AXIOM

DRIVELINE/AXLE

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Differential (Front)

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Service Precaution

WARNING: THIS VEHICLE HAS A SUPPLEMENTAL RESTRAINT SYSTEM(SRS). REFER TO THE SRS COMPONENT AND WIRING LOCATION VIEW IN ORDER TO DETERMINE WHETHER YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING. WHEN YOU ARE REFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING, REFER TO THE SRS SERVICE INFOMATION. FAILURE TO FOLLOW WARNINGS COULD RESULT IN POSSIBLE AIR BAG DEPLOYMENT, PERSONAL INJURY, OR OTHERWISE UNNEEDED SRS SYSTEM REPAIRS.

CAUTION: Always use the correct fastener in the proper location. When you replace a fastener, use ONLY the exact part number for that application. ISUZU will call out those fasteners that require a replacement after removal. ISUZU will also call out the fasteners that require thread lockers or thread sealant. UNLESS OTHERWISE SPECIFIED , do not use supplemental coatings (Paints, greases, or other corrosion inhibitors) on threaded fasteners or fastener joint interfaces. Generally,such coatings adversely affect the fastener torque and the joint clamping force, and may damage the fastener. When you install fasteners, use the correct tightening sequence and specification. Following these instructions can help you avoid damage to parts and systems.

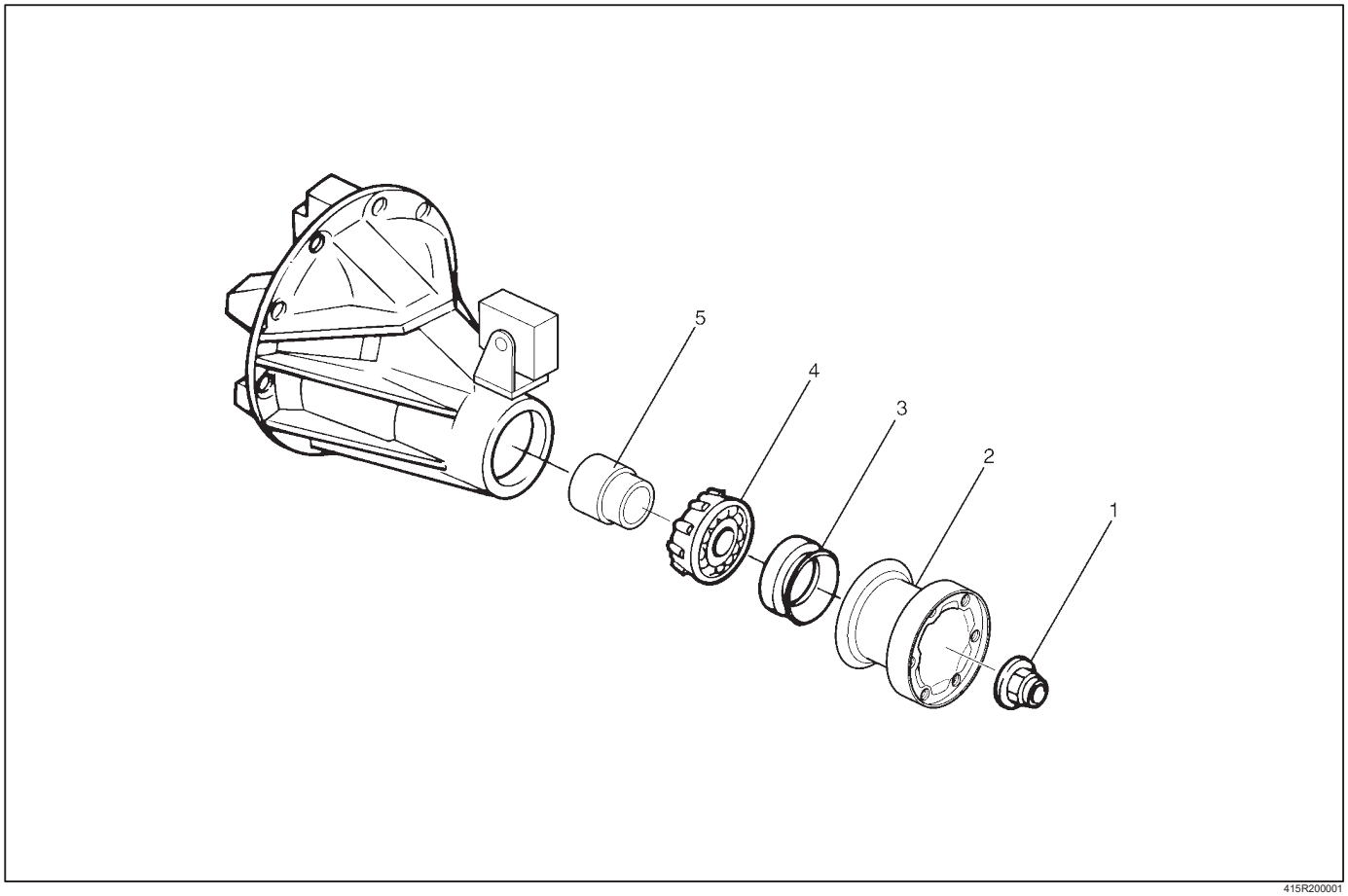
Front Drive Axle

Diagnosis

Condition	Possible cause	Correction
Oil Leak At Front Axle	Worn or defective oil seal.	Replace the oil seal.
	Front axle housing cracked.	Repair or replace.
Oil Leak At Pinion Shaft	Too much gear oil.	Correct the oil level.
	Oil seal worn or defective.	Replace the oil seal.
	Pinion flange loose or damaged.	Tighten or replace.
Noises In Front Axle Drive Shaft Joint	Broken or worn drive shaft joints and bellows (BJ and DOJ).	Replace the drive shaft joints and bellows.
“Clank” When Accelerating From “Coast”	Loose drive shaft joint to output shaft bolts.	Tighten.
	Damaged inner drive shaft joint.	Replace.
Shudder or Vibration During Acceleration	Excessive drive shaft joint angle.	Repair.
	Worn or damaged drive shaft joints.	Replace.
	Sticking spider assembly (inner drive shaft joint).	Lubricate or replace.
	Sticking joint assembly (outer drive shaft joint).	Lubricate or replace.
Vibration At Highway Speeds	Out of balance or out of round tires.	Balance or replace.
	Front end out of alignment.	Align.
Noises in Front Axle	Insufficient gear oil.	Replenish the gear oil.
	Wrong or poor grade gear oil.	Replace the gear oil.
	Drive pinion to ring gear backlash incorrect.	Adjust the backlash.
	Worn or chipped ring gear, pinion gear or side gear.	Replace the ring gear, pinion gear or side gear.
	Pinion shaft bearing worn.	Replace the pinion shaft bearing.
	Wheel bearing worn.	Replace the wheel bearing.
	Differential bearing loose or worn.	Tighten or replace.
Wanders and Pulls	Wheel bearing preload too tight.	Adjust the wheel bearing preload.
	Incorrect front alignment.	Adjust the front alignment.
	Steering unit loose or worn.	Tighten or replace.
	Tire worn or improperly inflated.	Adjust the inflation or replace.
	Front or rear suspension parts loose or broken.	Tighten or replace.
Front Wheel Shimmy	Wheel bearing worn or improperly adjusted.	Adjust or replace.
	Incorrect front alignment.	Adjust the front alignment.
	Worn ball joint or bush.	Replace the ball joint or bush.
	Steering unit loose or worn.	Tighten or replace.
	Tire worn or improperly inflated.	Replace or adjust the inflation.
	Shock absorber worn.	Replace the shock absorber.

Pinion Shaft Oil Seal

Pinion Shaft Oil Seal and Associated Parts



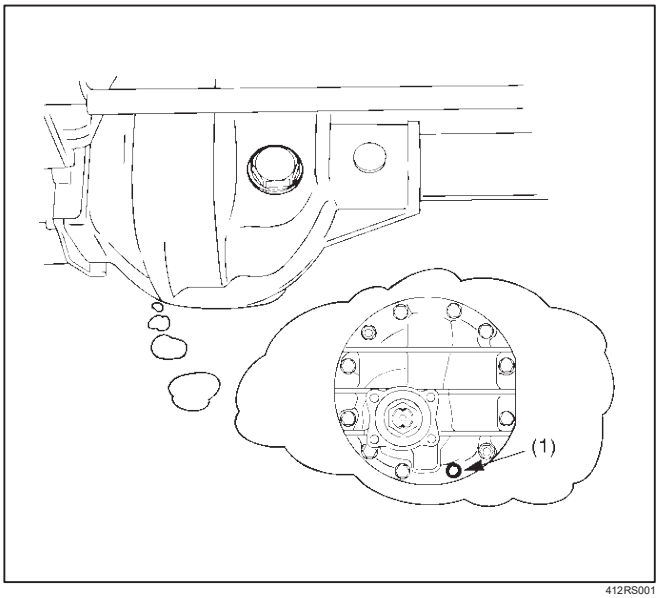
415R200001

Legend

(1) Flange Nut
(2) Flange
(3) Oil Seal
(4) Outer Bearing
(5) Collapsible Spacer

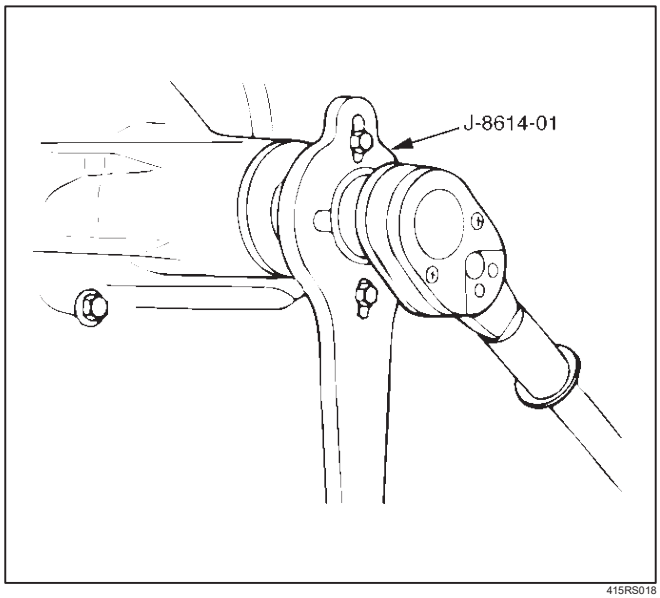
Removal

1. Raise the vehicle and support it at the frame.
   The hoist must remain under the front axle housing.
2. Drain the front axle oil by loosening the drain plug(1).



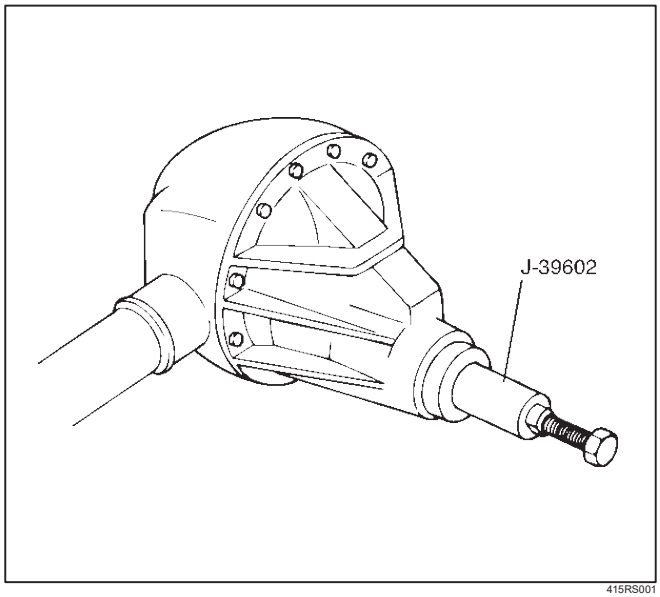
412RS001

3. Remove the front propeller shaft. Refer to *Front Propeller Shaft* in this section.
4. Remove flange nut by using pinion flange holder J–8614–01.



415RS018

5. Remove flange.
6. Remove oil seal.
7. Remove outer bearing by using remover J–39602.



415RS001

8. Remove collapsible spacer.

Inspection and Repair

Make necessary correction or parts replacement if wear, damage, corrosion or any other abnormal condition are found through inspection.
Check the following parts.

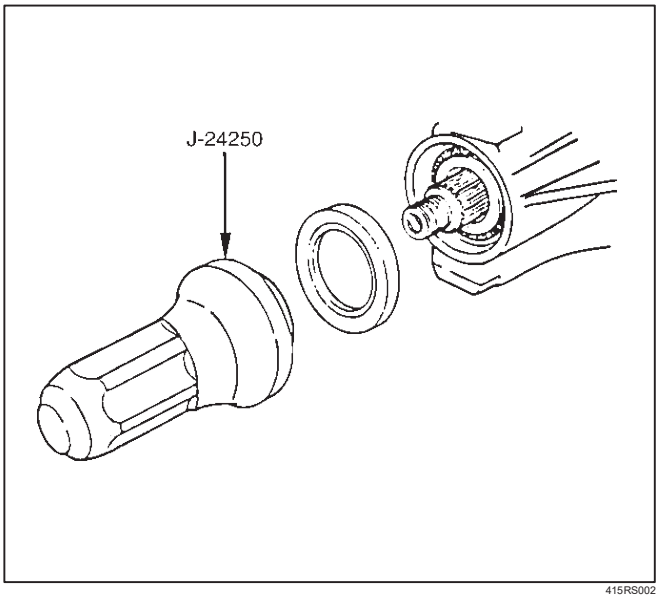
1. Seal surface of the pinion.
2. Cage bore for burns.

Installation

1. Install collapsible spacer. Discard the used collapsible spacer and install a new one.
2. Install outer bearing.

NOTE: Do not drive in, but just temporarily set in the outer bearing by hand, which should be indirectly pressed in finally by tightening the flange nut.

3. Install oil seal, use oil seal installer J–24250 to install a new oil seal that has been soaked in axle lubricant.



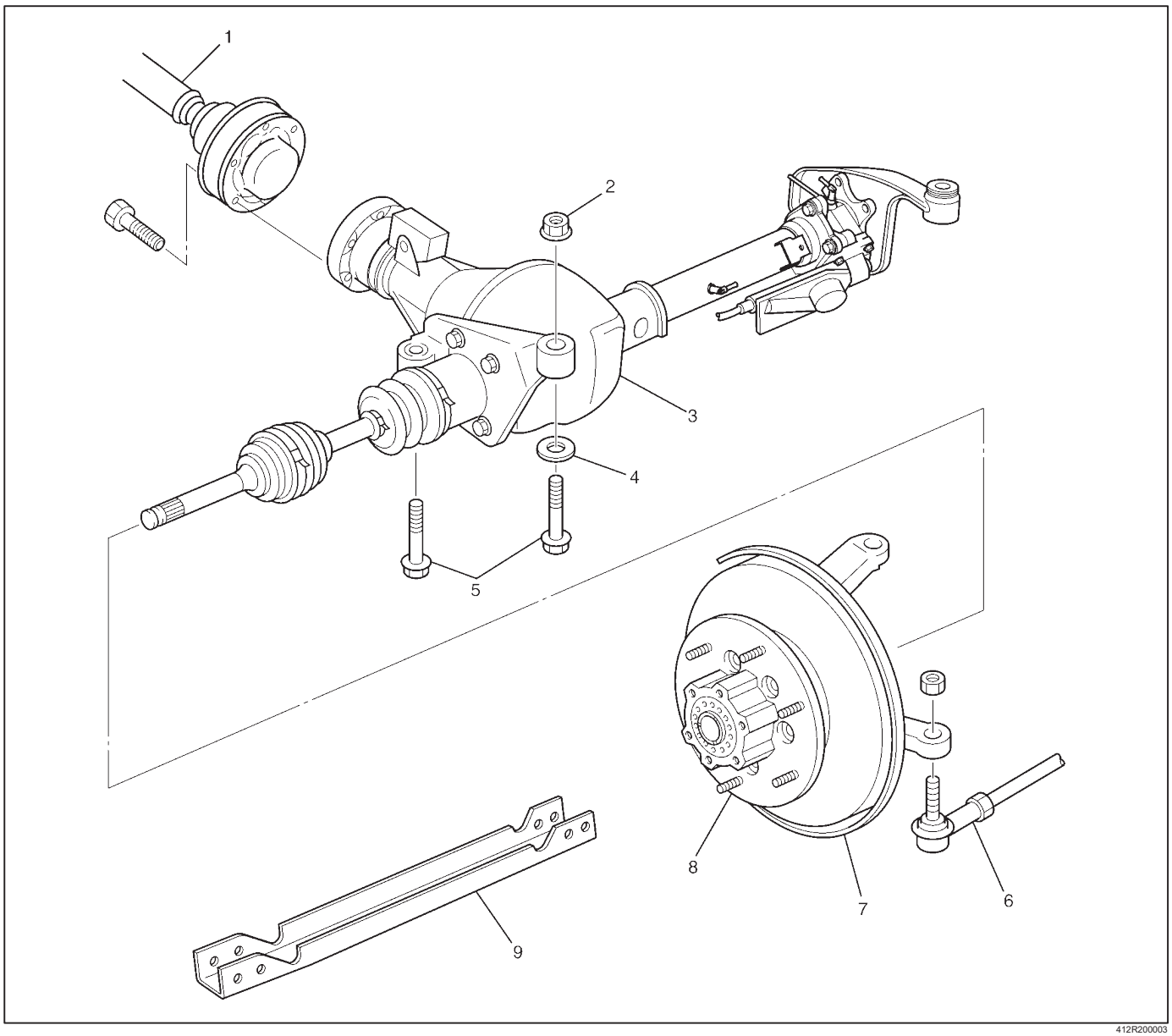
415RS002

4. Install flange.
5. Install flange nut, refer to *Differential Assembly Overhaul for flange nut reassembly* in this section.

NOTE: Discard the used nut and install a new one.

Front Drive Axle Assembly

Front Drive Axle Assembly and Associated Parts



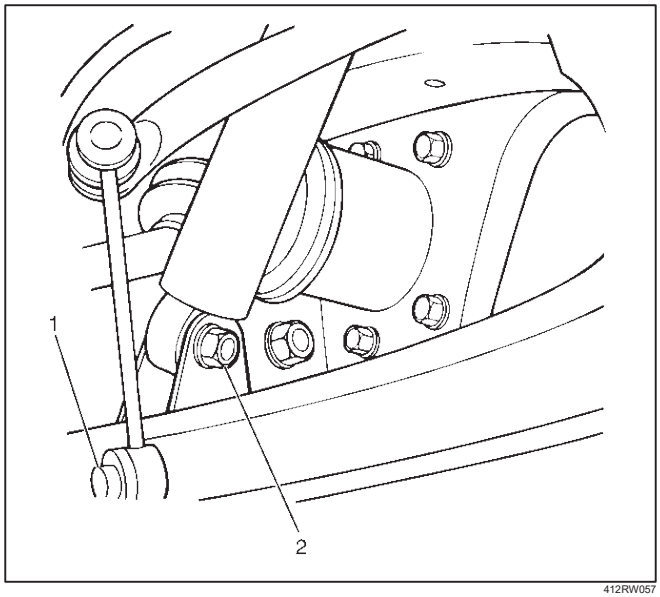
412R200003

Legend

(1) Propeller Shaft
(2) Mounting Nut
(3) Front Axle Case Assembly and Front Drive Shaft Assembly
(4) Washer
(5) Mounting Bolt
(6) Tie–rod End; Power Steering Unit
(7) Knuckle and Back Plate
(8) Hub and Disc Assembly
(9) Suspension Crossmember

Removal

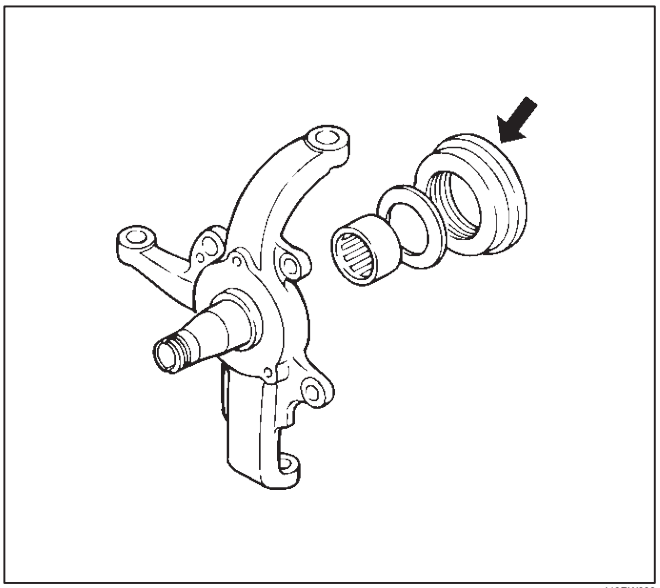
1. Jack up the vehicle and support it using jack stand.
2. Remove the tire and wheel.
3. Remove the stone guard.
4. Remove the brake caliper fixing bolt and hang the caliper. Refer to *Disc Brakes in Brake* section.
5. Remove the antilock brake system speed sensor. Refer to *Front Wheel Speed Sensor in Brake* section.
6. Remove the hub and disc assembly. Refer to *Front Hub and Disc* in this section.
7. Remove the propeller shaft, refer to *Front Propeller Shaft* in this section.
8. Loosen the height control arm of the torsion bar, then remove the torsion bar from lower control arm. Refer to *Torsion Bar in Suspension* section.
9. Remove the suspension crossmember.
10. Remove the lower nut (1) of the stabilizer link.
11. Remove the lower bolt and nut (2) of the shock absorber.



412RW057

12. Remove the tie-rod end from the knuckle. Refer to *Power Steering Unit* in Steering Section.
13. Disconnect the hose of the shift on the fly.
14. Disconnect the actuator connector.
15. Remove the bolts and nuts of the lower control arm (Frame side), then disconnect the lower control arm from frame.
16. Disconnect between the right side upper control arm and the knuckle, then remove the knuckle with lower control arm.

CAUTION: When removing the knuckle, be careful not to damage the oil seal inside of the knuckle.


410RW008

17. Support the differential case by the jack.
18. Remove the front axle mounting bolts and nuts, lower the jack slowly. Remove the left side drive shaft end from the knuckle, then lower the axle assembly from the vehicle.

CAUTION:

1. **Make sure the axle assembly is supported securely when performing repairs.**
2. **Do not damage the power steering unit when performing the repairs.**
3. **Do not damage the shift–on–the fly hose bracket when performing the repairs.**

Installation

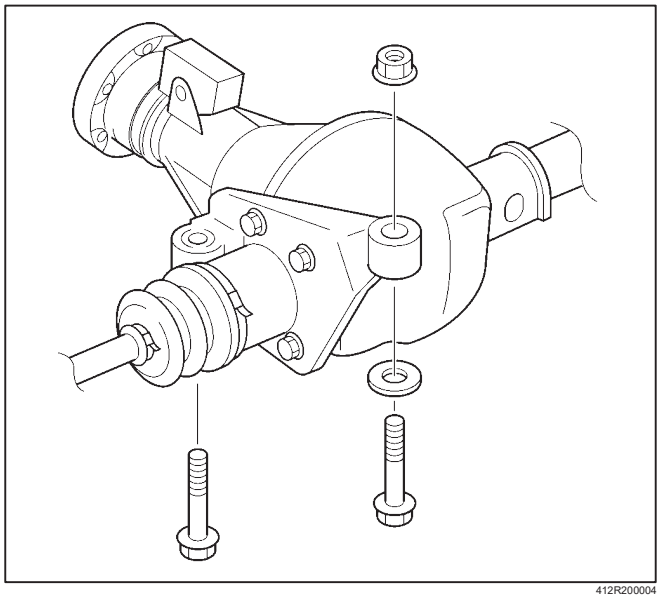
1. Support the differential case with a jack.
2. Jack up the front drive axle assembly, install the left side drive shaft to the knuckle, then install the mount bolts and nuts.

CAUTION:

1. **Do not damage the power steering unit when performing the repairs.**
2. **Do not damage the shift–on–the fly hose bracket when performing the repairs.**
3. **When installing the drive shaft to the knuckle, be careful not to damage the oil seal inside of the knuckle.**

3. Tighten the mounting bolts and nuts to the specified torque.

   Torque: 168 N·m (124 lb ft)


412R200004

4. Install the right side knuckle with lower control arm to the upper control arm.
   Refer to *Knuckle in Suspension* section.

CAUTION: Carefully insert the drive shaft into the knuckle, to avoid damaging the oil seal.

5. Align the bolt hole of the lower control arm, then install the bolts and nuts.

NOTE: Adjust the buffer clearance before tightening the bolts and nuts of the lower control arm.

6. Install the hose of the shift on the fly.
7. Install the actuator connector of the shift on the fly.
8. Install the tie-rod end of the power steering unit to the knuckle, tighten the nut to the specified torque.

   Torque: 118 N·m (87 lb ft)

9. Install lower bolts and nuts of the shock absorber, tighten it to the specified torque.

   Torque: 93 N·m (69 lb ft)

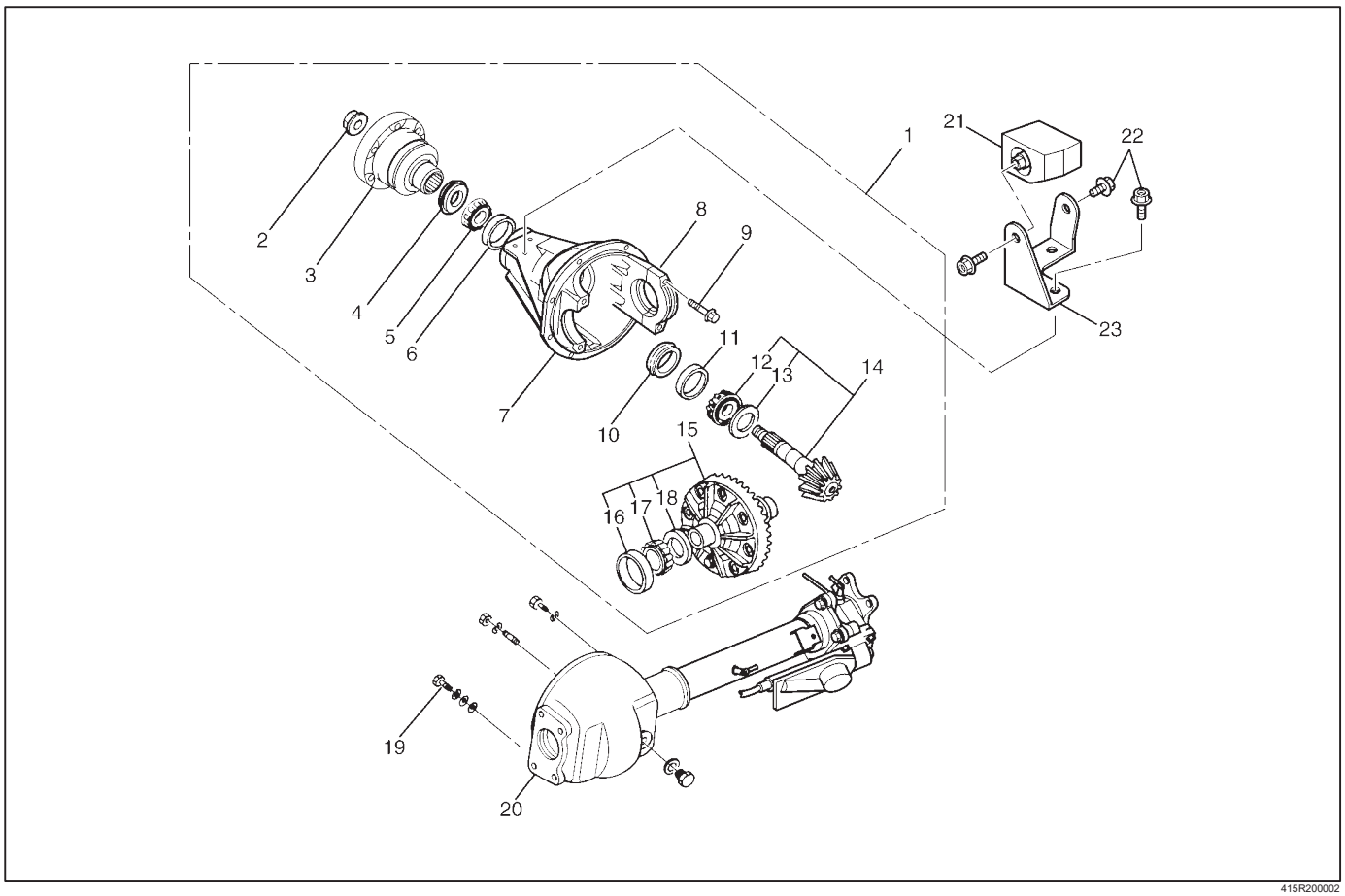
10. Install lower nuts of the stabilizer link, tighten it to the specified torque.
11. Install the suspension crossmember.
12. Install the torsion bar.
    Refer to *Torsion Bar in Suspension* section.
13. Install the front propeller shaft.
    Refer to *Front Propeller Shaft* in this section.
14. Install the hub and disc assembly and adjust the bearing preload.
    Refer to *Front Hub and Disc* in this section.
15. Install the wheel speed sensor of the antilock brake system.
16. Install the brake caliper. Tighten the bolt of the caliper bracket to the specified torque.

    Torque: 50 N·m (37 lb ft)

17. Install the stone guard.
18. Install the tire and wheel.
19. Lower the vehicle, adjust the trim height.
    Refer to *Trim Height Adjustment in Steering* section.
20. Tighten the bolts and nuts of the lower control arm to the specified torque.
    Refer to *Lower Control Arm in Suspension* section.

Differential Assembly

Disassembled View



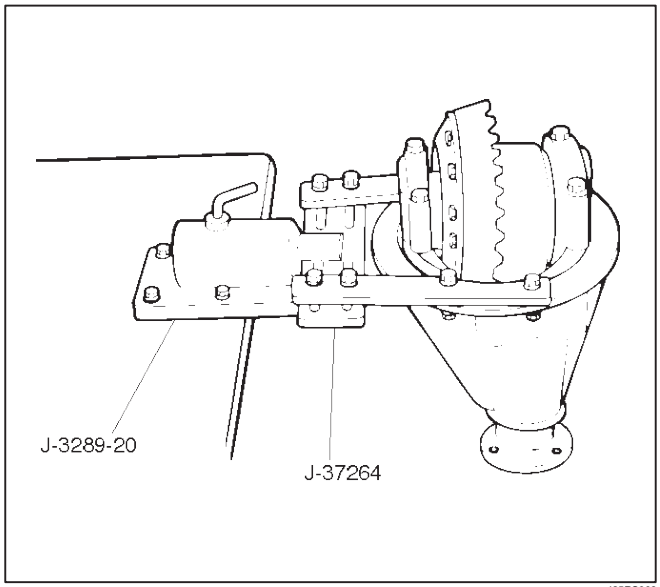
415R200002

Legend

(1) Differential Assembly
(2) Flange Nut
(3) Flange
(4) Oil Seal
(5) Outer Bearing
(6) Outer Bearing Outer Race
(7) Differential Carrier
(8) Bearing Cap
(9) Bolt
(10) Collapsible Spacer
(11) Inner Bearing Outer Race
(12) Inner Bearing
(13) Adjust Shim
(14) Pinion Gear
(15) Diff Cage Assembly
(16) Side Bearing Outer Race
(17) Side Bearing
(18) Adjust Shim
(19) Bolt
(20) Axle Case
(21) Final Drive Damper
(22) Damper Bolt
(23) Damper Bracket

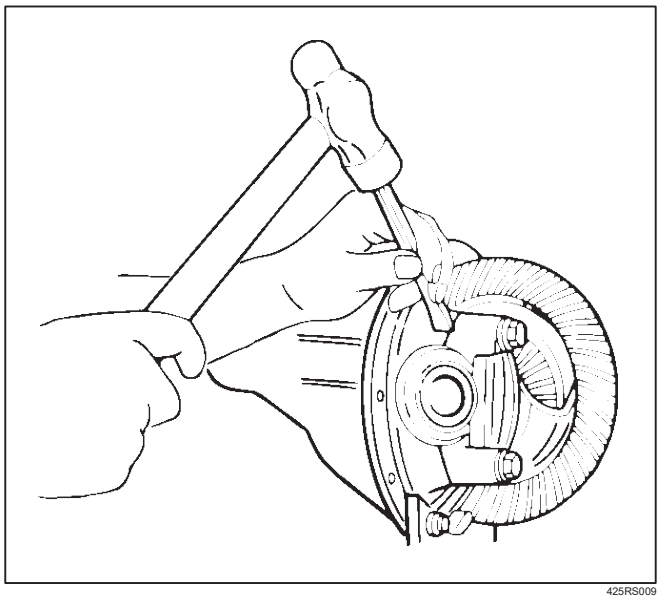
Disassembly

1. Remove differential carrier fixing bolt.
2. Remove differential assembly.
3. Using holding fixture J–37264 and holding fixture base J–3289–20, fix the differential assembly to the bench.

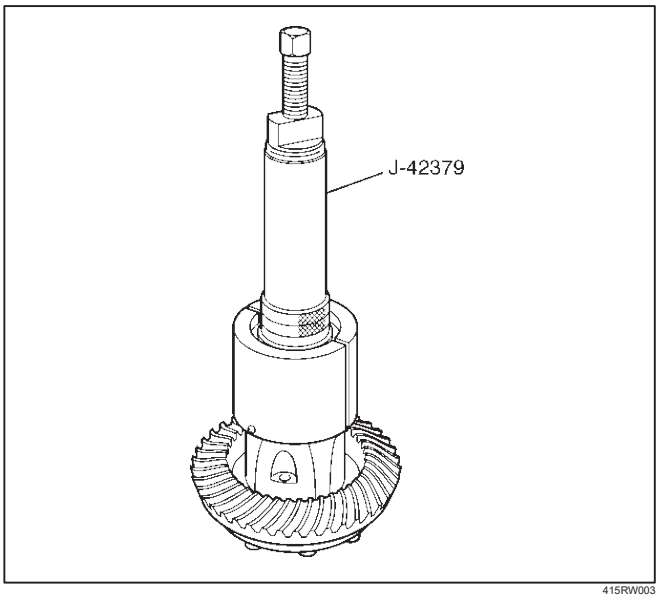


425RS008

4. Remove bearing cap bolt.
5. Apply a setting mark to the side bearing cap and the differential carrier then remove bearing cap.

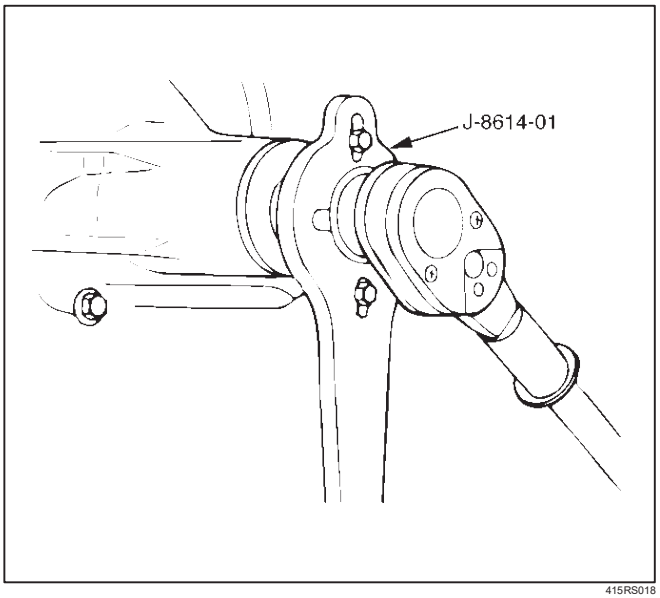

425RS009

6. Remove differential cage assembly.
7. Remove side bearing outer race, after removal, keep the right and left hand side bearing assemblies separate to maintain inner and outer race combinations.
8. Remove side bearing, using remover J–42379 and adapter J–8107–2.
   - Select insert; 303173 and collet halves; 44801 in remover kit J–42379.



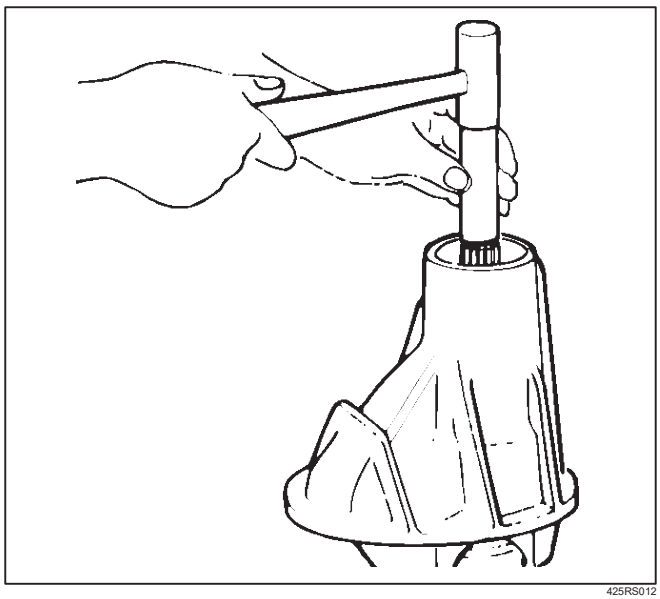
415RW003

9. Remove adjust shim, note the thickness and position of the shims removed.
10. Remove the flange nut using holding wrench J–8614–01.

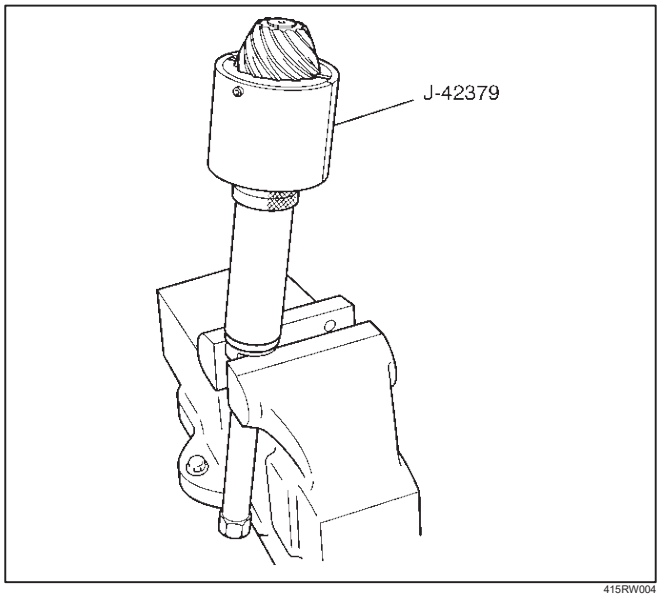


415RS018

11. Remove flange using a universal puller.
12. Remove the drive pinion assembly using a soft metal rod and a hammer.

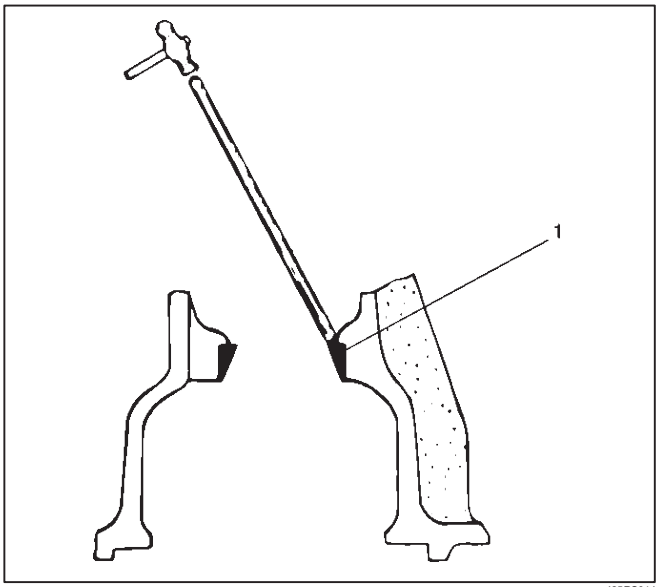

425RS012

13. Remove collapsible spacer.
14. Remove the inner bearing using remover J–42379.
    - Select insert; 303173 and collet halves; 44801 in remover kit J–42379.

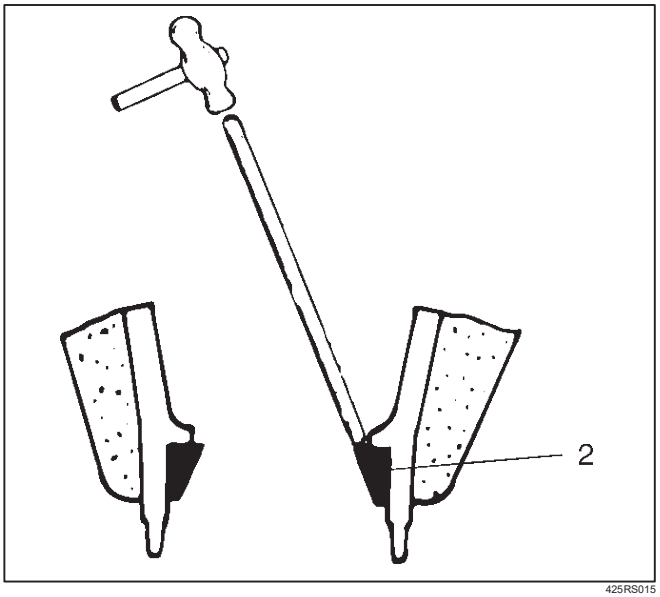


415RW004

15. Remove adjust shim.
16. Remove oil seal.
17. Remove outer bearing.
18. Remove the inner bearing outer race (1) and the outer bearing outer race (2) by using a brass bar and a hammer.

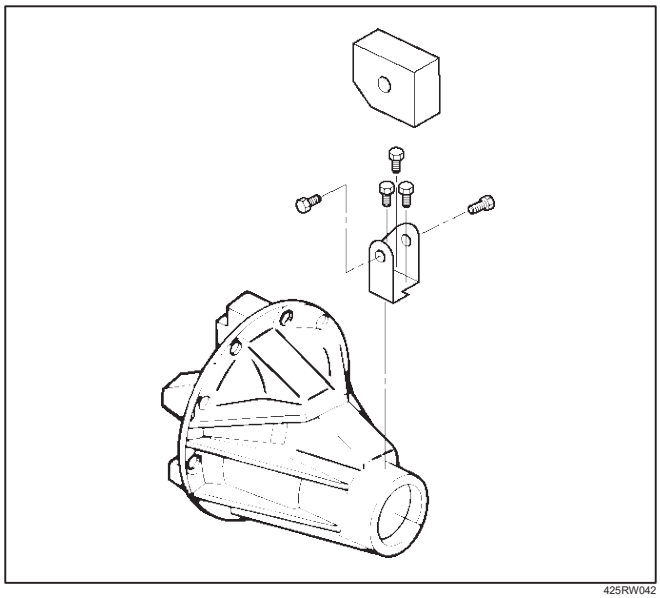


425RS014



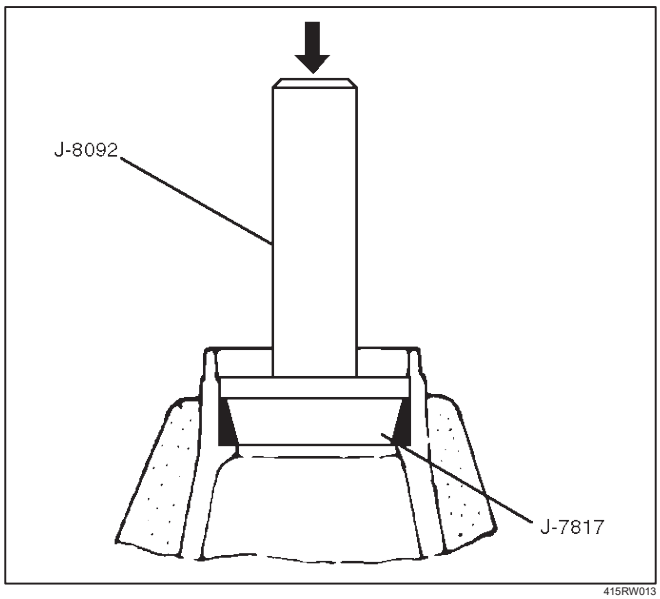
425RS015

19. Remove damper and bracket.


425RW042

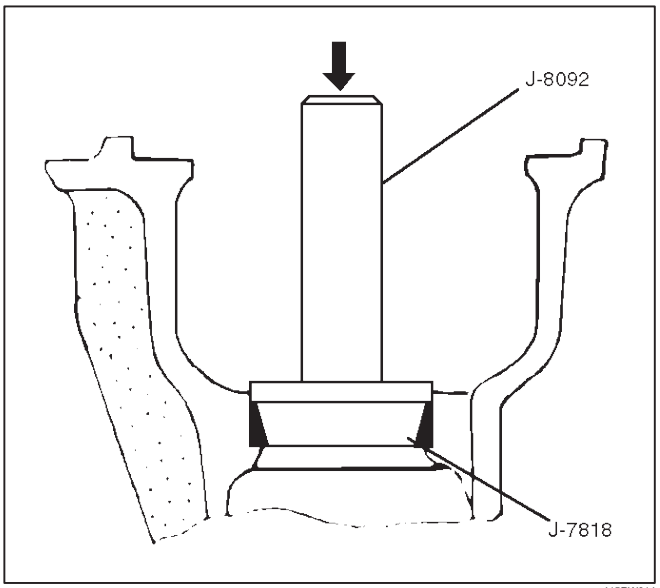
Reassembly

1. Using installer J–7817 and grip J–8092, install outer bearing outer race.



415RW013

2. Using installer J–7818 and grip J–8092, install Inner bearing outer race.

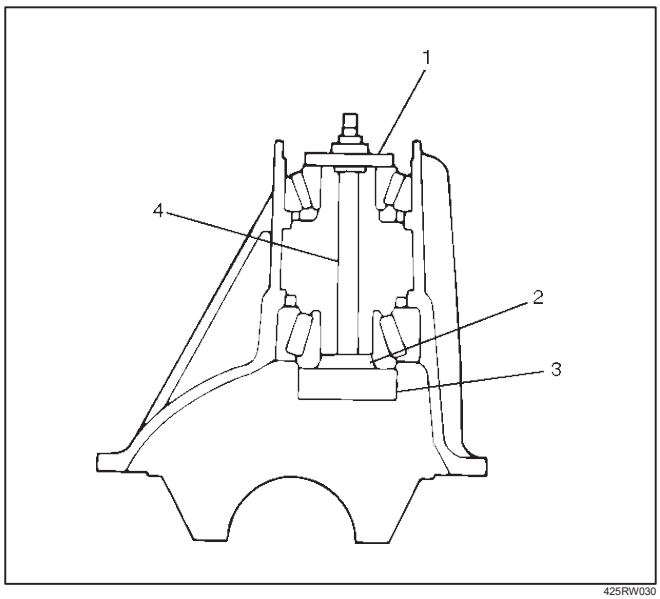


415RW014

3. Install adjust shim and adjust drive pinion mounting distance:
   1. Apply gear oil to the inner and outer drive pinion bearing.
      Clean the pinion setting gauge set.
      Then install the gauge set together with the inner and outer bearings.

2. Tighten the nut to the specified torque.

Torque: 2.3 N·m (20 lb in)



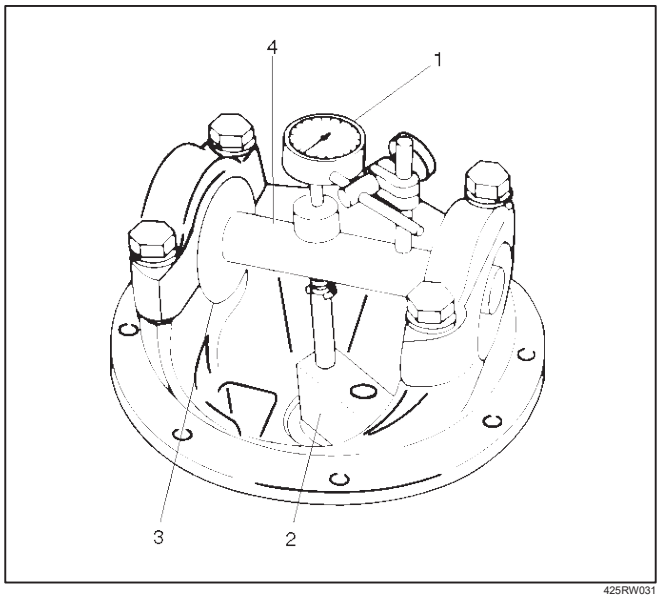
425RW030

Legend

(1) Pilot : J–21777–42
(2) Pilot : J–42479–2
(3) Gauge Plate : J–42479–1
(4) Nut and Stud : J–21777–43

3. Clean the side bearing bores. Install the dial indicator with the discs and arbor. Install and tighten the bearing caps to the specified torque.

Torque: 97 N·m (72 lb ft)

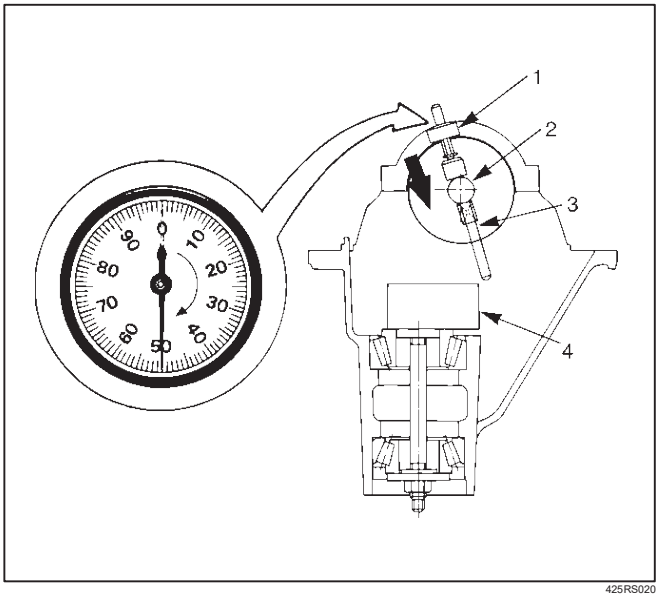


425RW031

Legend

(1) Dial Indicator: J–8001
(2) Gauge Plate: J–42479–1
(3) Disc (2 pcs.): J–23597–8
(4) Arbor: J–23597–1

4. Set the dial indicator to “0”. Place it on the mounting post of the gauging arbor with the contact button touching the indicator pad. Force the dial indicator downward until the needle has made a half turn clockwise. Tighten down the dial indicator in this position.



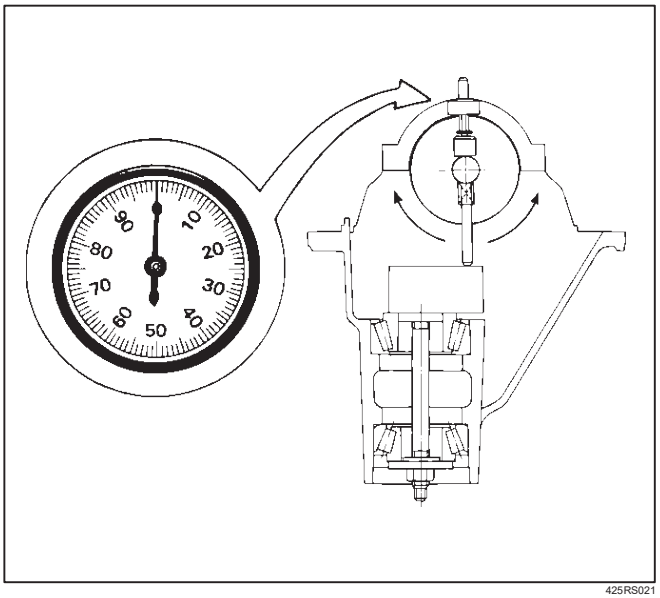
425RS020

Legend

(1) Dial Indicator
(2) Ganging Arbor
(3) Plunger
(4) Gauge Plate

5. Position the plunger on the gauge plate. Move the gauging arbor slowly back and forth and locate the position at which the dial indicator shows the greatest defection. At this point, once again set the dial indicator to “0”.

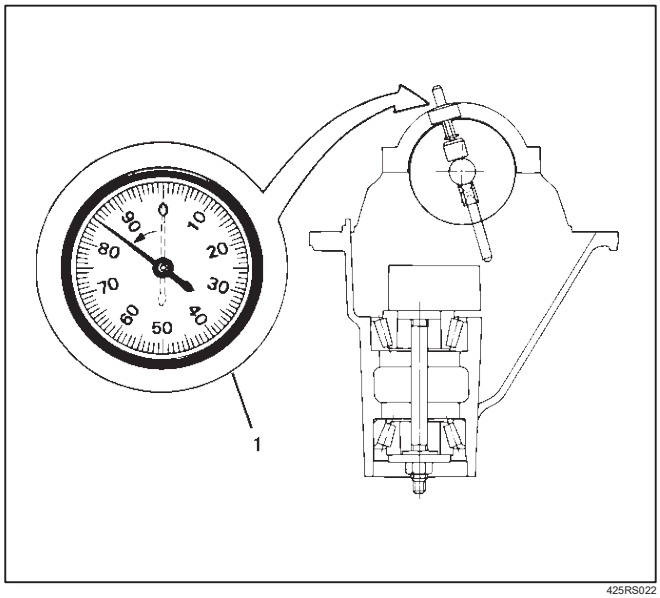
Repeat the procedure to verify the “0” setting.



425RS021

6. After the ZERO setting is obtained, rotate the gauging arbor until the dial indicator rod does not touch the gauging plate.

   Record the number the dial indicator needle points to.



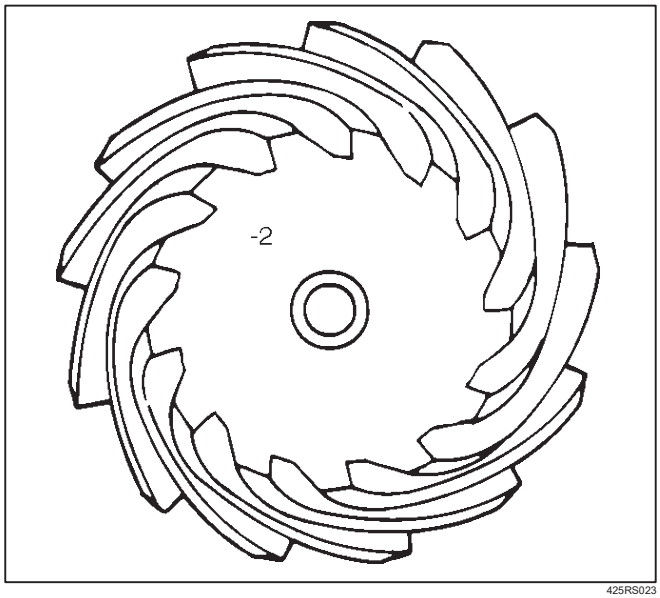
425RS022

Legend

(1) Example=Dial indicator reading of 0.085

7. Record the pinion depth code on the head of the drive pinion.

   The number indicates a necessary change in the pinion mounting distance. A plus number indicates the need for a greater mounting distance (which can be achieved by decreasing the shim thickness). A minus number indicates the need for a smaller mounting distance (which can be achieved by increasing the shim thickness). If examination reveals pinion depth code “0”, the pinion is “nominal”.



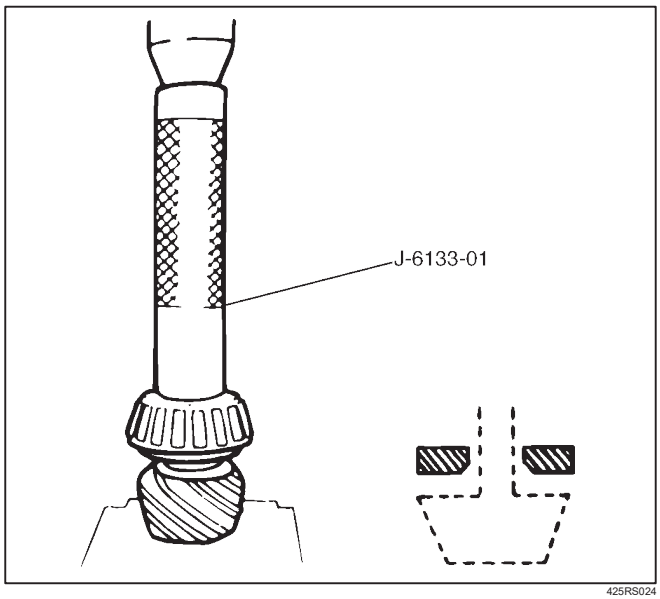
425RS023

8. Select the shim using chart;

Pinion marking / Dial indicator reading (Inches)	+7	+6	+5	+4	+3	+2	+1	0	–1	–2	–3	–4	–5	–6	–7
0.023															0.030
0.024														0.030	0.030
0.025													0.030	0.030	0.032
0.026												0.030	0.030	0.032	0.032
0.027											0.030	0.030	0.032	0.032	0.034
0.028										0.030	0.030	0.032	0.032	0.034	0.034
0.029									0.030	0.030	0.032	0.032	0.034	0.034	0.036
0.030								0.030	0.030	0.032	0.032	0.034	0.034	0.036	0.036
0.031							0.030	0.030	0.032	0.032	0.034	0.034	0.036	0.036	0.038
0.032						0.030	0.030	0.032	0.032	0.034	0.034	0.036	0.036	0.038	0.038
0.033					0.030	0.030	0.032	0.032	0.034	0.034	0.036	0.036	0.038	0.038	0.040
0.034				0.030	0.030	0.032	0.032	0.034	0.034	0.036	0.036	0.038	0.038	0.040	0.040
0.035			0.030	0.030	0.032	0.032	0.034	0.034	0.036	0.036	0.038	0.038	0.040	0.040	0.042
0.036		0.030	0.030	0.032	0.032	0.034	0.034	0.036	0.036	0.038	0.038	0.040	0.040	0.042	0.042
0.037	0.030	0.030	0.032	0.032	0.034	0.034	0.036	0.036	0.038	0.038	0.040	0.040	0.042	0.042	0.044
0.038	0.030	0.032	0.032	0.034	0.034	0.036	0.036	0.038	0.038	0.040	0.040	0.042	0.042	0.044	0.044
0.039	0.032	0.032	0.034	0.034	0.036	0.036	0.038	0.038	0.040	0.040	0.042	0.042	0.044	0.044	0.046
0.040	0.032	0.034	0.034	0.036	0.036	0.038	0.038	0.040	0.040	0.042	0.042	0.044	0.044	0.046	0.046
0.041	0.034	0.034	0.036	0.036	0.038	0.038	0.040	0.040	0.042	0.042	0.044	0.044	0.046	0.046	0.048
0.042	0.034	0.036	0.036	0.038	0.038	0.040	0.040	0.042	0.042	0.044	0.044	0.046	0.046	0.048	0.048
0.043	0.036	0.036	0.038	0.038	0.040	0.040	0.042	0.042	0.044	0.044	0.046	0.046	0.048	0.048	0.050
0.044	0.036	0.038	0.038	0.040	0.040	0.042	0.042	0.044	0.044	0.046	0.046	0.048	0.048	0.050	0.050
0.045	0.038	0.038	0.040	0.040	0.042	0.042	0.044	0.044	0.046	0.046	0.048	0.048	0.050	0.050	0.052
0.046	0.038	0.040	0.040	0.042	0.042	0.044	0.044	0.046	0.046	0.048	0.048	0.050	0.050	0.052	0.052
0.047	0.040	0.040	0.042	0.042	0.044	0.044	0.046	0.046	0.048	0.048	0.050	0.050	0.052	0.052	
0.048	0.040	0.042	0.042	0.044	0.044	0.046	0.046	0.048	0.048	0.050	0.050	0.052	0.052		
0.049	0.042	0.042	0.044	0.044	0.046	0.046	0.048	0.048	0.050	0.050	0.052	0.052			
0.050	0.042	0.044	0.044	0.046	0.046	0.048	0.048	0.050	0.050	0.052	0.052				
0.051	0.044	0.044	0.046	0.046	0.048	0.048	0.050	0.050	0.052	0.052					
0.052	0.044	0.046	0.046	0.048	0.048	0.050	0.050	0.052	0.052						
0.053	0.046	0.046	0.048	0.048	0.050	0.050	0.052	0.052							
0.054	0.046	0.048	0.048	0.050	0.050	0.052	0.052								
0.055	0.048	0.048	0.050	0.050	0.052	0.052									
0.056	0.048	0.050	0.050	0.052	0.052										
0.057	0.050	0.050	0.052	0.052											
0.058	0.050	0.052	0.052												
0.059	0.052	0.052													
0.060	0.052														

4. Place the shim on the drive pinion. Install the inner bearing onto the pinion using an installer J–6133–01 and a press.

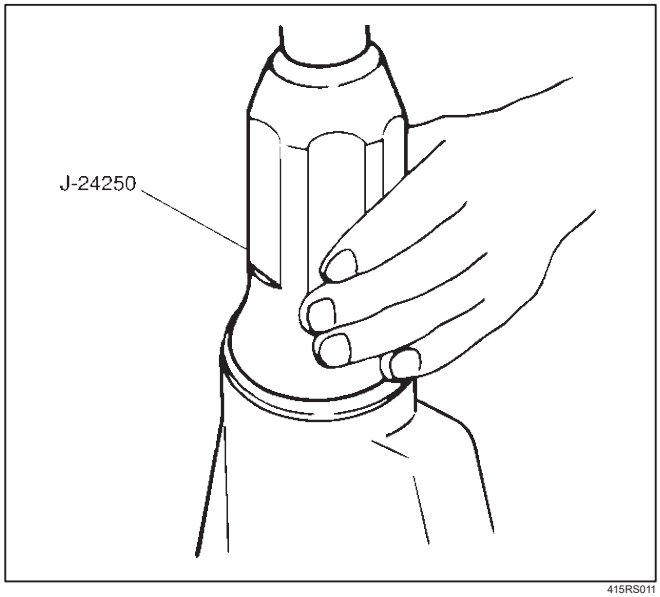
NOTE: Do not apply pressure to the roller cage and apply pressure only to the inner race.



425RS024

5. Discard the used collapsible spacer and install a new one.
6. Install pinion gear.
7. Install outer bearing.
8. Use oil seal installer J–24250 to install a new oil seal that has been soaked in front axle lubricant.

NOTE: Take care to use a front differential oil seal, NOT the rear differential oil seal.

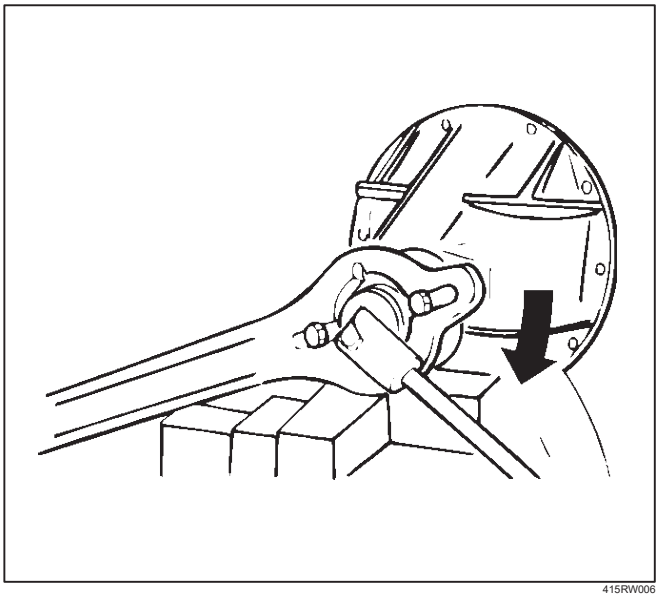


415RS011

9. Install flange.
10. Install flange nut.
    1. Apply lubricant to the pinion threads.
    2. Tighten the nut to the specified torque using the pinion flange holder J–8614–01.

Torque: 177–275N·m (130–203 lb ft)

NOTE: Discard used flange nut and install new one and do not over tighten the flange nut.


415RW006

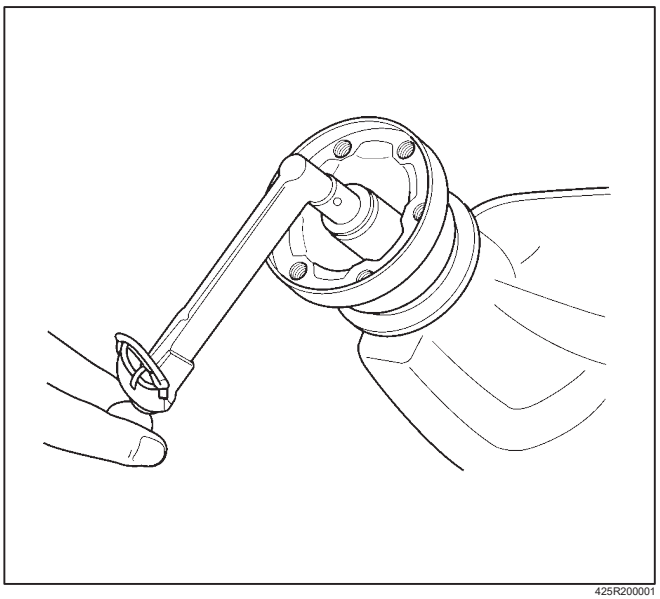
3. Adjust pinion bearing preload.
    a. Measure the bearing preload by using a torque meter. Note the scale reading required to rotate the flange.
    b. Continue tightening flange nut until the specified starting torque is obtained.

Starting torque:

New bearing 0.7–1.1 N·m (5.64–9.98 lb in)

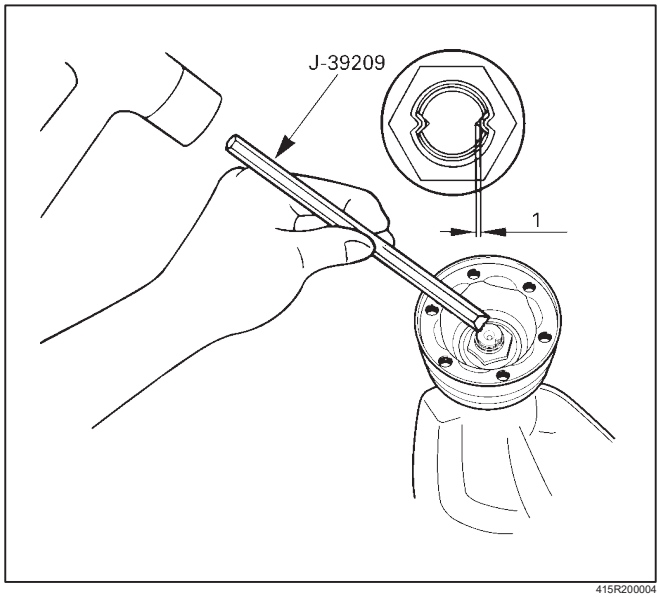
Used bearing 0.4–0.5 N·m (2.86–4.94 lb in)

NOTE: Do not tighten the flange nut more than 678 N·m(500 lb ft).


425R200001

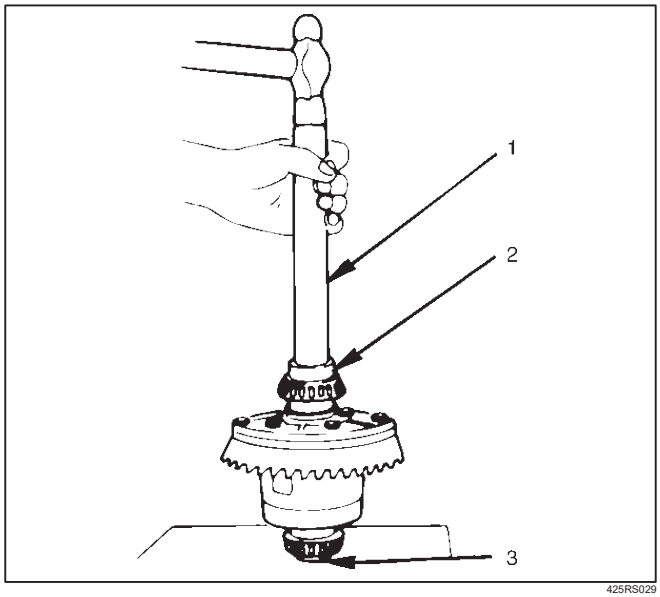
4. Using punch J–39209, stake the flange nut at two points.

NOTE: When staking, be sure to turn the nut to insure that there is no change in bearing preload. Make sure of preload again as instructed in 3.



415R200004

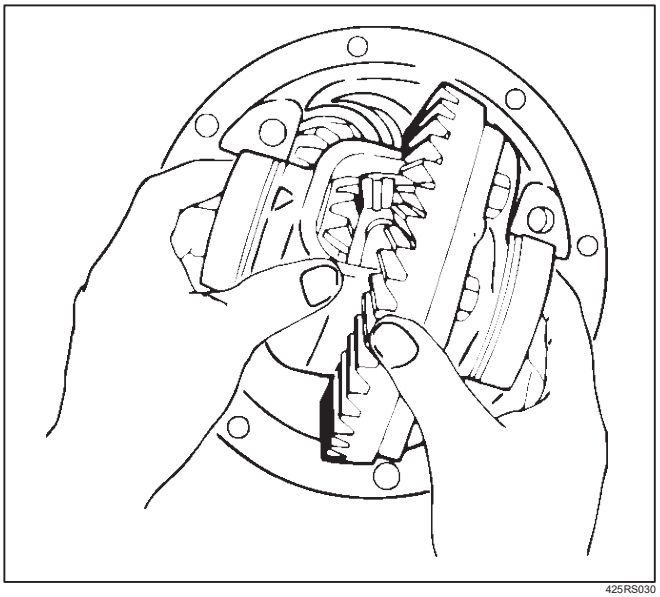
11. Install adjust shim.
    1. Attach the side bearing to the differential assembly without shims. Support the opposite side using a pilot to prevent bearing damage.



425RS029

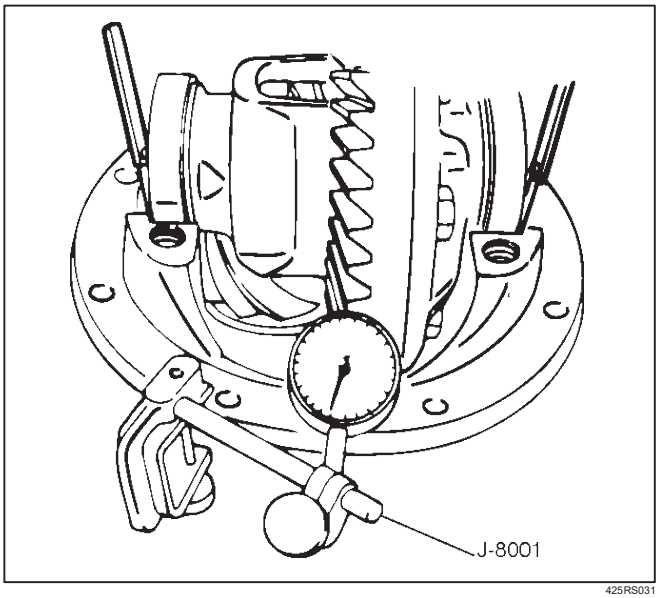
Legend
(1) Drive handle:J–8092
(2) Installer:J–24244
(3) Pilot:J–8107–2

2. Insert the differential cage assembly with bearing outer races into the side bearing bores of the carrier.


425RS030

3. Using two sets of feeler gauges, insert a feeler stock of sufficient thickness between each bearing outer race and the carrier to remove all end play. Make certain the feeler stock is pushed to the bottom of the bearing bores.

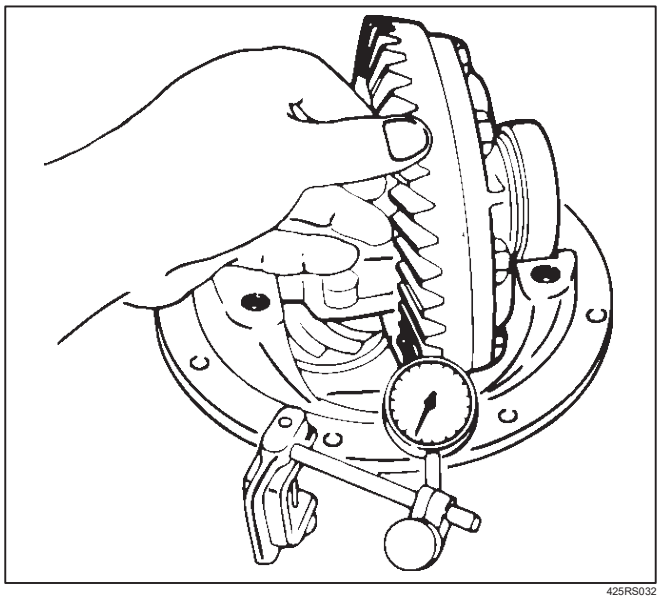
   Mount the dial indicator J–8001 on the carrier so that the indicator stem is at right angles to a tooth on the ring gear.



425RS031

4. Adjust feeler gauge thickness from side to side until ring gear backlash is in the specified range.

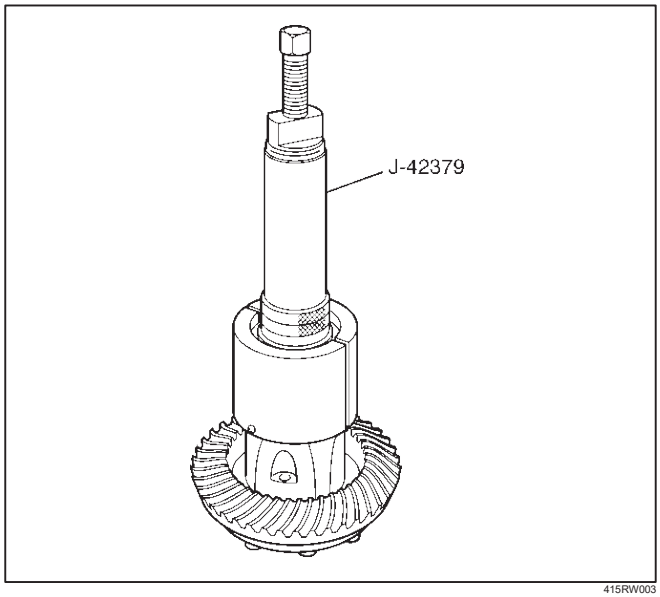
Backlash: 0.13–0.20 mm(0.005 –0.008 in)



425RS032

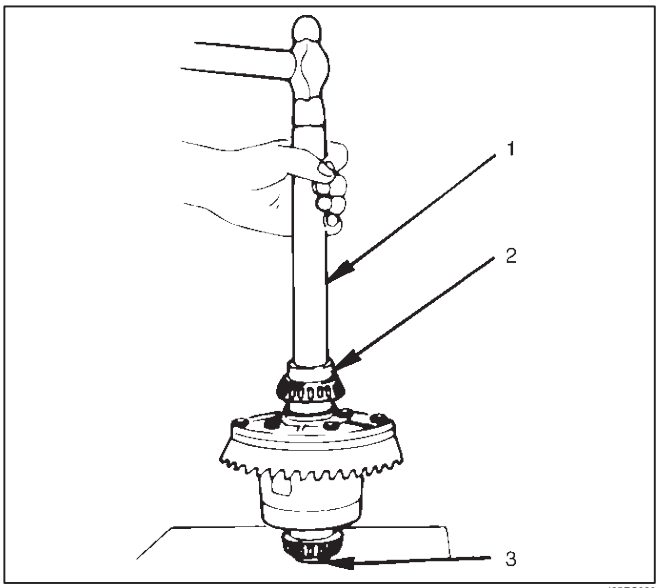
With zero end play and correct backlash established, remove the feeler gauge packs, determine the thickness of the shims required and add 0.025 mm (0.001 in) to each shim pack to provide side bearing preload. Always use new shims.

5. Use bearing remover J–42379 and pilot J–8107–2 to remove side bearing.
   - Select insert; 303173 and collet halves;44801 in remover kit J–42379.



415RW003

12. Install the side bearings together with the selected shims.

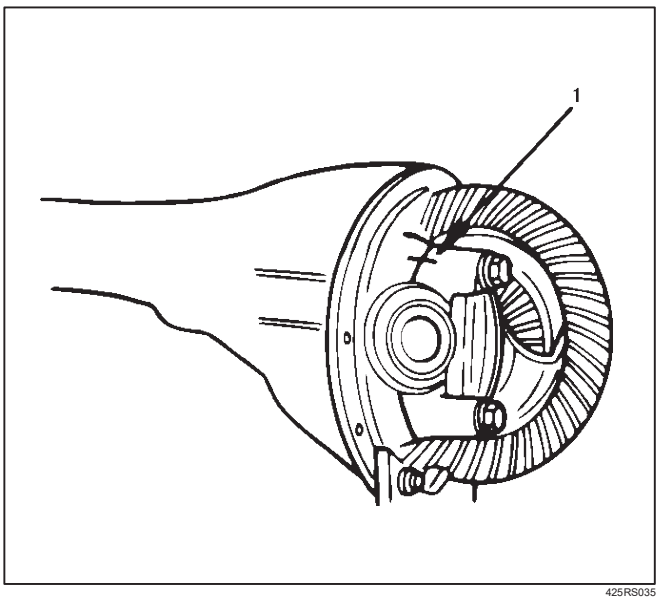


425RS029

Legend

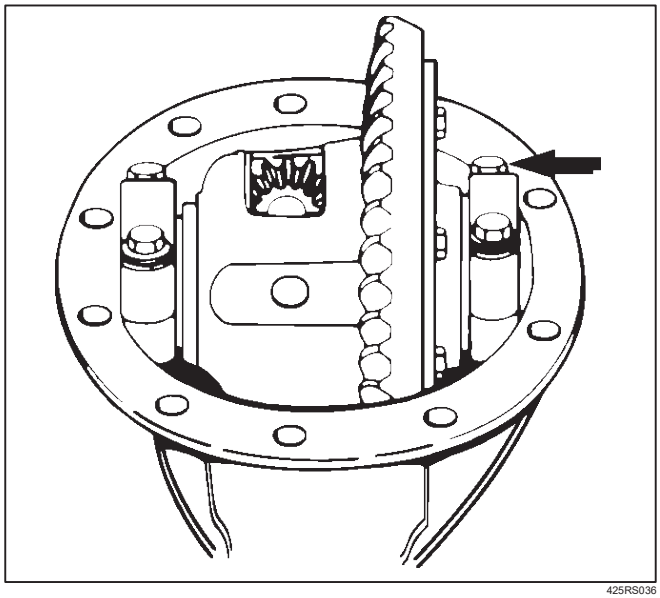
(1) Drive Handle:J–8092
(2) Installer: J–24244
(3) Pilot: J–8107–2

13. Install side bearing outer race.
14. Install differential cage assembly.
15. Install bearing cap then align the setting marks(1) applied at disassembly.



