

SST 09301-17010

Torque: 195 kg-cm (14 ft-lb, 19 N·m)

NOTE: Tighten the topmost bolt from the three near the knock pins first.

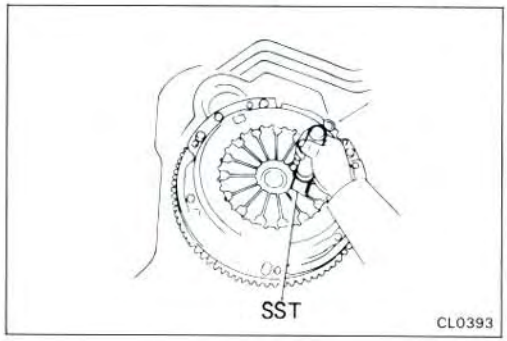




2. **CHECK DIAPHRAGM SPRING TIP ALIGNMENT**

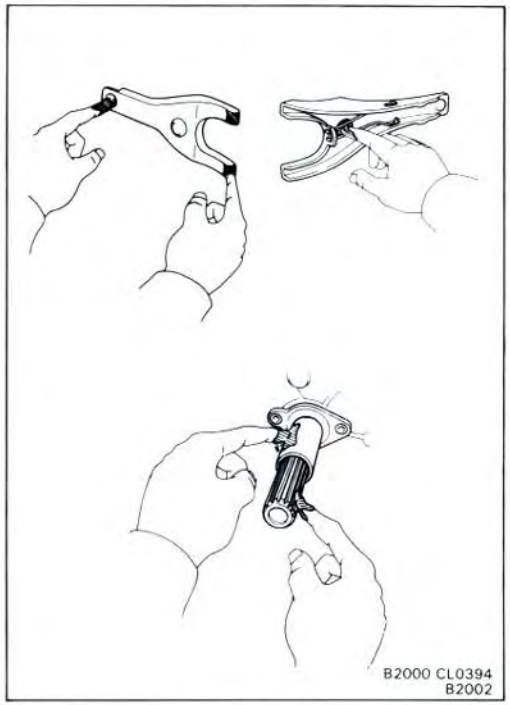
Using a dial indicator with roller instrument, check the diaphragm spring tip alignment.

Maximum non-alignment: 0.5 mm (0.020 in.)



If alignment is not as specified, using SST, adjust the diaphragm spring tip alignment.

SST 09333-00013



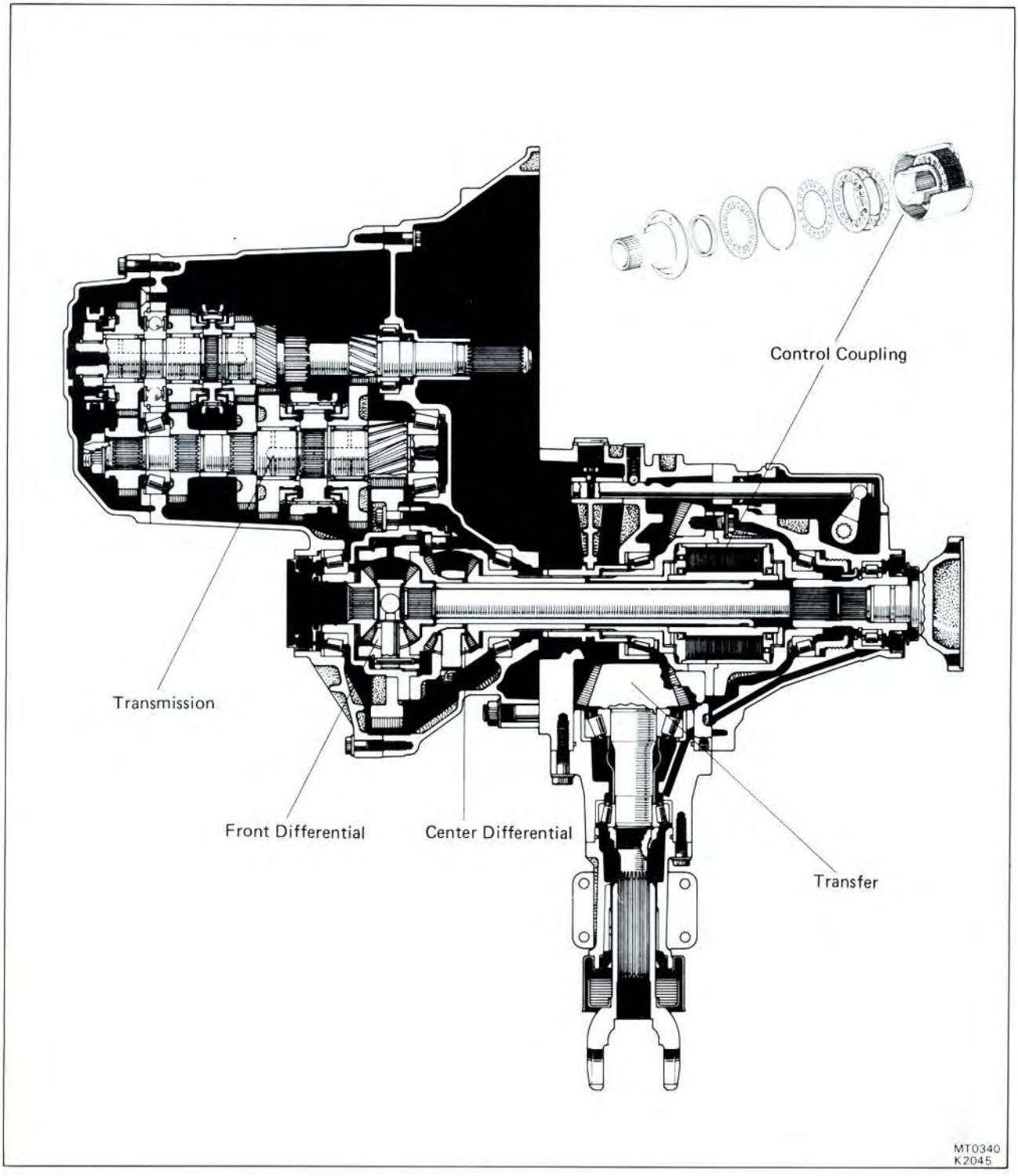
3. **APPLY MOLYBDENUM DISULPHIDE LITHIUM BASE GREASE (NLGI NO.2) AS SHOWN**

MANUAL TRANSAXLE (E50F2)

DESCRIPTION

GENERAL

- The E50F2 transaxle has been compactly designed by arranging the transmission, the center differential, the front differential and the transfer on the same quadruple case axle.
- The center differential, which compensates the difference in rotation speed between the front and rear wheels, utilizes bevel gear to provide durability and reliability by distributing the engine power from the transmission 50/50 to both front and rear propeller shafts. This center differential has been equipped with a control coupling which functions as a LSD.



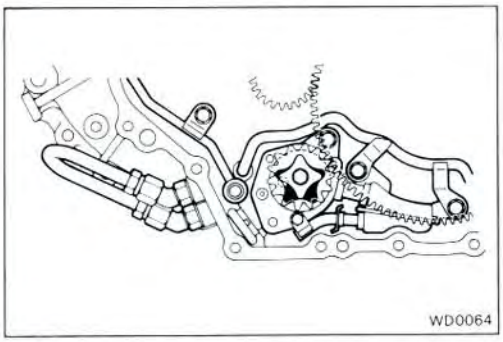
Transaxle type	E50F2	
Transmission	Operation method	Floor shift vehicles are provided with push-pull type remote control
	Transmission type	Forward . Constant mesh Reverse : Sliding mesh
Center differential	Reduction side (Gear type)	Helical gear
	Differential side (Gear type)	Bevel gear
	Type of differential center mechanism	Viscous coupling
Transfer	Gear type	Hypoid gear

- The oil used in each transaxle is as follow:

  Transaxle oil E50 (08885-80206) or equivalent

  (Recommended oil
  Oil grade: API GL-5
  Viscosity: SAE 75W-90 or 80W-90
  Above −18°C (0°F) SAE90
  Below −18°C (0°F) SAE80W)

- The oil capacity: 4.8 Liters (5.1 US qts, 4.2 Imp. qts)

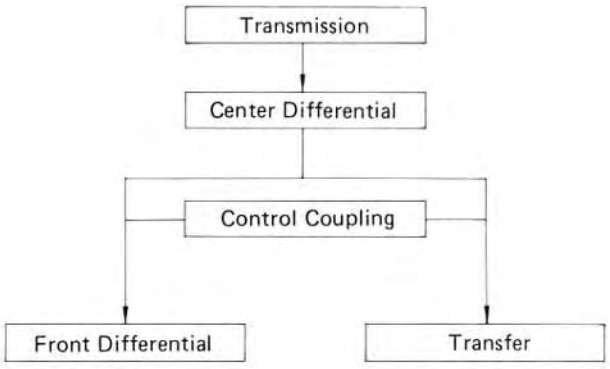


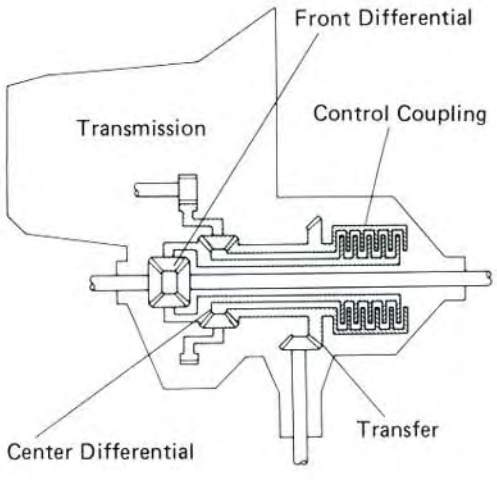
OIL PUMP

- The oil pump is of the trochoid type, and is driven by the differential ring gear and the pump drive gear. It is located at the bottom of the transaxle case.

POWER TRANSMISSION

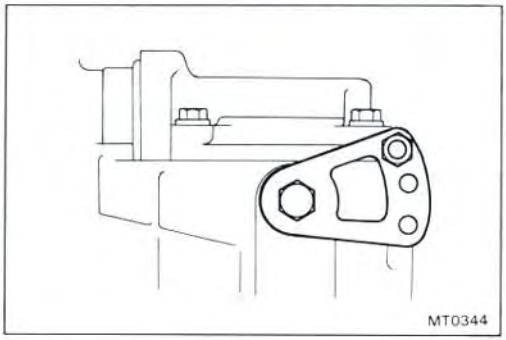
- Power from the transmission is transmitted along the route shown below:





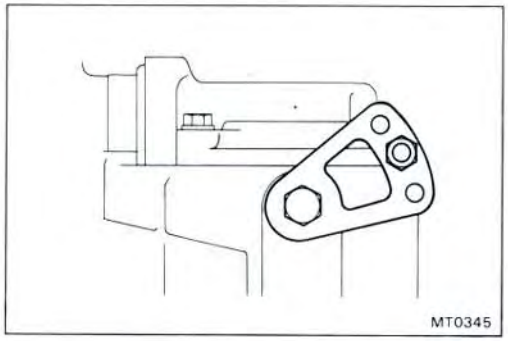
SELECT LEVER FOR SERVICING

- Ordinarily, there is no need for the ordinary customer to operate anything.
- However, to operate 2 wheels out of the four, the following switches have been installed.



VISCOUS MODE

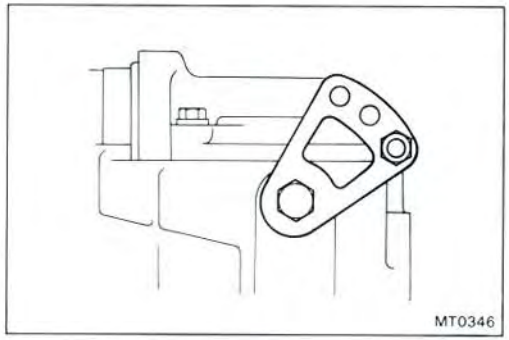
This is the mode for use during normal driving. After finishing inspection, be sure to return the lever to this mode and attach the lock bolt.



VISCOUS FREE MODE

This mode cuts off the driving force transmitted from the center differential to the control coupling, and makes the center differential free.

CAUTION: Never use this during normal driving.



FF MODE

This mode cuts off the driving force transmitted from the center differential to the transfer, and locks the center differential.

However, when the lever is shifted to this mode, the driving force is transmitted only to the front wheels.

CAUTION: Never use this during normal driving. It will have a bad effect on the transaxle.

PRECAUTIONS

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

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

TROUBLESHOOTING

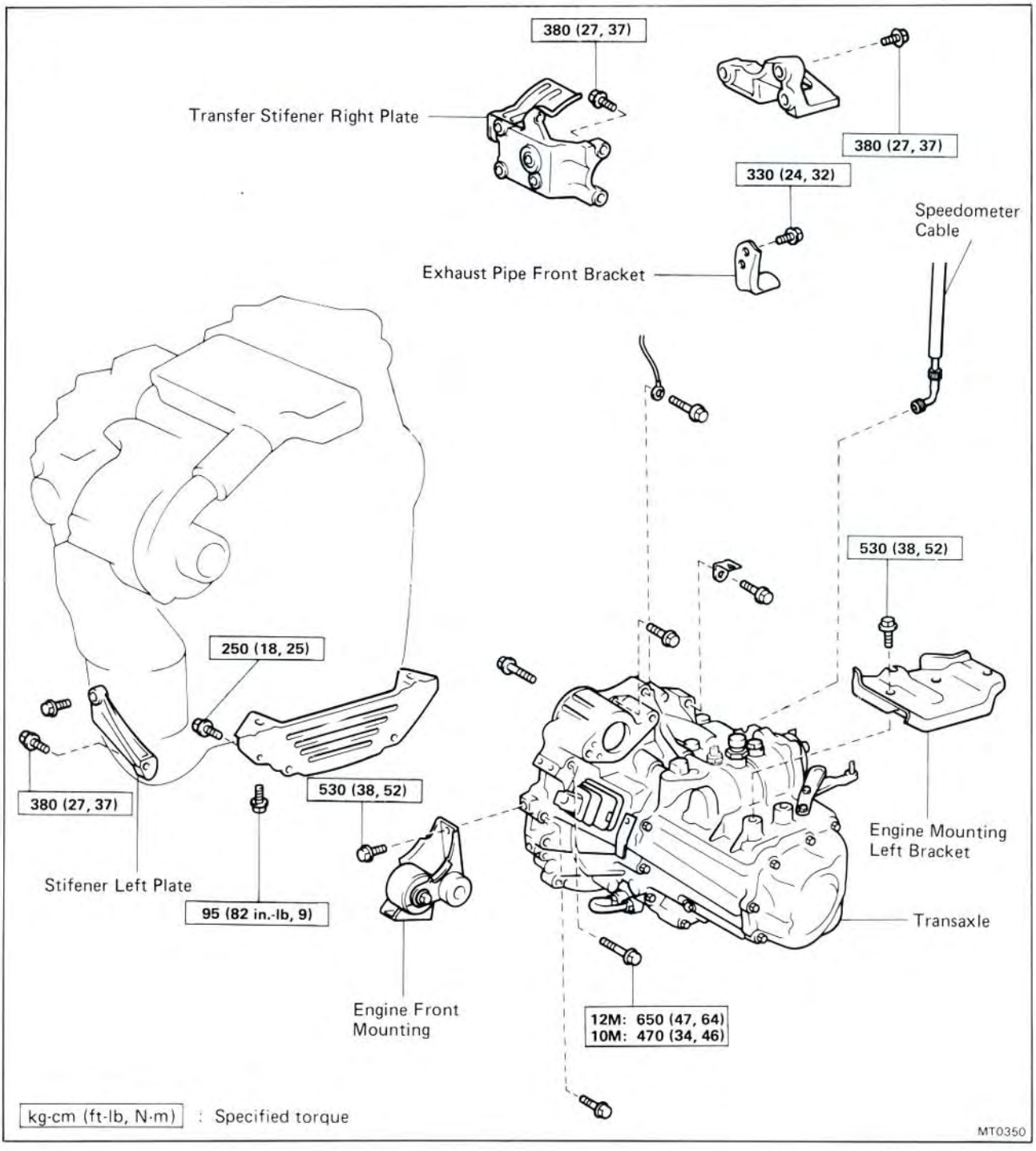
Problem	Possible cause	Remedy	Page
Noise	Transmission, differential or transfer faulty	Disassemble and inspect transmission, differential or transfer	MT-8
	Wrong oil grade	Replace oil	
	Oil level low	Add oil	MT-7
Oil leakage	Oil level too high	Drain oil	FA-10
	Oil seal, O-ring or gasket worn or damaged	Replace oil seal, O-ring or gasket	MT-8
Hard to shift or will not shift	Control cable faulty	Replace control cable	MT-97
	Transmission faulty	Disassemble and inspect transmission	MT-8
Tight corner braking phenomenon	Differential, center differential or transfer faulty	Replace differential, center differential or transfer	MT-43 MT-59

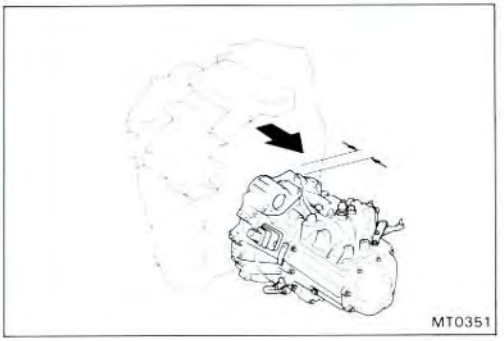
REMOVAL AND INSTALLATION OF TRANSAXLE

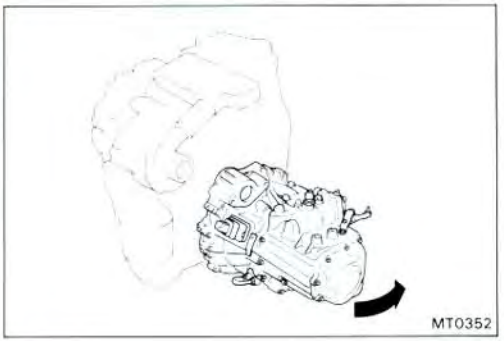
1. **REMOVE ENGINE WITH TRANSAXLE**
   (See page EM-43)

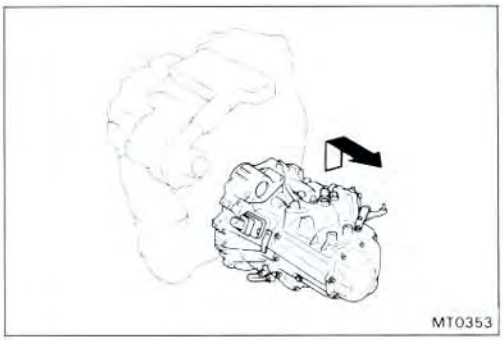
   INSTALL ENGINE WITH TRANSAXLE
   (See page EM-49)

2. **REMOVE AND INSTALL TRANSAXLE AS SHOWN**









(MAIN POINT OF REMOVAL AND INSTALLATION)

1. **REMOVE TRANSAXLE ASSEMBLY**

   NOTE: When removing transaxle from engine, remove as the following procedure since cylinder block rib contacts transfer case.

   (a) Pull straight until there are space of 60 — 80 mm (2 — 3 in.) between engine and transaxle case.

   (b) Move the transmission case cover to the arrow in the illustration.

   (c) While holding transfer output slightly, pull out whole transaxle.

2. **INSTALL TRANSAXLE ASSEMBLY FOLLOWING REMOVAL SEQUENCE IN REVERSE**

REPLACEMENT OF TRANSAXLE GEAR OIL

1. **DRAIN TRANSAXLE OIL**

2. **FILL TRANSAXLE OIL WITH GEAR OIL**

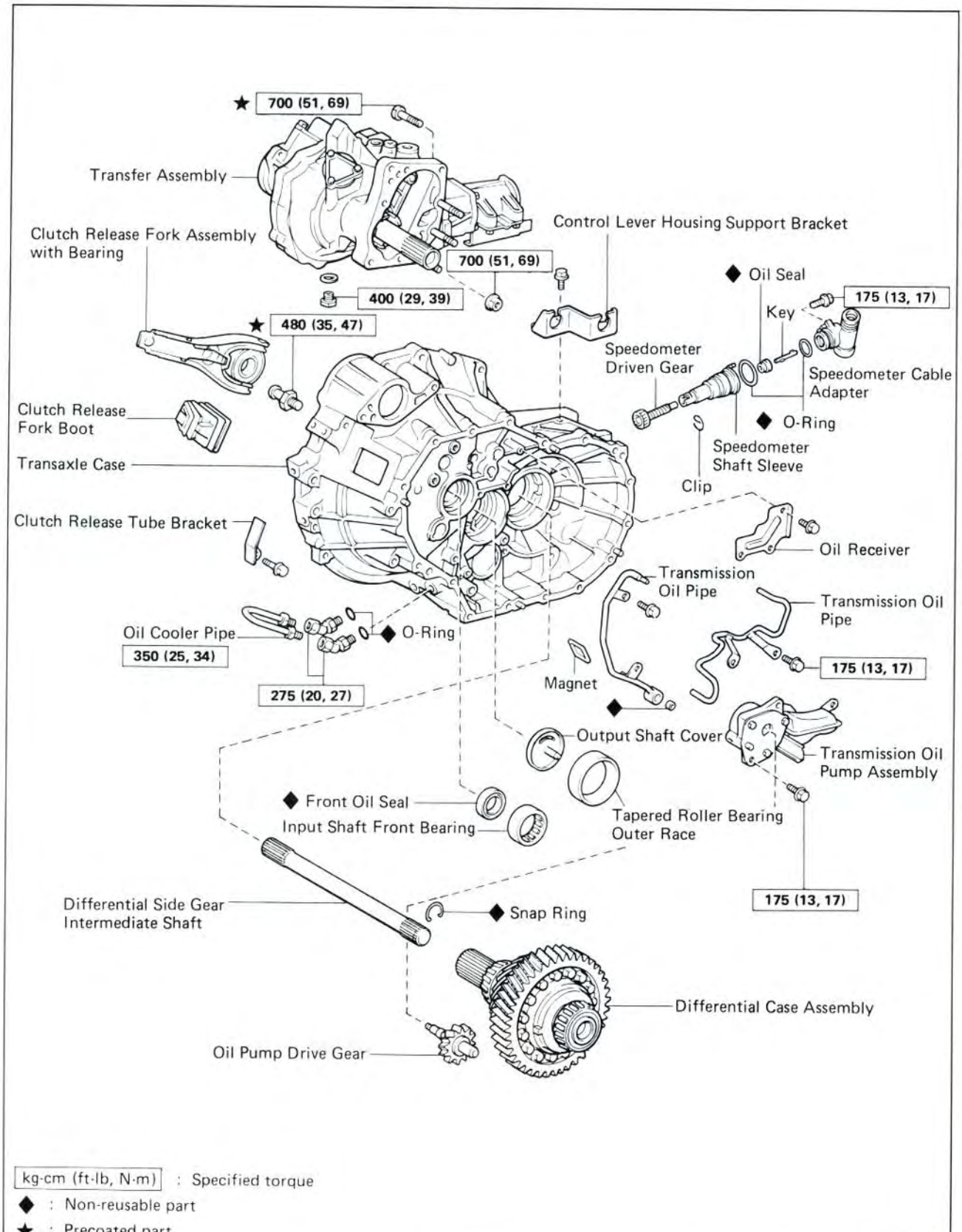
   Oil: Transaxle oil E50 (08885-80206) or equivalent

   Recommened oil
   Oil grade: API GL-5
   Viscosity: SAE 75W-90 or 80W-90
   Above −18°C (0°C) SAE 90
   Below −18°C (0°C) SAE 80W

   Capacity: 4.8 Liters (5.1 US qts, 4.2 Imp qts)

REMOVAL OF COMPONENT PARTS

COMPONENTS



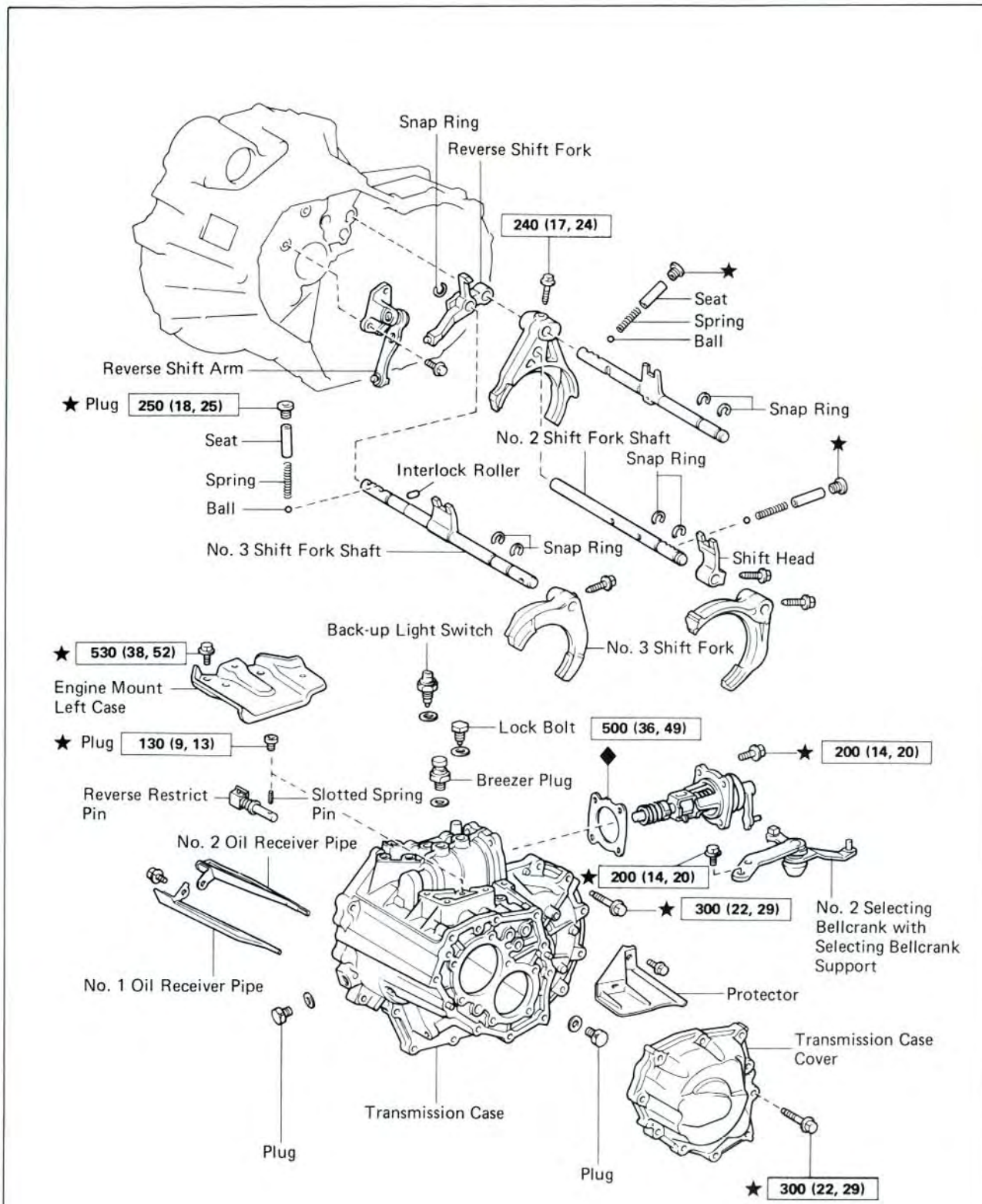
kg-cm (ft-lb, N·m) : Specified torque

◆ : Non-reusable part

★ : Precoated part

MT0374

COMPONENTS (Cont'd)



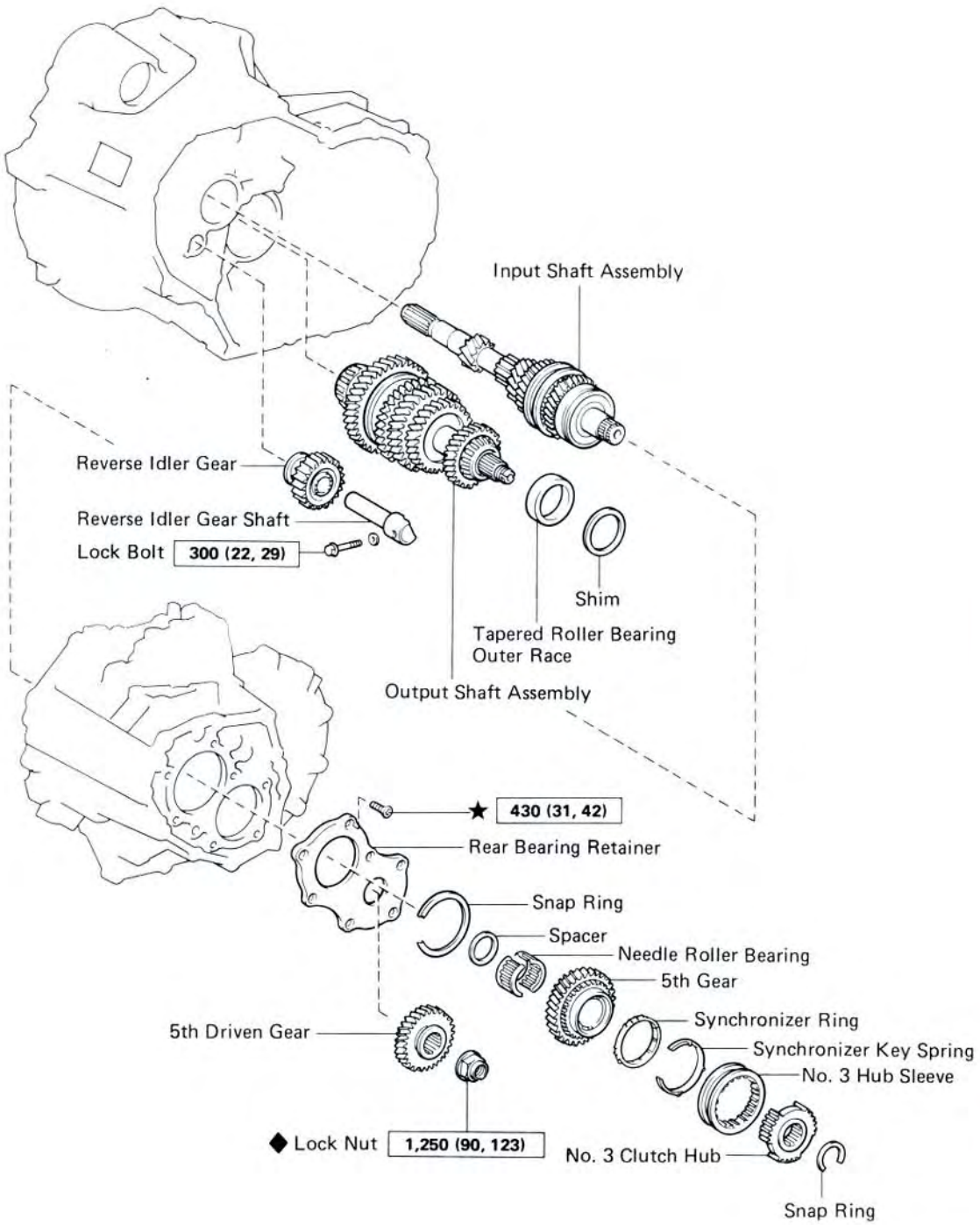
kg-cm (ft-lb, N·m) : Specified torque

◆ Non-reusable part

★ Precoated part

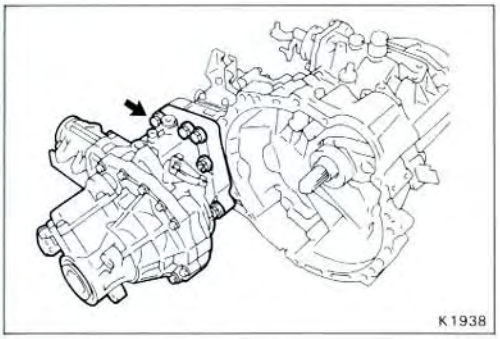
K2047

COMPONENTS (Cont'd)



kg-cm (ft-lb, N·m) : Specified torque
◆ : Non-reusable part
★ : Precoated part

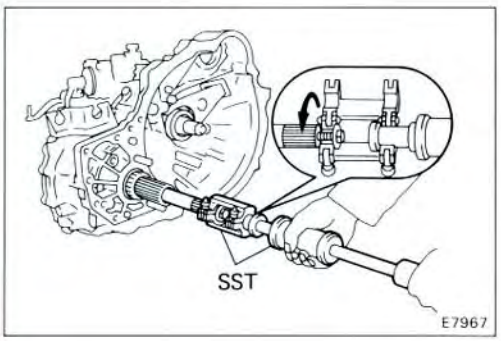
E8601



1. REMOVE TRANSFER ASSEMBLY

(a) Remove the three bolts and five nuts.

(b) Using a plastic hammer, remove the transfer assembly from the transaxle.

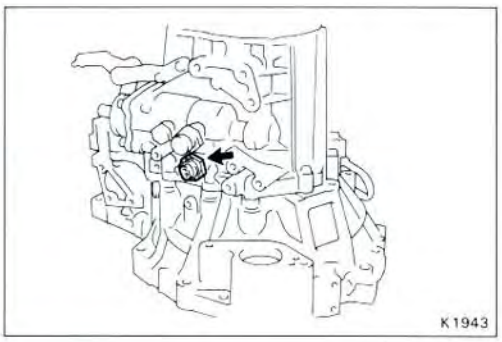


2. REMOVE DIFFERENTIAL SIDE GEAR INTERMEDIATE SHAFT

(a) Screw in a suitable bolt with washer into the side gear intermediate shaft.

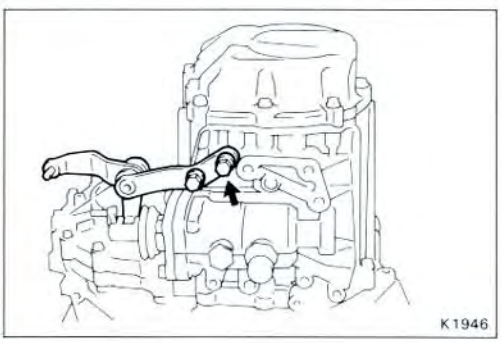
(b) Using SST, remove the side gear intermediate shaft.

SST 09910-00015 (09911-00011, 09912-00010)



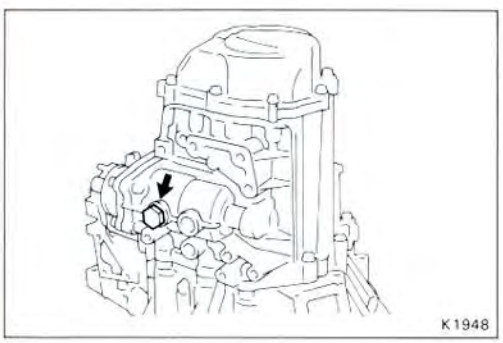
3. REMOVE RELEASE FORK AND BEARING

4. REMOVE BACK-UP LIGHT SWITCH

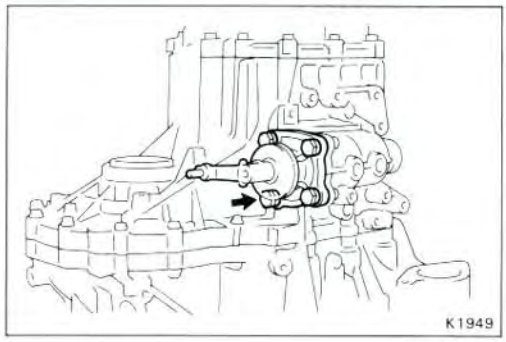


5. REMOVE SPEEDOMETER DRIVEN GEAR

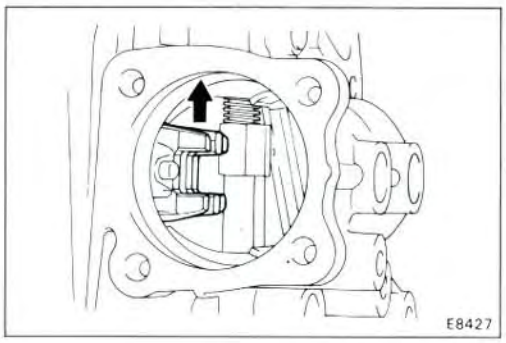
6. REMOVE NO.2 SELECTING BELLCRANK WITH SELECTING BELLCRANK SUPPORT



7. REMOVE SHIFT AND SELECT LEVER SHAFT LOCK BOLT



8. REMOVE SHIFT AND SELECTING LEVER ASSEMBLY

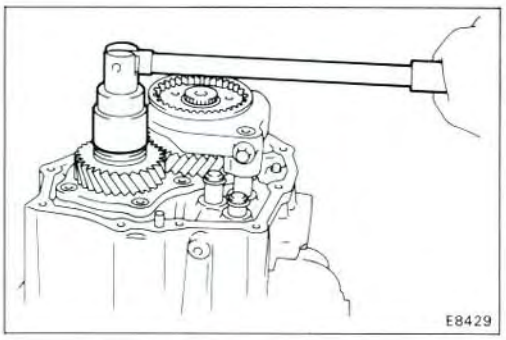


9. REMOVE TRANSMISSION CASE COVER

10. REMOVE OUTPUT SHAFT LOCK NUT

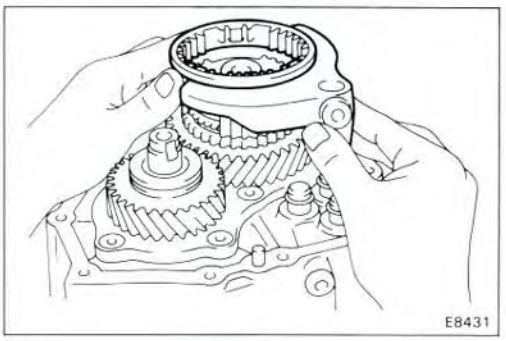
(a) Unstake the lock nut.

(b) Engage the gear double meshing.



(c) Remove the lock nut.

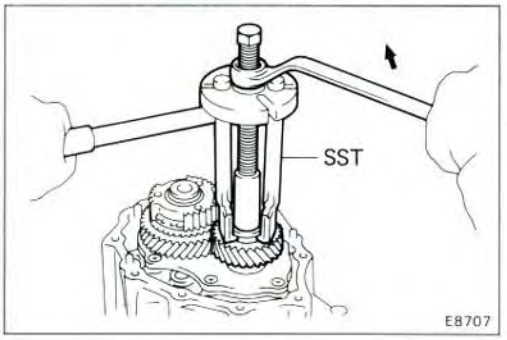
(d) Disengage the gear double meshing.



11. REMOVE NO.3 HUB SLEEVE AND FIFTH SHIFT FORK

(a) Remove the No.3 shift fork set bolt.

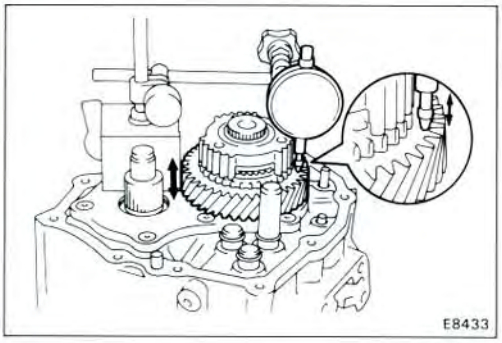
(b) Remove the No.3 hub sleeve and No.3 shift fork.



12. REMOVE FIFTH DRIVEN GEAR

Using SST, remove the 5th driven gear.

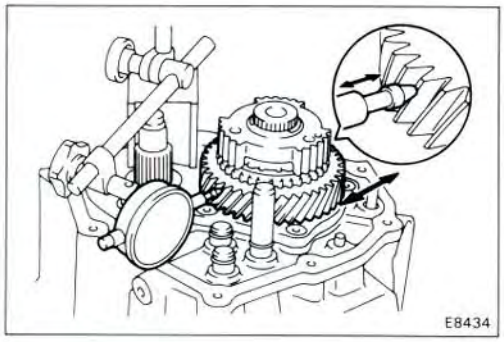
SST 09310-17010 (09310-07010, 09310-07020
09310-07040, 09310-07050)



13. MEASURE FIFTH GEAR THRUST CLEARANCE

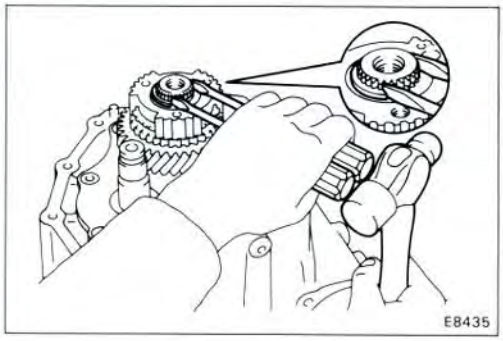
(a) Using a dial indicator, measure the thrust clearance.

Standard clearance: **0.10 — 0.57 mm (0.0039 — 0.0224 in.)**
Maximum clearance: **0.65 mm (0.0256 in.)**



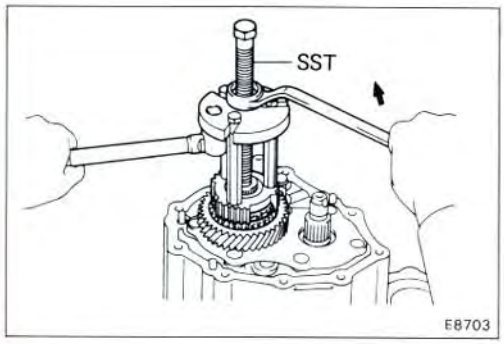
(b) Using a dial indicator, measure the oil clearance.

Standard clearance: **0.009 — 0.050 mm (0.0004 — 0.0020 in.)**
Maximum clearance: **0.070 mm (0.0028 in.)**



14. REMOVE NO.3 CLUTCH HUB AND FIFTH GEAR

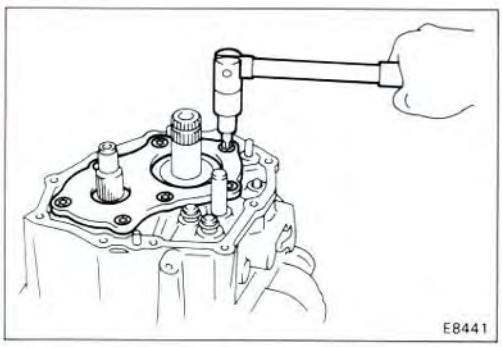
(a) Using two screwdrivers and a hammer, tap out the snap ring.



(b) Using SST, remove the No.3 clutch hub with synchronizer ring and 5th gear.

SST 09310-17010 (09310-07010, 09310-07020 09310-07040, 09310-07050)

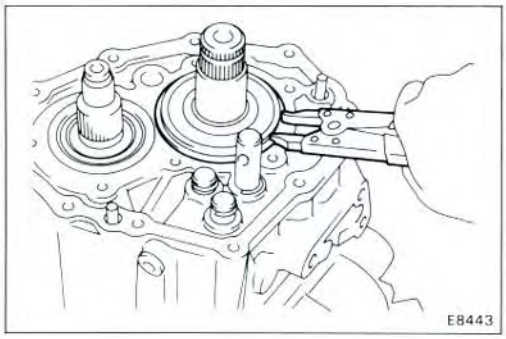
15. REMOVE NEEDLE ROLLER BEARING AND SPACER



16. REMOVE REAR BEARING RETAINER

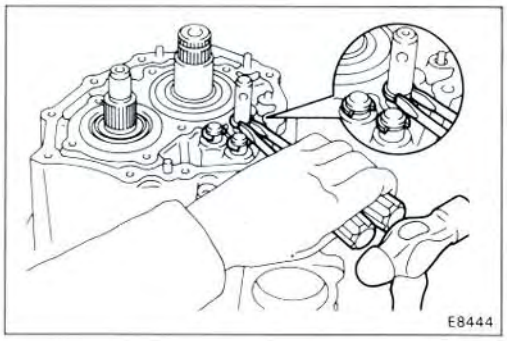
(a) Using a torx wrench, remove the seven torx screws and bearing retainer.

(b) Remove the adjust shim.

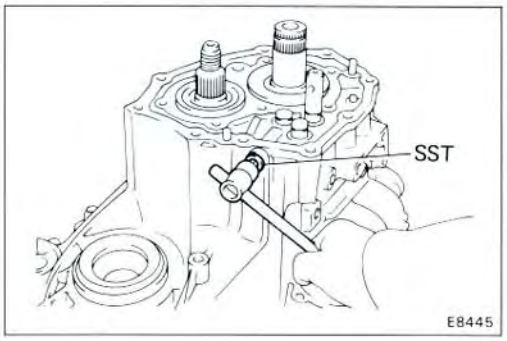


17. REMOVE SNAP RING

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



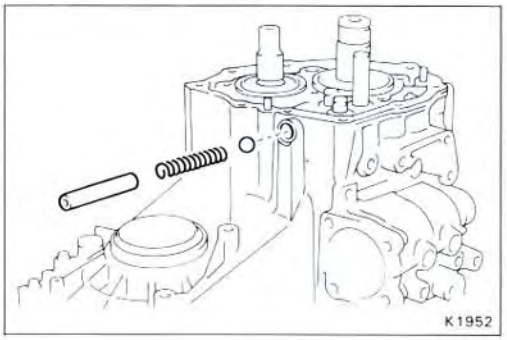
(b) Using two screwdrivers and a hammer, remove the three snap rings.



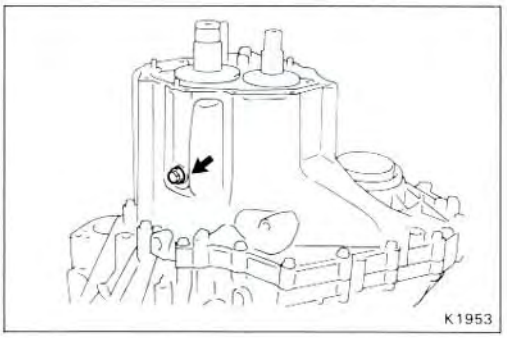
18. REMOVE PLUG, SEAT, SPRING AND LOCKING BALL

(a) Using SST, remove the plug.

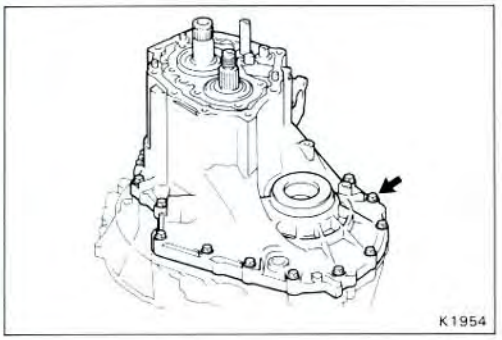
SST 09313-30021



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

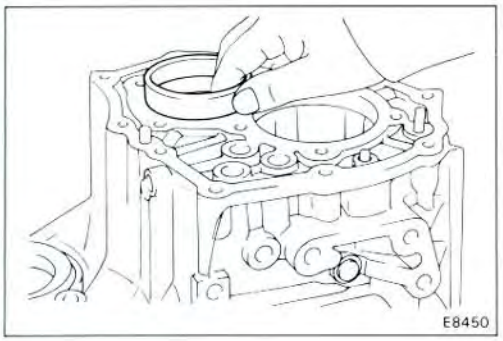


19. REMOVE REVERSE IDLER GEAR SHAFT RETAINING BOLT

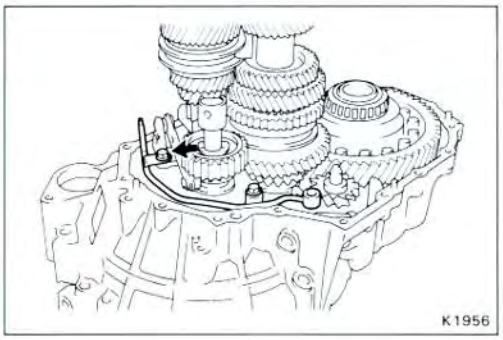


20. REMOVE TRANSMISSION CASE

Remove the seventeen bolts and tap off the case with a plastic hammer.



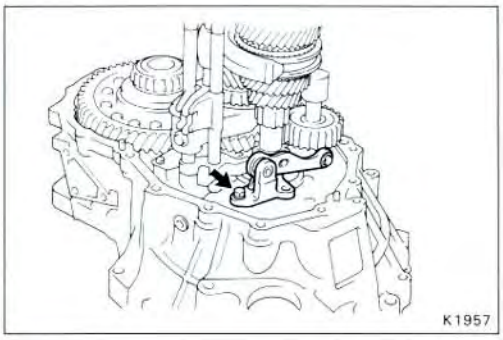
21. REMOVE OUTPUT SHAFT REAR TAPERED ROLLER BEARING OUTER RACE



22. REMOVE NO.2 OIL PIPE

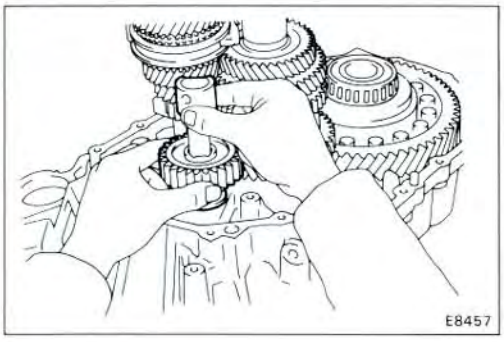
(a) Remove the gasket.

(b) Remove the two bolts and oil pipe.



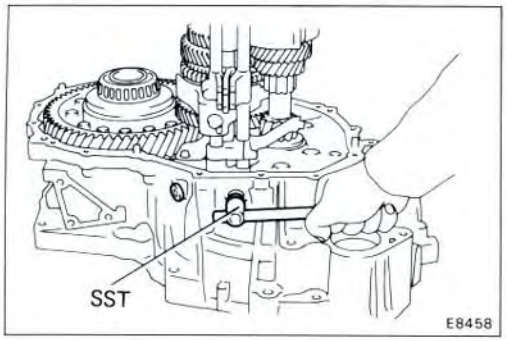
23. REMOVE REVERSE SHIFT ARM

Remove the bolt and pull off the bracket.



24. REMOVE REVERSE IDLER GEAR AND SHAFT

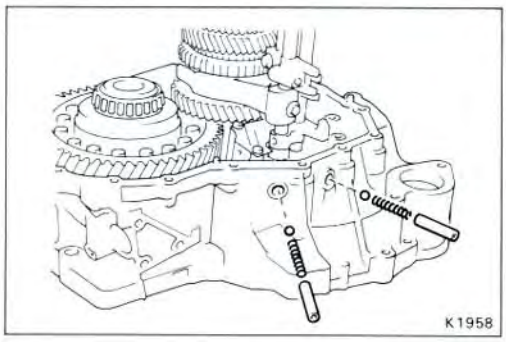
Pull out the shaft, remove the reverse idler gear.



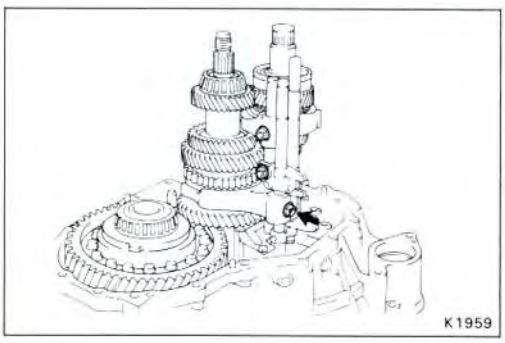
25. REMOVE PLUGS, SEATS, SPRINGS AND BALLS

(a) Using SST, remove the two plugs.

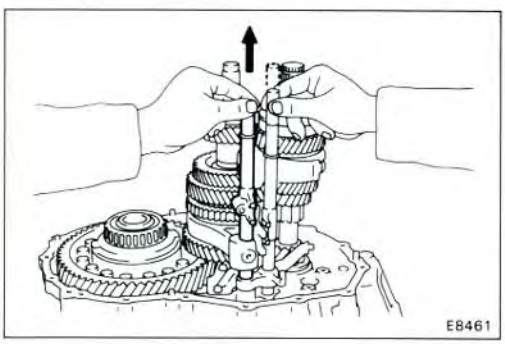
SST 09313-30021



(b) Using a magnetic finger, remove the two seats, springs and balls.

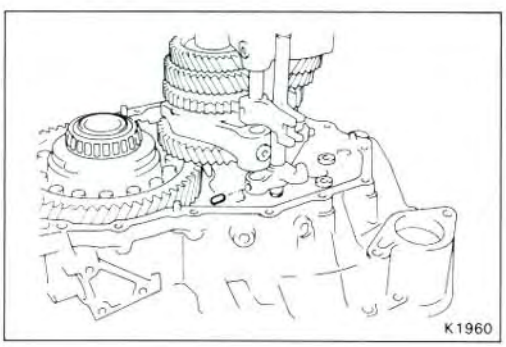


26. REMOVE SET BOLTS



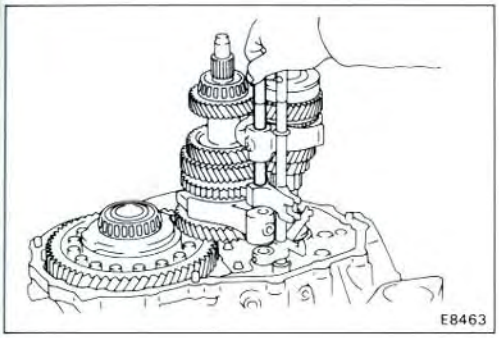
27. REMOVE NO.1 SHIFT FORK SHAFT

Pull up No.3 shift fork shaft, remove the No.1 shift fork shaft.



28. REMOVE INTERLOCK ROLLER

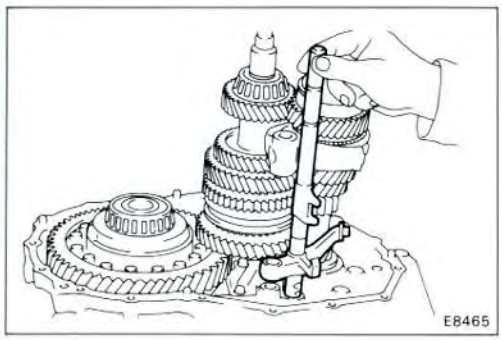
Using a magnetic finger, remove the interlock roller from the reverse shift fork.



29. REMOVE NO.2 SHIFT FORK SHAFT, SHIFT HEAD AND NO.1 SHIFT FORK

(a) Pull out the No.2 shift fork shaft.

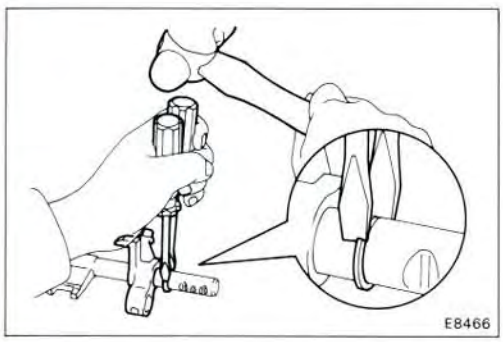
(b) Remove the shift head and No.1 shift fork.



30. REMOVE NO.3 SHIFT FORK SHAFT WITH REVERSE SHIFT FORK AND NO.2 SHIFT FORK

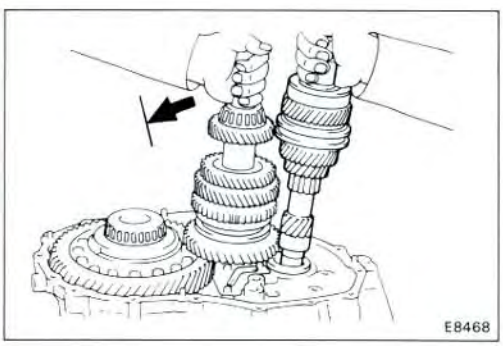
(a) Pull out the No.3 shift fork shaft with reverse shift fork.

(b) Remove the No.2 shift fork.



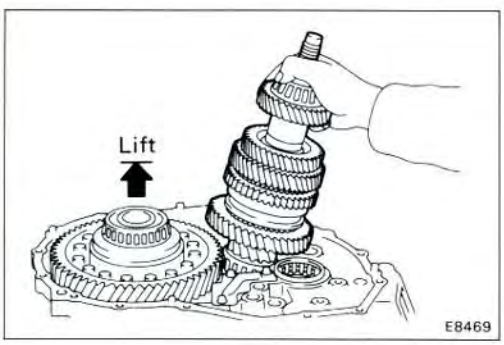
31. REMOVE SNAP RINGS

Using two screwdrivers and a hammer, remove the snap ring and reverse shift fork from the No.3 shift fork shaft.

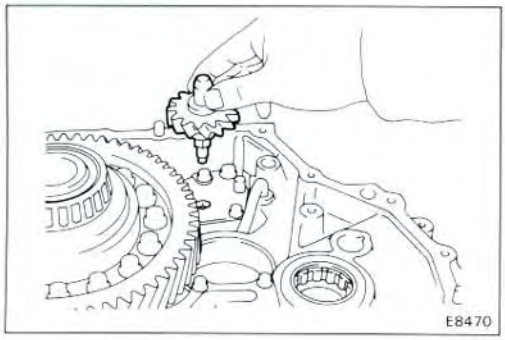


32. REMOVE INPUT AND OUTPUT SHAFT ASSEMBLY

(a) Leaning the output shaft to the differential side, remove the input shaft assembly.

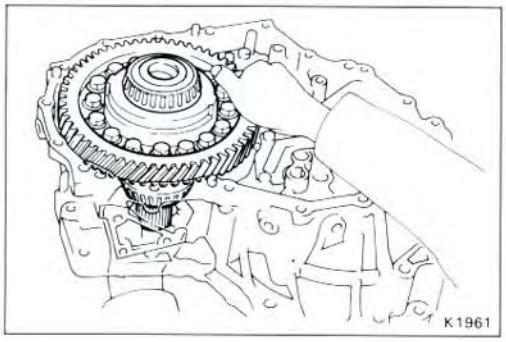


(b) Lift up the differential case assembly, remove the output shaft assembly.

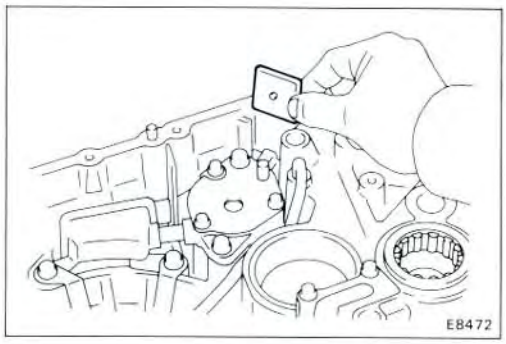


33. REMOVE DIFFERENTIAL ASSEMBLY

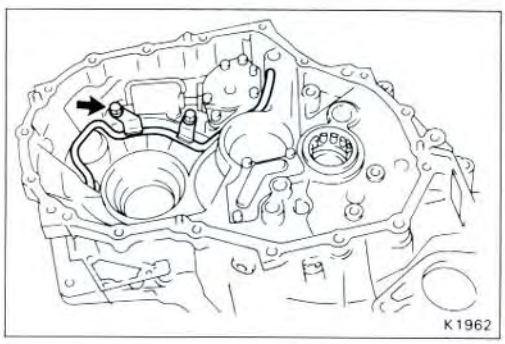
(a) Remove the oil pump drive gear.



(b) Remove the differential case assembly.

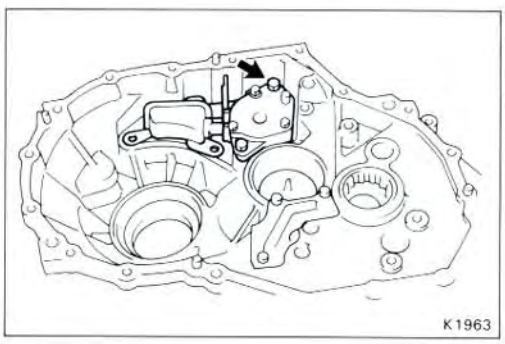


34. REMOVE MAGNET FROM TRANSAXLE CASE

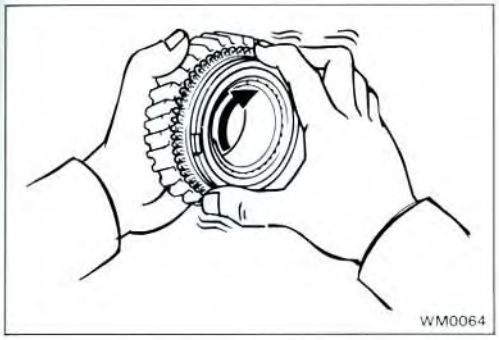


35. REMOVE OIL PUMP ASSEMBLY

(a) Remove the two bolts and oil pipe.



(b) Remove the two bolts and oil pump.

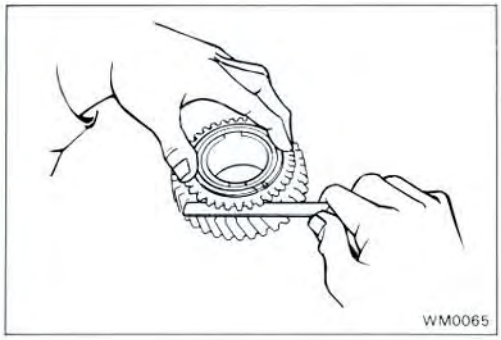


INSPECTION OF COMPONENT PARTS

1. INSPECT SYNCHRONIZER RING OF FIFTH GEAR

(a) Check for wear or damage.

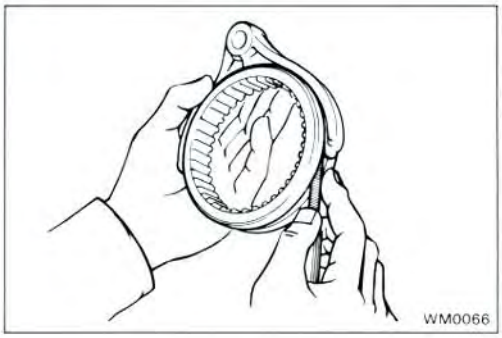
(b) Turn the ring and push it in to check the braking action.



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

Minimum clearance: 0.6 mm (0.024 in.)

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

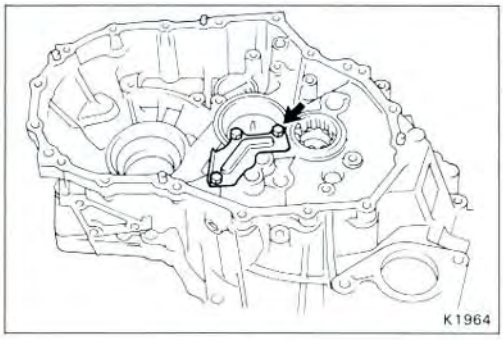


2. MEASURE CLEARANCE OF SHIFT FORK AND HUB SLEEVE

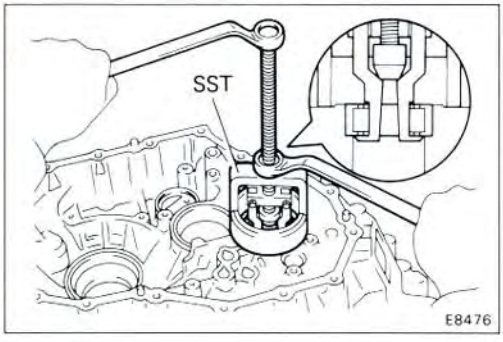
Using a feeler gauge, measure the clearance between the hub sleeve and shift fork.

Maximum clearance: 1.0 mm (0.039 in.)

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



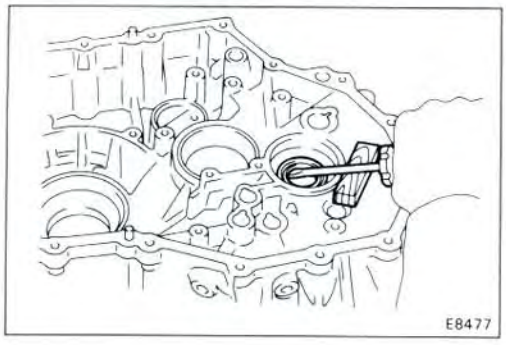
3. REMOVE TRANSAXLE CASE RECEIVER



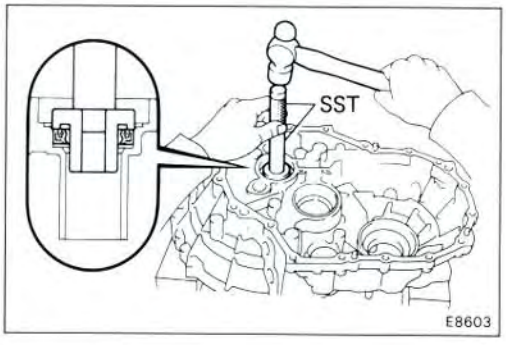
4. IF NECESSARY, REPLACE INPUT SHAFT BEARING AND OIL SEAL

(a) Using SST, pull out the bearing.

SST 09612-65014



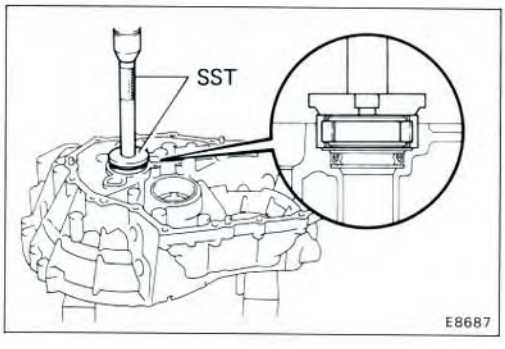
(b) Using a screwdriver, remove the oil seal.



(c) Using SST, drive in a new oil seal.

SST 09608-12010 (09608-00020, 09608-00080)

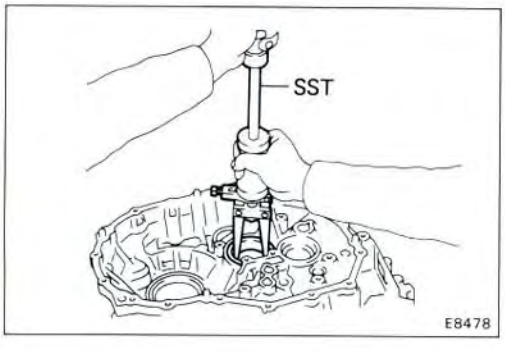
(d) Coat the lip of oil seal with MP grease.



(e) Using SST, drive in a new bearing.

SST 09608-12010 (09608-00020, 09608-00060)

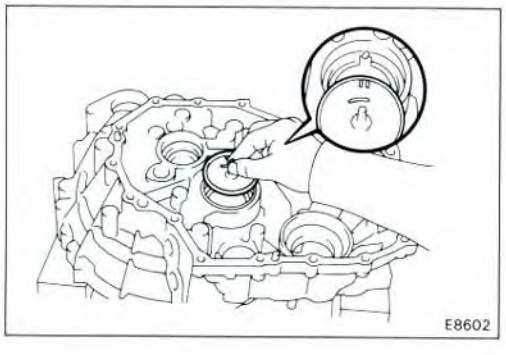
5. IF NECESSARY, REPLACE OUTPUT SHAFT FRONT OUTER RACE AND OUTPUT SHAFT COVER



(a) Using SST, pull out the outer race.

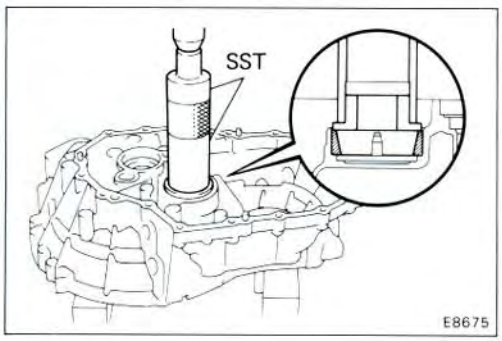
SST 09308-00010

(b) Remove the output shaft front cover.

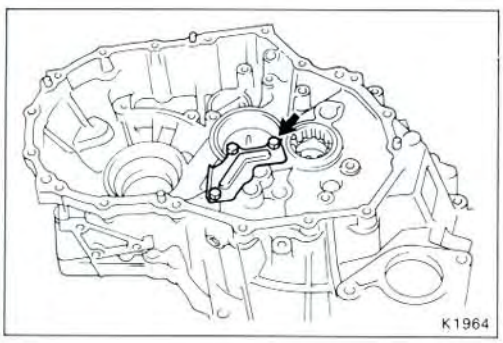


(c) Install the output shaft front cover.

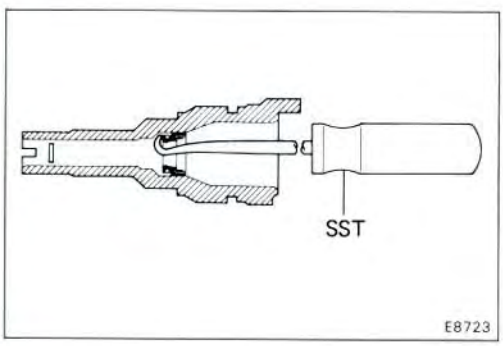
NOTE: Install the output shaft cover projection into the case side groove.



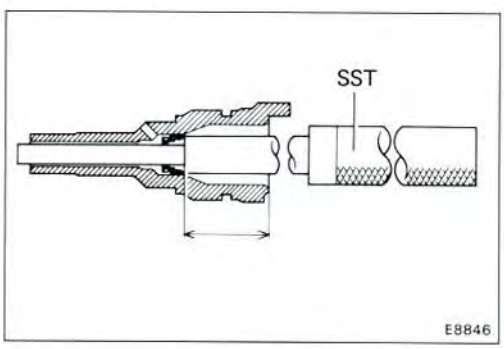
(d) Using SST, press in a new outer race.
SST 09316-60010 (09316-00010, 09316-00020)



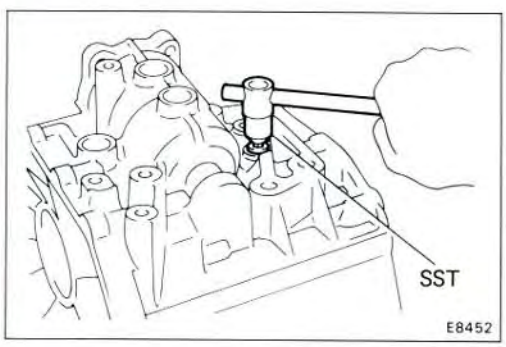
6. INSTALL AND TORQUE TRANSAXLE CASE RECEIVER
Torque: 75 kg-cm (65 in.-lb, 7.4 N·m)



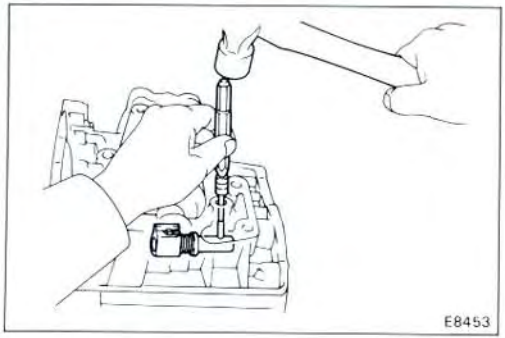
7. IF NECESSARY, REPLACE SPEEDOMETER DRIVEN GEAR OIL SEAL
(a) Using SST, pull out the oil seal.
SST 09921-00010



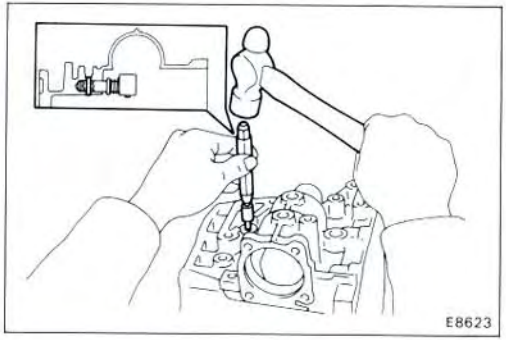
(b) Using SST, drive in a new oil seal.
SST 09201-60011
Drive in depth: 33 mm (1.30 in.)
(c) Coat the lip of oil seal with MP grease.



8. IF NECESSARY, REPLACE REVERSE RESTRICT PIN
(a) Using SST, remove the screw plug.
SST 09313-30021

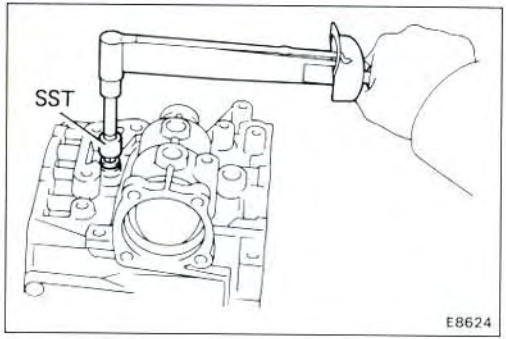


(b) Using a pin punch and hammer, drive out the slotted spring pin.



(c) Replace the reverse restrict pin.

(d) Using a pin punch, drive in the slotted spring pin.



(e) Apply liquid sealant to the plug threads.

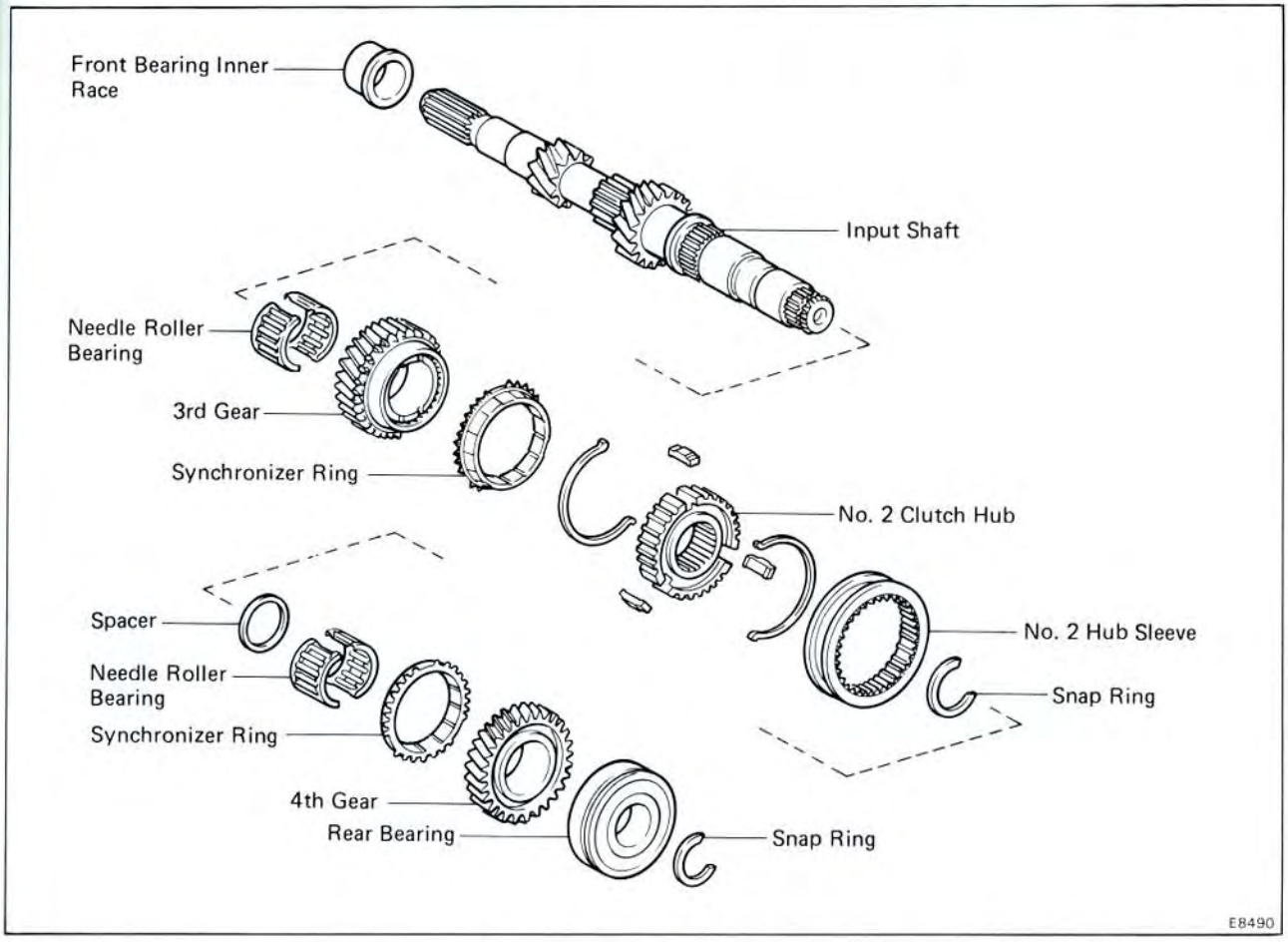
Sealant: Part No.08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

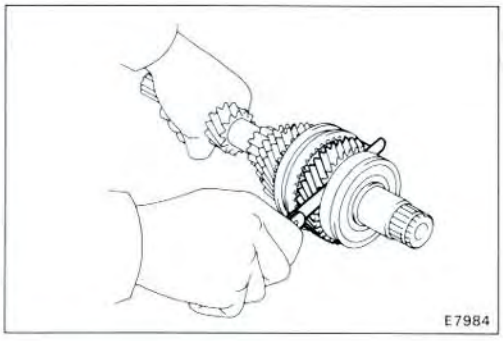
(f) Using SST, install the screw plug.

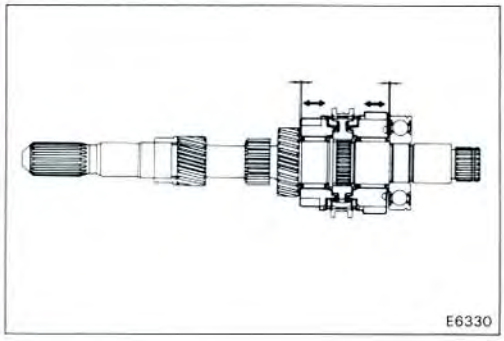
SST 09313-30021

COMPONENT PARTS

Input Shaft Assembly







DISASSEMBLY OF INPUT SHAFT ASSEMBLY

1. **MEASURE THIRD AND FOURTH GEAR THRUST CLEARANCE**

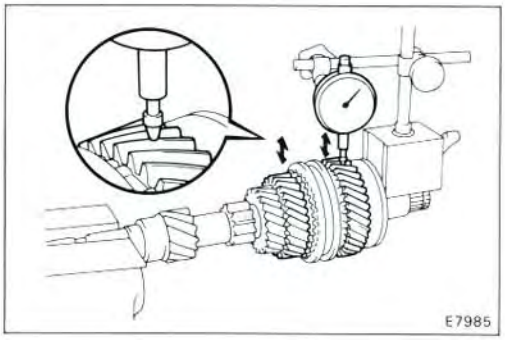
   Using a feeler gauge, measure the thrust clearance.

   Standard clearance:

3rd gear	0.10 — 0.35 mm (0.0039 — 0.0138 in.)
4th gear	0.10 — 0.55 mm (0.0039 — 0.0217 in.)

   Maximum clearance:

   3rd gear 0.40 mm (0.0157 in.)
   4th gear 0.60 mm (0.0236 in.)



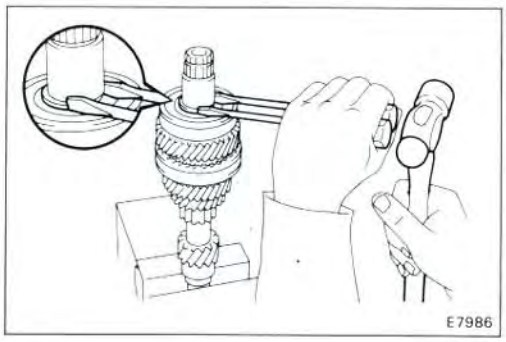
2. **CHECK OIL CLEARANCE OF THIRD AND FOURTH GEAR**

Using dial indicator, measure the oil clearance between the gear and shaft.

Standard clearance:
3rd gear 0.009 — 0.053 mm (0.0004 — 0.0020 in.)
4th gear 0.009 — 0.051 mm (0.0004 — 0.0020 in.)

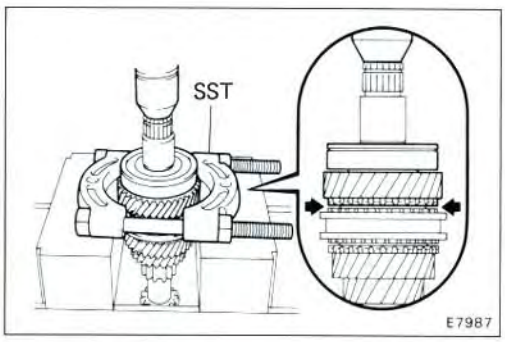
Maximum clearance: 0.080 mm (0.003 in.)

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



3. **REMOVE SNAP RING**

Using two screwdrivers and a hammer, tap out the snap ring.

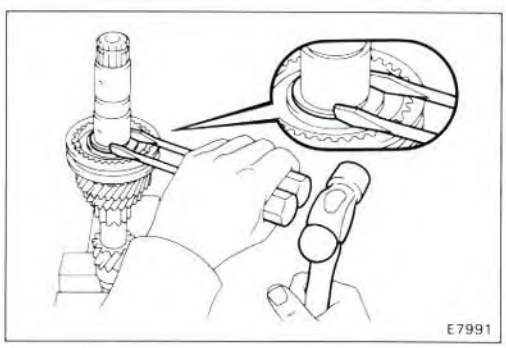


4. **REMOVE INPUT SHAFT REAR BEARING AND FOURTH GEAR**

Using SST and a press, remove the input shaft rear bearing.

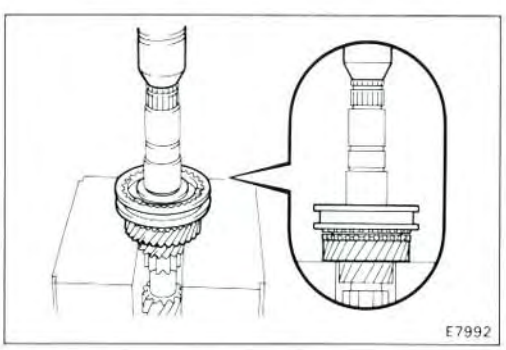
SST 09950-00020

5. **REMOVE NEEDLE ROLLER BEARINGS, SPACER AND SYNCHRONIZER RING**



6. **REMOVE SNAP RING**

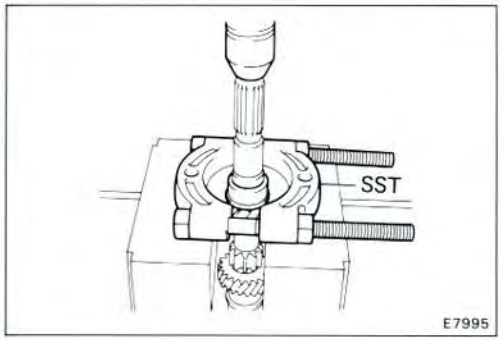
Using two screwdrivers and a hammer, tap out the snap ring.



7. **REMOVE NO.2 CLUTCH HUB ASSEMBLY, SYNCHRONIZER RING AND THIRD GEAR**

Using a press, remove No.2 hub sleeve, 3rd gear, synchronizer ring and needle roller bearings.

8. **REMOVE NEEDLE ROLLER BEARING**



9. REMOVE INPUT SHAFT FRONT BEARING INNER RACE

Using SST and a press, remove the inner race.

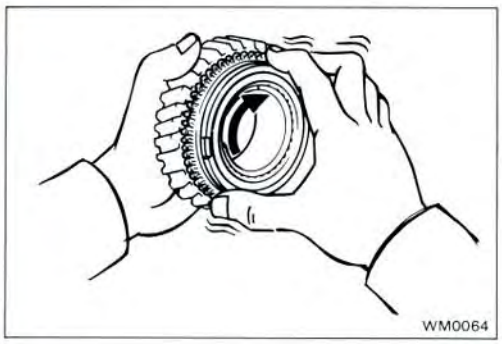
SST 09950-00020

INSPECTION OF INPUT SHAFT COMPONENT PARTS

1. INSPECT SYNCHRONIZER RINGS

(a) Check for wear or damage.

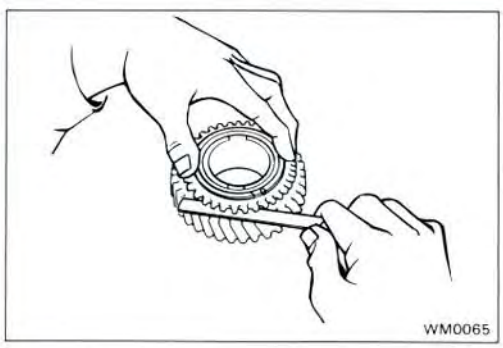
(b) Turn the ring and push it in to check the breaking action.



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

Minimum clearance: 0.6 mm (0.024 in.)

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

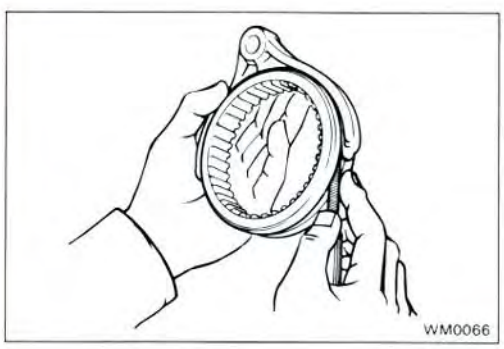


2. MEASURE CLEARANCE OF NO.2 SHIFT FORK AND HUB SLEEVE

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

Maximum clearance: 1.0 mm (0.039 in.)

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



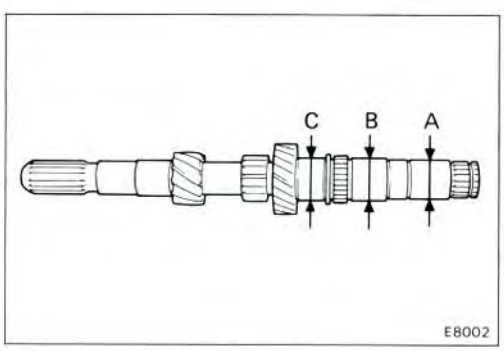
3. INSPECT INPUT SHAFT

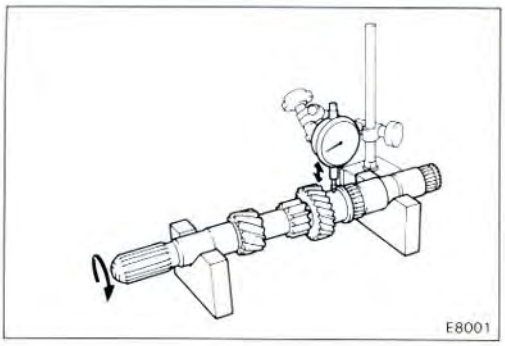
(a) Check the input shaft for wear or damage.

(b) Using a micrometer, measure the outer diameter of the input shaft journal surface.

Minimum outer diameter:

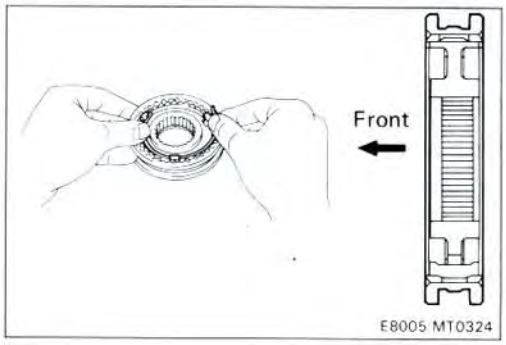
Part	**A**	**32.930 mm (1.2964 in.)**
	B and C	**35.950 mm (1.4154 in.)**




E8001

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

Maximum runout: 0.060 mm (0.0024 in.)



E8005 MT0324

ASSEMBLY OF INPUT SHAFT ASSEMBLY

(See page MT-23)

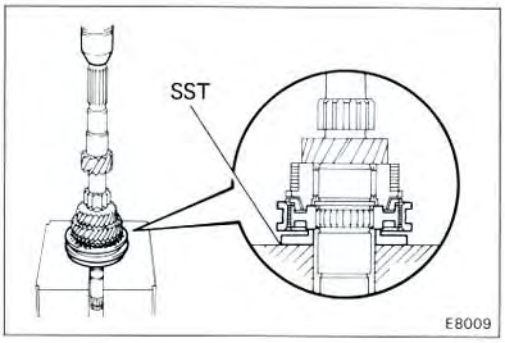
NOTE: Coat all of the sliding and rotating surface with gear oil before assembly.

1. INSERT NO.2 CLUTCH HUB SLEEVE

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

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

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



E8009

2. INSTALL NEEDLE ROLLER BEARING, THIRD GEAR, SYNCHRONIZER RING AND NO.2 HUB SLEEVE ASSEMBLY TO INPUT SHAFT

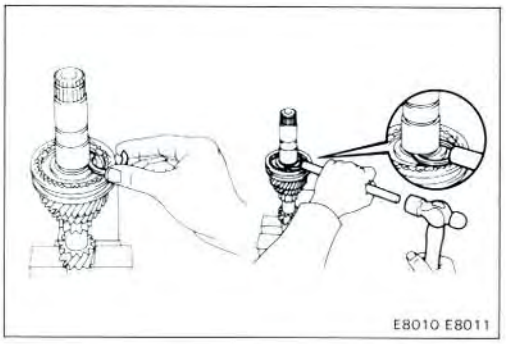
(a) Apply MP grease to the needle roller bearings.

(b) Install the 3rd gear.

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

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

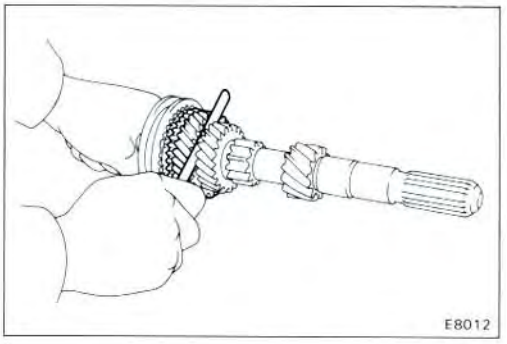
SST 09506-35010


E8010 E8011

3. INSTALL SNAP RING

Select a snap ring that will allow minimum axial play and install it on the shaft.

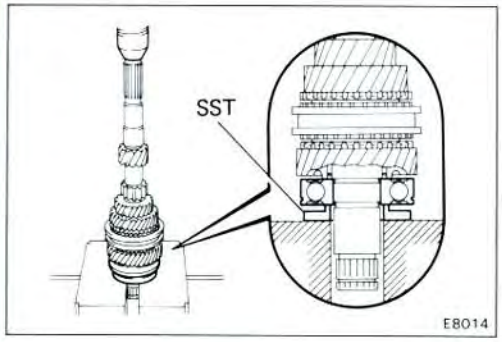
Mark	Thickness	mm (in.)
H	2.30 — 2.35	(0.0906 — 0.0925)
J	2.35 — 2.40	(0.0925 — 0.0945)
K	2.40 — 2.45	(0.0945 — 0.0965)
L	2.45 — 2.50	(0.0965 — 0.0984)
M	2.50 — 2.55	(0.0984 — 0.1004)
N	2.55 — 2.60	(0.1004 — 0.1024)
P	2.60 — 2.65	(0.1024 — 0.1043)


E8012

4. MEASURE THIRD GEAR THRUST CLEARANCE

Using a feeler gauge, measure the 3rd gear thrust clearance.

Standard clearance: 0.10 — 0.35 mm (0.0039 — 0.0138 in.)



5. INSTALL SPACER, SYNCHRONIZER RING, NEEDLE ROLLER BEARINGS, FOURTH GEAR AND RADIAL BALL BEARING

(a) Install the spacer.

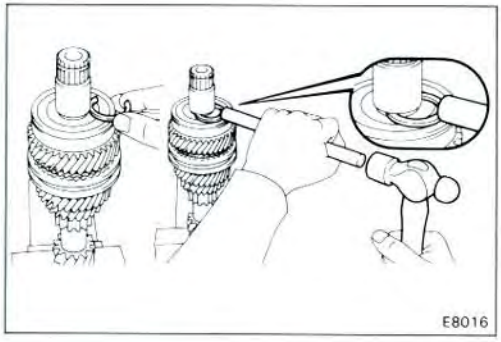
(b) Apply MP grease to the needle roller bearings.

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

(d) Install the 4th gear.

(e) Using SST and a press, install the radial ball bearing.

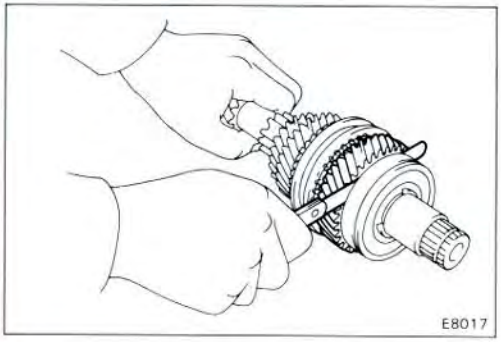
SST 09506-35010



6. INSTALL SNAP RING

Select a snap ring that will allow minimum axial play and install it on the shaft.

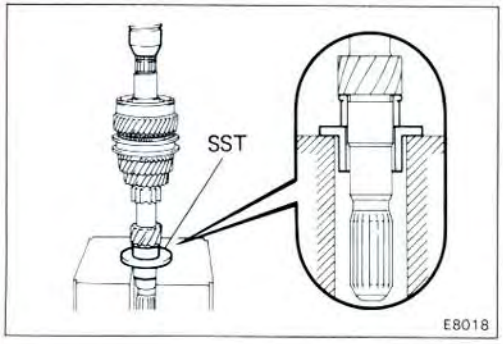
Mark	Thickness	mm (in.)
1	2.35 – 2.40	(0.0925 – 0.0945)
2	2.40 – 2.45	(0.0945 – 0.0965)
3	2.45 – 2.50	(0.0965 – 0.0984)
4	2.50 – 2.55	(0.0984 – 0.1004)
5	2.55 – 2.60	(0.1004 – 0.1024)
6	2.60 – 2.65	(0.1024 – 0.1043)
7	2.65 – 2.70	(0.1043 – 0.1063)
8	2.70 – 2.75	(0.1063 – 0.1083)



7. MEASURE FOURTH GEAR THRUST CLEARANCE

Using a feeler gauge, measure the 4th gear thrust clearance.

Standard clearance: 0.10 – 0.55 mm (0.0039 – 0.0217 in.)

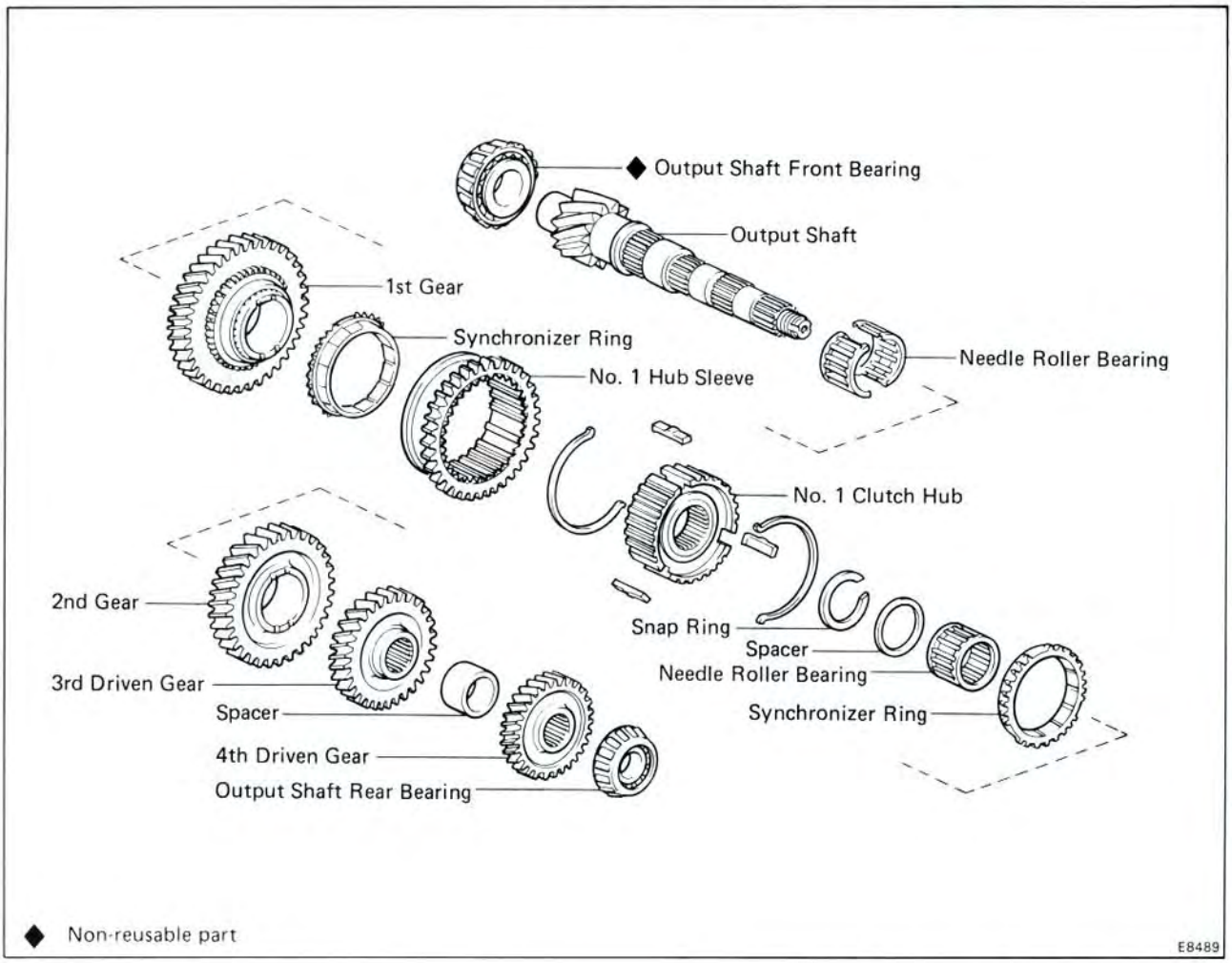


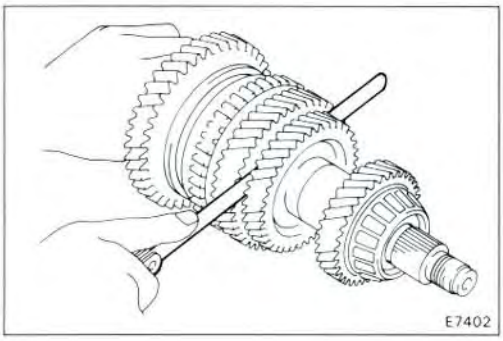
8. INSTALL INPUT SHAFT FRONT BEARING INNER RACE

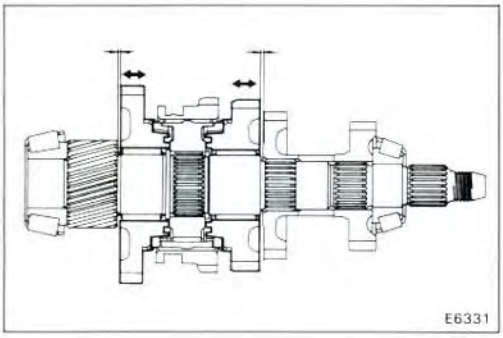
Using SST and a press, install the input shaft front bearing inner race.

SST 09316-60010 (09316-00020)

Output Shaft Assembly







DISASSEMBLY OF OUTPUT SHAFT ASSEMBLY

1. **MEASURE FIRST AND SECOND GEAR THRUST CLEARANCE**

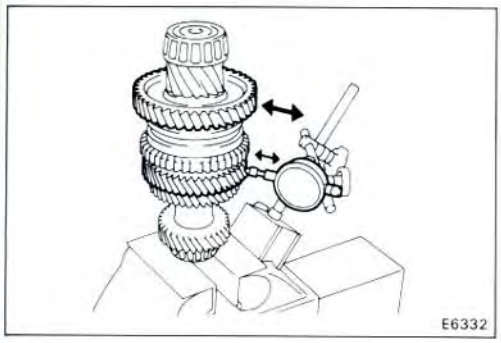
   Using a feeler gauge, measure the thrust clearance.

   Standard clearance:

1st gear	0.10 — 0.35 mm (0.0039 — 0.0138 in.)
2nd gear	0.10 — 0.45 mm (0.0039 — 0.0177 in.)

   Maximum clearance:

1st gear	0.40 mm (0.0157 in.)
2nd gear	0.50 mm (0.0197 in.)



2. CHECK OIL CLEARANCE OF FIRST AND SECOND GEAR

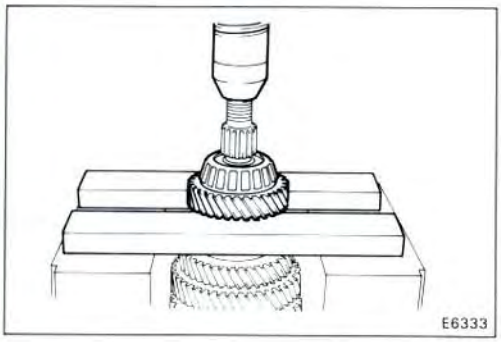
Using dial indicator, measure the oil clearance between the gear and shaft.

Standard clearance:

1st gear	0.009 — 0.051 mm (0.0004 — 0.0020 in.)
2nd gear	0.009 — 0.053 mm (0.0004 — 0.0020 in.)

Maximum clearance: 0.080 mm (0.003 in.)

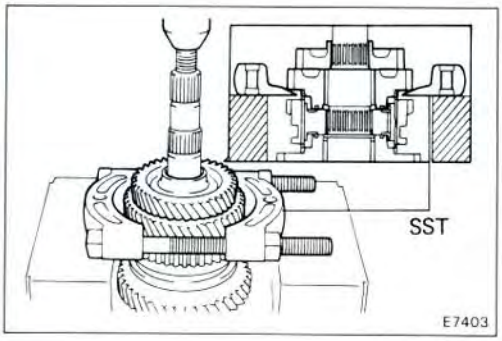
If the clearance exceeds the limit, replace the gear, needle roller bearing or shaft.



3. REMOVE OUTPUT SHAFT REAR BEARING, FOURTH DRIVEN GEAR AND SPACER

(a) Using a press, remove the bearing and 4th driven gear.

(b) Remove the spacer.

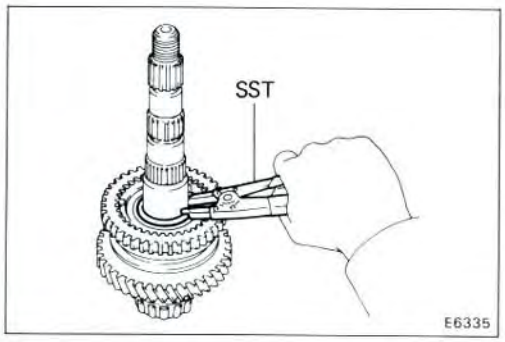


4. REMOVE THIRD DRIVEN GEAR AND SECOND GEAR

Using SST and a press, remove the 3rd driven gear and 2nd gear.

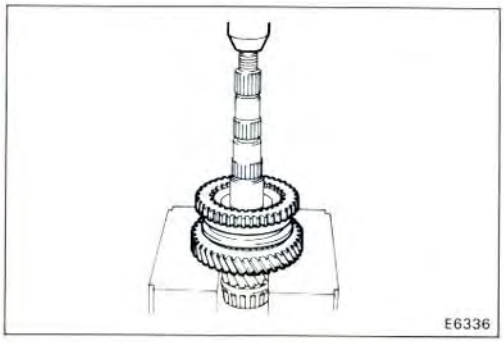
SST 09950-00020

5. REMOVE NEEDLE ROLLER BEARINGS, SPACER AND SYNCHRONIZER RING



6. REMOVE SNAP RING

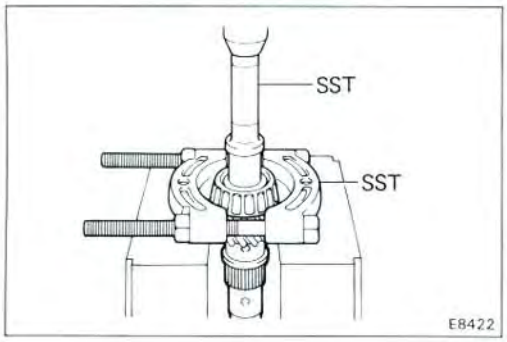
Using snap ring pliers, remove the snap ring.



7. REMOVE NO.1 HUB SLEEVE ASSEMBLY AND FIRST GEAR

Using a press, remove No.1 hub sleeve and 1st gear.

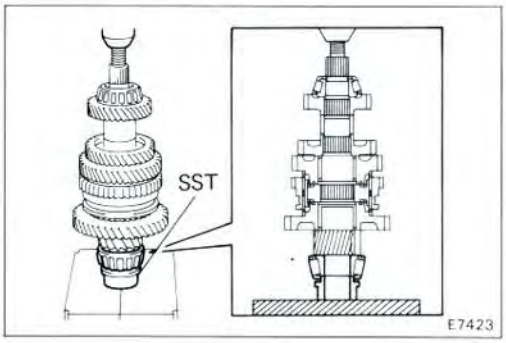
8. REMOVE SYNCHRONIZER RING AND NEEDLE ROLLER BEARING



9. IF NECESSARY, REPLACE OUTPUT SHAFT FRONT BEARING

(a) Using SST and a press, remove the bearing.

SST 09307-12010, 09950-00020



(b) Using SST and a press, install the new bearing.

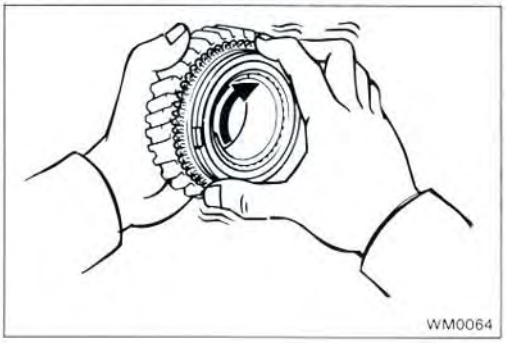
SST 09316-60010 (09316-00070)

INSPECTION OF OUTPUT SHAFT COMPONENT PARTS

1. INSPECT SYNCHRONIZER RINGS

(a) Check for wear or damage.

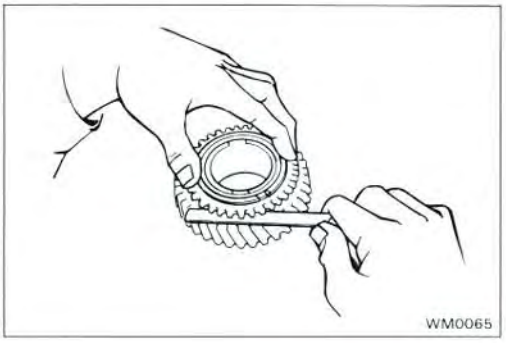
(b) Turn the ring and push it in to check the braking action.



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

Minimum clearance: 0.6 mm (0.024 in.)

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

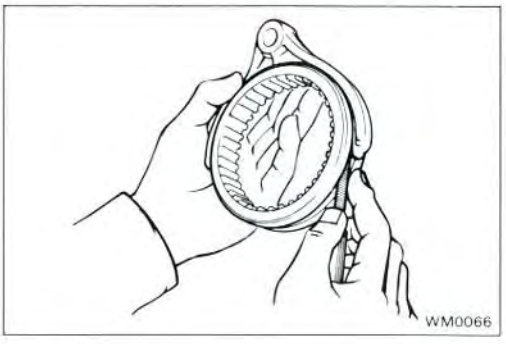


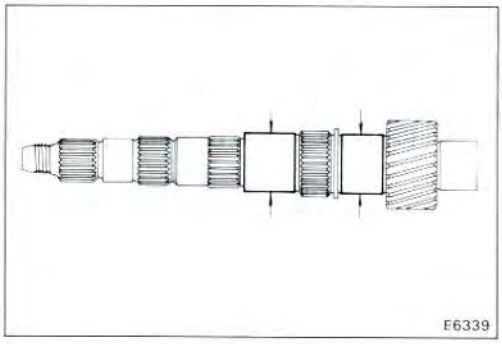
2. MEASURE CLEARANCE OF NO.1 SHIFT FORK AND HUB SLEEVE

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

Maximum clearance: 1.0 mm (0.039 in.)

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



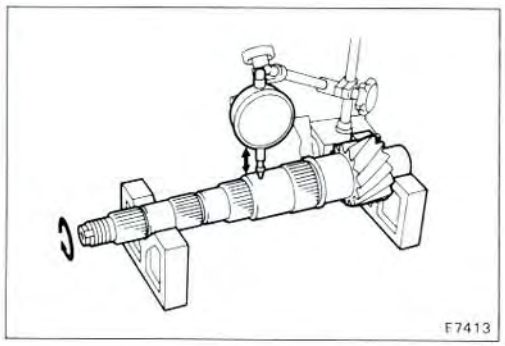

E6339

3. INSPECT OUTPUT SHAFT

(a) Check the output shaft for wear or damage.

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

Minimum outer diameter: 38.950 mm (1.5335 in.)


E7413

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

Maximum clearance: 0.060 mm (0.0024 in.)

ASSEMBLY OF OUTPUT SHAFT ASSEMBLY

(See page MT-28)

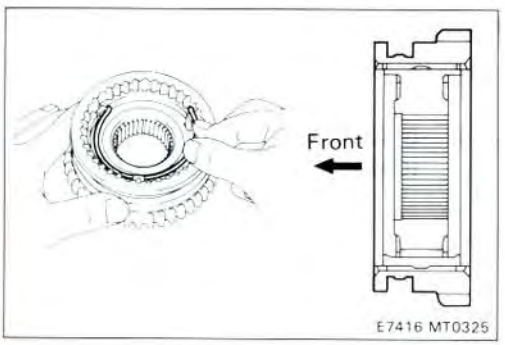
NOTE: Coat all of the sliding and rotating surface with gear oil before assembly.

1. INSERT NO.1 CLUTCH HUB INTO HUB SLEEVE

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

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

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



E7416 MT0325

2. INSTALL NEEDLE ROLLER BEARINGS, FIRST GEAR, SYNCHRONIZER RING AND NO.1 HUB SLEEVE TO OUTPUT SHAFT

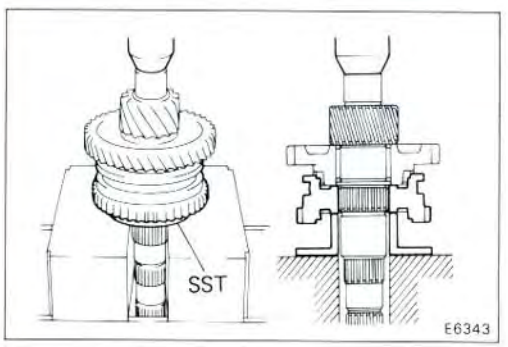
(a) Apply MP grease to the needle roller bearings.

(b) Install the 1st gear.

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

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

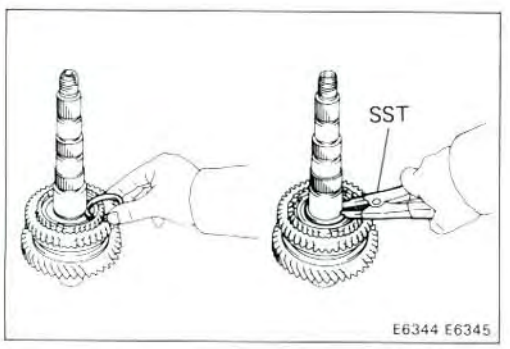
SST 09316-60010 (09316-00040)



E6343

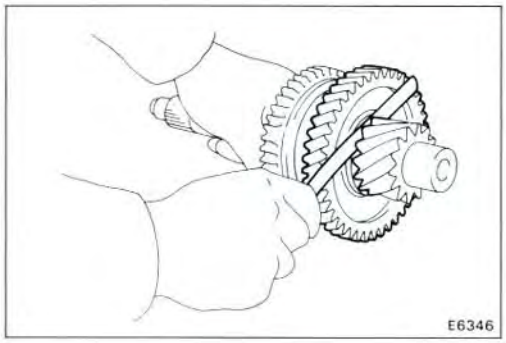
3. INSTALL SNAP RING

Select a snap ring that will allow minimum axial play and install it on the shaft.



E6344 E6345

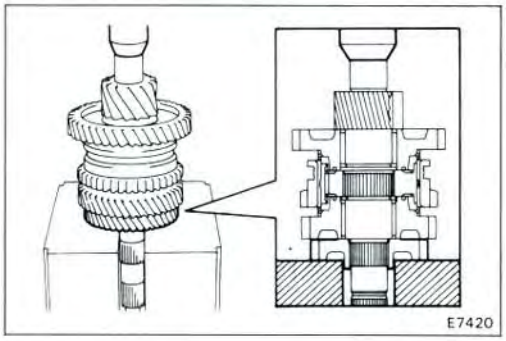
Mark	Thickness	mm (in.)
A	2.80 — 2.85	(0.1102 — 0.1122)
B	2.85 — 2.90	(0.1122 — 0.1142)
C	2.90 — 2.95	(0.1142 — 0.1161)
D	2.95 — 3.00	(0.1161 — 0.1181)
E	3.00 — 3.05	(0.1181 — 0.1201)
F	3.05 — 3.10	(0.1201 — 0.1220)
G	3.10 — 3.15	(0.1220 — 0.1240)



4. MEASURE FIRST GEAR THRUST CLEARANCE

Using a feeler gauge, measure the 1st gear thrust clearance.

Standard clearance: 0.10 — 0.35 mm (0.0039 — 0.0138 in.)



5. INSTALL SPACER, NEEDLE ROLLER BEARING, SYNCHRONIZER RING, SECOND GEAR AND THIRD DRIVEN GEAR

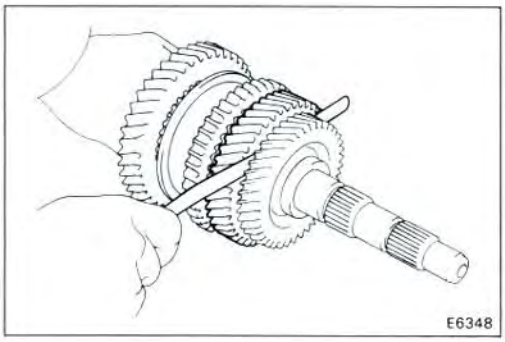
(a) Install the spacer.

(b) Apply MP grease to the needle roller bearing.

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

(d) Install the 2nd gear.

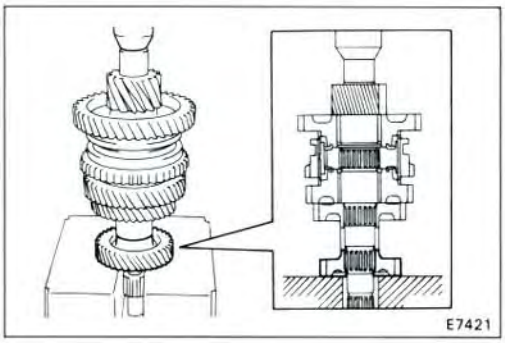
(e) Using a press, install the 3rd driven gear.



6. MEASURE SECOND GEAR THRUST CLEARANCE

Using a feeler gauge, measure the 2nd gear thrust clearance.

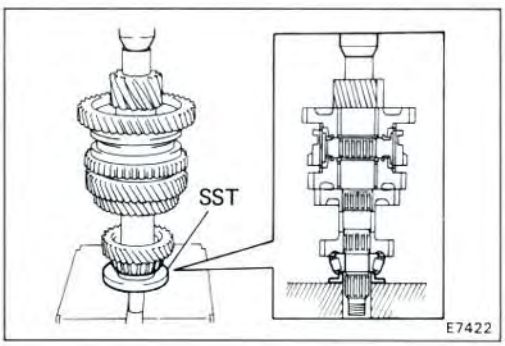
Standard clearance: 0.10 — 0.45 mm (0.0039 — 0.0177 in.)



7. INSTALL SPACER AND FOURTH DRIVEN GEAR

(a) Install the spacer.

(b) Using a press, install the 4th driven gear.

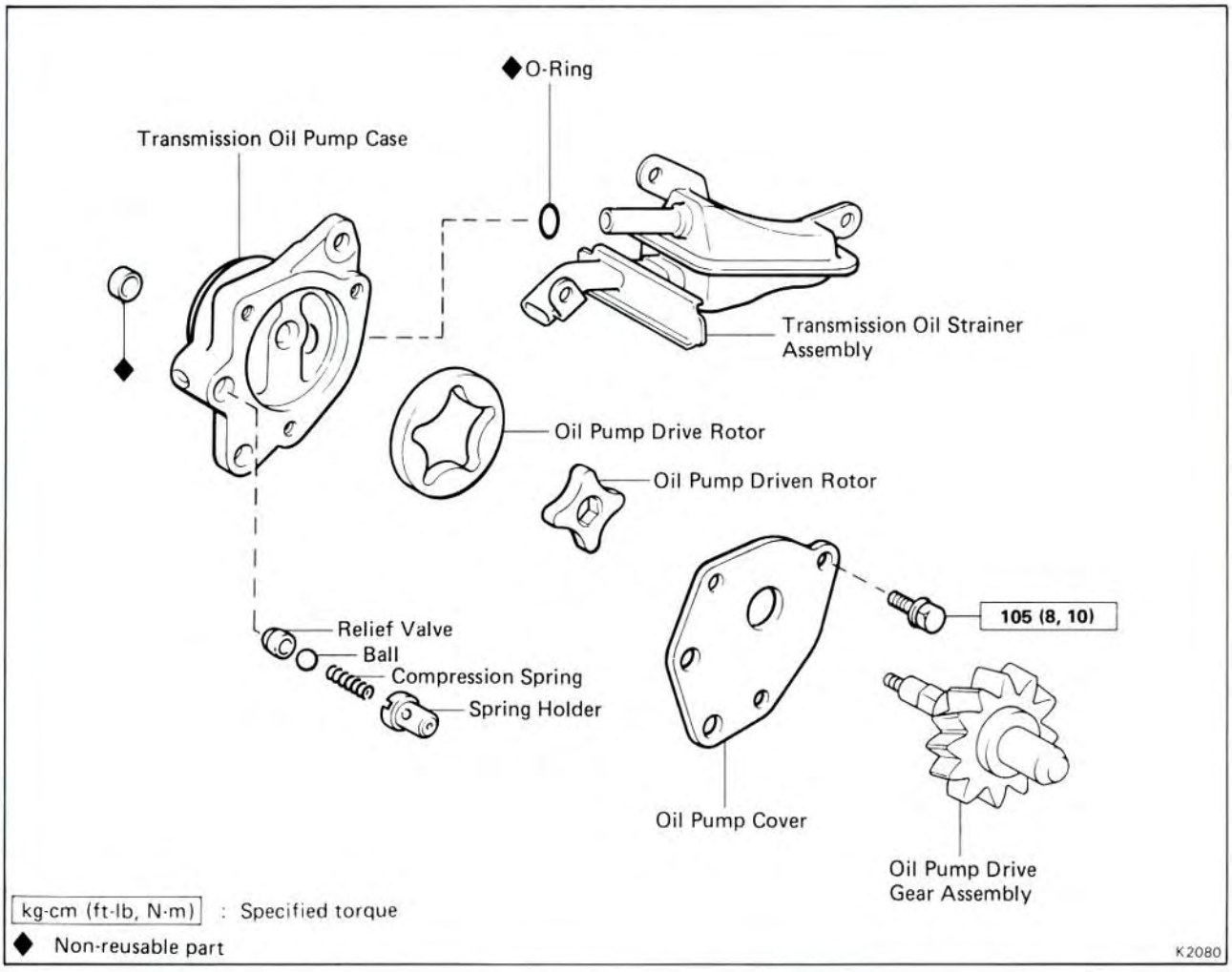


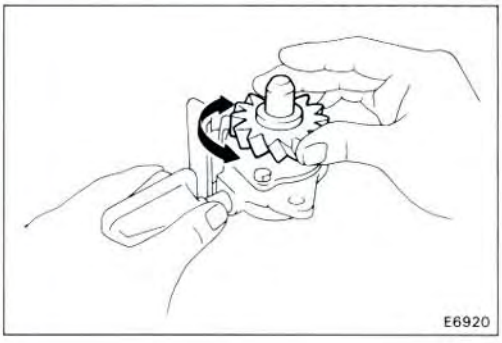
8. INSTALL OUTPUT SHAFT REAR BEARING

Using SST and a press, install the output shaft rear taper roller bearing.

SST 09506-30012

Oil Pump

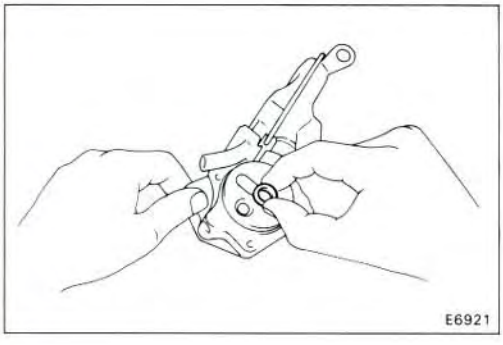




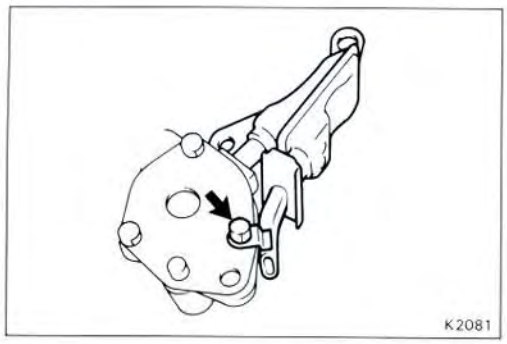
DISASSEMBLY OF OIL PUMP

1. CHECK OPERATION OF OIL PUMP

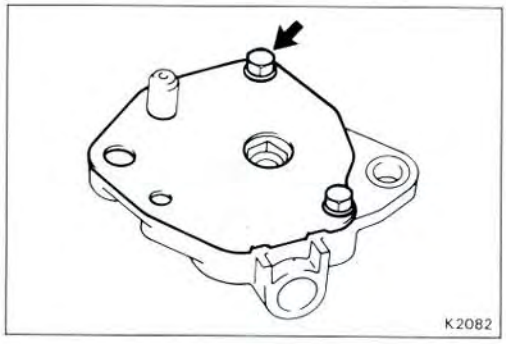
Install the oil pump drive gear to the drive rotor, check that the drive rotor turns smoothly.



2. REMOVE GASKET TO OIL PUMP CASE

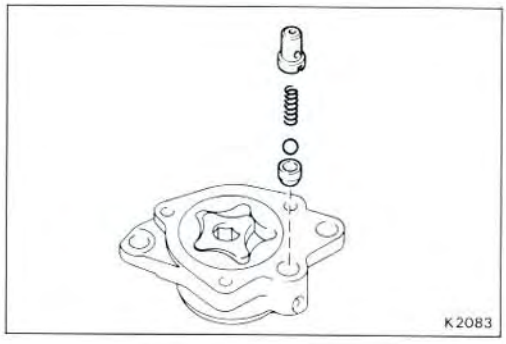


3. **REMOVE BOLT AND OIL STRAINER**

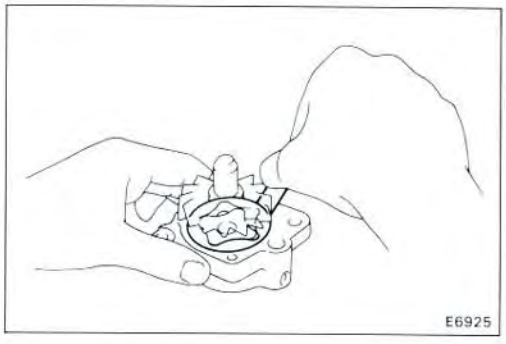


4. **REMOVE OIL PUMP COVER**

(a) Hold the oil pump cover, remove the two bolts and the cover.



(b) Remove the spring holder, spring, ball and relief valve seat.



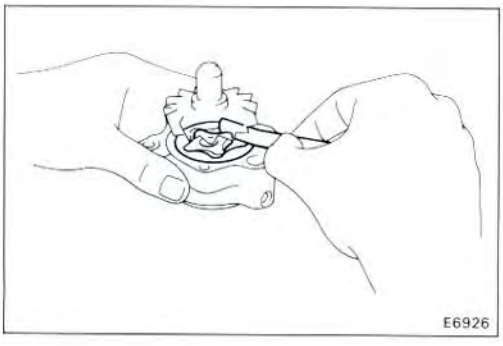
5. **CHECK ROTOR BODY CLEARANCE**

(a) Install the oil pump drive gear to the drive rotor.

(b) Using a feeler gauge, measure the body clearance between the drive rotor and oil pump case.

Standard clearance: **0.10 — 0.16 mm (0.004 — 0.006 in.)**

Maximum clearance: **0.30 mm (0.012 in.)**



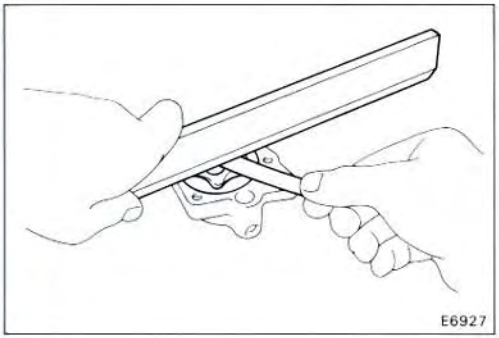
6. **CHECK ROTOR TIP CLEARANCE**

(a) Install the oil pump drive gear to the drive rotor.

(b) Using a feeler gauge, measure the tip clearance between the drive and driven rotors.

Standard clearance: **0.08 — 0.15 mm (0.003 — 0.006 in.)**

Maximum clearance: **0.30 mm (0.012 in.)**

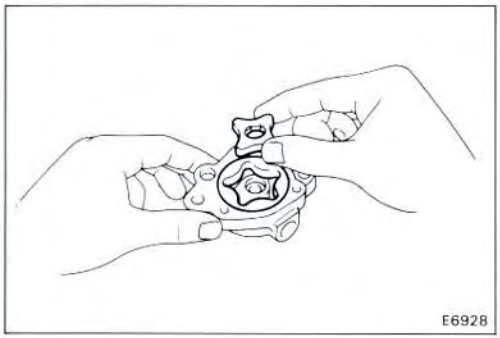


7. CHECK SIDE CLEARANCE

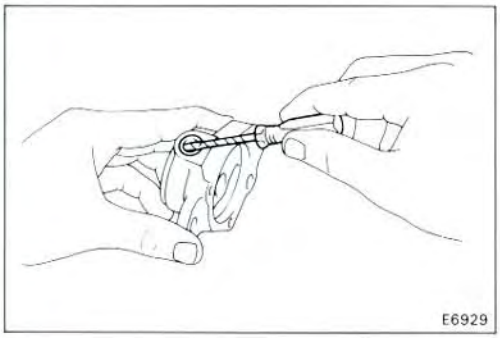
Using a precision straight edge and feeler gauge, measure the side clearance of both rotors.

Standard clearance: **0.03 — 0.08 mm (0.001 — 0.003 in.)**

Maximum clearance: **0.15 mm (0.006 in.)**

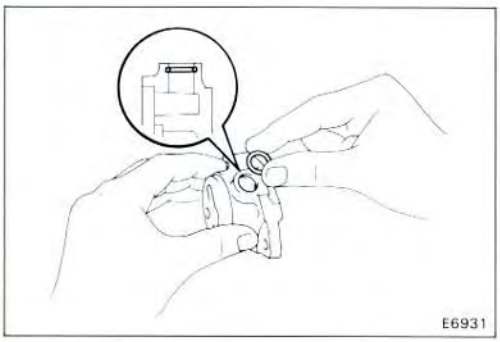


8. REMOVE OIL PUMP DRIVE ROTOR AND DRIVEN ROTOR



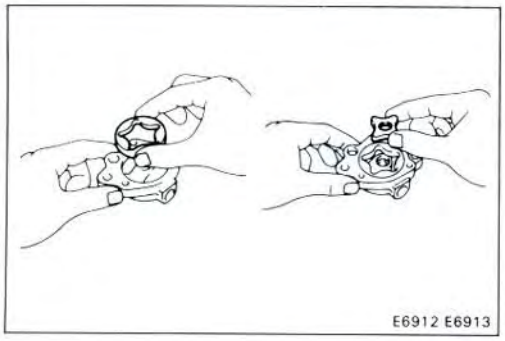
9. IF NECESSARY, REPLACE O-RING

(a) Using a screwdriver, remove the o-ring.



(b) Apply gear oil to the O-ring.

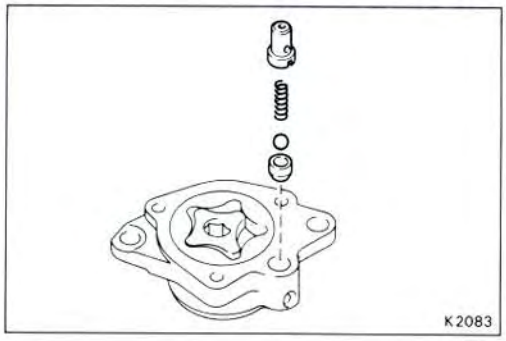
(c) Install the O-ring.


E6912 E6913

ASSEMBLY OF OIL PUMP

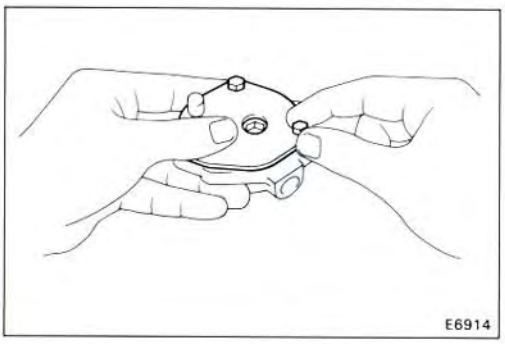
(See page MT-33)

1. INSTALL DRIVEN ROTOR AND DRIVE ROTOR

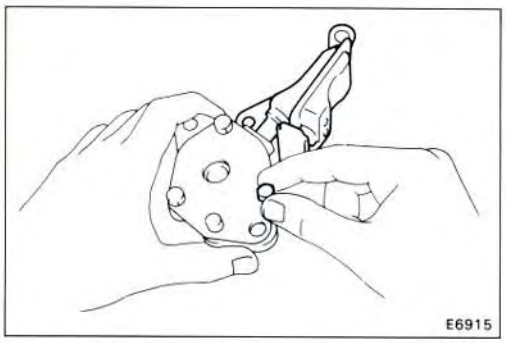

K2083

2. INSTALL OIL PUMP COVER

(a) Install the relief valve, ball, spring and spring holder to the oil pump case.