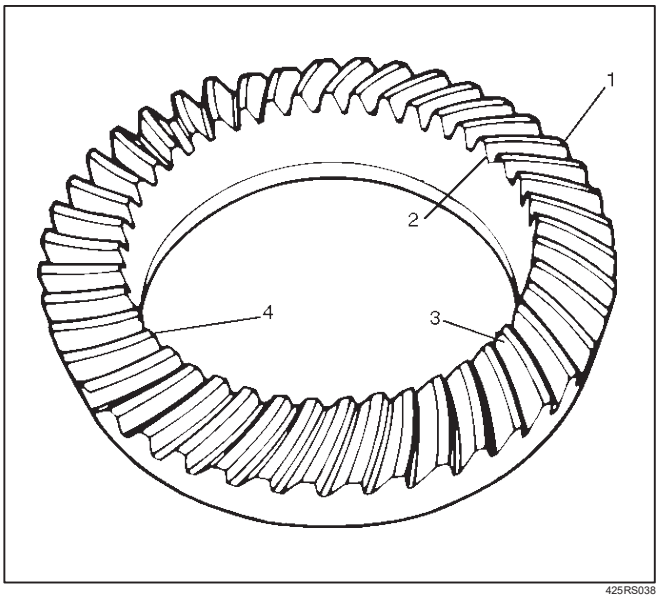
425RS035

16. Tighten the cap bolt to the specified torque.
Torque: 97 N·m (72 lb ft)


425RS036

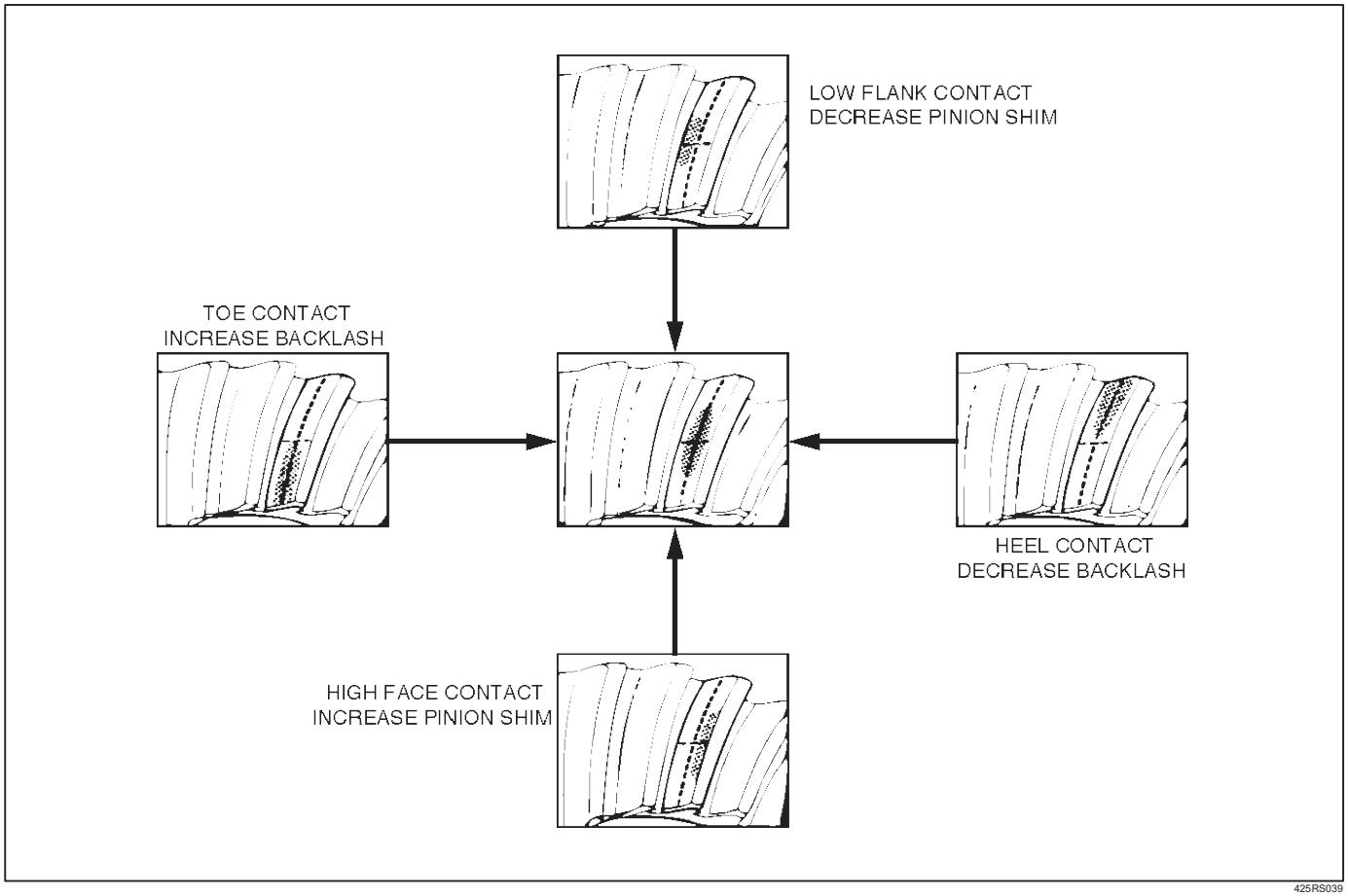
Gear Tooth Contact Pattern Check and Adjustment

1. Apply a thin coat of prussian blue or equivalent to at least 7–8 ring gear teeth. Rotate the ring gear and inspect the contact point of the impressions and make the necessary adjustments as described in the next page.



425RS038

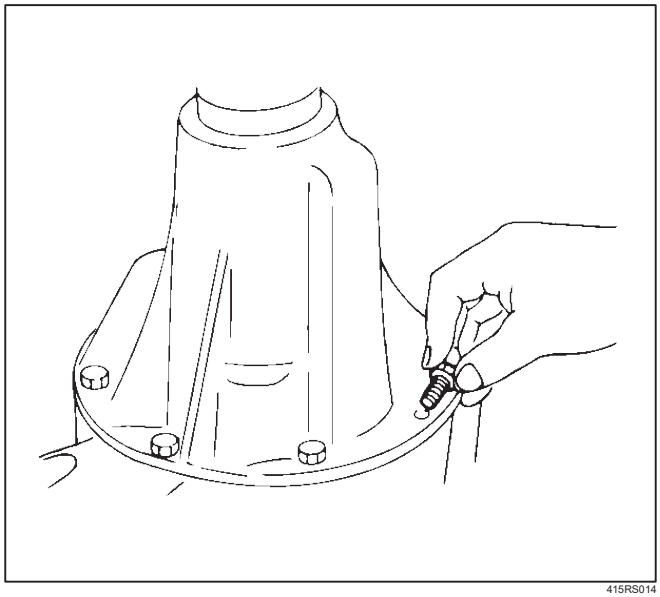
Legend
(1) Heel
(2) Toe
(3) Concave Side(Coast)
(4) Convex Side(Drive)



425RS039

17. Install differential assembly.
    1. Clean the faces of the front axle case and differential carrier.
       Apply Three Bond TB1215 or equivalent to the sealing side of the axle case and the carrier.
    2. Attach the differential case and the carrier assembly to the front axle case and tighten the nuts and bolts.

    Torque: 25 N·m (19 lb ft)

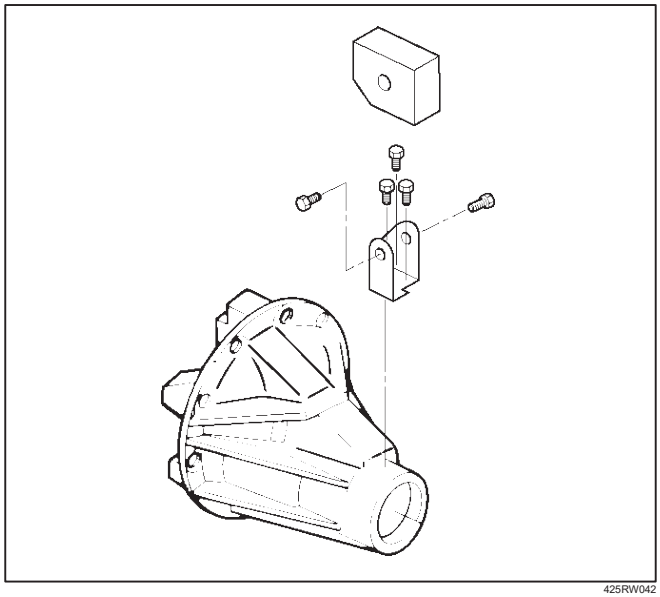

415RS014

    3. Fill the axle case with hypoid gear lubricant, up to the base of the filler hole.

    Lubricant capacity: 1.25 liter(1.32 US qt)

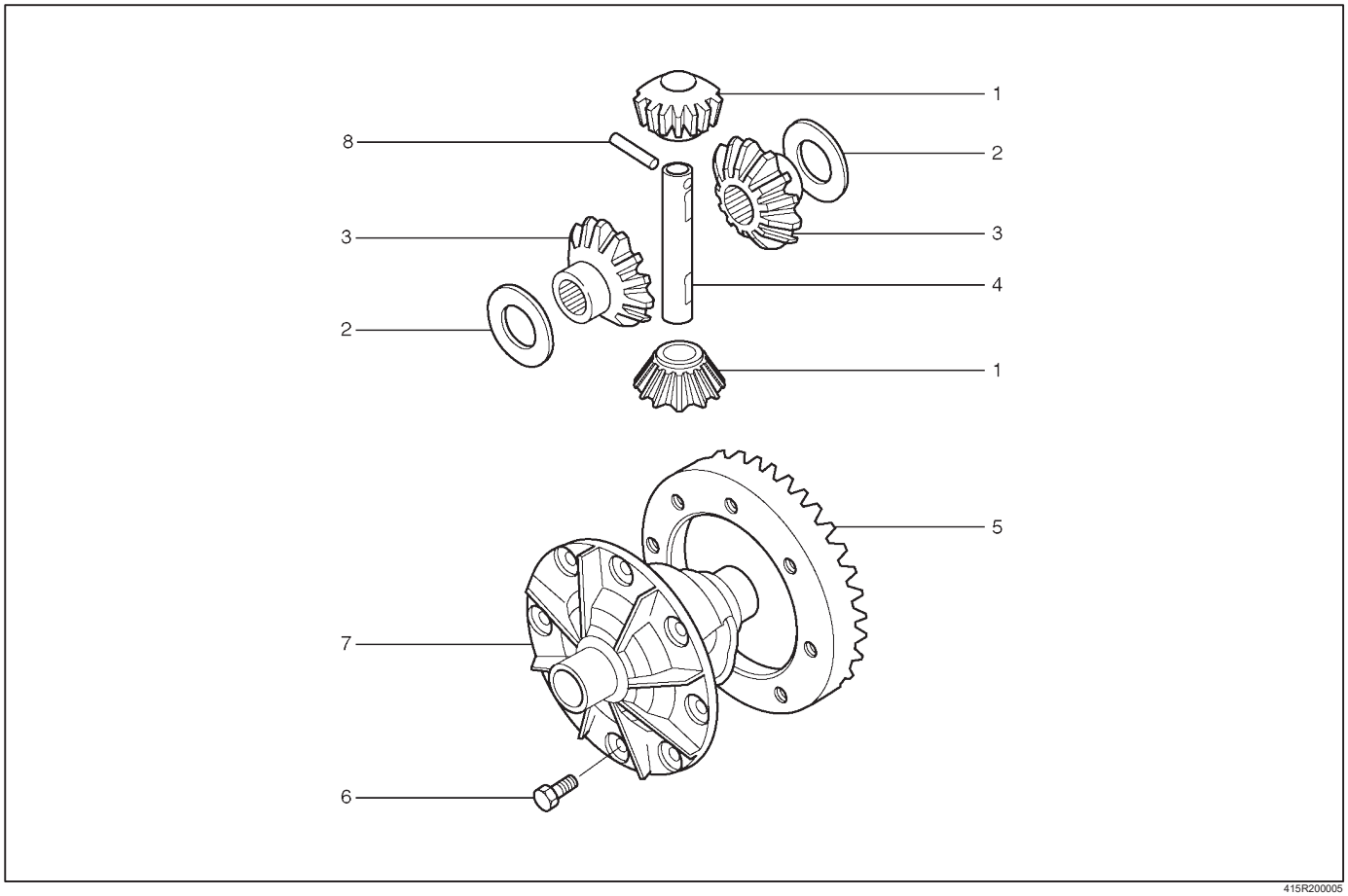
18. Install damper.
    1. Clean the faces and bolt thread hole of differential carrier.
    2. Install the bracket with new bolts.
    3. Install the damper to the bracket with new bolts.

    Torque: 25 N·m (19 lb ft)


425RW042

Differential Cage Assembly

Disassembled View



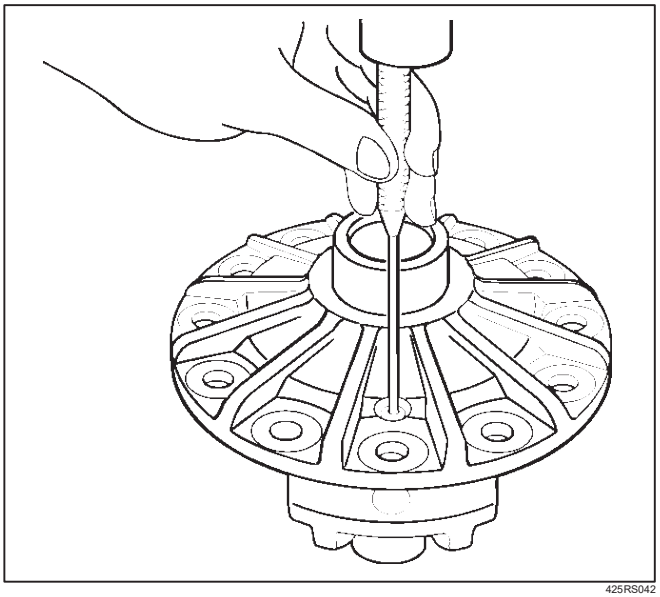
415R200005

Legend

(1) Pinion Gear
(2) Thrust Washer
(3) Side Gear
(4) Cross Pin
(5) Ring Gear
(6) Bolt
(7) Differential Cage
(8) Lock Pin

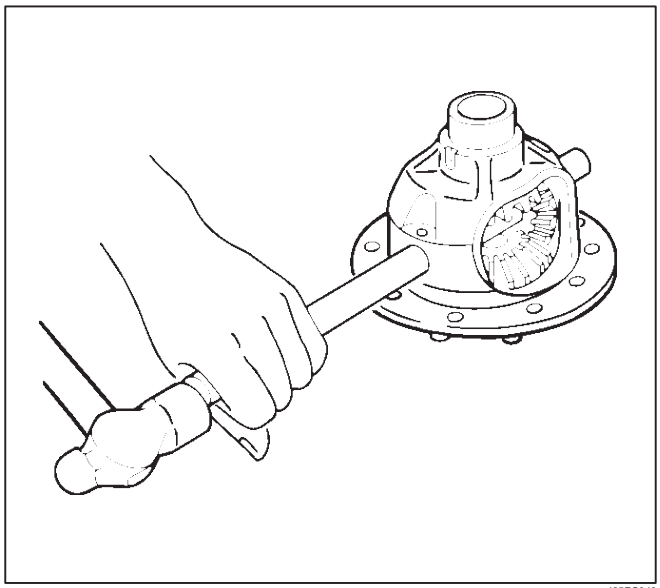
Disassembly

1. Remove bolt.
2. Remove ring gear.
3. Remove lock pin.



425RS042

4. Remove the cross pin, using a soft metal rod and a hammer.


425RS043

5. Remove pinion gear.
6. Remove side gear.
7. Remove thrust washer.

Inspection and Repair

Make necessary correction or parts replacement if wear, damage, corrosion or any other abnormal condition are found through inspection.
Check the following parts.

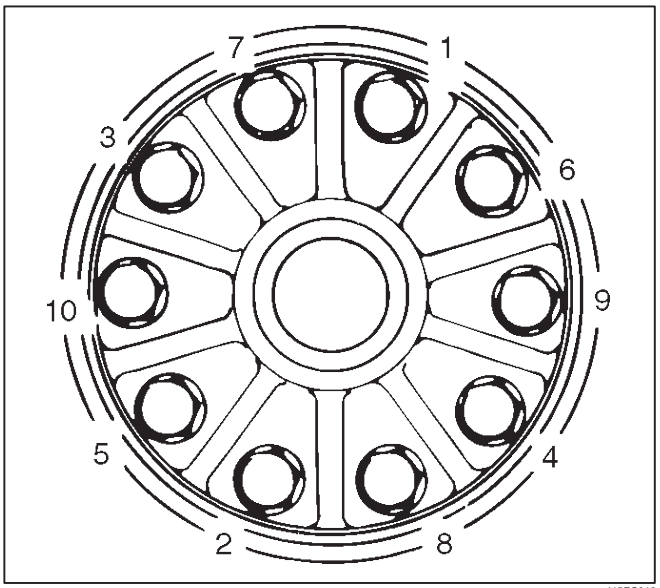
1. Ring gear, pinion gear
2. Bearing
3. Side gear, pinion gear, cross pin
4. Differential cage, carrier
5. Thrust washer
6. Oil seal

Ring gear replacement:

1. The ring gear should always be replaced with the drive pinion as a set.
2. Discard used bolts and install new ones.

Torque: 108 N·m (80 lb ft)

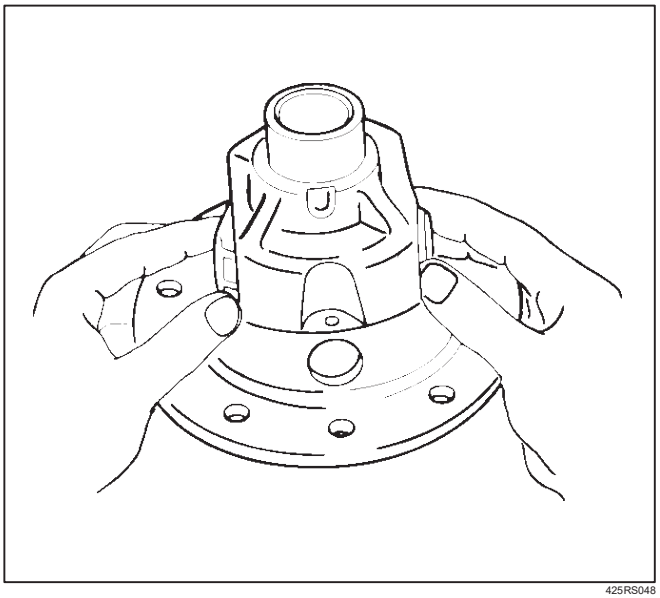
3. Tighten the fixing bolts in a diagonal sequence as illustrated.



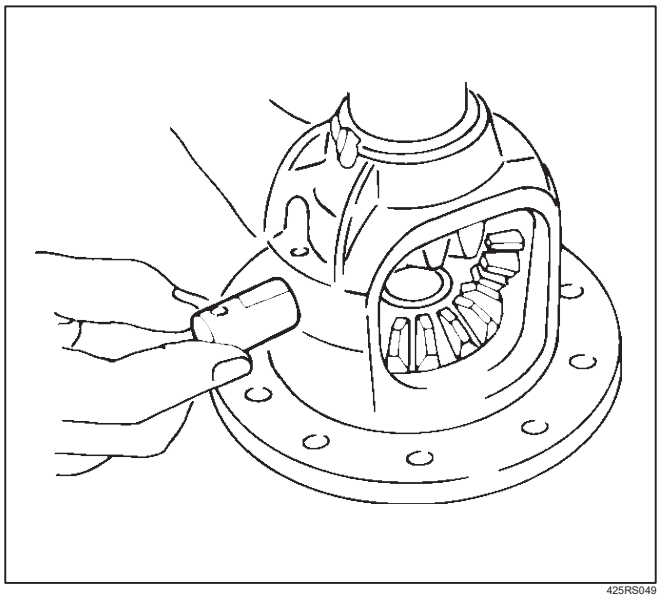
415RS016

Reassembly

1. Install thrust washer.
2. Install side gear.
3. Install the pinion gear with thrust washer by engaging it with the side gears while turning both pinion gears simultaneously in the same direction.


425RS048

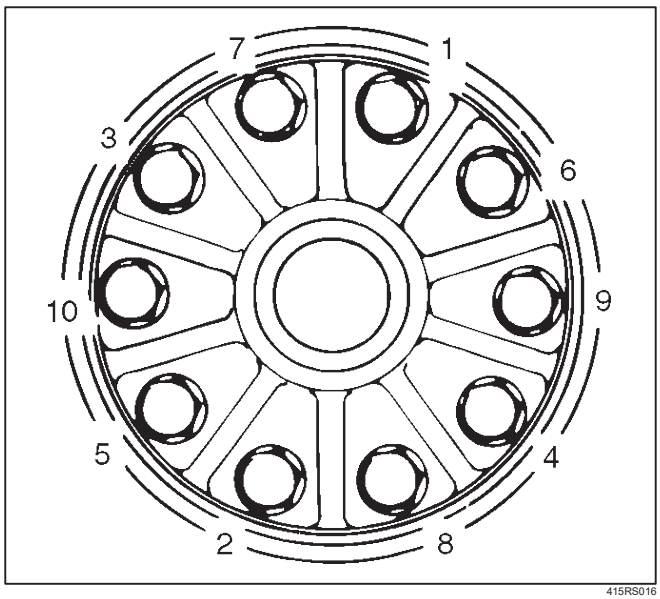
4. Install cross pin.
   - Be sure to install the cross pin so that it is in alignment with the lock pin hole in the differential cage.


425RS049

5. Install lock pin. After lock pin installation, stake the cage to secure the lock pin.
6. Install ring gear and tighten the bolts in diagonal sequence as illustrated.

Torque: 108 N·m (80 lb ft)

NOTE: Discard used bolts and install new ones.



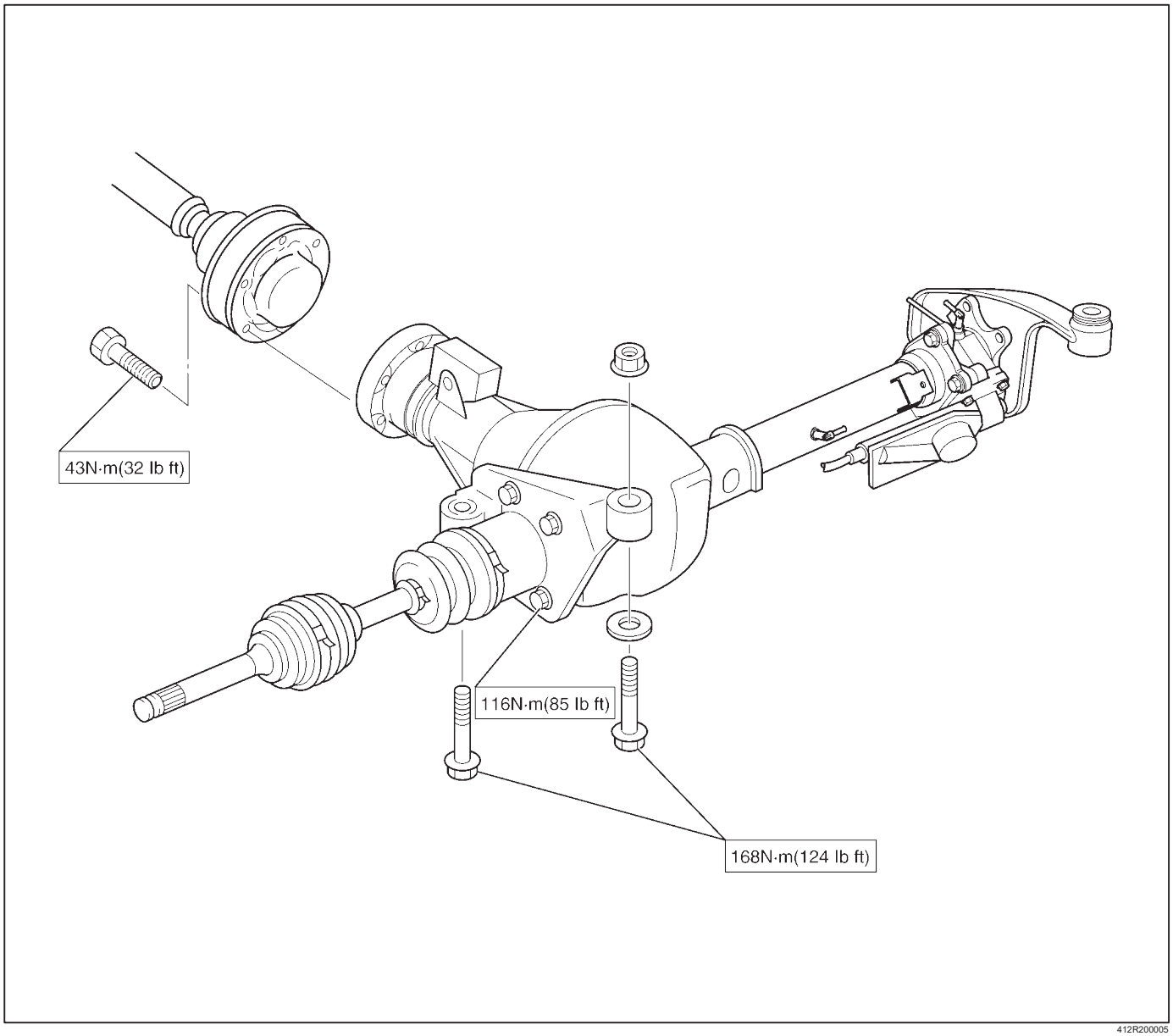
415RS016

Main Data and Specifications

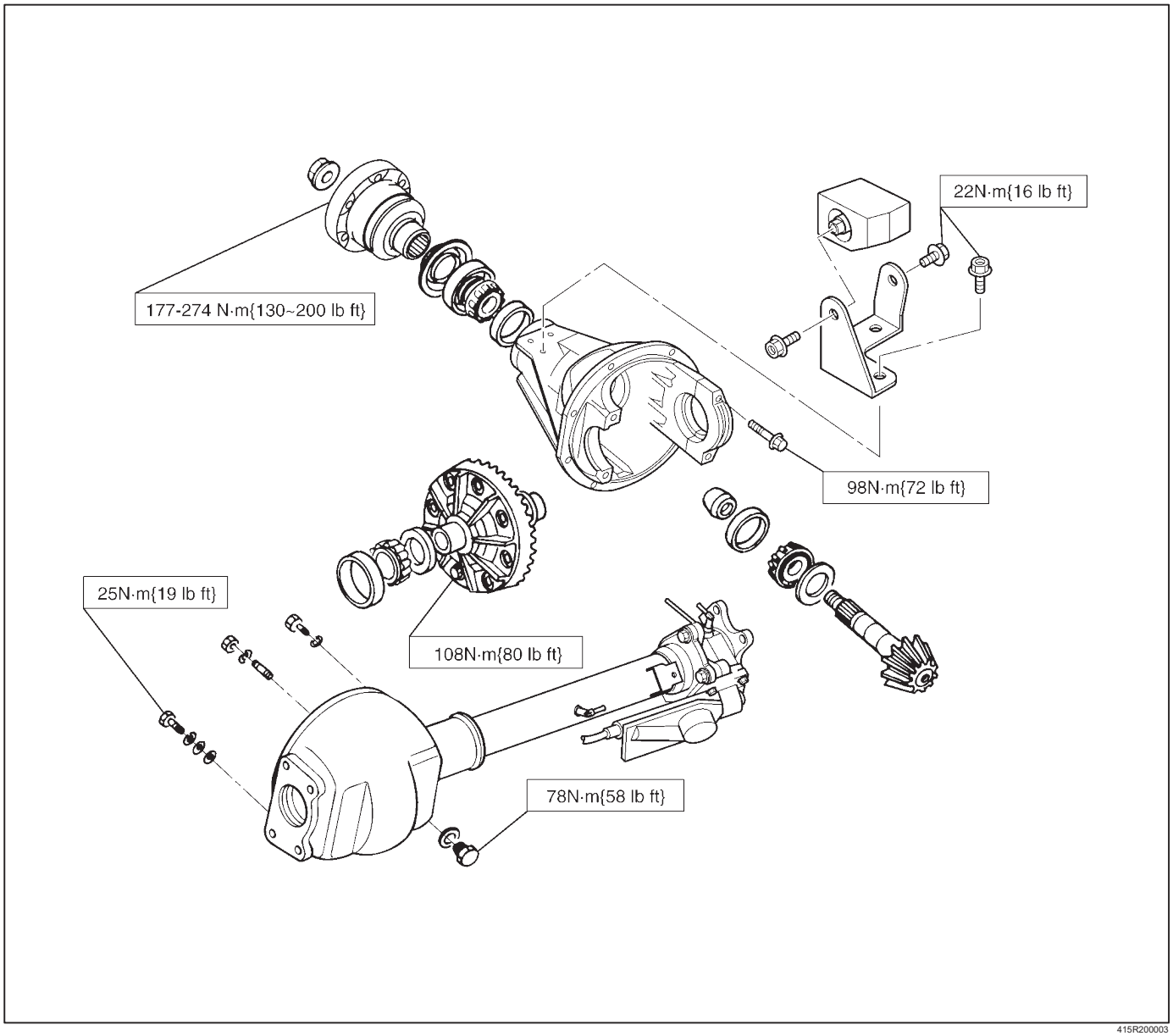
General Specifications

Axle tube Type		It consists of a duct, a cast iron housing and an axle tube.
Gear type		Hypoid
Gear ratio		4.300
Differential type		Two pinion
Oil capacity	liter (US qt)	1.25 (1.32) (Differential) 0.12 (0.13) (Actuator Housing: Shift on the fly)
Type of lubricant		GL–5 (75W–90)
Axle shaft type		Constant velocity joint (Birfield joint type and double offset joint)
Hub locking Type		Rigid

Torque Specifications



412R200005


22N·m{16 lb ft}
177-274 N·m{130~200 lb ft}
98N·m{72 lb ft}
25N·m{19 lb ft}
108N·m{80 lb ft}
78N·m{58 lb ft}
415R200003

Special Tools

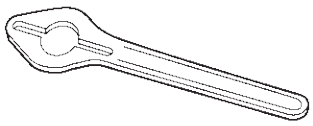
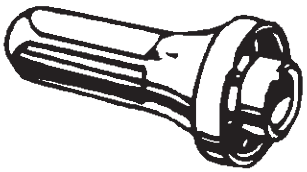
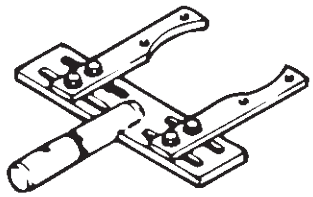
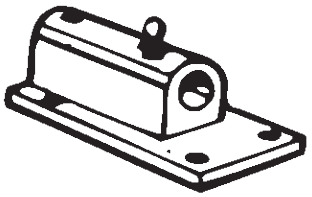
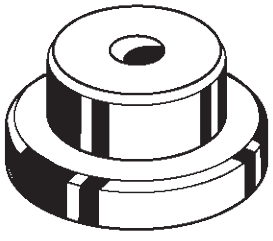
ILLUSTRATION	TOOL NO. TOOL NAME
 901HW071	**J–8614–01** Holder; Pinion flange
 901RS232	**J–24250** Installer; Oil seal
 901RS212	**J–37264** Differential holding fixture (Use with J–3289–20 base)
 901RS213	**J–3289–20** Holding fixture base
 901RW039	**J–42379** Remover; Side/Pinion bearing
 901RS238	**J–8107–2** Adapter; Side bearing plug

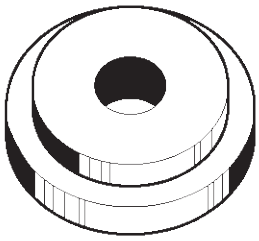
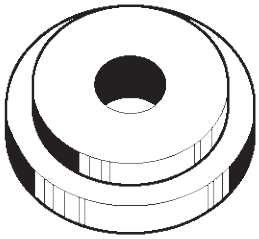
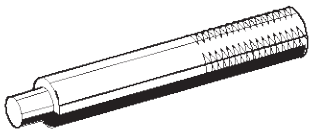
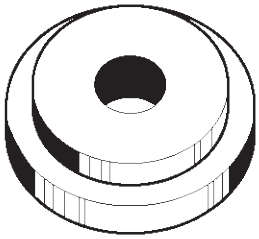
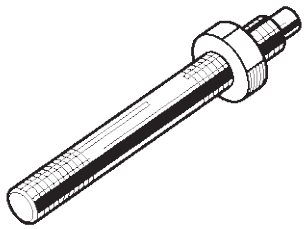
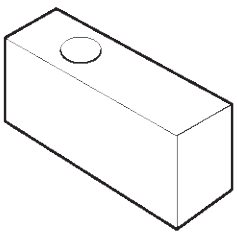
ILLUSTRATION	TOOL NO. TOOL NAME
 901RS220	**J–7817** Installer; Outer bearing outer race
 901RS225	**J–7818** Installer; Inner bearing outer race
 901RS24	**J–8092** Driver handle
 901RS226	**J–21777–42** Pilot
 901RS221	**J–21777–43** Nut and stud
 901RS223	**J–42479–1** Gauge plate

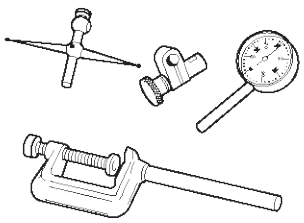
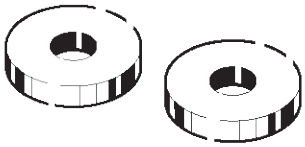
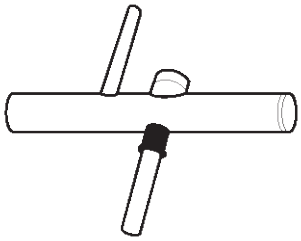
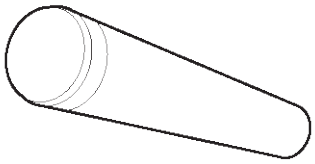
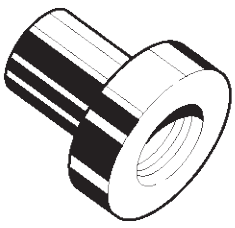
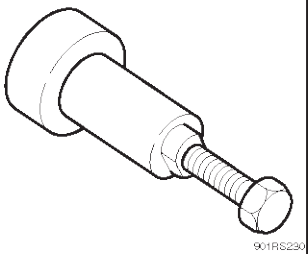
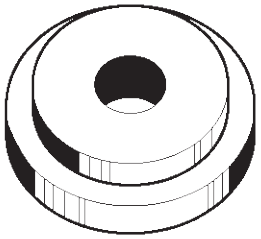
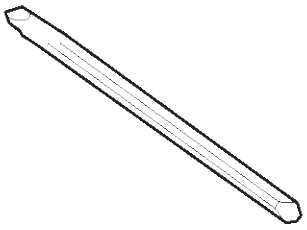
ILLUSTRATION	**TOOL NO.** TOOL NAME
 901RS224	**J–8001** Dial indicator
 901RS244	**J–23597–8** Disc
 901RS226	**J–23597–1** Arbor
 901RS227	**J–6133–01** Installer; Pinion bearing
 901RS245	**J–24244** Installer; Side bearing
 901RS230	**J–39602** Remover; Outer bearing

ILLUSTRATION	**TOOL NO.** TOOL NAME
 901RS220	**J–42479–2** Pilot
 901RS228	**J–39209** Punch; End nut lock

AXIOM

DRIVELINE/AXLE

Differential (Rear)

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Service Precaution

WARNING: THIS VEHICLE HAS A SUPPLEMENTAL RESTRAINT SYSTEM(SRS). REFER TO THE SRS COMPONENT AND WIRING LOCATION VIEW IN ORDER TO DETERMINE WHETHER YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING. WHEN YOU ARE REFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING, REFER TO THE SRS SERVICE INFOMATION. FAILURE TO FOLLOW WARNINGS COULD RESULT IN POSSIBLE AIR BAG DEPLOYMENT, PERSONAL INJURY, OR OTHERWISE UNNEEDED SRS SYSTEM REPAIRS.

CAUTION: Always use the correct fastener in the proper location. When you replace a fastener, use ONLY the exact part number for that application. ISUZU will call out those fasteners that require a replacement after removal. ISUZU will also call out the fasteners that require thread lockers or thread sealant. UNLESS OTHERWISE SPECIFIED , do not use supplemental coatings (Paints, greases, or other corrosion inhibitors) on threaded fasteners or fastener joint interfaces. Generally,such coatings adversely affect the fastener torque and the joint clamping force, and may damage the fastener. When you install fasteners, use the correct tightening sequence and specification. Following these instructions can help you avoid damage to parts and systems.

General Description

The rear axle assembly is of the semi–floating type in which the vehicle weight is carried on the axle housing . The center line of the pinion gear is below the center line of the ring gear (hypoid drive).

All parts necessary to transmit power from the propeller shaft to the rear wheels are enclosed in a salisbury type axle housing (a carrier casting with tubes pressed and welded into the carrier). A removable aluminum cover at the rear of the axle housing permits rear axle service without removal of the entire assembly from the vehicle.

The 8.9 inch ring gear rear axle uses a conventional ring and pinion gear set to transmit the driving force of the engine to the rear wheels. This gear set transfers this driving force at a 90 degree angle from the propeller shaft to the drive shafts.

The axle shafts are supported at the wheel end of the shaft by a roller bearing.

The pinion gear is supported by two tapered roller bearings. The pinion depth is set by a shim pack located between the gear end of the pinion and the roller bearing that is pressed onto the pinion. The pinion bearing preload is set by crushing a collapsible spacer between the bearings in the axle housing.

The ring gear is bolted onto the differential case with 10 bolts.

The differential case is supported in the axle housing by two tapered roller bearings. The differential and ring gear are located in relationship to the pinion by using selective shims and spacers between the bearing and the differential case. To move the ring gear, shims are deleted from one side and an equal amount are added to the other side. These shims are also used to preload the bearings which are pressed onto the differential case. Two bearing caps are used to hold the differential into the rear axle housing.

The differential is used to allow the wheels to turn at different rates of speed while the rear axle continues to transmit the driving force. This prevents tire scuffing when going around corners and prevents premature wear on internal axle parts.

The rear axle is sealed with a pinion seal, a seal at each axle shaft end, and by a liquid gasket between the rear cover and the axle housing.

Limited Slip Differential (LSD)

The axle assembly may be equipped with an limited slip differential (LSD). It is similar to the standard differential except that part of the torque from the ring gear is transmitted through clutch packs between the side gears and differential case.

The LSD construction permits differential action when required for turning corners and transmits equal torque to both wheels when driving straight ahead. However, when one wheel tries to spin due to a patch of ice, etc., the clutch packs automatically provide more torque to the wheel which is not trying to spin.

In diagnosing customer complaints, it is important to recognize two things:

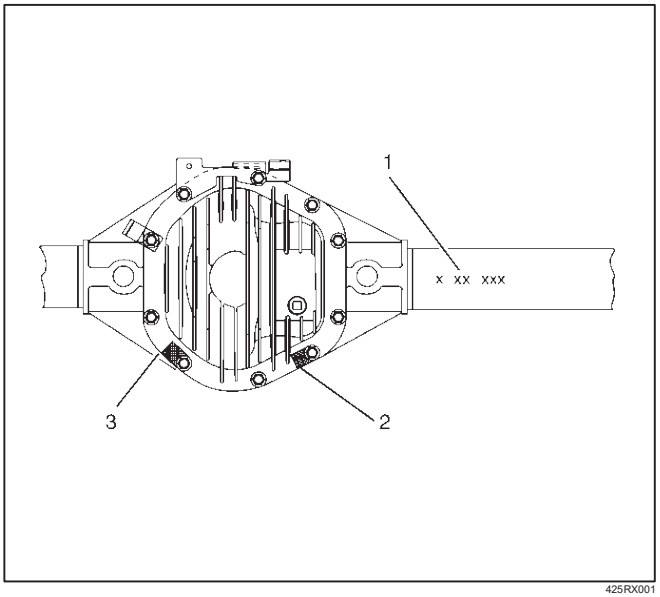
1. If, both wheels slip, with unequal traction, the LSD has done all it can possibly do.
2. In extreame cases of differences in traction, the wheel with the least traction may spin after the LSD has transferred as much torque as possible to the non-slipping wheel.

Limited Slip Differntials impose additional requirements on lubricants, and require a special lubricant or lubricant additive. Use 80W90 GL–5 LSD lubricant.

Rear Axle Identification

The Bill of Material and build date information(1) is stamped on the right axle tube on the rearward side.

The axle ratio is identified by a tag(3) which is secured by a cover bolt. If the axle has limited-slip differntial, it also will be identified with a tag(2) secured by a cover bolt.



425RX001

Diagnosis

Many noises that seem to come from the rear axle actually originate from other sources such as tires, road surface, wheel bearings, engine, transmission, muffler, or body drumming. Investigate to find the source of the noise before disassembling the rear axle. Rear axles, like any other mechanical device, are not absolutely quiet but should be considered quiet unless some abnormal noise is present.

To make a systematic check for axle noise, observe the following:

1. Select a level asphalt road to reduce tire noise and body drumming.
2. Check rear axle lubricant level to assure correct level, and then drive the vehicle far enough to thoroughly warm up the rear axle lubricant.
3. Note the speed at which noise occurs. Stop the vehicle and put the transmission in neutral. Run the engine speed slowly up and down to determine if the noise is caused by exhaust, muffler noise, or other engine conditions.
4. Tire noise changes with different road surfaces; axle noises do not. Temporarily inflate all tires to 344 kPa (50 psi) (for test purposes only). This will change noise caused by tires but will not affect noise caused by the rear axle.

   Rear axle nose usually stops when coasting at speeds under 48 km/h (30 mph); however, tire noise continues with a lower tone. Rear axle noise usually changes when comparing pull and coast, but tire noise stays about the same.

   Distinguish between tire noise and rear axle noise by noting if the noise changes with various speeds or sudden acceleration and deceleration. Exhaust and axle noise vary under these conditions, while tire noise remains constant and is more pronounced at speeds of 32 to 48 km/h (20 to 30 mph). Further check for tire noise by driving the vehicle over smooth pavements or dirt roads (not gravel) with the tires at normal pressure. If the noise is caused by tires, it will change noticeably with changes in road surface.
5. Loose or rough front wheel bearings will cause noise which may be confused with rear axle noise; however, front wheel bearing noise does not change when comparing drive and coast. Light application of the brake while holding vehicle speed steady will often cause wheel bearing noise to diminish. Front wheel bearings may be checked for noise by jacking up the wheels and spinning them or by shaking the wheels to determine if bearings are loose.
6. Rear suspension rubber bushings and spring insulators dampen out rear axle noise when correctly installed. Check to see that there is no link or rod loosened or metal–to–metal contact.
7. Make sure that there is no metal–to–metal contact between the floor and the frame.

After the noise has been determined to be in the axle, the type of axle noise should be determined, in order to make any necessary repairs.

Gear Noise

Gear noise (whine) is audible from 32 to 89 km/h (20 to 55 mph) under four driving conditions.

1. In drive under acceleration or heavy pull.
2. Driving under load or under constant speed.
3. When using enough throttle to keep the vehicle from driving the engine while the vehicle slows down gradually (engine still pulls slightly).
4. When coasting with the vehicle in gear and the throttle closed. The gear noise is usually more noticeable between 48 and 64 km/h (30 and 40 mph) and 80 and 89 km/h (50 and 55 mph).

Bearing Noise

Bad bearings generally produce a rough growl or grating sound, rather than the whine typical of gear noise. Bearing noise frequently “wow–wows” at bearing rpm, indicating a bad pinion or rear axle side bearing. This noise can be confused with rear wheel bearing noise.

Rear Wheel Bearing Noise

Rear wheel bearing noise continues to be heard while coasting at low speed with transmission in the neutral. Noise may diminish by gentle braking. Jack up the rear wheels, spin them by hand and listen for noise at the hubs. Replace any faulty wheel bearings.

Knock At Low Speeds

Low speed knock can be caused by worn universal joints or a side gear hub counter bore in the cage that is worn oversize. Inspect and replace universal joints or cage and side gears as required.

Backlash Clunk

Excessive clunk on acceleration and deceleration can be caused by a worn rear axle pinion shaft, a worn cage, excessive clearance between the axle and the side gear splines, excessive clearance between the side gear hub and the counterbore in the cage, worn pinion and side gear teeth, worn thrust washers, or excessive drive pinion and ring gear backlash. Remove worn parts and replace as required. Select close–fitting parts when possible. Adjust pinion and ring gear backlash.

Rear Axle Noise

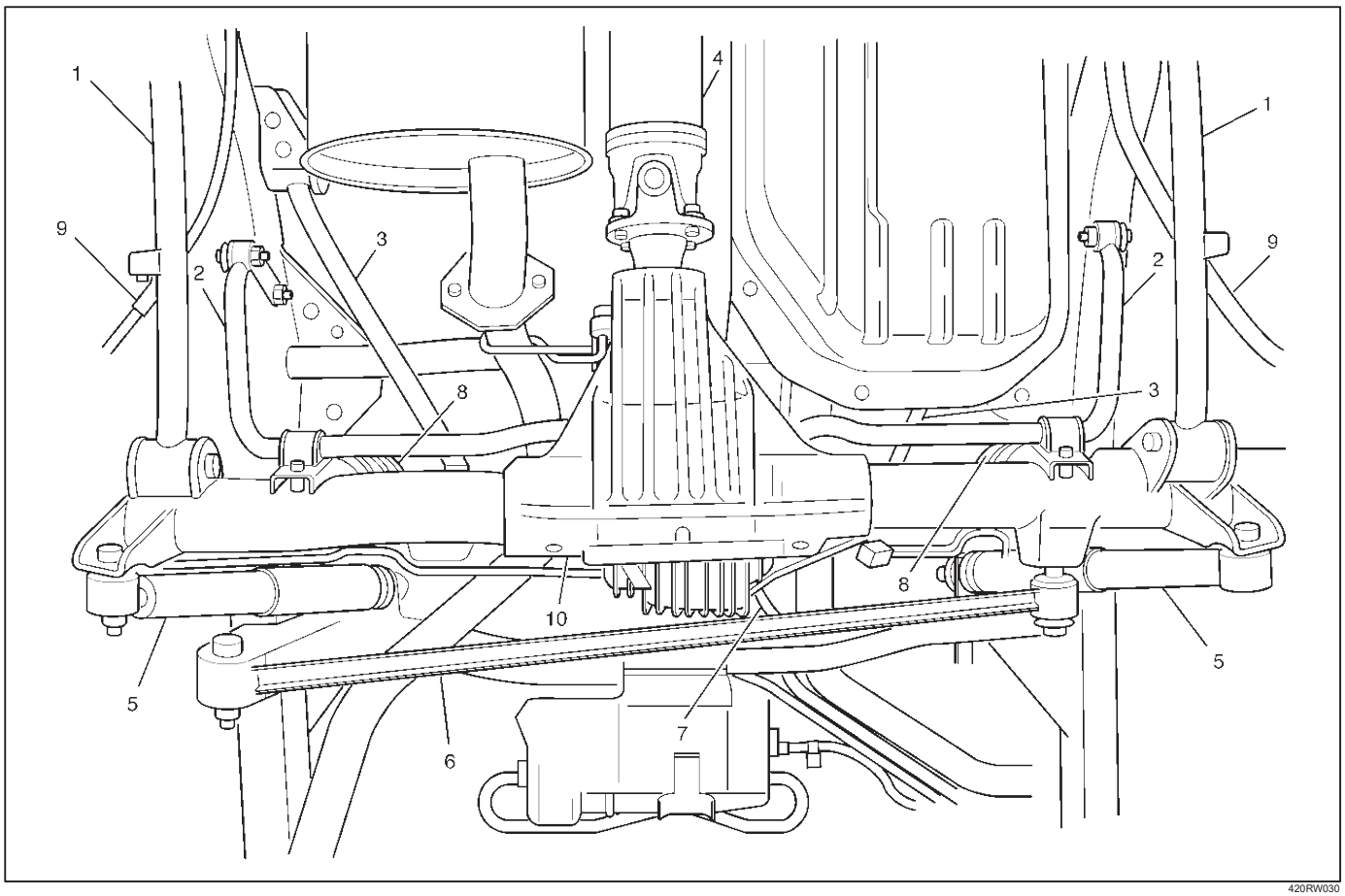
Condition	Possible cause	Correction
Noise in Drive	Excessive pinion to ring gear backlash.	Adjust.
	Worn pinion and ring gear.	Replace
	Worn pinion .bearings.	Replace.
	Loose pinion bearings.	Adjust.
	Excessive pinion end play.	Adjust.
	Worn side bearings.	Replace.
	Loose side bearings.	Adjust.
	Excessive ring gear run-out.	Replace.
	Low oil level.	Replenish.
	Wrong or poor grade oil.	Replace.
	Bent axle housing.	Replace.
Noisy when coasting	Axle noise heard when driving will usually be heard also on coasting, although not as loud.	Adjust or replace.
	Pinion and ring gear too tight (audible when slowing down and disappears when driving).	Adjust.
Intermittent noise	Warped bevel ring.	Replace.
	Loose differential case bolts.	Tighten.
Constant noise	Flat spot on pinion or ring gear teeth.	Replace.
	Flat spot on bearing.	Replace.
	Worn pinion splines.	Replace.
	Worn axle shaft dowel holes.	Replace.
	Worn hub studs.	Replace.
	Bent axle shaft.	Replace.
Noisy on turns	Worn differential side gears and pinions.	Replace.
	Worn differential shaft.	Replace.
	Worn axle shaft splines.	Replace.

Limited Slip Differential

Condition	Possible cause	Correction
Does not lock	Broken clutch plates.	Replace the clutch plates.
Chatters in turns	Lubricant contaminated.	Drain lube when hot. Wipe carrier clean. Refill with lube specified in Main Data and Specifications at the end of this section.
	Clutch plates dateriorated.	Replace clutch plates.
Noise (in addition to normal clutch engagement)	Broken clutch plates.	Replace clutch plates.
	Damaged case.	Replace unit.
	Broken differential gears.	Replace gears.

Axle Housing

Axle Housing and Associated Parts



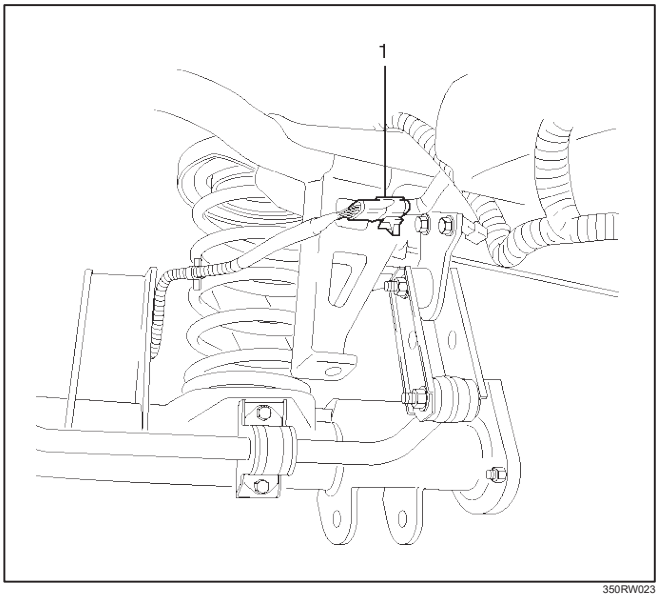
420RW030

Legend

(1) Lower Link
(2) Stabilizer
(3) Upper Link
(4) Rear Propeller shaft
(5) Shock Absorber
(6) Lateral Rod
(7) Brake Hose
(8) Coil Spring
(9) Parking Cable
(10) Axle Assembly

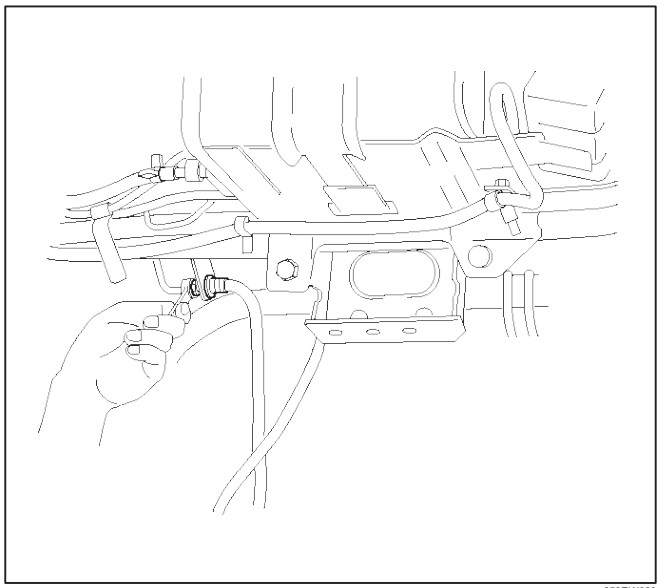
Removal

1. Raise the vehicle and support it with suitable safety stands.
   The hoist must remain under the rear axle housing.
2. Take out brake fluid. Refer to *Hydraulic Brakes in Brake* section.
3. Remove rear wheels and tires. Refer to *Wheel Replacement in Suspension* section.
4. Remove propeller shaft. Refer to *Rear Propeller Shaft* in this section.
5. Drain the rear axle oil into a proper container.
6. Remove parking brake cable, release the connection between the cable fixing clip equalizer. Refer to *Parking Brakes in Brake* section.
7. Move the clip aside and pull out the breather hose.
8. Disconnect the ABS connectors (1) and remove the brackets attached to the frame and center link.



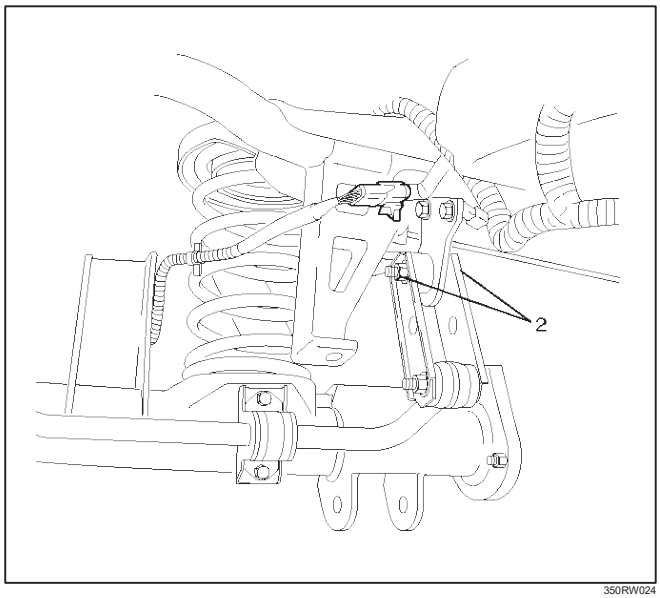
350RW023

9. Loosen the brake tube flare nut, remove the clip and take out the brake tube.



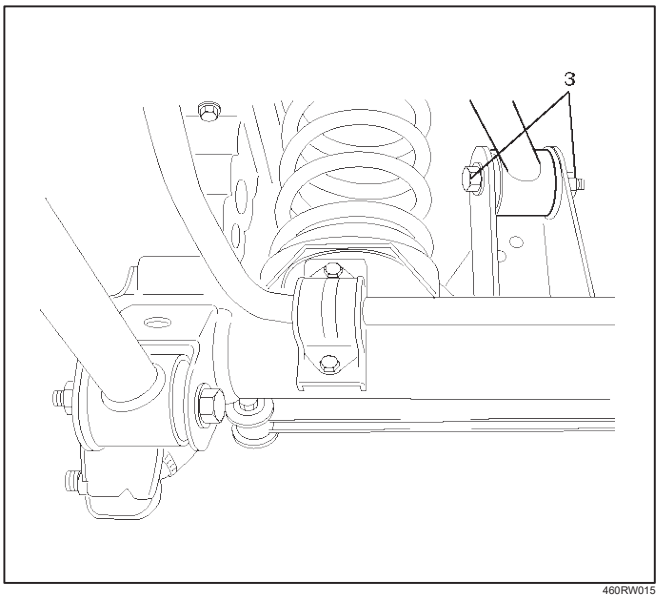
350RW020

10. Remove the shock absorber.
11. Remove the stabilizer linkage mounting bolts and nuts (2) from the frame side.



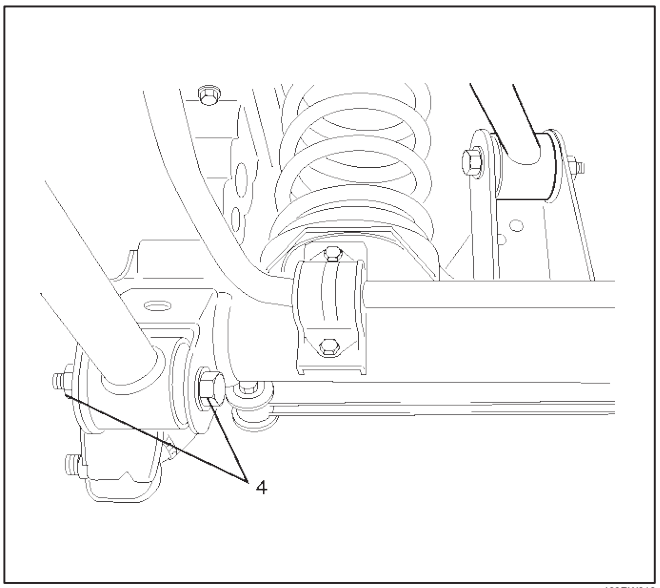
350RW024

12. Remove the lateral rod fixing bolt and nut from the frame.
13. Remove the upper link mounting bolt and nut (3) from the axle housing.



460RW015

14. Remove the lower link fixing bolt and nut (4) from the axle housing.



460RW016

15. Jack down and remove the coil spring and insulator.
16. Axle housing assembly can be separated from the vehicle upon completion of steps 1 – 15.
17. Remove the brake caliper fixing bolt, loosen the flare nut, release the clip and take out the brake caliper together with the flexible hose.
18. Remove brake disc.
19. Remove antilock brake system speed sensor fixing bolt and the clip and bracket on the axle housing.
20. Remove the brake pipe clip and fixing bolt on the axle housing and take out the brake pipe.

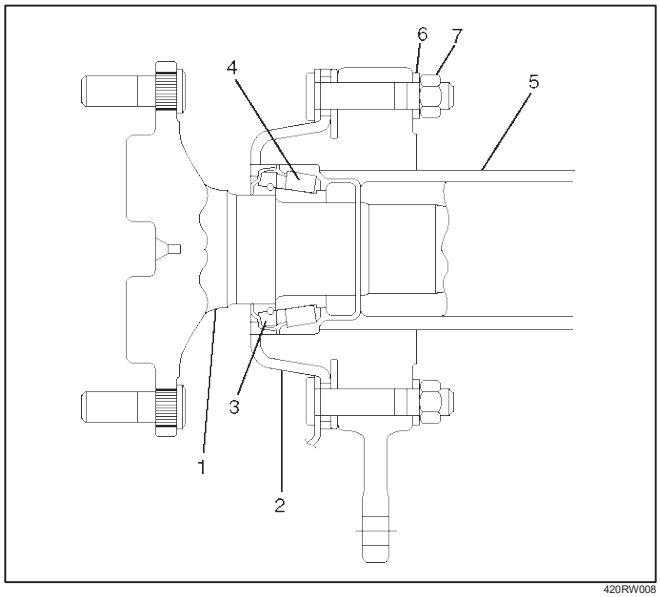
Installation

1. Install brake pipe.
2. Connect Antilock brake system (ABS) speed sensor and harness, refer to *4–Wheel Anti–Lock Brake System (ABS) in Brake* section.
3. Install brake disc.
4. Install brake caliper. Refer to *Disk Brakes in Brake* section.
5. Install axle housing assembly.
6. Install coil spring and insulator.
7. Install the lower link fixing bolt and nut to the axle housing. For the procedures in items 7–11, refer to *Suspension* section.
8. Install the upper link bolt and nut to the axle housing.
9. Install the lateral rod fixing nut and bolt to the frame side.
10. Install the stabilizer linkage mounting nut and bolt to the frame side.
11. Install the shock absorber.
12. Install brake tube flare nut, Refer to *Disk Brakes in Brake* section.
13. Install ABS connector and bracket.
14. Connect breather hose.
15. Install parking brake cable, Refer to *Parking Brakes in Brake* section.
16. Bleed brakes. Refer to *Hydraulic Brakes in Brake* section.

Axle Shaft, Oil Seal and Bearing

Axle Shaft and Associated Parts

Disc Brake Model

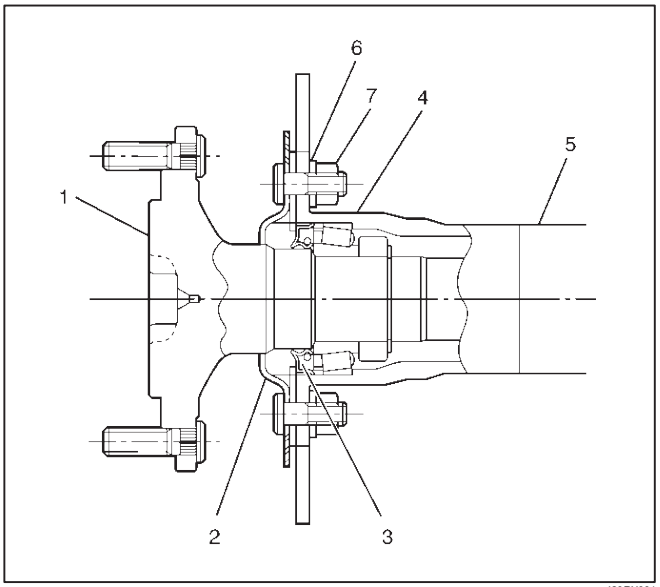


420RW008

Legend

(1) Axle Shaft
(2) Backing Plate
(3) Oil Seal
(4) Bearing
(5) Axle Housing
(6) Lock Washer
(7) Nut

Drum Brake Model



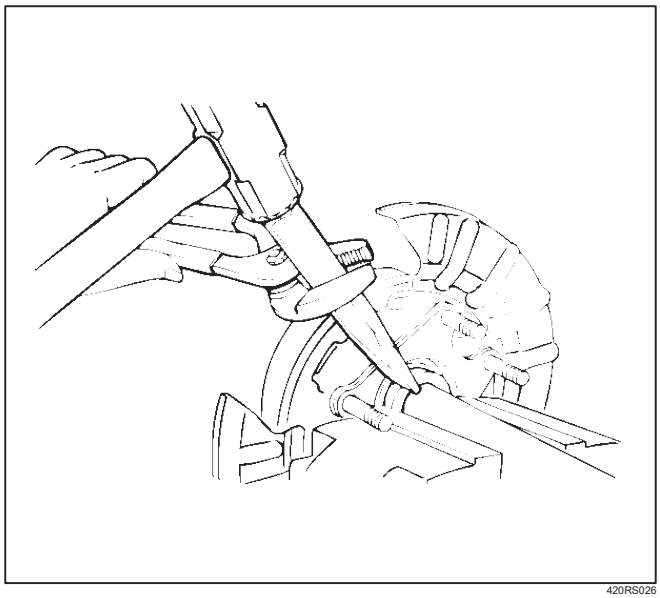
420RX001

Legend

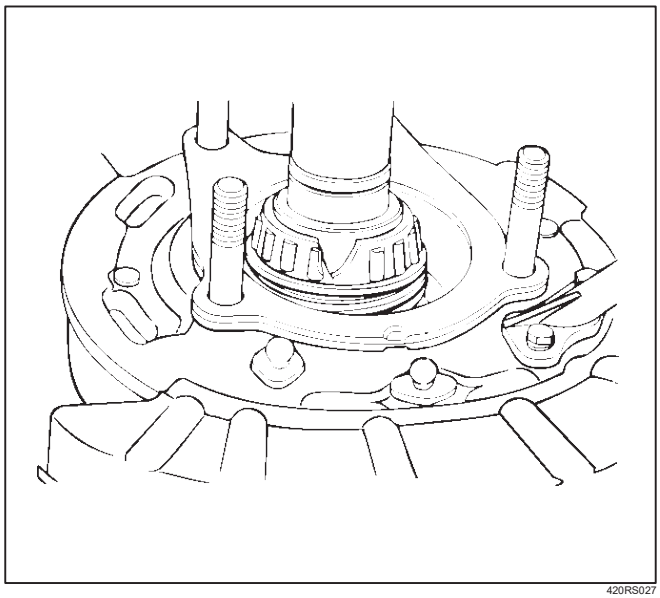
(1) Axle Shaft
(2) Backing Plate
(3) Oil Seal
(4) Bearing
(5) Axle Housing
(6) Lock Washer
(7) Nut

Removal

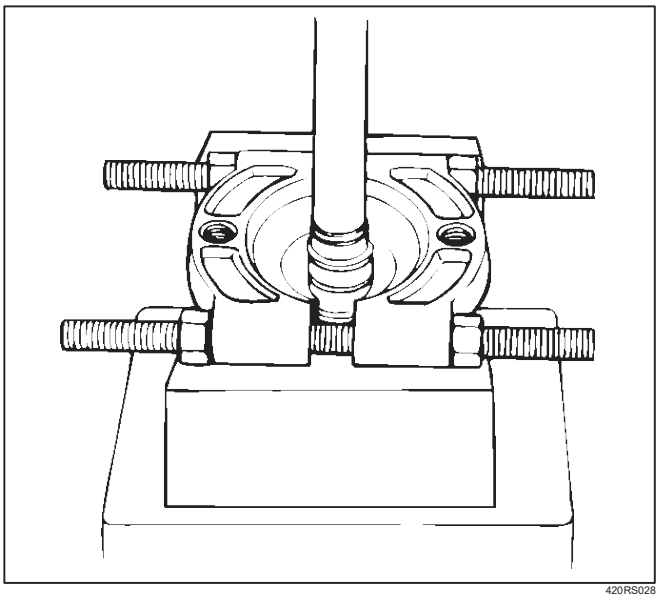
1. Raise the vehicle.
2. Remove rear wheels and brake calipers or drums.
   Do not let calipers hang from the vehicle by the brake line or hose. Use a wire to hang the caliper to the frame to prevent damage to the caliper.
3. Remove four nuts and lockwashers.
4. Remove shaft assembly from the axle housing.
5. Remove snap ring and bearing cup.
6. Break retainer ring with hammer and chisel.


420RS026

7. Break bearing cage with hammer and chisel.


420RS027

8. Remove oil seal, retainer, and emergency brake assembly.
9. Remove inner race from shaft with OTC–1126 bearing splitter and press.

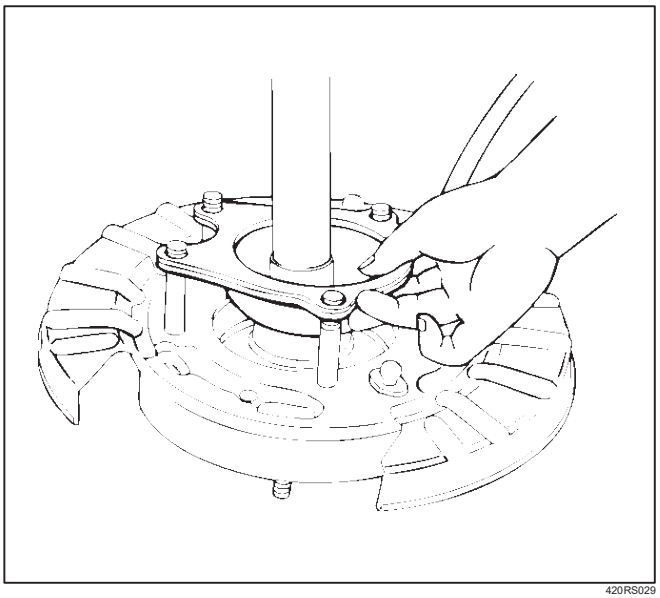

420RS028

Inspection

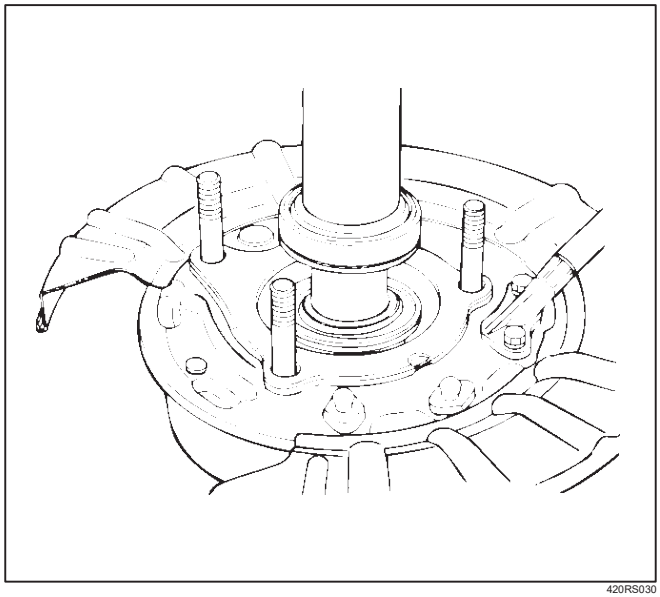
- Shaft for spalling or grooves from seal wear.
- Retainer – bent or damaged.
- Replace items if required.

Installation

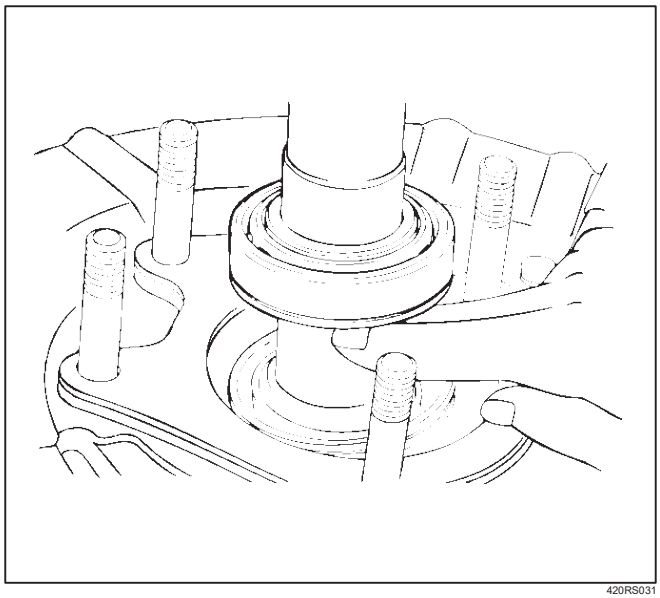
1. Emergency brake assembly.
2. Install retainer.
   Note direction – do not install backwards.


420RS029

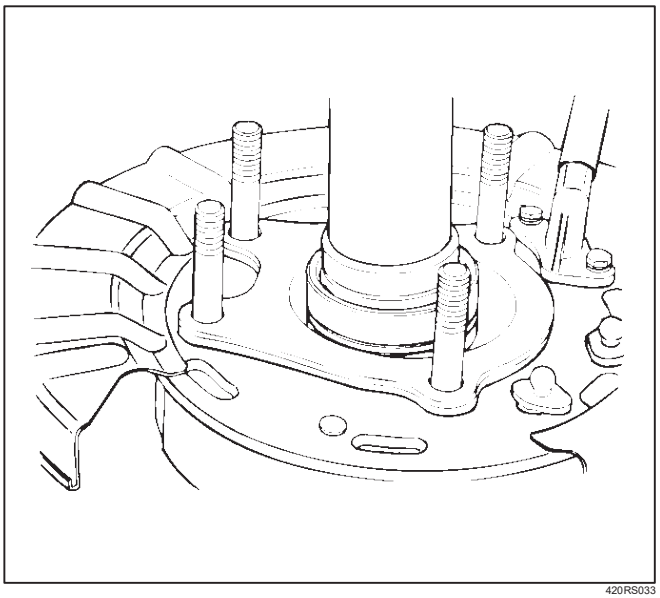
3. Install oil seal. Note direction.
4. Install bearing assembly, using installer and press.


420RS030

NOTE: Install bearing with cup towards inboard side.


420RS031

5. Install retainer ring, using installer and press.

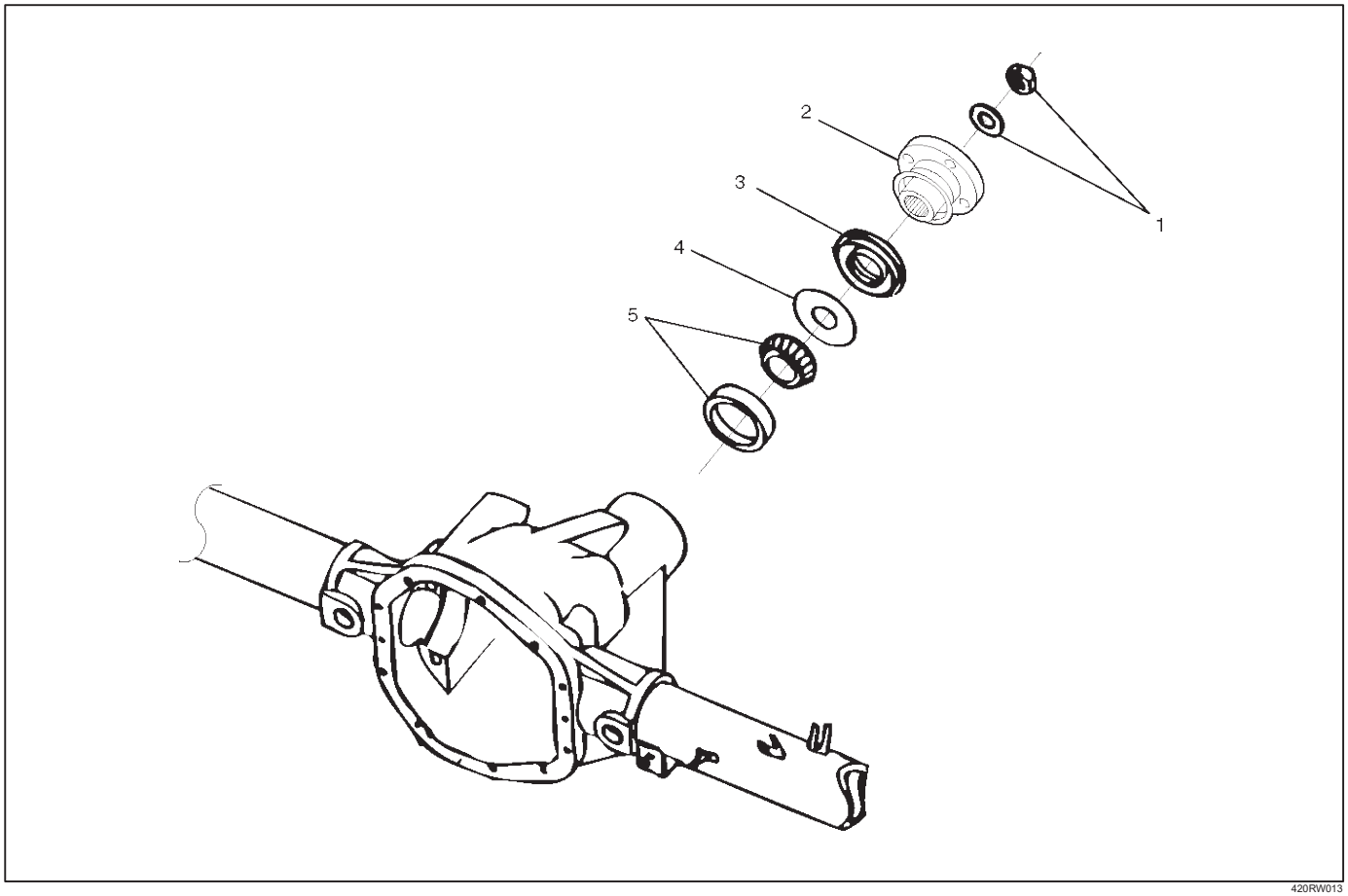

420RS033

6. Install snap ring.
7. Install axle shaft assembly into housing.
8. Install bolts, lockwashers, and nuts.
   Tighten the retainer nuts to the specified torque.

Torque : 75 N·m (55 lb ft)

Pinion Oil Seal

Pinion Oil Seal and Associated Parts



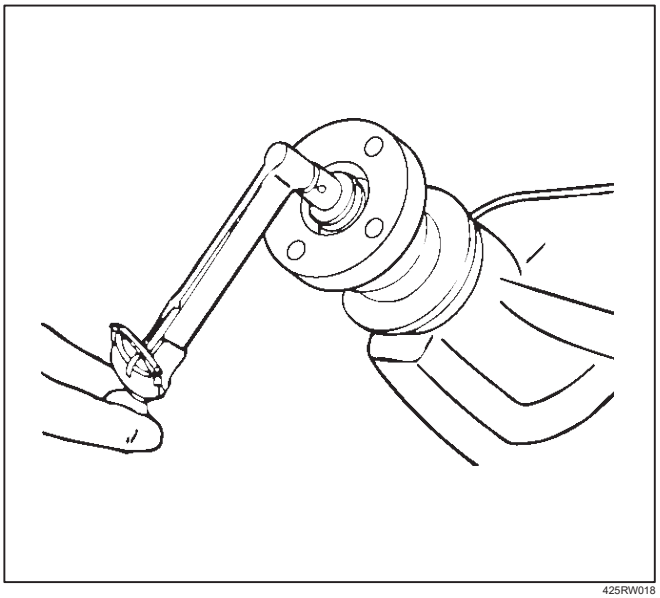
420RW013

Legend

(1) Flange Nut and Washer
(2) Flange
(3) Oil Seal
(4) Outer Oil Seal Slinger
(5) Outer Pinion Bearing (Cup and Cone)

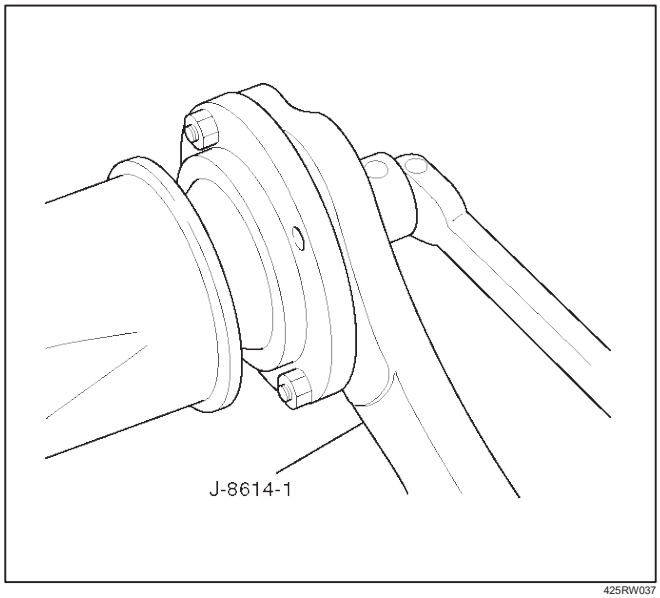
Removal

1. Remove the rear propeller shaft. Refer to *Rear Propeller Shaft* in this section.
2. Drain the rear axle oil.
3. Check and record preload with an inch pound torque wrench. This will give combined pinion bearing, seal, carrier bearing, axle bearing and seal preload.



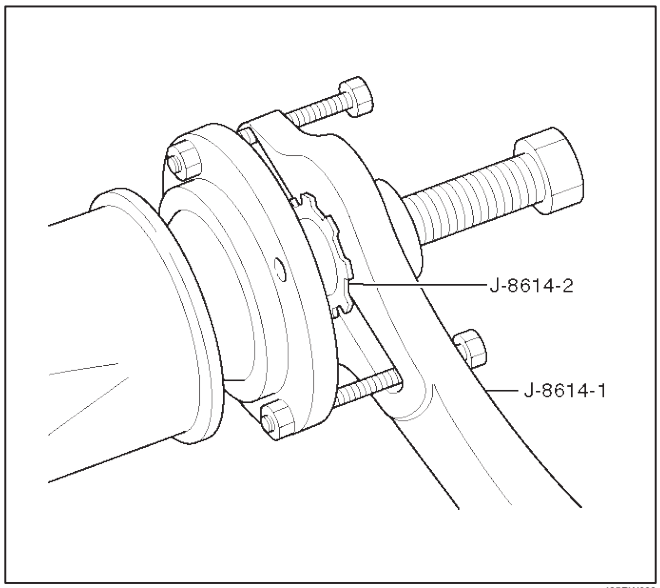
425RW018

4. Remove flange nut and washer by using pinion flange holder J–8614–01 after raising up its staked parts completely.



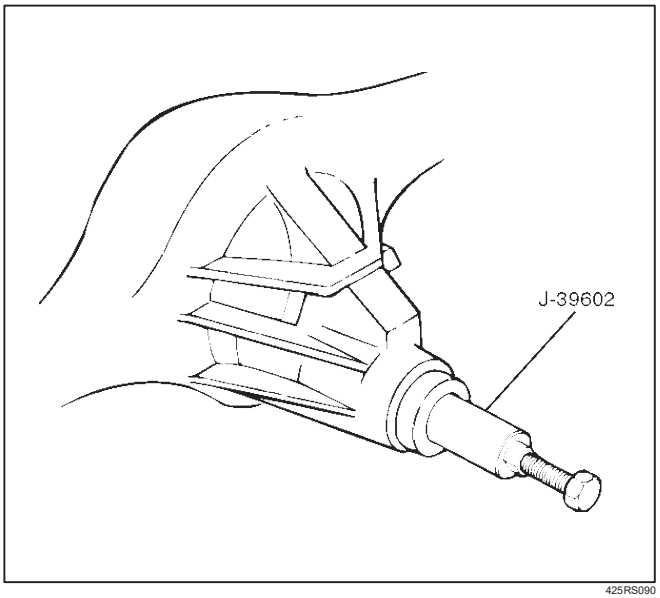
425RW037

5. Remove flange by using SST J–8614–1 ~ 3.
   - Have a suitable container in place to catch lubricant.



425RW038

6. Remove oil seal.
7. Remove pinion oil seal slinger.
8. Remove outer bearing by using remover J–39602.



425RS090

9. Remove collapsible spacer.

Inspection and Repair

Make necessary correction or parts replacement if wear, damage, corrosion or any other abnormal condition are found through inspection.
Check the following parts.

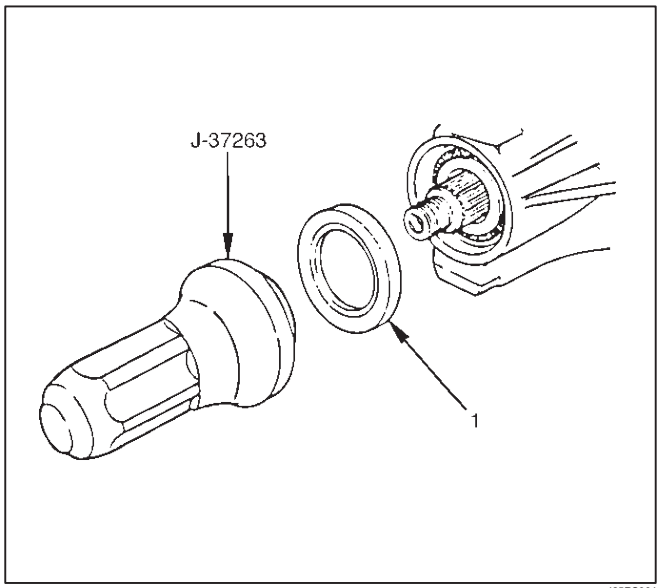
1. Seal surface of the flange.
2. Cage bore for burns.

Installation

1. Install collapsible spacer, discard the used collapsible spacer and install a new one.
2. Install outer bearing.

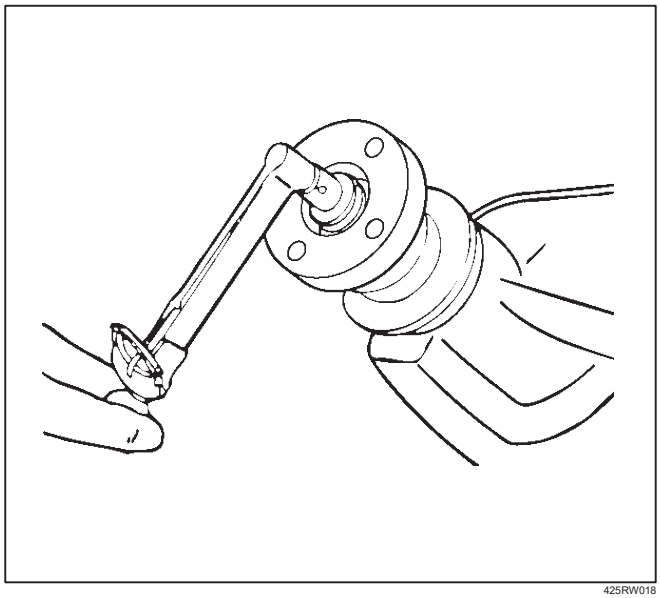
NOTE: Do not drive in, but just temporarily set in the outer bearing by hand, which should be indirectly pressed in finally by tightening the flange nut.

3. By using the seal installer J–37263, install a new oil seal (1) that has grease on seal lip.



425RS004

4. Install flange.
5. The pinion washer and a new nut while holding the pinion flange with J–8614–01.
   - Tighten the nut until the pinion end play is just taken up. Rotate the pinion while tightening the nut to seat the bearings. Once there is not end play in the pinion, the preload torque should be checked.
   - Remove J–8614–01. Using an inch-pound torque wrench, check to make sure the pinion preload is equal to or slightly over the reading recorded during removal.

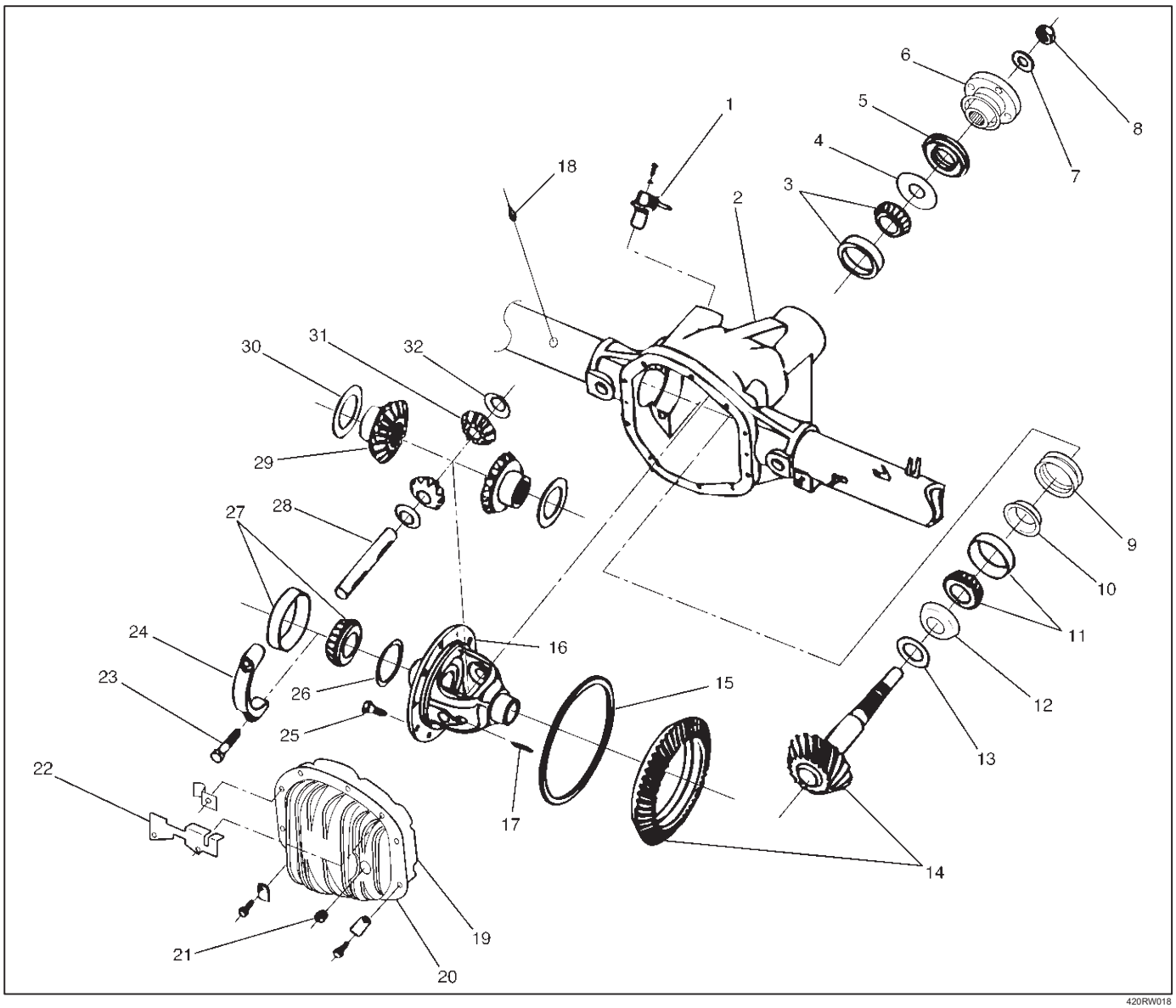

425RW018

6. Install propeller shaft to the frange.
7. Install bolt and nut. Tighten the bolt and nut to the specified torque.

   Torque: 63 N·m (46 lb ft)

Differential Assembly

Disassembled View



420RW018

Legend

(1) ABS Speed Sensor
(2) Housing
(3) Outer Pinion Bearing (Cup and Cone)
(4) Outer Oil Slinger
(5) Oil Seal
(6) Companion Flange Assembly
(7) Pinion Nut Washer
(8) Pinion Nut
(9) Collapsible Spacer
(10) Baffle Plate
(11) Inner Pinion Bearing (Cup and Cone)
(12) Inner Oil Slinger
(13) Pinion gear adj. Shim-Selective (Position)
(14) Ring gear and Pinion Gear Assembly
(15) Exciter Ring
(16) Differential Case
(17) Lock Pin
(18) Axle Vent
(19) Gasket
(20) Cover and Clip Assembly
(21) Fill Plug (with Magnet)
(22) Mounting Bracket
(23) Side Bearing Cap Bolt
(24) Side Bearing Cap
(25) Ring Gear Bolts
(26) Differential Adjustment Shims (Side Bearing Preload and Ring Gear/Pinion Backlash)
(27) Side Bearing (Cup and Cone)
(28) Differential Shaft
(29) Differential Side Gears
(30) Side Gear Thrust Washer
(31) Pinion Mate Gears
(32) Thrustwasher-Differential Pinion Mate Gear

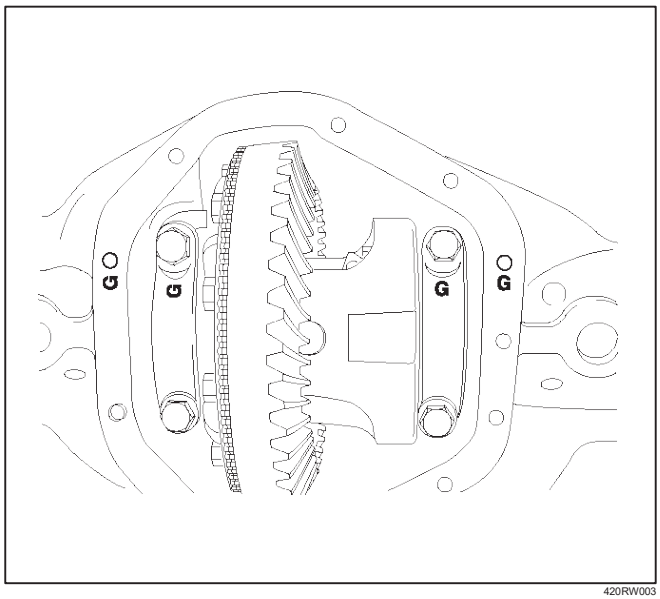
Inspecting the Axle Before Disassembly

1. Remove the axle cover from the rear axle and drain the axle lubricant into a suitable container.
2. Check ring gear backlash. Refer to *Backlash Adjustment* in this section. This information can be used to determine the cause of the axle problem. It will also help when setting up the shim packs for locating and preloading the differential cage.
3. Check case for metal chips and shavings. Determine where these chips and shavings come from, such as a broken gear or bearing cage.
   - If possible, determine the cause of the axle problem before disassembly.

Disassembly

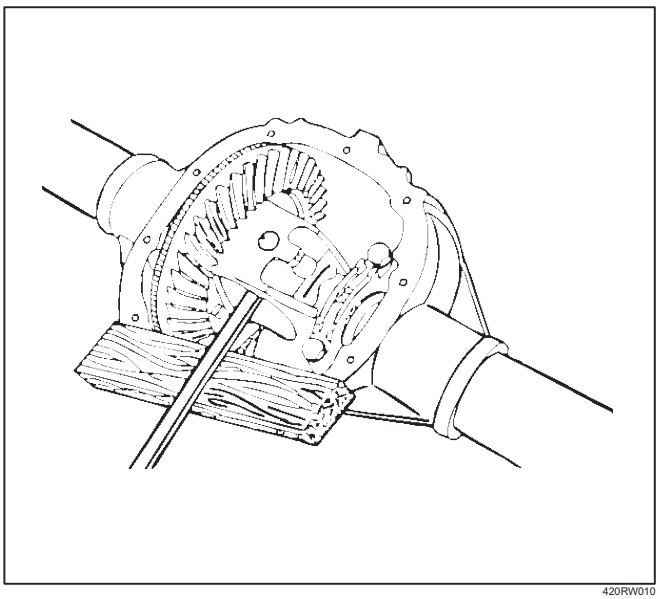
1. Remove axle shafts.
   - Refer to *axle shaft replacement* in this section.
2. Remove ABS sensor.
3. Remove bearing caps and bolts.
   - Mark the caps and the housing as left and right.

CAUTION: Bearing caps are machined with the housing and must be assembled in the same position as removed. Note the matched letter stamped on the caps and carrier. When assembled, the letters on the caps must agree in both the hosizontal and vertical position with the letters on the carrier.

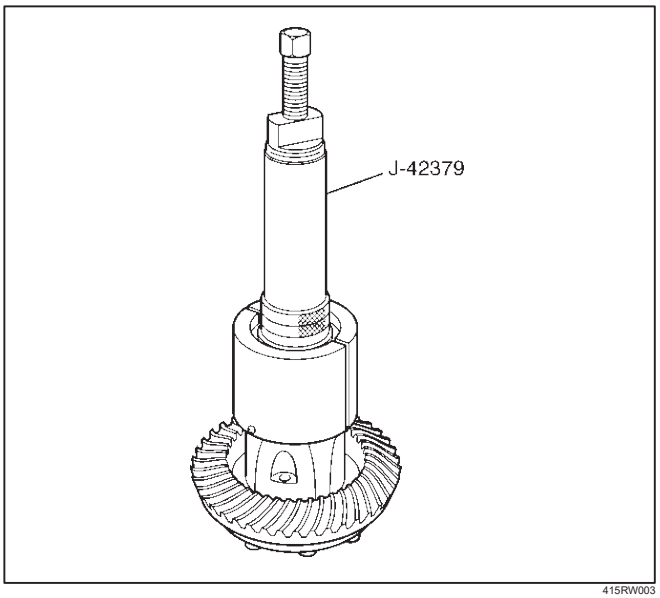


420RW003

4. Remove Differential case.
   - Pry the case from the axle housing at the differential “window”.


420RW010

5. Remove side bearing outer races and shims.
   - Mark the races and shims as left and right, and place them with the bearing cups.
6. Remove differential side bearings using remover J–42379 and plug J–39830.
   - Select insert ; 303174 and collet halves ; 44801 in remover kit J–42379.

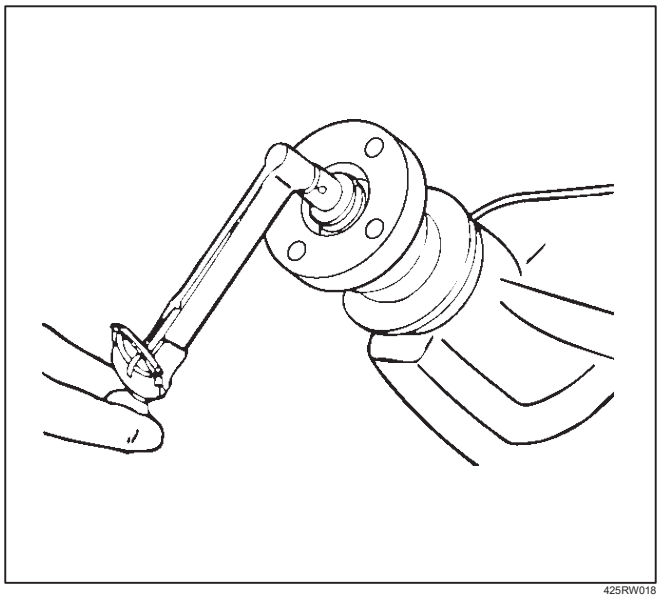


415RW003

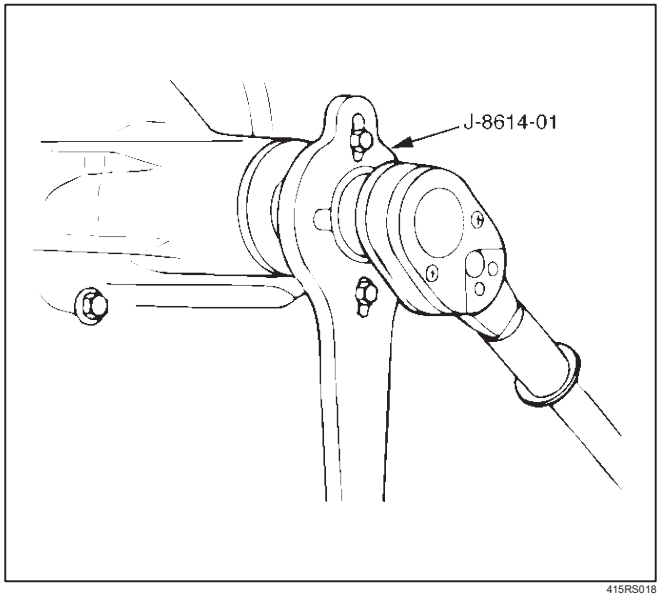
7. Remove ring gear bolts.
   - Ring gear bolts use right handed threads.

CAUTION: DO not pry the ring gear from the case. This will damage the ring and the differential case.

8. Remove ring gear from the differential.
   - Drive the ring gear off with a brass drift if necessary.
   - Check drive pinion bearing preload.

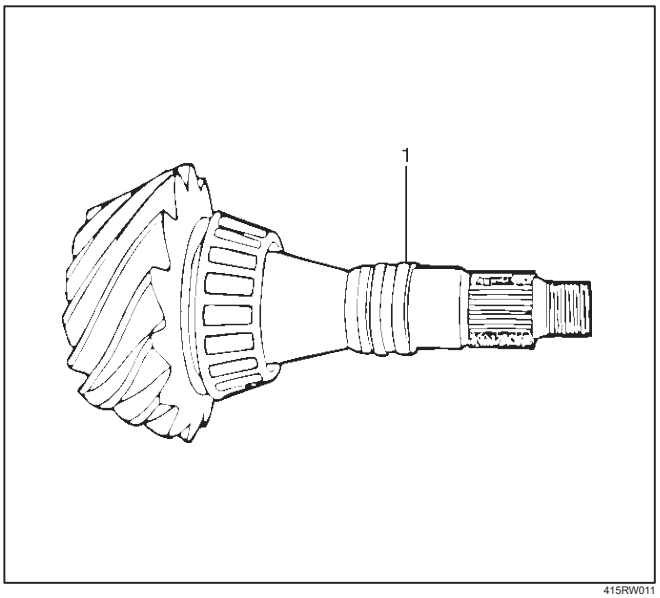

425RW018

   - Check the pinion assembly for looseness by moving it back and forth. (Looseness indicates excessive bearing wear.)
9. Remove pinion flange nut and washer.
   - Use flange holder J–8614–01 to hold the pinion flange.
10. Remove pinion flange.
   - Use flange holder J–8614–01 to remove the pinion flange.



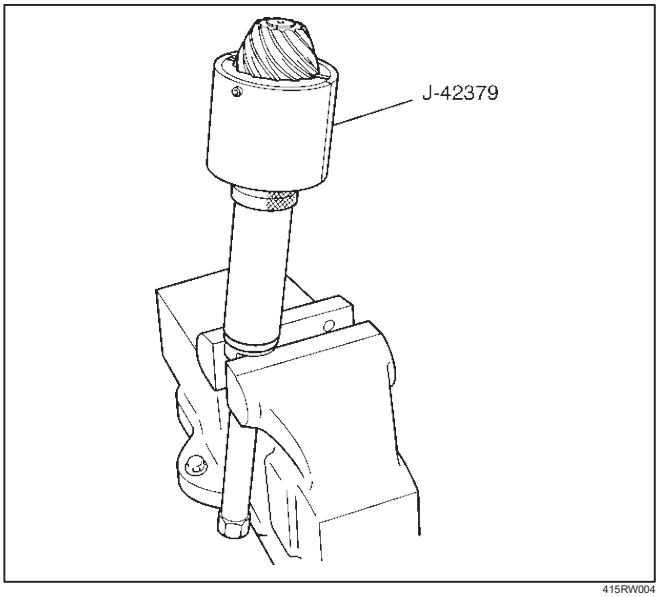
415RS018

11. Remove pinion from the axle housing.
   - Thread the pinion nut halfway onto the pinion.
   - Drive the pinion out of the housing with a hammer and a soft drift.
   - Remove the nut and then remove the pinion.
12. Remove collapsible spacer(1).



415RW011

13. Remove outer seal, outer oil slinger and outer pinion bearing.
14. Remove inner bearing, inner oil slinger and shim from the pinion.
   - Press the bearing off the pinion using remover J–42379.

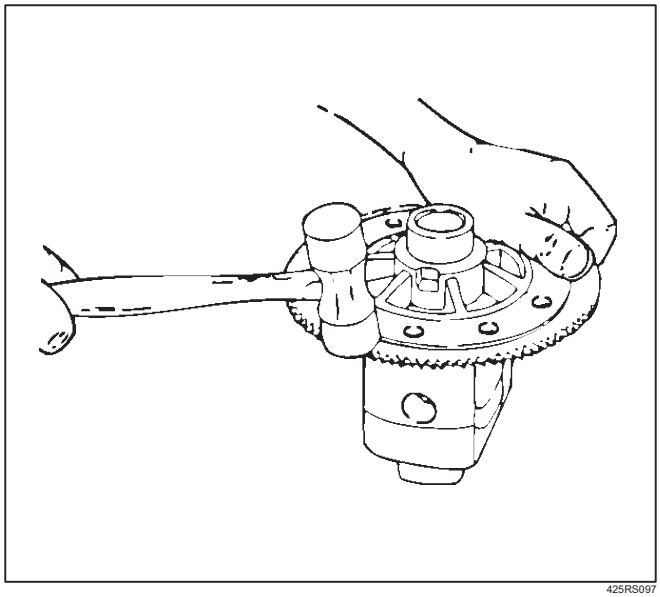


415RW004

   - Select insert ; 303174 and collet halves ; 44801 in remover kit J–42379.
   - Remove the shim.
15. Remove bearing cups and baffle plate from the axle housing using a hammer and a punch.
   - Work the cups out of the housing evenly, moving the punch back and forth between one side of the cup and the other.
   - The baffle plate will be destroyed and should be replaced with a new one.

16. Remove exciter ring.
    - Remove the exciter ring from the differential using a mallet or a brass hammer if it is required.

NOTE: Discard the exciter ring after removal.



425RS097

Cleaning

Do not steam clean drive parts which have ground and polished surfaces such as gears, bearings, and shafts. These parts should be cleaned in a suitable solvent. All parts should be disassembled before cleaning.
Parts should be thoroughly dried immediately after cleaning. Use soft, clean, lintless rags. Parts may be dried with cimpressed air. Do not allow the bearings to spin while drying them with compressed air.

Inspection and Repair

It is very important to carefully and thoroughly inspect all drive unit parts before reassembly.
Thorough inspection of the drive parts for wear or stress and subsequent replacement of worn parts will eliminate costly drive component repair after reassembly.

Axle Housing

- The carrier bore for nicks or burrs that would prevent the outer diameter of the pinion seal from sealing, Remove any burrs that are found.
- The bearing cap bores for nicks or burrs.
  Remove any burrs that are found.
- The housing for cracks. Replace the housing if any cracks are found.
- The housing for foreign material such as metal chips, dirt, or rust.

Pinion and Ring Gear

- Pinion and ring gear teeth for cracking, chipping, scoring, or excessive wear.
- Pinion splines for wear.
- Pinion flange splines for wear.
- The sealing surface of the pinion flange for nicks, burrs, or rough tool marks which would cause damage to the seal's inside diameter and result in an oil leak.
- Replace all worn or broken parts.
- Ring and pinion gears are matched sets and are both replaced anytime a replacement of either is necessary.

Bearings

- Bearings visually and by feel.
- The bearings should feel smooth when oiled and rotated while applying as much hand pressure as possible.
  The large end of the bearing rollers for wear.
  This is where tapered roller bearing wear is most evident.
- Bearing cups for wear, cracks, brinelling and scoring.
- Bearing and cups are only replaced as sets.
- If the rear axle was operated for an extended period of time with very loose bearings, the ring gear and drive pinion will also require replacement.
- Low mileage bearings may have minute scratches and pits on the rollers and the bearing cups from the initial pre-load. Do not replace a bearing for this reason.
- Bearing cups for cracks or chips.

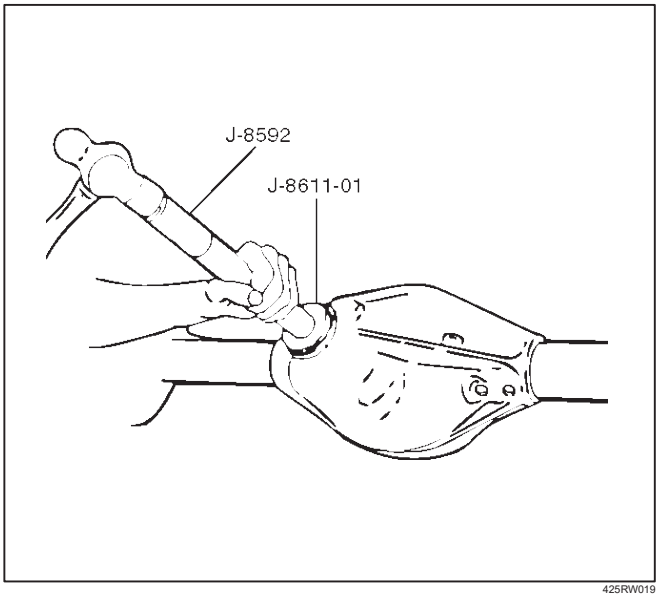
Shims

- Shims for cracks and chips. Damaged shims should be replaced with an equally sized service shim.

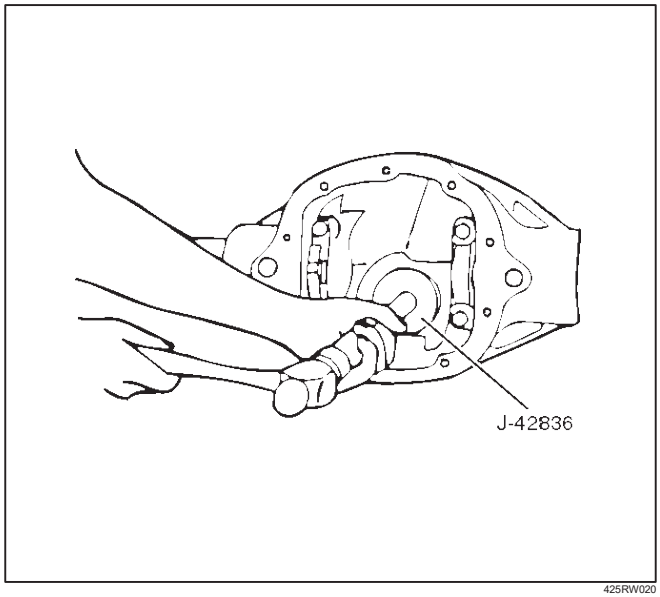
Reassembly

1. Install pinion bearing races and baffle plate using outer bearing race installer J–8611–01 / inner bearing race installer J–42836 and drive handle J–8592.

NOTE: Baffle plate must be installed, when install the inner pinion bearing race.



425RW019

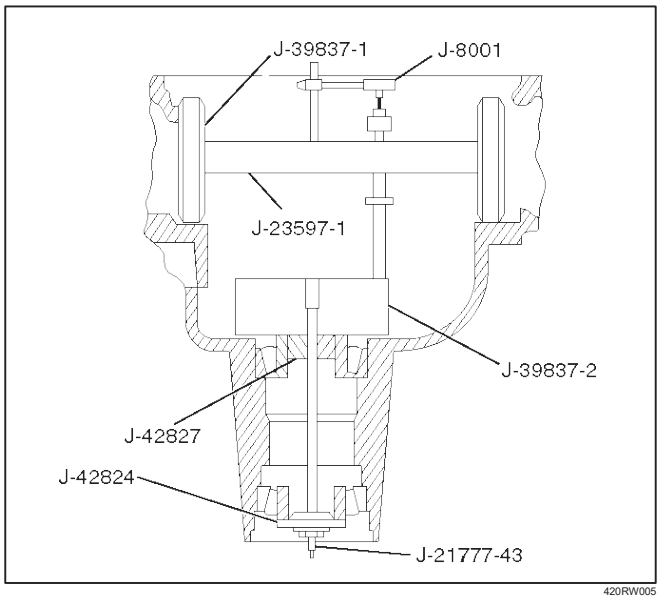


425RW020

2. Clean all the gauge parts.
3. Lubricate the outer and inner bearings with axle lubricant.
4. Place the bearings into the pinion bearing races.
5. Place the inner oil slinger onto the inner pinion bearing.

NOTE: The inner oil slinger must be placed between gauge plate and inner pinion bearing when measuring the pinion depth.

6. Install gauge plate J–39837–2, inner J–42827 stud and nut J–21777–43 and outer pilot J–42824 to the pinion bore.



420RW005

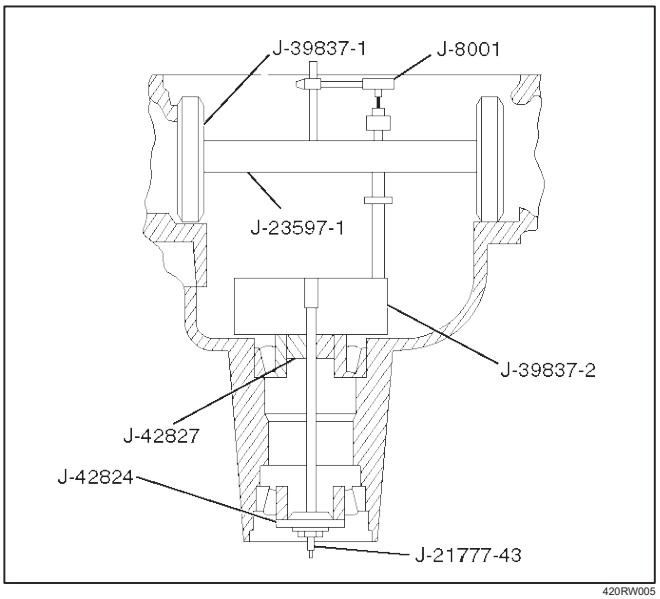
7. Hold the stud stationary at the flats of the stud (and).

Tighten the stud nut

Torque: 2.2 N·m (1.6 lb ft)

8. Rotate the gauge plate and bearings several complete revolutions to seat the bearings.
9. Tighten the stud nut until a torque of 1.6 to 2.2 N·m (1.2 to 1.6 lb ft.) is required to keep the gauge plate in rotation.
10. Assemble discs J–39837–1, arbor J–23597–1 and dial indicator J–8001 to the side bearing bores.

NOTE: The bearing bores must be clean and burr-free.



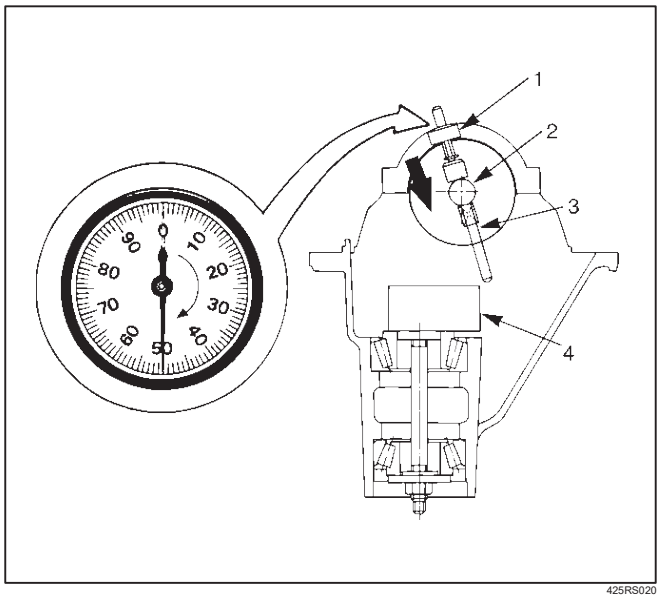
420RW005

11. Install the side bearing caps and tighten the bolts to the specified torque.

Torque: 108 N·m (80 lb ft)

12. Rotate the gauge plate until the gauging area is parallel with the discs.
13. Position the arbor assembly in the carrier so that the plunger is centered on the gauge area of the gauge plate.

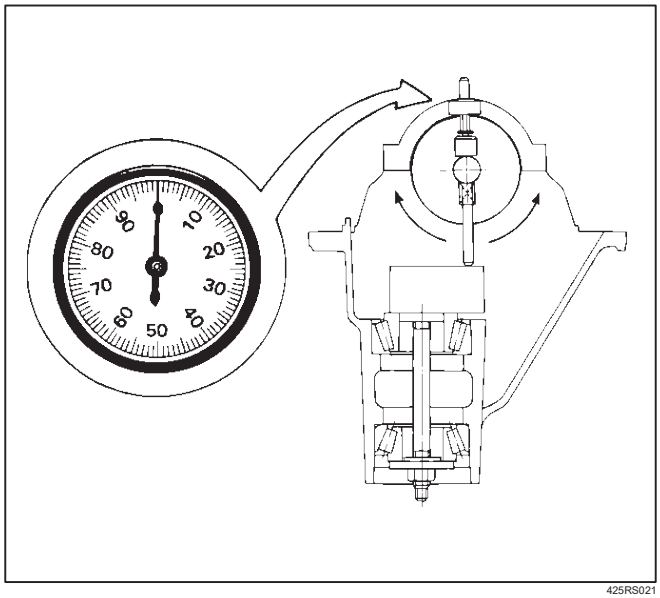
14. Set the dial indicator to “0”. Place it on the mounting post of the gauging arbor with the contact button touching the indicator pad.
    Force the dial indicator downward until the needle has made a half turn clockwise. Tighten down the dial indicator in this position.



425RS020

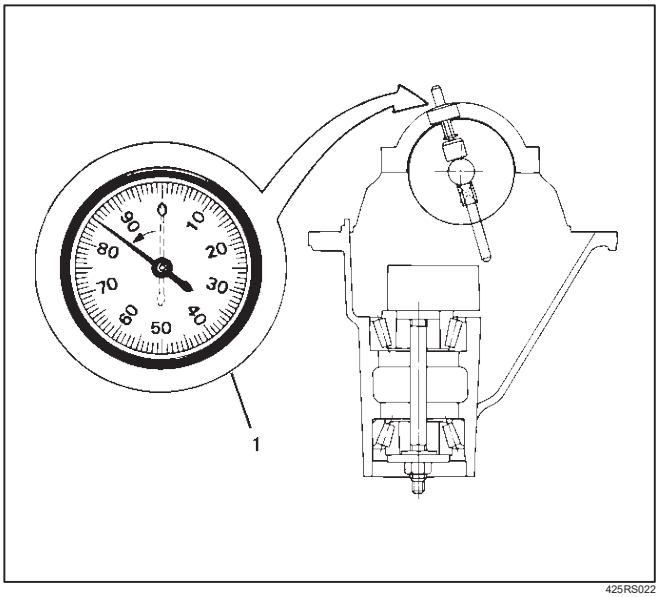
Legend
(1) Dial Indicator
(2) Ganging Arbor
(3) Plunger
(4) Gaug Plate

15. Position the plunger on the gauge plate. Move the gauging arbor slowly back and forth and locate the position at which the dial indicator shows the greatest defection. At this point, once again set the dial indicator to “0”.
    Repeat the procedure to verify the “0” setting.



425RS021

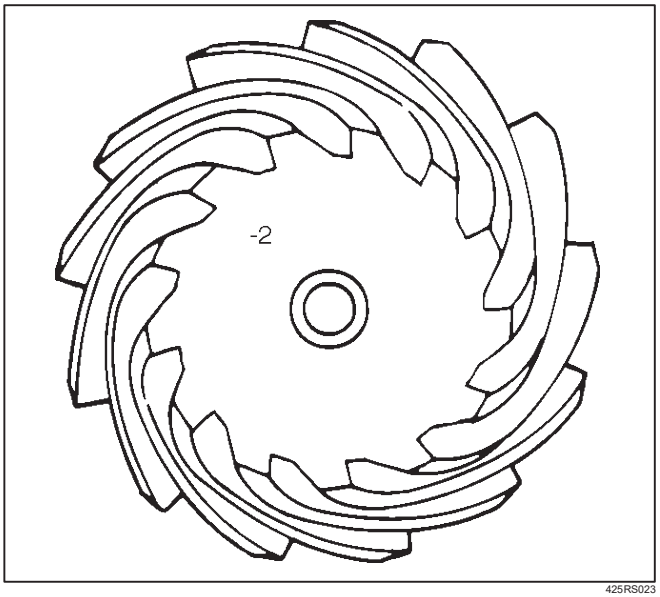
16. After the ZERO setting is obtained, rotate the gauging arbor until the dial indicator rod does not touch the gauging plate.
    Record the number the dial indicator needle points to.



425RS022

Legend
(1) Example=Dial indicator reading of 0.085

17. Record the pinion depth code on the head of the drive pinion.
    The number indicates a necessary change in the pinion mounting distance. A plus number indicates the need for a greater mounting distance (which can be achieved by decreasing the shim thickness). A minus number indicates the need for a smaller mounting distance (which can be achieved by increasing the shim thickness). If examination reveals pinion depth code “0”, the pinion is “nominal”.



425RS023

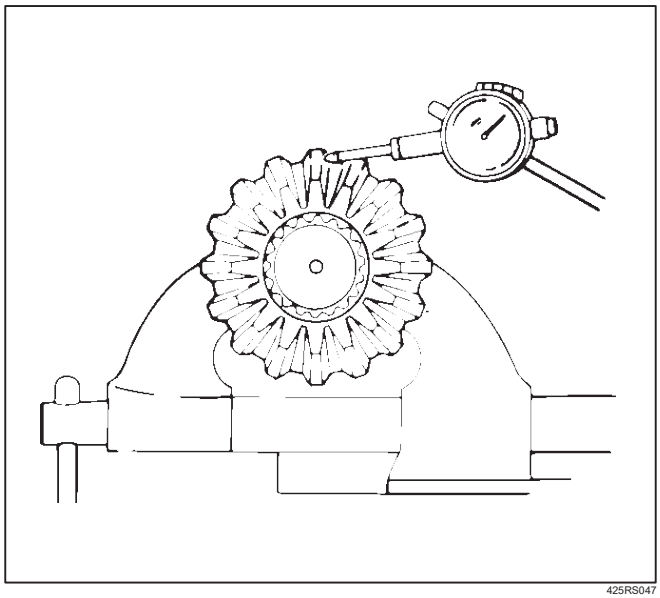
18. Select the shim using the chart;

Dial Indicator Reading (inches)	Marking (inches)						
	+3	+2	+1	0	–1	–2	–3
0.027							0.030
0.028						0.030	0.031
0.029					0.030	0.031	0.032
0.030				0.030	0.031	0.032	0.033
0.031			0.030	0.031	0.032	0.033	0.034
0.032		0.030	0.031	0.032	0.033	0.034	0.035
0.033	0.030	0.031	0.032	0.033	0.034	0.035	0.036
0.034	0.031	0.032	0.033	0.034	0.035	0.036	0.037
0.035	0.032	0.033	0.034	0.035	0.036	0.037	0.038
0.036	0.033	0.034	0.035	0.036	0.037	0.038	0.039
0.037	0.034	0.035	0.036	0.037	0.038	0.039	0.040
0.038	0.035	0.036	0.037	0.038	0.039	0.040	0.041
0.039	0.036	0.037	0.038	0.039	0.040	0.041	0.042
0.040	0.037	0.038	0.039	0.040	0.041	0.042	0.043
0.041	0.038	0.039	0.040	0.041	0.042	0.043	0.044
0.042	0.039	0.040	0.041	0.042	0.043	0.044	0.045
0.043	0.040	0.041	0.042	0.043	0.044	0.045	0.046
0.044	0.041	0.042	0.043	0.044	0.045	0.046	0.047
0.045	0.042	0.043	0.044	0.045	0.046	0.047	0.048
0.046	0.043	0.044	0.045	0.046	0.047	0.048	0.049
0.047	0.044	0.045	0.046	0.047	0.048	0.049	0.050
0.048	0.045	0.046	0.047	0.048	0.049	0.050	0.051
0.049	0.046	0.047	0.048	0.049	0.050	0.051	0.052
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0.052	0.049	0.050	0.051	0.052	0.053		
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0.055	0.052	0.053					
0.056	0.053						

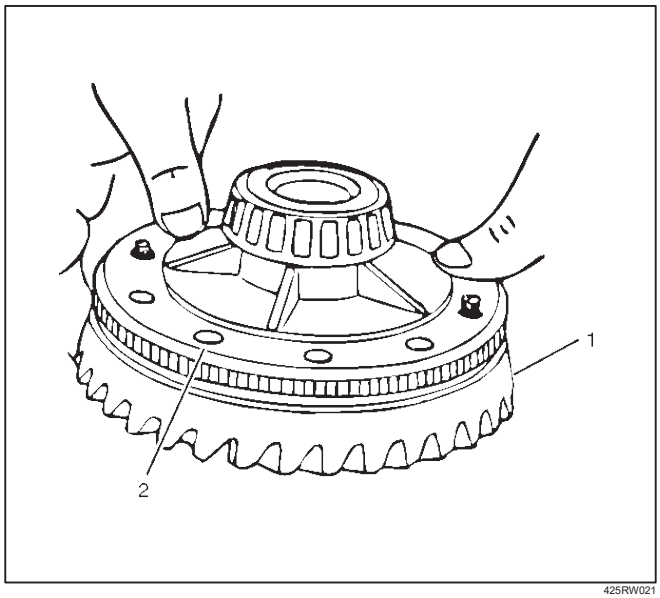
19. Remove bearing caps and depth gauging tools.
20. Install the correct pinion shim and inner oil slinger onto pinion.

NOTE: Do not install pinion gear into housing at this time.

21. If the exciter ring was removed, install the new exciter ring onto the differential case by pressing using the ring gear as a pilot.


425RS047

22. Install ring gear(1) to the differential case(2)

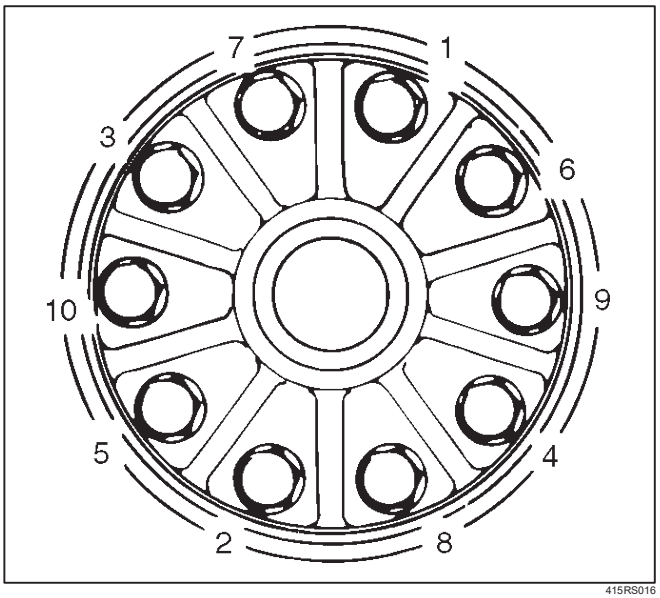


425RW021

23. Install new ring gear bolts.
    - Tighten the ring gear bolts alternately in stages, gradually pulling the ring gear onto the differential case.

Tighten the ring gear bolts in sequence
Torque: 108 N·m (80 lb ft)

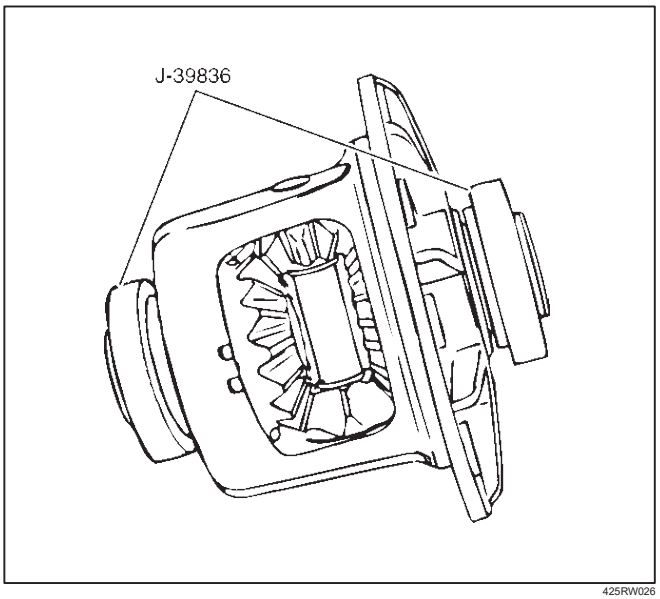
NOTE: Discard used bolts and install new ones.



415RS016

Side Bearing Preload Adjustment

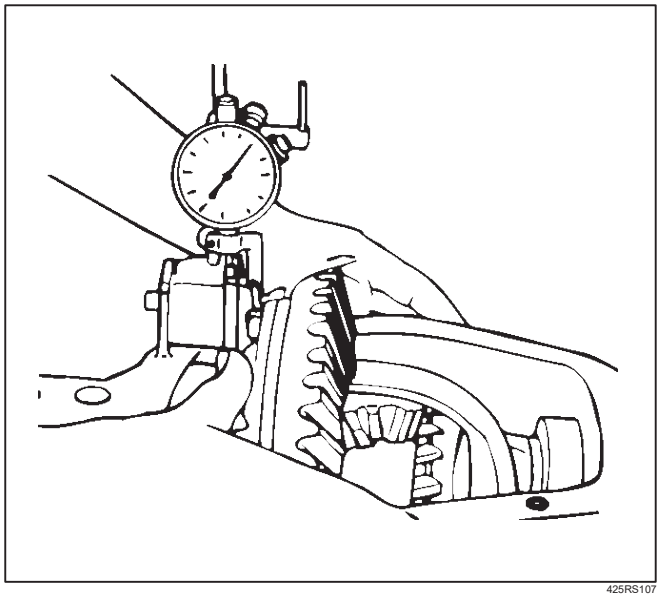
1. The side bearing preload adjustment must be made before installing the pinion.
2. The side bearing preload is adjusted by changing the thickness of both the left and right shims equally. This maintain the original backlash.
3. Install master side bearings J–39836 onto the case. Remove all nicks, burrs, dirt etc., from the hubs to allow the master bearings to rotate freely.



425RW026

4. Assemble the differential case into the housing (less pinion). Install bearing caps and finger tight bolts. Mount a dial indicator with a magnetic base to the housing and indicate on the flange or head of screw.
   Force the differential assembly as far as possible in the dirction towards the indicator.
   With force still applied, set indicator at zero(0).

NOTE: Dial indicator set should be capable of a minimum travel of 5.08 mm (0.2 in).

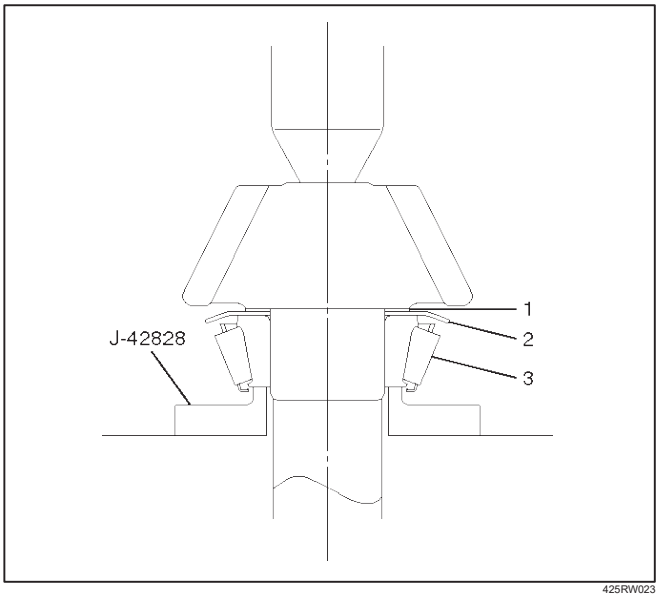

425RS107

5. Force the differetial assembly as far as it will go in the opposite direction. Repeat these steps until the same reading is obtained.
6. RECORD THE READING OF THE INDICATOR.
   This amount, in shims, will be included in the final assembly shim stack to establish side bearing preload and ring gear and pinion backlash.
7. After marking sure the readings are correct, remove the indicator and differetial assembly from the housing.

Pinion Installation

- The bearing cups should have been installed in Pinion Depth Adjustment in this section.

1. Place the shim(1) and inner oil slinger(2) on the pinion gear, then install the pinion inner bearing(3) using installer J–42828.



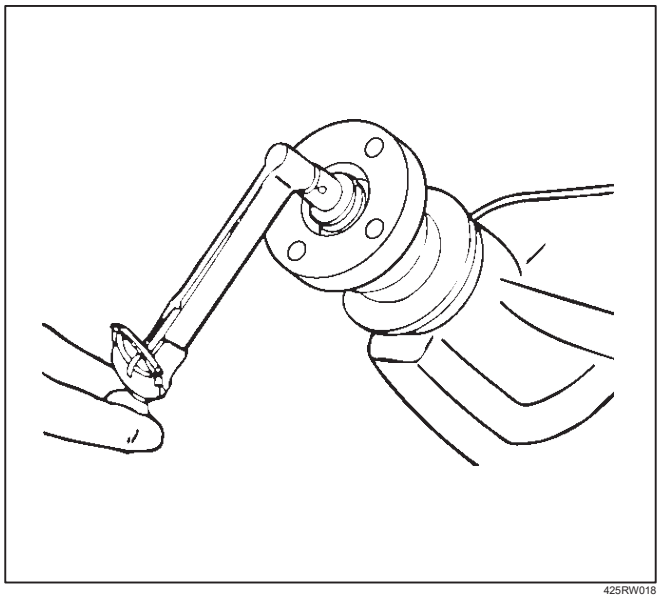
425RW023

   - Drive the bearing until the bearing cone seats on the pinion shims.
2. Install a new collapsible spacer.
   - Lubracate the pinion bearings with axle lublicant.
3. Install pinion to the axle housing.
4. Install outer pinion bearing onto the pinion.
   - Hold the pinion forward from inside the case while driving the bearing onto the pinion.
5. Install oil seal slinger.
6. Install pinion oil seal using installer J–37263.
7. Install the pinion flange to the pinion by tapping it with a rawhide hammer until a few threads show through the pinion flange.
8. Install pinion washer and a new nut while holding the pinion flange with flange holder J–8614–01.
   - Tighten the nut until the pinion end play is just taken up. Rotate the pinion while tightening the nut to seat the bearings.

   Torque:217-678 N·m (160-500 lb ft)

   Once there is no end play in the pinion, the preload torque should be checked.

   - Remove flange holder J–8614–01. Using an inch-pound torque wrench, check the pinion preload by rotating the pinion with the wrench.

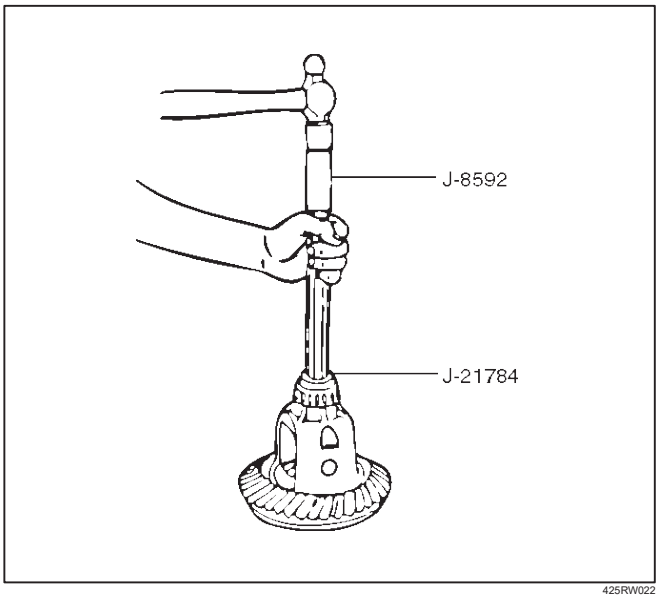

425RW018

Preload should be at 1.0 to 1.6 N·m (8 to 14 in lbs.) on new bearings, or 0.46 to 0.69 N·m (4 to 6 in lbs.) for used bearings.

- If the preload torque is below the preloads given above, continue torquing the nut in small increments. Check the preload after each tightening. Each tightening increases the bearing preload by several pounds. If the bearing preload is exceeded, the pinion will have to be removed, and a new collapsible spacer installed.
- Once a preload of 1.0 to 1.4 N·m (8 to 12 in lbs.) has been obtained, rotate the pinion several times to assure that the bearings have seated. Recheck the preload, and adjust if necessary.

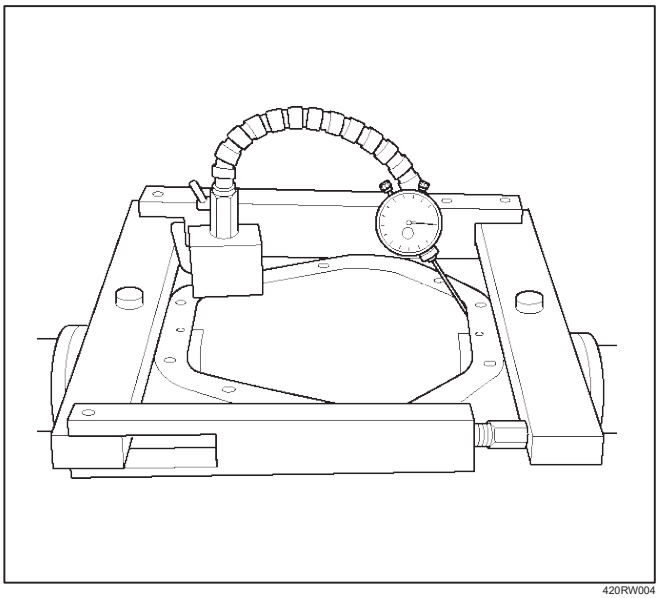
Determination of Backlash & Preload Shims

1. Install master side bearings onto the case.
2. Install differential assembly into the carrier.
3. Install the bearing cap and finger tight bolts.
4. Set up the dial indicator.
5. Force the differential assembly away from the pinion gear until it is completely seated against the cross bore face of the carrier.
6. With force still applied to the differential case, place the tip of dial indicator on a machined surface of the differential case, if available, or on the head of a ring gear screw, and set the indicator at zero(0).
7. Force the ring gear to mesh with the pinion gear. Rock the ring gear slightly to make sure the gear teeth are meshed. Repeat this procedure several times until the same reading is obtained each time. Be sure the indicator reads zero(0) each time the ring gear is forced back into contact with the cross bore face. This reading will be the necessary amount of shims to be placed between the differential case and side bearing cone on the ring gear side.
8. The remaining amount of shims, which is the difference between the overall found in step 6 of Side Bearing Pre-load Adjustment and step(7) above, should be placed on the other side of the differential case, plus additional 0.38 mm (0.015 in) for obtaining preload and backlash.
9. Place the required amount of shims on each hub as determined in the previous steps and assemble side bearing cone by using installer J–21784 and handle J–8592.



425RW022

10. Total torque to rotate — Increase of pinion torque to rotate due to differential case assembly shall not exceed 3.4 N·m (30 in lbs.) divided by the gear ratio.
11. Assembly the spreader J–24385–B and indicator to the carrier as shown in figure. Spread the carrier 0.5 mm (0.02 in) for differential installation.


420RW004

CAUTION: Do not spread the carrier over 0.5 mm (0.02 in).

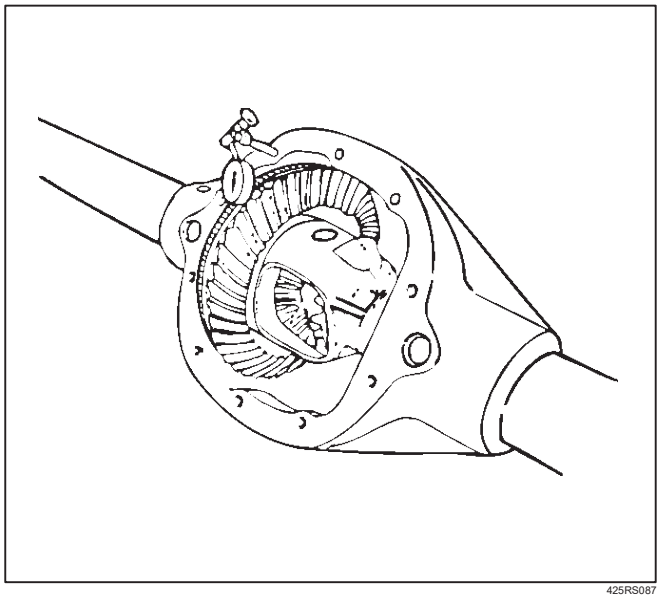
12. Remove the indicator.

Backlash Adjustment

1. Install the differential case assembly and bearing caps.
2. Rotate the case several times to seat the bearings.
3. Remove the spreader.
4. Install the side bearing cap bolts.

   Tighten side bearing cap bolts

   Torque: 108 N·m (80 lb ft)
5. Install a dial indicator to the case using a magnetic base.
6. Place the indicator stem at the heel end of a tooth.
   - Set the dial indicator so that the stem is in line with the gear rotation and perpendicular to the tooth angle.



425RS087

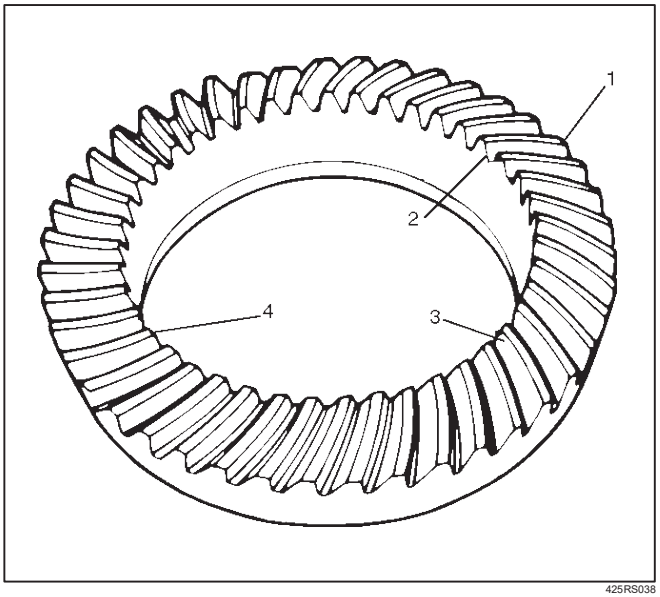
7. Check and record the backlash at three points around the ring gear.
   - The pinion must be held stationary when checking backlash.
   - The backlash should be the same at each point within 0.07 mm (0.003 in). If the backlash varies more than 0.07 mm (0.003 in), check for burrs, a distorted case flange, or uneven bolting conditions.
8. Backlash at the minimum lash point measured should be between 0.13 and 0.20 mm (0.005 and 0.008 in) for all new gear sets.
9. If the backlash is not within specifications, move the ring gear in or out from the pinion by increasing the thickness of one shims, and decreasing the thickness of the other shim by the same amount.

   This will maintain the correct rear axls side bearing preload.
   - Moving 0.05 mm (0.002 in) worth of shim from one side of the differential to the other will change the backlash adjustment by 0.03 mm (0.001 in).
10. After obtaining correct tooth contact described in later, install ABS speed sensor.
11. Install the cover with sealant.

    Torque: 40 N·m (30 lb ft)
12. Fill the axle lubricant.

Gear Tooth Pattern Check

Checking the ring gear to pinion tooth pattern is to be done only after setting up the axle according to the methods in this section. The pattern check is NEVER to be used as an initial check, or instead of checking pinion depth and backlash adjustments.
This check is only to be verify the correct adjustment of the gear set after set up.

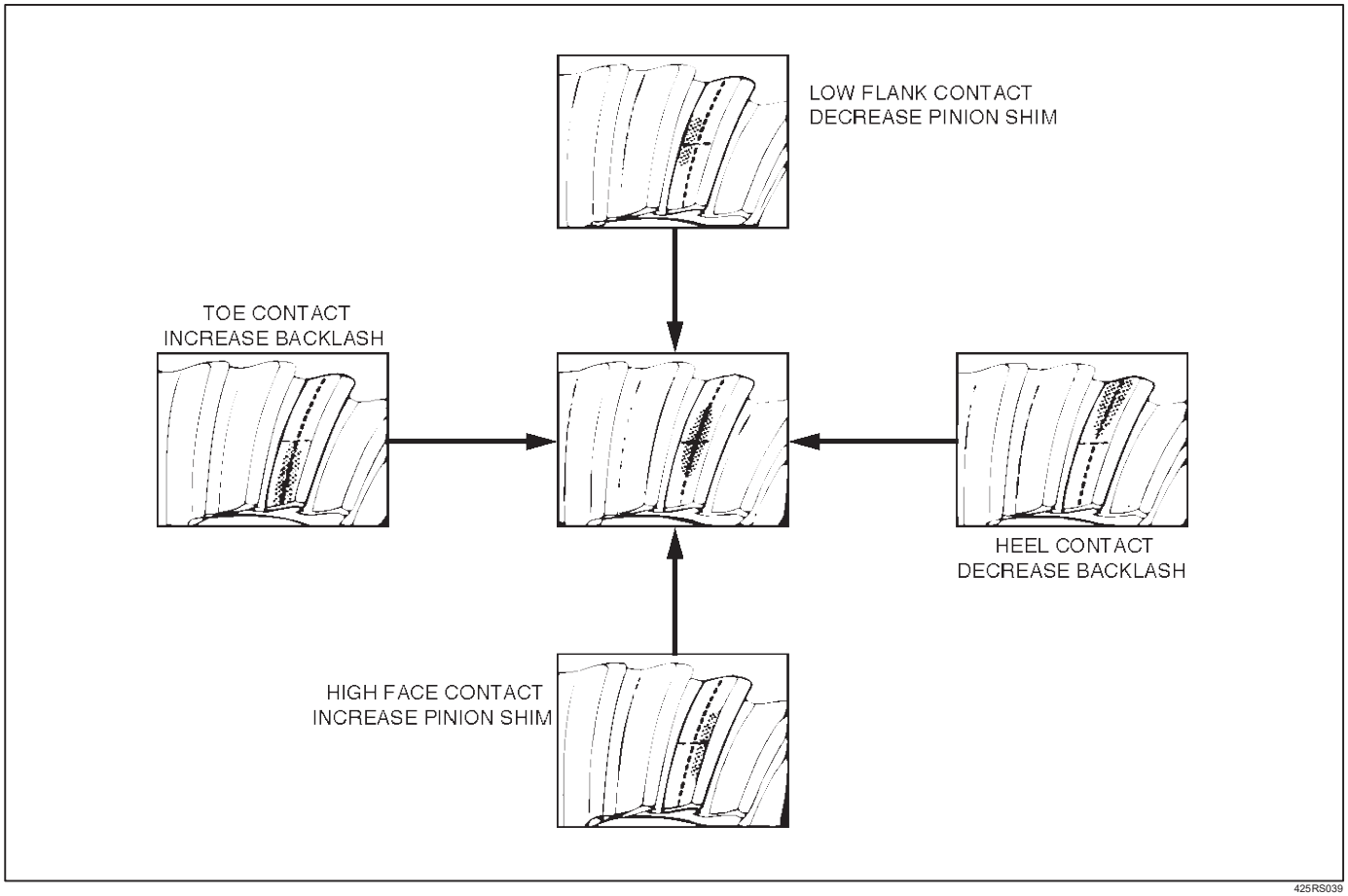


425RS038

Legend

(1) Heel
(2) Toe
(3) Concave Side (Coast)
(4) Convex Side (Drive)

1. Wipe all oil out of the carrier, and carefully clean each tooth of the ring gear.
2. Use gear marking compound 1052351 or equivalent and apply this mixture sparingly to all ring gear teeth, using a medium-stiff brush. When properly used, the area of pinion tooth contact will be visible when hand load is applied.
3. Tighten the bearing cap bolts to the specified torque.
4. Expand the brake shoes until a torque of 54 to 68 N·m (40 to 50 lb ft.) is required to turn the pinion. A test made without loading the gears will not give a satisfactory pattern. Turn the pinion flange with a wrench so that the ring gear rotates one full revolution, then reverse the rotation so that the ring gear rotates one revolution in the opposite direction.
5. Observe the pattern on the ring gear teeth and compare this with figure.



Adjustments Affecting Tooth Contact

Two adjustments can be made which will affect tooth contact pattern: backlash, and the position of the drive pinion in the case. The effects of bearing preloads are not readily apparent on head loaded tooth contact pattern tests; however, these adjustments should be within specifications before proceeding with backlash and drive pinion adjustments.

The position of the drive pinion is adjusted by increasing or decreasing the distance between the pinion head and the centerline of the ring gear.

Decreasing the distance will move the pinion closer to the centerline of the ring gear. Increasing the distance will move the pinion farther away from the centerline of the ring gear.

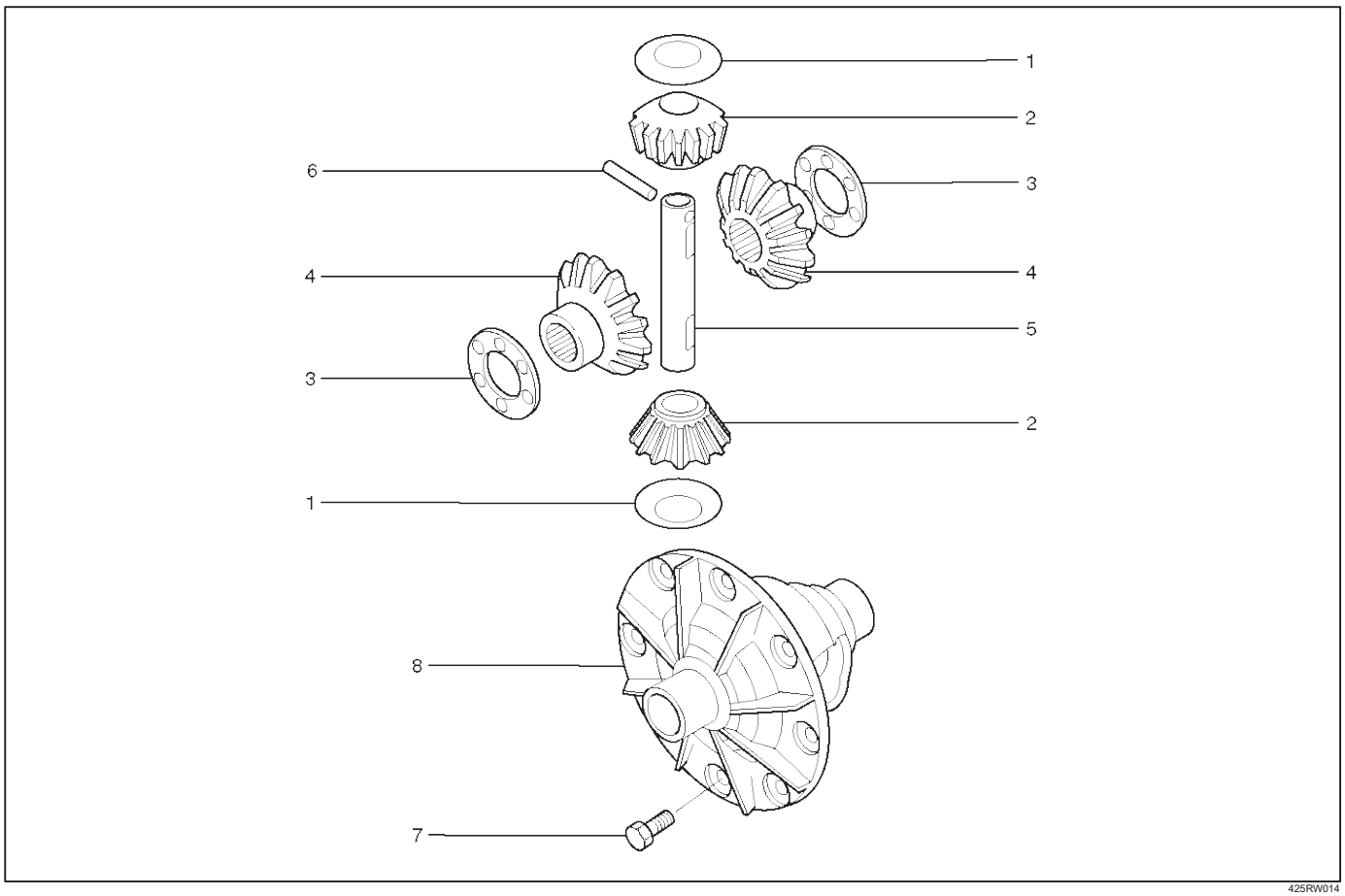
Backlash is adjusted by means of the side bearing adjusting shims which move the entire case and ring gear assembly closer to, or farther from, the drive pinion. (The adjusting shims are also used to set side bearing preload.)

If the thickness of the right shim is increased (along with decreasing the left shim thickness), backlash will increase.

The backlash will decrease if the left shim thickness is increased (along with a decrease in right shim thickness).

Differential Case Assembly

Disassembled View



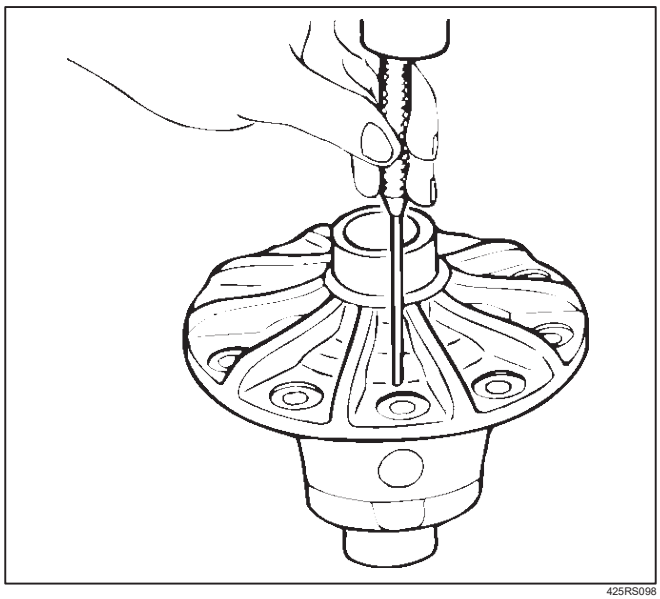
425RW014

Legend

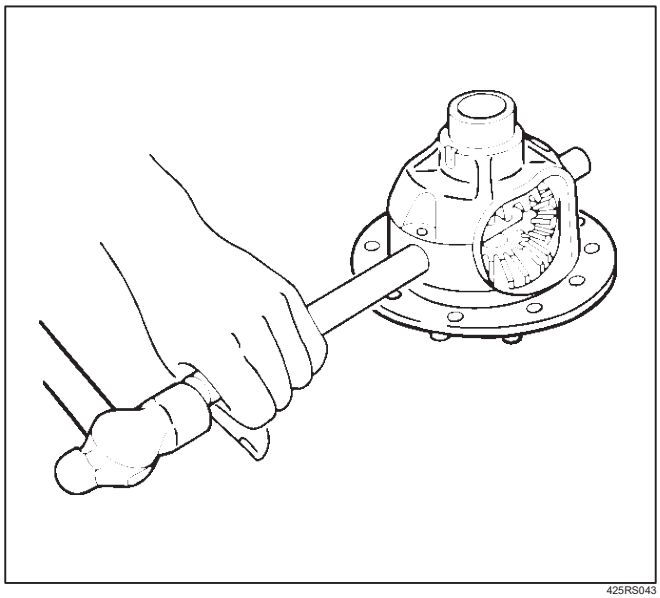
(1) Thrust Washer (for Pinion Gear)
(2) Pinion Mate Gear
(3) Thrust Washer(for Side Gear)
(4) Side Gear
(5) Differential Shaft
(6) Lock Pin
(7) Bolt
(8) Differential Case

Disassembly

1. Remove lock pin using a small drift.


425RS098

2. Remove the differential shaft by using a soft metal rod and a hammer.


425RS043

3. Remove pinion mate gear and thrust washer.
4. Remove side gear and thrust washer.

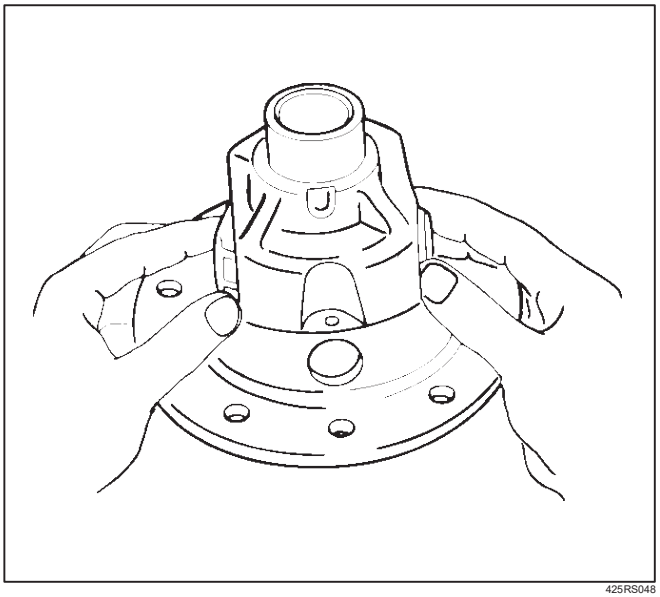
Inspection and Repair

Make necessary correction or parts replacement if wear, damage, corrosion or any other abnormal condition are found through inspection.
Check the following parts.