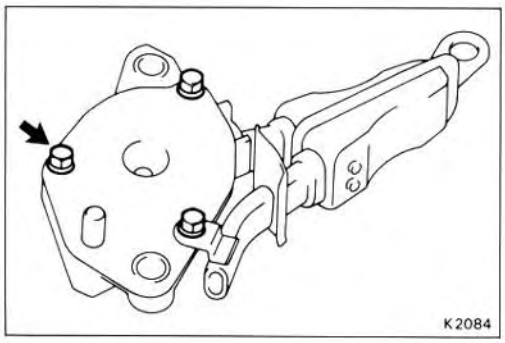

E6914

(b) Hold the oil pump cover, temporarily install the two bolts.


E6915

3. INSTALL OIL STRAINER

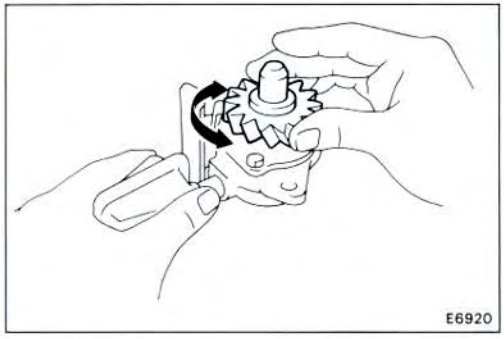
Install the oil strainer to the oil pump case, temporarily install the bolt.


K2084

4. TORQUE OIL PUMP COVER BOLTS

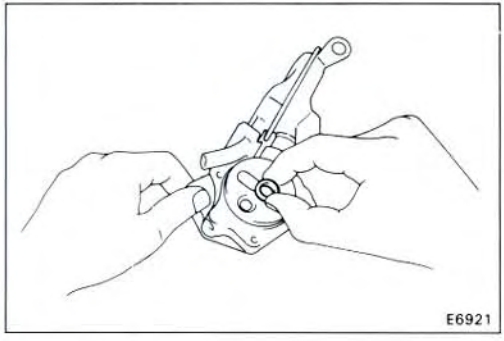
Torque the three bolts evenly.

Torque: 105 kg-cm (8 ft-lb, 10 N·m)



5. CHECK OPERATION OF OIL PUMP

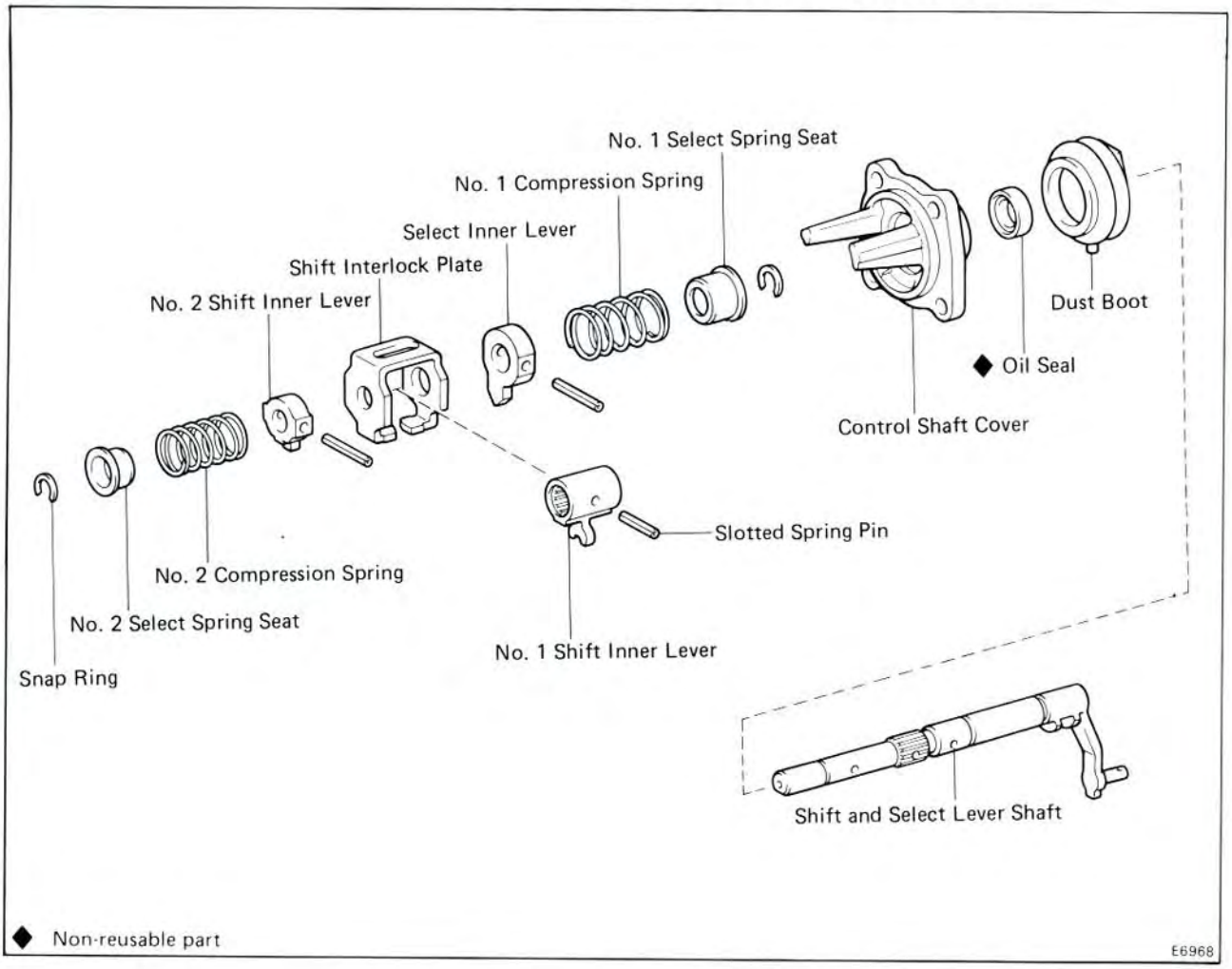
Insert the oil pump drive gear to the drive rotor, check that the drive rotor turns smoothly.

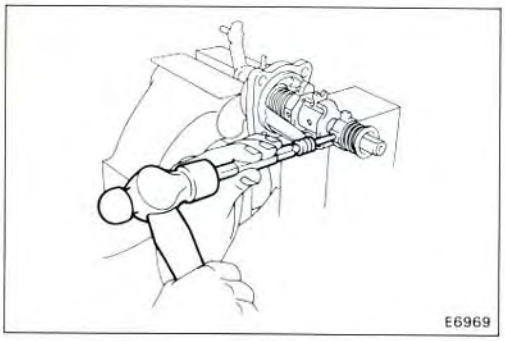


6. INSTALL GASKET

Install the new gasket to the oil pump case.

Shift and Select Lever Shaft

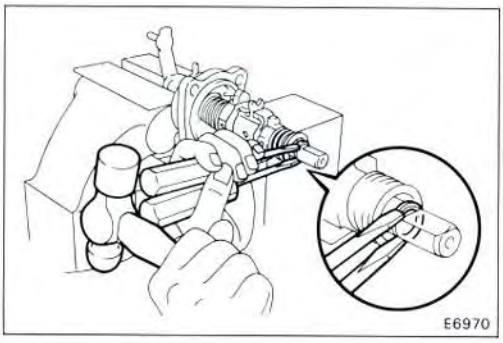




DISASSEMBLY OF SHIFT AND SELECT LEVER SHAFT

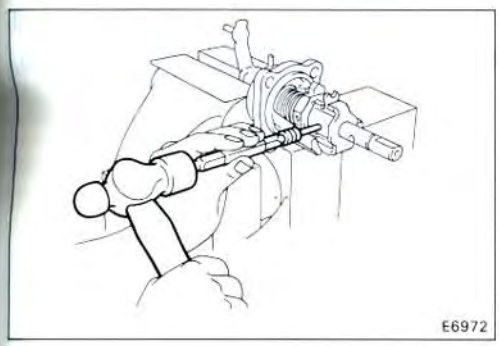
1. REMOVE NO.2 SHIFT INNER LEVER

(a) Using a pin punch and a hammer, drive out the slotted spring pin from No.2 shift inner lever.



(b) Using two screwdrivers and a hammer, remove the snap ring.

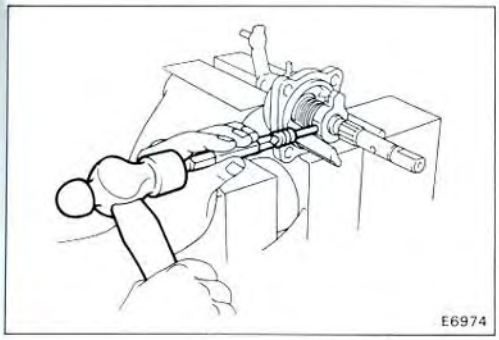
(c) Remove No.2 select spring seat, No.2 compression spring and No.2 shift inner lever.



2. REMOVE SHIFT INTERLOCK PLATE AND NO.1 SHAFT INNER LEVER

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

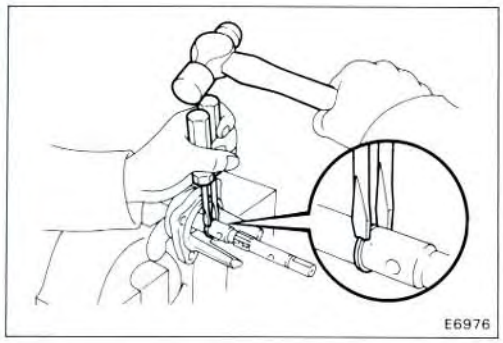
(b) Remove the shift interlock plate and No.1 shift inner lever.



3. REMOVE SELECT INNER LEVER

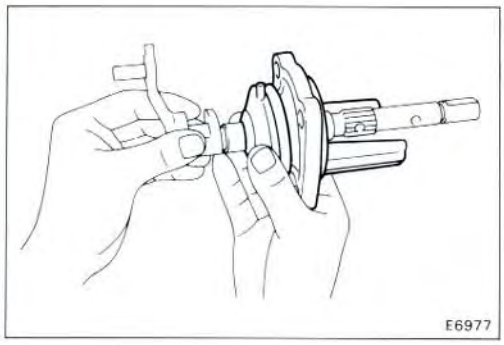
(a) Using a pin punch and hammer, drive out the slotted spring pin.

(b) Remove the select inner lever, No.1 compression spring and No.1 select spring seat.

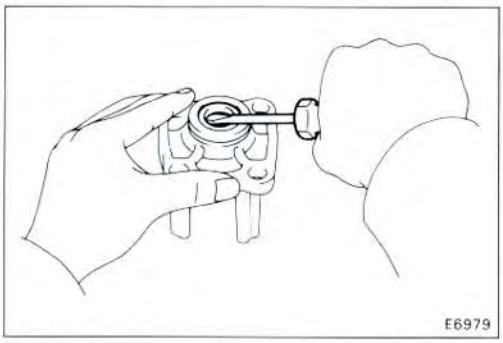


4. REMOVE SNAP RING

Using two screwdrivers and a hammer, remove the snap ring.

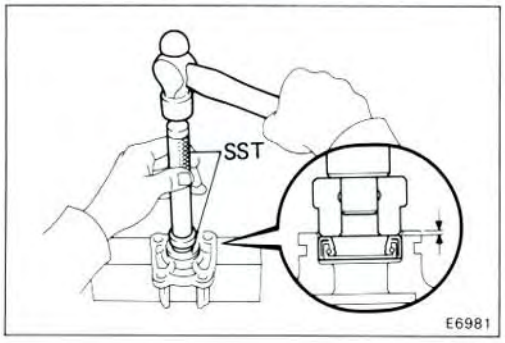


5. REMOVE CONTROL SHAFT COVER AND DUST BOOT



6. IF NECESSARY, REPLACE CONTROL SHAFT COVER OIL SEAL

(a) Using a screwdriver, remove oil seal.

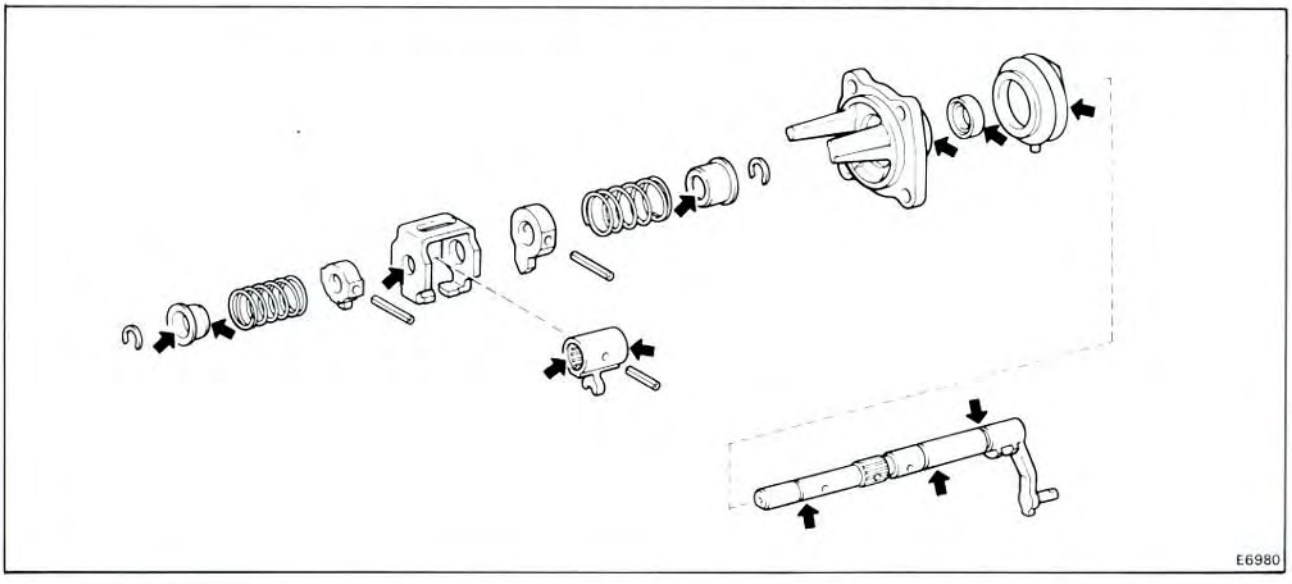


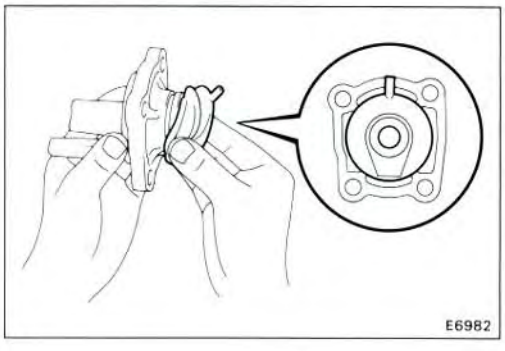
(b) Using SST and a hammer, drive in the new oil seal.
SST 09620-30010 (09627-30010 and 09631-00020)
Oil seal depth: 0 — 1.0 mm (0 — 0.039 in.)

(c) Apply MP grease to the oil seal.

ASSEMBLY OF SHIFT AND SELECT LEVER SHAFT

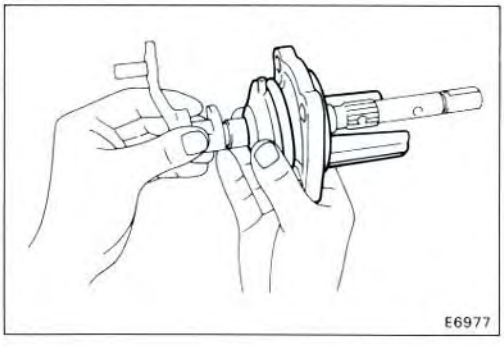
1. APPLY MP GREASE TO PARTS, AS SHOWN



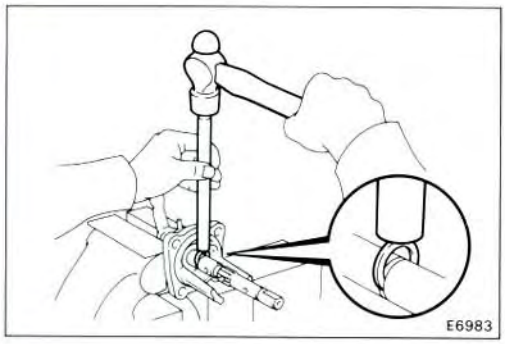


2. INSTALL SHIFT AND SELECT LEVER SHAFT

(a) Install the boot to the control shaft cover, as shown.

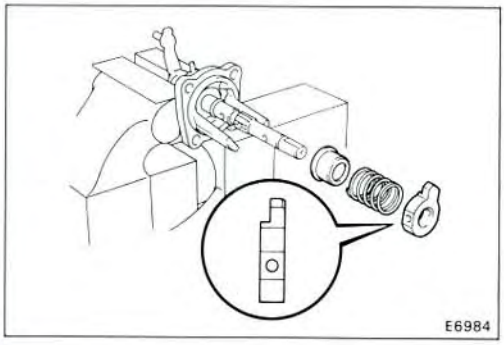


(b) Install the shift and select lever shaft to the control shaft cover.



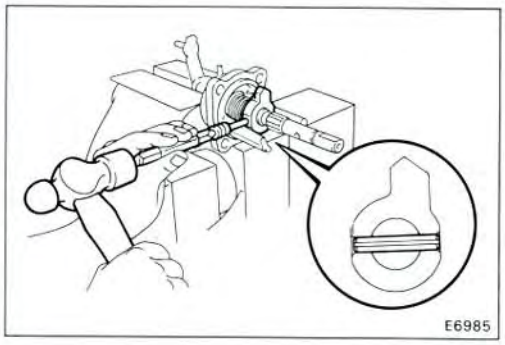
3. INSTALL SNAP RING

Using a brass bar and hammer, install the snap ring and spring seat.

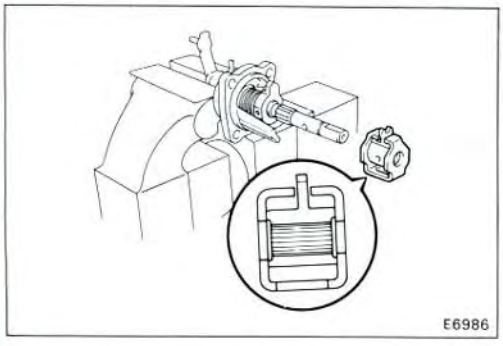


4. INSTALL SELECT INNER LEVER

(a) Install the No.1 spring seat, No.1 select spring and select inner lever, as shown.

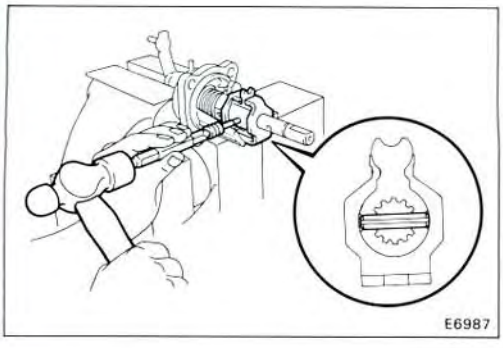


(b) Using a pin punch and hammer, drive in the slotted spring pin.



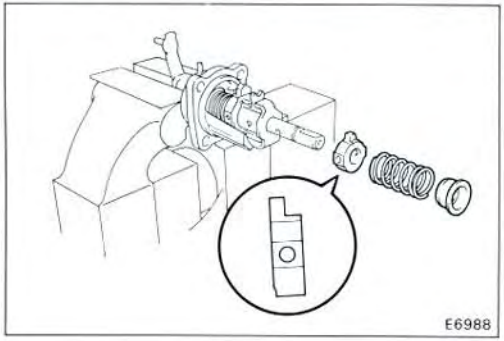
5. INSTALL SHIFT INTERLOCK PLATE AND NO.1 SHIFT INNER LEVER

(a) Install the shift interlock plate and No.1 shift inner lever.



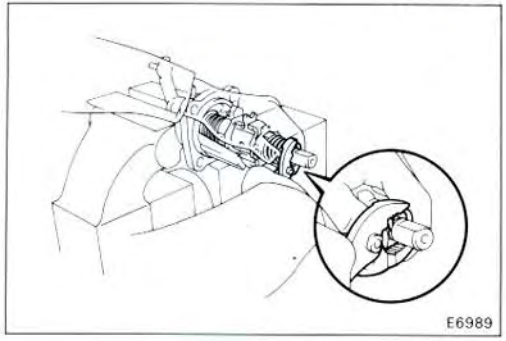
(b) Using a pin punch and hammer, drive in the slotted spring pin.

(c) Check that the shift interlock plate turns smoothly.

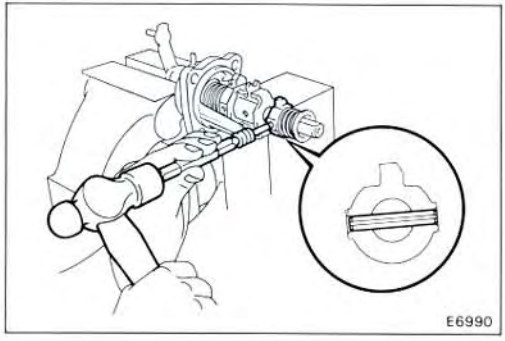


6. INSTALL NO.2 SHIFT INNER LEVER

(a) Install the No.2 shift inner lever, No.2 compression spring and No.2 select spring seat, as shown.

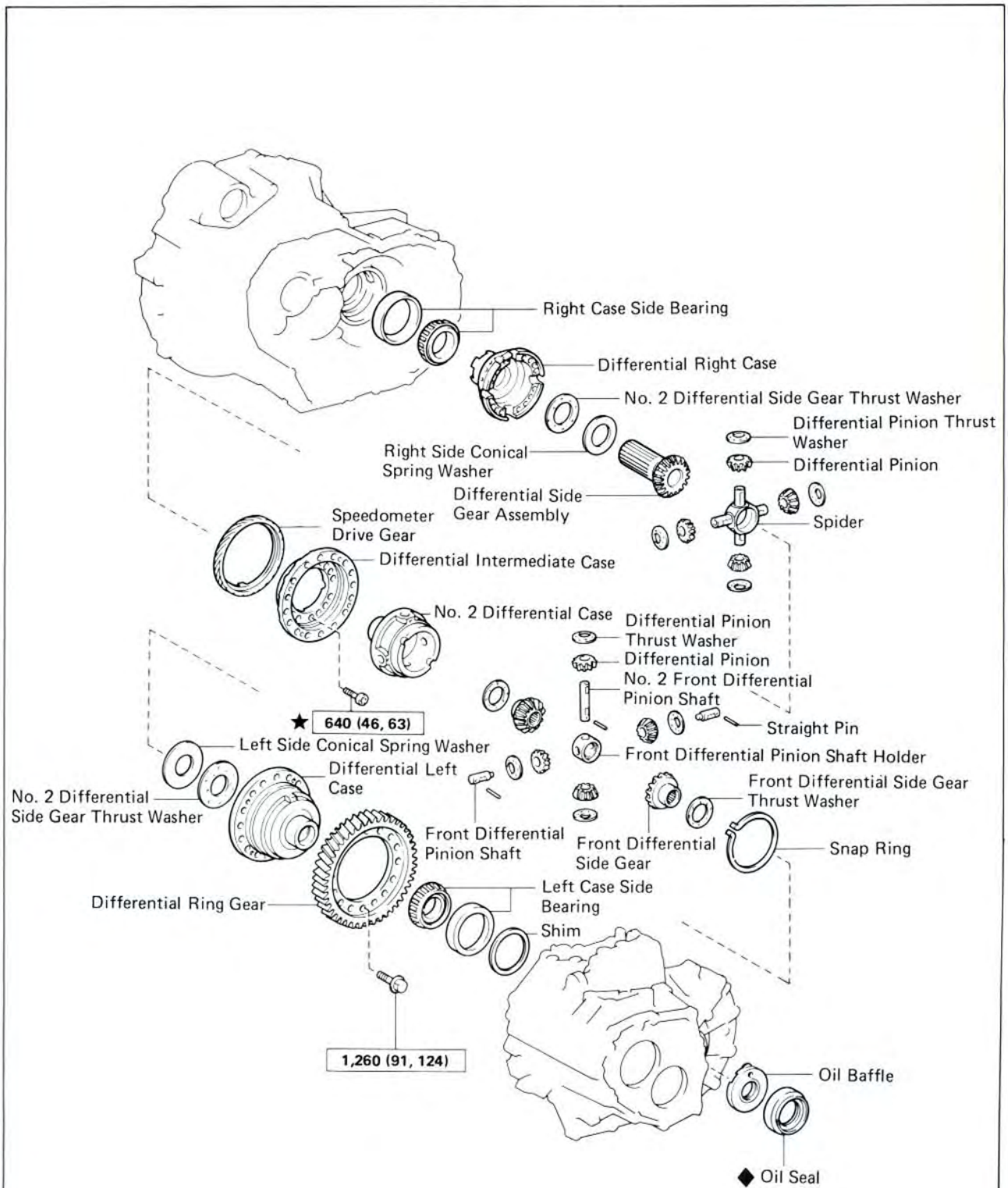


(b) Install the snap ring.



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

Differential Case

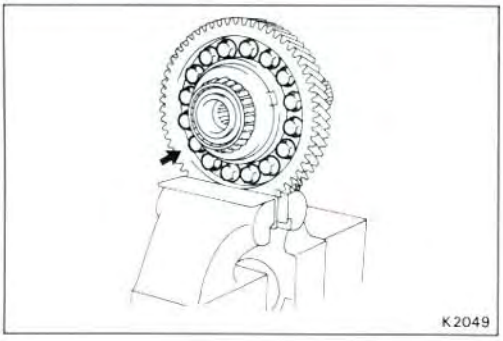


kg-cm (ft-lb, N·m) : Specified torque

◆ : Non-reusable part

★ : Precoated part

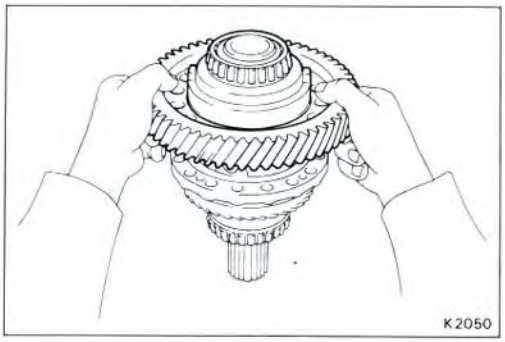
K2048



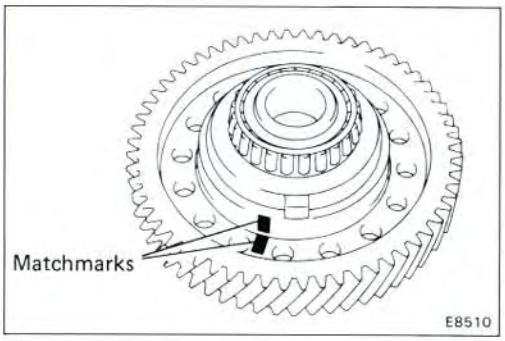
DISASSEMBLY OF DIFFERENTIAL CASE

1. REMOVE DIFFERENTIAL LEFT CASE

(a) Remove the sixteen bolts.

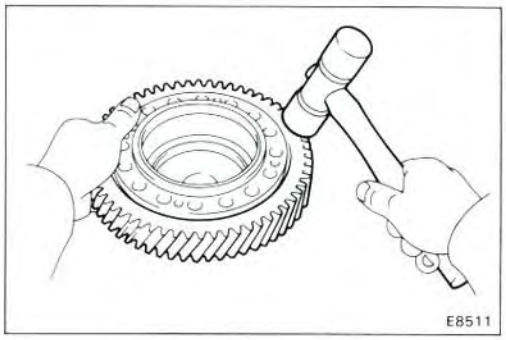


(b) Remove the differential left case up ward.

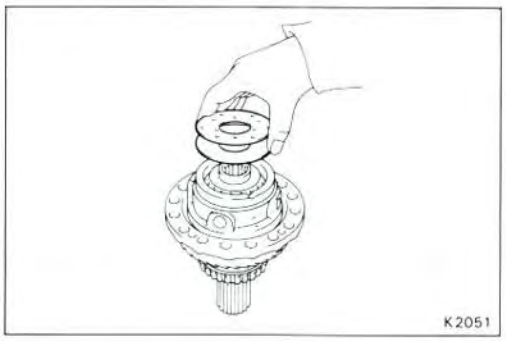


2. REMOVE RING GEAR

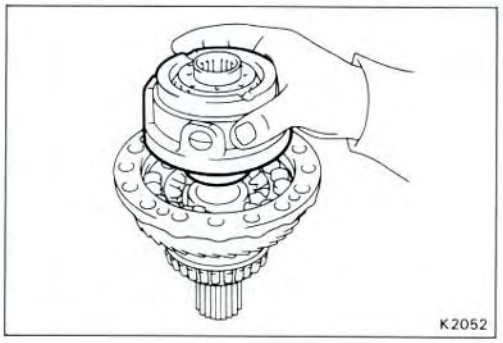
(a) Place the matchmarks on both the differential left case and ring gear.



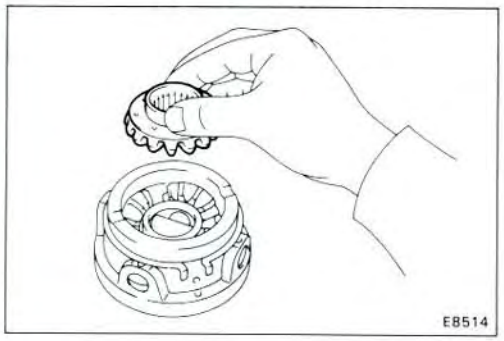
(b) Using a plastic hammer, tap out the ring gear.



3. REMOVE NO.2 DIFFERENTIAL SIDE GEAR THRUST WASHER AND CONICAL SPRING WASHER



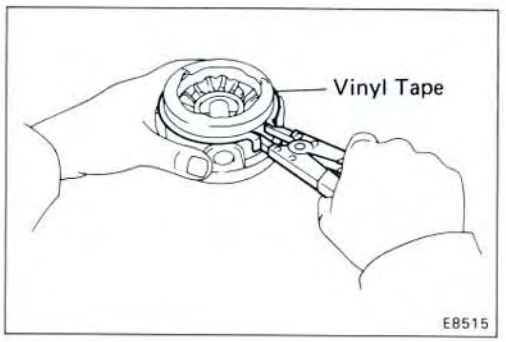
4. REMOVE DIFFERENTIAL NO.2 CASE ASSEMBLY



5. DISASSEMBLE DIFFERENTIAL NO.2 CASE

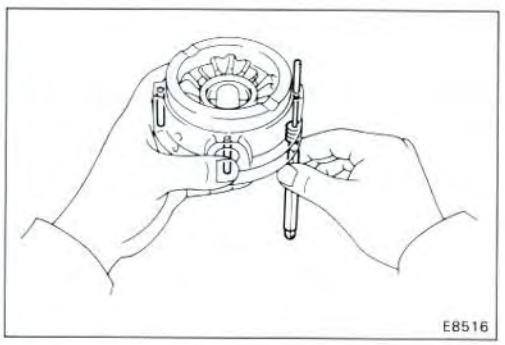
(a) Remove the front differential side gear together with thrust washer.

(b) Remove the front differential side gear thrust washer from the side gear.

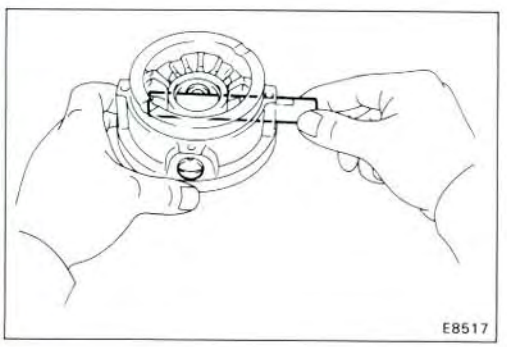


(c) Using snap ring pliers, remove the snap ring.

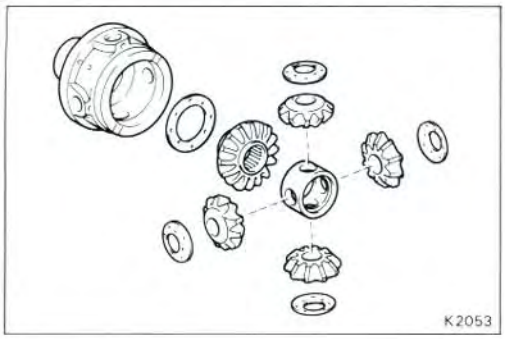
NOTE: Before removing the shaft snap ring, wrap vinyl tape around the case prevent from damege.



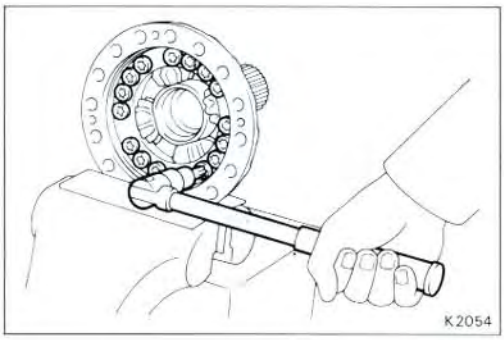
(d) Using a pin punch, push out the three straight pins.



(e) Remove the two front differential pinion shafts and No.2 front differential pinion shaft.

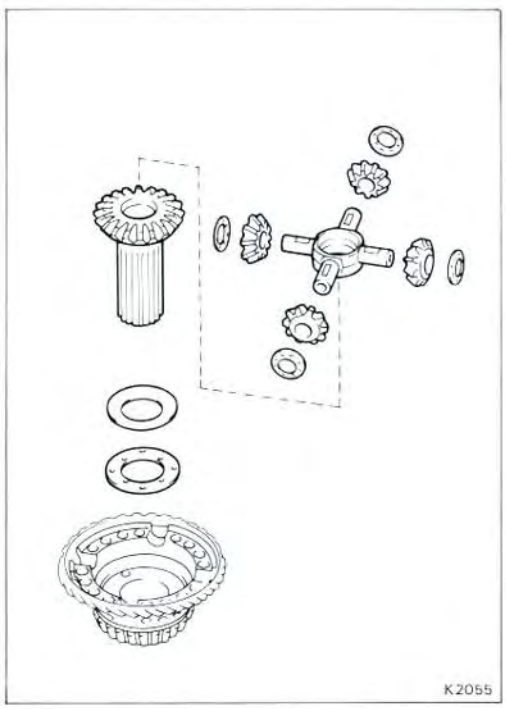


(f) Remove the pinion shaft holder, four differential pinions, pinion thrust washers, front side gear and thrust washer from the differential No.2 case.



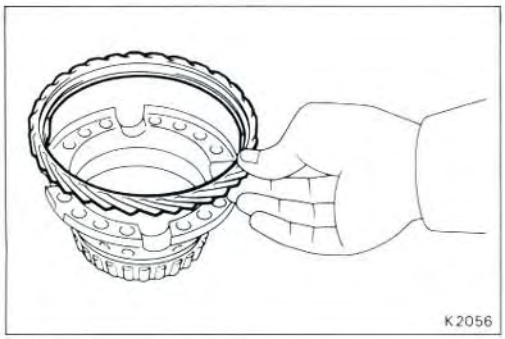
6. REMOVE DIFFERENTIAL INTERMEDIATE CASE

Using a torx wrench, remove the sixteen torx screws and differential intermediate case.

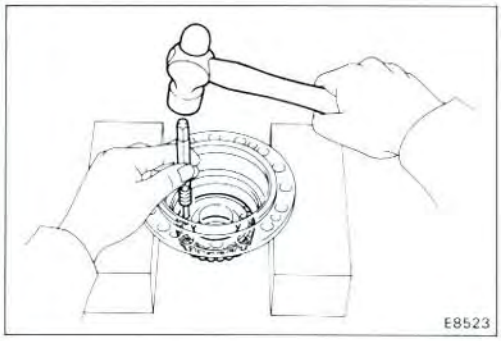


7. DISASSEMBLY DIFFERENTIAL RIGHT CASE

(a) Remove the differential spider, four pinions, pinion thrust washers, side gear subassembly, conical spring washer and No.2 side gear thrust washer.

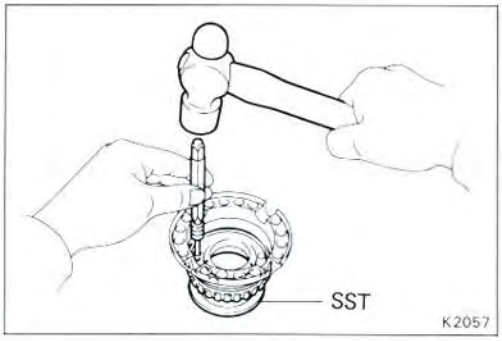


8. REMOVE SPEEDOMETER DRIVE GEAR



9. **REMOVE SIDE BEARING**

(a) Using a pin punch and hammer, drive out the side bearing evenly through two holes in the differential left case.



(b) Using a pin punch and hammer, drive out the side bearing evenly through four holes in the differential right case.

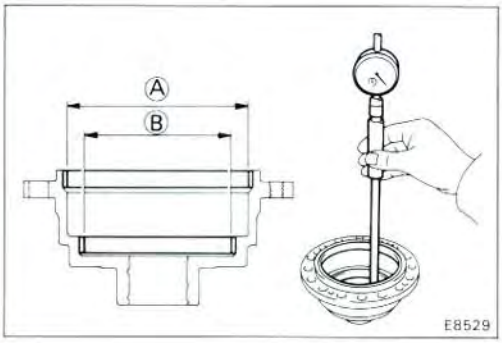
SST 09316-60010 (09316-00020)

INSPECTION OF DIFFERENTIAL CASE

1. **MEASURE DIFFERENTIAL LEFT CASE**

Using a cylinder gauge, measure the inner diameter of the differential left case bushing.

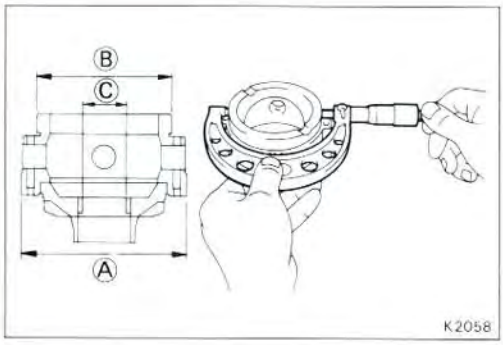
Standard diameter:	**A**	**111.000 — 111.035 mm (4.3701 — 4.3714 in.)**
	B	**90.500 — 90.535 mm (3.5630 — 3.5644 in.)**
Maximum diameter:	**A**	**110.060 mm (4.3331 in.)**
	B	**90.560 mm (3.5653 in.)**



2. **MEASURE DIFFERENTIAL NO.2 CASE**

Using a micrometer, measure the outer diameter of differential No.2 case.

Standard diameter:	**A**	**110.929 — 110.964 mm (4.3673 — 4.3686 in.)**
	B	**90.429 — 90.464 mm (3.5606 — 3.5615 in.)**
	C	**35.000 — 35.025 mm (1.3778 — 1.3789 in.)**
Minimum diameter:	**A**	**110.850 mm (4.3642 in.)**
Minimum diameter:	**B**	**90.350 mm (3.5571 in.)**
Maximum diameter:	**C**	**35.030 mm (1.3791 in.)**

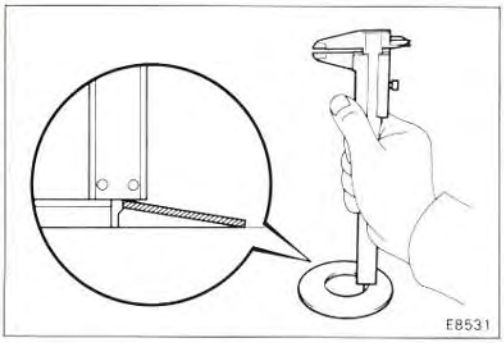


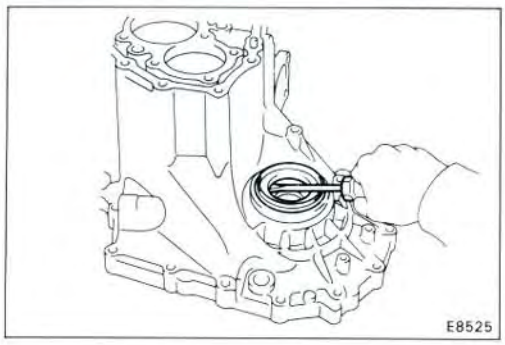
3. **MEASURE CONICAL SPRING WASHER**

Using a caliper, measure the height of the conical spring washer.

Standard height:
Left conical spring washer
2.60 — 2.80 mm (0.102 — 0.110 in.)
Right conical spring washer
1.70 — 1.90 mm (0.067 — 0.075 in.)

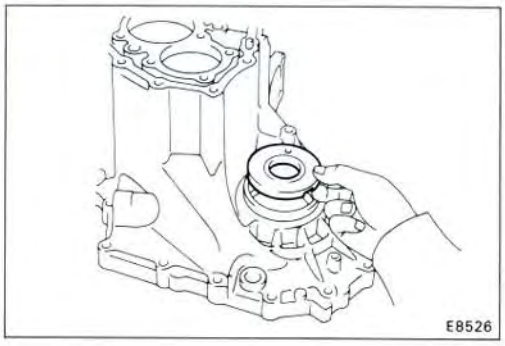
Minimum height:
Left conical spring washer
2.50 mm (0.098 in.)
Right conical spring washer
1.60 mm (0.063 in.)



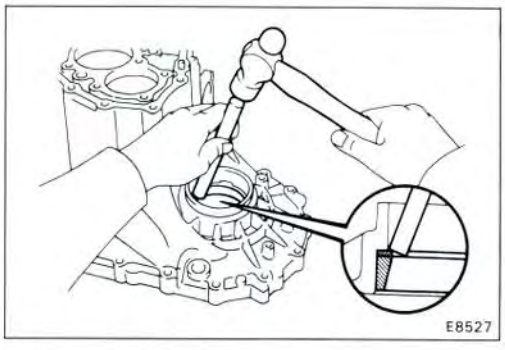


4. **(Transmission Case Side)**
IF NECESSARY, REPLACE OIL SEAL AND TAPERED ROLLER BEARING OUTER RACE

(a) Using a screwdriver, remove the oil seal.

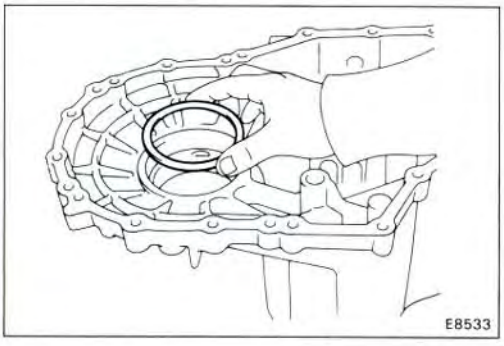


(b) Remove the transmission oil baffle.



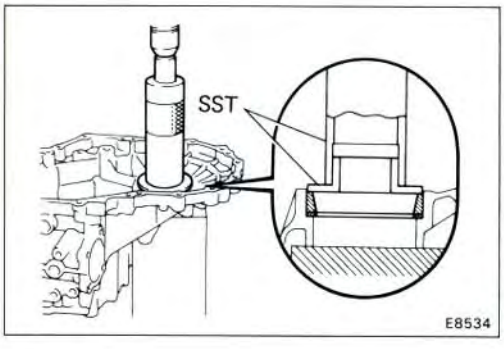
(c) Using a brass bar and hammer, drive out the bearing outer race lightly and evenly.

(d) Remove the adjust shim.



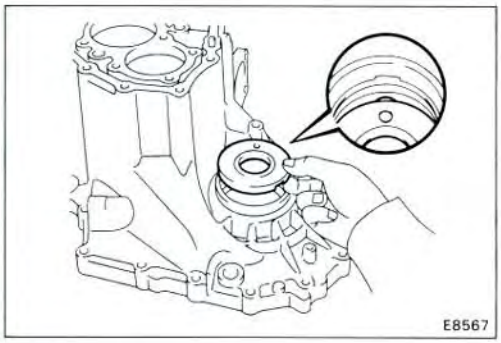
(e) Install the adjust shim.
(See page MT-57)

NOTE: First select and install a shim of lesser thickness than before.



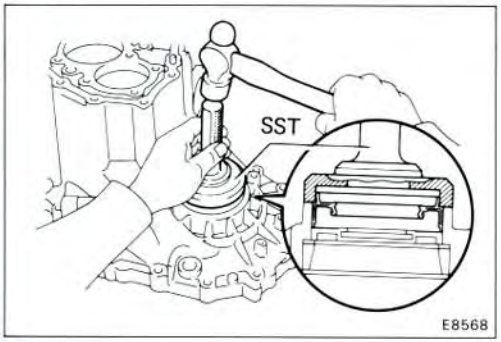
(f) Using SST and a press, install the taper roller bearing outer race.

SST 09316-60010 (09316-00010, 09316-00040)



(g) Install the transmission oil baffle.

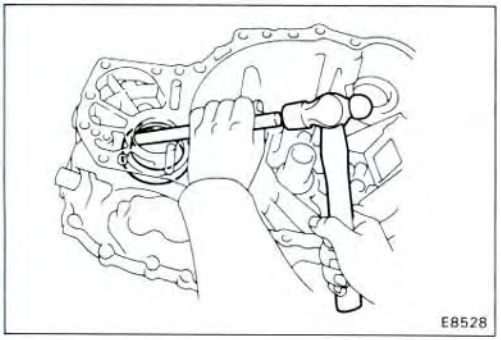
NOTE: Install the transmission oil baffle projection into the case side cutout.



(h) Using SST, drive in a new oil seal.

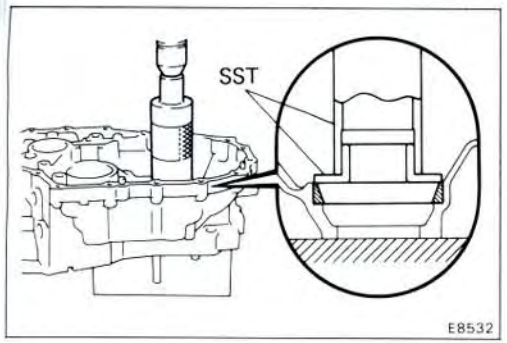
SST 09223-15010

(i) Coat the lip of the oil seal with MP grease.



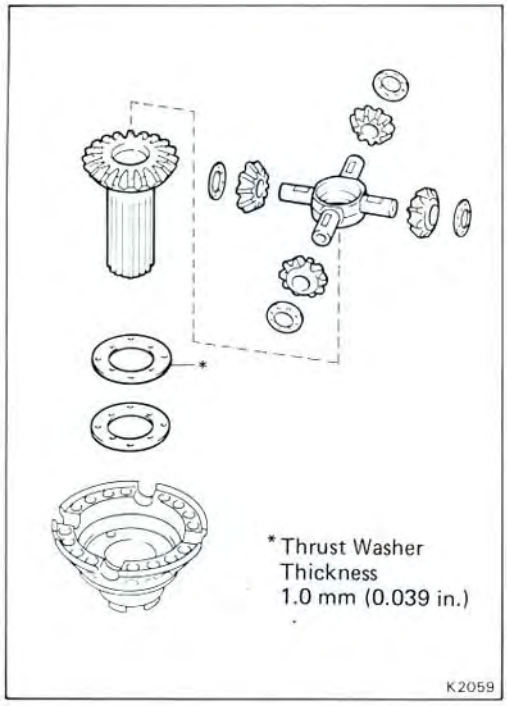
5. (Transaxle Case Side)
IF NECESSARY, REPLACE TAPER ROLLER BEARING OUTER RACE

(a) Using a brass bar and hammer, drive out the bearing outer race lightly and evenly through the cut-out portion on the transaxle case.



(b) Using SST and a press, install the taper roller bearing outer race.

SST 09316-60010 (09316-00010, 09316-00040)



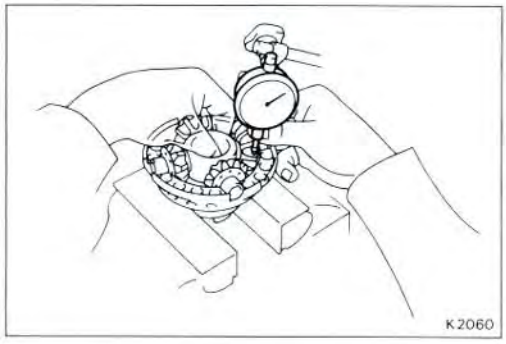
ASSEMBLY OF DIFFERENTIAL CASE

NOTE: Coat all of of the sliding surface with gear oil before assembly.

1. **CHECK AND ADJUST CENTER DIFFERENTIAL SIDE GEAR BACKLASH**
(Differential Side Gear Sub Assembly)

(a) Install the No.2 side gear thrust washer, (Temporarily install) 1.0 mm (0.039 in.) size thrust washer, differential side gear subassembly, spider, four pinions and pinion thrust washers to the differential right case.

NOTE: Thrust washer 1.0 mm (0.039 in.) size is for check of backlash.



(b) Using a dial indicator, measure the backlash of one pinion gear while holding the differential side gear sub assembly toward the case.

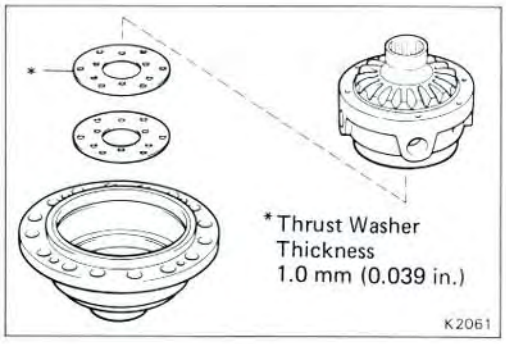
Standard clearance: 0.05 — 0.20 mm (0.0020 — 0.0079 in.)

NOTE: Push the pinion gear of the right side of the differential case.

Referring to the table below, select the No.2 thrust washer which will ensure that the backlash is within specification. Try to select a washer of the same size.

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
—	0.80 (0.0315)	—	1.15 (0.0453)
—	0.85 (0.0335)	—	1.20 (0.0472)
—	0.90 (0.0354)	—	1.25(0.0492)
—	0.95 (0.0374)	—	1.30(0.0512)
—	1.00 (0.0394)	—	1.35(0.0531)
—	1.05 (0.0413)	—	1.40(0.0551)
—	1.10 (0.0433)		

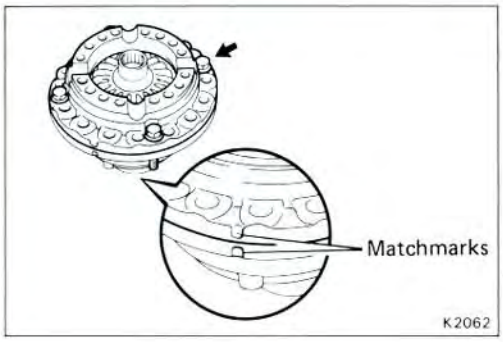
(c) Remove the differential right case.



(No.2 Differential Case)

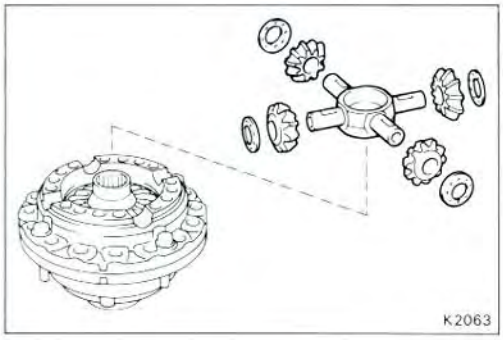
(a) Install the No.2 side gear thrust washer, (Temporarily install) 1.0 mm (0.039 in.) size thrust washer and differential No.2 case to the differential left case.

NOTE: Thrust washer 1.0 mm (0.039 in.) size is for check of backlash.

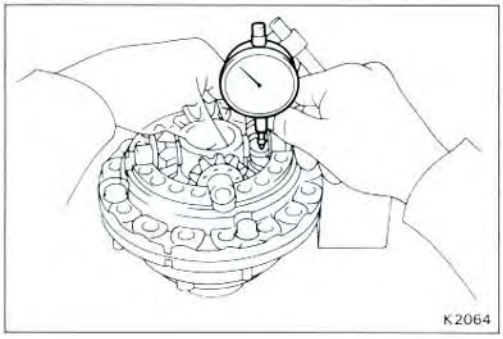


(b) Using four transmission case cover bolts, install the differential intermediate case to the left case.

NOTE: Align the matchmarks on the differential left case and connect the intermediate case.



(c) Install the differential spider, four pinions and pinion thrust washers to the differential intermediate case.



(d) Using a dial indicator, measure the backlash of one pinion gear while holding the No.2 differential case.

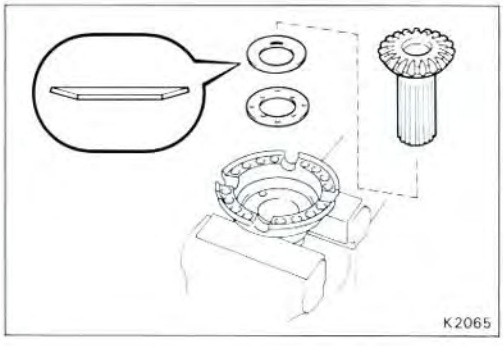
Standard backlash: 0.05 — 0.20 mm (0.0020 — 0.0079 in.)

NOTE: Push the pinion gear of the differential intermediate case.

Referring to the table below, select the thrust washer which will ensure that the backlash is within specification. Try to select a washer of the same size.

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
—	0.80 (0.0315)	—	1.15 (0.0453)
—	0.85 (0.0335)	—	1.20 (0.0472)
—	0.90 (0.0354)	—	1.25 (0.0492)
—	0.95 (0.0374)	—	1.30 (0.0512)
—	1.00 (0.0394)	—	1.35 (0.0531)
—	1.05 (0.0413)	—	1.40 (0.0551)
—	1.10 (0.0433)		

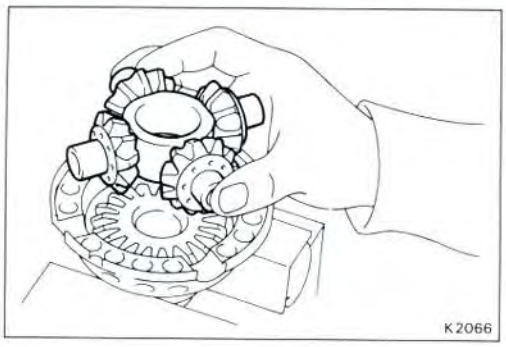
(e) Remove the differential left case.



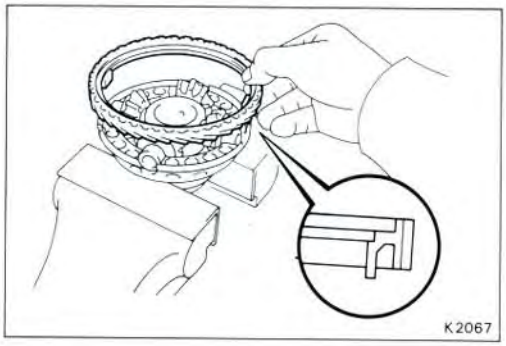
5. ASSEMBLY DIFFERENTIAL RIGHT CASE

(a) Install the No.2 side gear thrust washer (previously selected), conical spring washer and differential side gear subassembly to the right case.

NOTE: Be careful not to mistake the direction of conical spring washer.

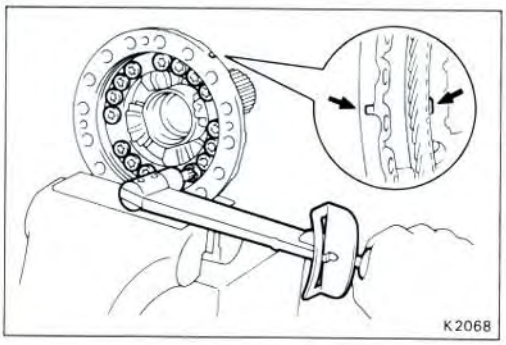


(b) Install the differential spider, four pinion and pinion thrust washers to the differential right case.



6. INSTALL SPEEDOMETER DRIVE GEAR

Install the speedometer drive gear to the differential right case.

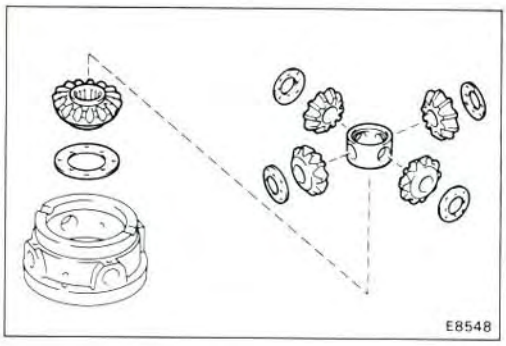


7. INSTALL DIFFERENTIAL INTERMEDIATE CASE

(a) Align the matchmarks on the right case and connect the intermediate case.

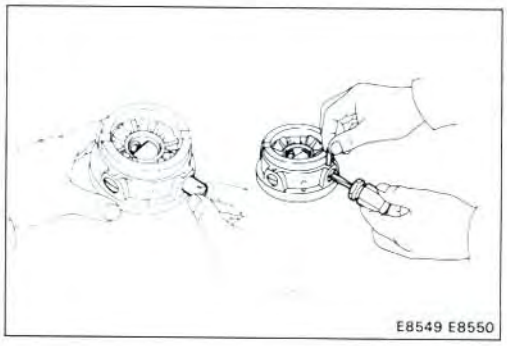
(b) Install the sixteen torx screws. Using a torx wrench, tighten the screws uniformly and a little at a time in succession. Torque the screws.

Torque: 640 kg-cm (46 ft-lb, 63 N·m)



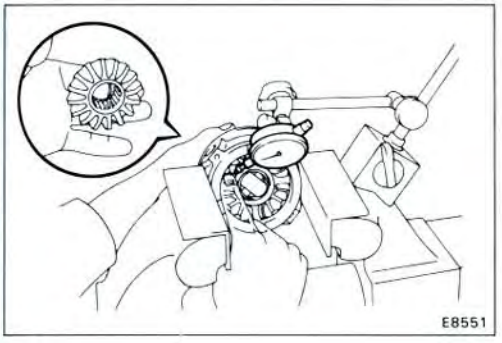
8. CHECK AND ADJUST FRONT SIDE GEAR BACKLASH (Differential No.2 Case)

(a) Install the front differential side gear thrust washer, side gear, pinion shaft holder, four pinions and thrust washers.



(b) Fit No.2 case pin hole and pinion shaft pin hole, install the No.2 pinion shaft and two pinion shafts to the No.2 case.

(c) Install the three straight pins.



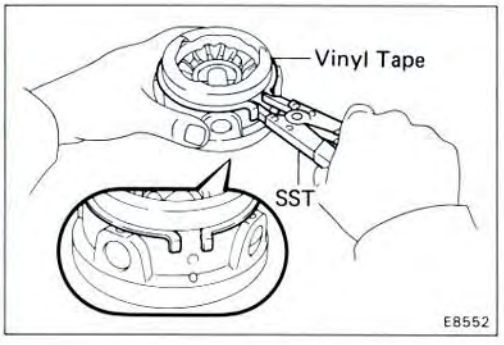
(d) Using a dial indicator, measure the backlash of one pinion gear while holding the front differential side gear toward the case.

Standard backlash: 0.05 — 0.20 mm (0.0020 — 0.0079 in.)

NOTE: Do not mount the surface of No.2 differential case which contacts with bushing in a vise.

Referring to the table below, select the thrust washer which will ensure that the backlash is within specification. Try to select a washer of the same size.

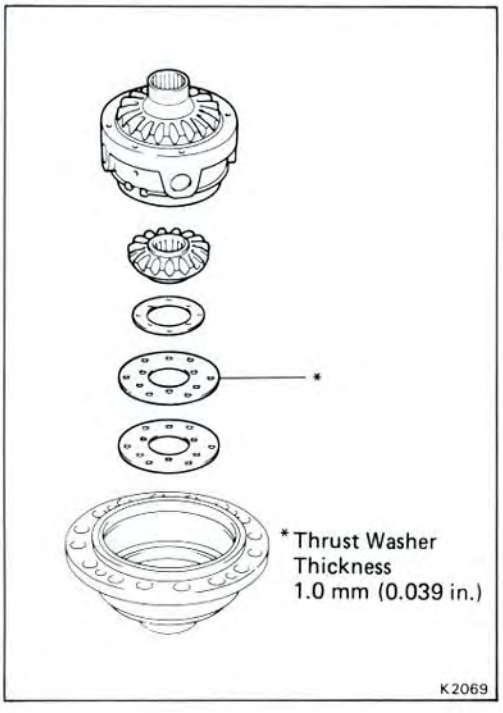
Mark	Thickness	mm (in.)
B	1.00	(0.0394)
C	1.05	(0.0413)
D	1.10	(0.0433)
E	1.15	(0.0453)
F	1.20	(0.0472)
G	1.25	(0.0492)



9. INSTALL SNAP RING

Using snap ring pliers, install the shaft snap ring toward as shown.

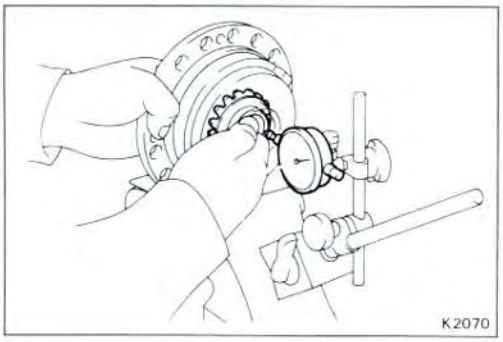
NOTE: Before installing the shaft snap ring, wrap vinyl tape around the case prevent from damege.



10. CHECK AND ADJUST FRONT DIFFERENTIAL SIDE GEAR THRUST CLEARANCE
(Differential Left Case)

(a) Install the No.2 side gear thrust washer, (temporarily install) 1.0 mm (0.039 in.) size No.2 side gear thrust washer, front differential side gear thrust washer, side gear and No.2 case assembly.

NOTE: Engage the front differential side gear and pinion gear of No.2 case.


K2070

(b) Using a dial indicator, measure the thrust clearance of front differential side gear while holding the No.2 case on the left side.

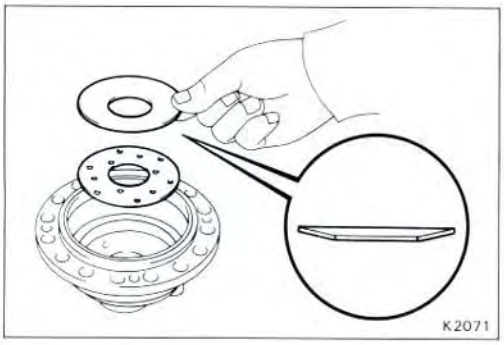
Standard clearance: 0.14 – 0.21 mm (0.006 – 0.008 in.)

NOTE: Turning the side gear a bit, check the maximum value of thrust clearance.

Referring to the table below, select the thrust washer which will ensure that the thrust clearance within specification. Try to select a washer of the same size.

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
A	0.95 (0.0374)	F	1.20 (0.0472)
B	1.00 (0.0394)	G	1.25 (0.0492)
C	1.05 (0.0413)	H	1.30 (0.0512)
D	1.10 (0.0433)	J	1.35 (0.0531)
E	1.15 (0.0453)	K	1.40 (0.0551)

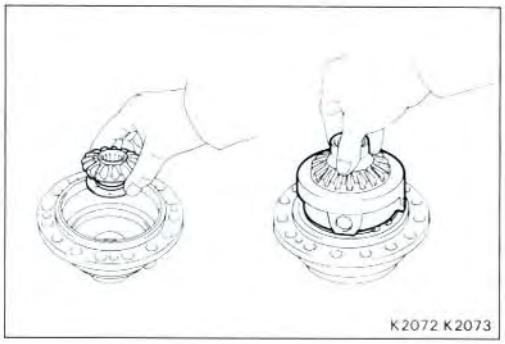
(c) Remove the differential left case.


K2071

11. ASSEMBLY DIFFERENTIAL LEFT CASE

(a) Install the No.2 side gear thrust washer (previously selected) and conical spring washer to the left case.

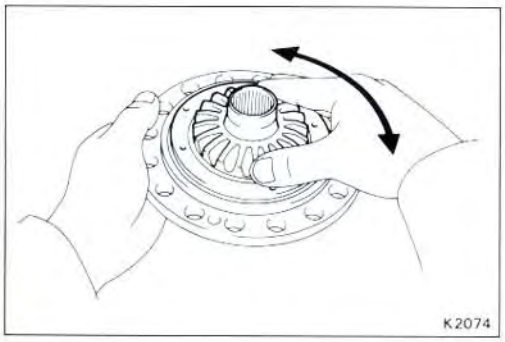
NOTE: Be careful not to mistake the direction of conical spring washer.


K2072 K2073

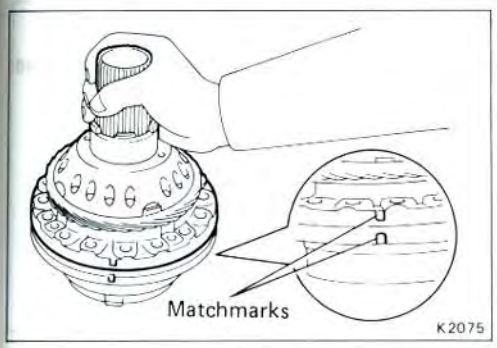
(b) Install the front differential side gear thrust washer and side gear to the left case.

(c) Install the differential No.2 case assembly.

NOTE: Engage the front differential side gear and pinion gear of No.2 case.

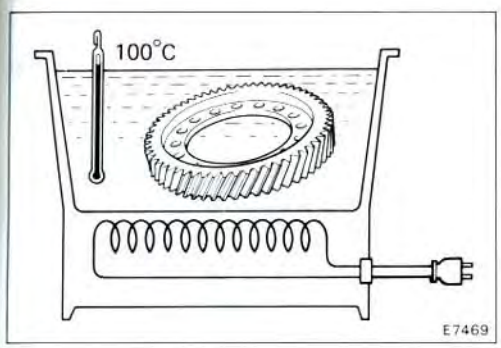

K2074

(d) Turning the differential No.2 case, check the turns smoothly.



(e) Install the intermediate case to the differential left case.

NOTE: Align the matchmarks on the differential left case and connect the intermediate case.



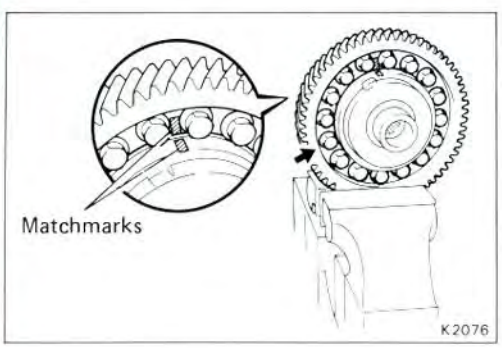
12. INSTALL RING GEAR

(a) Clean the contact surface of the differential left case.

(b) Heat the ring gear to about 100°C (212°F) in an oil bath.

CAUTION: Do not heat the ring gear above 110°C (230°F)

(c) Clean the contact surface of the ring gear with cleaning solvent.

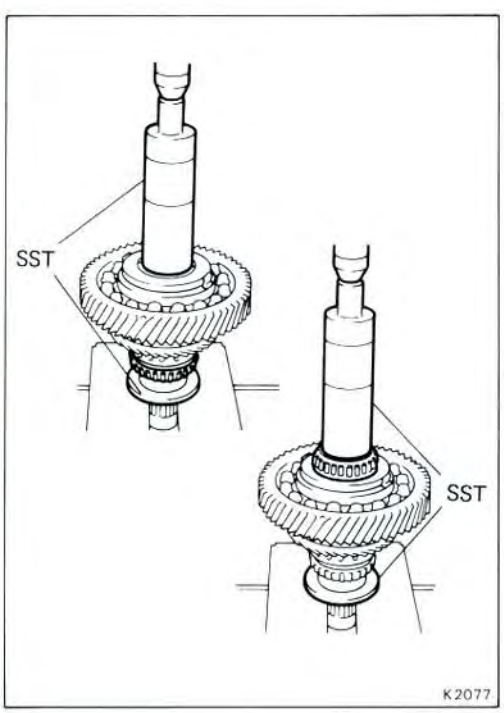


(d) Then quickly install the ring gear on the differential case.

NOTE: Align the matchmarks on the differential left case and connect the ring gear.

(e) Install the sixteen set bolts. Tighten the set bolts uniformly and a little at a time in succession. Torque the bolts.

Torque: 1260 kg-cm (91 ft-lb, 124 N·m)

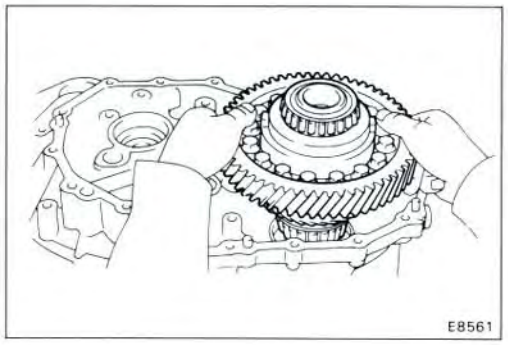


13. INSTALL SIDE BEARING

Using SST and a press, install the side bearing to the differential case.

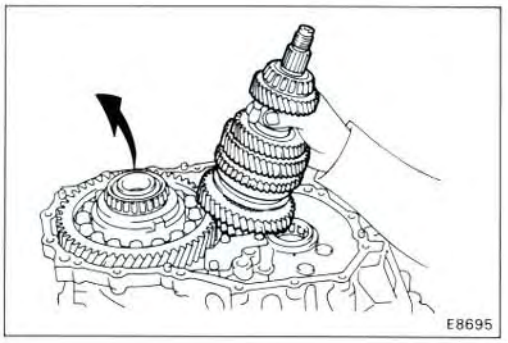
SST 09316-20011 and 09316-60010 (09316-00010)

14. ADJUST OUTPUT SHAFT PRELOAD
(See page MT-83)



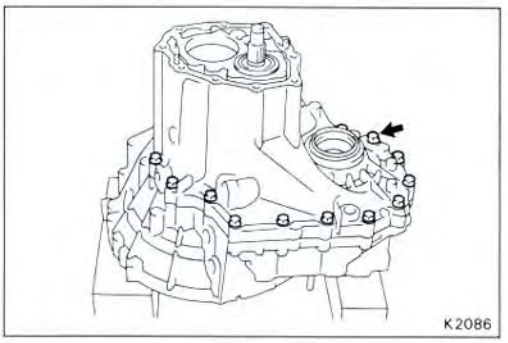
15. INSTALL DIFFERENTIAL CASE ASSEMBLY

Install the differential case assembly to the transaxle case.



16. INSTALL OUTPUT SHAFT ASSEMBLY

Lift up the differential case, install the output shaft assembly.



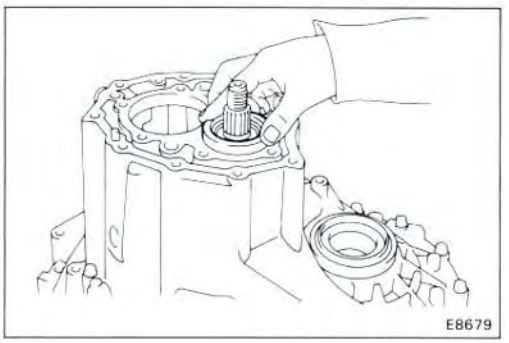
17. INSTALL TRANSMISSION CASE

(a) Install the transmission case.

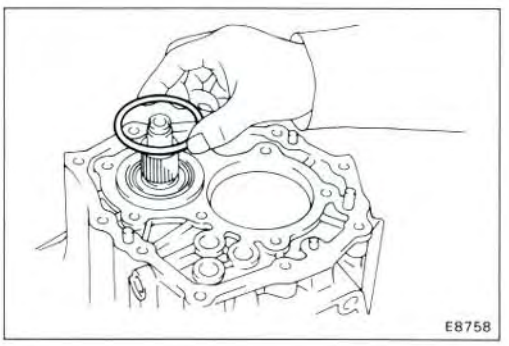
NOTE: If necessary, tap on the case with a plastic hammer.

(b) Install and torque the seventeen bolts.

Torque: 300 kg-cm (22 ft-lb, 29 N·m)

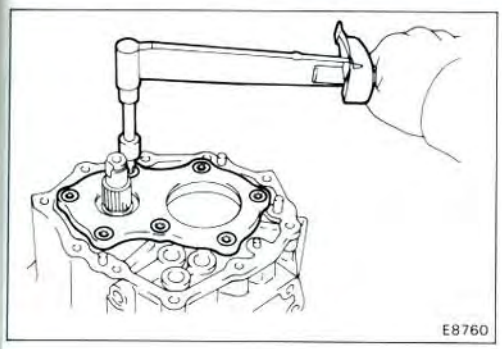


18. INSTALL OUTPUT SHAFT REAR TAPERED ROLLER BEARING OUTER RACE



19. INSTALL ADJUST SHIM
(See page MT-83)

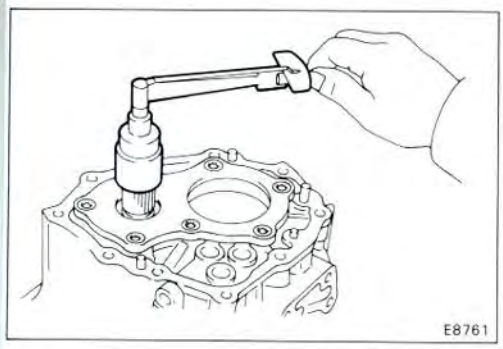
NOTE: Install the previously selected shim.



20. INSTALL REAR BEARING RETAINER

Using a torx wrench, install and torque the seven torx screws.

Torque: 430 kg-cm (31ft-lb, 42 N·m)



21. ADJUST DIFFERENTIAL CASE PRELOAD

(a) Install the new lock nut to the output shaft.

(b) Turn the output shaft right and left two or three times to allow the bearings to settle.

(c) Using a torque wrench, measure the preload.

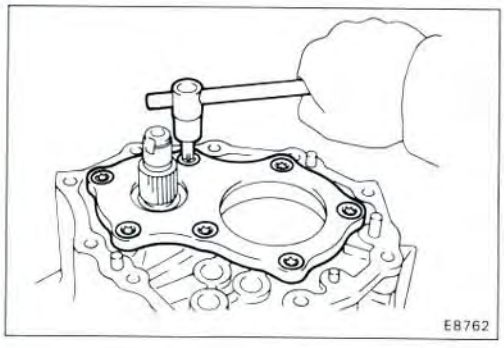
Preload (at starting):

New bearing
Add output shaft preload
1.9 — 3.7 kg-cm
(1.6 — 3.2 in.-lb, 0.2 — 0.4 N·m)
Reused bearing
Add output shaft preload
1.2 — 2.3 kg-cm
(1.0 — 2.0 in.-lb, 0.1 — 0.2 N·m)

If the preload is not within specification, select the thrust washers.

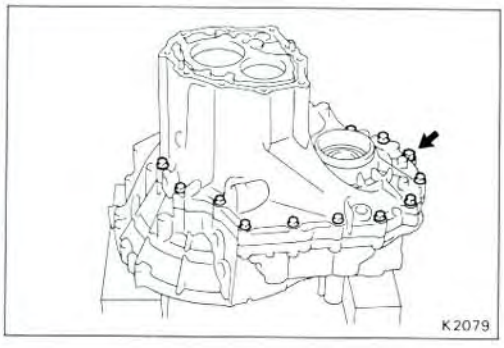
NOTE: The preload will change about 1.3 kg-cm (1.13 in.-lb, 0.13 N·m) with each shim thickness.

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
0	2.00 (0.0787)	9	2.45 (0.0965)
1	2.05 (0.0807)	A	2.50 (0.0984)
2	2.10 (0.0827)	B	2.55 (0.1004)
3	2.15 (0.0846)	C	2.60 (0.1024)
4	2.20 (0.0866)	D	2.65 (0.1043)
5	2.25 (0.0886)	E	2.70 (0.1063)
6	2.30 (0.0906)	F	2.75 (0.1083)
7	2.35 (0.0925)	G	2.80 (0.1102)
8	2.40 (0.0945)	H	2.85 (0.1122)



22. REMOVE REAR BEARING RETAINER

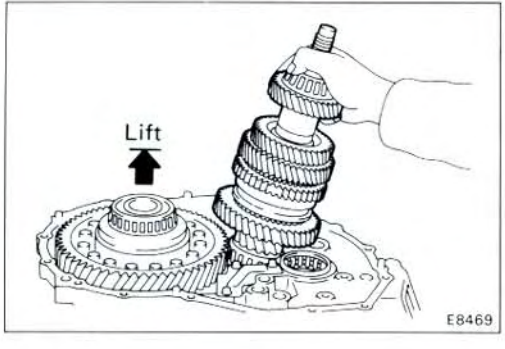
Using torx wrench, remove the seven torx screws and rear bearing retainer.



23. REMOVE ADJUST SHIM

24. REMOVE TRANSMISSION CASE

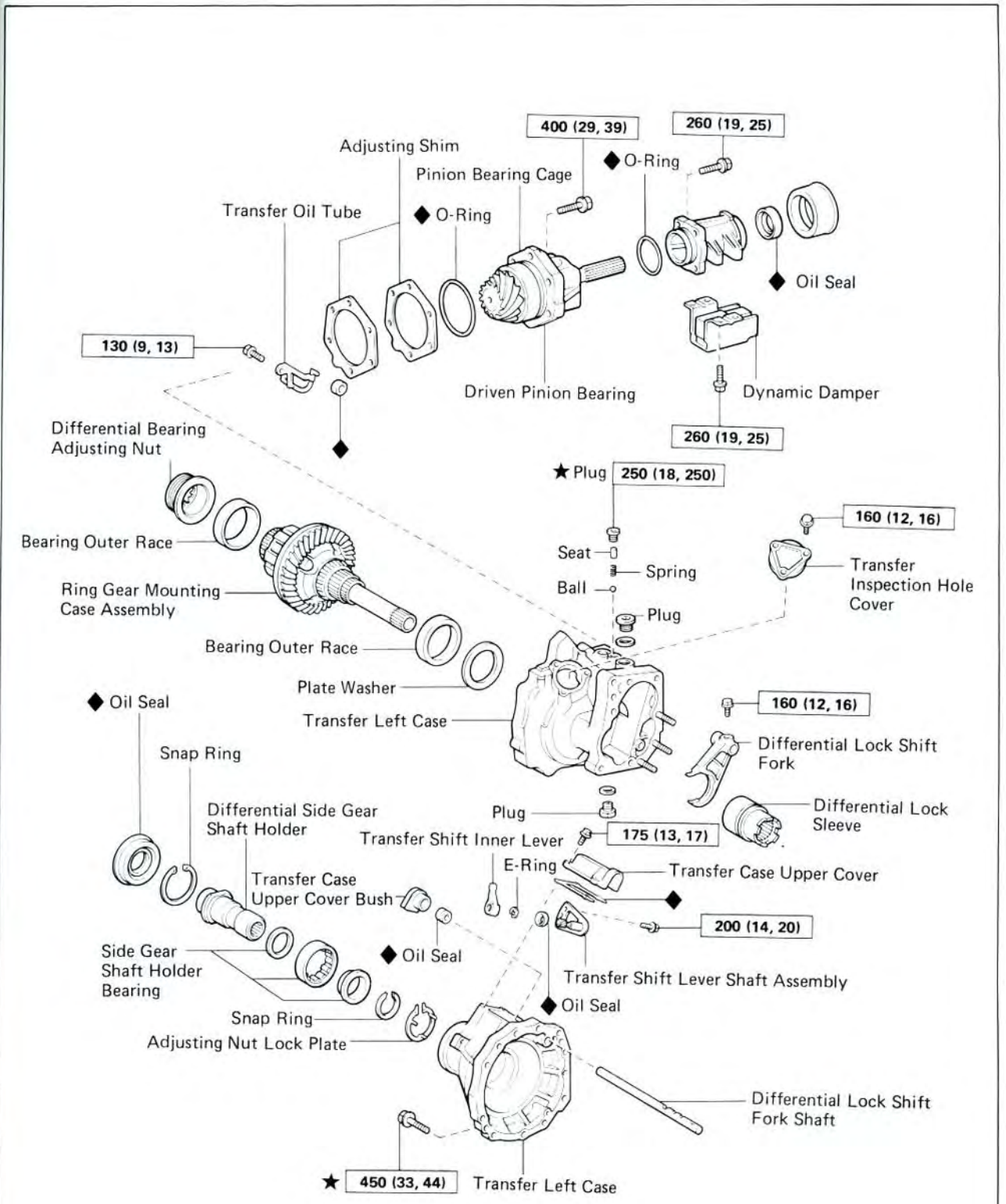
Remove the seventeen bolts and tap off the case with a plastic hammer.



25. **REMOVE OUTPUT SHAFT ASSEMBLY**

26. **REMOVE DIFFERENTIAL CASE ASSEMBLY**

Transfer

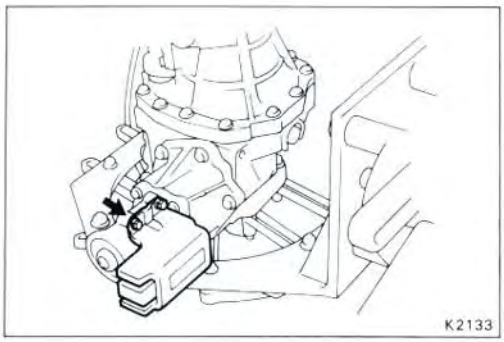


kg-cm (ft-lb, N·m) : Specified torque

◆ Non-reusable part

★ Precoated part

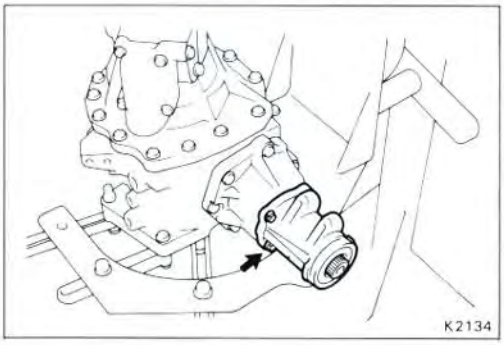
K2111


K2133

DISASSEMBLY OF TRANSFER COMPONENT PARTS

1. REMOVE DYNAMIC DAMPER

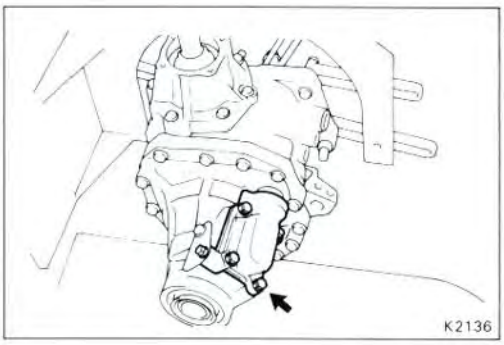
Remove the four bolts and dynamic damper.


K2134

2. REMOVE EXTENSION HOUSING

(a) Remove the four bolts and tap off the housing with a plastic hammer.

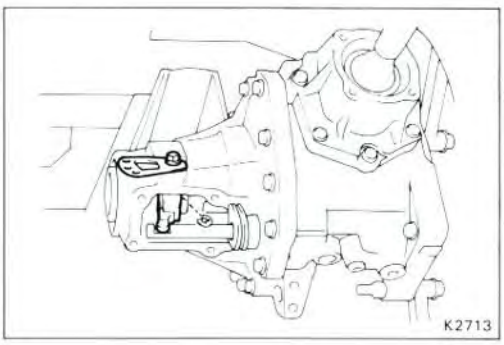
(b) Remove the O-ring from the extension housing.


K2136

3. REMOVE TRANSFER CASE COVER

(a) Remove the five bolts.

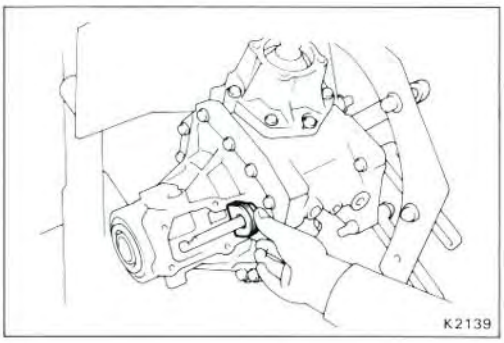
(b) Remove the case cover and gasket.


K2713

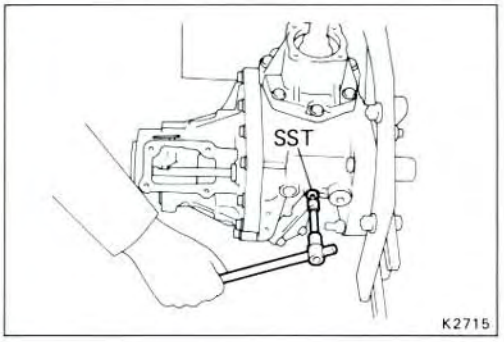
4. REMOVE SHIFT LEVER SHAFT AND INNER LEVER

(a) Remove the E-ring.

(b) Remove the shift lever shaft and inner lever.


K2139

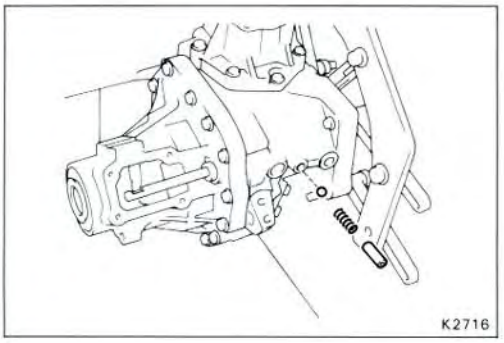
5. REMOVE TRANSFER CASE UPPER BUSHING



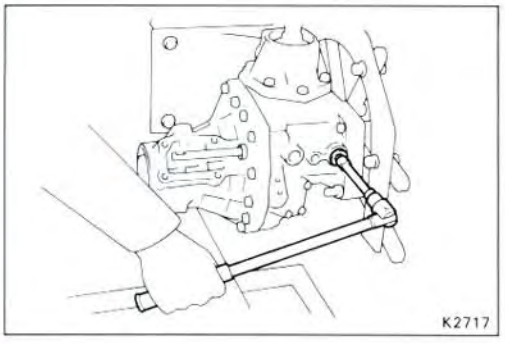
6. REMOVE PLUG, SEAT, SPRING AND LOCKING BALL

(a) Using SST, remove the plug.

SST 09313-30021



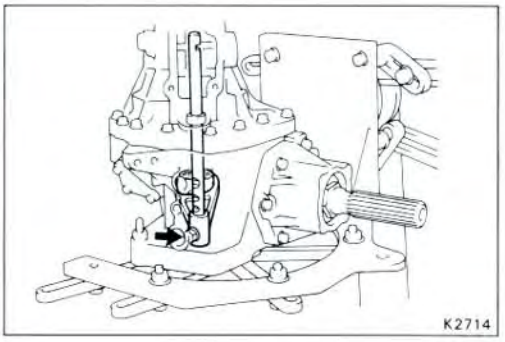
(b) Using a magnetic finger, remove the seat, spring and ball.



7. REMOVE DIFFERENTIAL LOCK SHIFT FORK AND SHIFT FORK SHAFT

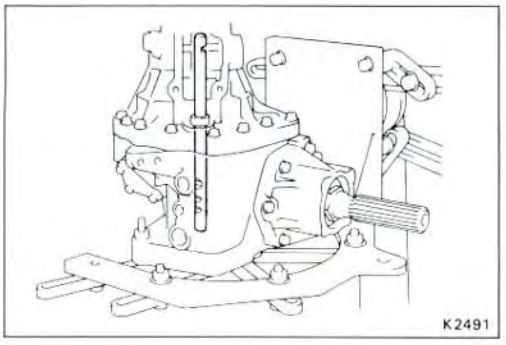
(a) Using SST, remove the plug.

SST 09043-38100

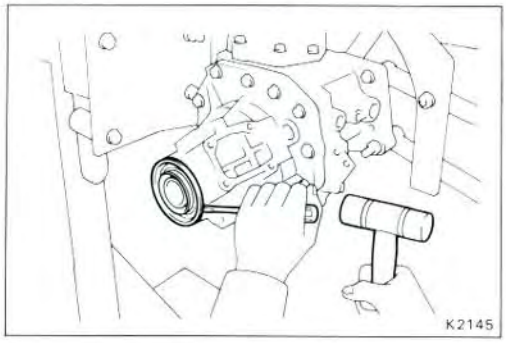


(b) Remove the set bolt.

(c) Remove the differential lock sleeve and shift fork.

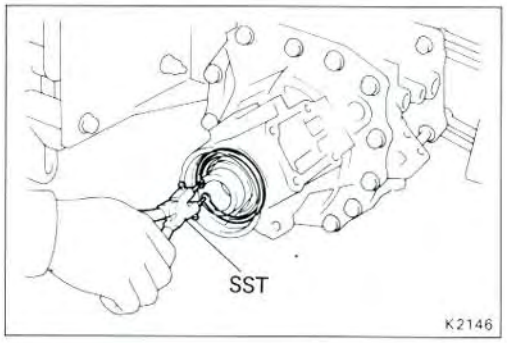


(d) Pull out the shift fork shaft.

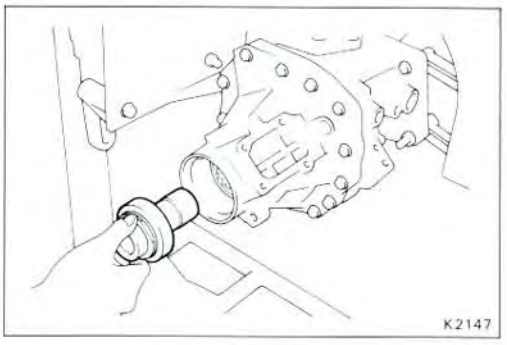


8. REMOVE SIDE GEAR SHAFT HOLDER

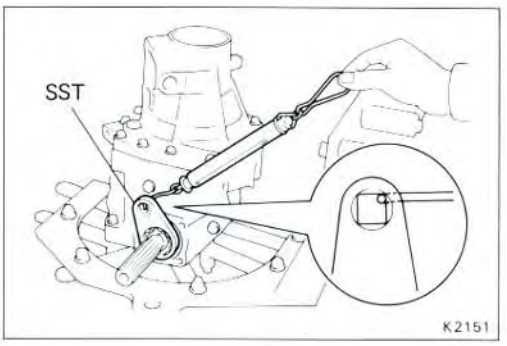
(a) Using a screwdriver and hammer, remove the oil seal.



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



(c) Remove the shaft holder.



9. CHECK PRELOAD

(a) Using SST and a spring tension gauge, measure the driven pinion preload of the backlash between the driven pinion and ring gear.

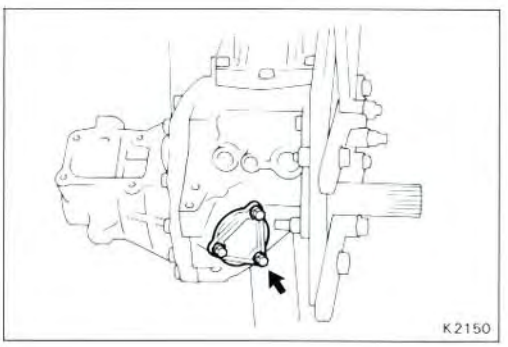
SST 09326-20011

Preload (at starting): 0.9 — 1.4 kg (2 — 3 lb, 9 — 14 N)

(b) Using SST and a spring tension gauge, measure the total preload.

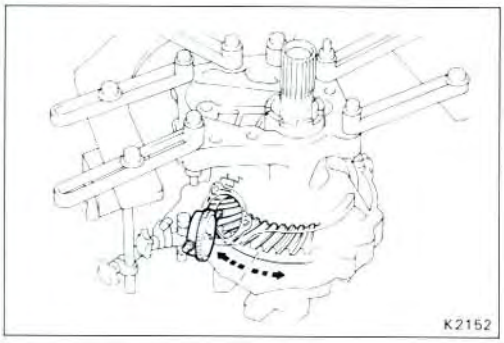
SST 09326-20011

Total preload (at starting):
Add driven pinion preload
0.5 — 0.9 kg (1 — 2 lb, 5 — 9 N)



10. REMOVE TRANSFER INSPECTION HOLE COVER

Remove the three bolts and a cover.

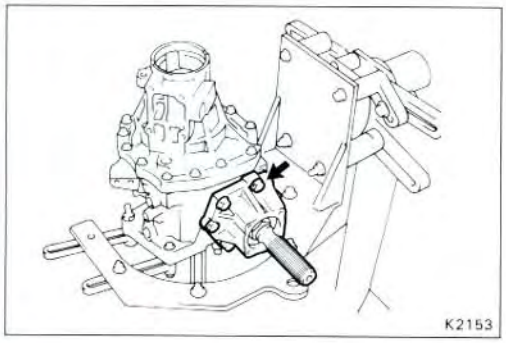


11. CHECK RING GEAR BACKLASH

Using a dial indicator, measure the ring gear backlash.

Backlash: 0.13 — 0.18 mm (0.0051 — 0.0071 in.)

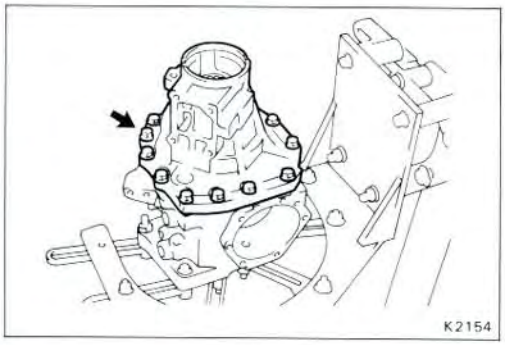
12. CHECK TOOTH CONTACT (See page MT-00)



13. REMOVE DRIVEN PINION BEARING CAGE ASSEMBLY

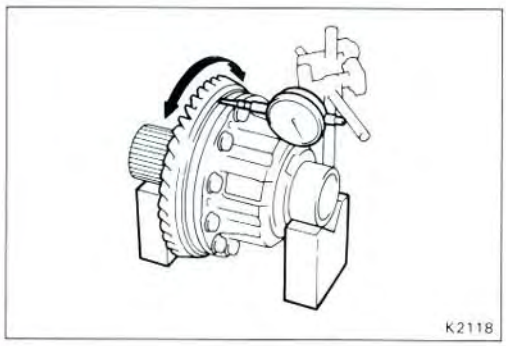
(a) Remove the six bolts and tap off the bearing cage assembly with a plastic hammer.

(b) Remove the O-ring from the driven pinion bearing cage.

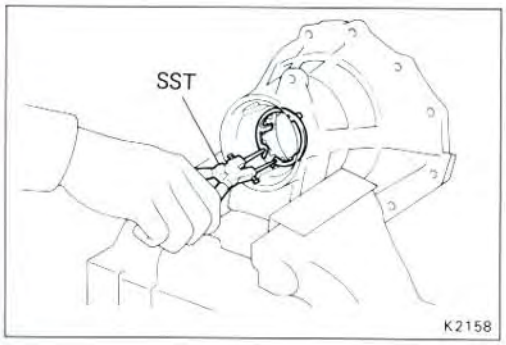


14. REMOVE TRANSFER RIGHT CASE

Remove the twelve bolts and tap off the case with a plastic hammer.

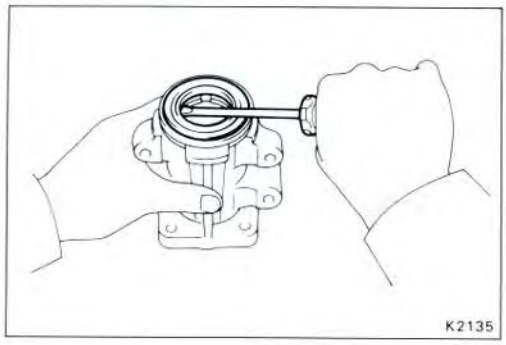


15. REMOVE RING GEAR MOUNTING CASE ASSEMBLY



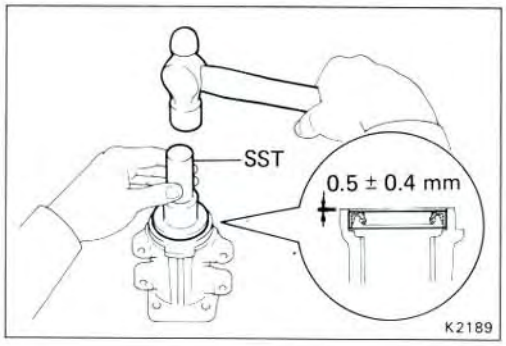
16. REMOVE ADJUSTING NUT LOCK PLATE

Using snap ring pliers, remove the lock plate from the transfer right case.



17. IF NECESSARY, REPLACE EXTENSION HOUSING OIL SEAL

(a) Using a screwdriver, remove the oil seal.

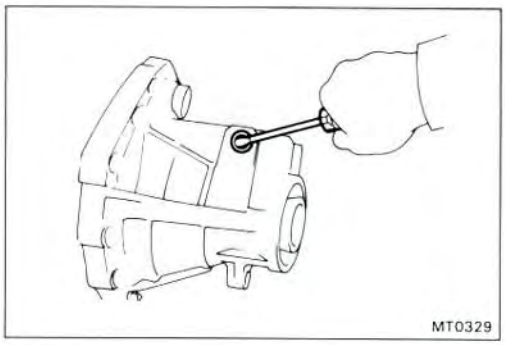


(b) Using SST and a hammer, drive in a new oil seal.

SST 09325-20010

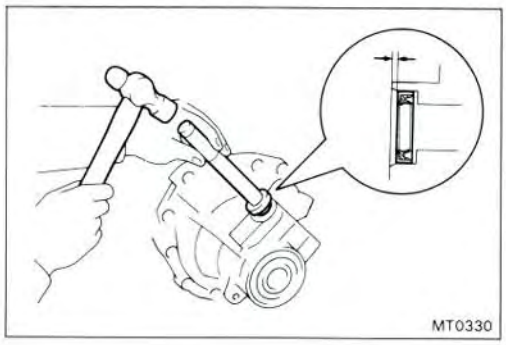
Oil seal depth: 0.1 – 0.9 mm (0.004 – 0.035 in.)

(c) Coat the lip of oil seal with MP grease.



18. IF NECESSARY, REPLACE DIFFERENTIAL LOCK SHIFT LEVER SHAFT OIL SEAL

(a) Using a screwdriver, remove the oil seal.

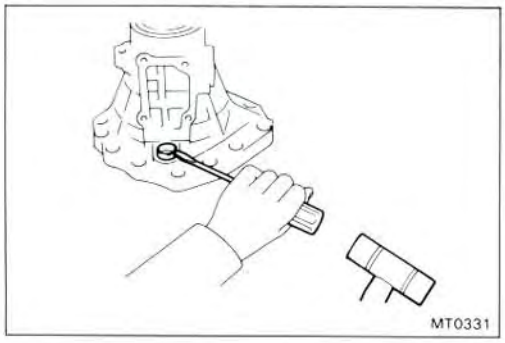


(b) Coat the lip seal with MP grease.

(c) Using SST and a hammer, drive in a new oil seal.

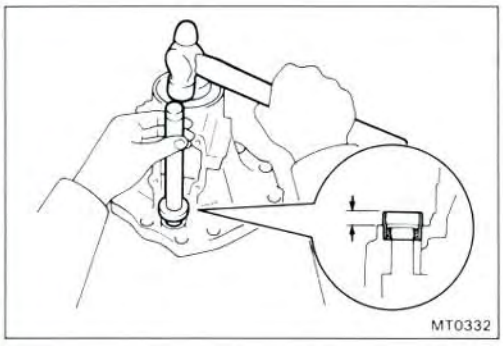
SST 09620-30010 (09625-30010, 09631-00020)

Oil seal depth: 1.0 – 2.0 mm (0.039 – 0.079 in.)



19. IF NECESSARY, REPLACE SHIFT FORK SHAFT OIL SEAL

(a) Using a screwdriver and hammer, remove the oil seal.

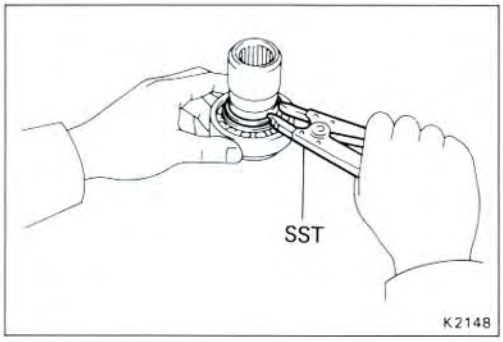


(b) Coat the lip of the oil seal with MP grease.

(c) Using SST and a hammer, drive in a new oil seal as shown.

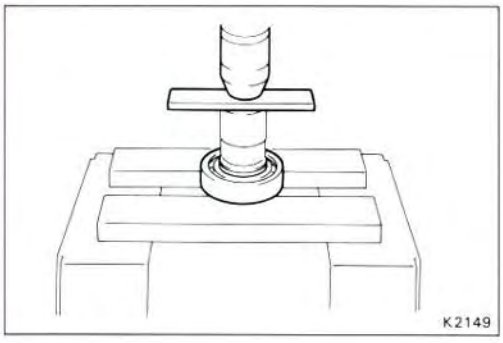
SST 09620-30010 (09625-30010, 09631-00020)

Oil seal height: 8.5 – 9.5 mm (0.335 – 0.374 in.)

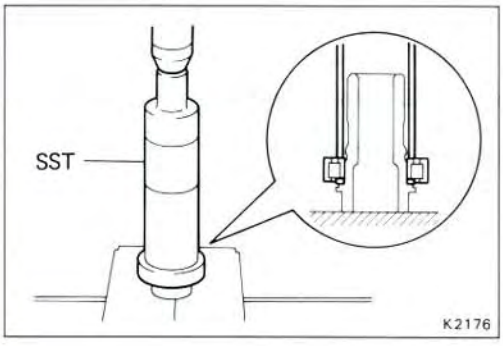


20. IF NECESSARY, REPLACE SIDE GEAR SHAFT HOLDER BEARING

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

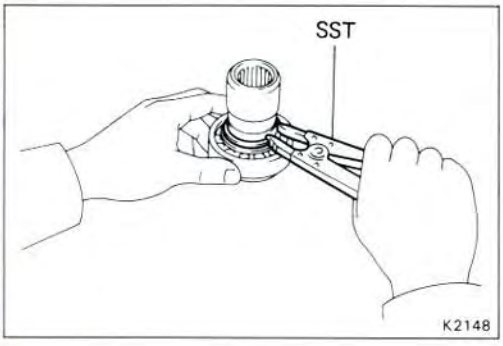


(b) Using a press, remove the bearing from the side gear shaft holder.

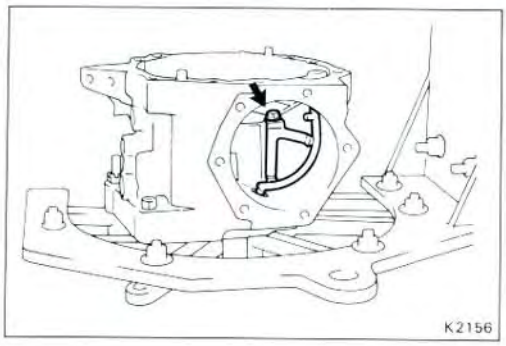


(c) Using SST and a press, install the new bearing as shown.

SST 09316-60010 (09316-00010)

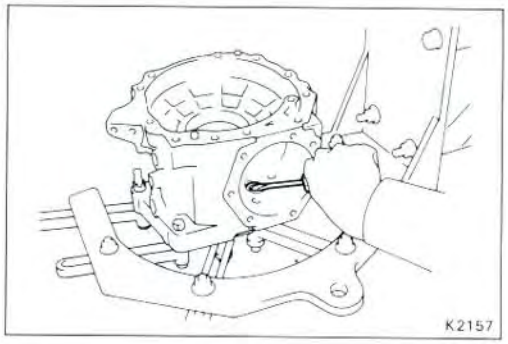


(d) Using snap ring pliers, install the snap ring.

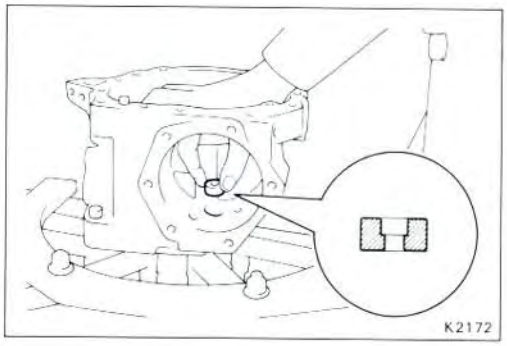


21. IF NECESSARY, REPLACE TRANSFER OIL TUBE

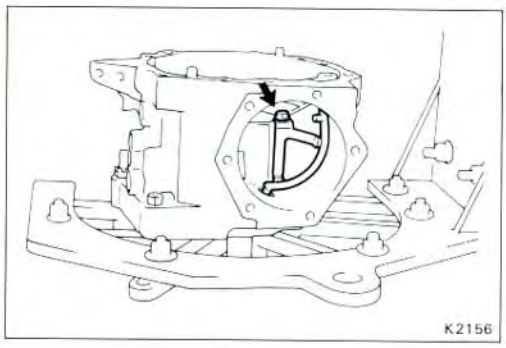
(a) Remove the bolt and oil tube.



(b) Using a screwdriver, remove the cushion.



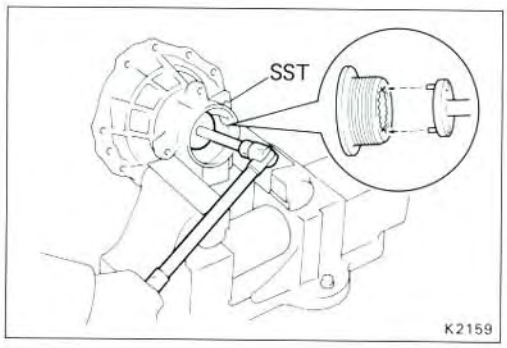
(c) Install the new cushion.



(d) Install the oil tube.

(e) Install and torque the bolt.

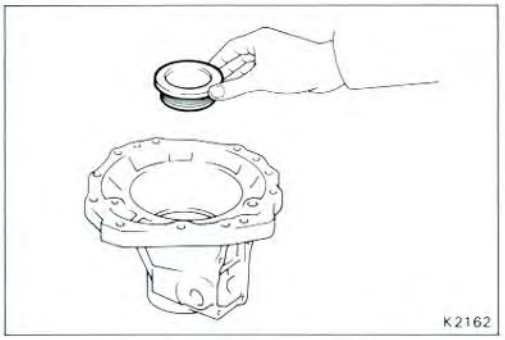
Torque: 130 kg-cm (9 ft-lb, 13 N·m)



22. IF NECESSARY, REPLACE RING GEAR MOUNTING CASE SIDE BEARING OUTER RACE (Transfer Right Case)

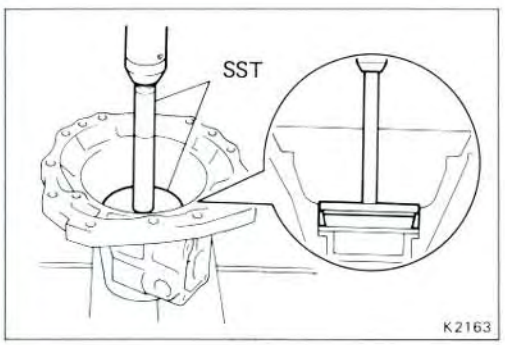
(a) Using SST, turn the bearing adjusting nut, remove the outer race and bearing adjusting nut.

SST 09318-20010



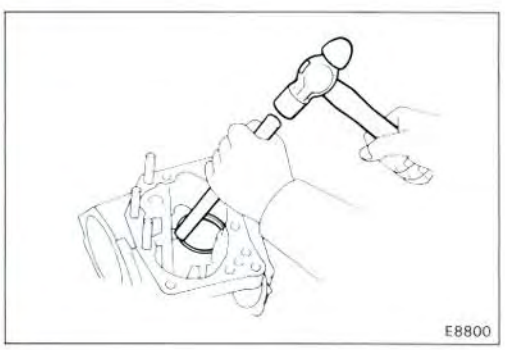
(b) Install the bearing adjusting nut until it touches the lip of the case.

NOTE: If the nut is difficult to turn, use SST (09318-20010).



(c) Using SST and a press, install the bearing outer race until it is almost touching the bearing adjusting nut.

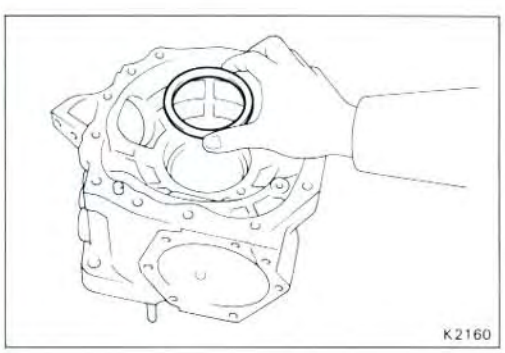
SST 09608-35014 (09608-06020, 09608-06180)



(Transfer Left Case)

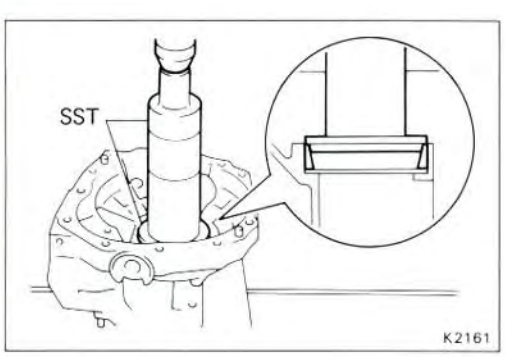
(a) Using a brass bar and hammer, drive out the bearing outer race lightly and evenly.

(b) Remove the plate washer.



(c) Install the plate washer.

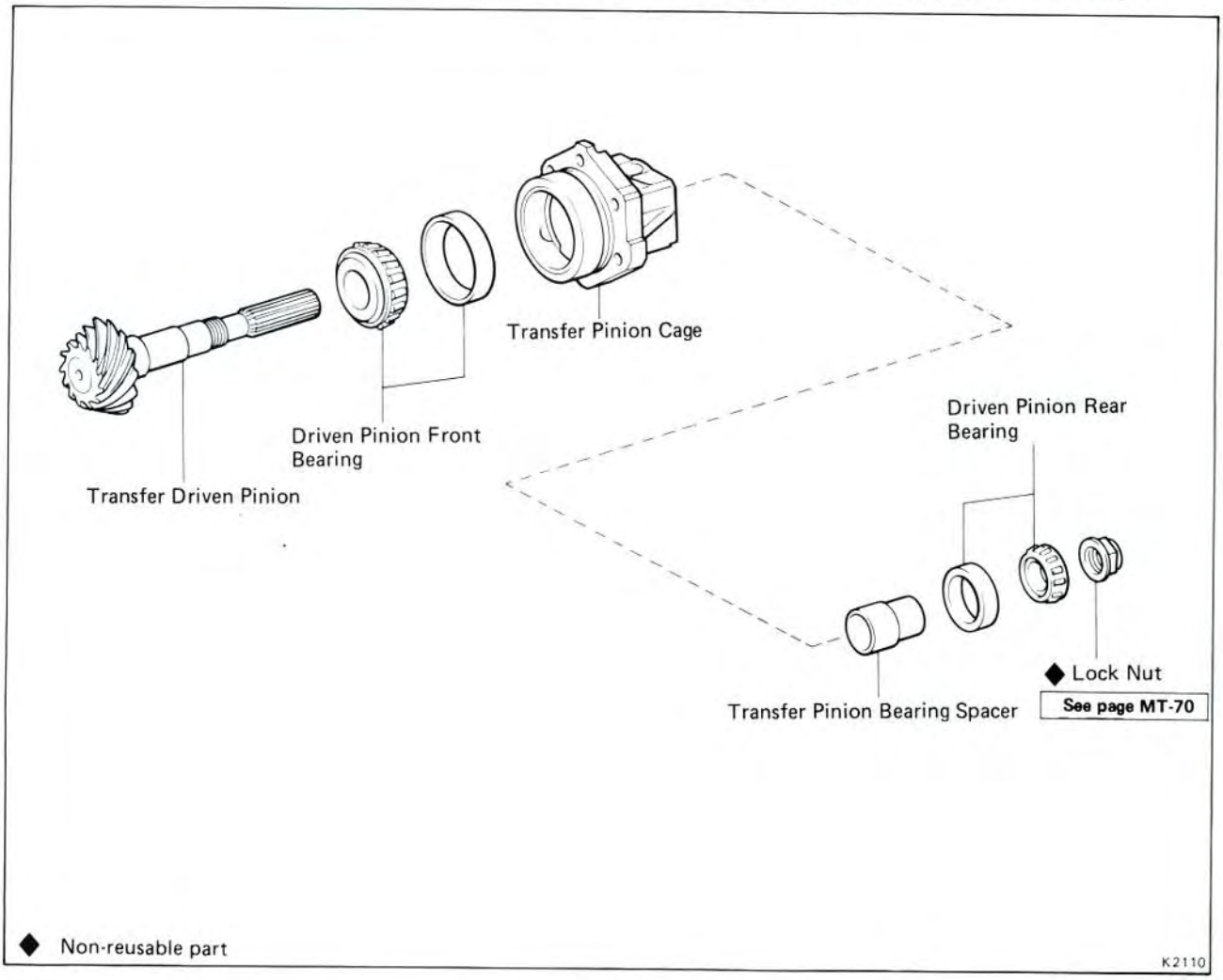
NOTE: First install a washer of the same thickness as before.

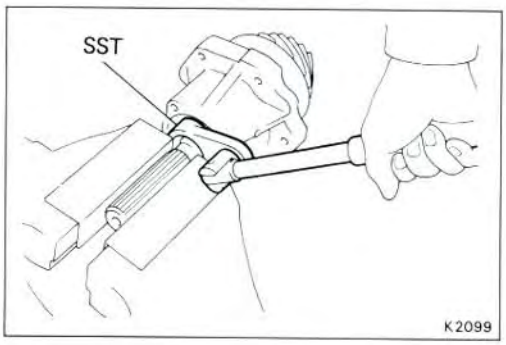


(d) Using SST and a press, install the outer race.

SST 09316-60010 (09316-00010, 09316-00060)

DRIVEN PINION BEARING CAGE ASSEMBLY





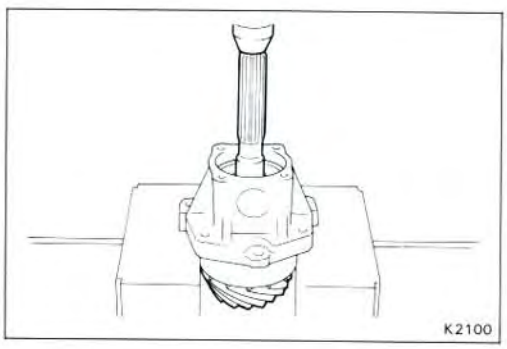
DISASSEMBLY OF DRIVEN PINION BEARING CAGE

1. REMOVE LOCK NUT

(a) Unstake the lock nut.

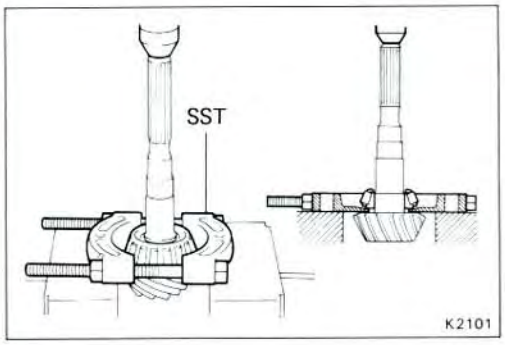
(b) Using SST, remove the lock nut.

SST 09326-20011



2. REMOVE DRIVEN PINION

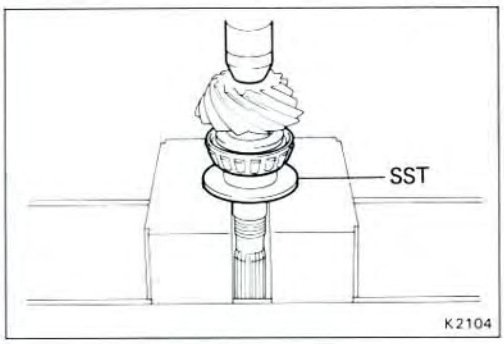
Using a press, remove the driven pinion, rear bearing and spacer.



3. **IF NECESSARY, REPLACE DRIVEN PINION FRONT BEARING**

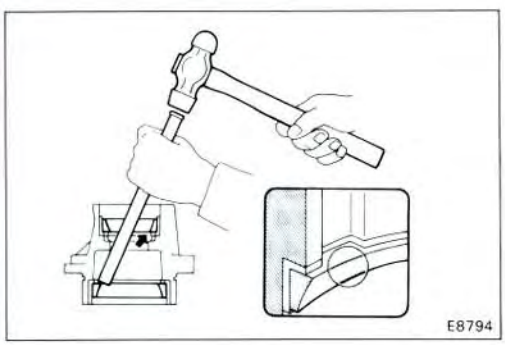
(a) Using SST and a press, remove the front bearing.

SST 09950-00020



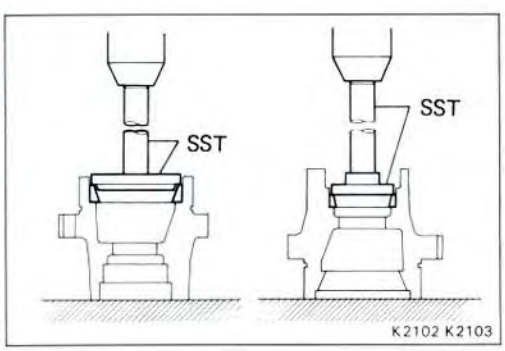
(b) Using SST and a press, install the front bearing.

SST 09316-60010 (09316-00050)



4. **IF NECESSARY, REPLACE FRONT AND REAR BEARING OUTER RACE**

(a) Using a brass bar and hammer, drive out the bearing outer race lightly and evenly.

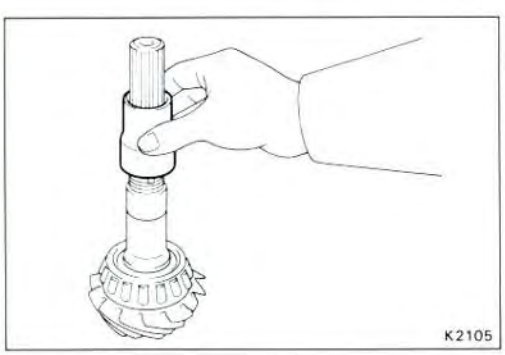


(b) Using SST and a press, install the front bearing outer race.

SST 09608-35014 (09608-06020, 09608-06210)

(c) Using SST and a press, install the rear bearing outer race.

SST 09550-10012 (09252-10010, 09555-10010)



ASSEMBLY OF DRIVEN PINION BEARING CAGE

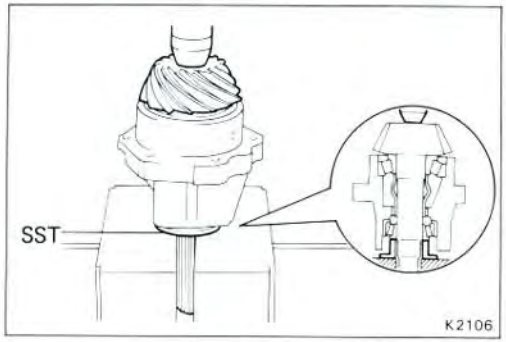
(See page MT-68)

NOTE: Coat all of the sliding and rotating surface with gear oil before assembly.

1. **INSTALL DRIVEN PINION BEARING CAGE**

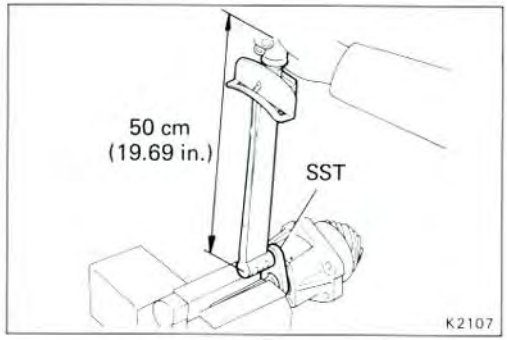
(a) Install the new bearing spacer.

NOTE: Insert the spacer with the smaller facing upwards.



(b) Using SST and a press, install the rear bearing.

NOTE: Press down until the pinion can just move slightly up and down.



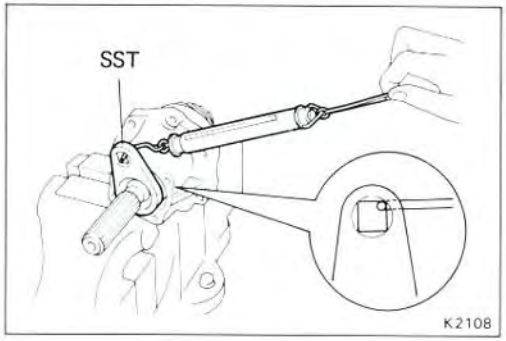
2. ADJUST DRIVEN PINION PRELOAD

(a) Using SST, install and torque the new lock nut.

SST 09326-20011

Torque: 1,000 kg-cm (72 ft-lb, 98 N·m)

NOTE: Use a torque wrench with a fulcrum length of 50 cm (19.69 in.).



(b) Using SST and a spring tension gauge, measure the driven pinion preload.

NOTE: Turn the driven pinion right and left two or three times to allow the bearings to settle.

Preload (at starting):

New bearing	**1.8 — 2.9 kg (4.0 — 6.4 lb, 17.7 — 28.4 N)**
Reused bearing	**0.9 — 1.4 kg (1.1 — 2.0 lb, 4.9 — 8.8 N)**

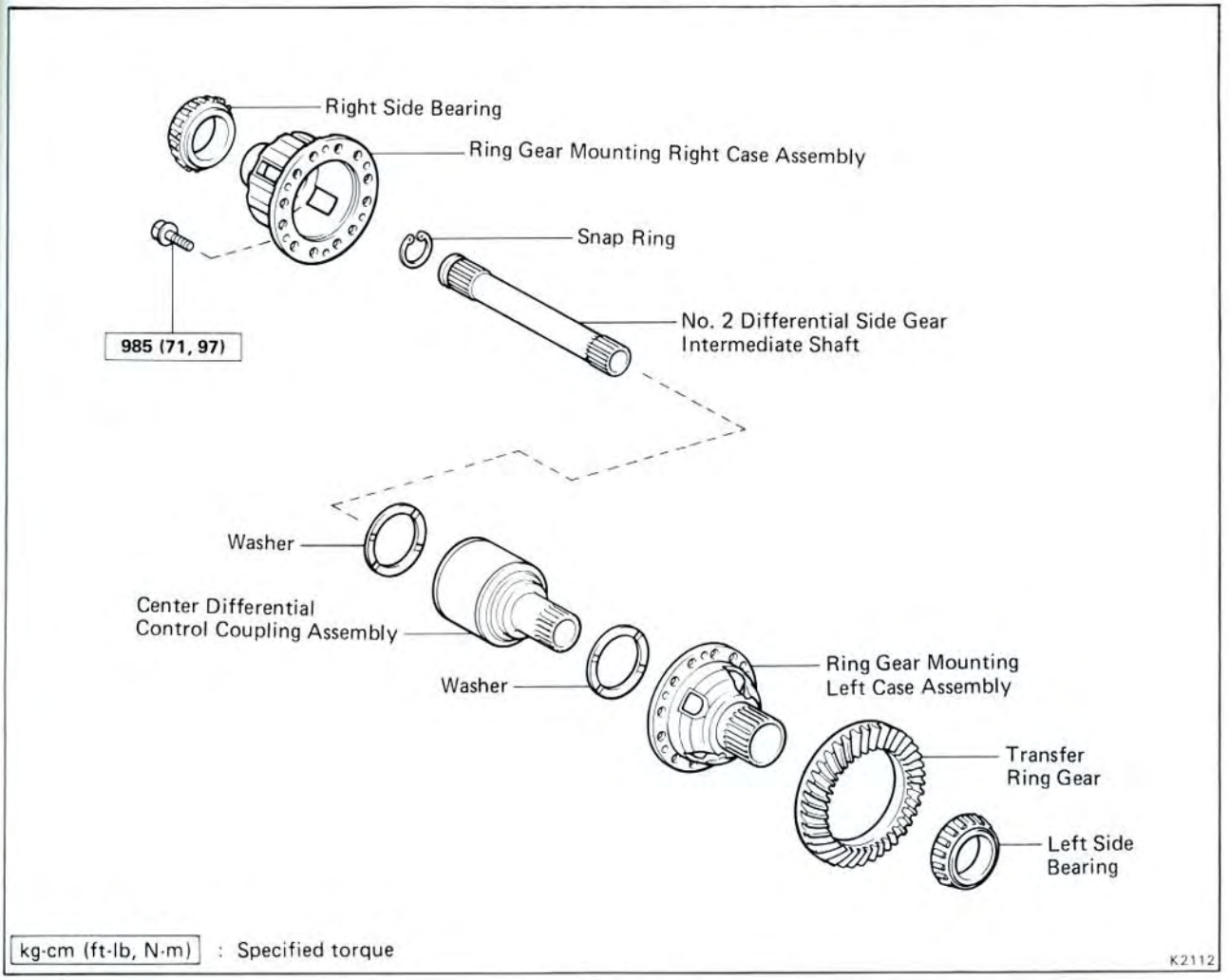
- If preload is greater than specification, replace the bearing spacer.
- If preload is less than specification, retighten the nut 5 — 10° at a time until the specified preload is reached.

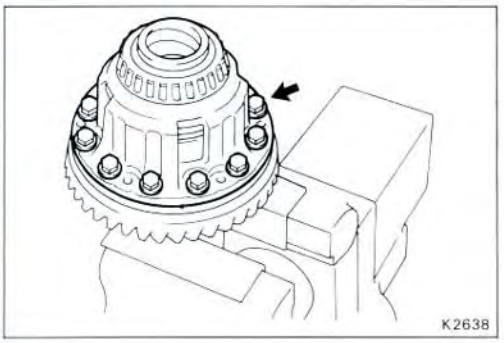
If the maximum torque is exceed while retightening the nut, replace the bearing spacer and repeat the preload procedure. Do not back off the pinion nut to reduce the preload.

Maximum torque: 2,200 kg-cm (159 ft-lb, 216 N·m)

3. STAKE LOCK NUT

RING GEAR MOUNTING CASE ASSEMBLY

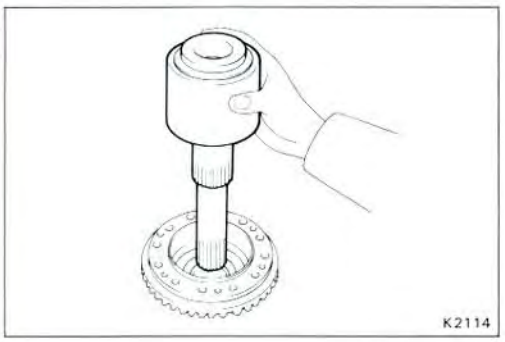




DISASSEMBLY OF RING GEAR MOUNTING CASE

1. **REMOVE RING GEAR MOUNTING RIGHT CASE**

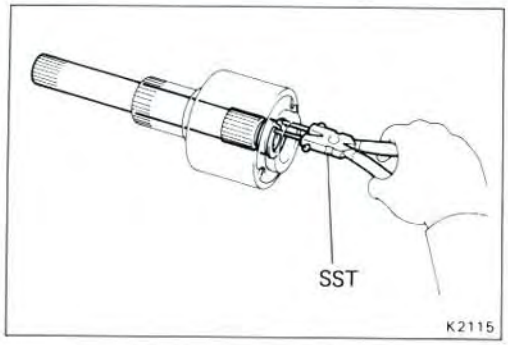
   Remove twelve bolts and right case.



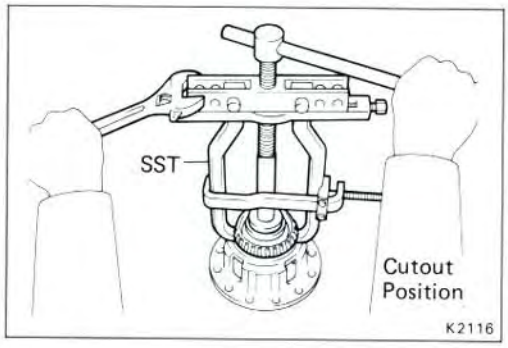
2. **REMOVE CENTER DIFFERENTIAL CONTROL COUPLING**

   (a) Remove the control coupling from the left case.

   (b) Remove the two washers from the control coupling.



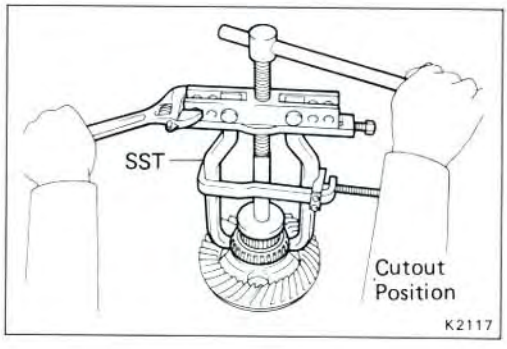
(c) Using a snap ring pliers , remove the snap ring and No.2 intermediate shaft.



3. REMOVE MOUNTING CASE SIDE BEARING (Right Case Side)

Using SST, remove the side bearing.

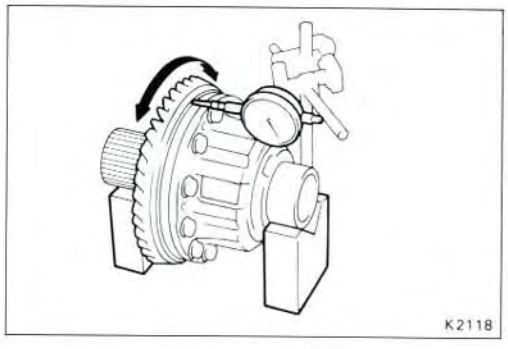
SST 09950-20017



(Left Case Side)

Using SST, remove the side bearing.

SST 09950-20017



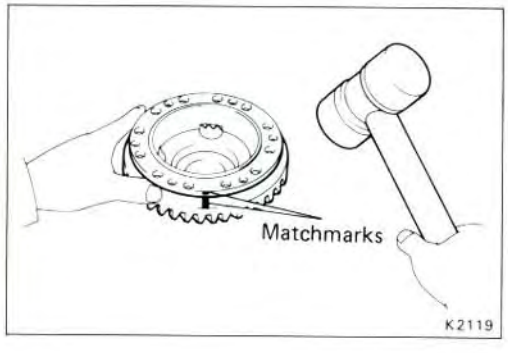
4. CHECK RING GEAR RUNOUT

(a) Install the mounting right case to the left case.