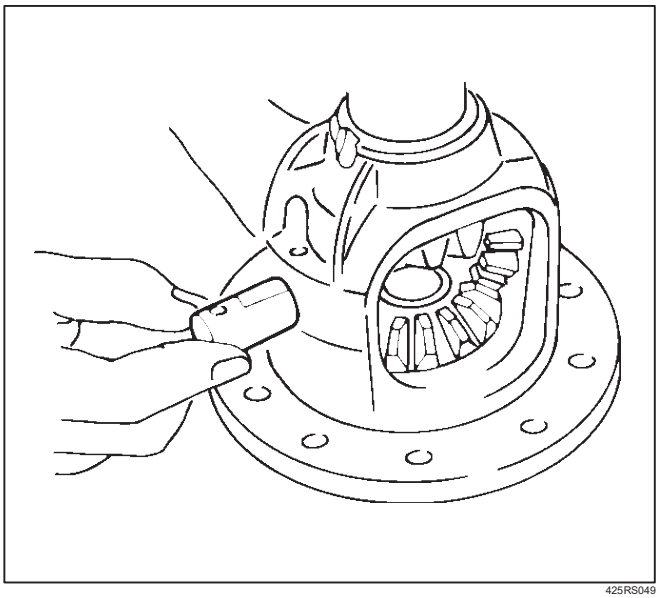
- Ring gear, pinion gear
- Bearing
- Side gear, pinion mate gear, differential shaft
- Differential case, carrier
- Thrust washer
- Oil seal

Reassembly

1. Install side gear with thrust washer.
2. Install the pinion mate gear with thrust washer by engaging it with the side gears while turning both pinion mate gears simultaneously in the same direction.


425RS048

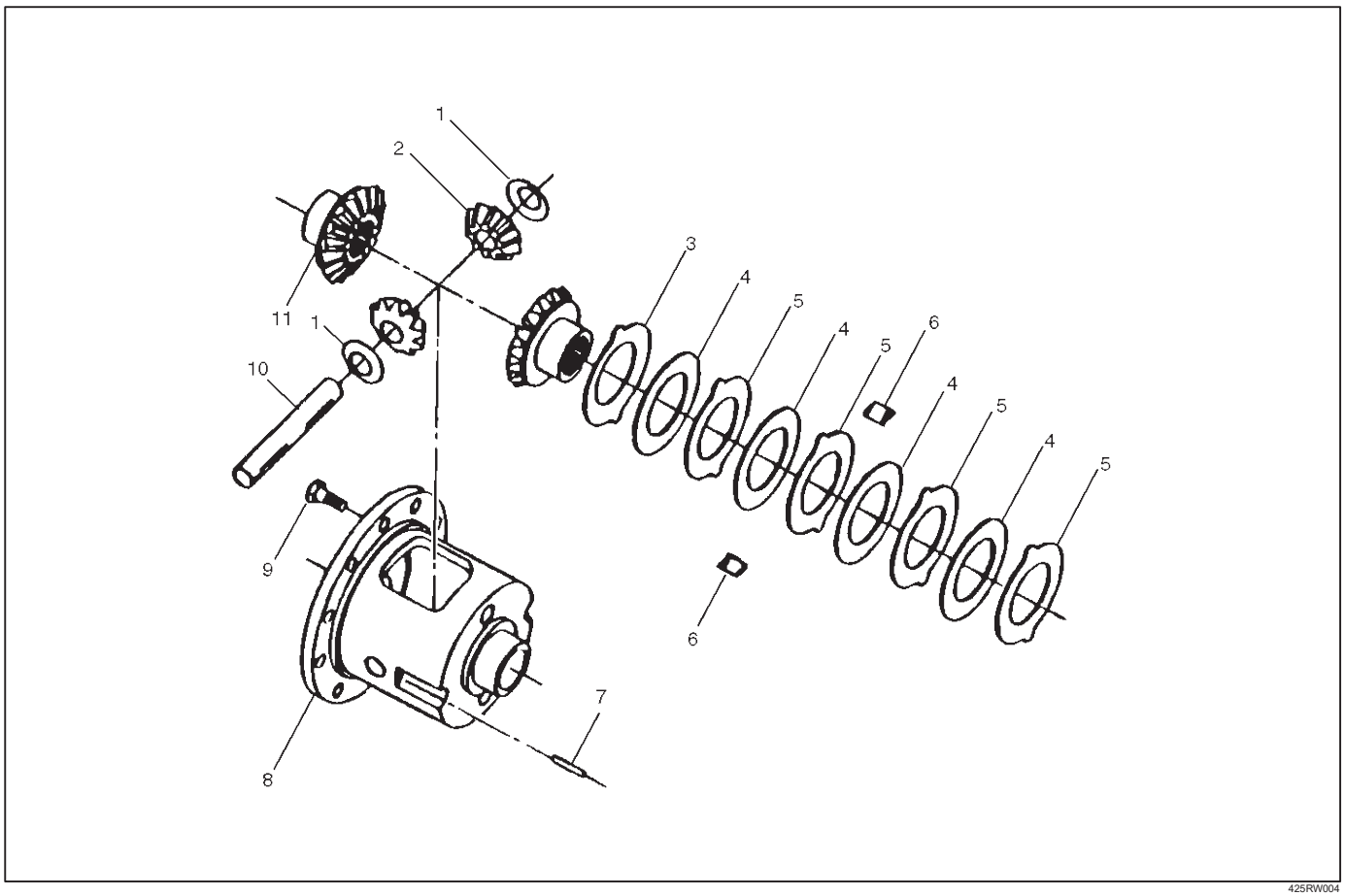
3. Install differential shaft.
   1. Be sure to install the differential shaft so that it is in alignment with the lock pin hole in the differential case.


425RS049

4. Install lock pin.
   After lock pin installation, stake the case to secure the lock pin.

Limited Slip Differential Assembly

Disassembled View



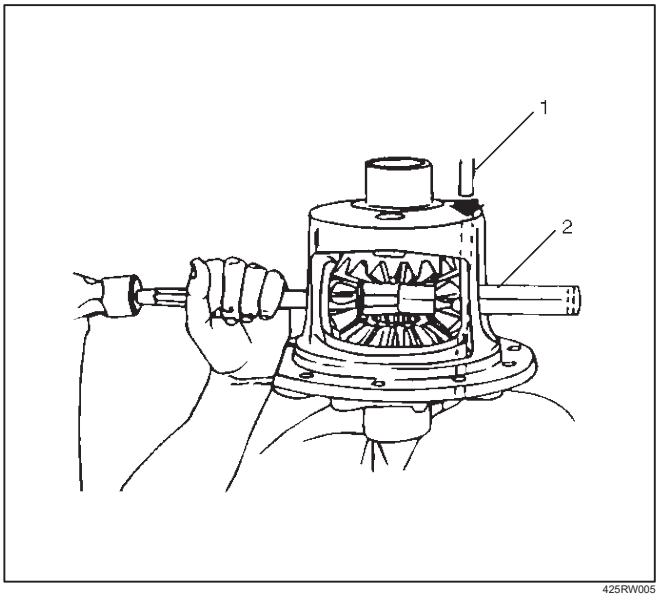
425RW004

Legend

(1) Thrust Washer–Differential Pinion Mate Gear
(2) Pinion Mate Gear
(3) Dished Spacer
(4) Disc
(5) Plate
(6) Differential Plate Retainer
(7) Lock Pin
(8) Differential Case
(9) Ring Gear Bolts
(10) Differential Shaft
(11) Differential Side Gear

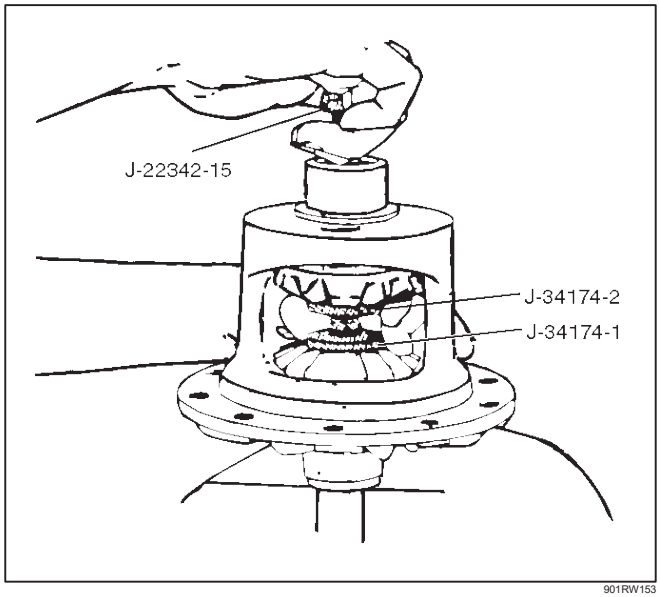
Disassembly

1. Place the holder J–39824 into a vise.
   Position the differential on the holder with the ring gear side down.
2. Remove Lock pin (1) from differential shaft using a punch.
3. Remove Differential shaft (2) using hammer and punch.
   Place shop towel behind case to prevent differential shaft from dropping out of case.



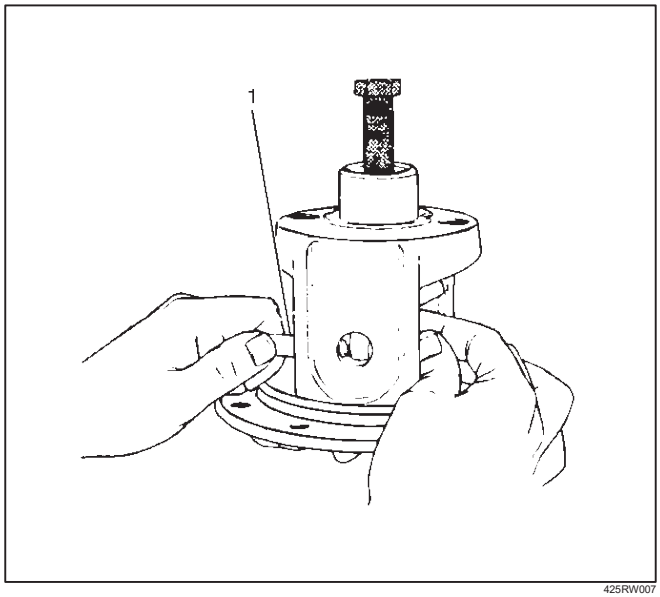
425RW005

4. Assemble clutch pack unloading tool .
   a. Install cap J–34174–1 to the bottom differential side gear.
   b. Install threaded screw cap J–34174–2 to top differential side gear. Thread forcing screws J–22342–15 into threaded screw cap until it becomes centered into the bottom cap.



901RW153

   c. Tighten forcing screw until tight enough to collapse dished spacers and allow looseness between side and pinion mate gears.
5. Both pinion mate gear thrust washers using a shim stock (1) of 0.51 mm (0.020 in.) or equivalent tool to push out washers.



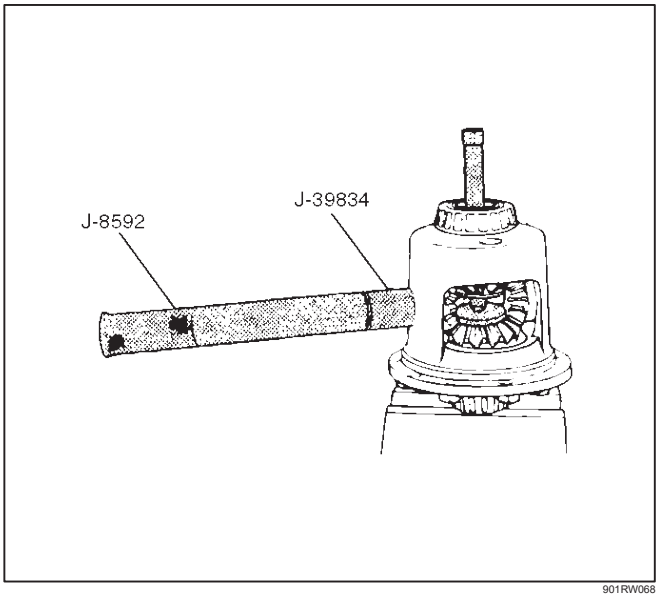
425RW007

6. Relieve tension of dished spacers by loosening forcing screw.

NOTE:

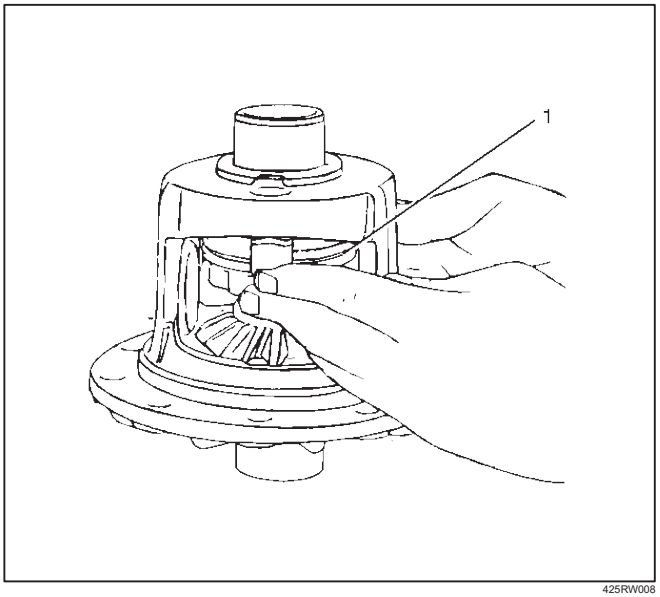
- You may have to adjust the forcing screw slightly to allow the case to rotate.

7. Assemble LSD service adapter J–39834 onto long drive handle J–8592.Insert it into differential shaft hole of case. Pull on handle and rotate case until pinion mate gears can be removed.



901RW068

8. Remove pinion mate gears.
9. Hold side gear top clutch pack (1) with one hand and remove positraction unloading tools.



425RW008

10. Remove top side gear and clutch pack.

NOTE:

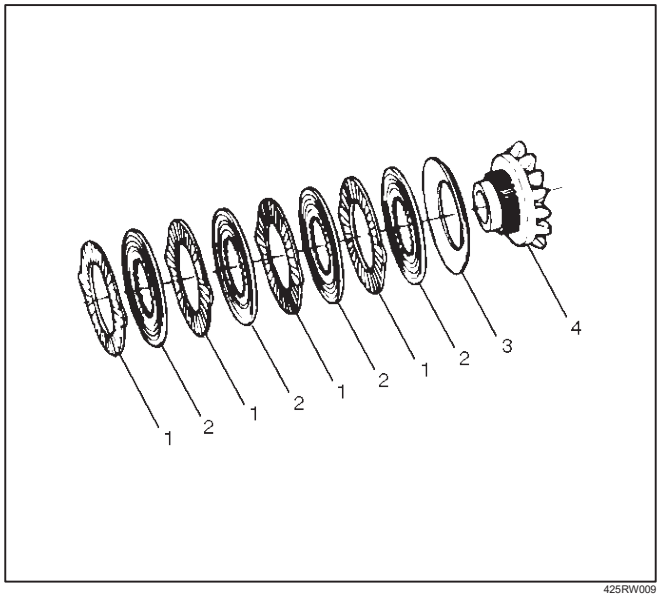
- Keep the stack of plates and discs intact and in exactly the same position while they are being removed.

11. Remove case from holder. Turn case with flange or ring gear side up to allow side gear and clutch pack to be removed from case.

12. Remove differential plate retainer from both clutch packs to allow separation of the plates and discs.

NOTE:

- Keep the discs and plates in the same order as they were removed.



425RW009

Legend

(1) Differential Plate
(2) Differential Disc
(3) Dished Spacer
(4) Side Gear

Inspection and Repair

Cleaning

- All parts with solvent.

Visual Inspection

- Clean all parts with solvent.
- Plates and Discs. If any one disc or plate in either stack shows evidence of excessive wear or scoring, the complete stack is to be replaced on both sides.
- Side Gears and Pinion Mate Gears. The gear teeth of these parts should be checked for extreme wear and possible cracks. The external teeth of the side gear, which retain the concentric groove discs, should also be checked for wear or cracks.
- If replacement of one gear is required due to wear, etc., then both side gears, pinion mate gears, and thrust washers are to be replaced.
- Differential Shaft. If excessive wear is evident, the differential shaft should be replaced.
- Differential Plate Retainers. If wear is evident on any one of the differential plate retainers, all four retainers must be replaced.
- Differential Case. If scoring, wear or metal pickup is evident on the machined surfaces, replacement of the case is necessary.

Reassembly

1. Lubricate thrust face of side gears, plates and discs with the proper limited slip rear axle lubricant.
2. Assemble plates and discs in exactly in the same position as they were removed, regardless of whether they are new or original.
3. Install differential plate retainer to ears of plates.

NOTE:

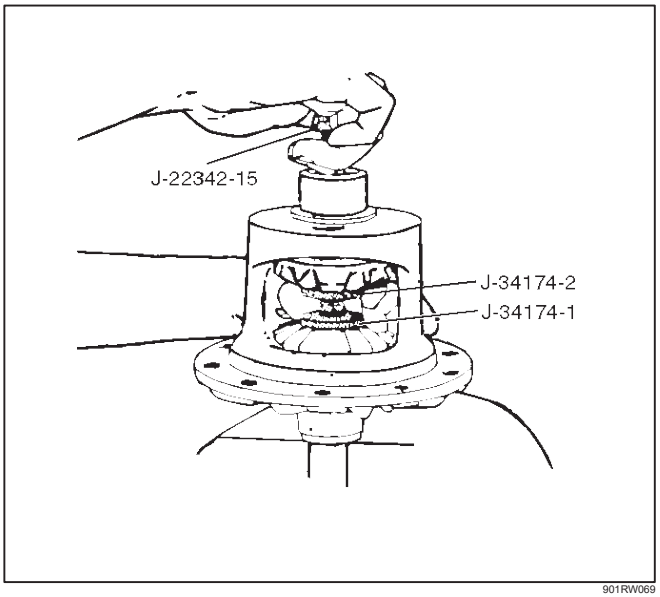
- Make sure both retainers are Completely seated on ears of plates.

4. Install clutch pack and side gear into bottom side gear bore. Make sure clutch pack stays assembled to side gear splines, and that retainers are completely seated into pockets of case.

NOTE:

- To prevent clutch pack from falling out of case, hold clutch pack in place by hand while repositioning case on bench.

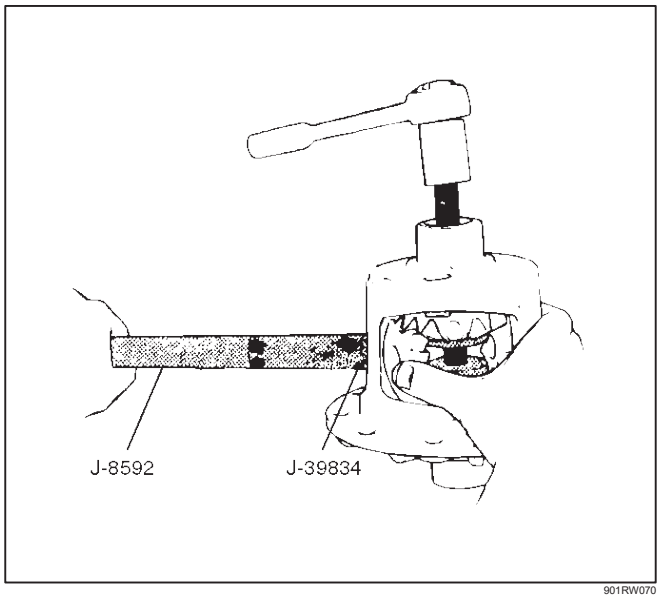
5. Install other side gear and clutch pack. Make sure clutch pack stays assembled to side gear splines, and retainers are completely seated into pockets of case.
6. Hold clutch pack in position and assemble screw cap J–34174–2, cap J–34174–1 and forcing screw J–22342–15. Tighten forcing screw into bottom cap to hold both clutch packs in position.
7. With tools assembled to case, position case on holder J–39824 by aligning splines of side gear with those of shaft. Tighten forcing screw to compress clutch packs in order to provide clearance for pinion mate gears.



901RW069

8. Install pinion mate gears.
   - Place the pinion mate gears into the differential 180 degrees apart.

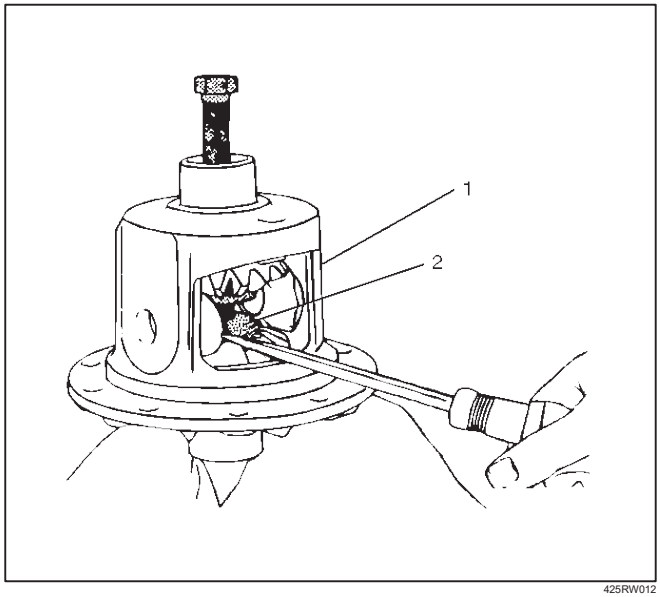
9. While holding gears in place, insert LSD service adapter J–39834 with long drive handle J–8592 in differential shaft hole of case. Pull on long drive handle J–8592 and rotate case, allowing gears to turn. Make sure that holes in pinion mate gears align with holes in case.



901RW070

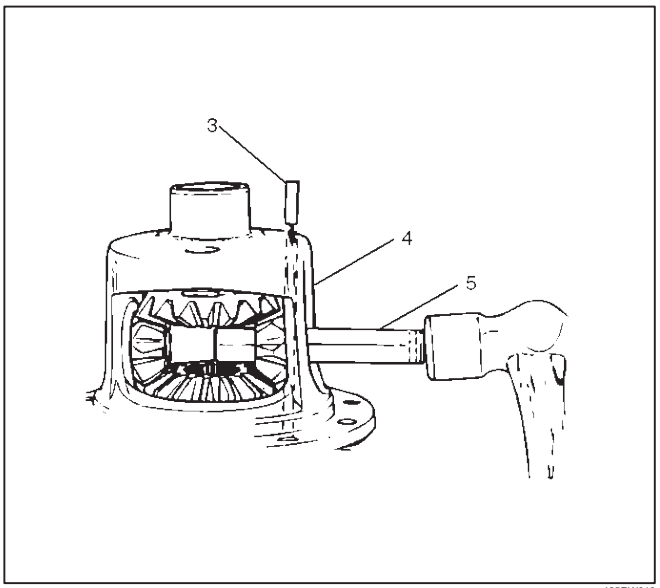
- It may be necessary to adjust tension on forcing screw to rotate case.

10. Tighten forcing screw to compress the clutch packs, to allow installation of spherical thrust washers.
11. Lubricate spherical thrust washers (2), and assemble into case (1). Use a small screw driver to push washers into place. Remove tools.



425RW012

12. Position differential shaft in case and drive in with hammer. Be sure lock pin hole of differential shaft (5) is properly aligned to allow installation of lock pin (3). Be sure that thrust washers and differential pinion mate gears are aligned with the differential case (4). Install new lock pin to proper depth using a punch.
    Stake metal of case over pin in two places, 180 degrees apart.



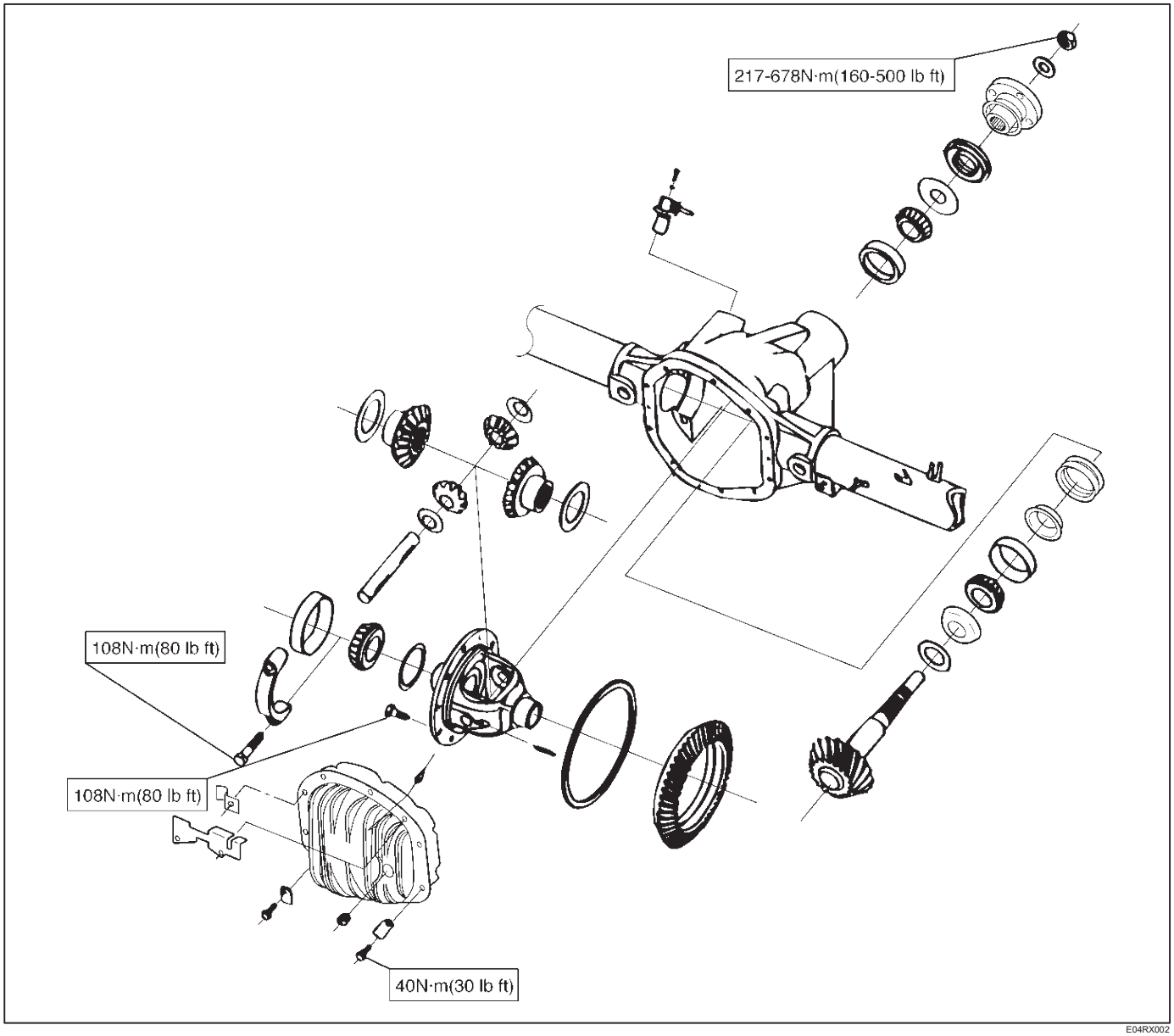
425RW013

Main Data And Specifications

General Specifications

Rear axle	
Type	Salisbury, Semi–floating
Rear axle Size	226 mm (8.9 in)
Gear type	Hypoid
Gear ratio	4.300
Differential type	Two pinion
Lubricant Grade	GL–5: (Standard differential)
	GL–5, LSD: (Limited slip differential)
Locking Differential Lubricant	80W90 GL–5 (USE Limited Slip Differential Gear Lubricant or Friction Modifier Organic Additive)
Capacity	1.77 liter (1.87 US qt)

Torque Specifications



E04RX002

Special Tools

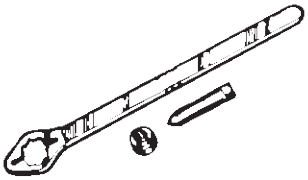
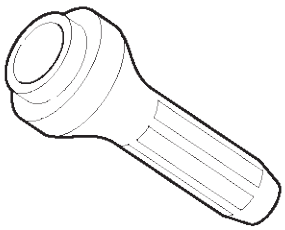
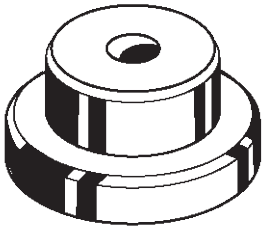
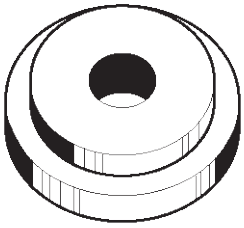
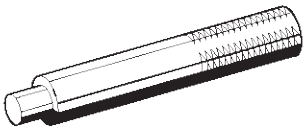
ILLUSTRATION	TOOL NO. TOOL NAME
 901RW037	**J–8614–01** Pinion flange holder
 901RS211	**J–37263** Installer; Pinion oil seal
 901RW039	**J–42379** Remover; Bearing
 901RS215	**J–39830** Adapter; Side bearing plug
 901RS217	**J–8611–01** Installer; Outer bearing outer race
 901RS218	**J–8592** Grip

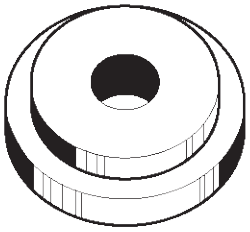
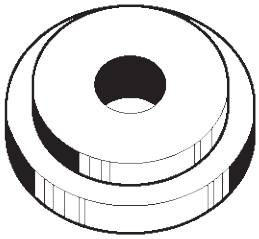
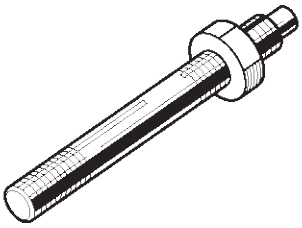
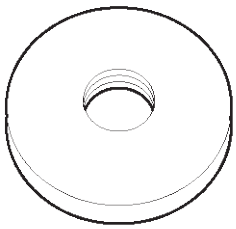
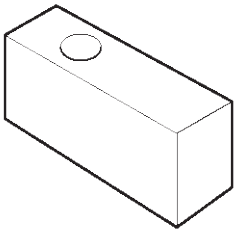
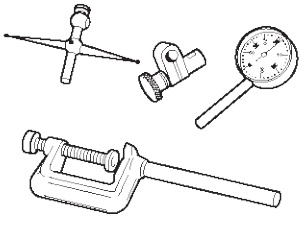
ILLUSTRATION	TOOL NO. TOOL NAME
 901RS219	**J–42836** Installer; Inner bearing outer race
 901RS220	**J–42824** Pilot;Outer
 901RS221	**J–21777–43** Nut & Stud
 901RS222	**J–42827** Pilot;Inner
 901RS223	**J–39837–2** Gauge plate
 901RS224	**J–8001** Dial indicator

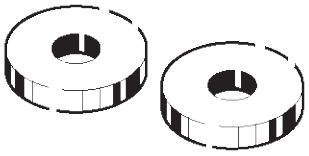
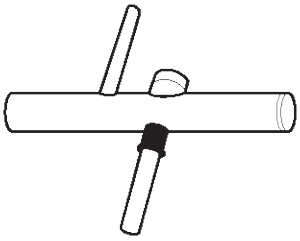
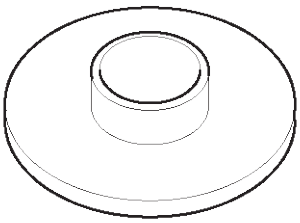
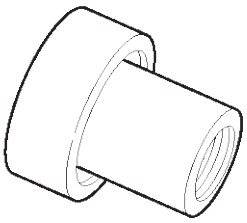
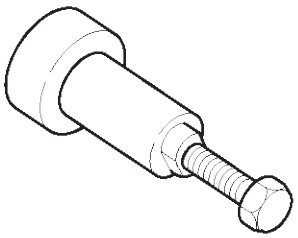
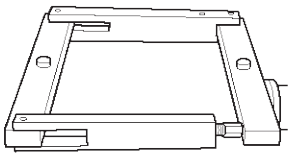
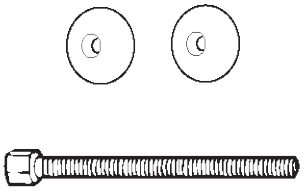
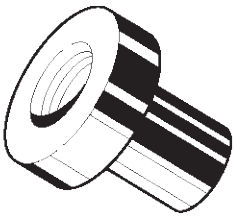
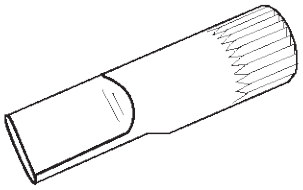
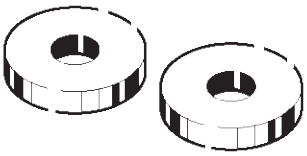
ILLUSTRATION	**TOOL NO.** TOOL NAME
 901RS225	**J–39837–1** Disc (2 required)
 901RS226	**J–23597–1** Arbor
 901RS208	**J–42828** Installer; Pinion bearing
 901RS229	**J–21784** Installer; Side bearing
 901RS230	**J–39602** Remover; Outer bearing
 901RW170	**J–24385–B** Spreader

ILLUSTRATION	**TOOL NO.** TOOL NAME
 901RW064	**J–39858** Clutch pack unloading tool kit Includes **J–34174–1/J–34174–2** Screw cap and Cap **J–22342–15** Forcing screw
 901RW065	**J–39834** Limited–slip differential (LSD) service adapter
 901RW066	**J–39824** Holder
 901RS225	**J–39836** Side bearing preload master bearings

AXIOM

DRIVELINE/AXLE

DRIVELINE CONTROL SYSTEM

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Service Precaution

WARNING: THIS VEHICLE HAS A SUPPLEMENTAL RESTRAINT SYSTEM (SRS). REFER TO THE SRS COMPONENT AND WIRING LOCATION VIEW IN ORDER TO DETERMINE WHETHER YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING. WHEN YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING, REFER TO THE SRS SERVICE INFORMATION. FAILURE TO FOLLOW WARNINGS COULD RESULT IN POSSIBLE AIR BAG DEPLOYMENT, PERSONAL INJURY, OR OTHERWISE UNNEEDED SRS SYSTEM REPAIRS.

CAUTION: Always use the correct fastener in the proper location. When you replace a fastener, use ONLY the exact part number for that application. ISUZU will call out those fasteners that require a replacement after removal. ISUZU will also call out the fasteners that require thread lockers or thread sealant. UNLESS OTHERWISE SPECIFIED, do not use supplemental coatings (Paints, greases, or other corrosion inhibitors) on threaded fasteners or fastener joint interfaces. Generally, such coatings adversely affect the fastener torque and the joint clamping force, and may damage the fastener. When you install fasteners, use the correct tightening sequence and specifications. Following these instructions can help you avoid damage to parts and systems.

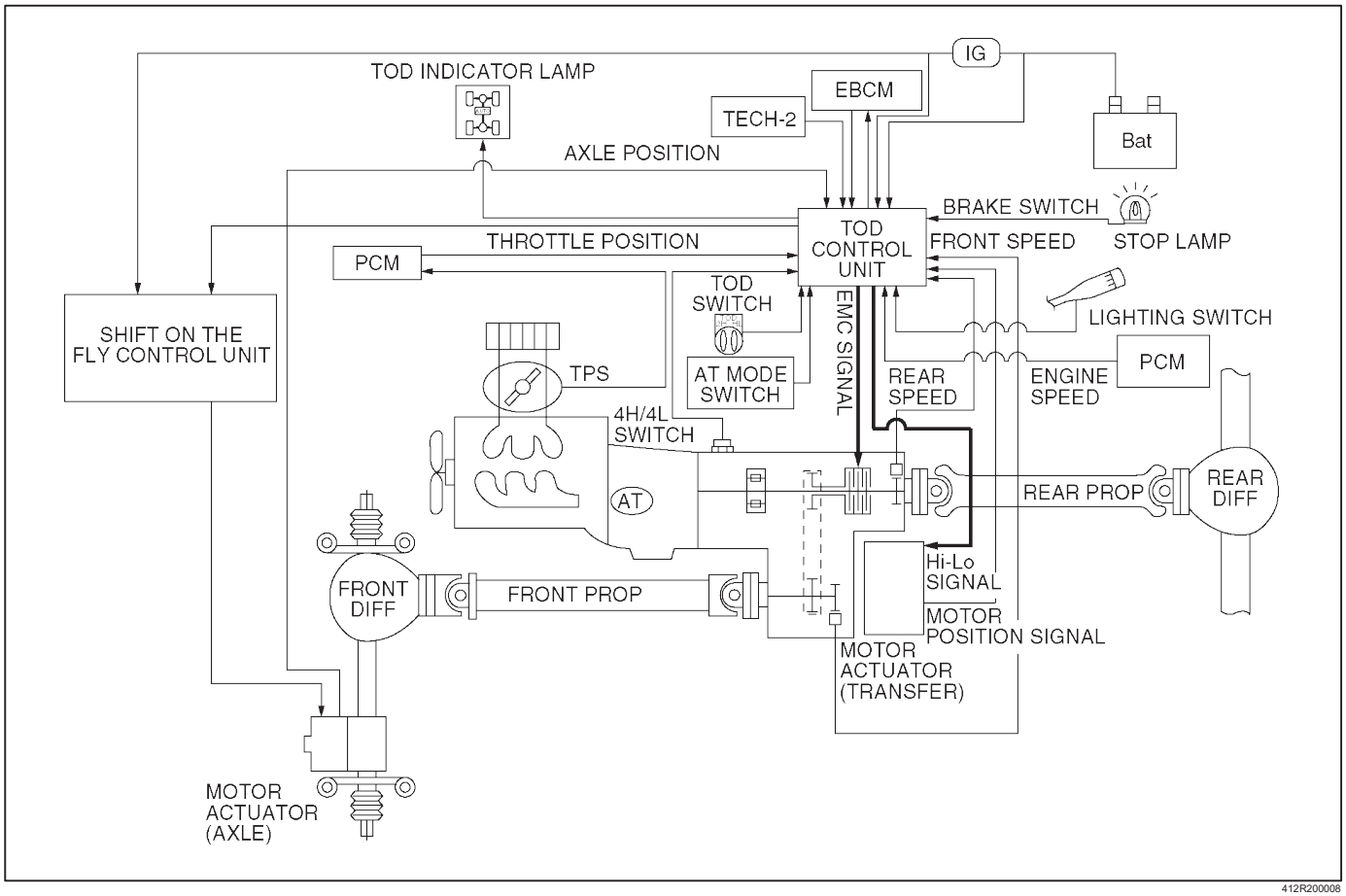
Shift On The Fly System

Outline of Shift on The Fly System

The shift on the fly system switches between 2 wheel drive (2WD) and 4 wheel drive (4WD) electronically by the driver turning the TOD switch on the instrument panel. This system will control the following operations. (Shifting between “4H” and “4L” must be performed by TOD switch.)

1. Transmitting the torque to the front propeller shaft.
2. Connecting front wheels to, and disconnecting them from, the front axles by axle motor actuator.
3. Indicating on instrument panel.
4. 4WD out signal to other Electronic Brake Control Module (EBCM).

System Diagrams

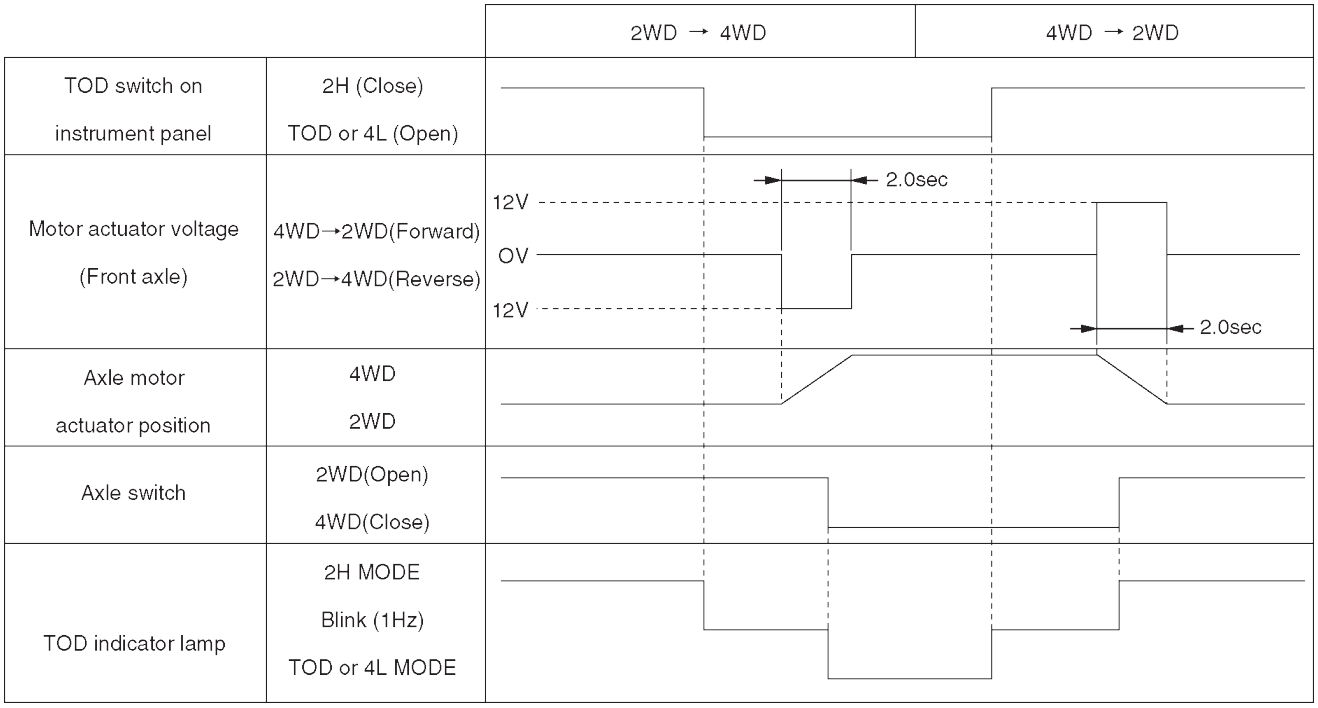


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Normal Operation

The axle disconnect controller is driven by the signal from TOD control unit and the axle motor actuator connects (or disconnects when the 4WD switch is deactivated) the front wheels to the front axles.

Time Chart of Shifting Under Normal Condition



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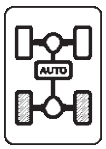
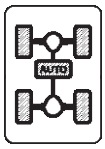
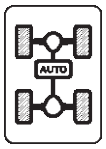
4WD out signal to other Electronic Brake Control Module : TOD Control Unit of shift on the fly sends 4WD out signal to other Electronic Brake Control Module as below.

4WD out signal (Period)	Vehicle Condition	Transfer position switch	Front axle switch
120 ms	2WD	2WD (Open)	2WD (Open)
240 ms	4WD	4WD (Close)	4WD (Close)

Functions of Indicator Lamp

TOD Switch and Indication of Drive Mode

The TOD switch sends signals to the TOD control unit which selects drive modes and controls the shift on the fly system (axle disconnect : ADC).

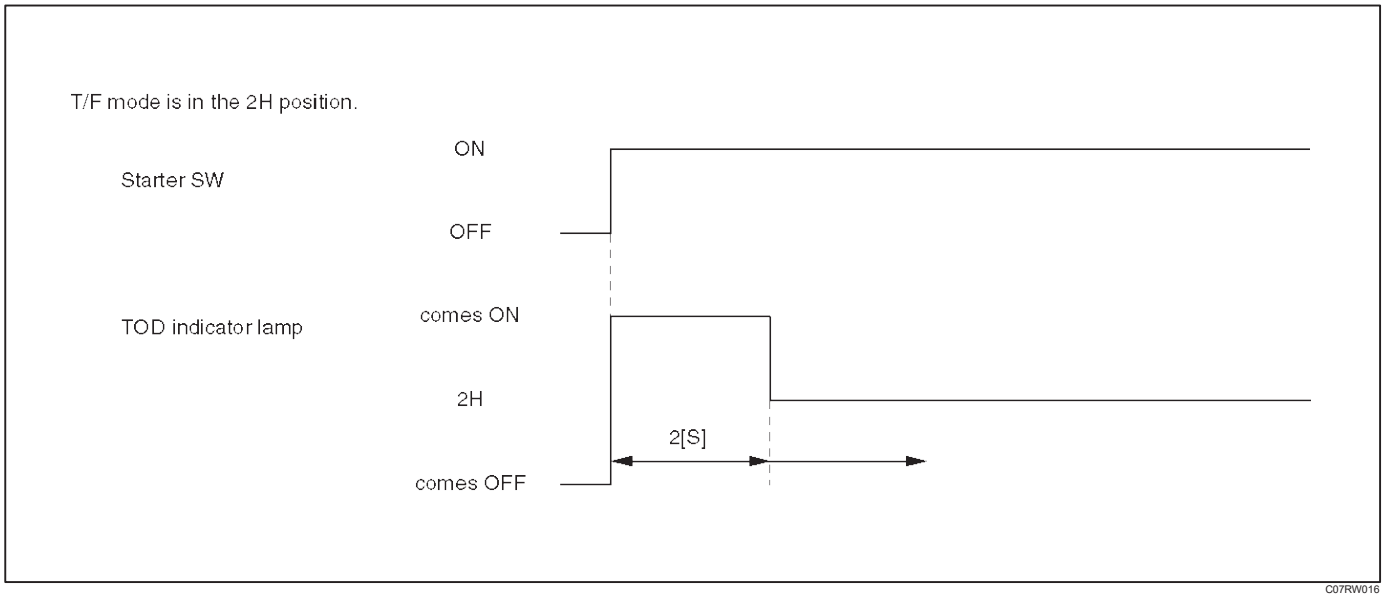
TOD switch state	Drive mode	Transfer shift condition	Transfer position detection		Shift on the fly		TOD indicator state
			4HSW	4LSW	Axle SW	ADC circuit	
2H	Rear-wheel drive (RWD)	Permissible during driving (less than 100 km/h or 62 mph)	OFF	OFF	OFF	Turning on electricity	
TOD	Electronic torque split 4WD (HIGH) (TOD)		OFF	OFF	ON	Turning off electricity	
		AT: Neutral Brake: Applied					
4L	Low range mechanical direct 4WD (LOW) (4L)	The car stops (less than 2 km/h or 1.2 mph and less than 1500 rpm)	OFF	ON	ON	Turning off electricity	
ADC: Shift on the fly SW: Switch							

Bulb check : The bulb of indicator lamp is checked for 2 seconds when ignition key is turned on.

Bulb Check

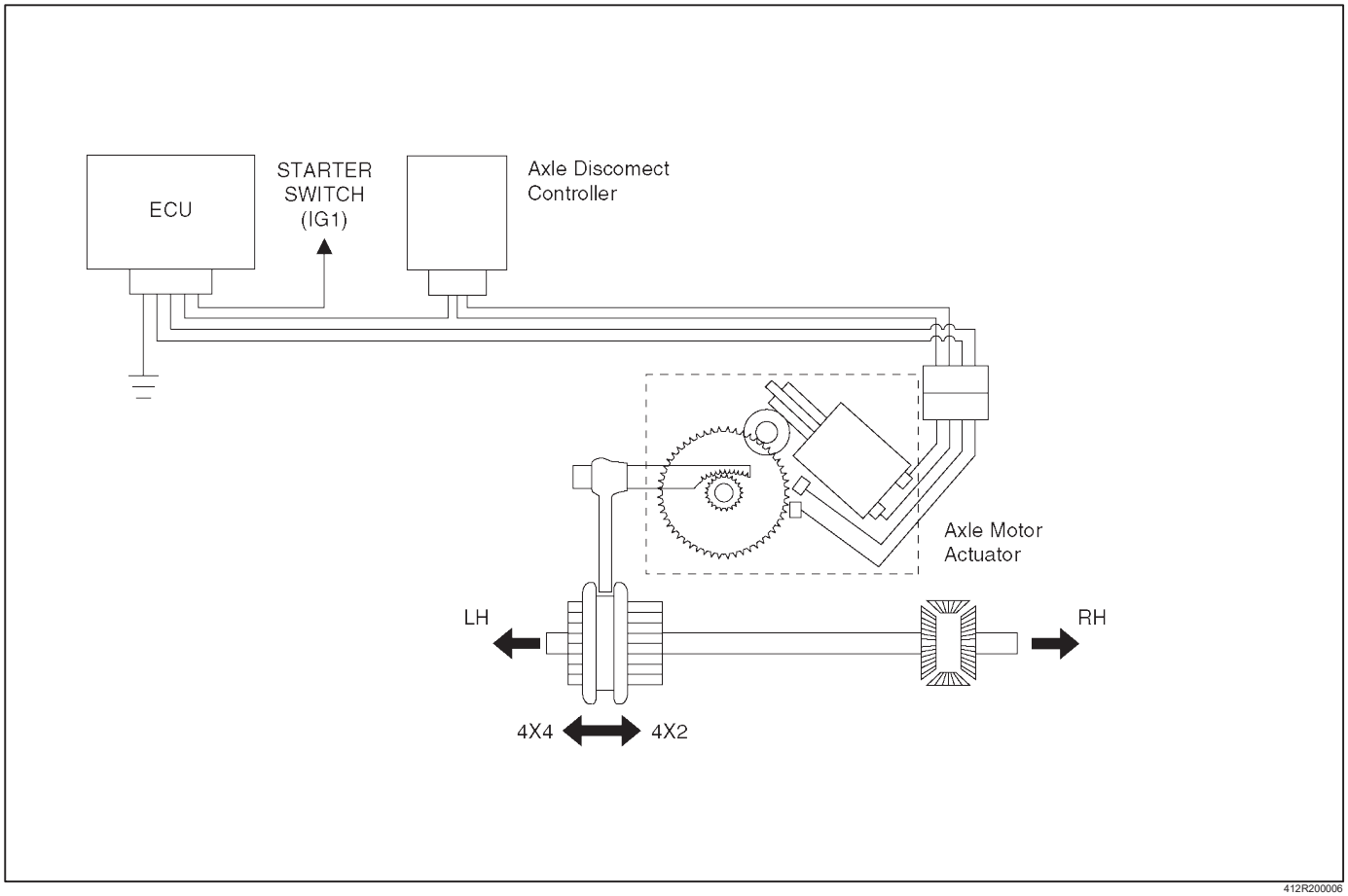
When the starter switch is turned on, the TOD indicator lamps comes on as shown below.

NOTE: Once the starter switch is turned on, all the TOD indicator lamps are lit for two seconds even if the transfer lever is in any position.



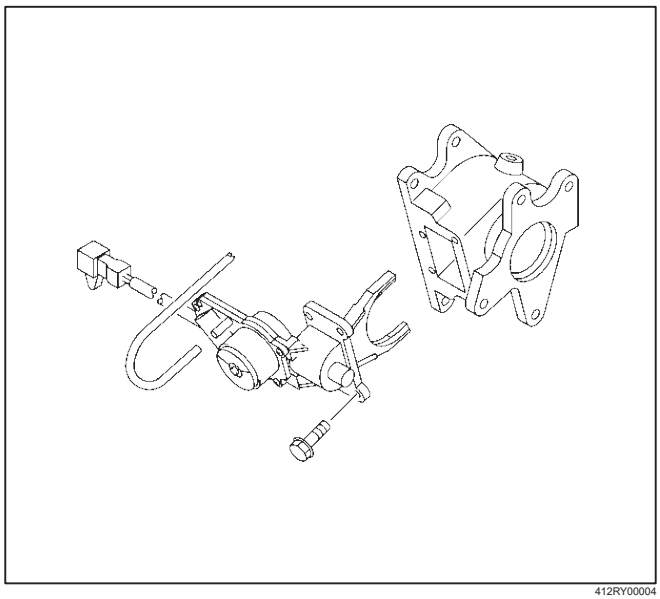
Shift On The Fly Electrical Equipment

Axle Shaft Connection and Disconnection



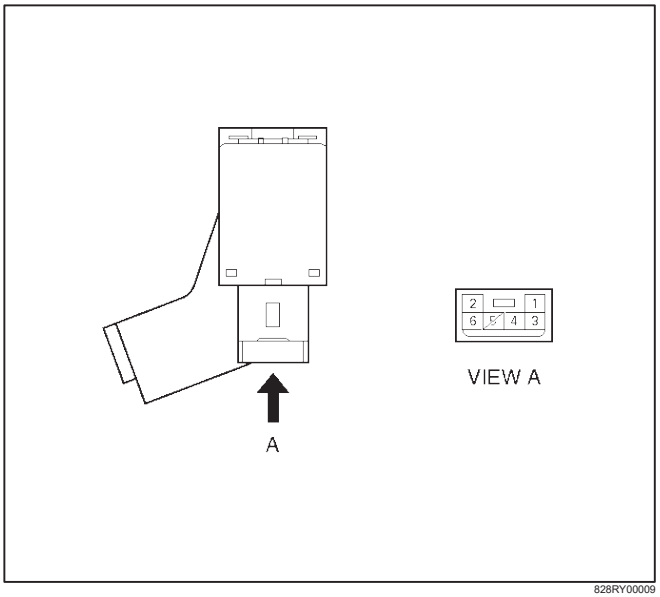
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Actuator Assembly

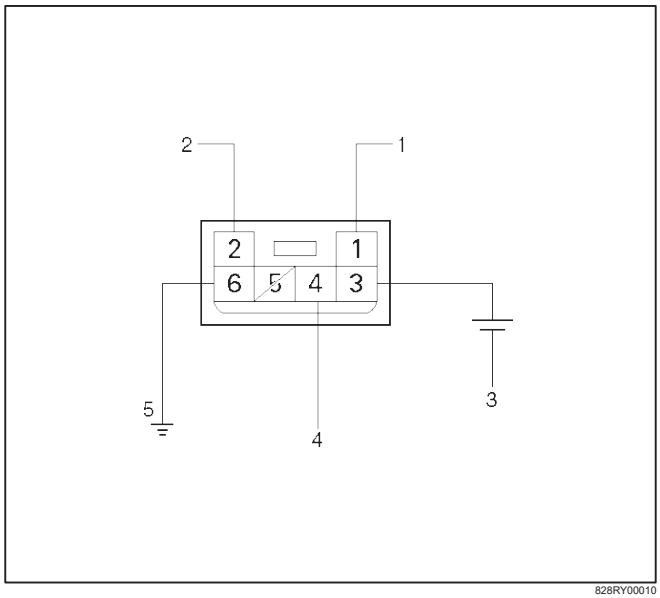


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Axle Disconnect Controller



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Legend

(1) Output Signal
(2) Output Signal
(3) 12V
(4) Input Signal
(5) GND

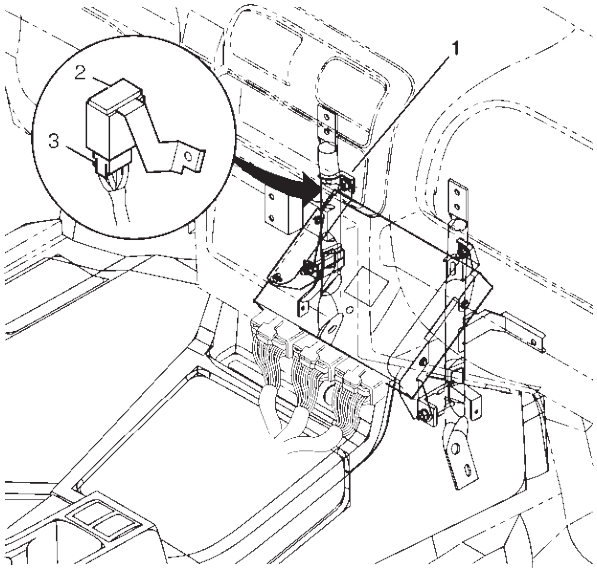
1. Connect 12V with terminal (3) and the ground with the terminal (6).
2. Send the signal to the terminal (4)
   2WD → 4WD less than 2.4V
   4WD → 2WD more than 9.0V
3. Confirm the output signal from the terminals (1) & (2) (2 seconds output)

	INPUT SIGNAL	OUTPUT SIGNAL (2 seconds)	
	4	1	2
2WD → 4WD	Less than 2.4V	0V	12V
4WD → 2WD	More than 9.0V	12V	0V

4. If the trouble occurs afther above test, charge the Axle Disconnect Controller to the new one.

Shift On The Fly Controller

Shift On The Fly Controller and Associated Parts



828RY00003

Legend
(1) Nut
(2) SOF Controller
(3) Connector

Removal

1. Disconnect the battery ground cable.
2. Remove the front console assembly.
   Refer to *Consoles in Body and Accessories* section.
3. Disconnect the connector from the controller.
4. Remove the nut.
5. Remove the controller.

Installation

To install, follow the removal steps in the reverse order, noting the following points.

Torque: Nut (1) 8 N·m (69 lb in)

AXIOM

DRIVELINE/AXLE

DRIVELINE CONTROL SYSTEM (TOD)

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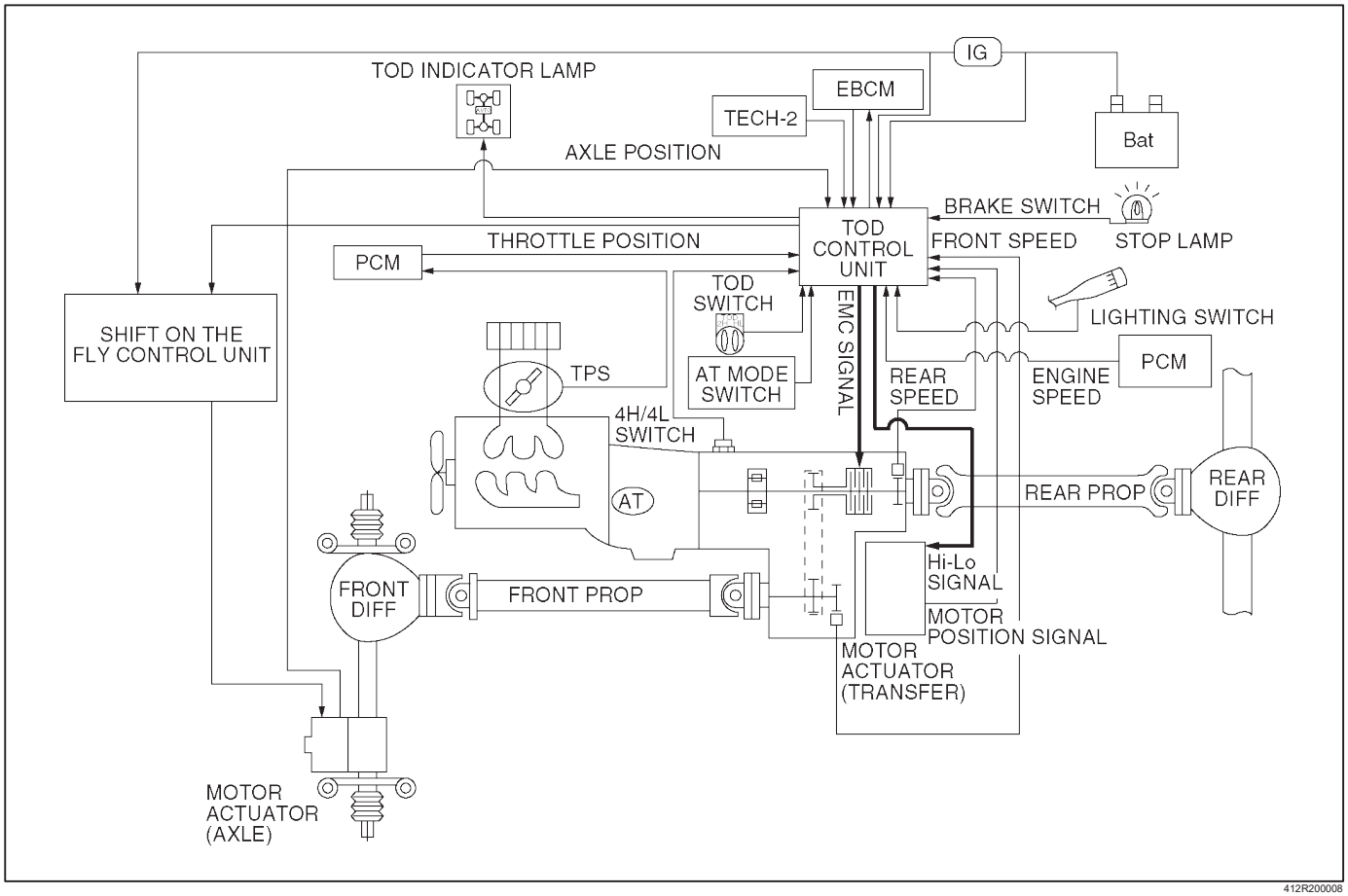
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General Description



TOD (Torque on Demand) system is traction state control system to vehicle.

Transfer Position and Drive Mode

Three drive modes can be selected through operation of TOD switch and transfer lever.

Transfer Position	TOD SWITCH	Mode	Drive mode
HIGH	2H	RWD	Rear wheel drive
	TOD	4WD (HIGH)	Electronically controlled torque split four wheel drive
LOW	4L	4WD (LOW)	Low-speed mechanical lock-up four wheel drive

The electronic control unit (ECU) judges the signals from the TOD switch and controls the transfer drive mode and shift-on-the-fly system status.

TOD Control

The TOD position usually drives the rear wheels, and transmits the torque to the front wheels with the help of electronically controlled torque split mechanism according to running conditions encountered. The driving force is directly transmitted to the rear wheels. This force is split by the transfer and delivered to the front wheels. The magnitude of the torque transmitted to the front wheels is controlled by changing the pressing force of the multi plate disk clutch built in the transfer unit. The pressing force of the clutch is controlled by changing the duty ratio to the electromagnetic coil mounted to the rear of the clutch. When the clutch is completely disengaged, the rear wheels are driven. When the clutch is completely engaged, a rigid four wheel drive mode is obtained. The torque split status is controlled continuously between the rear wheel and four wheel drive modes. This system includes front and rear speed sensors, and receives throttle position sensor and engine speed information from the PCM, ABS control unit signal, brake switch signal, and shift motor position information.

The control unit receives signals sent from these sensors and changes the pressing force of the multi-plate disk clutch to determine the torque distribution on the front and rear wheels. Therefore, when the slip of the rear wheels is increased against the current torque level in the normal rear wheel drive mode, the control unit detects the slip condition, determines the optimum torque based on the feedback control logic, and increases the torque to the front wheels.

The control unit uses the signal from the throttle position sensor to predict the future vehicle condition and the intention of the driver with respect to acceleration and deceleration, and determines the initial torque distribution using these data and the information from the speed sensors.

In case of small circle turning in the parking lot, for example, the control unit minimizes the clutch pressing force to restrict a braking phenomenon. When the ABS becomes active, the control unit optimizes the clutch pressing force to ensure stable braking.

TOD Indicator Control

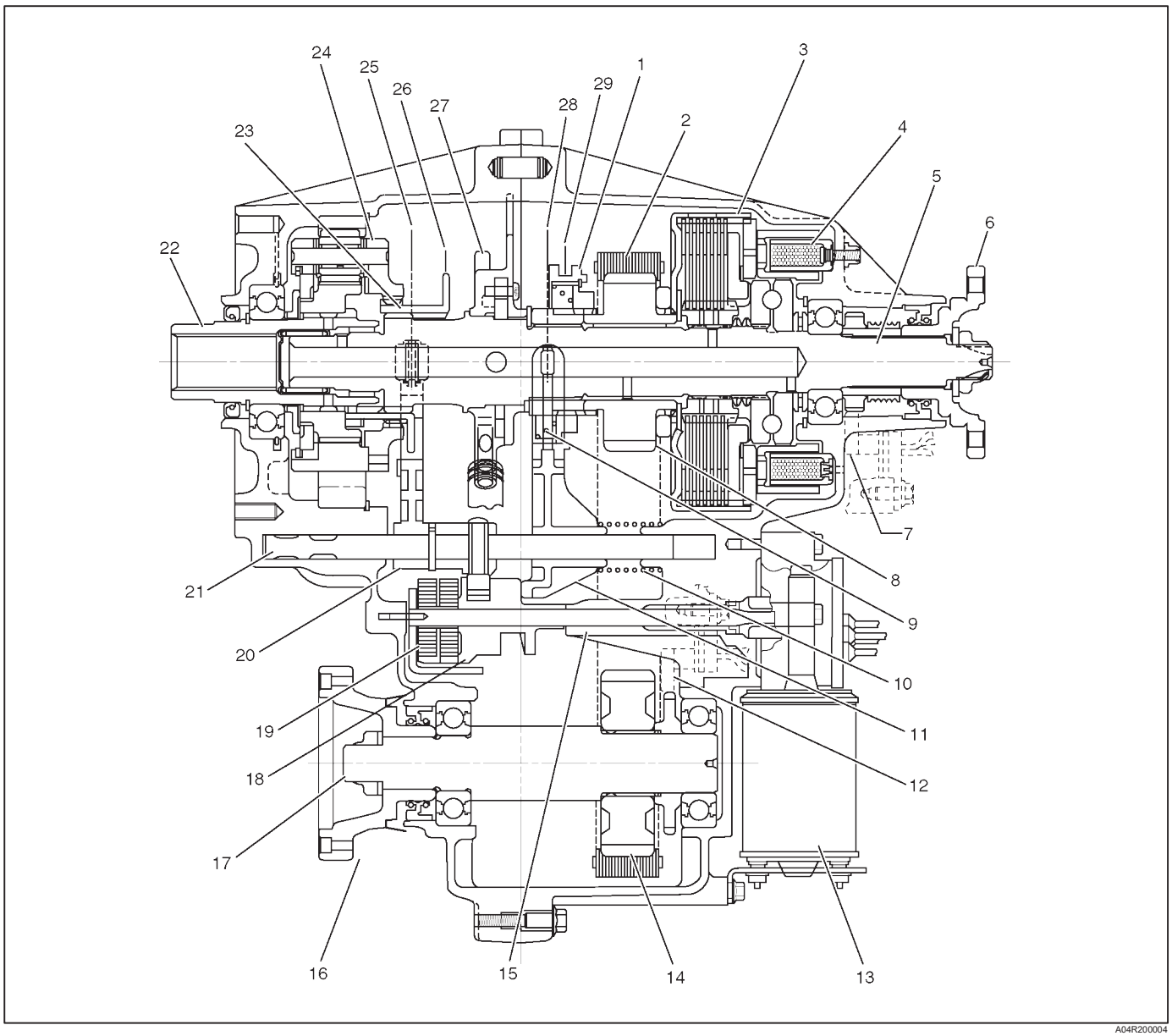
The TOD indicator on the instrument panel informs the driver of the current working status of the transfer unit. The information is the drive mode (2H, TOD, 4L, transition). The indicator can display occasional errors and corresponding error codes.

Abbreviations

ABS	Anti-lock Brake System
ADC	Axle Disconnect (Shift on the fly system)
VB	Battery Voltage
VIGN	Ignition Voltage

System Components

Parts Location



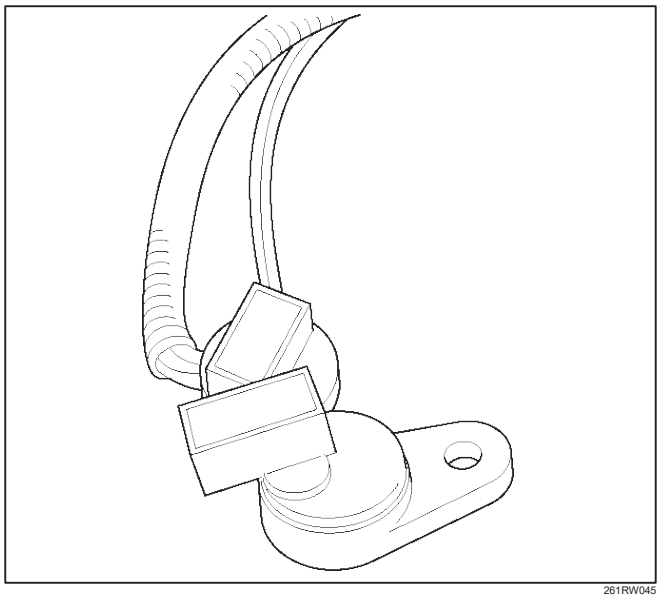
A04R200004

Legend

(1) Mechanical Lock Sleeve
(2) Drive Chain
(3) Clutch Pack
(4) Electromagnetic Clutch Solenoid
(5) Output Shaft
(6) Rear Output Coupling
(7) Rear Speed Sensor
(8) Drive Sprocket
(9) Spring
(10) Return Spring
(11) Lockup Shift Fork
(12) Front Speed Sensor
(13) High-Low Shift Motor
(14) Driven Sprocket
(15) Shift Shaft
(16) Front Output Coupling
(17) Front Output Shaft
(18) Shift Cam
(19) Torsional Spring
(20) High-Low Shift Fork
(21) Shift Rod
(22) Input Shaft
(23) Reduction Hub
(24) High-Low Planetary Gear
(25) High Position
(26) Low Position
(27) Oil Pump
(28) Free Position
(29) Lock Position

Front and Rear Speed Sensors

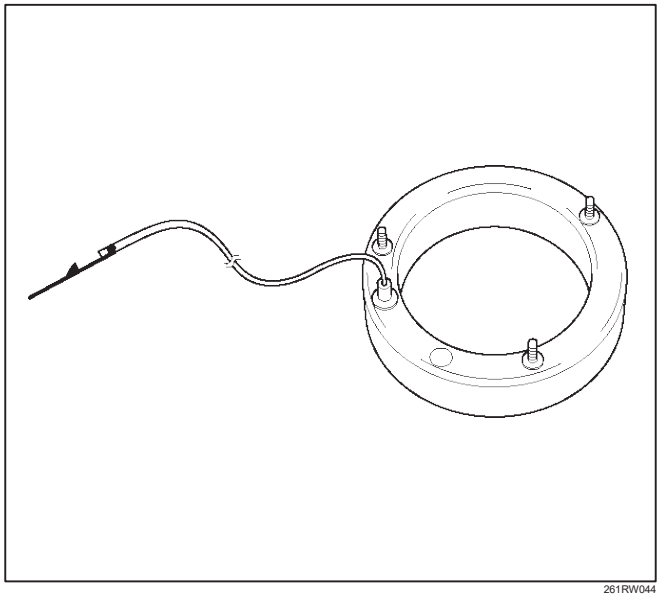
The sensors are built in the transfer case, and detect the rotation of rotors directly coupled to the propeller shafts. Thirty rectangular pulses are output per one rotation of the propeller shaft.



261RW045

Electromagnetic Coil

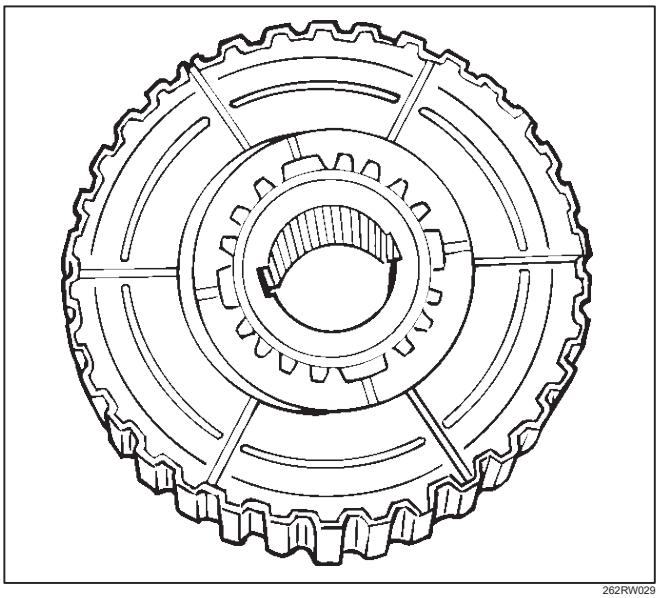
Receives the duty signals from the TOD control unit and controls the pressing force of the clutch pressure cam.



261RW044

Multi Plate Disk Clutch Pack

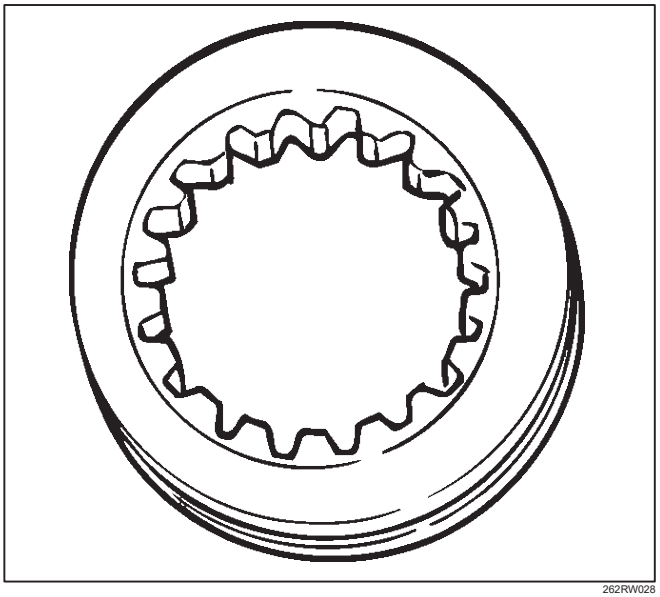
Transmits the torque determined by the clutch pressing force to the front propeller shaft via the front drive chain.



262RW029

Mechanical Lock Sleeve

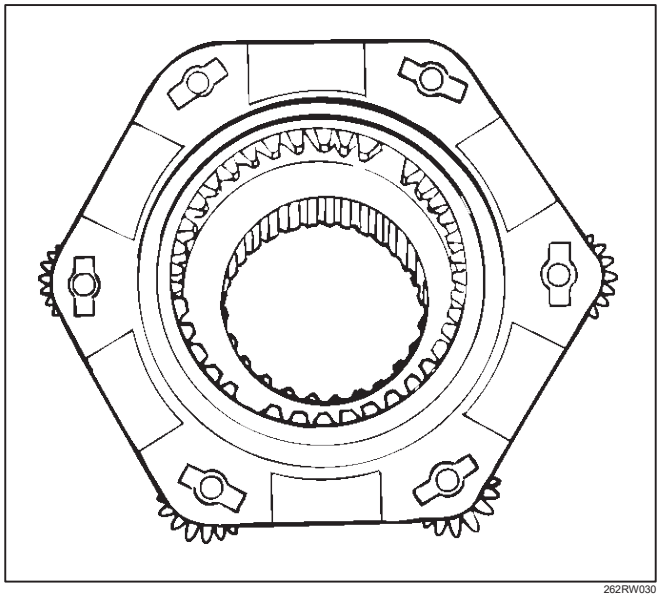
Couples the front and rear propeller shaft mechanically when the transfer shaft is in the 4L position.



262RW028

High-Low Planetary Gear Set

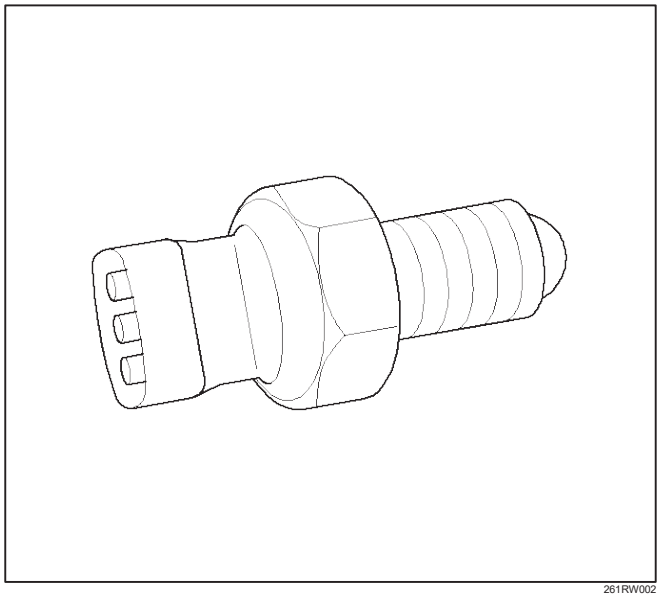
Establishes an auxiliary transmission mechanism. When the TOD switch is set to the 2H or TOD position, the reduction gear ratio is 1.000 and the corresponding driving force is generated. When the TOD switch is set to the 4L position, the reduction gear ratio is 2.480 and the corresponding driving force is generated.



262RW030

4H and 4L Switch

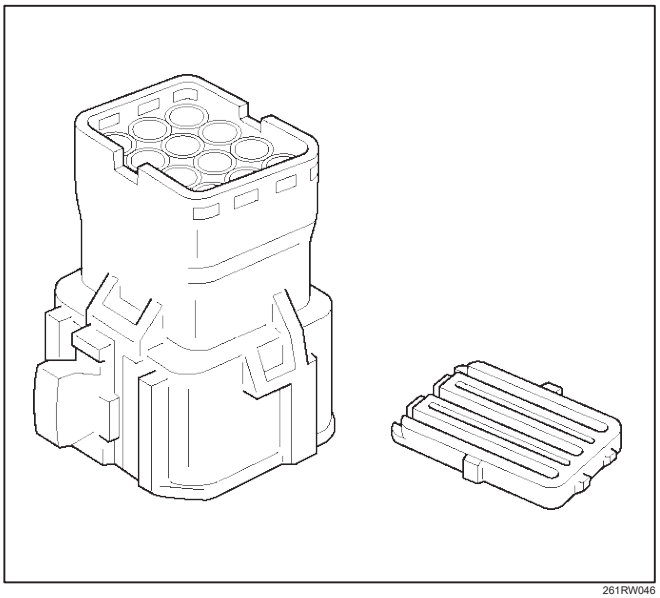
Detects the shift position of the transfer from the movement of the shift rod and outputs signals to the TOD control unit.



261RW002

Transfer Connector (12-pin type)

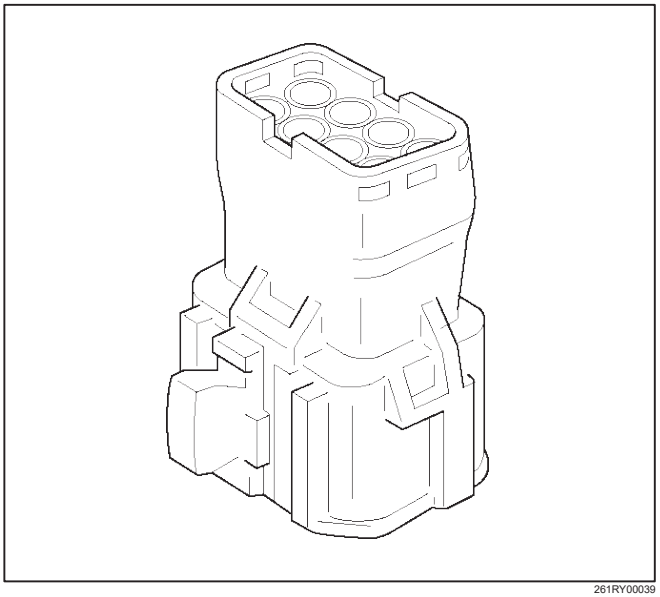
Transmits the input and output signals of the speed sensors, electromagnetic coil, and 4H and 4L switche to the vehicle harness. A waterproof 12-pin type is used.