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

Maximum runout: 0.1 mm (0.004 in.)

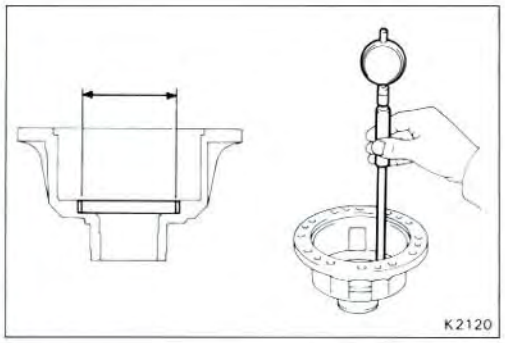
(c) Remove the mounting right case from the left case.



5. REMOVE RING GEAR

(a) Place the matchmarks on both the mounting left case and ring gear.

(b) Using a plastic hammer, tap out the ring gear.



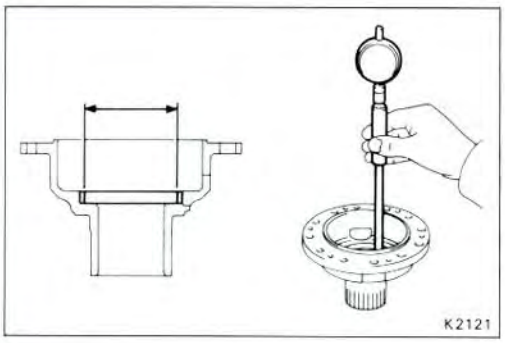
INSPECTION OF RING GEAR MOUNTING CASE

1. MEASURE RING GEAR MOUNTING CASE

(a) Using a cylinder gauge, measure the inner diameter of the mounting right case bushing.

Standard diameter: 69.000 — 69.035 mm (2.7165 — 2.7179 in.)

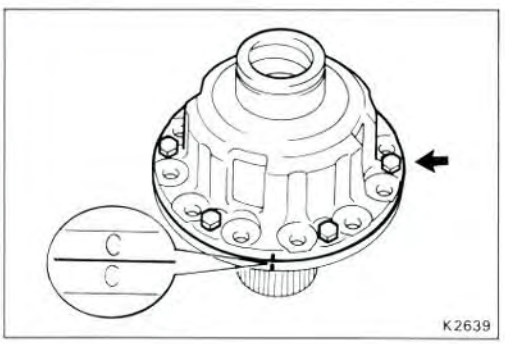
Maximum diameter: 69.060 mm (2.7189 in.)



(b) Using a cylinder gauge, measure the inner diameter of the mounting left case bushing.

Standard diameter: 69.000 — 69.035 mm (2.7165 — 2.7179 mm)

Maximum diameter: 69.060 mm (2.7189 in.)

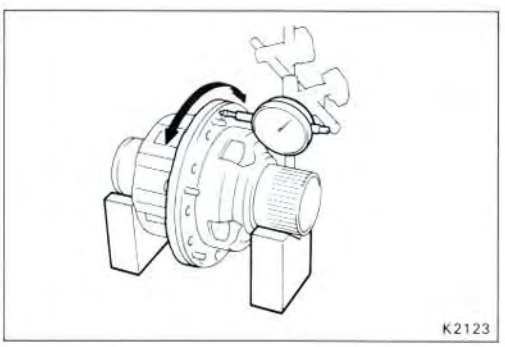


2. CHECK RING GEAR MOUNTING CASE RUNOUT

NOTE: Perform only when the limit is exceeded in the ring gear runout inspection.

(a) Using six bolts (Diameter 8 mm, Pitch 1.25 mm), install the mounting right case to the left case.

NOTE: Align the matchmarks on the right case and connect the left case.

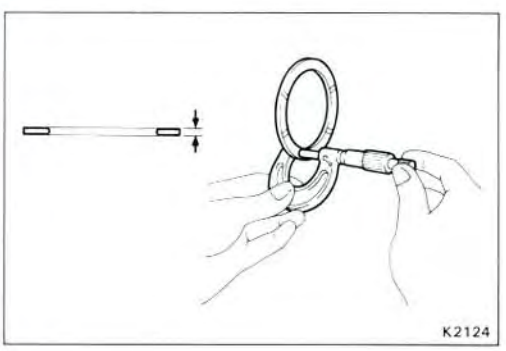


(b) Using a dial indicator, check the mounting case runout.

Maximum runout: 0.1 mm (0.004 in.)

(c) Remove the six bolts.

(d) Remove the mounting right case from the left case.

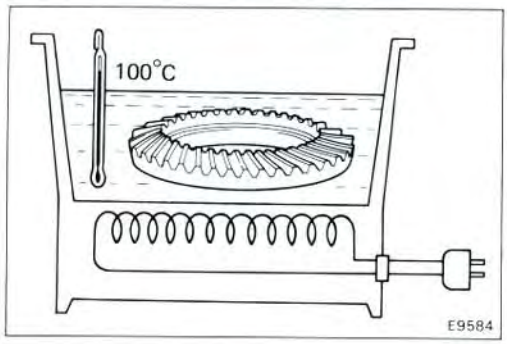


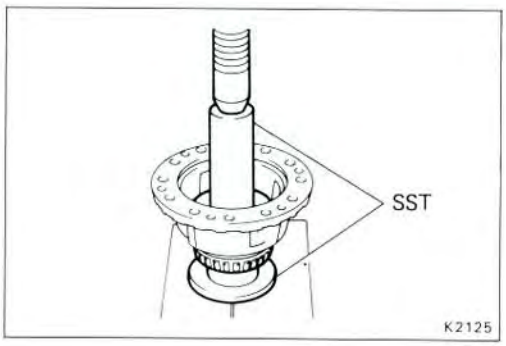
3. MEASURE WASHER

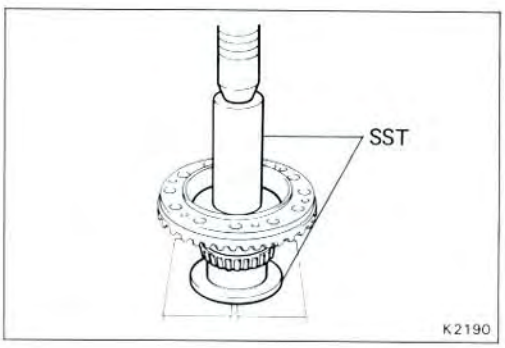
Using a micrometer, measure the two washers thickness.

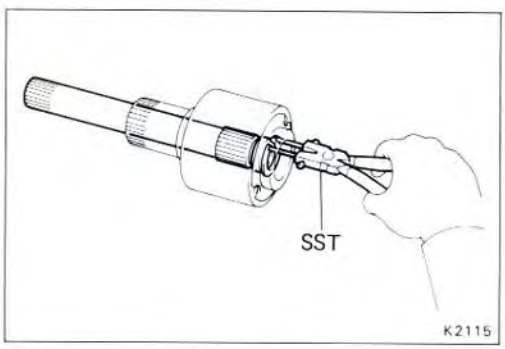
Standard thickness: 1.49 — 1.51 mm (0.0587 — 0.0594 in.)

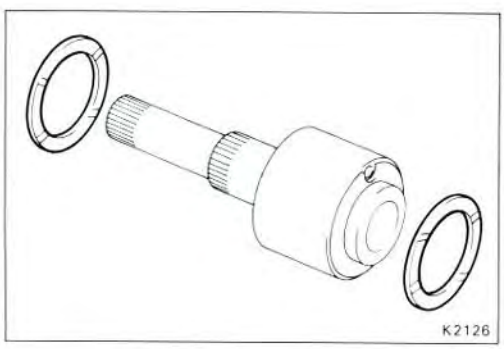
Minimum thickness: 1.45 mm (0.0571 in.)











ASSEMBLY OF RING GEAR MOUNTING CASE

1. INSTALL RING GEAR

(a) Clean the contact surface of the mounting left case.

(b) Heat the ring gear to about 100°C (212°F) in an oil bath.

CAUTION: Do not heat the ring gear above 110°C (230°F).

(c) Clean the contact surface of the ring gear with cleaning solvent.

(d) Turn quickly install the ring gear on the mounting left case.

NOTE: Align the matchmarks on the mounting left case and connect the ring gear.

2. CHECK RING GEAR RUNOUT

(See page MT-72)

3. INSTALL MOUNTING CASE SIDE BEARING

(Right Case Side)

Using SST and a press, install the side bearing.

SST 09309-36010, 09316-20011

(Left Case Side)

Using SST and a press, install the side bearing.

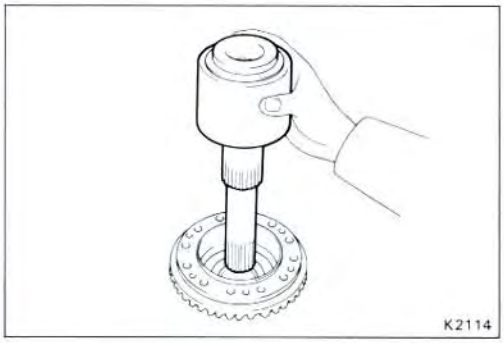
SST 09309-36010, 09316-20011

4. INSTALL CENTER DIFFERENTIAL CONTROL COUPLING

(a) Insert the No.2 intermediate shaft to the center differential control coupling.

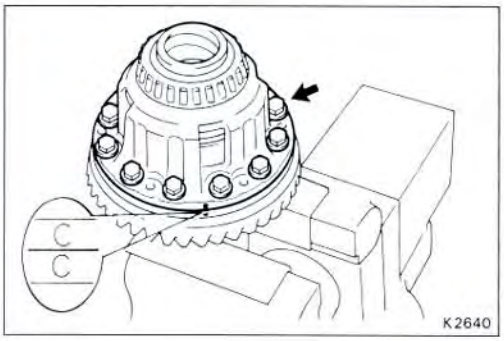
(b) Using snap ring pliers, install the snap ring.

(c) Install the two washers to the center differential control coupling.



(d) Install the center differential control coupling to the left case.

NOTE: Do not drop the washer.



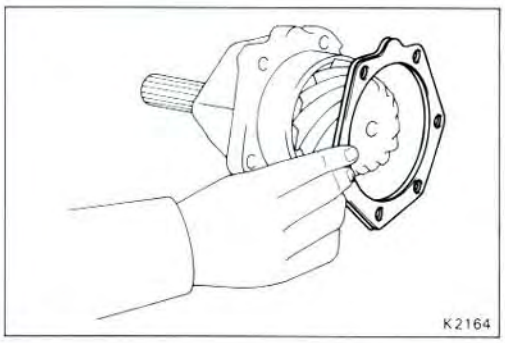
4. INSTALL RING GEAR MOUNTING RIGHT CASE

(a) Install the right case to the left case.

(b) Install and torque the twelve bolts.

Torque: 985 kg-cm (71 ft-lb, 97 N·m)

NOTE: Align the matchmarks on the left case and connect the right case.



ASSEMBLY OF TRANSFER COMPONENT PARTS

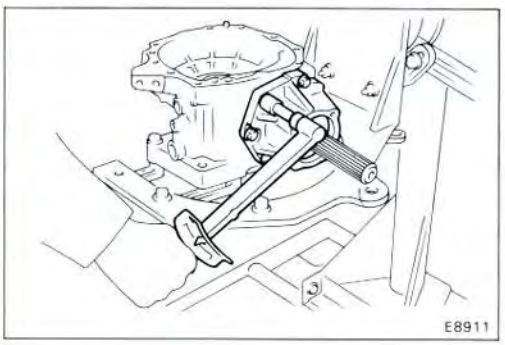
(See page MT-59)

NOTE: Coat all of the sliding and rotating surface with gear oil before assembly.

1. ADJUST RING GEAR BACKLASH

(a) Install the adjusting shim to the driven pinion bearing cage assembly.

NOTE: First install a shim of the same thickness as before.

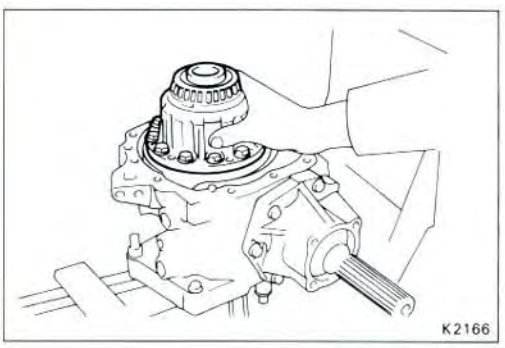


(b) Install the driven pinion bearing cage assembly to the transfer left case.

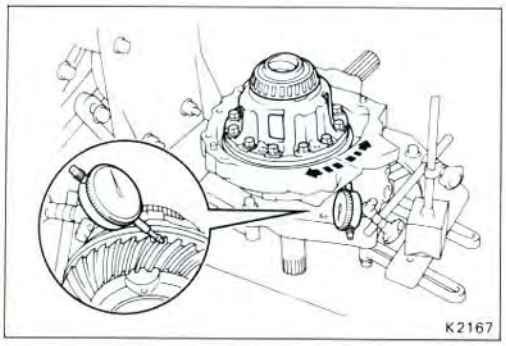
(c) Install and torque the six bolts.

Torque: 400 kg-cm (29 ft-lb, 39 N·m)

NOTE: Do not install the O-ring.



(d) Install the ring gear mounting case assembly to the transfer left case.



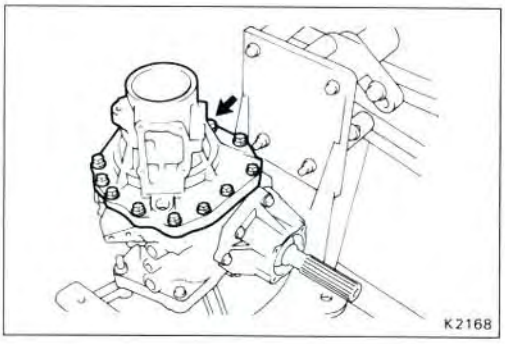
(e) Using a dial indicator, measure the ring gear backlash.

Backlash: 0.13 — 0.18 mm (0.0051 — 0.0071 in.)

(f) Referring to the table below, select the plate washer which will ensure that the backlash is within specification. Try to select a washer of the same size.

NOTE: The backlash will change about 0.02 mm (0.0008 in.) with each shim thickness.

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
1	2.13 (0.0839)	13	2.49 (0.0980)
2	2.16 (0.0850)	14	2.52 (0.0992)
3	2.19 (0.0862)	15	2.55 (0.1004)
4	2.22 (0.0874)	16	2.58 (0.1016)
5	2.25 (0.0886)	17	2.61 (0.1028)
6	2.28 (0.0898)	18	2.64 (0.1039)
7	2.31 (0.0909)	19	2.67 (0.1051)
8	2.34 (0.0921)	20	2.70 (0.1063)
9	2.37 (0.0933)	21	2.73 (0.1075)
10	2.40 (0.0945)	22	2.76 (0.1087)
11	2.43 (0.0957)	23	2.79 (0.1098)
12	2.46 (0.0968)	24	2.82 (0.1110)

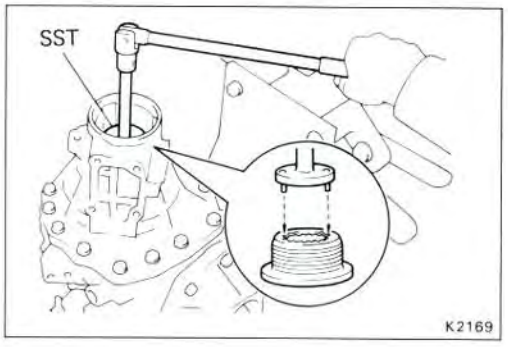


2. ADJUST TOTAL PRELOAD

(a) Install the transfer right case.

(b) Install and torque the twelve bolts.

Torque: 450 kg-cm (33 ft-lb, 44 N·m)



(c) Adjust the total preload by tightening the bearing adjusting nut.

Using SST, tightening the adjusting nut.

SST 09318-20010

NOTE: Measure the preload while tightening the adjusting nut a little at a time.

(d) Using SST and a spring tension gauge, measure the total preload.

SST 09326-20011

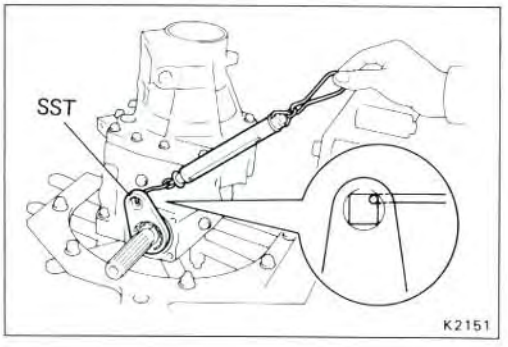
Preload (at starting):

New bearing

Add driven pinion preload 1.3 — 1.4 kg (2.9 — 3.1 lb, 13 — 14 N)

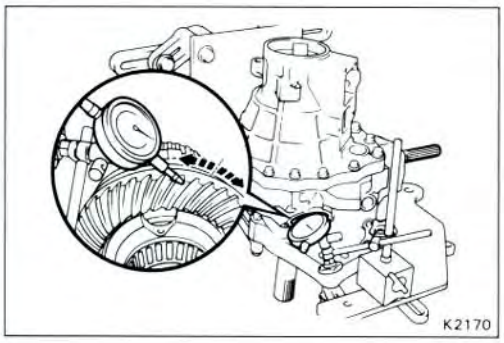
Reused bearing

Add driven pinion preload 0.5 — 0.9 kg (1 — 2 lb, 5 — 9 N)



NOTE: Turn the output shaft counterclockwise and clockwise several times.

(e) When the standard value for total preload is exceeded, remove the transfer right case, push in the adjusting nut and outer race. Again adjust the total preload.

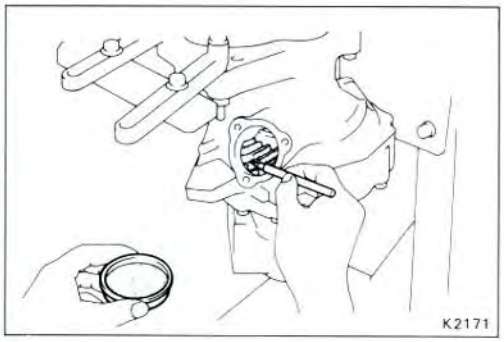


3. CHECK RING GEAR BACKLASH

(a) Using a dial indicator, measure the ring gear backlash.

Backlash: 0.13 — 0.18 mm (0.0051 — 0.0071 in.)

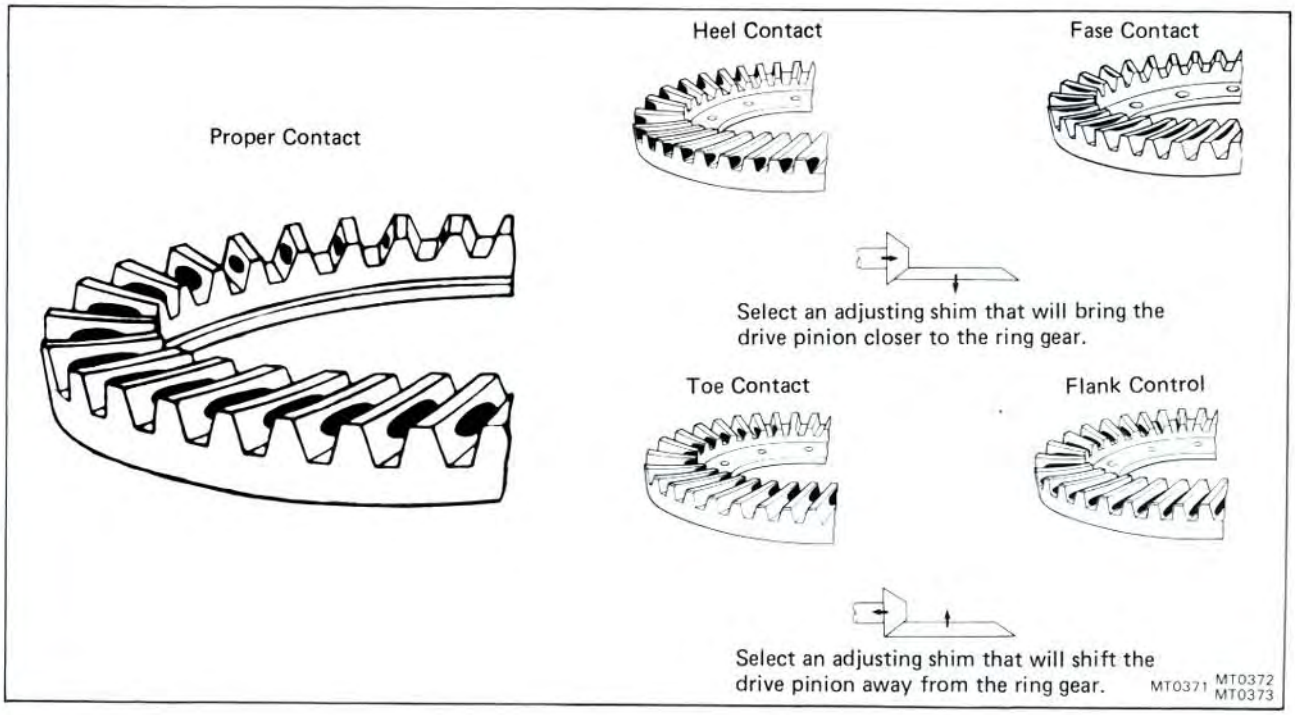
(b) When the backlash is outside the standard value, select a different plate washer to the one selected step 2. Again adjust the backlash and total preload.



4. CHECK TOOTH CONTACT

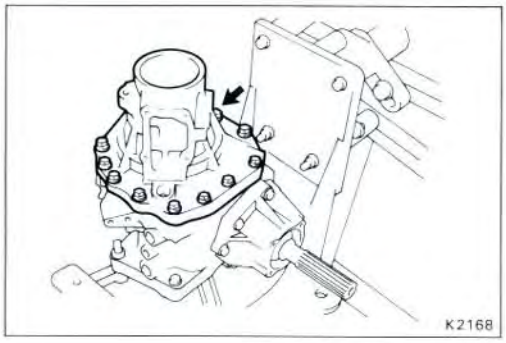
(a) Coat 3 or 4 teeth at four different position on the ring gear with red lead.

(b) Rotate the ring gear, inspect the teeth pattern.



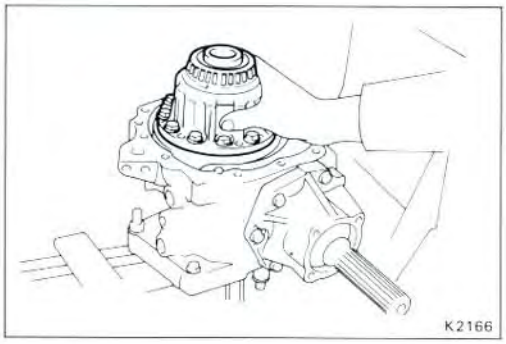
(e) If the teeth are not contacting properly, again select the proper shim and plate.

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
A	0.30 (0.0118)	F	0.45 (0.0177)
B	0.33 (0.0130)	G	0.48 (0.0189)
C	0.36 (0.0142)	H	0.51 (0.0201)
D	0.39 (0.0154)	J	0.54 (0.0213)
E	0.42 (0.0165)	K	0.57 (0.0224)

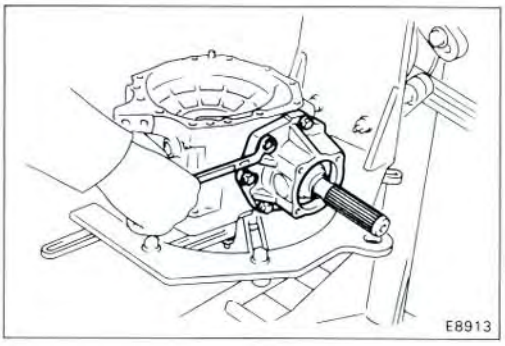


5. **REMOVE RING GEAR MOUNTING CASE ASSEMBLY**

(a) Remove the twelve bolts and transfer right case.

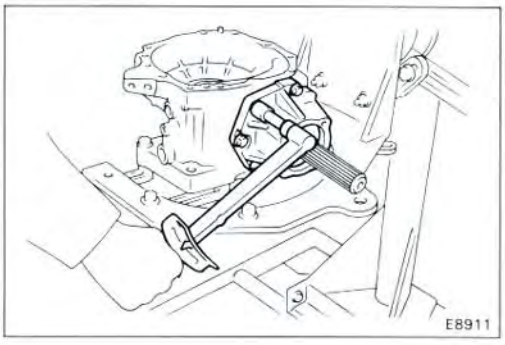


(b) Remove the ring gear mounting case assembly.



6. **REMOVE DRIVEN PINION BEARING CAGE ASSEMBLY**

Remove the six bolts and bearing cage assembly.



7. **INSTALL DRIVEN PINION BEARING CAGE ASSEMBLY**

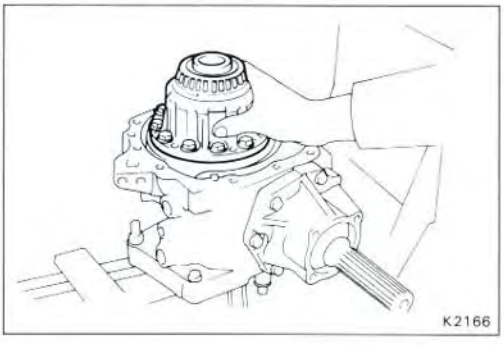
(a) Coat the O-ring with gear oil.

(b) Install the O-ring to the driven pinion bearing cage.

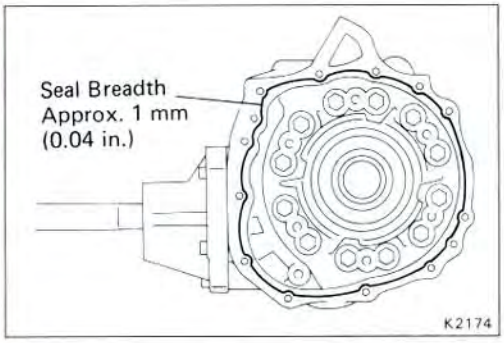
(c) Install the driven pinion bearing cage with the adjusting shim (previously selected) to the transfer left case.

(d) Install and torque the six bolts.

Torque: 400 kg-cm (29 ft-lb, 39 N·m)



8. **INSTALL RING GEAR MOUNTING CASE ASSEMBLY**



9. INSTALL TRANSFER RIGHT CASE

(a) Remove any packing material and be careful not to drop oil on the contacting surfaces of the transfer left case or right case.

(b) Apply seal packing to the transfer left case as shown in the figure.

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

NOTE: Install the transfer right case as soon as the seal packing is applied.

(c) Apply sealant to the bolt threads.

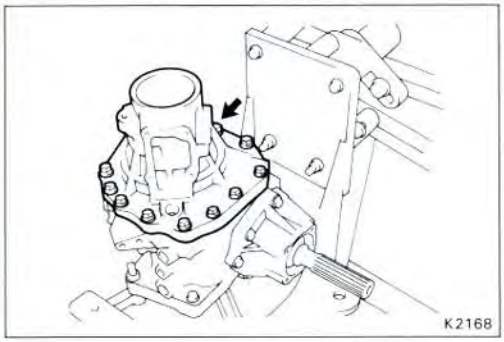
Sealant: Part No.08833-00080, THREE BOND 1344, LOCTITE 242 OR EQUIVALENT

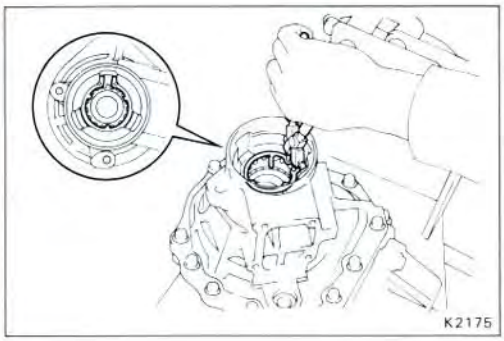
(d) Install and torque the twelve bolts.

Torque: 450 kg-cm (33 ft-lb, 44 N·m)

10. CHECK TOTAL PRELOAD

(See page MT-76)

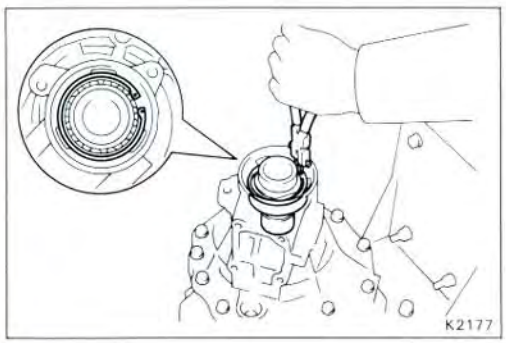




11. INSTALL ADJUSTING NUT LOCK PLATE

Using snap ring pliers, install the lock plate so that the projection from the lock plate fits properly into the groove of the adjusting nut.

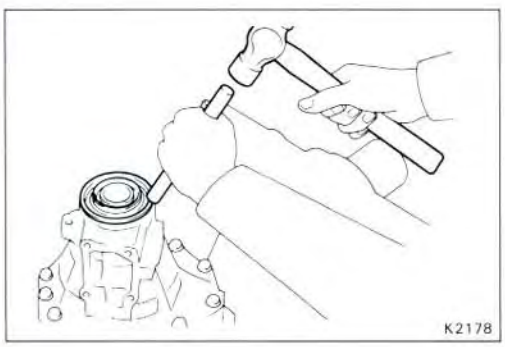
NOTE: Choose one of the two types of lock plate can be installed, tighten the adjusting nut to the minimum limit.



12. INSTALL SIDE GEAR SHAFT HOLDER

(a) Install the side gear shaft holder to the transfer right case.

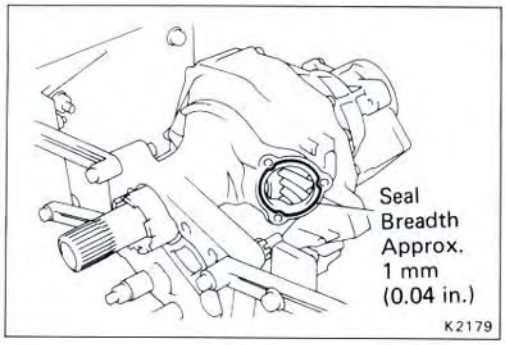
(b) Using snap ring pliers, install the snap ring.



13. INSTALL OIL SEAL

(a) Coat the lip of the oil seal with MP grease.

(b) Using a brass bar and hammer, drive in a new oil seal.



14. INSTALL TRANSFER INSPECTION HOLE COVER

(a) Remove any packing material and be careful not to drop oil on the contacting surfaces of transfer left case or transfer inspection hole cover.

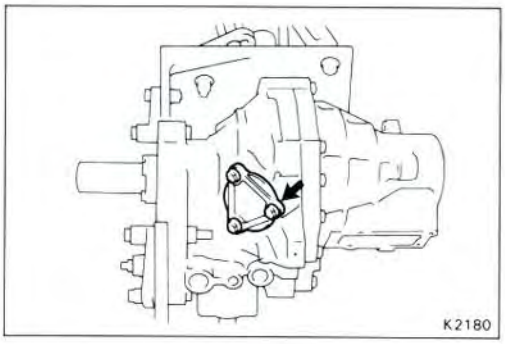
(b) Apply seal packing to the transfer left case as shown in the figure.

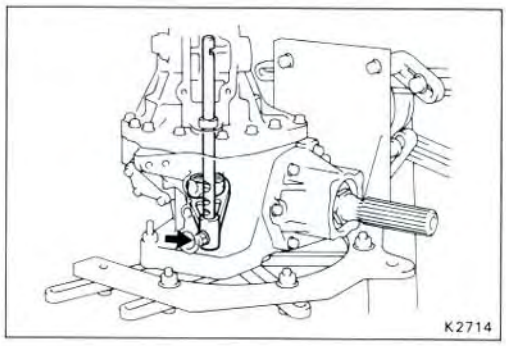
Seal packing: Part No.08826-00090, THREE BOND 1281 or equivalent

NOTE: Install the transfer inspection hole cover as soon as the seal packing is applied.

(c) Install and torque the three bolts.

Torque: 160 kg-cm (12 ft-lb, 16 N·m)





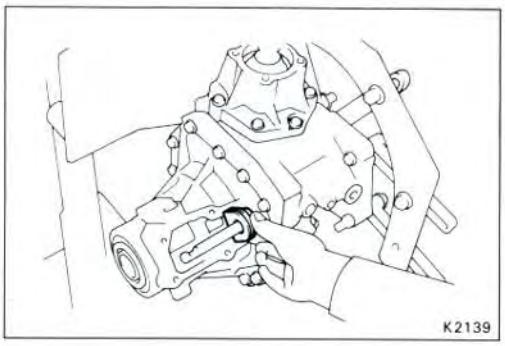
15. INSTALL DIFFERENTIAL LOCK SHIFT FORK SHAFT

(a) Install the differential lock sleeve with shift fork.

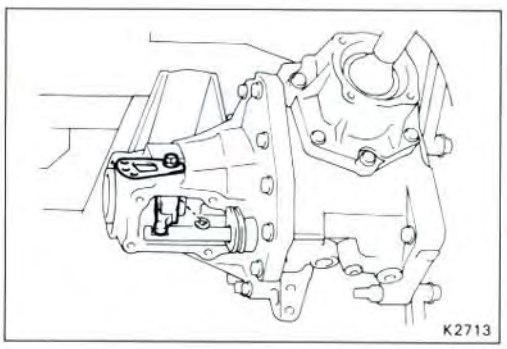
(b) Install the shift fork shaft to the transfer case.

(c) Install and torque the bolt.

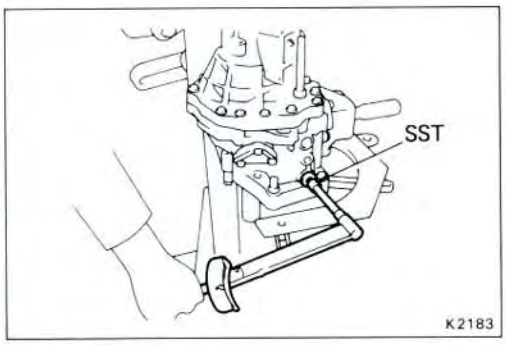
Torque: 160 kg-cm (12 ft-lb, 16 N·m)



(b) Install the transfer case upper cover bushing.



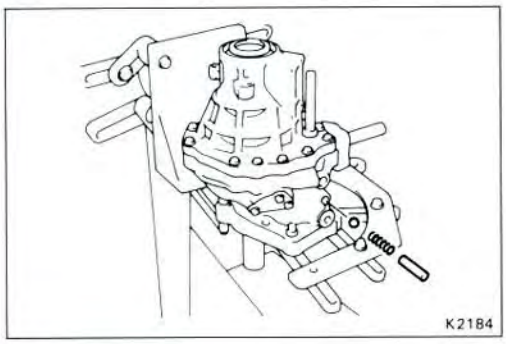
(c) Install the inner lever in the shift fork shaft groove. Insert the shift lever shaft and install the E-ring.



(d) Using SST, install and torque the plug.

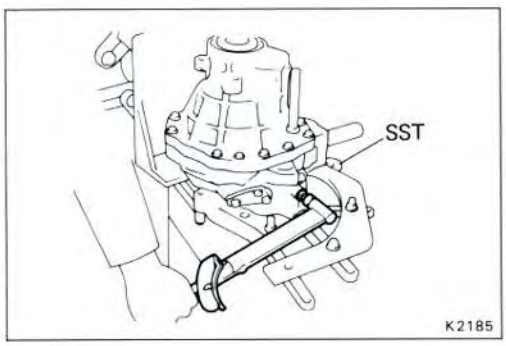
SST 09043-38100

Torque: 400 kg-cm (29 ft-lb, 39 N·m)



16. INSTALL LOCKING BALL, SPRING, SEAT AND PLUG

(a) Using magnetic finger, install the locking ball, spring and seat.



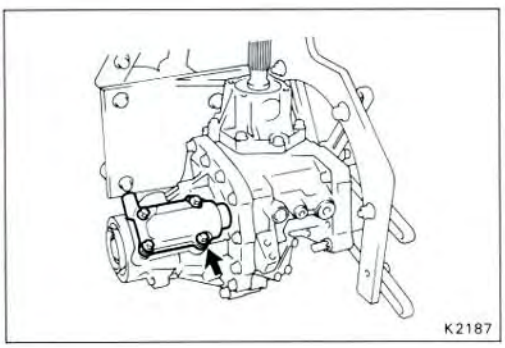
(b) Apply sealant to the plug threads.

Sealant: Part No.08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

(c) Using SST, install and torque the plug.

SST 09313-30021

Torque: 250 kg-cm (18 ft-lb, 25 N·m)

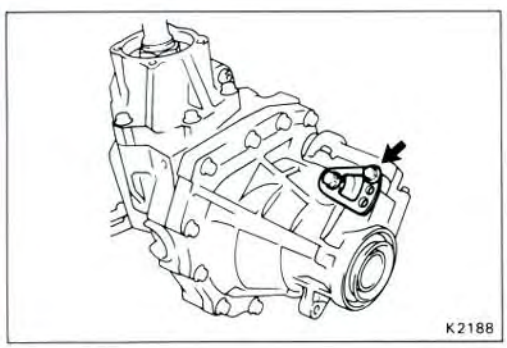


17. INSTALL TRANSFER CASE COVER

(a) Install the new gasket and case cover.

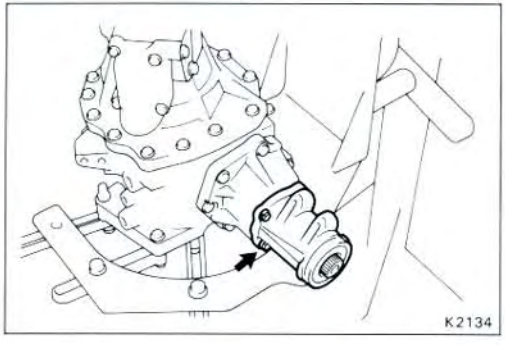
(b) Install and torque the four bolts.

Torque: 175 kg-cm (13 ft-lb, 17 N·m)



(c) Install the bolt to the shift lever shaft as shown.

Torque: 200 kg-cm (14 ft-lb, 20 N·m)



18. INSTALL EXTENSION HOUSING

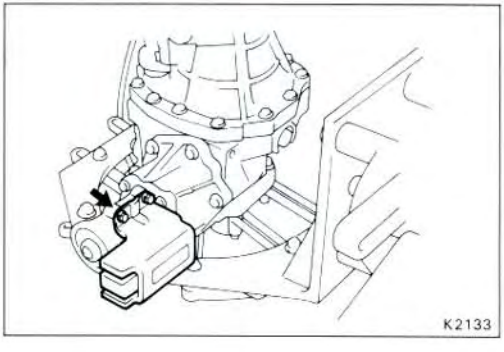
(a) Coat the O-ring with gear oil.

(b) Install the O-ring to the extension housing.

(c) Install the extension housing to the driven pinion bearing cage.

(d) Install and torque the four bolts.

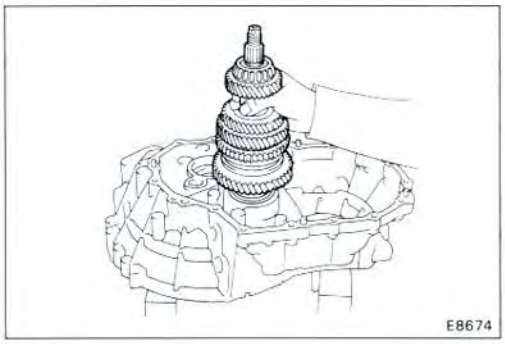
Torque: 260 kg-cm (19 ft-lb, 25 N·m)



19. INSTALL DYNAMIC DAMPER

Install and torque the four bolts.

Torque: 260 kg-cm (19 ft-lb, 25 N·m)


E8674

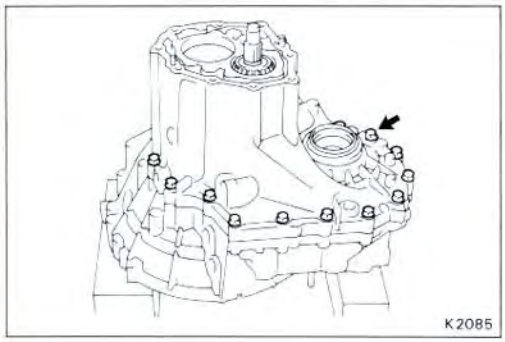
INSTALLATION OF COMPONENT PARTS

(See page MT-8 to MT-10)

NOTE: Coat all of the sliding and rotating surface with gear oil before assembly.

1. ADJUST OUTPUT SHAFT PRELOAD

(a) Install the output shaft assembly to the transaxle case.

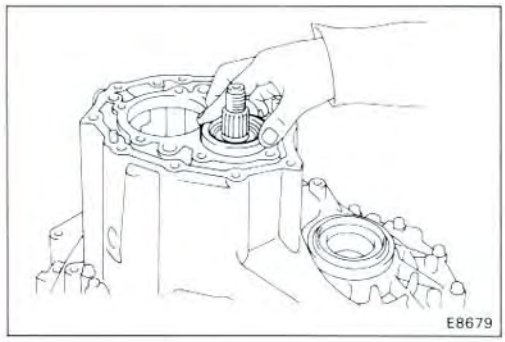

K2085

(b) Install the transmission case to the transaxle case.

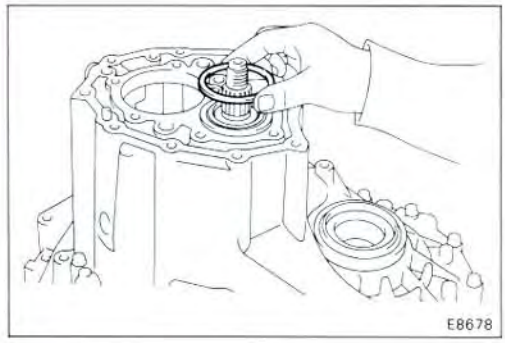
If necessary, tap on the case with a plastic hammer.

(c) Install and torque the seventeen bolts.

Torque: 300 kg-cm (22 ft-lb, 29 N·m)

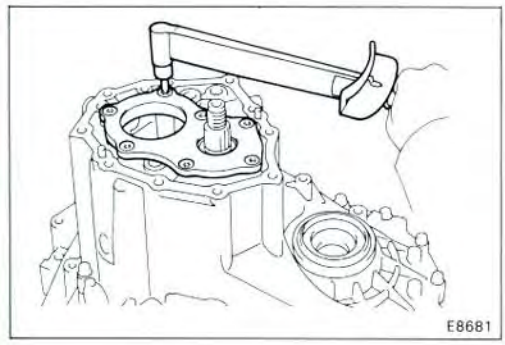

E8679

(d) Install the output shaft rear bearing outer race.


E8678

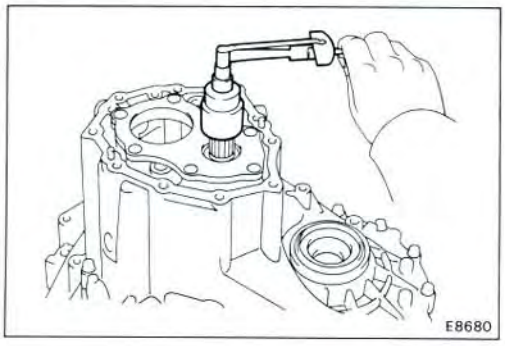
(e) Install the adjust shim.

NOTE: When reusing the output shaft bearing, first install a shim of the same thickness as before. If installing a new tapered roller bearing, first select and install a shim of lesser thickness than before.


E8681

(f) Using a torx wrench, install and torque the seven torx screws.

Torque: 430 kg-cm (31 ft-lb, 42 N·m)


E8680

(g) Install the new lock nut to the output shaft.

(h) Turn the output shaft counterclockwise and clockwise several times.

(i) Using a torque meter, measure the preload of the output shaft.

Preload (at starting)

New bearing

8.0 — 16.0 kg-cm

(6.9 — 13.9 in.-lb, 0.78 — 1.57 N·m)

Reused bearing

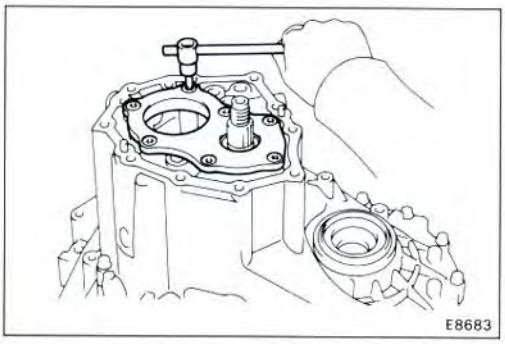
5.0 — 10.0 kg-cm

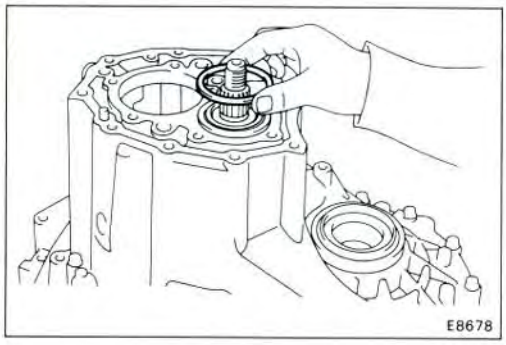
(4.3 — 8.7 in.-lb, 0.49 — 0.98 N·m)

If the preload is not within specification, select the thrust washers.

NOTE: The preload will change about 4 — 5 kg-cm (3.5 — 4.3 in.-lb, 0.4 — 0.5 N·m) with each shim thickness.

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
—	0.80 (0.0315)	—	1.15 (0.0453)
0	1.30 (0.0512)	D	1.95 (0.0768)
1	1.35 (0.0531)	E	2.00 (0.0787)
2	1.40 (0.0551)	F	2.05 (0.0807)
3	1.45 (0.0571)	G	2.10 (0.0827)
4	1.50 (0.0591)	H	2.15 (0.0846)
5	1.55 (0.0610)	J	2.20 (0.0866)
6	1.60 (0.0630)	K	2.25 (0.0886)
7	1.65 (0.0650)	L	2.30 (0.0906)
8	1.70 (0.0669)	M	2.35 (0.0925)
9	1.75 (0.0689)	N	2.40 (0.0945)
A	1.80 (0.0709)	P	2.45 (0.0965)
B	1.85 (0.0728)	Q	2.50 (0.0984)
C	1.90 (0.0748)		

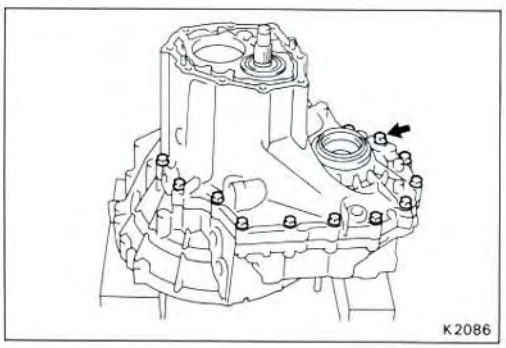

E8683


E8678

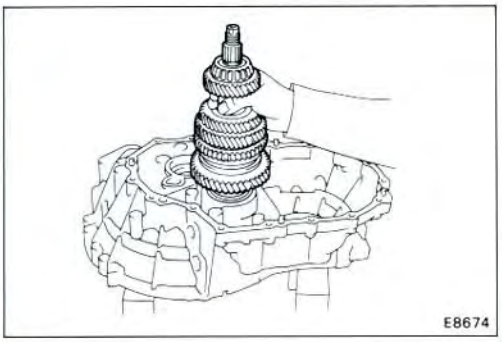
(j) Remove the lock nut.

(k) Using a torx wrench, remove the seven torx screws.

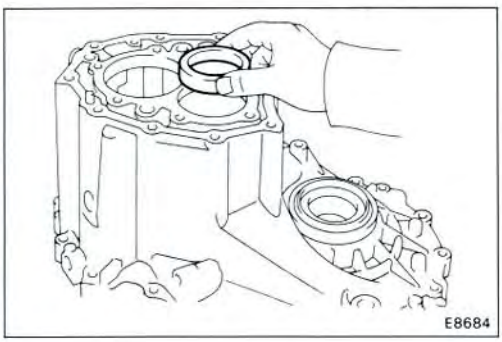
(l) Remove the adjusting shim.


K2086

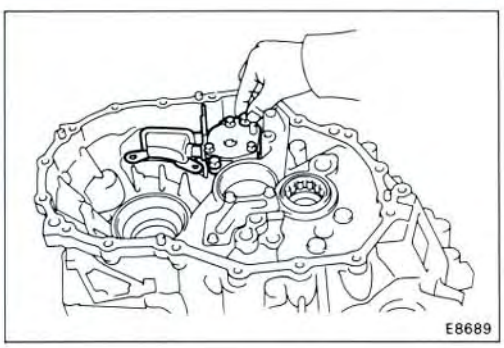
(m) Remove the seventeen bolts and tap off the case with a plastic hammer.


E8674

(n) Remove the output shaft rear bearing outer race.


E8684

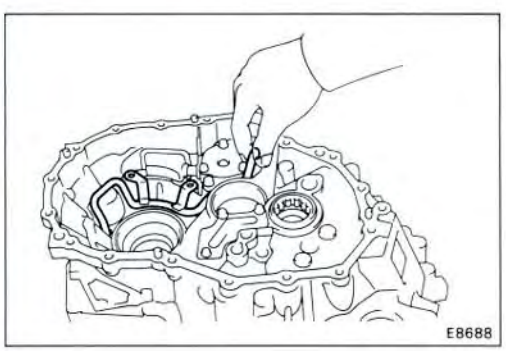
(o) Remove the output shaft assembly.


E8689

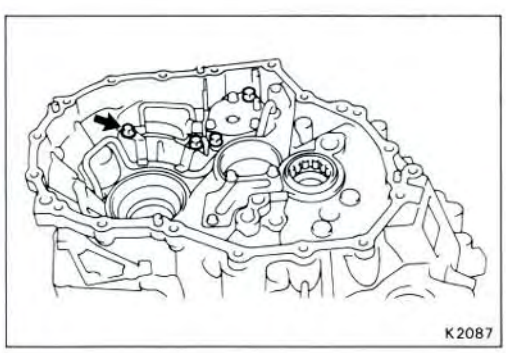
2. INSTALL OIL PUMP ASSEMBLY AND OIL PIPE

(a) Install the oil pump assembly. Install two bolts.

NOTE: Do not drop the oil pump gasket.

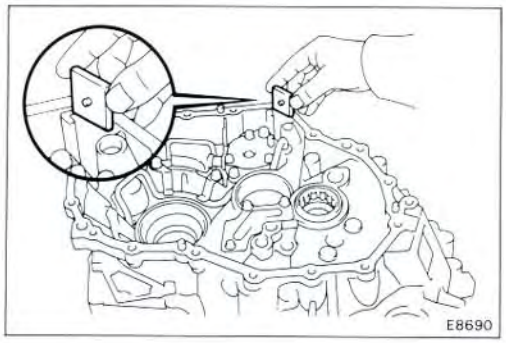

E8688

(b) Install the oil pipe.

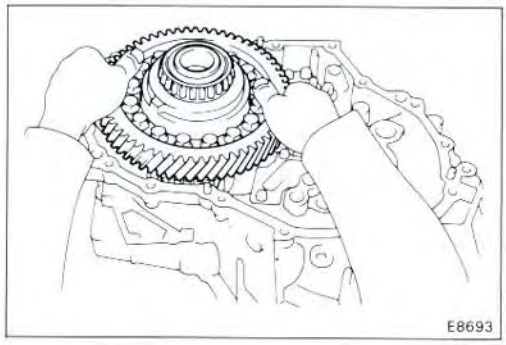

K2087

(c) Torque the four bolts.

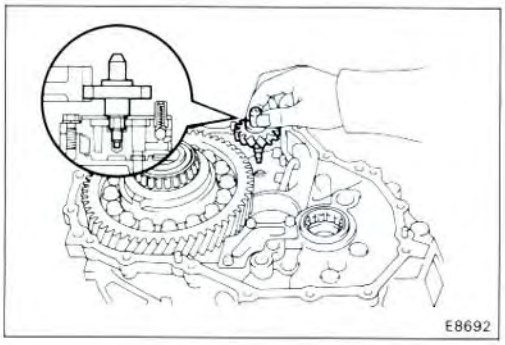
Torque: 175 kg-cm (13 ft-lb, 17 N·m)



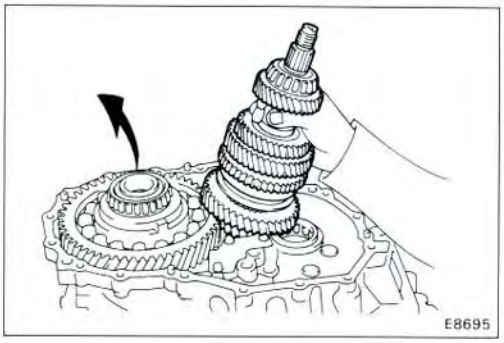
3. INSTALL MAGNET TO TRANSAXLE CASE



4. INSTALL DIFFERENTIAL CASE ASSEMBLY

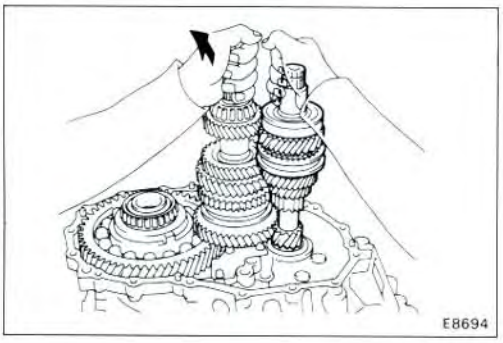


5. INSTALL OIL PUMP DRIVE GEAR



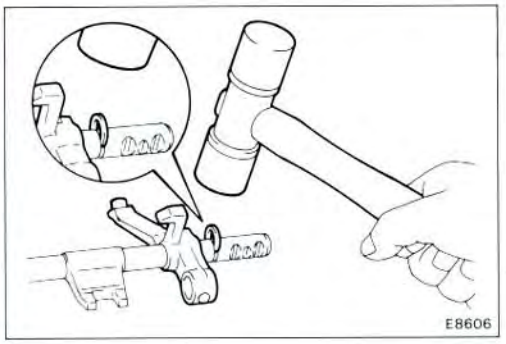
6. INSTALL OUTPUT SHAFT ASSEMBLY

Left the differential case assembly, install the output shaft assembly.



7. INSTALL INPUT SHAFT ASSEMBLY

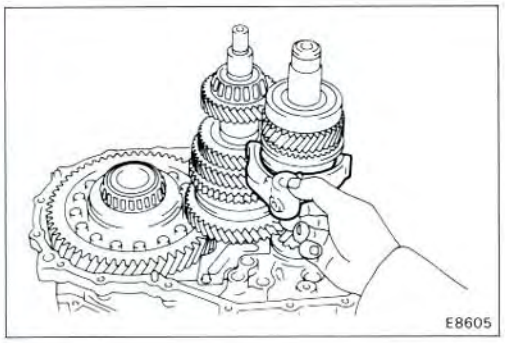
Leaning the output shaft to the differential side, install the input shaft assembly.



8. **INSTALL SNAP RING**

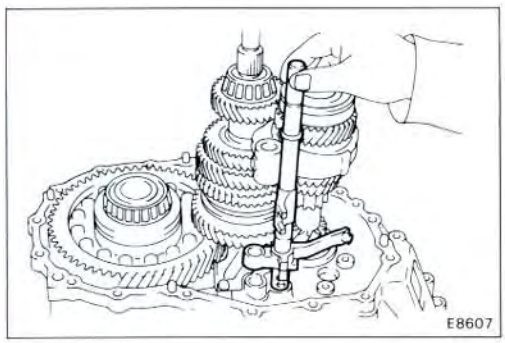
(a) Install the reverse shift fork to the No.3 shift fork.

(b) Using a hammer, install the snap ring.

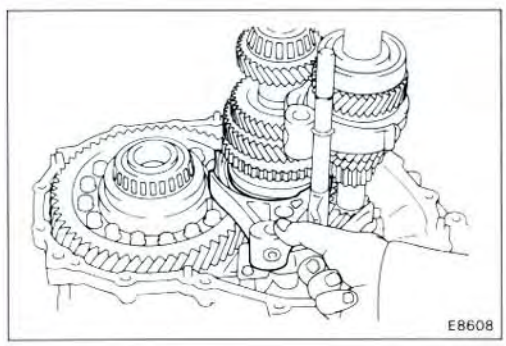


9. **INSTALL NO.2 SHIFT FORK AND NO.3 SHIFT FORK SHAFT WITH REVERSE SHIFT FORK**

(a) Place No.2 shift fork into the groove of No.2 hub sleeve.

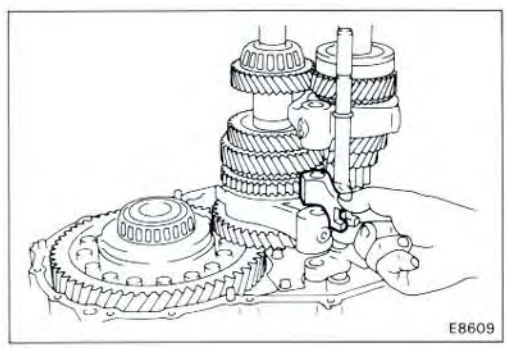


(b) Install the No.3 shift fork shaft with reverse shift fork to the case.

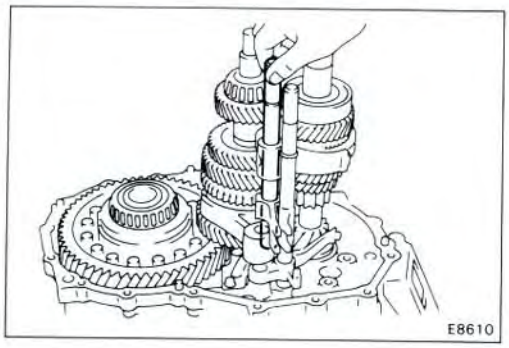


10. **INSTALL NO.1 SHIFT FORK, SHIFT HEAD AND N0.2 SHIFT FORK SHAFT**

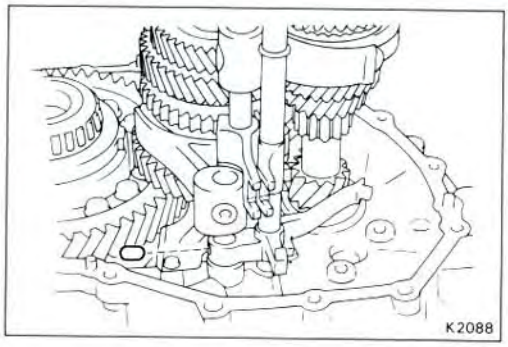
(a) Place No.1 shift fork into the groove of No.1 hub sleeve.



(b) Put shift head onto the No.1 shift fork.

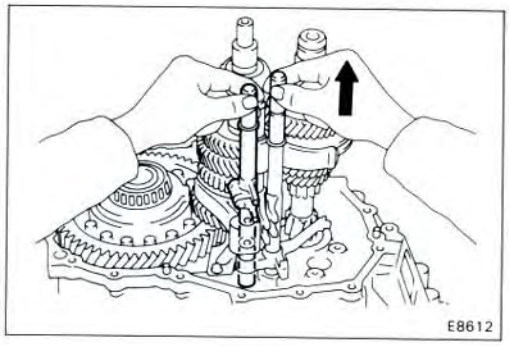


(c) Install the No.2 shift fork shaft to the case, through the No.2 shift fork, the shift head and the No.1 shift fork.



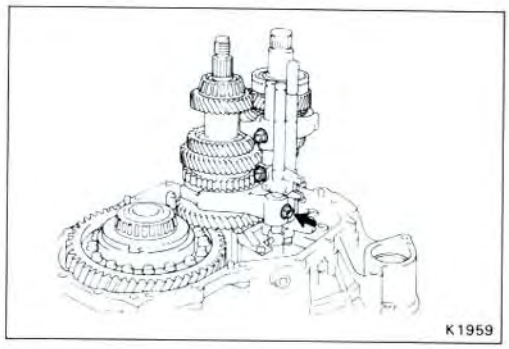
11. INSTALL NO.1 SHIFT FORK SHAFT

(a) Using a magnetic finger, install the interlock roller into the reverse shift fork.



(b) Install the No.1 shift fork shaft to the case, through the No.1 shift fork and reverse shift fork.

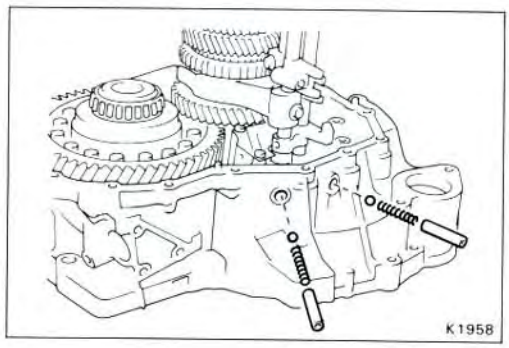
NOTE: If it is difficult to put the fork shaft through the reverse shift fork, pull up the No.3 shift fork shaft.



12. INSTALL SET BOLTS

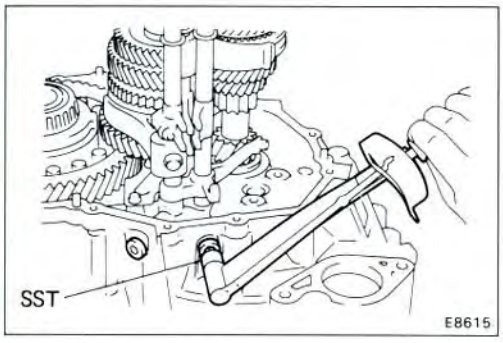
Install and torque the three bolts.

Torque: 240 kg-cm (17 ft-lb, 24 N·m)



13. INSTALL LOCKING BALLS, SPRINGS, SPRING SEATS AND SCREW PLUGS

(a) Install the two locking balls, spring and spring seats.



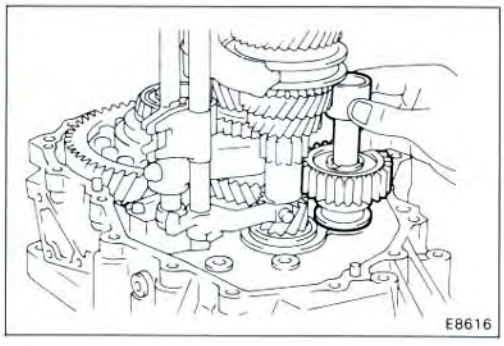
(b) Apply sealant to the screw plugs.

Sealant: Part No.08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

(c) Using SST, torque the screw plugs.

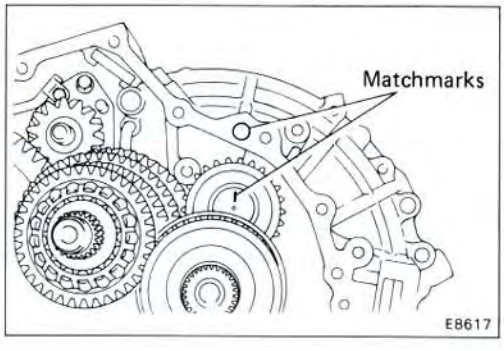
SST 09313-30021

Torque: 250 kg-cm (18 ft-lb, 25 N·m)

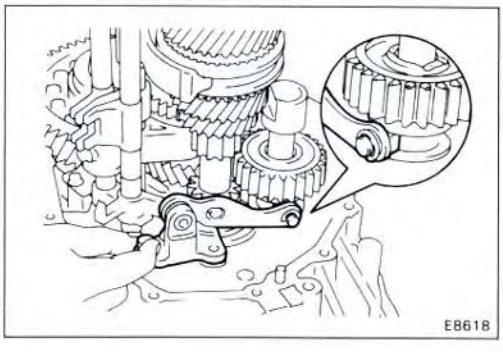


14. INSTALL REVERSE IDLER GEAR SHAFT AND GEAR

(a) Install the reverse idler gear shaft with gear to the case.



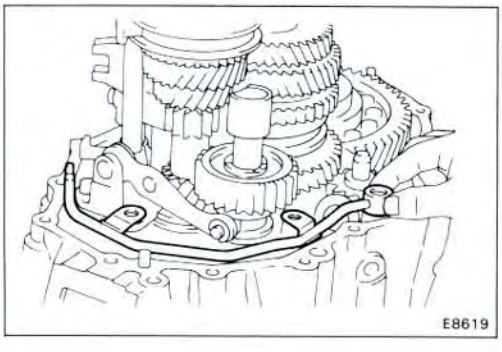
(c) Align the matchmarks, as shown.



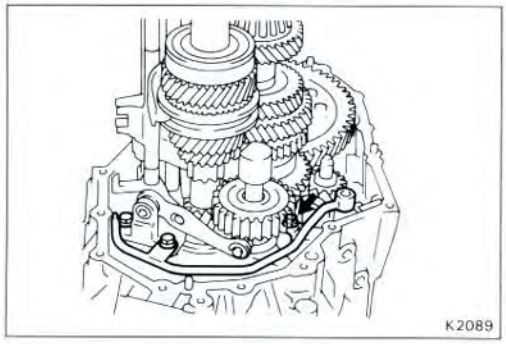
15. INSTALL REVERSE SHIFT ARM BRACKET ASSEMBLY AND NO.2 OIL PIPE

(a) Put the reverse shift fork pivot into the reverse shift arm and install the reverse shift arm bracket to the transaxle case.

(b) Install the bolt.

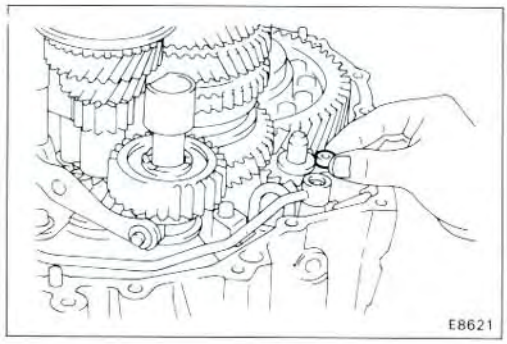


(c) Install the No.2 oil pipe.

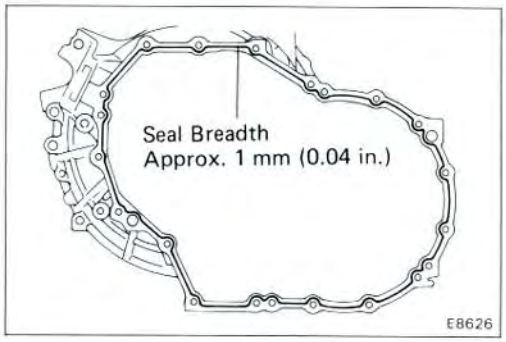


(d) Torque the two oil pipe bolts and shift arm bracket bolt.

Torque: 175 kg-cm (13 ft-lb, 17 N·m)



(e) Install the new gasket to the oil pipe.



16. INSTALL TRANSMISSION CASE

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

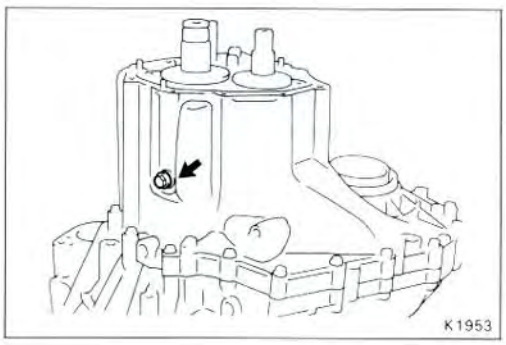
(b) Apply seal packing to the transmission case as shown in the figure.

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

NOTE: Install the transmission case as soon as the seal packing is applied.

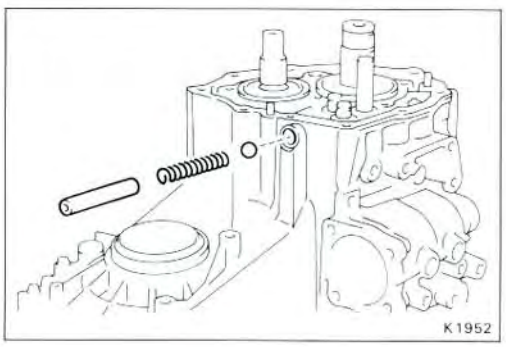
(c) Install and torque the seventeen bolts.

Torque: 300 kg-cm (22 ft-lb, 29 N·m)



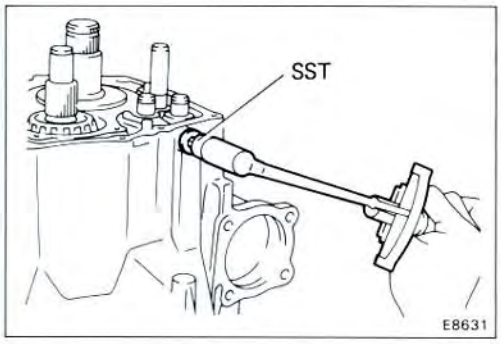
17. INSTALL AND TORQUE REVERSE IDLER GEAR SHAFT BOLT WITH GASKET

Torque: 300 kg-cm (22 ft-lb, 29 N·m)



18. INSTALL LOCKING BALL, SPRING, SPRING SEAT AND SCREW PLUG

(a) Install the locking ball, spring and spring seat.



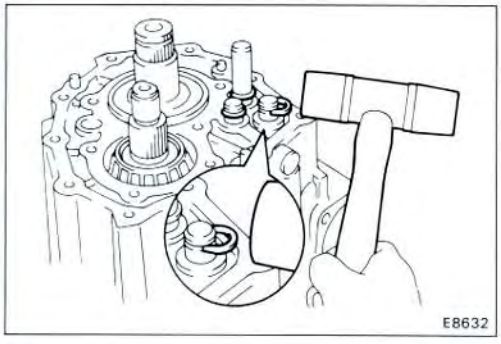
(b) Apply sealant to the screw plug.

Sealant: Part No.08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

(c) Using SST, torque the screw plug.

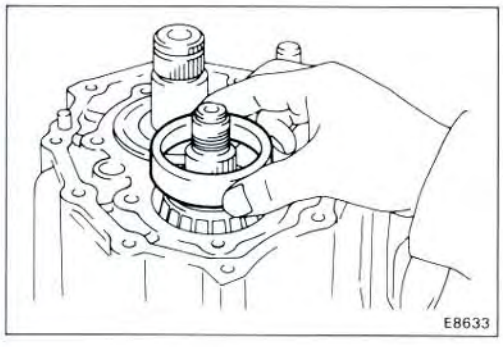
SST 09313-30021

Torque: 250 kg-cm (18 ft-lb, 25 N·m)



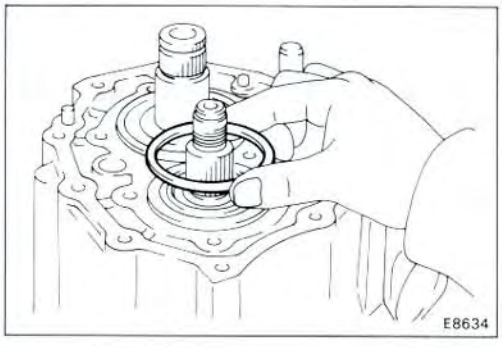
19. INSTALL SNAP RINGS

Using a plastic hammer, install the three snap rings.

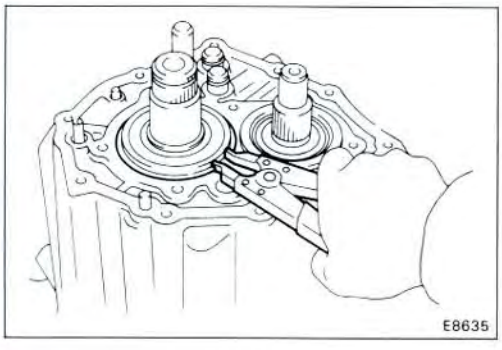


20. INSTALL REAR BEARING RETAINER

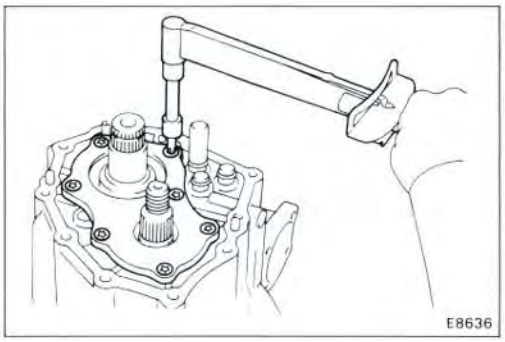
(a) Install the output shaft rear bearing outer race.



(b) Install the adjusting shim.



(c) Using snap ring pliers, install the snap ring to the input shaft rear bearing.

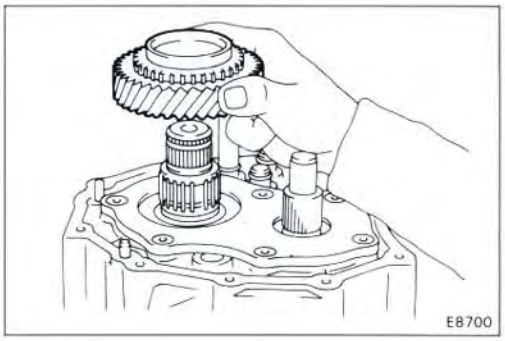


(d) Apply sealant to the screw plugs.

Sealant: Part No.08833-00070, THREE BOND 1324, LOCTITE 242 or equivalent

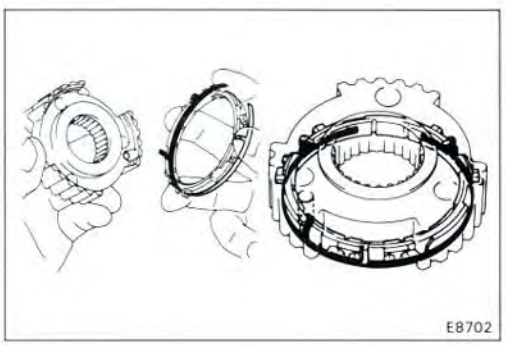
(e) Using a torx wrench, torque the screw plug.

Torque: 430 kg-cm (31 ft-lb, 42 N·m)

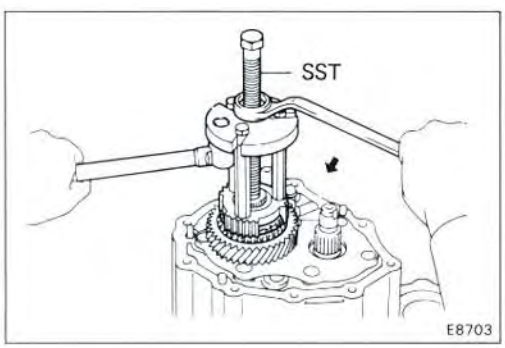


21. INSTALL FIFTH GEAR AND NO.3 CLUTCH HUB

(a) Install the spacer, needle roller bearings and 5th gear.

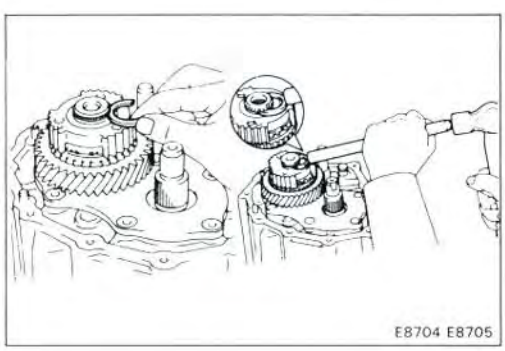


(b) Install the synchronizer ring and key spring to the No.3 clutch hub.



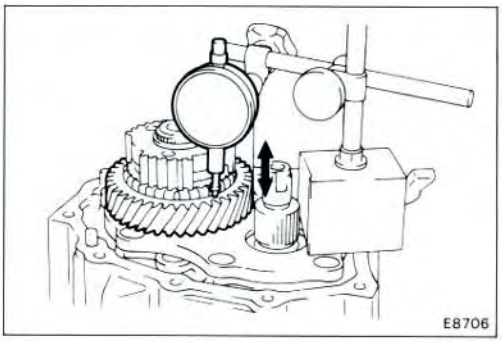
(c) Using SST, install the No.3 clutch hub with synchronizer ring and key spring.

SST 09310-17010 (09310-07010, 09310-07020, 09310-07030)



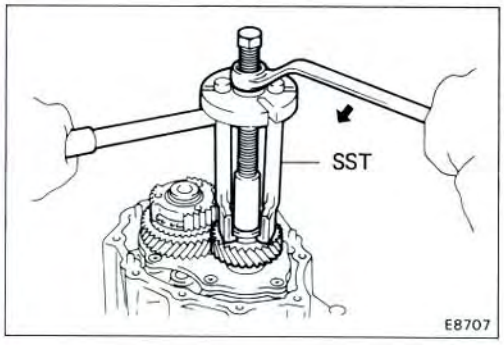
(d) Select a snap ring that will allow minimum axial play and install it on the shaft.

Mark	Thickness	mm (in.)
Q	2.25 — 2.30	(0.0886 — 0.0906)
R	2.30 — 2.35	(0.0906 — 0.0925)
S	2.35 — 2.40	(0.0925 — 0.0945)
T	2.40 — 2.45	(0.0945 — 0.0965)
U	2.45 — 2.50	(0.0965 — 0.0984)
V	2.50 — 2.55	(0.0984 — 0.1004)
W	2.55 — 2.60	(0.1004 — 0.1024)
X	2.60 — 2.65	(0.1024 — 0.1043)
Y	2.65 — 2.70	(0.1043 — 0.1063)



(e) Using a dial indicator, measure the 5th gear thrust clearance.

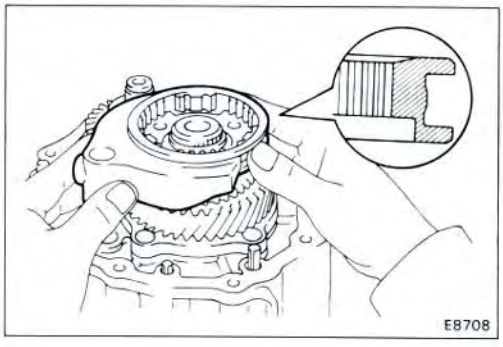
Standard clearance: 0.10 — 0.57 mm (0.004 — 0.022 in.)



22. INSTALL FIFTH DRIVEN GEAR

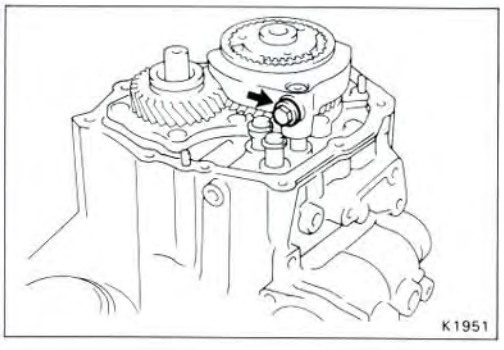
Using SST, install the 5th driven gear.

SST 09310-17010 (09310-07010, 09310-07020 09310-07040, 09310-07050)



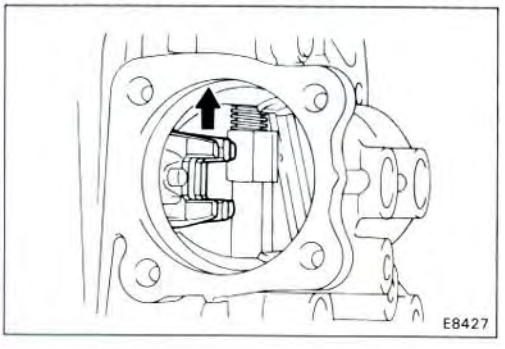
23. INSTALL NO.3 HUB SLEEVE AND FIFTH SHIFT FORK

(a) Install the No.3 hub sleeve and 5th shift fork.



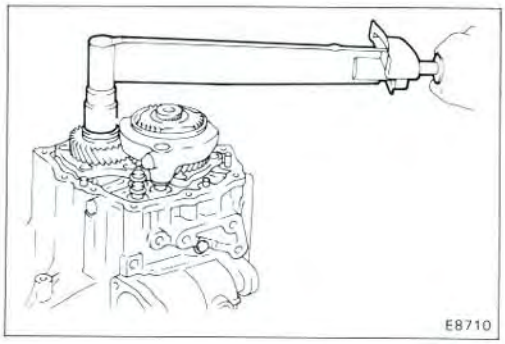
(b) Install and torque the set bolt.

Torque: 240 kg-cm (17 ft-lb, 24 N·m)



24. INSTALL LOCK NUT

(a) Engage the gear double meshing.

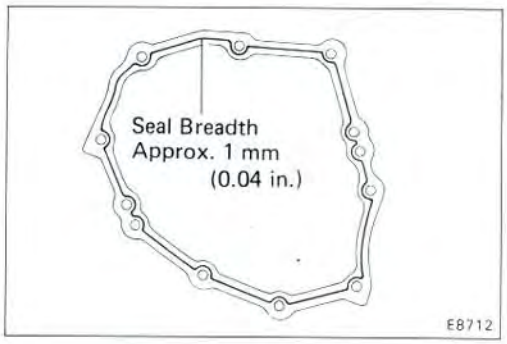


(b) Install and torque the nut.

Torque: 1,250 kg-cm (90 ft-lb, 123 N·m)

(c) Disengage the gear double meshing.

(d) Stake the lock nut.



25. INSTALL TRANSMISSION CASE COVER

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

(b) Apply seal packing to the transmission case as shown in the figure.

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

NOTE: Install the transmission case cover as soon as the seal packing is applied.

(c) Install and torque the ten bolts.

Torque: 300 kg-cm (22 ft-lb, 29 N·m)

26. INSTALL SHIFT AND SELECT LEVER SHAFT ASSEMBLY

(a) Install the shift and select lever shaft assembly and new gasket.

(b) Apply sealant to the bolt threads.

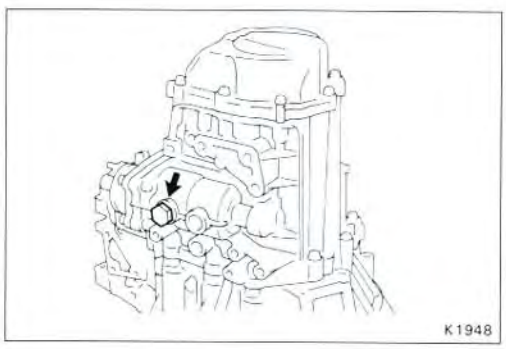
Sealant: Part No.08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

(c) Install and torque the four bolts.

Torque: 200 kg-cm (14 ft-lb, 20 N·m)

(d) Install and torque the lock bolt with gasket.

Torque: 500 kg-cm (36 ft-lb, 49 N·m)



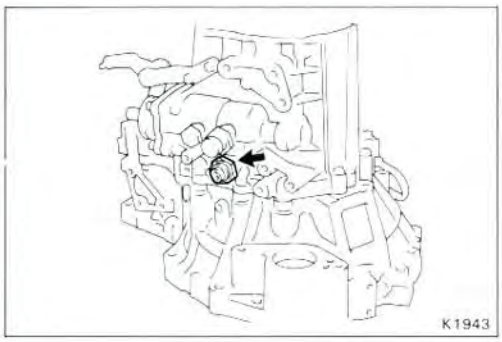
27. INSTALL NO.2 SELECTING BELLCRANK WITH SELECTING BELLCRANK SUPPORT

(a) Apply sealant to the bolt threads.

Sealant: Part No.08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

(b) Install and torque the two bolts.

Torque: 200 kg-cm (14 ft-lb, 20 N·m)

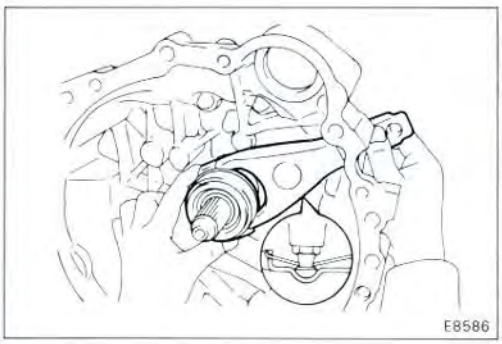


28. INSTALL BACK-UP LIGHT SWITCH

Using SST, install and torque the back-up light switch.

Torque: 410 kg-cm (30 ft-lb, 40 N·m)

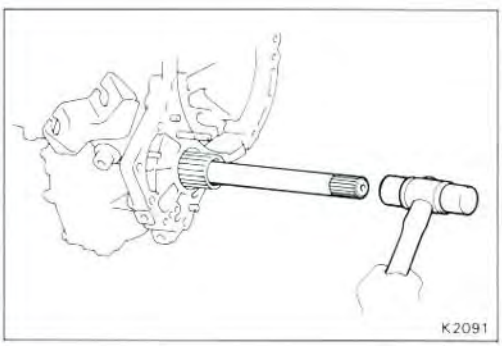
29. INSTALL SPEEDOMETER DRIVEN GEAR



30. INSTALL RELEASE FORK AND BEARING

Apply molybdenum disulphide lithium base grease to the following part:

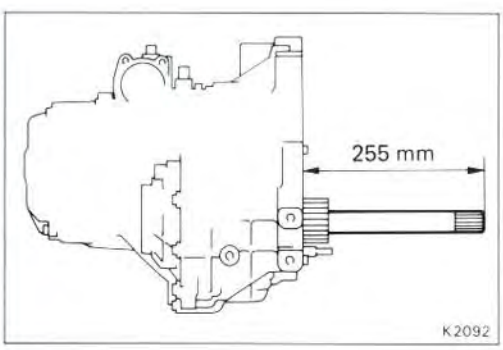
- Release bearing hub inside groove
- Input shaft spline
- Release fork contact surface



31. INSTALL DIFFERENTIAL SIDE GEAR INTERMEDIATE SHAFT

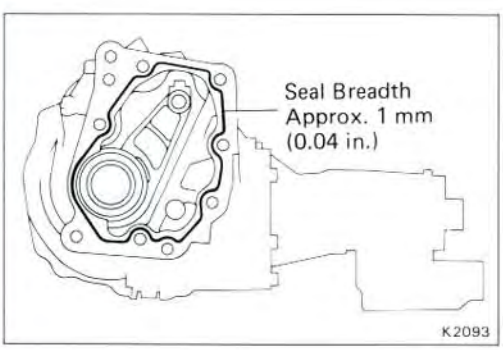
(a) Coat the MP grease to the intermediate shaft.

(b) Using a plastic hammer, correctly drive the intermediate shaft straight until the top of it touches the differential pinion shaft.



NOTE: Keeping the intermediate shaft on the pinion shaft of differential, measure the point in the illustration.

Protrusion length: 255 mm (10.04 in.)



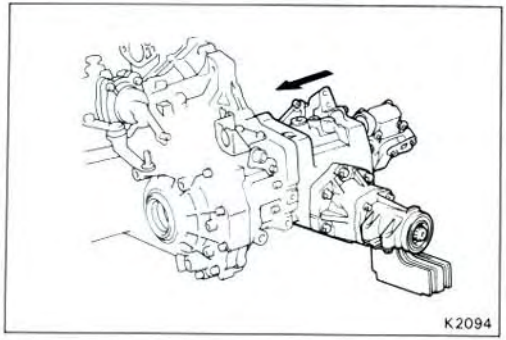
32. INSTALL TRANSFER ASSEMBLY

(a) Remove any packing material and be careful not to drop oil on the contacting surfaces of the transfer or transaxle.

(b) Apply seal packing to the transfer as shown in the figure.

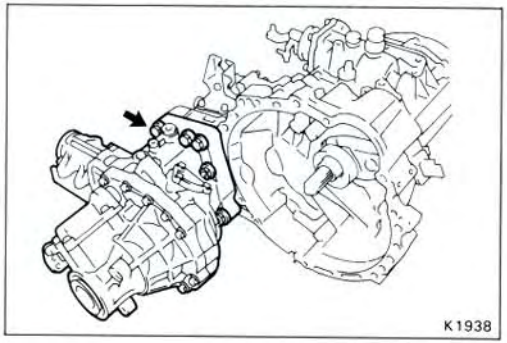
Seal packing: Part No.08826-00090, THREE BOND 1281 or equivalent

NOTE: Install the transfer as soon as the seal packing is applied.


K2094

(c) Install the transfer assembly to the transaxle assembly.

NOTE: Shift into 4th gear, install the transfer assembly while turning the input shaft of the transaxle.


K1938

(d) Apply sealant to the bolt threads.

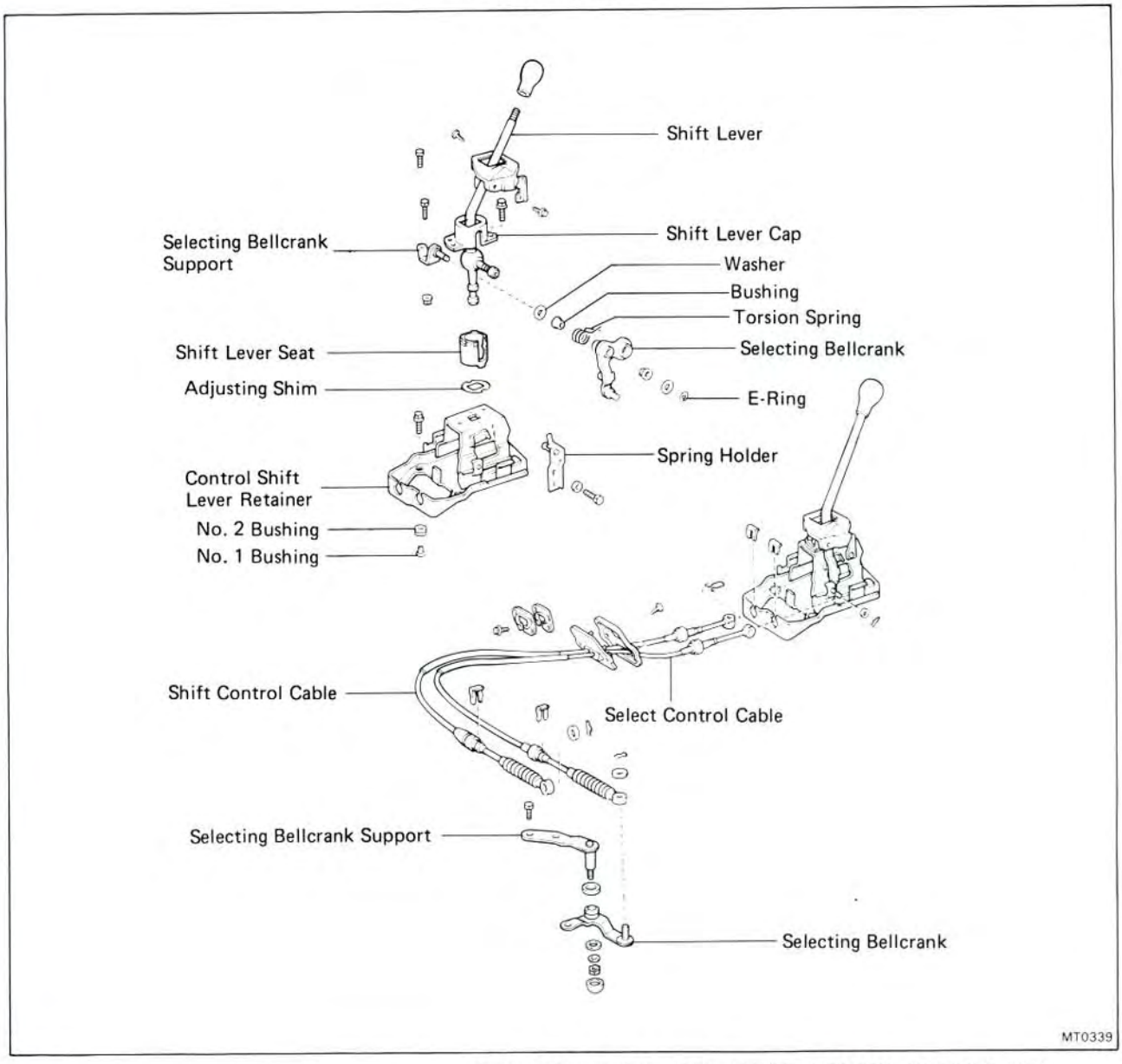
Sealant: Part No.08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

(e) Install and torque the three bolts and five nuts.

Torque: 700 kg-cm (51 ft-lb, 69 N·m)

SHIFT LEVER AND CONTROL CABLE

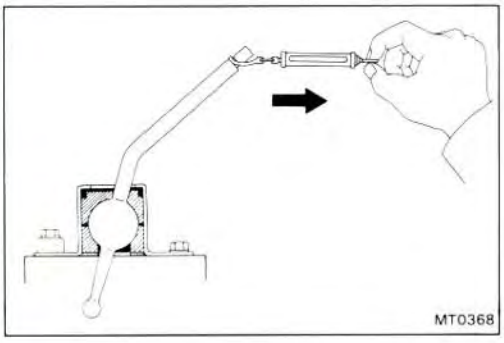
COMPONENTS



ADJUSTMENT OF SHIFT LEVER FREEPLAY

ADJUST SHIFT LEVER SEAT CLEARANCE

Select a shim of a thickness that allow a preload of 50 — 100 g (0.1 — 0.2 lb, 0.5 1.0 N) at the top of lever and install it in the shift lever seat.



Shim thickness

Mark	Thickness	mm (in.)	Mark	Thickness	mm (in.)
C or 5	0.5	(0.020)	G or 9	0.9	(0.035)
D or 6	0.6	(0.024)	H or 10	1.0	(0.039)
E or 7	0.7	(0.028)	K or 11	1.1	(0.043)
F or 8	0.8	(0.031)	L or 12	1.2	(0.047)

PROPELLER SHAFT

PRECAUTION

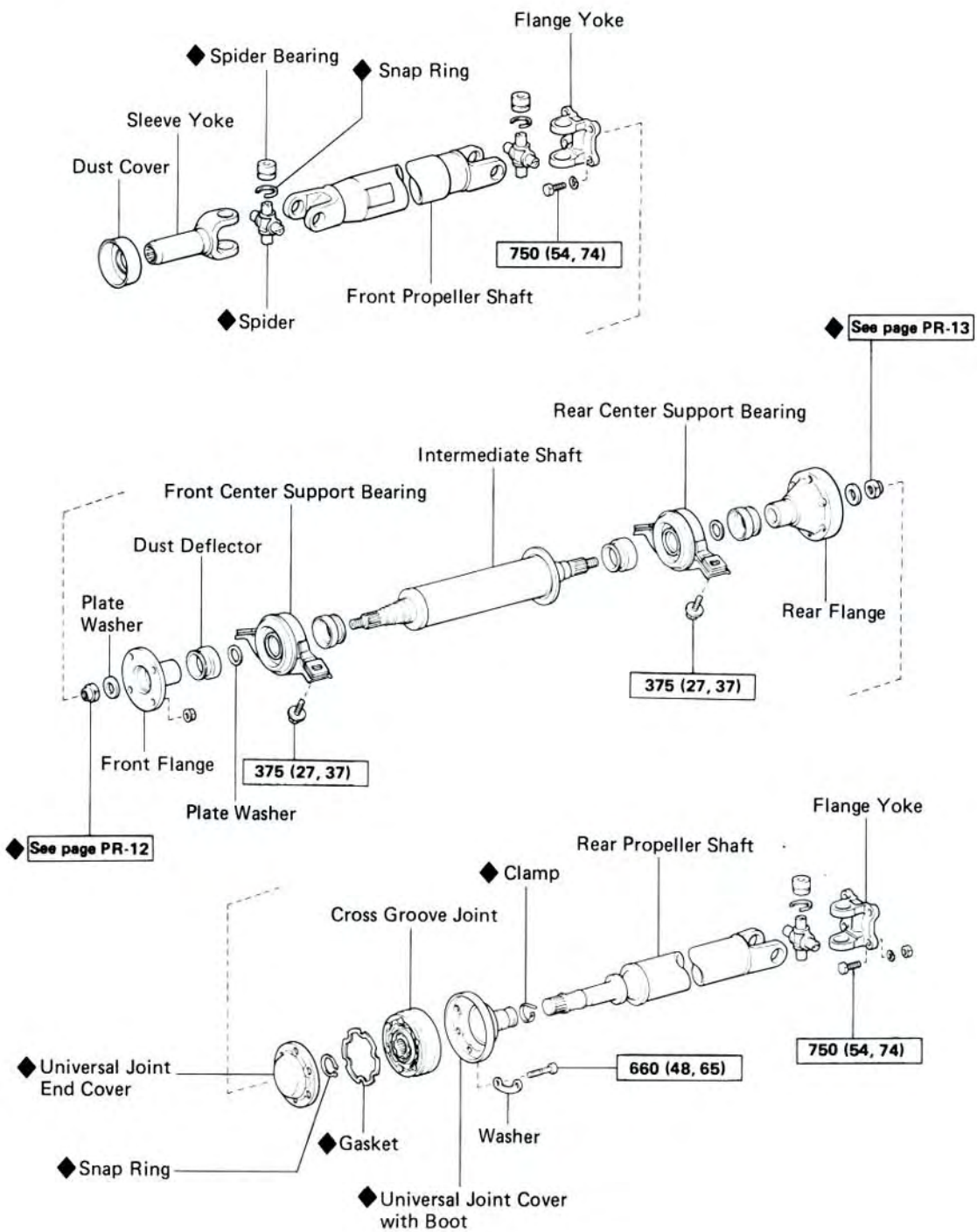
Be careful not to grip the propeller shaft tube too tightly in the vise as this will cause deformation.

TROUBLESHOOTING

Problem	Possible cause	Remedy	Page
Noise	Sleeve yoke spline worn	Replace sleeve yoke	PR-4
	Center support bearing worn	Replace center support bearing	PR-4
	Spider bearing worn or stuck	Replace spider bearing	PR-9
Vibration	Propeller and intermediate shafts runout	Replace shafts	PR-4
	Propeller shafts imbalance	Balance propeller shafts	
	Front flange runout	Replace front flange	PR-7
	Rear flange runout	Replace rear flange	PR-6
	Cross groove joint stuck or damaged	Replace cross groove joint	PR-8
	Transfer extention housing rear bushing worn	Replace bushing	
	Sleeve yoke spline stuck	Replace sleeve yoke	PR-4

PROPELLER SHAFT

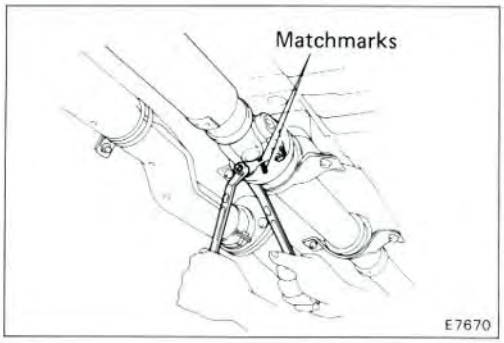
COMPONENTS



◆ Non-reusable part

kg-cm (ft-lb, N·m) : Specified torque

PR0173

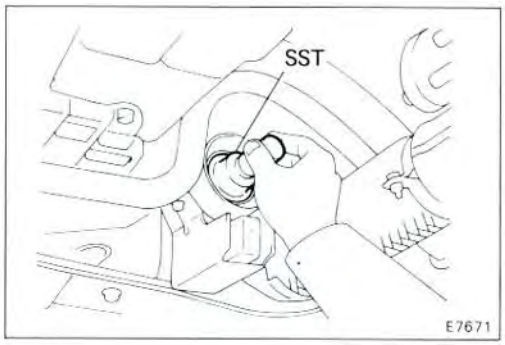


REMOVAL OF PROPELLER SHAFT

1. DISCONNECT FRONT PROPELLER SHAFT

(a) Place the matchmarks on the both flanges.

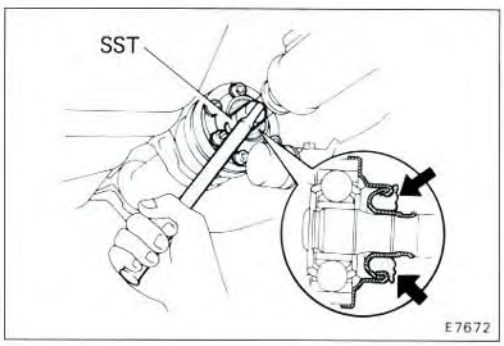
(b) Remove the four bolts, washers and nuts.



(c) Pull the yoke from the transfer.

(d) Insert SST in the transfer to prevent oil leakage.

SST 09325-20010



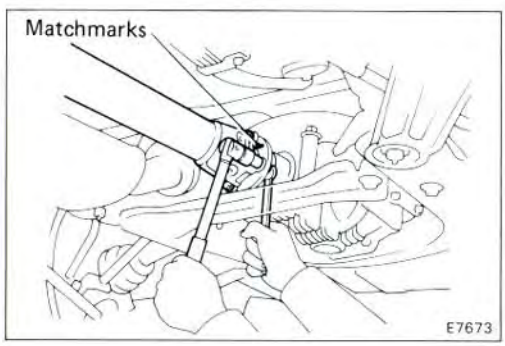
2. LOOSEN CROSS GROOVE JOINT SET BOLT

(a) Depress the brake pedal and hold it.

(b) Using a SST, loosen the cross groove joint set bolts 1/2 turn.

SST 09923-00020

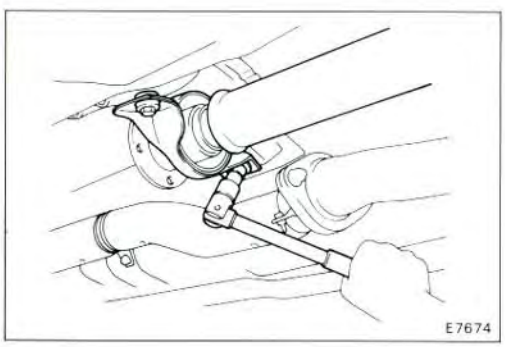
NOTE: Put a piece of cloth or an equivalent into the inside of the universal joint cover so that the boot would not be touched to the inside of the universal joint cover.



3. REMOVE INTERMEDIATE SHAFT AND REAR PROPELLER SHAFT

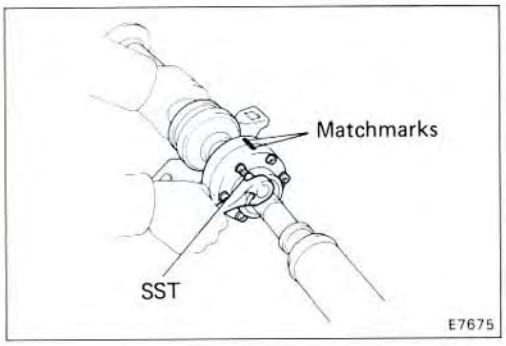
(a) Place the matchmarks on the both flanges.

(b) Remove the bolts, nuts and washers.



(c) Remove the two bolts, front center support bearing and washers.

(d) Remove rear center support bearing and washers.



4. **SEPARATE INTERMEDIATE SHAFT AND REAR PROPELLER SHAFT**

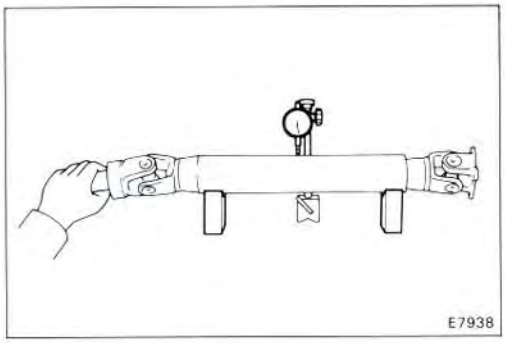
(a) Place the matchmarks on the joint and flange.

NOTE: Do not place the matchmarks with a punch.

(b) Using SST, remove the six bolts and three washers to separate intermediate shaft and rear propeller shaft.

SST 09923-00020

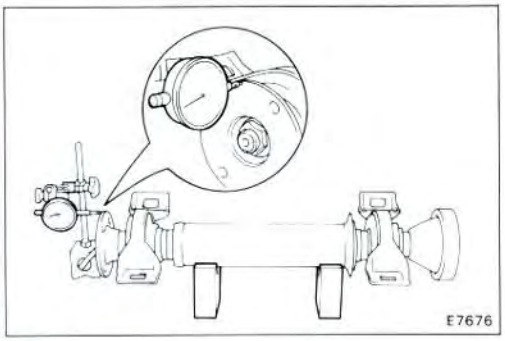
INSPECTION OF PROPELLER SHAFT



1. **INSPECT PROPELLER AND INTERMEDIATE SHAFTS RUNOUT**

If shaft runout is greater than maximum, replace the shaft.

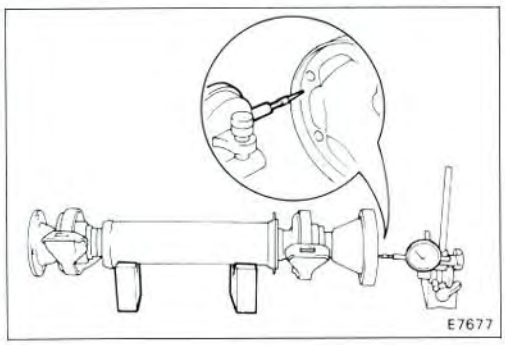
Maximum runout: 0.8 mm (0.031in.)



2. **INSPECT INTERMEDIATE SHAFT FLANGE RUNOUT**

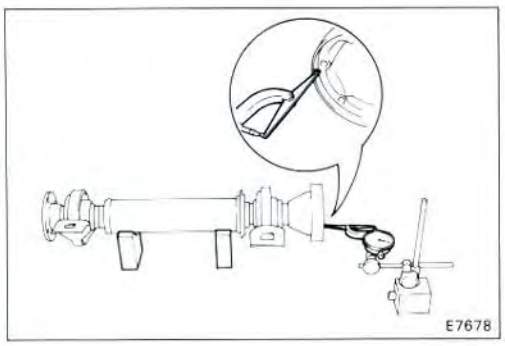
(a) Inspect the front side of intermediate shaft flange runout.

Maximum runout: 0.1 mm (0.004 in.)



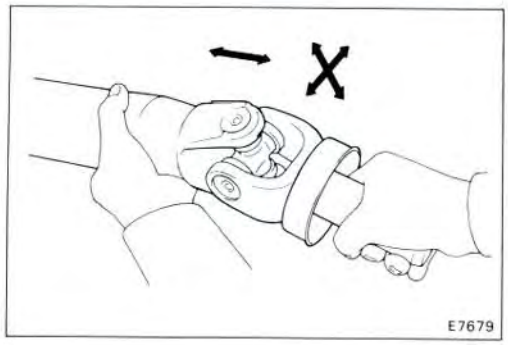
(b) Inspect the rear side of intermediate shaft flange runout in horizontal direction.

Maximum runout: 0.1 mm (0.004 in.)



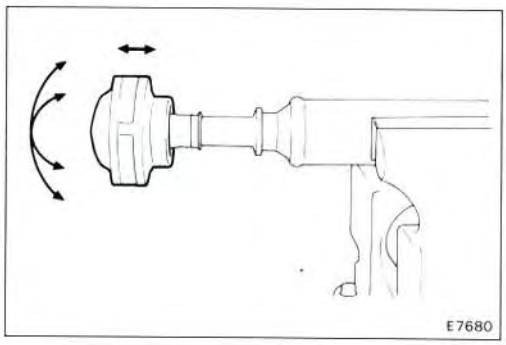
(c) Inspect the rear side of intermediate shaft flange runout in vertical direction.

Maximum runout: 0.1 mm (0.004 in.)



3. INSPECT SPIDER BEARINGS

Check the spider bearing axial play by turning the flange while holding the shaft tightly.



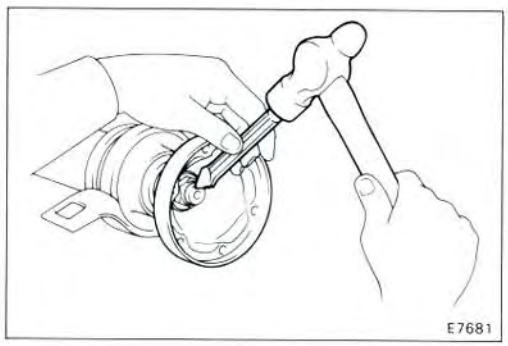
4. INSPECT CROSS GROOVE JOINT

Check the joint smooth play by turning the joint in directions as shown. And check the crack or damage or grease leakage of boot. If problem is found, replace the joint.

DISASSEMBLY OF PROPELLER SHAFT

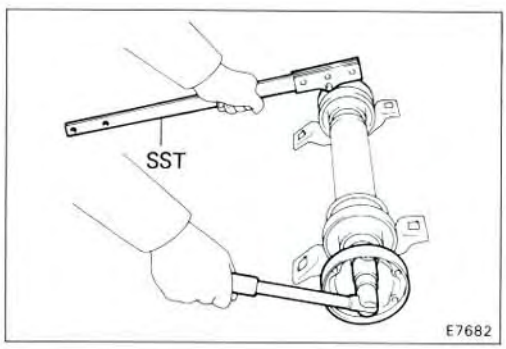
1. REMOVE REAR CENTER SUPPORT BEARING

(a) Using a hammer and chisel, loosen the staked part of the nut.

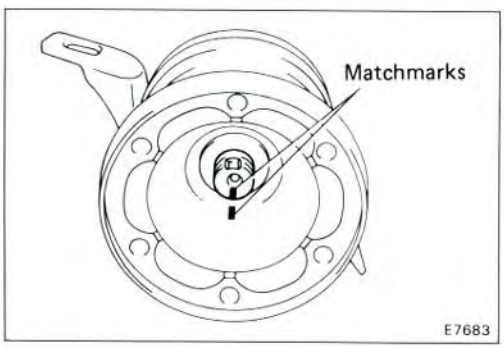


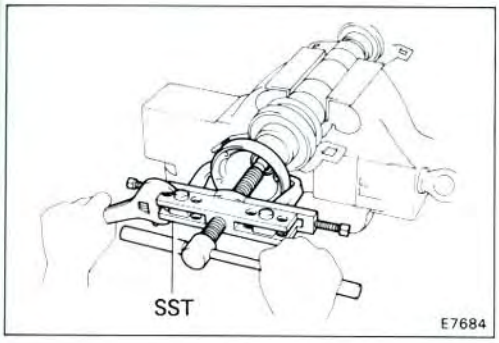
(b) Using SST to hold the front flange, remove the nut and plate washer.

SST 09330-00021



(c) Place the matchmarks on the rear flange and shaft.

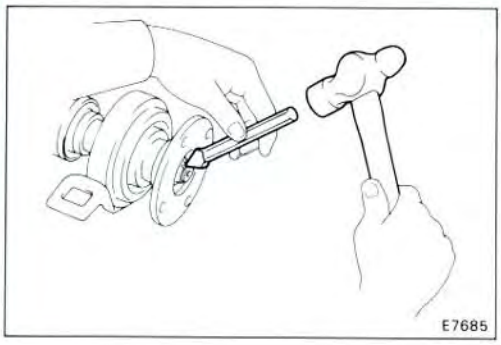




(d) Using SST, remove the rear flange.

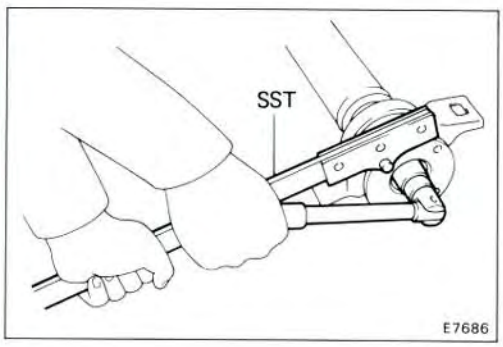
SST 09950-20017

(e) Remove the rear center support bearing and plate washer.



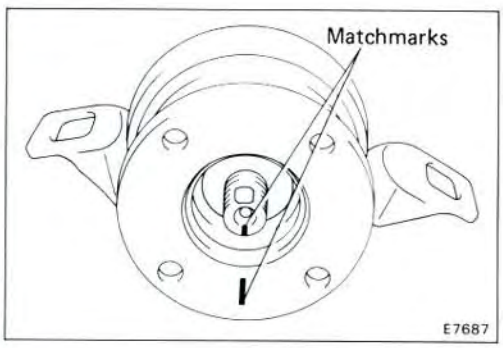
2. REMOVE FRONT CENTER SUPPORT BEARING

(a) Using a hammer and chisel, loosen the staked part of the nut.

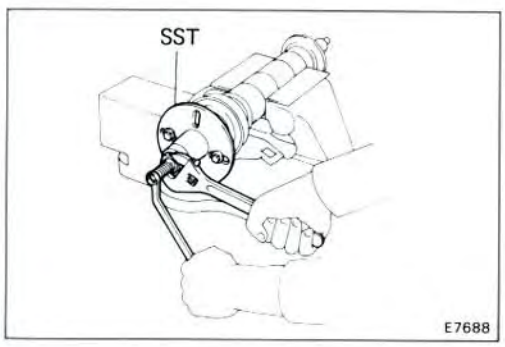


(b) Using SST to hold the flange, remove the nut and plate washer.

SST 09330-00021



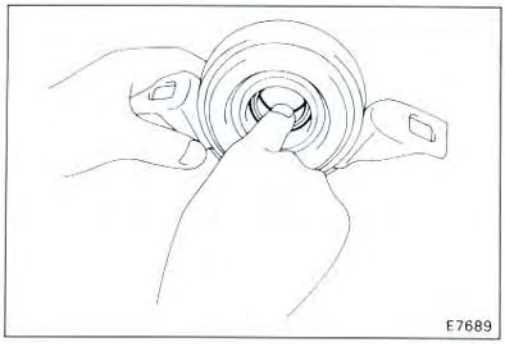
(c) Place the matchmarks on the flange and the shaft.



(d) Using SST, remove the flange.

SST 09557-22022

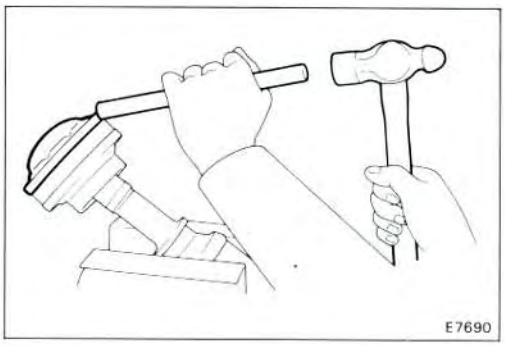
(e) Remove the front center support bearing and plate washer.



3. INSPECT CENTER SUPPORT BEARING

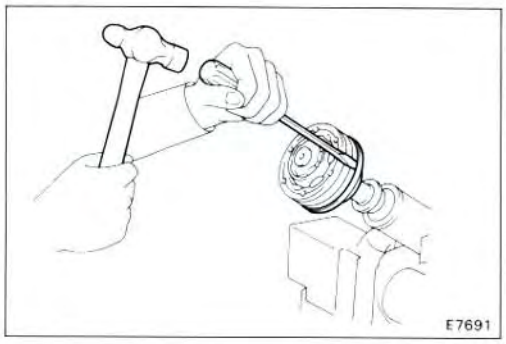
(a) Turning the bearing by hand while applying force in the rotation direction. Check the bearing smooth play.

(b) Check that there are no cracks and no damages about both seals.

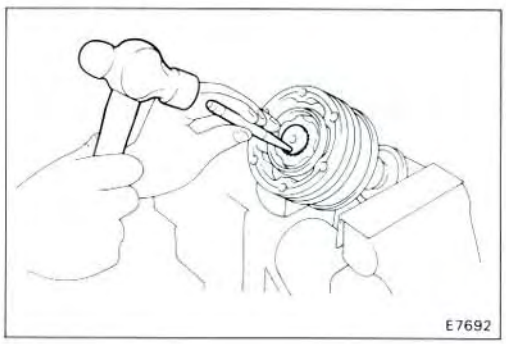


4. REMOVE CROSS GROOVE JOINT

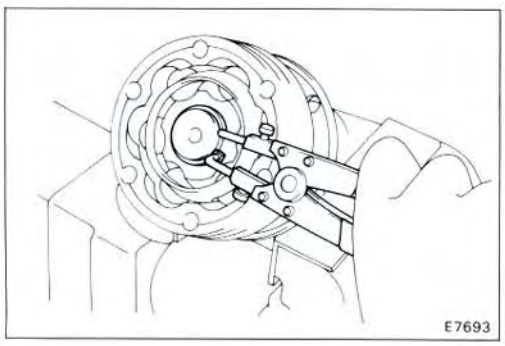
(a) Using a hammer and brass bar, remove the joint end cover.



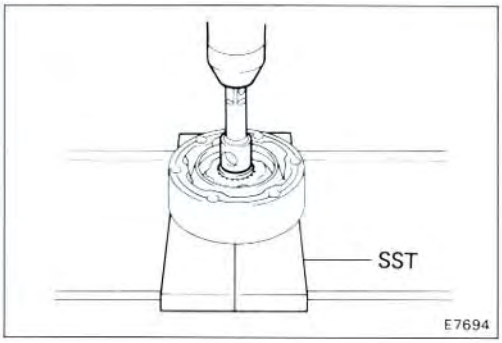
(b) Using a hammer and screwdriver, remove the cover.



(c) Place the matchmarks on the inner race and shaft.



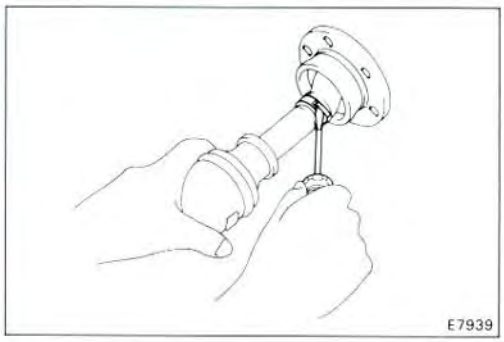
(d) Using snap ring pliers, remove the snap ring.



(e) Using SST, extension bar and press, remove the cross groove joint.

SST 09527-21011

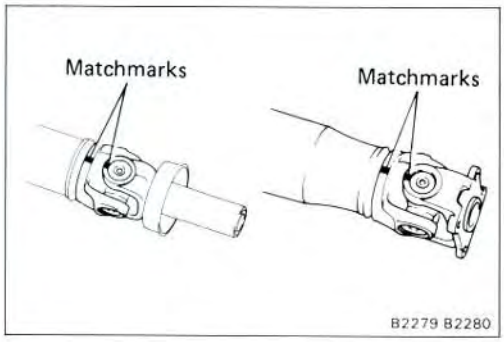
(f) Remove the joint end cover gasket.



5. REMOVE UNIVERSAL JOINT COVER WITH BOOT

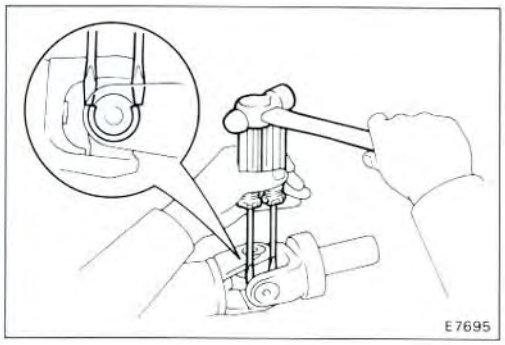
Remove the clamp and the universal joint cover with boot.

REPLACEMENT OF SPIDER BEARING



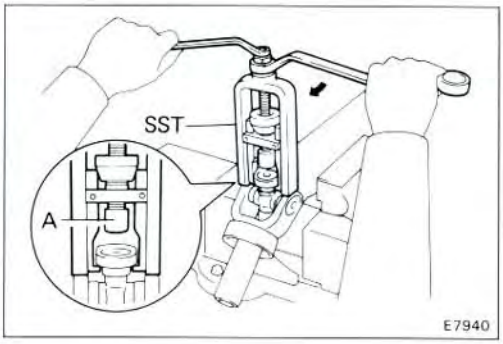
1. REMOVE SNAP RINGS

(a) Place matchmarks on shaft and flange or yoke.



(b) Slightly tap in the bearing outer races.

(c) Using two screwdrivers, remove the four snap rings from the grooves.



2. REMOVE SPIDER BEARINGS

(a) Using SST, push out the bearing from the shaft.

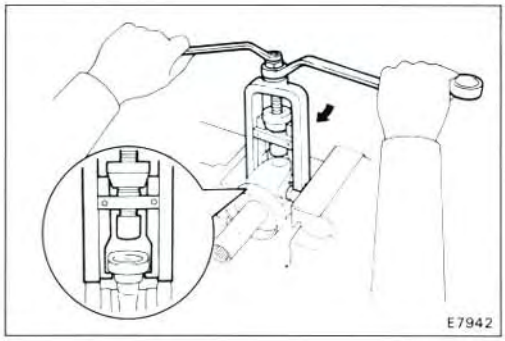
SST 09332-25010

NOTE: Sufficiently raise the part indicated by A so that it does not come into contact with the bearing.


E7941

(b) Clamp the bearing outer race in a vise and tap off the shaft with a hammer.

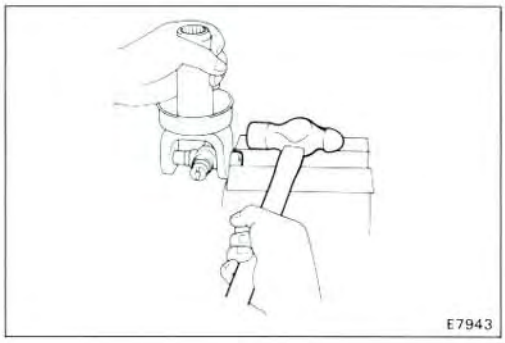
NOTE: Remove the bearing on the opposite side in the same procedure.


E7942

(c) Install the two removed bearing outer races to the spider.

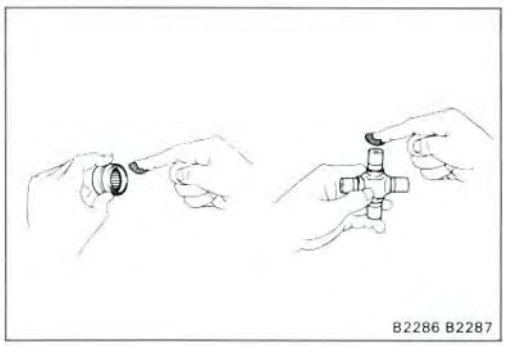
(d) Using SST, push out the bearing from the yoke.

SST 09332-25010


E7943

(e) Clamp the bearing outer race in a vise and tap off the yoke with a hammer.

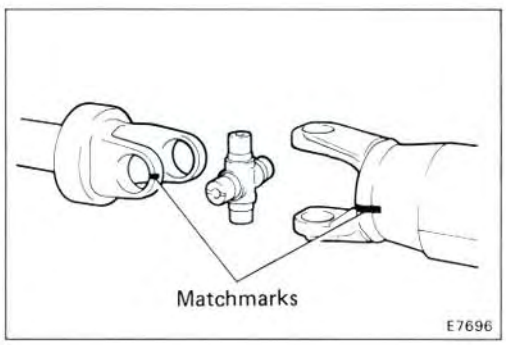
NOTE: Remove the bearing on the opposite side in the same procedure.


B2286 B2287

3. INSTALL SPIDER BEARINGS

(a) Apply MP grease to the new spider and bearings.

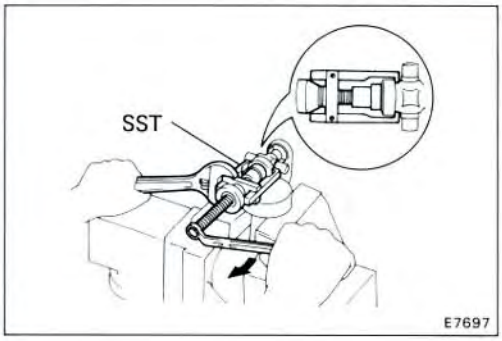
NOTE: Be careful not to apply too much grease.



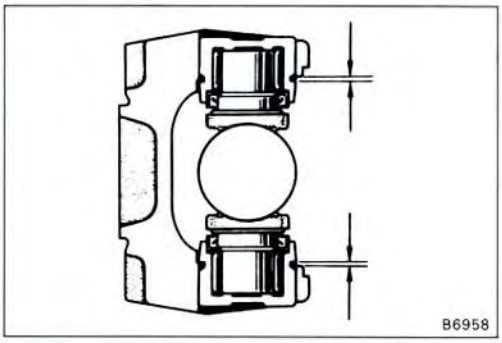
E7696

(b) Align the matchmarks on the yoke and shaft.

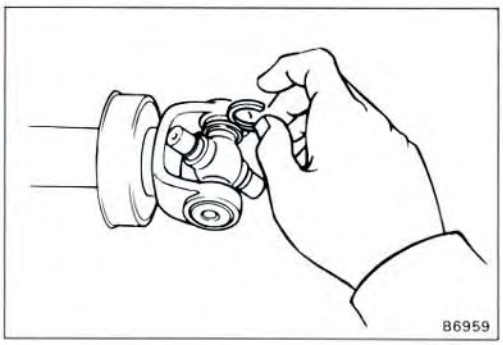
(c) Fit a new spider into the yoke.



(d) Using SST, install new bearings on the spider.
SST 09332-25010



NOTE: Adjust both bearings so that the snap ring grooves are at maximum and equal width.

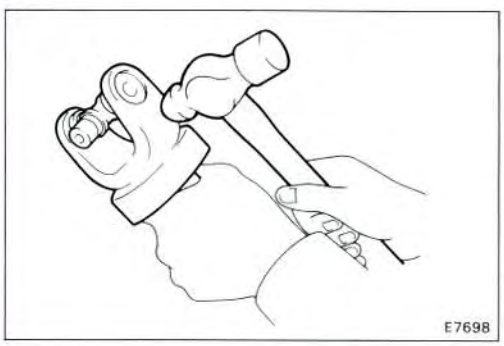


4. INSTALL SNAP RINGS

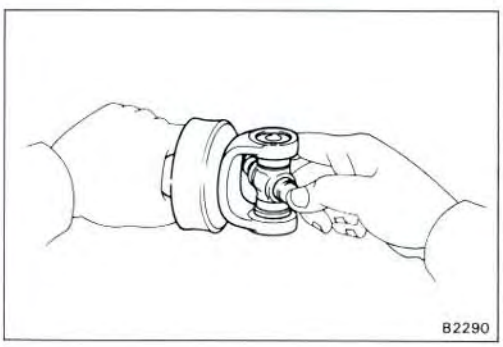
(a) Install two snap rings of equal thickness which will allow 0 — 0.05 mm (0 — 0.0020 in.) axial play.

NOTE: Do not reuse the snap rings.

Color	Thickness mm (in.)
—	1.475 — 1.525 (0.0581 — 0.0600)
Brown	1.525 — 1.575 (0.0600 — 0.0620)
Blue	1.575 — 1.625 (0.0620 — 0.0640)



(b) Using a hammer, tap the yoke until there is no clearance between the bearing outer race and snap ring.



5. CHECK SPIDER BEARING

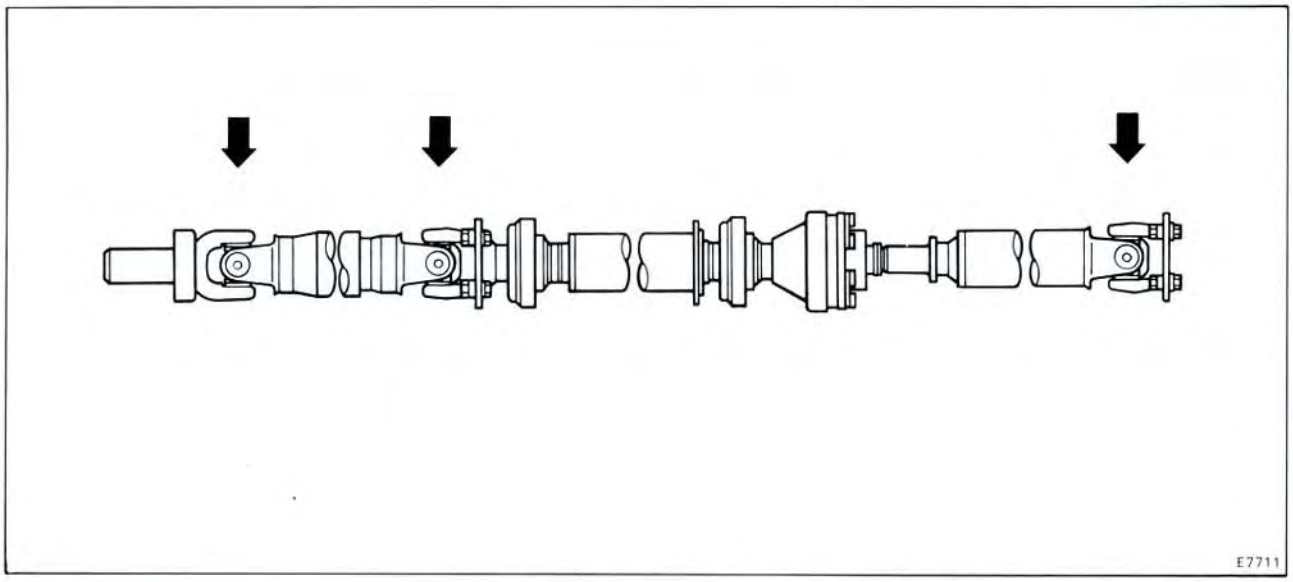
(a) Check that the spider bearing moves smoothly.

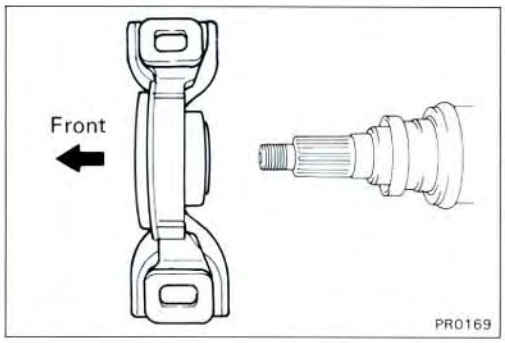
(b) Check the spider bearing axial play.

NOTE: Install new spider bearings on the shaft side in the procedure described above.

ASSEMBLY OF PROPELLER SHAFT

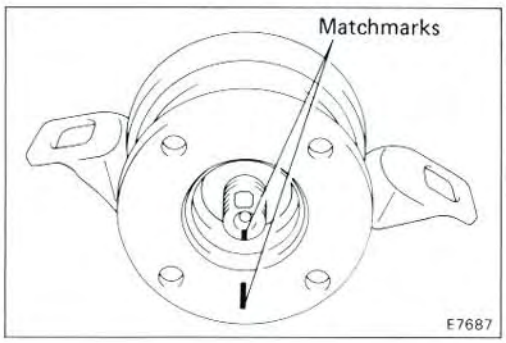
NOTE: If replacing or disassembling propeller shaft parts, reassemble them as shown in the figure below.





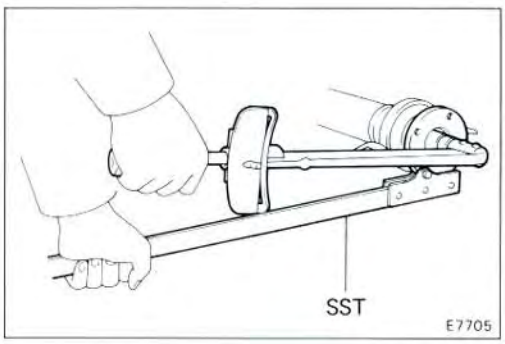
1. INSTALL FRONT CENTER SUPPORT BEARING

(a) Set the front center support bearing on the intermediate shaft as shown.



(b) Install the plate washer to the intermediate shaft.

(c) Align the matchmarks on the flange and shaft and place the flange on the shaft.



(d) Using SST to hold the flange, press the bearing into position by tightening down a new nut and washer.

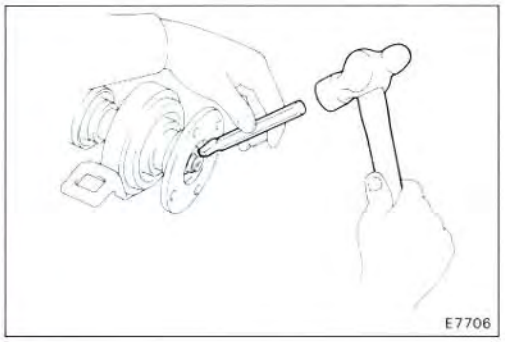
SST 09330-00021

Torque: 1850 kg-cm (134 ft-lb, 181 N·m)

(e) Loosen the nut.

(f) Torque the nut again.

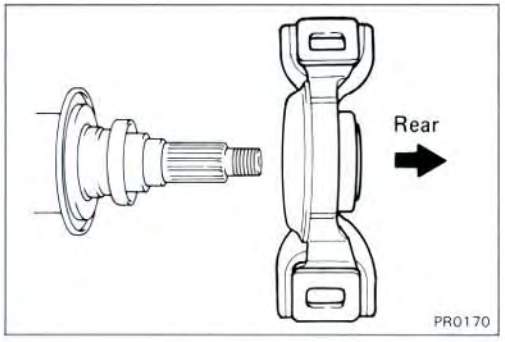
Torque: 700 kg-cm (51 ft-lb, 69 N·m)



(g) Using a hammer and chisel, stake the nut.

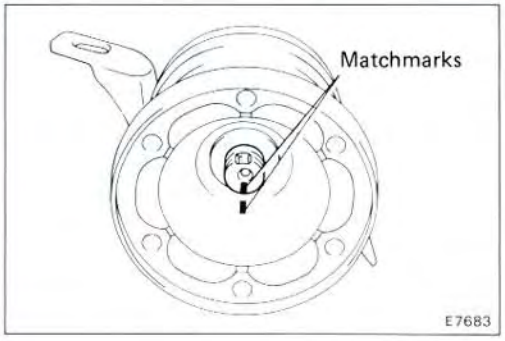
2. INSTALL REAR CENTER SUPPORT BEARING

(a) Set the rear center support bearing on the intermediate shaft as shown.



(b) Install the plate washer to the intermediate shaft.

(c) Align the matchmarks on the flange and shaft and place the flange on the shaft.



(d) Using SST to hold the flange, press the bearing into position by tightening down a new nut and washer.

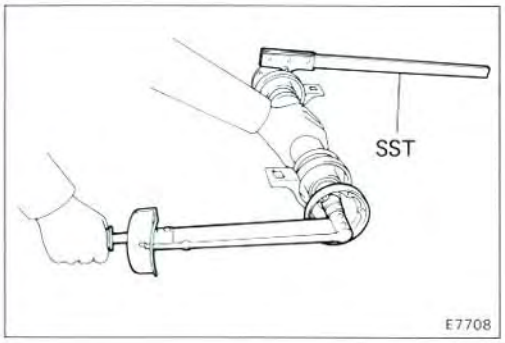
SST 09330-00021

Torque: 1850 kg-cm (134 ft-lb, 181 N·m)

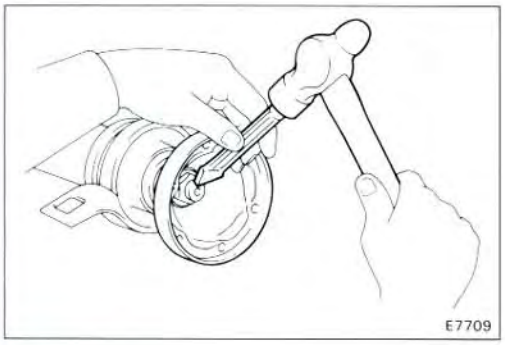
(e) Loosen the nut.

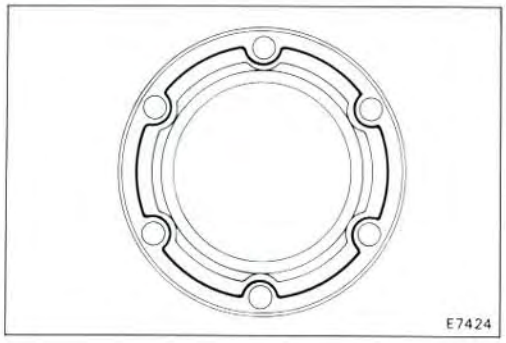
(f) Torque the nut again.

Torque: 700 kg-cm (51 ft-lb, 69 N·m)



(g) Using a hammer and chisel, stake the nut.



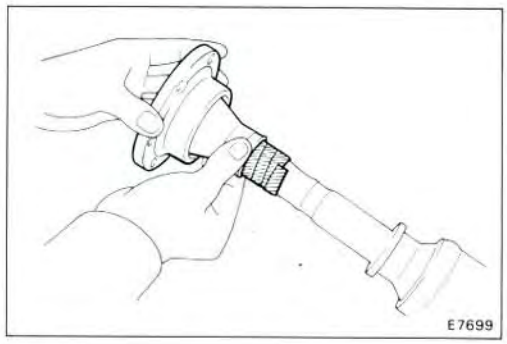


3. INSTALL UNIVERSAL JOINT COVER WITH BOOT

(a) Apply sealant to the new joint cover with boot as shown in the illustration.

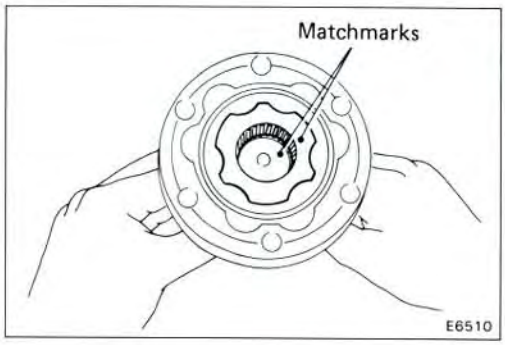
Sealant: Part No.08828-00801

NOTE: The diameter of sealant along the bolt hole keeps 1.0 mm — 1.8 mm (0.0394 in. — 0.0709 in.)



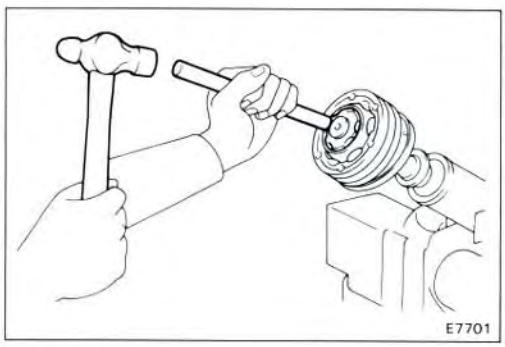
(b) Apply the adhesive tape from the top of shaft to the spline to prevent damaging the boot.

(c) Install the universal joint cover with boot to the shaft.



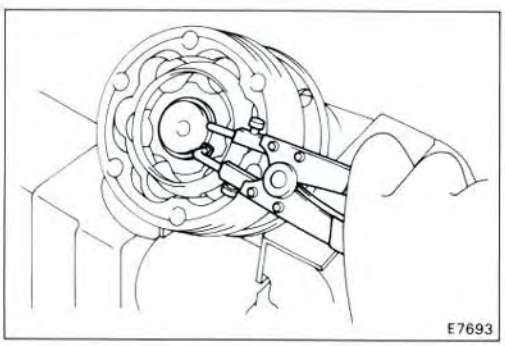
4. INSTALL CROSS GROOVE JOINT

(a) Align the matchmarks on the shaft and the inner race.

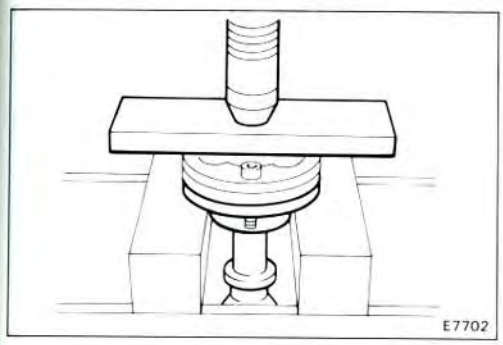


(b) Using a hammer and brass bar, tap the cross groove joint.

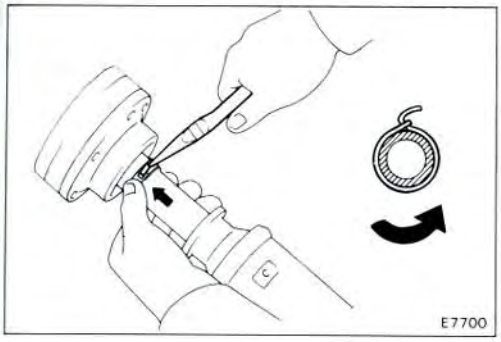
NOTE: Be sure to put the brass bar on the inner race.



(c) Using snap ring pliers, install the new snap ring.

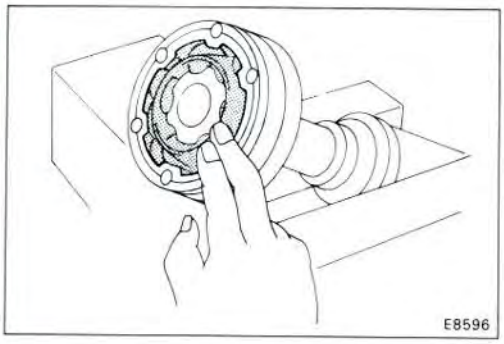


(d) Pass the bolt through to align the both bolt holes, then using a press and steel plate, press the universal joint cover with boot.



(e) Install the new boot clamp.

NOTE: Bend the clamp in opposite direction of shaft turning.



(f) Fill the grease into the joint.

Grease capacity: 110 g (0.24 lb)

5. INSTALL JOINT END COVER

(a) Remove the backing paper from the new gasket, then attach the gasket.

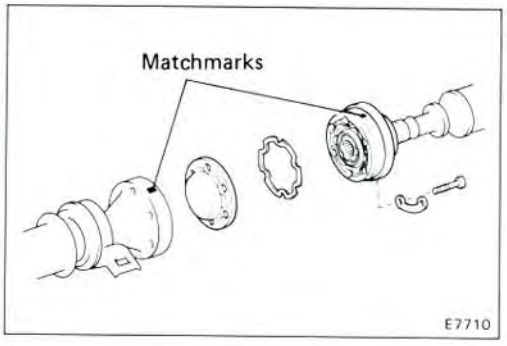
(b) Install the joint end cover.

(c) Align the matchmarks and install the universal joint flange to the cross groove joint.

(d) Tighten the six bolts and three washers to press the joint end cover.

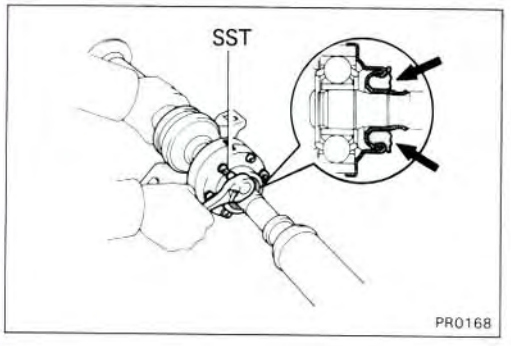
NOTE: Tighten the bolts gradually and equally to prevent damaging the end cover.

(e) Remove the six bolts and three washers and separate the universal joint flange from the cross groove joint.



6. INSPECT CROSS GROOVE JOINT

(See step 4 on page PR-6)

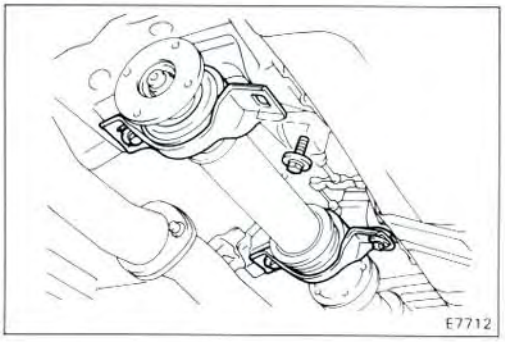


7. CONNECT INTERMEDIATE SHAFT WITH REAR PROPELLER SHAFT

Using SST, tighten the six bolts and three washers temporarily.

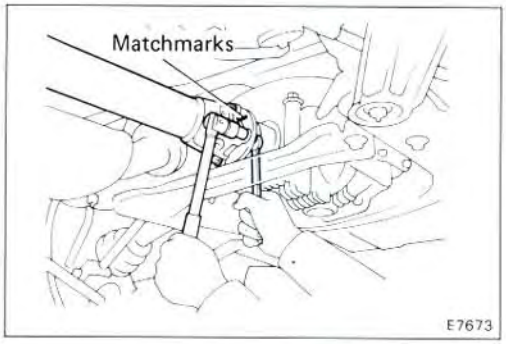
SST 09923-00020

NOTE: Put a piece of cloth or an equivalent into the inside of the universal joint cover.



INSTALLATION OF PROPELLER SHAFT

1. INSTALL CENTER SUPPORT BEARING TEMPORARILY

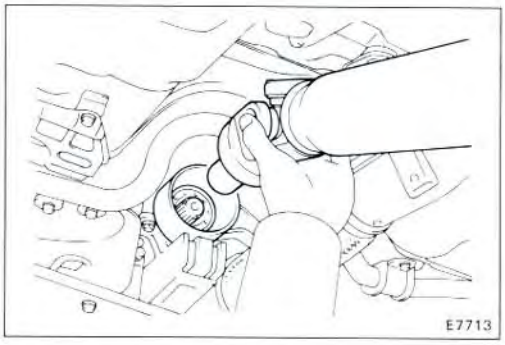


2. INSTALL REAR PROPELLER SHAFT

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

(b) Torque the bolts and nuts.

Torque: 750 kg-cm (54 ft-lb, 74 N·m)

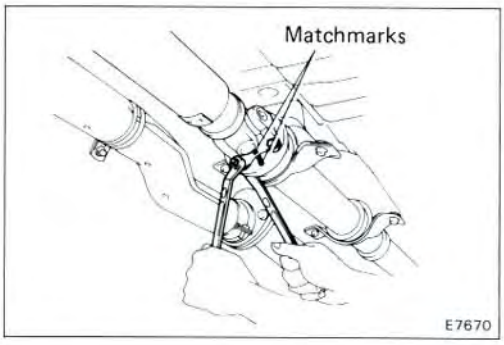


3. INSTALL FRONT PROPELLER SHAFT

(a) Remove SST from the transfer.

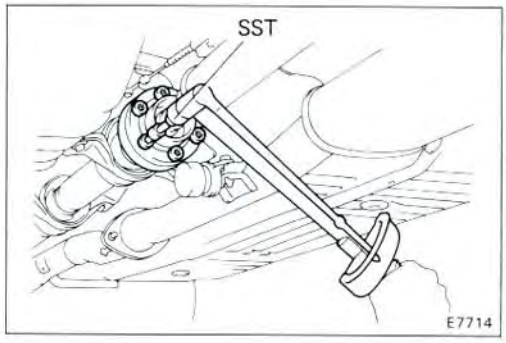
SST 09325-20010

(b) Insert the yoke into the transfer.



(c) Align the matchmarks on the both flanges, then install the bolts, washers and nuts.

Torque: 750 kg-cm (54 ft-lb, 74 N·m)



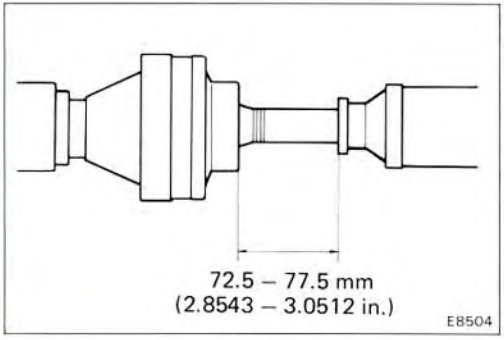
4. TIGHTEN CROSS GROOVE JOINT SET BOLT

(a) Depress the brake pedal and hold it.

(b) Using a SST, tighten the cross groove joint set bolts.

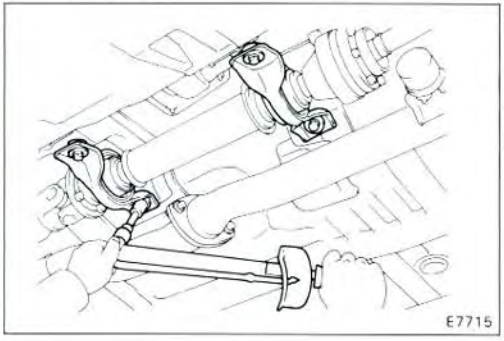
SST 09923-00020

Torque: 660 kg-cm (48 ft-lb, 65 N·m)



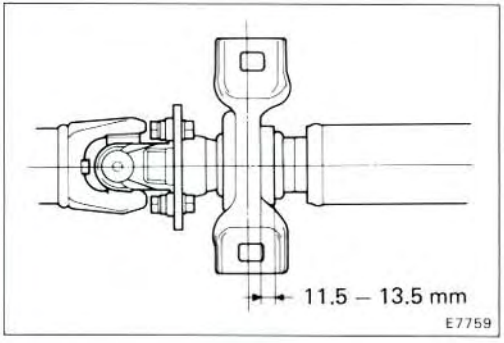
5. INSTALL CENTER SUPPORT BEARING

(a) With a vehicle unladen condition, adjust the intervals between the rear side of cover and the shaft as shown in the illustration.



(b) With the same condition, adjust the intervals between the rear side of center bearing housing and the rear side of cushion at 11.5 — 13.5 mm (0.4528 in. — 0.5315 in.) as shown in the illustration below, then torque the bolts.

Torque: 375 kg-cm (27 ft-lb, 37 N·m)



(c) Check that the center line of the bracket is at right angles at the shaft axial direction.

FRONT AXLE AND SUSPENSION

REFER TO 1988 CELICA REPAIR MANUAL (Pub.No. RM071U)

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

TROUBLESHOOTING

Problem	Possible cause	Remedy	Page
Wanders/pulls	Tires worn or improperly inflated	Replace tire or inflate tires to proper pressure	FA-3
	Alignment incorrect	Check front wheel alignment	FA-3
	Front or rear suspension parts loose or broken	Tighten or replace suspension parts	
Bottoming	Vehicle overloaded	Check loading	
Sways/pitches	Tires improperly inflated	Inflate tires to proper pressure	FA-3
	Stabilizer bar bent or broken	Inspect stabilizer bar	FA-18
Front wheel shimmy	Tires worn or improperly inflated	Replace tire or inflate tires to proper pressure	FA-3
	Wheels out of balance	Balance wheels	
	Alignment incorrect	Check front wheel alignment	FA-3
Abnormal tire wear	Tires improperly inflated	Inflate tires to proper pressure	FA-3
	Alignment incorrect	Check wheel alignment	FA-3

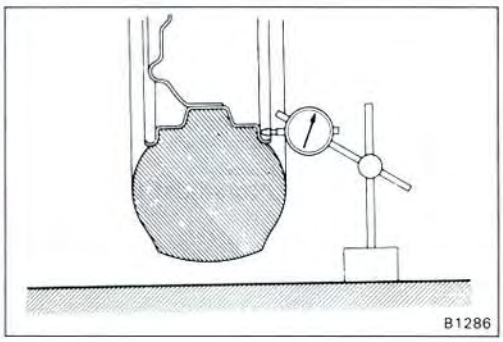
FRONT WHEEL ALIGNMENT

1. MAKE FOLLOWING CHECKS AND CORRECT ANY PROBLEMS

(a) Check the tires for wear, size and proper inflation.

Cold Tire Inflation Pressure kg/cm² (psi, kPa)

Tire size	Front	Rear
205/60 VR 14 205/60 R14 87H	2.1 (30, 210)	2.1 (30, 210)



(b) Check the front wheel bearings for looseness.

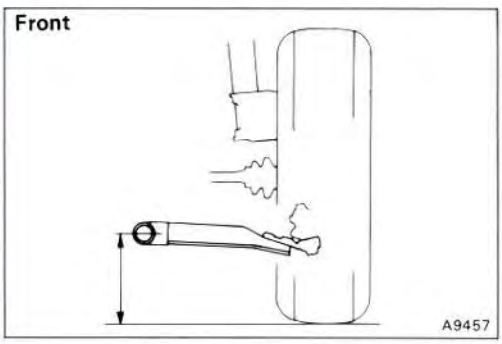
(c) Check the wheel runout.

Lateral runout: Less than 1.0 mm (0.039 in.)

(d) Check the front suspension for looseness.

(e) Check the steering linkage for looseness.

(f) Check that the front absorbers function properly by using the standard bounce test.



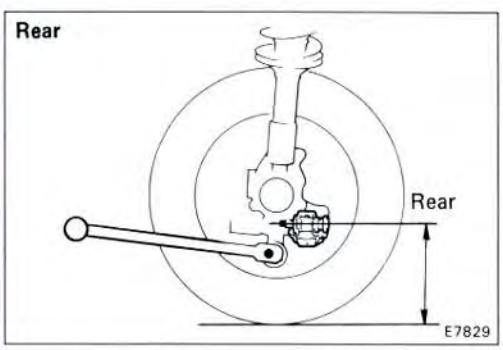
2. MEASURE CHASSIS GROUND CLEARANCE

Chassis Ground Clearance mm (in.)

Tire size	Front	Rear
205/60 VR 14 205/60 R14 87H	192.6 (7.583)	233.7 (9.200)

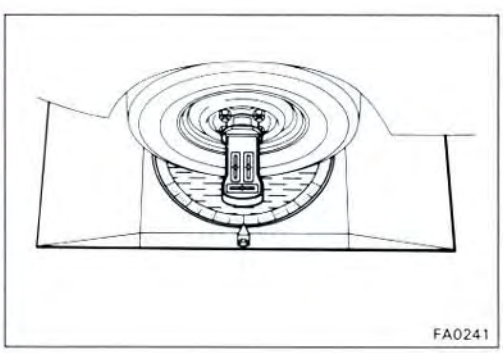
If the clearance of the vehicle is not standard, try to level by locking it down. If still not correct, check for bad springs or suspension parts.

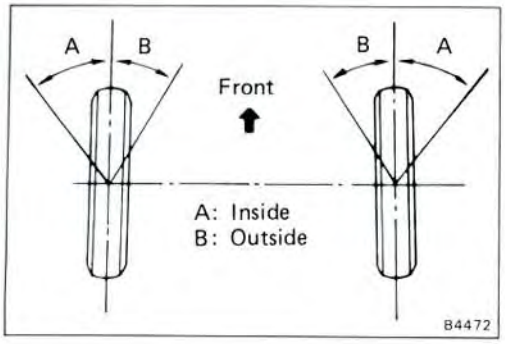
NOTE: Before inspecting wheel alignment, adjust chassis ground clearance to specification.



3. INSTALL WHEEL ALIGNMENT EQUIPMENT

Follow the specific instructions of the equipment manufacturer.

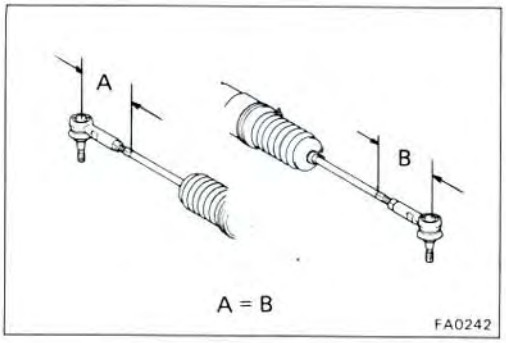




4. CHECK WHEEL ANGLE

Wheel angle:

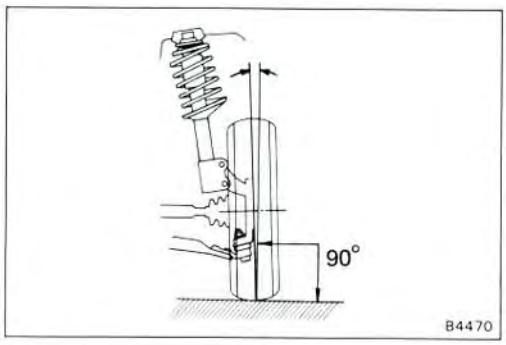
Max.		at 20° (Outside wheel)
Inside wheel	Outside wheel	Inside wheel
34°	30°	21°30′



If steering angles differ from the standard specifications, check to see if the lengths of the left and right tie rods are the same.

NOTE: If the tie rod lengths are not equal, the steering angle cannot be adjusted properly.

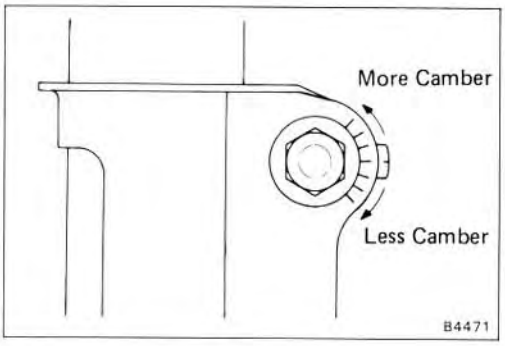
If the tie rod lengths were changed to adjust the steering angle, reinspect the toe-in.



5. INSPECT CAMBER

Camber:

Inspection standard	**−10′ ± 45′**
Adjustment standard	**−10′ ± 30′**
Left-right error	**30′**



If camber is not within specification, adjust by turning the camber adjust cam.

(a) Loosen the shock absorber set nut.

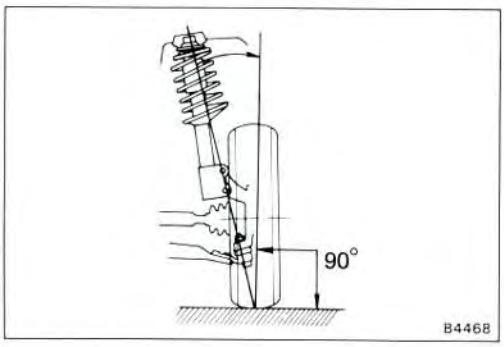
(b) Turn the cam to adjust.

NOTE: Camber changes about 20′ with each graduation of the cam.

(c) Apply engine oil to the threads of the nut.

(d) Tighten to the specified torque.

Torque: 2,600 kg-cm (188 ft-lb, 255 N·m)

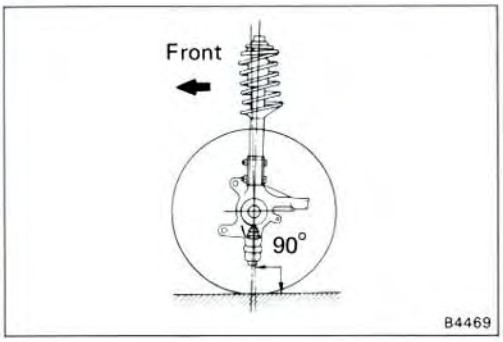


6. CHECK STEERING AXIS INCLINATION

Steering axis inclination:

Inspection standard	**13°30′ ± 45′**
Left-right error	**30′**

NOTE: Steering axis inclination is not adjustable. If measurement is off standard, inspect suspension parts as necessary, then recheck the front wheel alignment.

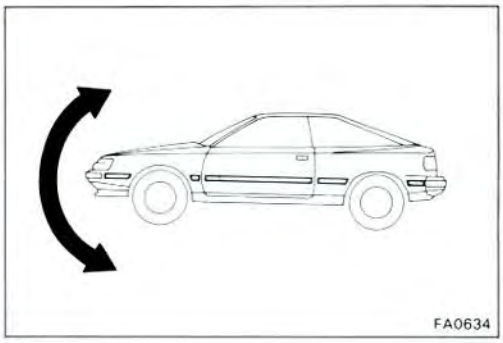


7. CHECK CASTER

Caster:

Inspection standard 1°10′ ± 45′
Left-right error 30′

NOTE: Caster is not adjustable. If measurement is off standard, inspect suspension parts as necessary, then recheck the front wheel alignment.

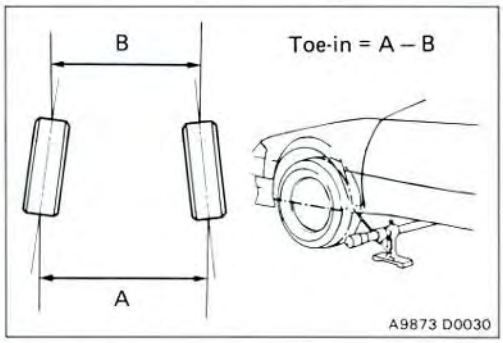


8. INSPECT TOE-IN

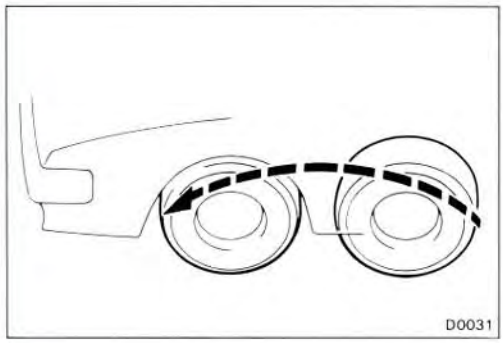
Adjust toe-in with a toe-in gauge in the following procedure.

(a) Bounce the vehicle up and down to stabilize the suspension.

(b) Move the vehicle forward about 5 m (16.4 ft) with the front wheel in the straight-ahead on a level place.

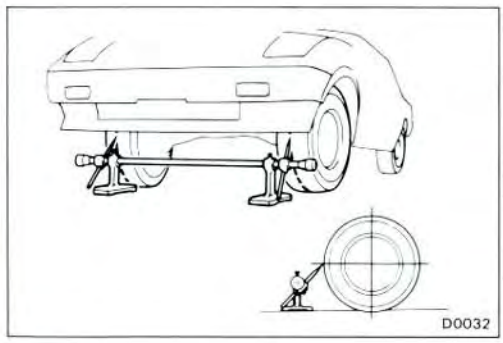


(c) Mark the center of each rear tread and measure the distance between the marks of the right and left tires.



(d) Advance the vehicle until the marks on the rear sides of the tires come to the measuring heights of the gauge on the front side.

NOTE: If the tire rolls too far, repeat from step (b).



(e) Measure the distance between the marks on the front of the tires.

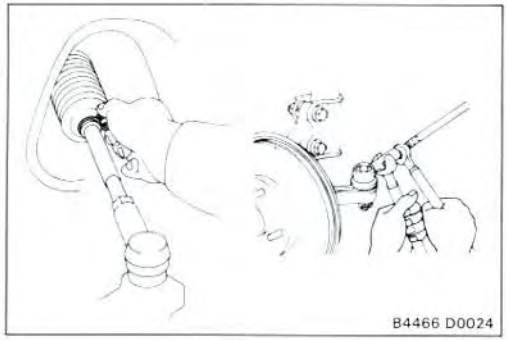
Toe-in:

Inspection standard 0 ± 2 mm (0 ± 0.08 in.)

(f) If not within standard, adjust the toe-in.

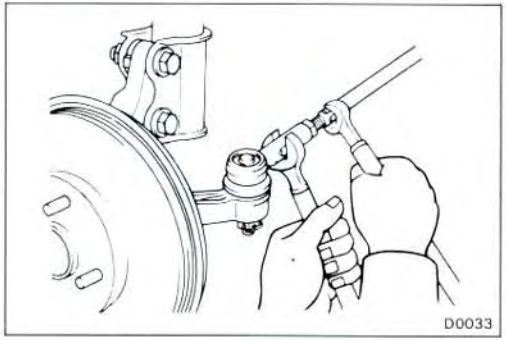
Toe-in:

Adjustment standard 0 ± 1 mm (0 ± 0.04 in.)



(g) Remove the boot clip.

(h) Loosen the lock nut.



(i) Turn the left and right rack ends an equal amount to adjust.

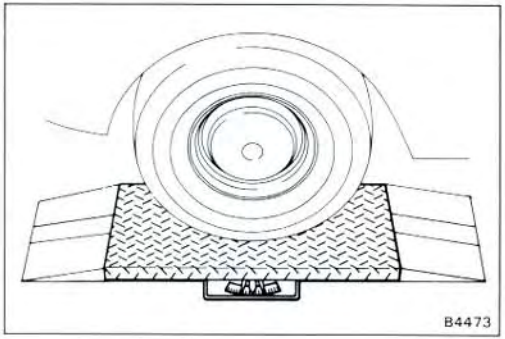
(j) Insure that the lengths of the left and right tie rods are the same.

(k) Torque the tie rod lock nut.

Torque: 570 kg-cm (41 ft-lb, 56 N·m)

(l) Place the boot on the seat and clamp it.

NOTE: Insure that the boot is not twisted.



9. INSPECT SIDE SLIP WITH SIDE SLIP TESTER

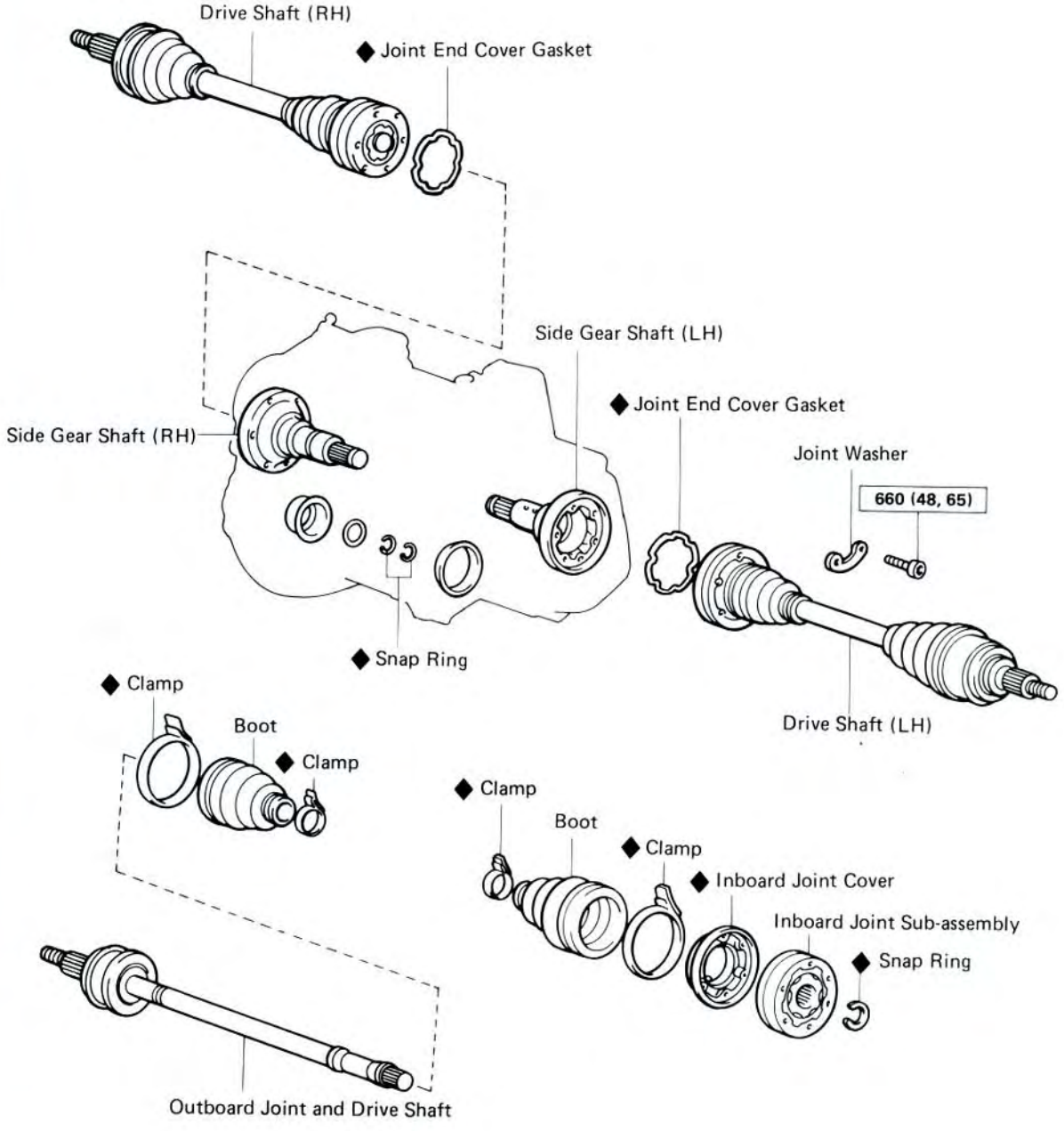
Side slip limit:

Less than 3.0 mm/m (0.118 in./3.3 ft)

If the side slip exceeds the limit, the toe-in or front wheel alignment may not be correct.

FRONT DRIVE SHAFT

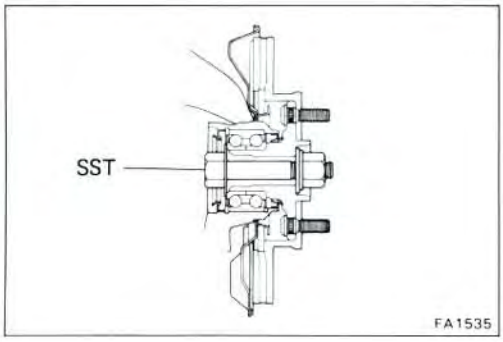
COMPONENTS



kg-cm (ft-lb, N·m) : Specified torque

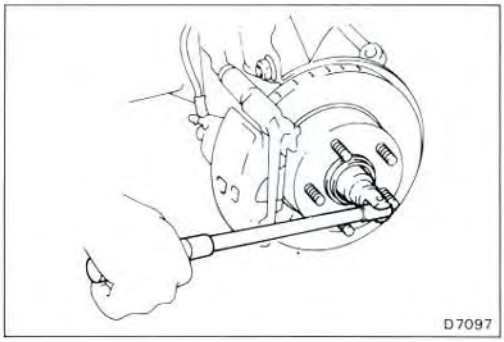
◆ Non-reusable part

FA1864



CAUTION: The hub bearing could be damaged if it is subjected to the vehicle weight, such as when moving the vehicle with the drive shaft removed. Therefore, if it is absolutely necessary to place the vehicle weight on the hub bearing, first support it with SST.

SST 09608-16041 (09608-02020, 09608-02040)



REMOVAL OF FRONT DRIVE SHAFT

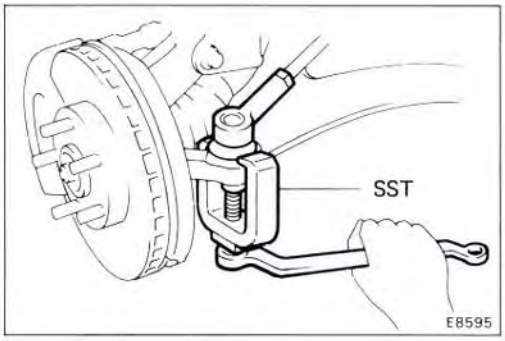
(See page FA-7)

1. REMOVE COTTER PIN, LOCK NUT CAP AND LOCK NUT

(a) Remove the cotter pin and lock nut cap.

(b) Loosen the bearing lock nut while depressing the brake pedal.

2. REMOVE ENGINE UNDER COVER RH AND LH

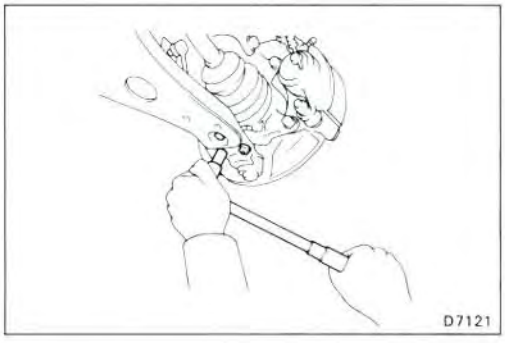


3. DISCONNECT TIE ROD END

(a) Remove the cotter pin and nut from the tie rod end.

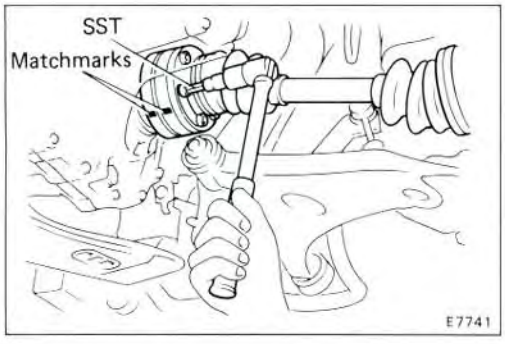
(b) Using SST, disconnect the tie rod end from the steering knuckle.

SST 09611-22012



4. DISCONNECT STEERING KNUCKLE FROM LOWER ARM

Remove the bolt and two nuts and disconnect the steering knuckle from the lower arm.



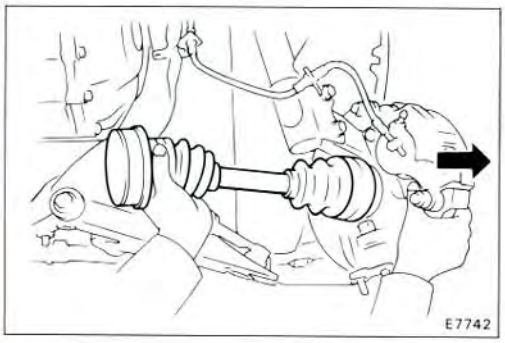
5. LOOSEN SIX NUTS HOLDING FRONT DRIVE SHAFT TO DIFFERENTIAL SIDE GEAR SHAFT

(a) Place matchmarks on the drive shaft and side gear shaft.

CAUTION: Do not use a punch to mark the matchmarks. Use paint, etc.

(b) Using SST, remove the six hexagon bolts and the three washers while depressing the brake pedal.

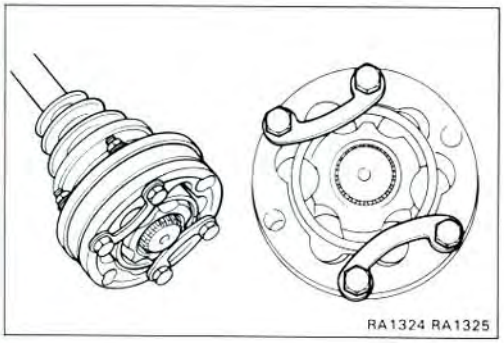
SST 09043-88010



(c) Push the front axle carrier towards the outside of the vehicle, and separate the drive shaft from the side gear shaft.

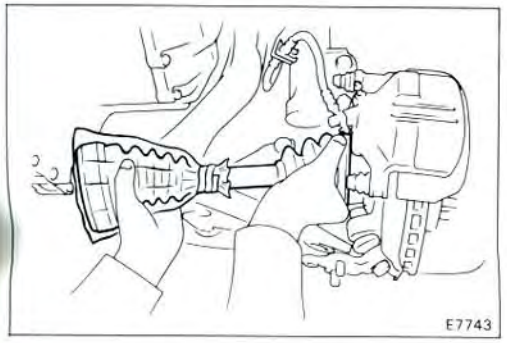
CAUTION: When moving the drive shaft, do not compress the inboard boot.

(d) Remove the joint end cover gasket from the drive shaft.

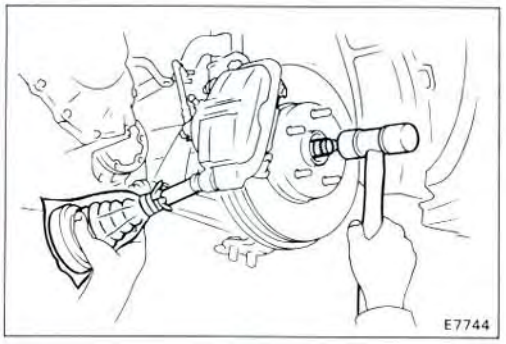


(e) Use bolts, nuts and washers to keep the inboard joint together.

CAUTION: Tighten the bolts by hand to avoid scratching the flange surface.

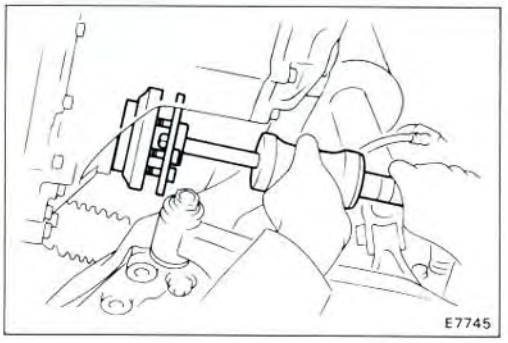


(f) Cover the inboard joint and side gear shaft, vinyl bag to keep out dust and sand.



6. REMOVE FRONT DRIVE SHAFT

Using a plastic hammer, tap out the drive shaft from the axle hub.



7. DRAIN OUT GEAR OIL

8. REMOVE SIDE GEAR SHAFT FROM TRANSAXLE

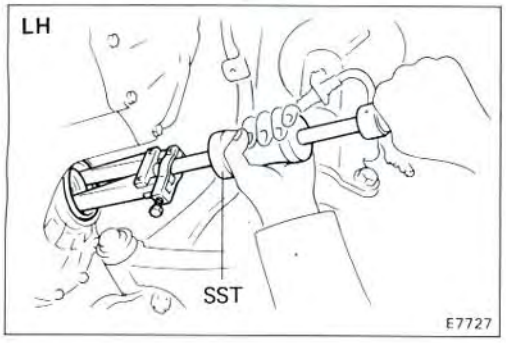
(a) In order to install the side gear shaft, push the side gear shaft to the differential. Measure and note the distance between the transaxle case and the side gear shaft.

(b) Using SST, drive out the side gear shaft.

SST 09520-32012

ON-VEHICLE REPLACEMENT OF SIDE GEAR SHAFT OIL SEAL

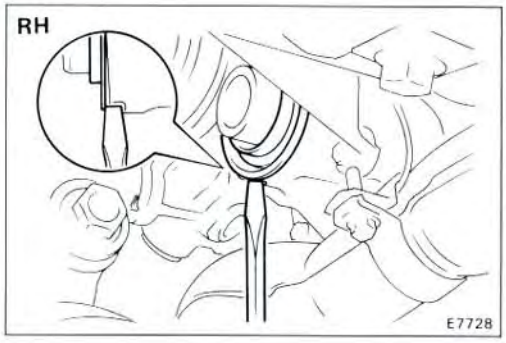
1. **REMOVE SIDE GEAR SHAFT**
(See step 8 on page FA-9)



2. **REMOVE LH OIL SEAL**

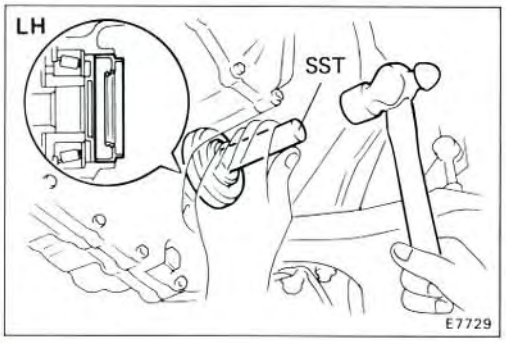
Using SST, drive out the oil seal from the case.

SST 09308-00010



3. **REMOVE RH OIL SEAL**

Using a screwdriver, remove the oil seal as shown.

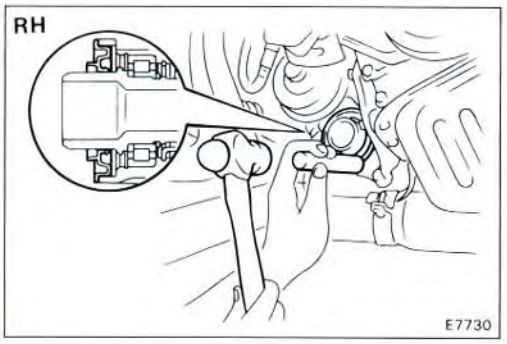


4. **INSTALL LH OIL SEAL**

Using SST and hammer, tap in a new oil seal.

SST 09223-15010

NOTE: Coat the oil seal lip with MP grease.

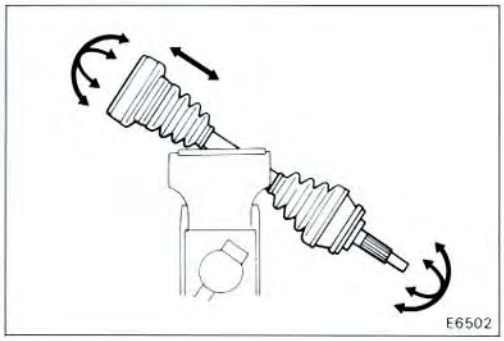


5. **INSTALL RH OIL SEAL**

Using a brass bar and hammer, tap in a new oil seal.

NOTE: Coat the oil seal lip with MP grease.

6. **INSTALL SIDE GEAR SHAFT**
(See page FA-15)



DISASSEMBLY OF FRONT DRIVE SHAFT

(See page FA-7)

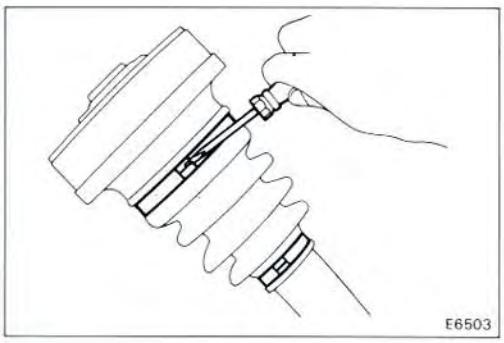
1. CHECK DRIVE SHAFT

(a) Check to see that there is no play in the inboard and outboard joints.

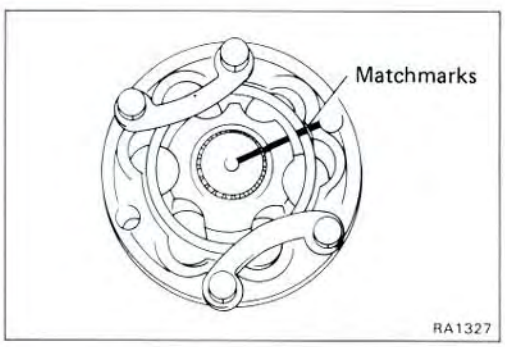
(b) Check to see that the inboard joint slide smoothly in the thrust direction.

(c) Check to see that there is no play in the radial direction of the inboard joint.

(d) Check the damage of boot.



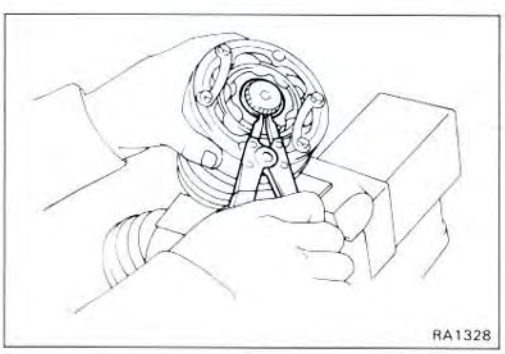
2. REMOVE INBOARD JOINT BOOT CLAMPS



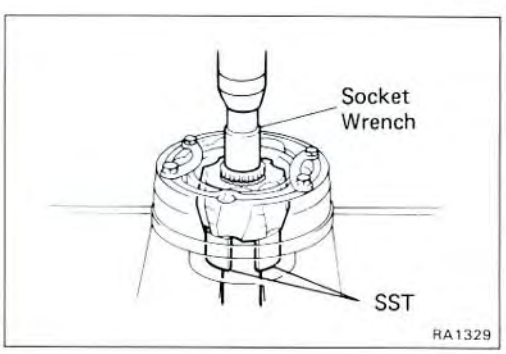
3. DISASSEMBLE INBOARD JOINT

(a) Place matchmarks on the inboard joint and drive shaft.

CAUTION: Do not use a punch to mark the matchmarks. Use paint, etc.



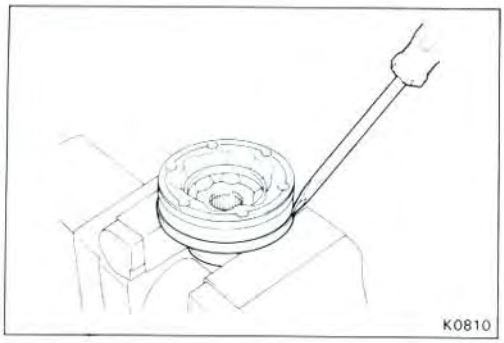
(b) Using snap ring pliers, remove the snap ring.



(c) Using SST, a socket wrench and a press, remove the inboard joint from the drive shaft.

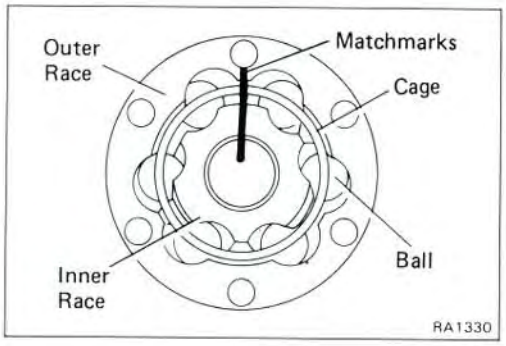
SST 09726-10010 (09726-00030)

(d) Remove the bolts, nuts and washers from the inboard joint.


K0810

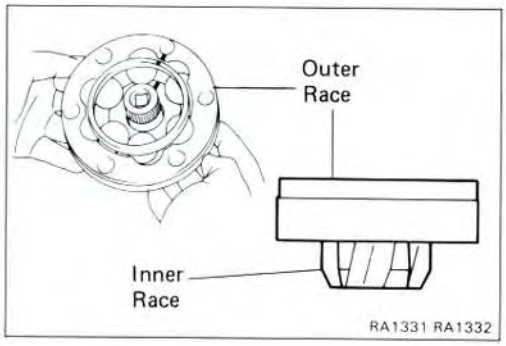
(e) Using a screwdriver and hammer, remove the inboard joint from inboard joint cover.

CAUTION: When lifting the inboard joint, hold onto the inner race and outer race.



RA1330

NOTE: Should the joint become disassembled, reassemble it in the way shown in the illustration.



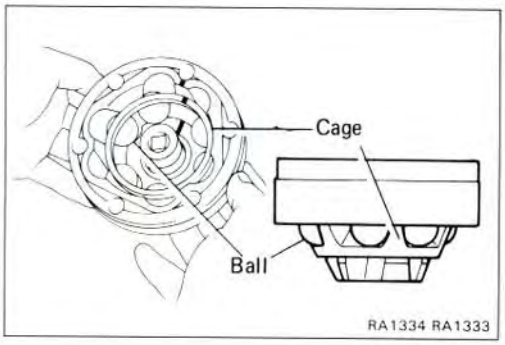
RA1331 RA1332

SERVICE HINT

(a) Align the matchmarks placed before disassembly.

(b) Insert the spark plug wrench into the inner race.

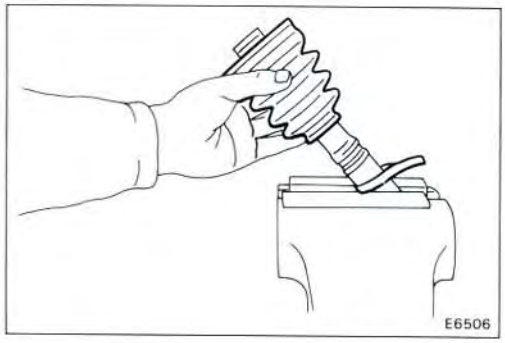
(c) Lift the outer race and cage, and insert the six balls.



RA1334 RA1333

(d) Jiggle the outer race and cage as shown in the illustration to place the balls in their respective grooves.

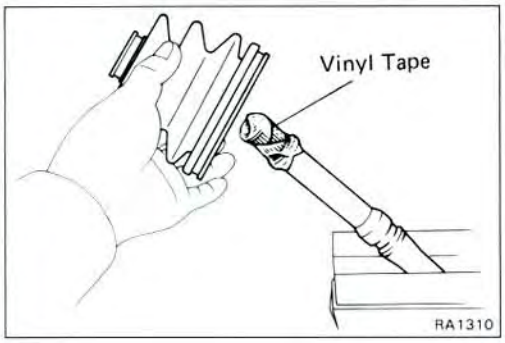
(e) Lower the outer race and cage so that they fit tightly with the inner race.


E6506

4. REMOVE BOOTS

(a) Remove the boot of the inboard joint and outboard joint.

(b) Check the inside and outside of the boots for damage.



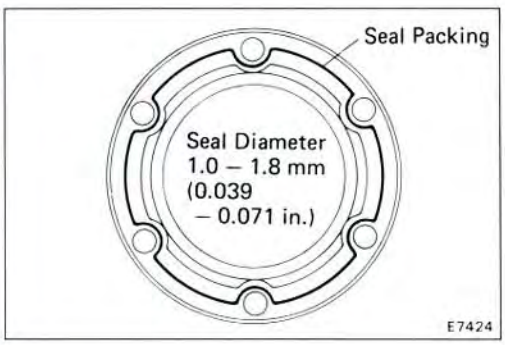
ASSEMBLY OF FRONT DRIVE SHAFT

(See page FA-7)

1. TEMPORARILY INSTALL BOOTS AND NEW BOOT CLAMPS

NOTE: Before installing the boot, wrap vinyl tape around the spline of the shaft to prevent damaging the boot.

Temporarily install the boot and a new clamp to the outboard joint and inboard joint.

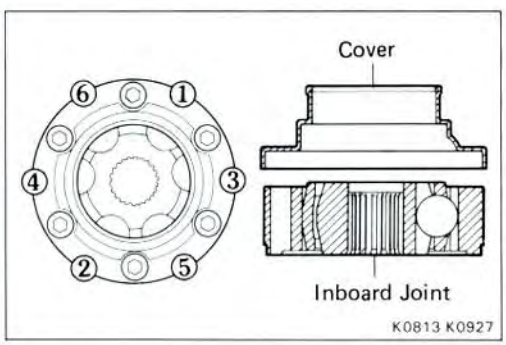


2. ASSEMBLE NEW INBOARD JOINT COVER

(a) Apply seal packing to the inboard joint cover as shown in the figure.

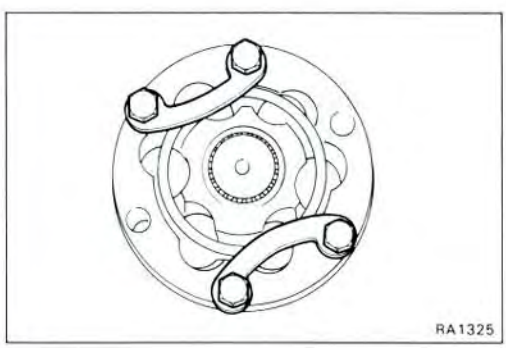
Seal packing: Part No. 08826-00801, THREE BOND 1121 or equivalent

NOTE: Avoid applying an excess amount to the surface.



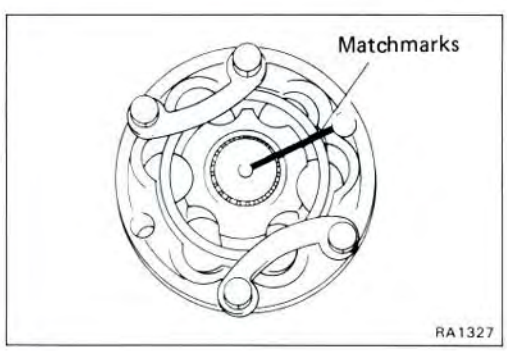
(b) Align the bolt holes of the cover with those of the inboard joint, then insert the hexagon bolts.

(c) Using a plastic hammer to tap the rim of the inboard joint cover into place. Do this in the order shown, and repeat several times.



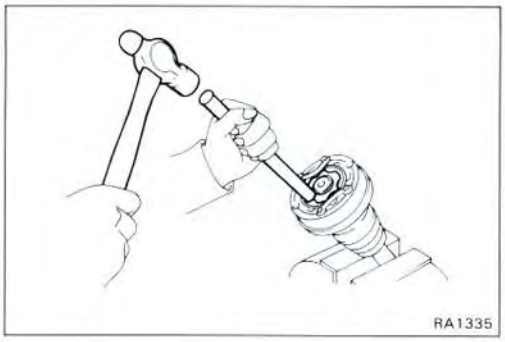
(d) Use bolts, nuts and washers to keep the inboard joint toghther.

CAUTION: Tighten the bolts by hand to avoid scratching the flange surface.



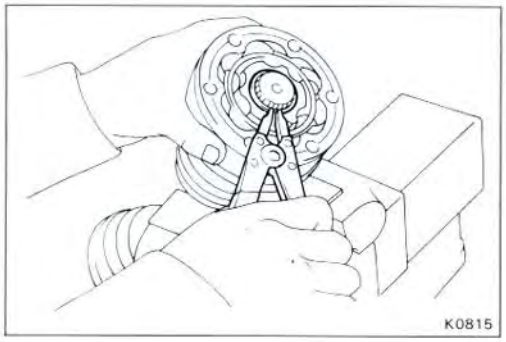
3. ASSEMBLE INBOARD JOINT

(a) Align the matchmarks placed before disassembly.

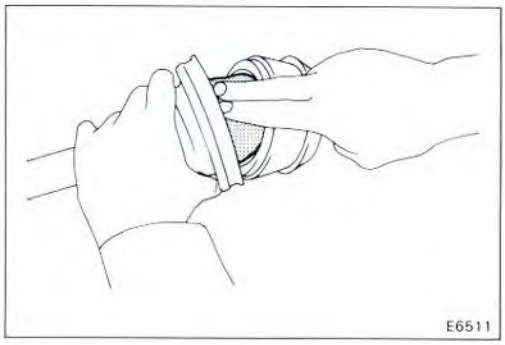


(b) Using a brass bar and hammer, tap the inboard joint onto the drive shaft.

CAUTION: Make sure that the brass bar is touching the inner race, and not the cage.



(c) Using snap ring pliers, install a new snap ring.

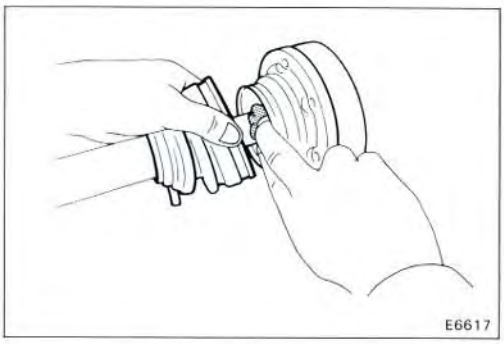


4. ASSEMBLE BOOT TO OUTBOARD JOINT

Before assembling the boots, pack in grease.

NOTE: Use the grease supplied in the boot kit.

Grease capacity: 120 g (0.26 lb)

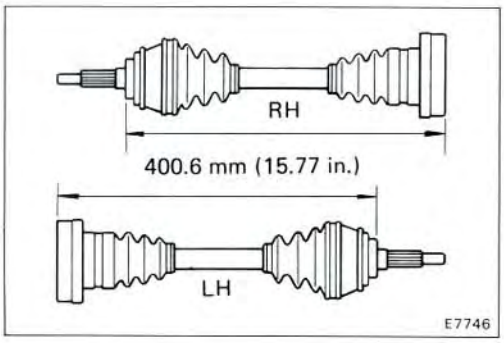


5. ASSEMBLE INBOARD JOINT TO INBOARD JOINT

Pack in grease to the inboard tulip and boot.

NOTE: Use the grease supplied in the boot kit.

Grease capacity: 90 g (0.20 lb)

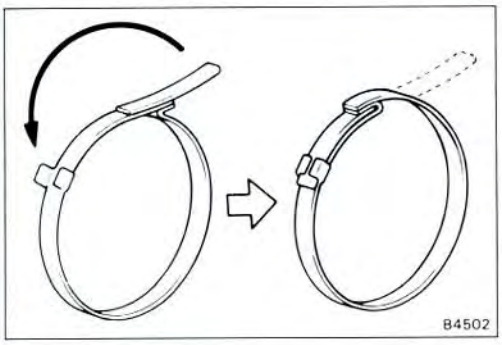


6. ASSEMBLE BOOT CLAMPS TO BOTH BOOTS

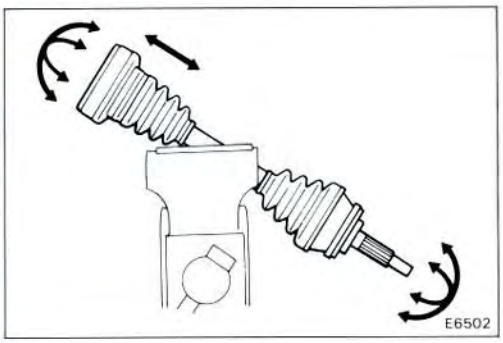
(a) Be sure the boot is on the shaft groove.

(b) Insure that the boot is not stretched or contracted when the drive shaft is at standard length.

Drive shaft length: 400.6 mm (15.77 in.)



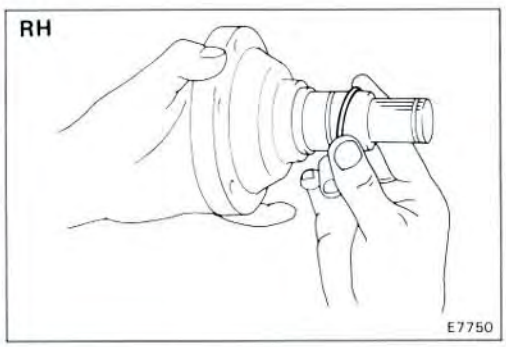
(c) Bend the band and lock it as shown in the figure.



7. CHECK DRIVE SHAFT

(a) Check to see that there is no play in the inboard joint and outboard joint.

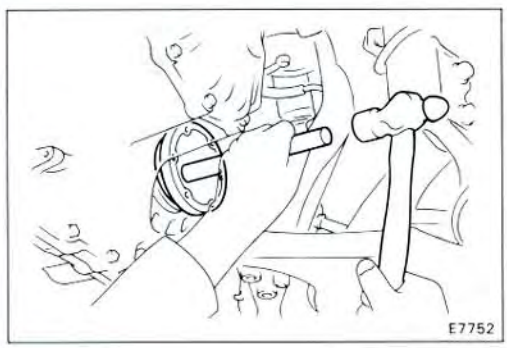
(b) Check to see that the inboard joint slide smoothly in the thrust direction.



INSTALLATION OF FRONT DRIVE SHAFT

(See page FA-7)

1. INSTALL A NEW O-RING TO RH SIDE GEAR SHAFT



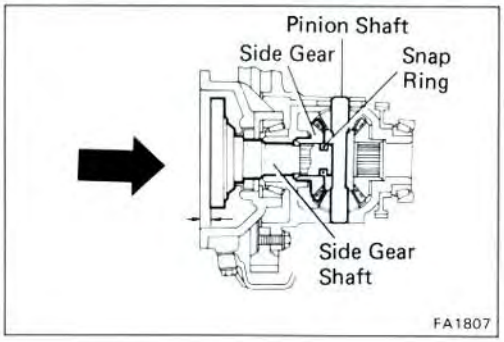
2. INSTALL SIDE GEAR SHAFT

(a) Insure that a new snap ring is positioned securely in the groove of the side gear shaft.

(b) Using a brass bar and hammer, tap in the drive shaft until it makes contact with the pinion shaft.

NOTE:

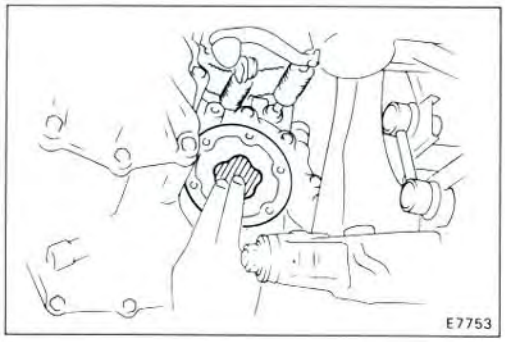
- Before installing the drive shaft, set the snap ring opening side facing downward.
- Whether or not the side gear shaft is making contact with the pinion shaft can be known by the sound or feeling when driving it in.



3. CHECK INSTALLATION OF SIDE GEAR SHAFT

(a) Check that the side gear shaft will not come out by trying to pull it completely out by hand.

(b) Push the side gear shaft to the differential and measure the distance between the side gear shaft and the transaxle case. Check that the distance between the two is the same as the measurement taken before removing the side gear shaft.



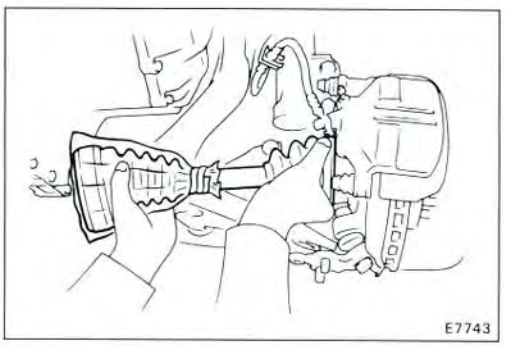
4. PACK IN GREASE TO SIDE GEAR SHAFT

Pack in grease to the side gear shaft.

Grease capacity: 43 g (0.09 lb)

NOTE: Use the grease supplied in the boot kit. Supply of grease only is also available.

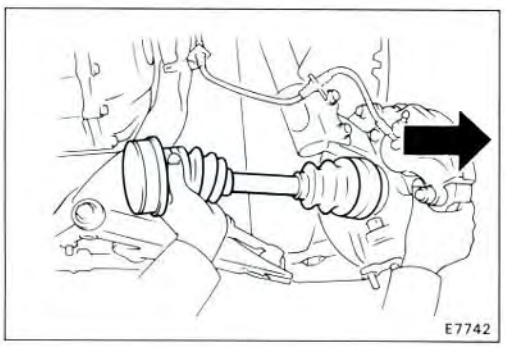
Part No. 90999-94029



5. INSTALL FRONT DRIVE SHAFT TO AXLE HUB

(a) Install the outboard joint side of the drive shaft to the axle hub.

CUTION: Be careful not to damage the boot, oil seal and deflector.

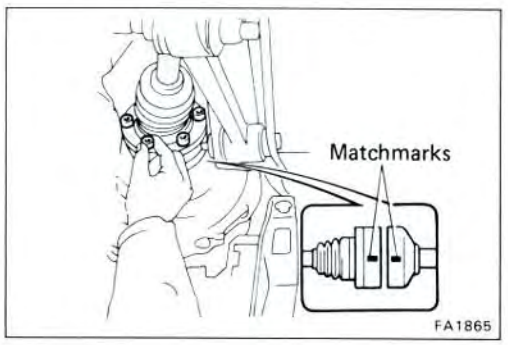


(b) Push the rear axle carrier towards the outside vehicle and lift up the inboard joint.

CAUTION: When moving the drive shaft do not compress the boot.

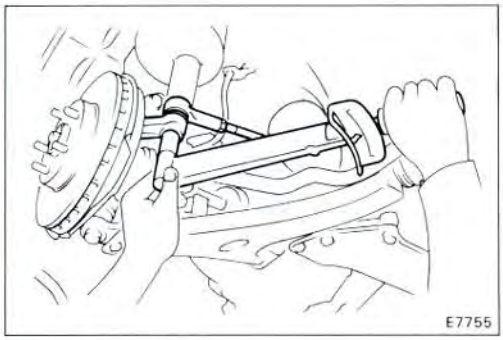
(c) Remove the vinyl bag, bolts, nuts and washers from the inboard joint.

(d) Place the new gasket on the inboard joint.



(e) Align the matchmarks on the side gear shaft and inboard joint.

(f) Finger tighten the six hexagon bolts and the three washer holding the drive shaft to the side gear shaft.


E7755

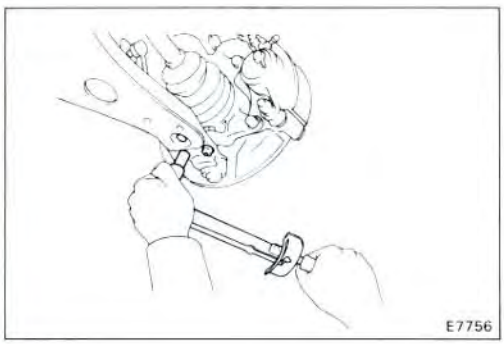
6. **CONNECT TIE ROD END TO STEERING KNUCKLE**

(a) Install and torque the nut.

Torque: 500 kg-cm (36 ft-lb, 49 N·m)

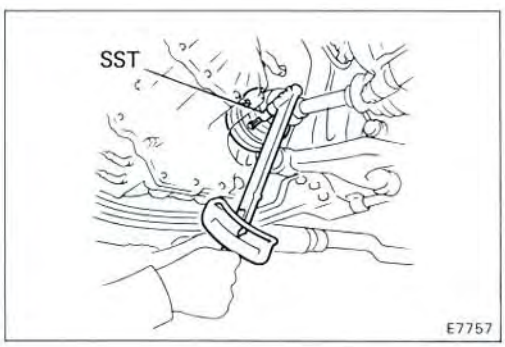
(b) Install a new cotter pin.

NOTE: If the cotter pin hole does not line up, correct by tightening the nut by the smallest amount possible.


E7756

7. **CONNECT STEERING KNUCKLE TO LOWER ARM**

Torque: 1,300 kg-cm (94 ft-lb, 127 N·m)



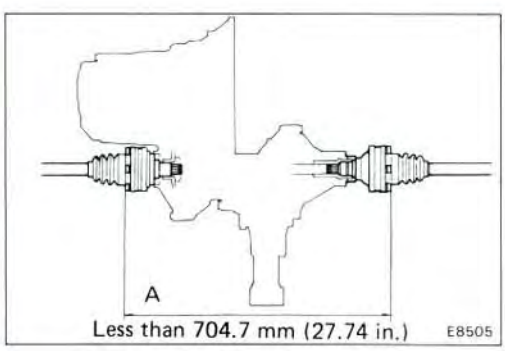
E7757

8. **TIGHTEN INBOARD JOINT HOLDING SIX HEXAGON BOLTS**

Using SST, torque the six hexagon bolts while depressing the brake pedal.

SST 09043-88010

Torque: 660 kg-cm (48 ft-lb, 65 N·m)



Less than 704.7 mm (27.74 in.) E8505

REFERENCE

Measure the distance between RH and LH side gear shaft as shown the illustration.

Reference only
Distance A: Less than 704.7 mm (27.74 in.)

9. **INSTALL BEARING LOCK NUT, LOCK NUT CAP AND NEW COTTER PIN**

(a) Torque the bearing lock nut while depressing the brake pedal.

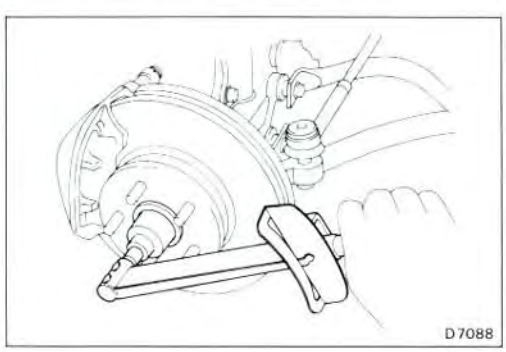
Torque: 1,900 kg-cm (137 ft-lb, 186 N·m)

(b) Install the lock nut cap and, using pliers, install a new cotter pin.

10. **FILL TRANSAXLE WITH GEAR OIL**
(See step 4 on page MT-7)

11. **INSTALL ENGINE UNDER COVER RH AND LH**

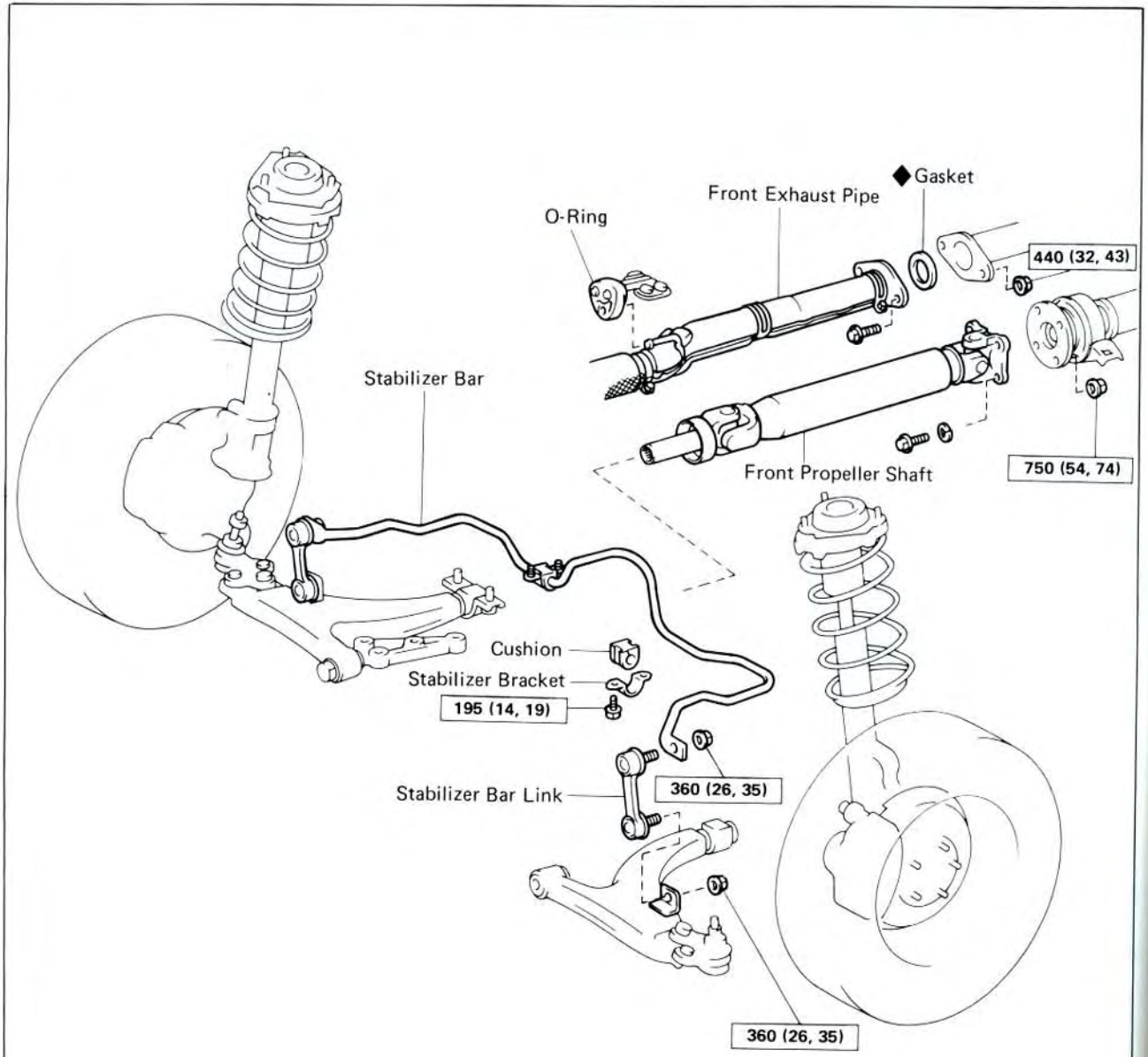
12. **CHECK FRONT WHEEL ALIGNMENT**
(See page FA-3)


D7088

FRONT SUSPENSION

Stabilizer Bar

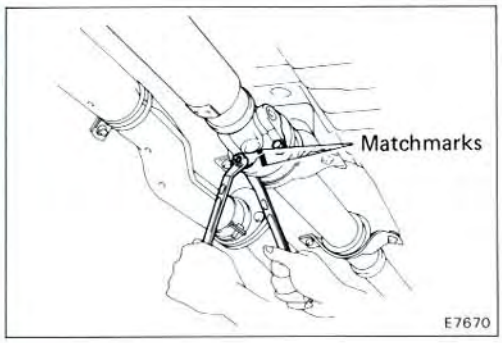
COMPONENTS



kg-cm (ft-lb, N-m) : Specified torque

◆ Non-reusable part

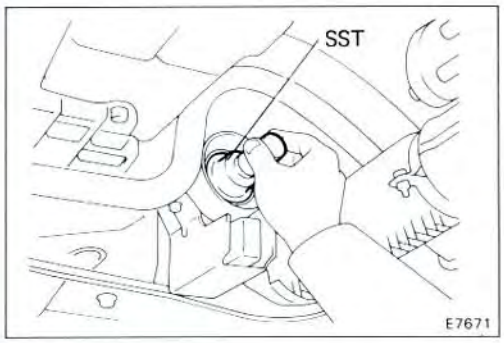
E7762



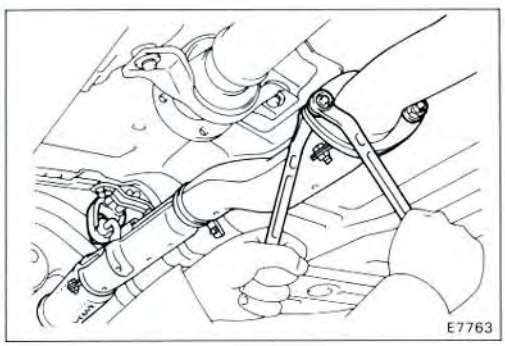
REMOVAL OF STABILIZER

(See page FA-18)

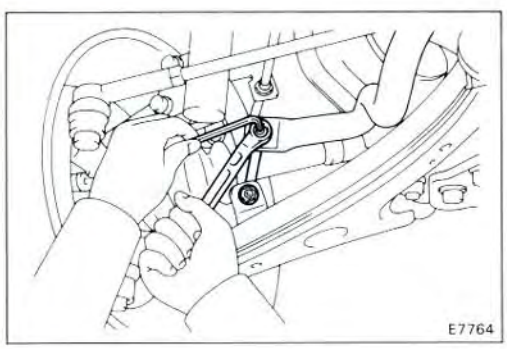
1. **DISCONNECT FRONT PROPELLER SHAFT FROM INTERMEDIATE PROPELLER SHAFT**
   (a) Place the matchmarks on the flanges.
   (b) Remove the four bolts and nuts.



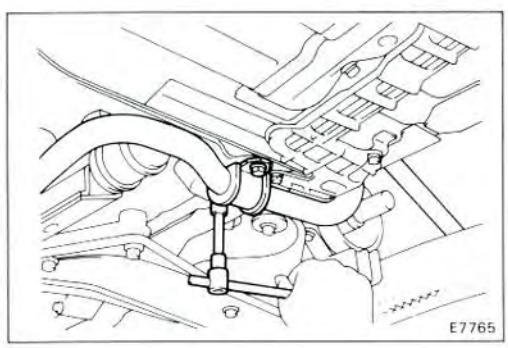
2. **REMOVE FRONT PROPELLER SHAFT FROM TRANSAXLE**
   (a) Pull the yoke from the transaxle.
   (b) Insert SST into the transaxle to prevent oil leakage.
   SST 09325-20010



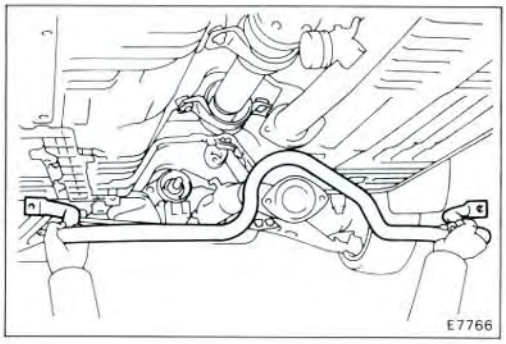
3. **DISCONNECT FRONT EXHAUST PIPE FROM TAIL PIPE**
   (a) Disconnect front exhaust pipe from O-ring.
   (b) Disconnect front exhaust pipe from tail pipe.



4. **REMOVE STABILIZER BAR LINK**
   NOTE: If the ball joint stud turns together with the nut, use a hexagon wrench 5 mm (0.197 in.) to hold the stud.



5. **REMOVE STABILIZER BAR BRACKET AND CUSHION**



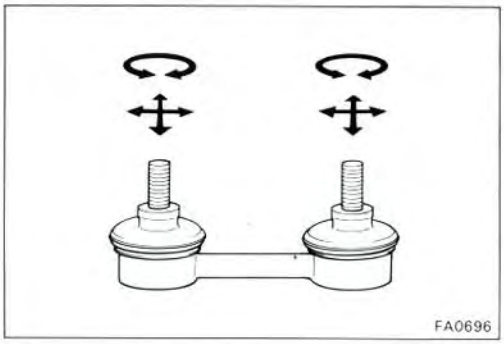
6. REMOVE STABILIZER BAR

INSPECTION OF STABILIZER LINK

INSPECT STABILIZER LINK

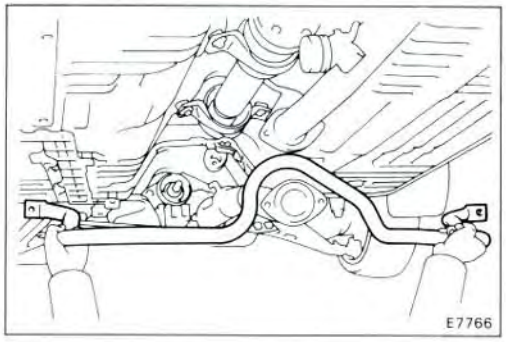
Rotate ball joint arm in all directions.

If the movement is not smooth and free, replace the stabilizer link.



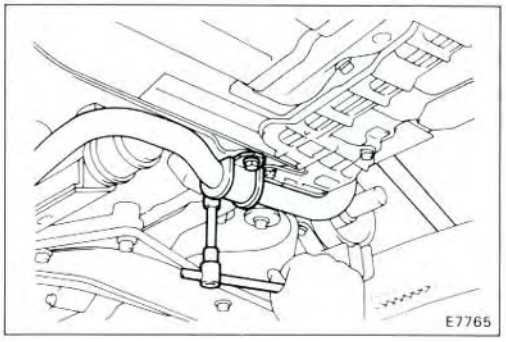
INSTALLATION OF STABILIZER BAR

1. INSTALL STABILIZER BAR



2. INSTALL STABILIZER BRACKET AND CUSHION

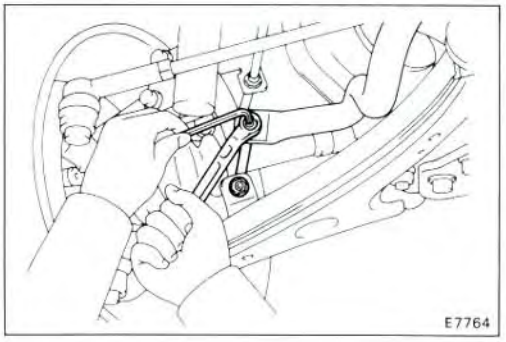
Torque: 195 kg-cm (14 ft-lb, 19 N·m)

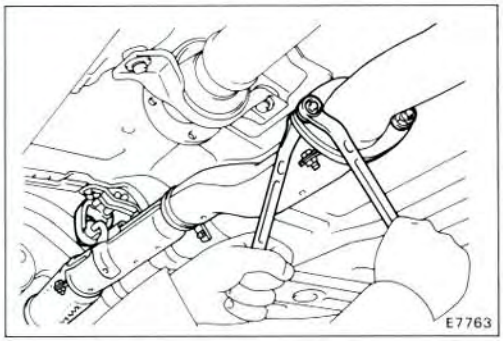


3. INSTALL STABILIZER LINK

Torque: 360 kg-cm (26 ft-lb, 35 N·m)

NOTE: If the ball joint stud turns together with the nut, use a hexagon wrench 5 mm (0.197 in.) to hold the stud.





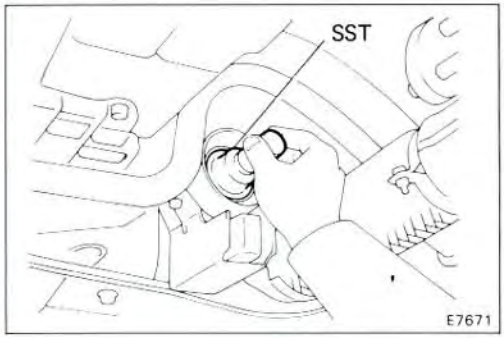
4. CONNECT FRONT EXHAUST PIPE TO TAIL PIPE

(a) Connect front exhaust pipe to tail pipe.

Torque: 440 kg-cm (32 ft-lb, 43 N·m)

NOTE: Replace exhaust pipe gasket with new ones.

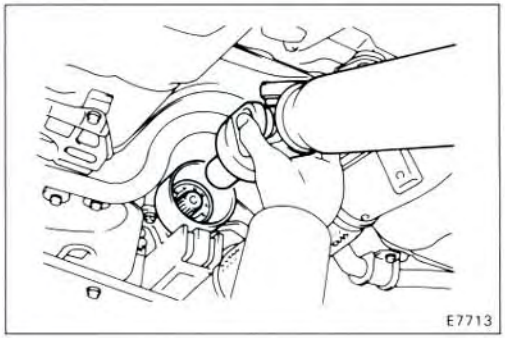
(b) Connect front exhaust pipe to O-ring.



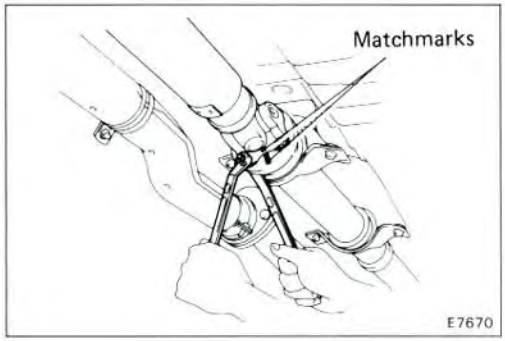
5. INSTALL FRONT PROPELLER SHAFT TO TRANSAXLE

(a) Remove SST.

SST 09325-20010



(b) Insert the yoke into the transaxle.



6. CONNECT FRONT PROPELLER SHAFT TO TRANSAXLE

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

(b) Torque the bolts and nuts.

Torque: 750 kg-cm (54 ft-lb, 74 N·m)

7. FILL TRANSAXLE WITH GEAR OIL

(See step 4 on page MT-7)

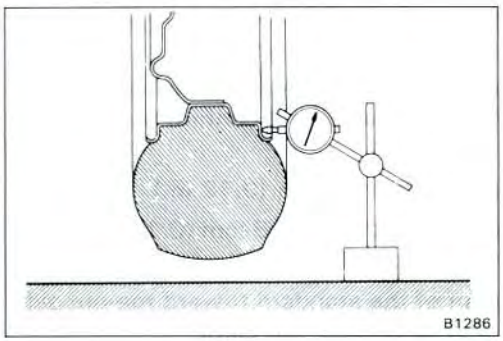
REAR AXLE AND SUSPENSION

REFER TO 1988 CELICA REPAIR MANUAL (Pub. No. RM071U)

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

TROUBLESHOOTING

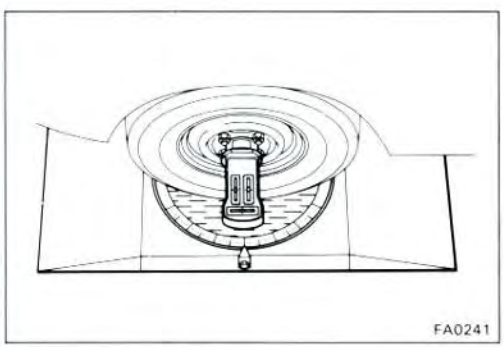
Problem	Possible cause	Remedy	Page
Wanders/pulls	Tires worn or improperly inflated	Replace tires or inflate to proper pressure	FA-3
	Wheel alignment incorrect	Check wheel alignment	RA-3
	Wheel bearing worn	Replace wheel bearing	RA-5
	Rear suspension parts loose or broken	Tighten or replace suspension parts	
Bottoming	Vehicle overloaded	Check loading	
Sways/pitches	Tires improperly inflated	Inflate tires to proper pressure	FA-3
	Stabilizer bar bent or broken	Inspect stabilizer bar	RA-43
Abnormal tire wear	Tire improperly inflated	Inflate tires to proper pressure	FA-3
	Alignment incorrect	Check camber and toe-in	RA-3
	Suspension parts worn	Replace suspension parts	RA-43


B1286

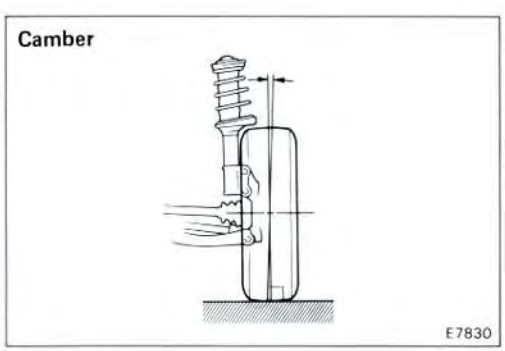
REAR WHEEL ALIGNMENT

1. **MAKE FOLLOWING CHECKS AND CORRECT ANY PROBLEMS**
   (a) Check that the tires for wear, size and proper inflation. (See page FA-3)
   (b) Check the rear wheel bearings for looseness.
   (c) Check the wheel runout.
   Lateral runout: Less than 1.0 mm (0.039 in.)
   (d) Check the rear suspension for looseness.

2. **MEASURE VEHICLE HEIGHT**
   (See page FA-3)


FA0241

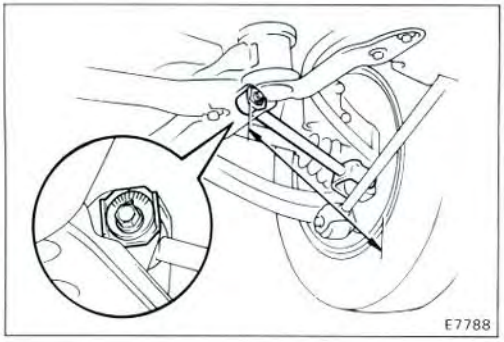
3. **INSTALL WHEEL ALIGNMENT EQUIPMENT**
   Follow the specific instructions of the equipment manufacturer.

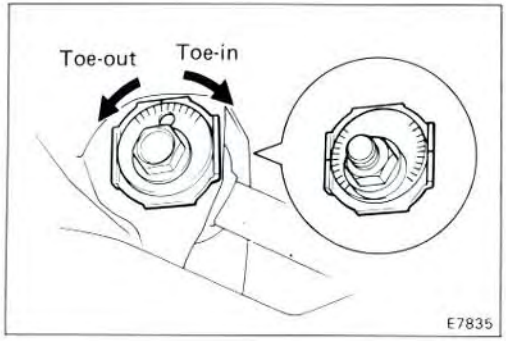


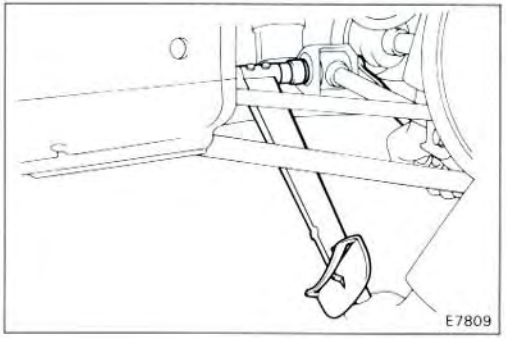
E7830

4. **CHECK CAMBER**
   Camber: Inspection standard −45′ ± 45′
   Left-right error 30′
   Camber is not adjustable. If measurement is not within specification, inspect and replace the suspension parts as necessary.

5. **INSPECT TOE-IN**
   (See step 8 on page FA-5)
   Toe-in: Inspection STD 5 ± 2 mm (0.197 in. ± 0.08 in.)
   If toe-in is not within specification adjust by the cam.







6. ADJUST TOE-IN
(See step 9 on page FA-5)

(a) Measure the distance between each wheel disc and corner of the cam bracket and confirm that both are the same.

Left-right error: Less than 3 mm (0.12 in.)

If the left-right error is greater than 3 mm (0.12 in.) adjust following the procedures below.

- If the toe-in is out of the standard toward toe-out side, lengthen the shorter arm by the cam.
- If the toe-in is out of the standard toward toe-in side, shorten the longer arm by the cam.

(b) Measure the toe-in.

Toe-in: Adjustment STD 5 ± 1 mm (0.19 ± 0.04 in.)

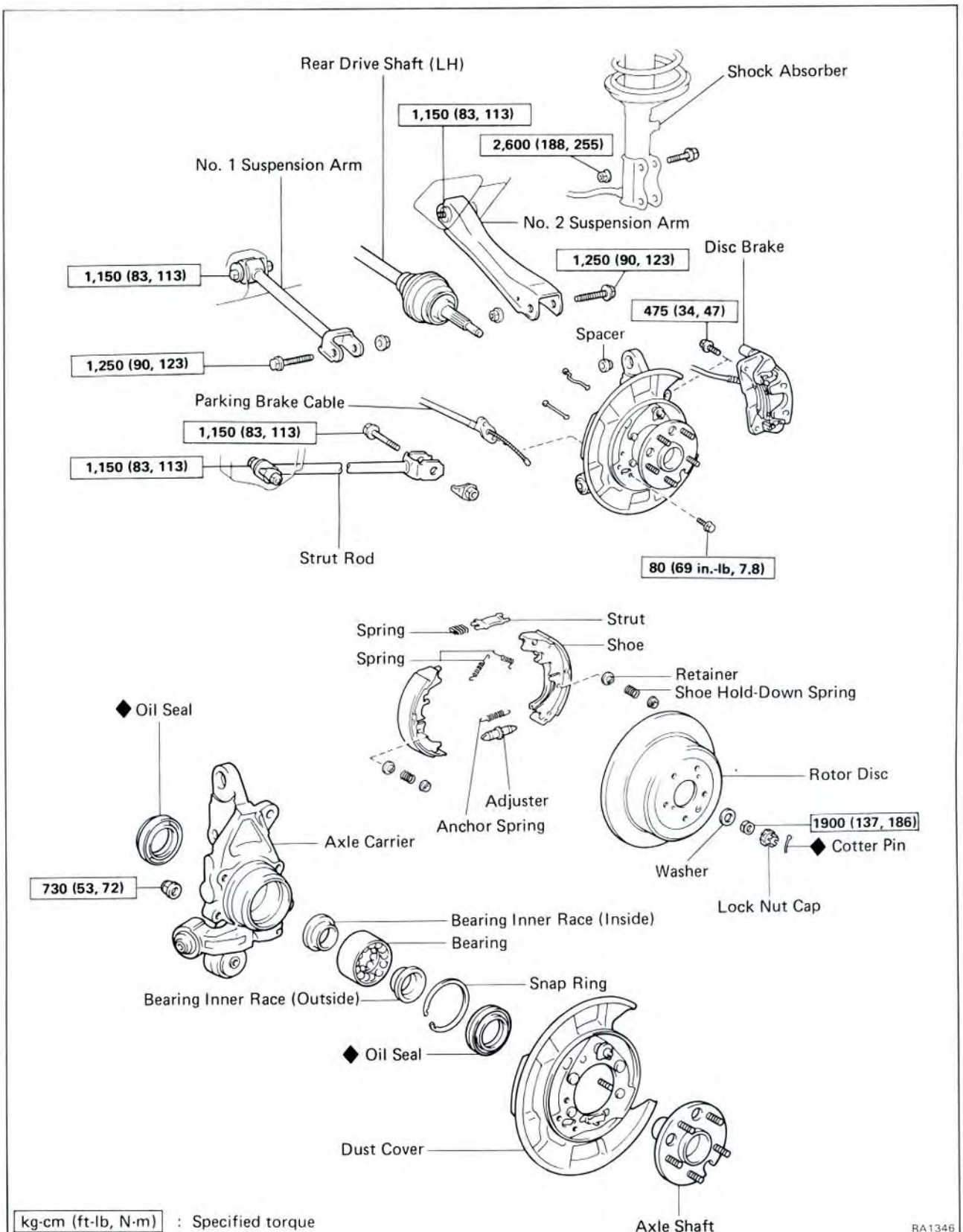
If the left-right error is within specifications but the overall toe-in is not, lengthen or shorten both arms an equal amount by turning the two cams in the opposite direction, until the adjustment standard is obtained.

NOTE: The toe-in will change about 4.2 mm (0.17 in.) with each graduation of the cam (one side).

Torque: 1,150 kg-cm (83 ft-lb, 113 N·m)

REAR AXLE HUB AND CARRIER

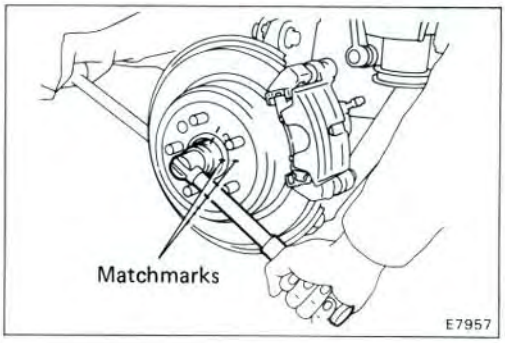
COMPONENTS



kg-cm (ft-lb, N·m) : Specified torque

◆ Non-reusable part

RA1346
RA1345
RA1340



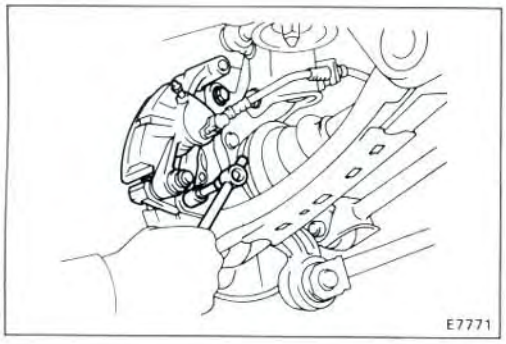
REMOVAL OF REAR AXLE HUB AND CARRIER

(See page RA-5)

1. REMOVE COTTER PIN, BEARING LOCK NUT CAP AND BEARING LOCK NUT

(a) Remove the cotter pin and bearing lock nut cap.

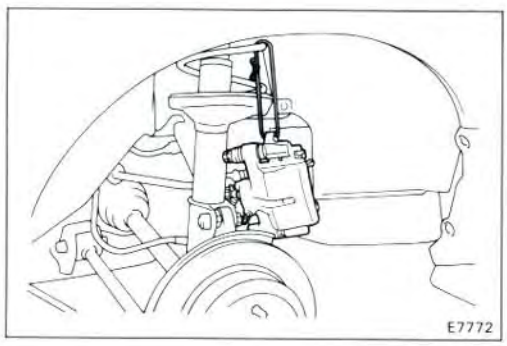
(b) With the parking brake engaged, remove the bearing lock nut.



2. DISCONNECT PARKING BRAKE CABLE

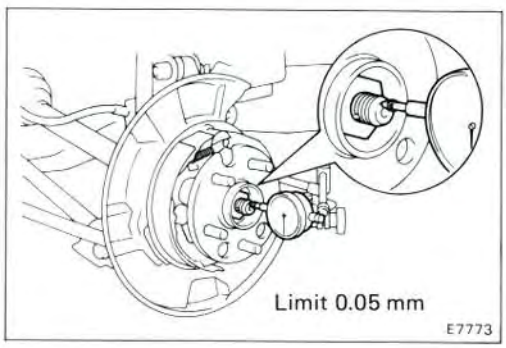
3. REMOVE BRAKE CALIPER

Remove the brake caliper from the rear axle carrier and suspend it with wire.



4. REMOVE ROTOR DISC

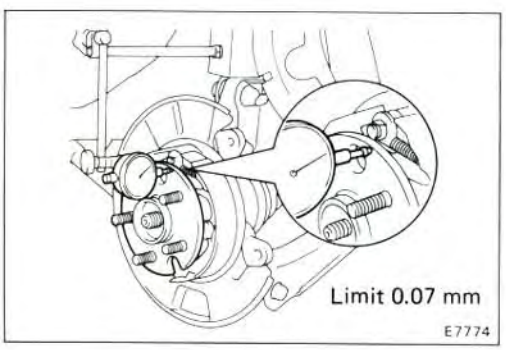
NOTE: Before removing the rotor disc, place the matchmarks on the axle hub and rotor disc.



5. CHECK BEARING PLAY IN AXIAL DIRECTION

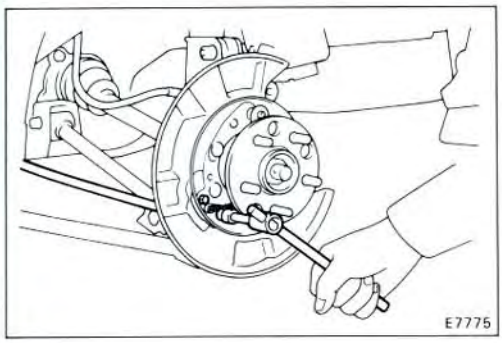
Bearing play: 0.05 mm (0.0020 in.) or less

If the bearing play is greater than the maximum, replace the bearing.



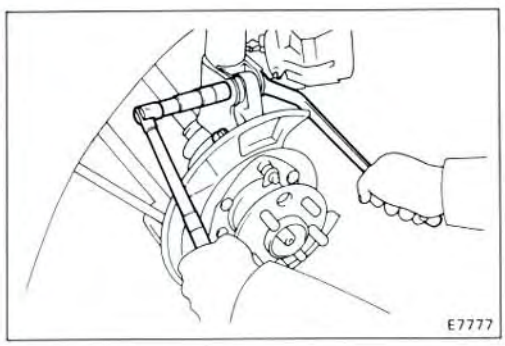
6. CHECK AXLE SHAFT FLANGE RUNOUT

Maximum flange runout: 0.07 mm (0.0028 in.) or less



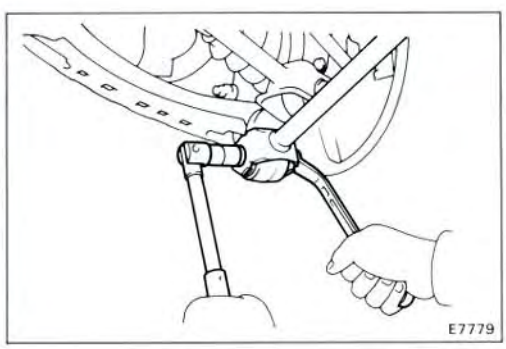
7. **REMOVE PARKING BRAKE ASSEMBLY**
(See page RA-5)

8. **REMOVE PARKING BRAKE CABLE**

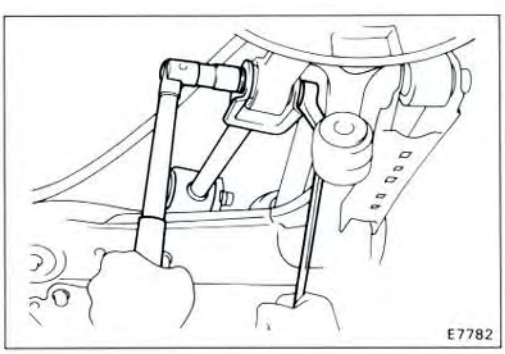


9. **REMOVE AXLE CARRIER WITH AXLE HUB**

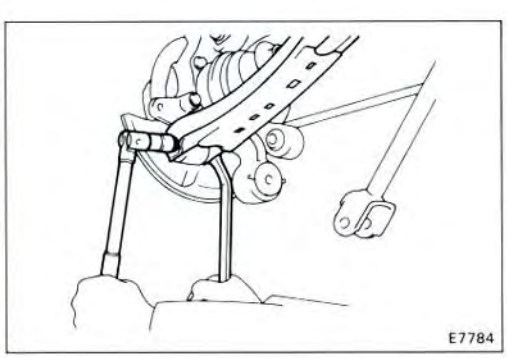
(a) Remove the two axle carrier set nuts and two bolts with the camber adjusting cam.



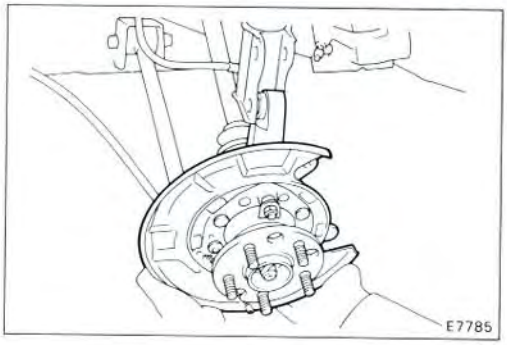
(b) Disconnect the strut rod from the axle carrier.



(c) Disconnect the No. 1 suspension arm from the axle carrier.

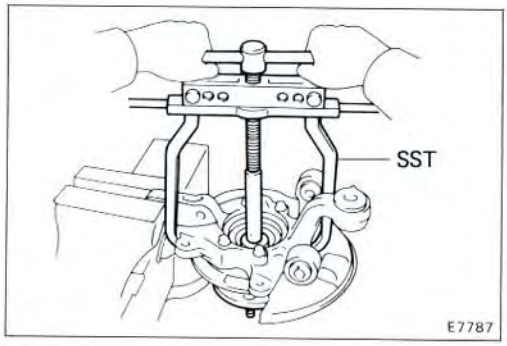


(d) Disconnect the No. 2 suspension arm from the axle carrier.



(e) Remove the axle carrier with axle hub.

CAUTION: Cover the drive shaft boot with cloth to protect it from damage.

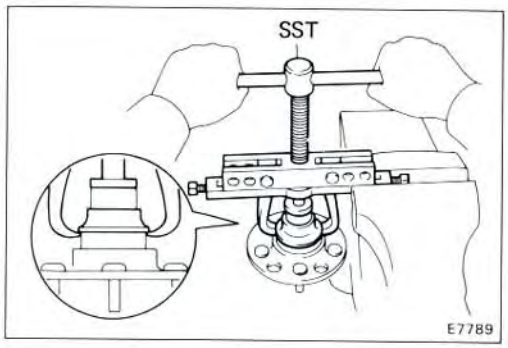


REPLACEMENT OF AXLE HUB AND BEARING

1. REMOVE AXLE SHAFT FROM AXLE HUB

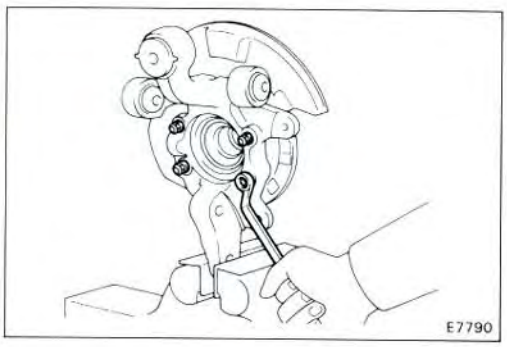
Using SST, push the axle shaft off the axle hub.

SST 09950-20017

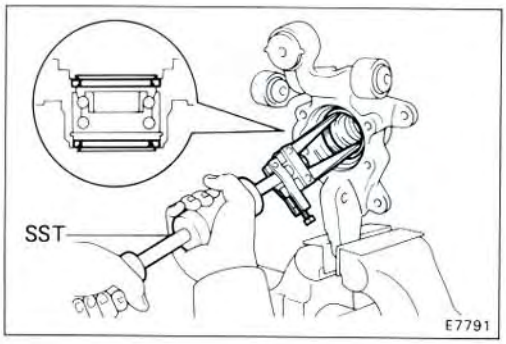


2. REMOVE BEARING INNER RACE (OUTSIDE) FROM AXLE SHAFT

Using SST, pull off the bearing inner race (outside) from the axle shaft.



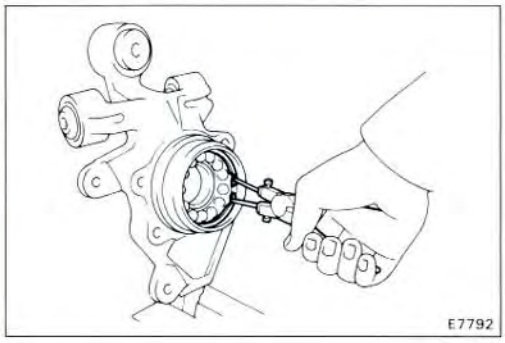
3. REMOVE DUST COVER



4. REMOVE INNER AND OUTER OIL SEAL

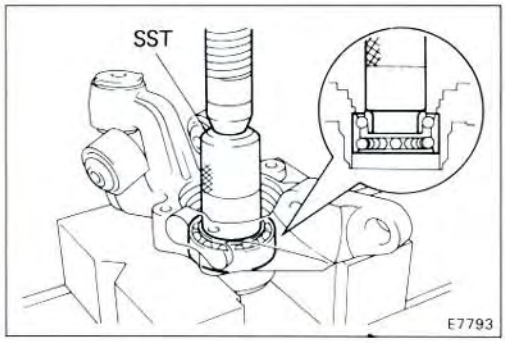
Using SST, remove the oil seal from the axle carrier.

SST 09308-00010



5. REMOVE HOLE SNAP RING

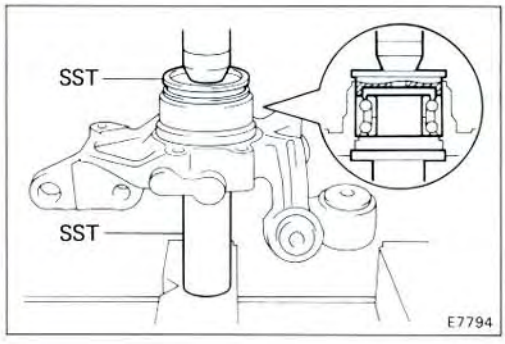
Using snap ring pliers, remove the hole snap ring from the axle carrier.



6. REMOVE BEARING

Using SST, press out the bearing from the axle carrier.

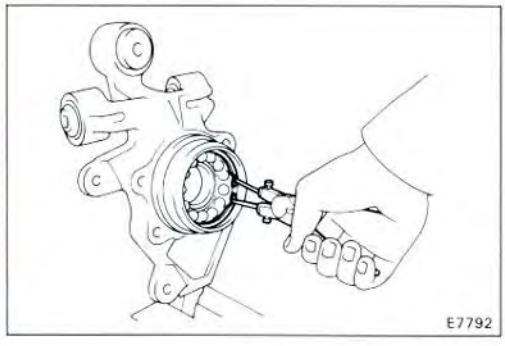
SST 09636-20010



7. INSTALL BEARING

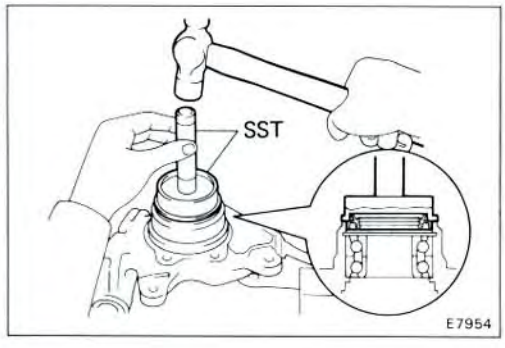
Using SST, press the bearing into the axle hub.

SST 09309-36010, 09608-32010



8. INSTALL HOLE SNAP RING

Using pliers, install a hole snap ring into the rear axle carrier.

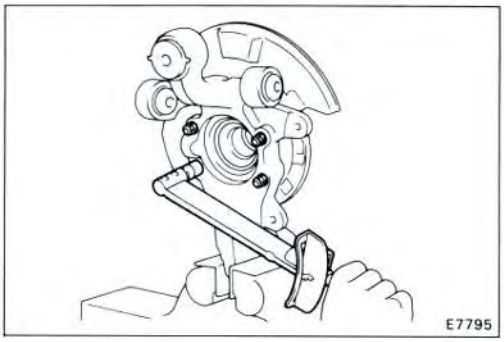


9. INSTALL OUTER OIL SEAL

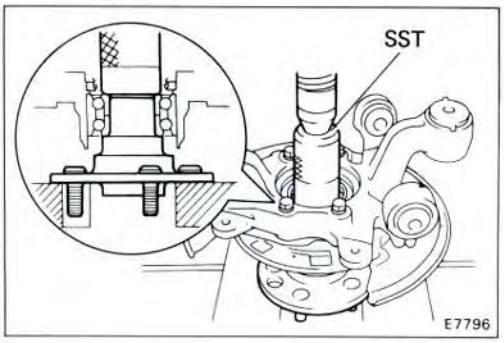
(a) Using SST, drive in a new oil seal to the axle carrier.

SST 09608-30012 (09608-04020), 09608-32010

(b) Apply MP grease to the oil seal lip.



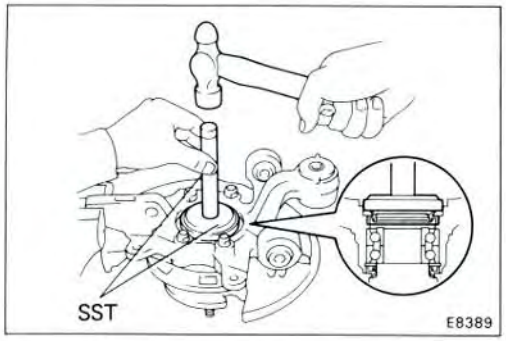
10. INSTALL DUST COVER



11. INSTALL AXLE SHAFT

Using SST, install the axle shaft to the axle carrier.

SST 09636-20010

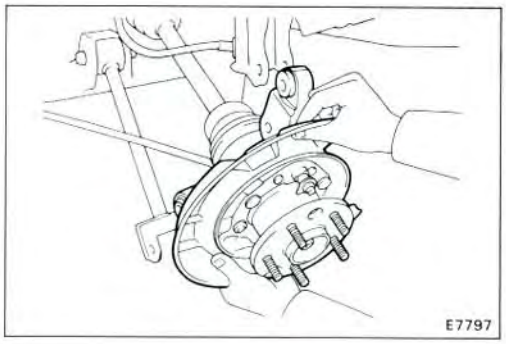


12. INSTALL INNER OIL SEAL

(a) Using SST, drive in a new oil seal to the axle carrier.

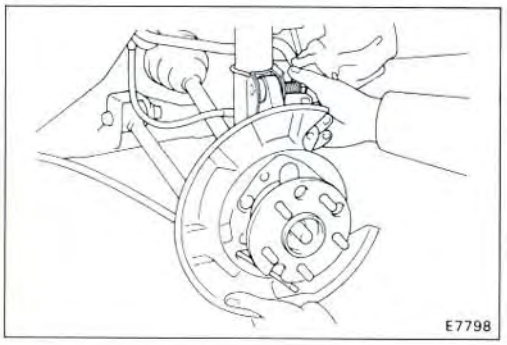
SST 09608-30012 (09608-04020, 09608-04110)

(b) Apply MP grease to the oil seal lip.



13. INSTALL AXLE CARRIER WITH AXLE HUB

(a) Install the axle carrier with axle hub.



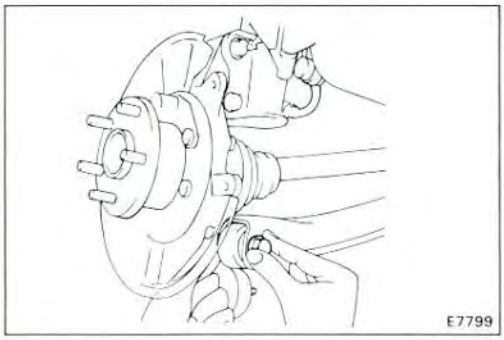
(b) Install the axle carrier with axle hub.

(1) Place the rear axle carrier to the shock absorber's lower bracket.

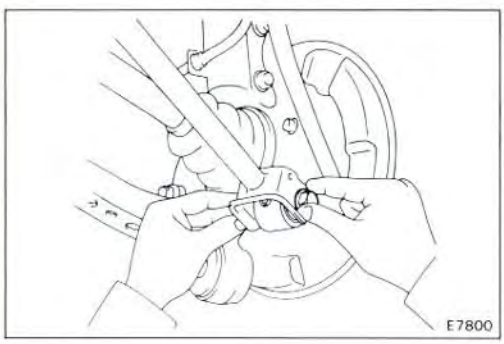
(2) Install the two set bolts and two nuts.

(3) Torque the nuts.

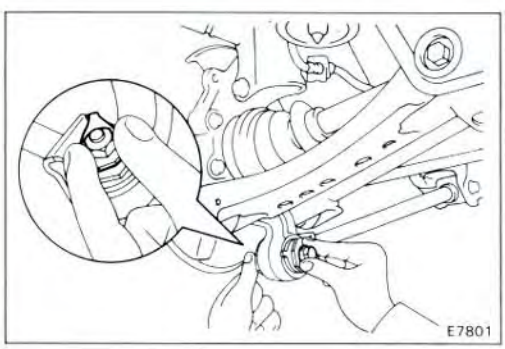
Torque: 2,600 kg-cm (188 ft-lb, 255 N·m)



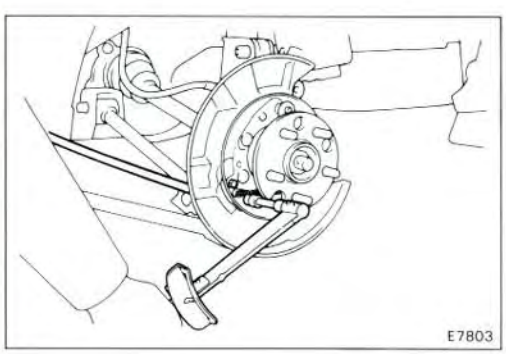
(c) Temporarily connect the No. 2 suspension arm to the axle carrier.



(d) Temporarily connect the No. 1 suspension arm to the axle carrier.

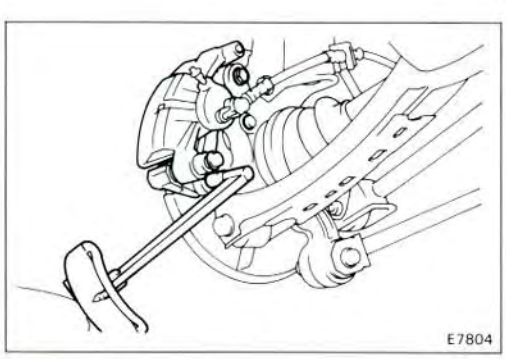


(e) Temporarily connect the strut rod to the axle carrier.



14. INSTALL PARKING BRAKE CABLE

15. INSTALL PARKING BRAKE ASSEMBLY
(See page RA-5)

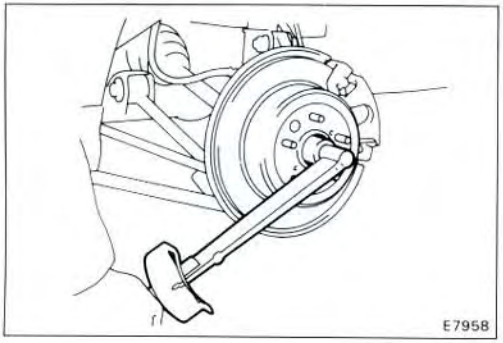


16. INSTALL ROTOR DISC

NOTE: Align the matchmarks on the axle hub and rotor disc.

17. INSTALL BRAKE CALIPER

Torque: 475 kg-cm (34 ft-lb, 47 N·m)



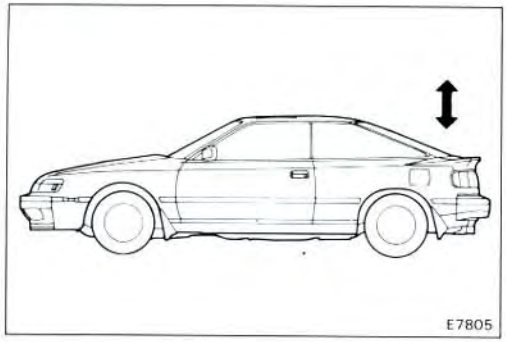
18. INSTALL PLATE WASHER, BEARING LOCK NUT, BEARING LOCK NUT CAP AND NEW COTTER PIN

(a) Install the plate washer and lock nut.

(b) With the parking brake engaged, and tighten the nut.

Torque: 1,900 kg-cm (137 ft-lb, 186 N·m)

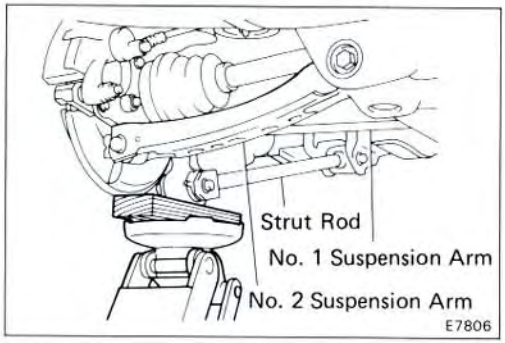
(c) Install the lock nut cap and a new cotter pin.



19. INSTALL WHEELS AND LOWER VEHICLE

(a) Install the wheel.

(b) Remove the stands and bounce the vehicle up and down to stabilize the suspension.



20. TORQUE AXLE CARRIER MOUNTING BOLTS

Torque the axle carrier mounting bolts with the vehicle weight on the suspension.

Torque: Strut rod × Axle carrier
1,150 kg-cm (83 ft-lb, 113 N·m)

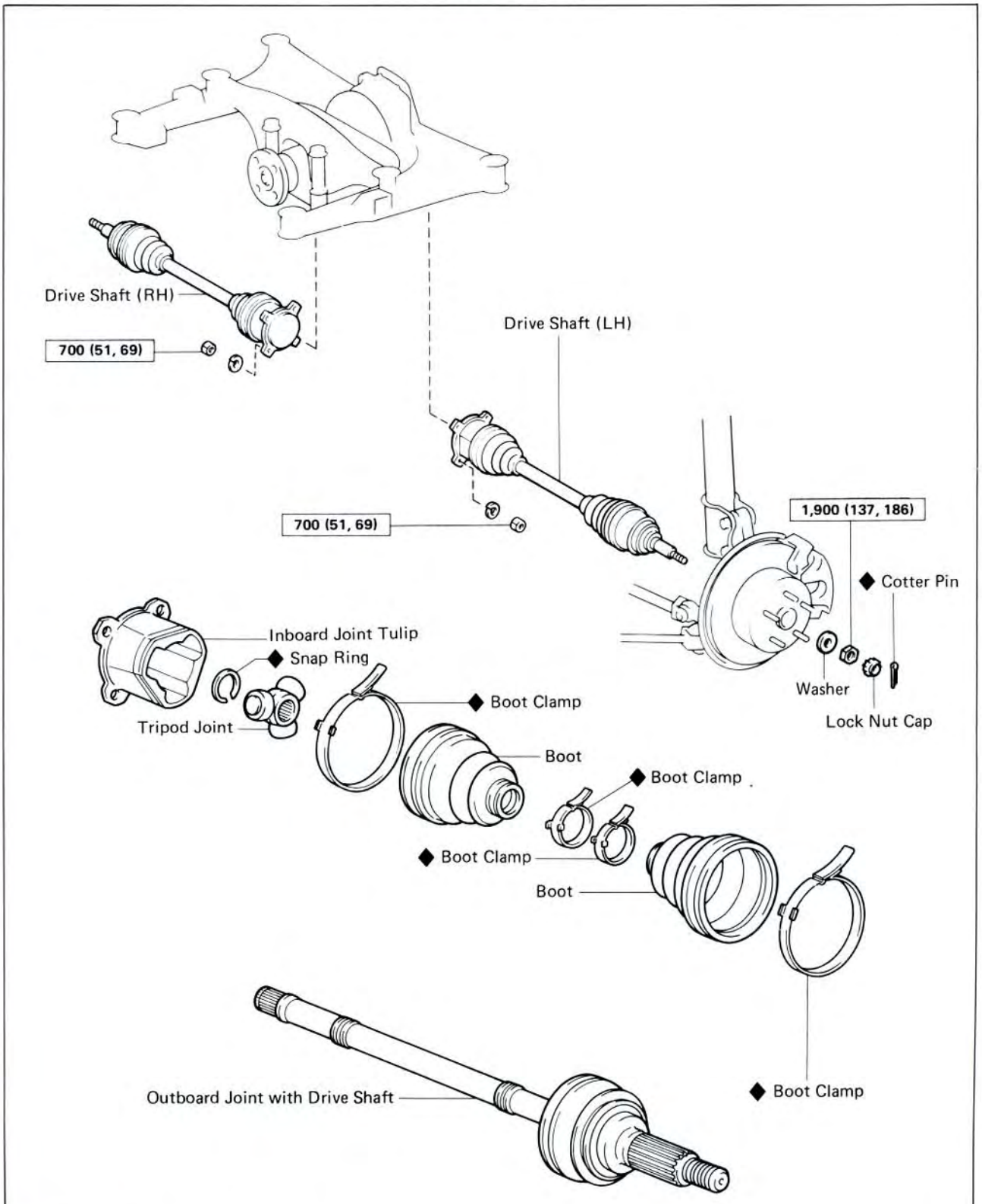
No. 1 and No. 2 suspension arm × Axle carrier
1,250 kg-cm (90 ft-lb, 123 N·m)

21. BLEED BRAKE SYSTEM

22. CHECK REAR WHEEL ALIGNMENT
(See page RA-3)

REAR DRIVE SHAFT

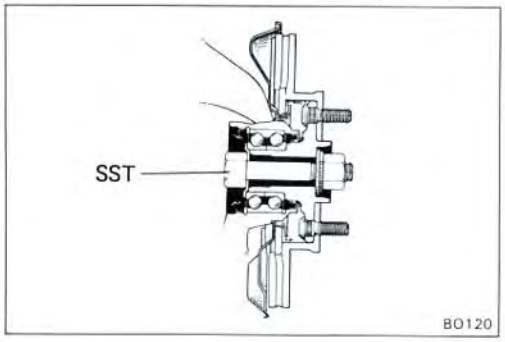
COMPONENTS



kg-cm (ft-lb, N·m) : Specified torque

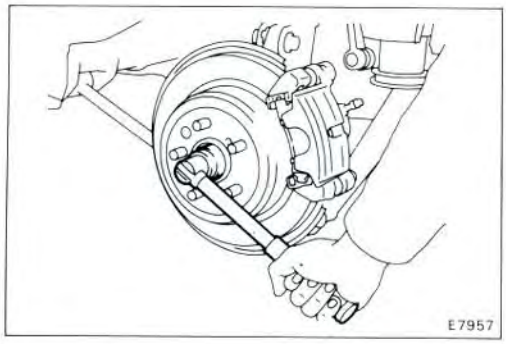
◆ Non-reusable part

RA1341
RA1342



CAUTION: The hub bearing could be damaged if it is subjected to the vehicle weight, such as when moving the vehicle with the drive shaft removed. Therefore, if it is absolutely necessary to place the vehicle weight on the hub bearing, first support it with SST.