261RW046

Transfer Connector (8-pin type)

Transmits the output signals of the shift motor position to the vehicle harness and power for the shift motor to the transfer. A waterproof 8-pin type is used.

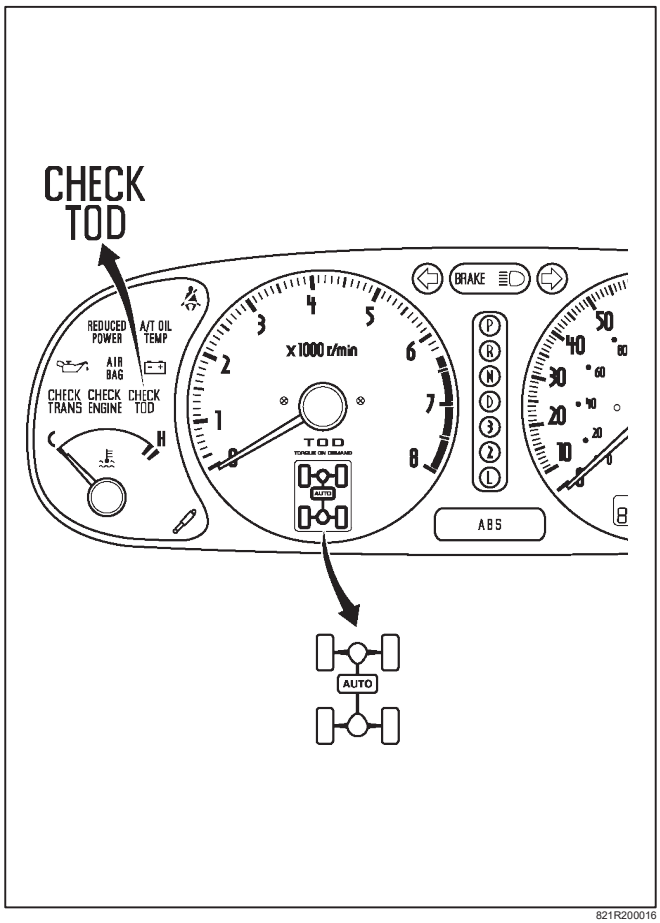


261RY00039

TOD Indicator Lamps (on the instrument panel)

Inform the following items.

- Bulb check
- Drive mode
- ABS IN status
- BRAKE ON status

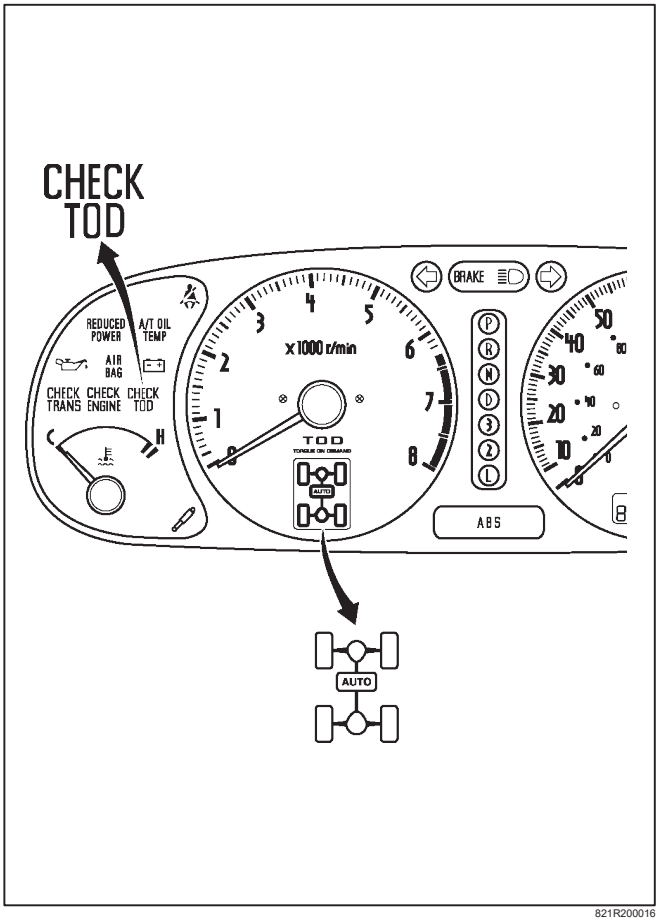


821R200016

Check Lamp

Inform the following items.

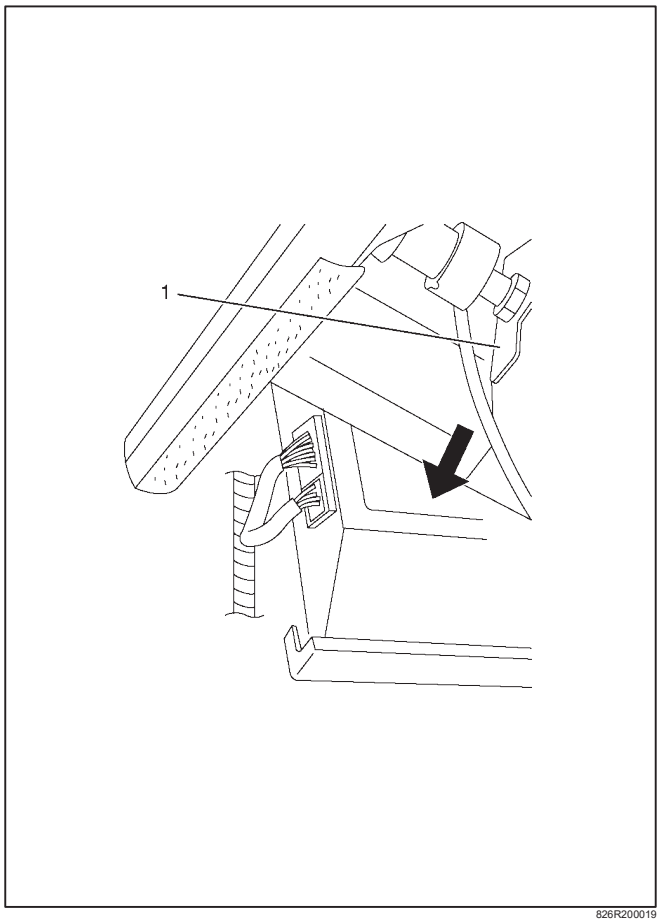
- Bulb check
- Fail (fail alarm)
- Trouble code



821R200016

TOD ECU

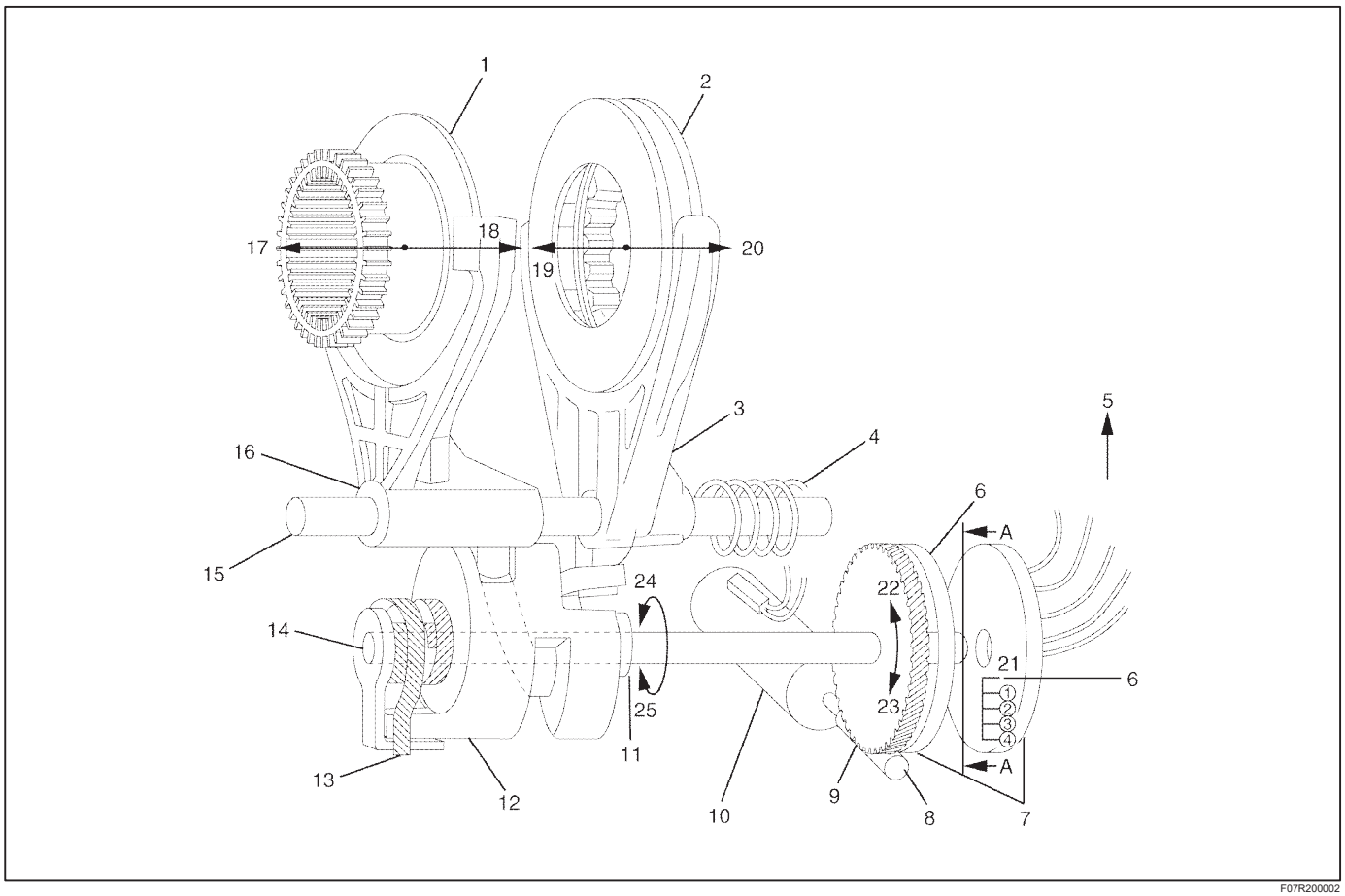
This control unit is mounted to the clutch pedal position via a special bracket.



Legend

(1) Brake Pedal Bracket

High-Low Shift Motor



F07R200002

Legend

(1) Reduction Hub
(2) Mechanical Lock Sleeve (Including the built-in Spring)
(3) Lockup Shift Fork
(4) Return Spring
(5) To TOD Control Unit
(6) Fixed Contact Point
(7) Encoder
(8) Worm gear
(9) Rotate
(10) Shift Motor
(11) The shift cam (12) can be turned freely around the shift shaft (14).
(12) Shift Cam
(13) Torsional Spring
(14) Shift Shaft
(15) Shift Rod
(16) High-Low Shift Fork
(17) High
(18) Low
(19) 2H and TOD Position
(20) Direct Four Wheel Drive (4L Position)
(21) Earth
(22) High
(23) Low
(24) High
(25) Low

When the TOD switch is changed to the 4L (or TOD) position from the TOD (or 4L) position, the TOD control unit drives the high–low shift motor according to the signal. The transfer is shifted to low range from high range (or to high range from low range) by the shift motor.
The high-low shift motor can run, only when the operation meets the following conditions to prevent an unexpected shift between high and low range by a operation error.

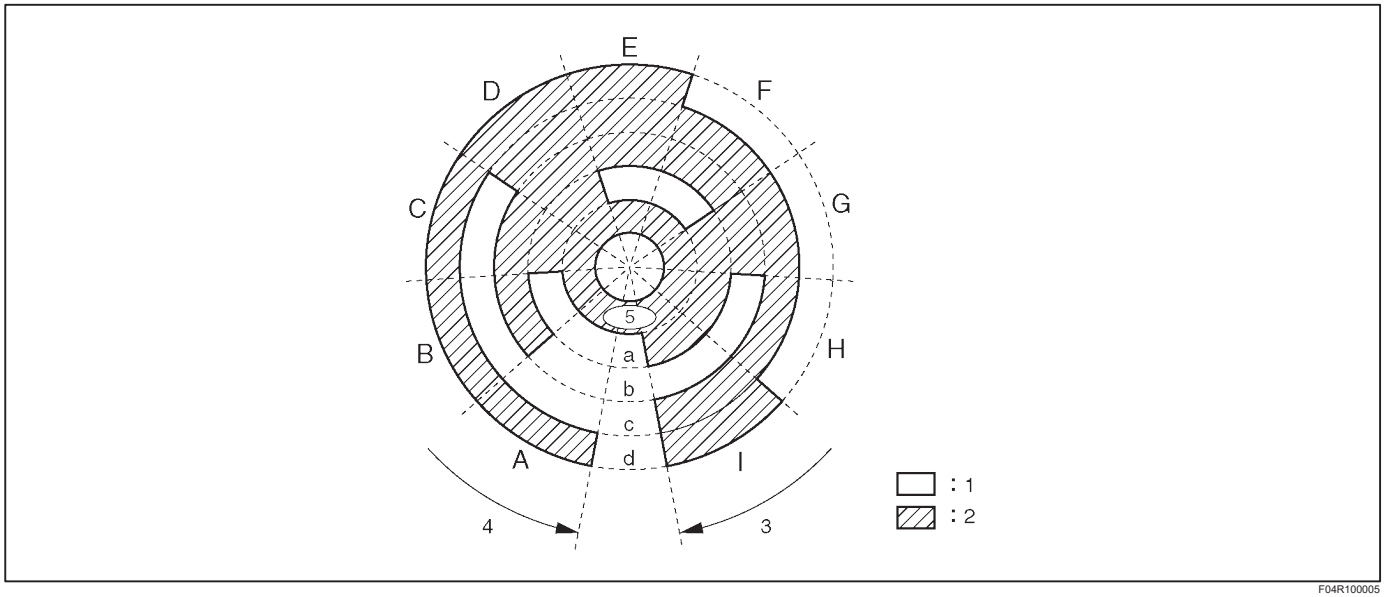
1. The car stops. (less than 2 km/h or 1.2 mph and less than 1500 rpm.)
2. The AT selector position is neutral.
3. The brake is applied. (brake switch is on.)

The shift motor has a built-in encoder which watches motor rotation position. The control unit controls the rotation of the shift motor based on the position code detected by the encoder.
The encoder position plate turns together with the shift shaft and switches on or off the current from the 4 (four) fixed contact points on the case, then the control unit recognizes the rotation position of the shift motor.

Motor Position and Encoder Position Code

High-Low Shift Motor Position		High-Low shift Motor Encoder Signal				State of Motor
		Position a	Position b	Position c	Position d	
High End	A	OFF	OFF	OFF	ON	High Position
Near High End	B	OFF	ON	OFF	ON	
High Position	C	ON	ON	OFF	ON	
Middle Zone (1)	D	ON	ON	ON	ON	
Middle Zone (2)	E	OFF	ON	ON	ON	
Neutral Position	F	OFF	ON	ON	OFF	
Middle Zone (3)	G	ON	ON	ON	OFF	
Low Position	H	ON	OFF	ON	OFF	Low Position
Low End	I	ON	OFF	ON	ON	

Encode Position Plate



F04R100005

Legend

(1) OFF Aria
(2) ON Aria
(3) Low
(4) High
(5) Earth

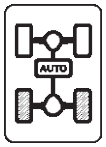
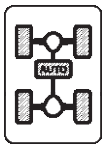
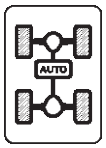
Shift High Range and Low Range

When the car is stops (less than 2km/h or 1.2 mph and less than 1500 rpm), the AT selector position is neutral, the brake is applied, and the TOD switch is changed to 4L from TOD (or to TOD from 4L), the high-low shift motor starts by power applied from the TOD control unit and turns the shift shaft through the worm gear.
The shift shaft turns the shift cam through the torsional spring.
The end of the shift cam moves the lockup shift fork and the spiral groove on the outside of the shift cam slides the high–low shift fork.

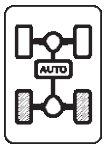
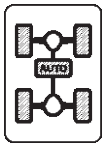
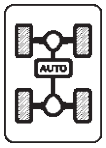
Functions of TOD Switch and Indicator Lamp

TOD Switch and Indication of Drive Mode

The TOD switch sends signals to the TOD control unit which selects drive modes and controls the shift on the fly system (axle disconnect : ADC).

TOD switch state	Drive mode	Transfer shift condition	Transfer position detection		Shift on the fly		TOD indicator state
			4HSW	4LSW	Axle SW	ADC circuit	
2H	Rear-wheel drive (RWD)	Permissible during driving (less than 100 km/h or 62 mph)	OFF	OFF	OFF	Turning on electricity	
TOD	Electronic torque split 4WD (TOD)		OFF	OFF	ON	Turning off electricity	
4L	Low range mechanical direct 4WD (4L)	AT: Neutral Brake: Applied The car stops (less than 2 km/h or 1.2 mph and less than 1500 rpm)	OFF	ON	ON	Turning off electricity	

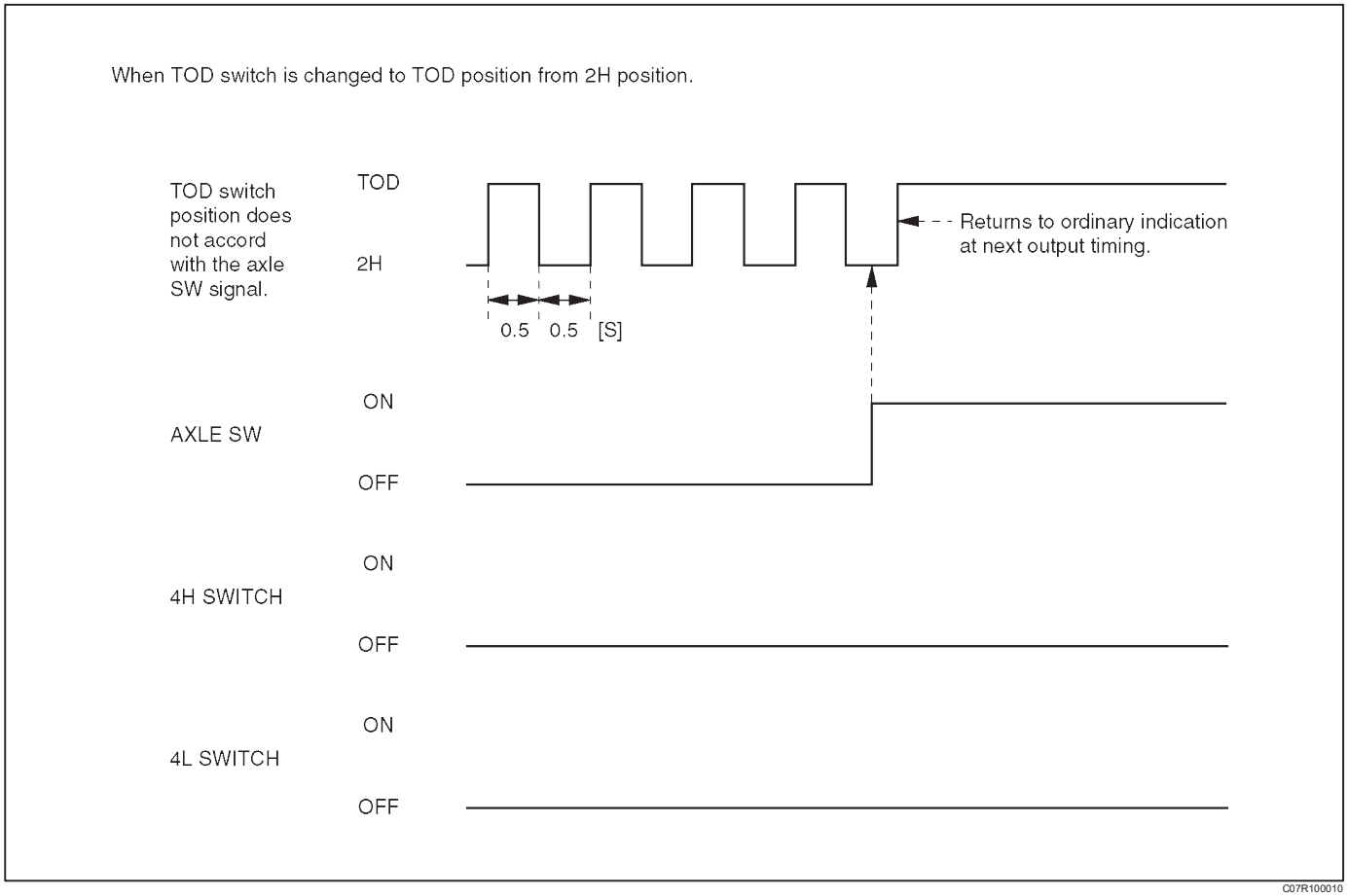
ADC: Shift on the fly
SW: Switch

TOD Switch state	TOD control unit terminal No.					TOD indicator state
	TOD indicator			TOD switch		
	7(Front)	8(Rear)	19(Auto)	30(2H)	43(4L)	
2H	OFF	ON	OFF	ON	OFF	
TOD	ON	ON	ON	OFF	OFF	
4L	ON	ON	OFF	OFF	ON	

Indication During Transition of Shift Rod

When the TOD switch is turned, and the signals from the AXLE switch do not comply with the signal conditions of the 4H and 4L switch, the indicator lamp state selected on the TOD switch and light-off mode are repeatedly output at an interval of 1.0 second.

NOTE: After the TOD switch is turned to the specified position and the AXLE switch generates compliant signals, the normal output status is returned.

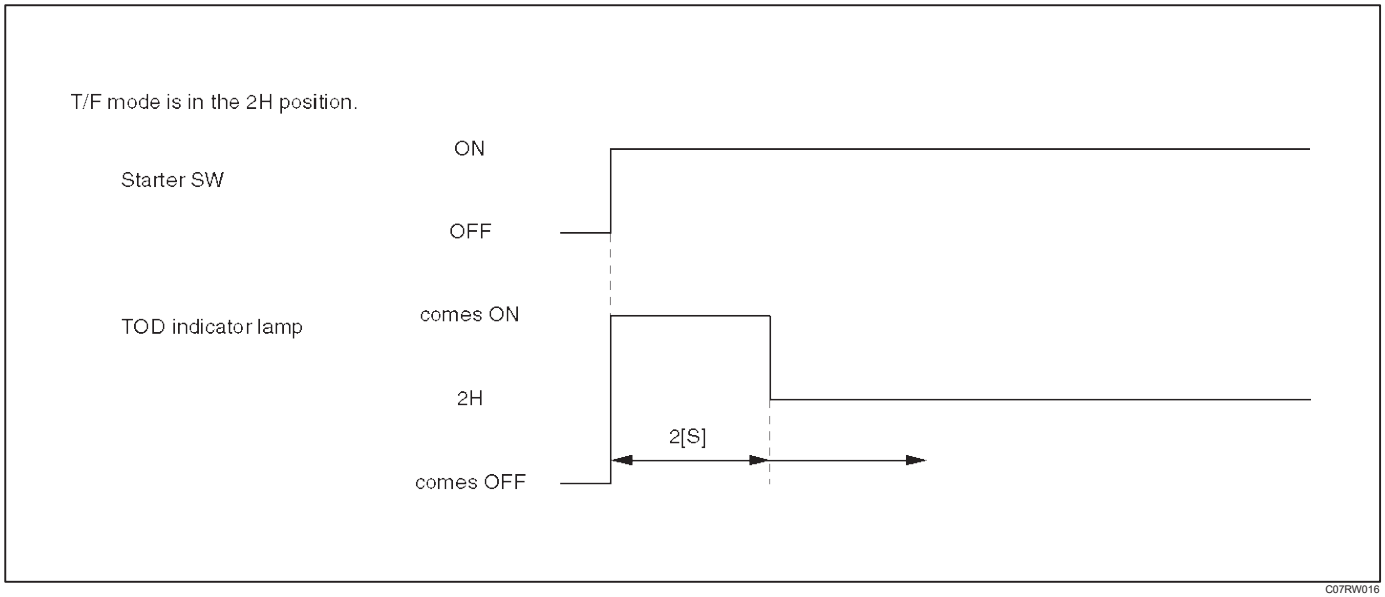


C07R100010

Bulb Check

When the starter switch is turned on, the TOD indicator lamps go on as shown below.

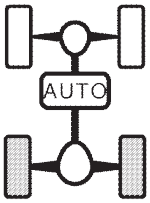
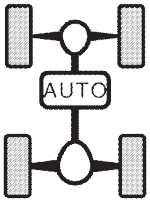
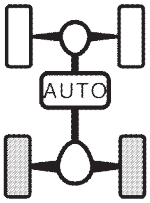
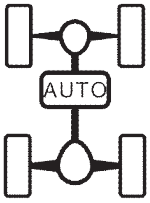
NOTE: Once the starter switch is turned on, all the TOD indicator lamps are lit for two seconds even if the TOD switch is in any position.



C07RW016

Simplified checking method of ABS IN and BRAKE ON signals:

In the event that any of the signal inputs listed below are observed while the self-diagnostic code is being displayed (the self-diagnostic connector is short-circuited to GND), you can simply check the ABS IN and BRAKE ON signals as shown in the figures below.

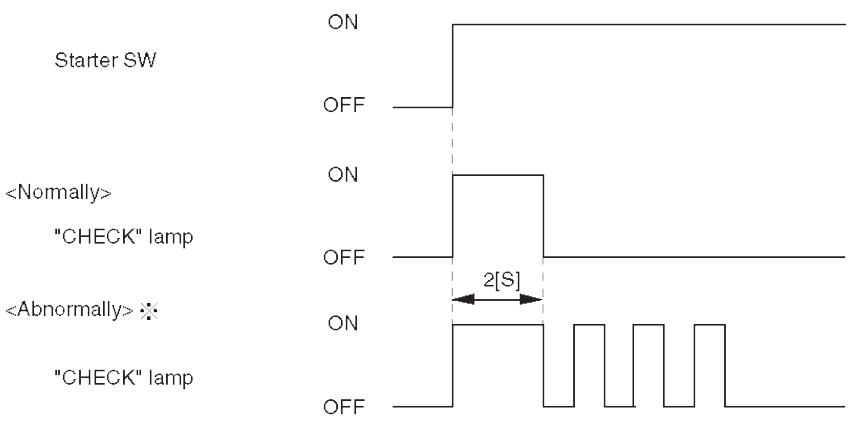
1		• In case of ABS signal being inputted, TOD indicator will light as illustrated.
2		• In case of BRAKE ON signal being inputted, TOD indicator will light as illustrated.
3		• When both the ABS and BRAKE ON signals are inputted simultaneously, ABS signal is indicated.
4		• In cases other than “1, 2, 3”, the indication is always as illustrated. (This is light-off mode) • TOD indicator light returns to usual control (mode) at 12 km/h or more.

C07R200002

Check Lamp

Check Lamp Bulb Check

When the starter switch is turned on in the normal state, the control unit turns on the CHECK lamp to check the bulb.



C07RW019

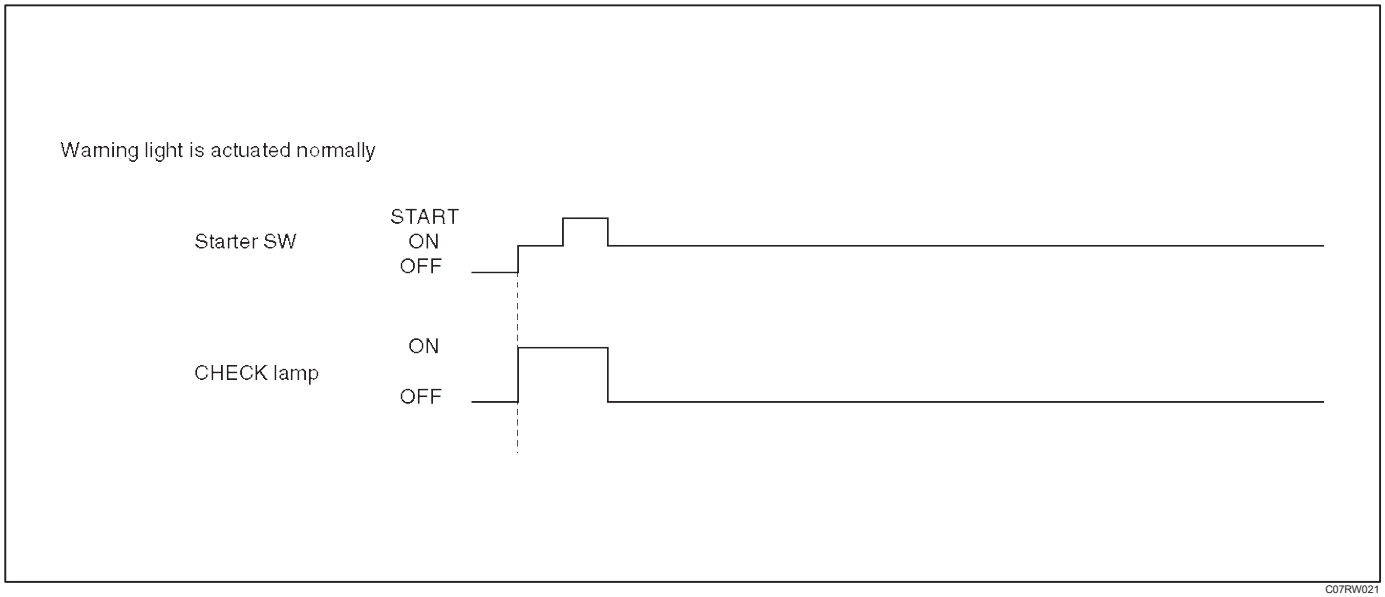
Diagnosis

General Information Diagnosis

The troubles on TOD are classified into the group that can be identified by the lighting status of the TOD indicator lamps and those that can be recognized as abnormal phenomena of the vehicle by the driver.
The troubles that can be identified by the lighting status of the TOD indicator lamps are examined by the procedures “Diagnosis from Trouble Codes” and “Trouble Diagnosis Depending on The Status of TOD Indicator”. The troubles that can be recognized as abnormal phenomena of the vehicle by the driver are examined by the procedure “Diagnosis from symptom”.

Self-diagnosis

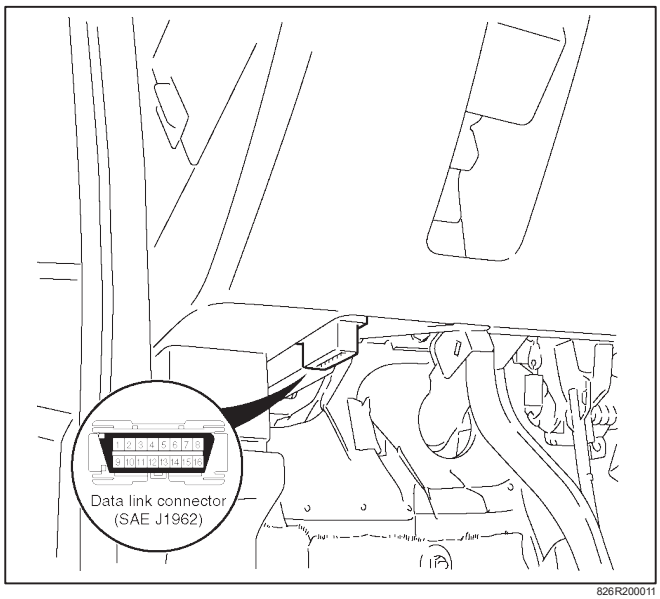
The control unit has a function of self-diagnosis. If a trouble occurs in the course of system startup, the control unit blinks the CHECK lamp and saves the trouble code.



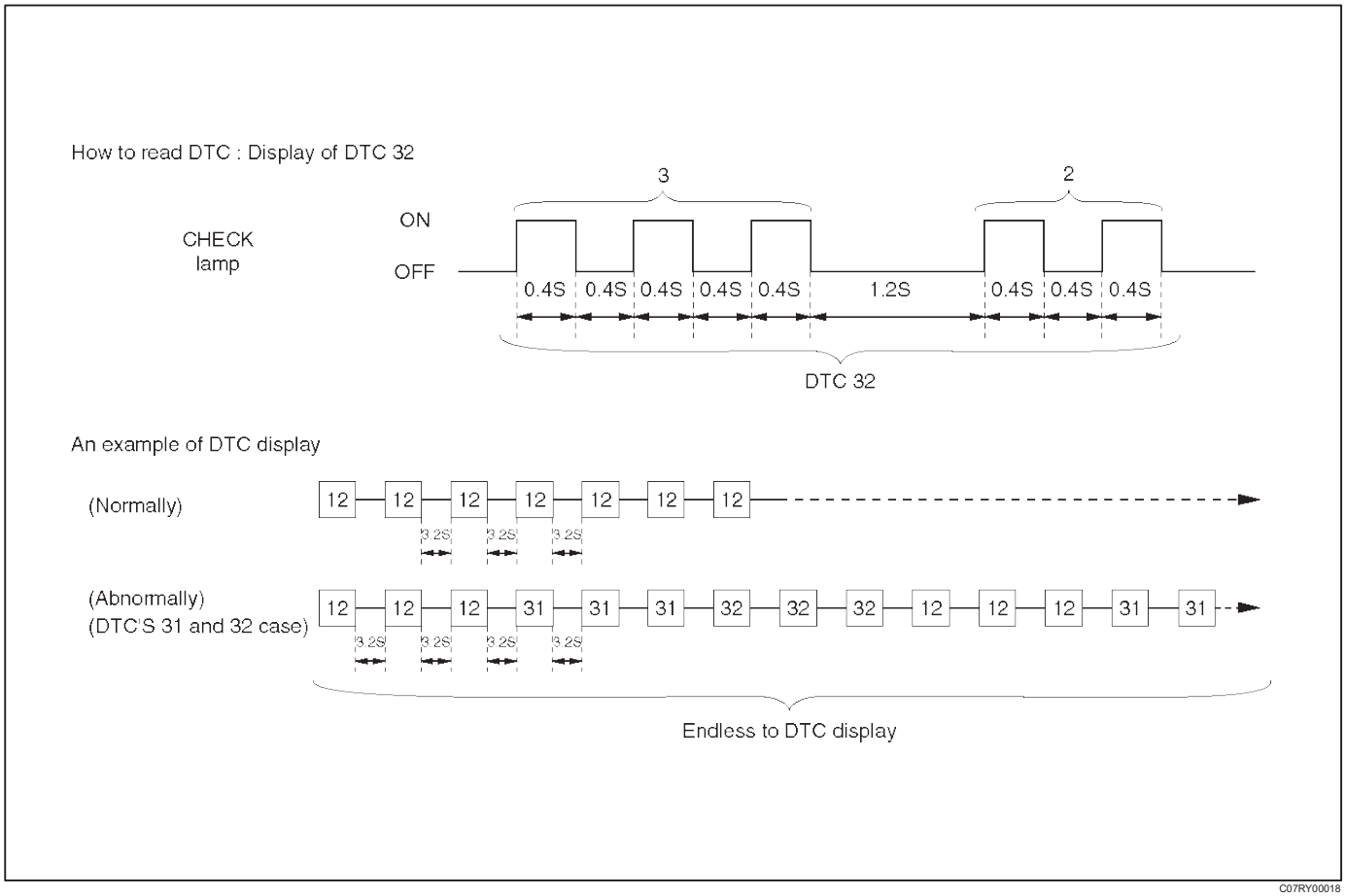
NOTE: If an intermittent fault occurs, the control unit stops blinking upon removal of the fault. The trouble code is saved to the control unit.

Indication Method of Trouble Code

- Turn on the starter switch, while the engine does not start.
- Short-circuit terminal 8 of the self-diagnostic connector to GND (terminal 4 or 5) to display the trouble code on the CHECK lamp.



- If no trouble codes exist, code “12” is displayed continuously.
- If trouble codes exist, code “12” is displayed three times, and the trouble codes, starting from the smaller code number, are displayed three times respectively.

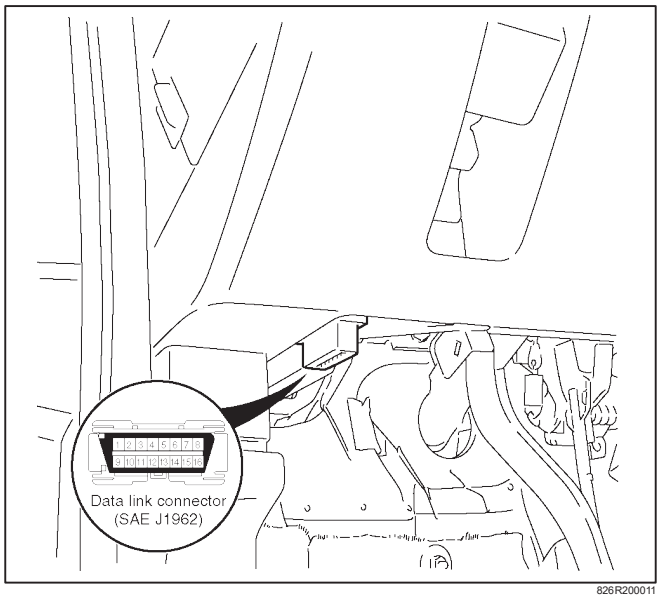


C07RY00018

How to Clear The Trouble Code

The trouble codes saved to the control unit can be deleted by the following procedure if the starter switch is being in the OFF position.

1. Short-circuit terminal 8 of the self-diagnostic connector to GND (terminal 4 or 5).
2. Turn on the starter switch while maintaining the state of step1, and stop short-circuiting terminal 8 to GND within five seconds.



826R200011

3. If the conditions shown in steps 1 and 2 are met, the trouble codes saved to the control unit are cleared. (After the codes are completely deleted, the code 12 that indicates the normal condition is continuously displayed.)

Precautions on Diagnosis

Replacement of Control Unit

The control unit itself rarely fails. In most cases, the harnesses have failed (i.e. short-circuit) to cause secondary troubles. Other cases include that the cause has been unknown due to intermittent occurrence of troubles and the troubles are removed accidentally along with replacement of control unit, resulting in misjudgment of cause. Therefore, before replacing the control unit, check the connector joints and whether the unspecified current flows in the control unit due to short-circuit between harnesses.

Trouble Intermittently Observed

Troubles intermittently observed are mostly attributable to temporary imperfect connection of harnesses and connectors.

When such troubles are found, check the associated circuit according to the following procedure.

1. Check whether improper connectors are plugged in or connector terminals are completely engaged.
2. Check whether the terminals are deformed or damaged. If yes, remove the deformation or damage and connect the terminals securely.
3. It is likely that wires in the harness are falsely broken. Therefore, in examination of failed harness circuit, shake the harness for check to such extent that the harness will not be damaged.

Test Run of Failed TOD Vehicle

If the TOD indicator lamps experienced faulty operation even once in the past, the failed portion can be identified by use of the procedure “Diagnosis from Trouble Codes” or “Trouble Diagnosis Depending on the Status of TOD Indicator”. If the troubles that are only recognized as abnormal phenomena of the vehicle by the driver are observed, conduct the test run in the following procedure to reproduce the faulty phenomena and diagnose the fault for each phenomenon.

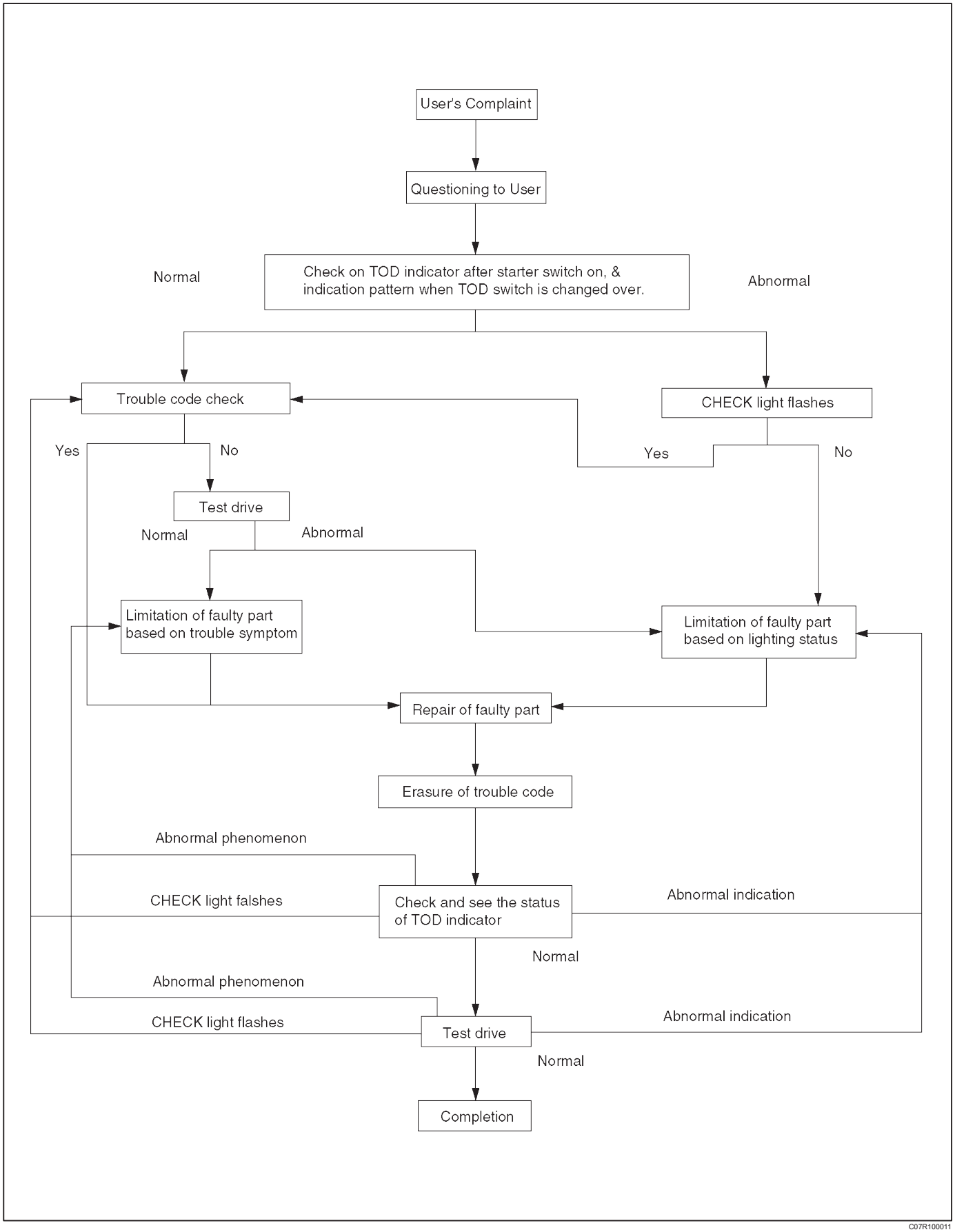
1. Start the engine, and check that the TOD indicator lamps are turned on for about two seconds for initial check; the CHECK lamp goes off; and the TOD indicator lamps display the specified drive mode. (If the CHECK lamp starts blinking, read the trouble codes and identify the failed portion.)
2. While keeping the vehicle standstill, operate the TOD switch to change the modes: 2H mode→TOD mode→4L mode→TOD mode→2H mode. Check that the TOD indicator lamps correctly display the status whenever the mode is changed. If the transition status is displayed during the shift operation, run the vehicle a little to complete shifting.
3. Slowly start the vehicle in the TOD mode, and add the power to accelerate to at least 40 km/h (25 mph)and maintain the speed for about two minutes. Apply the brake to completely stop the vehicle. Repeat this test pattern at least three times.
4. Turn the steering to the right end (or left end) in the TOD mode, and slowly start the vehicle and make a circle five times. Next, conduct the same test in the 2H mode.
5. Slowly start the vehicle in the TOD mode, and accelerate to at least 40 km/h (25 mph). Keep the established speed, carefully change the mode in the sequence “TOD mode→2H mode →TOD mode” while checking that the shift is complete in each mode change. After the test, apply the brake to completely stop the vehicle.
6. Slowly start the vehicle in the TOD mode, and accelerate to at least 40 km/h (25 mph). Apply the brake strongly so that the ABS works, and completely stop the vehicle.
7. Slowly start the vehicle in the 4L mode, and accelerate to at least 20 km/h (13 mph). Apply the brake to completely stop the vehicle.

If the CHECK lamp starts blinking during the test run, read the trouble codes and give appropriate maintenance according to the diagnostic procedure. If the TOD indicator lamps are lit abnormally during the run, check the lighting condition and give appropriate maintenance according to the diagnostic procedure. Even if the phenomena are not observed, try to reproduce the abnormal state reported by the customer to the possible extent.

Post-Repair Check

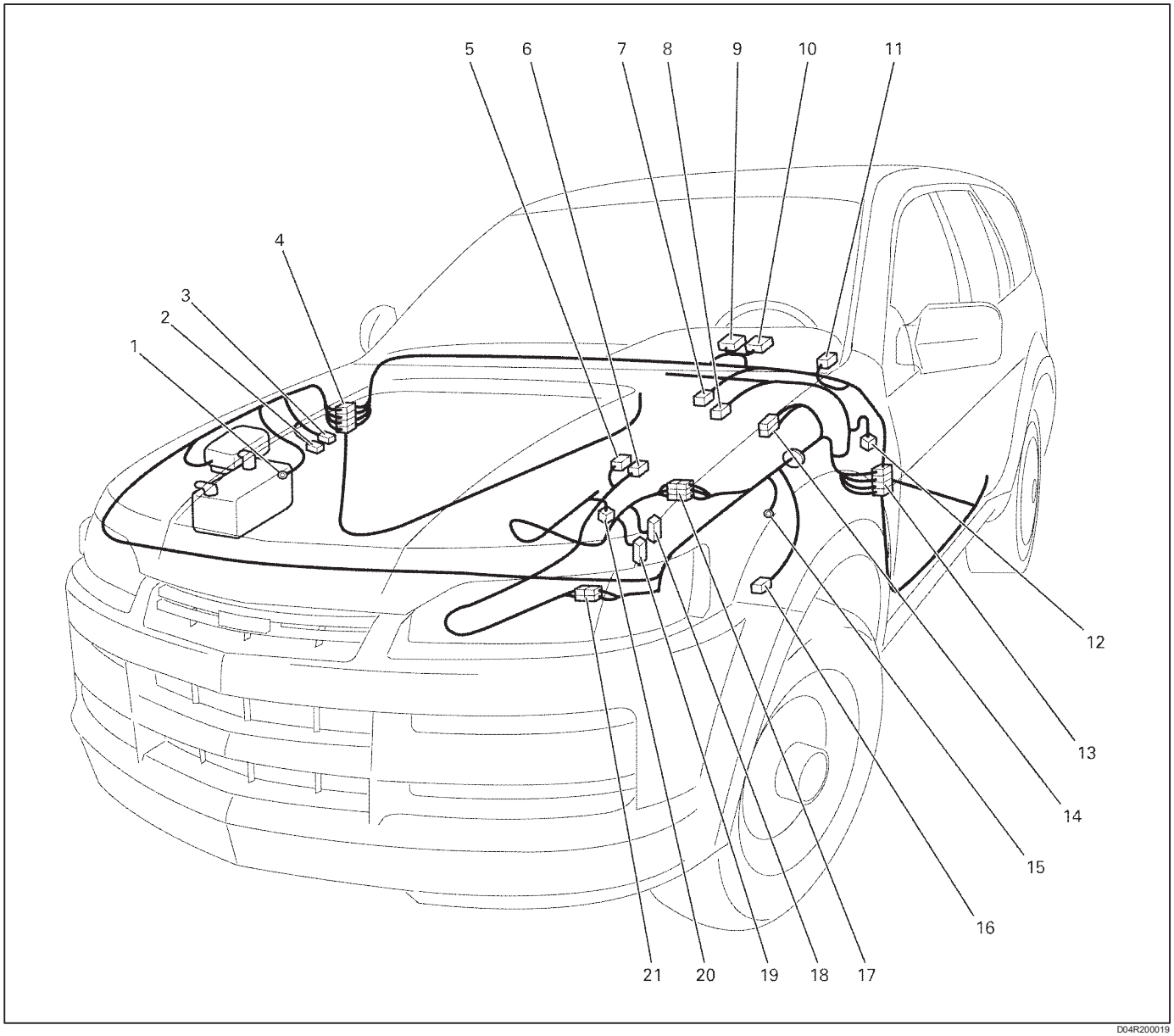
As long as the starter is not turned off, the TOD indicator lamps continue blinking even after the failed portion is repaired. Therefore, upon completion of repair, be sure to turn off the starter switch once and then turn on it to conduct the test run sequence specified in steps 1 through 7 above and check that the TOD indicator lamps no longer show any faulty status.

Basic Diagnostic Flow Chart



C07R100011

Parts Location

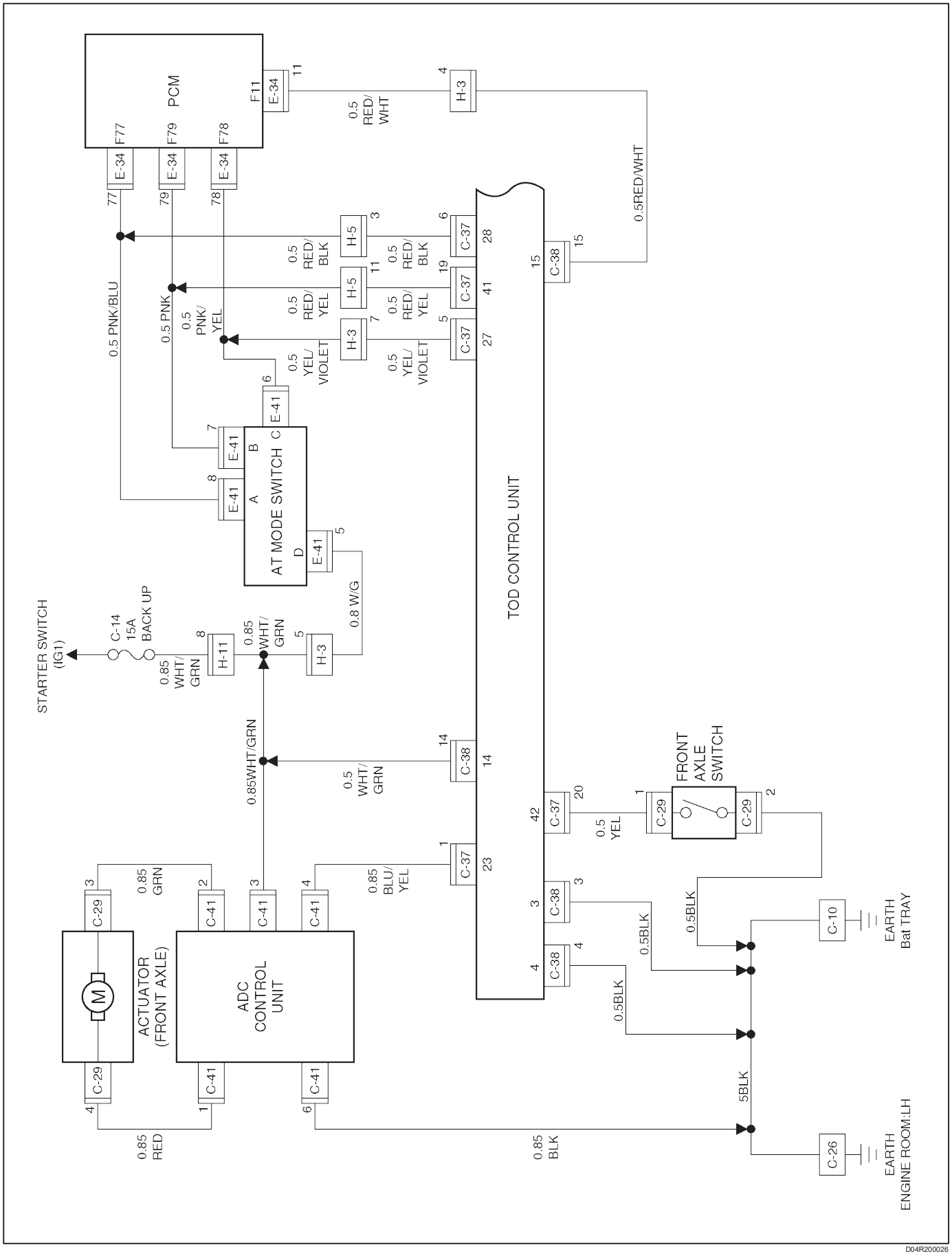


D04R200019

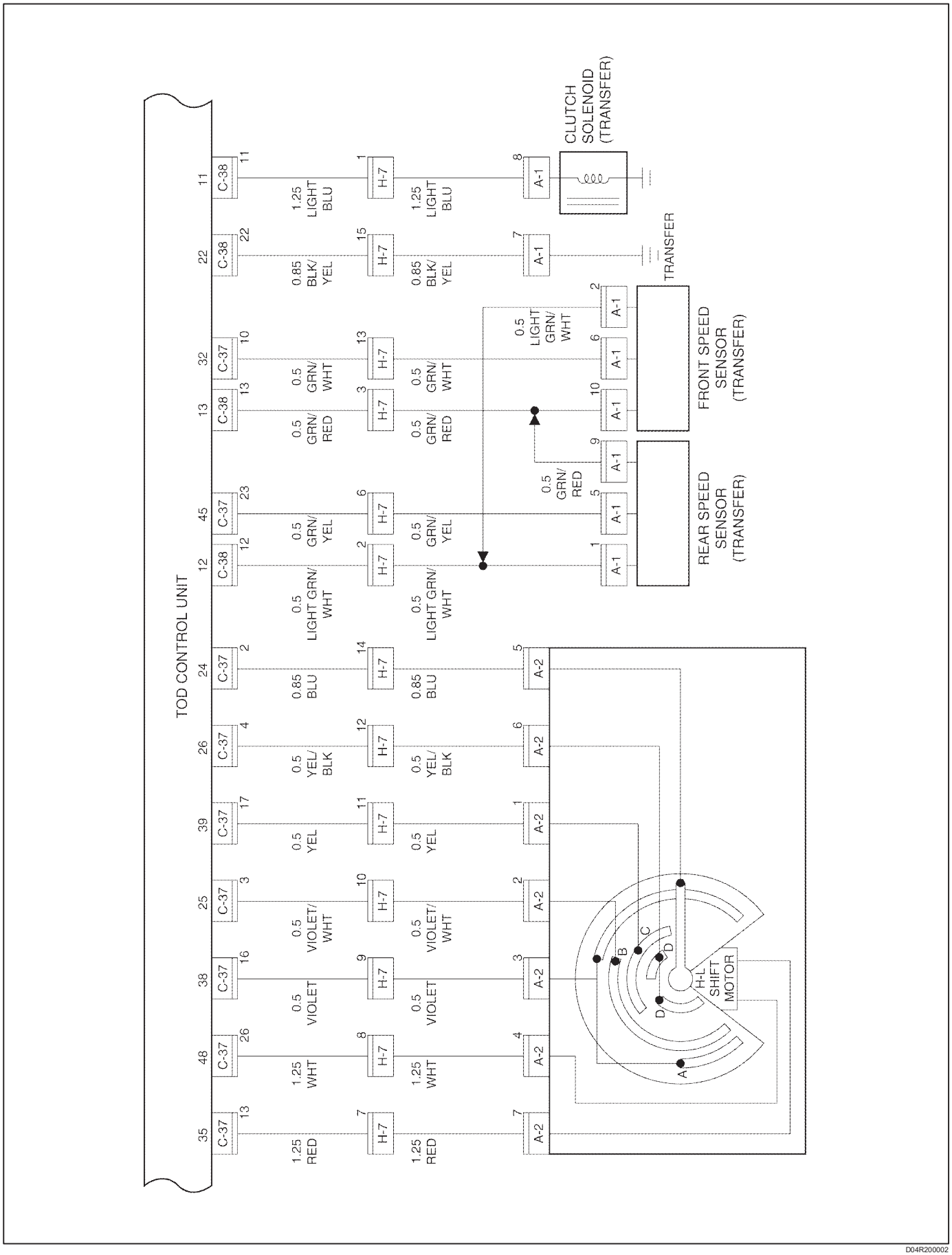
Legend

(1) C–10
(2) C–6
(3) C–5
(4) H–13 H–14
(5) A–1
(6) A–2
(7) I–31
(8) C–41
(9) I–23
(10) I–24
(11) I–25
(12) C–39
(13) H–10
(14) C–37 C–38
(15) C–26
(16) C–29
(17) H–3 H–5
(18) E–35
(19) E–34
(20) E–41
(21) H–7

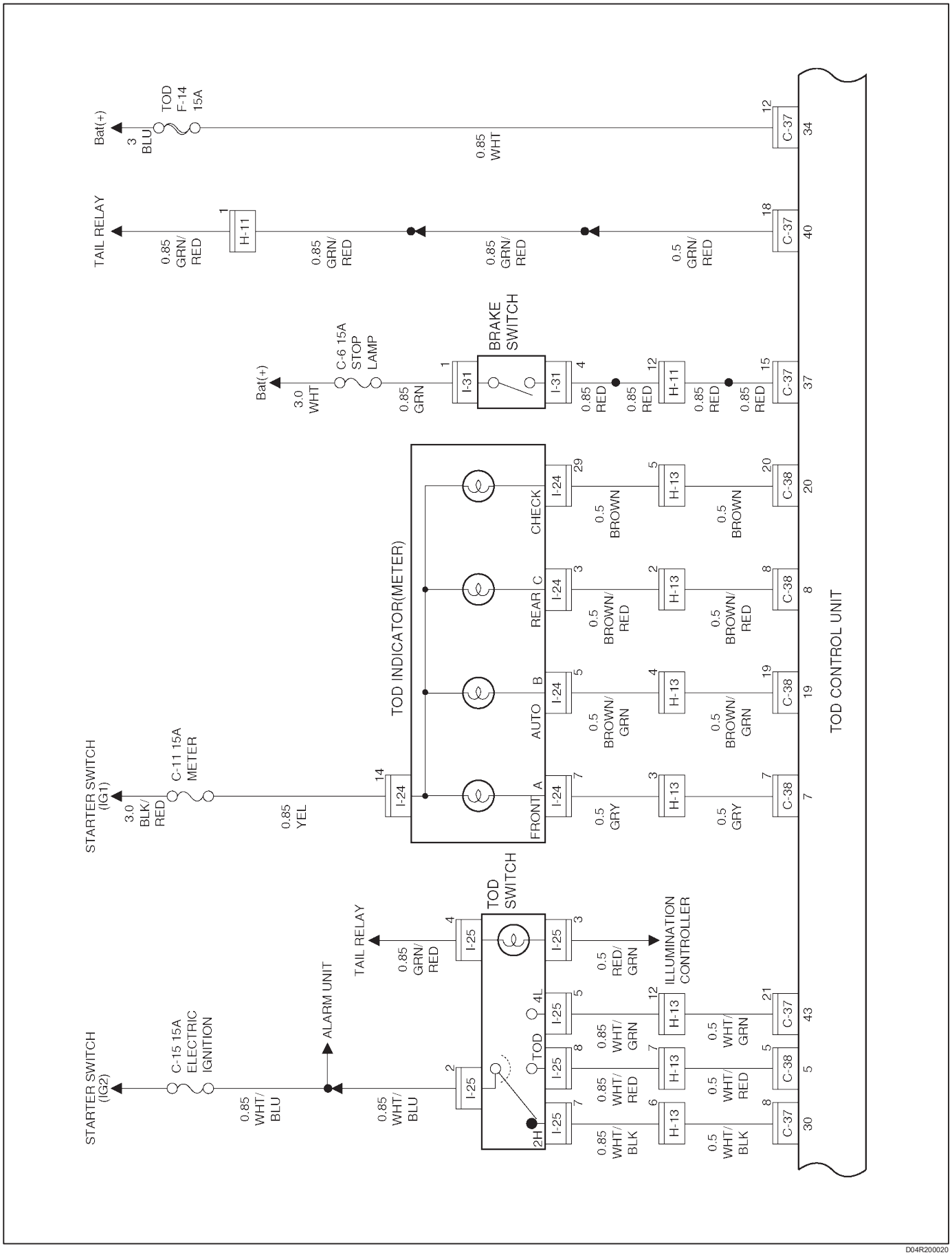
Circuit Diagram



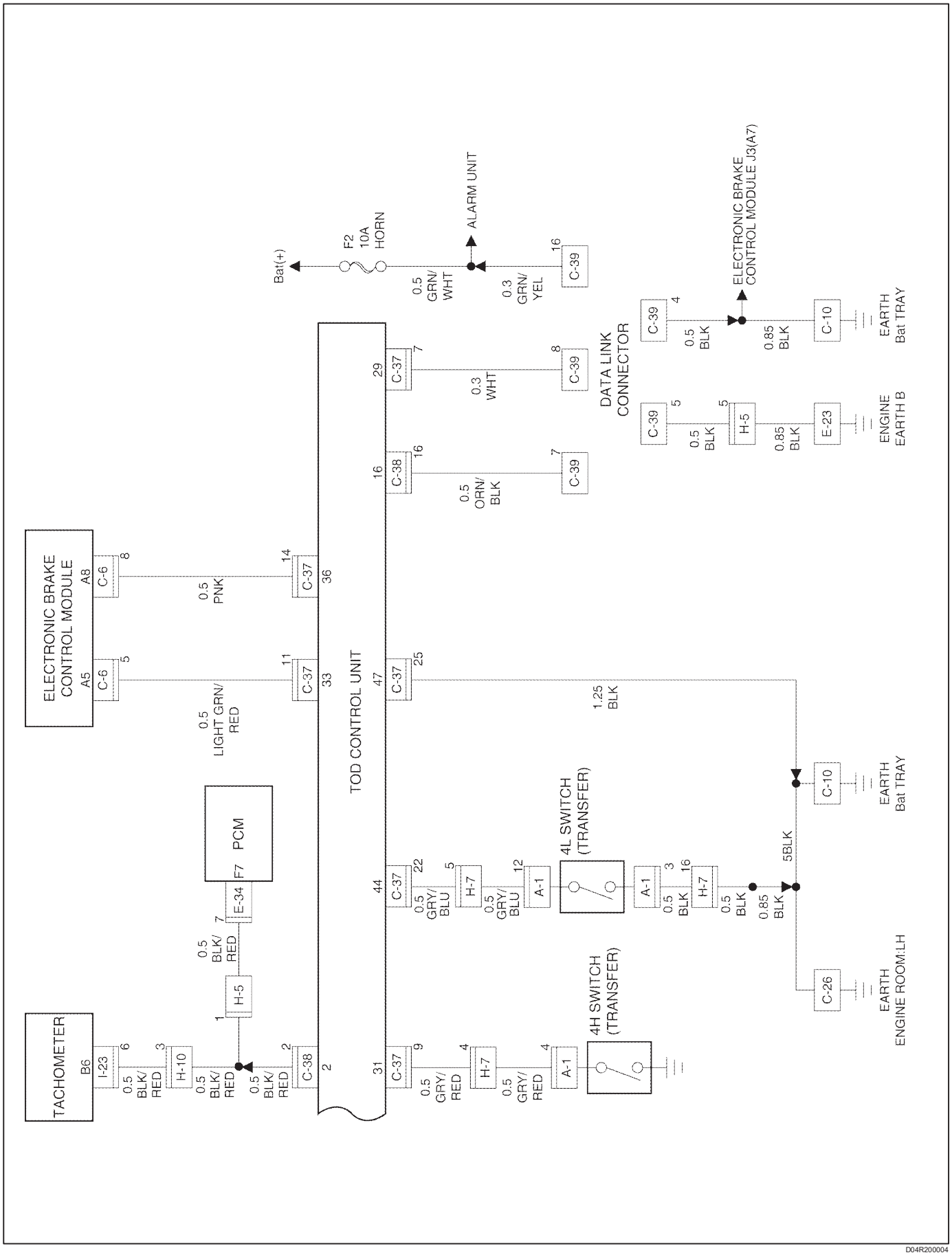
D04R200026


TOD CONTROL UNIT
CLUTCH SOLENOID (TRANSFER)
TRANSFER
FRONT SPEED SENSOR (TRANSFER)
REAR SPEED SENSOR (TRANSFER)
H-L SHIFT MOTOR
A
B
C
D
D
1.25 LIGHT BLU
0.85 BLK/ YEL
0.5 LIGHT GRN/ WHT
0.5 GRN/ WHT
0.5 GRN/ RED
0.5 GRN/ YEL
0.5 LIGHT GRN/ WHT
0.85 BLU
0.5 YEL/ BLK
0.5 YEL
0.5 VIOLET/ WHT
0.5 VIOLET
1.25 WHT
1.25 RED

D04R200002

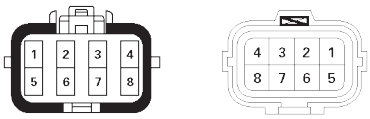
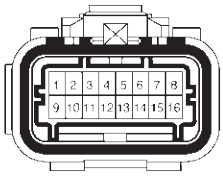
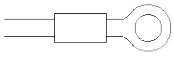
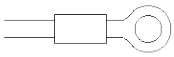
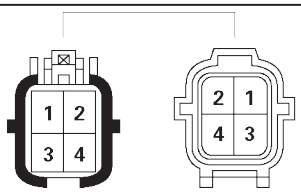
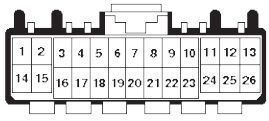
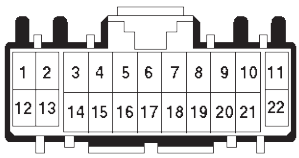
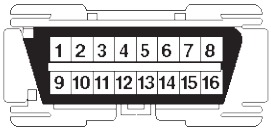

Bat(+)
3
BLU
TOD
F-14
15A
0.85
WHT
12
C-37
34
TAIL RELAY
0.85
GRN/
RED
1
H-11
0.85
GRN/
RED
0.85
GRN/
RED
0.5
GRN/
RED
18
C-37
40
Bat(+)
3.0
WHT
C-6 15A
STOP
LAMP
0.85
GRN
1
I-31
BRAKE
SWITCH
I-31
4
0.85
RED
0.85
RED
12
H-11
0.85
RED
0.85
RED
15
C-37
37
STARTER SWITCH
(IG1)
3.0
BLK/
RED
C-11 15A
METER
0.85
YEL
14
I-24
TOD INDICATOR(METER)
FRONT
A
AUTO
B
REAR
C
CHECK
I-24
7
I-24
5
I-24
3
I-24
29
0.5
GRY
0.5
BROWN/
GRN
0.5
BROWN/
RED
0.5
BROWN
3
H-13
4
H-13
2
H-13
5
H-13
0.5
GRY
0.5
BROWN/
GRN
0.5
BROWN/
RED
0.5
BROWN
7
C-38
19
C-38
8
C-38
20
C-38
7
19
8
20
TOD CONTROL UNIT
TOD
SWITCH
TAIL RELAY
0.85
GRN/
RED
4
I-25
3
I-25
0.5
RED/
GRN
ILLUMINATION
CONTROLLER
4L
TOD
2H
I-25
5
I-25
8
I-25
7
I-25
12
H-13
7
H-13
6
H-13
21
C-37
5
C-38
8
C-37
0.85
WHT/
GRN
0.85
WHT/
RED
0.85
WHT/
BLK
0.5
WHT/
GRN
0.5
WHT/
RED
0.5
WHT/
BLK
43
5
30
STARTER SWITCH
(IG2)
C-15 15A
ELECTRIC
IGNITION
0.85
WHT/
BLU
ALARM UNIT
0.85
WHT/
BLU
2
I-25

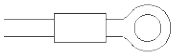
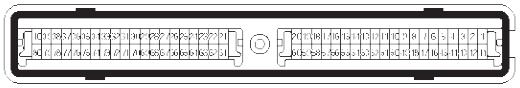
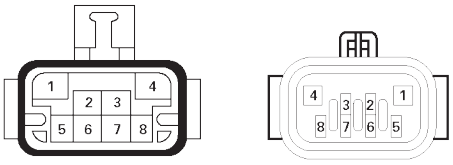
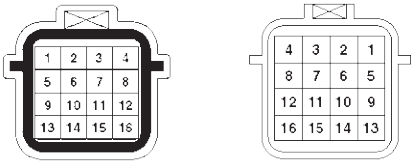
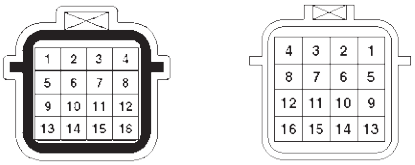
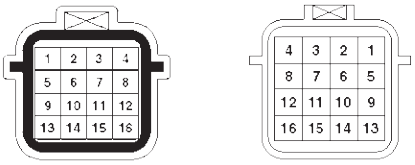
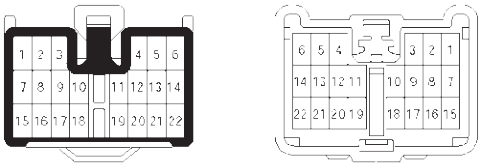
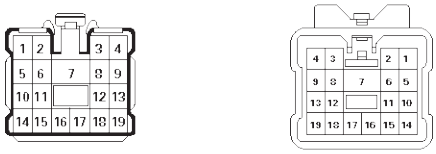
D04R200020

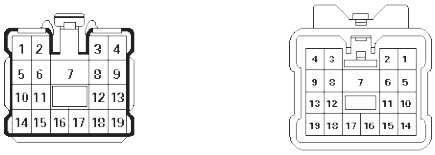
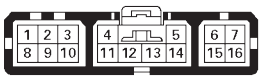
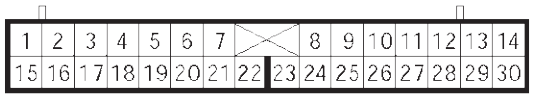

Bat(+)
F2
10A
HORN
ALARM UNIT
0.5
GRN/
WHT
0.3
GRN/
YEL
C-39
16
ELECTRONIC BRAKE
CONTROL MODULE J3(A7)
DATA LINK
CONNECTOR
0.3
WHT
0.5
ORN/
BLK
0.5
BLK
0.85
BLK
EARTH
Bat TRAY
ENGINE
EARTH B
EARTH
ENGINE ROOM:LH
ELECTRONIC BRAKE
CONTROL MODULE
A8
A5
C-6
C-37
C-38
C-39
C-10
C-26
E-23
H-5
0.5
PNK
0.5
LIGHT GRN/
RED
TOD CONTROL UNIT
PCM
F7
E-34
0.5
BLK/
RED
TACHOMETER
B6
I-23
H-10
H-7
A-1
0.5
BLK/
RED
0.5
GRY/
RED
0.5
GRY/
BLU
4H SWITCH
(TRANSFER)
4L SWITCH
(TRANSFER)
1.25
BLK
5BLK
0.85
BLK
0.5
BLK

D04R200004

Connector List

No.	Connector face
A-1	
A-2	
C-6	
C-10	
C-26	
C-29	
C-37	
C-38	
C-39	

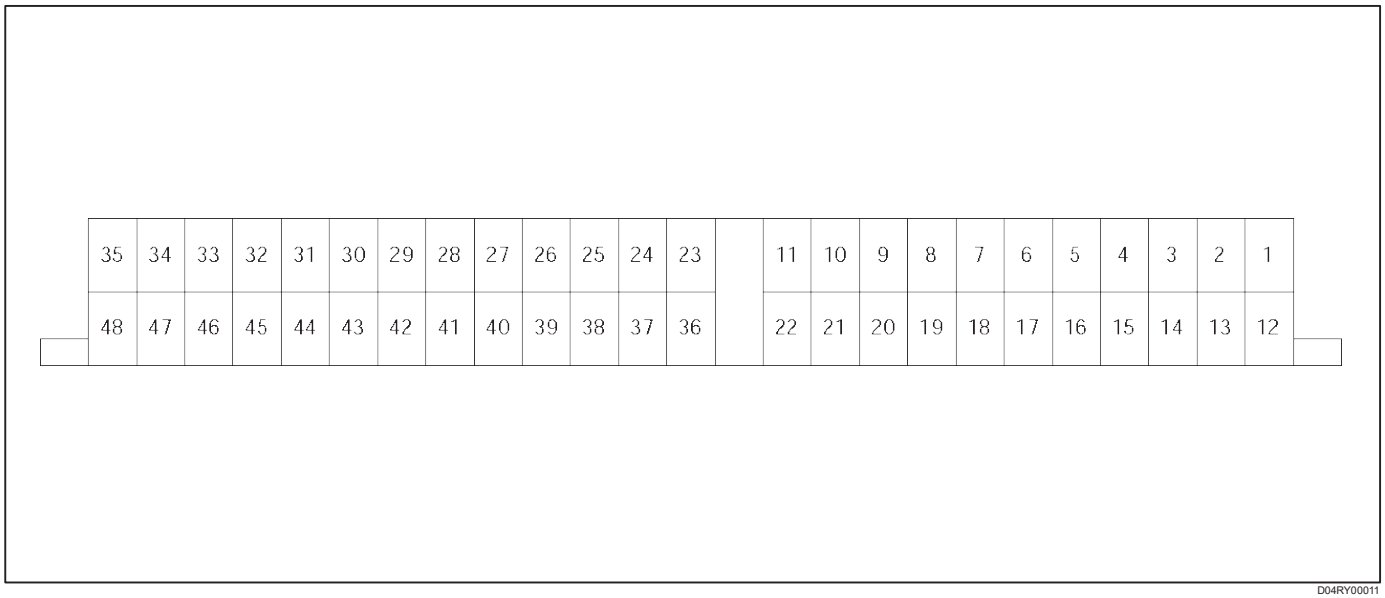
No.	Connector face
C-41	
E-23	
E-34	
E-41	
H-5 6VD1	
H-3	
H-7	
H-10	
H-11	

No.	Connector face
H-13	
I-23	
I-24	
I-25	
I-31	

Checking Failed Pin

Connector Pin Assignment

- TOD control unit pin assignment

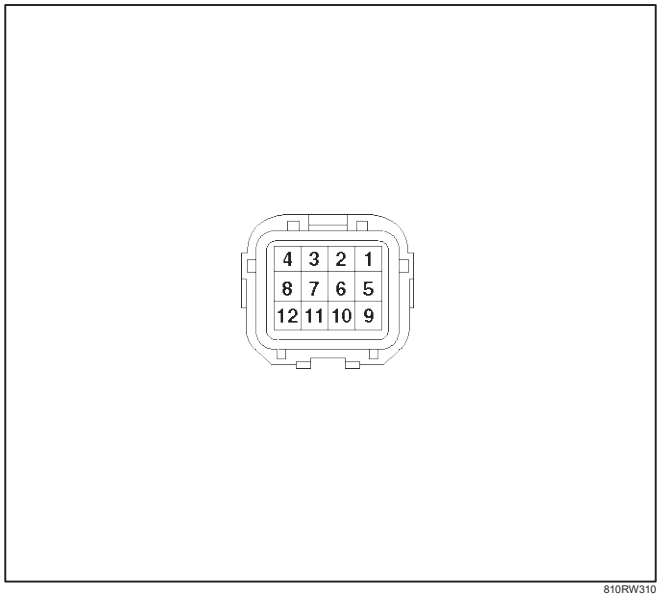


No.	NAME	CONTENTS
1	N.C	Not used
2	ENG REV	Engine Speed
3	N.C	Not used
4	N.C	Not used
5	N.C	Not used
6	N.C	Not used
7	IND.A	Display Front
8	IND. C	Display Rear
9	N.C	Not used
10	N.C	Not used
11	EMC	Clutch Solenoid
12	REF	Speed Reference
13	COM (–)	Speed GND
14	VIG	Ignition
15	TPS	TPS (PWM)
16	TECH 2	TECH–2
17	N. C	Not used
18	N. C	Not used
19	IND. B	Display Auto
20	CHK TOD	Check TOD
21	N.C	Not used
22	PWR GND	Power Ground
23	ADC (+)	Axle Disconnect Output
24	COM GND	Shift Motor Position GND
25	MTR POS3	Shift Motot Position 3

No.	NAME	CONTENTS
26	MTR POS1	Shift Motor Position 1
27	POSC	AT Position C
28	POSA	AT Position A
29	DIAG	Diagnostic Input
30	TOD SW A	TOD Switch A (2H)
31	4H SW	4H Switch Input
32	FT. SIG	Front Speed Signal
33	ABS IN	ABS In
34	VB	Power Bat
35	MTR H-L	Power Shift Motor H-L
36	4WD OUT	4WD Signal Output
37	BRAKE SW	Brake Switch Input
38	MTR POS4	Shift Motor Position 4
39	MTR POS2	Shift Motor Position 2
40	LIGHTING SW	Lighting Switch Input
41	POSB	AT Position B
42	AXLE SW	Axle Switch Input
43	TOD SWB	TOD Switch B (4L)
44	4L SW	4L Switch Input
45	RR. SIG	Rear Speed Signal
46	GND. 1	ECU Ground 1
47	GND. 2	ECU Ground 2
48	MTR L-H	Power Shift Motor L-H

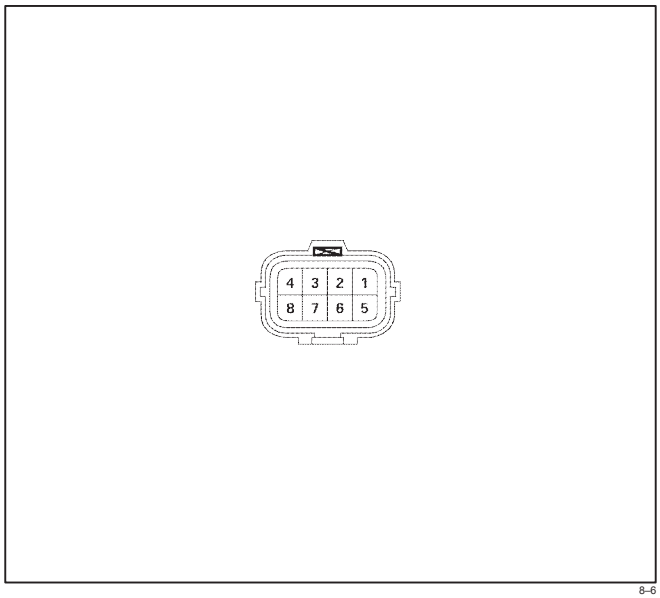
Reference

- Transfer connector pin assignment (connector on the transfer case)
  for inspection of transfer pins.