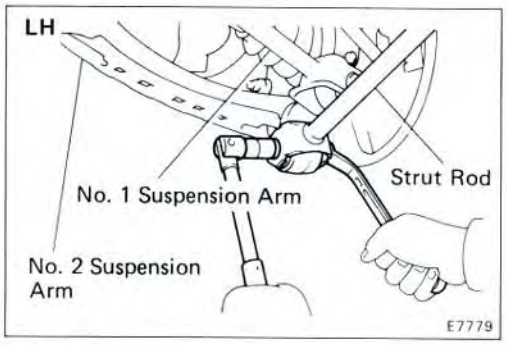
SST 09608-16041 (09608-02020, 09608-02040)



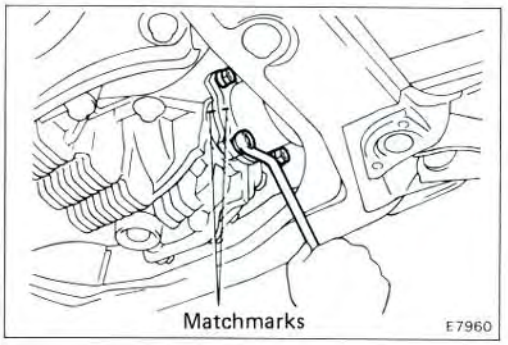
REMOVAL OF REAR DRIVE SHAFT

(See page RA-13)

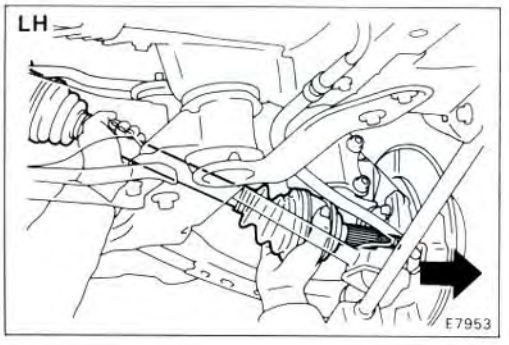
1. **REMOVE COTTER PIN, LOCK NUT CAP AND LOCK NUT**
   (a) Remove the cotter pin and lock nut cap.
   (b) Loosen the bearing lock nut while depressing the brake pedal.



2. **(LH Drive Shaft)**
   DISCONNECT STRUT ROD, NO. 1 AND NO. 2 SUSPENSION ARM FROM AXLE CARRIER

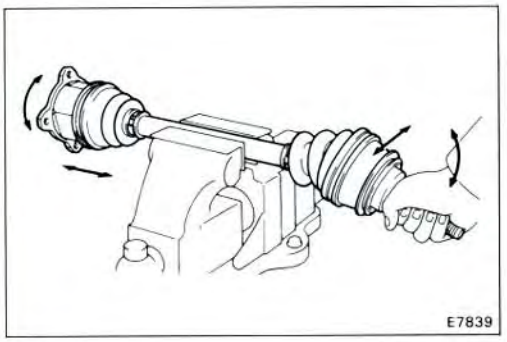


3. **REMOVE DRIVE SHAFT**
   NOTE: Be careful not to damage the boots.
   (a) Place matchmarks on the inboard joint tulip and the side gear shaft flange.
   (b) Loosen four nuts holding the drive shaft to the side gear shaft.
   (c) Disconnect the drive shaft from the side gear shaft.



(d) Remove the drive shaft from the axle carrier.

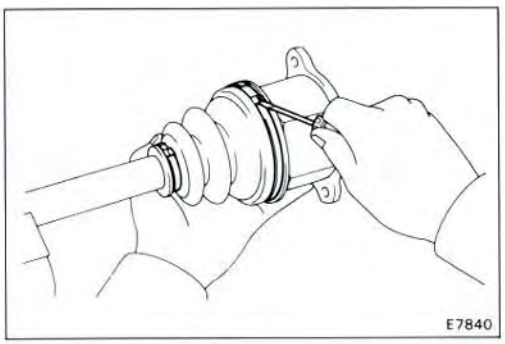
NOTE: (LH Drive Shaft)
Push the axle carrier towards the outside of vehicle, and separate the drive shaft from the axle carrier.



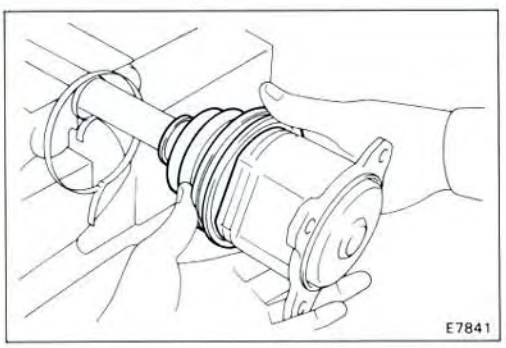
DISASSEMBLY OF REAR DRIVE SHAFT

(See page RA-13)

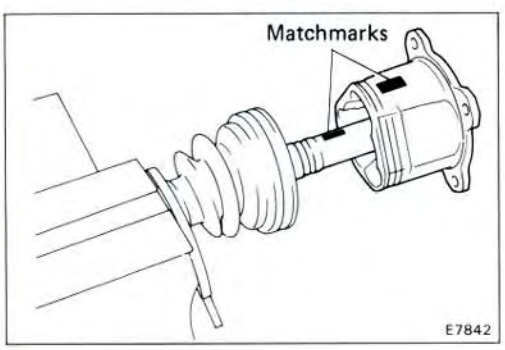
1. **CHECK DRIVE SHAFT**
   (a) Check to see that there is no play in the inboard and outboard joints.
   (b) Check to see that the inboard joint slide smoothly in the thrust direction.
   (c) Check to see that there is no remarkable play in the radial direction of the inboard joint.
   (d) Check the damage of boot.



2. **REMOVE INBOARD JOINT BOOT CLAMPS**

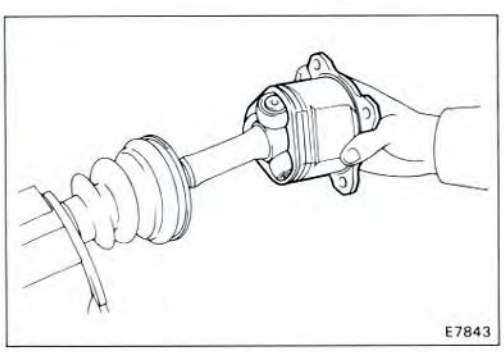


3. **REMOVE INBOARD JOINT BOOT FROM INBOARD JOINT TULIP**

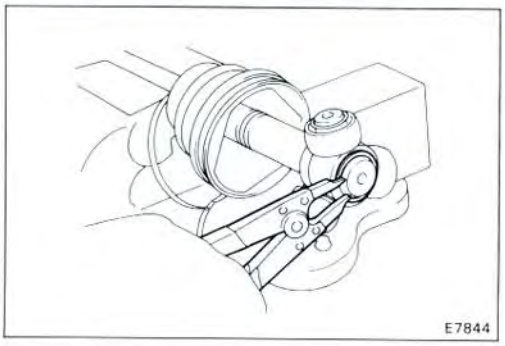


4. **REMOVE INBOARD JOINT TULIP FROM DRIVE SHAFT**
   (a) Place matchmarks on the inboard joint tulip and drive shaft.

   CAUTION: Do not punch the marks.

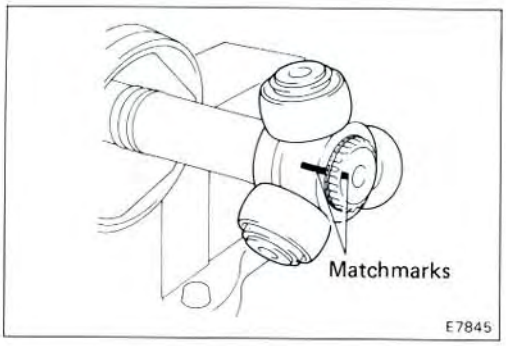


   (b) Remove the inboard joint tulip from the drive shaft.


E7844

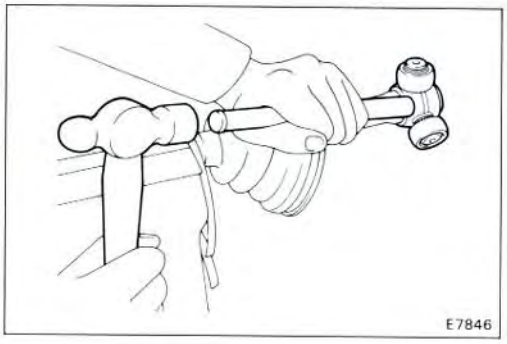
5. REMOVE TRIPOD JOINT

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

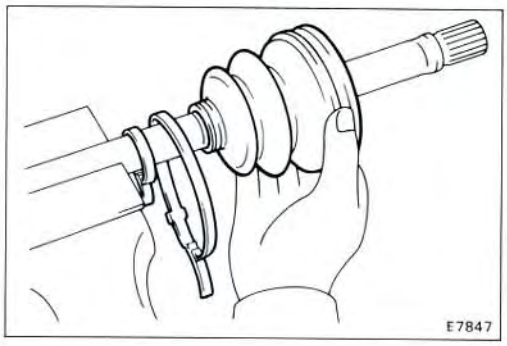


E7845

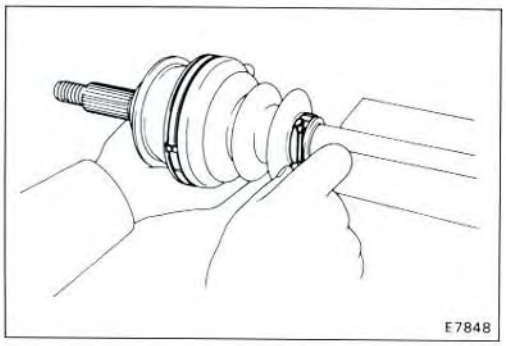
(b) Place matchmarks on the shaft and the tripod.


E7846

(c) Using a hammer and brass bar, drive out the tripod joint from the drive shaft.


E7847

6. REMOVE INBOARD JOINT BOOT AND CLAMPS

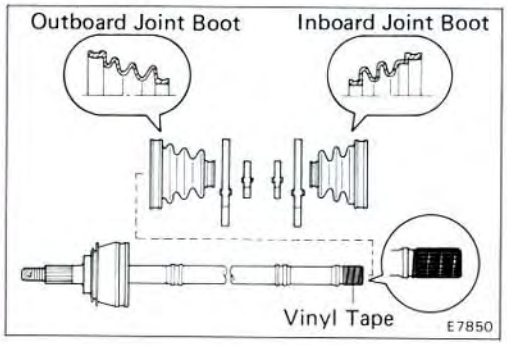

E7848

7. REMOVE OUTBOARD JOINT BOOT

(a) Using a screwdriver, remove the two boot clamps of the outboard joint boot.

(b) Remove the boot from the outboard joint.

CAUTION: Do not disassemble the outboard joint.



ASSEMBLY OF REAR DRIVE SHAFT

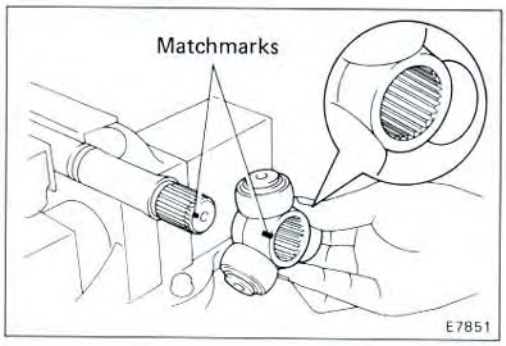
(See page RA-13)

1. **TEMPORARILY INSTALL BOOTS AND NEW BOOT CLAMPS**

CAUTION: The boot and clamp of the outboard joint are smaller than those of the inboard joint.

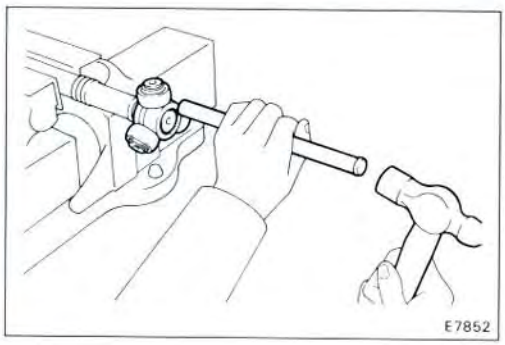
NOTE: Before installing the boot, wrap vinyl tape around the spline of the shaft to prevent damaging the boot.

Temporarily install the boots and new clamps to the drive shaft.

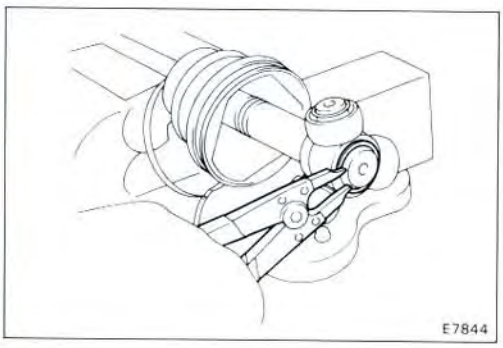


2. **INSTALL TRIPOD JOINT**

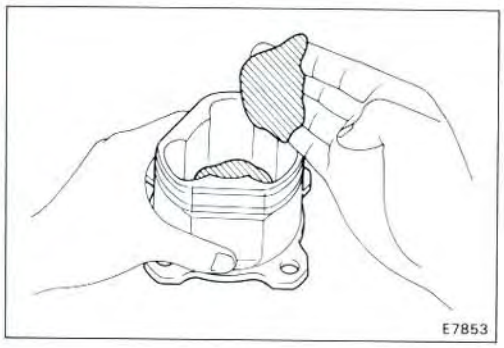
(a) Align the matchmarks placed before remove.



(b) Using a brass bar and hammer, tap in the tripod joint to the drive shaft.



(c) Using a snap ring pliers, install a new snap ring.

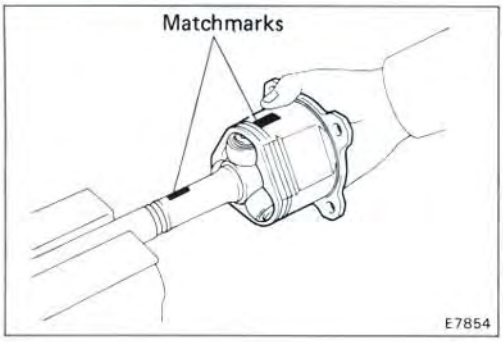


3. **INSTALL INBOARD JOINT TULIP TO DRIVE SHAFT**

(a) Pack in the grease to the inboard tulip.

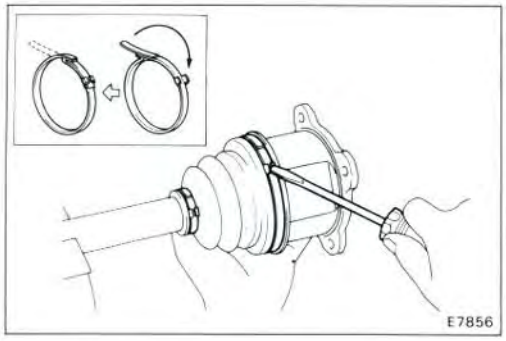
NOTE: Use the grease supplied in the boot kit.

Grease capacity: 215 g (0.48 lb)



(b) Align the matchmarks placed before remove, and install the inboard joint tulip to the drive shaft.

5. INSTALL INBOARD JOINT BOOT TO INBOARD JOINT TULIP

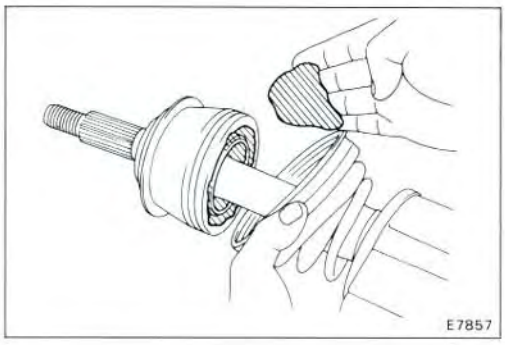


6. INSTALL INBOARD JOINT BOOT CLAMPS

CAUTION: The clamps of the outboard joint are smaller than those of the inboard joint.

(a) Be sure the boot is on the shaft groove.

(b) Using a screwdriver, bend the band and lock it as shown in the illustration.



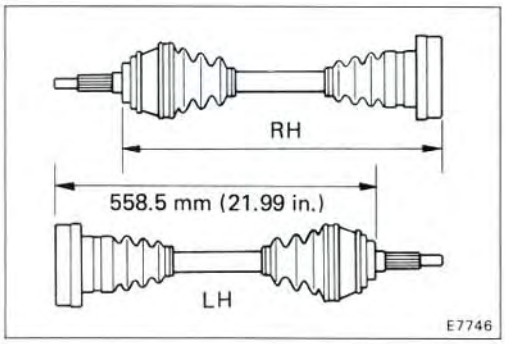
7. INSTALL OUTBOARD JOINT BOOT

(a) Before install the boot, back in grease.

NOTE: Use the grease supplied in the boot kit.

Grease capacity: 120 g (0.26 lb)

(b) Install the boot to the outboard joint.

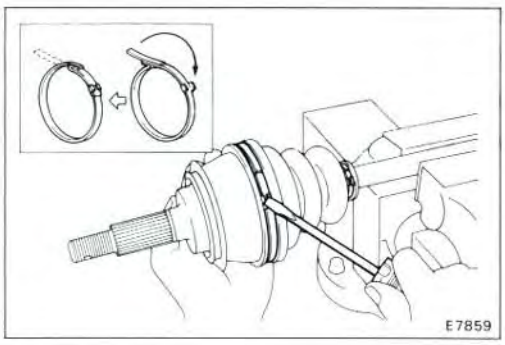


8. INSTALL OUTBOARD JOINT BOOT CLAMPS

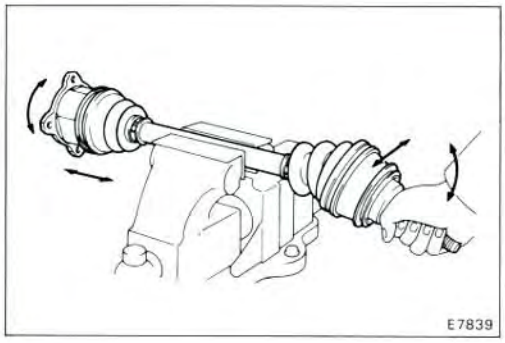
(a) Be sure the boot is on the shaft groove.

(b) In sure that the boot is not streched or contracted when drive shaft is at standard length.

Drive shaft length: 558.5 mm (21.99 in.)



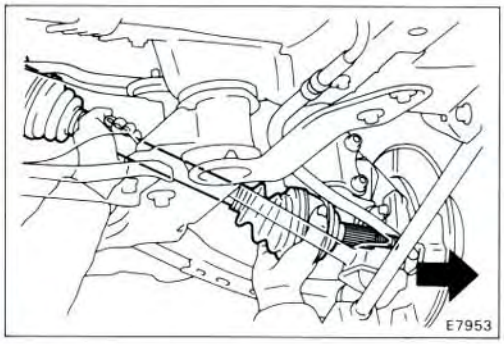
(c) Using screwdriver, bend the band and lock it as shown in the illustration.



9. **CHECK DRIVE SHAFT**

(a) Check to see that there is no play in the inboard joint and outboard joint.

(b) Check to see that the inboard joint side smoothly in the thrust direction.



INSTALLTION OF REAR DRIVE SHAFT

(See page RA-13)

1. **INSTALL DRIVE SHAFT**

NOTE: Be careful not to damage the boots.

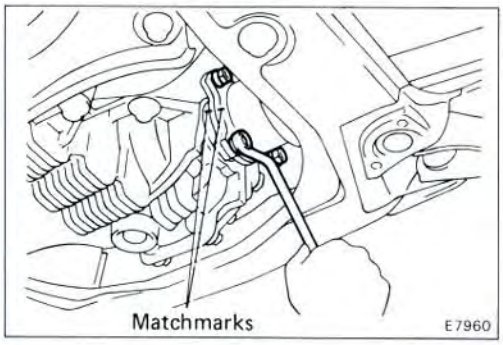
(a) Install the drive shaft to the axle carrier.

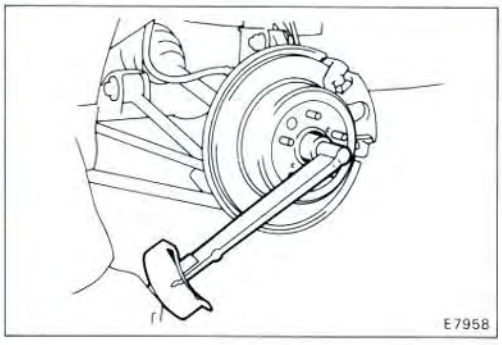
NOTE: (LH Drive Shaft)
Push the rear axle carrier towards the outside vehicle and connect the drive shaft to the axle carrier.

(b) Align the matchmarks on the inboard joint tulip and the side gear shaft flange.

(c) Connect the drive shaft to the side gear shaft.

Torque: 700 kg-cm (51 ft-lb, 69 N·m)





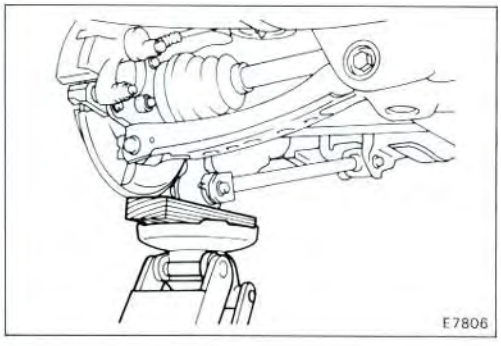
2. **INSTALL BEARING LOCK NUT, LOCK NUT CAP AND COTTER PIN**

(a) Torque the bearing lock nut while depressing the brake pedal.

Torque: 1,900 kg-cm (137 ft-lb, 186 N·m)

(b) Install the lock nut cap and, using pliers, install a new cotter pin.

3. **(LH Drive Shaft)**
TEMPORARILY CONNECT STRUT ROD, NO. 1 AND NO. 2 SUSPENSION ARM TO AXLE CARRIER



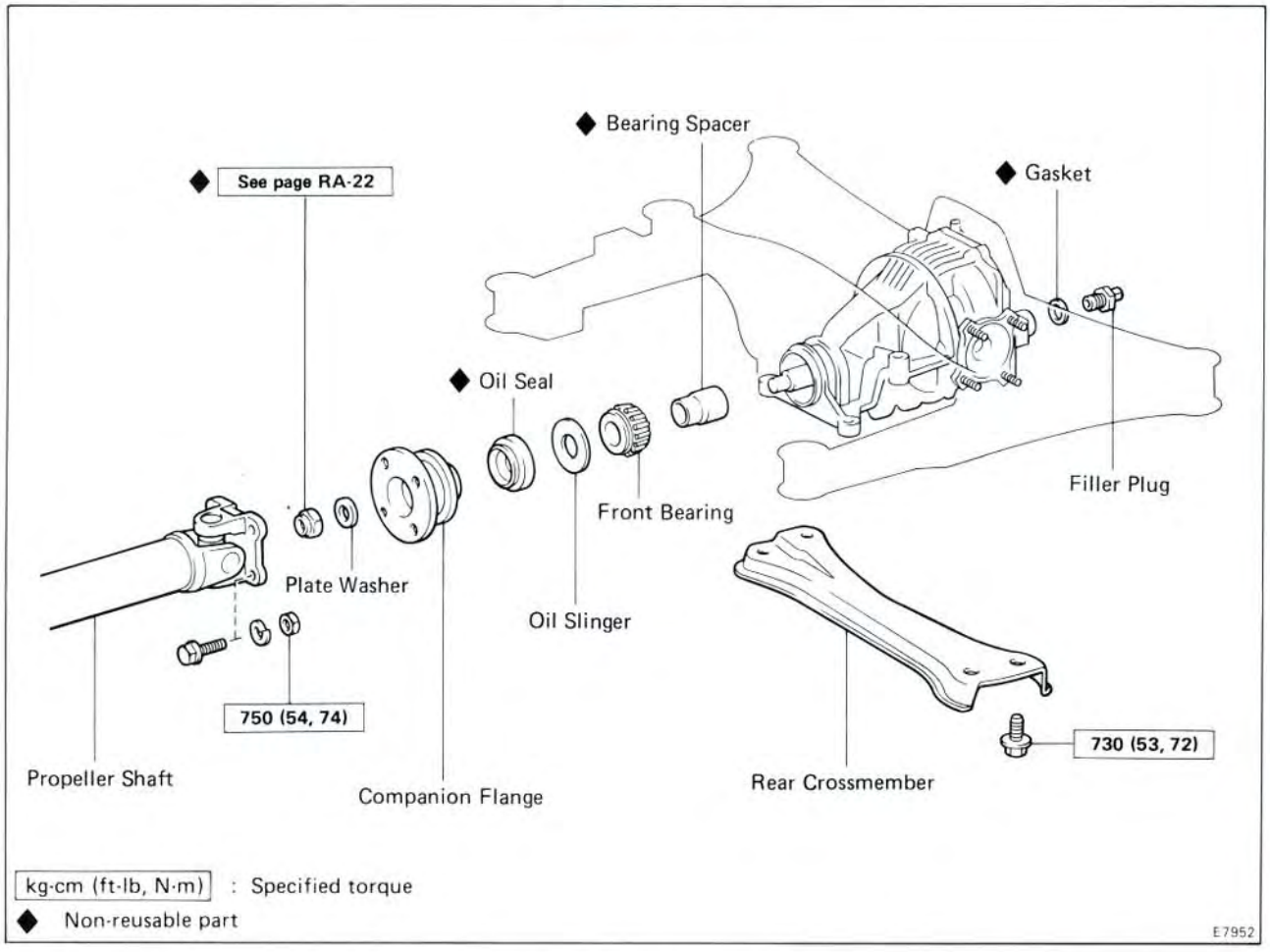
4. **TORQUE AXLE CARRIER MOUNTING BOLTS**
(See step 19, 20 on page RA-12)

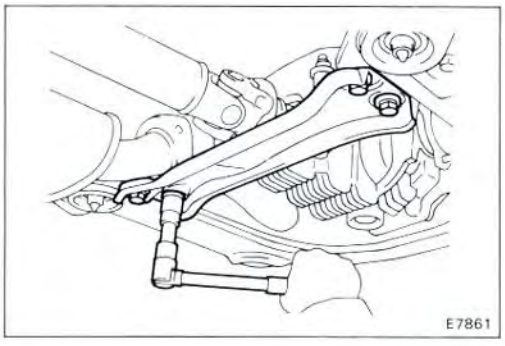
Torque: Strut rod × Axle carrier
1,150 kg-cm (83 ft-lb, 113 N·m)
No. 1 and No. 2 Suspension arm × Axle carrier
1,250 kg-cm (90 ft-lb, 123 N·m)

5. **CHECK REAR WHEEL ALIGNMENT**
(See page RA-3)

DIFFERENTIAL

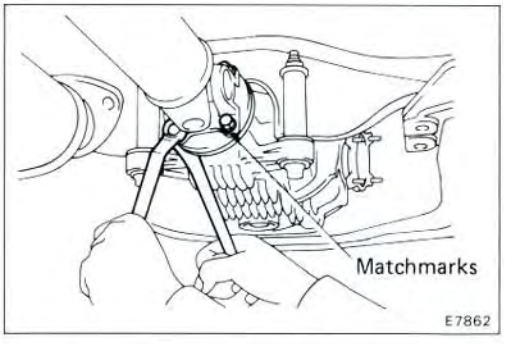
On-Vehicle Repair





REPLACEMENT OF FRONT OIL SEAL

1. REMOVE REAR CROSSMEMBER

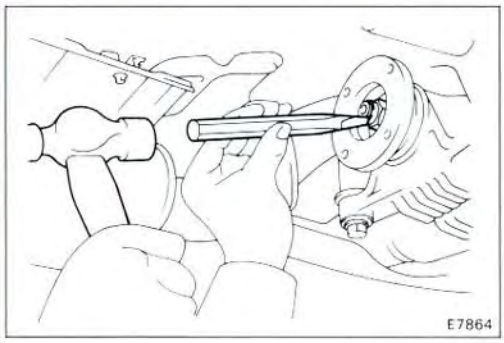


2. DISCONNECT PROPELLER SHAFT

(a) Place the matchmarks on the both flanges.

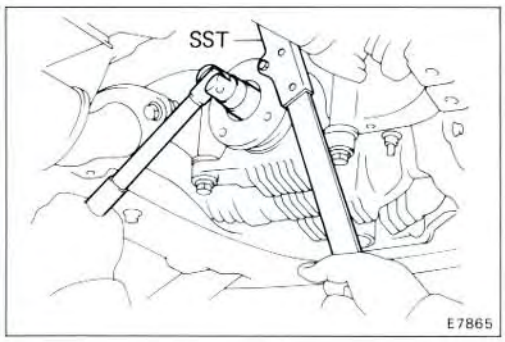
(b) Remove the four bolts, washers and nuts.

(c) Disconnect the propeller shaft from the differential.



3. REMOVE COMPANION FLANGE

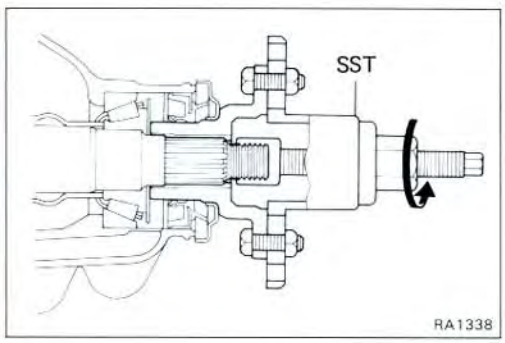
(a) Using a hammer and chisel, loosen the staked part of the nut.



(b) Using SST to hold the flange, remove the nut.

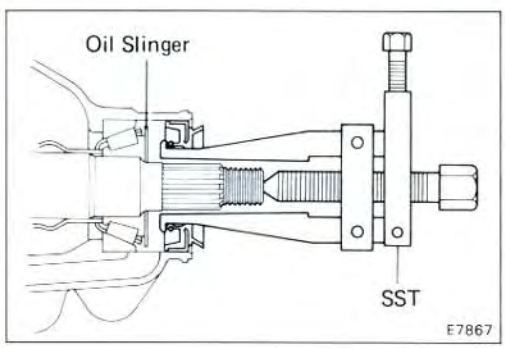
SST 09330-00021

(c) Remove the plate washer.



(d) Using SST, remove the companion flange.

SST 09557-22022

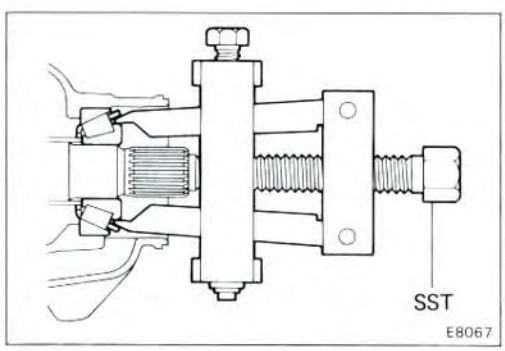


4. REMOVE FRONT OIL SEAL AND OIL SLINGER

(a) Using SST, remove the front oil seal.

SST 09308-10010

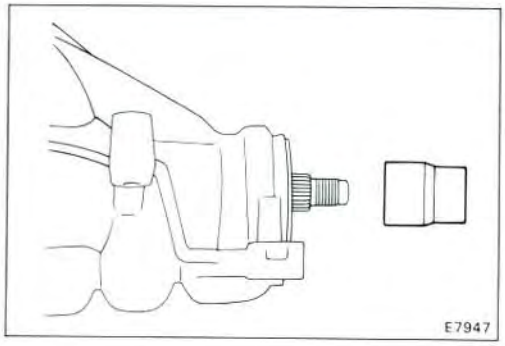
(b) Remove the oil slinger.



5. REMOVE FRONT BEARING AND BEARING SPACER

(a) Using SST, remove the front bearing.

SST 09556-22010

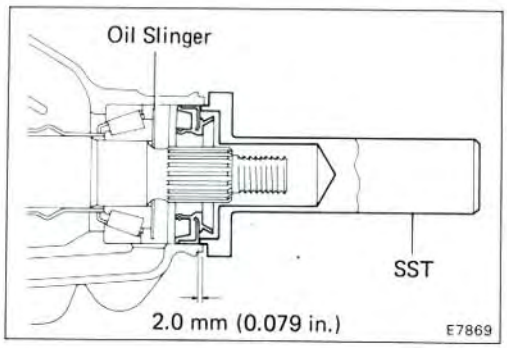


(b) Remove the bearing spacer.

6. INSTALL NEW BEARING SPACER AND FRONT BEARING

(a) Install a new bearing spacer on the shaft.

(b) Install the front bearing on the shaft.



7. INSTALL OIL SLINGER AND NEW OIL SEAL

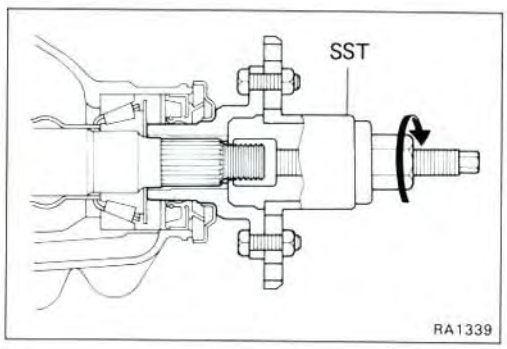
(a) Install the oil slinger on the shaft.

(b) Using SST, drive in a new oil seal.

SST 09554-22010

Oil seal drive in depth: 2.0 mm (0.079 in.)

(c) Apply MP grease to the oil seal lip.



8. INSTALL COMPANION FLANGE

(a) Using SST, install the companion flange.

SST 09557-22022

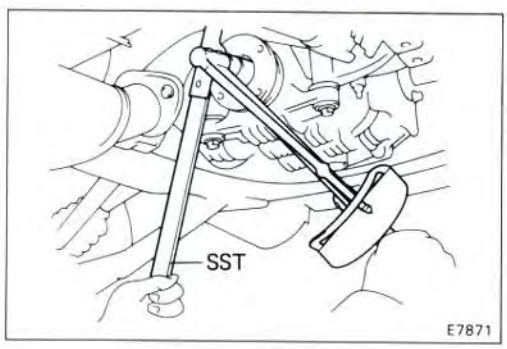
(b) Install the plate washer.

(c) Coat the threads of a new nut with gear oil.

(d) Using SST to hold the flange, tighten the nut.

SST 09330-00021

Torque: 1,100 kg-cm (80 ft-lb, 108 N·m)



9. CHECK DRIVE PINION BEARING PRELOAD

Using a torque wrench, measure the preload of the backlash between the drive pinion and ring gear.

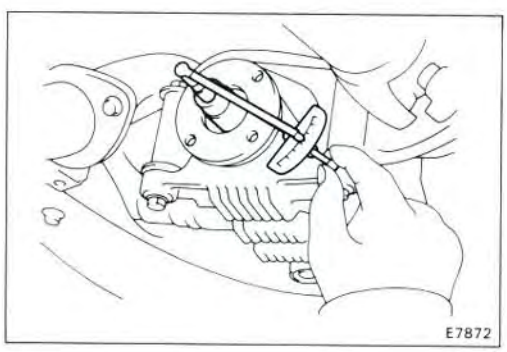
Preload (at starting):

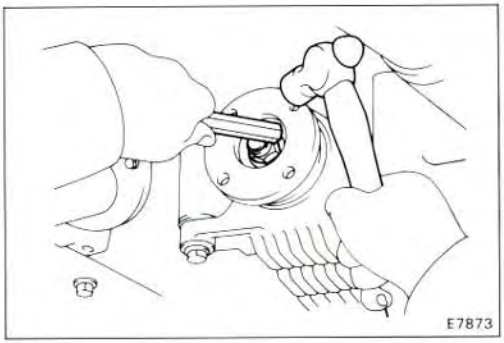
New bearing	**10 — 16 kg-cm (8.7 — 13.9 in.-lb, 1.0 — 1.6 N·m)**
Reused bearing	**5 — 8 kg-cm (4.3 — 6.9 in.-lb, 0.5 — 0.8 N·m)**

- If preload is greater than specification, replace the bearing spacer.
- If preload is less than specification, retighten the nut 130 kg-cm (9 ft-lb, 13 N·m) at a time until the specified preload is reached.

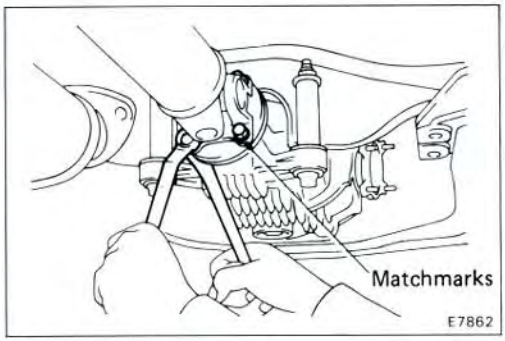
If the maximum torque is exceed while retightening the nut, replace the bearing spacer and repeat the preload procedure. Do not back off the pinion nut to reduce the preload.

Maximum torque: 2,400 kg-cm (174 ft-lb, 235 N·m)





10. STAKE DRIVE PINION NUT

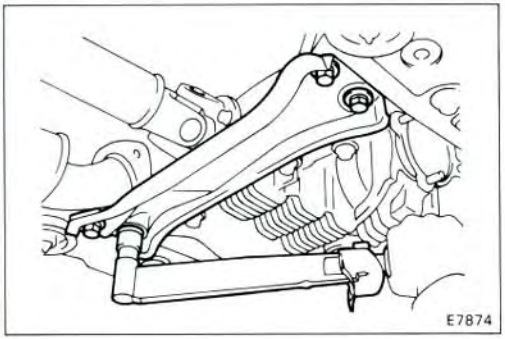


11. CONNECT PROPELLER SHAFT

(a) Align the matchmarks on the flanges and connect the propeller shaft with the four bolts, washers and nuts.

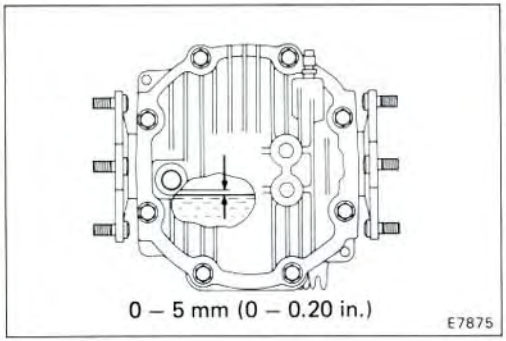
(b) Torque the bolts and nuts.

Torque: 750 kg-cm (54 ft-lb, 74 N·m)



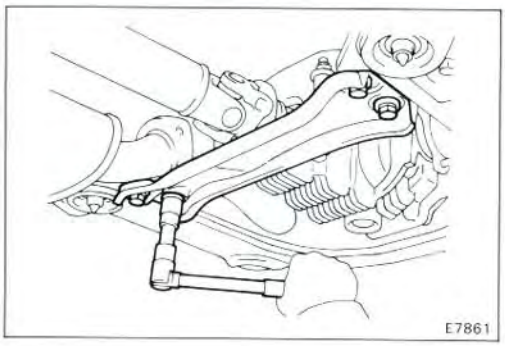
12. INSTALL REAR CROSSMEMBER

Torque: 730 kg-cm (53 ft-lb, 72 N·m)



13. CHECK OIL LEVEL

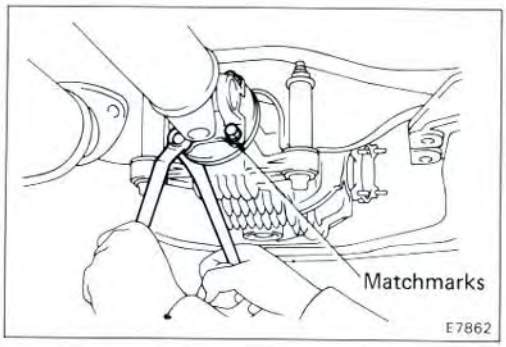
Oil grade : API GL-5 hypoid gear oil
Viscosity : Above −18°C (0°F) SAE 90
Below −18°C (0°F) SAE 80W-90
Capacity : 1.1 liters (1.2 US qts, 1.0 Imp.qts)



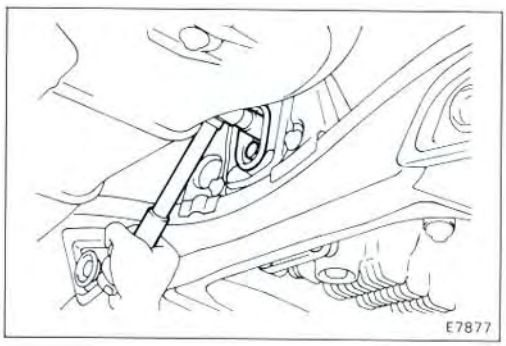
REMOVAL OF DIFFERENTIAL

(See page RA-20)

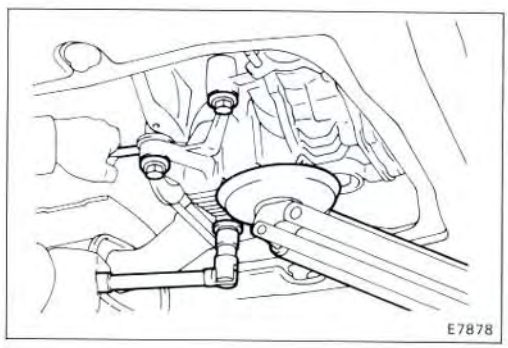
1. DRAIN DIFFERENTIAL OIL
2. REMOVE DRIVE SHAFTS (See page RA-13)
3. REMOVE REAR CROSSMEMBER



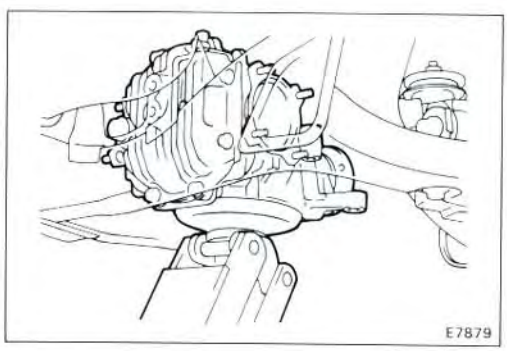
4. DISCONNECT PROPELLER SHAFT
   (a) Place the matchmarks on the both flanges.
   (b) Remove the four bolts, washers and nuts.
   (c) Disconnect the propeller shaft from the differential.



5. REMOVE DIFFERENTIAL
   (a) Jack up the differential slightly.
   (b) Remove the two bolts.

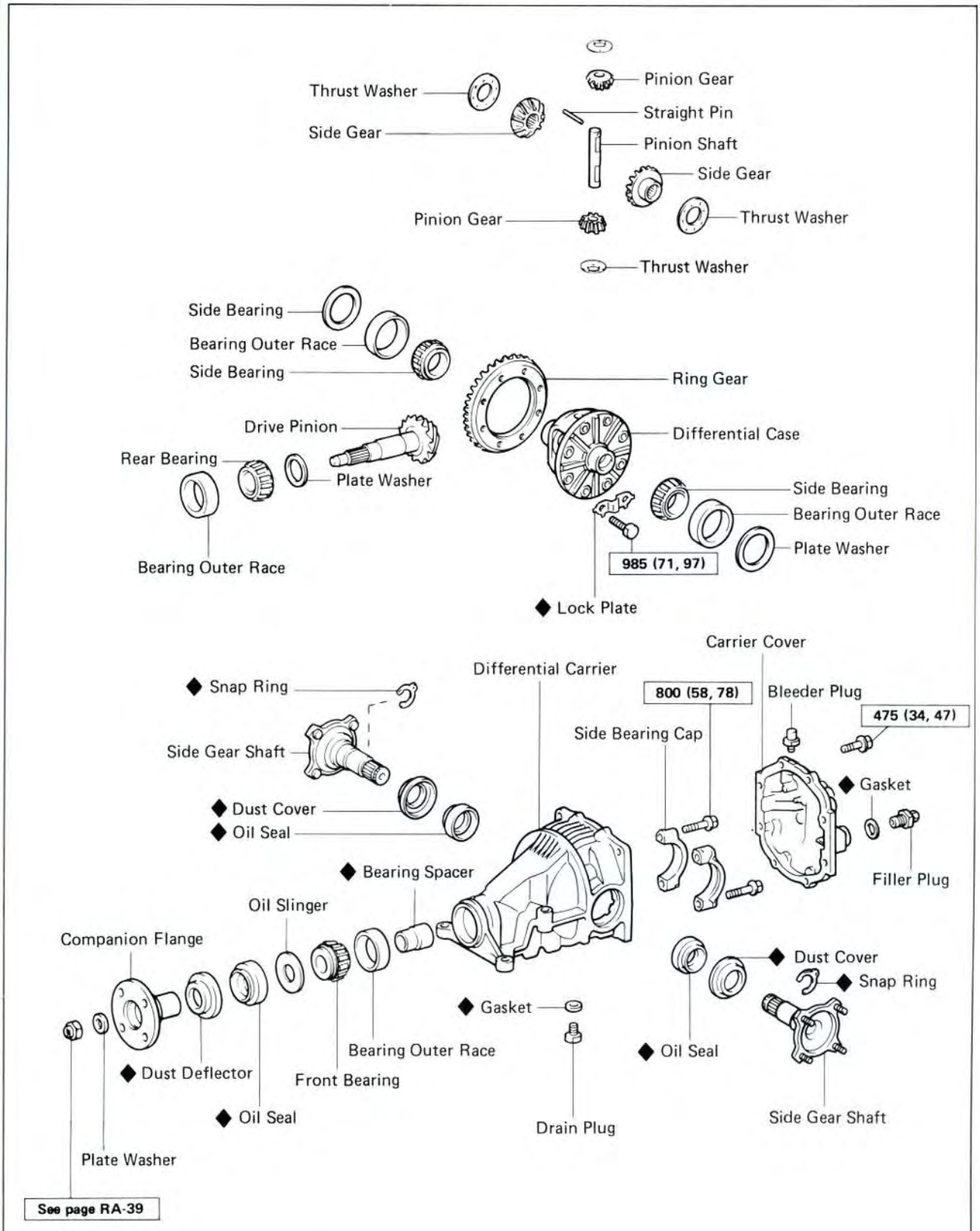


   (c) Remove the four nuts and bolts.



   (d) Remove the differential from the body.

DIFFERENTIAL CARRIER



kg-cm (ft-lb, N·m) : Specified torque

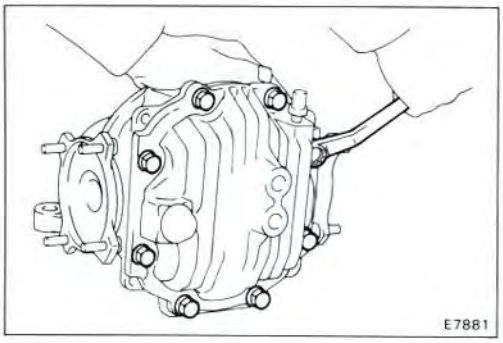
◆ Non-reusable part

RA1343

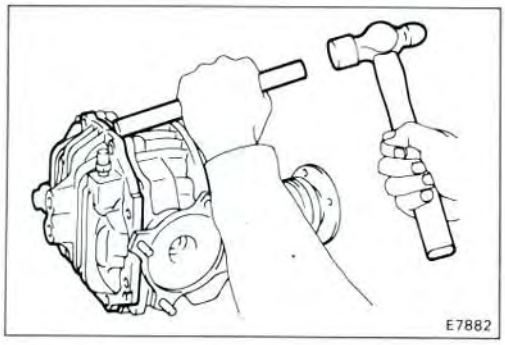
PRE-INSPECTION OF DIFFERENTIAL CARRIER

1. REMOVE DIFFERENTIAL CARRIER COVER

(a) Remove the eight bolts.


E7881

(b) Using a brass bar and hammer, separate the cover and carrier.

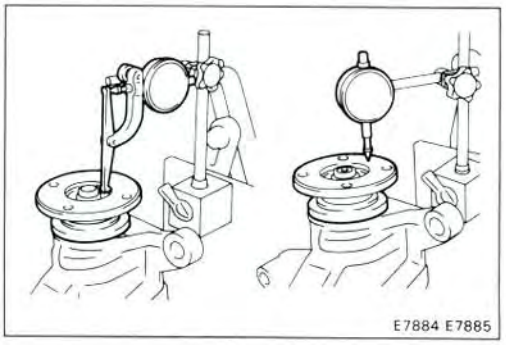

E7882

2. CHECK COMPANION FLANGE RUNOUT

Using a dial indicator, measure the lateral and radial runout of the companion flange.

Maximum lateral runout: 0.10 mm (0.039 in.)
Maximum radial runout: 0.10 mm (0.039 in.)

If the runout is greater than the maximum, replace the companion flange.

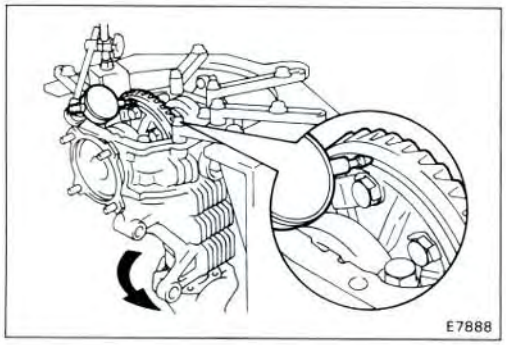

E7884 E7885

3. CHECK RING GEAR RUNOUT

Using a dial indicator, measure the runout of the ring gear.

Maximum runout: 0.07 mm (0.0028 in.)

If the runout is greater than the maximum, replace the ring gear.

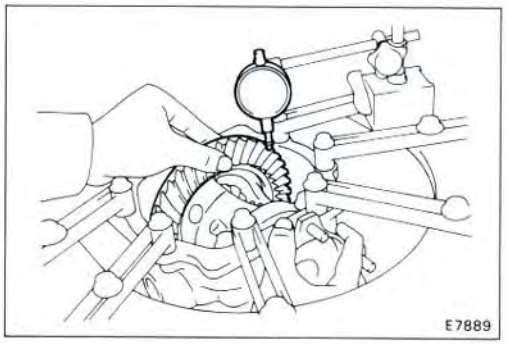

E7888

4. CHECK RING GEAR BACKLASH

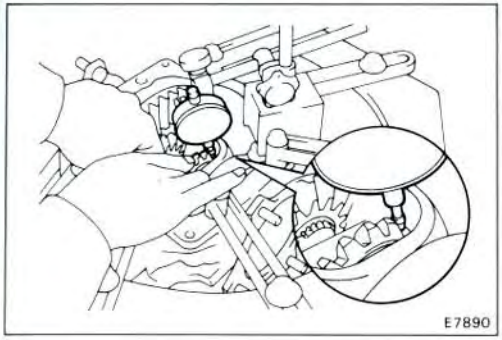
Using a dial indicator, check the backlash of the ring gear.

Backlash: 0.13 — 0.18 mm (0.0051 — 0.0071 in.)

If the backlash is not within specification, adjust the side bearing preload.


E7889

5. CHECK TOOTH CONTACT (See page RA-38)

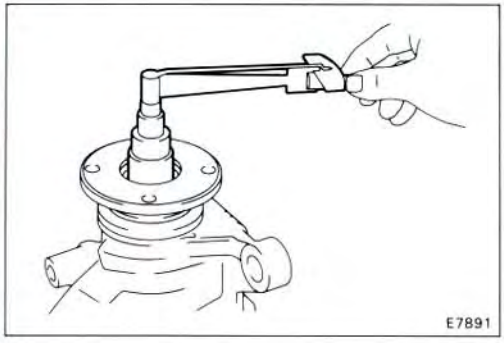

E7890

6. CHECK SIDE GEAR BACKLASH

Using a dial indicator, check the backlash of the side gear while holding one pinion gear toward the differential case.

Backlash: 0.05 — 0.20 mm (0.0020 — 0.0079 in.)

If the backlash is not within specification, install the side gear thrust washers of different thickness.


E7891

7. MEASURE DRIVE PINION PRELOAD

Using a torque wrench, measure the preload of the backlash between the drive pinion and ring gear.

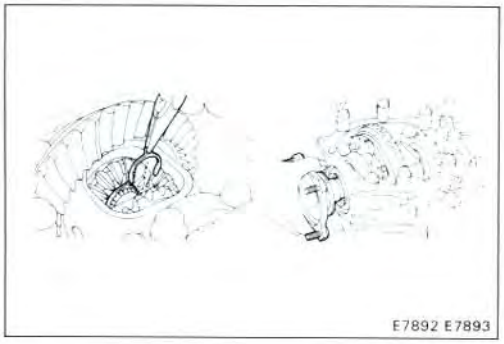
Preload (at starting):
5 — 8 kg-cm (4.3 — 6.9 in.-lb, 0.5 — 0.8 N·m)

8. CHECK TOTAL PRELOAD

Using a torque wrench, measure the total preload.

Total preload (at starting):
In addition to drive pinion preload
5 — 8 kg-cm (4.3 — 6.9 in.-lb, 0.5 — 0.8 N·m)

If necessary disassembly and inspect a differential.

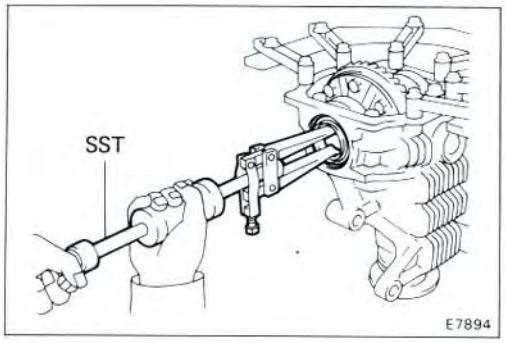


DISASSEMBLY OF DIFFERENTIAL CARRIER

1. REMOVE SIDE GEAR SHAFTS

(a) Remove the two shaft snap rings.

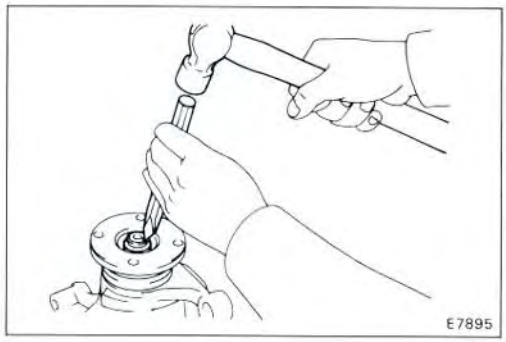
(b) Remove the two side gear shafts.



2. REMOVE SIDE GEAR SHAFT OIL SEALS

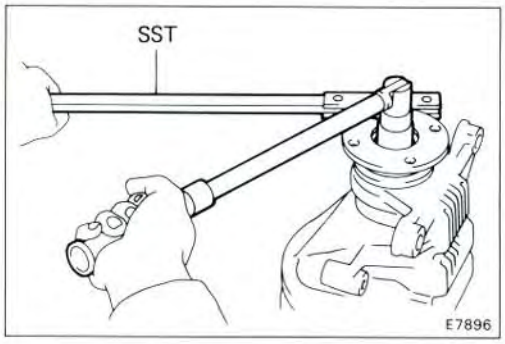
Using SST, remove the two oil seals from the housing.

SST 09308-00010



3. REMOVE COMPANION FLANGE

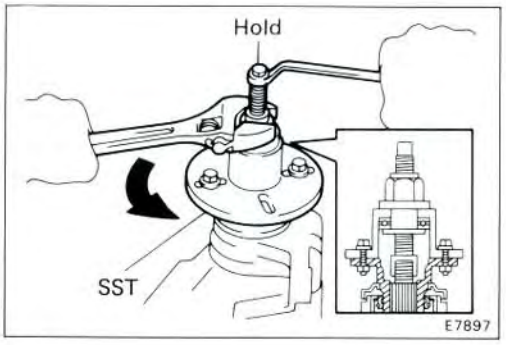
(a) Using a hammer and chisel, loosen the staked part of the nut.



(b) Using SST to hold the flange, remove the nut.

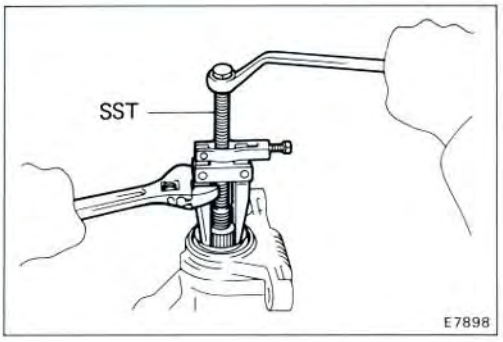
SST 09330-00021

(c) Remove the plate washer.



(d) Using SST, remove the companion flange.

SST 09557-22022

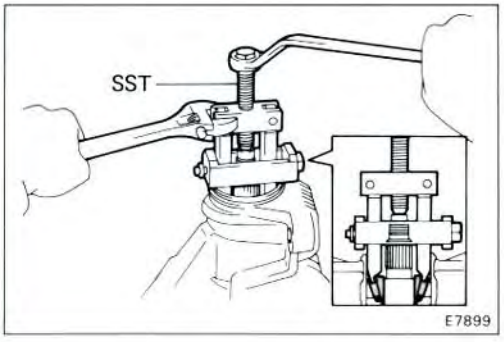


4. REMOVE FRONT OIL SEAL AND OIL SLINGER

(a) Using SST, remove the oil seal from the housing.

SST 09308-10010

(b) Remove the oil slinger.

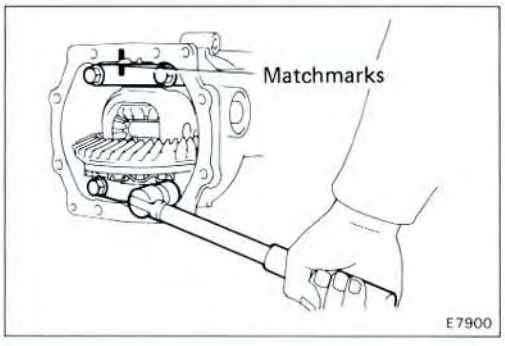


5. REMOVE FRONT BEARING AND BEARING SPACER

(a) Using SST, remove the bearing from the housing.

SST 09556-22010

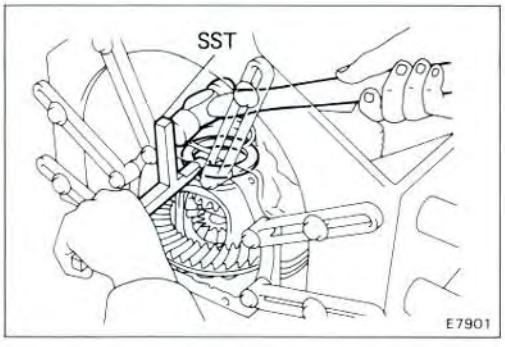
(b) Remove the bearing spacer.



6. REMOVE DIFFERENTIAL CASE

(a) Place matchmarks on the bearing cap and differential carrier.

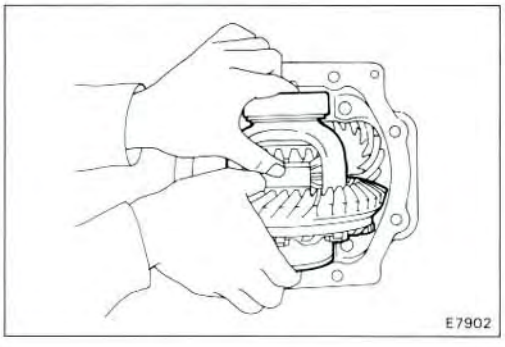
(b) Remove the two bearing caps.



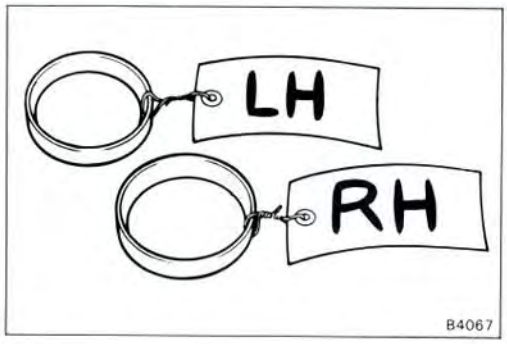
(c) Using SST, remove the two side bearing preload adjusting plate.

SST 09504-22011

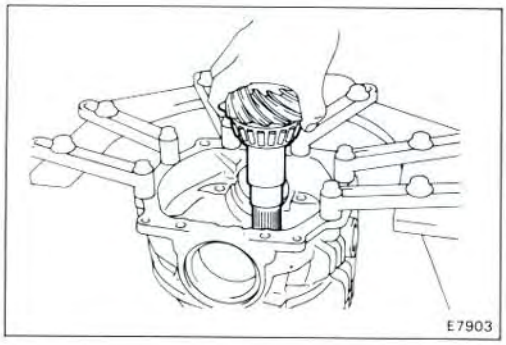
NOTE: Measure the adjusting plate washer and note the thickness.



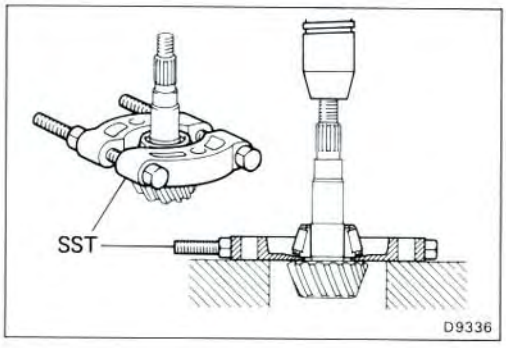
(d) Remove the differential case and bearing outer race from the carrier.



NOTE: Tag the bearing outer races to show the location for reassembly.



7. REMOVE DRIVE PINION FROM DIFFERENTIAL CARRIER



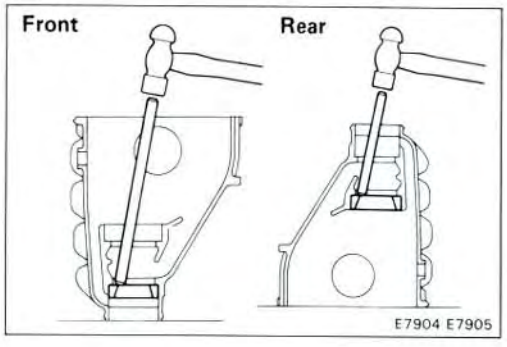
8. REMOVE DRIVE PINION REAR BEARING

(a) Using SST and a press, remove the bearing from the drive pinion.

SST 09950-00020

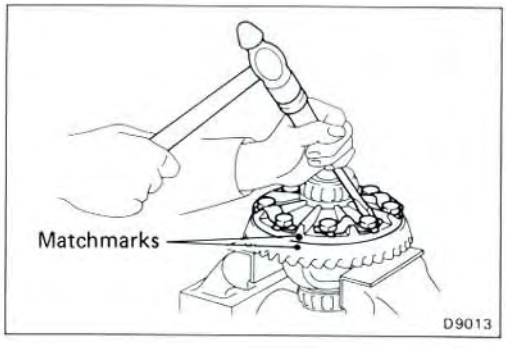
NOTE: If the drive pinion or ring gear are damaged replace them a set.

(b) Remove the plate washer.



9. REMOVE FRONT AND REAR BEARING OUTER RACES

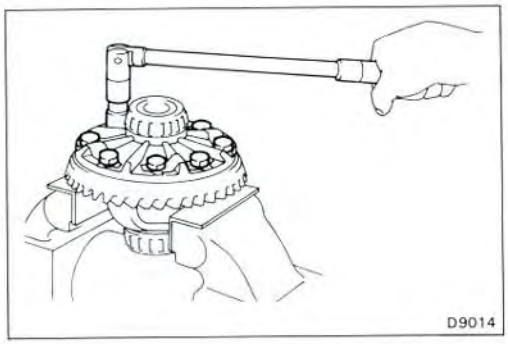
Using a hammer and brass bar, drive out the outer races from the carrier.



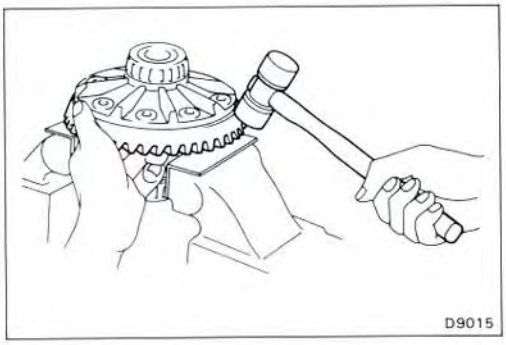
10. REMOVE RING GEAR

(a) Place the matchmarks on the ring gear and differential case.

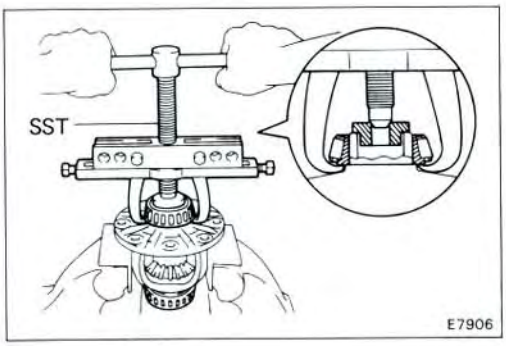
(b) Unsake the lock plates.



(c) Remove the eight bolts and four lock plates.



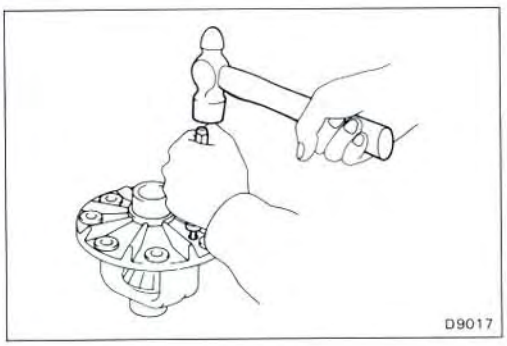
(d) Using a plastic hammer, tap on the ring gear to separate it from differential case.



11. REMOVE SIDE BEARINGS

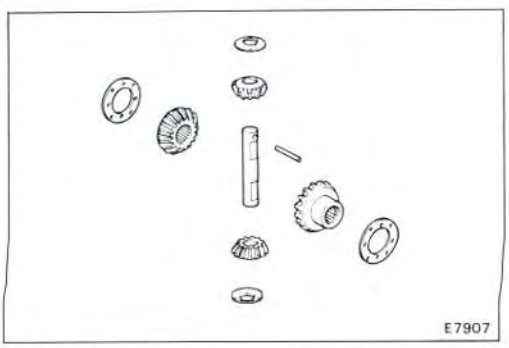
Using SST, remove the two side bearings from differential case.

SST 09950-20017



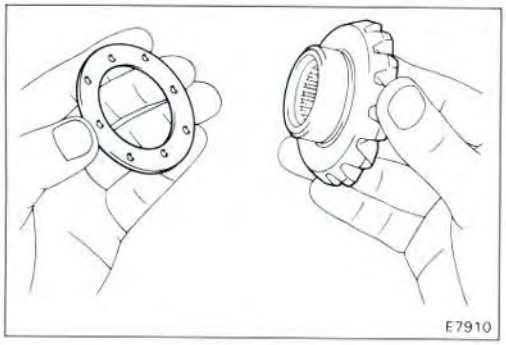
12. DISASSEMBLE DIFFERENTIAL CASE

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



(b) Remove the following parts from differential case:

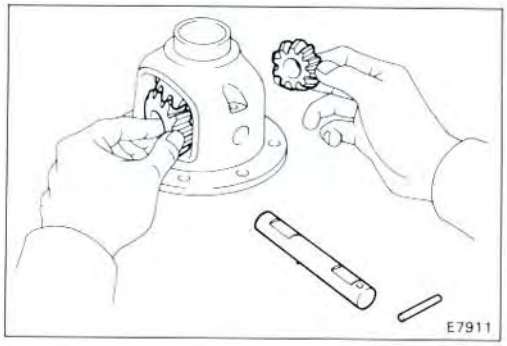
- Pinion shaft
- Two pinion gears
- Two side gears
- Four thrust washers



ASSEMBLY OF DIFFERENTIAL CARRIER

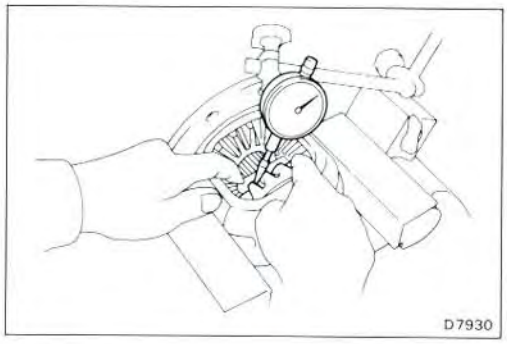
1. ASSEMBLE DIFFERENTIAL CASE

(a) Install the thrust washers to the side gears.



(b) Install the side gears with thrust washers and pinion gears with thrust washers.

(c) Install the pinion shaft.



(d) Check the side gear backlash.

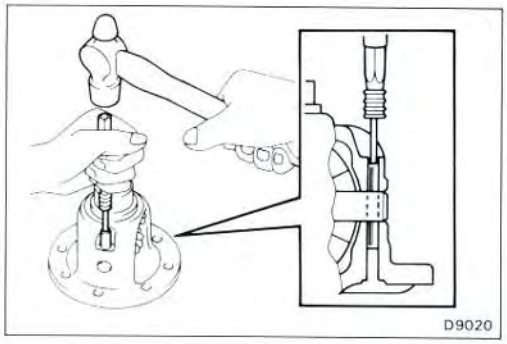
Measure the side gear backlash while holding one pinion gear toward the case.

Backlash: 0.05 — 0.20 mm (0.0020 — 0.0079 in.)

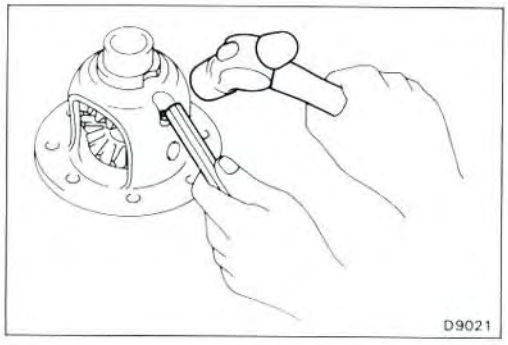
If the backlash is not within specification, install the side gear thrust washers of different thickness.

Thrust washer thickness	mm (in.)
0.95 (0.0374)	1.10 (0.0433)
1.00 (0.0394)	1.15 (0.0453)
1.05 (0.0413)	1.20 (0.0472)

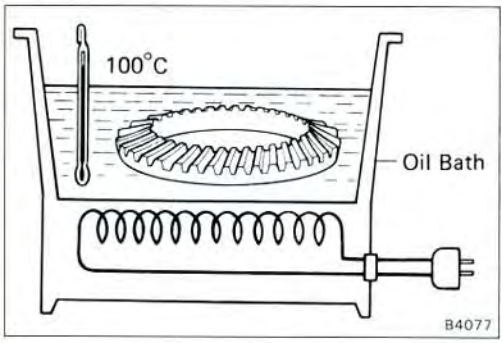
NOTE: Use washers of same thickness on both the right and left sides.



(e) Using a hammer and punch, drive in the straight pin through the case and hole in the pinion shaft.



(f) Stake the case.



2. INSTALL RING GEAR ON DIFFERENTIAL CASE

(a) Clean the contact surface of the differential case.

(b) Heat the ring gear to about 100°C (212°F) in an oil bath.

CAUTION: Do not heat the ring gear above 110°C (230°F).

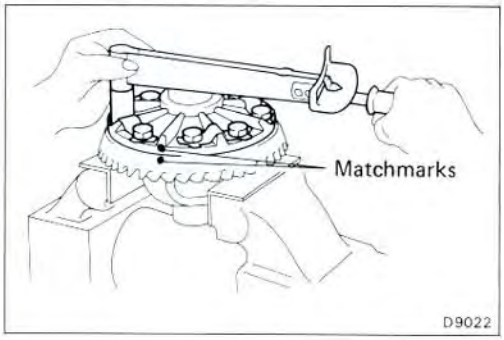
(c) Clean the contact surface of the ring gear with cleaning solvent.

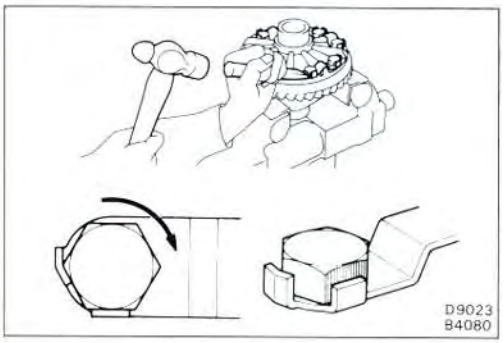
(d) Then quickly install the ring gear on the differential case.

(e) Align the matchmarks on the ring gear and differential case.

(f) Install new lock plates and set bolts. Tighten the set bolts uniformly and a little at a time. Torque the bolts.

Torque: 985 kg-cm (71 ft-lb, 97 N·m)





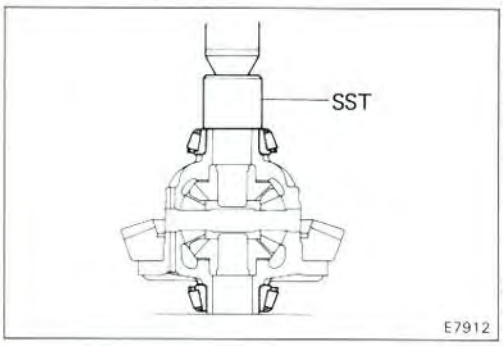
(g) Using a hammer and drift punch, stake the lick plates.

NOTE: Stake one claw flush with the flat surface of the nut. For the claw contacting the protruding portion of the nut, stake only the half on the tightening side.

3. INSTALL SIDE BEARINGS

Using a press and SST, drive in the side bearings into the differential case.

SST 09710-22020 (09710-01030)



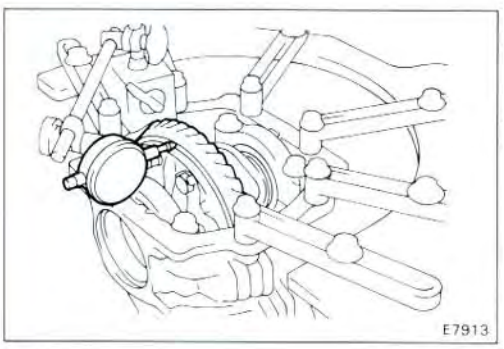
4. CHECK RING GEAR RUNOUT

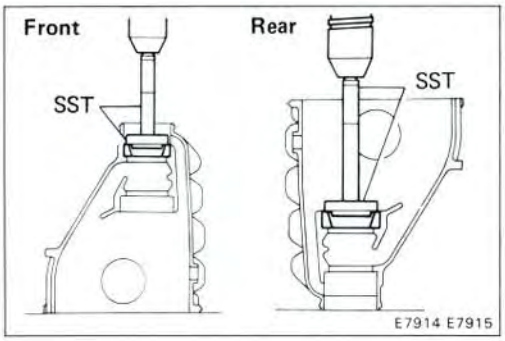
(a) Install the differential case onto the carrier and install the plate washers to where there is no play in the bearing. (See page RA-35)

(b) Install bearing caps. (See page RA-37)

(c) Using a dial indicator, measure the runout of ring gear.

Maximum runout: 0.07 mm (0.0028 in.)



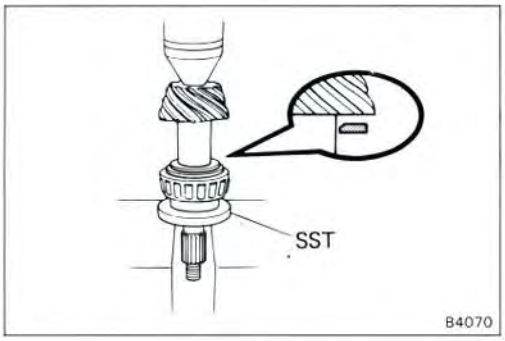


5. INSTALL FRONT AND REAR BEARING OUTER RACES

Using a press and SST, drive in the front and rear bearing outer races.

SST 09608-30012

Front (09608-04020 and 09608-00060)
Rear (09608-04020 and 09608-04100)

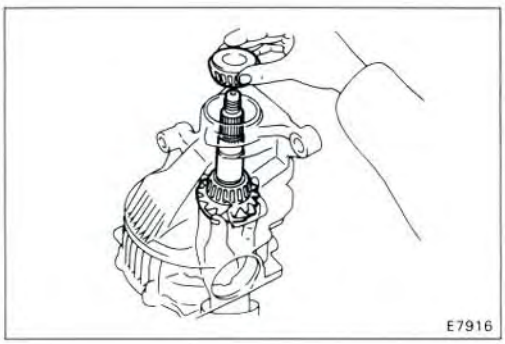


6. INSTALL REAR BEARING TO DRIVE PINION

(a) Install the plate washer on the drive pinion with the chamfered end facing toward the pinion gear.

(b) Using a press and SST, install the rear bearing onto the drive pinion.

SST 09506-30012

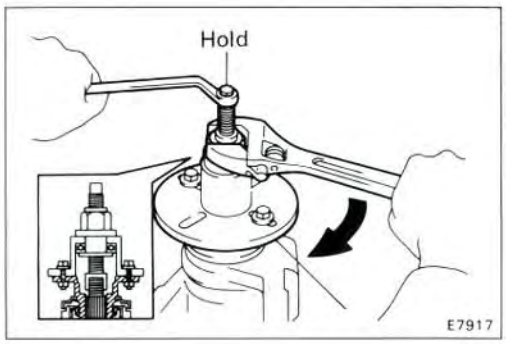


7. TEMPORARILY ADJUST DRIVE PINION PRELOAD

(a) Install the following parts:

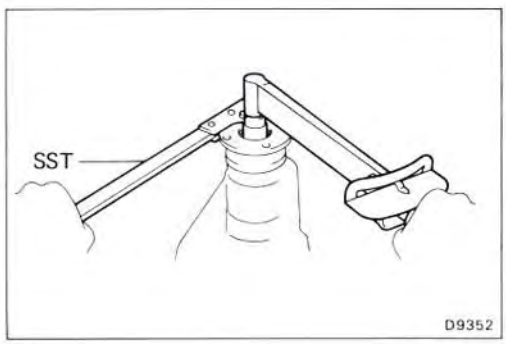
- Drive pinion
- Front bearing

NOTE: Assemble the spacer, oil slinger and oil seal after adjusting the gear contact pattern.



(b) Install the companion flange with SST.

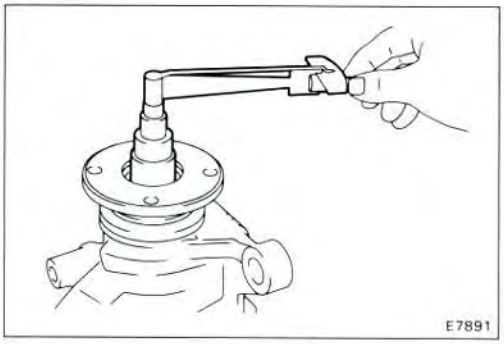
SST 09557-22022



(c) Adjusting the drive pinion preload by tightening the companion flange nut.

Using SST to hold the flange, tighten the nut.

SST 09330-00021



(d) Using a torque meter, measure the preload.

Preload (at starting)

New bearing

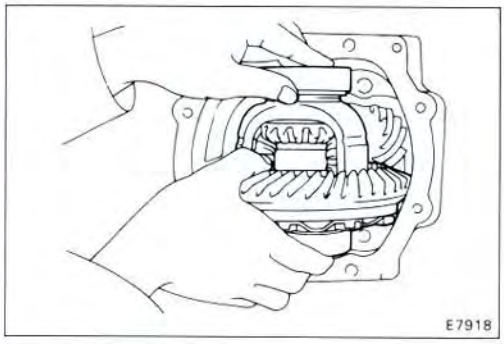
12 — 19 kg-cm

(10.4 — 16.5 in.-lb, 1.2 — 1.9 N·m)

Reused bearing

6 — 10 kg-cm

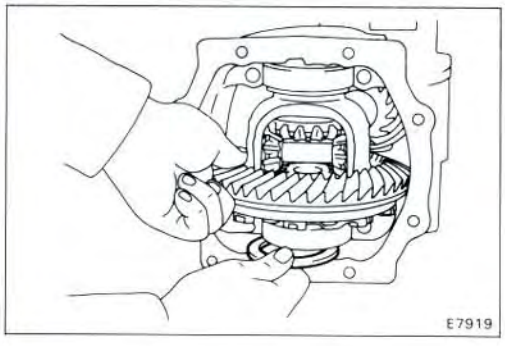
(5.2 — 8.7 in.-lb, 0.6 — 1.0 N·m)



8. INSTALL DIFFERENTIAL CASE IN CARRIER

(a) Place the bearing outer races on their respective bearings. Make sure the left and right outer races are not interchanged.

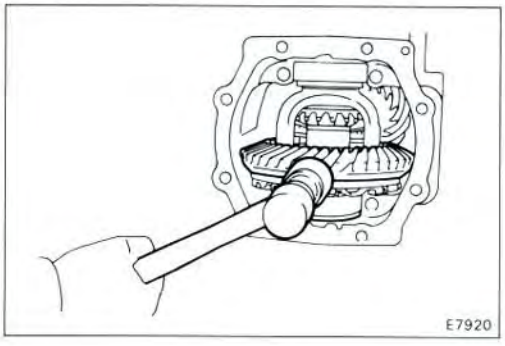
(b) Install the differential case in the carrier.



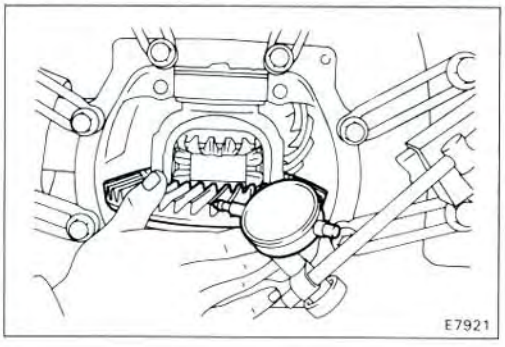
9. ADJUST RING GEAR BACKLASH

(a) Install only the plate washer on the ring gear back side.

NOTE: Insure that the ring gear has backlash.

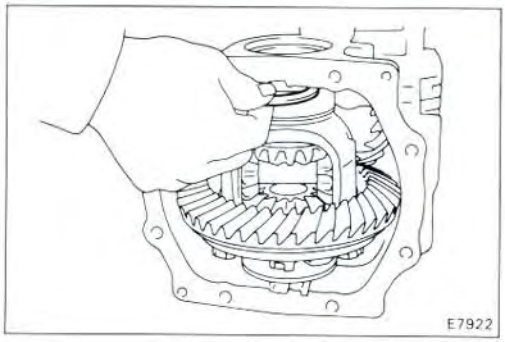


(b) Snug down the washer and bearing by tapping on the ring gear with a plastic hammer.

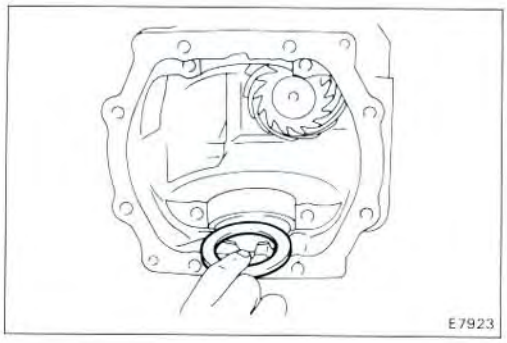


(c) Using a dial indicator, measure the backlash.

(d) Select a ring gear back side plate washer so that the backlash is 0.13 mm (0.0051 in.).
(See table on page RA-37)

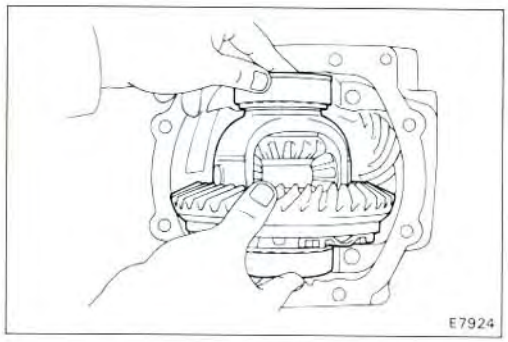


(e) Select a ring gear teeth side washer with a thickness which eliminates any clearance between the outer race and case.

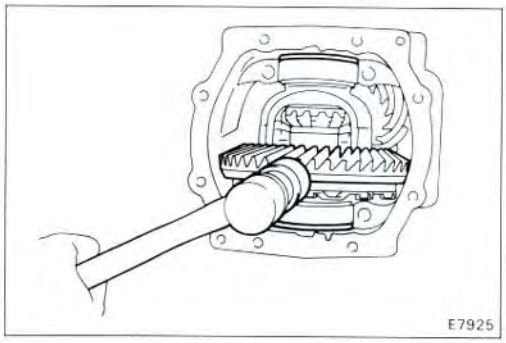


(f) Remove the plate washer and differential case.

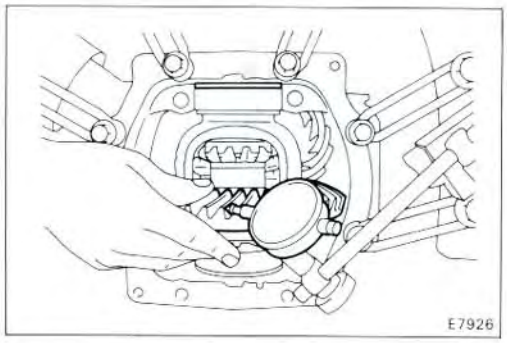
(g) Install the plate washer into the ring gear back side.



(h) Place the other plate washer onto the differential case together with the outer race, and install the differential case with the outer race into the carrier.



(i) Using a plastic hammer, snug down the washer and bearing by tapping the ring gear.



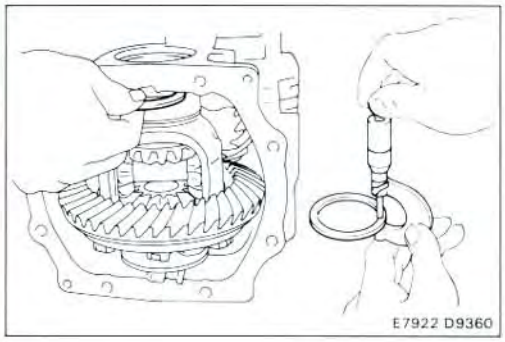
(j) Using a dial indicator, measure the ring gear backlash.

Backlash: 0.13 — 0.18 mm (0.0051 — 0.0071 in.)

(k) If not within the specification, adjust by either increasing or decreasing the number of washers on both sides by an equal amount.

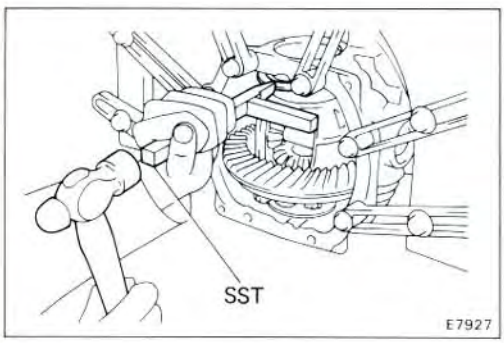
NOTE: There should be bo clearance between the plate washer and case.

Insure that there is ring gear backlash.



10. ADJUST SIDE BEARING PRELOAD

(a) Remove the ring gear teeth side plate washer and measure the thickness.

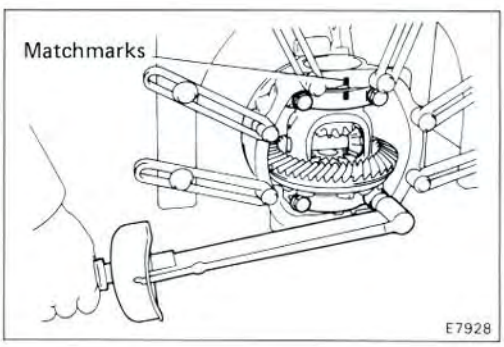


(b) Install a new plate washer of 0.06 — 0.09 mm (0.0024 — 0.0035 in.) thicker than the removed washer.

NOTE: Select a washer which can be pressed in 2/3 of the way by finger.

(c) Using a hammer and SST, tap in the side washer.

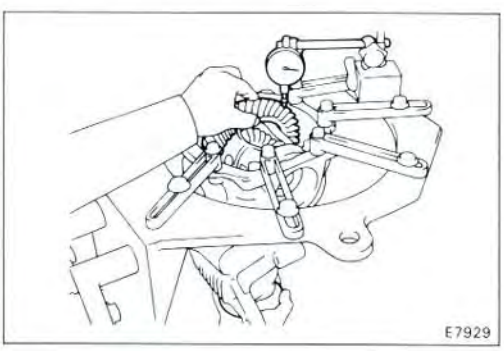
SST 09504-22011



(d) Install the side bearing caps.

NOTE: Align the matchmarks on the cap and carrier.

Torque: 800 kg-cm (58 ft-lb, 78 N·m)



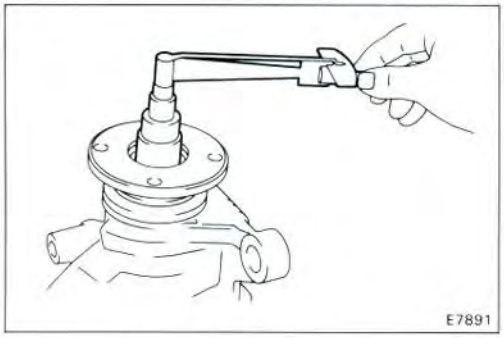
(e) Recheck the ring gear backlash.

Backlash: 0.13 — 0.18 mm (0.0051 — 0.0071 in.)

(f) If not within the standard, adjust by either increasing or decreasing the washers on both sides by equal amount.

NOTE: The backlash will change about 0.02 mm (0.0008 in.) with 0.03 mm (0.0012 in.) alteration of the side washer.

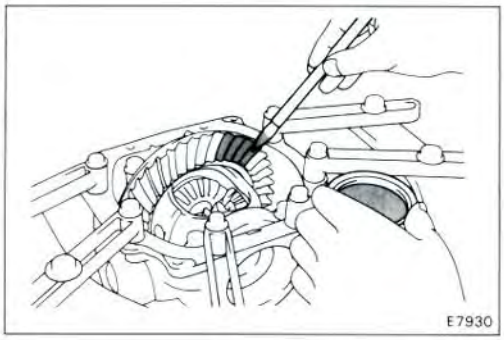
Washer thickness	mm (in.)
2.21 — 2.23 (0.0870 — 0.0878)	2.72 — 2.74 (0.1071 — 0.1079)
2.24 — 2.26 (0.0882 — 0.0890)	2.75 — 2.77 (0.1083 — 0.1091)
2.27 — 2.29 (0.0894 — 0.0902)	2.78 — 2.80 (0.1094 — 0.1102)
2.30 — 2.32 (0.0906 — 0.0913)	2.81 — 2.83 (0.1106 — 0.1114)
2.33 — 2.35 (0.0917 — 0.0925)	2.84 — 2.86 (0.1118 — 0.1126)
2.36 — 2.38 (0.0929 — 0.0937)	2.87 — 2.89 (0.1130 — 0.1138)
2.39 — 2.41 (0.0941 — 0.0949)	2.90 — 2.92 (0.1142 — 0.1150)
2.42 — 2.44 (0.0953 — 0.0961)	2.93 — 2.95 (0.1154 — 0.1161)
2.45 — 2.47 (0.0965 — 0.0972)	2.96 — 2.98 (0.1165 — 0.1173)
2.48 — 2.50 (0.0976 — 0.0984)	2.99 — 3.01 (0.1177 — 0.1185)
2.51 — 2.53 (0.0988 — 0.0996)	3.02 — 3.04 (0.1189 — 0.1197)
2.54 — 2.56 (0.1000 — 0.1008)	3.05 — 3.07 (0.1201 — 0.1209)
2.57 — 2.59 (0.1012 — 0.1020)	3.08 — 3.10 (0.1213 — 0.1220)
2.60 — 2.62 (0.1024 — 0.1031)	3.11 — 3.13 (0.1224 — 0.1232)
2.63 — 2.65 (0.1035 — 0.1043)	3.14 — 3.16 (0.1236 — 0.1244)
2.66 — 2.68 (0.1047 — 0.1055)	3.17 — 3.19 (0.1248 — 0.1256)
2.69 — 2.71 (0.1059 — 0.1067)	3.20 — 3.22 (0.1260 — 0.1268)



11. MEASURE TOTAL PRELOAD

Using a torque wrench, measure the total preload.

Total preload (at starting):
Add drive pinion preload
3 – 5 kg-cm (2.6 – 4.3 in.-lb, 0.3 – 0.5 N·m)

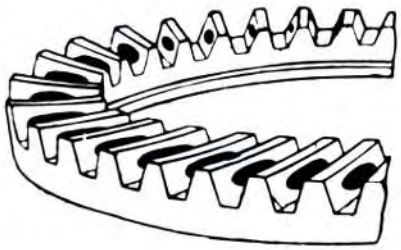


12. INSPECT TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION

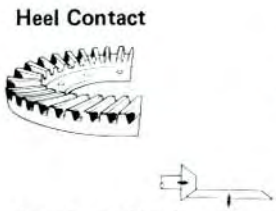
(a) Coat 3 or 4 teeth at three different positions on the ring gear with red lead.

(b) Hold the companion flange firmly and rotate the ring gear in both directions.

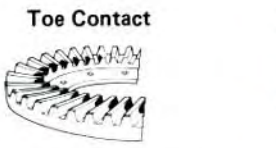
(c) Inspect the tooth contact.

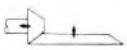


Proper Contact



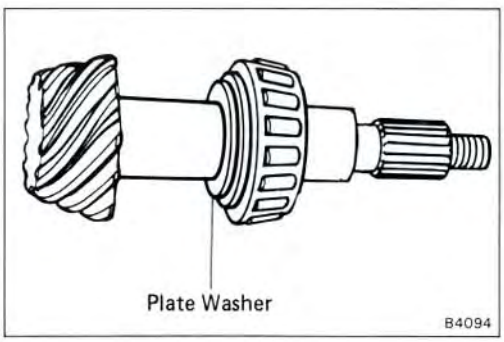
Select an adjusting shim that will bring the drive pinion closer to the ring gear.





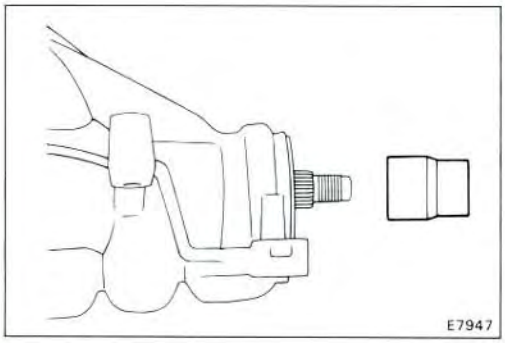
Select an adjusting shim that will shift the drive pinion away from the ring gear.

E6909
B4093 E6910



If the teeth are not contacting properly, use the following chart to select a proper washer for correction.

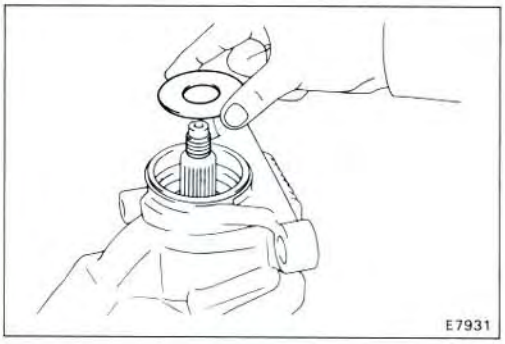
Thickness	mm (in.)
2.27 (0.0894)	2.51 (0.0988)
2.30 (0.0906)	2.54 (0.1000)
2.33 (0.0917)	2.57 (0.1012)
2.36 (0.0929)	2.60 (0.1024)
2.39 (0.0941)	2.63 (0.1035)
2.42 (0.0953)	2.66 (0.1047)
2.45 (0.0965)	2.69 (0.1059)
2.48 (0.0976)	



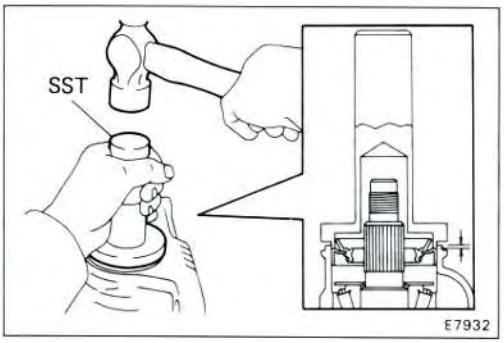
13. **REMOVE COMPANION FLANGE**
(See step 3 on page RA-28)

14. **REMOVE FRONT BEARING**
(See step 5 on page RA-29)

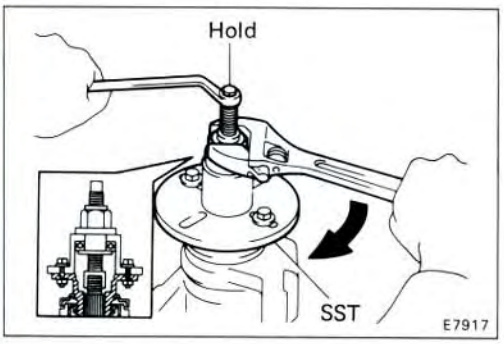
15. **INSTALL NEW BEARING SPACER AND FRONT BEARING**
(a) Install a new bearing spacer on the drive pinion.
(b) Install the front bearing on the drive pinion.



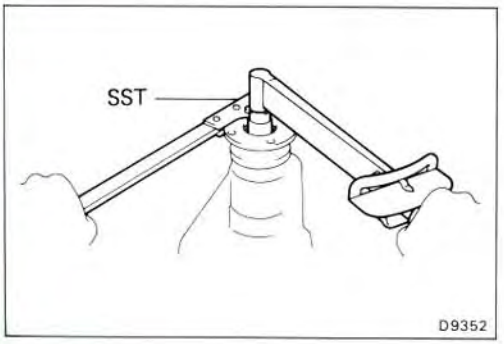
16. **INSTALL OIL SLINGER**



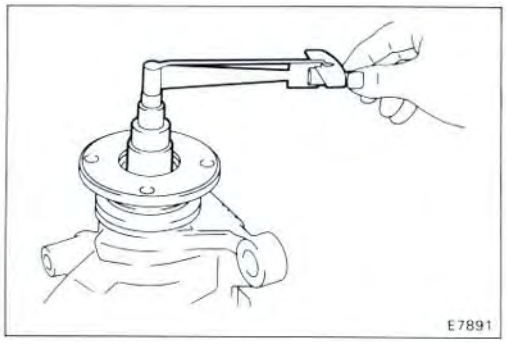
17. **INSTALL NEW OIL SEAL**
(a) Using SST, drive in a new oil seal.
SST 09554-22010
Oil seal drive in depth: 2.0 mm (0.079 in.)
(b) Apply MP grease to oil seal lip.



18. **INSTALL COMPANION FLANGE**
(a) Using SST, install the companion flange on the shaft.
SST 09557-22022



(b) Install the plate washer.
(c) Coat the threads of a new nut with gear oil.
(d) Using SST to hold the flange, tighten the nut.
SST 09330-00021
Torque: 1,100 kg-cm (80 ft-lb, 108 N·m)


E7891

19. CHECK DRIVE PINION BEARING PRELOAD

Using a torque wrench, measure the preload of the backlash between the drive pinion and ring gear.

Preload (at starting):

New bearing	**10 – 16 kg-cm (8.7 – 13.9 in.-lb, 1.0 – 1.6 N·m)**
Reused bearing	**5 – 8 kg-cm (4.3 – 6.9 in.-lb, 0.5 – 0.8 N·m)**

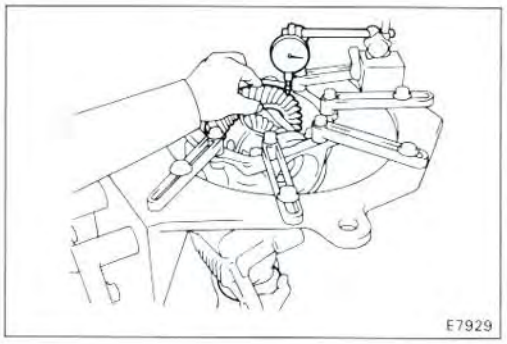
- If preload is greater than specification, replace the bearing spacer.
- If preload is less than specification, retighten the nut 130 kg-cm (9 ft-lb, 13 N·m) at a time until the specified preload is reached.

If the maximum torque is exceed while retightening the nut, replace the bearing spacer and repeat the preload procedure. Do not back off the pinion nut to reduce the preload.

Maximum torque: 2,400 kg-cm (174 ft-lb, 235 N·m)

20. CHECK TOTAL PRELOAD

Total preload (at starting):
Add drive pinion preload
3 – 5 kg-cm (2.6 – 4.3 in.-lb, 0.3 – 0.5 N·m)


E7929

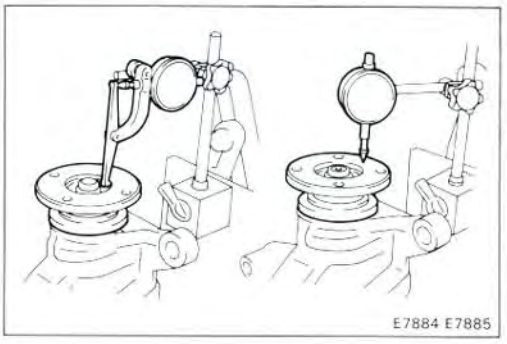
21. CHECK RING GEAR BACKLASH

Using a dial indicator, check the backlash of the ring gear.

Backlash: 0.13 – 0.18 mm (0.0051 – 0.0071 in.)

If the backlash is not within specification, adjust the side bearing preload.

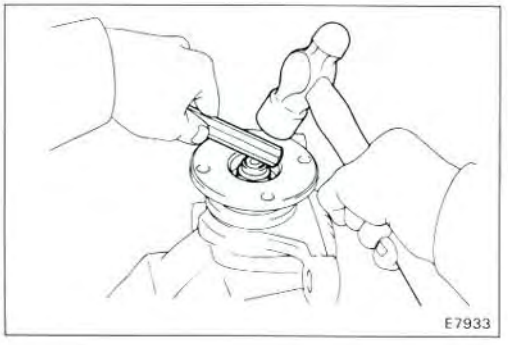
22. INSPECT TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION (See page RA-38)


E7884 E7885

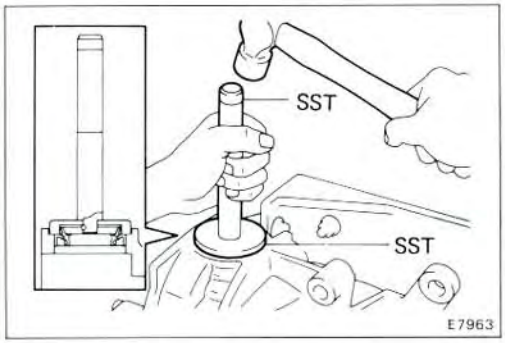
23. CHECK COMPANION FLANGE RUNOUT

Using a dial indicator, measure the lateral and radial runout of the companion flange.

Maximum lateral runout: 0.10 mm (0.0039 in.)
Maximum radial runout: 0.10 mm (0.0039 in.)


E7933

24. STAKE DRIVE PINION NUT

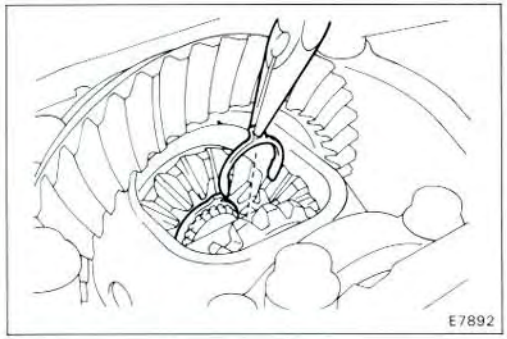


25. INSTALL NEW SIDE GEAR SHAFT OIL SEALS

(a) Using SST, drive in two new oil seals until they are flush with the carrier end surface.

SST 09550-22011 (09550-00020 and 09550-00031)

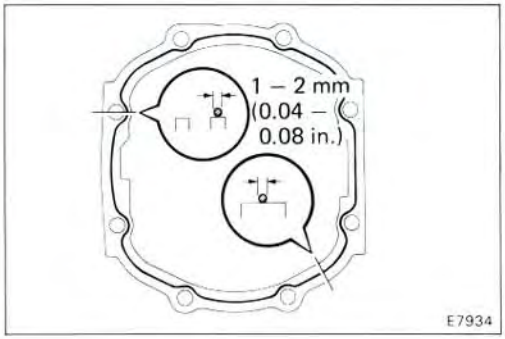
(b) Coat the oil seal lips with MP grease.



26. INSTALL SIDE GEAR SHAFTS

(a) Install the two side gear shafts to the differential case.

(b) Install two new shaft snap rings to the side gear shafts.



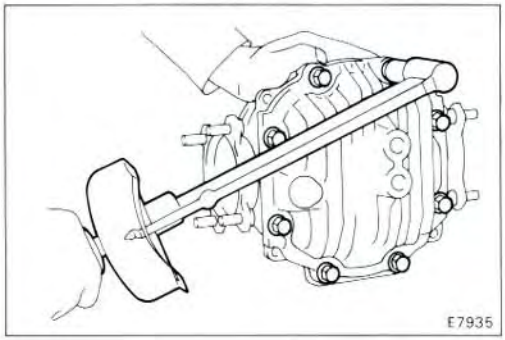
27. INSTALL DIFFERENTIAL CARRIER COVER

(a) Clean contacting surfaces of any residual packing material using gasoline or alcohol.

(b) Apply seal packing to the carrier.

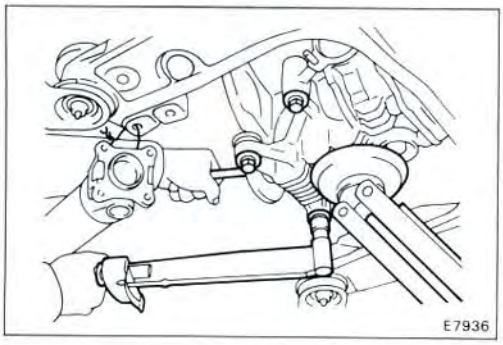
Seal packing: Part No. 08826-00090, THREE BOND 1281 or equivalent

NOTE: Install the carrier cover within 3 minutes after applying seal packing.



(c) Install and tighten the eight set bolts.

Torque: 475 kg-cm (34 ft-lb, 47 N·m)


E7936

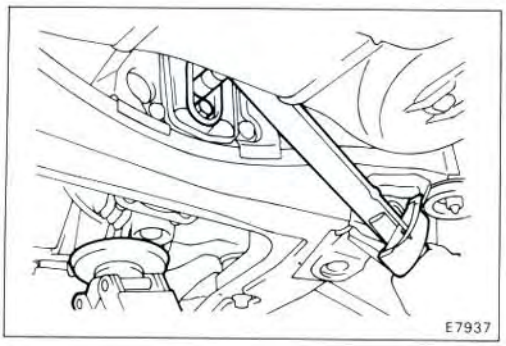
INSTALLATION OF DIFFERENTIAL

(See page RA-20)

1. INSTALL DIFFERENTIAL

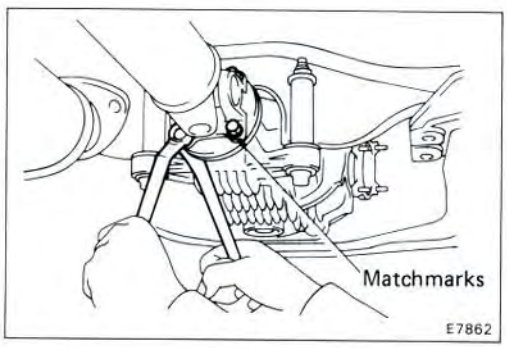
(a) Position the differential and torque the four bolts and nuts.

Torque: 970 kg-cm (70 ft-lb, 95 N·m)


E7937

(b) Install and torque the two bolts.

Torque: 1,500 kg-cm (108 ft-lb, 147 N·m)



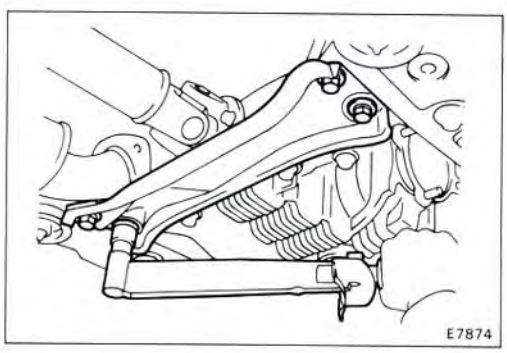
E7862

2. CONNECT PROPELLER SHAFT

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

(b) Torque the four bolts and nuts.

Torque: 750 kg-cm (54 ft-lb, 74 N·m)

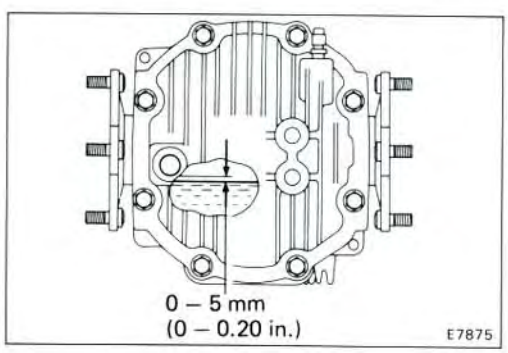

E7874

3. INSTALL REAR CROSSMEMBER

Install the rear crossmember with four bolts.

Torque: 730 kg-cm (53 ft-lb, 72 N·m)

4. CONNECT DRIVE SHAFTS (See page RA-13)



E7875

5. FILL DIFFERENTIAL WITH GEAR OIL

(a) Install the drain plug with new gasket.

Torque: 500 kg-cm (36 ft-lb, 49 N·m)

(b) Fill the differential with gear oil.

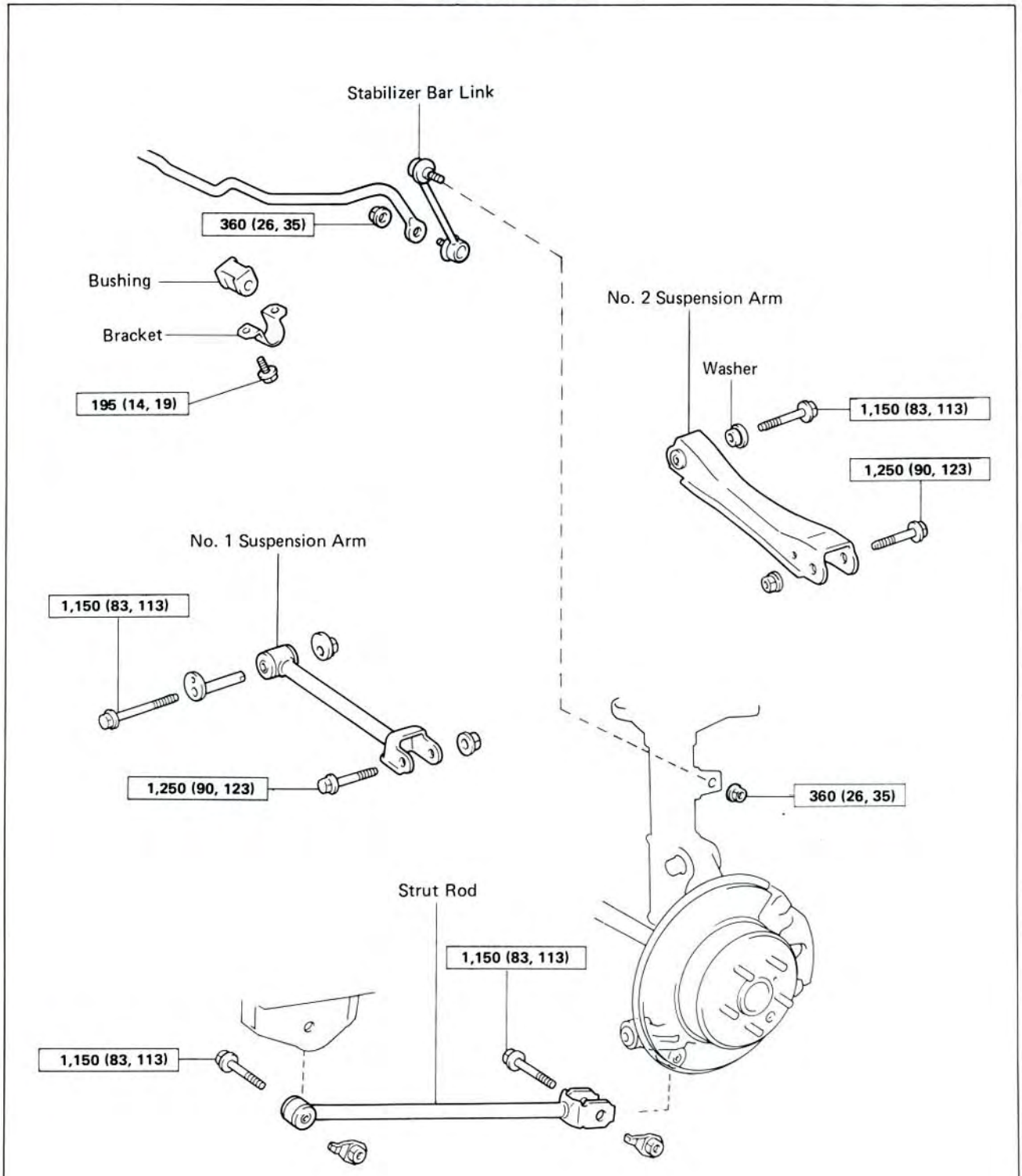
Oil grade: API GL-5 hypoid gear oil
Viscosity: Above −18°C (0°F) SAE 90
Below −18°C (0°F) SAE 80W-90
Capacity: 1.1 liters (1.2 US qts, 1.0 Imp.qts)

(c) Install the filler plug with new gasket.

Torque: 400 kg-cm (29 ft-lb, 39 N·m)

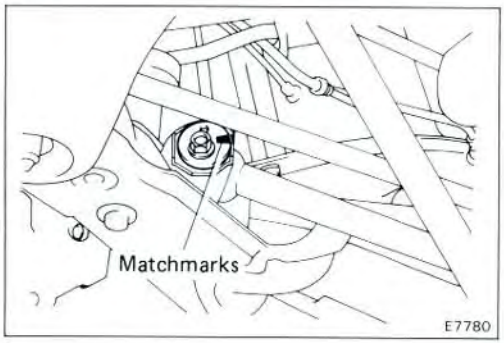
REAR SUSPENSION

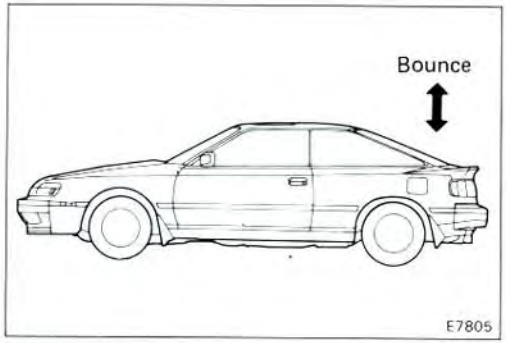
COMPONENTS



kg-cm (ft-lb, N·m) : Specified torque

RA1345





Suspension Arm and Strut Rod

REMOVAL AND INSTALLATION OF SUSPENSION ARM AND STRUT ROD

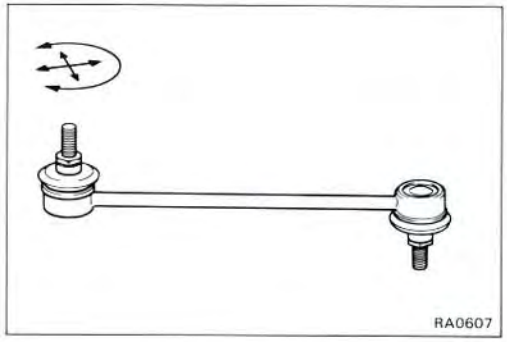
Remove and install the parts as shown components on page RA-43.

(MAIN POINT OF REMOVAL SUSPENSION ARM AND STRUT ROD)

- Place matchmarks on the adjusting cam and body. (No. 2 suspension arm only)

(MAIN POINT OF INSTALLATION SUSPENSION ARM AND STRUT ROD)

- Place the suspension arm or the strut rod in position.
- Temporarily install the bolt to the body and the axle carrier.
- Bounce the vehicle up and down to stabilize the suspension arm or strut rod.
- Align the matchmarks on the cam and body. (No. 2 suspension arm only)
- Torque the installation bolt with the vehicle weight on the suspension.
  (See page RA-43)
- Check rear wheel alignment.
  (See page RA-3)



Stabilizer Bar

REMOVAL AND INSTALLATION OF STABILIZER BAR

Remove and install the stabilizer bar as shown components on page SA-43.

INSPECT STABILIZER BAR LINK

Move the ball joint stud in all directions, if the movement is not smooth and free, replace the stabilizer link.

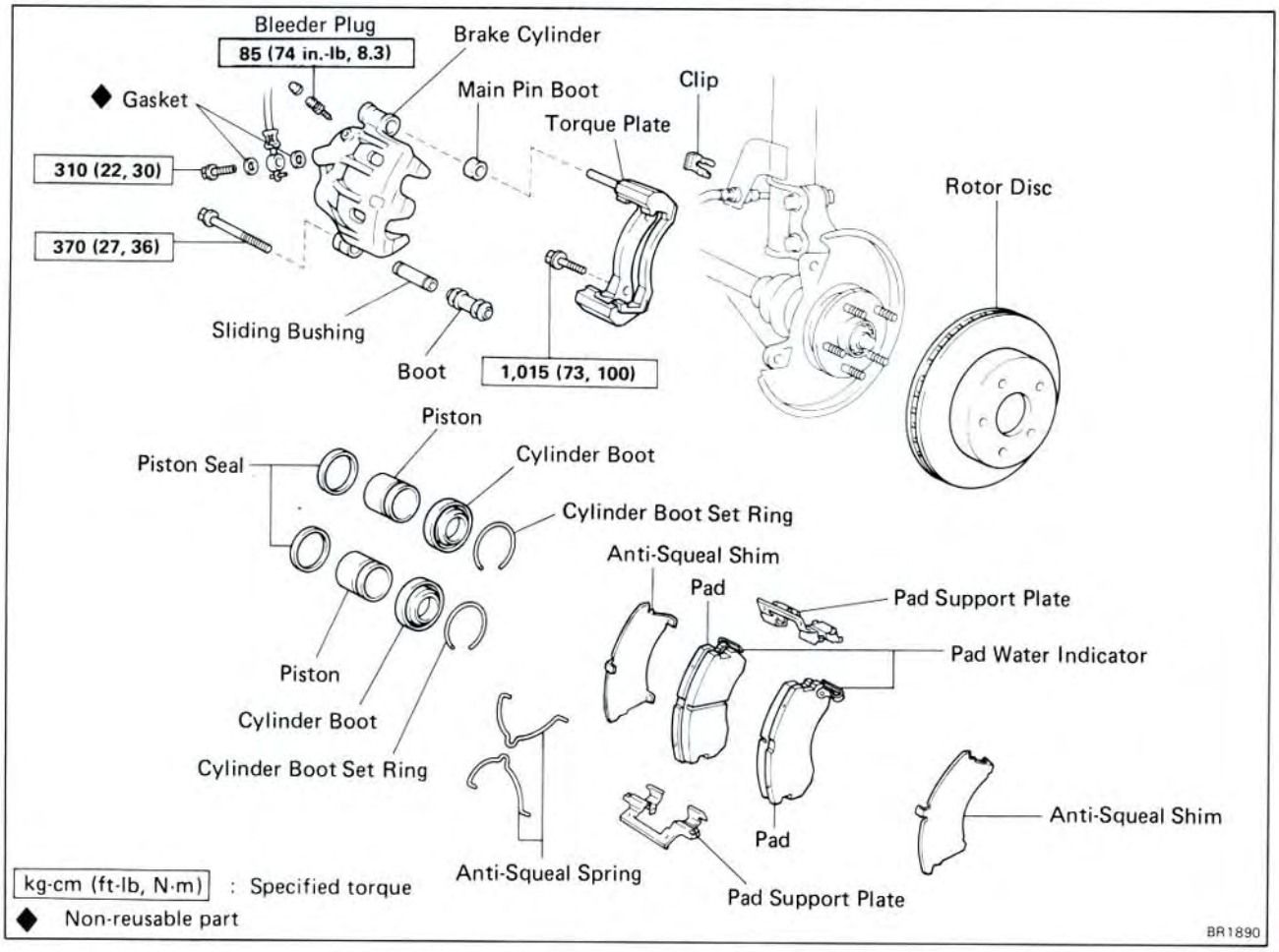
BRAKE SYSTEM

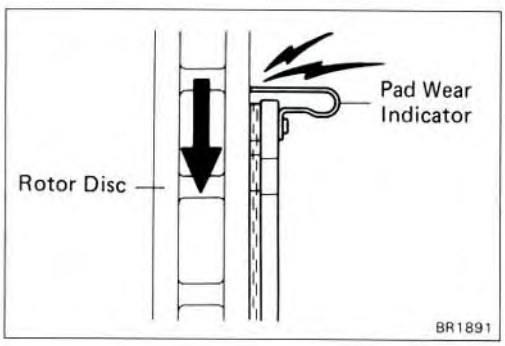
REFER TO 1988 CELICA REPAIR MANUAL (Pub. No. RM071U)

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

FRONT BRAKE

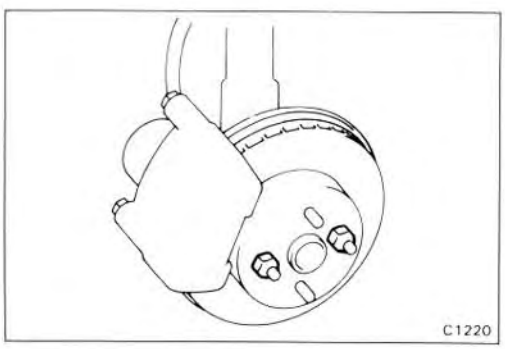
COMPONENTS





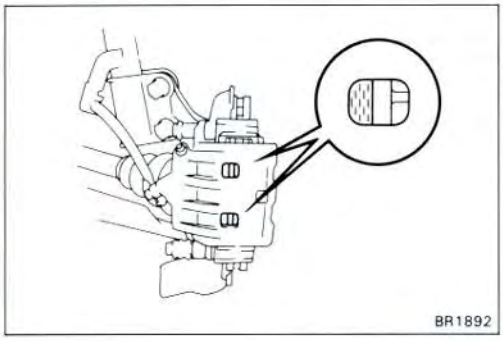
REPLACEMENT OF BRAKE PADS

NOTE: If a squealing noise occurs from the brakes while driving, check the pad wear indicator. If there are traces of the indicator contacting the rotor disc, the brake pad should be replaced.



1. REMOVE FRONT WHEEL

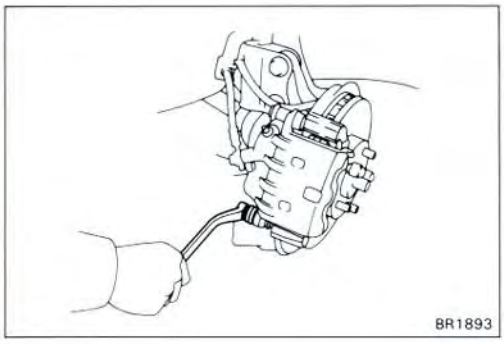
Remove the wheel and temporarily fasten the rotor disc with the hub nuts.



2. INSPECT PAD LINING THICKNESS

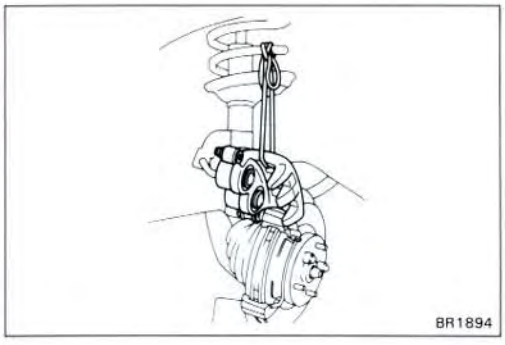
Check the pad thickness through the cylinder inspection hole and replace pads if not within specification.

Minimum thickness: 1.0 mm (0.039 in.)



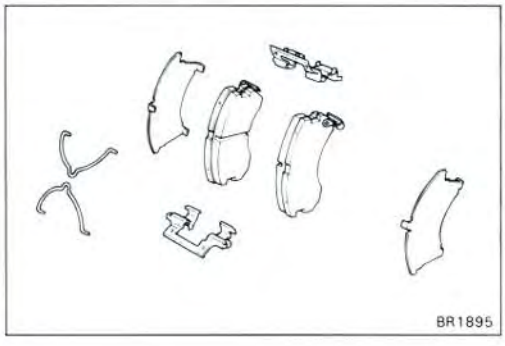
3. REMOVE CYLINDER FROM TORQUE PLATE

(a) Remove the installation bolt.



(b) Lift up the brake cylinder and suspend it so the hose is not stretched.

NOTE: Do not disconnect the brake hose.



4. REMOVE FOLLOWING PARTS

(a) Two anti-squeal springs

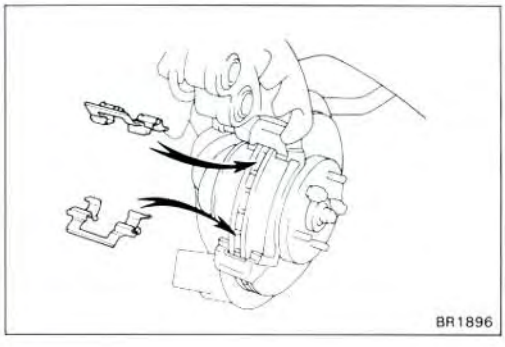
(b) Two brake pads

(c) Two anti-squeal shims

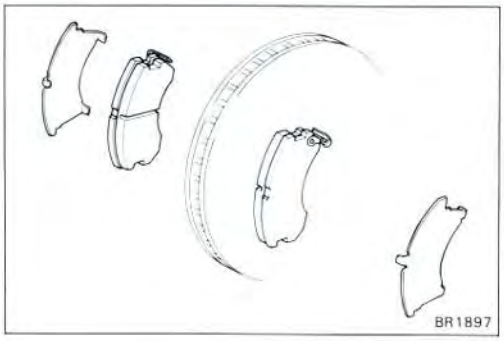
(d) Two pad support plates

5. CHECK ROTOR DISC THICKNESS
(See step 2 on page BR-7)

6. CHECK ROTOR DISC RUNOUT
(See step 3 on page BR-7)

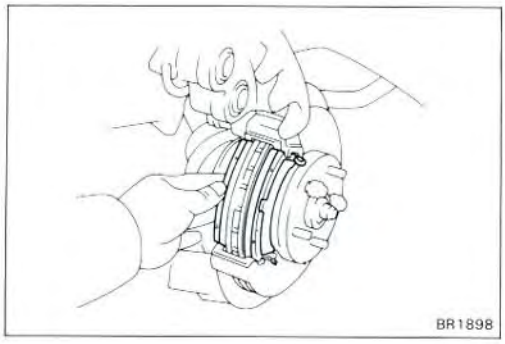


7. INSTALL PAD SUPPORT PLATES



8. INSTALL NEW PADS

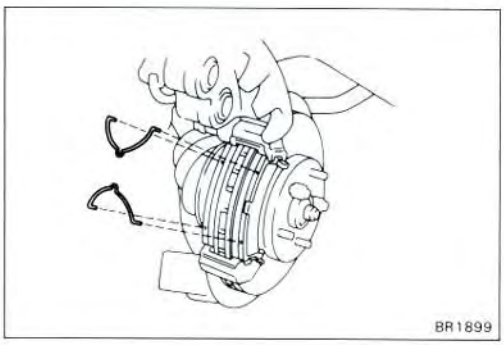
(a) Install the anti-squeal shims to the pads.



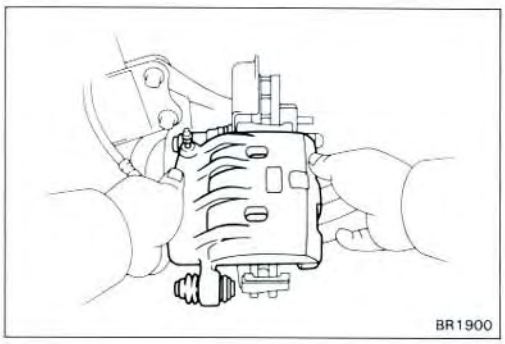
(b) Install the pads onto each support plate.

NOTE: Install the pads so the wear indicator is at the top side.

CAUTION: Do not allow oil or grease to get on the rubbing face.



(c) Install the anti-squeal springs in position.



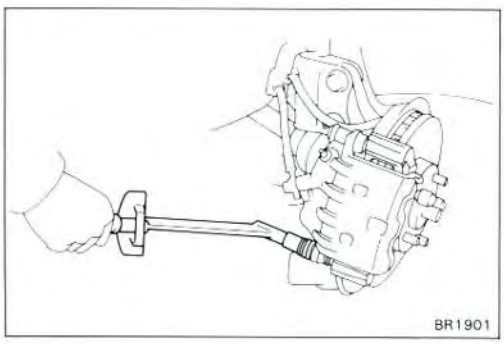
9. INSTALL CYLINDER

(a) Draw out a small amount of brake fluid from the reservoir.

(b) Press in piston with a hammer handle or an equivalent.

NOTE: Always change the pad on one wheel at a time as there is a possibility of the opposite piston flying out.

(c) Insert the brake cylinder carefully so the boot is not wedged.

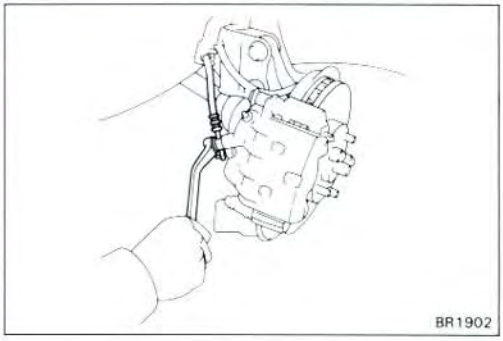


(d) Install and torque the installation bolt.

Torque: 370 kg-cm (27 ft-lb, 36 N·m)

10. INSTALL FRONT WHEEL

11. CHECK THAT FLUID LEVEL IS MAX LINE

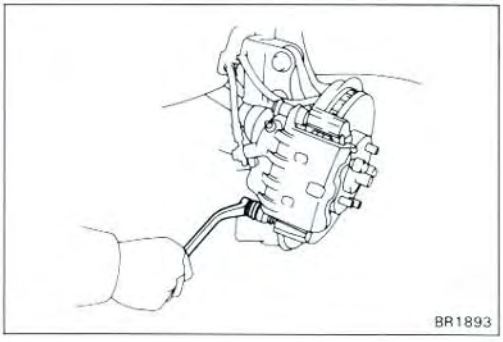


REMOVAL OF CYLINDER

(See page BR-2)

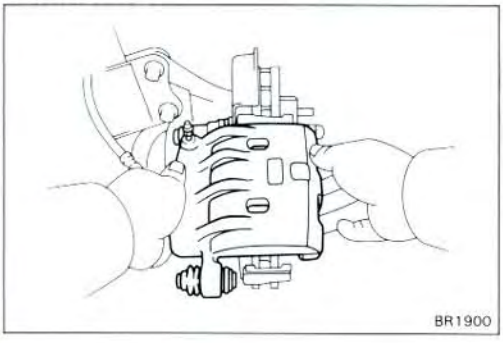
1. DISCONNECT BRAKE HOSE

Remove the union bolt and disconnect the brake hose. Use a container to catch the brake fluid.

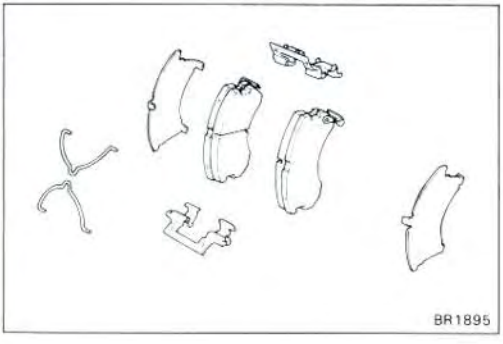


2. REMOVE CYLINDER FROM TORQUE PLATE

(a) Remove the installation bolt.

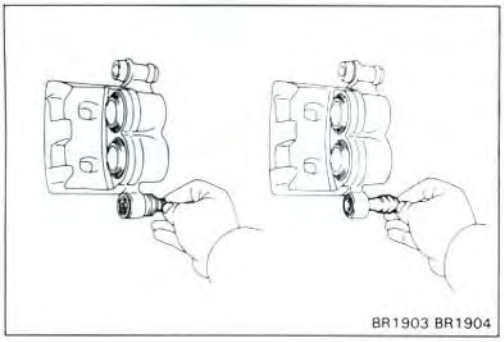


(b) Slide out the brake cylinder.



3. REMOVE PADS

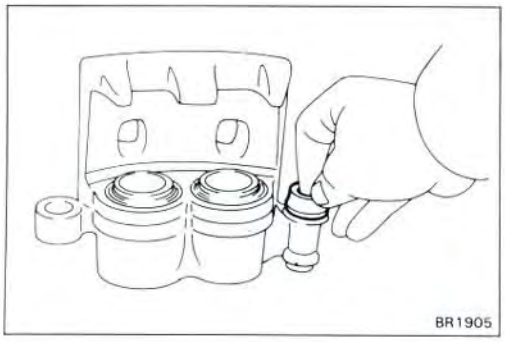
(See step 4 on page BR-3)


BR1903 BR1904

DISASSEMBLY OF CYLINDER

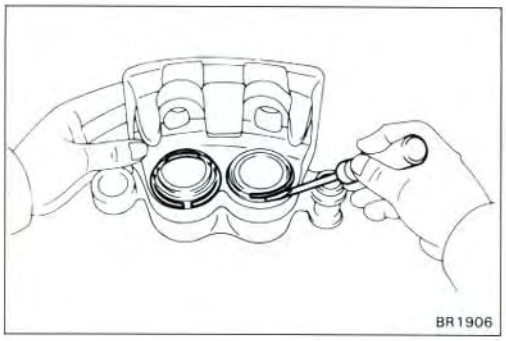
(See page BR-2)

1. REMOVE SLIDING BUSHING AND BOOT


BR1905

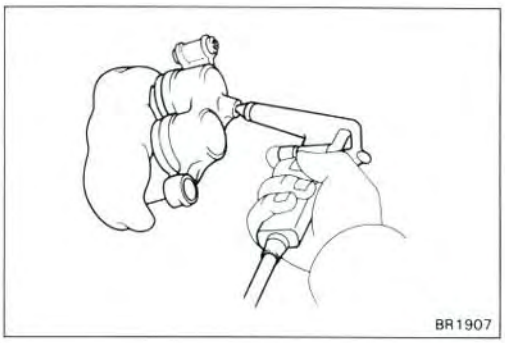
2. REMOVE MAIN PIN BOOT

Pull out the main pin boot.


BR1906

3. REMOVE CYLINDER BOOT SET RINGS AND CYLINDER BOOTS

Using a screwdriver, remove the two cylinder boot set rings and remove the two cylinder boots from the brake cylinder.

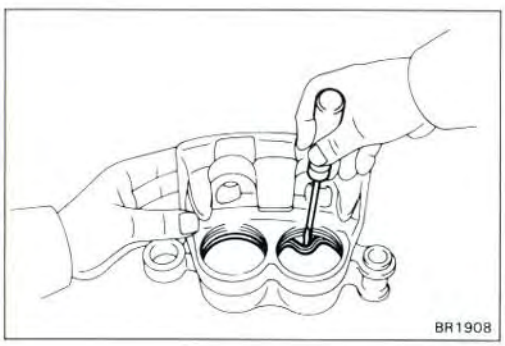

BR1907

4. REMOVE PISTONS FROM CYLINDER

(a) Put a piece of cloth or an equivalent as shown.

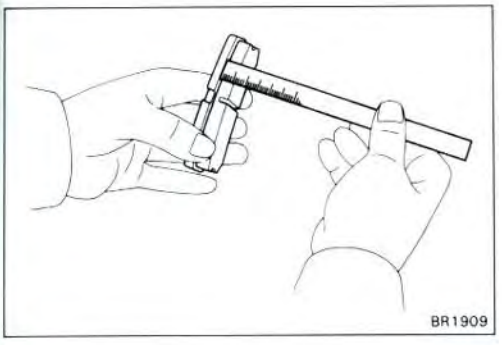
(b) Use compressed air to remove the pistons from the cylinder.

WARNING: Do not place your fingers in front of the pistons when using compressed air.


BR1908

5. REMOVE PISTON SEALS FROM CYLINDER

Using a screwdriver, remove the two piston seals from the brake cylinder.


BR1909

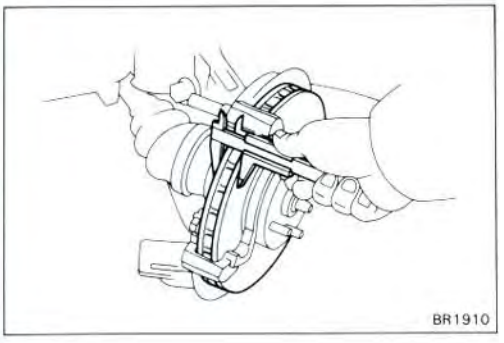
INSPECTION OF FRONT BRAKE COMPONENTS

1. MEASURE PAD LINING THICKNESS

Standard thickness: 10.0 mm (0.394 in.)

Minimum thickness: 1.0 mm (0.039 in.)

Replace the pad if the thickness is less than the minimum or if it shows sign of uneven wear.

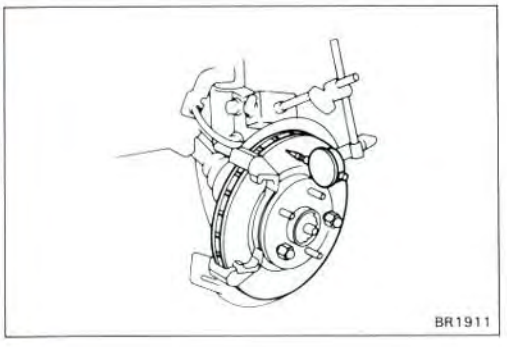

BR1910

2. MEASURE ROTOR DISC THICKNESS

Standard thickness: 25.0 mm (0.984 in.)

Minimum thickness: 24.0 mm (0.945 in.)

If the disc is scored or worn, or if thickness is less than minimum, repair or replace the disc.


BR1911

3. MEASURE ROTOR DISC RUNOUT

NOTE: Before measuring the runout, confirm that the front hub bearing play is within specification.
Measure the rotor disc runout at 10 mm (0.39 in.) from the outer edge of the rotor disc.

Maximum disc runout: 0.15 mm (0.0059 in.)

If the runout is greater than the maximum, inspect and adjust following the procedure listed below.

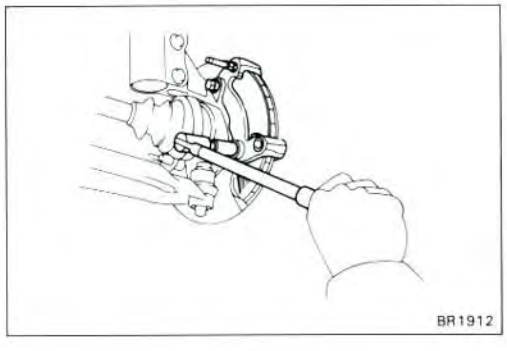
Then replace the disc if necessary.

(a) Remove the torque plate from the knuckle.

(b) Remove the hub nuts of the temporarily installed disc and pull off the rotor disc.

(c) Check that the hub axial play is within specification, and replace the bearing if not within specification.

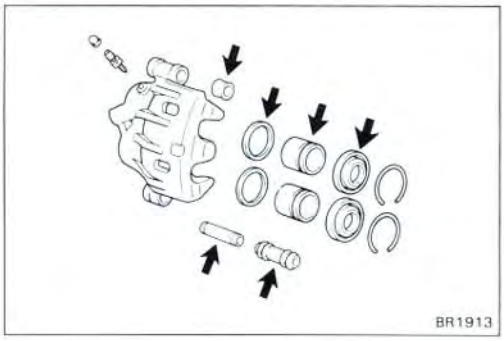
(d) Install the rotor disc and measure the disc runout, then shift the rotor disc one fifth a turn and measure the disc runout. Similarly measure the runout at each position, and select the position where the runout is minimum.


BR1912

(e) In this position, if the runout is within specification, install the torque plate and torque the mounting bolts.

Torque: 1,015 kg-cm (73 ft-lb, 100 N·m)

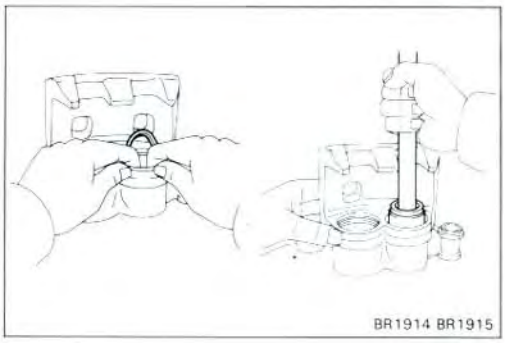
(f) If not within specification, replace the rotor disc, and repeat (d) and (e).


BR1913

ASSEMBLY OF CYLINDER

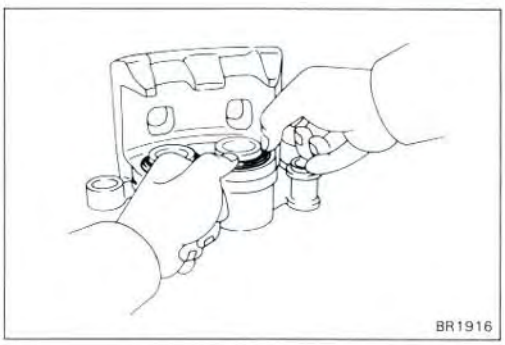
(See page BR-2)

1. **APPLY LITHIUM SOAP BASE GLYCOL GREASE TO PARTS INDICATED WITH ARROWS**


BR1914 BR1915

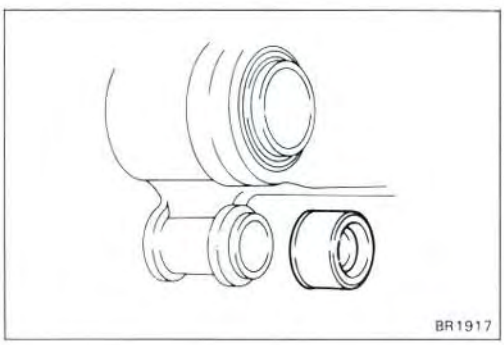
2. **INSTALL PISTON SEALS AND PISTONS IN CYLINDER**

   Install the two piston seals and two pistons into the brake cylinder.


BR1916

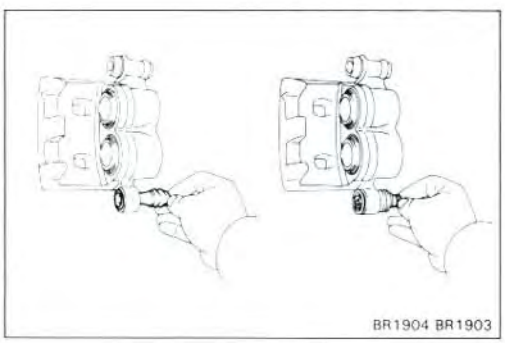
3. **INSTALL CYLINDER BOOTS AND SET RINGS IN CYLINDER**

   Install the cylinder boots and set rings to each piston.


BR1917

4. **INSTALL MAIN PIN BOOT**

   Install the main pin boot in place.


BR1904 BR1903

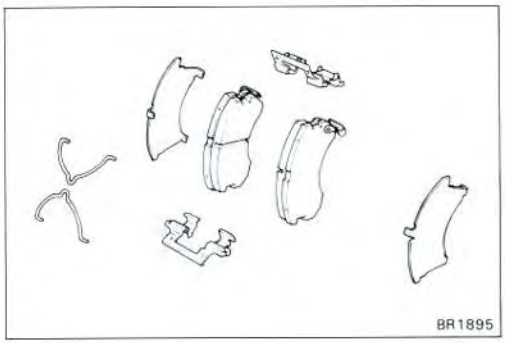
5. **INSTALL DUST BOOT AND SLIDING BUSHING**

   (a) Install the dust boot.

   (b) Insure that the boot is secured firmly to the brake cylinder grooves.

   (c) Install the bushing into the boot.

   (d) Insure that the boot is secured firmly to the bushing grooves.



INSTALLATION OF CYLINDER

(See page BR-2)

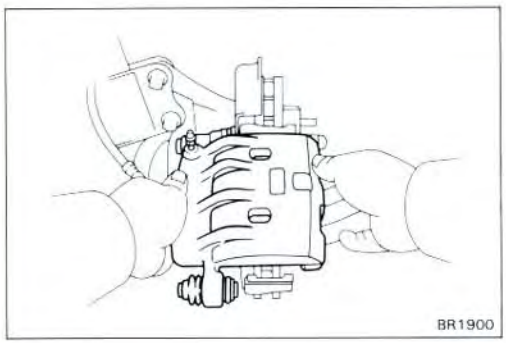
1. INSTALL FOLLOWING PARTS

(a) Two pad support plates

(b) Two brake pads

(c) Two anti-squeal shims

(d) Two anti-squeal springs

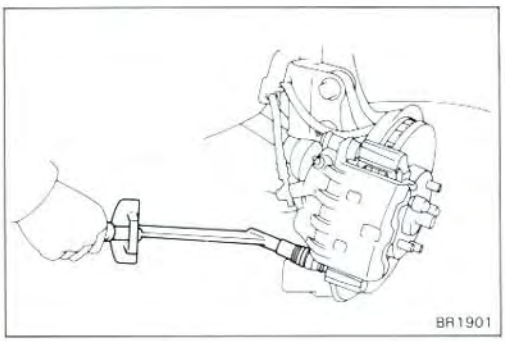


2. INSTALL CYLINDER

(a) Install the brake cylinder onto the main pin.

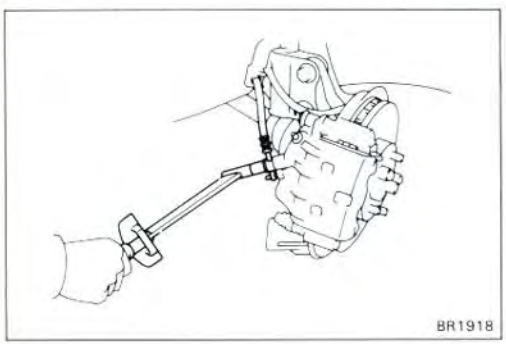
NOTE: Make sure that the boot end is installed into the groove of the main pin.

(b) Install the brake cylinder over the brake pads.



(c) Install the cylinder installation bolt and torque the bolt.

Torque: 370 kg-cm (27 ft-lb, 36 N·m)



3. CONNECT FLEXIBLE HOSE TO BRAKE CYLINDER

Set the flexible hose and new gaskets in position and install the union bolt and torque it.

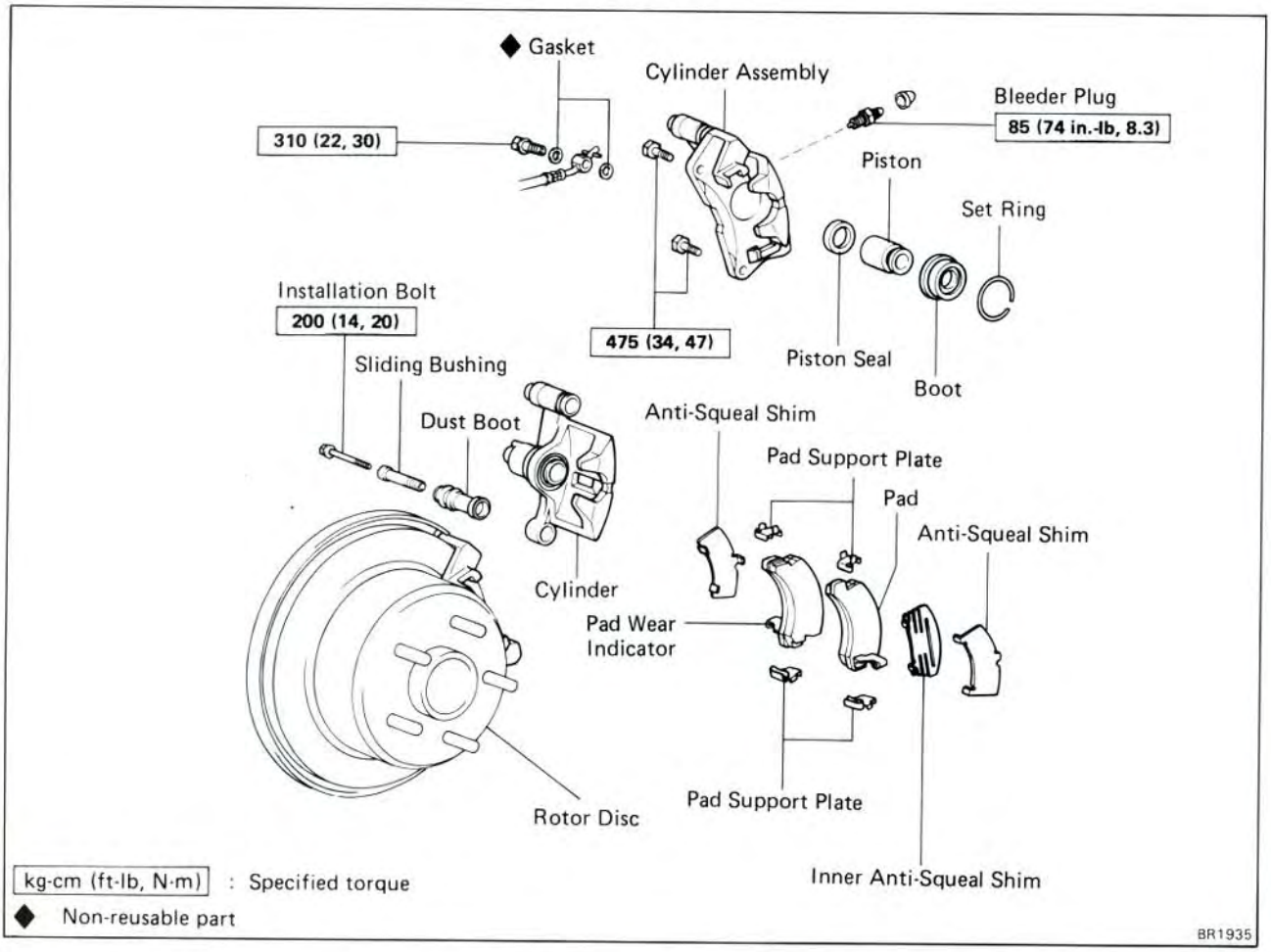
Torque: 310 kg-cm (22 ft-lb, 30 N·m)

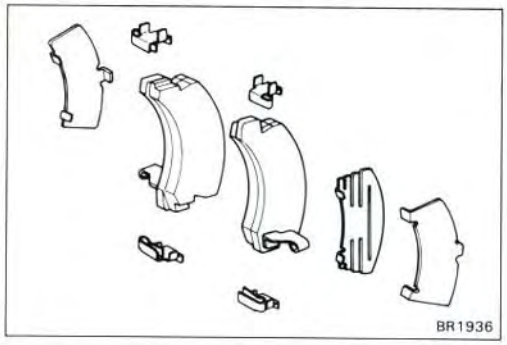
4. FILL BRAKE RESERVOIR WITH BRAKE FLUID AND BLEED BRAKE SYSTEM

5. CHECK FOR LEAKS

REAR BRAKE

COMPONENTS

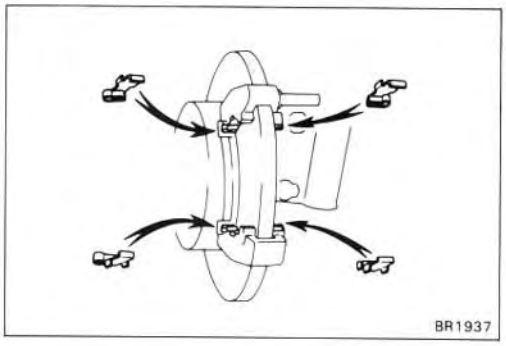




REMOVAL OF BRAKE PADS

REMOVE FOLLOWING PARTS

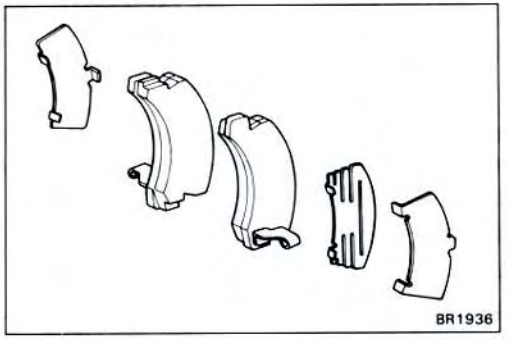
(a) Two brake pads
(b) Three anti-squeal shims
(c) Four pad support plates



INSTALLATION OF BRAKE PADS

1. INSTALL PAD SUPPORT PLATES

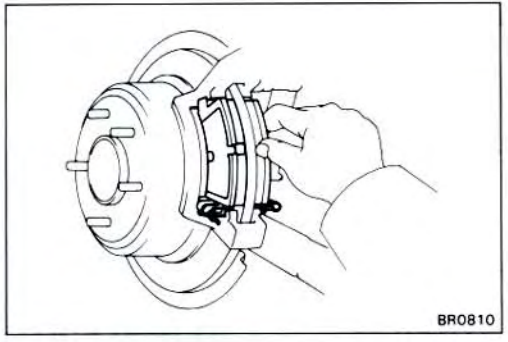
Install the four pad support plates.


BR1936

2. INSTALL PADS

(a) Install the three anti-squeal shims to the pads.

NOTE: Apply disc brake grease to the both side of the inner anti-squeal shim.


BR0810

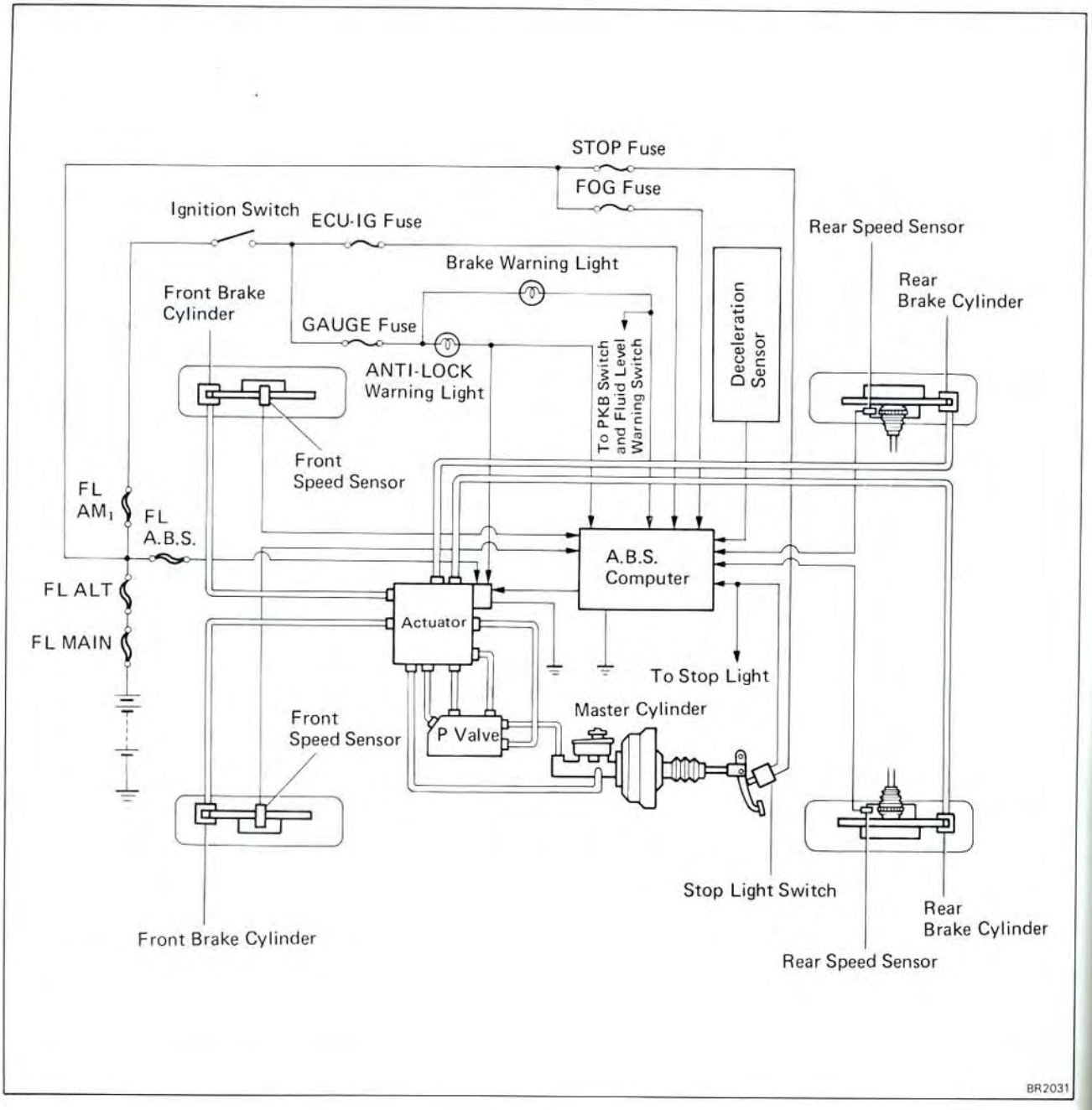
(b) Install the two pads so the wear indicator plate is at the bottom side.

CAUTION: Do not allow oil or grease to get on the rubbing face.

ANTI-LOCK BRAKE SYSTEM (A.B.S.)

Description

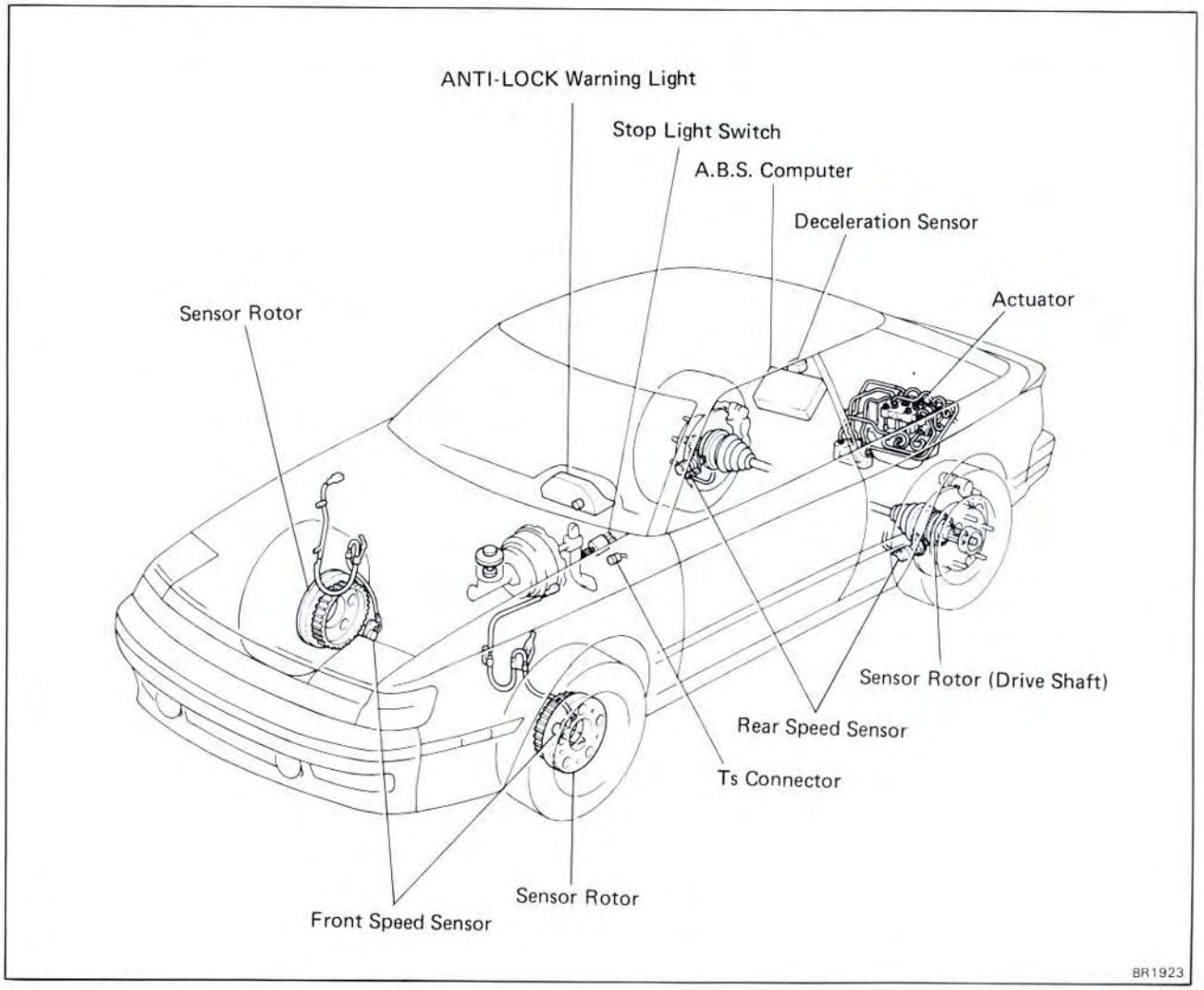
- The A.B.S. is a brake system which controls the wheel cylinder hydraulic pressure of all four wheels during sudden braking and braking on slippery road surfaces, preventing the wheels from locking. This A.B.S. provides the following benefits:
  (1) Enables steering round an obstacle with a greater degree of certainty even when panic braking.
  (2) Enables stopping in a panic brake without affecting stability and steerability, even on curves.
- The function of the A.B.S. is to maintain directional stability and vehicle steerability on most road conditions. However, the system cannot prevent the vehicle from skidding if the cornering speed limit is exceeded.
- The A.B.S. has a longitudinal deceleration sensor to match braking characteristics to the full-time four-wheel drive.
- In case a malfunction occurs, a diagnosis function and fail-safe system have been adopted for the A.B.S. to increase serviceability.



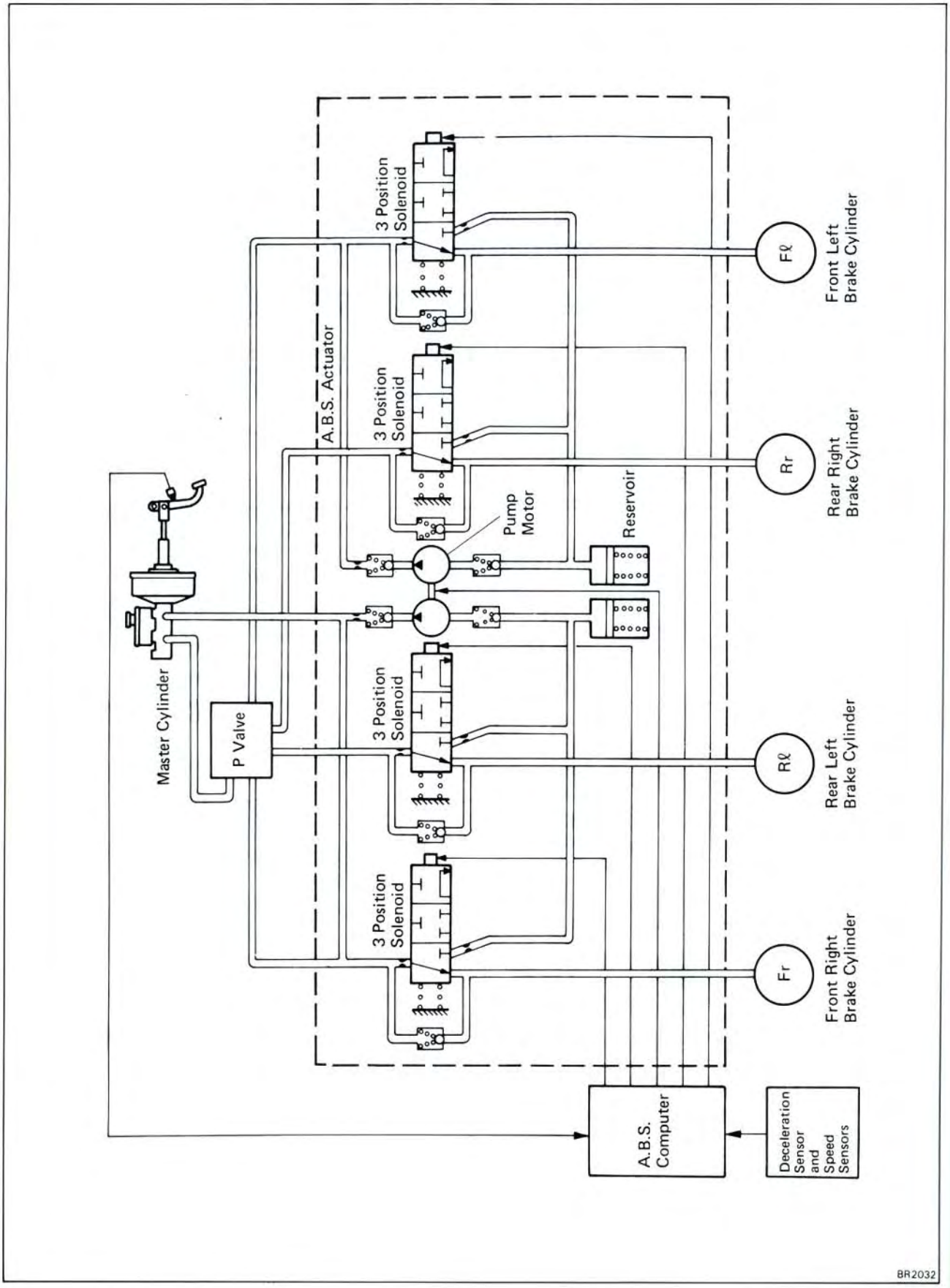
FUNCTION OF COMPONENTS

Component	Function
Front Speed Sensor	Detects the wheel speed of each of the left and right front wheels.
Rear Speed Sensor	Detects the wheel speed of each of the left and right rear wheels.
Deceleration Sensor	Detects the deceleration speed of the vehicle and sends a signal accordingly to the A.B.S. computer.
Stop Light Switch	Detects the brake signal and sends it to the computer.
ANTI-LOCK Warning Light	Lights up to alert the driver when trouble has occured in the Anti-lock Brake System.
Actuator	Controls the brake fluid pressure to each disc brake cylinder through signals from the computer.
Anti-lock Brake System Computer	From the wheel speed signals from each sensor, it calculates acceleration, deceleration and slip values and sends signals to the actuator to control brake fluid pressure.

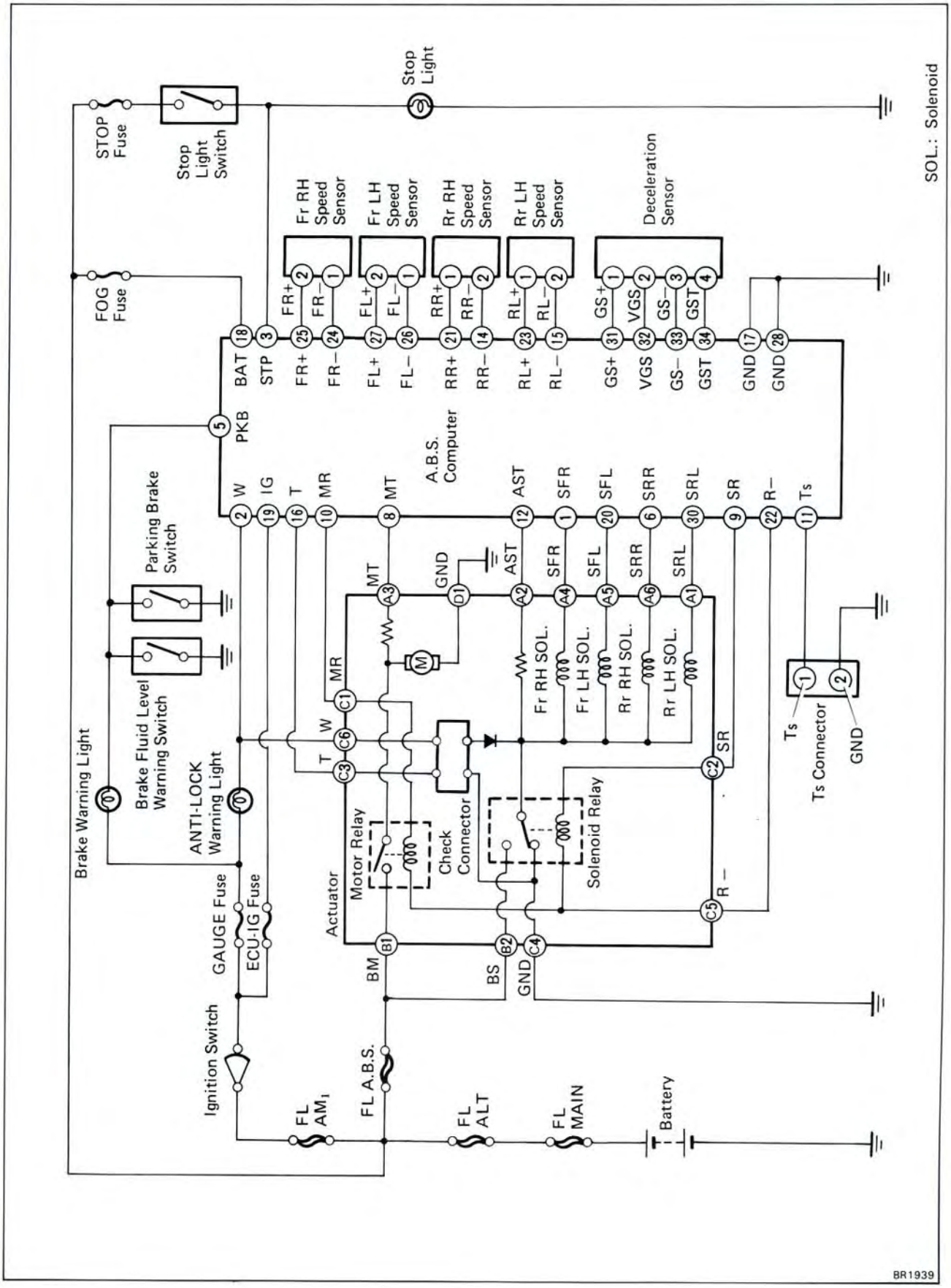
LOCATION OF SYSTEM PARTS



SYSTEM DIAGRAM



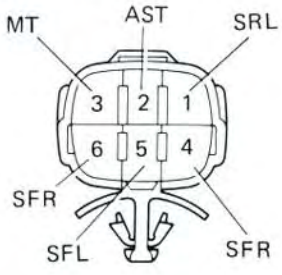
WIRING DIAGRAM



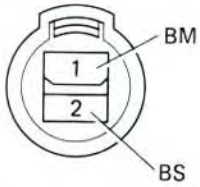
CONNECTORS

Brake Actuator

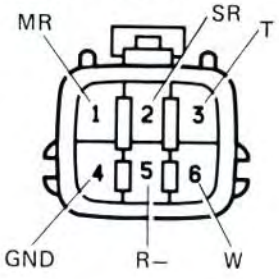
CONNECTOR A



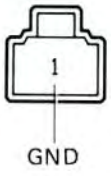
CONNECTOR B



CONNECTOR C

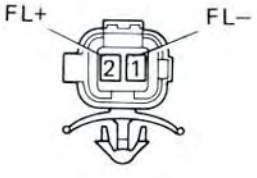


CONNECTOR D

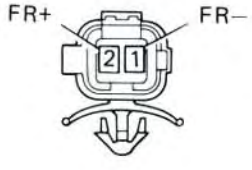


Check Connector

Front Speed Sensor (LH)

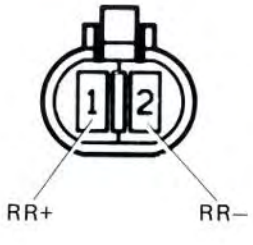


Front Speed Sensor (RH)

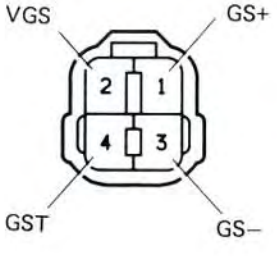


Rear Speed Sensor (LH)

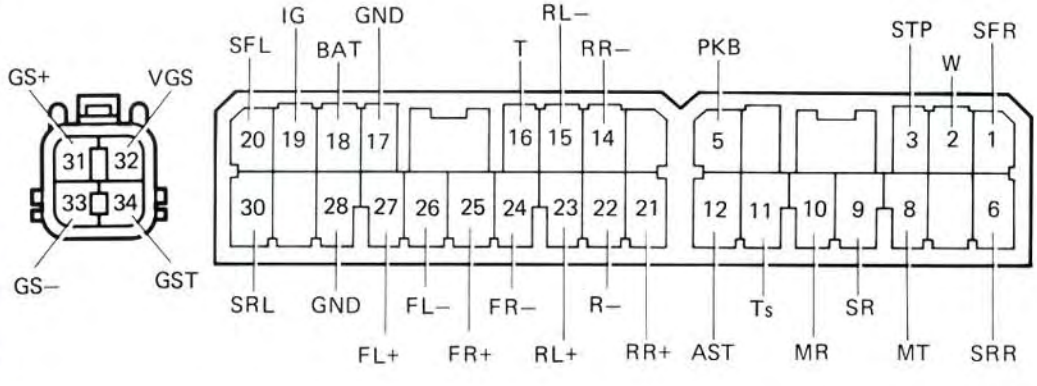
Rear Speed Sensor (RH)



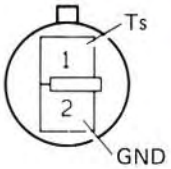
Deceleration Sensor



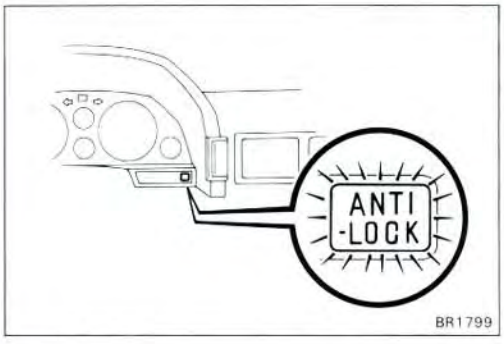
Anti-lock Brake System Computer

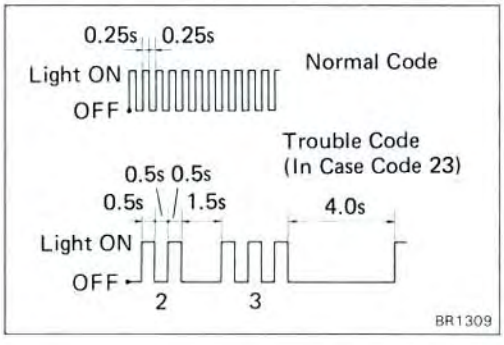


Ts Connector



E2402 ID-2-2 IS-6-1-B Q-1-2
IS-2-1-B BR1798 BR1798
IS-2-1-B IS-2-1-B IS-4-2-B
IS-4-1-B E2403 IC-2-1





Diagnosis System

DESCRIPTION

If a functional malfunction occurs, diagnosis system will identify the problem and computer stores the codes for the trouble items.

At the same time, the system informs the driver of a malfunction via the "ANTI-LOCK" warning light in the combination meter.

By turning on the ignition switch and disconnecting the check connector, the trouble can be identified by the number of blinks (diagnostic code) of the warning light.

In event of two codes, that having the smallest number (code) will be identified first.

NOTE: The warning light does not show the diagnostic codes while the vehicle is running.

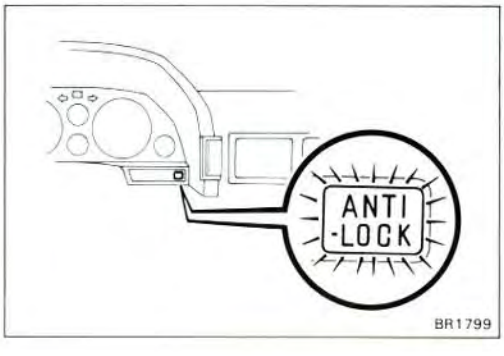
PRIMARY CHECK

CHECK ACTUATOR OPERATION NOISE

(a) Start the engine and drive at a speed over 6 km/h (4 mph).

(b) Check that the actuator operation noise is heard.

NOTE: A primary check is carried out once each time after the engine has been started and initial speed exceeds 6 km/h (4 mph). The respective functions, in order, of the 3 position solenoid and pump motor in the actuator are checked. However, if the brake pedal is depressed, the primary check is not carried out, but is started after the pedal has been released.



INSPECTION OF DIAGNOSIS SYSTEM

1. INSPECT BATTERY VOLTAGE

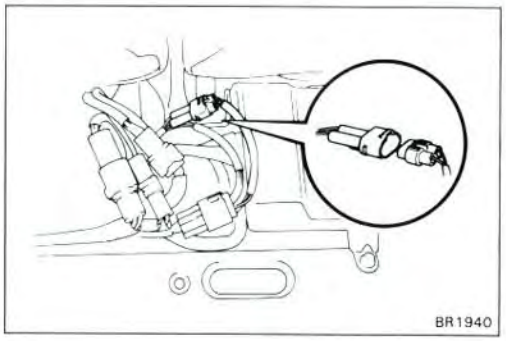
Inspect that the battery voltage is about 12 V.

2. CHECK THAT WARNING LIGHT TURNS ON

(a) Turn the ignition switch on.

(b) Check that the "ANTI-LOCK" warning light turns on for 3 seconds.

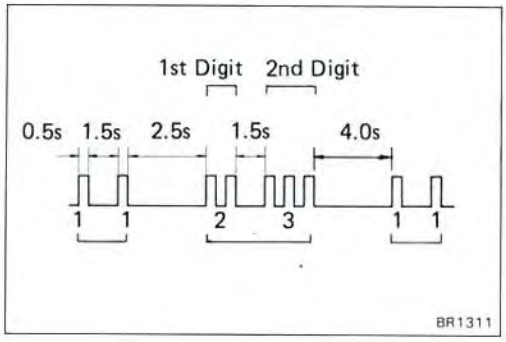
If not, inspect and repair or replace the fuse, bulb and wire harness.



3. READ DIAGNOSTIC CODE

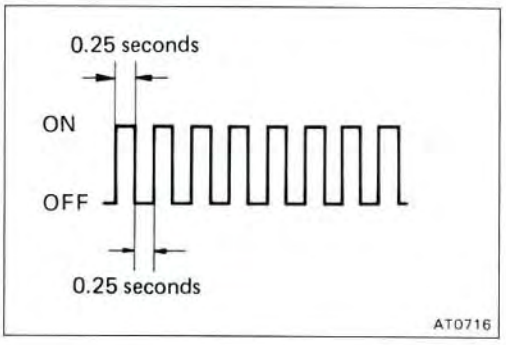
(a) Turn the ignition switch on.

(b) Disconnect the check connector from the actuator.



(c) In event of a malfunction, 4 seconds later the warning light will begin to blink. Read the number of blinks. (See DIAGNOSTIC CODE on page BR-19)

NOTE: The first number of blinks will equal the first digit of a two digit diagnostic code. After a 1.5 second pause, the 2nd number of blinks will equal the 2nd number of a two digit code. If there are two or more codes, there will be a 2.5 second pause between each, and indication will begin after 4.0 second pause from the smaller value and continue in order to larger.

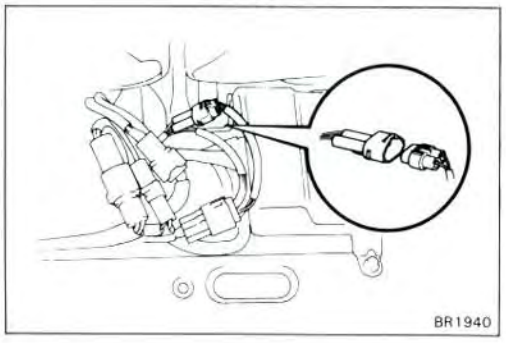


(d) If the system is operating normally (no malfunction), the warning light will blink once every 0.5 seconds.

(e) Repair the system.

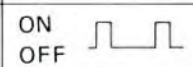
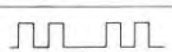
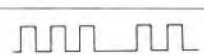
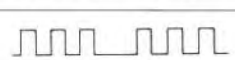
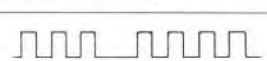
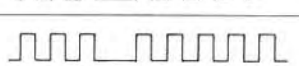
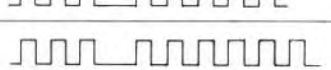
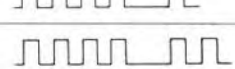
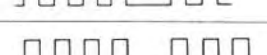
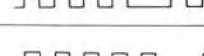
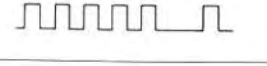
(f) After the malfunctioning components has been repaired, clear the diagnostic codes stored in the computer.
(See page BR-20)

NOTE: If you disconnect the battery cable while repairing, all diagnostic codes in the computer will erased.

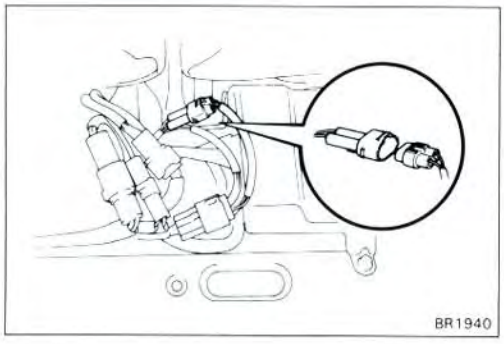


(g) Connect the check connector.

(h) Turn the ignition switch on, and check that the "ANTI-LOCK" warning light goes off after the warning light goes on for 3 seconds.

Code No.	Light Pattern	Diagnosis	Trouble Part
11		Open circuit in solenoid relay circuit	• Actuator inside wire harness • Solenoid relay • Wire harness and connector of solenoid relay circuit
12		Short circuit in solenoid relay circuit	
13		Open circuit in pump motor relay circuit	• Actuator inside wire harness • Pump motor relay • Wire harness and connector of pump motor relay circuit
14		Short circuit in pump motor relay circuit	
21		Open or short circuit in 3 position solenoid of front right wheel	• Actuator solenoid • Wire harness and connector of actuator solenoid circuit
22		Open or short circuit in 3 position solenoid of front left wheel	
23		Open or short circuit in 3 position solenoid of rear right wheel	
24		Open or short circuit in 3 position solenoid of rear left wheel	
31		Front right wheel speed sensor signal malfunction	• Speed sensor • Sensor rotor • Wire harness and connector of speed sensor
32		Front left wheel speed sensor signal malfunction	
33		Rear right wheel speed sensor signal malfunction	
34		Rear left wheel speed sensor signal malfunction	
35		Open circuit in front left or rear right wheel speed sensor	
36		Open circuit in front right or rear left wheel speed sensor	
41		Low battery voltage (9.5 V or lower)	• Battery • Voltage regulator
42		Abnormally high battery voltage (16.2 V or higher)	
43		Malfunction in deceleration sensor	• Deceleration sensor • Deceleration sensor installation • Wire harness and connector of deceleration sensor
44		Open or short circuit in deceleration sensor	
51		Pump motor of actuator locked or open circuit in pump motor circuit in actuator	• Pump motor, relay and battery • Wire harness, connector and ground bolt or actuator pump motor circuit
Always on		Malfunction in computer	• Computer

BR1941



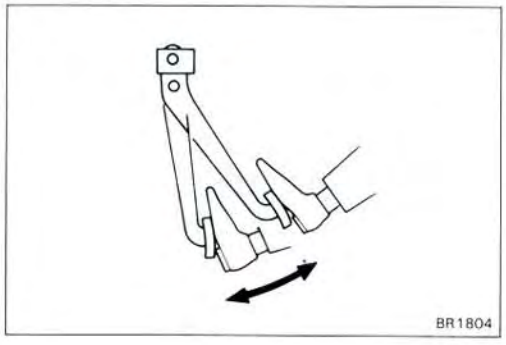
CLEARING OF DIAGNOSTIC CODES

CLEAR DIAGNOSTIC CODES

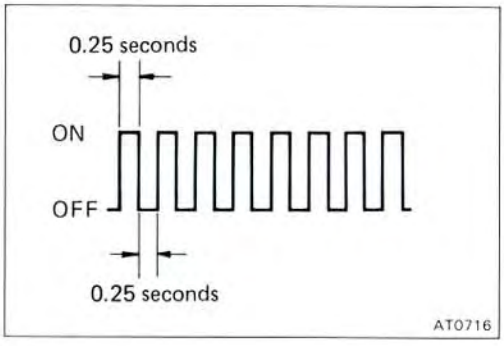
(a) Turn the ignition switch on.

(b) Disconnect the check connector from the actuator.

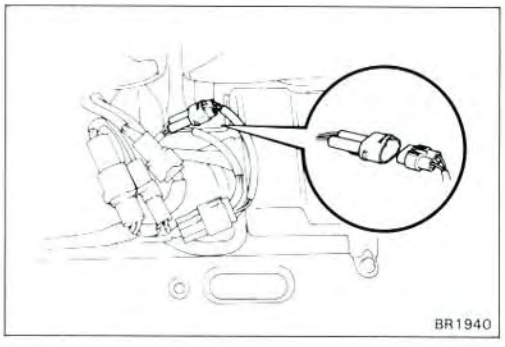
NOTE: Keep the vehicle stopped [vehicle speed 0 km/h (0 mph)].



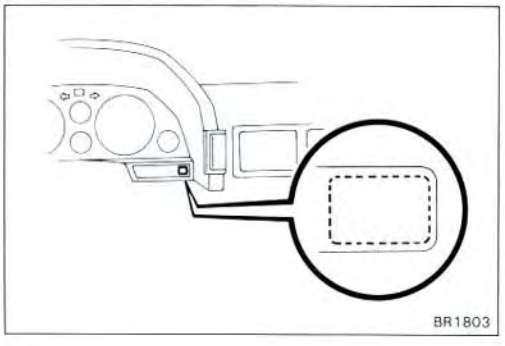
(c) Clear the diagnostic codes stored in computer by depressing the brake pedal 8 or more times within 3 seconds.



(d) Check that the warning light shows the normal code.



(e) Connect the check connector.



(f) Check that the warning light goes off.

Troubleshooting

Problem		No.
"ANTI-LOCK" warning light	Always comes on after ignition switch is turned on.	1
	Does not come on for 3 seconds after ignition switch on.	2
	Comes on and off.	3
	Comes on while running.	1
Brake working	Brakes pull.	4
	Braking inefficient.	4
	A.B.S. operates at ordinary braking.	4
	A.B.S. operates just before stopping at ordinary braking.	4
	Brake pedal pulsates abnormally while A.B.S. is operating.	4
	Skidding noise occurs while A.B.S. working. (A.B.S. works inefficiently)	5

1	"ANTI-LOCK" warning light comes on.

Disconnect check connector.
(See page BR-18)

↓

Does warning light always come on or show the normal code?
(Ignition switch on)

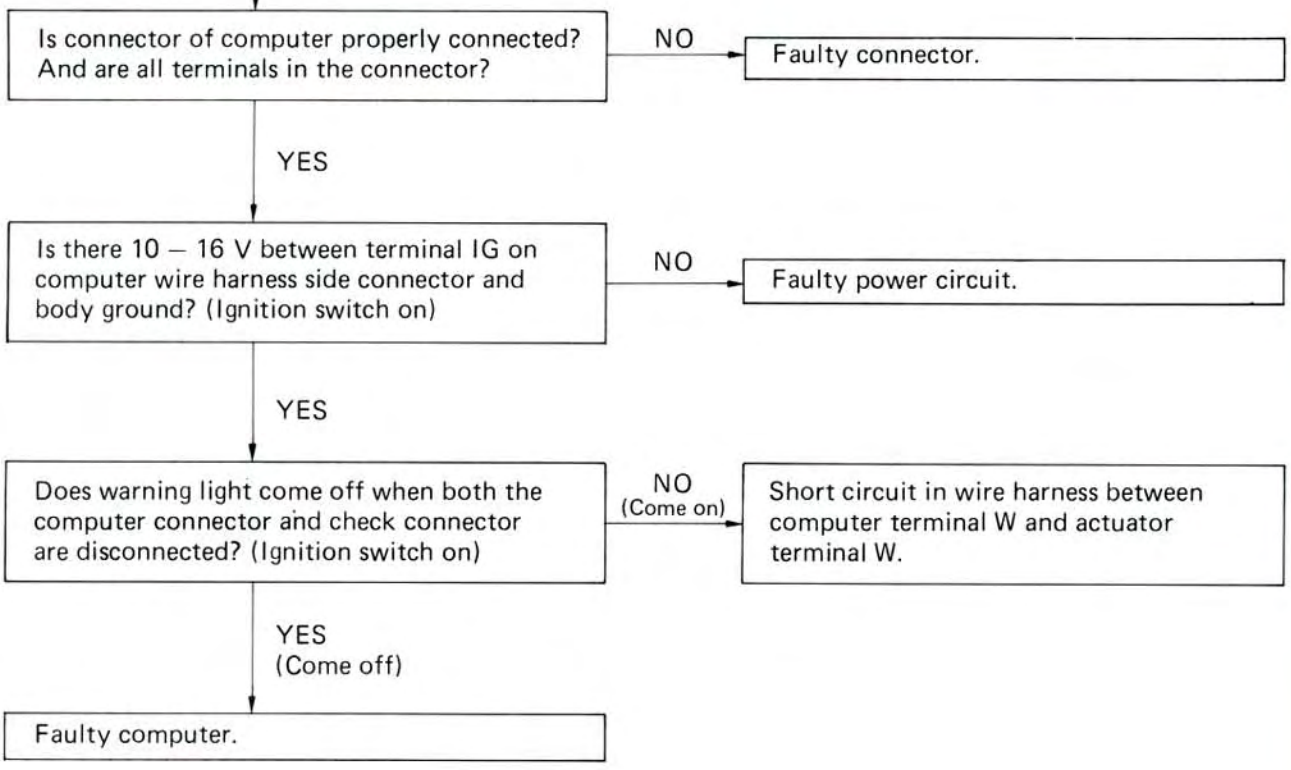
NO → See diagnostic code.
(See page BR-19)

YES

↓

Continued on page BR-22

Continued from page BR-21



2	"ANTI-LOCK" warning light does not come on for 3 seconds after ignition switch on.

Disconnect check connector from actuator, and ground the terminal W of the wire harness side connector.
(Ignition switch on)

↓

Does warning light come on?

NO → Bulb burned out or open circuit in wire harness between warning light and actuator terminal W.

YES ↓

Disconnect connectors from computer and actuator, and ground terminal W of computer wire harness side connector.
(Ignition switch on)

↓

Does warning light come on?

NO → Open circuit in wire harness between computer terminal W and warning light.

YES ↓

With ignition switch off, disconnect actuator connectors, and check continuity between terminal W and AST on actuator side.

↓

Reverse tester leads and check again.
Is there one way continuity between terminals?

NO → Short circuit in actuator inside diode.

YES ↓

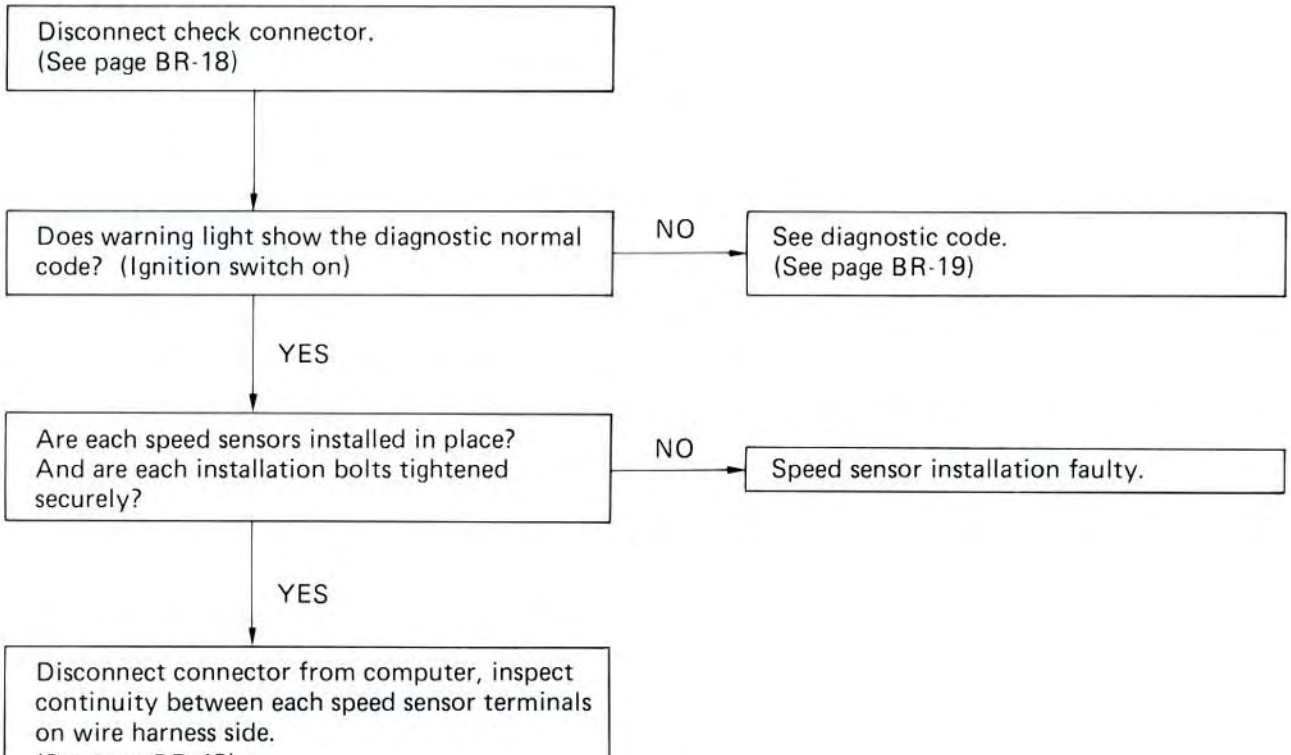
Faulty computer.

NOTE: If the diode is short-circuited, a malfunction at computer terminal W will occur.
When inspecting the terminal, connect the computer connector, and disconnect actuator connectors. Then turn the ignition switch on, and check that the warning light goes on. If it does, the computer terminal is OK.

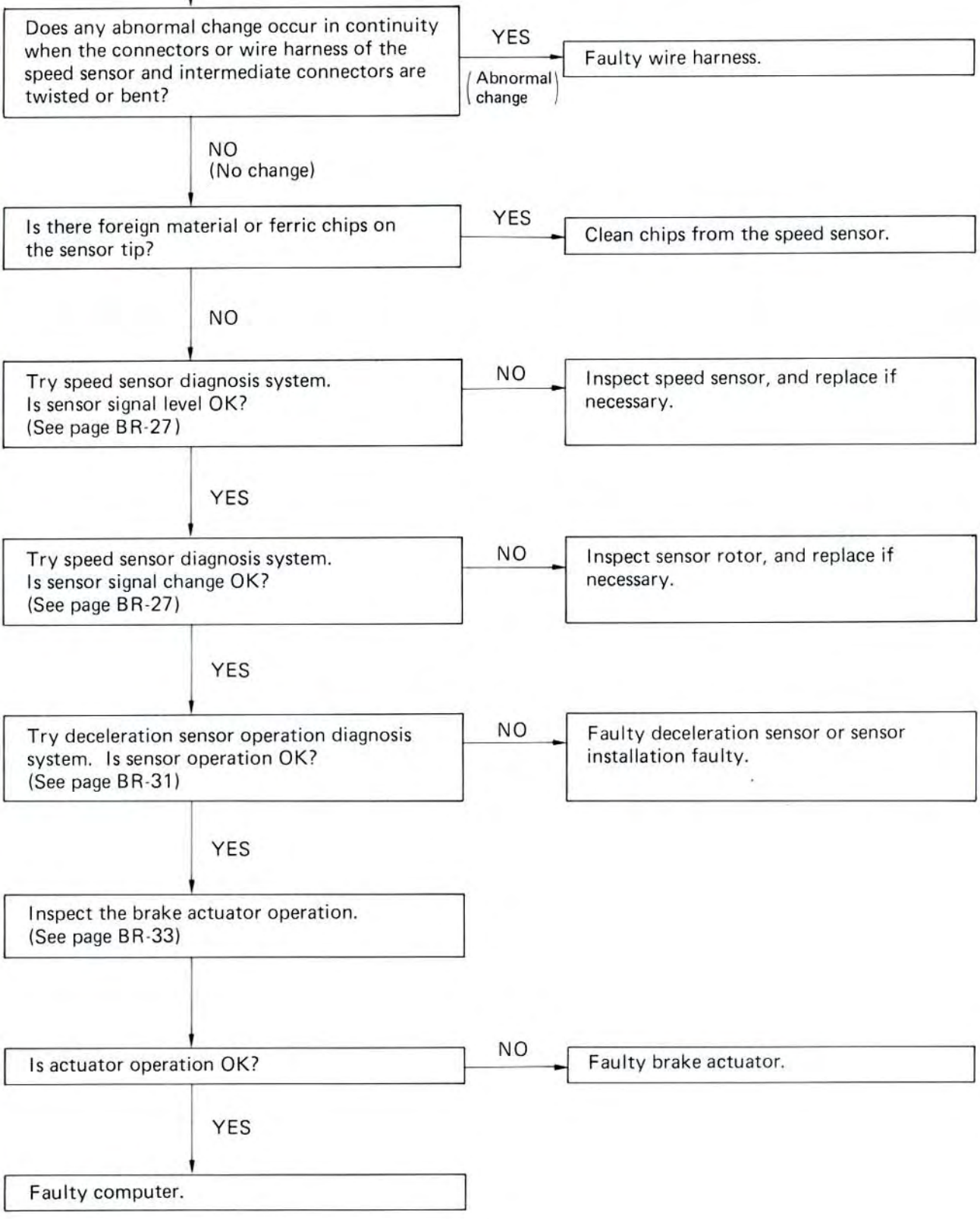
3	"ANTI-LOCK" warning light comes on and off.

- Check connector is disconnected.
- Open circuit in wire harness between computer terminal T and actuator terminal T.
- Actuator terminal GND is improperly connected or open circuit in wire harness between actuator terminal GND and body ground.
- Short circuit in wire harness between computer terminal Ts and Ts connector.

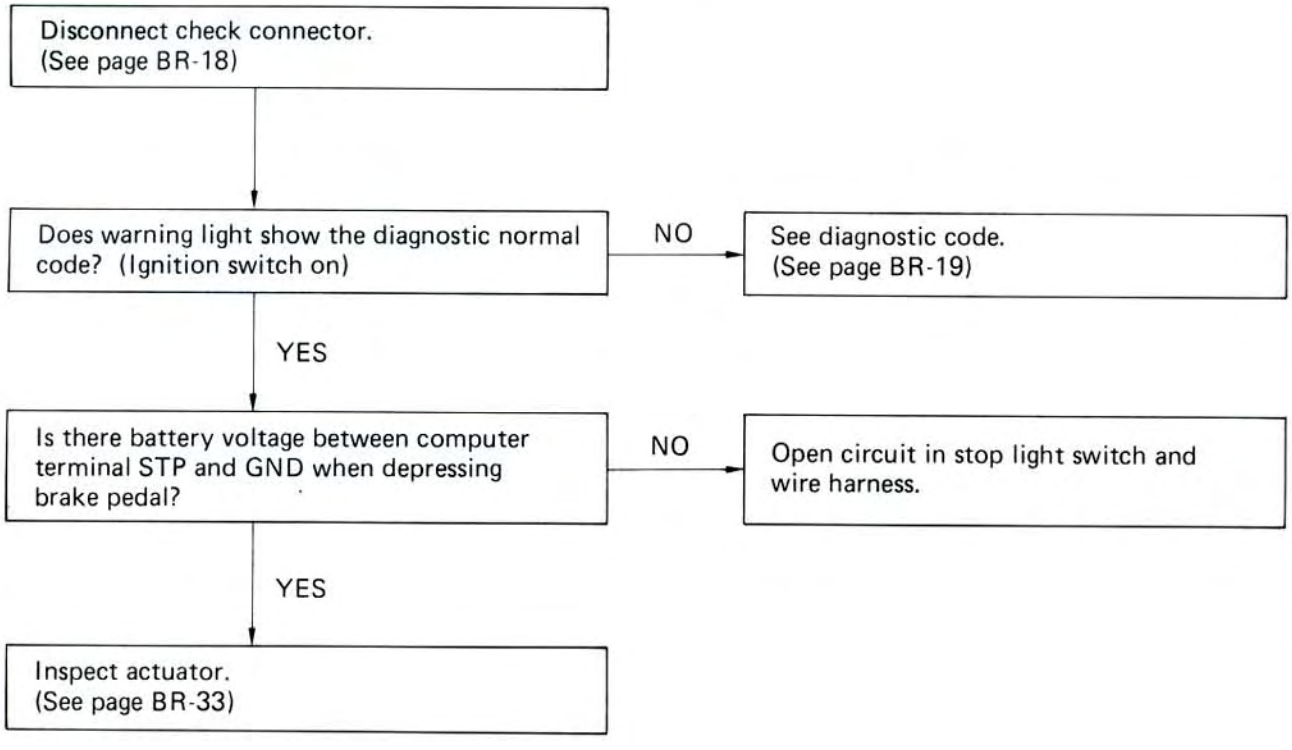
4	• Brakes pull. • Braking inefficient. • A.B.S. operates at ordinary braking. • A.B.S. operates just before stopping at ordinary braking. • Brake pedal pulsates abnormally while A.B.S. working.



Continued from page BR-24



5	Anti-lock brake system works inefficiently.



Speed Sensor Diagnosis System

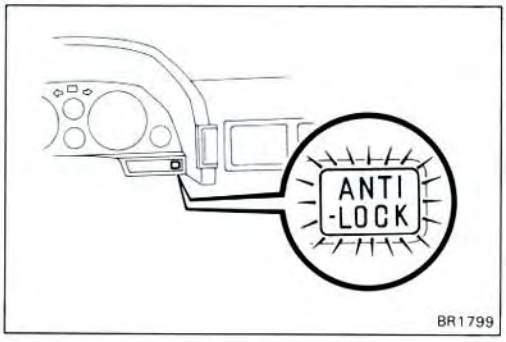
PRECAUTION

While checking the speed sensor diagnosis system, A.B.S. does not work and brake system works as normal brake system.

INSPECTION OF DIAGNOSIS SYSTEM

1. INSPECT BATTERY VOLTAGE

Inspect that the battery voltage is about 12 V.



2. CHECK THAT WARNING LIGHT TURNS ON

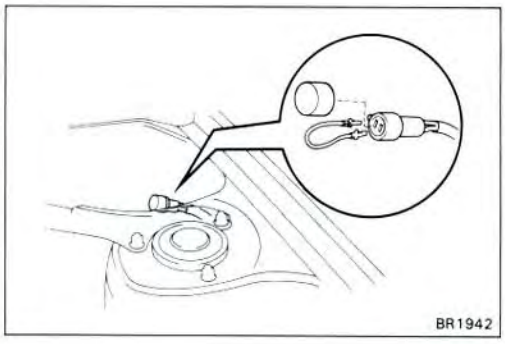
(a) Turn the ignition switch on.

(b) Check that the "ANTI-LOCK" warning light turns on for 3 seconds.

If not, inspect and repair or replace the fuse, bulb and wire harness.

(c) Check that the "ANTI-LOCK" warning light turns off.

(d) Turn the ignition switch off.



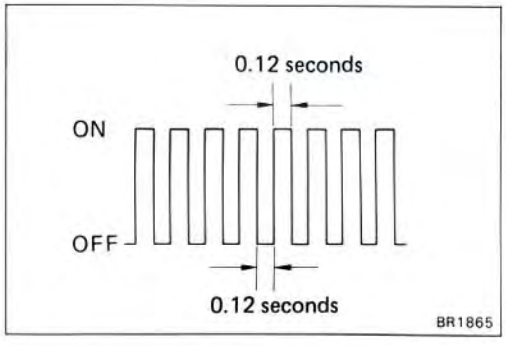
3. PERFORM FOLLOWING STEPS

(a) Remove the rubber cap from the Ts connector located in back of the left side shock absorber protrusion in engine room.

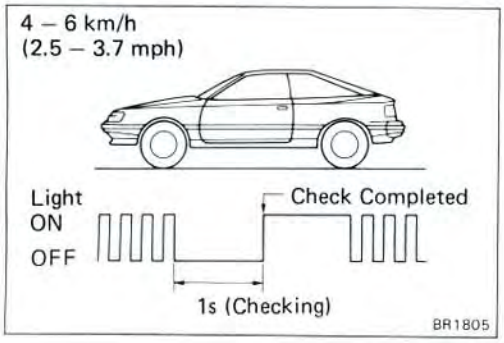
(b) Short the terminals of Ts connector.

(c) Pull the parking brake lever up, and start the engine.

CAUTION: Do not depress the brake pedal.



(d) Check that the warning light blinks about 4 times every 1 second as shown.



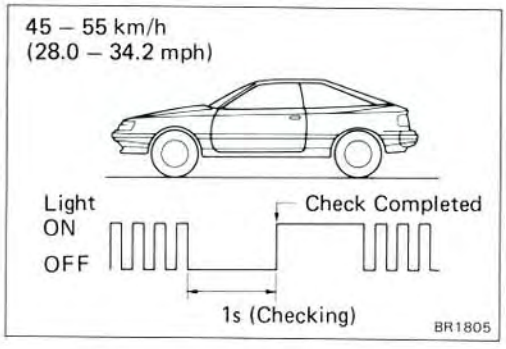
4. INSPECT SENSOR SIGNAL LEVEL

Drive the vehicle straight ahead at about 4 — 6 km/h (2.5 — 3.7 mph), and check that the warning light turns on after a 1 second pause.

If the warning light turns on without blinking when the vehicle speed is not within the specified speed range above, stop the vehicle and read the diagnostic code, and repair the malfunctioning parts.
(See step 6 on this page)

NOTE: If the warning light turns on while the vehicle speed is within specified speed range above, the check is completed. And when the vehicle speed exceeds 6 km/h (3.7 mph), the warning light will blink again. In this condition, speed sensors are OK.

CAUTION: While the warning light is off, do not give any shocks to computer such as acceleration, deceleration, braking, shift change, steering or shocks from the road condition.



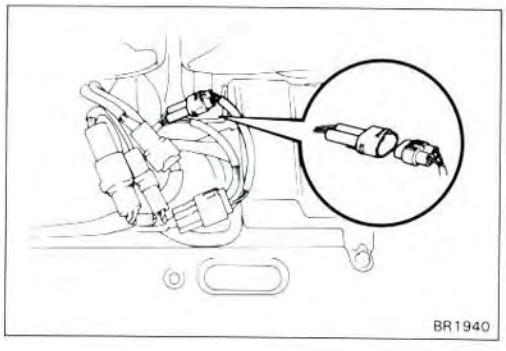
5. INSPECT SENSOR SIGNAL CHANGE

Drive the vehicle straight ahead at about 45 — 55 km/h (28.0 — 34.2 mph), and check that the warning light turns on after a 1 second pause.

If the warning light turns on without blinking when the vehicle speed is not within the specified speed range above, stop the vehicle and read the diagnostic code, and repair the malfunctioning parts.
(See step 6 on this page)

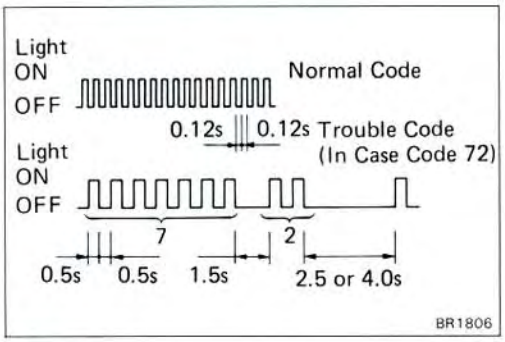
NOTE: If the warning light turns on while the vehicle speed is within specified speed range above, the check is completed. And when the vehicle speed is not within specified speed range, the warning light will blink again. In this condition, sensor rotors are OK.

CAUTION: While the warning light is off, do not give any shocks to computer such as acceleration, deceleration, braking, shift change, steering or shocks from the road condition.



6. READ DIAGNOSTIC CODE

Stop the vehicle and disconnect the check connector, and warning light will begin to blink. Read the number of blinks.
(See DIAGNOSTIC CODE on page BR-30)



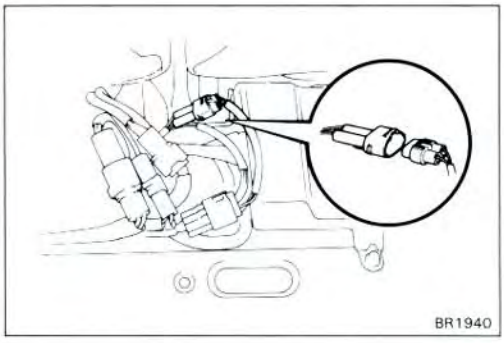
NOTE: The first number of blinks will equal the first digit of a two digit diagnostic code. After a 1.5 second pause, the 2nd number of blinks will equal the 2nd number of a two digit code. If there are two or more codes, there will be a 2.5 second pause between each code, and then indication will begin again after a 4.0 second pause, continuing in order from the smaller value up to the larger one.

7. REPAIR MALFUNCTIONING PARTS

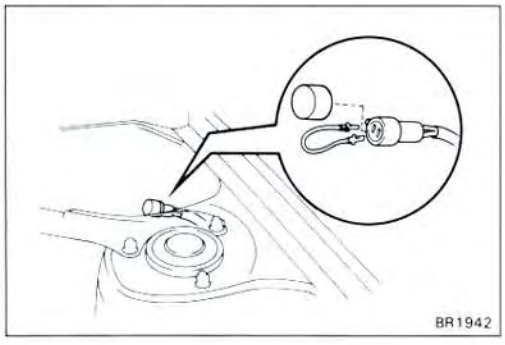
Repair or replace the malfunctioning parts.

8. PERFORM FOLLOWING STEPS

(a) Turn the ignition switch on.



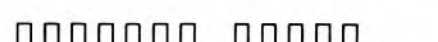
(b) Connect the check connector.



(c) Remove the short pin or wire from the Ts connector and install the rubber cap to it.

(d) Turn the ignition switch off.

DIAGNOSTIC CODE

Code No.	Light Pattern	Diagnosis	Malfunctioning Part
	ON / OFF 	All speed sensors and sensor rotors are normal	
71		Low voltage of front right speed sensor signal	• Front right speed sensor • Sensor installation
72		Low voltage of front left speed sensor signal	• Front left speed sensor • Sensor installation
73		Low voltage of rear right speed sensor signal	• Rear right speed sensor • Sensor installation
74		Low voltage of rear left speed sensor signal	• Rear left speed sensor • Sensor installation
75		Abnormal change of front right speed sensor signal	• Front right sensor rotor
76		Abnormal change of front left speed sensor signal	• Front left sensor rotor
77		Abnormal change of rear right speed sensor signal	• Rear right sensor rotor
78		Abnormal change of rear left speed sensor signal	• Rear left sensor rotor

BR1807

Deceleration Sensor Operation Diagnosis System

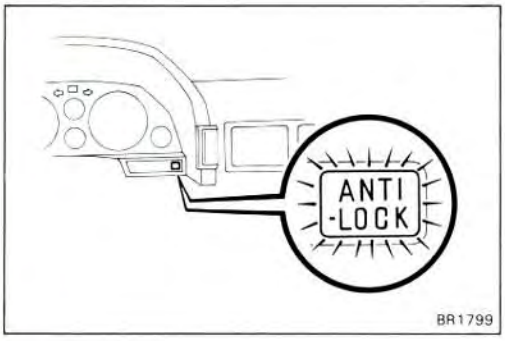
PRECAUTION

While checking the deceleration sensor diagnosis system, A.B.S. does not work and brake system works as normal brake system.

INSPECTION OF DIAGNOSIS SYSTEM

1. INSPECT BATTERY VOLTAGE

Inspect that the battery voltage is about 12 V.



2. CHECK THAT WARNING LIGHT TURNS ON

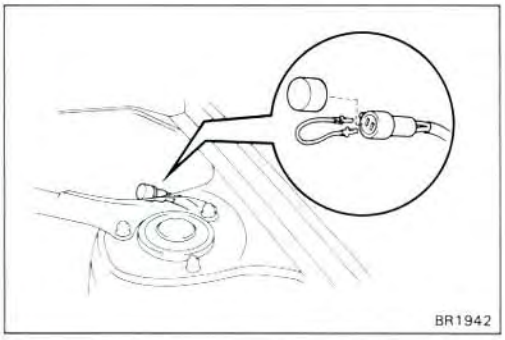
(a) Turn the ignition switch on.

(b) Check that the "ANTI-LOCK" warning light turns on for 3 seconds.

If not, inspect and repair or replace the fuse, bulb and wire harness.

(c) Check that the "ANTI-LOCK" warning light turns off.

(d) Turn the ignition switch off.

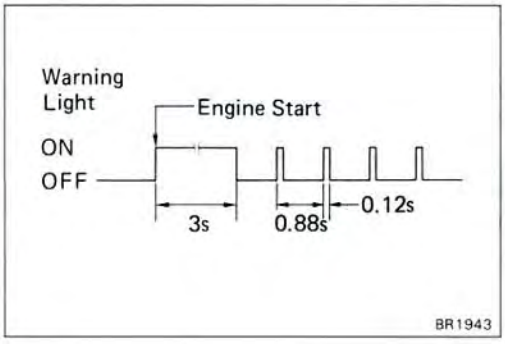


3. PERFORM FOLLOWING STEPS

(a) Remove the rubber cap from the Ts connector located in back of the left side shock absorber protrusion in engine room.

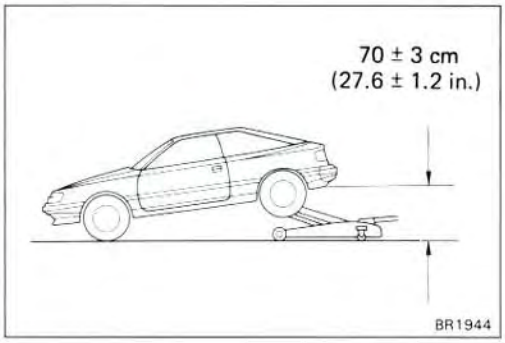
(b) Short the terminals of Ts connector.

(c) Pull the parking brake lever up and depress the brake pedal, and start the engine.



(d) Check that the warning light blinks about 1 time every 1 second as shown.

If the warning light does not blink, inspect the parking brake switch, stop light switch, Ts connector, deceleration sensor installation and computer.



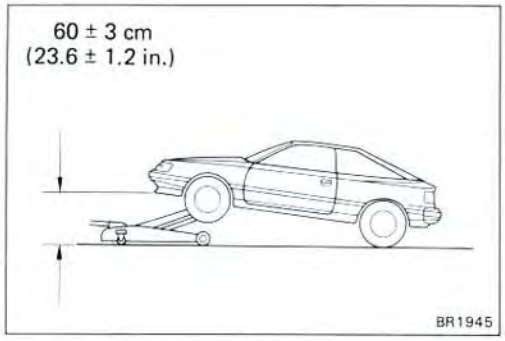
4. INSPECT SENSOR DETECTION POINT

(a) Jack up the rear side of the vehicle slowly as shown.

NOTE: When measuring the height, measure at the center of the lower body of the vehicle.

(b) Check that the warning light does not turn on.

(c) Jack down the vehicle and check that the warning light blinking.



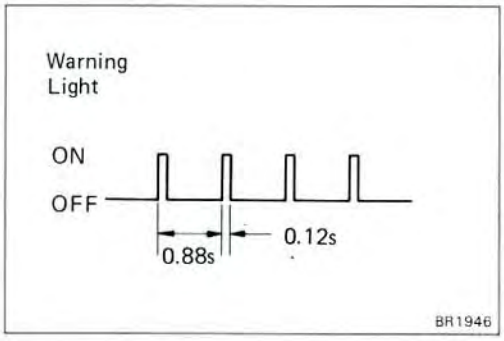
(d) Jack up the front side of the vehicle slowly as shown.

NOTE: When measuring the height, measure at the center of the lower body of the vehicle.

(e) Check that the warning light does not turn on.

(f) Jack down the vehicle and check that the warning light blinking.

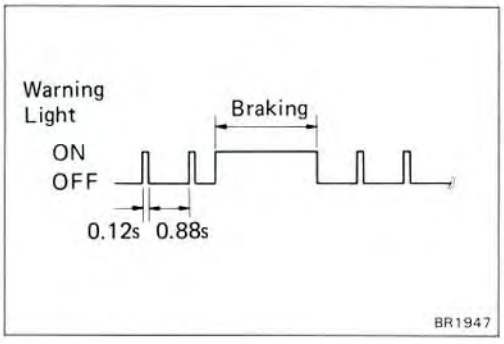
If the warning light turns on, inspect the deceleration sensor installation. And if the sensor installation is OK, replace the deceleration sensor.



5. INSPECT SENSOR OPERATION

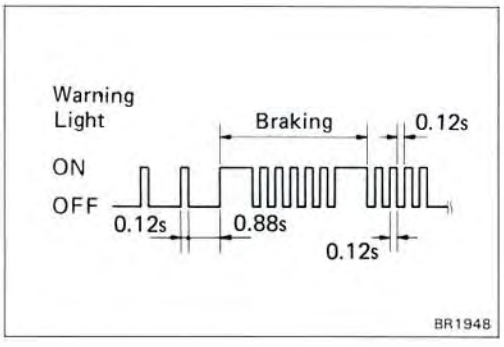
(a) Drive the vehicle straight ahead at about 10 km/h (6.2 mph) or more, lightly depress the brake pedal.

(b) Check that there is no change in the warning light light pattern.



(c) Drive the vehicle straight ahead at about 20 km/h (12.4 mph) or more, depress the brake pedal a little strong.

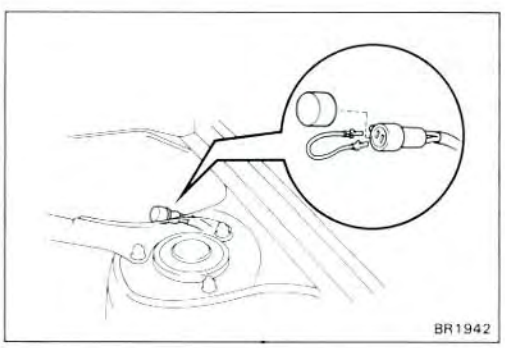
(d) Check that the warning light turns on while braking.



(e) Drive the vehicle straight ahead at about 20 km/h (12.4 mph) or more, depress the brake pedal strongly.

(f) Check that the warning light light pattern changes after braking as shown.

If the operation is not as specified, inspect the deceleration sensor installation. And if the sensor installation is OK, replace the deceleration sensor.



6. REMOVE SHORT PIN

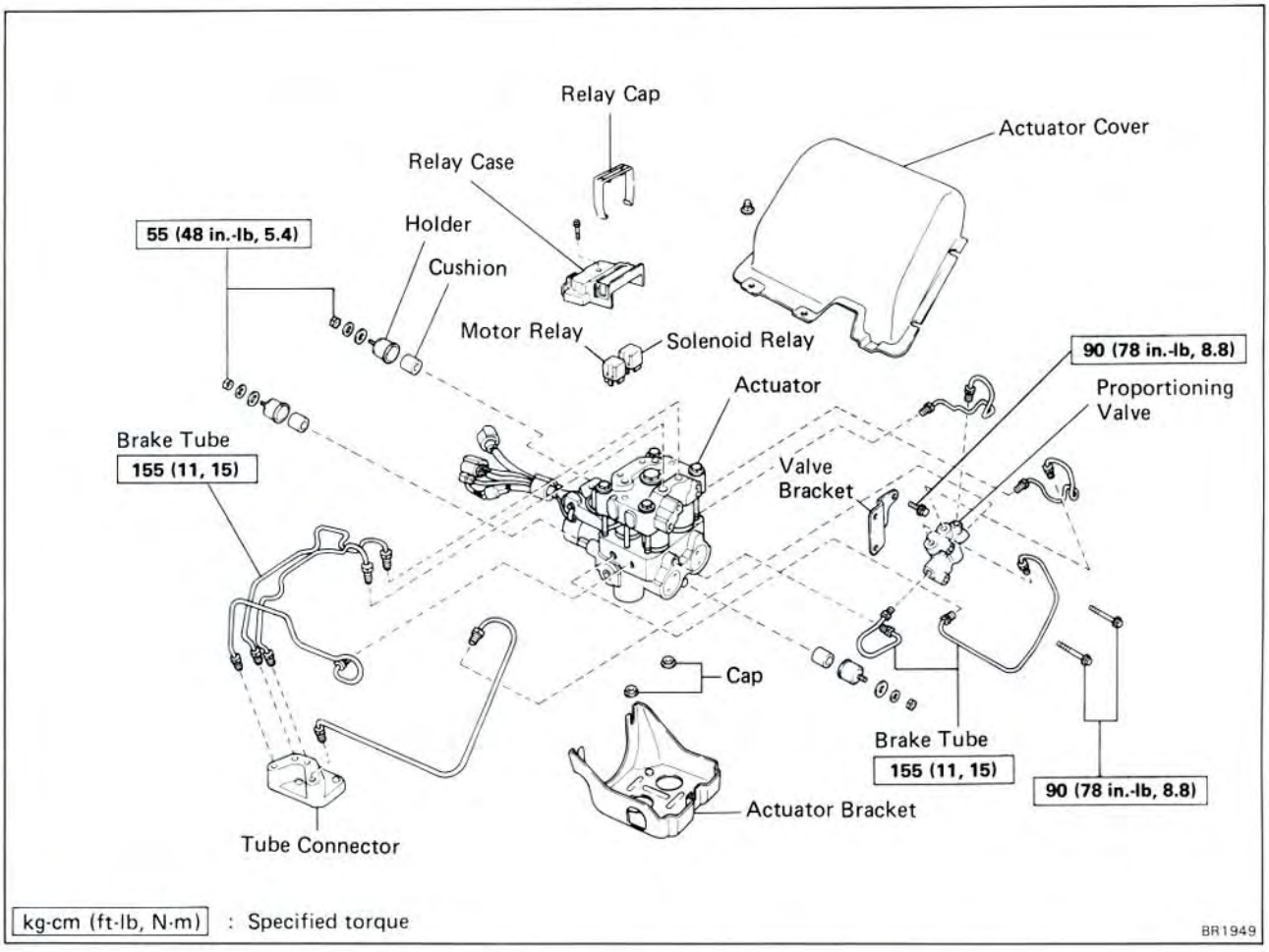
(a) Stop the engine.

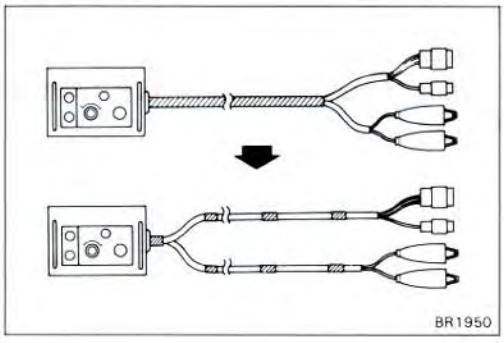
(b) Remove the short pin or wire from the Ts connector.

(c) Install the rubber cap to the Ts connector.

Brake Actuator

COMPONENTS





PREPARATION FOR INSPECTION

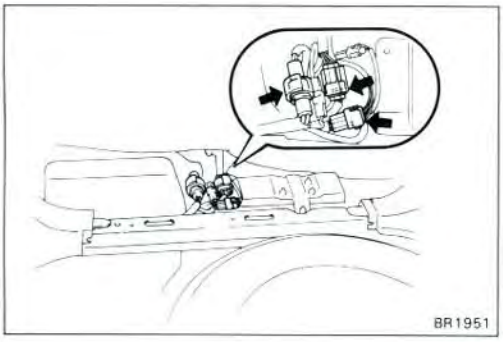
Before inspecting actuator, tear off the the vinyl tube which wrapped the wire harness of the actuator checker (SST). And then divide the clip mounted wire harnesses from the connector mounted wire harnesses, and wrap the tape at several points for each wire harness as shown.

SST 09990-00150

INSPECTION OF BRAKE ACTUATOR OPERATION

1. **INSPECT BATTERY VOLTAGE**

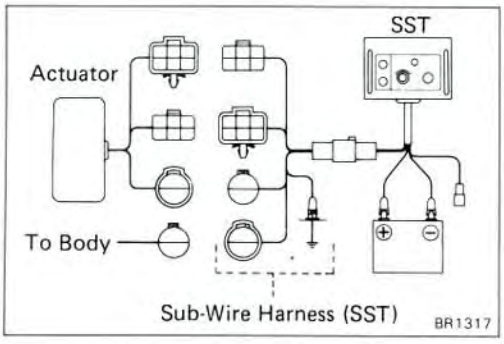
   Battery voltage: 10 — 14.5 V



2. DISCONNECT CONNECTORS FROM ACTUATOR

(a) Remove the three clips and turn over the luggage compartment mat.

(b) Disconnect the three connectors from the actuator as shown.



3. CONNECT ACTUATOR CHECKER (SST) TO ACTUATOR

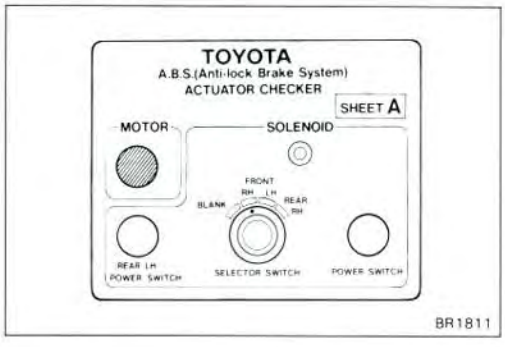
(a) Connect the actuator checker (SST) to the actuator and body side wire harness through the sub-wire harness (SST) as shown.

SST 09990-00150

(b) Connect the red cable of the checker to the battery positive (+) terminal and black to the negative (−) terminal. Connect the black cable of the sub-wire harness to the battery negative (−) terminal or body ground.

(c) Place the "SHEET A" (SST) on the actuator checker.

SST 09990-00163



4. INSPECT BRAKE ACTUATOR OPERATION

(a) Start the engine, and run it at idle.

(b) Turn the selector switch of the actuator checker to "FRONT RH" position.

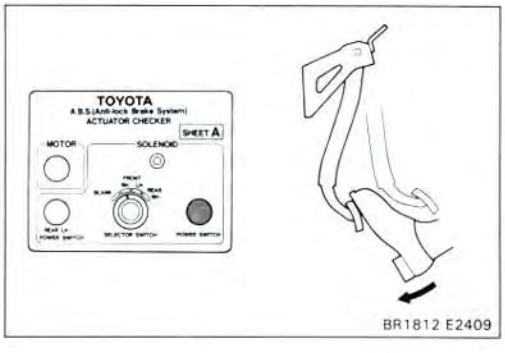
(c) Push and hold in the MOTOR switch for a few seconds.

(d) Depress the brake pedal and hold it until the step (g) is completed.

(e) Push the POWER SWITCH, and check that the brake pedal does not go down.

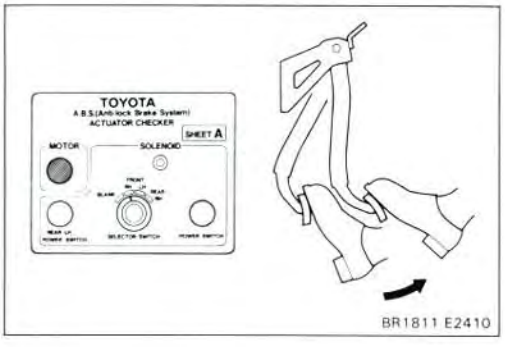
CAUTION: Do not keep the POWER SWITCH pushing more than 10 seconds.

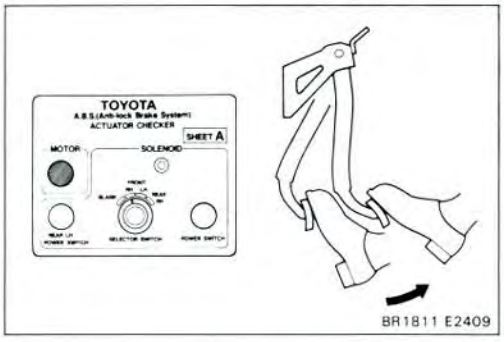
(f) Release the switch, and check that the pedal go down.



(g) Push and hold in the MOTOR switch for a few seconds, and check that the pedal returns.

(h) Release the brake pedal.

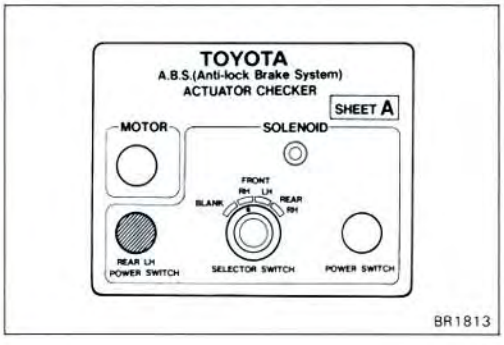




BR1811 E2409

(i) Push and hold in the MOTOR switch for a few seconds.

(j) Depress the brake pedal and hold it for about 15 seconds. As you hold the pedal down, push the MOTOR switch for a few seconds. Check that the brake pedal does not pulsate.



BR1813

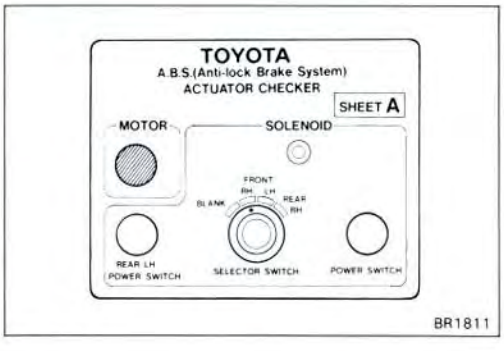
5. INSPECT FOR OTHER WHEELS

(a) Turn the selector switch to "FRONT LH" position.

(b) Repeating (c) to (j) of the step 4, check the actuator operation similarly.

(c) Similarly, inspect "REAR RH" and "REAR LH" position.

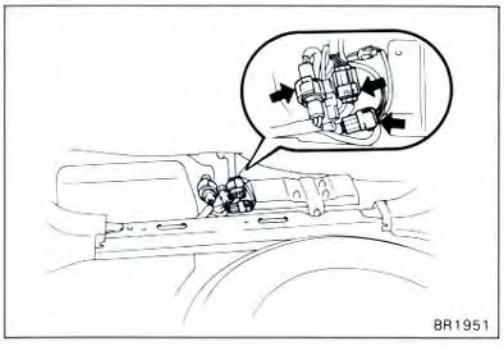
NOTE: When inspecting "REAR LH" position, push the REAR LH switch instead of the POWER SWITCH, and you can inspect anywhere the selector switch position is.



BR1811

6. PUSH SUB MOTOR SWITCH

Push and hold in the MOTOR switch for a few seconds.


BR1951

7. DISCONNECT ACTUATOR CHECKER (SST) FROM ACTUATOR

(a) Remove the "SHEET A" (SST) and disconnect the actuator checker (SST) and sub-wire harness (SST) from the actuator.

SST 09990-00150 and 09990-00163

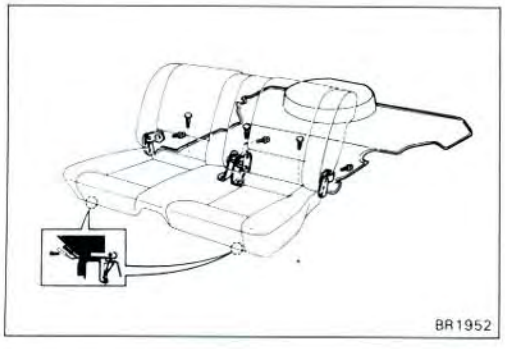
(b) Connect the actuator connectors.

(c) Clear the diagnostic codes.
(See page BR-20)

REMOVAL OF BRAKE ACTUATOR

1. **TAKE OUT FLUID WITH SYRINGE OR AN EQUIVALENT**

CAUTION: Do not let brake fluid remain on a painted surface. Wash off it immediately.

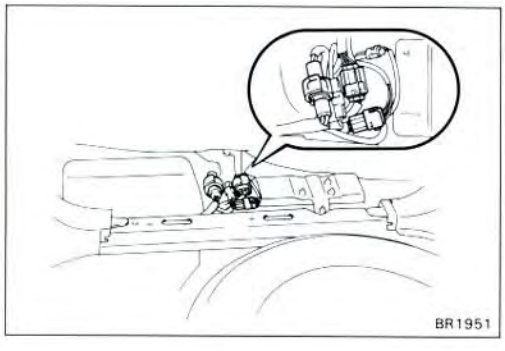


2. **REMOVE REAR SEAT CUSHION AND SEAT BACKS**

(a) Remove the rear seat cushion.

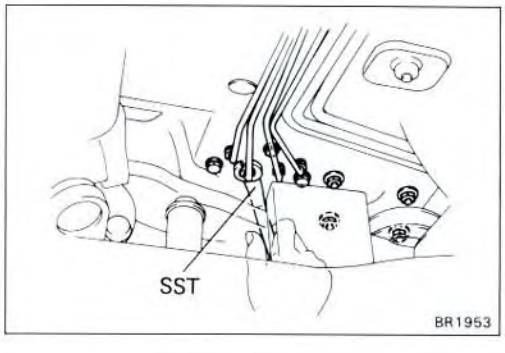
(b) Remove the three clips holding luggage compartment mat to the body.

(c) Remove the six bolts and remove the seat backs with luggage compartment cover.



3. **DISCONNECT ACTUATOR CONNECTORS**

Disconnect the four connectors from the actuator.

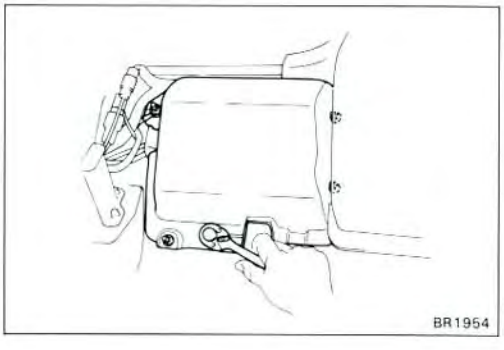


4. **REMOVE ACTUATOR**

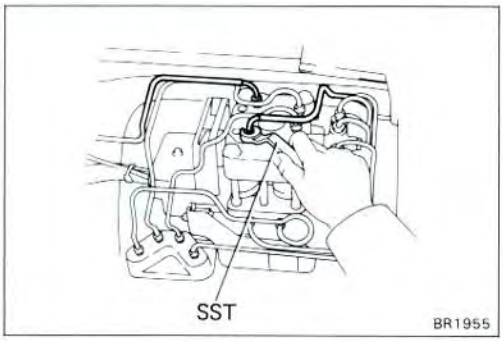
(a) Lift up the vehicle, and using SST, disconnect the four brake tubes from the tube connector.

SST 09751-36011

(b) Remove the three bolts and four nuts.



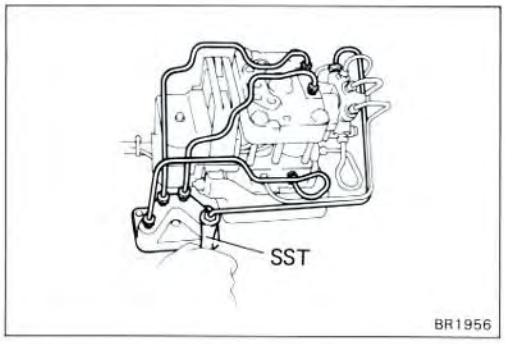
(c) Remove the five nuts, remove the actuator cover and rubber seat.



(d) Using SST, disconnect the two brake tubes from the actuator as shown.

SST 09751-36011

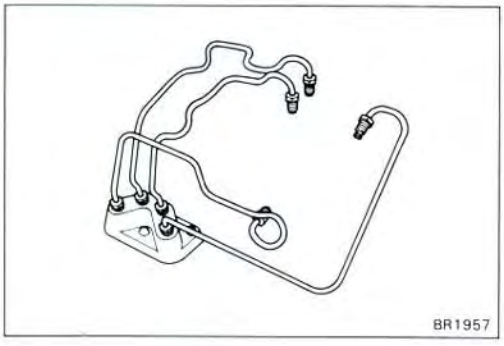
(e) Remove the actuator with bracket.



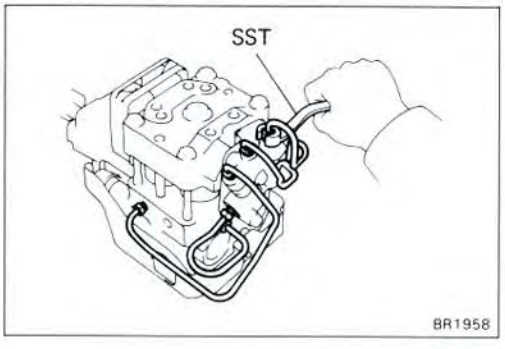
5. REMOVE BRAKE TUBES

(a) Using SST, remove the four brake tubes connecting to the tube connector and remove the tube connector.

SST 09751-36011

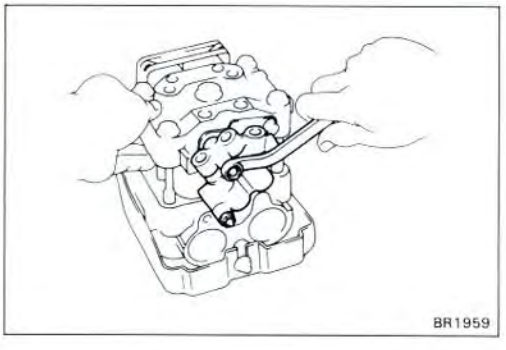


(b) Temporarily install the removed tubes to the tube connector.



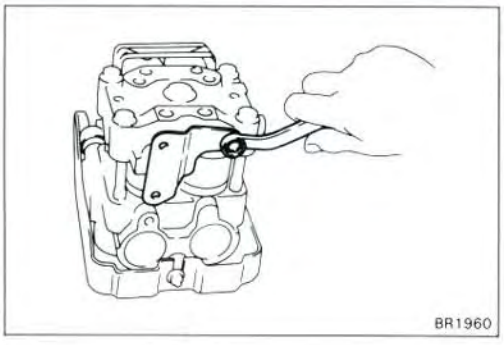
(c) Using SST, remove the four brake tubes from the actuator.

SST 09751-36011

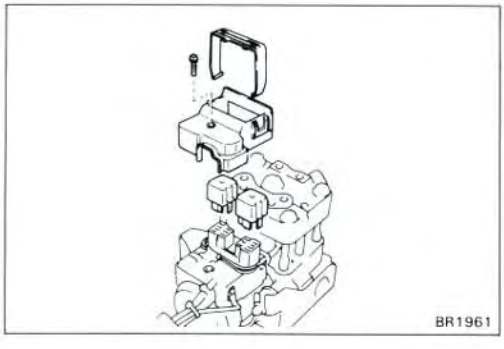


6. REMOVE PROPORTIONING VALVE

(a) Remove the two bolt and remove the proportioning valve from the actuator.



(b) Remove the bolt and remove the valve bracket.

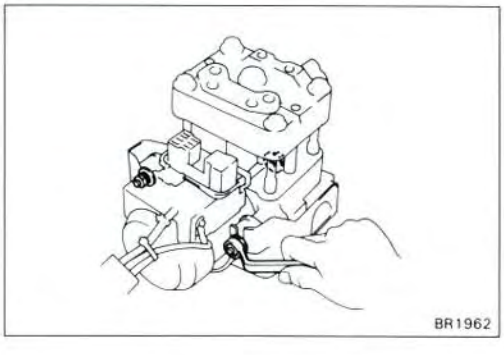


7. REMOVE CONTROL RELAYS

(a) Remove the screw and remove the relay case with relay cap.

(b) Remove the relay cap from the relay case.

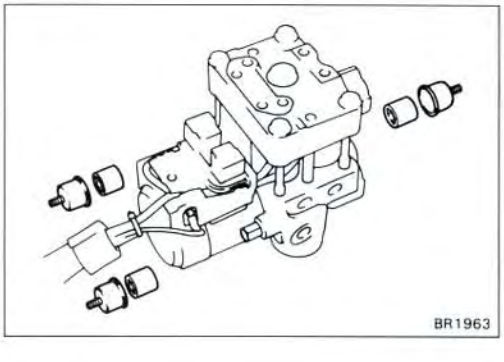
(c) Remove the two control relays from the actuator.



8. REMOVE ACTUATOR BRACKET

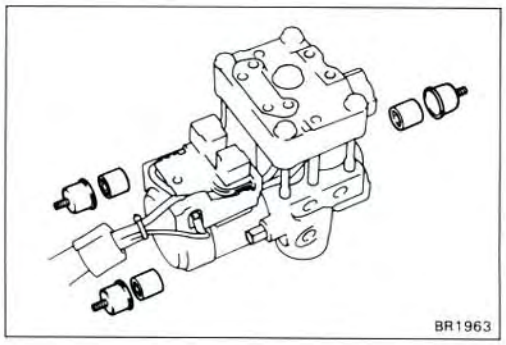
(a) Remove the three nuts, wave washers and washers.

(b) Remove the actuator from the actuator bracket.



9. REMOVE THREE HOLDERS AND CUSHIONS

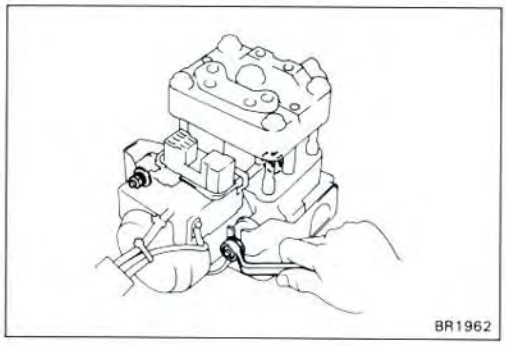
Remove the three holders and cushions.



INSTALLATION OF BRAKE ACTUATOR

1. INSTALL THREE CUSHIONS AND HOLDERS

Install the three cushions to holders and install them to the actuator.



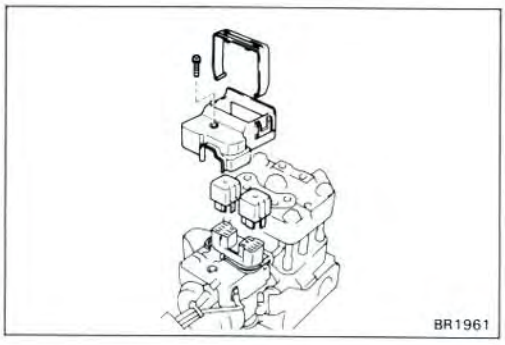
2. INSTALL ACTUATOR BRACKET

(a) Install the actuator to the actuator bracket in place.

(b) Install the washers, wave washers and nuts.

(c) Tighten the three nuts.

Torque: 55 kg-cm (48 in.-lb, 5.4 N·m)

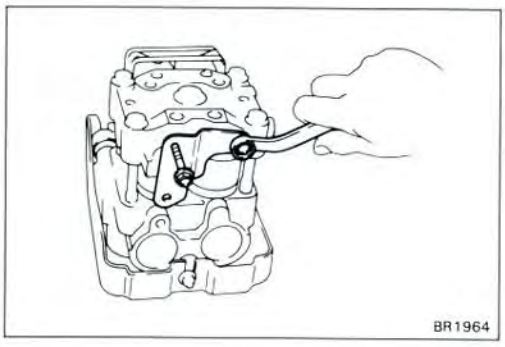


3. INSTALL CONTROL RELAYS

(a) Install the two control relays in position.

(b) Install the relay case and tighten the screw.

(c) Install the relay cap onto the control relays.

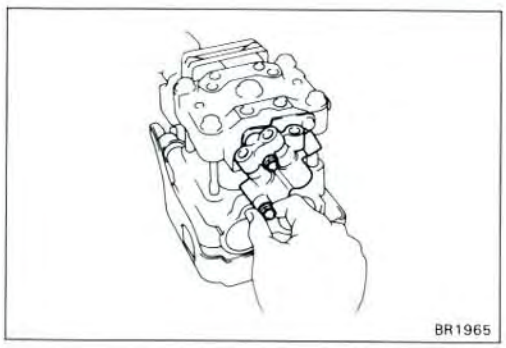


4. INSTALL PROPORTIONING VALVE

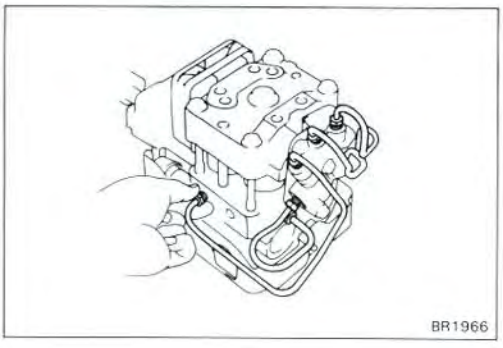
(a) Using a proportioning valve installation bolt, install the valve bracket in place and tighten the bolt.

Torque: 90 kg-cm (78 in.-lb, 8.8 N·m)

(b) Remove the proportioning valve installation bolt.

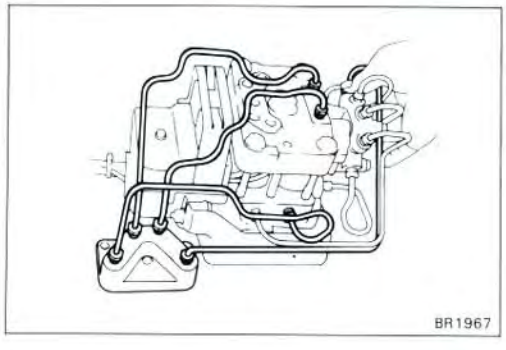


(c) Temporarily install the proportioning valve.

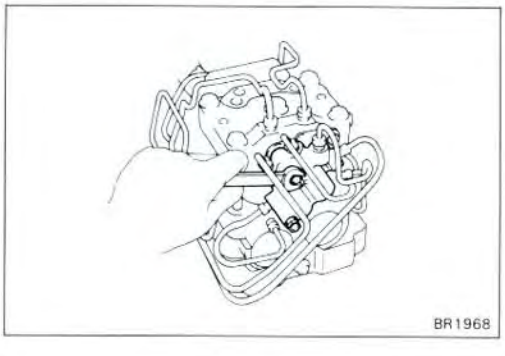


5. INSTALL BRAKE TUBES

(a) Temporarily install the four brake tubes as shown.

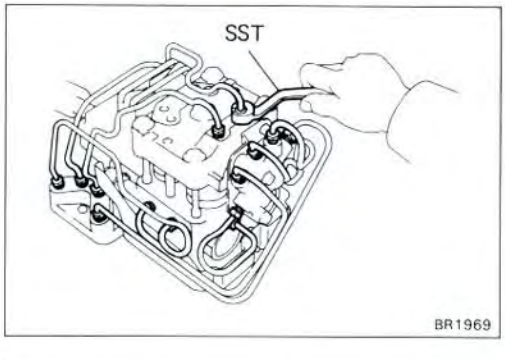


(b) Remove the four brake tubes from the tube connector and temporarily install them to the actuator. And temporarily install the tube connector.



(c) Tighten the two proportioning valve installation bolts.

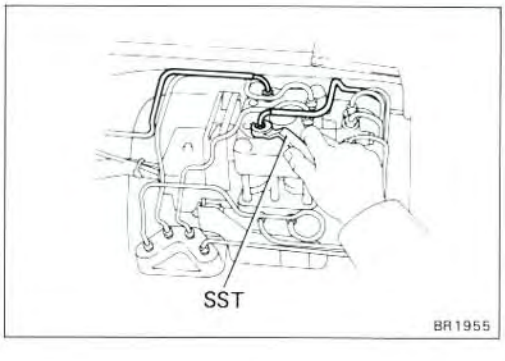
Torque: 90 kg-cm (78 in.-lb, 8.8 N·m)



(d) Using SST, tighten the eight brake tubes.

SST 09751-36011

Torque: 155 kg-cm (11 ft-lb, 15 N·m)



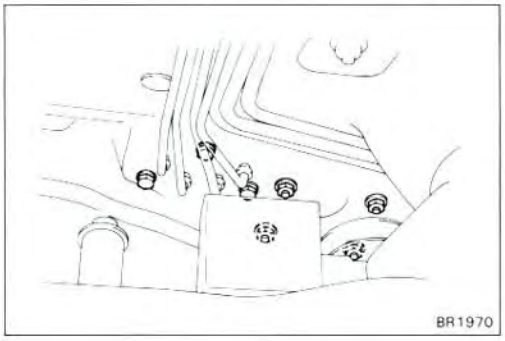
6. INSTALL ACTUATOR

(a) Install the actuator in place.

(b) Using SST, connect the two brake tubes to the actuator.

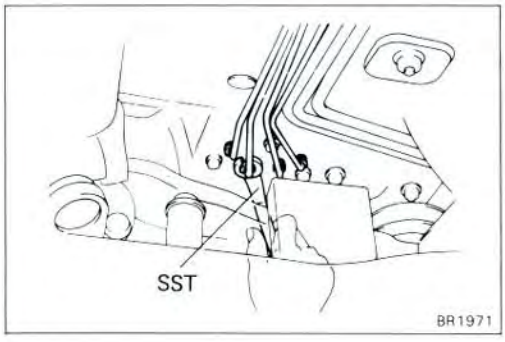
SST 09751-36011

Torque: 155 kg-cm (11 ft-lb, 15 N·m)



(c) Lift up the vehicle, install and tighten the three bolts and four nuts from the lower side of the vehicle.

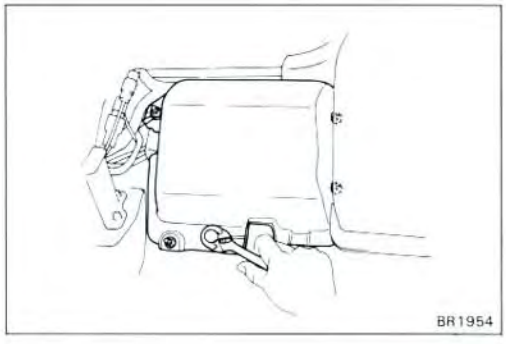
Torque: Bolt (Tube connector)
80 kg-cm (69 in.-lb, 7.8 N·m)
Nut (Actuator bracket)
130 kg-cm (9 ft-lb, 13 N·m)



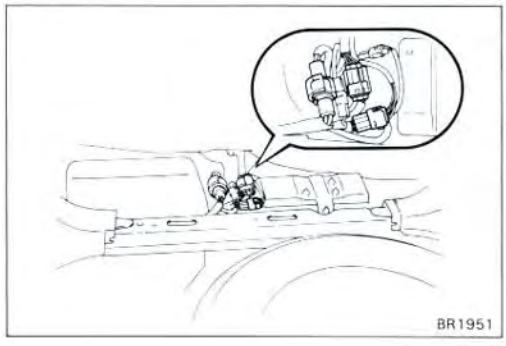
(d) Using SST, connect the four brake tubes to the tube connector.

SST 09751-36011

Torque: 260 kg-cm (19 ft-lb, 25 N·m)

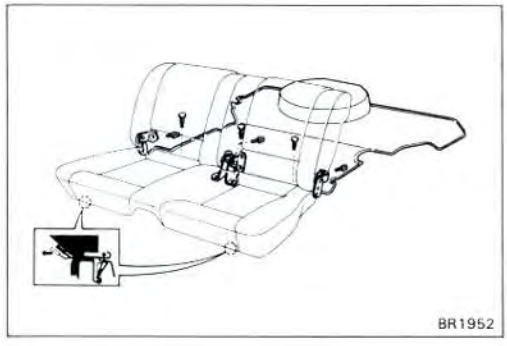


(e) Install the actuator cover and rubber seat in place, and tighten the five nuts.



7. CONNECT ACTUATOR CONNECTORS

Connect the four connectors to the actuator.



8. INSTALL REAR SEAT BACKS AND SEAT CUSHION

(a) Install the seat backs with the six bolts.

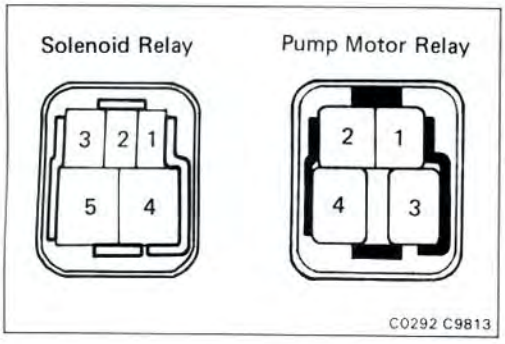
(b) Install the three clips.

(c) Install the seat cushion.

9. FILL BRAKE RESERVOIR WITH BRAKE FLUID AND BLEED BRAKE SYSTEM

10. CHECK FOR FLUID LEAKAGE

11. CHECK ACTUATOR OPERATION
(See page BR-33)

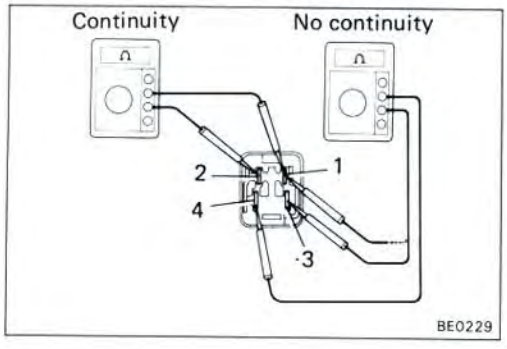


Control Relays

INSPECTION OF CONTROL RELAYS

1. REMOVE CONTROL RELAYS

Remove the two control relays from the actuator.



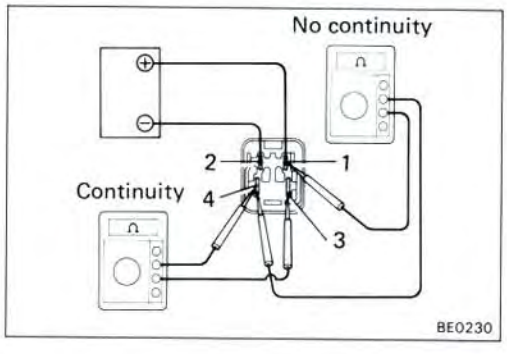
2. INSPECT PUMP MOTOR RELAY CONTINUITY

(a) Check that there is continuity between terminals 1 and 2.

(b) Check that there is no continuity between terminals 3 and 4.

(c) Check that there is no continuity between terminals 1 and 4.

If continuity is not as specified, replace the relay.



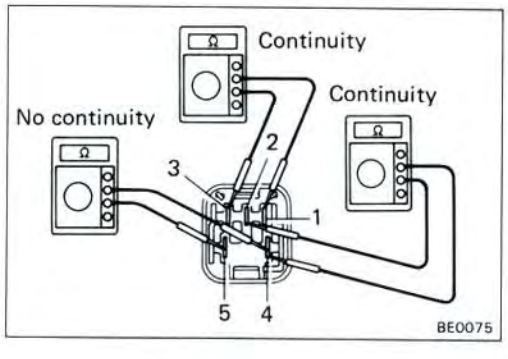
3. INSPECT PUMP MOTOR RELAY OPERATION

(a) Apply battery voltage to terminals 1 and 2.

(b) Check that there is continuity between terminals 3 and 4.

(c) Check that there is no continuity between terminals 1 and 4.

If operation is not as specified, replace the relay.



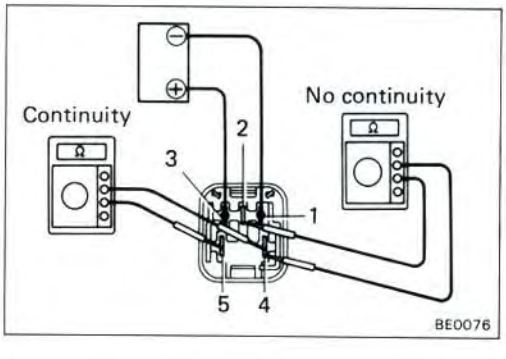
4. INSPECT SOLENOID RELAY CONTINUITY

(a) Check that there is continuity between terminals 1 and 3.

(b) Check that there is continuity between terminals 2 and 4.

(c) Check that there is no continuity between terminals 4 and 5.

If continuity is not as specified, replace the relay.



5. INSPECT SOLENOID RELAY OPERATION

(a) Apply battery voltage to terminals 1 and 3.

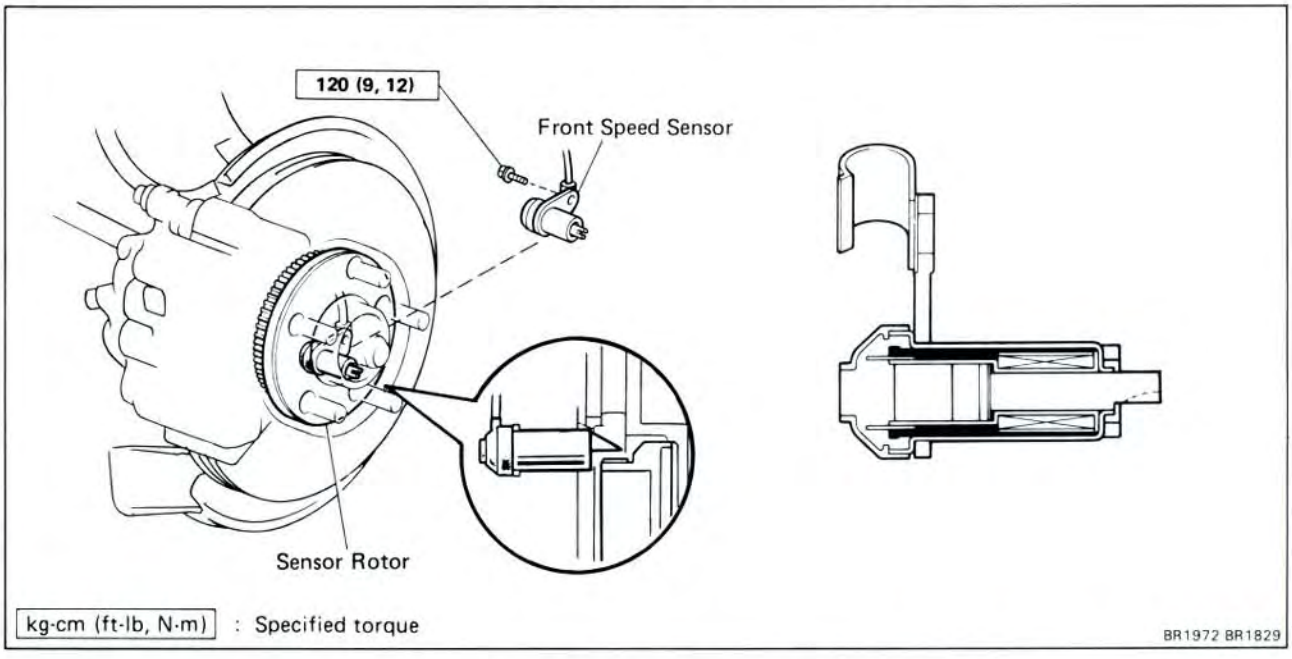
(b) Check that there is continuity between terminals 4 and 5.

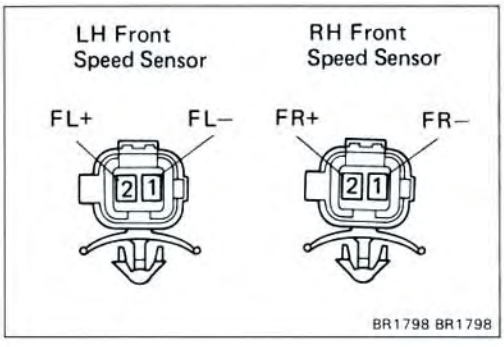
(c) Check that there is no continuity between terminals 2 and 4.

If operation is not as specified, replace the relay.

6. INSTALL TWO CONTROL RELAYS

Front Speed Sensor





INSPECTION OF FRONT SPEED SENSOR

1. **INSPECT SPEED SENSOR**

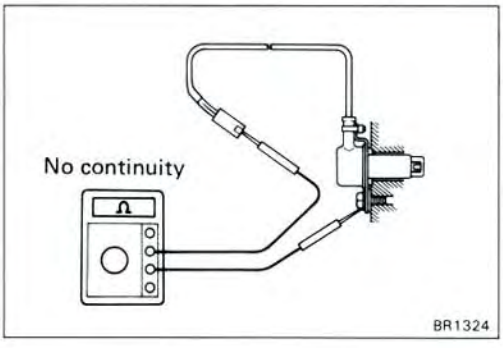
(a) Remove the screw and bolt from the pipe clamp of the wire harness.

(b) Disconnect the speed sensor connector.

(c) Measure the resistance between terminals.

Resistance: 0.85 — 1.30 kΩ

If resistance value is not as specified, replace the sensor.