810RW310

No.	NAME	CONTENTS
1	Ref. (Rer.)	Rear speed sensor reference output
2	Ref. (Frt.)	Front speed sensor reference output
3	SW GND	SW GND
4	4H SW (+)	4H SW plus terminal
5	RR. SIG	Rear Speed Sensor Signal
6	FT. SIG	Front Speed Sensor Signal
7	POWER GND	Power GND
8	SOL (+)	Electromagnetic solenoid
9	COM (–) (Rer.)	Rear speed sensor GND
10	COM (–) (Frt.)	Front speed sensor GND
11	NC	Not used
12	4L SW (+)	4L SW Plus Terminal



No.	NAME	CONTENTS
1	MTR POS2	Shift Motor Position 2
2	MTR POS3	Shift Motor Position 3
3	MTR POS4	Shift Motor Position 4
4	MTR L-H	Power Shift Motor L-H
5	POS RETURN	Shift Motor Position GND
6	MTR POS1	Shift Motor Position 1
7	MTR H-L	Power Shift Motor H-L
8	NC	Not Used

Checking Failed TOD Control Unit Pin

NOTE:

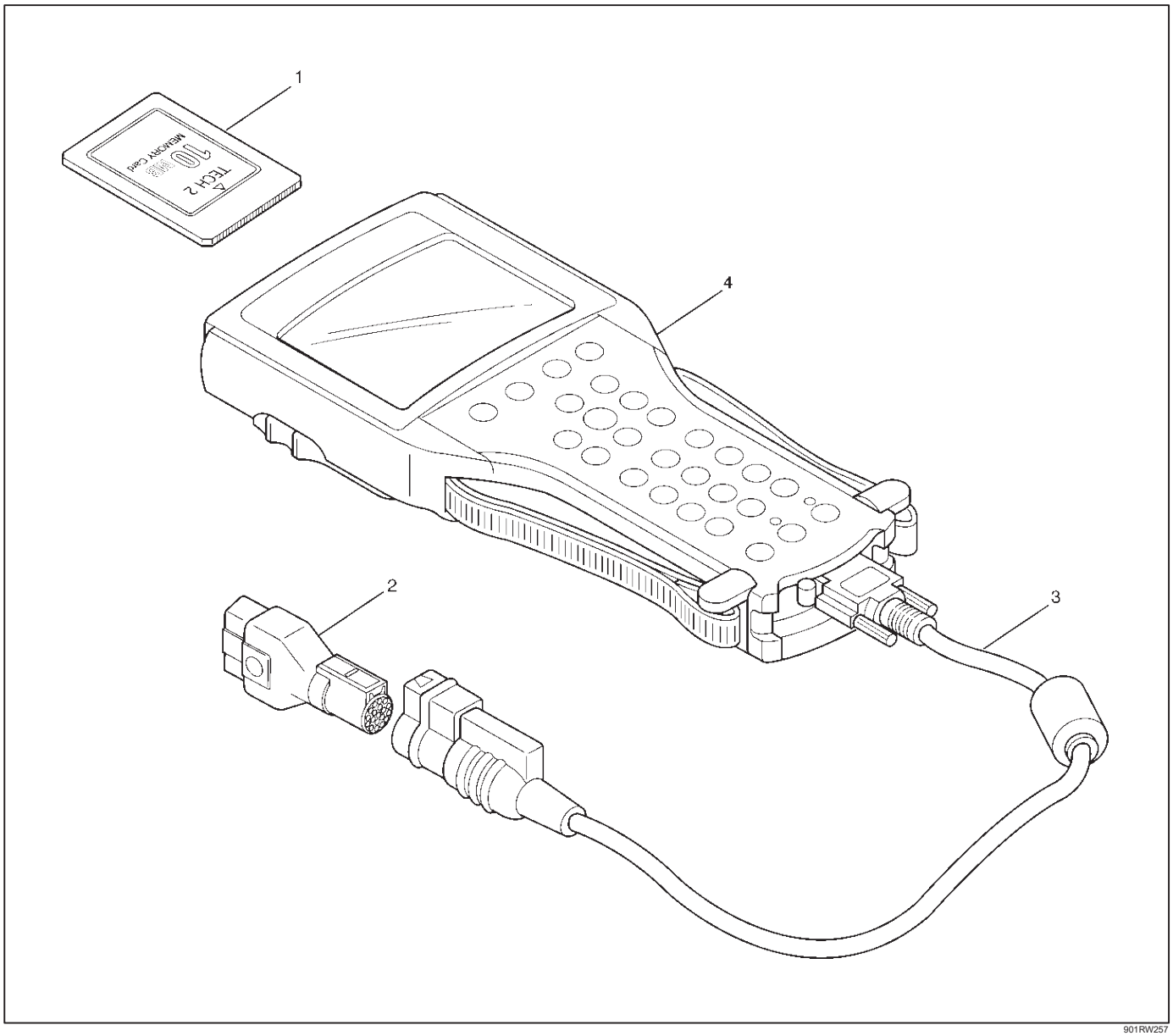
1. Unplug the ECU connector and the pins, unless otherwise specified.
2. Before removing the ECU, turn off the ignition switch.
3. If the standard values are not observed, check the pins with other testers.

Check Pin No.	Circuit to be tested	Ignition Switch Position	Engine State	Unit Scale/ Range	Measure between Pin No.	Standard Value	Note
22	P-GND	OFF	STOP	Ω	22, 47	Continuity : OK	
46	GNDI	OFF	STOP	Ω	46, 47	Continuity : OK	
47	GND 2	OFF	STOP	Ω	47, GND	Continuity : OK	
31	4H SW	OFF	STOP	Ω	31, 47	No continuity (high, 4L) : OK	
44	4L SW	OFF	STOP	Ω	44, 47	No continuity (high) and continuity (4L) : OK	
42	AXLE SW	ON	RUN	Ω	42, 47	Continuity(TOD, 4L) : OK	Remove ECU connector and start the engine. Move the vehicle forth and back to connect axle surely.
29	DIAG	OFF	STOP	Ω	29 (TOD), 8 (DLC Connec-tor)	Continuity : OK	DLC connector terminal 8
7	IND.A	ON	STOP	DCV	7 (+), 47 (–)	8.0 ~14.5 V	when the indicator lamp is turned off.
20	CHECK TOD	ON	STOP	DCV	20 (+), 47 (–)	8.0 ~14.5 V	When the indicator lamp is turned off.
33	ABS IN	ON	STOP	DCV	33 (+), 47 (–)	6.0 ~11.0 V	
12	REF	ON	STOP	DCV	12 (+), 47 (–)	5 ~9 V	Connect ECU
32	FRT.(+)	ON	STOP	DCV	32 (+), 47 (–)	0.7 ~6 V	Connect ECU and move the vehicle (off one tooth of speed sensor ring) making sure of voltage change.
45	RR.(+)	ON	STOP	DCV	45 (+), 47 (–)	0.7 ~6 V	Connect ECU and move the vehicle (off one tooth of speed sensor ring) making sure of voltage change.
13	COM(-)	ON	STOP	DCV	13 (+), 47 (–)	0V	Connect ECU
14	VIG	ON	STOP	DCV	14 (+), 47 (–)	8 ~14.5 V	
34	VB	OFF	STOP	DCV	34 (+), 47 (–)	8.0 ~14.5 V	
37	BRAKE SW	OFF	STOP	DCV	37 (+), 47 (–)	8 ~14.5 V	Press brake pedal
15	TPS	ON	STOP	DCV	15 (+), 47 (–)	PWM duty cycle 10%(MAX) – 90 %(MIN)	Step on the accelerator pedal and make sure that duty cycle changes.

Check Pin No.	Circuit to be tested	Ignition Switch Position	Engine State	Unit Scale/ Range	Measure between Pin No.	Standard Value	Note
36	4WD OUT	OFF	STOP	Ω	36, 47	7 ~12 kΩ	Disconnect battery GND terminal
11	EMC(+)	OFF	STOP	Ω	11, 22	1.0 ~5.0 Ω	Disconnect battery GND terminal
30	TOD SW A	ON	STOP	DCV	30 (+), 47 (–)	SW: TOD, 4L: 0 V SW:2H:8.0 ~ 14.5 V	
43	TOD SWB	ON	STOP	DCV	43 (+), 47 (–)	SW: 2H, TOD:0V SW: 4L: 8.0 ~ 14.5V	
40	LIGHT	ON	STOP	DCV	40 (+), 47 (–)	SW OFF : 0 V SW ON : 8.0 ~ 14.5 V	
19	IND B	ON	STOP	DCV	19 (+), 47 (–)	8.0 ~14.5 V	When the indicator lamp is turned off
8	IND C	ON	STOP	DCV	8 (+), 47 (–)	8.0 ~ 14.5 V	When the indicator lamp is turned off
27	AT POSC	ON	STOP	DCV	27 (+), 47 (–)	ON:D, 3, 2, 1 OFF:PRN	ON:8.0 ~ 14.5 V OFF:0V
41	AT POSB	ON	STOP	DCV	41 (+), 47 (–)	ON:R, N, D, 3 OFF:P, 2, 1	ON:8.0 ~ 14.5 V OFF:0V
28	AT POSA	ON	STOP	DCV	28 (+), 47 (–)	ON:P, R, 3, 2 OFF:N, D, 1	ON:8.0 ~ 14.5 V OFF:0V
2	ENG REV	ON	RUN	ms	2, 47	Waveform (PWM)	50 ms (1000 rpm)

Tech 2 Scan Tool

From 98 MY, Isuzu dealer service departments are recommended to use Tech 2. Please refer to Tech 2 scan tool user guide.



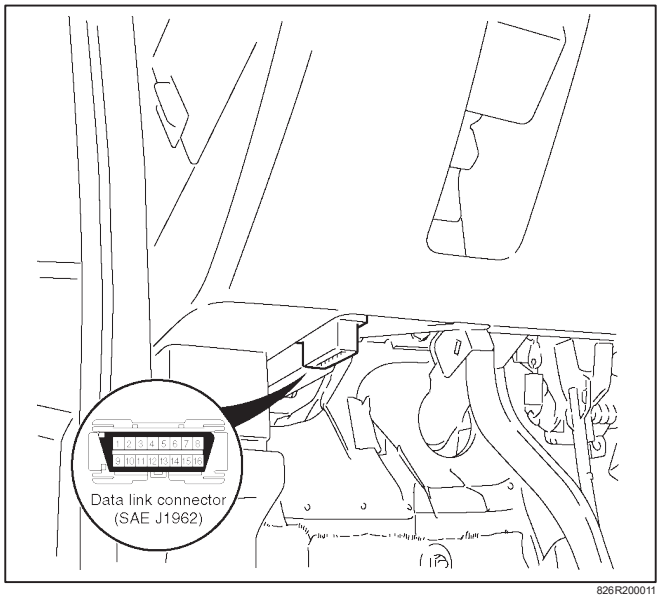
Legend

(1) PCMCIA Card
(2) SAE 16/19 Adaptor
(3) DLC Cable
(4) Tech 2

Getting Started

- Before operating the Isuzu PCMCIA card with the Tech 2, the following steps must be performed:

1. The Isuzu 02 System PCMCIA card (1) inserts into the Tech 2 (4).
2. Connect the SAE 16/19 adapter (2) to the DLC cable (4).
3. Connect the DLC cable to the Tech 2 (4)
4. Mark sure the vehicle ignition is off.
5. Connect the Tech 2 SAE 16/19 adapter to the vehicle DLC connector.



826R200011

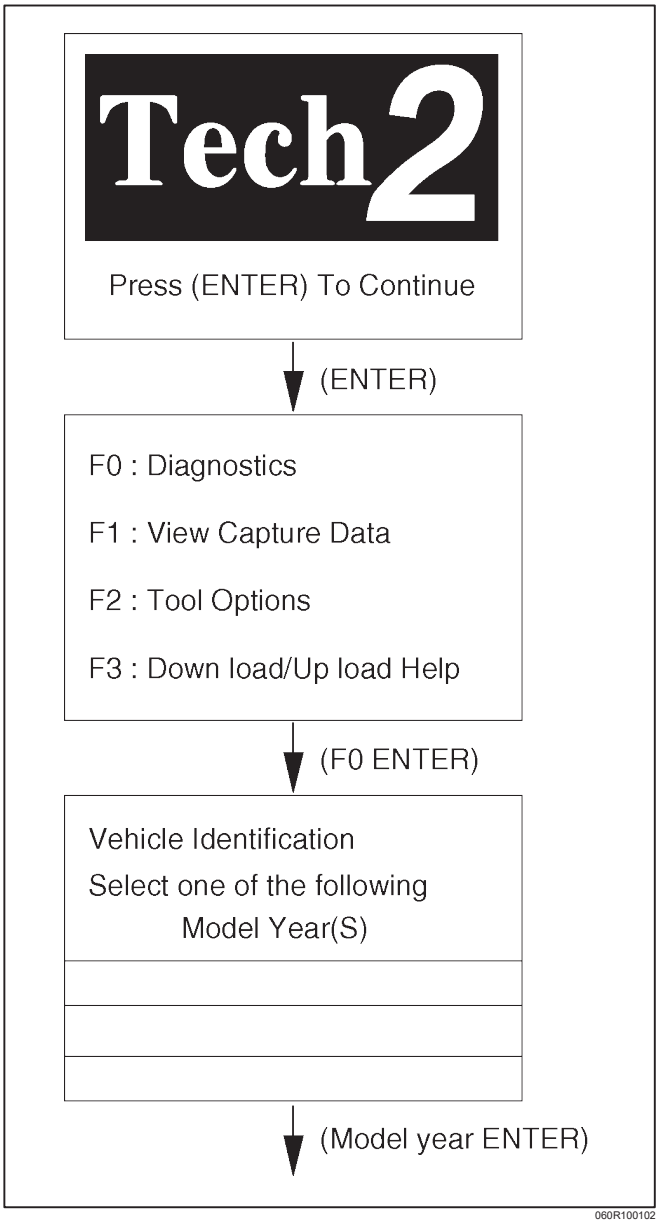
6. The vehicle ignition turns on.
7. Power up the Tech 2.
8. Verify the Tech 2 power up display.



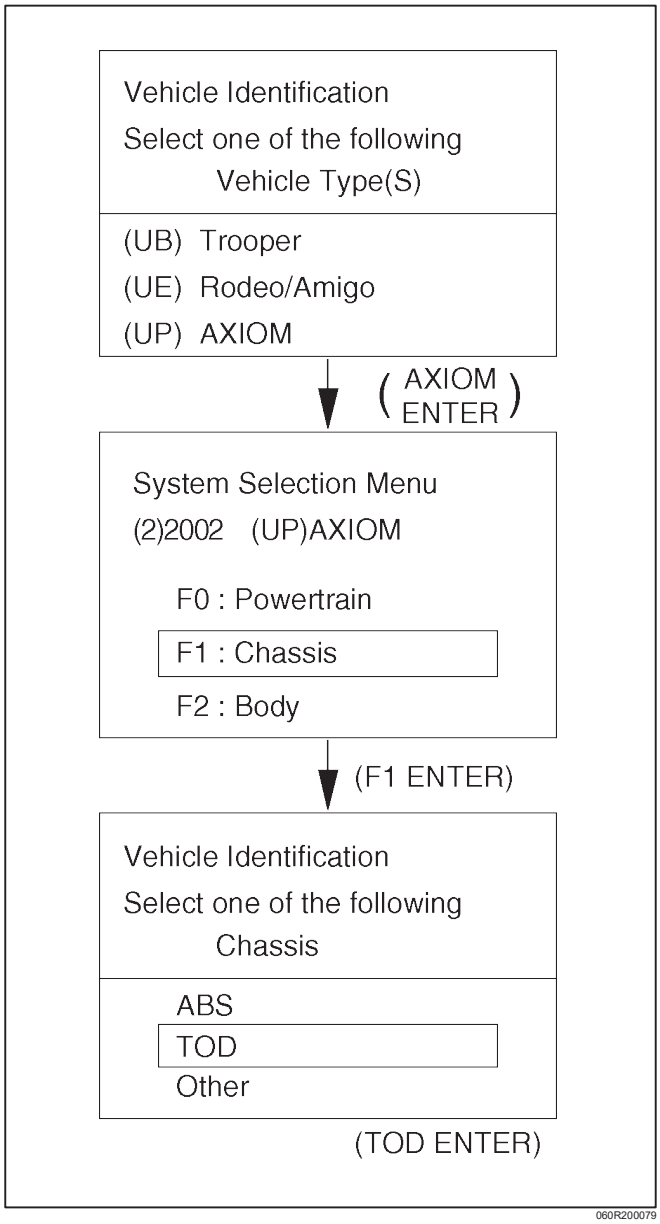
060RW009

Operating Procedure

The power up screen is displayed when you power up the tester with the Isuzu systems PCMCIA card. Follow the operating procedure below.



060R100102


Vehicle Identification
Select one of the following
Vehicle Type(S)
(UB) Trooper
(UE) Rodeo/Amigo
(UP) AXIOM
(AXIOM ENTER)
System Selection Menu
(2)2002 (UP)AXIOM
F0 : Powertrain
F1 : Chassis
F2 : Body
(F1 ENTER)
Vehicle Identification
Select one of the following
Chassis
ABS
TOD
Other
(TOD ENTER)
060R200079

Diagnostic Trouble Codes

Code	Tech 2 code (P code)	Item	Diagnosis	Check flow No.
12	—	Start code	Normal	—
13	P1735	Ref	Shorted GND	6
14	P1731	Front speed sensor	Input abnormality (open, sig or com)	2
15	P1736	Ref	Shorted V_B	6
16	P1737	Front speed sensor	Input abnormality	4
17	P1774	Inhibitor switch	Input abnormality	8
21	P1716	TPS	Shorted or disconnected wiring, abnormality in input	7
23	—	ECU	CPU abnormality	1
24	P1733	Rear speed sensor	Input abnormality (open, sig or com)	3
27	P1738	Rear speed sensor	Input abnormality	5
28	P1760	ADC (+) & AXLE SW	Output abnormality	10
31	P1721	EMC (+)	Shorted VB, disconnected coil/wiring or shorted GND	9
32	P1761	ADC (+)	Shorted VB or disconnected wiring	11
33	P1762	ADC (+)	Shorted GND	12
36	—	ECU	CPU abnormality	1
37	P1712	ECU	CPU abnormality	1
38	P1714	ECU	CPU abnormality	1
41	P1741	Hight-Low shift motor	Shorted GND or disconnected wiring	13
42	P1773	Hight-Low shift motor	User operation error (not failure)	14
43	P1743	Hight-Low shift motor	Motor moving more than 5s	15
55	P1755	Hight-Low shift motor	Input abnormality of motor position signal	16

TPS : Throttle Position Sensor
EMC : Electromagnetic coil
ADC : Shift on the fly (Axle Dis Connect)

Diagnosis from Trouble Codes

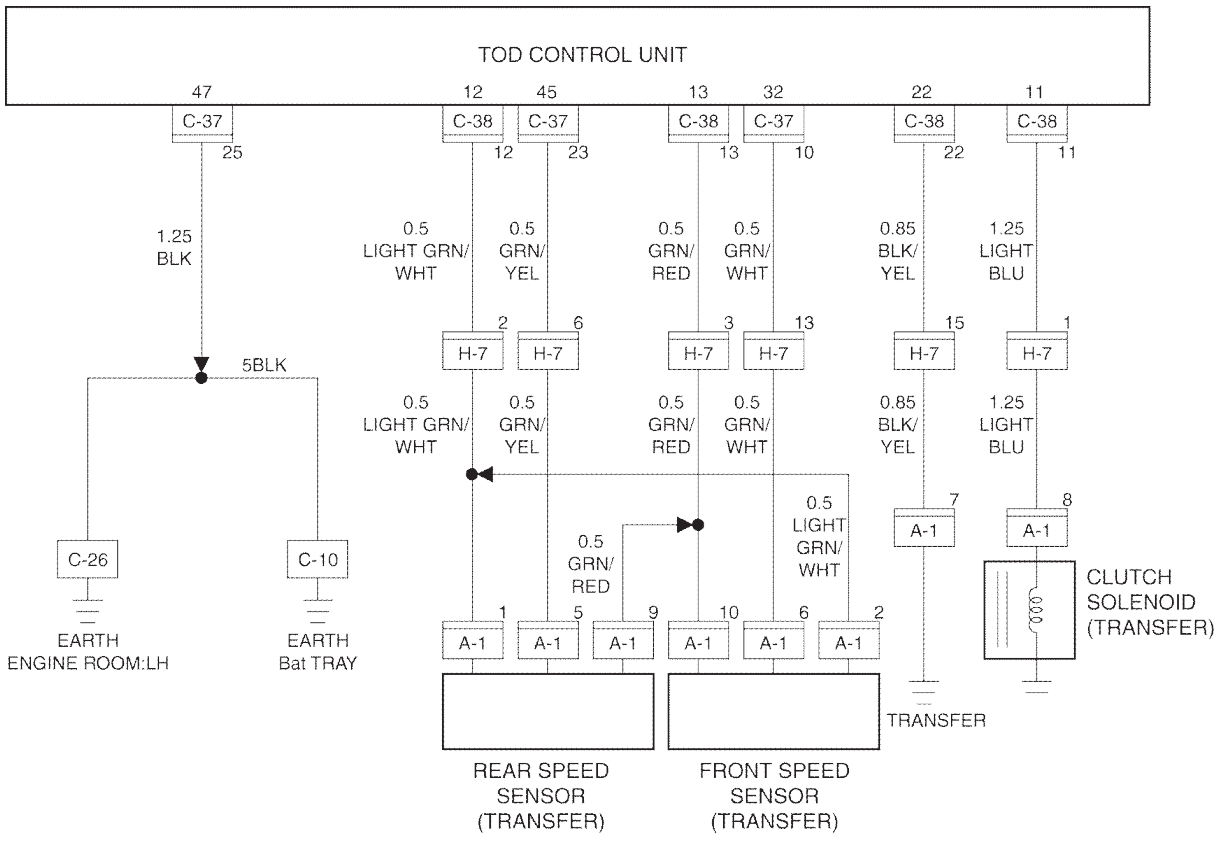
- Diagnose the fault that have been saved to the control unit according to the system self-diagnostic function.

Check flow	Trouble code	Phenomenon	Standard
1	23, 36, 37, 38	The ECU has failed.	—
	P1712, P1714		

Step	Action	Yes	No
1	Turn on the starter switch. Is the trouble reproduced?	Replace the ECU and conduct the test run. Go to *Step 3*	Go to *Step 2*
2	1. Clear the trouble codes. 2. Conduct the test run. Is the trouble reproduced during the test run?	Replace the ECU and conduct the test run. Go to *Step 3*	The trouble is not reproduced. Refer to *"Trouble intermittently observed".* Go to *Step 3*
3	1. Check that all the parts are mounted. 2. Clear the trouble codes. Is this step complete?	Verify the repair.	Return to *Step 3*

Check flow	Trouble code	Phenomenon	Standard
2	14 P1731	Front speed sensor signal open or GND short, speed sensor com open.	0.2V > sensor voltage

NOTE: The following procedure shows the case that the front or rear sensor common grounding line is broken.

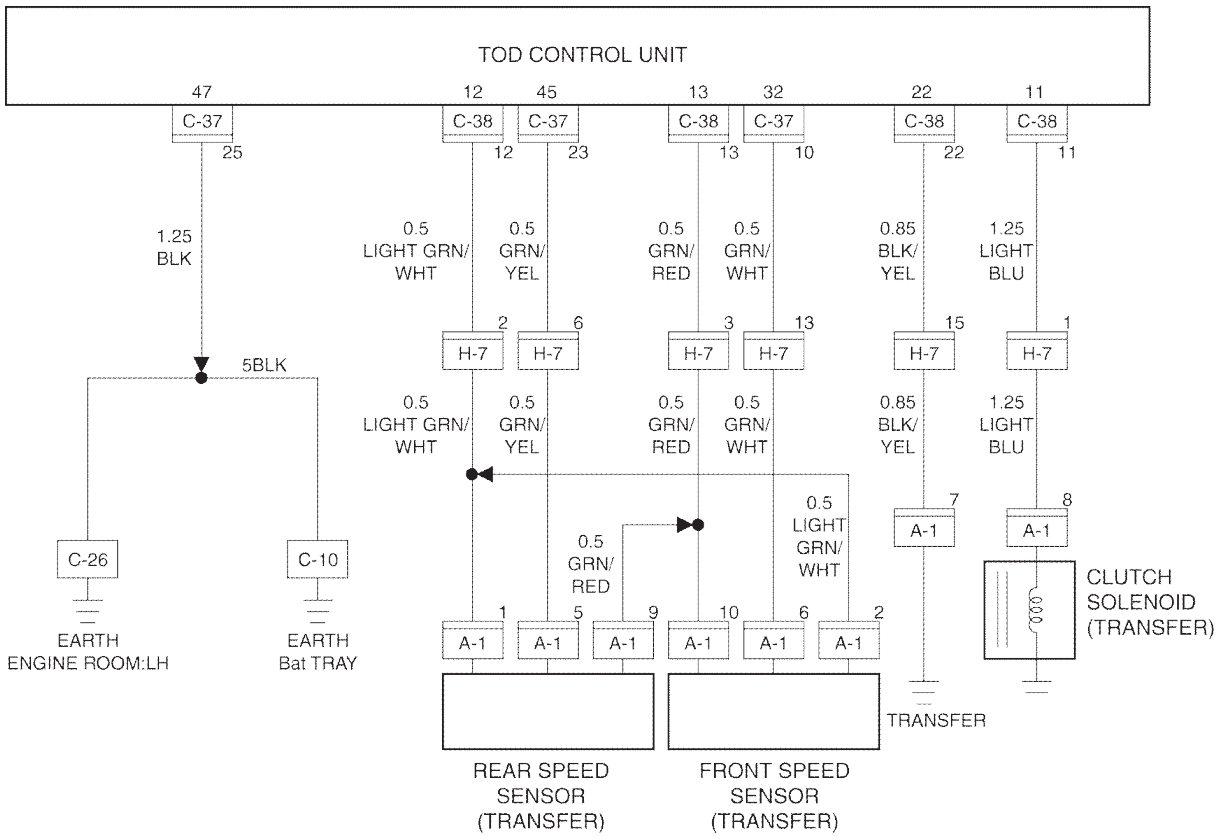


D04R200005

Step	Action	Yes	No
1	1. Start the engine. 2. Select TOD mode. Is there the memory except DTC 14(P1731)?	Go to *Step 4*	Go to *Step 2*
2	1. Turn off the starter switch. 2. Disconnect the ECU connector (C–38) and (C–37). Is there the continuity between (C–37) terminal 10 and 25?	Repair the circuit. Go to *Step 7*	Go to *Step 3*
3	1. Disconnect the transfer connector (A–1). Is there the continuity between the connector (C–37) terminal 10 and the connector (A–1) terminal 6, the connector (C–38) terminal 12 and connector (A–1) terminal 2, and the connector (C–38) terminal 13 and connector (A–1) terminal 10?	Replace the front speed sensor. Go to *Step 7*	Repair the circuit. Go to *Step 7*
4	Is the memory DTC 24(P1733)?	Go to *Step 5*	Refer to *other trouble check flow.*
5	Is there the continuity between harnesses of terminal 32 and 45 (vehicle side terminal of the front and rear speed sensor)?	Go to *Step 6*	Repair the circuit. Go to *Step 7*
6	Is there the continuity between harnesses of terminal 12 and 13 (vehicle side terminal of the speed sensor COM(–) and ref)?	Replace front and rear speed sensor. Go to *Step 7*	Repair the circuit. Go to *Step 7*
7	1. Check that all the parts are mounted. 2. Clear the trouble code. Is the step complete?	Verify the repair.	Return to *Step 7*

Check flow	Trouble code	Phenomenon	Standard
3	24	Rear speed sensor signal open or GND short, speed sensor COM open.	0.2 V > sensor voltage
	P1733		

NOTE: The following procedure shows the case that the front or rear sensor common grounding line is broken.

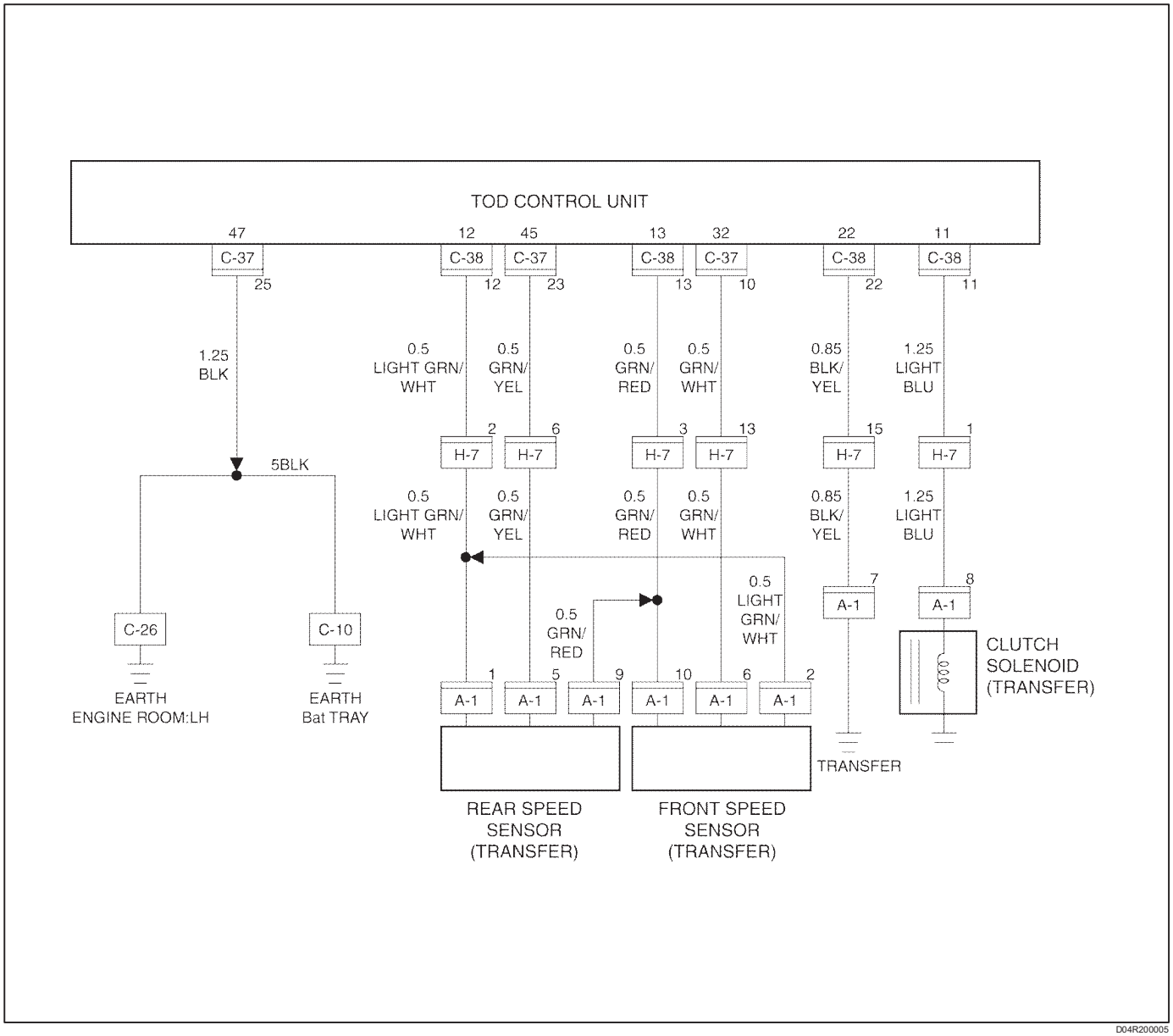


D04R200005

Step	Action	Yes	No
1	1. Start the engine. 2. Select TOD mode. Is there the memory except DTC 24(P1733)?	Go to *Step 4*	Go to *Step 2*
2	1. Turn off the starter switch. 2. Disconnect the ECU connector (C–38) and (C–37). Is there the continuity between the connector (C–37) terminal 23 and 25?	Repair the circuit. Go to *Step 7*	Go to *Step 3*
3	1. Disconnect the transfer connector (A–1). Is there the continuity between the connector (C–37) terminal 23 and the connector (A–1) terminal 5, the connector (C–38) terminal 12 and connector (A–1) terminal 1, and the connector (C–38) terminal 13 and connector (A–1) terminal 9?	Replace the rear speed sensor. Go to *Step 7*	Repair the circuit. Go to *Step 7*
4	Is the memory DTC 14(P1731)?	Go to *Step 5*	Refer to *other trouble cheek flow.*
5	Is there the continuity between harnesses of terminal 32 and 45 (vehicle side terminal of the front and rear speed sensor)?	Go to *Step 6*	Repair the circuit Go to *Step 7*
6	Is there the continuity between harnesses of terminal 12 and 13 (vehicle side terminal of the speed sensor COM(–) and ref)?	Replace front and rear speed sensor. Go to *Step 7*	Repair the circuit. Go to *Step 7*
7	1. Check that all the parts are mounted. 2. Clear the trouble code. Is the step complete?	Verify the repair	Return to *Step 7*

Check flow	Trouble code	Phenomenon	Standard
4	16 P1737	The front speed sensor no pulse.	Hi level : 4.5 ~ 6.0 V Lo level : 0.7 ~ 2.0 V Frequency (F) = 700-850 Hz (at 50 km/h or 31 mph)

NOTE: Find the trouble in which the pulse corresponding to the running speed is not input.

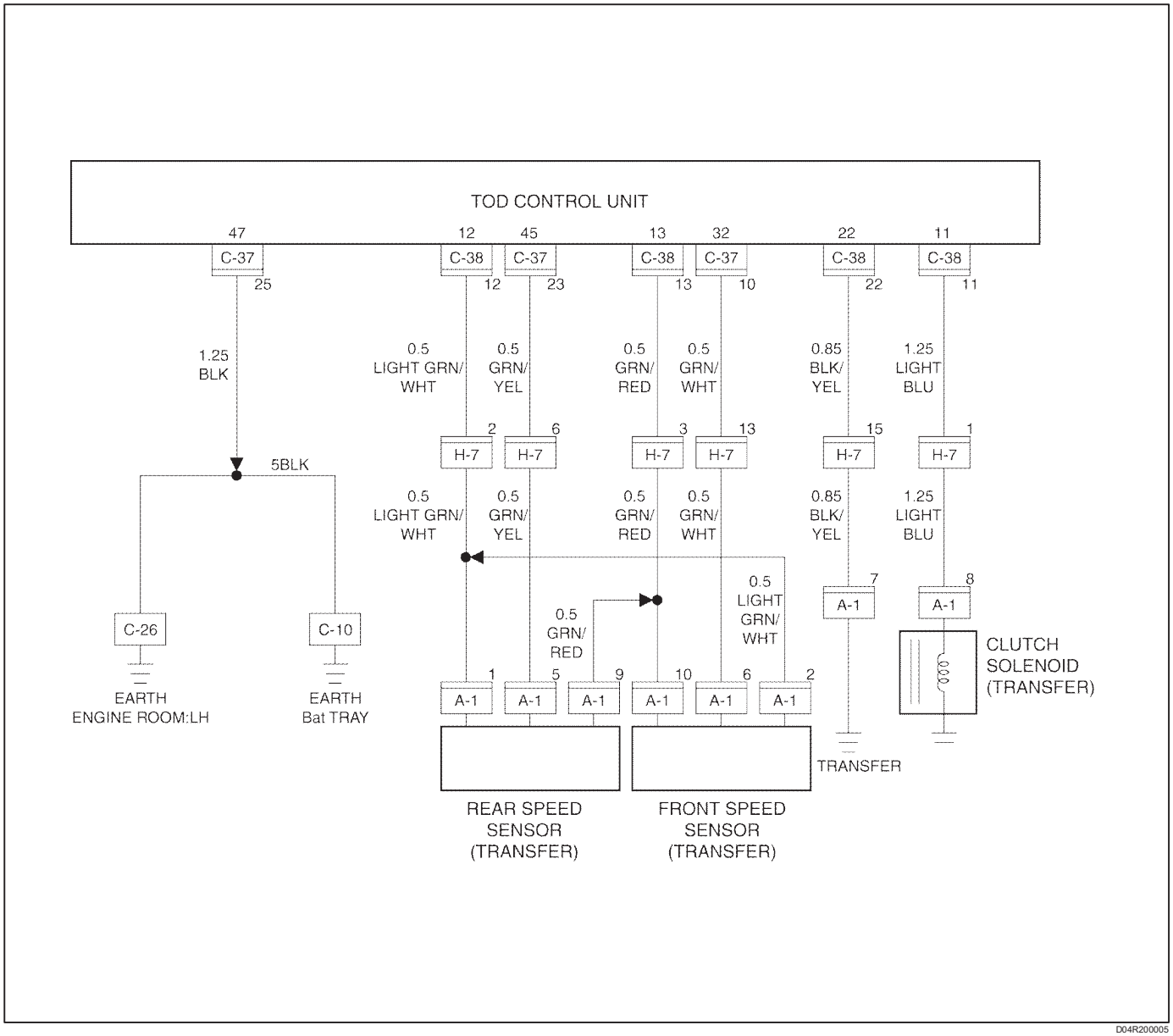


D04R200005

Step	Action	Yes	No
1	1. Connect TECH 2. While running in TOD mode, does TECH–2's front speed sensor indication change with vehicle speed?	Go to *Step 2*	Repair and inspection front speed sensor tone wheel. Go to *Step 6*
2	1. Clear the trouble code. While running at 40 km/h or 25 mph in TOD mode for 30 consecutive sec, is the trouble code reissued?	Go to *Step 3*	The trouble is not reproduced. Refer to *"Troubles intermittently observed".*
3	1. Turn off the starter switch. 2. Disconnect the ECU connector (C–38) and (C–37). Is there the continuity between the connector (C–37) terminal 10 and 25?	Repair the circuit. Go to *Step 6*	Go to *Step 4*
4	1. Disconnect the transfer connector (A–1). Is there the continuity between the connector (C–37) terminal 10 and the connector (A–1) terminal 6, the connector (C–38) terminal 12 and connector (A–1) terminal 2, and the connector (C–38) terminal 13 and connector (A–1) terminal 10?	Replace the front speed sensor. Go to *Step 5*	Repair the circuit. Go to *Step 5*
5	1. Clear the trouble code. While running at 40 km/h or 25 mph in TOD mode for 30 consecutive sec, is the trouble code reissued?	Replace ECU. Go to *Step 6*	Go to *Step 6*
6	1. Check that all the parts are mounted. 2. Clear the trouble code. Is this step complete?	Repeat the "Diagnosis Flow".	Return to Step 6

Check flow	Trouble code	Phenomenon	Standard
5	27 P1738	The rear speed sensor no pulse.	Hi level : 4.5 ~ 6.0 V Lo level : 0.7 ~ 2.0 V Frequency (F) = 700-850 Hz (at 50 km/h or 31 mph)

NOTE: Find the trouble in which the pulse corresponding to the running speed is not input.

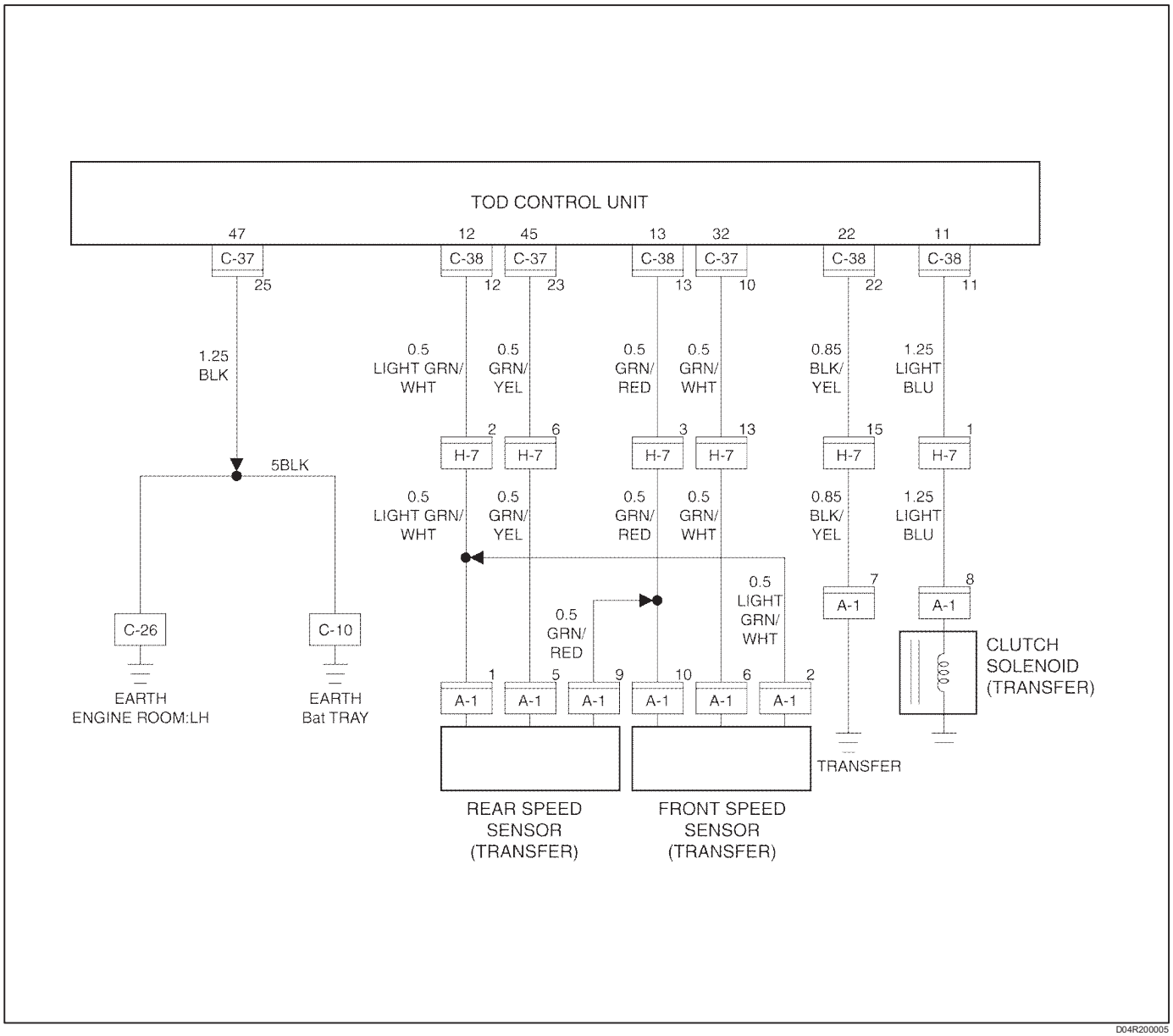


D04R200005

Step	Action	Yes	No
1	1. Connect TECH 2. While running in TOD mode, does TECH–2's rear speed sensor indication change with vehicle speed?	Go to *Step 2*	Repair and inspection front speed sensor tone wheel. Go to *Step 6*
2	1. Clear the trouble code. While running at 40 km/h or 25 mph in TOD mode for 30 consecutive sec, is the trouble code reissued?	Go to *Step 3*	The trouble is not reproduced. Refer to *"Troubles intermittently observed"*.
3	1. Turn off the starter switch. 2. Disconnect the ECU connector (C–38) and (C–37). Is there the continuity between the connector (C–37) terminal 23 and 25?	Repair the circuit. Go to *Step 5*	Go to *Step 4*
4	1. Disconnect the transfer connector (A–1). Is there the continuity between the connector (C–37) terminal 23 and the connector (A–1) terminal 5, the connector (C–38) terminal 12 and connector (A–1) terminal 1, and the connector (C–38) terminal 13 and connector (A–1) terminal 9?	Replace the rear speed sensor. Go to *Step 5*	Repair the circuit. Go to *Step 5*
5	1. Clear the trouble code. While running at 40 km/h or 25 mph in TOD mode for 30 consecutive sec, is the trouble code reissued?	Replace ECU. Go to *Step 6*	Go to *Step 6*
6	1. Check that all the parts are mounted. 2. Clear the trouble code. Is this step complete?	Repeat the "Diagnosis Flow".	Return to *Step 6*

Check flow	Trouble code	Phenomenon	Standard
6	13 (P1735)	The reference is short-circuited to GND.	Reference ≃ 5 V
	15 (P1736)	The reference is short-circuited to VB.	

If the reference wire (12) is short-circuited to GND, the speed signal is not generated. If the wire is short-circuited to the battery voltage, the signal level becomes faulty.

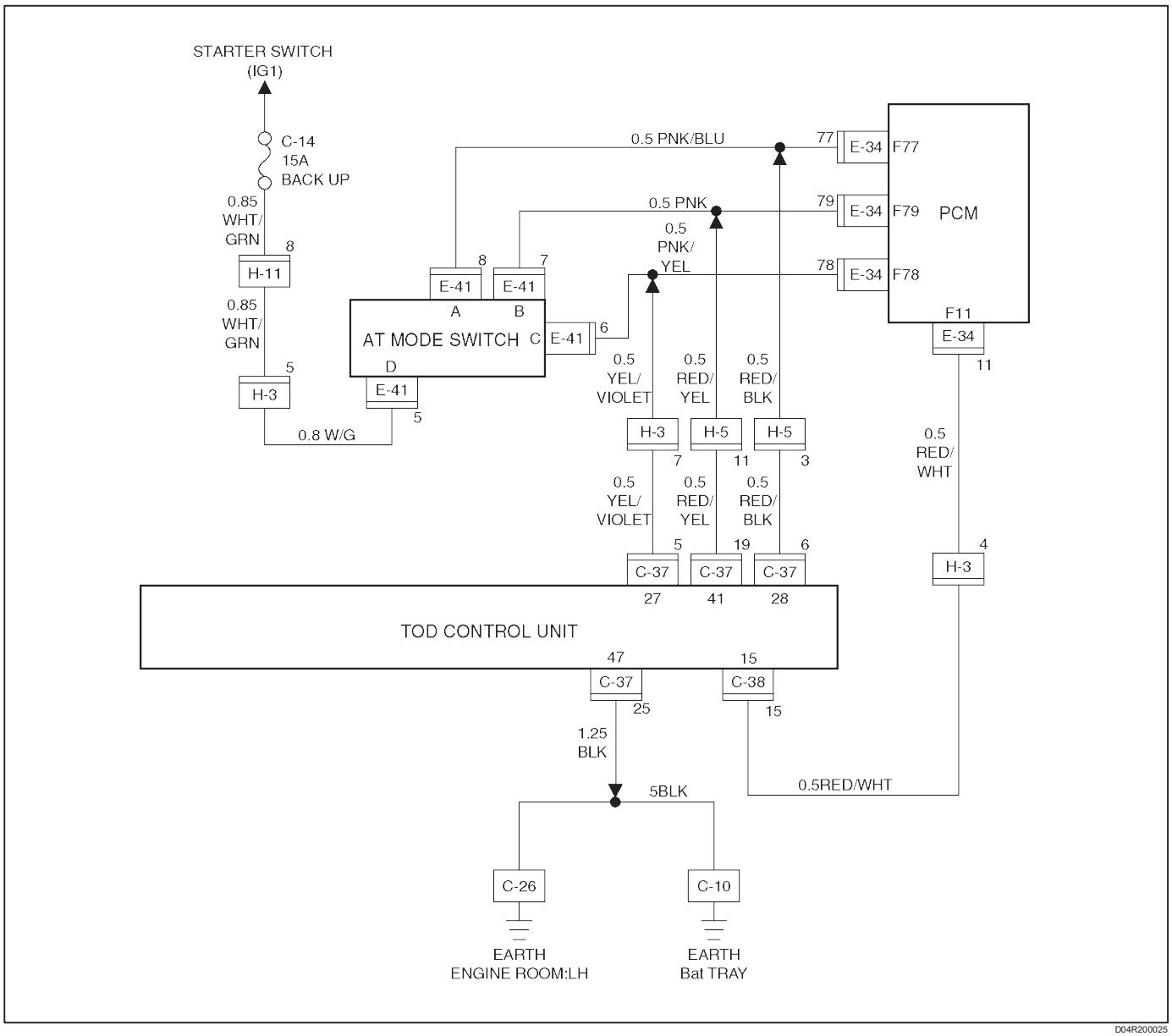


D04R200005

Step	Action	Yes	No
1	1. Start the engine. Does the voltage between terminals 12 and 47 meet the standard 5V?	Refer to *"Trouble intermittently observed".*	Go to *Step 2*
2	Is the voltage below the standard?	Go to *Step 3*	Go to *Step 7*
3	1. Turn off the starter switch. 2. Disconnect the ECU connector. Is the continuity established between vehicle harness terminals (C–38)12 and (C–37)25?	Go to *Step 4*	The ECU is failed. Replace the ECU. Go to *Step 8*
4	1. Disconnect the H-7 connector. Is the continuity established between floor harness connector terminals (H-7)2 and (H-7)15?	Go to *Step 5*	Short to GND between (C–38)12 and (H–7)2. Repair the circuit. Go to *Step 8*
5	1. Disconnect the A-1 connector. Is the continuity established between transfer harness connector male terminals (A–1)1 and (A–1)7?	Replace the rear speed sensor. Go to *Step 8*	The reference harness for the rear speed sensor is short–circuited to GND. Repair the circuit. Go to *Step 6*
6	1. Disconnect the A-1 connector. Is the continuity established between transfer harness connector terminals (A–1)2 and (A–1)7?	Replace the front speed sensor. Go to *Step 8*	The reference harness for the rear speed sensor is short–circuited to GND. Repair the circuit. Go to *Step 8*
7	1. Turn off the starter switch. 2. Disconnect the ECU connector. 3. Turn on the starter switch. Is the battery voltage observed between harness connector terminals (C–38)12 and (C–37)25?	Repair the circuit. Go to *Step 8*	The ECU has failed. Replace the ECU. Go to *Step 8*
8	1. Check that all the parts are mounted. 2. Clear the trouble code. Is this step complete?	Repeat the "Diagnosis Flow"	Go to *Step 8*

Check flow	Trouble code	Phenomenon	Standard
7	21 (P1716)	The voltage of the throttle position sensor (TPS) is faulty.	See below table.

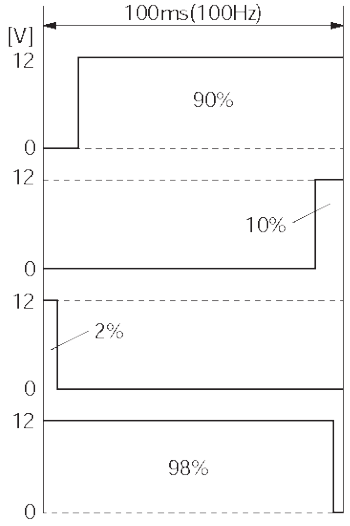
NOTE: The signal voltage from the TPS deviates from the standard range.



D04R200025

Oscilloscope Waveform

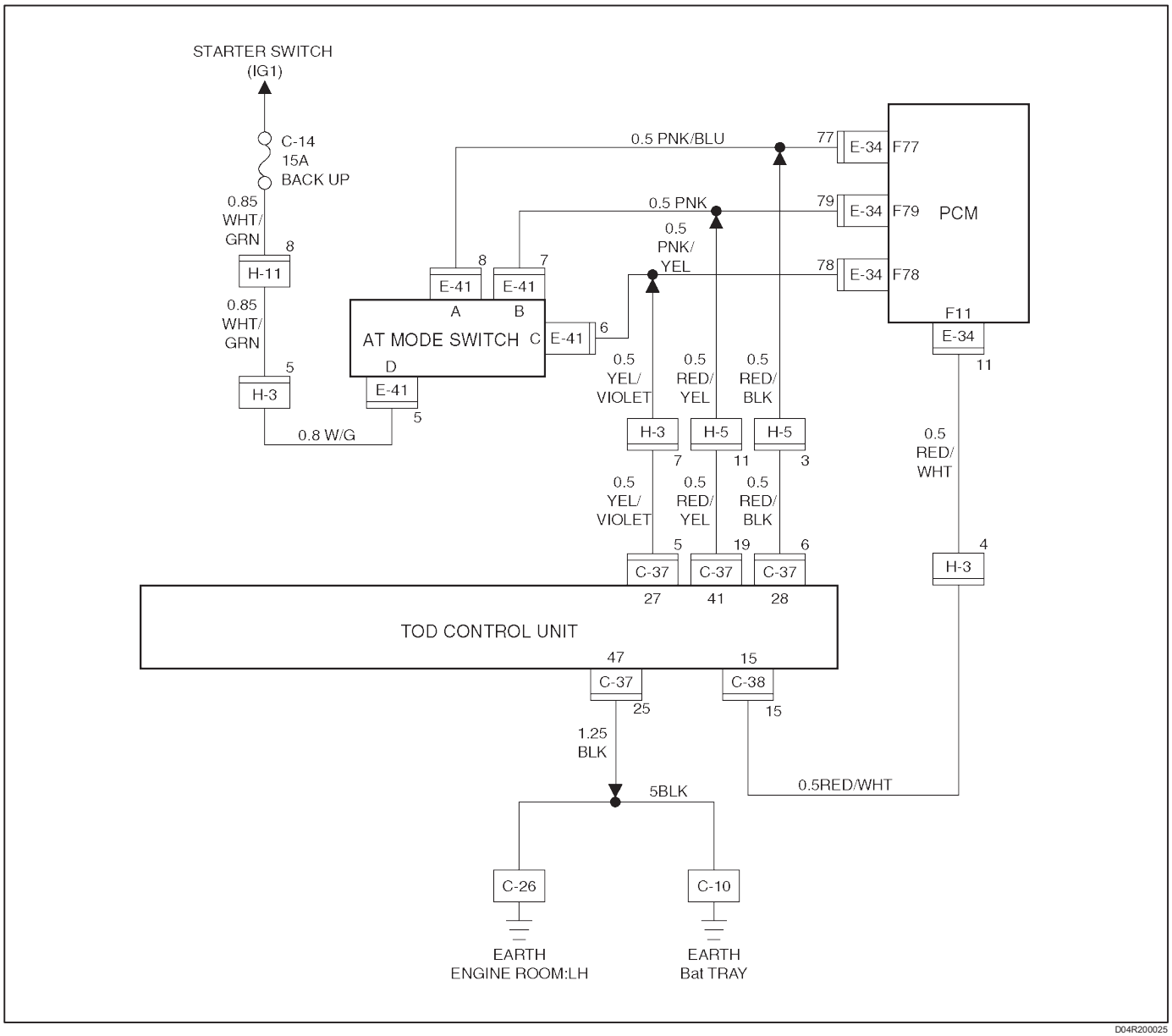
PWM 0-12V	Duty Cycle
1. Minimum Throttle	90%
2. Maximum Throttle	10%
3. TPS PWM FAULT	Less than 2% More than 98%



D04RY00012

Step	Action	Yes	No
1	1. Turn off the starter switch. Is the battery voltage normal?	Go to *Step 2*	Charge or replace the battery. Go to *Step 7*
2	1. Turn on the starter switch. Does the voltage between terminals 15 and 47 fall within the standard range?	Go to *Step 3*	Go to *Step 4*
3	1. Clear the trouble code. 2. Turn on the starter switch. Is there DTC21 (P1716)?	Go to *Step 4*	Refer to *"Trouble intermittently observed".*
4	1. Turn off the starter switch. 2. Disconnect the ECU connector. 3. Turn on the starter switch. Does the voltage between terminals (C–38)15 and (C–37)25 fall within the standard range above?	The ECU has failed. Replace the ECU. Go to *Step 7*	Go to *Step 5*
5	Is the harness healthy?	Go to *Step 6*	Repair the harness. Go to *Step 7*
6	Is the TPS healthy?	Go to *Step 7*	Replace the TPS. Go to *Step 7*
7	1. Check that all the parts are mounted. 2. Clear the trouble code. Is this step complete?	Repeat the "Diagnosis Flow".	Go to *Step 7*

Check flow	Trouble code	Phenomenon	Standard
8	17 (P1774)	The input from the mode switch is abnormal.	—



D04R200025

Step	Action	Yes	No
1	Is the TOD control unit the regular part? (Verity the part number.)	Go to *Step 2*	Replace with the regular part. Go to *Step 2*
2	1. Turn on the starter switch. Does the voltage between the terminal 28 and 47 accord with the table 1 corresponding to the AT selector positions?	Go to *Step 3*	Go to *Step 5*
3	Does the voltage between the terminal 41 and 47 accord with the table 1 corresponding to the AT selector positions?	Go to *Step 4*	Go to *Step 6*
4	Does the voltage between the terminal 27 and 47 accord with the table 1 corresponding to the AT selector positions?	Refer to *"Trouble intermittently observed".*	Go to *Step 7*
5	1. Disconnect the AT mode connector (E–41). Does the continuity between the inhibitor switch terminal 5 (D) and 8 (A) accord with the table 2 corresponding to the AT selector positions?	Repair the circuit between the connector terminal (C–37) 6 and (E–41) 8. Go to *step 8*	Replace the inhibitor switch. Go to *Step 8*
6	1. Disconnect the AT mode connector (E–41). Does the continuity between the inhibitor switch terminal 5 (D) and 7 (B) accord with the table 2 corresponding to the AT selector positions?	Repair the circuit between the connector terminal (C–37) 19 and (E–41) 7. Go to *Step 8*	Replace the inhibitor switch. Go to *Step 8*
7	1. Disconnect the AT mode connector (E–41). Does the continuity between the inhibitor switch terminal 5 (D) and 6 (C) accord with the table 2 corresponding to the AT selector positions?	Repair the circuit between the connector terminal (C–37) 5 and (E–41) 6. Go to *Step 8*	Replace the inhibitor switch. Go to *Step 8*
8	1. Check that all the parts are mounted. 2. Clear the trouble code. Is this step complete?	Verify the repair.	Go to *Step 8*

Table 1

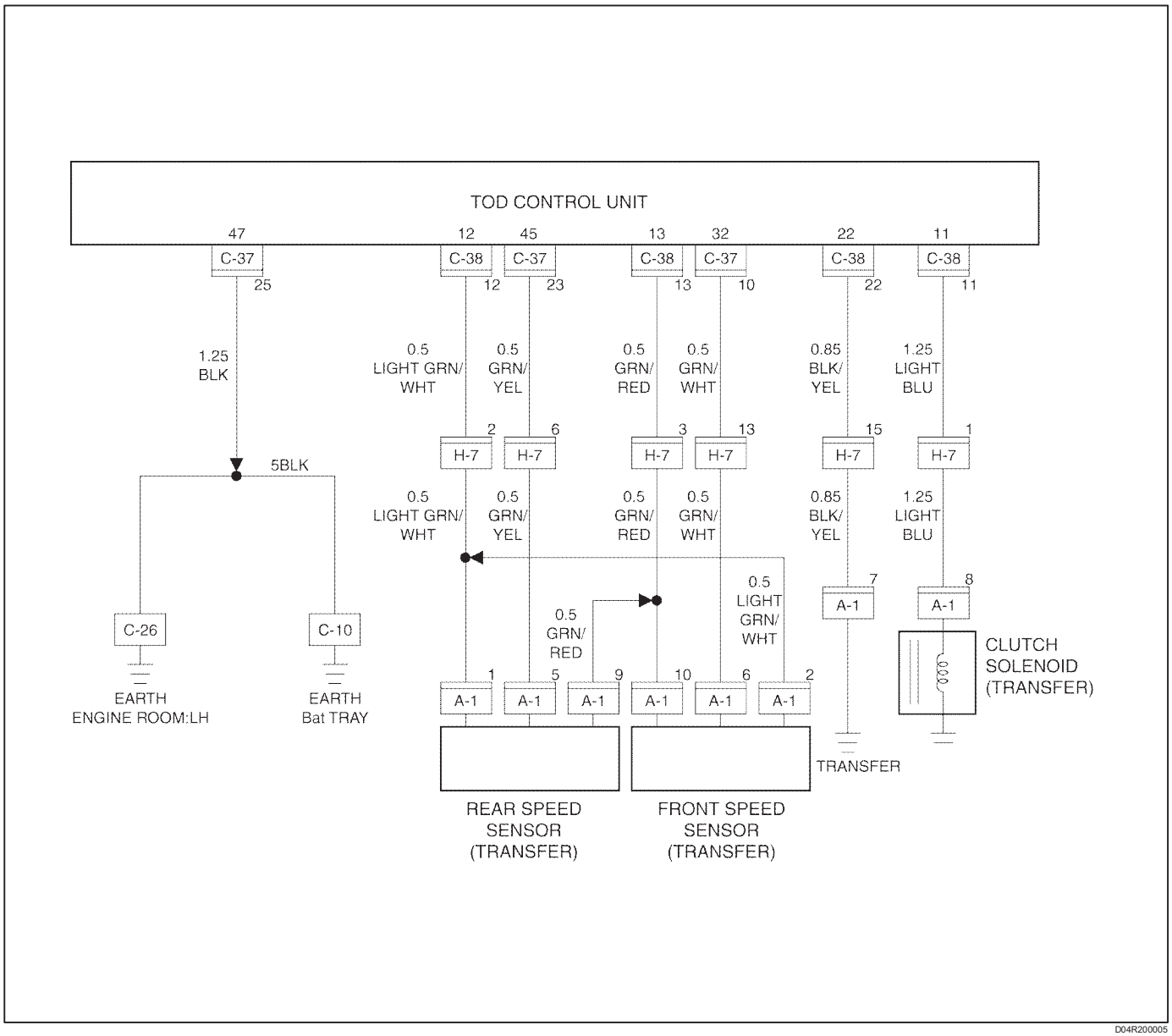
Unit: V

AT selector position	Voltage between terminal 28 and 47	Voltage between terminal 41 and 47	Voltage between terminal 27 and 47
P	12	0	0
R	12	12	0
N	0	12	0
D	0	12	12
3	12	12	12
2	12	0	12
1	0	0	12

Table 2

Continuity between terminals of inhibitor switch connector (E–41)			
AT selector position	Continuity between terminal 8(A) and 5(D)	Continuity between terminal 7(B) and 5(D)	Continuity between terminal 6(C) and 5(D)
P	YES	NO	NO
R	YES	YES	NO
N	NO	YES	NO
D	NO	YES	YES
3	YES	YES	YES
2	YES	NO	YES
1	NO	NO	YES

Check flow	Trouble code	Phenomenon	Standard
9	31 (P1721)	The electromagnetic coil is broken or shorted to the battery or GND.	—



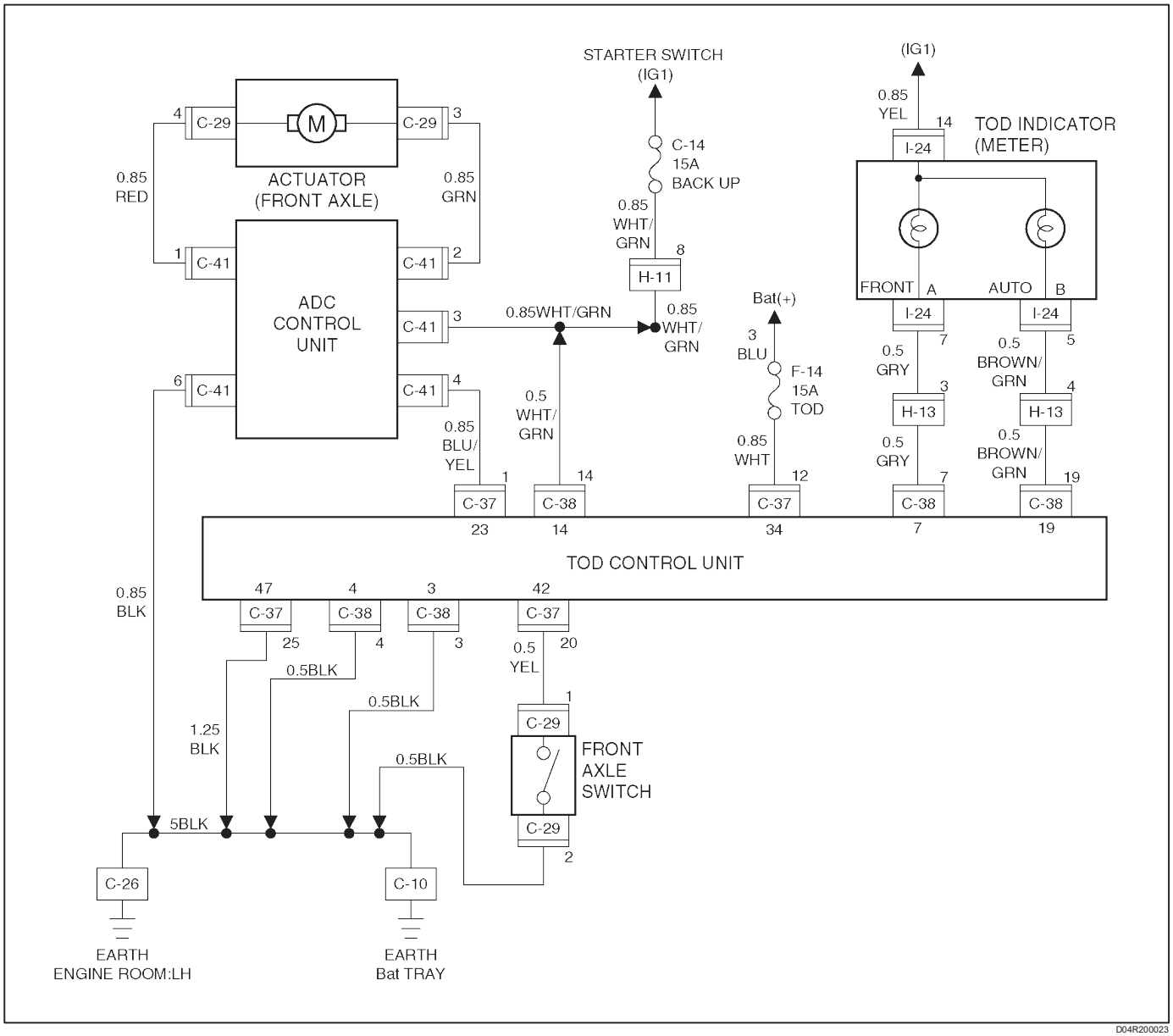
D04R200005

Step	Action	Yes	No
1	1. Clear the trouble code. 2. Start the engine 3. Set the TOD mode. Is there DTC31 (P1721)?	Go to *Step 2*	Refer to *"Trouble intermittently observed".*
2	1. Turn off the starter switch. 2. Disconnect the ECU connector from ECU. Is the continuity established between terminals (C–38)11 and (C–38)22?	Go to *Step 3*	Go to *Step 5*
3	1. Connect the ECU connector. 2. Start the engine. 3. Set the TOD mode. Does the voltage between terminals 11 and 22 indicate at least 0.4V?	Go to *Step 4*	Go to *Step 6*
4	Is the battery voltage always observed between terminals 11 and 22?	The harness is short–circuited on the battery. Repair the circuit. Go to *Step 8*	Go to *Step 6*
5	1. Disconnect the A–1 connector. Is the continuity established between transfer connector terminals (A–1)8 and (A–1)7?	The harness is broken. Repair the circuit. Go to *Step 8*	Replace the transfer electromagnetic coil (solenoid clutch). Go to *Step 8*
6	1. Turn off the starter switch. 2. Disconnect the ECU connector from ECU. Is the resistance between the connector (C–38) terminal 11 and 22 1.0 ~ 5.0Ω?	The ECU has failed. Replace the ECU Go to *Step 8*	Go to *Step 7*
7	Is the resistance between the transfer connector (A–1) terminal 8 and 7 1.0 ~ 5.0Ω?	The harness is disconnection or short to GND. Repair the circuit. Go to *Step 8*	Replace the transfer electromagnetic coil (solenoid clutch). Go to *Step 8*
8	1. Check that all the parts are mounted. 2. Clear the trouble code. Is this step complete?	Repeat the "Diagnosis Flow".	Return to Step 8

Check flow	Trouble code	Phenomenon	Standard
10	28 (P1760)	The shift on the fly system (front axle disconnect) works incorrectly.	—

NOTE: The shift on the fly system is not changed between 2WD and 4WD modes normally.

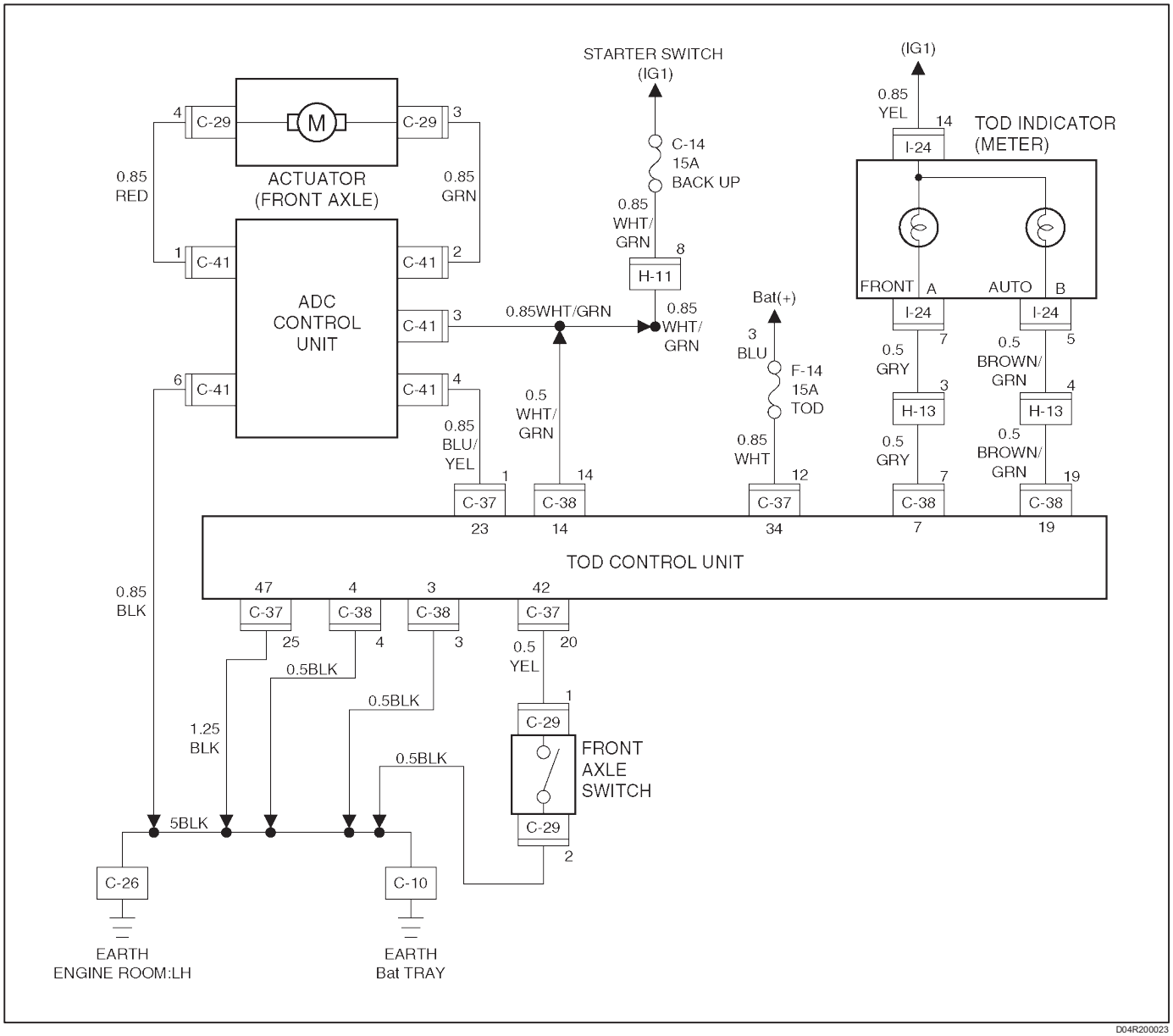
CAUTION: If code 32 or 33 is also observed, remove the trouble associated with code 32 or 33 first.



Step	Action	Yes	No
1	1. Turn on the starter switch. 2. Set the transfer to the 2H mode. Is the battery voltage observed between terminals 23 and 47?	Go to *Step 2*	Go to *Step 5*
2	Is 5V observed between terminals 42 and 47?	Go to *Step 3*	Go to *Step 6*
3	1. Set the transfer to the TOD mode. Does the voltage between terminals 23 and 47 indicate 0~1V?	Go to *Step 4*	The ECU has failed. Replace the ECU. Go to *Step 7*
4	Does the voltage between terminals 42 and 47 indicate 0V?	The phenomenon is not reproduced. Refer to *"Troubles intermittently observed".*	The shift on the fly system is failed (refer to *Section 4B1 and 4C*). Go to *Step 7*
5	Does the TOD indicator show the 2H mode?	The ECU has failed. Replace the ECU. Go to *Step 7*	See "Trouble Diagnosis Depending on The Status of TOD Indicator".
6	Set the transfer to the TOD mode. Does the voltage between terminals 23 and 47 indicate 0~1V?	The shift on the fly system has failed (refer to *Section 4B1 and 4C*). Go to *Step 7*	The ECU has failed. Replace the ECU. Go to *Step 7*
7	1. Check that all the parts are mounted. 2. Clear the trouble code. Is this step complete?	Verify the repair.	Return to *Step 7*

Check flow	Trouble code	Phenomenon	Standard
11	32 (P1761)	The on/off signal (ADC) line of the shift on the fly system (front axle disconnect) is broken, or the line is short-circuited to the battery.	—

NOTE: The on/off signal line of the shift on the fly system is broken, or the line is short–circuited to the battery.



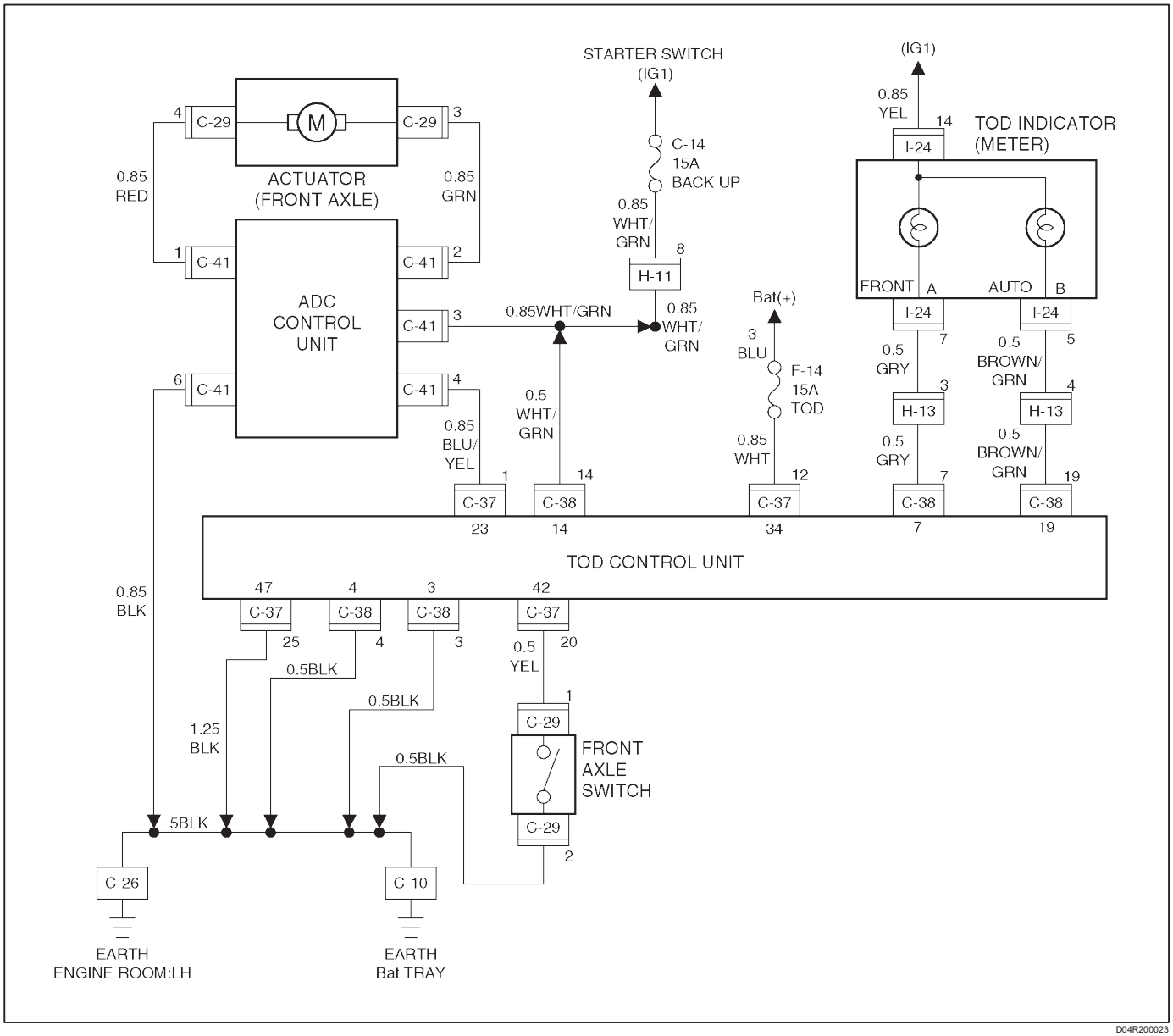
Step	Action	Yes	No
1	1. Turn off the starter switch. 2. Disconnect the ECU connector from ECU. 3. Disconnect ADC control unit connector (C–41). Is the continuity established between terminals (C–37) 1 and (C–41) 4? After checking, connect the ADC control unit connector.	Go to *Step 2*	The harness is broken. Repair the circuit. Go to *Step 6*
2	1. Disconnect the battery ground cable. Is there the continuity between the connector terminal (C–37) 1 and (C–38) 14?	The harness is short-circuited to VIGN. Repair the circuit. Go to *Step 6*	Go to *Step 3*
3	1. Disconnect the battery ground cable. Is there the continuity between the connector terminal (C–37) 1 and (C–37) 12?	The harness is short-circuited to VB. Repair the circuit. Go to *Step 6*	Go to *Step 4*
4	Is the resistance between the connector terminal (C–37) 1 and (C–37) 25 less than 1Ω?	The harness is short-circuited to GND. Repair the circuit. Go to *Step 6*	Go to *Step 5*
5	1. Turn off the starter switch. 2. Connect ECU connector. 3. Turn on the starter switch. 4. Set the transfer to the 2H mode. Is the battery voltage observed between the connector (C–37) terminals 1 and 25?	The phenomenon is not reproduced. Refer to *"Trouble intermittently observed"*, or refer to *"Sec 4B1 Shift on the Fly"*.	The ECU has failed. Replace the ECU. Go to *Step 6*
6	1. Check that all the parts are mounted. 2. Clear the trouble code. Is this step complete?	Verify the repair.	Return to Step 6

Check flow	Trouble code	Phenomenon	Standard
12	33 (P1762)	The ADC line is short-circuited to GND.	—

NOTE:

- The on/off signal line of the shift on the fly system is short–circuited to GND.
- The system enters into the fail-safe mode because of fusing or system protection.