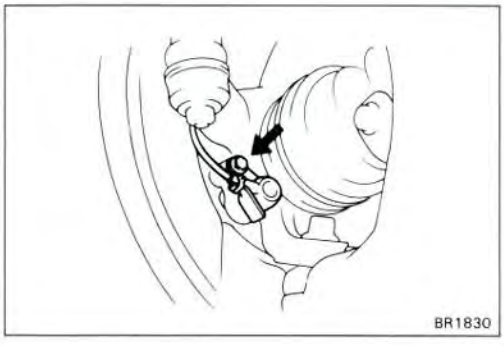


(d) Check that there is no continuity between each terminal and sensor body.

If there is continuity, replace the sensor.

(e) Connect the speed sensor connector.

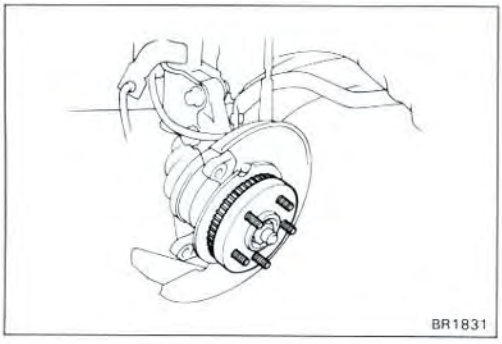
(f) Install the screw and bolt of the pipe clamp.

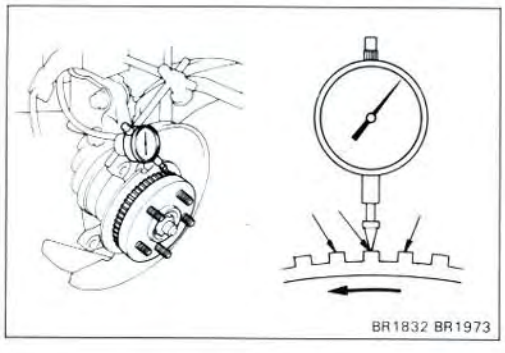


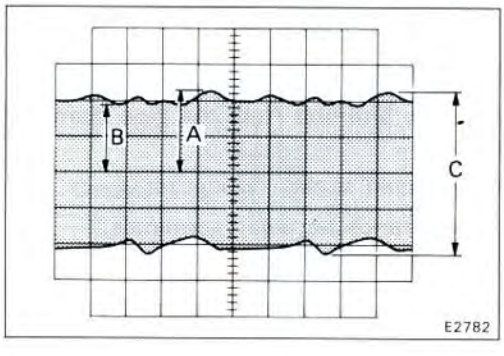
2. **INSPECT SENSOR INSTALLATION**

Check that the sensor installation bolt is tightened properly. If not, tighten the bolt.

Torque: 120 kg-cm (9 ft-lb, 12 N·m)


BR1831


BR1832 BR1973



E2782

3. **VISUALLY INSPECT SENSOR ROTOR SERRATIONS**

(a) Remove the two bolts and remove the torque plate with brake cylinder.

(b) Remove the rotor disc.

(c) Inspect the sensor rotor serrations for scratches, cracks, warping or missing teeth.

(d) Install the rotor disc and brake cylinder assembly with two bolts.

Torque: 1,015 kg-cm (73 ft-lb, 100 N·m)

CAUTION: To prevent damage to the serrations, do not strike the axle hub.

4. **INSPECT SENSOR ROTOR RUNOUT**

Measure the sensor rotor runout at 2 mm (0.08 in.) from the serration edge.

Maximum sensor rotor runout (the runout fluctuation measured at the top of 3 consecutive serrations): 0.1 mm (0.004 in.)

If not as specified, replace the sensor rotor.

INSPECTION OF FRONT SPEED SENSOR AND SENSOR ROTOR SERRATIONS (REFERENCE)

INSPECT FRONT SPEED SENSOR AND SENSOR ROTOR SERRATIONS BY USING AN OSCILLOSCOPE

(a) Connect an oscilloscope to the speed sensor connector.

(b) Run the vehicle at 20 km/h (12.4 mph), and inspect speed sensor output wave.

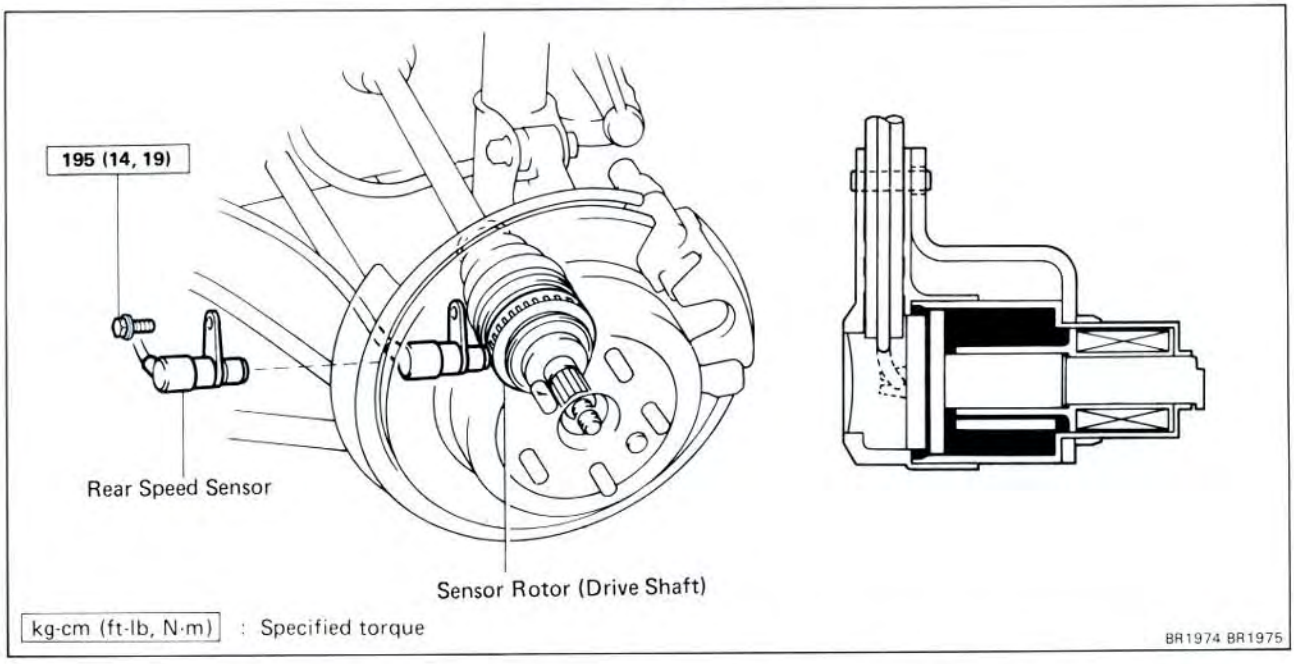
(c) Check that C is 0.5 V or more.

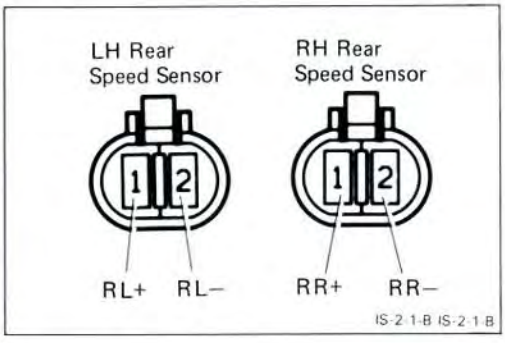
If not as specified, replace the speed sensor.

(d) Check that B is 70% or more of A.

If not as specified, replace the sensor rotor.

Rear Speed Sensor





INSPECTION OF REAR SPEED SENSOR

1. INSPECT SPEED SENSOR

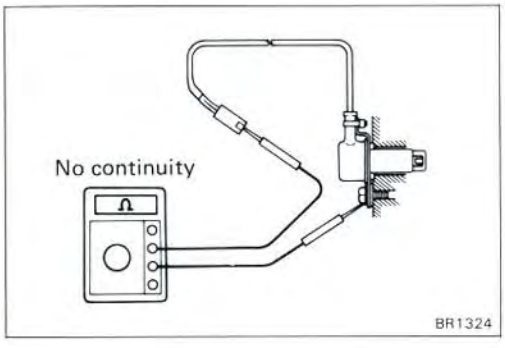
(a) Remove the rear seat cushion.

(b) Disconnect the speed sensor connector.

(c) Measure the resistance between terminals.

Resistance: 0.85 — 1.30 kΩ

If resistance value is not as specified, replace the sensor.

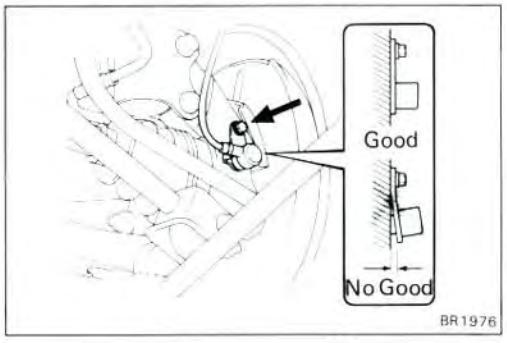


(d) Check that there is no continuity between each terminal and sensor body.

If there is continuity, replace the sensor.

(e) Connect the speed sensor connector.

(f) Install the rear seat cushion.



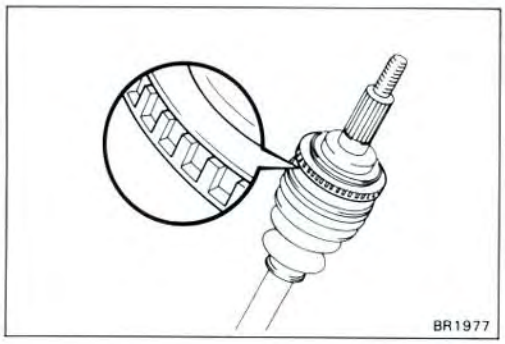
2. INSPECT SENSOR INSTALLATION

(a) Check that the sensor installation bolt is tightened properly. If not, tighten the bolt.

Torque: 195 kg-cm (14 ft-lb, 19 N·m)

(b) Check that there is no clearance between the sensor and rear axle carrier as shown.

If there is clearance, replace the sensor.



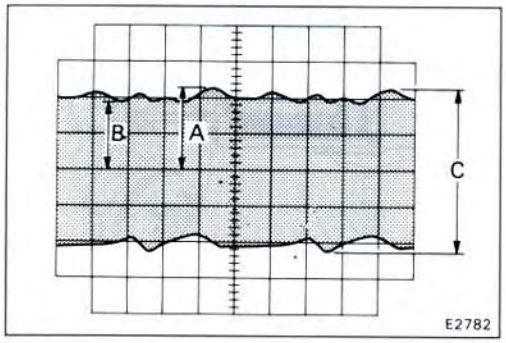
3. VISUALLY INSPECT SENSOR ROTOR SERRATIONS

(a) Remove the drive shaft.
(See page RA-14)

(b) Inspect the sensor rotor serrations for scratches, cracks, warping or missing teeth.

(c) Install the drive shaft.
(See page RA-19)

CAUTION: To prevent damage to the serrations, do not strike the drive shaft.



INSPECTION OF REAR SPEED SENSOR AND SENSOR ROTOR SERRATIONS (REFERENCE)

INSPECT REAR SPEED SENSOR AND SENSOR ROTOR SERRATIONS BY USING AN OSCILLOSCOPE

(a) Connect an oscilloscope to the speed sensor connector.

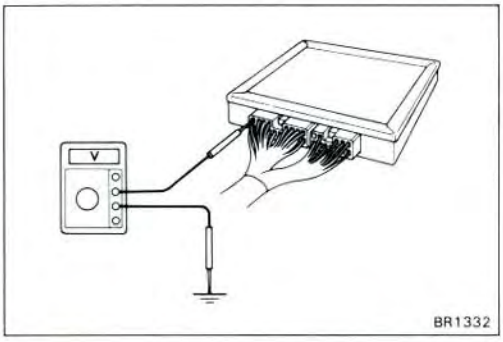
(b) Run the vehicle at 20 km/h (12.4 mph), and inspect speed sensor output wave.

(c) Check that C is 0.5 V or more.

If not as specified, replace the speed sensor.

(d) Check that B is 60 % or more of A.

If not as specified, replace the rear axle hub.



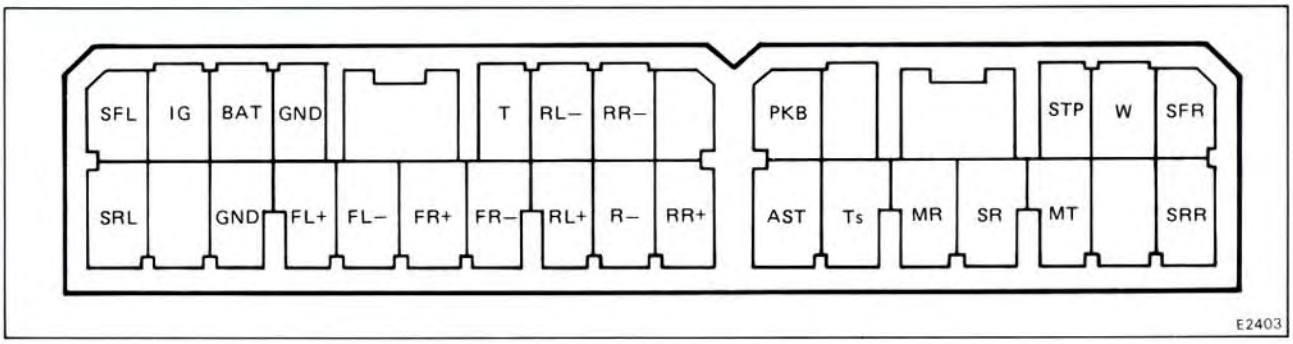
Anti-lock Brake System Circuit

INSPECTION OF SYSTEM CIRCUIT

1. INSPECT SYSTEM CIRCUIT WITH CONNECTOR CONNECTED

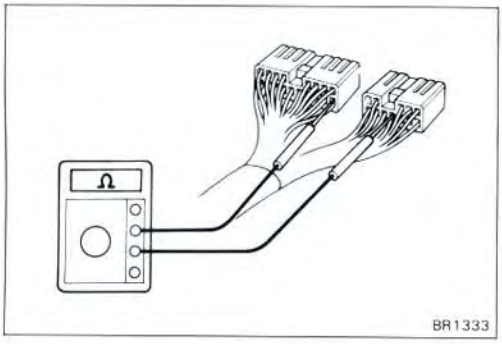
(a) Pull out the A.B.S. computer.
(See page BR-49)

(b) Using a voltmeter with high impedance (10 kΩ/V minimum), measure the voltage at each terminal and body ground.



Tester Connection	Condition	Voltage	Trouble Part
SFL – Body ground	Ignition switch on	Battery voltage	Actuator, control relays
	Ignition switch on and "ANTI-LOCK" warning light goes on	About 0 V	
SFR – Body ground	Ignition switch on	Battery voltage	
	Ignition switch on and "ANTI-LOCK" warning light goes on	About 0 V	
SRL – Body ground	Ignition switch on	Battery voltage	
	Ignition switch on and "ANTI-LOCK" warning light goes on	About 0 V	
SRR – Body ground	Ignition switch on	Battery voltage	
	Ignition switch on and "ANTI-LOCK" warning light goes on	About 0 V	
AST – Body ground	Ignition switch on	Battery voltage	
	Ignition switch on and "ANTI-LOCK" warning light goes on	About 0 V	
W – Body ground	Ignition switch on	Battery voltage	"ANTI-LOCK" warning light bulb
	Ignition switch on and "ANTI-LOCK" warning light goes on	About 0 V	
T – Body ground	Check connector disconnected	Battery voltage	Check connector, computer
	Check connector connected	About 0 V	

If the circuit is not as specified, check and repair or replace the trouble part shown in the table above.



2. INSPECT SYSTEM CIRCUIT WITH CONNECTOR DISCONNECTED

(a) Disconnect the connectors from the computer, inspect at the wire harness side connector.

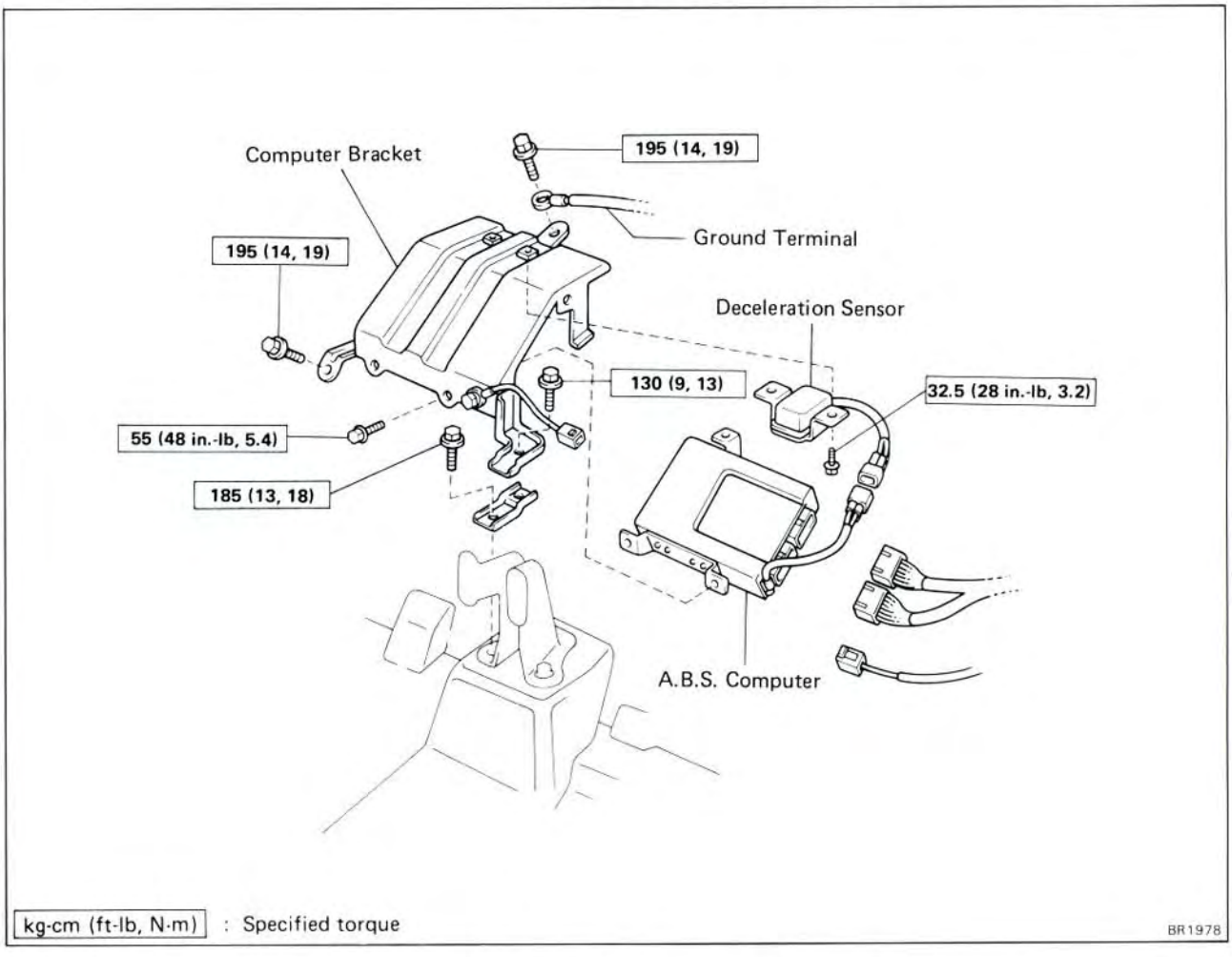
Tester Connection	Check Item	Condition	Voltage or Resistance Value	Trouble Part
SFR – AST	Resistance	Ignition switch off	About 6 Ω	Actuator
STP – Body ground	Voltage	Ignition switch off and brake pedal depressed	Battery voltage	Stop light switch, stop light
	Continuity	Ignition switch off and brake pedal returned	Continuity	
PKB – Body ground	Voltage	Ignition switch on and PKB lever pulled	About 0 V	Parking brake switch, level warning switch
		Ignition switch on and PKB lever returned	Battery voltage	
SRR – AST	Resistance	Ignition switch off	About 6 Ω	Actuator
MT – Body ground	Continuity	Ignition switch off	Continuity	
SR – R⊖	Resistance	Ignition switch off	65 – 100 Ω	
MR – R⊖	Resistance	Ignition switch off	50 – 80 Ω	
Ts – Body ground	Continuity	–	No continuity	Ts connector, wiring harness
		Ts connector shorted	Continuity	
AST – Body ground	Resistance	Ignition switch off	About 5 Ω	Wiring harness
RR⊖ – Body ground	Continuity	Ignition switch off	No continuity	Rear RH speed sensor
RL⊖ – Body ground	Continuity	Ignition switch off	No continuity	Rear LH speed sensor
T – Body ground	Continuity	Ignition switch off	Continuity	Check connector, wiring harness
GND – Body ground	Continuity	Ignition switch off	Continuity	Wiring harness
BAT – Body ground	Voltage	–	Battery voltage	FOG fuse
IG – Body ground	Voltage	Ignition switch on	Battery voltage	ECU-IG fuse
SFL – AST	Resistance	Ignition switch off	About 6 Ω	Actuator
RR⊕ – RR⊖	Resistance	–	0.85 – 1.30 kΩ	Rear RH speed sensor
R⊖ – Body ground	Continuity	Ignition switch off	No continuity	Wiring harness
RL⊕ – RL⊖	Resistance	–	0.85 – 1.30 kΩ	Rear LH speed sensor
FR⊖ – Body ground	Continuity	–	No continuity	Front RH speed sensor
FR⊕ – FR⊖	Resistance	–	0.85 – 1.30 kΩ	
FL⊖ – Body ground	Continuity	–	No continuity	Front LH speed sensor
FL⊕ – FL⊖	Resistance	–	0.85 – 1.30 kΩ	
SRL – AST	Resistance	Ignition switch off	About 6 Ω	Actuator

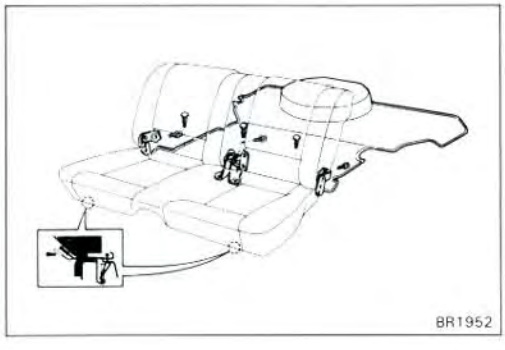
If the circuit is not as specified, check and repair or replace the trouble part shown in the table above.

(b) Connect the connectors, and install the computer in place.

(See page BR-49)

REMOVAL AND INSTALLATION OF A.B.S. COMPUTER AND DECELERATION SENSOR





1. REMOVE A.B.S. COMPUTER

(a) Remove the rear seat cushion.
(See page BR-36)

(b) Remove the three bolts and ground terminal.

(c) Disconnect the connectors and remove the three bolts and computer from the bracket.

2. REMOVE DECELERATION SENSOR

Remove the two bolts and deceleration sensor.

CAUTION: Do not drive without normal installation of deceleration sensor and computer assembly.

3. **INSTALL DECELERATION SENSOR**

Install the deceleration sensor to the bracket with the two bolts.

Torque: 32.5 kg-cm (28 in.-lb, 3.2 N·m)

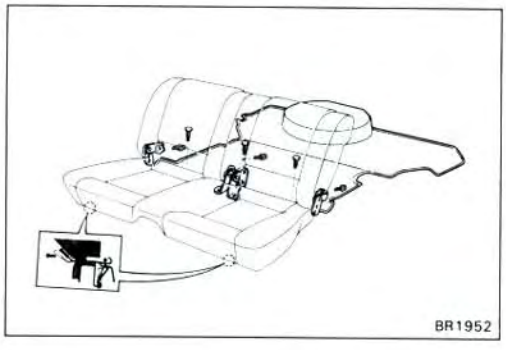
4. **INSTALL A.B.S. COMPUTER**

(a) Install the computer to the bracket with the three bolts.

Torque: 55 kg-cm (48 in.-lb, 5.4 N·m)

(b) Connect the connectors and install the bracket and computer with the three bolts.

Torque:	**Front left**	**130 kg-cm (9 ft-lb, 13 N·m)**
	Front right	**195 kg-cm (14 ft-lb, 19 N·m)**
	Rear	**195 kg-cm (14 ft-lb, 19 N·m)**


BR1952

(c) Install the rear seat cushion.

STEERING

REFER TO 1988 CELICA REPAIR MANUAL (Pub. No. RM071U)

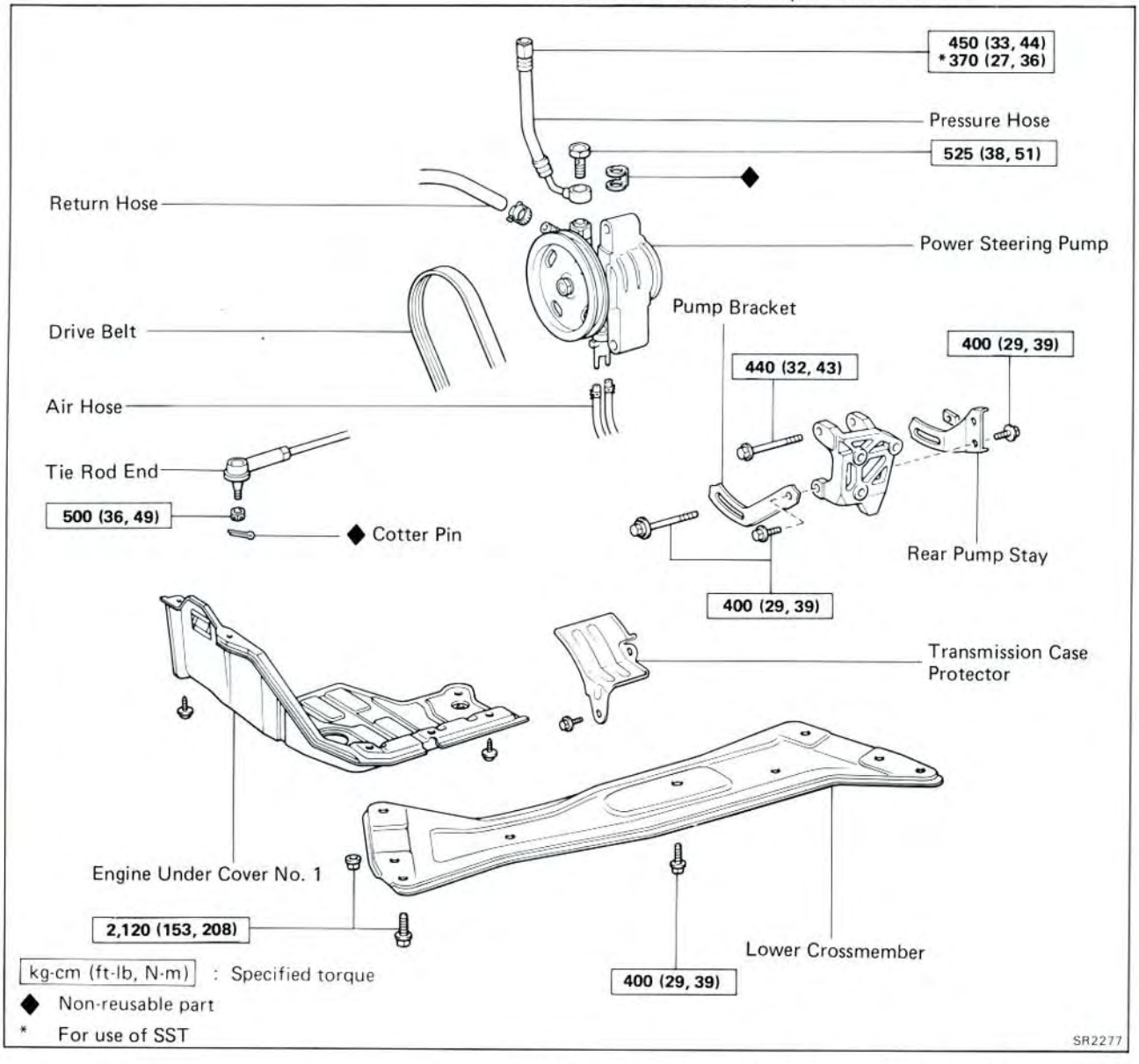
NOTE: The following pages contain only the points which differ from the above listed manual.

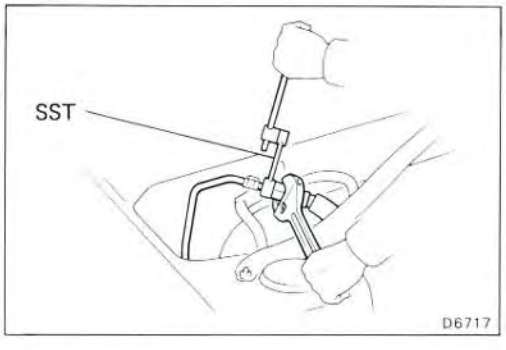
POWER STEERING

Power Steering Pump

REMOVAL AND INSTALLATION OF POWER STEERING PUMP

Remove and install the parts as shown.



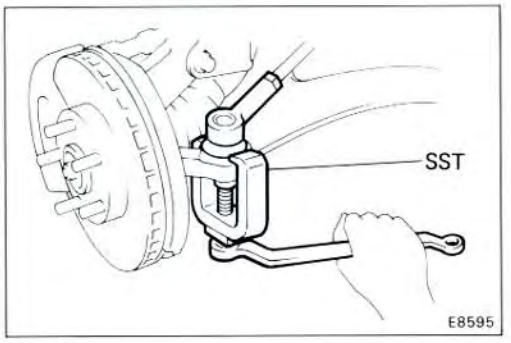


(MAIN POINT OF REMOVAL AND INSTALLATION)

1. **DISCONNECT AND CONNECT PRESSURE LINE**

   Using SST, disconnect and connect the pressure line.

   SST 09631-22020

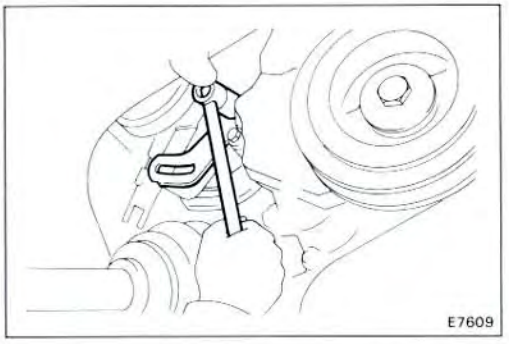


2. DISCONNECT TIE ROD END RH

(a) Remove the cotter pin and nut.

(b) Using SST, disconnect the tie rod end RH.

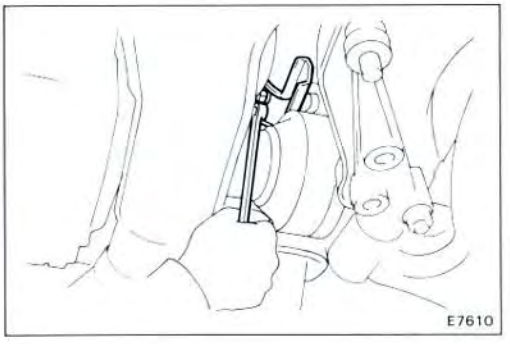
SST 09611-22012



3. REMOVE PUMP BRACKET

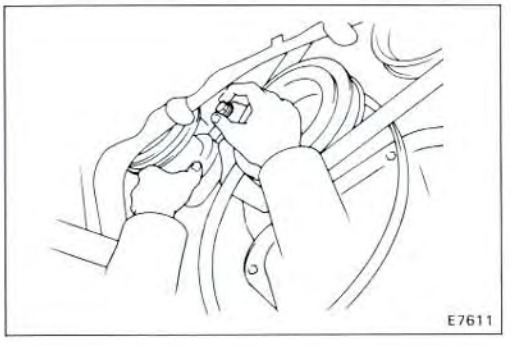
(a) Remove the adjusting bolt.

(b) Remove the bolt and bracket.



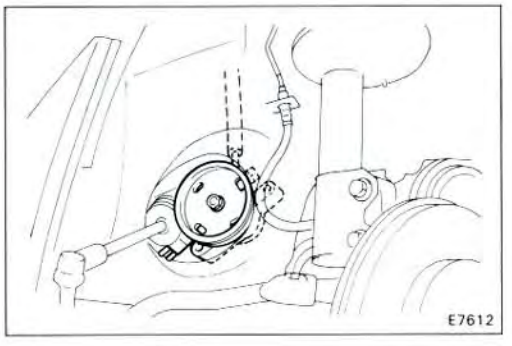
4. REMOVE REAR PUMP STAY

Remove the two bolts and stay.



5. REMOVE PS PUMP WITH PRESSURE TUBE

(a) Remove the through bolt.



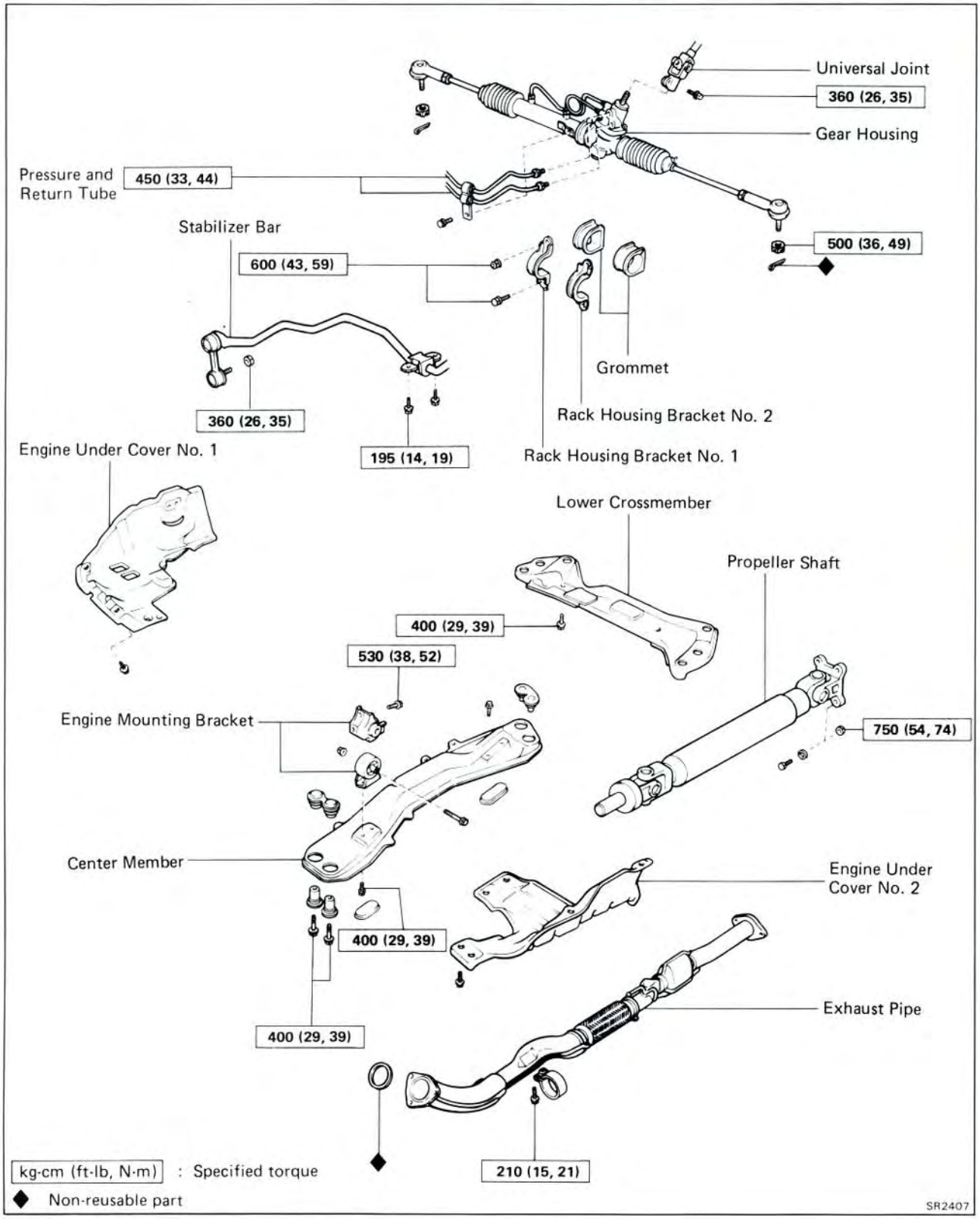
(b) Remove the PS pump from the tie rod end hole.

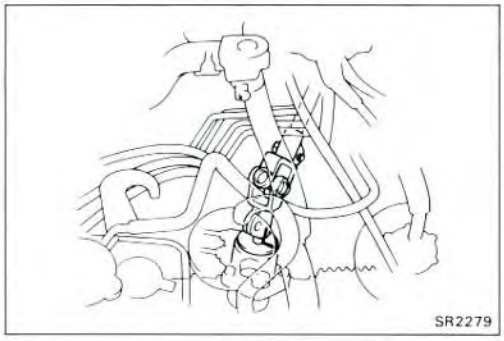
6. AFTER INSTALLING PS PUMP CHECK TOE-IN
(See page FA-3)

Gear Housing

REMOVAL AND INSTALLATION OF STEERING GEAR HOUSING

Remove and install the parts as shown.



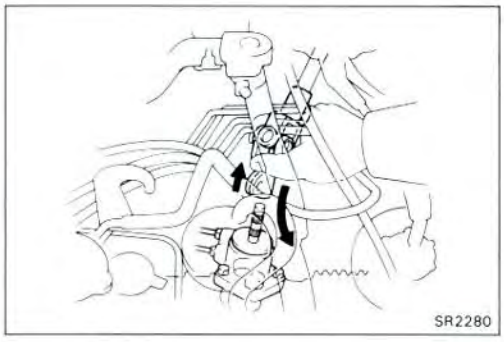


(MAIN POINT OF REMOVAL AND INSTALLATION)

1. REMOVE UNIVERSAL JOINT

(a) Place matchmarks on the universal joint and control valve shaft.

(b) Remove the two bolts.



(c) First pull the universal joint from the gear housing.

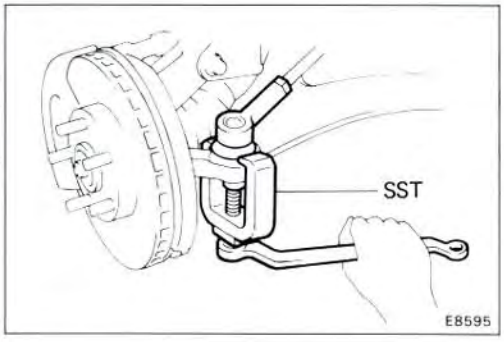
(d) Then pull it out from the main shaft.

2. DISCONNECT TIE ROD ENDS

(a) Remove the cotter pin and nut.

(b) Using SST, disconnect the tie rod end.

SST 09611-22012

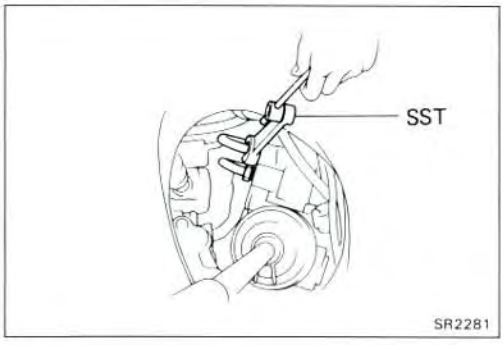


3. DISCONNECT AND CONNECT PRESSURE AND RETURN LINE

Using SST, disconnect and connect the pressure and return line.

SST 09631-22020

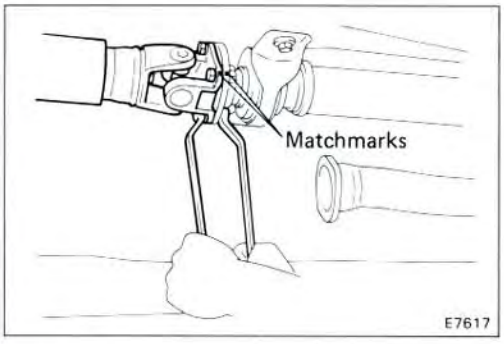
Torque: 450 kg-cm (33 ft-lb, 44 N·m)

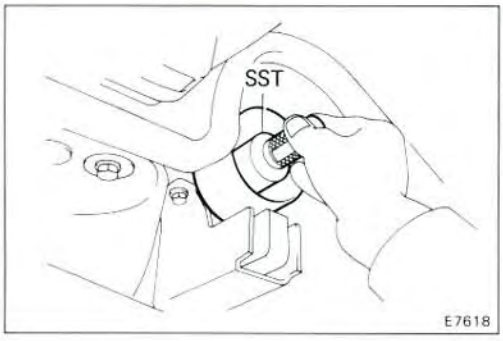


4. REMOVE PROPELLER SHAFT

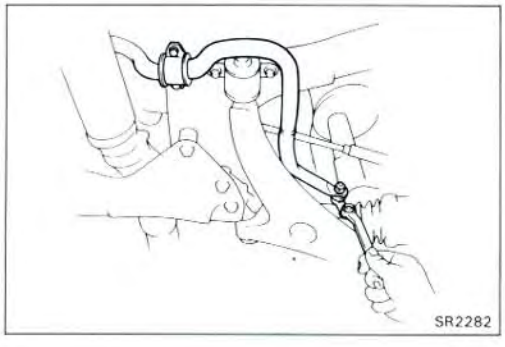
(a) Place matchmarks to the propeller shaft flange and intermediate shaft flange.

(b) Remove the four bolts and nuts.





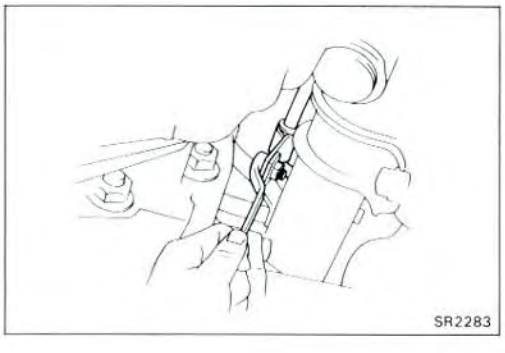
(c) Pull out the propeller shaft and insert SST.
SST 09325-20010



5. DISCONNECT STABILIZER BAR RH

(a) Remove the stabilizer bar bracket RH.

(b) Disconnect the stabilizer link from the lower arm.

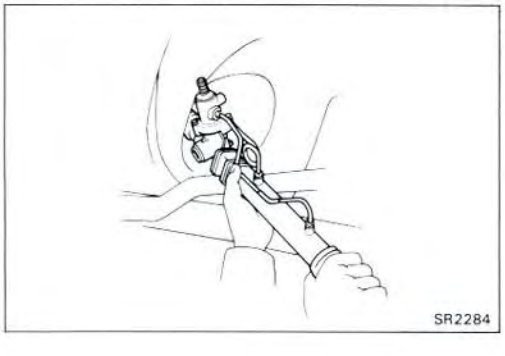


6. REMOVE GEAR HOUSING

(a) Remove the two bolts, two nuts and the two bracket.

(b) Remove the PS tube clamp bolt.

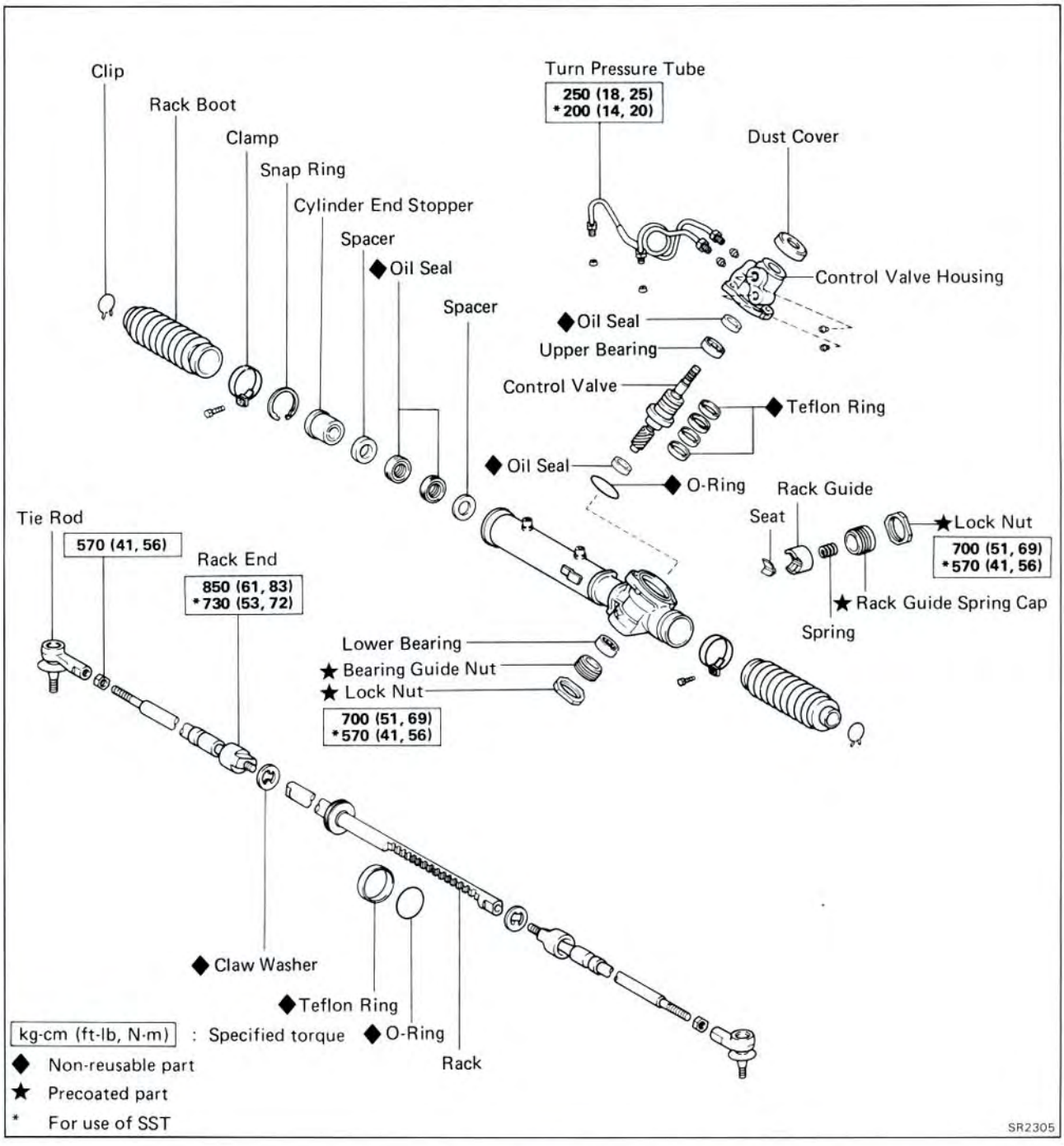
(c) Move the gear housing to the right side.

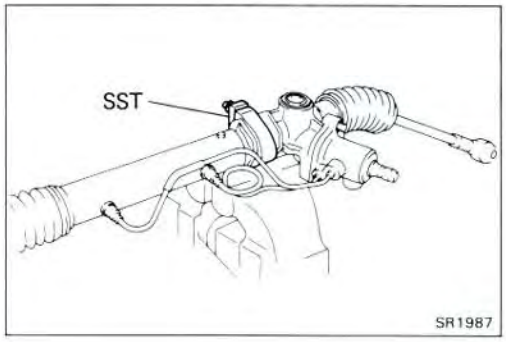


(d) Remove the gear housing.

7. AFTER INSTALLING GEAR HOUSING CHECK TOE-IN
(See page FA-3)

COMPONENTS



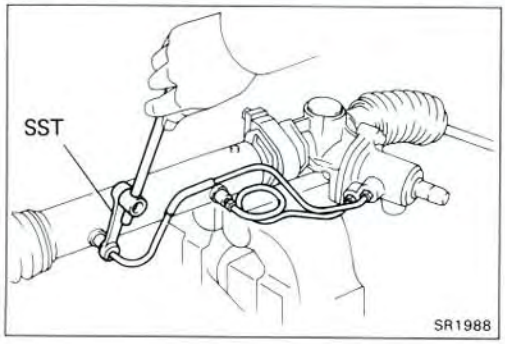


DISASSEMBLY OF GEAR HOUSING

1. **CLAMP GEAR HOUSING IN VISE**

   NOTE: Using SST, secure the steering gear in a vise.

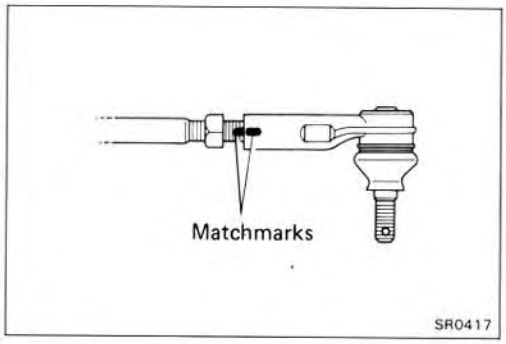
   SST 09612-00012



2. REMOVE RIGHT AND LEFT TURN PRESSURE TUBES

Using SST, remove the pressure tubes.

SST 09633-00020



3. REMOVE TIE ROD

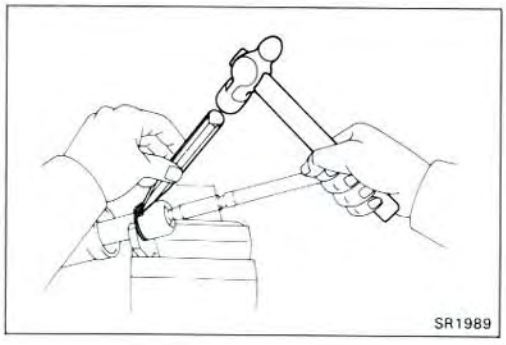
(a) Loosen the lock nut and place matchmarks on the tie rod and rack end.

(b) Remove the tie rod and lock nut.

4. REMOVE RACK BOOTS

(a) Remove the clips and clamps.

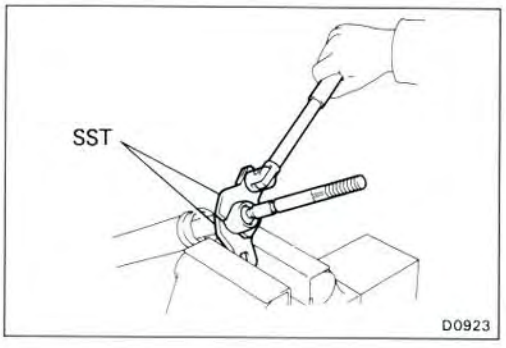
(b) Remove the rack boots.



5. REMOVE RACK ENDS AND CLAW WASHERS

(a) Unstake the claw washer.

CAUTION: Avoid any impact to the rack.

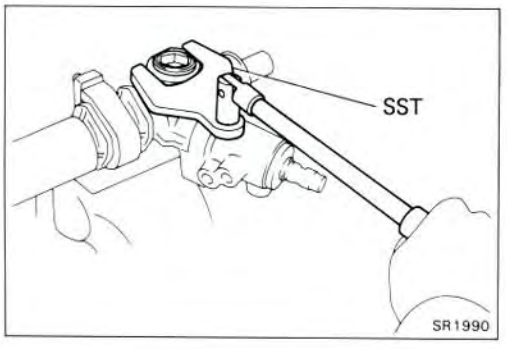


(b) Using SST, remove the rack ends.

SST 09612-10093 (09628-10020)
09612-24013 (09617-24010)

(c) Mark the left and right rack ends accordingly.

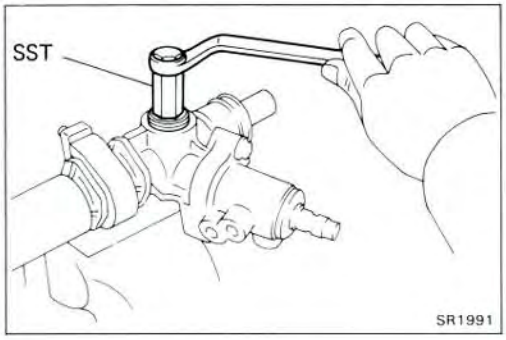
(d) Remove the claw washer.



6. REMOVE RACK GUIDE SPRING CAP LOCK NUT

Using SST, remove the rack guide spring cap lock nut.

SST 09612-24013 (09617-24020)

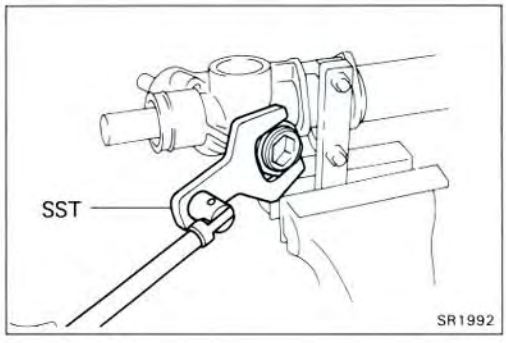


7. REMOVE RACK GUIDE SPRING CAP

Using SST, remove the rack guide spring cap.

SST 09612-24013 (09612-10022)

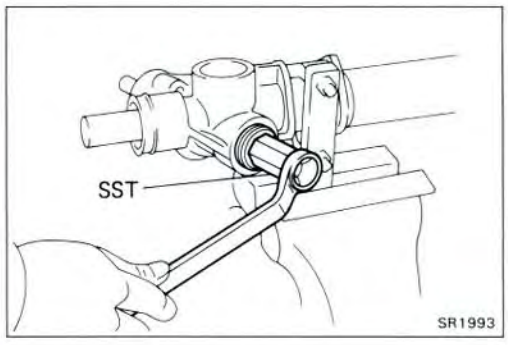
8. REMOVE RACK GUIDE SPRING, RACK GUIDE AND SEAT



9. REMOVE BEARING GUIDE LOCK NUT

Using SST, remove the lock nut.

SST 09612-24013 (09617-24020)

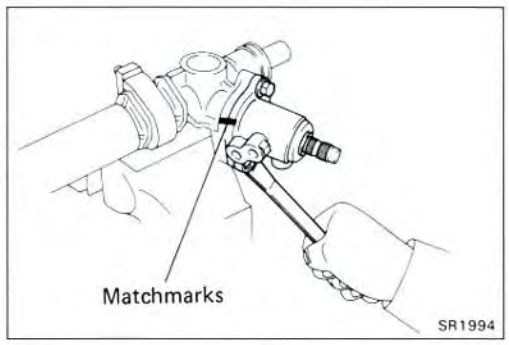


10. REMOVE BEARING GUIDE NUT

Using SST, remove the bearing guide nut.

SST 09612-24013 (09612-10022)

11. REMOVE DUST COVER



12. REMOVE CONTROL VALVE HOUSING

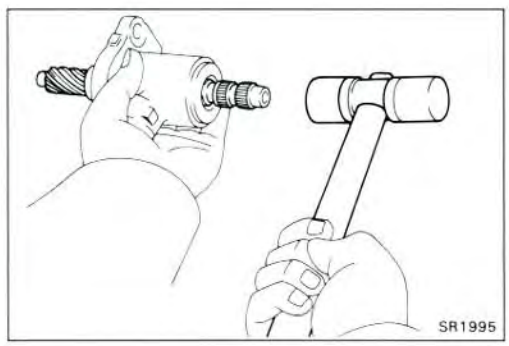
(a) Place matchmarks on the valve housing and rack housing.

(b) Remove the two bolts.

(c) Pull out the valve with the valve housing.

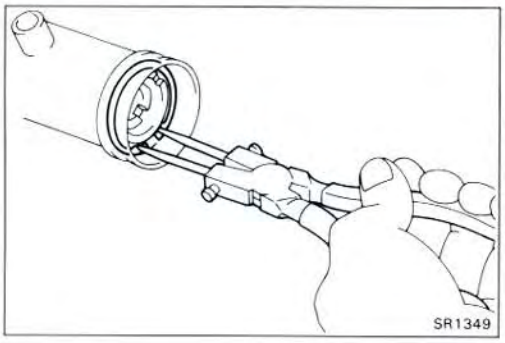
(d) Remove the O-ring from the rack housing.

13. REMOVE LOWER BEARING



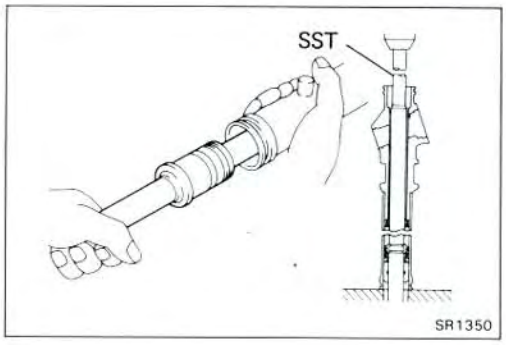
14. REMOVE CONTROL VALVE FROM HOUSING

Tap out the control valve.



15. REMOVE CYLINDER END STOPPER, SPACER, OIL SEAL AND RACK

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

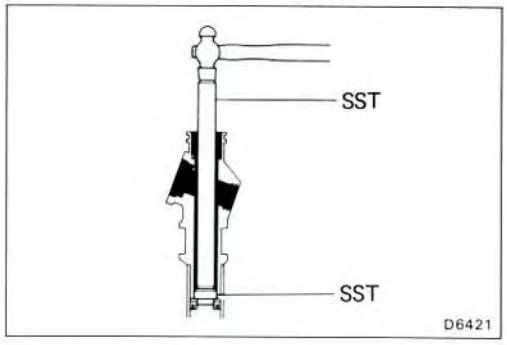


(b) Using SST, press the cylinder end stopper until the end stopper is slightly touch to the press block.

SST 09612-24013 (09612-10061)

(c) Pull out the rack with the cylinder end stopper, spacer and oil seal.

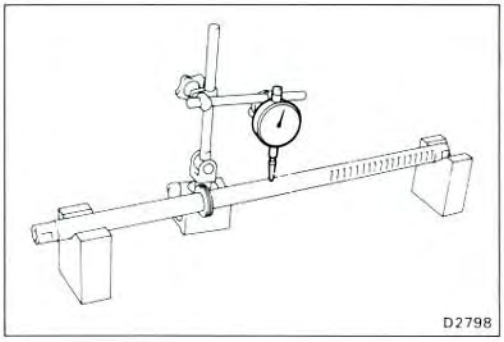
NOTE: If necessary, slightly tap the rack end with a brass bar and hammer.



16. REMOVE CYLINDER HOUSING OIL SEAL AND SPACER

Using SST, drive out the spacer and oil seal.

SST 09631-12020, 09631-20031



INSPECTION AND REPAIR OF GEAR HOUSING COMPONENTS

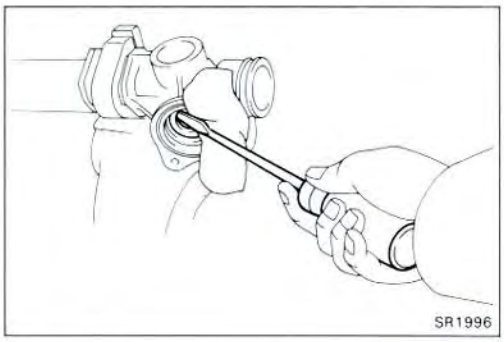
1. INSPECT RACK

(a) Check the rack for runout and for tooth wear or damage.

(b) Check the back surface for wear or damage.

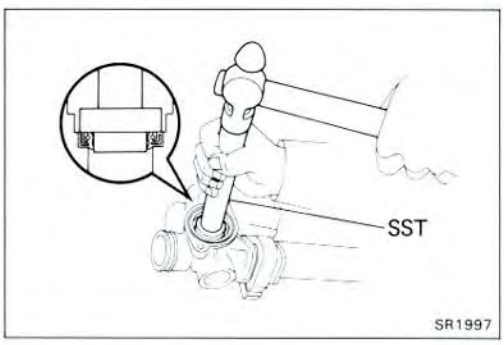
If faulty, replace it.

Maximum runout: 0.3 mm (0.012 in.)



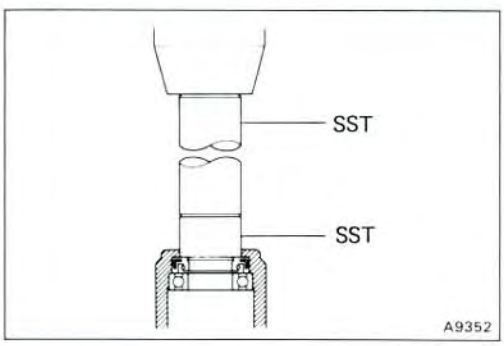
2. IF NECESSARY, REPLACE RACK HOUSING OIL SEAL

(a) Using a screwdriver, pry out the oil seal.



(b) Using SST, drive in a new oil seal.

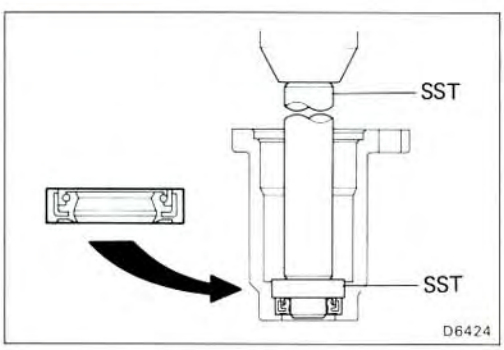
SST 09620-30010 (09624-30010, 09631-00020)



3. IF NECESSARY, REPLACE CONTROL VALVE HOUSING OIL SEAL

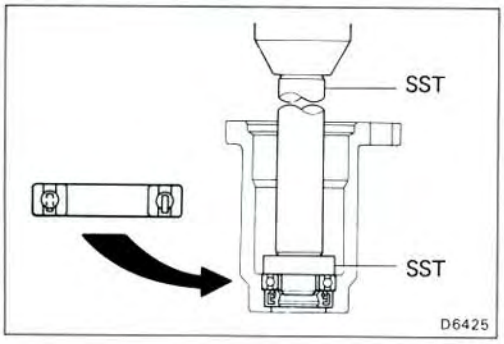
(a) Using SST, press out the oil seal with bearing.

SST 09630-24013 (09620-24010), 09631-12020

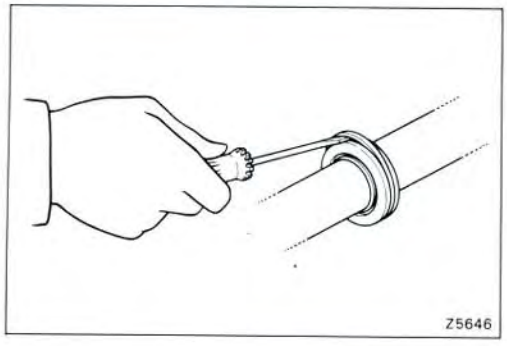


(b) Using SST, press in a new oil seal.

SST 09630-24013 (09620-24020), 09631-12020

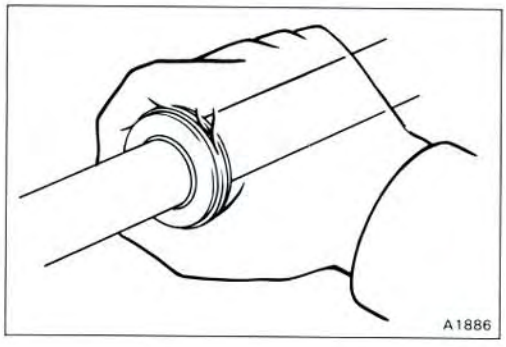


(c) Using SST, press in a new bearing.
SST 09630-24013 (09620-24030), 09631-12020

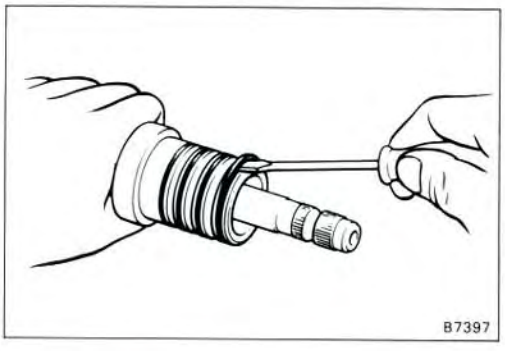


4. IF NECESSARY, REPLACE TEFLON RING AND O-RING

(a) Remove the teflon ring and O-ring.



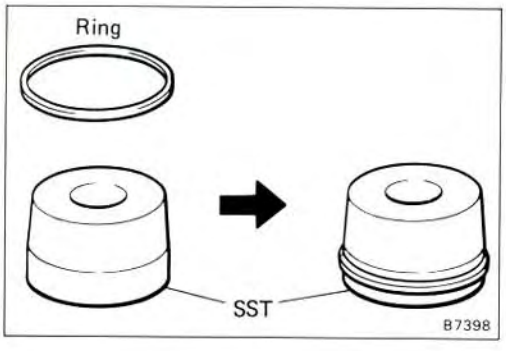
(b) Coat the teflon ring with power steering fluid and snug it down with your fingers.



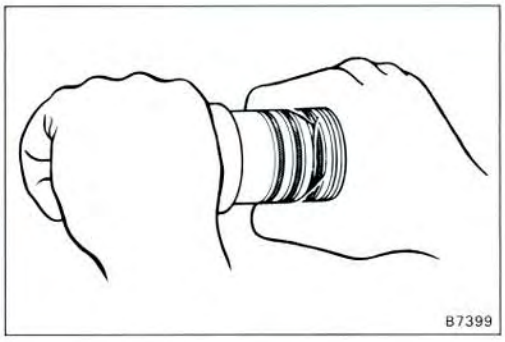
5. IF NECESSARY, REPLACE CONTROL VALVE TEFLON RING

(a) Using a screwdriver, remove the teflon ring.

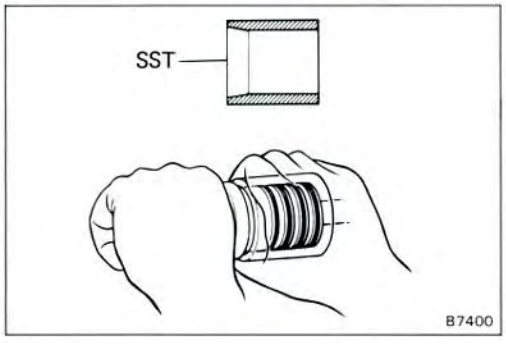
CAUTION: Be careful not to damage the control valve.



(b) Install a new teflon ring to SST and expand it.
SST 09631-20070



(c) Install the expanded teflon rings to the control valve and snug it down with your fingers.

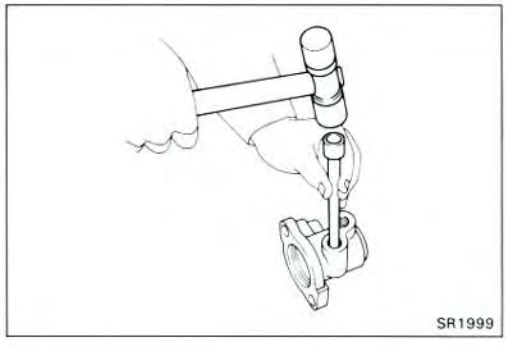


(d) Coat the teflon ring with power steering fluid, and carefully slide the tapered end of SST over the teflon ring to seat the ring.

SST 09631-20081

6. IF NECESSARY, REPLACE UNION SEAT

(a) Using a screw extractor, remove the union seat.

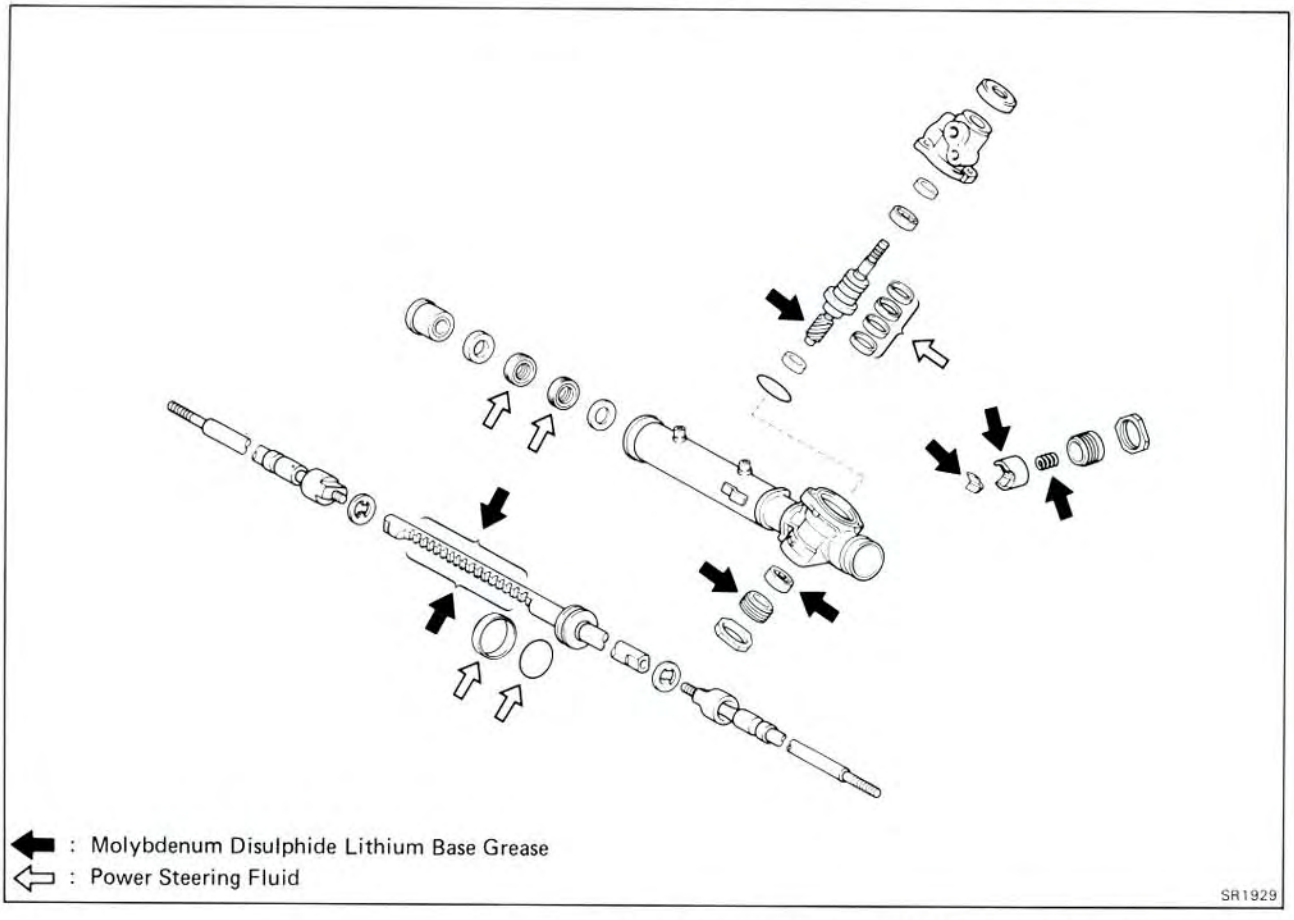


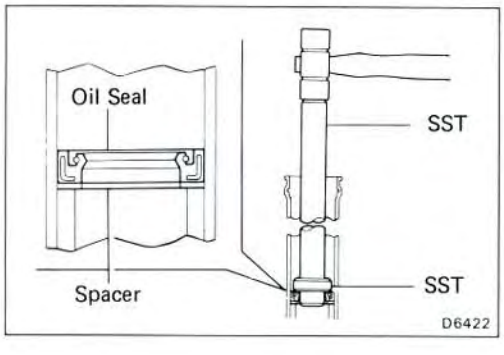
(b) Using a plastic hammer and extension bar, tap in a new union seat.

ASSEMBLY OF GEAR HOUSING

(See page SR-7)

1. **COAT POWER STEERING FLUID OR GREASE ON FOLLOWING PARTS:**

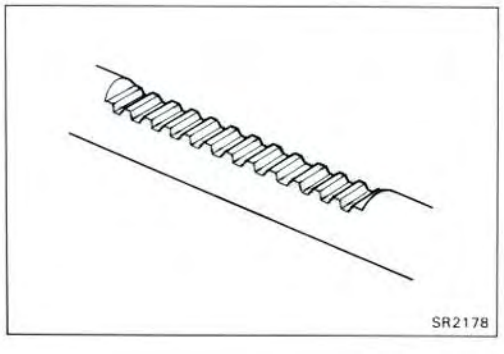




2. **INSTALL CYLINDER HOUSING OIL SEAL AND SPACER**

Install a new oil seal and spacer to SST, and drive in it with a plastic hammer.

SST 09631-12020, 09631-32010

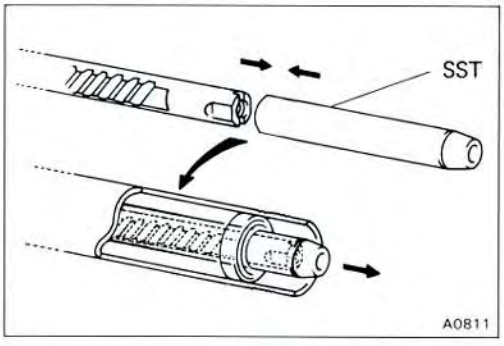


3. **INSTALL RACK**

(a) Install SST to the rack.

NOTE: If necessary, scrape the burrs off the rack teeth end and burnish.

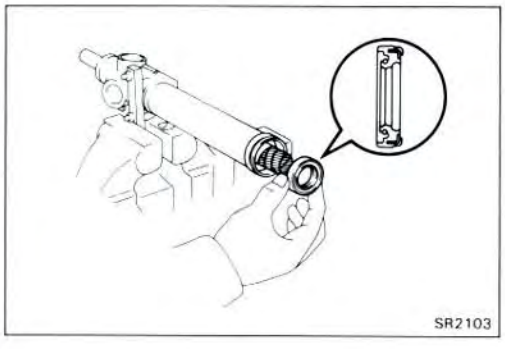
SST 09631-20051



(b) Coat SST with power steering fluid.

(c) Insert the rack into the cylinder.

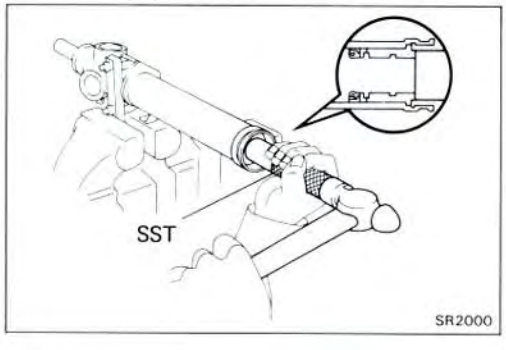
(d) Remove SST.



4. INSTALL CYLINDER END STOPPER, OIL SEAL AND SPACER

(a) To prevent oil seal lip damage, wind vinyl tape on the steering rack end, and apply power steering fluid.

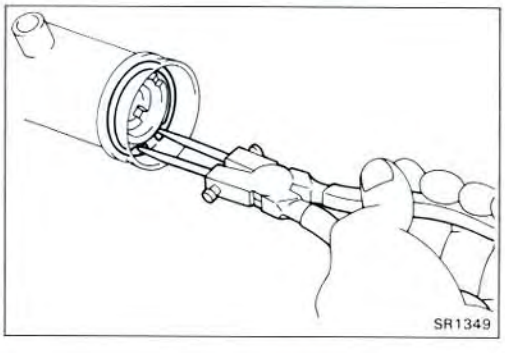
(b) Install the oil seal by pushing into the cylinder in the direction shown in drawing, without tilting.



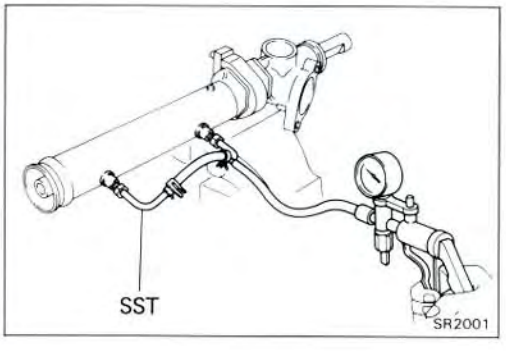
(c) Install the spacer and cylinder end stopper.

(d) Using SST, drive in the cylinder end stopper.

SST 09612-22011



(e) Using snap ring pliers, install the snap ring.



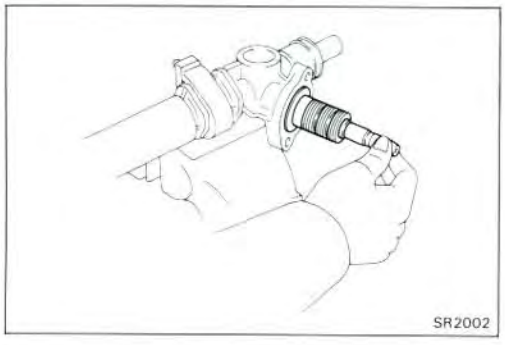
5. AIR TIGHTNESS TEST

(a) Install SST to the union of the cylinder housing.

SST 09631-12070

(b) Apply 400 mmHg (15.75 in.Hg, 53.3 kPa) of vacuum for about 30 seconds.

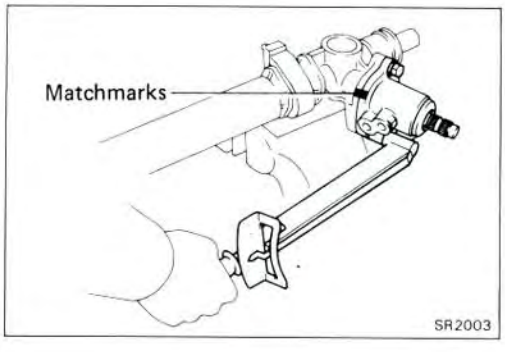
(c) Check that there is no change in the vacuum.



6. INSTALL CONTROL VALVE

(a) Coat the teflon ring with power steering fluid.

(b) Push the control valve into the housing.

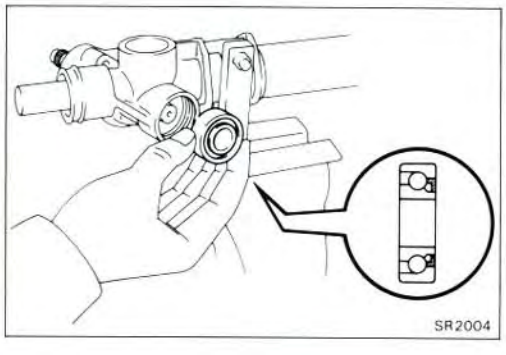


7. INSTALL CONTROL VALVE HOUSING

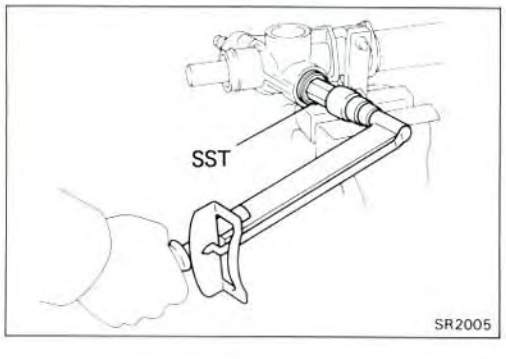
(a) Align the marks on the valve housing and rack housing.

(b) Torque the two bolts.

Torque: 315 kg-cm (23 ft-lb, 31 N·m)



8. INSTALL CONTROL VALVE LOWER BEARING



9. INSTALL BEARING GUIDE NUT

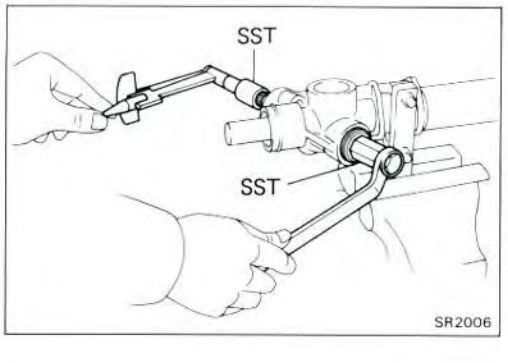
(a) Apply liquid sealer to 2 or 3 threads of the bolt end.

Sealant: Part No.08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

(b) Using SST, torque the bearing guide nut.

SST 09612-24013 (09612-10022)

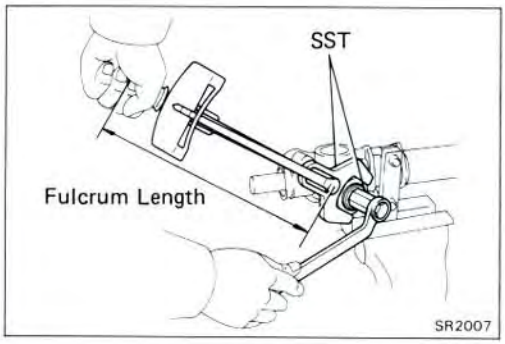
Torque: 150 kg-cm (11 ft-lb, 15 N·m)



(c) Using SST and torque meter, loosen the bearing guide nut until the preload is within specification.

SST 09612-24013 (09612-10022), 09616-00010

Preload (turning): 4.5 — 6.5 kg-cm (3.9 — 5.6 in.-lb, 0.4 — 0.6 N·m)



10. INSTALL BEARING GUIDE LOCK NUT

(a) Apply liquid sealer to 2 or 3 threads of the lock nut.

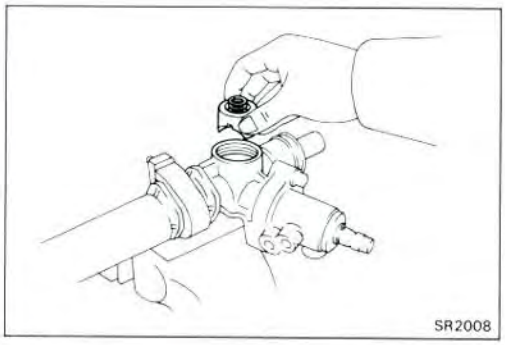
Sealant: Part No.08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

(b) Using SST, install and torque the lock nut.

SST 09612-24013 (09612-10022, 09617-24020)

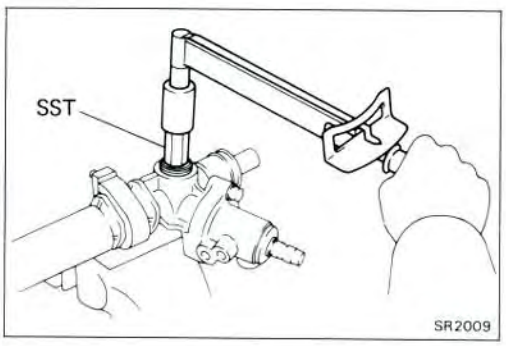
Torque: 570 kg-cm (41 ft-lb, 56 N·m)

NOTE: Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).



11. INSTALL RACK GUIDE SEAT, RACK GUIDE AND RACK GUIDE SPRING

Install the rack guide with the seat and spring.



12. ADJUST TOTAL PRELOAD

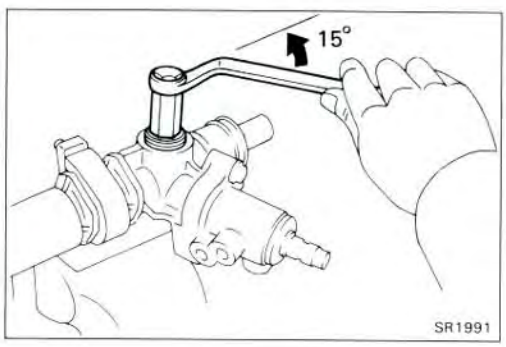
(a) Apply liquid sealer to 2 or 3 threads of the spring cap.

Sealant: Part No.08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

(b) Using SST, install and torque the spring cap.

SST 09612-24013 (09612-10022)

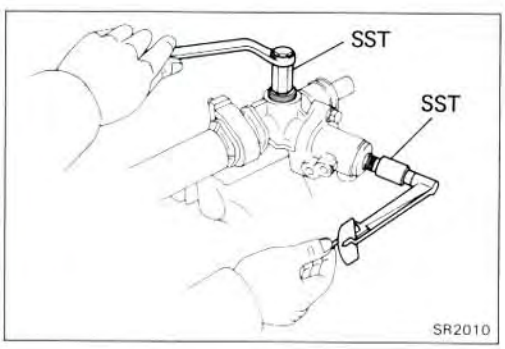
Torque: 250 kg-cm (18 ft-lb, 25 N·m)



(c) Using SST, return the rack guide spring cap 15°.

(d) Turn the control valve shaft right and left one or two times.

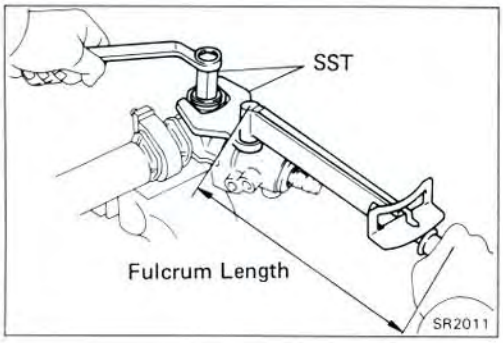
(e) Loosen the spring cap until the rack guide compression spring is not functioning.



(f) Using SST and a torque meter, tighten the rack guide spring cap until the preload is within specification.

SST 09612-24013 (09612-10022), 09616-00010

Preload (turning): 9 – 12 kg-cm (7.8 – 10.4 in.-lb, 0.9 – 1.2 N·m)



13. INSTALL RACK GUIDE SPRING CAP LOCK NUT

(a) Apply liquid sealer to 2 or 3 threads of the lock nut.

Sealant: Part No.08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

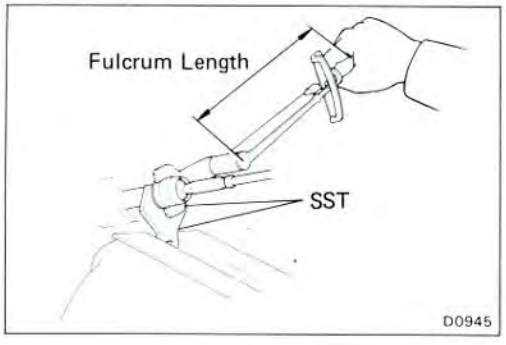
(b) Using SST, install and torque the lock nut.

SST 09612-24013 (09612-10022, 09617-24020)

Torque: 570 kg-cm (41 ft-lb, 56 N·m)

NOTE: Use a torque wrench with a fulcrum length of 340 mm (13.39 in.).

(c) Recheck the total preload.



14. INSTALL DUST COVER

15. INSTALL CLAW WASHER AND RACK END

(a) Install a new claw washer.

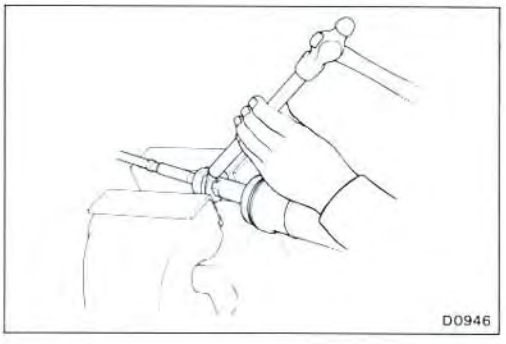
(b) Using SST, install and torque the rack end.

SST 09612-10093 (09628-10020)
09612-24013 (09617-24010)

Torque: 730 kg-cm (53 ft-lb, 72 N·m)

NOTE: Use a torque wrench with a fulcrum length of 340 mm (13.39 in.).

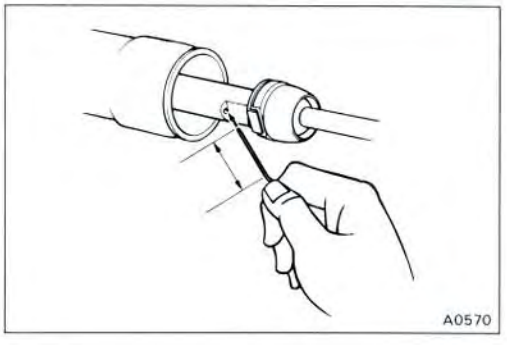
(c) Using a brass bar and hammer, stake the claw washer.



16. INSTALL RACK BOOTS, CLAMPS AND CLIPS

(a) Insure that the tube hole is not clogged with grease.

NOTE: If the tube hole is clogged, the pressure inside the boot will change after it is assembled and the steering wheel turned.

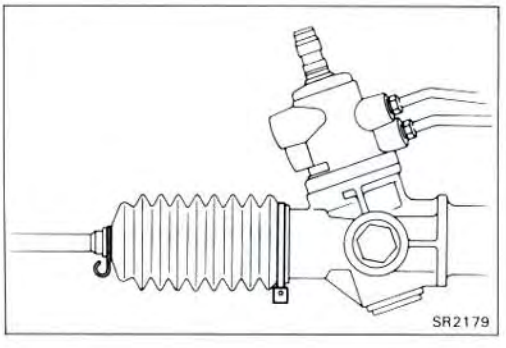


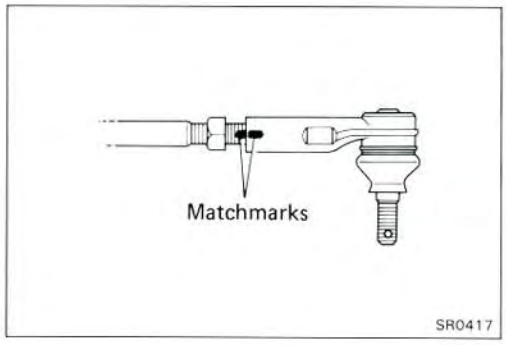
(b) Install the boots.

NOTE: Be careful not to damage or twist the boots.

(c) Install the clamps.

(d) Install the clips with the ends facing outward.



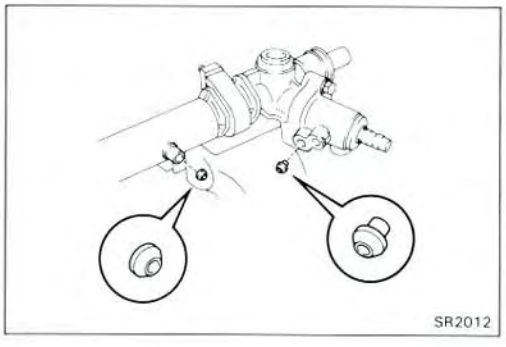


17. INSTALL TIE RODS

(a) Screw the lock nuts and tie rods onto the rack ends until the matchmarks are aligned.

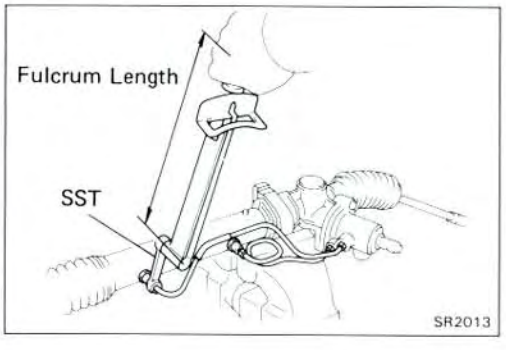
(b) After adjusting toe-in, torque the lock nut.

Torque: 570 kg-cm(41 ft-lb, 56 N·m)



18. INSTALL RIGHT AND LEFT TURN PRESSURE TUBES

(a) Install new union seats as shown.



(b) Using SST, install and torque the tubes.

SST 09633-00020

Torque: 200 kg-cm (14 ft-lb, 20 N·m)

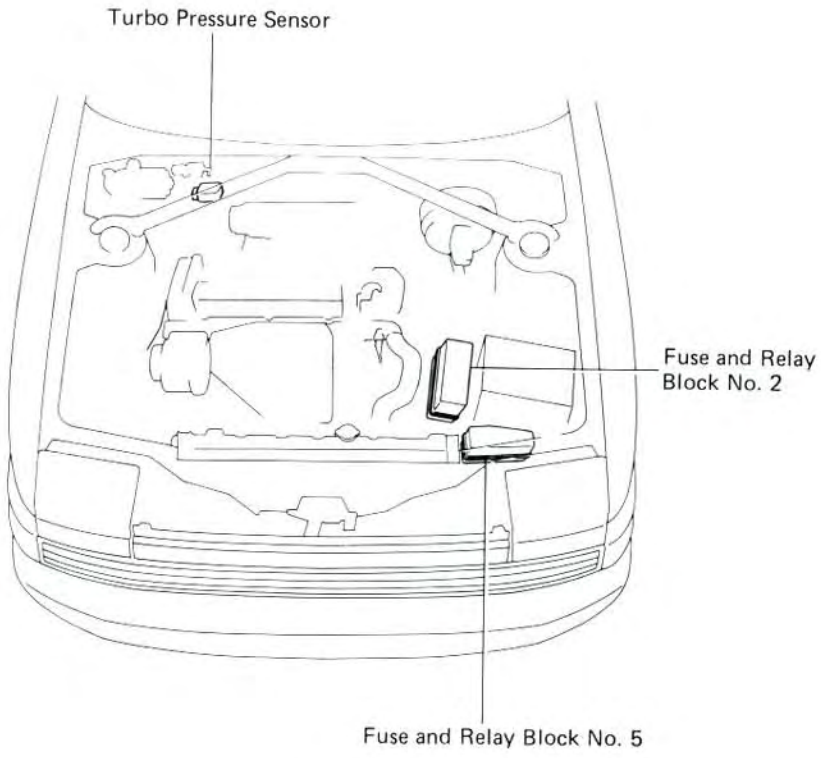
NOTE: Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).

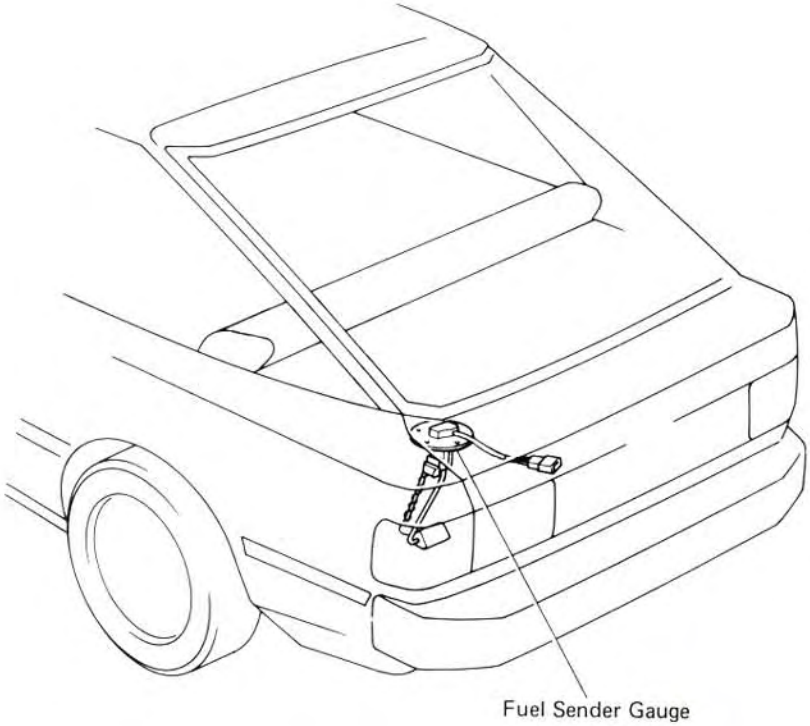
BODY ELECTRICAL SYSTEM

REFER TO 1988 CELICA REPAIR MANUAL (Pub. No. RM071U)

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

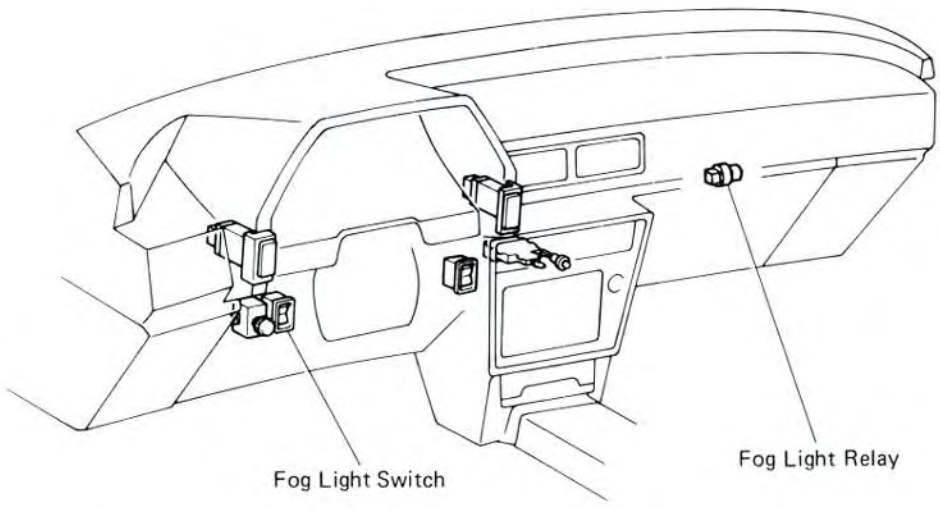
LOCATION OF SWITCHES AND RELAYS



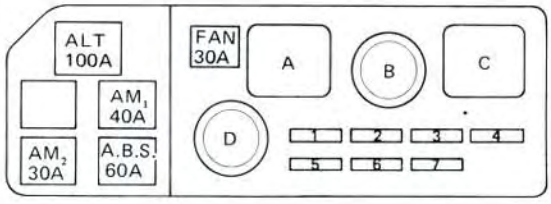


BE2140
BE2139

LOCATION OF SWITCHES AND RELAYS (Cont'd)



FUSE AND RELAY BLOCK NO. 2 (LOCATION: Engine Compartment)



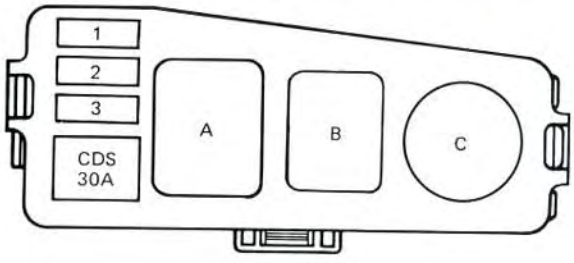
Fuses

1.	HEAD (LH)	15 A
2.	HAZ-HORN	15 A
3.	EFI	15 A
4.	CHARGE	7.5 A
5.	HEAD (RH)	15 A
6.	RTR	30 A
7.	RADIO NO. 1	15 A

Relays

A. Engine Main Relay
B. EFI Main Relay
C. Headlight Control Relay
D. Fan No. 1 Relay

FUSE AND RELAY BLOCK NO. 5 (LOCATION: Engine Compartment)



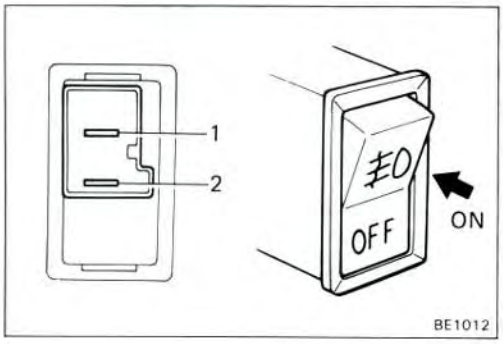
Fuses

1.	FOG	15 A

Relays

A. A/C Fan No. 2 Relay
B. A/C Magnetic Clutch Relay
C. A/C Fan No. 3 Relay

BE2125
BE1661
BE2121



LIGHTING

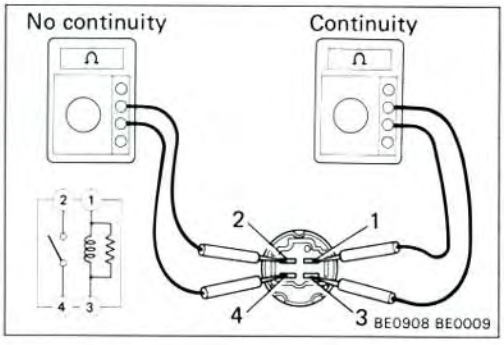
Fog Light Switch

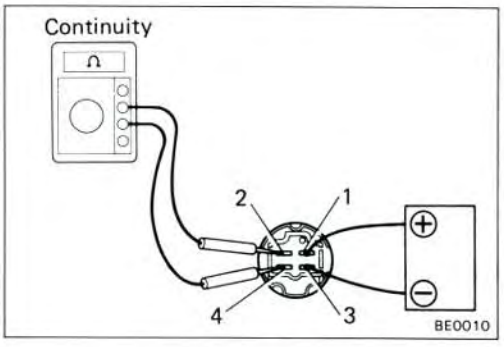
INSPECT SWITCH CONTINUITY

Inspect the switch continuity between terminals.

Terminals / Position	1	2
ON	○	○
OFF		

If continuity is not as specified, replace the switch.





Fog Light Relay

1. **INSPECT RELAY CONTINUITY**

   (a) Check that there is continuity between terminals 1 and 3.

   (b) Check that there is no continuity between terminals 2 and 4.

   (c) Check that there is no continuity between terminals 3 and 4.

   If continuity is not as specified, replace the relay.

2. **INSPECT RELAY OPERATION**

   (a) Apply battery voltage to terminals 1 and 3.

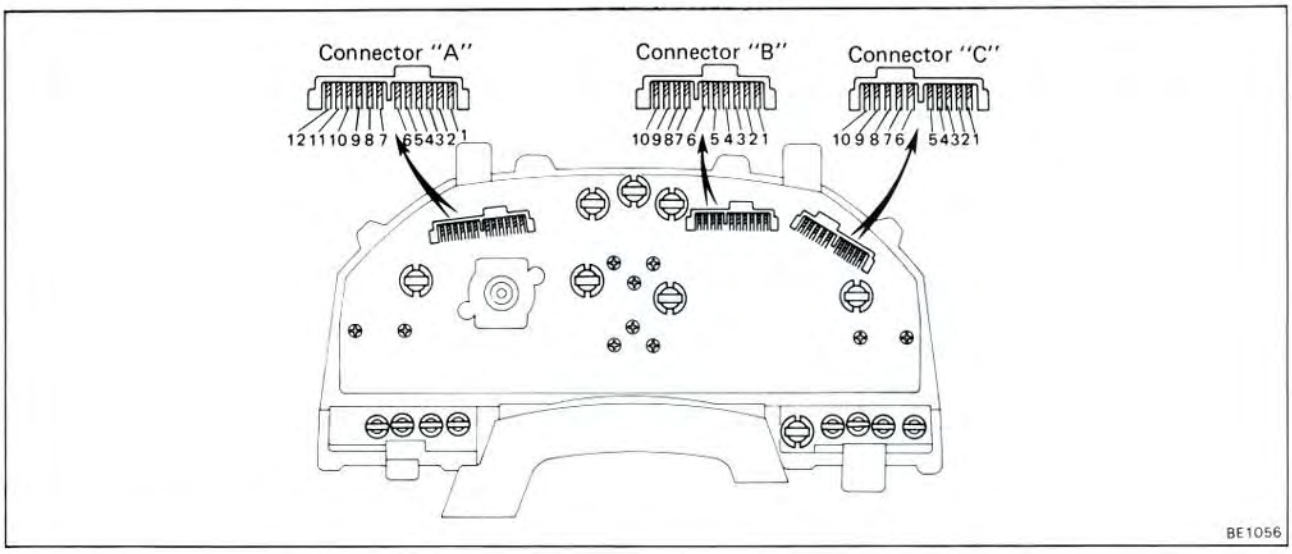
   (b) Check that there is continuity between terminals 2 and 4.

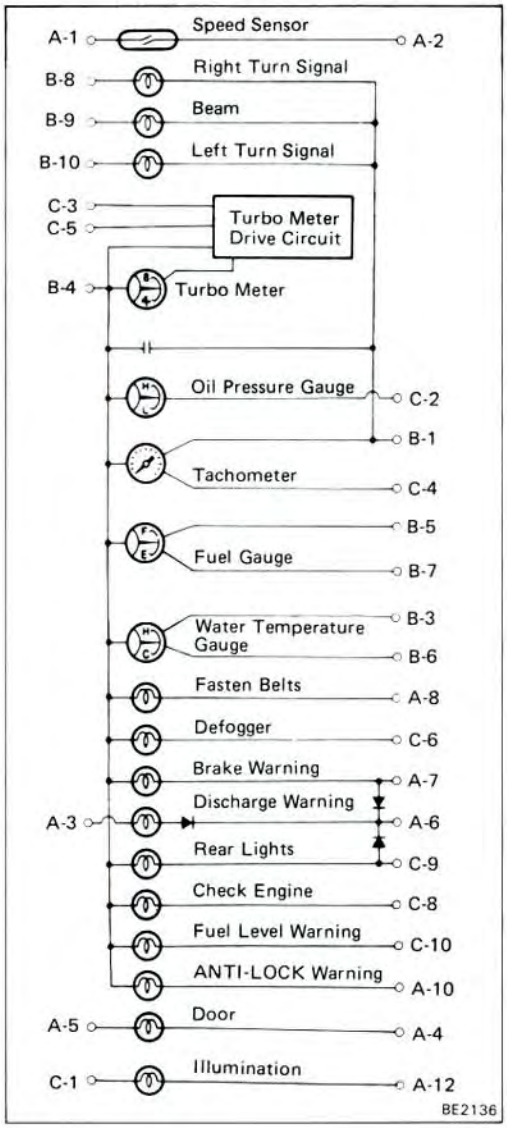
   (c) Check that there is no continuity between terminals 3 and 4.

   If operation is not as specified, replace the relay.

INSTRUMENTS, GAUGES AND WARNING LIGHTS

Combination Meter and Gauge



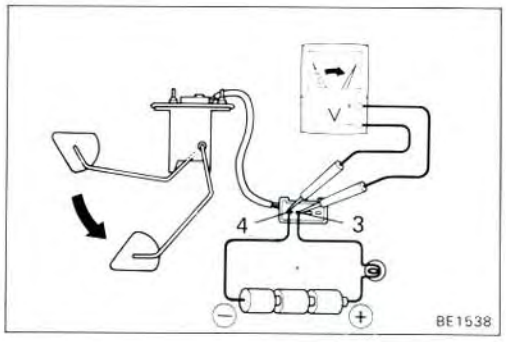


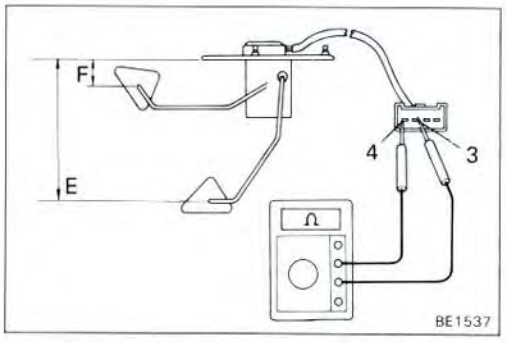
COMBINATION METER CIRCUIT

No.		Wiring connector side
A	1	TCCS ECU, Cruise Control ECU and ECT ECU
	2	Ground
	3	IGN Fuse
	4	Door Courtesy Switch
	5	DOME Fuse
	6	CHARGE Fuse
	7	Parking Brake Switch and Brake Fluid Level Warning Switch
	8	Seat Belt Warning Relay
	10	A.B.S. ECU
	12	Light Control Rheostat
B	1	Ground
	3	Water Temperature Gauge
	4	GAUGE Fuse
	5	Ground
	6	Ground
	7	Fuel Sender Gauge
	8	Turn Signal Switch
	9	Headlight Dimmer Switch
	10	Turn Signal Switch
C	1	TAIL Fuse
	2	Oil Pressure Sender Gauge
	3	Turbo Pressure Sensor
	4	IIA or Ignition Coil
	5	Turbo Pressure Sensor (Ground)
	6	Rear Window Defogger Switch
	8	TCCS ECU
	9	Light Failure Sensor
	10	Fuel Sender Gauge

Speedometer

(See INTRODUCTION on page IN-13)





Fuel Gauge

INSPECTION OF FUEL GAUGE

1. INSPECT SENDER GAUGE OPERATION

(a) Connect a series of three 1.5 V dry cell batteries.

(b) Connect the positive (+) lead from the dry cell batteries to terminal 3 through a 3.4 W test bulb and the negative (−) lead to terminal 4.

(c) Check that the voltage rises betweeen terminals 3 and 4 as the float is moved from the top to bottom position.

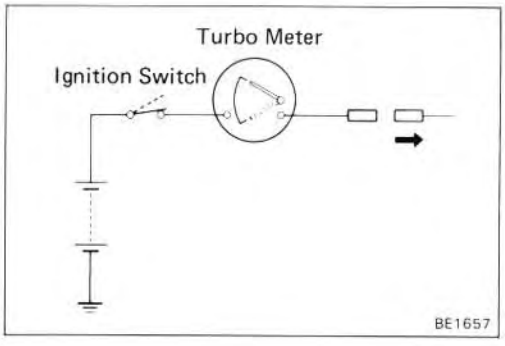
2. MEASURE SENDER GAUGE RESISTANCE

(a) Check that resistance changes as the float is moved from the top to bottom position.

(b) Measure the resistance between terminals 3 and 4 for each float position.

Float position	mm (in.)	Resistance (Ω)
F	Approx. 70 (2.7)	Approx. 3
E	Approx. 234 (9.21)	Approx. 110

If operation is not as specified, replacae the sender gauge.

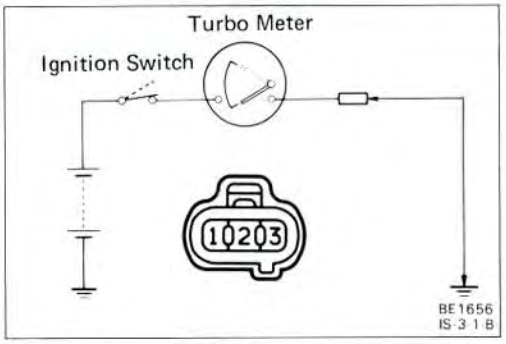


Turbo Meter

1. INSPECT METER OPERATION

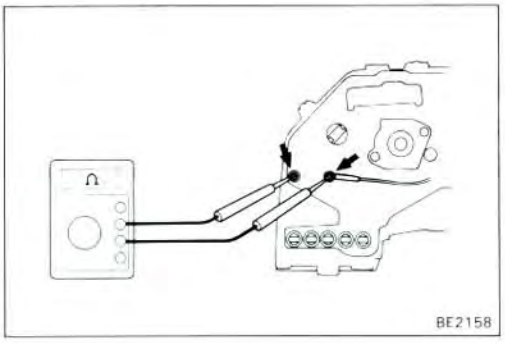
(a) Disconnect the connector from the pressure sensor.

(b) Turn the ignition switch ON. Check that the meter needle moves to upper position.



(c) Ground the terminal 2 on the wire harness side. Check that the meter needle moves to lower position.

If operation is not as specified, inspect the turbo meter circuit and resistance.

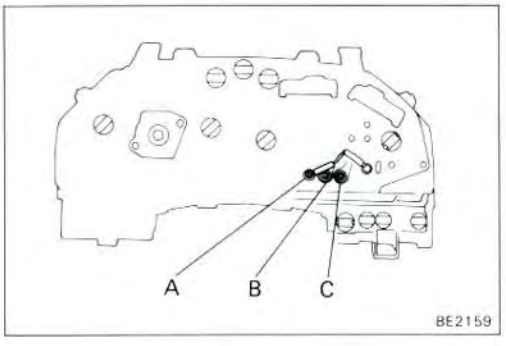


2. MEASURE METER RESISTANCE

Measure the resistance between terminals.

Resistance: Approx. 72 Ω

If resistance value is not as specified, replace the turbo meter.



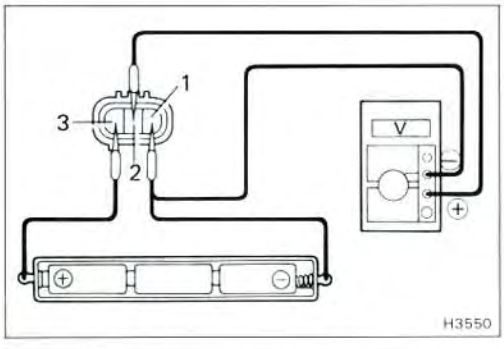
3. INSPECT METER DRIVE CIRCUIT

(a) Remove the combination meter with connected the wire harness.

(b) Inspect the terminals of the meter drive circuit as show in the chart.

Check for	Tester connection	Condition	Specification value
Continuity	B — Ground	Always	Continuity
Voltage	A — Ground	Turn ignition switch to ACC or LOCK	No voltage
		Turn ignition switch ON	Battery voltage
	C — Ground	Turn ignition switch to ACC or LOCK	No voltage
		Turn ignition switch ON	Approx. 2.6 V
		Engine idling	Less than Approx. 2.0 V

If operation is as specifeied replace the drive circuit.



4. INSPECT PRESSURE SENSOR

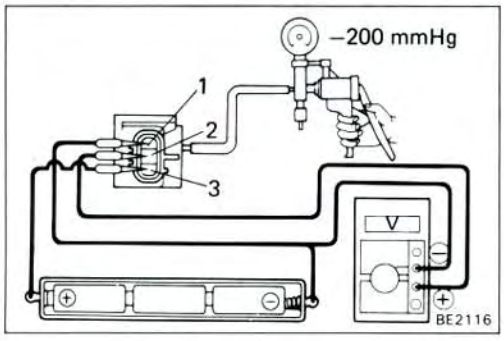
(a) Connect a series of three 1.5 V dry cell batteries.

(b) Connect the positive (+) lead from the dry cell batteries to terminal 3 and the negative (—) lead to terminal 1.

(c) Connect the positive (+) lead from the voltmeter to terminal 2 and the negative (—) lead to terminal 1.

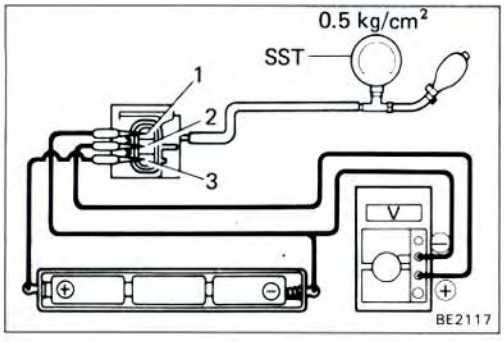
(d) Check that the voltage between terminals 2 and 1.

Voltage: Approx. 2.6 V



(e) Apply 200 mmHg (7.87 in.Hg. 26.7 kPa) of vacuum.

Check that the voltage drops below approximately 2.6 V.



(f) Using SST, apply 0.5 kg/cm² (7.1 psi, 49 kPa) of pressure.

Check that the voltage rises approximately 2.6 V.

SST 09992-00241

If operations are not as specified, replace the sensor.

AUDIO SYSTEM

CD Player

Troubleshooting

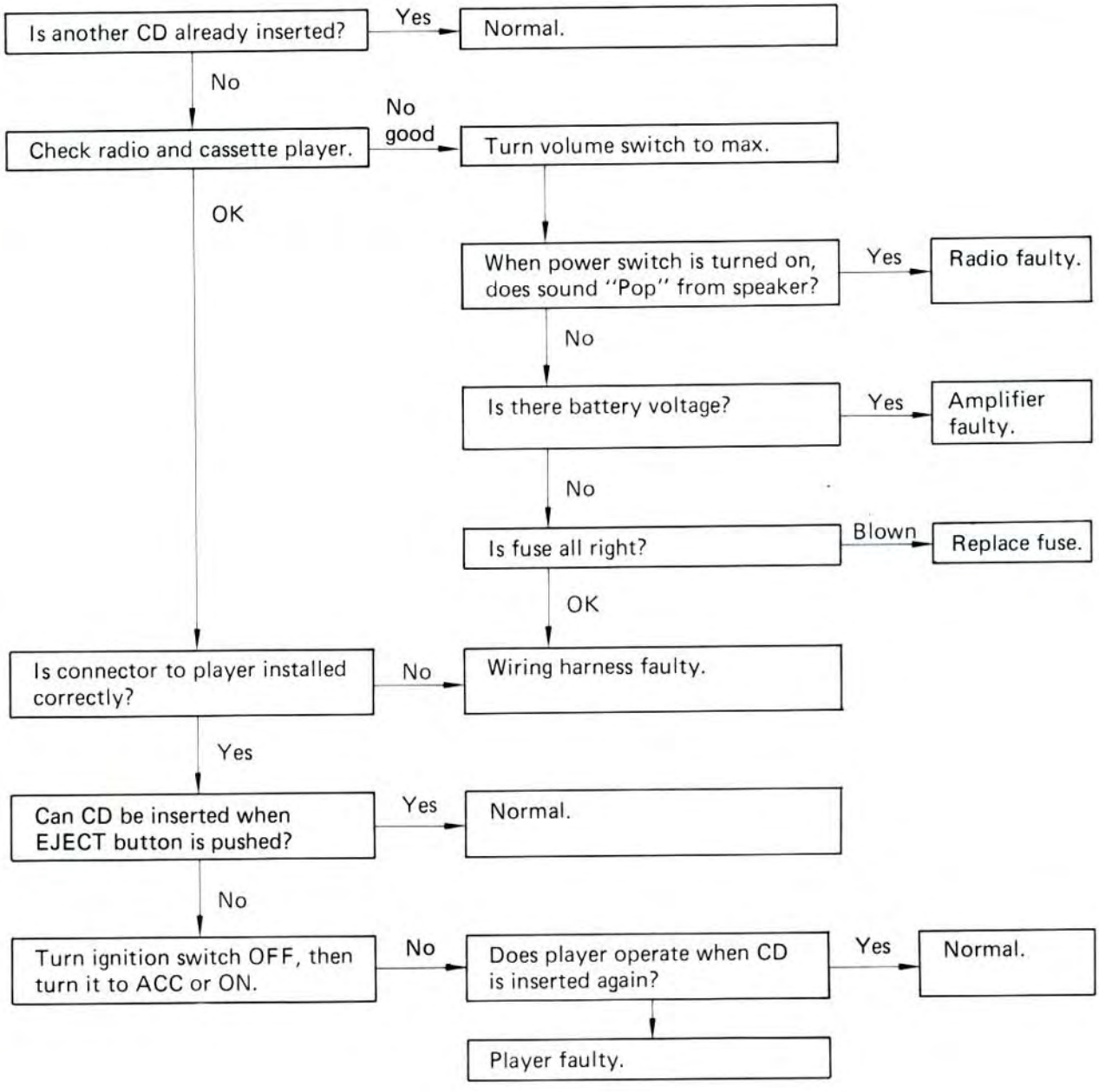
Problem	Section
CD can not be inserted	A
Does not play	B
Sound jumps	C
Bad sound Quality	D
CD will not eject	E

Check that the operation of other audio systems (Radio, Cassette etc.) are normal.

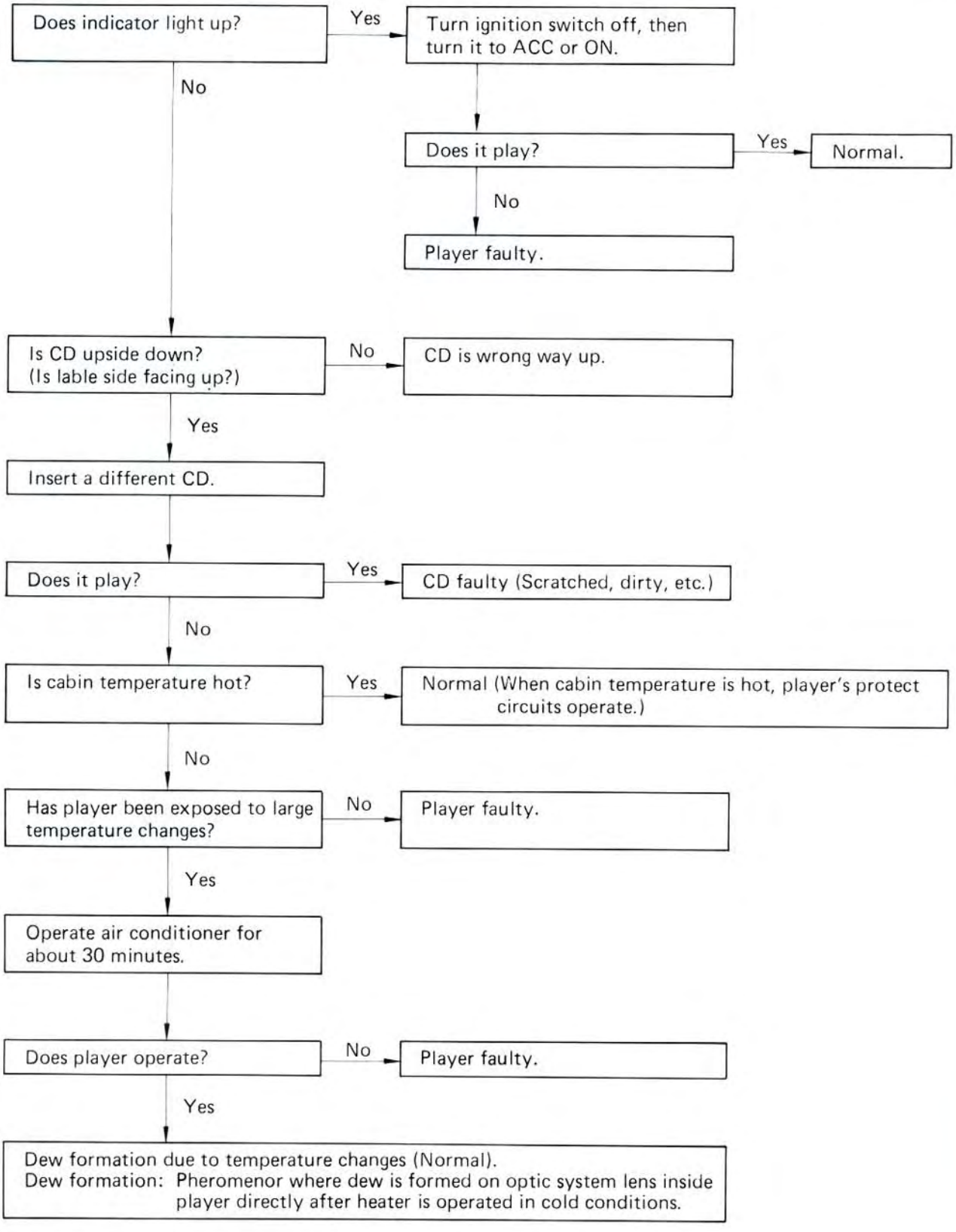
NOTE: Never attempt to disassemble or oil any part of the player nuit. Do not insert any object other than a disc into the slot. Remember there are no user-serviceable parts inside.

CAUTION: Compact Disc players use invisible laser beam which could cause hazardous radiation exposure if directed. Be sure to operate the player correctly as instructed.