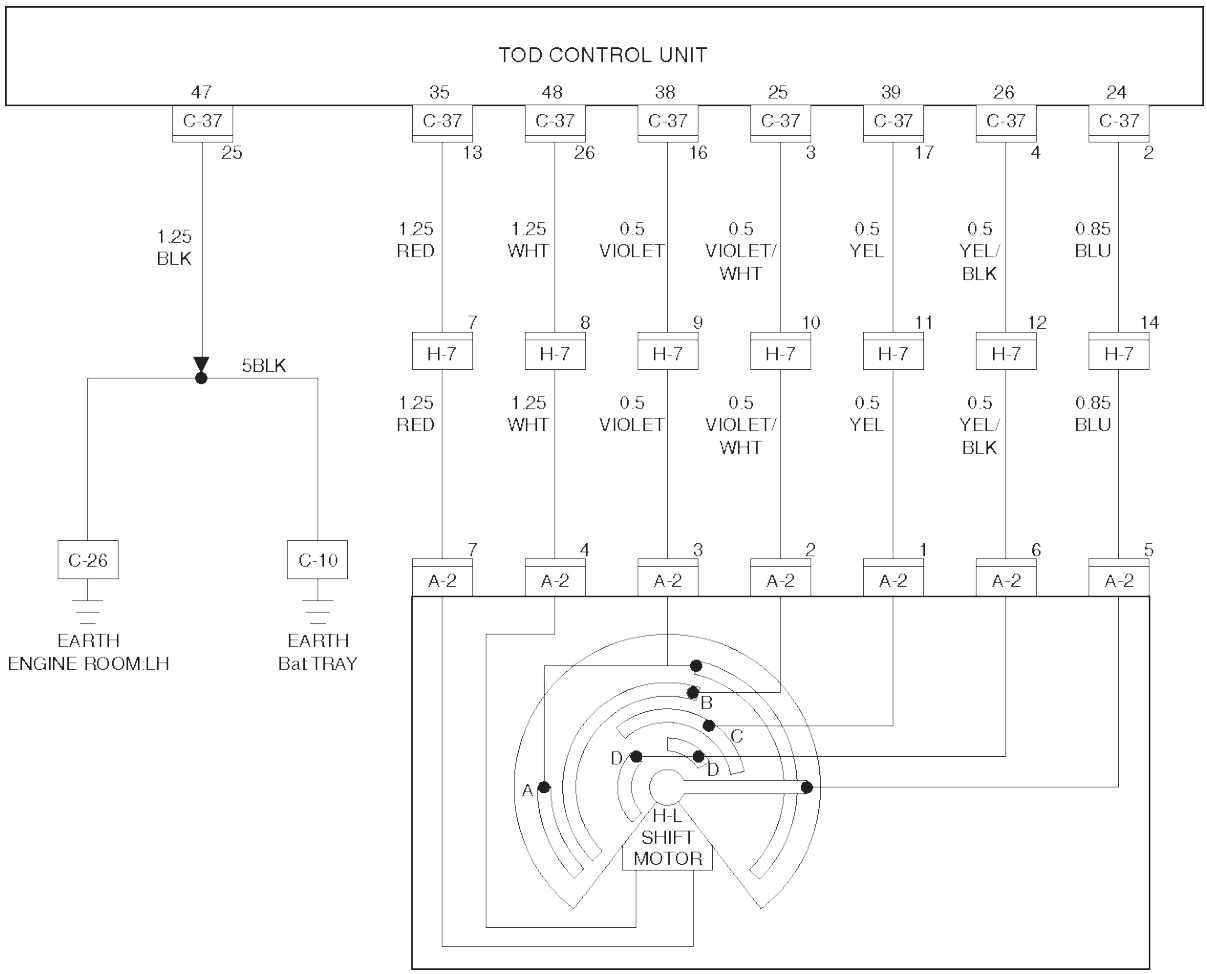
  (If a short–circuit is observed on GND, the output to the on/off signal line becomes 0V.)



D04R200023

Step	Action	Yes	No
1	1. Turn off the starter switch. 2. Disconnect the ECU connector from ECU. 3. Disconnect the ADC control unit connector (C–41). Is there the continuity between the connector terminal (C–37) 1 and (C–41) 4? After checking, connect the ADC control unit connector.	Go to *Step 2*	The harness is broken. Repair the circuit. Go to *Step 4*
2	Is the resistance between terminals (C–37) 1 and (C–37) 25 less than 1Ω?	The signal line circuit of the shift on the fly system is short-circuited to GND. Repair the circuit. Go to *Step 4*	Go to *Step 3*
3	1. Connect the ECU connector. 2. Turn on the starter switch. 3. Set the transfer to the 2H mode. Is the battery voltage observed between the connector (C–37) terminal 1 and 25?	The phenomenon is not reproduced. Refer to *"Trouble intermittently observe"*, or refer to *"Sec 4B1 Shift on the Fly".*	The ECU has failed.Replace the ECU. Go to *Step 4.*
4	1. Check that all the parts are mounted. 2. Clear the trouble code. Is this step complete?	Verify the repair.	Return to *Step 4*

Check flow	Trouble code	Phenomenon	Standard
13	41 (P1741)	The High-Low motor circuit is broken. The circuit is short–circuited to GND.	—
	43 (P1743)	The High-Low motor has moved consecutive more than 5 sec.	—



D04R200007

Step	Action	Yes	No
1	1. Turn on the starter switch. When the motor is not moving, is the voltage between the terminals 35 and 47 8.0 ~ 14.5V?	Go to *Step 2*	Go to *Step 3*
2	When the motor is not moving, is the voltage between the terminal 48 and 47 8.0 ~ 14.5V?	Go to *Step 5*	Go to *Step 3*
3	1. Turn off the starter switch. 2. Disconnect the ECU connector (C–37) and transfer connector (A–2). Is there the continuity between the connector terminal (C–37) 13 and (A–2) 7?	Go to *Step 4*	Repair the circuit. Go to *Step 11*
4	Is there the continuity between the connector terminal (C–37) 26 and (A–2) 4?	Go to *Step 5*	Repair the circuit Go to *Step 11*
5	1. Connect the ECU connector (C–37) and transfer connector (A–2). 2. Turn on the starter switch Is the transfer shifted to the low range from the high range?	Go to *Step 6*	Go to *Step 7*
6	1. Is the transfer shifted to the high range from the low range.	The phenomenon is not reproduced. Refer to *"Trouble intermittently observed".*	Go to *Step 8*
7	1. After the starter switch is turned off, turn on the starter switch. 2. Right after the TOD switch is changed to the 4L position from the TOD position, measure the voltage for 5 seconds. Is the voltage between terminal 48 and 47 0V while the motor is moving and 8.0 ~ 14.5V after the motor moving stops?	Go to *Step 9*	Replace the ECU. Go to *Step 11*
8	1. After the starter switch is turned off, turn on the starter switch. 2. Right after the TOD switch is changed to the TOD position from 4L position, measure the voltage for 5 seconds. Is the voltage between terminals 35 and 47 0V while motor is moving and 8.0 ~14.5V after the motor moving stops?	Go to *Step 9*	Replace the ECU. Go to *Step 11*
9	1. Remove the motor asm with the connector (A–2) from the transfer. 2. Connect the ECU connector (C–37). 3. Turn on the starter switch. When the TOD switch is changed to the 4L position from the TOD position, does the shaft in the motor asm rotate to the Low direction?	Go to *Step 10*	Replace the high-low motor asm. Go to *Step 11*
10	When the TOD switch is changed to the TOD position from the 4L position, does the shaft in the motor asm rotate to the High direction?	Repair the transfer asm. Go to *Step 11*	Replace the high–low motor asm. Go to *Step 11*
11	1. Check that all the parts are mounted. 2. Clear the trouble code. Is this step complete?	Verify the repair	Return to *Step 11*

NOTE:

- Confirm the operation conditions when changing high and low range.
  - – The car stops. (less than 2 km/h or 1.2 mph and engine speed less than 1500 rpm)
  - – The AT selector position is neutral.
  - – The brake is applied (brake switch: ON)
- Verify the completion of changing the high/low range by the TOD indicator on the instrument panel.

Check flow	Trouble code	Phenomenon	Standard
14	42 (P1773)	Error operation was carried out under high–low motor running.	—

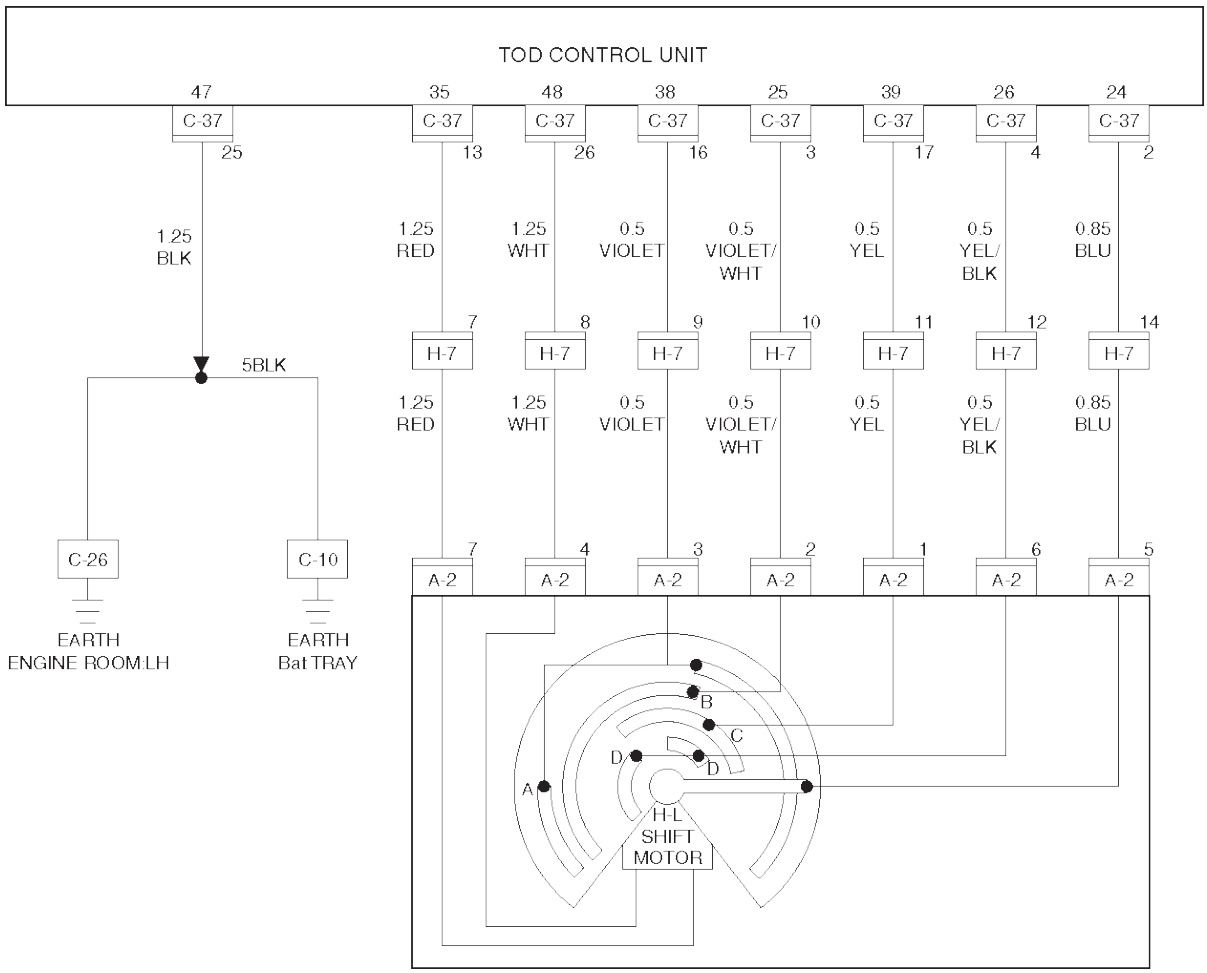
Step	Action	Yes	No
1	1. Clear the trouble code. Is the transfer changed to the low range from the high range?	Go to *Step 2*	Go to *Step 3*
2	Is the transfer changed to the high range from the low range?	The phenomenon is not reproduced. Refer to *"Trouble intermittently observed".*	Go to *Step 3*
3	Is the trouble code memoried?	Go to *Step 4*	See "Diagnosis from Symptom".
4	Is the memory DTC42 (P1773)?	Go to *Step 5*	Remove the trouble associated with codes except DTC 42 first. Confirm the DTC again. Go to *Step 5*
5	1. Clear the trouble code. 2. Confirm the condition and operation of the transfer range changing and check the state of the TOD indicator. Change the transfer to the low from the high and vice versa. Is the transfer changed to the low from the high and to the high from the low?	The transfer is changed in both ranges by the correct operation. Operate the transfer according to *"Owner's Manual".*	Go to *Step 6*
6	Is the trouble code memoried?	Go to *Step 7*	See *"Diagnosis from Symptom".*
7	Is the memory DTC 42 (P1773)?	Replace the ECU. Go to *Step 8*	Remove the trouble associated with codes except DTC 42 first. Confirm the DTC again. Go to *Step 5*
8	1. Check that all the parts are mounted. 2. Clear the trouble code. Is this step complete?	Verify the repair.	Go to *Step 8*

NOTE:

- Confirm the operation conditions when changing high/low range.
  - The car stops. (less than 2 km/h or 1.2 mph and engine speed: less than 1500 rpm)
  - The AT selector position is neutral.
  - The brake is applied (brake switch: ON)
- Verify the completion of changing the high/low range by the TOD indicator on the instrument panel.
- This code does not indicate the trouble of the transfer or ECU, and is memoried when an error operation is carried out under high-low motor running.

  Therefore this code is not memoried if the transfer is operated according to *"Owner's Manual"*.

Check flow	Trouble code	Phenomenon	Standard
15	55 (P1755)	High-Low motor position signal is abnormal. Circuit is shorted to GND.	—



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Step	Action	Yes	No
1	1. Turn on the starter switch. Is the transfer changed to the low range from the high range?	Go to *Step 2*	Go to *Step 4*
2	Is the transfer changed to the high range from the low range?	Go to *Step 3*	Go to *Step 5*
3	1. Clear the trouble code. 2. Turn on the starter switch. Is the memory DTC 55 (P1755)?	Go to *Step 1*	The phenomenon is not reproduced. Refer to *"Trouble intermittently observed".*
4	1. Turn off the starter switch. 2. Disconnect the ECU connector (C–37). Is the continuity between the terminals ranged within the any case (case1, 2 or 3) in the following table (1)?	Go to *Step 8*	Go to *Step 6*
5	1. Turn off the starter switch. 2. Disconnect the ECU connector (C–37). Does the continuity between the terminals comply with the following table (2)?	Go to *Step 8*	Go to *Step 7*
6	1. Turn off the starter switch. 2. Disconnect the transfer connector (A–2). Is the continuity between the male terminals ranged within the any case (case1, 2 or 3) in the following table (3)?	Go to *Step 8*	The encoder has failed. Replace the high-low motor asm. Go to *Step 9*
7	1. Turn off the starter switch. 2. Disconnect the transfer connector (A-2). Does the continuity between male terminals comply with the following table (4)?	Go to *Step 8*	The encoder has failed. Replace the high-low motor asm. Go to *Step 9*
8	1. Turn off the starter switch. 2. Disconnect the ECU connector (C–37) and transfer connector (A–2). Is there the continuity between connector terminal (C–37) 4 and (A–2) 6, (C–37) 17 and (A–2) 1, (C–37) 3 and (A–2) 2, (C–37) 16 and (A–2) 3, and (C–37) 2 and (A–2) 5?	The encoder has failed. Replace the high-low motor asm. Go to *Step 9*	The circuit in which there is no continuity is broken. Repair the circuit. Go to *Step 9*
9	1. Check that all the parts are mounted. 2. Clear the trouble code. Is this step complete?	Verify the repair.	Go to *Step 9*

NOTE:

- Confirm the operation conditions when changing high and low range.
  - The car stops. (less than 2 km/h or 1.2 mph and engine speed: less than 1500 rpm)
  - The AT selector position is neutral.
  - The brake is applied (brake switch: ON)
- Verify the completion of changing the high/low range by the TOD indicator on the instrument panel.
- When changing high/low range, start the engine to prevent the battery dead.

Table (1) (high position standard)

Case	Continuity between terminals:			
	26 and 24	39 and 24	25 and 24	38 and 24
1	NO	NO	NO	YES
2	NO	YES	NO	YES
3	YES	YES	NO	YES

Table (2) (low position standard)

Continuity between terminals:			
26 and 24	39 and 24	25 and 24	38 and 24
YES	NO	YES	YES or NO

Table (3) (high position standard)

Case	Continuity between the connector (A–2) terminals:			
	6 and 5	1 and 5	2 and 5	3 and 5
1	NO	NO	NO	YES
2	NO	YES	NO	YES
3	YES	YES	NO	YES

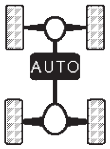
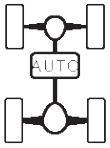
Table (4) (low position standard)

Continuity between the connector (A–2) terminals:			
6 and 5	1 and 5	2 and 5	3 and 5
YES	NO	YES	YES or NO

Trouble Diagnosis Depending on The Status of TOD Indicator

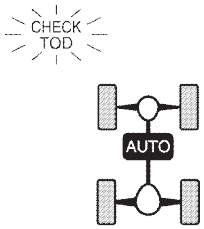
Functional check with TOD indicator light is conducted prior to check on Charts A–H.

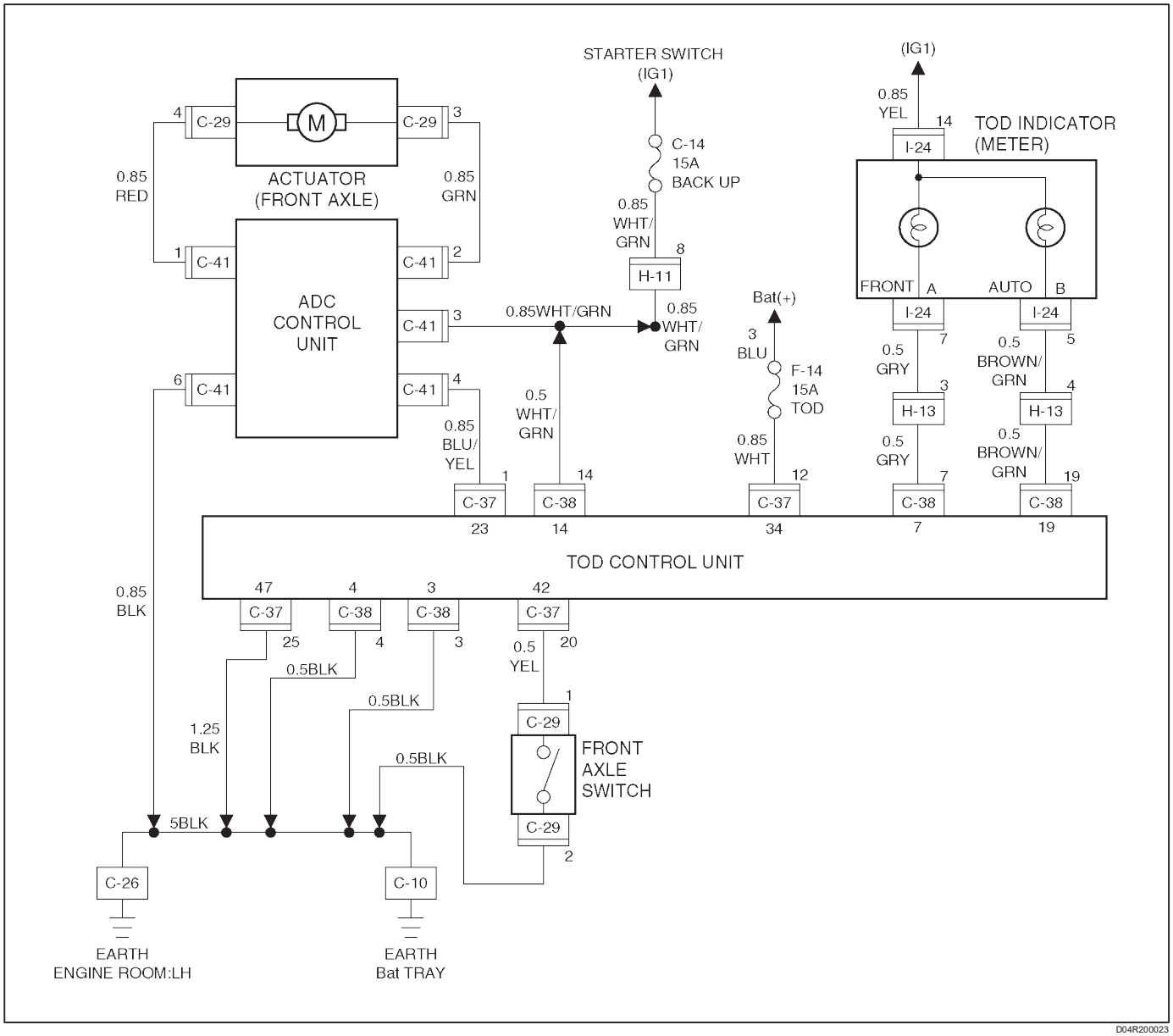
- After the starter is switched on, check and see if the status has become as tabulated below.

ECU Terminal 8	ECU Terminal 7	ECU Terminal 19	TOD Indicator state
Short to terminal 47	Short to terminal 47	Short to terminal 47	
Open	Open	Open	

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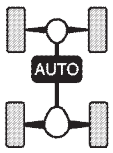
- If the status is as tabulated above, there is no problem. If not as tabulated above, inspect the harness.

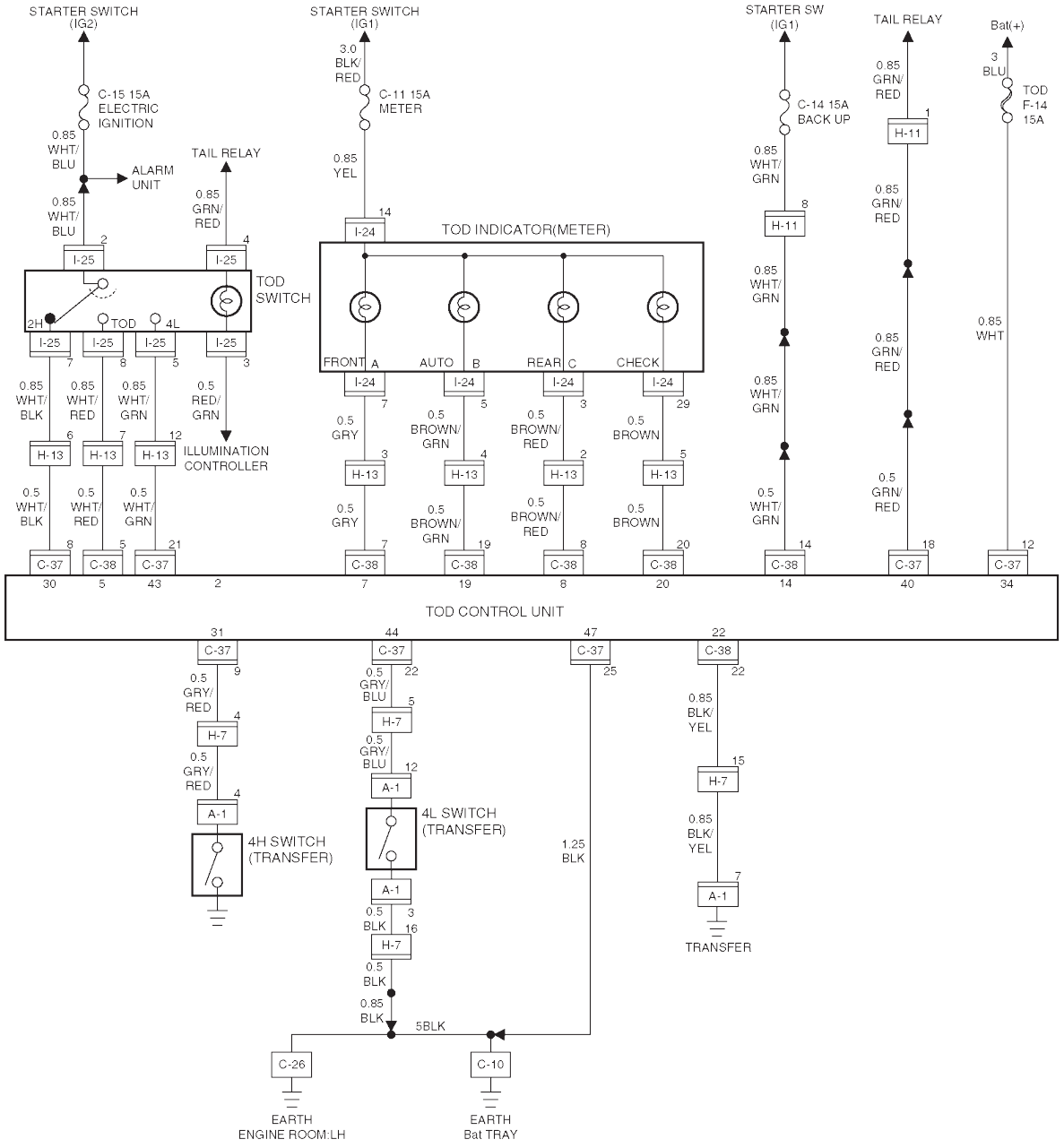
Chart A	Indicator drive circuit	
Function of circuit	The circuit informs the indicator of the working condition of the ECU.	
Fail condition	All the TOD indicator lamps and CHECK lamp are lit.	
Indicator lamp state		—
TOD switch position	2H/TOD/4L	—



D04R200023

Step	Action	Yes	No
1	Turn on the starter switch. Is the battery voltage observed between terminals 14 and 47?	The ECU has failed. Replace the ECU. Go to *Step 2*	Check the battery circuit. Go to *Step 2*
2	Check that all the parts are mounted. Is this step complete?	Repeat the “Diagnosis Flow”.	Return to Step 2

Chart B–1	The TOD switch A circuit wires are broken or short-circuited to the GND	
Function of circuit	—	
Fail condition	Even after the TOD switch position is selected from TOD to 2H, the indicator lamp status is not changed.	
Indicator lamp state	CHECK TOD 	—
TOD switch position	2H	—


STARTER SWITCH (IG2)
C-15 15A ELECTRIC IGNITION
0.85 WHT/ BLU
ALARM UNIT
TAIL RELAY
0.85 GRN/ RED
I-25
TOD SWITCH
2H
TOD
4L
0.85 WHT/ BLK
0.85 WHT/ RED
0.85 WHT/ GRN
0.5 RED/ GRN
H-13
ILLUMINATION CONTROLLER
0.5 WHT/ BLK
0.5 WHT/ RED
0.5 WHT/ GRN
C-37
C-38
STARTER SWITCH (IG1)
3.0 BLK/ RED
C-11 15A METER
0.85 YEL
I-24
TOD INDICATOR(METER)
FRONT A
AUTO B
REAR C
CHECK
0.5 GRY
0.5 BROWN/ GRN
0.5 BROWN/ RED
0.5 BROWN
STARTER SW (IG1)
C-14 15A BACK UP
0.85 WHT/ GRN
0.5 WHT/ GRN
TAIL RELAY
0.85 GRN/ RED
H-11
0.5 GRN/ RED
Bat(+)
3 BLU
TOD F-14 15A
0.85 WHT
TOD CONTROL UNIT
0.5 GRY/ RED
H-7
A-1
4H SWITCH (TRANSFER)
0.5 GRY/ BLU
4L SWITCH (TRANSFER)
1.25 BLK
0.85 BLK/ YEL
TRANSFER
0.5 BLK
0.85 BLK
5BLK
C-26
C-10
EARTH ENGINE ROOM:LH
EARTH Bat TRAY

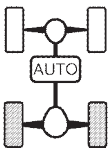
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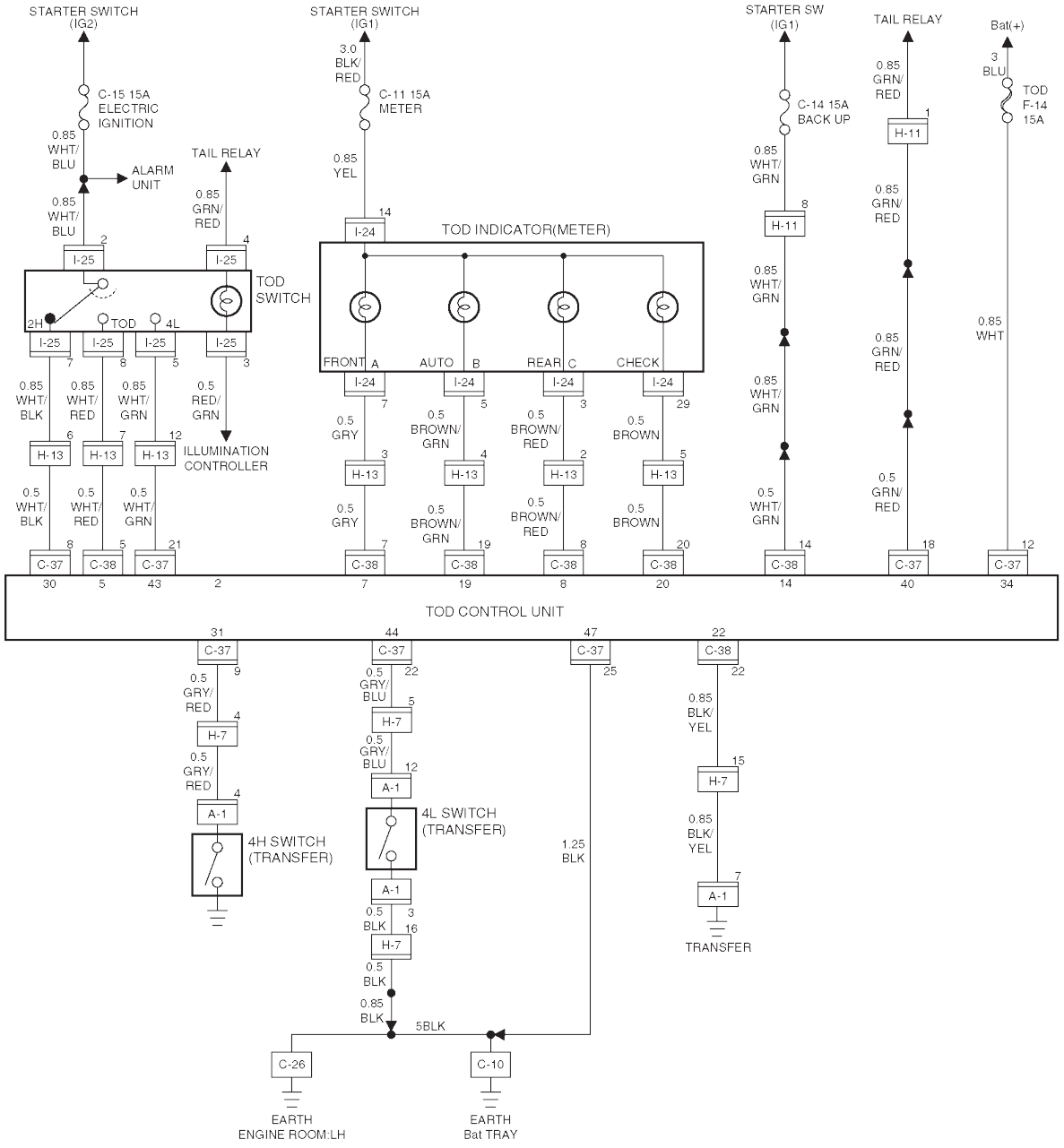
Step	Action	Yes	No
1	1. Turn on the starter switch. When the TOD switch is selected to the TOD position, is 0V observed between terminal 30 and 47, and 43 and 47? Does the voltage between the terminals 7 and 47, 19 and 47, and 8 and 47 comply with the TOD mode in the following table?	Go to *Step 2*	Repair the TOD switch circuit. Go to *Step 4*
2	When the TOD switch is selected to the 2H position, is 12 V observed between terminals 30 and 47 and is 0V observed between terminal 43 and 47? Does the voltage between the terminals 7 and 47, 19 and 47, and 8 and 47 comply with the 2H mode is the following table?	Go to *Step 3*	Repair the TOD switch circuit. Go to *Step 4*
3	When the TOD switch is selected to the 4L position, is 0V observed between terminals 30 and 47 and is 12V observed between terminal 43 and 47? Does the voltage between terminals 7 and 47, 19 and 47, and 8 and 47 comply with the 4L mode in the following table?	The phenomenon is not reproduced. Refer to *"Trouble intermittently observed".*	Repair the TOD switch circuit. Go to *Step 4*
4	Check that all the parts are mounted. Is this step complete?	Verify the repair.	Return to Step 4

Table: Indicator Voltage

Unit: V

TOD switch mode	Terminals measured		
	Front 7 and 47	AUTO 19 and 47	Rear 8 and 47
2H	8.0 ~ 14.5	8.0 ~ 14.5	0
TOD	0	0	0
4L	0	8.5 ~ 14.5	0

Chart B–2	The TOD switch A circuit is shorted to battery.
Function of circuit	—
Fail condition	Even after the transfer mode is selected from 2H to TOD, the indicator lamp state does not change.
Indicator lamp state	CHECK TOD 
TOD switch position	TOD


STARTER SWITCH (IG2)
C-15 15A ELECTRIC IGNITION
0.85 WHT/ BLU
ALARM UNIT
TAIL RELAY
0.85 GRN/ RED
I-25
TOD SWITCH
2H
TOD
4L
0.85 WHT/ BLK
0.85 WHT/ RED
0.85 WHT/ GRN
0.5 RED/ GRN
H-13
ILLUMINATION CONTROLLER
0.5 WHT/ BLK
0.5 WHT/ RED
0.5 WHT/ GRN
C-37
C-38
STARTER SWITCH (IG1)
3.0 BLK/ RED
C-11 15A METER
0.85 YEL
I-24
TOD INDICATOR(METER)
FRONT A
AUTO B
REAR C
CHECK
0.5 GRY
0.5 BROWN/ GRN
0.5 BROWN/ RED
0.5 BROWN
STARTER SW (IG1)
C-14 15A BACK UP
0.85 WHT/ GRN
H-11
0.5 WHT/ GRN
TAIL RELAY
0.85 GRN/ RED
0.5 GRN/ RED
Bat(+)
3 BLU
TOD F-14 15A
0.85 WHT
TOD CONTROL UNIT
0.5 GRY/ RED
H-7
A-1
4H SWITCH (TRANSFER)
0.5 GRY/ BLU
4L SWITCH (TRANSFER)
1.25 BLK
0.85 BLK/ YEL
TRANSFER
0.5 BLK
0.85 BLK
5BLK
C-26
C-10
EARTH ENGINE ROOM:LH
EARTH Bat TRAY

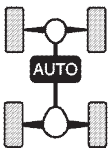
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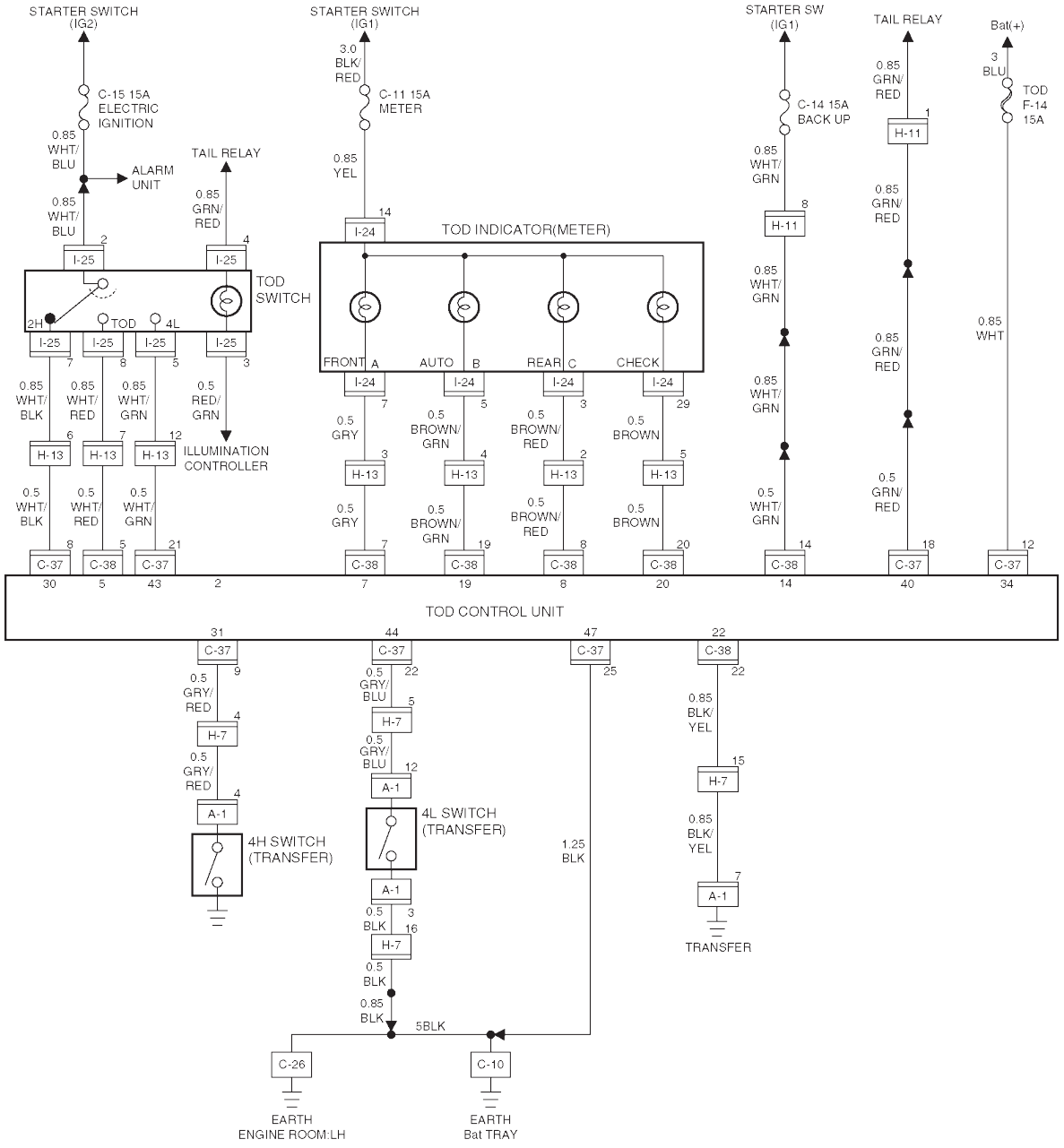
Step	Action	Yes	No
1	1. Turn off the starter switch. 2. Disconnect the ECU connector (C–38). Is the continuity established between the connector terminals (C–38) 14 and (C–38) 7?	Go to *Step 2*	Replace TOD indicator lamp bulb. Go to *Step 6*
2	Is the continuity established between the connector terminals (C–38) 14 and (C–38) 19?	Go to *Step 3*	Replace TOD indicator lamp bulb. Go to *Step 6*
3	1. Turn off the starter switch and connect the ECU connector. 2. Turn on the starter switch. When the TOD switch is selected to the TOD position, is 0V observed between terminals 30 and 47, and 43 and 47? Does the voltage between the terminals 7 and 47, 19 and 47, and 8 and 47 comply with the TOD mode in the following table?	Go to *Step 4*	Repair the TOD switch circuit. Go to *Step 6*
4	When the TOD switch is selected to the 2H position, is 12V observed between terminals 30 and 47, and 0V observed between terminals 43 and 47? Does the voltage between the terminals 7 and 47, 19 and 47, and 8 and 47 comply with the 2H mode in the following table?	Go to *Step 5*	Repair the TOD switch circuit. Go to *Step 6*
5	When the TOD switch is selected to the 4L position, is 0V observed between the terminal 30 and 47 and 12V observed between the terminal 43 and 47? Does the voltage between the terminals 7 and 47, 19 and 47, and 8 and 47 comply with the 4L mode in the following table?	The phenomenon is not reproduced. Refer to *"Trouble intermittently observed".*	Repair the TOD switch circuit. Go to *Step 6*
6	1. Check that all the parts are mounted. Is this step complete?	Verify repair.	Go to *Step 6*

Table: Indicator terminal voltage

Unit: V

TOD switch mode	Terminals measured		
	Front 7 and 47	AUTO 19 and 47	Rear 8 and 47
2H	8.0 ~ 14.5	8.0 ~ 14.5	0
TOD	0	0	0
4L	0	8.0 ~ 14.5	0

Chart B–3	The TOD switch B circuit is shorted to GND or broken.
Function of circuit	—
Fail condition	Even after the transfer mode is selected from TOD to 4L, the indicator lamp state does not change.
Indicator lamp state	CHECK TOD 
TOD switch position	4L


STARTER SWITCH (IG2)
C-15 15A ELECTRIC IGNITION
0.85 WHT/ BLU
ALARM UNIT
TAIL RELAY
0.85 GRN/ RED
I-25
TOD SWITCH
2H
TOD
4L
0.85 WHT/ BLK
0.85 WHT/ RED
0.85 WHT/ GRN
0.5 RED/ GRN
H-13
ILLUMINATION CONTROLLER
0.5 WHT/ BLK
0.5 WHT/ RED
0.5 WHT/ GRN
C-37
C-38
STARTER SWITCH (IG1)
3.0 BLK/ RED
C-11 15A METER
0.85 YEL
I-24
TOD INDICATOR(METER)
FRONT A
AUTO B
REAR C
CHECK
0.5 GRY
0.5 BROWN/ GRN
0.5 BROWN/ RED
0.5 BROWN
STARTER SW (IG1)
C-14 15A BACK UP
0.85 WHT/ GRN
0.5 WHT/ GRN
TAIL RELAY
0.85 GRN/ RED
H-11
0.5 GRN/ RED
Bat(+)
3 BLU
TOD F-14 15A
0.85 WHT
C-37
TOD CONTROL UNIT
0.5 GRY/ RED
H-7
A-1
4H SWITCH (TRANSFER)
0.5 GRY/ BLU
4L SWITCH (TRANSFER)
0.5 BLK
0.85 BLK
5BLK
1.25 BLK
0.85 BLK/ YEL
TRANSFER
C-26
EARTH ENGINE ROOM:LH
C-10
EARTH Bat TRAY

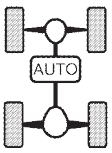
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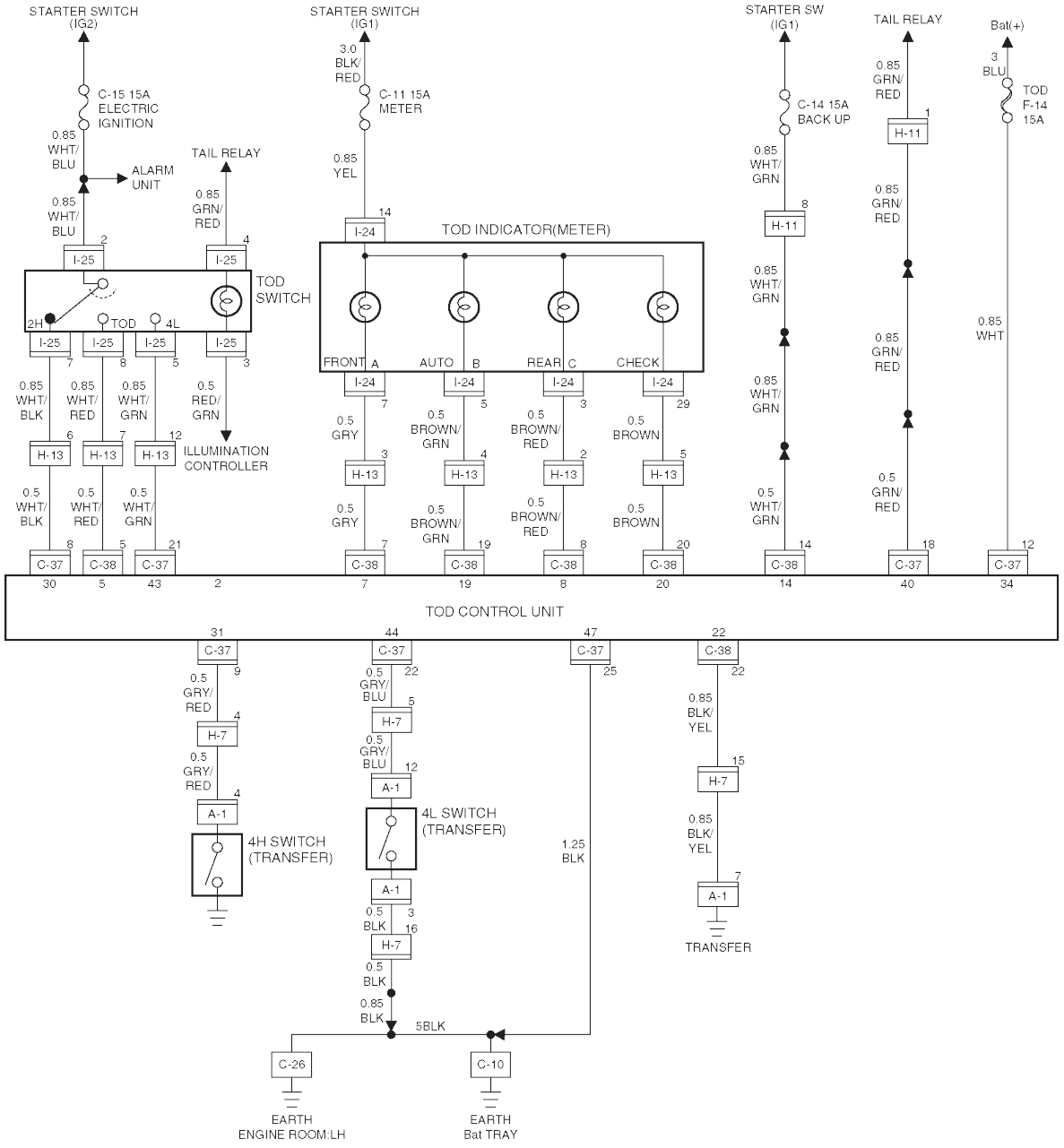
Step	Action	Yes	No
1	1. Turn on the starter switch. When the TOD switch is selected to the TOD position, is 0V observed between terminals 30 and 47, and 43 and 47? Does the voltage between the terminals 7 and 47, 19 and 47, and 8 and 47 comply with the TOD mode in the following table?	Go to *Step 2*	Repair the TOD switch circuit. Go to *Step 4*
2	When the TOD switch is selected to the 2H position, is 12V observed between terminals 30 and 47, and 0V observed between terminals 43 and 47? Does the voltage between the terminals 7 and 47, 19 and 47, and 8 and 47 comply with the 2H mode in the following table?	Go to *Step 3*	Repair the TOD switch circuit. Go to *Step 4*
3	When the TOD switch is selected to the 4L position, is 0V observed between the terminal 30 and 47 and 12V observed between the terminal 43 and 47? Does the voltage between the terminals 7 and 47, 19 and 47, and 8 and 47 comply with the 4L mode in the following table?	The phenomenon is not reproduced. Refer to *"Trouble intermittentry observed".*	Repair the TOD switch circuit. Go to *Step 4*
4	1. Check that all the parts are mounted. Is this step complete?	Verify repair.	Go to *Step 4*

Table: Indicator terminal voltage

Unit: V

TOD switch mode	Terminals measured		
	Front 7 and 47	AUTO 19 and 47	Rear 8 and 47
2H	8.0 ~ 14.5	8.0 ~ 14.5	0
TOD	0	0	0
4L	0	8.0 ~ 14.5	0

Chart B–4	The TOD switch B circuit is shorted to battery.
Function of circuit	—
Fail condition	Even after the transfer mode is selected from 4L to TOD, the indicator lamp state does not change.
Indicator lamp state	CHECK TOD 
TOD switch position	TOD


STARTER SWITCH (IG2)
C-15 15A ELECTRIC IGNITION
0.85 WHT/ BLU
ALARM UNIT
TAIL RELAY
0.85 GRN/ RED
I-25
TOD SWITCH
2H
TOD
4L
0.85 WHT/ BLK
0.85 WHT/ RED
0.85 WHT/ GRN
0.5 RED/ GRN
H-13
ILLUMINATION CONTROLLER
0.5 WHT/ BLK
0.5 WHT/ RED
0.5 WHT/ GRN
C-37
C-38
STARTER SWITCH (IG1)
3.0 BLK/ RED
C-11 15A METER
0.85 YEL
I-24
TOD INDICATOR(METER)
FRONT A
AUTO B
REAR C
CHECK
0.5 GRY
0.5 BROWN/ GRN
0.5 BROWN/ RED
0.5 BROWN
STARTER SW (IG1)
C-14 15A BACK UP
0.85 WHT/ GRN
H-11
TAIL RELAY
0.85 GRN/ RED
Bat(+)
3 BLU
TOD F-14 15A
0.85 WHT
0.5 GRN/ RED
TOD CONTROL UNIT
0.5 GRY/ RED
H-7
A-1
4H SWITCH (TRANSFER)
0.5 GRY/ BLU
4L SWITCH (TRANSFER)
1.25 BLK
0.85 BLK/ YEL
TRANSFER
0.5 BLK
0.85 BLK
5BLK
C-26
C-10
EARTH ENGINE ROOM:LH
EARTH Bat TRAY

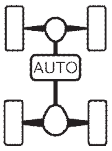
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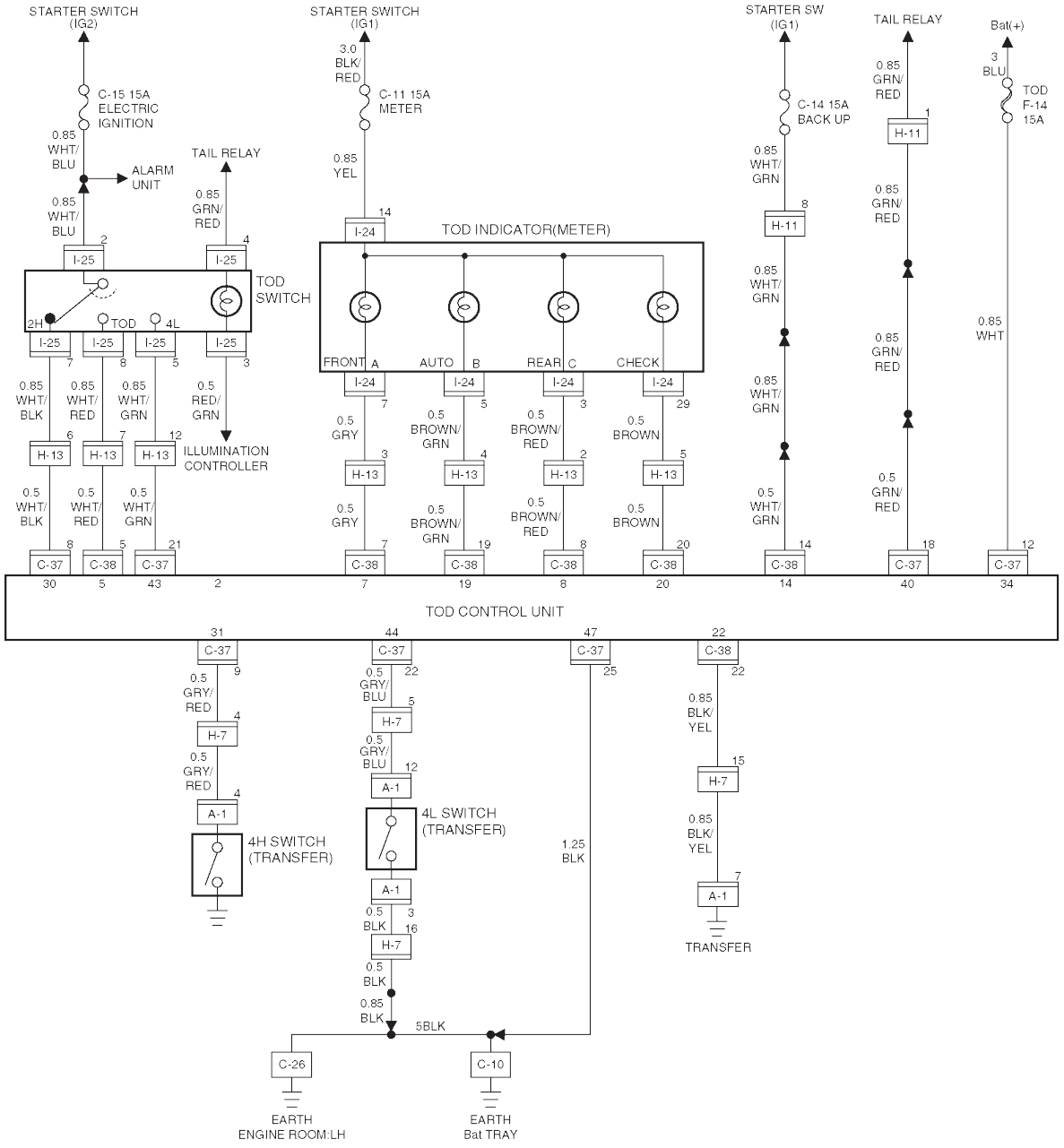
Step	Action	Yes	No
1	1. Turn off the starter switch. 2. Disconnect the ECU connector (C–38). Is the continuity established between the connector terminals (C–38) 14 and (C–38) 19?	Go to *Step 2*	Replace TOD indicator lamp bulb. Go to *Step 5*
2	1. Turn off the starter switch and connect the ECU connector. 2. Turn on the starter switch. When the TOD switch is selected to the TOD position, is 0V observed between terminals 30 and 47, and 43 and 47? Does the voltage between the terminals 7 and 47, 19 and 47, and 8 and 47 comply with the TOD mode in the following table?	Go to *Step 3*	Repair the TOD switch circuit. Go to *Step 5*
3	When the TOD switch is selected to the 2H position, is 12V observed between terminals 30 and 47, and 0V observed between terminals 43 and 47? Does the voltage between the terminals 7 and 47, 19 and 47, and 8 and 47 comply with the 2H mode in the following table?	Go to *Step 4*	Repair the TOD switch circuit. Go to *Step 5*
4	When the TOD switch is selected to the 4L position, is 0V observed between the terminal 30 and 47 and 12V observed between the terminal 43 and 47? Does the voltage between the terminals 7 and 47, 19 and 47, and 8 and 47 comply with the 4L mode in the following table?	The phenomenon is not reproduced. Refer to *"Trouble intermittently observed".*	Repair the TOD switch circuit. Go to *Step 5*
5	1. Check that all the parts are mounted. Is this step complete?	Verify repair.	Go to *Step 5*

Table: Indicator terminal voltage

Unit: V

TOD switch mode	Terminals measured		
	Front 7 and 47	AUTO 19 and 47	Rear 8 and 47
2H	8.0 ~ 14.5	8.0 ~ 14.5	0
TOD	0	0	0
4L	0	8.0 ~ 14.5	0

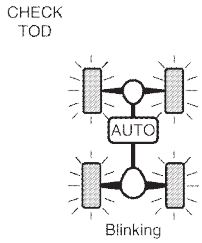
Chart C–1	4H switch circuit is short-circuited to GND.
Function of circuit	—
Fail condition	When the TOD switch is selected to 4L from TOD, all the indicator lamps are turned off.
Indicator lamp state	CHECK TOD 
TOD switch position	4L

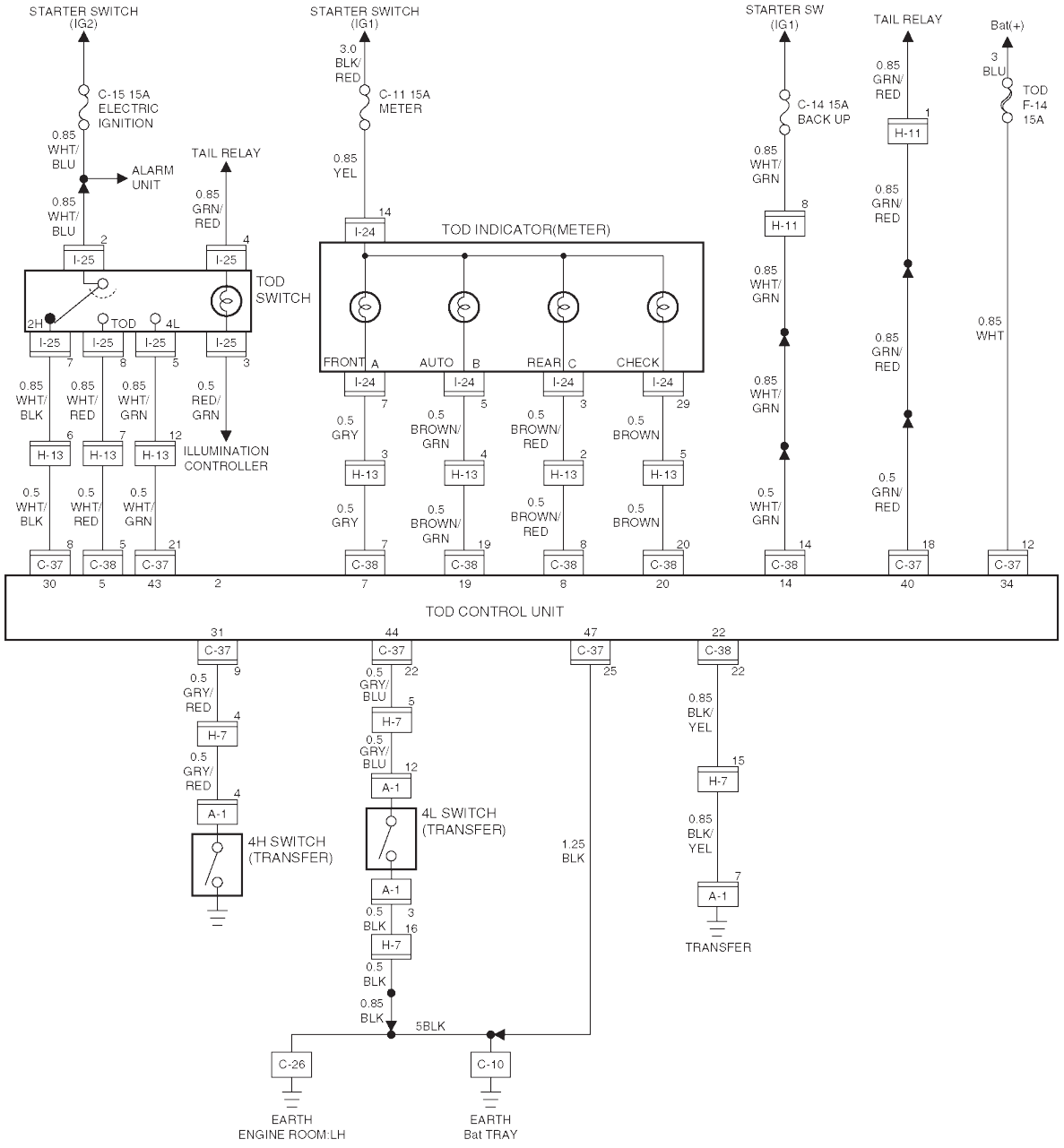

STARTER SWITCH (IG2)
C-15 15A ELECTRIC IGNITION
0.85 WHT/ BLU
ALARM UNIT
TAIL RELAY
0.85 GRN/ RED
I-25
TOD SWITCH
2H
TOD
4L
0.85 WHT/ BLK
0.85 WHT/ RED
0.85 WHT/ GRN
0.5 RED/ GRN
H-13
ILLUMINATION CONTROLLER
0.5 WHT/ BLK
0.5 WHT/ RED
0.5 WHT/ GRN
C-37
C-38
STARTER SWITCH (IG1)
3.0 BLK/ RED
C-11 15A METER
0.85 YEL
I-24
TOD INDICATOR(METER)
FRONT A
AUTO B
REAR C
CHECK
0.5 GRY
0.5 BROWN/ GRN
0.5 BROWN/ RED
0.5 BROWN
STARTER SW (IG1)
C-14 15A BACK UP
0.85 WHT/ GRN
0.5 WHT/ GRN
TAIL RELAY
0.85 GRN/ RED
H-11
0.5 GRN/ RED
Bat(+)
3 BLU
TOD F-14 15A
0.85 WHT
TOD CONTROL UNIT
0.5 GRY/ RED
H-7
A-1
4H SWITCH (TRANSFER)
0.5 GRY/ BLU
4L SWITCH (TRANSFER)
1.25 BLK
0.85 BLK/ YEL
TRANSFER
0.5 BLK
0.85 BLK
5BLK
C-26
C-10
EARTH ENGINE ROOM:LH
EARTH Bat TRAY

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Step	Action	Yes	No
1	1. Turn on the starter switch. 2. The car stops, the AT selector is N position and the brake is applied. When the TOD switch is changed to the TOD position, is 12V observed between terminals 31 and 47 (4H switch)?	Go to *Step 2*	Go to *Step 9*
2	1. The car stops the AT selector is N position and the brake is applied. When the TOD switch is changed to the 4L position, is 12V observed between terminals 31 and 47 (4H switch)?	Go to *Step 3*	Go to *Step 9*
3	1. Turn off the starter switch. Is there the continuity terminal 14 and 7?	Go to *Step 4*	Replace the TOD indicator lamp bulb, or repair the circuit. Go to *Step 13*
4	Is there the continuity between the terminals 14 and 19?	Go to *Step 5*	Replace the TOD indicator lamp bulb, or repair the circuit. Go to *Step 13*
5	Is there the continuity between the terminal 14 and 8?	Go to *Step 6*	Replace the TOD indicator lamp bulb, or repair the circuit. Go to *Step 13*
6	1. Turn on the starter switch. 2. The car stops the AT selector is N position and the brake is applied. When the TOD switch is changed to the 4L position, is 0V observed between terminal 7 and 47? (for 2 seconds after the starter switch ON) ?	Go to *Step 7*	The ECU has frailed. Replace the ECU. Go to *Step13*
7	Is 0V observed between terminal 19 and 47? (for 2 seconds after the starter switch ON)	Go to *Step 8*	The ECU has failed. Replace the ECU. Go to *Step 13*
8	Is 0V observed between terminal 8 and 47? (for 2 seconds after the starter switch ON)	The phenomenon is not reproduced. Refer to *"Trouble intermittently observed".*	The ECU has failed. Replace the ECU. Go to *Step 13*
9	1. The car stops, the AT selector is N position, and the brake is applied. 2. The TOD switch is changed to the TOD (or 2H) position. 3. Turn off the starter switch. 4. Disconnect the ECU connector (C–37). Is there the continuity between the connector (C–37) terminal 9 and 25?	Go to *Step 11*	Go to *Step 10*

Step	Action	Yes	No
10	1. Connect the ECU connector (C–37) and turn on the starter switch. 2. The car stops, the AT selector is N position, and the brake is applied. 3. Change the TOD switch to the 4L position. 4. Turn off the starter switch and disconnect the ECU connector (C–37). Is there the continuity between the connector (C–37) terminal 9 and 25?	Go to *Step 11*	The ECU has failed. Replace the ECU. Go to *Step 13*
11	1. Disconnect the connector (H–7). Is the continuity established between the transfer connector terminals (H–7)4 and (C–37) 9?	Go to *Step 12*	The harness is broken between terminal (H–7) 4 and (C–37) 9. Repair the circuit. Go to *Step 13*
12	1. Connect the connector (H–7). 2. Disconnect the connector (A–1). Is there the continuity between the connector terminal (A–1) 4 and (C–37) 9?	Repair the transfer. Go to *Step 13*	The harness between the connector terminal (C–37) 9 and (A–1) 4 is short-circuited to GND. Repair the circuit. Go to *Step 13*
13	Check that all the parts are mounted. Is this step complete?	Verify the repair.	Return to Step 13

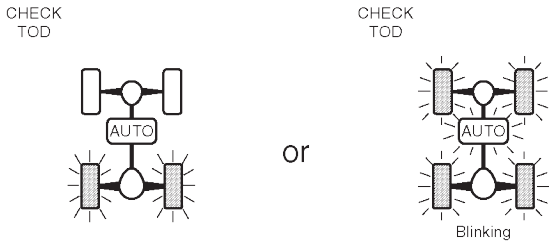
Chart D–1	4L switch circuit wires are broken or the battery circuit is short-circuited.
Function of circuit	—
Fail condition	When the TOD switch is changed to the 4L position, the indicator 4L mode goes on and off.
Indicator lamp state	
TOD switch position	4L

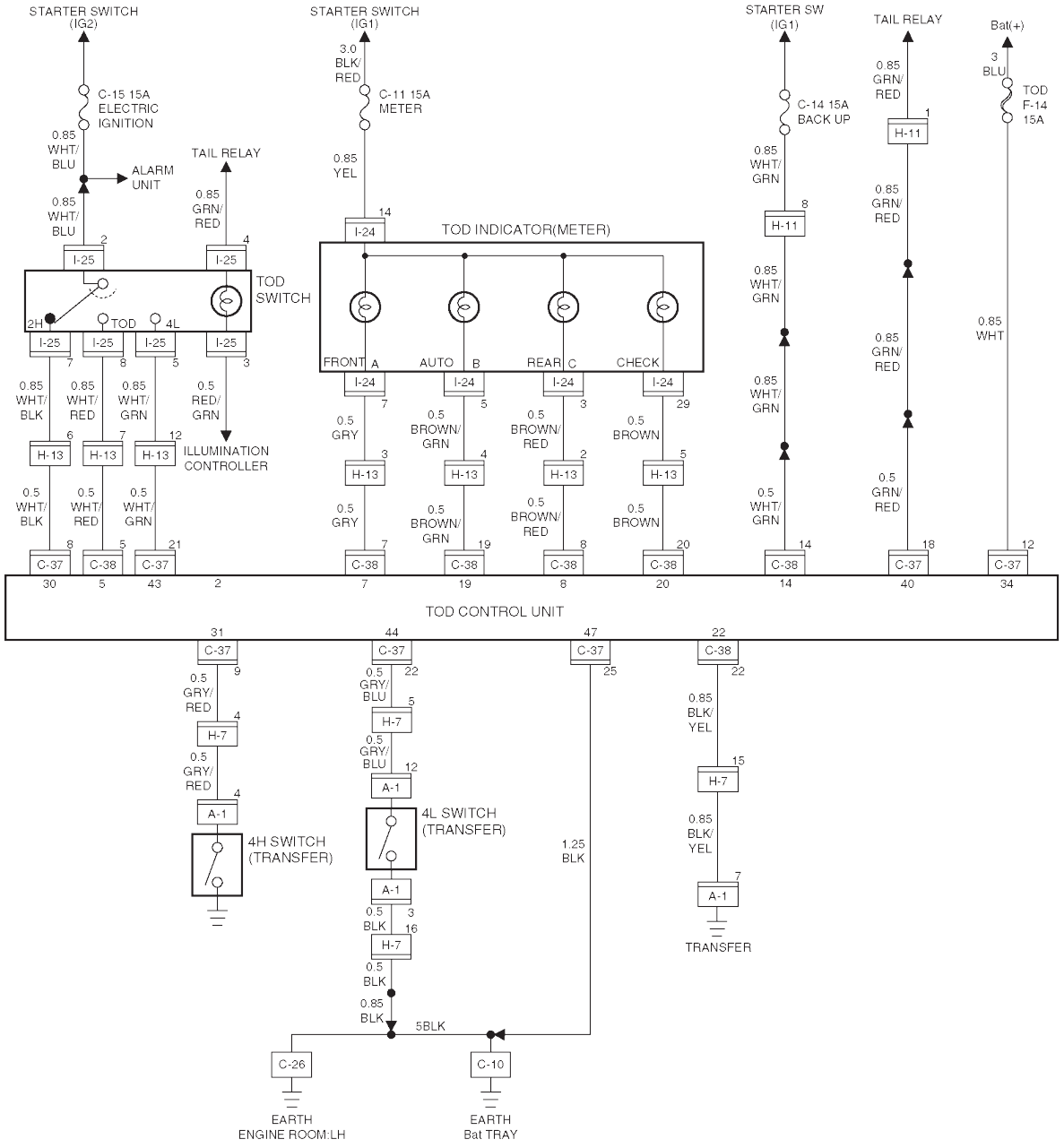

STARTER SWITCH (IG2)
C-15 15A ELECTRIC IGNITION
0.85 WHT/ BLU
ALARM UNIT
TAIL RELAY
0.85 GRN/ RED
I-25
TOD SWITCH
2H
TOD
4L
0.85 WHT/ BLK
0.85 WHT/ RED
0.85 WHT/ GRN
0.5 RED/ GRN
H-13
ILLUMINATION CONTROLLER
0.5 WHT/ BLK
0.5 WHT/ RED
0.5 WHT/ GRN
C-37
C-38
STARTER SWITCH (IG1)
3.0 BLK/ RED
C-11 15A METER
0.85 YEL
I-24
TOD INDICATOR(METER)
FRONT A
AUTO B
REAR C
CHECK
0.5 GRY
0.5 BROWN/ GRN
0.5 BROWN/ RED
0.5 BROWN
STARTER SW (IG1)
C-14 15A BACK UP
0.85 WHT/ GRN
0.5 WHT/ GRN
TAIL RELAY
0.85 GRN/ RED
H-11
0.5 GRN/ RED
Bat(+)
3 BLU
TOD F-14 15A
0.85 WHT
TOD CONTROL UNIT
0.5 GRY/ RED
H-7
A-1
4H SWITCH (TRANSFER)
0.5 GRY/ BLU
4L SWITCH (TRANSFER)
0.5 BLK
0.85 BLK
5BLK
1.25 BLK
0.85 BLK/ YEL
TRANSFER
C-26
EARTH ENGINE ROOM:LH
C-10
EARTH Bat TRAY

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Step	Action	Yes	No
1	1. Turn on the starter switch. 2. The car stops, the AT selector is the N position, and the brake is applied. When the TOD switch is changed to the TOD (or 2H) position, is 12V observed between terminals 44 and 47 (4L switch)?	Go to *Step 2*	Go to *Step 4*
2	1. The car stops, the AT selector is the N position, and the brake is applied. When the TOD switch is changed to the 4L position, does the transfer become the 4L state?	Go to *Step 3*	Refer to *"Diagnosis from symptom".*
3	Is 0V observed between the terminal 44 and 47?	The ECU has failed.Replace the ECU. Go to *Step 10*	Go to *Step 10*
4	1. The car stops, the AT selector is the N position, and the brake is applied. When the TOD switch is changed to the TOD (or 2H) position, is 12V observed between the connector (C–37) terminal 22 and 25?	Go to *Step 5*	Go to *Step 6*
5	1. Turn off the starter switch and connect the EUC connector. 2. The car stops, the AT selector is the N position, and the brake is applied. When the TOD switch is changed to the 4L position, is 0V observed between terminals (C–37) 22 and (C–37) 25 (4L switch)?	The phenomenon is not reproduced. Refer to *"Trouble intermittently observed".*	Go to *Step 6*
6	1. Turn off the starter switch and connect ECU connector. 2. Turn on the starter switch. 3. The car stops, the AT selector is the N position, and the brake is applied. 4. Change the TOD switch to the TOD (or 2H) position. 5. After the transfer has changed to the TOD (or 2H) mode, turn off the starter switch and disconnect the ECU connector (C–37). Is there the continuity between the connector (C–37) terminal 22 and 25?	Go to *Step 9*	Go to *Step 7*
7	1. Turn off the starter switch and connect the ECU connector. 2. Turn on the starter switch. 3. The car stops, the AT selector is the N position, and the brake is applied. 4. Change the TOD switch to the 4L position. 5. After the transfer has changed to the 4L mode, turn off the starter switch. 6. Disconnect the ECU connector. Is there the continuity between the connector (C–37) terminal 22 and 25?	The phenomenon is not reproduced. Refer to *"Trouble intermittently observed".*	Go to *Step 8*
8	1. Turn off the starter switch and connect the ECU connector. 2. Turn on the starter switch. 3. The car stops, the AT selector is the N position, and the brake is applied. 4. Change the TOD switch to the TOD (or 2H) position. 5. After the transfer has changed to the TOD (or 2H) mode, turn off the starter switch. 6. Disconnect the transfer connector (A–1). Is there the continuity between the connector terminal (A–1) 12 and GND?	Repair the transfer. Go to *Step 10*	Repair the circuit between (C–37) 22 and (A–1) 12. Go to *Step 10*

Step	Action	Yes	No
9	1. Turn off the starter switch and connect the connector (A–1). 2. Turn on the starter switch. 3. The car stops, the AT selector is N position, and the brake is applied. 4. Change the TOD switch to the 4L position. 5. After the transfer has changed to the 4L mode, turn off the starter switch. 6. Disconnect the transfer connector (A–1). Is there the continuity between the connector terminal (A–1) 12 and GND?	Repair the circuit between (C–37)22 and (A–1)12. Go to *Step 10*	Repair the transfer. Go to *Step 10*
10	Check that all the parts are mounted. Is this step complete?	Verify the repair.	Go to *Step 10*

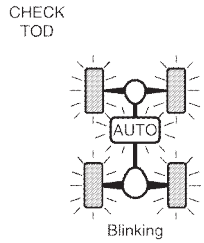
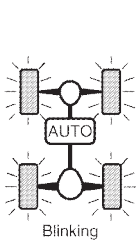
Chart D–2	The 4L switch circuit is short-circuited to GND.
Function of circuit	—
Fail condition	When the TOD switch is changed to the 2H or TOD position, the indicator 2H or TOD mode goes on and off.
Indicator lamp state	
TOD switch position	2H or TOD

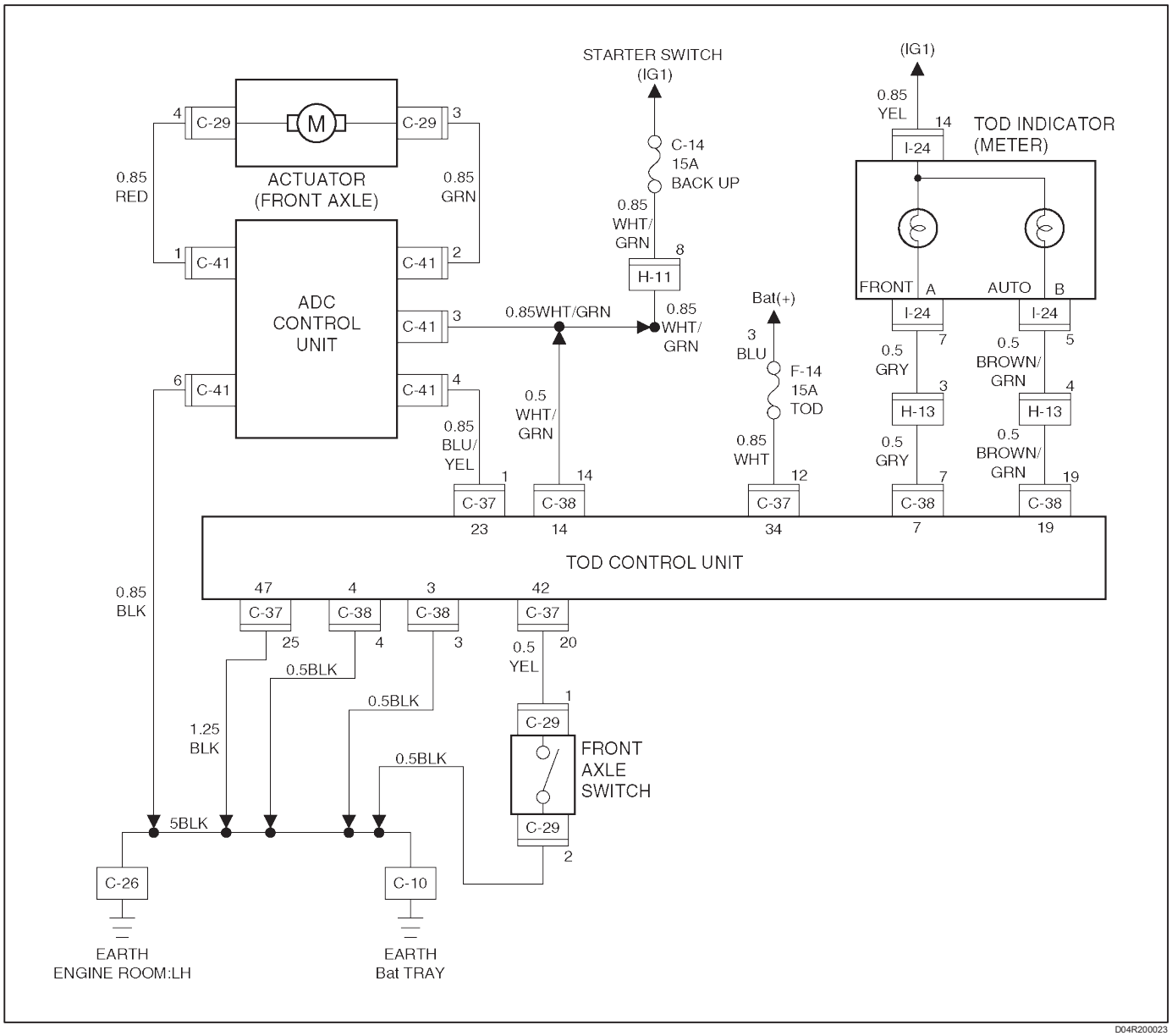

STARTER SWITCH (IG2)
C-15 15A ELECTRIC IGNITION
0.85 WHT/ BLU
ALARM UNIT
TAIL RELAY
0.85 GRN/ RED
I-25
TOD SWITCH
2H
TOD
4L
0.85 WHT/ BLK
0.85 WHT/ RED
0.85 WHT/ GRN
0.5 RED/ GRN
H-13
ILLUMINATION CONTROLLER
0.5 WHT/ BLK
0.5 WHT/ RED
0.5 WHT/ GRN
C-37
C-38
STARTER SWITCH (IG1)
3.0 BLK/ RED
C-11 15A METER
0.85 YEL
I-24
TOD INDICATOR(METER)
FRONT A
AUTO B
REAR C
CHECK
0.5 GRY
0.5 BROWN/ GRN
0.5 BROWN/ RED
0.5 BROWN
STARTER SW (IG1)
C-14 15A BACK UP
0.85 WHT/ GRN
0.5 WHT/ GRN
TAIL RELAY
0.85 GRN/ RED
H-11
0.5 GRN/ RED
Bat(+)
3 BLU
TOD F-14 15A
0.85 WHT
TOD CONTROL UNIT
0.5 GRY/ RED
H-7
A-1
4H SWITCH (TRANSFER)
0.5 GRY/ BLU
4L SWITCH (TRANSFER)
1.25 BLK
0.85 BLK/ YEL
TRANSFER
0.5 BLK
0.85 BLK
5BLK
C-26
C-10
EARTH ENGINE ROOM:LH
EARTH Bat TRAY