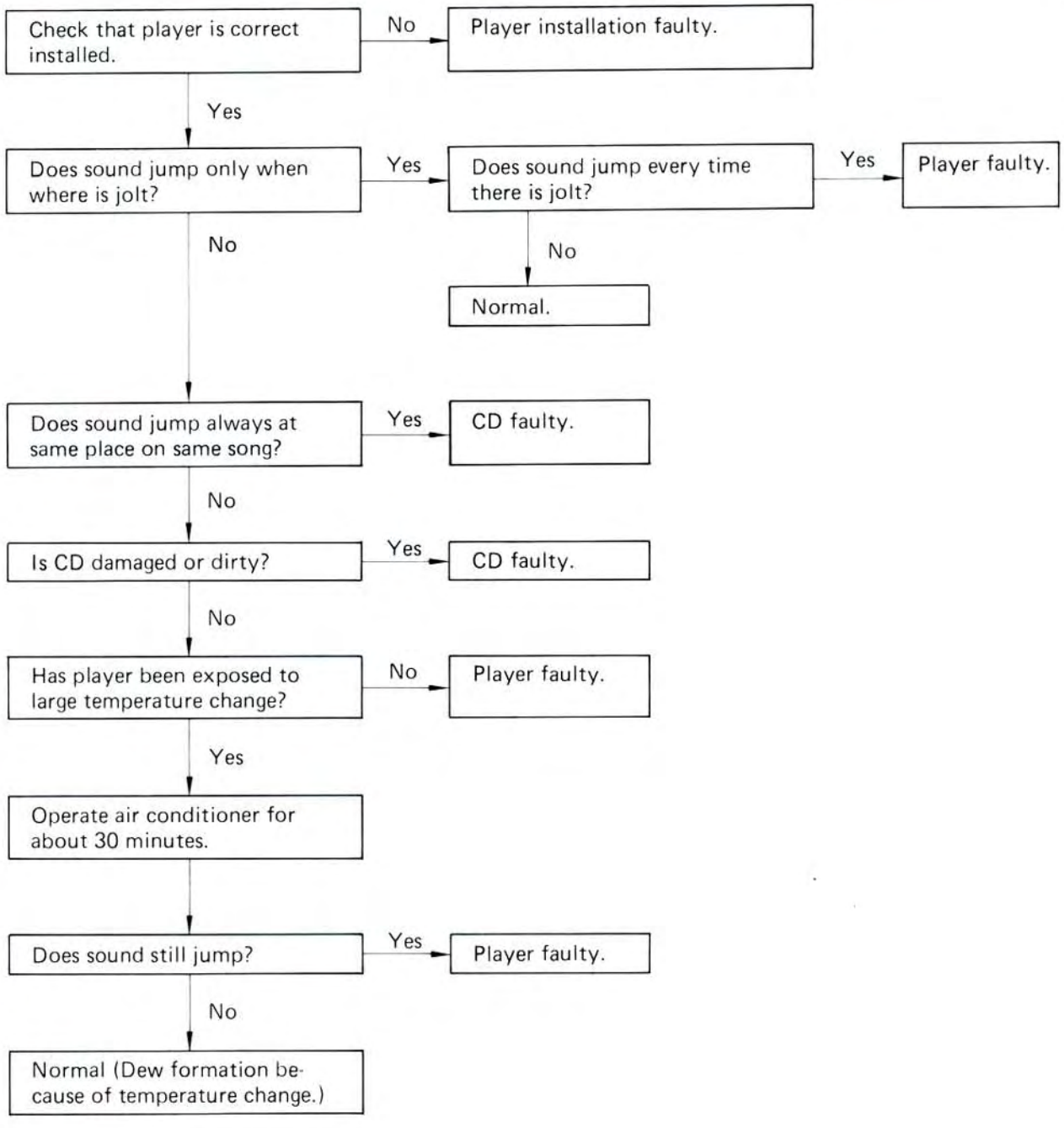
A CD CAN NOT BE INSERTED



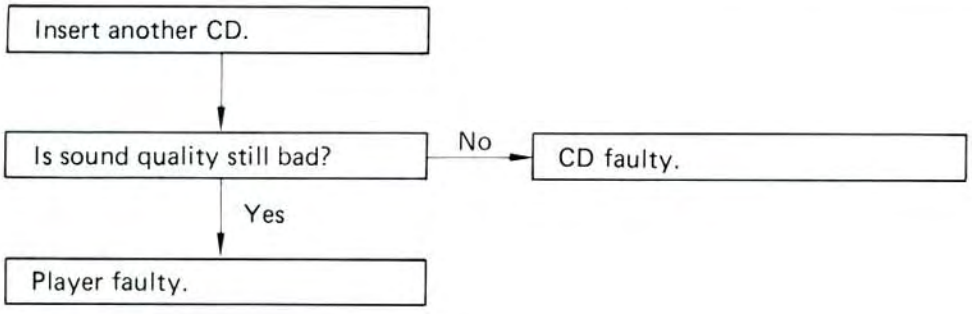
B DOES NOT PLAY



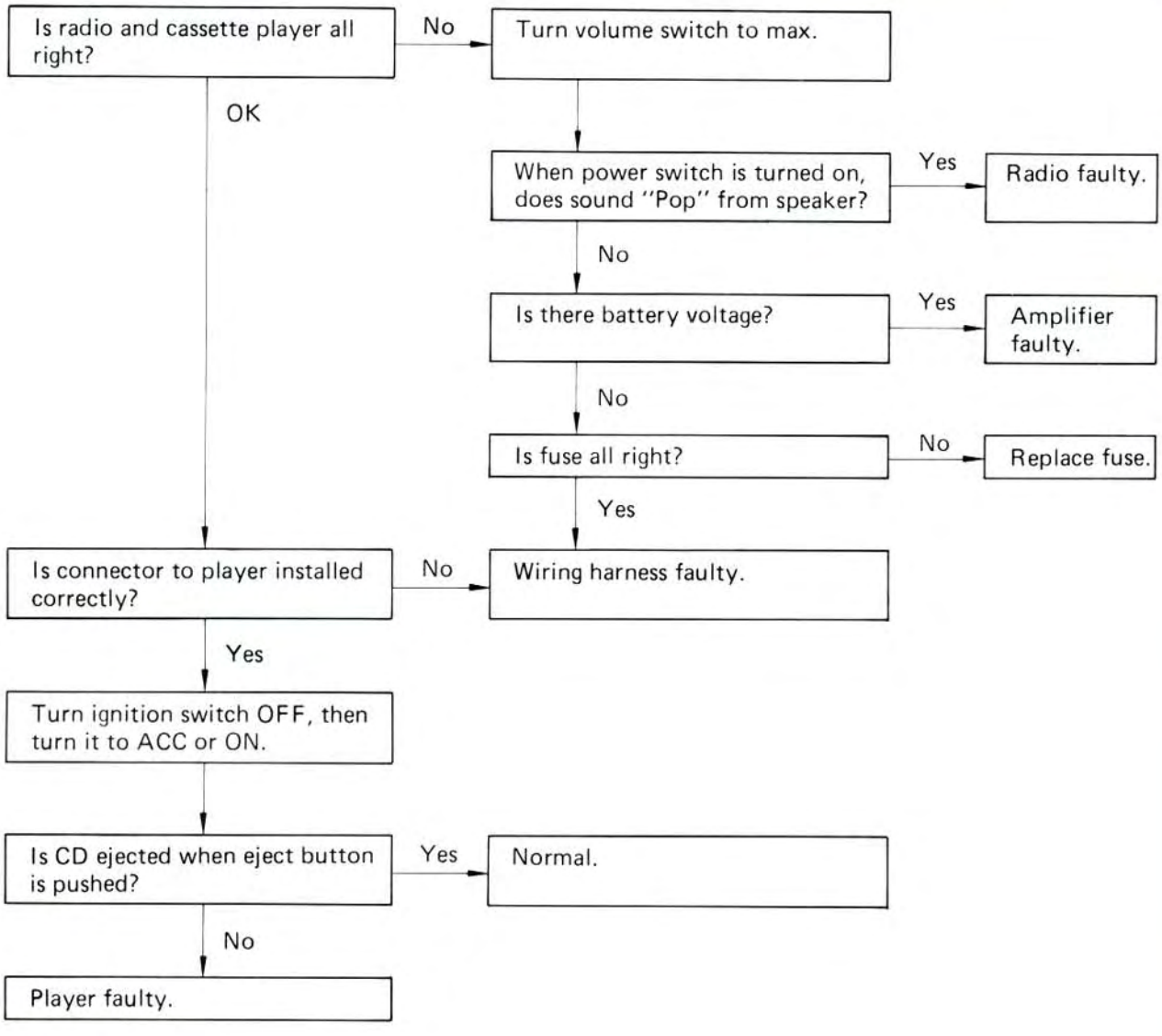
C SOUND JUMPS



D BAD SOUND QUALITY



E CD WILL NOT EJECT



BODY

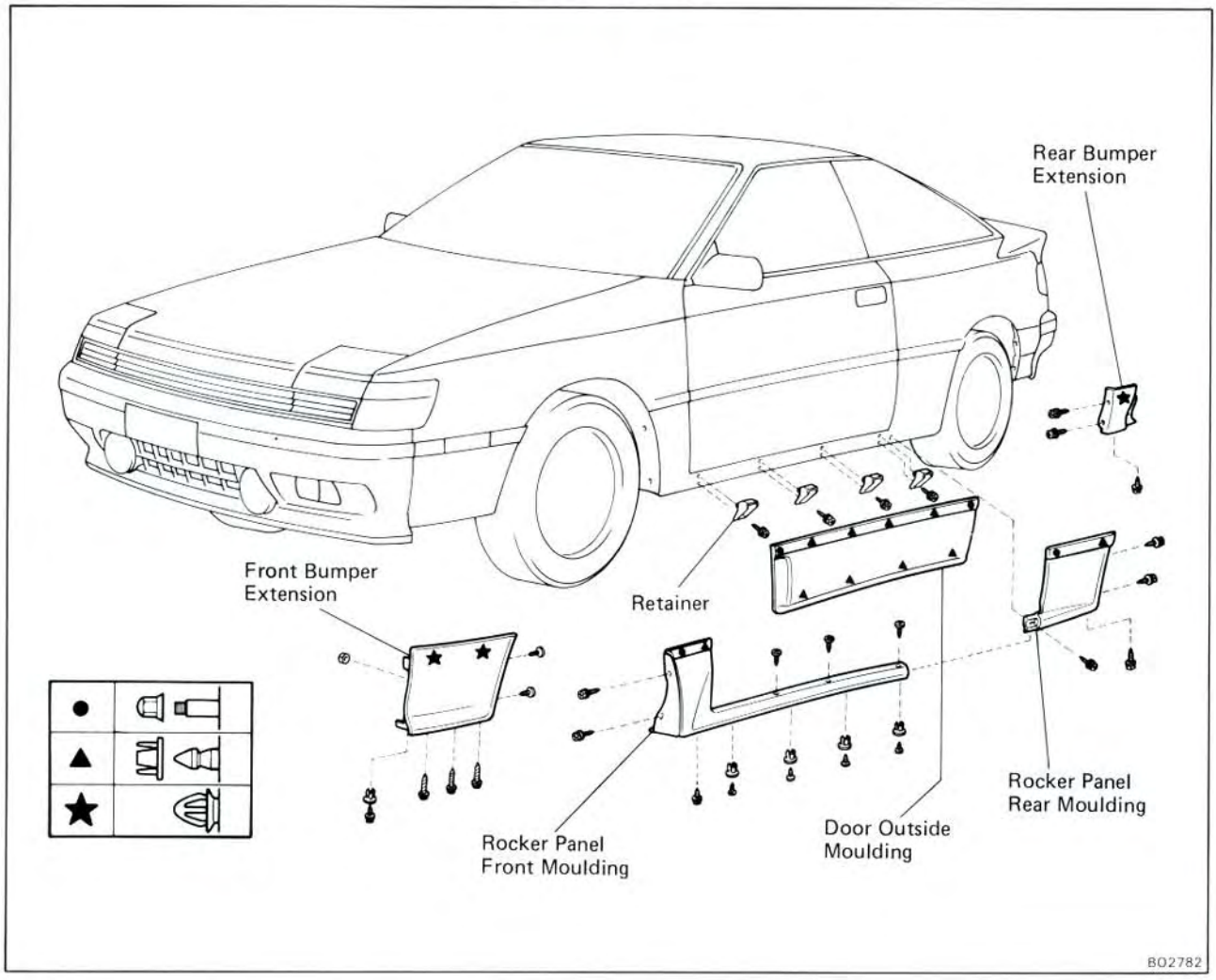
REFER TO 1988 CELICA REPAIR MANUAL (Pub. No. RM071U)

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

MOULDING

Side Body Moulding

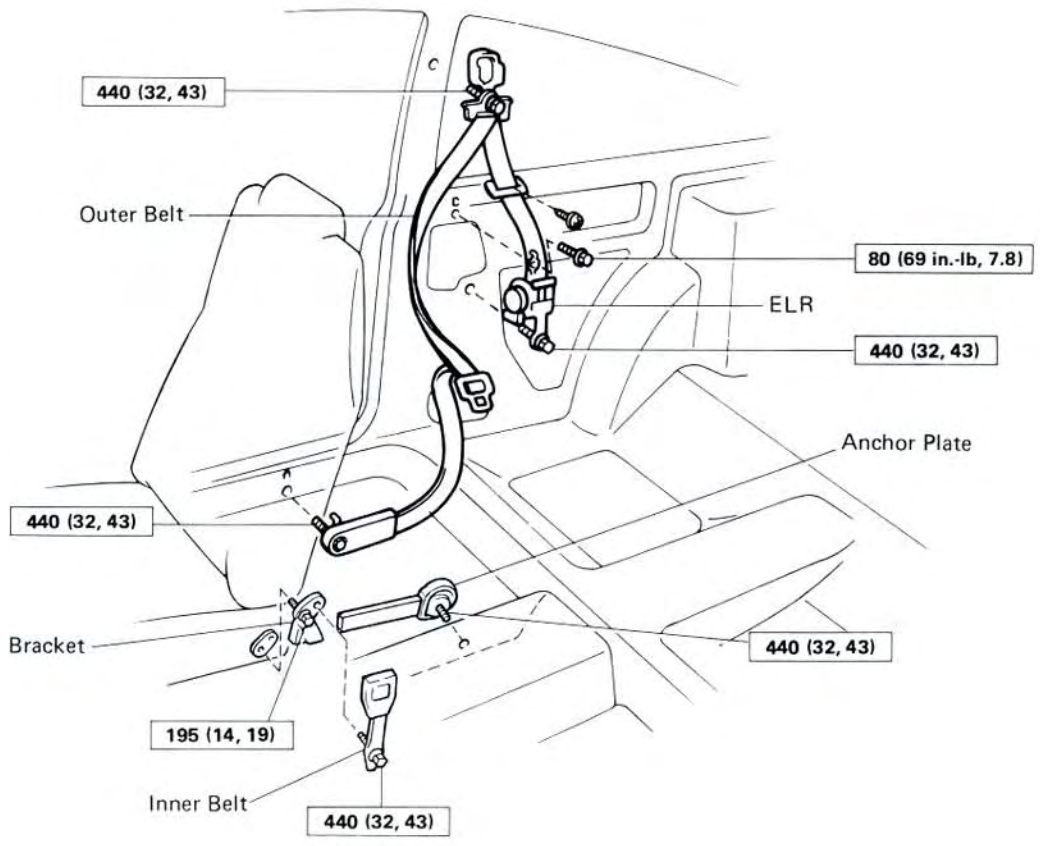
COMPONENTS



SEAT BELT

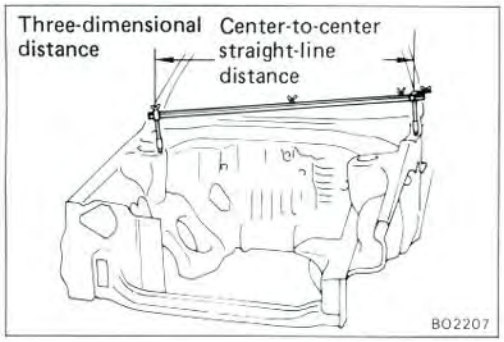
COMPONENTS

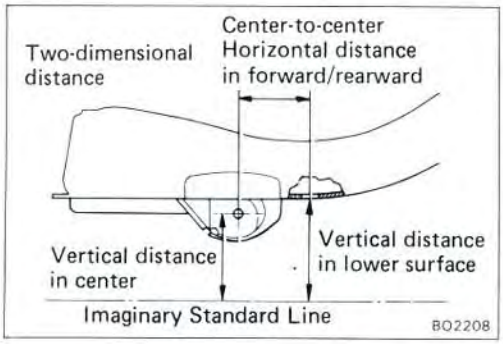
Front Seat Belt

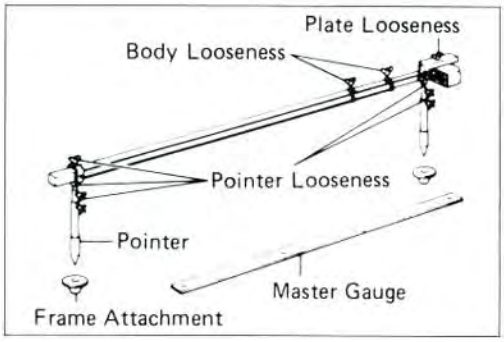


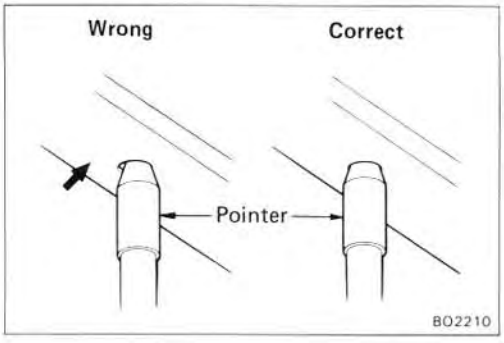
kg-cm (ft-lb, N-m) : Specified torque

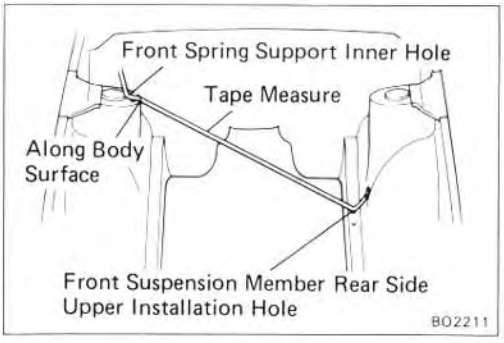
BO2781











BODY DIMENSIONS

General Information

1. BASIC DIMENSIONS

(a) There are two types of dimensions in the diagram.
(Three-dimensional distance)

- Staight-line distance between the centers of two measuring points.

(Two-dimensional distance)

- Horizontal distance in forward/rearward between the centers of two measuring points.
- The height from an imaginary standard line.

(b) Incases in which only one dimension is given, left and right are symmetrical.

(c) The dimensions in the following drawing indicates actual distance. Therefore, please use the dimensions as a reference.

2. MEASURING

(a) Basically, all measurments are to be done with a tracking gauge. For portion at which it is not possible to use to tracking gauge, a tape measure should be used.

(b) Use only a tracking gauge that has no looseness in the body, measuring plate, or pointers.

NOTE:

1. The height of the left and right pointers must be equal.
2. Always calibrate the tracking gauge before measuring or after adjusting the pointer height.
3. Take care not to drop the tracking gauge or otherwise shock it.
4. Confirm that the pointers are securely in the holes.

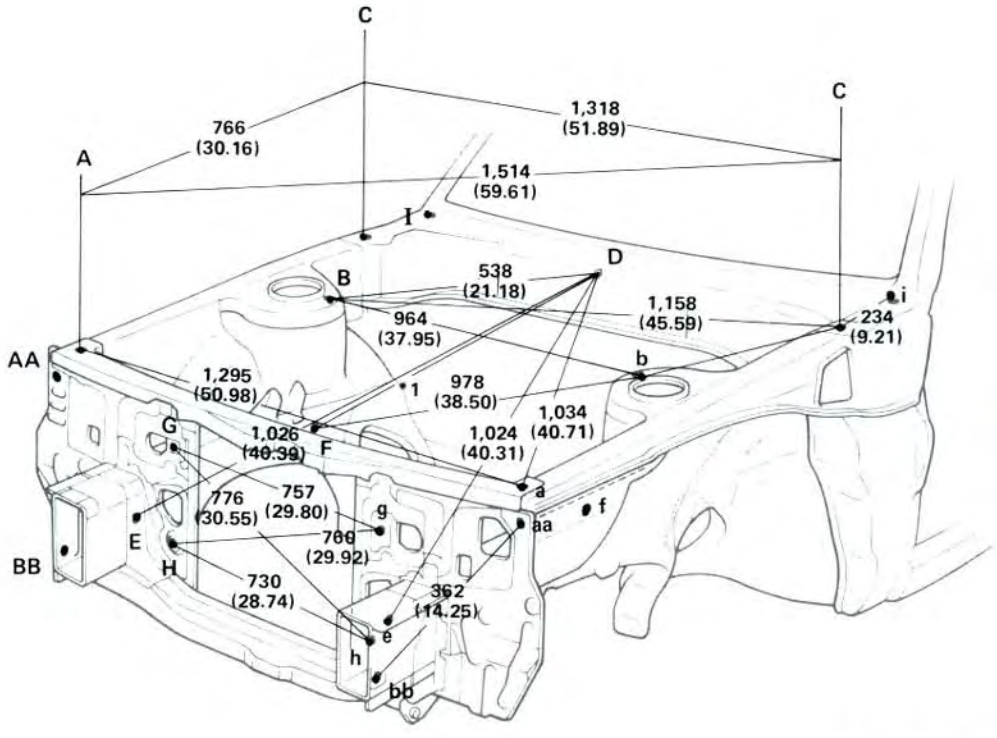
(c) When using a tape measure, avoid twists and bends in the tape.

(d) When tracking a diagonal measurement from the front spring support inner hole to the suspension member upper rear installation hole, measure along the front spring support panel surface.

BODY DIMENSION DRAWINGS

ENGINE COMPARTMENT

(Three-dimensional Distance)



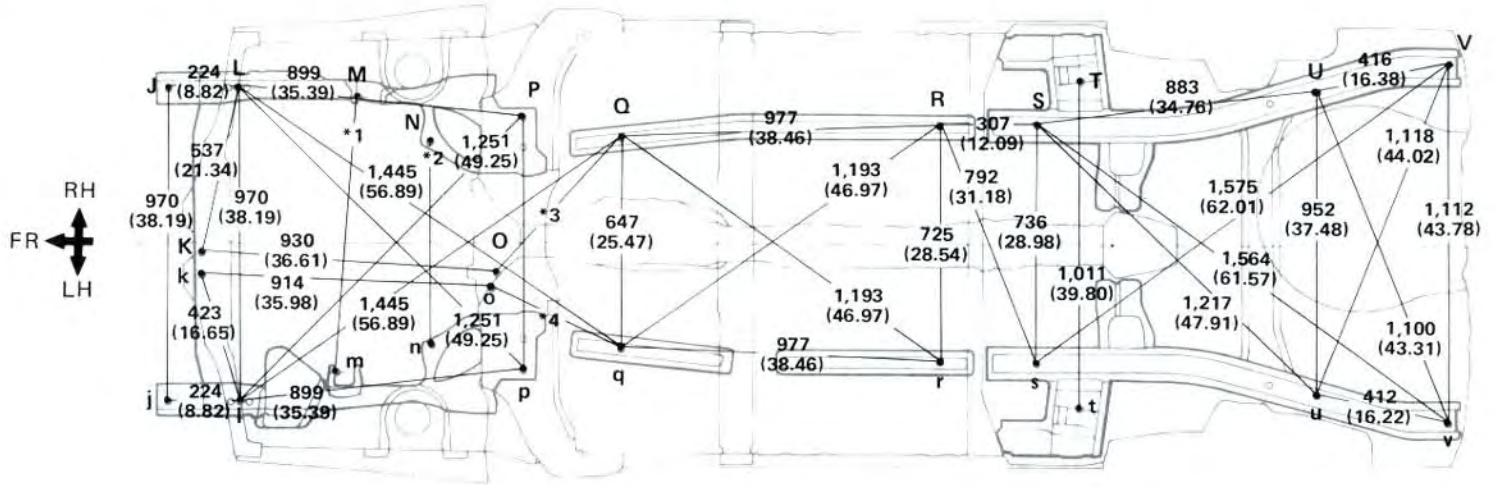
*1: 655 (25.79)

mm (in.)

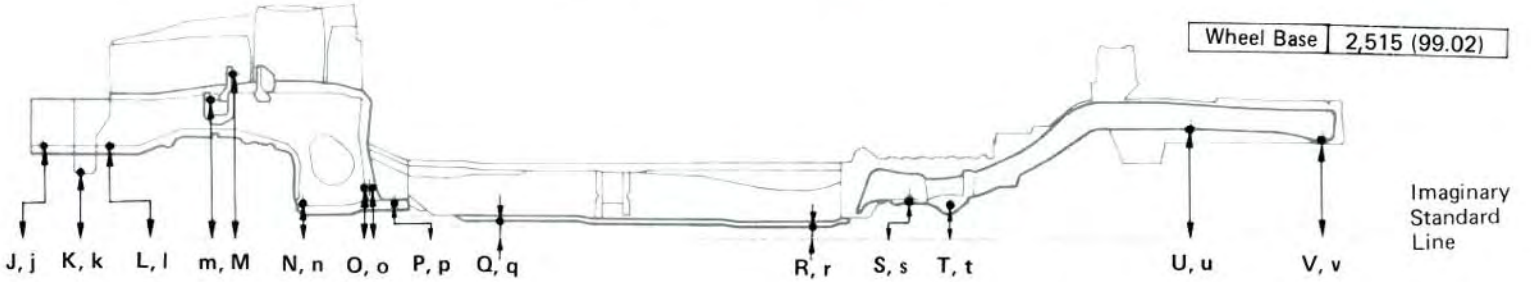
Symbol	Nomenclature	Hole dia.
A, a	Front fender installation nut – front	6 (0.24)
B, b	Front spring support hole – inner	11 (0.43)
C, c	Front fender installation nut – rear	6 (0.24)
D	Cowl top panel center mark	–
E, e	Front side member standard hole	15 (0.59)
F, f	Front side member working hole	15 (0.59)
G	Cooler pipe installation nut	6 (0.24)
g	Radiator support standard hole	9 (0.35)
H, h	Cooler condenser installation hole	10 (0.39)
I, i	Cowl top side panel standard hole	10 (0.39)
AA, aa	Front fender installation nut	6 (0.24)
BB, bb	Front side member extention standard hole	11 (0.39)

BO2775

(Three-dimensional Distance)



*1 M-m 864 (34.01)
*2 N-n 650 (25.59)
*3 O-Q 570 (22.44)
*4 o-q 440 (17.32)



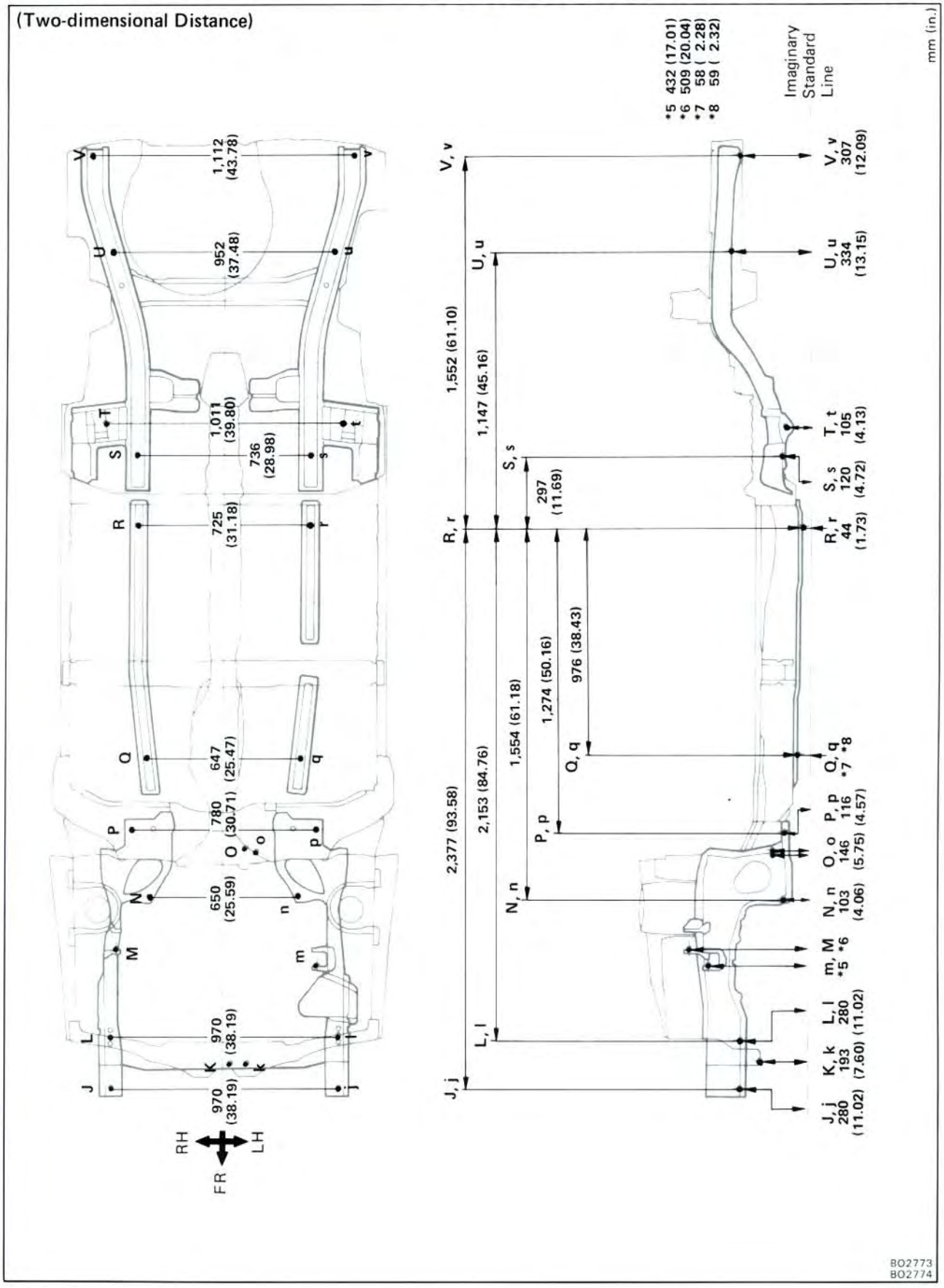
BO2773
BO2774

mm (in.)

Symbol	Nomenclature	Hole dia.	Symbol	Nomenclature	Hole dia.
J, j	Front side member bumper installation hole	RH 13 (0.51) LH 16 (0.63)	P, p	Lower arm installation nut	12 (0.47)
			Q, q	Front floor under reinforcement standard hole	15 (0.59)
K, k	Engine mounting member installation nut – front	10 (0.39)	R, r	Front floor under reinforcement standard hole	15 (0.59)
L, l	Front side member standard hole	15 (0.59)	S, s	Rear floor side member standard hole	18 (0.71)
M, m	Engine mounting bracket hole – front	13 (0.51)	T, t	Strut bar installation hole – inner	12 (0.47)
N, n	Lower arm installation nut	12 (0.47)	U, u	Rear floor side member standard hole	12 (0.47)
O, o	Engine mounting member installation nut	10 (0.39)	V	Rear floor side member standard hole	18 (0.71)

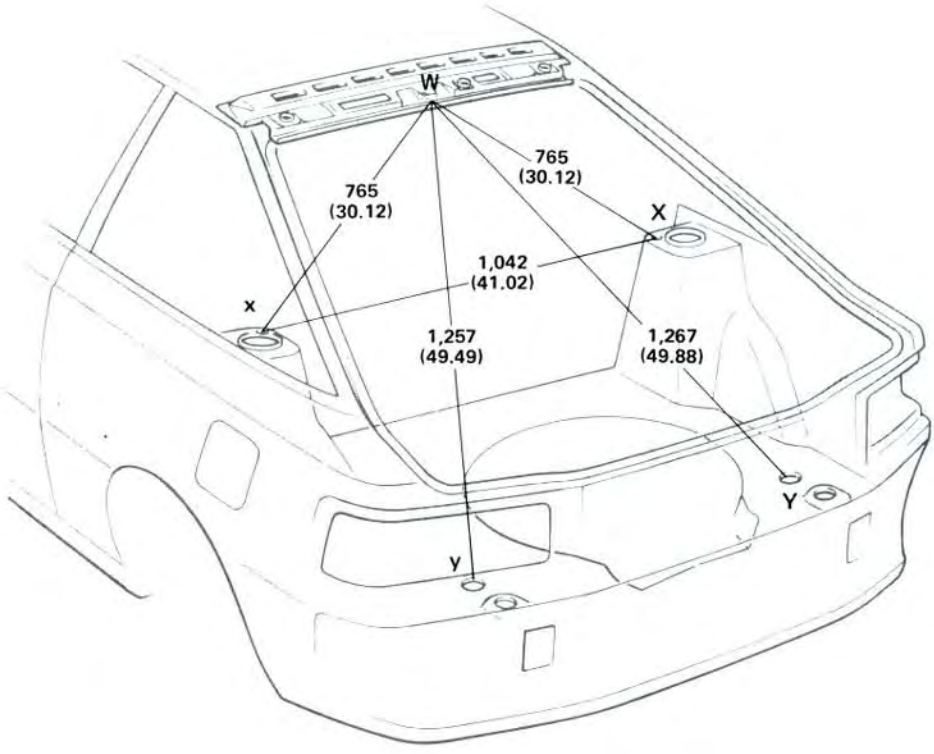
UNDER BODY (Cont'd)

(Two-dimensional Distance)

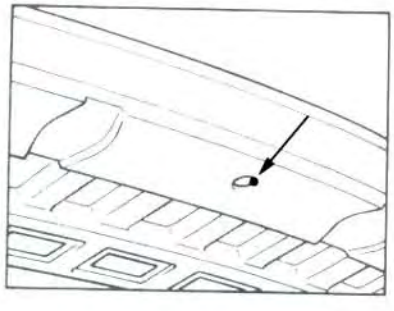


LUGGAGE COMPARTMENT

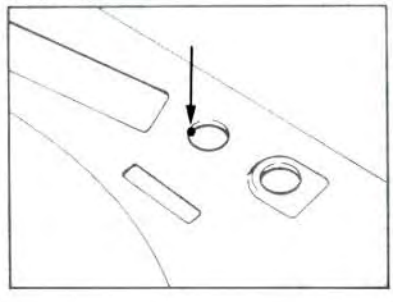
(Three-dimensional Distance)



W Point



Y, y Points



NOTE: The luggage compartment measurement is performed between the two dot marked points as shown in the above figugre.

mm (in.)

Symbol	Nomenclature	Hole dia.
W	Back door opening frame standard hole	9 (0.35)
X, x	Rear spring support hole — front	9.5 (0.374)
Y, y	Rear floor pan bumper installation hole — front	40 (1.57)

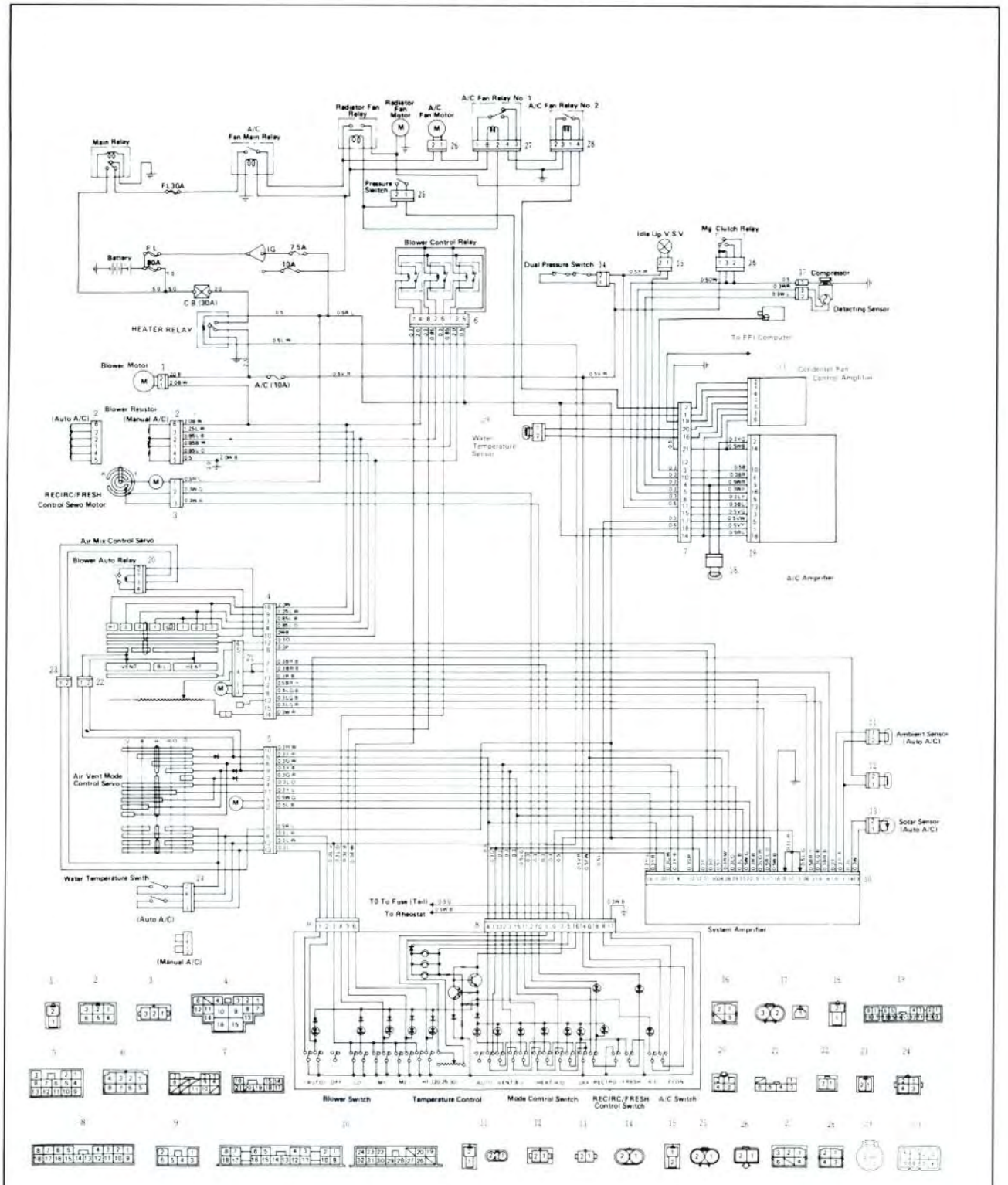
BO2772

AIR CONDITIONING SYSTEM

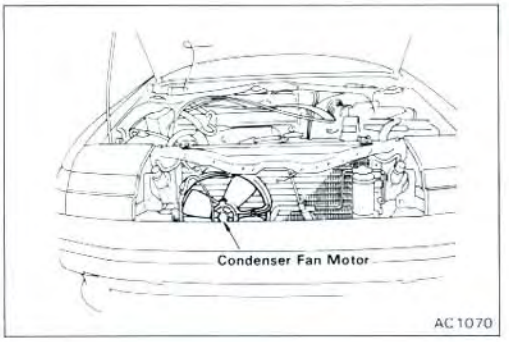
REFER TO 1988 CELICA REPAIR MANUAL (Pub. No. RM071U)

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

AIR CONDITIONING SYSTEM CIRCUIT



IC-2-2
G-7-2
AC1431



CONDENSER FAN MOTOR

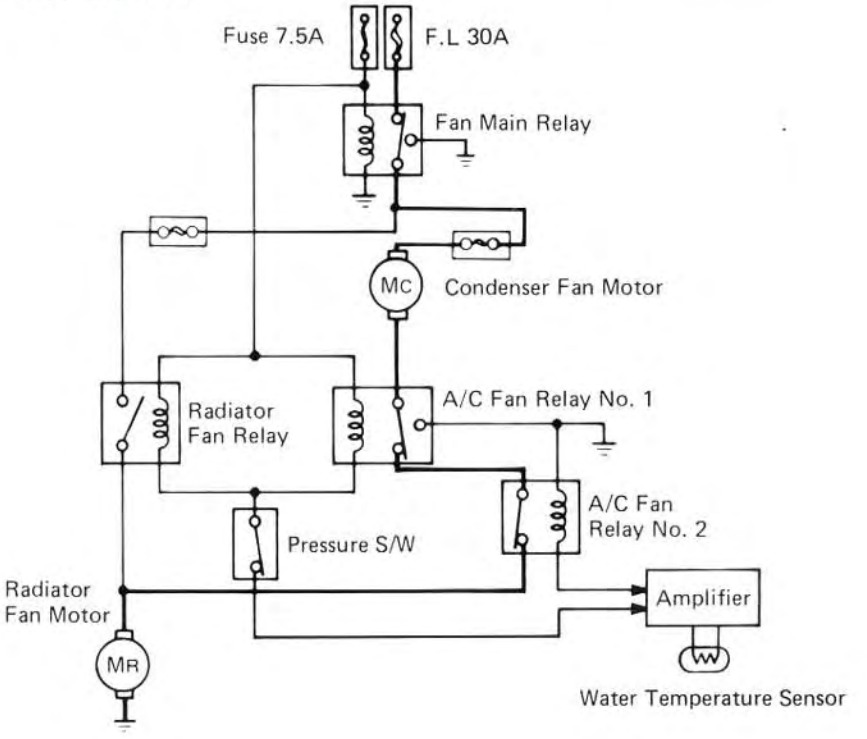
INSPECTION OF FAN MOTORS

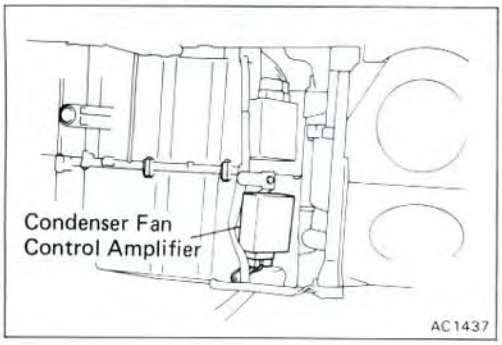
CHECK FAN MOTORS OPERATION

NOTE: The fan motors operate at two speed depending on the water temperature and A/C switch.

A/C switch	Magnetic clutch	Water temperature °C (°F)	Refrigerant pressure (kg/cm²)	Fan motor speed
OFF or ON	OFF	85 (185) or below	15.5 or below	OFF
		85 – 90 (185 – 194)		LO
		90 (194) or above		HI
ON	ON	85 (185) or below		LO
		85 – 90 (185 – 194)		
		90 (194) or above		HI
		90 (194) or below	15.5 or above	
		90 (194) or above		

(Example) A/C Switch: ON Magnetic Clutch: ON Water Temperature: 90°C (194°F) or below
Fan Motor Speed: Low



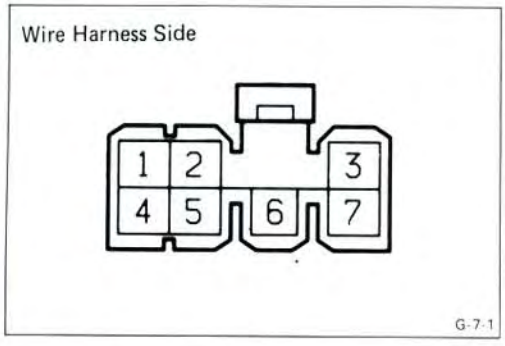


CONDENSER FAN CONTROL AMPLIFIER

INSPECTION OF AMPLIFIER

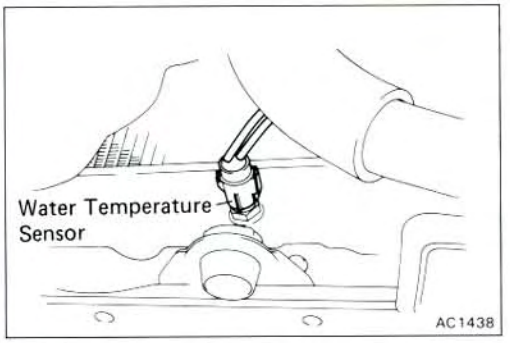
INSPECT AMPLIFIER CIRCUIT

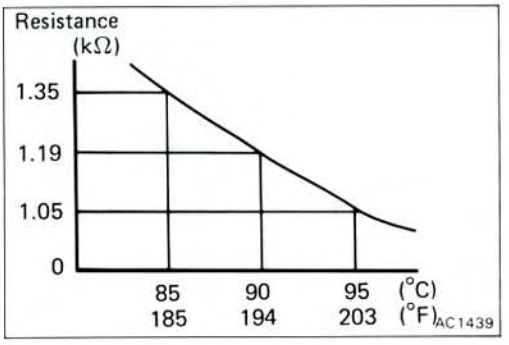
Disconnect the amplifier and inspect the connector on the wire harness side as shown in the chart below.



Test conditions:
(1) Ignition switch: ON
(2) Temperature control lever: MAX COOL
(3) Blower switch: HI

Check for	Tester connection	Condition	Specified value
Continuity	6 – Ground	—	Continuity
Voltage	3 – 6	Turn ignition switch on	Battery voltage
		Turn ignition switch off	No voltage
Voltage	4 – 6	Turn ignition switch on	Battery voltage
		Turn ignition switch off	No voltage
Resistance	7 – 5	—	Approx. 570 Ω at 25°C (77°F)
Continuity	2 – 6	—	Continuity





SENSOR

INSPECTION OF WATER TEMPERATURE SENSOR

Check the sensor operation.

SERVICE SPECIFICATIONS

REFER TO 1988 CELICA REPAIR MANUAL
(Pub. No. RM071U)

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

MAINTENANCE

Engine

Drive belt tension					
Alternator	w/ A/C	New belt	175 ± 5 lb		
		Used belt	115 ± 20 lb		
	w/o A/C	New belt	150 ± 25 lb		
		Used belt	130 ± 25 lb		
PS pump		New belt	125 ± 10 lb		
		Used belt	80 ± 20 lb		
Engine coolant capacity (w/ Heater)			8.0 liters	8.5 US qts	7.0 Imp. qts
Intercooler coolant capacity			1.7 liters	1.8 US qts	1.5 Imp. qts
Engine oil capacity (Drain and refill)					
	w/ Oil filter change		3.6 liters	3.8 US qts	3.2 Imp. qts
	w/o Oil filter change		3.3 liters	3.6 US qts	2.9 Imp. qts
Spark plug					
Type		ND	PQ16R8		
		NGK	BCPR5EP8		
Gap			0.8 mm	0.031 in.	
Firing order			1–3–4–2		
Valve clearance		Intake	0.15 – 0.25 mm	0.006 – 0.010 in.	
		Exhaust	0.20 – 0.30 mm	0.008 – 0.012 in.	

Chassis

Front and rear brake					
Pad thickness		Limit	1.0 mm	0.039 in.	
Disc thickness	Front	Limit	24.0 mm	0.945 in.	
	Rear	Limit	9.0 mm	0.354 in.	
Disc runout		Limit	0.15 mm	0.0059 in.	
Parking brake					
Lining thickness		Limit	1.0 mm	0.039 in.	
Drum inside diameter		Limit	171.0 mm	6.732 in.	
Front axle and suspension					
Ball joint vertical play		Limit	0 mm	0 in.	
Steering wheel freeplay			30 mm (1.18 in.) or less		
Torque specifications					
Front seat mount bolts			375 kg-cm	27 ft-lb	37 N·m
Engine mounting center member-to-body mount bolts			400 kg-cm	29 ft-lb	39 N·m
Front suspension lower crossmember-to-body mount nuts			2,125 kg-cm	154 ft-lb	208 N·m
Rear suspension member-to-body mount nuts			1,620 kg-cm	117 ft-lb	159 N·m

ENGINE MECHANICAL

Specifications

Idle speed				750 ± 50 rpm
Intake manifold vacuum	at Idle speed			450 mmHg 17.72 in.Hg 60.0 kPa
Compression pressure	at 250 rpm		STD	12.5 kg/cm² (178 psi, 1,226 kPa) or more
			Limit	9.0 kg/cm² 128 psi 883 kPa
	Difference of pressure between each cylinder			1.0 kg/cm² (14 psi, 98 N) or less
Cylinder head	Warpage Cylinder block side		Limit	0.2 mm 0.008 in.
	Manifold side	Limit	Intake	0.2 mm 0.008 in.
			Exhaust	0.3 mm 0.012 in.
	Valve seat Refacing angle			30°, 45°, 75°
	Contacting angle			45°
	Contacting width			1.0 – 1.4 mm 0.039 – 0.055 in.
Valve guide bushing	Inside diameter			6.000 – 6.018 mm 0.2362 – 0.2369 in.
	Outside diameter		STD	11.033 – 11.044 mm 0.4344 – 0.4348 in.
			O/S 0.05	11.083 – 11.094 mm 0.4363 – 0.4368 in.
Valve	Valve overall length	STD	Intake	102.85 mm 4.0492 in.
			Exhaust	101.90 mm 4.0118 in.
		Limit	Intake	102.15 mm 4.0216 in.
			Exhaust	101.20 mm 3.9842 in.
	Valve face angle			44.5°
	Stem diameter		Intake	5.960 – 5.975 mm 0.2346 – 0.2352 in.
			Exhaust	5.955 – 5.970 mm 0.2344 – 0.2350 in.
	Stem oil clearance	STD	Intake	0.025 – 0.058 mm 0.0010 – 0.0023 in.
			Exhaust	0.030 – 0.063 mm 0.0012 – 0.0025 in.
		Limit	Intake	0.08 mm 0.0031 in.
			Exhaust	0.10 mm 0.0039 in.
	Margin thickness		STD	0.8 – 1.2 mm 0.031 – 0.047 in.
			Limit	0.5 mm 0.020 in.
Valve spring	Squareness		Limit	2.0 mm 0.079 in.
	Free length			45.3 mm 1.783 in.
	Installed tension at 34.7 mm (1.366 in.)			18.4 – 21.6 kg (40.6 – 47.6 lb, 180 – 212 N)
Valve lifter	Lifter diameter			27.975 – 27.985 mm 1.1014 – 1.1018 in.
	Lifter bore diameter			28.000 – 28.021 mm 1.1024 – 1.1032 in.
	Oil clearance		STD	0.015 – 0.046 mm 0.0006 – 0.0018 in.
			Limit	0.07 mm 0.0028 in.
Manifold	Warpage	Limit	Intake	0.3 mm 0.012 in.
			Exhaust	1.0 mm 0.039 in.
Air control valve	Warpage		Limit	0.2 mm 0.008 in.
T-VIS VSV	Resistance			33 – 39 Ω
Camshaft	Thrust clearance		STD	0.100 – 0.240 mm 0.0039 – 0.0094 in.
			Limit	0.30 mm 0.0118 in.
	Journal oil clearance		STD	0.025 – 0.062 mm 0.0010 – 0.0024 in.
			Limit	0.08 mm 0.0031 in.

Specifications (Cont'd)

Camshaft (cont'd)	Journal diameter		26.959 – 26.975 mm	1.0614 – 1.0620 in.
	Circle runout	Limit	0.06 mm	0.0024 in.
	Cam lobe height	STD	35.460 – 35.560 mm	1.3961 – 1.4000 in.
		Limit	35.40 mm	1.3937 in.
Idler pulley tension spring	Free length		43.8 mm	1.724 in.
	Installed load at 51.9 mm (2.043 in.)		7.54 kg 16.6 lb	74 N
Cylinder block	Cylinder head surface warpage	Limit	0.05 mm	0.0020 in.
	Cylinder bore diameter	STD	86.000 – 86.030 mm	3.3858 – 3.3870 in.
		Limit	86.23 mm	3.3949 in.
Piston and piston ring	Piston diameter (at right angles to piston pin center, 29.1 mm (1.146 in.) from piston head)		85.960 – 85.990 mm	3.3854 – 3.4138 in.
	Piston oil clearance	STD	0.030 – 0.050 mm	0.0012 – 0.0020 in.
		Limit	0.070 mm	0.0028 in.
	Piston ring groove clearance	No. 1	0.040 – 0.080 mm	0.0015 – 0.0031 in.
		No. 2	0.030 – 0.070 mm	0.0012 – 0.0028 in.
	Piston ring end gap STD	No. 1	0.330 – 0.570 mm	0.0130 – 0.0224 in.
		No. 2	0.450 – 0.690 mm	0.0177 – 0.0272 in.
		Oil	0.200 – 0.620 mm	0.0079 – 0.0244 in.
	Limit	No. 1	0.87 mm	0.0343 in.
		No. 2	0.99 mm	0.0390 in.
		Oil	0.92 mm	0.0362 in.
Connecting rod	Thrust clearance	STD	0.160 – 0.312 mm	0.0063 – 0.0123 in.
		Limit	0.35 mm	0.35 in.
	Connecting rod bearing center wall thickness			
	STD	Mark 1	1.484 – 1.488 mm	0.0584 – 0.0586 in.
		Mark 2	1.488 – 1.492 mm	0.0586 – 0.0587 in.
		Mark 3	1.492 – 1.496 mm	0.0587 – 0.0589 in.
	Connecting rod oil clearance	STD	0.024 – 0.055 mm	0.0009 – 0.0022 in.
		Limit	0.08 mm	0.0031 in.
	Rod bent Limit per 100 mm (3.94 in.)		0.05 mm	0.0020 in.
	Rod twist Limit per 100 mm (3.94 in.)		0.15 mm	0.0059 in.
	Bushing inside diameter		22.005 – 22.017 mm	0.8663 – 0.8668 in.
	Piston pin diameter		21.997 – 22.009 mm	0.8660 – 0.8665 in.
	Piston pin oil clearance	STD	0.005 – 0.011 mm	0.0002 – 0.0004 in.
		Limit	0.05 mm	0.0020 in.
Crankshaft	Thrust clearance	STD	0.020 – 0.220 mm	0.0008 – 0.0087 in.
		Limit	0.30 mm	0.0118 in.
	Thrust washer thickness	STD	2.440 – 2.490 mm	0.0961 – 0.0980 in.
	Main journal oil clearance STD	No. 3	0.028 – 0.047 mm	0.0011 – 0.0019 in.
		Others	0.018 – 0.037 mm	0.0007 – 0.0015 in.
	Limit		0.08 mm	0.0031 in.
	Main journal diameter		54.985 – 55.000 mm	2.1648 – 2.1653 in.
	Main bearing center wall thickness			
	STD No. 3	Mark 1	1.992 – 1.995 mm	0.0784 – 0.0785 in.
		Mark 2	1.995 – 1.998 mm	0.0785 – 0.0787 in.
		Mark 3	1.998 – 2.001 mm	0.0787 – 0.0788 in.
		Mark 4	2.001 – 2.004 mm	0.0788 – 0.0789 in.
		Mark 5	2.004 – 2.007 mm	0.0789 – 0.0790 in.

Specifications (Cont'd)

Crankshaft (cont'd)	Main bearing center wall thickness (cont'd)				
	STD	Others	Mark 1	1.997 – 2.000 mm	0.0786 – 0.0787 in.
			Mark 2	2.000 – 2.003 mm	0.0787 – 0.0789 in.
			Mark 3	2.003 – 2.006 mm	0.0789 – 0.0790 in.
			Mark 4	2.006 – 2.009 mm	0.0790 – 0.0791 in.
			Mark 5	2.009 – 2.012 mm	0.0791 – 0.0792 in.
	Crank pin diameter			47.985 – 48.000 mm	1.8892 – 1.8898 in.
	Circle runout		Limit	0.06 mm	0.0024 in.
	Main journal taper and out-of-round		Limit	0.02 mm	0.0008 in.
	Crank pin taper and out-of-round		Limit	0.02 mm	0.0008 in.

Torque Specifications

Part tightened		kg-cm	ft-lb	N·m
Oil pump pulley x Oil pump drive shaft		290	21	28
No. 1 idler pulley x Cylinder head		440	32	43
No. 2 idler pulley x Cylinder block		440	32	43
Camshaft timing pulley x Camshaft		600	43	59
Crankshaft pulley x Crankshaft		1,100	80	108
Cylinder head x Cylinder block	1st	550	40	53
	2nd	90° turns		
RH engine hanger x Cylinder head		195	14	19
Camshaft bearing cap x Cylinder head		190	14	19
No. 3 timing belt cover x Cylinder head		80	69 in.-lb	7.8
Cylinder head cover x Cylinder head		25	21 in.-lb	2.5
Intake manifold x Cylinder head		195	14	19
Intake manifold stay x Intake manifold		260	119	25
Intake manifold stay x Cylinder block		260	19	25
EGR valve x Intake manifold		195	14	19
EGR pipe x Cylinder head		195	14	19
Water outlet x Cylinder head		130	9	13
LH engine hanger x Cylinder head	12 mm bolt head	130	9	13
	14 mm bolt head	195	14	19
Exhaust manifold x Cylinder head		530	38	52
Alternator bracket x Cylinder head		400	29	39
Alternator bracket x Cylinder block		400	29	39
Alternator bracket x Turbine outlet elbow		440	32	43
Catalytic converter x Turbine outlet elbow		300	22	29
Catalytic converter stay x Catalytic converter		650	47	64
Catalytic converter stay x Cylinder block		650	47	64
Suspension upper brace x Body	Bolt	210	15	21
	Nut	375	27	37
Main bearing cap x Cylinder block		600	43	59
Connecting rod cap x Connecting rod		680	49	67
Rear oil seal retainer x Cylinder block		95	82 in.-lb	9.3
Rear end plate x Cylinder block		95	82 in.-lb	9.3
Flywheel x Crankshaft	New bolt	900	65	88
	Reused bolt	950	69	93
Suspension lower crossmember x Body		2,125	154	208
Suspension lower crossmember x Engine mounting center member		400	29	39
Engine mounting center member x Body		400	29	39

Torque Specifications (Cont'd)

Part tightened	kg-cm	ft-lb	N·m
Engine mounting center member x Engine mounting bracket	530	38	52
Engine mounting insulator x Body	800	58	78
Engine mounting insulator x Engine mounting bracket	530	38	52
Engine mounting bracket x Cylinder block	530	38	52
Catalytic converter x Exhaust pipe	440	32	43

TURBOCHARGER SYSTEM

Specifications

Intercooler coolant capacity		See page A-2
Turbocharger	Turbocharging pressure	0.40 – 0.70 kg/cm^2 (5.7 – 10.0 psi, 39 – 69 kPa)
	Impeller wheel axial play	0.13 mm (0.0051 in.) or less
Intercooler filler cap	Relief valve opening pressure	0.75 – 1.05 kg/cm^2 (10.7 – 14.9 psi, 74 – 103 kPa)
		0.6 kg/cm^2 8.5 psi 59 kPa

Torque Specifications

Part tightened	kg-cm	ft-lb	N·m
No. 3 turbo water pipe x Turbocharger	120	9	11
No. 1 turbo water pipe x Turbocharger	120	9	11
Turbocharger x Exhaust manifold	650	47	64
No. 2 oil pipe x Turbocharger	175	13	17
No. 2 oil pipe x No. 1 oil pipe	195	14	19
Turbocharger stay x Turbocharger	810	59	79
Turbocharger stay x Cylinder block	530	38	52
Turbine outlet elbow x Turbocharger	650	47	64

EFI SYSTEM

Specifications

Fuel pressure regulator	Fuel pressure	at No vacuum	2.3 – 2.7 kg/cm² (33 – 38 psi, 226 – 265 kPa)	
Cold start injector	Resistance Fuel leakage		2 – 4 Ω One drop or less per minute	
Injector	Resistance Injection volume Difference between each cylinder Fuel leakage		2 – 4 Ω 104 – 110 cc (6.3 – 6.7 cu in.) per 15 sec. 5 cc (0.31 cu in.) or less One drop or less per minute	
Throttle body	Throttle body fully closed angle		6°	
Throttle position sensor	Clearance between stop screw and lever		Between terminals	Resistance
	0 mm 0.50 mm 0.70 mm Throttle valve fully opened position	0 in. 0.020 in. 0.028 in. –	VTA – E2 IDL – E2 IDL – E2 VTA – E2 VC – E2	0.2 – 0.8 kΩ 2.3 kΩ or less Infinity 3.3 – 10.3 kΩ 3 – 8.3 kΩ
ISC valve	Resistance	+B – ISC 1 or ISC 2	16.0 – 17.0 Ω	
Cold start injector time switch	Resistance	STA – STJ below 10°C (50°F) STA – STJ above 25°C (77°F) STA – Ground	30 – 50 Ω 70 – 90 Ω 30 – 90 Ω	
Air flow meter	Resistance	VS – E2	200 – 600 Ω (Measuring plate fully closed) 20 – 1,000 Ω (Measuring plate fully open)	
		VC – E2 FC – E1	200 – 400 Ω Infinity (Measuring plate fully closed) Zero (Others)	
		THA – E2 at –20°C (–4°F) at 0°C (32°F) at 20°C (68°F) at 40°C (104°F) at 60°C (140°F)	10 – 20 kΩ 4 – 7 kΩ 2 – 3 kΩ 0.9 – 1.3 kΩ 0.4 – 0.7 kΩ	
Fuel pump resistor	Resistance		Approx. 0.73 Ω	
Solenoid resistor	Resistance	+B – No. 10, No. 20, No. 30 or No. 40	5 – 7 Ω	
Water temp. sensor	Resistance	at –20°C (–4°F) at 0°C (32°F) at 20°C (68°F) at 40°C (104°F) at 60°C (140°F) at 80°C (176°F)	10 – 20 kΩ 4 – 7 kΩ 2 – 7 kΩ 0.9 – 1.3 kΩ 0.4 – 0.7 kΩ 0.2 – 0.4 kΩ	
EGR gas temp. sensor (Calif. only)	Resistance	at 50°C (122°F) at 100°C (212°F) at 150°C (302°F)	69.40 – 88.50 kΩ 11.89 – 14.37 kΩ 2.79 – 3.59 kΩ	
Oxygen sensor	Heater coil resistance		5.1 – 6.3 Ω	
T-VIS VSV	Resistance		33 – 39 Ω	
EGR VSV	Resistance		33 – 39 Ω	
Turbocharging pressure VSV	Resistance		24 – 30 Ω	
Fuel pressure VSV	Resistance		33 – 39 Ω	

Specifications (Cont'd)

ECU

NOTE:
- Perform all voltage and resistance measurements with the computer connected.
- Verity that the battery voltage in 11 V or above with the ignition switch is ON.

Voltage

Terminals	Condition		STD voltage (V)
+B, +B1 – E1	IG S/W ON		10 – 14
BATT – E1	–		10 – 14
IDL – E2	IG S/W ON	Throttle valve open	4 – 6
VTA – E2	IG S/W ON	Throttle valve fully closed	0.1 – 1.0
	IG S/W ON	Throttle valve fully open	3 – 4.5
VC – E2	IG S/W ON	–	4 – 6
IGT – E1	Cranking or idling		0.7 – 1.0
STA – E1	Cranking		6 – 14
No. 1, No. 2, No. 3, No.-4 – E01, E02	IG S/W ON		10 – 14
W – E1	No trouble (Check engine warning light off) and engine running		8 – 14
VS – E2	IG S/W ON	Measuring plate fully closed	4 – 6
	IG S/W ON	Measuring plate fully open	1.0 or less
	Idling		2 – 4
THA – E2	IG S/W ON	Intake air temperature 20°C (68°F)	1 – 3
THW – E2	IG S/W ON	Coolant temperature 80°C (176°F)	0.1 – 1.0
ISC1, ISC2 – E1	IG S/W ON		9 – 14
PIM – E2	IG S/W ON		2.5 – 4.5
A/C – E1	IG S/W ON	Air conditioning ON	8 – 14
w/ Regular gasoline: T-VIS – E1	IG S/W ON	Throttle valve fully closed	2 or less
	IG S/W ON	Throttle valve open	10 – 14
w/ Premium gasoline: T-VIS – E1	Idling		2 or less
	4,200 rpm or more		10 – 14
T – E1	IG S/W ON	Check connector T – E1 not short	4 – 6
	IG S/W ON	Check connector T – E1 short	0.5 or less

Resistance

Terminals	Condition	Resistance (Ω)
IDL – E1	Throttle valve open	Infinity
	Throttle valve fully closed	Less than 2,300
VTA – E2	Throttle valve fully open	3,300 – 10,000
	Throttle valve fully closed	200 – 800
VS – E2	Measuring plate fully closed	200 – 600
	Measuring plate fully open	20 – 1,000
THA – E2	Intake air temperature 20°C (68°F)	2,000 – 3,000
THW – E2	Coolant temperature 80°C (176°F)	200 – 400
G1, G2 – G⊖, NE	–	140 – 180

Fuel cut rpm w/ Vehicle speed 0 km/h and coolant temperature 80°C (176°F)	Fuel cut rpm Fuel return rpm	2,000 rpm 1,600 rpm

Torque Specifications

Part tightened		kg-cm	ft-lb	N·m
Fuel line	Union bolt type	300	22	29
	Flare nut type	310	22	30
Fuel sender gauge x Fuel tank		15	13 in.-lb	1.5
Fuel pump x Fuel tank		30	26 in.-lb	2.9
Fuel evaporation bent tube x Fuel tank		15	13 in.-lb	1.5
Fuel inlet pipe x Fuel tank		30	26 in.-lb	2.9
Fuel tank drain plug		130	9	13
Fuel tank band x Body		220	16	22
Cold start injector x Intake manifold (Air intake chamber)		60	52 in.-lb	5.9
Cold start injector pipe x Cold start injector		180	13	18
Cold start injector pipe x Delivery pipe		180	13	18
Fuel pressure regulator x Delivery pipe		300	22	29
Delivery pipe x Cylinder head		195	14	19
Fuel inlet hose x Delivery pipe		300	22	29
Throttle body x Intake manifold (Air intake chamber)		195	14	19
Air connector stay x Throttle body		195	14	19
Air connector stay x Cylinder head		80	69 in.-lb	7.8
Air connector x Throttle body		195	14	19

COOLING SYSTEM

Specifications

Engine coolant capacity			See page A-2
Radiator cap	Relief valve opening pressure	STD	0.75 – 1.05 kg/cm^2 (10.7 – 14.9 psi, 74 – 103 kPa)
		Limit	0.6 kg/cm^2 8.5 psi 59 kPa
Thermostat	Valve opening temperature		80 – 84°C 176 – 183°F
	Valve lift at 95°C (203°F)		8 mm (0.31 in.) or more

Torque Specifications

Part tightened	kg-cm	ft-lb	N·m
Engine coolant x Drain plug	130	9	13
Water pump x Water pump cover	80	69 in.-lb	7.8
Water pump x Cylinder block	80	69 in.-lb	7.8
Water by-pass pipe x Water pump	80	69 in.-lb	7.8
Water inlet housing x Water pump	80	69 in.-lb	7.8
Oil cooler x Radiator lower tank	220	16	22

LUBRICATION SYSTEM

Specifications

Engine oil capacity			See page A-25	
Oil pressure		at Idling at 3,000 rpm	0.3 kg/cm^2 (4.3 psi, 29 kPa) or more 2.5 – 5.0 kg/cm^2 (36 – 71 psi, 245 – 490 kPa)	
Oil pump	Body clearance	STD Limit	0.10 – 0.16 mm 0.20 mm	0.0039 – 0.0063 in. 0.0079 in.
	Tip clearance	STD Limit	0.08 – 0.16 mm 0.20 mm	0.0031 – 0.0063 in. 0.0079 in.

Torque Specifications

Part tightened	kg-cm	ft-lb	N·m
Engine oil drain plug	250	18	25
Oil pump body cover x Oil pump body	90	78 in.-lb	8.8
Oil pump x Cylinder block	80	69 in.-lb	7.8
Oil strainer x Cylinder block	90	78 in.-lb	8.0
Oil strainer x Oil pump	55	48 in.-lb	5.4
Oil pan x Cylinder block	55	48 in.-lb	5.4
Oil pan x Oil pump	55	48 in.-lb	5.4
Stiffener plate x Cylinder block	380	27	37
Stiffener plate x Transaxle case	380	27	37
Relief valve plug x Oil filter bracket	375	27	37
Union (for oil filter bracket) x Cylinder block	300	22	29
Oil filter bracket x Cylinder block	80	69 in.-lb	7.8
Oil cooler pipe x Cylinder block	525	38	51
Oil cooler pipe x Oil filter bracket	525	38	51
Oil nozzle x Cylinder block	93	81 in.-lb	9.1

IGNITION SYSTEM

Ignition timing		10° BTDC @ idle (w/ Terminals T and E1 short-circuited)	
Firing order		1 – 3 – 4 – 2	
Spark plug		See page A-2	
High-tension cord	Resistance	25 kΩ per cord	
Ignition coil	Primary coil resistance Secondary coil resistance	0.40 – 0.50 Ω 10.2 – 13.8 kΩ	
Distributor	Air gap Pickup coil resistance	0.2 – 0.4 mm 140 – 180 Ω	0.008 – 0.016 in.

STARTING SYSTEM

Starter	Rated voltage and output power			12 V 1.0 kW, 12 V 1.4 kW		
	No-load characteristic		Current	90 A or less at 11.5 V		
			rpm	3,000 rpm or more		
	Brush Length	STD	1.0 kW type	13.5 mm	0.531 in.	
			1.4 kW type	15.5 mm	0.610 in.	
		Limit	1.0 kW type	8.5 mm	0.335 in.	
			1.4 kW type	10.0 mm	0.394 in.	
	Spring installed load			1.79 – 2.41 g	3.9 – 5.3 lb	18 – 24 N
	Commutator Outer diameter		STD	30 mm	1.18 in.	
			Limit	29 mm	1.14 in.	
	Undercut depth		STD	0.6 mm	0.024 in.	
			Limit	0.2 mm	0.008 in.	
	Circle runout		Limit	0.05 mm	0.0020 in.	

CHARGING SYSTEM

Drive belt tension			See page A-2	
Battery specific gravity	When fully charge at 20°C (68°F)		1.25 – 1.27	
Alternator	Rated output		12 V 70 A	
	Rotor coil resistance		2.8 – 3.0 Ω	
	Slip ring diameter	STD	14.2 – 14.4 mm	0.559 – 0.567 in.
		Limit	12.8 mm	0.504 in.
	Brush exposed length	STD	10.5 mm	0.413 in.
		Limit	1.5 mm	0.059 in.
Alternator regulator	Regulating voltage	at 25°C (77°F)	13.9 – 15.1 V	
		at 115°C (239°F)	13.5 – 14.3 V	

CLUTCH

Specifications

Disc rivet head depth		Limit	0.3 mm	0.012 in.
Disc runout		Limit	0.8 mm	0.031 in.
Diaphragm spring out of alignment		Limit	0.5 mm	0.020 in.
Diaphragm spring finger wear	Depth	Limit	0.6 mm	0.024 in.
	Width	Limit	5.0 mm	0.197 in.
Flywheel runout		Limit	0.1 mm	0.004 in.

Torque Specifications

Part tightened	kg-cm	ft-lb	N·m
Clutch cover x Flywheel	195	14	19
Release fork support	480	35	47

MANUAL TRANSAXLE

Specifications

TRANSMISSION ASSEMBLY				
Input shaft				
Roller bearing journal diameter		Limit	32.930 mm	1.2964 in.
3rd gear journal diameter		Limit	35.950 mm	1.4154 in.
4th gear journal diameter		Limit	35.950 mm	1.4154 in.
Runout		Limit	0.060 mm	0.0024 in.
Output shaft				
1st gear journal diameter		Limit	38.950 mm	1.5335 in.
2nd gear journal diameter		Limit	38.950 mm	1.5335 in.
Runout		Limit	0.060 mm	0.0024 in.
Gear thrust clearance	1st	STD	0.10 – 0.35 mm	0.0039 – 0.0138 in.
		Limit	0.40 mm	0.0157 in.
	2nd	STD	0.10 – 0.45 mm	0.0039 – 0.0177 in.
		Limit	0.50 mm	0.0197 in.
	3rd	STD	0.10 – 0.35 mm	0.0039 – 0.0139 in.
		Limit	0.40 mm	0.0157 in.
	4th	STD	0.10 – 0.55 mm	0.0039 – 0.0217 in.
		Limit	0.60 mm	0.0236 in.
	5th	STD	0.10 – 0.57 mm	0.0039 – 0.0224 in.
		Limit	0.65 mm	0.0256 in.
Gear oil clearance				
1st and 4th gear		STD	0.009 – 0.051 mm	0.0004 – 0.0020 in.
		Limit	0.080 mm	0.0031 in.
2nd and 3rd gear		STD	0.009 – 0.053 mm	0.0004 – 0.0020 in.
		Limit	0.080 mm	0.0031 in.
5th gear		STD	0.009 – 0.050 mm	0.0004 – 0.0020 in.
		Limit	0.070 mm	0.0028 in.
Shift fork to hub sleeve clearance		Limit	1.0 mm	0.039 in.
Synchronizer ring to gear clearance		Limit	0.6 mm	0.024 in.
Oil pump assembly				
Rotor body clearance		STD	0.10 – 0.16 mm	0.0039 – 0.0063 in.
		Limit	0.30 mm	0.0118 in.
Rotor tip clearance		STD	0.08 – 0.15 mm	0.0031 – 0.0059 in.
		Limit	0.30 mm	0.0118 in.
Side clearance		STD	0.03 – 0.08 mm	0.0012 – 0.0031 in.
		Limit	0.15 mm	0.0059 in.
Input shaft snap ring thickness				
No. 2 clutch hub		Mark		
		H	2.30 – 2.35 mm	0.0906 – 0.0925 in.
		J	2.35 – 2.40 mm	0.0925 – 0.0945 in.
		K	2.40 – 2.45 mm	0.0945 – 0.0965 in.
		L	2.45 – 2.50 mm	0.0965 – 0.0984 in.
		M	2.50 – 2.55 mm	0.0984 – 0.1004 in.
		N	2.55 – 2.60 mm	0.1004 – 0.1024 in.
		P	2.60 – 2.65 mm	0.1024 – 0.1043 in.

Specifications (Cont'd)

Input shaft snap ring thickness (cont'd)				
4th gear and rear bearing	Mark			
	1	2.35 – 2.40 mm		0.0925 – 0.0945 in.
	2	2.40 – 2.45 mm		0.0945 – 0.0965 in.
	3	2.45 – 2.50 mm		0.0965 – 0.0984 in.
	4	2.50 – 2.55 mm		0.0984 – 0.1004 in.
	5	2.55 – 2.60 mm		0.1004 – 0.1024 in.
	6	2.60 – 2.65 mm		0.1024 – 0.1043 in.
	7	2.65 – 2.70 mm		0.1043 – 0.1063 in.
	8	2.70 – 2.75 mm		0.1063 – 0.1083 in.
Output shaft snap ring thickness				
No. 1 clutch hub	Mark			
	A	2.80 – 2.85 mm		0.1102 – 0.1122 in.
	B	2.85 – 2.90 mm		0.1122 – 0.1142 in.
	C	2.90 – 2.95 mm		0.1142 – 0.1161 in.
	D	2.95 – 3.00 mm		0.1161 – 0.1181 in.
	E	3.00 – 3.05 mm		0.1181 – 0.1201 in.
	F	3.05 – 3.10 mm		0.1201 – 0.1220 in.
	G	3.10 – 3.15 mm		0.1220 – 0.1240 in.
DIFFERENTIAL ASSEMBLY				
Output shaft preload (at starting)	New bearing	8.0–16.0 kg-cm	6.9 – 13.9 in.-lb	0.8 – 1.6 N·m
	Reused bearing	5.0–10.0 kg-cm	4.3 – 8.7 in.-lb	0.5 – 1.0 N·m
Differential case preload (at starting)	New bearing	1.9–3.7 kg-cm	1.6 – 3.2 in.-lb	0.2 – 0.4 N·m
	Reused bearing	1.2–2.3 kg-cm	1.0 – 2.0 in.-lb	0.1 – 0.2 N·m
Left case inner diameter				
Right case bushing	STD	111.000 – 111.035 mm		4.3701 – 4.3714 in.
	Limit	110.060 mm		4.3724 in.
Left case bushing	STD	90.500 – 90.535 mm		3.5630 – 3.5644 in.
	Limit	90.560 mm		3.5653 in.
No. 2 differential case outer diameter				
Right side	STD	110.929 – 110.964 mm		4.3673 – 4.3687 in.
	Limit	110.850 mm		4.3632 in.
Left side	STD	90.429 – 90.464 mm		3.5602 – 3.5616 in.
	Limit	90.350 mm		3.5571 in.
Differential No. 2 case inner diameter				
Side gear bushing	STD	35.000 – 35.025 mm		1.3780 – 1.3789 in.
	Limit	35.030 mm		1.3791 in.
Conical spring washer height				
Left conical spring washer	STD	2.60 – 2.80 mm		0.1024 – 0.1102 in.
	Limit	2.50 mm		0.0984 in.
Right conical spring washer	STD	1.70 – 1.90 mm		0.0669 – 0.0748 in.
	Limit	1.60 mm		0.0630 in.
Right case backlash		0.05 – 0.20 mm		0.0020 – 0.0079 in.
No. 2 differential case backlash		0.05 – 0.20 mm		0.0020 – 0.0079 in.
Intermediate case backlash		0.05 – 0.20 mm		0.0020 – 0.0079 in.

Specifications (Cont'd)

Thrust washer thickness			
For right case side gear		0.80 mm	0.0315 in.
		0.85 mm	0.0335 in.
		0.90 mm	0.0354 in.
		0.95 mm	0.0374 in.
		1.00 mm	0.0394 in.
		1.05 mm	0.0413 in.
		1.10 mm	0.0433 in.
		1.15 mm	0.0453 in.
		1.20 mm	0.0472 in.
		1.25 mm	0.0492 in.
		1.30 mm	0.0512 in.
		1.35 mm	0.0531 in.
		1.40 mm	0.0551 in.
For intermediate case side gear		0.80 mm	0.0315 in.
		0.85 mm	0.0335 in.
		0.90 mm	0.0354 in.
		0.95 mm	0.0374 in.
		1.00 mm	0.0394 in.
		1.05 mm	0.0413 in.
		1.10 mm	0.0433 in.
		1.15 mm	0.0453 in.
		1.20 mm	0.0472 in.
		1.25 mm	0.0492 in.
		1.30 mm	0.0512 in.
		1.35 mm	0.0531 in.
		1.40 mm	0.0551 in.
For No. 2 differential case side gear	Mark		
	B	1.00 mm	0.0394 in.
	C	1.05 mm	0.0413 in.
	D	1.10 mm	0.0433 in.
	E	1.15 mm	0.0453 in.
	F	1.20 mm	0.0472 in.
	G	1.25 mm	0.0492 in.
For left case side gear	Mark		
	A	0.95 mm	0.0374 in.
	B	1.00 mm	0.0394 in.
	C	1.05 mm	0.0413 in.
	D	1.10 mm	0.0433 in.
	E	1.15 mm	0.0453 in.
	F	1.20 mm	0.0472 in.
	G	1.25 mm	0.0492 in.
	H	1.30 mm	0.0512 in;
	J	1.35 mm	0.0531 in.
	K	1.40 mm	0.0551 in.

Specifications (Cont'd)

Adjusting shim thickness			
For differential preload	Mark		
	0	2.00 mm	0.0787 in.
	1	2.05 mm	0.0807 in.
	2	2.10 mm	0.0827 in.
	3	2.15 mm	0.0846 in.
	4	2.20 mm	0.0866 in.
	5	2.25 mm	0.0886 in.
	6	2.30 mm	0.0906 in.
	7	2.35 mm	0.0925 in.
	8	2.40 mm	0.0945 in.
	9	2.45 mm	0.0965 in.
	A	2.50 mm	0.0984 in.
	B	2.55 m	0.1004 in.
	C	2.60 mm	0.1024 in.
	D	2.65 mm	0.1043 in.
	E	2.70 mm	0.1063 in.
	F	2.75 mm	0.1083 in.
	G	2.80 mm	0.1102 in.
	H	2.85 mm	0.1122 in.
For output shaft preload	Mark		
	0	1.30 mm	0.0512 in.
	1	1.35 mm	0.0531 in.
	2	1.40 mm	0.0551 in.
	3	1.45 mm	0.0571 in.
	4	1.50 mm	0.0591 in.
	5	1.55 mm	0.0610 in.
	6	1.60 mm	0.0630 in.
	7	1.65 mm	0.0650 in.
	8	1.70 mm	0.0669 in.
	9	1.75 mm	0.0689 in.
	A	1.80 mm	0.0709 in.
	B	1.85 mm	0.0728 in.
	C	1.90 mm	0.0748 in.
	D	1.95 mm	0.0768 in.
	E	2.00 mm	0.0787 in.
	F	2.05 mm	0.0807 in.
	G	2.10 mm	0.0827 in.
	H	2.15 mm	0.0846 in.
	J	2.20 mm	0.0866 in.
	K	2.25 mm	0.0886 in.
	L	2.30 mm	0.0906 in.
	M	2.35 mm	0.0925 in.
	N	2.40 mm	0.0945 in.
	P	2.45 mm	0.0965 in.
	Q	2.50 mm	0.0984 in.

Specifications (Cont'd)

TRANSFER ASSEMBLY				
Ring gear backlash		0.13 – 0.18 mm		0.0051 – 0.0071 in.
Ring gear runout	Limit	0.1 mm		0.004 in.
Driven pinion preload (at starting)	New bearing	1.8 – 2.9 kg	4.0 – 6.4 lb	17.7 – 28.4 N
	Reused bearing	0.5 – 0.9 kg	1.1 – 2.0 lb	4.9 – 8.8 N
Transfer total preload (at starting)				
(Add driven pinion preload)	New bearing	1.3 – 1.4 kg	2.9 – 3.1 lb	12.7 – 13.7 N
	Reused bearing	0.5 – 0.9 kg	1.1 – 2.0 lb	4.9 – 8.8 N
Right case bushing inner diameter	STD	69.000 – 69.035 mm		2.7165 – 2.7179 in.
	Limit	69.060 mm		2.7189 in.
Left case bushing inner diameter	STD	69.000 – 69.035 mm		2.7165 – 2.7179 in.
	Limit	69.060 mm		2.7189 in.
Control coupling washer thickness	STD	1.49 – 1.51 mm		0.0587 – 0.0594 in.
	Limit	1.45 mm		0.0571 in.
Adjusting shim thickness				
For ring gear backlash .	Mark			
	1	2.13 mm		0.0839 in.
	2	2.16 mm		0.0850 in.
	3	2.19 mm		0.0862 in.
	4	2.22 mm		0.0874 in.
	5	2.25 mm		0.0886 in.
	6	2.28 mm		0.0898 in.
	7	2.31 mm		0.0909 in.
	8	2.34 mm		0.0921 in.
	9	2.37 mm		0.0933 in.
	10	2.40 mm		0.0945 in.
	11	2.43 mm		0.0957 in.
	12	2.46 mm		0.0968 in.
	13	2.49 mm		0.0980 in.
	14	2.52 mm		0.0992 in.
	15	2.55 mm		0.1004 in.
	16	2.58 mm		0.1016 in.
	17	2.61 mm		0.1028 in.
	18	2.64 mm		0.1039 in.
	19	2.67 mm		0.1051 in.
	20	2.70 mm		0.1063 in.
	21	2.73 mm		0.1075 in.
	22	2.76 mm		0.1087 in.
	23	2.79 mm		0.1098 in.
	24	2.82 mm		0.1110 in.

Specifications (Cont'd)

Adjusting shim thickness (cont'd)			
For tooth contact	Mark		
	A	0.30 mm	0.0118 in.
	B	0.33 mm	0.0130 in.
	C	0.36 mm	0.0142 in.
	D	0.39 mm	0.0154 in.
	E	0.42 mm	0.0165 in.
	F	0.45 mm	0.0177 in.
	G	0.48 mm	0.0189 in.
	H	0.51 mm	0.0201 in.
	J	0.54 mm	0.0213 in.
	K	0.57 mm	0.0224 in.

Torque Specifications

Part tightened	kg-cm	ft-lb	N·m
Oil pump x Cover	105	8	10
Ring gear x Differential case	1,260	91	124
Rear bearing retainer x Transmission case	430	31	42
Transmission case x Transaxle case	300	22	29
Oil pump assembly x Transaxle case	175	13	17
Shift fork x Shift fork shaft	240	17	24
Oil pipe x Housing	175	13	17
Transmission case x Transmission case cover	300	22	29
Shift and select lever assembly x Transmission case	200	14	20
Bellcrank x Transmission case	200	14	20
Back-up light switch x Transmission case	410	30	40
Driven pinion x Bearing cage	See page MT-70		
Ring gear x Ring gear mounting	985	71	97
Driven pinion cage x Transfer case	400	29	39
Transfer case x Transfer right case	450	33	44
Transfer case x Inspection hole cover	160	12	16
Differential lock sleeve x Shift fork	160	12	16
Transfer right case x Transfer case cover	175	13	17
Driven pinion cage x Extension housing	260	19	25
Extension housing x Dynamic damper	260	19	25
Transaxle assembly x Transfer assembly	700	51	69
Transaxle assembly x Engine M12 bolt	650	47	64
M10 bolt	470	34	46

PROPELLER SHAFT

Specifications

Bearing axial play			0.05 mm	0.0020 in.
Front propeller shaft runout		Limit	0.8 mm	0.031 in.
Intermediate shaft runout		Limit	0.8 mm	0.031 in.
Rear propeller shaft runout		Limit	0.8 mm	0.031 in.
Intermediate shaft flange runout		Limit	0.1 mm	0.0039 in.
Snap ring thickness	Color	None	1.475 – 1.525 mm	0.0581 – 0.0600 in.
		Brown	1.525 – 1.575 mm	0.0600 – 0.0620 in.
		Blue	1.575 – 1.625 mm	0.0620 – 0.0640 in.

Torque Specifications

Part tightened		kg-cm	ft-lb	N·m
Propeller shaft x Differential		750	54	74
Intermediate shaft x Propeller shaft		750	54	74
Center support bearing x Body		375	27	37
Intermediate shaft x Center support bearing x Joint flange				
	1st	1,850	134	181
	2nd	Loosen nut		
	3rd	700	51	69
Cross groove joint set bolt		660	48	65

FRONT AXLE AND SUSPENSION

Specifications

Cold tire inflation pressure	Tire size	Inflation pressure kg/cm² (psi, kPa)	
		Front	Rear
	205/60 VR 14 205/60 R 14 87H	2.1 (30, 210)	2.1 (30, 210)
Front wheel alignment		Inspection STD	Adjustment STD
	Toe-in	0 ± 2 mm (0 ± 0.08 in.)	0 ± 1 mm (0 ± 0.04 in.)
	Camber Left-right error	−10′ ± 45′ 30′	−10′ ± 30′ 30′
	Steering axis inclination Left-right error	13°30′ ± 45′ 30′	–
	Caster Left-right error	1°10′ ± 45′ 30′	–
	Side slip	Less than 3.0 mm/m (0.118 in./3.3 ft)	
	Wheel angle Inside wheel Max. Outside wheel	34°00′ 30°00′	
	At 20° (Outside wheel) Inside wheel	21°30′	
Front axle and suspension	Wheel lateral runout	Limit	Less than 1.0 mm (0.039 in.)
	Hub bearing axial direction play	Limit	0.05 mm 0.0020 in.
	Drive shaft length		400.6 mm 15.772 in.

Torque Specifications

Part tightened	kg-cm	ft-lb	N·m
Tie rod end x Steering knuckle	500	36	49
Tie rod lock nut	570	41	56
Wheel bearing lock nut	1,900	137	186
Lower arm x Ball joint	1,300	94	127
Stabilizer bar x Stabilizer bar link	360	26	35
Stabilizer bar bracket x Body	195	14	19
Drive shaft x Side gear shaft	660	48	65
Wheel nut	1,050	76	103
Stabilizer bar link x Lower arm	360	26	35

REAR AXLE AND SUSPENSION

Specifications

Rear wheel alignment			Inspection STD	Adjustment STD
	Toe-in		5 ± 2 mm (0.20 ± 0.08 in.)	5 ± 1 mm (0.20 ± 0.04 in.)
	Camber		–45′ ± 45′	
	Left-right error		30′	
Rear axle and suspension	Disc wheel lateral runout	Limit	Less than 1.0 mm (0.039 in.)	
	Hub bearing axial direction	Limit	0.05 mm	0.0020 in.
	Drive shaft length		558.5 mm	21.988 in.
Differential	Drive pinion bearing preload	at Starting		
		New bearing	10 – 16 kg-cm (8.7 – 13.9 in.-lb, 1.0 – 1.6 N·m)	
		Reused bearing	5 – 8 kg-cm (4.3 – 6.9 in.-lb, 0.5 – 0.8 N·m)	
	Total preload	at Starting	Add drive pinion bearing preload 3 – 5 kg-cm (2.6 – 4.3 in.-lb, 0.3 – 0.5 N·m)	
	Drive pinion to ring gear backlash		0.13 – 0.18 mm	0.0051 – 0.0071 in.
	Pinion gear to side gear backlash		0.05 – 0.20 mm	0.0020 – 0.0079 in.
	Ring gear runout	Limit	0.07 mm	0.0028 in.
	Companion flange runout			
	Limit	Lateral runout	0.1 mm	0.004 in.
		Radial runout	0.1 mm	0.004 in.
	Ring gear installing temperature		90 – 110°C	194 – 230°F
	Drive pinion oil seal drive in depth		2.0 mm	0.079 in.
	Side gear oil seal drive in depth		Flash the carrier end surface	
	Side gear thrust washer thickness		0.95 mm	0.0374 in.
			1.00 mm	0.0394 in.
			1.05 mm	0.0413 in.
			1.10 mm	0.0433 in.
			1.15 mm	0.0453 in.
			1.20 mm	0.0472 in.
	Drive pinion adjusting plate washer thickness		2.27 mm	0.0894 in.
			2.30 mm	0.0906 in.
			2.33 mm	0.0917 in.
			2.36 mm	0.0929 in.
			2.39 mm	0.0941 in.
			2.42 mm	0.0953 in.
			2.45 mm	0.0965 in.
			2.48 mm	0.0976 in.
			2.51 mm	0.0988 in.
			2.54 mm	0.1000 in.
			2.57 mm	0.1012 in.
			2.60 mm	0.1024 in.
			2.63 mm	0.1035 in.
			2.66 mm	0.1047 in.
			2.69 mm	0.1059 in.

Specifications (Cont'd)

Differential (cont'd)	Side bearing adjusting plate thickness	2.21 – 2.23 mm	0.0870 – 0.0878 in.
		2.24 – 2.26 mm	0.0882 – 0.0890 in.
		2.27 – 2.29 mm	0.0894 – 0.0902 in.
		2.30 – 2.32 mm	0.0906 – 0.0913 in.
		2.33 – 2.35 mm	0.0917 – 0.0925 in.
		2.36 – 2.38 mm	0.0929 – 0.0937 in.
		2.39 – 2.41 mm	0.0941 – 0.0949 in.
		2.42 – 2.44 mm	0.0953 – 0.0961 in.
		2.45 – 2.47 mm	0.0965 – 0.0972 in.
		2.48 – 2.50 mm	0.0976 – 0.0984 in.
		2.51 – 2.53 mm	0.0988 – 0.0996 in.
		2.54 – 2.56 mm	0.1000 – 0.1008 in.
		2.57 – 2.59 mm	0.1012 – 0.1020 in.
		2.60 – 2.62 mm	0.1024 – 0.1031 in.
		2.63 – 2.65 mm	0.1035 – 0.1043 in.
		2.66 – 2.68 mm	0.1047 – 0.1055 in.
		2.69 – 2.71 mm	0.1059 – 0.1067 in.
		2.72 – 2.74 mm	0.1071 – 0.1079 in.
		2.75 – 2.77 mm	0.1083 – 0.1091 in.
		2.78 – 2.80 mm	0.1094 – 0.1102 in.
		2.81 – 2.83 mm	0.1106 – 0.1114 in.
		2.84 – 2.86 mm	0.1118 – 0.1126 in.
		2.87 – 2.89 mm	0.1130 – 0.1138 in.
		2.90 – 2.92 mm	0.1142 – 0.1150 in.
		2.93 – 2.95 mm	0.1154 – 0.1161 in.
		2.96 – 2.98 mm	0.1165 – 0.1173 in.
		2.99 – 3.01 mm	0.1177 – 0.1185 in.
		3.02 – 3.04 mm	0.1189 – 0.1197 in.
		3.05 – 3.07 mm	0.1201 – 0.1209 in.
		3.08 – 3.10 mm	0.1213 – 0.1220 in.
		3.11 – 3.13 mm	0.1224 – 0.1232 in.
		3.14 – 3.16 mm	0.1236 – 0.1244 in.
		3.17 – 3.19 mm	0.1248 – 0.1256 in.
		3.20 – 3.22 mm	0.1260 – 0.1268 in.

Torque Specifications

	Part tightened	kg-cm	ft-lb	N·m
Axle hub and rear suspension	Drive shaft x Side gear shaft	700	51	69
	No. 1 and No. 2 suspension arm x Axle carrier	1,250	90	123
	No. 1 suspension arm x Body	1,150	83	113
	No. 2 suspension arm x Body	1,150	83	113
	Strut rod x Axle carrier	1,150	83	113
	Strut rod x Body	1,150	83	113
	Stabilizer bar x Link	360	26	35
	Stabilizer bar bracket x Body	195	14	19
	Stabilizer link x Shock absorber	360	26	35
	Wheel nut	1,050	76	103

Torque Specifications (Cont'd)

Differential	Part tightened		kg-cm	ft-lb	N·m
	Differential x Support member	(Under side)	970	70	95
		(Rear side)	1,500	108	147
	Carrier x Carrier cover		475	34	47
	Carrier x Drain plug		500	36	49
	Carrier x Filler plug		400	29	39
	Carrier x Side bearing cap		800	58	78
	Ring gear x Differential case		985	71	97
	Drive pinion x Companion flange		See page RA-39		
	Companion flange x Propeller shaft		750	54	74

BRAKE SYSTEM

Specifications

Front brake	Pad thickness	STD	10.0 mm	0.394 in.
		Limit	1.0 mm	0.039 in.
	Disc thickness	STD	25.0 mm	0.984 in.
		Limit	24.0 mm	0.945 in.
	Disc runout	Limit	0.15 mm	0.0059 in.

Torque Specifications

Part tightened	kg-cm	ft-lb	N·m
Front disc brake cylinder installation bolt	370	27	36
Front disc brake torque plate x Steering knuckle	1,015	73	100
Front disc brake cylinder x Flexible hose	310	22	30
Rear disc brake cylinder installation bolt	200	14	20
Rear disc brake torque plate x Dust cover	475	34	47
Rear disc brake cylinder x Flexible hose	310	22	30
Bleeder plug	85	74 in.-lb	8.3
A.B.S. actuator x Actuator bracket	55	48 in.-lb	5.4
Brake tube union nut	155	11	15
A.B.S. actuator x Proportioning valve bracket	90	78 in.-lb	8.8
Proportioning valve installation bolt	90	78 in.-lb	8.8
A.B.S. tube connector x Brake tube (Body side)	260	19	25
A.B.S. tube connector installation bolt	80	69 in.-lb	7.8
A.B.S. actuator bracket x Body (Nut)	130	9	13
Front speed sensor installation bolt	120	9	12
Front sensor rotor x Axle hub	140	10	14
Rear speed sensor installation bolt	195	14	19
A.B.S. computer x Computer bracket	55	48 in.-lb	5.4
A.B.S. deceleration sensor x Computer bracket	32.5	28 in.-lb	3.2
A.B.S. computer bracket installation bolt			
Front left	130	9	13
Front right	195	14	19
Rear	195	14	19
A.B.S. computer sub-bracket x Body	185	13	18

STEERING

Specifications

Power steering	Steering rack runout	Maximum	0.3 mm	0.012 in.	
	Bearing preload		4.5–6.5 kg-cm	3.9 – 5.6 in.-lb	0.4 – 0.6 N·m
	Total preload		9 – 12 kg-cm	7.8 – 10.4 in.-lb	0.9 – 1.2 N·m

Torque Specifications

Power steering	Part tightened		kg-cm	ft-lb	N·m
	PS pump x Pressure tube		525	38	51
	PS pump x Bracket	Upper	440	32	43
		Lower	400	29	39
	Rear pump stay x Pump bracket		400	29	39
	Stabilizer bar bracket x Body		195	14	19
	Stabilizer link x Lower arm		360	26	35
	Propeller shaft x Intermediate shaft		750	54	74
	Exhaust pipe clamp		210	15	21
	Lower crossmember	Center	400	29	39
		Others	2,120	153	208
	Pressure hose x Pressure tube		370	27	36
	Control valve housing x Rack housing		315	23	31
	Bearing guide lock nut		570	41	56
	Rack guide spring cap lock nut		570	41	56
	Rack x Rack end		730	53	72
	Turn pressure tube x Gear housing		200	14	20
	Gear housing x Body		600	43	59
	Rear mount bracket		530	38	52
	Gear housing x Return line		450	33	44
	Gear housing x Pressure line		450	33	44
	Center member x Body		400	29	39
	Tie rod end x Knuckle arm		500	36	49
	Pinion x Universal joint		360	26	35
	Tie rod end lock nut		570	41	56

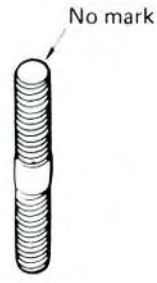
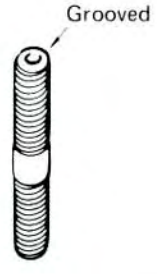
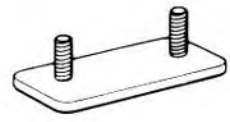
LUBRICANT

Item	Capacity			Classification
	Liters	US qts	Imp. qts	
Engine oil Dry fill Drain and refill w/ Oil filter change w/o Oil filter change	 4.6 3.6 3.3	 4.9 3.8 3.6	 4.0 3.2 2.9	API grade SF or SF/CC, multigrade, recommended viscosity and fuel-efficient oil
Manual transaxle oil (E50F2) (w/ Differential and transfer)	4.8	5.1	4.2	Transaxle oil E50 (08885-80206) or equivalent Recommended oil Oil grade : API GL-5 Viscosity : SAE 75W-90 or 80W-90 SAE 90 (above – 18°C (0°F)) SAE 80W (below – 18°C (0°F))
Power steering fluid Pump Total	350 cc 21.4 cu in. 800 cc 48.8 cu in.			ATF DEXRON® or DEXRON® II
Steering gear housing grease	–			Molybdenum disulphide lithium base, NLGI No. 2
Brake fluid	–			SAE J1703, DOT3

STANDARD BOLT TORQUE SPECIFICATIONS

STANDARD BOLT TORQUE SPECIFICATIONS

HOW TO DETERMINE BOLT STRENGTH

	Mark	Class		Mark	Class
Hexagon head bolt	 Bolt head No. 4– 5– 6– 7–	4T 5T 6T 7T	Stud bolt		4T
	 No mark	4T			
Hexagon flange bolt w/ washer hexagon bolt	 No mark	4T			6T
Hexagon head bolt	 Two protruding lines	5T			
Hexagon flange bolt w/ washer hexagon bolt	 Two protruding lines	6T	Welded bolt		4T
Hexagon head bolt	 Three protruding lines	7T			

SPECIFIED TORQUE FOR STANDARD BOLTS

Class	Diameter mm	Pitch mm	Specified torque					
			Hexagon head bolt			Hexagon flange bolt		
			kg-cm	ft-lb	N·m	kg-cm	ft-lb	N·m
4T	6	1	55	48 in.-lb	5.4	60	52 in.-lb	5.9
	8	1.25	130	9	13	145	10	14
	10	1.25	260	19	25	290	21	28
	12	1.25	480	35	47	540	39	53
	14	1.5	760	55	75	850	61	83
	16	1.5	1,150	83	113		–	
5T	6	1	65	56 in.-lb	6.4		–	
	8	1.25	160	12	16		–	
	10	1.25	330	24	32		–	
	12	1.25	600	43	59		–	
	14	1.5	930	67	91		–	
	16	1.5	1,400	101	137		–	
6T	6	1	80	69 in.-lb	7.8	90	78 in.-lb	8.8
	8	1.25	195	14	19	215	16	21
	10	1.25	400	29	39	440	32	43
	12	1.25	730	53	72	810	59	79
	14	1.5		–		1,250	90	123
7T	6	1	110	8	11	120	9	12
	8	1.25	260	19	25	290	21	28
	10	1.25	530	38	52	590	43	58
	12	1.25	970	70	95	1,050	76	103
	14	1.5	1,500	108	147	1,700	123	167
	16	1.5	2,300	166	226		–	

SST AND SSM

REFER TO 1988 CELICA REPAIR MANUAL
(Pub. No. RM071U)

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

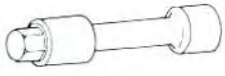
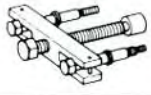
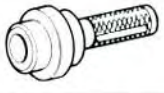
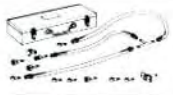
SST (SPECIAL SERVICE TOOLS)

NOTE: Classification

A = SST required for vehicle inspections and minor repairs and multipurpose SST.

B = SST required for major repairs involving disassembly of components.

C = SST required for rather special, less frequent work not of classifiable as either A or B.

Section / Classification / Part Name / Part No. / Illustration				EM	TC	FI	CO	LU	ST	CL	MT	PR	FA	RA	BR	SR	BE
	**09043-38100**	(Hexagon 10 mm Wrench)	A	●							●						
	**09043-88010**	(Hexagon 8 mm Wrench)	A										●				
	**09201-60011**	(Valve Guide Bushing Remover & Replacer)	A								*1 ●						
	09213-14010	(Crankshaft Pulley Holding Tool)	A	●													
	**09213-31021**	(Crankshaft Pulley Puller)	A	●													
	**09223-15010**	(Crankshaft Rear Oil Seal Replacer)	B								*2 ●		*3 ●				
	**09223-50010**	(Crankshaft Front Oil Seal Replacer)	B	*4 ●													
	09228-07500	(Oil Filter Wrench)	A					●									
	**09268-41045**	(Injection Measuring Tool Set)	B			●											

Remarks:

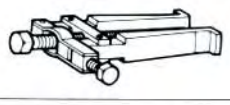
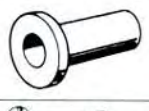
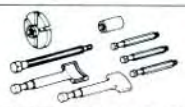
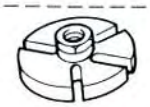
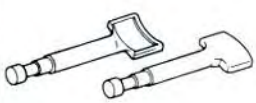
*1 Speedometer driven gear oil seal

*2 Transmission case oil seal

*3 Transaxle side gear shaft oil seal

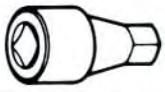
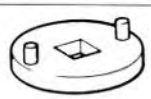
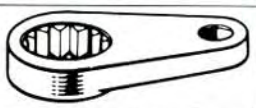
*4 Camshaft oil seal

SST (SPECIAL SERVICE TOOLS) (Cont'd)

Section / Classification / Part Name / Part No. / Illustration				EM	TC	FI	CO	LU	ST	CL	MT	PR	FA	RA	BR	SR	BE
	09268-45012	(EFI Fuel Pressure Gauge)	A			●											
	09301-17010	(Clutch Guide Tool)	A							●							
	09307-12010	(Extension Housing Bushing Replacer)	B								*1 ●						
	09308-00010	(Oil Seal Puller)	A								●		●	●			
	09308-10010	(Oil Seal Puller)	A											●			
	09309-36010	(Transmission Rear Bearing Replacer)	B								●			*2 ●			
	09310-17010	(Transaxle Gear Remover & Replacer)	B								●						
	(09310-07010)	(Plate)									●						
	(09310-07020)	(Center Bolt)									●						
	(09310-07030)	(Set Bolt)									●						
	(09310-07040)	(Claw)									●						
	(09310-07050)	(Adaptor)									●						

Remarks:
*1 Output shaft front bearing
*2 Rear axle hub

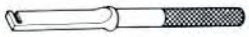
SST (SPECIAL SERVICE TOOLS) (Cont'd)

Section / Classification / Part Name / Part No. / Illustration			EM	TC	FI	CO	LU	ST	CL	MT	PR	FA	RA	BR	SR	BE
	**09313-30021**	(Detent Ball Plug Socket)	A							●						
	09316-20011	(Transfer Bearing Replacer)	B							●						
	**09316-60010**	(Transmission & Transfer Bearing Replacer)	B							●						
	**(09316-00010)**	(Replacer Pipe)								●						
	**(09316-00020)**	(Replacer "A")								●						
	**(09316-00040)**	(Replacer "C")								●						
	**(09316-00050)**	(Replacer "D")								●						
	**(09316-00060)**	(Replacer "E")								●						
	**(09316-00070)**	(Replacer "F")								●						
	**09318-20010**	(Transfer Side Bearing Adjusting Nut Wrench)	B							●						
	**09325-20010**	(Transmission Oil Plug)	A							*1 ●	●	●			●	
	**09326-20011**	(Output Shaft Bearing Lock Nut Wrench)	B							●						

Remark:

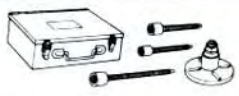
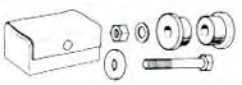
*1 Extension housing oil seal

SST (SPECIAL SERVICE TOOLS) (Cont'd)

Section / Classification / Part Name / Part No. / Illustration				EM	TC	FI	CO	LU	ST	CL	MT	PR	FA	RA	BR	SR	BE
	09330-00021	Companion Flange Holding Tool	A	*1 ●								●		●			
	09332-25010	Universal Joint Bearing Remover & Replacer	B									●					
	09333-00013	Clutch Diaphragm Spring Aligner	B							●							
	09504-22011	Differential Side Washer Remover & Replacer	B											●			
	09506-30012	Differential Drive Pinion Bearing Cone Replacer	B								●			●			
	09506-35010	Differential Drive Pinion Rear Bearing Replacer	B								●						
	09520-32012	Differential Side Gear Shaft Puller	A										●				
	09527-21011	Rear Axle Shaft Bearing Remover	B									●					
	09550-10012	("B" Replacer Set)	B								●						
	(09252-10010)	(No. 1 Replacer Handle)									●						
	(09555-10010)	Differential Drive Pinion Rear Bearing Replacer									●						
	09550-22011	Rear Axle Bearing & Differential Tool Set	B											●			

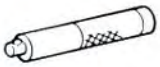
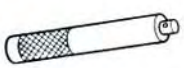
Remark:
*1 Crankshaft pulley

SST (SPECIAL SERVICE TOOLS) (Cont'd)

Section / Classification / Part Name / Part No. / Illustration				EM	TC	FI	CO	LU	ST	CL	MT	PR	FA	RA	BR	SR	BE
	(09550-00020)	(Handle)												●			
	(09550-00031)	(Replacer)												●			
	09554-22010	(Differential Oil Seal Replacer)	A											●			
	09556-22010	(Drive Pinion Front Bearing Remover)	B											●			
	09557-22022	(Companion Flange Remover & Replacer)	A									●		●			
	09608-12010	(Front Hub & Drive Pinion Bearing Replacer Set)	B								●						
	(09608-00020)	(Remover & Replacer Handle)									●						
	(09608-00060)	(Drive Pinion Front Bearing Cup Replacer)									●						
	(09608-00080)	(Differential Side Bearing Cone Replacer)									●						
	09608-16041	(Front Hub Bearing Adjusting Tool)	B										●	●			
	(09608-02020)	(Bolt & Nut)											*1 ●	*1 ●			
	(09608-02040)	(Retainer)											*1 ●	*1 ●			

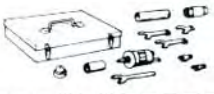
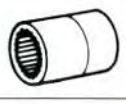
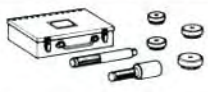
Remark:
*1 Hub bearing

SST (SPECIAL SERVICE TOOLS) (Cont'd)

Section / Classification / Part Name / Part No. / Illustration				EM	TC	FI	CO	LU	ST	CL	MT	PR	FA	RA	BR	SR	BE
	**09608-30012**	Front Hub & Drive Pinion Bearing Tool Set	B											●			
	**(09608-00060)**	(Replacer)												●			
	**(09608-04020)**	(Handle)												●			
	**(09608-04100)**	Drive Pinion Front Bearing Cup Replacer												●			
	**(09608-04110)**	Drive Pinion Rear Bearing Cup Replacer												*1 ●			
	**09608-32010**	Steering Knuckle Oil Seal Replacer	B											*2 ●			
	**09608-35014**	Axle Hub & Drive Pinion Bearing Tool Set	B								●						
	**(09608-06020)**	(Handle)									●						
	**(09608-06180)**	Drive Pinion Rear Bearing Cup Replacer									●						
	**(09608-06210)**	Rear Axle Bearing Replacer									●						
	**09611-22012**	(Tie Rod End Puller)	A										●			●	
	**09612-00012**	Rack & Pinion Steering Rack Housing Stand	B													●	

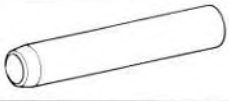
Remarks:
*1 Rear axle hub inner oil seal
*2 Rear axle hub

SST (SPECIAL SERVICE TOOLS) (Cont'd)

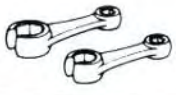
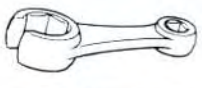
Section / Classification / Part Name / Part No. / Illustration				EM	TC	FI	CO	LU	ST	CL	MT	PR	FA	RA	BR	SR	BE
	09612-10093	(Steering Gear Housing Overhaul Tool Set)	B													●	
	(09628-10020)	(Ball Joint Lock Nut Wrench)														*1 ●	
	09612-22011	(Tilt Handle Bearing Replacer)	B													*2 ●	
	09612-24013	(Steering Gear Housing Overhaul Tool Set)	B													●	
	(09612-10022)	(Hexagon Wrench)														●	
	(09612-10061)	(Steering Pinion Bearing Replacer)														●	
	(09617-24010)	(Steering Rack Wrench)														●	
	(09617-24020)	(Steering Pinion Bearing Adjusting Screw Lock Nut Wrench)														●	
	09612-65014	(Steering Worm Bearing Puller)	B								*3 ●						
	09616-00010	(Steering Worm Bearing Adjusting Socket)	B													●	
	09616-30011	(Steering Worm Bearing Adjusting Screw Wrench)	B	*4 ●													
	09620-30010	(Steering Gear Box Replacer Set)	B								●					●	

Remarks:
- *1 Rack end
- *2 Steering cylinder end stopper
- *3 Input shaft front bearing
- *4 Oil pump pulley

SST (SPECIAL SERVICE TOOLS) (Cont'd)

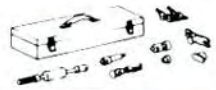
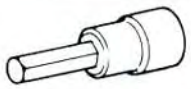
Section / Classification / Part Name / Part No. / Illustration				EM	TC	FI	CO	LU	ST	CL	MT	PR	FA	RA	BR	SR	BE
	09624-30010	Steering Sector Shaft Oil Seal Replacer														●	
	09625-30010	Steering Main Shaft Bearing Replacer									●						
	09627-30010	Steering Sector Shaft Bushing Replacer									●						
	09631-00020	(Handle)									●					●	
	09630-24013	Steering Rack Oil Seal Tool Set	B													●	
	09620-24010	Valve Cup Oil Seal Remover														●	
	09620-24020	Valve Cup Oil Seal Replacer														●	
	09620-24030	Valve Cup Bearing Replacer														●	
	09631-12020	(Handle)	B													●	
	09631-12070	Steering Rack Oil Seal Test Tool	B													●	
	09631-20031	(Oil Seal "B" Remover)	B													●	
	09631-20051	Steering Rack "C" Cover	B													●	

SST (SPECIAL SERVICE TOOLS) (Cont'd)

Section / Classification / Part Name / Part No. / Illustration				EM	TC	FI	CO	LU	ST	CL	MT	PR	FA	RA	BR	SR	BE
	**09631-20070**	(Seal Ring Guide)	B													●	
	09631-20081	(Seal Ring Tool)	B													●	
	**09631-22020**	(Power Steering Hose Nut.14 x 17 Wrench)	A													●	
	**09631-32010**	(Oil Seal Replacer)	B													●	
	**09633-00020**	(Power Steering Hose Nut Wrench)	A													●	
	**09636-20010**	(Upper Ball Joint Dust Cover Replacer)	B										●	*1 ●			
	**09710-22020**	(Front Suspension Bushing Tool Set)	B											●			
	**(09710-01030)**	(Upper Arm Bushing Replacer)												*2 ●			
	**09726-10010**	(Lower Suspension Arm Bushing Remover & Replacer)	B										●				
	**(09726-00030)**	(Spacer)										●	*3				
	**09751-36011**	(Brake Tube Union Nut 10 x 12 Wrench)	A												●		
	**09842-30050**	(Wiring "A" EFI Inspection)	B			●											

Remarks:
*1 Rear axle shaft
*2 Differential
*3 Front drive shaft

SST (SPECIAL SERVICE TOOLS) (Cont'd)

Section / Classification / Part Name / Part No. / Illustration				EM	TC	FI	CO	LU	ST	CL	MT	PR	FA	RA	BR	SR	BE
	09842-30060	(Wiring "E" EFI Inspection)	B			●											
	09910-00015	(Puller Set)	B								●						
	09921-00010	(Spring Tension Tool)	A								*1 ●						
	09923-00020	(Hexagon Wrench)	B									●					
	09950-00020	(Bearing Remover)	B								●			●			
	09950-20017	(Universal Puller)	A								●	●		●			
	09990-00150	(A.B.S (Anti-lock Brake System) Actuator Checker & Sub-harness)	C												●		
	09990-00163	(A.B.S. Checker Sheet "A")	C												●		
	09992-00241	(Turbocharger Pressure Gauge)	C		●												●

Remark:
*1 Speedometer driven gear oil seal

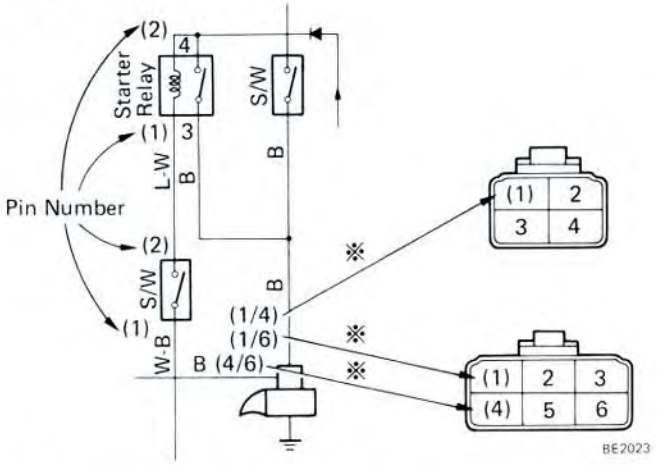
SSM (SPECIAL SERVICE MATERIALS)

Part Name	Part No.	Sec.	Use etc.
Seal packing or equivalent	08826-00080	EM	Cylinder head cover, Camshaft bearing cap
Seal packing 1281, Three bond 1281 or equivalent	08826-00090	MT	Transmission case Control shaft cover Transfer case Transfer inspection hole cover Transfer right case
		RA	Differential carrier
Seal packing 1121, Three bond 1121 or equivalent	08826-00801	PR	Universal joint cover
		FA	The contact surface of the outer race and cover of the drive shaft
Adhesive 1324, Three bond 1324 or equivalent	08833-00070	CL	Release fork support
		MT	Rear bearing retainer set bolt
Adhesive 1344, Three bond 1344, Loctite 242 or equivalent	08833-00080	MT	Straight screw plug Transmission case cover set bolt Transmission case set bolt Transaxle case set bolt Transfer case set bolt Transfer right case set bolt Shift and select lever shaft assembly set bolt
		SR	Bearing guide nut Bearing guide nut lock nut Rack guide spring cap Rack guide spring cap lock nut

ELECTRICAL WIRING DIAGRAMS

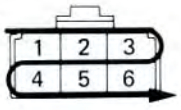
HOW TO READ THIS SECTION

PIN NUMBER



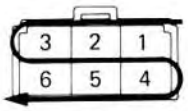
※ When connectors with different numbers of terminals are used with the same parts, the pin number and the numbers of terminals are specified.
e.g. (1/4) = No. 1 pin/4 terminals connector

Numbered in order from upper left to lower right



Female

Numbered in order from upper right to lower left

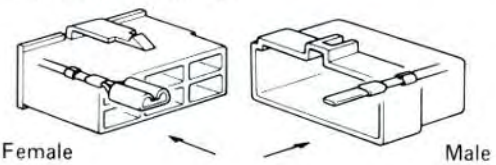


Male

BE0832

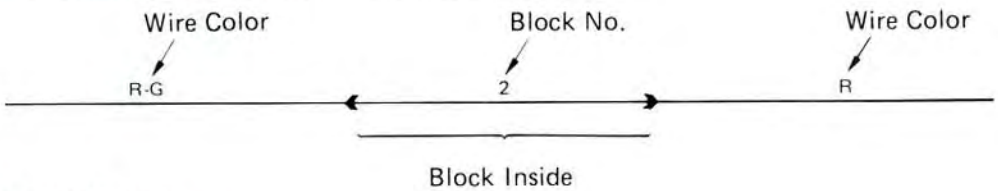
Male & female connectors distinguished by shape of their internal pins.

- All connectors are shown from the open end, and the lock is on top.



BE0833

JUNCTION BLOCK OR RELAY BLOCK



WIRE COLOR

Wire colors are indicated by an alphabetical code.

B = Black	BR = Brown	G = Green	GR = Gray	L = Blue
LG = Light Green	O = Orange	P = Pink	R = Red	V = Violet
W = White	Y = Yellow			

The 1st letter indicates the basic wire color and the 2nd indicates the stripe color.

Example: R-G indicates a Red wire with a Green stripe.

ABBREVIATION

The following abbreviations are used in this wiring diagram.

A/C	= Air Conditioner	LH	= Left-hand
A/T	= Automatic Transmission	M/T	= Manual Transmission
CB	= Circuit Breaker	O/D	= Overdrive
ECT	= Electronic Controlled Transmission	RH	= Right-hand
ECU	= Electronic Controlled Unit	S/W	= Switch
EFI	= Electronic Fuel Injection	TCCS	= Toyota Computer Controlled System
FL	= Fusible Link	VSV	= Vacuum Switching Valve
ISC	= Idle Speed Control	w/	= With
J/B	= Junction Block	w/o	= Without

SYSTEM INDEX

CELICA

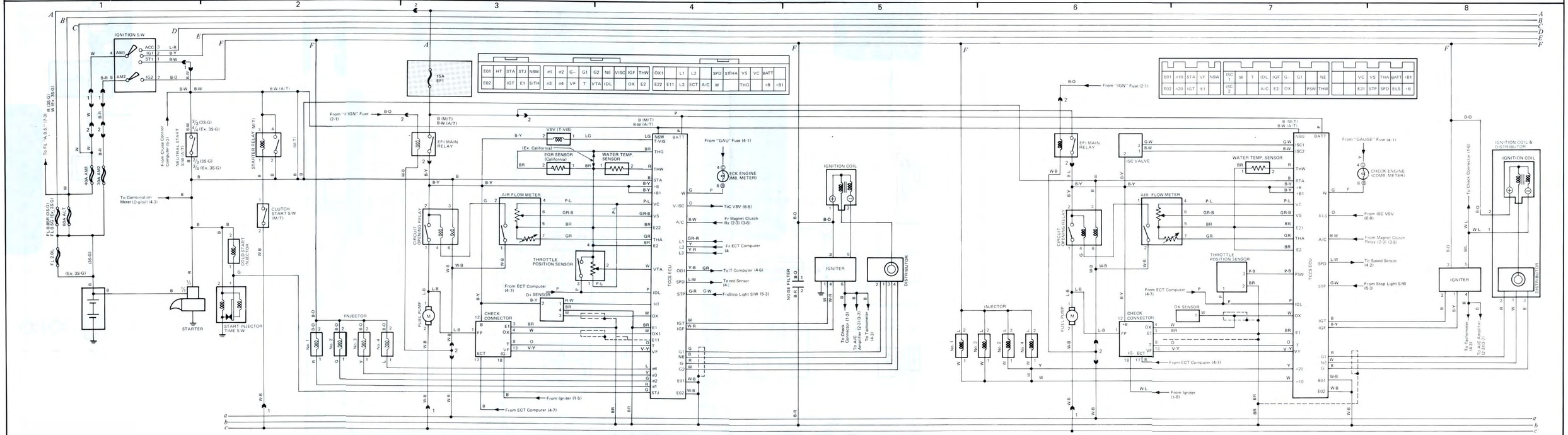
1988 Model (Page 1 to Page 8)

Power Source (Ex. 3S-GTE)

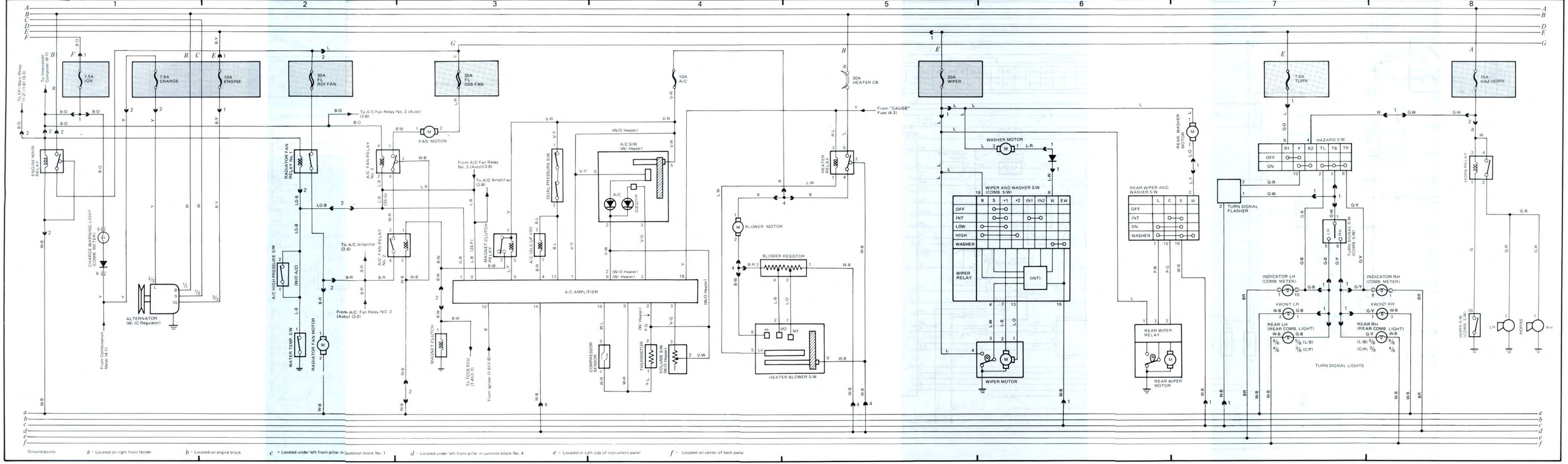
Starting (Ex. 3S-GTE)

TCCS (3S-G)

TCCS (3S-FE)



Charging | Radiator Fan and Condenser Fan | Air Conditioner, Cooler and Heater (Lever Switch Type) | Front Wiper and Washer | Rear Wiper and Washer | Turn Signal and Hazard | Horn



Ground points

a = Located on right front fender

b = Located on engine block

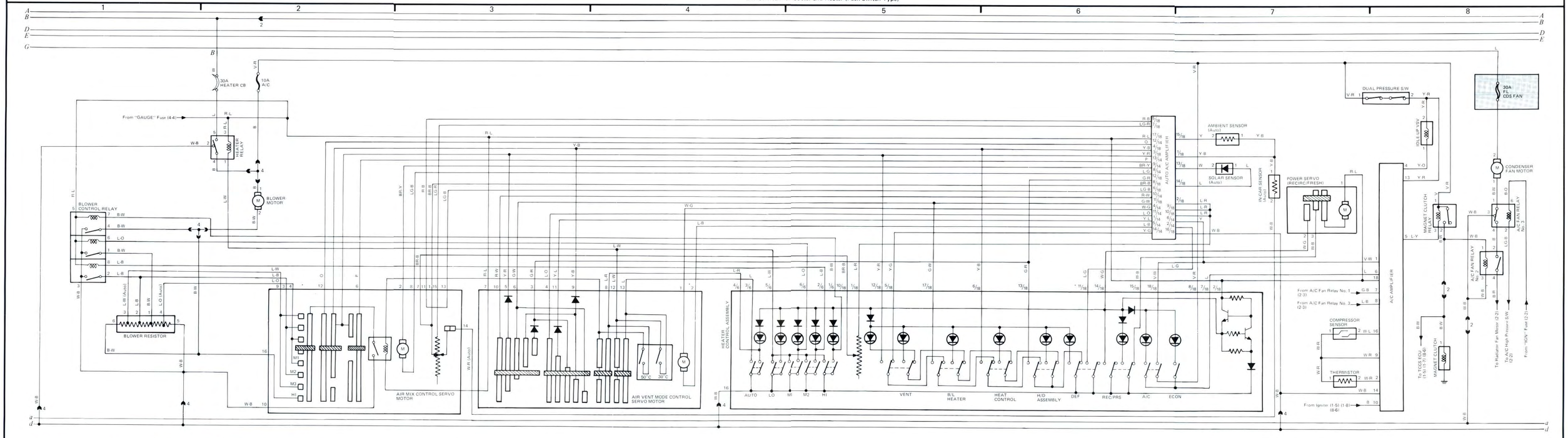
c = Located under left front pillar in junction block No. 1

d = Located under left front pillar in junction block No. 4

e = Located in Left side of instrument panel

f = Located on center of back panel

Air Conditioner Cooler and Heater (Push Switch Type)



Ground points

a = Located on right front fender

d = Located under left pillar in junction block No. 4

Combination Meter

Remote Control Mirrors with Heater

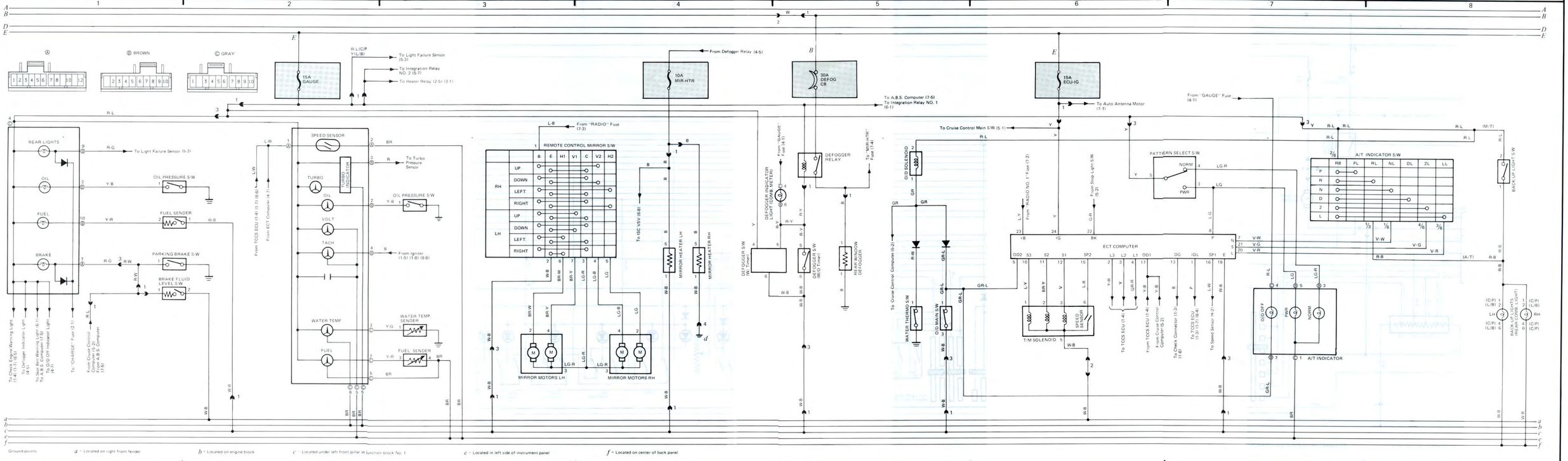
Rear Window Defogger

Overdrive

ECT (Electronic Controlled Transmission)

Automatic Transmission Indicator

Back-up Lights

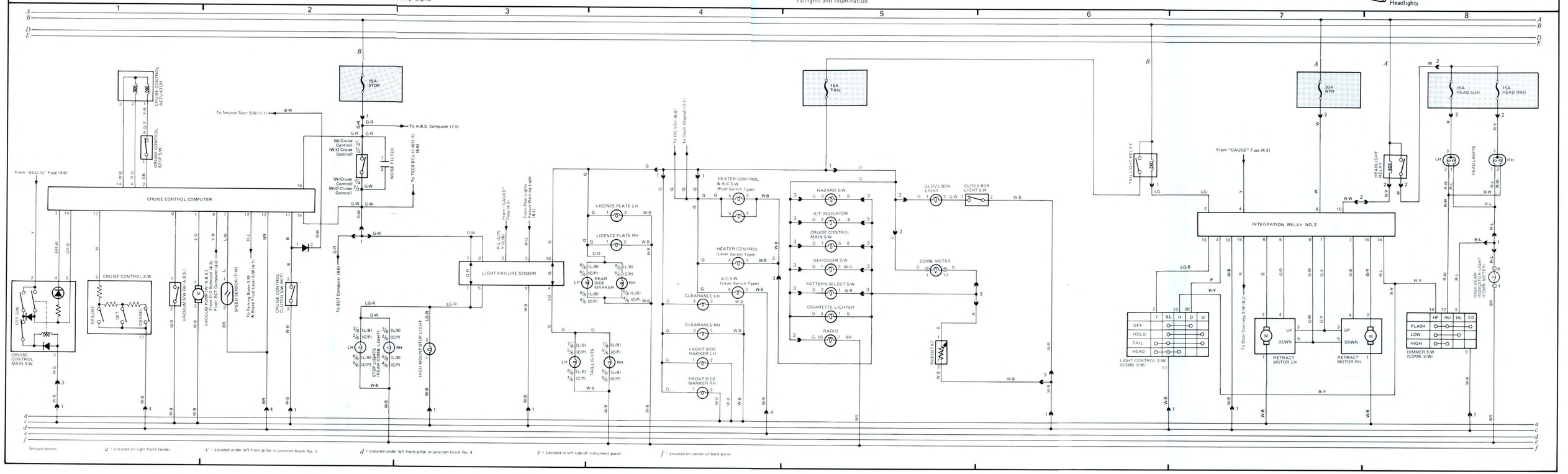


Cruise Control

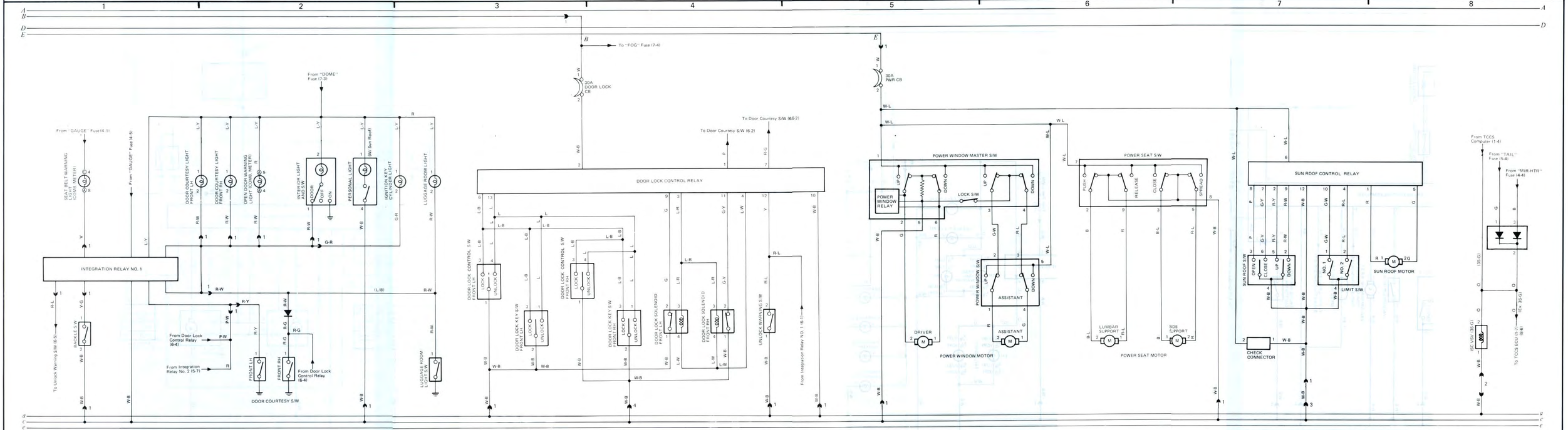
Stop Lights

Taillights and Illumination

Headlights



Unlock and Seat Belt Warning | Interior Lights | Door Locks | Power Windows | Power Seats | Sun Roof | Idle-up



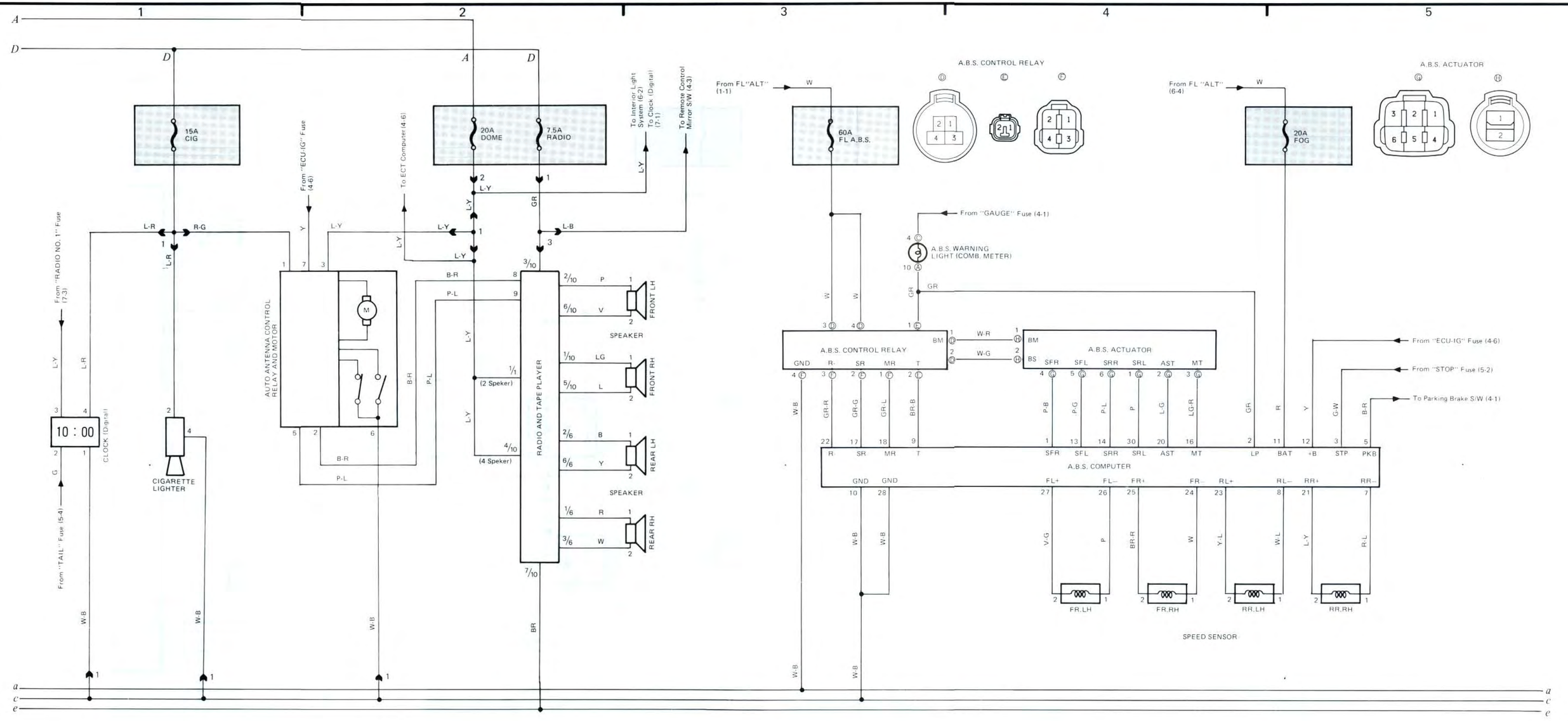
Clock

Cigarette Lighter

Auto Antenna

Radio and Tape Player

A.B.S. (Anti-Lock Brake System)



Ground points

a = Located on right front fender

c = Located under left front pillar in junction block No. 1

e = Located in left side of instrument panel


Power Source (3S-GTE)
Starting (3S-GTE)
TCCS
TCCS (3S-GTE)
1
2
3
4
5
6
7
8
IGNITION S/W
AM1
ACC
IG
ST1
AM2
IG2
40A AM1
30A AM2
FL 0.5G
80 ALT
FL 2.0L
BATTERY
STARTER
STARTER RELAY
CLUTCH START S/W
COLD START INJECTOR
START INJECTOR TIME S/W
15A EFI
EFI MAIN RELAY
From "IGN" Fuse (2-1)
RESISTOR
INJECTOR
No. 1
No. 2
No. 3
No. 4
FUEL RESISTOR
FUEL PUMP
CIRCUIT OPENING RELAY
FUEL PUMP RELAY
AIR FLOW METER
CHECK CONNECTOR
O2 SENSOR
From Igniter (8-6)
VSV (TURBOCHARGING PRESSURE CONTROL)
WATER TEMP. SENSOR
EGR SENSOR (California)
THROTTLE POSITION SENSOR
From ECT Computer (4-7)
From Intercooler Computer (8-7)
TURBO PRESSURE SENSOR
TCCS ECU
From "GAUGE" Fuse (4-1)
VSV (T-VIS)
CHECK ENGINE (COMB. METER)
ISC VALVE
VSV (FUEL PRESSURE UP)
VSV (EGR)
From Intercooler Computer (8-7)
From ISC VSV (6-8)
From Stop Light S/W (5-3)
From A/C Amplifier (3-8)
To Speed Sensor (4-2)
KNOCK SENSOR
IGNITION COIL
IGNITER
DISTRIBUTOR
NOISE FILTER
To Check Connector (8-4)
To A/C Amplifier (3-7)
To Tachometer (4-3)
To TCCS ECU (8-6)
INTERCOOLER MOTOR
From "IGN" Fuse (2-1)
INTERCOOLER COMPUTER
COOLANT LEVEL SENSOR
To Throttle Position Sensor (8-4)
E01 RSC STA STJ
E02 RSO IGT E1 TVIS
#1 #2 G G1 G2 NE FPR IGF THW
#3 #4 VF T VTA IDL HT OX E2
WIN TPC SPD STP THA VS VC BATT ELS
E22 EGR A/C W FPU KNK IMP THG +B +B1
Ground points
a = Located on right front fender
b = Located on engine block
c = Located under left front pillar in junction block No. 1