D04R200022

Step	Action	Yes	No
1	1. The car stops, the AT selector is the N position, and the brake is applied. When the TOD switch is changed to the TOD (or 2H) position, is 12V observed between terminals 44 and 47 (4L switch)?	Go to *Step 2*	Go to *Step 3*
2	1. The car stops, the AT selector is the N position, and the brake is applied. When the TOD switch is changed to the 4L position, is 0V observed between terminals 44 and 47 (4L switch)?	Refer to *"Trouble intermittently observed".*	Go to *Step 3*
3	1. The car stops, the AT selector is the N position, and the brake is applied. 2. Select the TOD switch to the TOD (or 2H) position. Is there the continuity between the connector (C–37) terminal 22 and 25?	Go to *Step 5*	Go to *Step 4*
4	1. Connect the ECU connector (C–37) and turn on the starter switch. 2. The car stops, the AT selector is the N position, and the brake is applied. 3. Select the TOD switch to the 4L position. 4. Turn off the starter switch and disconnect the ECU connector (C–37). Is there the continuity between the connector (C–37) terminal 22 and 25?	The ECU has failed.Replace the ECU. Go to *Step 9*	Go to *Step 5*
5	1. Connect the ECU connector (C–37) and turn on the starter switch. 2. The car stops, the AT selector is the N position, and the brake is applied. 3. Select the TOD switch to the TOD (or 2H) position. 4. Turn off the starter switch and disconnect the connector (H–7). Is there the continuity between the connector terminal (H–7) 5 and (C–37) 25?	Go to *Step 7*	Go to *Step 6*
6	1. Connect the connector (H–7) and turn on the starter switch. 2. The car stops, the AT selector is the N position, and the brake is applied. 3. Select the TOD switch to the 4L position. 4. After the transfer has changed to the 4L mode, turn off the starter switch and disconnect the connector (H–7). Is there the continuity between the connector terminal (H–7) 5 and (C–37) 25?	Go to *Step 7*	GND is short-circuited between terminals (C–37) 2 and (H–7) 5. Repair the circuit. Go to *Step 9*
7	1. Connect the connector (H–7) and turn on the starter switch. 2. The car stops, the AT selector is the N position, and the brake is applied. 3. Select the TOD switch to the TOD (or 2H) position. 4. After the transfer has changed to the TOD (or 2H) mode, turn off the starter switch and disconnect the connector (A–1). Is there the continuity between the connector terminal (A–1) 12 and GND?	Repair the transfer. Go to *Step 9*	Go to *Step 8*

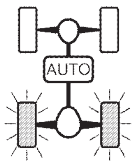
Step	Action	Yes	No
8	1. Connect the connector (A–1) and turn on the starter switch. 2. The car stops, the AT selector is the N position, and the brake is applied. 3. Select the TOD switch to the 4L position. 4. After the transfer has changed to the 4L mode, disconnect the connector (A–1). Is there the continuity between the connector terminal (A–1) 12 and GND?	GND is short-circuited between terminals (A–1) 12 and (H–7) 5. Repair the circuit. Go to *Step 9*	Repair the transfer. Go to *Step 9*
9	Check that all the parts are mounted. Is this step complete?	Verify the repair.	Go to *Step 9*

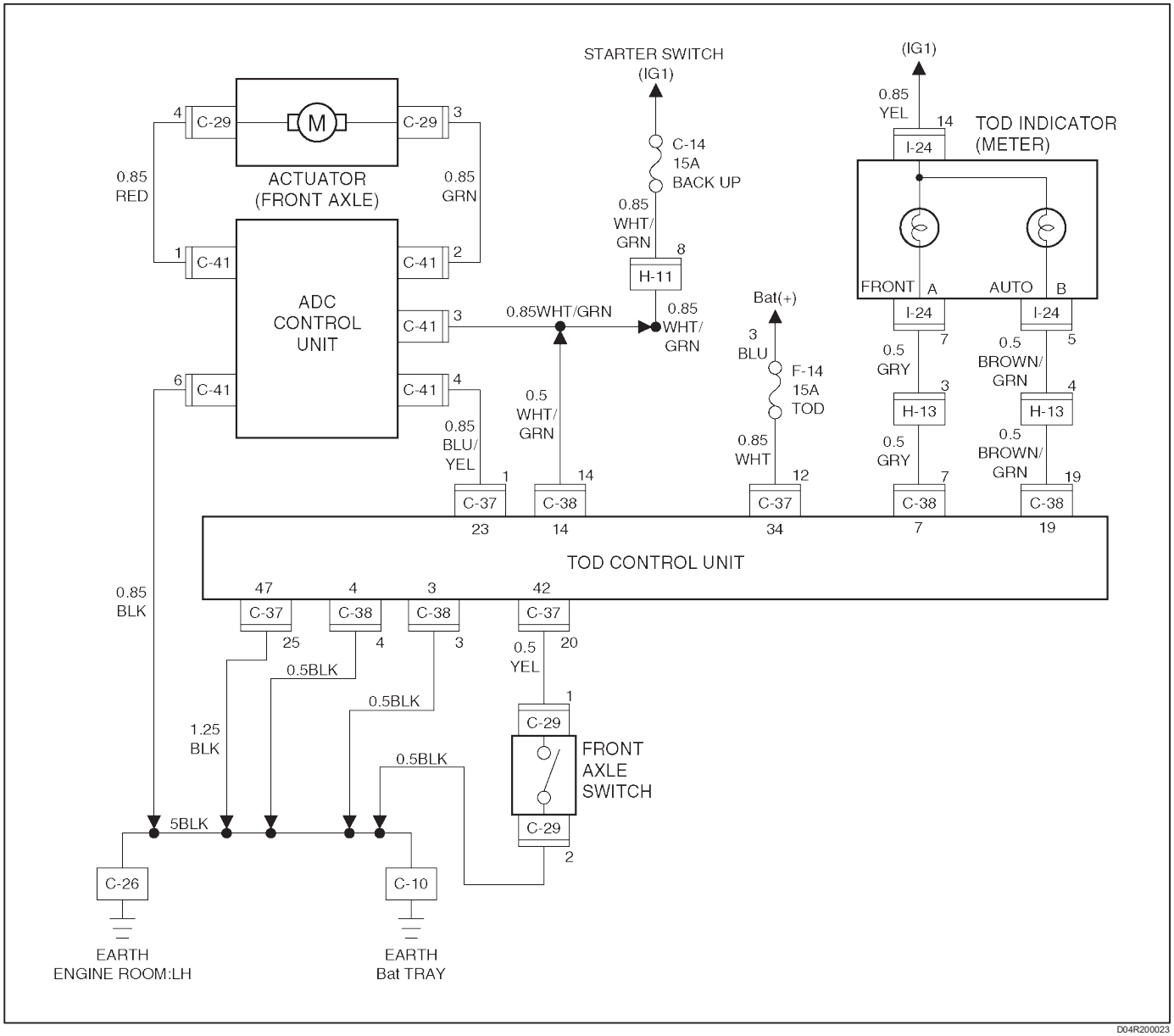
Chart E–1	AXLE switch circuit wires are broken.	
Function of circuit	—	
Fail condition	Both the TOD and 4L modes are disabled. (The transition status is not removed.)	
Indicator lamp state		
TOD switch position	TOD	4L



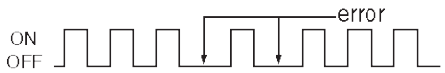
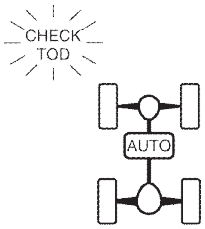
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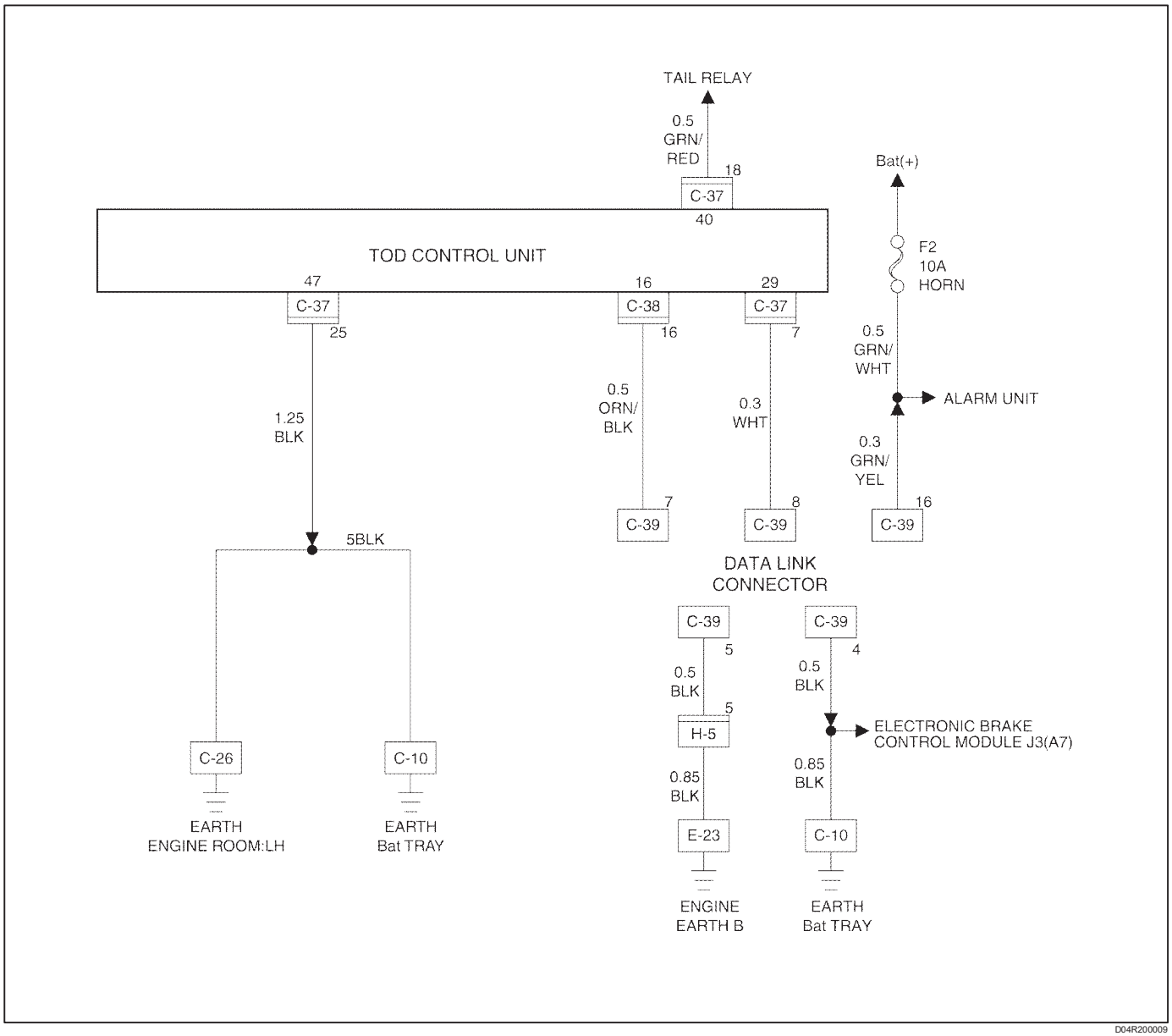
Step	Action	Yes	No
1	Start the engine. When the TOD switch is selected to the TOD position, is 0V observed between terminals 42 and 47?	Go to *Step 2*	Go to *Step 4*
2	1. The car stops, the AT selector is N position, and the brake is applied. 2. Select the TOD switch to the 4L position. Is 0V observed between terminals 42 and 47?	Go to *Step 3*	Go to *Step 4*
3	1. The car stops, the AT selector is N position, and the brake is applied. When the TOD switch is selected to the 4L position, is 12V observed between the terminal 19 and 47?	The phenomenon is not reproduced. Refer to *"Troubles intermittently observed".*	The ECU has failed.Replace the ECU. Go to *Step 8*
4	1. The car stops, the AT selector is N position, and the brake is applied. When the TOD switch is selected to the 2H position, is the battery voltage observed between the terminal 23 and 47.	Go to *Step 5*	Go to *Step 7*
5	When the TOD switch is selected to the TOD position (TOD mode), is 0 ~ 1V observed between terminals 23 and 47?	Go to *Step 6*	Go to *Step 7*
6	1. The car stops, the AT selector is N position, and the brake is applied. When the TOD switch is selected to the 4L position, is 0V observed between terminals 23 and 47?	Repair the circuit or check the "Front Axle Disconnect". (Refer to *section 4B*) Go to *Step 8*	Go to *Step 7*
7	Is any of the trouble codes 28 (P1760), 32 (P1761) and 33 (P1762) recorded?	Examine the trouble based on "Diagnosis from Trouble Codes".	The ECU has failed. Replace the ECU. Go to *Step 8*
8	Check that all the parts are mounted. Is this step complete?	Verify the repair.	Go to *Step 8*

Chart E–2	The AXLE switch circuit is short-circuited to GND.
Function of circuit	—
Fail condition	Even after the TOD switch is selected to the 2H position, the 2H mode is not enabled. (The transition status is not removed.)
Indicator lamp state	CHECK TOD 
TOD switch position	2H



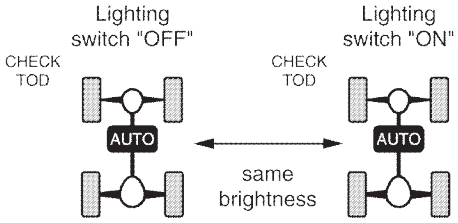
Step	Action	Yes	No
1	Start the engine. When the TOD switch is selected to the TOD position, is 0V observed between terminals 42 and 47?	Go to *Step 2*	Go to *Step 6*
2	1. The car stops, the AT selector is N position, and the brake is applied. When the TOD switch is selected to the 4L position, is 0V observed between terminals 42 and 47?	Go to *Step 3*	Go to *Step 6*
3	1. The car stops, the AT selector is N position, and the brake is applied. 2. Select the TOD switch to the 2H position. Is 5V observed between terminals 42 and 47?	Go to *Step 4*	Go to *Sep 6*
4	Is 12V observed between terminals 7 and 47?	Go to *Step 5*	Replace the ECU. Go to *Step 10*
5	Is 12V observed between terminals 19 and 47?	The phenomenon is not reproduced. Refer to *"Troubles intermittently observed".*	The ECU has failed.Replace the ECU. Go to *Step 10*
6	1. The car stops, the AT selector is N position, and the brake is applied. When the TOD switch is selected to the 2H position, is the battery voltage observed between terminals 23 and 47?	Go to *Step 7*	Go to *Step 9*
7	1. The car stops, the AT selector is N position, and the brake is applied. When the TOD switch is selected to the TOD position, is 0V observed between terminals 23 and 47?	Go to *Step 8*	Go to *Step 9*
8	1. The car stops, the AT selector is N position, and the brake is applied. When the TOD switch is selected to the 4L position, is 0V observed between terminals 23 and 47?	Repair the circuit or check the "Front Axle Disconnect". (Refer to *section 4B*) Go to *Step 10*	Go to *Step 9*
9	Is any of the trouble codes 28 (P1760), 32 (P1761) and 33 (P1762) recorded?	Examine the trouble based on "Diagnosis from Trouble Codes".	The ECU has failed. Replace the ECU. Go to *Step 10*
10	Check that all the parts are mounted. Is this step complete?	Verify the repair.	Go to *Step 10*

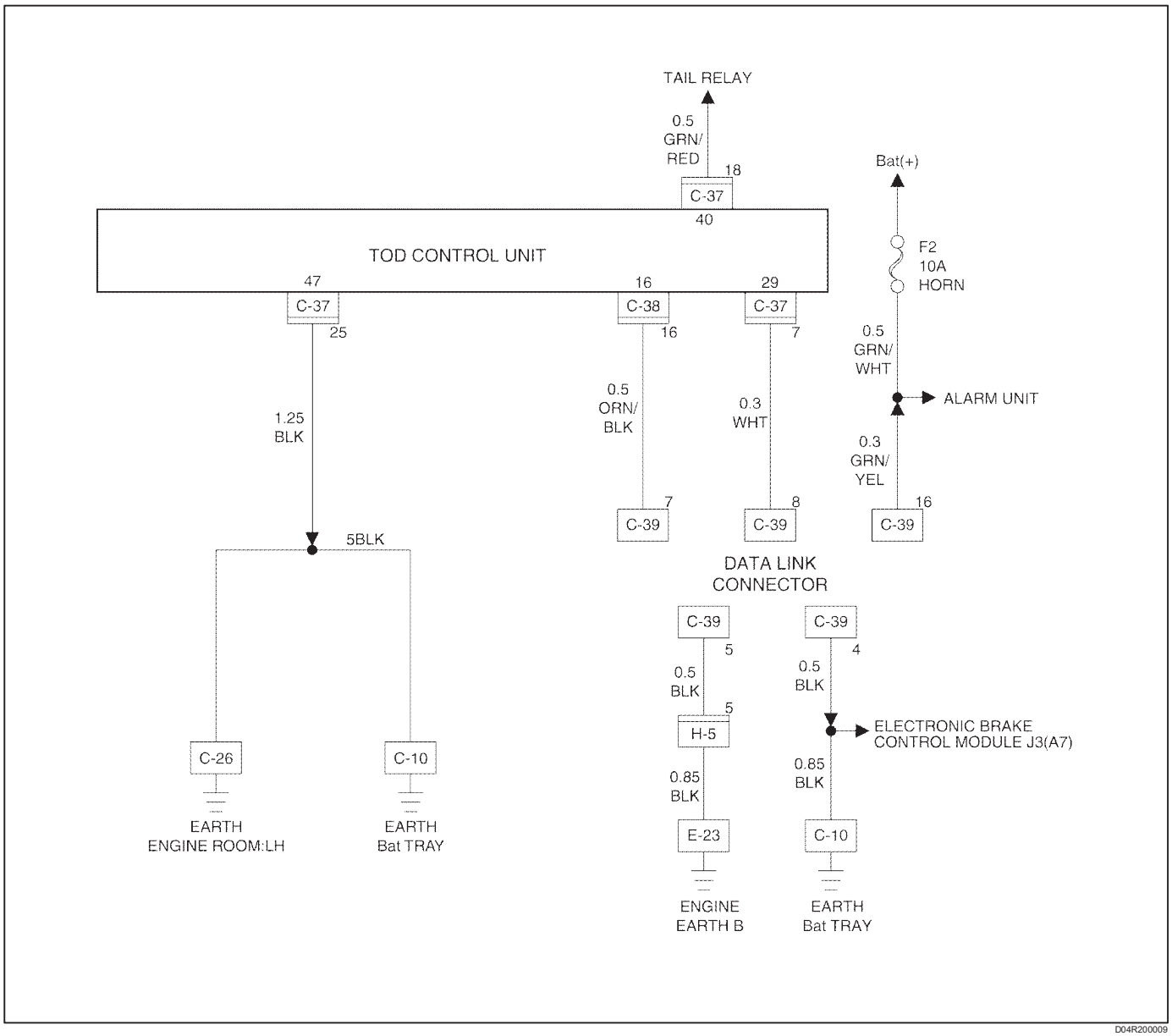
Chart G	The trouble codes are displayed.
Function of circuit	—
Fail condition	The CHECK lamp continues blinking irregularly. 
Indicator lamp state	
TOD switch position	—



D04R200009

Step	Action	Yes	No
1	Disconnect the ECU connector from ECU. Is there the continuity established between terminals (C–37)7 and (C–37)25?	Go to *Step 2*	The ECU has failed. Replace the ECU. Go to *Step 3*
2	Is the self-diagnostic connector short-circuited?	Go to *Step 3*	Open the self-diagnostic connector. Go to *Step 3*
3	1. Check that all the parts are mounted. 2. Clear the trouble codes. Is this step complete?	Verify the repair.	Go to *Step 3*

Chart H	Lighting switch circuit
Function of circuit	Reads in the status of lighting switch, and reduces the indicator at night.
Fail condition	Even if the lighting switch is pressed on and off, brightness does not change.
Indicator lamp state	
TOD switch position	All position (exsample TOD mode)



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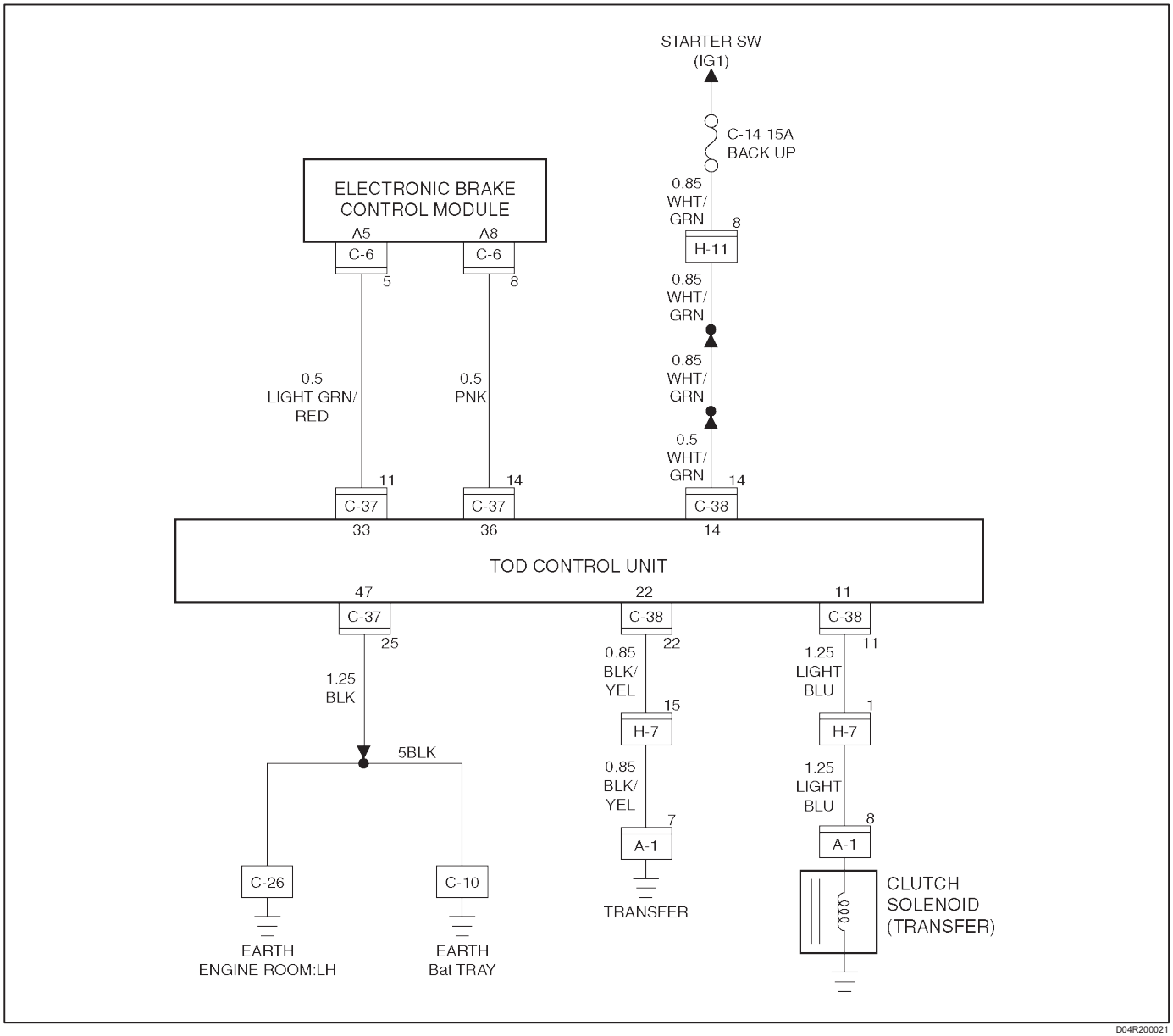
Step	Action	Yes	No
1	1. Turn on the starter switch. 2. Turn off the lighting switch. Is 0V observed between the EUC terminal 40 and 47?	Go to *Step 2*	Lighting switch battery circuit short. Repair the circuit. Go to *Step 4*
2	Turn lighting switch “ON”. Is the battery voltage observed between ECU terminal 40 and 47?	Go to *Step 3*	Wires are broken in lighting switch circuit. Repair the circuit. Go to *Step 4*
3	While the lighting switch is pressed on and off, does the brightness of the indicator change?	The phenomenon is not reproduced. Refer to *“Troubles intermittently observed”*	The ECU has failed. Replace the ECU. Go to *Step 4*
4	Check that all the parts are mounted. Is this step complete?	Verify the repair.	Go to *Step 4*

Diagnosis from Symptom

Troubles that are not indicated by the warning lamp are listed in the table below. These troubles are caused by the faults that cannot be detected by the self-diagnostic function of the control unit.
If this type of trouble is observed, interview the customer and conduct test runs to reproduce the trouble, cross-check the reported trouble with the listed phenomena, and diagnose and analyze the trouble on the item by item basis.

	Phenomena	Major cause	Corrective action
1	The tight corner braking is observed when the vehicle is subject to full steering.	● The standard tires are not used. ● The tire pressure is incorrect. ● The tires are worn inuniformity. ● The transfer or wiring is imperfect. ● The limited slip differential is failed.	Check and recondition the vehicle according to Chart 1.
2	Even if the TOD switch is selected to the TOD position, the F4WD mode is not active, resulting in remarkable rear wheel spin.	● The transfer or wiring is imperfect. ● The shift on the fly system is failed.	Check and recondition the vehicle according to Chart 2.
3	● When the TOD switch is selected to the TOD position, the drive resistance of the F4WD system is too large to get sufficient running speed. ● Noised drive line.	● The standard tires are not used. ● The tires are worn inuniformity. ● The transfer or wiring is imperfect. ● The limited slip differential is failed.	Check and recondition the vehicle according to Chart 1.
4	The shift on the fly system (front axle disconnect) generates gear noises.	● The wiring is imperfect. ● The shift on the fly system is failed.	Check and recondition the vehicle according to Chart 3.
5	The braking distance gets long even when the ABS is active.	● The wiring is imperfect. ● The ABS is failed.	Check and recondition the vehicle according to Chart 4.
6	The transfer does not change to the low range from the high range.	● The transfer or wiring is imperfect. ● The TOD switch is imperfect. ● The AT inhibitor switch is imperfect. ● The brake switch is imperfect. ● The engine speed signal is imperfect. ● The speed sensor is imperfect.	Check and recondition the vehicle according to chart 5.
7	The transfer does not change to the high range from the low range.		Check and recondition the vehicle according to chart 6.
8	The transfer stays neutral and the vehicle does not run.	● The transfer is imperfect.	Check and recondition the vehicle according to chart 7.

Chart 1	The tight corner braking is observed.
Function of circuit	—
Fail condition	When the vehicle is subject to full steering in the TOD mode, the drive resistance gets large or the judder occurs. Otherwise, the above phenomenon is observed only when the brake is applied.



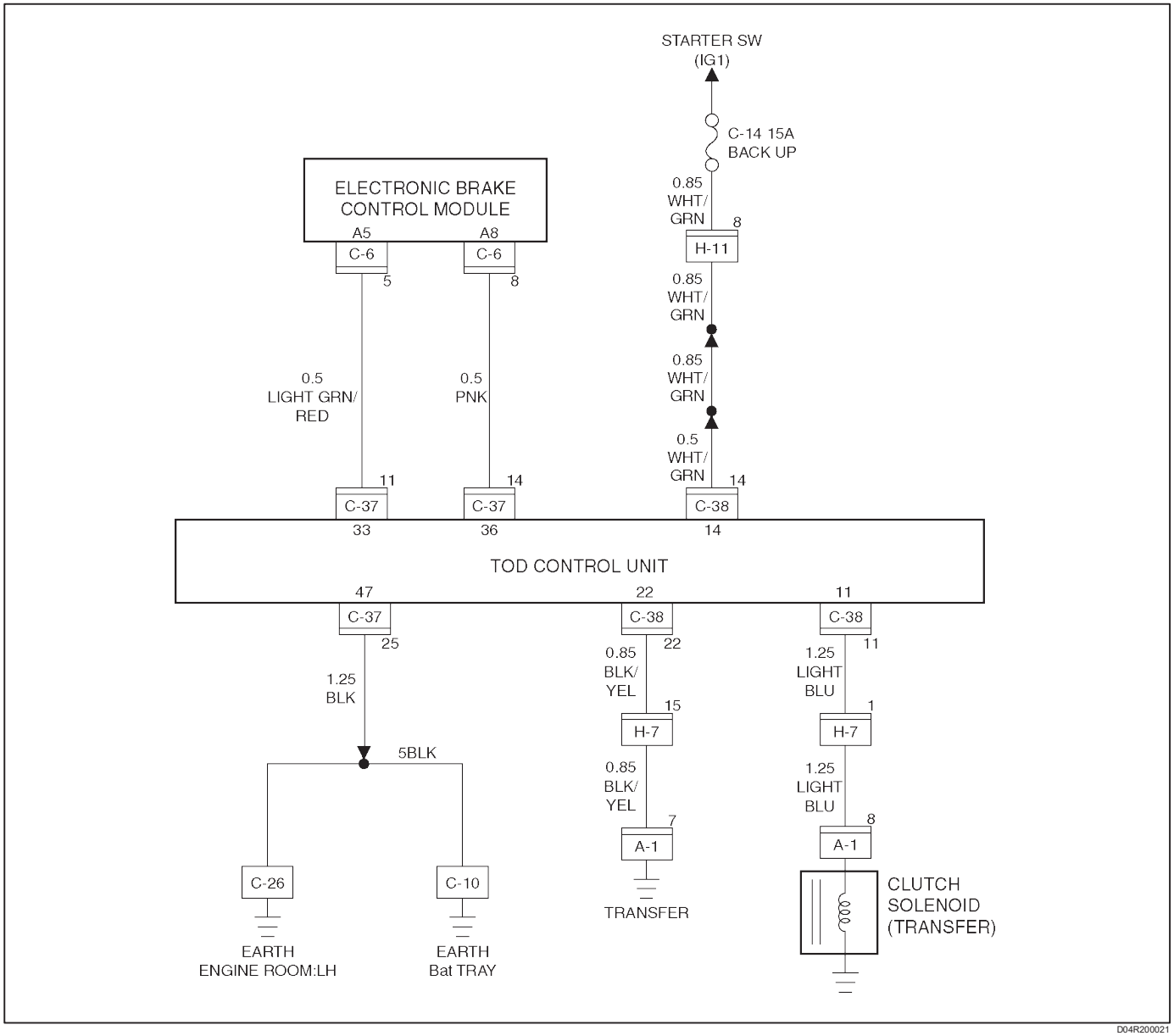
D04R200021

Step	Action	Yes	No
1	Are the front and rear tires in specified size?	Go to *Step 2*	Replace the tires with specified ones, and service the new tires. Go to *Step 16*
2	Is the tire pressure correct?	Go to *Step 3*	Inflate the tires with specified pressure. Go to *Step 16*
3	Are the tires free from abnormal wear?	Go to *Step 4*	Replace the tires with specified ones, and service the new tires. Go to *Step 16*
4	Are different types of tires used?	Go to *Step 5*	Replace the tires with specified ones, and service the new tires. Go to *Step 16*
5	1. Start the engine. 2. Select the TOD switch to the TOD position. 3. Fully turn the steering to the left (or right) end, and select the D range and start the creep run. Does the tight corner braking occur? Is the judder with chug-chug sound observed? * Use caution on the operation.	Go to *Step 6*	Go to *Step 11*
6	1. Select the TOD switch to the 2H position. 2. Fully turn the steering to the left (or right) end, and select the D range and start the creep run. Does the tight corner braking occur? Is the judder with chug-chug sound observed? * Use caution on the operation.	Go to *Step 7*	Go to *Step 14*
7	Is an LSD mounted to the rear differential?	Go to *Step 8*	Go to *Step 9*
8	Is the genuine LSD oil used in the rear differential?	Go to *Step 9*	Replace the differential oil. Go to *Step 16*
9	Does the engine output the power correctly?	Go to *Step 10*	Check the engine. Go to *Step 16*
10	Do the speed sensors work correctly? (Check trouble codes.)	The ECU has failed. Replace the ECU. Go to *Step 16*	Replace the speed sensors. Go to *Step 16*
11	Is the tight corner braking observed only when the brake is applied?	Go to *Step 12*	Conduct full steering under WOT. Go to *Step 5*
12	1. Turn on the starter switch. Is 8 ~ 10 V observed between terminals 33 and 47?	Go to *Step 13*	Repair the circuit of the ECU connector terminal 33 (ABS IN). Go to *Step 16*

Step	Action	Yes	No
13	1. Apply the brake and fully turn the steering to the left (or right) end, and start the creep run. Does the voltage between terminals 11 and 22 range between 0.1 and 1.0V?	Repair the transfer assembly. Go to *Step 16*	The ECU has failed. Replace the ECU. Go to *Step 16*
14	1. Select the TOD switch to the TOD position. 2. Fully turn the steering to the left (or right) end, and select the D range and start the creep run. Does the voltage between terminals 11 and 22 range between 0.1 and 1.0V?	Go to *Step 15*	Go to *Step 10*
15	1. Select the TOD switch to the 2H position. 2. Jack up the right front wheel. Does the front tire rotate smoothly?	The phenomenon is not reproduced. Refer to *"Troubles intermittently observed"*.	Repair the transfer assembly. Go to *Step 16*
16	Check that all the parts are mounted. Is this step complete?	Verify the repair	Go to *Step 16*

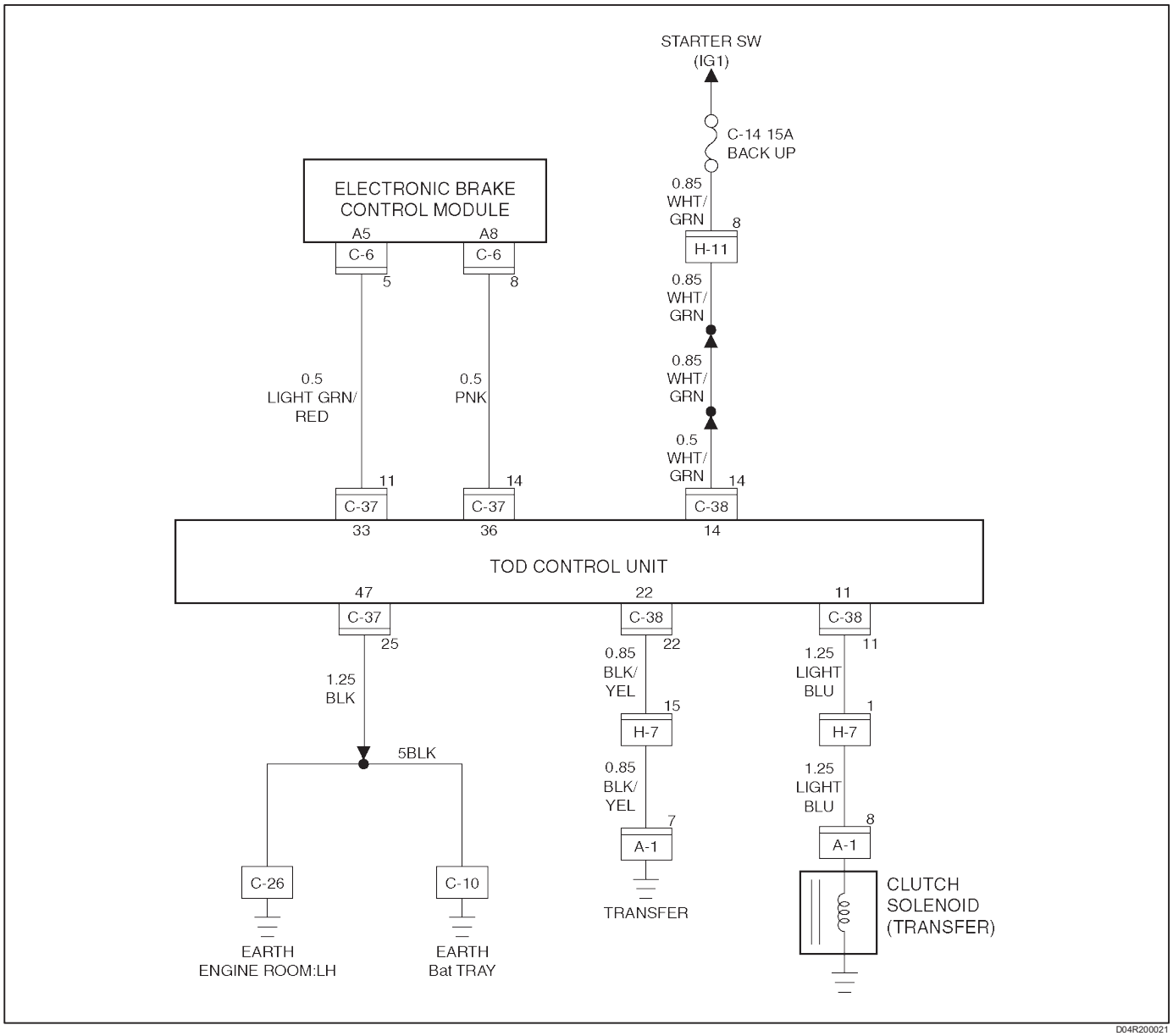
*NOTE: Before checking this item, run the vehicle more than 10 meters with the steering wheel in straight position so that the 4L mechanical lock sleeve can be released certainly.

Chart 2	The TOD mode is not active.
Function of circuit	—
Fail condition	The rear wheels spin in the TOD mode, so the driving torque is not transmitted to the front wheels. The indicator lamps will not show the 4L and TOD status.



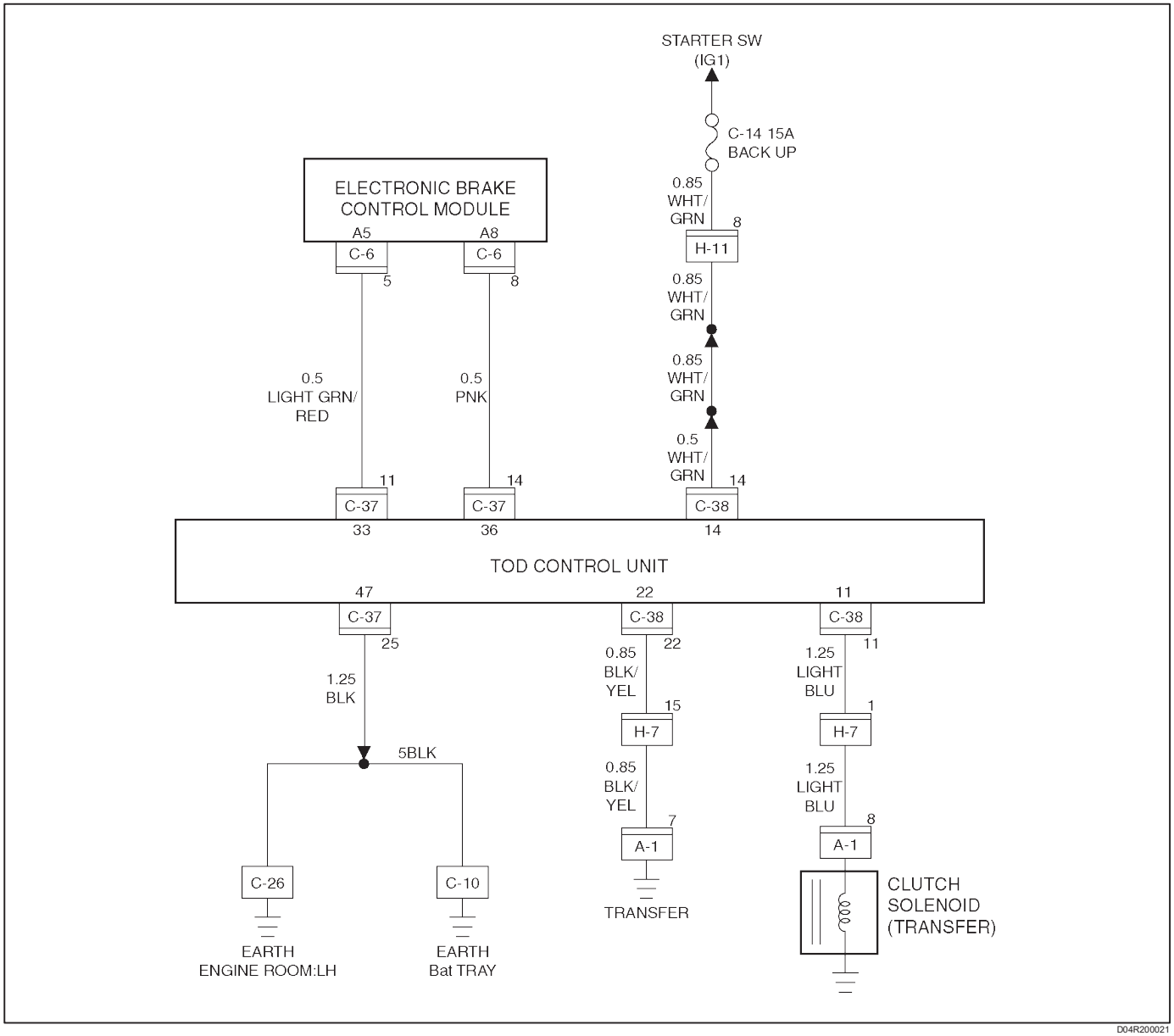
Step	Action	Yes	No
1	Is the trouble code 31(P1721) recorded?	Examine the trouble based on “Diagnosis from Trouble Codes”.	Go to *Step 2*
2	Is any of the trouble codes 28(P1760), 32(P1761) and 33(P1762) recorded?	Examine the trouble based on “Diagnosis from Trouble Codes”.	Go to *Step 3*
3	When the TOD switch is selected to the specified position, do the TOD indicator lamps show the correct status?	Go to *Step 4*	Examine the trouble based on “Trouble Diagnosis Depending on The Status of TOD Indicator”.
4	Select the TOD switch to the 4L position, fully turn the steering to the left (or right) end, and start the creep run. Does the tight corner braking occur?	Go to *Step 5*	Repair the transfer assembly. Go to *Step 7*
5	1. Select the TOD switch to the TOD position. 2. Turn on the starter switch. Does the voltage between terminals 11 and 22 indicate at least 3V while the throttle is completely open?	Go to *Step 6*	The ECU has failed. Replace the ECU. Go to *Step 7*
6	Does the voltage between terminals 11 and 22 indicate at least 0.1V while the throttle is completely closed?	The TOD clutch is worn. Repair the transfer assembly. Go to *Step 7*	The ECU has failed. Replace the ECU. Go to *Step 7*
7	Check that all the parts are mounted. Is this step complete?	Verify the repair.	Go to *Step 7*

Chart 3	The shift on the fly system generates gear noises. (The fuel economy is bad in the 2H mode.)
Function of circuit	—
Fail condition	When the vehicle is run in the 2H mode, the shift on the fly system generates gear noises or the front wheel gears are engaged to generate a shock.



Step	Action	Yes	No
1	Do the indicator lamps show the correct status?	Go to *Step 2*	Examine the trouble based on "Trouble Diagnosis Depending on the Status of TOD Indicator".
2	Is any of the trouble codes 28(P1760), 32(P1761) and 33(P1762) recorded?	Examine the trouble based on "Diagnosis from Trouble Codes".	Go to *Step 3*
3	Turn on the starter switch. Is the battery voltage observed between terminals 14 and 47?	Go to *Step 4*	Go to *Step 5*
4	When the TOD Switch is selected to the 2H position, are the front axle gears correctly disengaged (and when the left front tire is jacked up and turned, is the front propeller shaft standstill)?	The phenomenon is not reproduced. Refer to *"Trouble intermittently observed"*.	The shift on the fly system is failed (refer to *Section 4B1 and 4C*).
5	Does the battery voltage maintain the correct level?	Repair the battery circuit. Go to *Step 6*	Repair the battery and charging system. Go to *Step 6*
6	Check that all the parts are mounted. Is this step complete?	Verify the repair.	Go to *Step 6*

Chart 4	The braking distance gets long even when the ABS is active.
Function of circuit	—
Fail condition	Enough deceleration is not obtained and the braking distance gets long even when the ABS is active in the 2H mode.



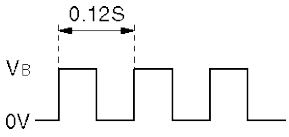
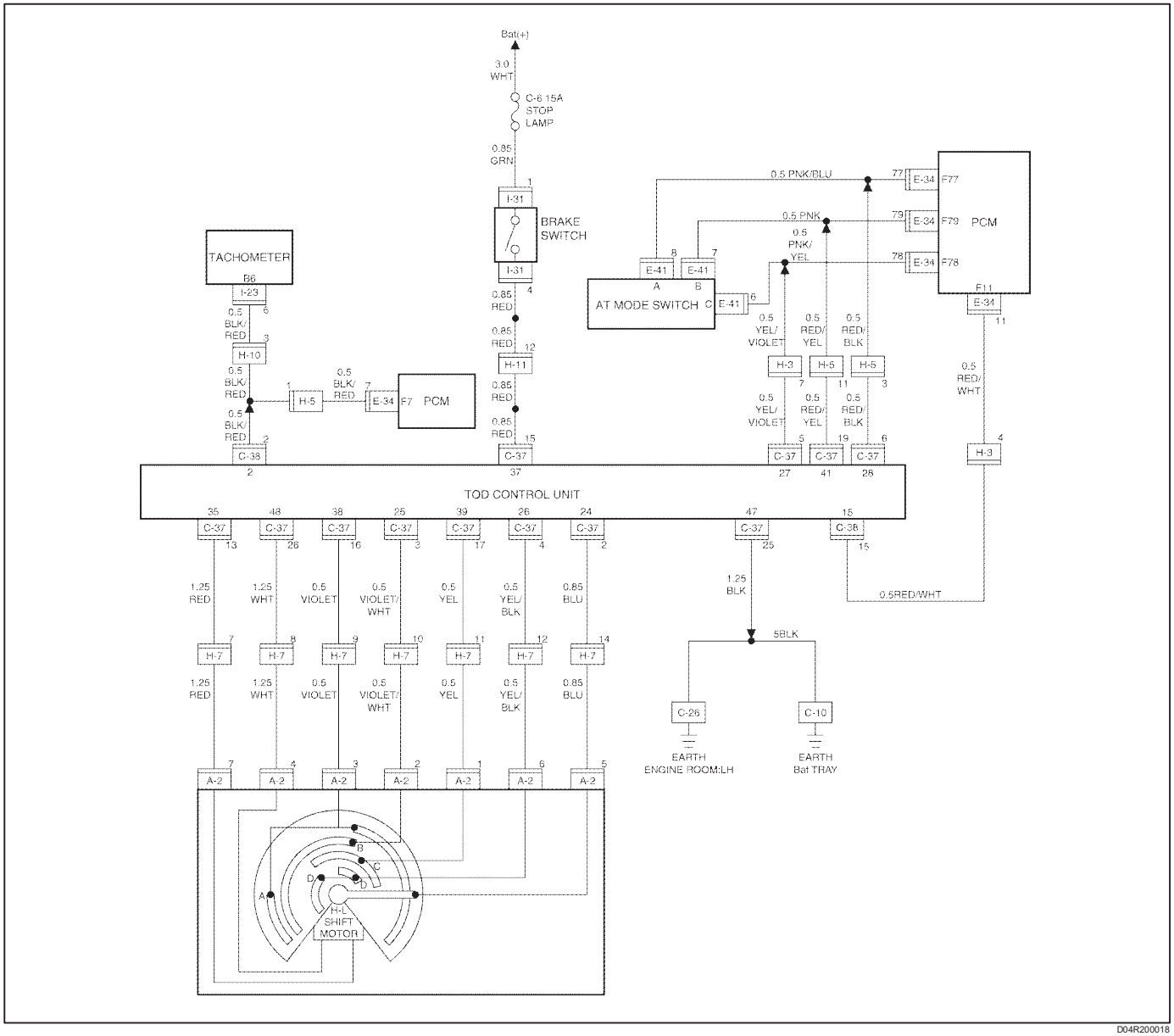
Step	Action	Yes	No
1	Are the brake and ABS systems healthy?	Go to *Step 2*	Repair the brake and ABS. (Refer to *section 5A and 5B)*
2	Turn on the starter switch. Is the battery voltage observed between terminals 14 and 47?	Go to *Step 3*	Repair the battery system. Go to *Step 5*
3	1. Select the TOD switch to the 2H position.  Does the voltage between terminals 36 and 47 range between 7.5 and 16V (0.12 seconds make a cycle)?	Go to *Step 4*	The ECU has failed. Replace the ECU. Go to *Step 5*
4	1. Turn off the starter switch. 2. Disconnect the connector (C–37). Is there the continuity between the connector terminal (C–37) 14 and (C–6) 8?	The phenomenon is not reproduced. Refer to *"Trouble intermittently observed".*	Repair the harness. Go to *Step 5*
5	Check that all the parts are mounted. Is this step complete?	Verify the repair.	Go to *Step 5*

Chart 5	The transfer does not change to low from high.
Function of circuit	—
Fail condition	When the TOD switch is selected to the 4L position, the transfer does not change to the low range.



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Step	Action	Yes	No
1	1. Turn on the starter switch. Is any of the trouble codes 41 (P1741), 42 (P1773), 43 (P1743) and 55 (P1755) recorded?	Examine the trouble based on “Diagnosis from Trouble Codes”.	Go to *Step 2*
2	Is any of the trouble codes 13 (P1735), 14 (P1731), 15 (P1736), 16 (P1737), 24 (P1733), and 27 (P1738) recorded?	Examine the trouble based on “Diagnosis from Trouble Codes”.	Go to *Step 3*
3	Is the trouble code 17 (P1774) recorded?	Examine the trouble based on “Diagnosis from Trouble Codes”.	Go to *Step 4*
4	1. Turn on the starter switch. 2. The car stops, engine speed is less than 1500 rpm, the AT selector is N position, and select the TOD switch to the 4L position. Do the front lamp and rear lamp in the indicator blink?	Go to *Step 5*	Examine the trouble based on “Trouble Diagnosis Depending on the Status of TOD Indicator”.
5	1. Step on the brake pedal. Is the transfer changed to the 4L mode?	The phenomenon is not reproduced. Refer to *“Trouble intermittently observed”.*	Go to *Step 6*
6	When the vehicle is moved forth and back, is the transfer changed to the 4L mode?	The phenomenon is not reproduced. Refer to *“Trouble intermittently observed”.*	Go to *Step 7*
7	Does the continuity corresponding to the encoder position between the terminals comply with the 4L position in the following table (continuity)?	Examine the trouble based on “Trouble diagnosis Depending on The Status of TOD Indicator”.	Go to *Step 8*
8	1. Step on the brake pedal. Is the battery voltage observed between the terminal 37 and 47?	Go to *Step 10*	Go to *Step 9*
9	1. Turn off the starter switch. 2. Disconnect the ECU connector (C–37) and the brake switch connector (I–31). Is there the continuity between the connector terminal (C–37) 15 and (I–31) 4?	The brake switch is abnormal. Repair or replace the brake switch. Go to *Step 13*	Repair the harness. Go to *Step 13*
10	1. Select the AT selector to the N position. Is the voltage between the terminals ranged within the following table (voltage)?	Go to *Step 12*	Go to *Step 11*
11	1. Turn off the starter switch. 2. Disconnect the ECU connector (C–37). 3. Disconnect the AT mode switch connector (E–41). Is there the continuity between the following connector terminals? (C–37)6 and (E–41)8 (C–37)19 and (E–41)7 (C–37)5 and (E–41)6	Repair or replace the AT mode switch. Go to *Step 13*	Repair the circuit which has no continuity. Go to *Step 13*

Step	Action	Yes	No
12	1. Start the engine. Is the engine pulse signal between terminal 2 and 47 at engine speed under 1500 rpm within the standard? Standard: less than 4500 Hz	Replace the ECU. Go to *Step 13*	The engine pulse signal is abnormal. Repair or replace the PCM. Go to *Step 13*
13	Check that all the parts are mounted. Is this step complete?	Verify the repair.	Go to *Step 13*

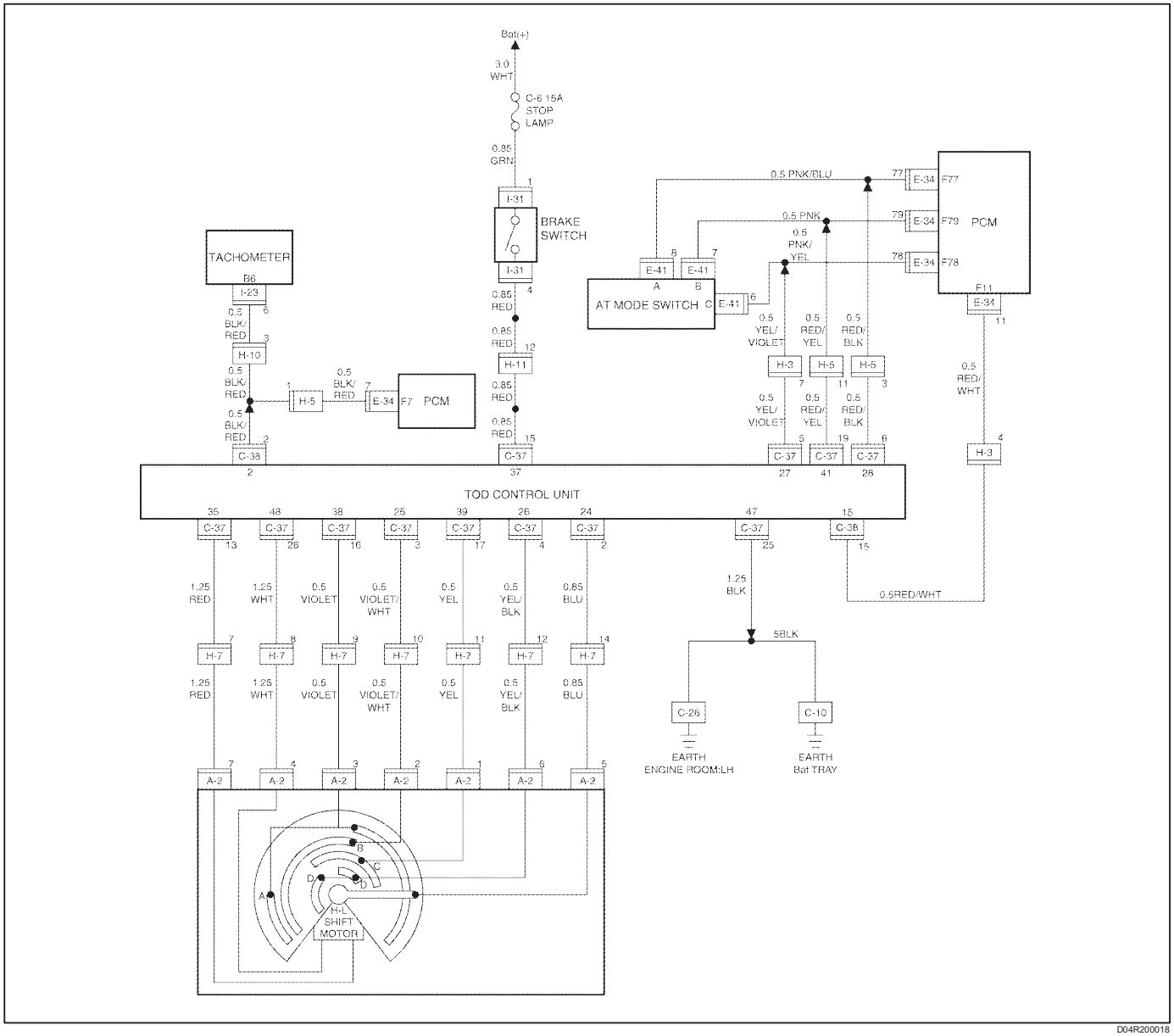
Continuity between terminal in 4L position
(Table: continuity)

Terminals No.	26 and 24	39 and 24	25 and 24	38 and 24
Continuity of 4L position	YES	NO	YES	YES or NO

Standard (Table: voltage)

			Unit: V
Terminals	28 and 47	41 and 47	27 and 47
Voltage	0	12	0

Chart 6	The transfer does not change to high from low.
Function of circuit	—
Fail condition	When the TOD switch is selected to the TOD, the transfer does not change to the high range.



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Step	Action	Yes	No
1	1. Turn on the starter switch. Is any of the trouble codes 41 (P1741), 42 (P1773), 43 (P1743) and 55 (P1755) recorded?	Examine the trouble based on “Diagnosis from Trouble Codes”.	Go to *Step 2*
2	Is any of the trouble codes 13 (P1735), 14 (P1731), 15 (P1736), 16 (P1737), 24 (P1733), and 27 (P1738) recorded?	Examine the trouble based on “Diagnosis from Trouble Codes”.	Go to *Step 3*
3	Is the trouble code 17 (P1774) recorded?	Examine the trouble based on “Diagnosis from Trouble Codes”.	Go to *Step 4*
4	1. Turn on the starter switch. 2. The car stops, engine speed is less than 1500 rpm, the AT selector is N position, and select the TOD switch to the TOD position. Do the front, rear, and AUTO lamps in the indicator blink?	Go to *Step 5*	Examine the trouble based on “Trouble Diagnosis Depending on the Status of TOD Indicator”.
5	1. Step on the brake pedal. Is the transfer changed to the TOD mode?	The phenomenon is not reproduced. Refer to *“Trouble intermittently observed”.*	Go to *Step 6*
6	When the vehicle is moved forth and back, is the transfer changed to the TOD mode?	The phenomenon is not reproduced. Refer to *“Trouble intermittently observed”.*	Go to *Step 7*
7	Is the continuity corresponding to the encoder position between the terminals ranged within the any case (case 1, 2 and 3) of TOD position in the following table (continuity)?	Examine the trouble based on “Trouble diagnosis Depending on The Status of TOD Indicator”.	Go to *Step 8*
8	1. Step on the brake pedal. Is the battery voltage observed between the terminal 37 and 47?	Go to *Step 10*	Go to *Step 9*
9	1. Turn off the starter switch. 2. Disconnect the ECU connector (C–37) and the brake switch connector (I–31). Is there the continuity between the connector terminal (C–37) 15 and (I–31) 4?	The brake switch is abnormal. Repair or replace the brake switch. Go to *Step 13*	Repair the harness. Go to *Step 13*
10	1. Select the AT selector to the N position. Is the voltage between the terminals ranged within the following table (voltage)?	Go to *Step 12*	Go to *Step 11*
11	1. Turn off the starter switch. 2. Disconnect the ECU connector (C–37) and brake switch connector (I–31). 3. Disconnect the AT mode switch connector (E–41). Is there the continuity between the following connector terminals? (C–37)6 and (E–41)8 (C–37)19 and (E–41)7 (C–37)5 and (E–41)6	Repair or replace the AT mode switch. Go to *Step 13*	Repair the circuit which has no continuity. Go to *Step 13*

Step	Action	Yes	No
12	1. Start the engine. Is the engine pulse signal between terminal 2 and 47 at engine speed under 1500 rpm within the standard? Standard: less than 4500 Hz	Replace the ECU. Go to *Step 13*	The engine pulse signal is abnormal. Repair or replace the PCM. Go to *Step 13*
13	Check that all the parts are mounted. Is this step complete?	Verify the repair.	Go to *Step 13*

Continuity in TOD position (Table: continuity)

Case	Continuity between terminals			
	26 and 24	39 and 24	25 and 24	38 and 24
1	NO	NO	NO	YES
2	NO	YES	NO	YES
3	YES	YES	NO	YES

Standard (Table: voltage)

			Unit: V
Terminals	28 and 47	41 and 47	27 and 47
Voltage	0	12	0

Chart 7	The transfer does not change to low from high.
Function of circuit	—
Fail condition	When the TOD switch is selected to the 4L position, the transfer does not change to the low position. (The transfer stays neutral and the vehicle does not run.)

Step	Action	Yes	No
1	1. Turn on the starter switch. 2. Set the TOD switch to the any position. Is the transfer changed to high or low?	Go to *Step 2*	Go to *Step 3*
2	Is the transfer changed to high from low and the low from high?	The phenomenon is not reproduced. Refer to *"Trouble intermittently observed".*	Go to *Step 3*
3	Is any of the trouble codes 41 (P1741), 42 (P1773), 43 (P1743), and 55 (P1755) recorded?	Examine the trouble based on "Diagnosis from Trouble Codes".	The transfer is abnormal. Repair the transfer. Go to *Step 4*
4	Check that all the parts are mounted. Is this step complete?	Verify the repair.	Go to *Step 4*

AXIOM (Vehicles Produced Before July/31/2001)

DRIVELINE/AXLE

DRIVE SHAFT SYSTEM

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Service Precaution

WARNING: THIS VEHICLE HAS A SUPPLEMENTAL RESTRAINT SYSTEM(SRS). REFER TO THE SRS COMPONENT AND WIRING LOCATION VIEW IN ORDER TO DETERMINE WHETHER YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING. WHEN YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING, REFER TO THE SRS SERVICE INFORMATION. FAILURE TO FOLLOW WARNINGS COULD RESULT IN POSSIBLE AIR BAG DEPLOYMENT, PERSONAL INJURY, OR OTHERWISE UNNEEDED SRS SYSTEM REPAIRS.

CAUTION: Always use the correct fastener in the proper location. When you replace a fastener, use ONLY the exact part number for that application. ISUZU will call out those fasteners that require a replacement after removal. ISUZU will also call out the fasteners that require thread lockers or thread sealant. UNLESS OTHERWISE SPECIFIED , do not use supplemental coatings (Paints, greases, or other corrosion inhibitors) on threaded fasteners or fastener joint interfaces. Generally, such coatings adversely affect the fastener torque and the joint clamping force, and may damage the fastener. When you install fasteners, use the correct tightening sequence and specifications. Following these instructions can help you avoid damage to parts and systems.

General Description

This publication contains essential removal, installation, adjustment and maintenance procedures.
The front axle utilizes a central disconnect type front axle/transfer case system.

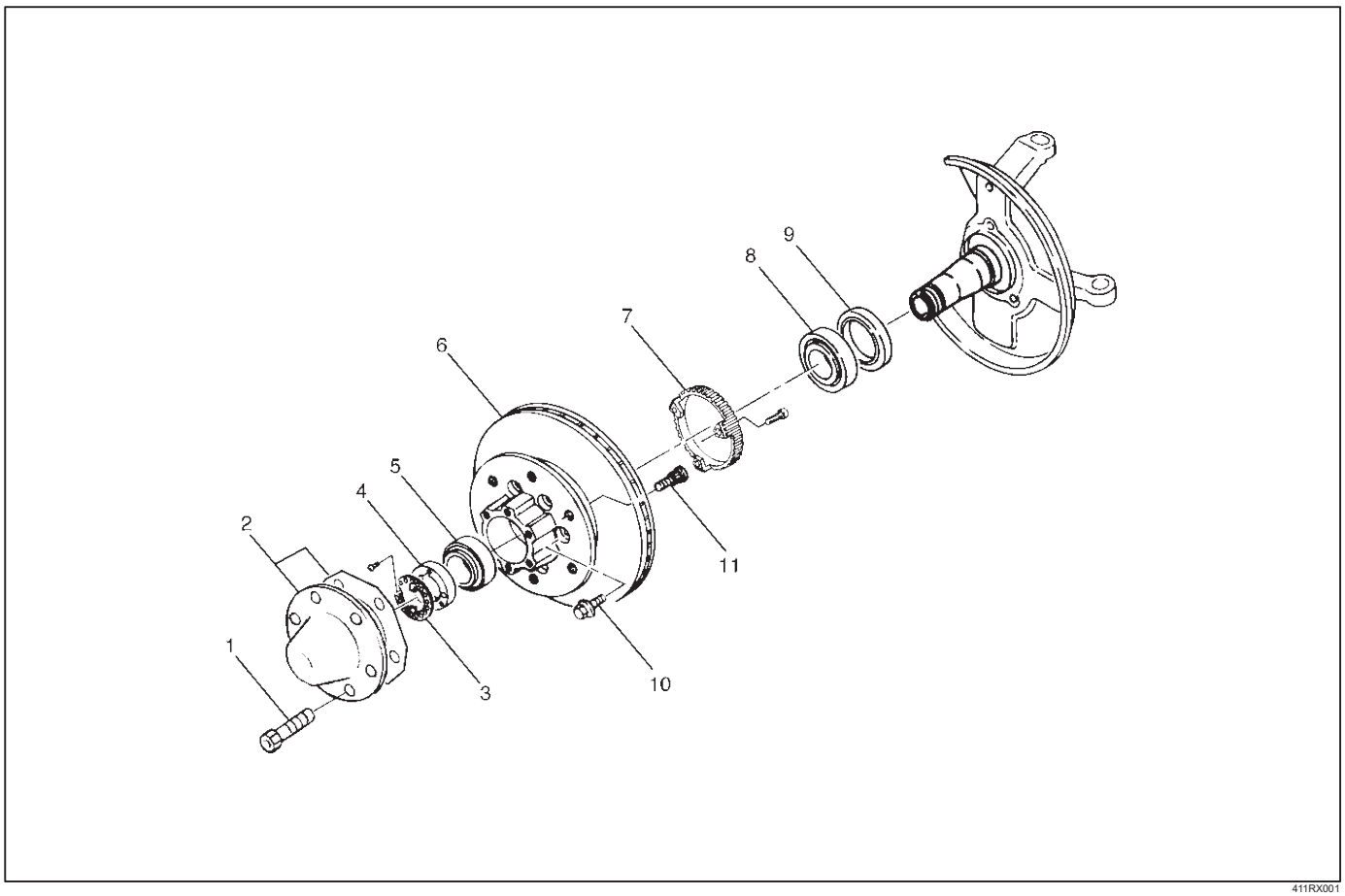
The drive axles are completely flexible assemblies, consisting of inner and outer constant velocity (CV) drive shaft joints connected by an axle shaft.
For description of front propeller shaft and universal joint, refer to *Front Propeller Shaft* in this section.

Diagnosis

Condition	Possible cause	Correction
Oil Leak At Front Axle	Worn or defective oil seal.	Replace the oil seal.
	Front axle housing cracked.	Repair or replace.
Oil Leak At Pinion Shaft	Too much gear oil.	Correct the oil level.
	Oil seal worn or defective.	Replace the oil seal.
	Pinion flange loose or damaged.	Tighten or replace.
Noises In Front Axle Drive Shaft Joint	Broken or worn drive shaft joints and bellows (BJ and DOJ).	Replace the drive shaft joints and bellows.
“Clank” When Accelerating From “Coast”	Loose drive shaft joint to output shaft bolts.	Tighten.
	Damaged inner drive shaft joint.	Replace.
Shudder or Vibration During Acceleration	Excessive drive shaft joint angle.	Repair.
	Worn or damaged drive shaft joints.	Replace.
	Sticking spider assembly (inner drive shaft joint).	Lubricate or replace.
	Sticking joint assembly (outer drive shaft joint).	Lubricate or replace.
Vibration At Highway Speeds	Out of balance or out of round tires.	Balance or replace.
	Front end out of alignment.	Align.
Noises in Front Axle	Insufficient gear oil.	Replenish the gear oil.
	Wrong or poor grade gear oil.	Replace the gear oil.
	Drive pinion to ring gear backlash incorrect.	Adjust the backlash.
	Worn or chipped ring gear, pinion gear or side gear.	Replace the ring gear, pinion gear or side gear.
	Pinion shaft bearing worn.	Replace the pinion shaft bearing.
	Wheel bearing worn.	Replace the wheel bearing.
	Differential bearing loose or worn.	Tighten or replace.
Wanders and Pulls	Wheel bearing preload too tight.	Adjust the wheel bearing preload.
	Incorrect front alignment.	Adjust the front alignment.
	Steering unit loose or worn.	Tighten or replace.
	Tire worn or improperly inflated.	Adjust the inflation or replace.
	Front or rear suspension parts loose or broken.	Tighten or replace.
Front Wheel Shimmy	Wheel bearing worn or improperly adjusted.	Adjust or replace.
	Incorrect front alignment.	Adjust the front alignment.
	Worn ball joint or bush.	Replace the ball joint or bush.
	Steering unit loose or worn.	Tighten or replace.
	Tire worn or improperly inflated.	Replace or adjust the inflation.
	Shock absorber worn.	Replace the shock absorber.

Front Hub and Disc (2WD Model)

Disassembled View



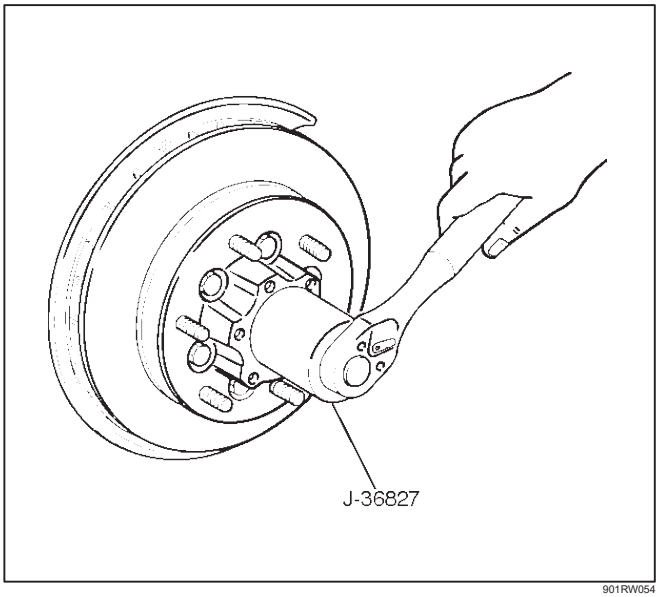
411RX001

Legend

(1) Bolt
(2) Cover and Gasket
(3) Lock Washer and Lock Screw
(4) Hub Nut
(5) Outer Bearing
(6) Hub and Disc Assembly
(7) ABS Sensor Ring
(8) Inner Bearing
(9) Oil Seal
(10) Bolt
(11) Wheel Pin

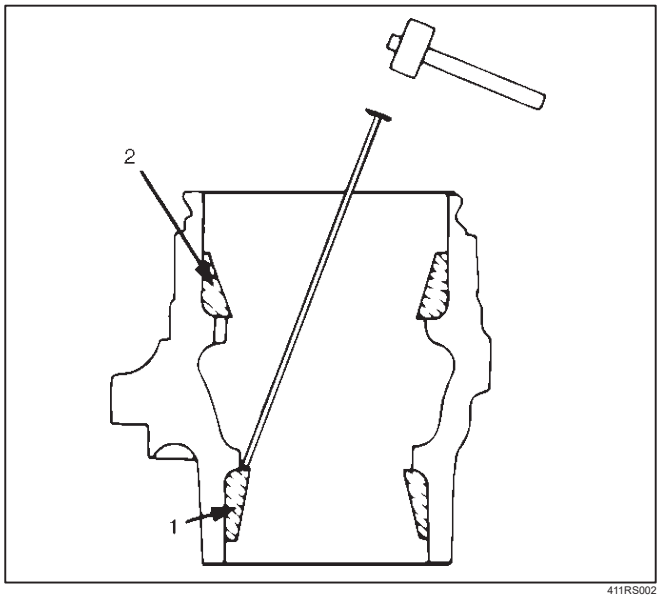
Disassembly

1. Before disassembly, jack up the front of vehicle and support frame with jack stands.
2. Remove the two bolts from the rear side of the knuckle arm, then remove the brake caliper, with the brake hose attached.
   Use a wire to attach the brake caliper to the upper link. Refer to *Disk Brakes in Brake* section.
3. Remove cover bolt.
4. Remove cover and gasket.
5. Remove lock washer and Lock screw.
6. Remove hub nut, using front hub nut wrench J–36827.



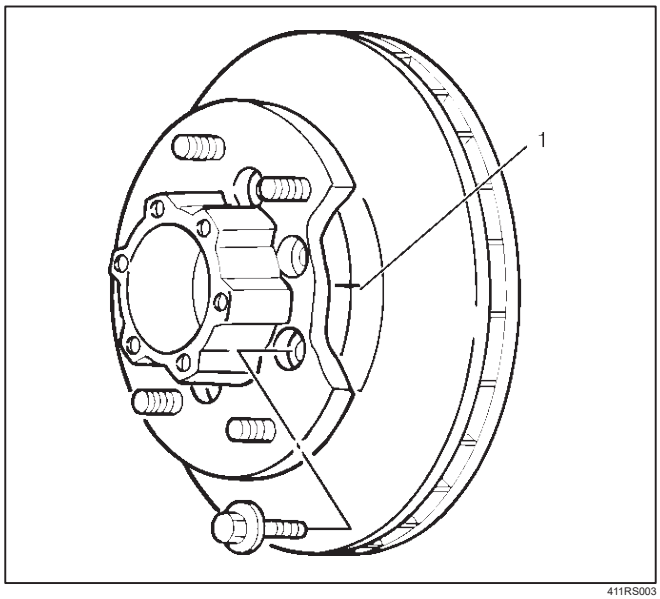
901RW054

7. Remove hub and disc assembly.
8. Remove ABS sensor ring.
9. Remove outer bearing.
10. Remove oil seal.
11. Remove inner bearing.
12. Use a brass bar to remove the outer bearing outer race(1), oil seal, inner bearing and inner bearing outer race(2) from the hub.



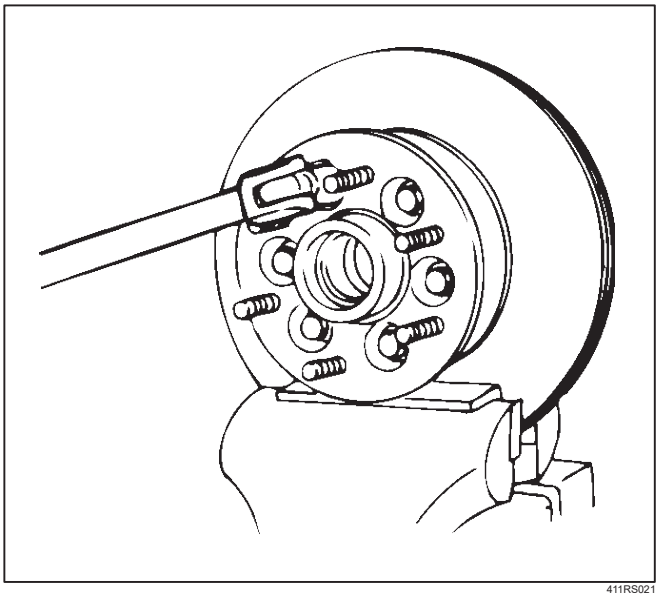
411RS002

13. Remove bolt.
14. If necessary, replace the wheel pin in the following manner.
    - Scribe mark(1) on hub to disc before disassembly to insure proper assembly.

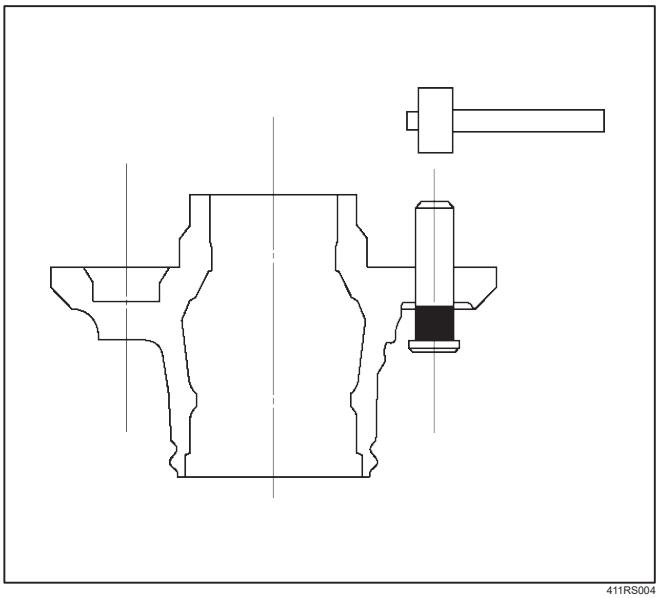


411RS003

- Clamp hub and disc assembly in vise, using protective pads. Remove six(6) disc-to-hub retaining bolts.


411RS021

- Place hub on a suitable work surface and remove wheel studs, as required, using a hammer.


411RS004

Inspection and Repair

Make necessary correction or parts replacement if wear, damage, corrosion or any other abnormal condition are found through inspection.
Check the following parts.

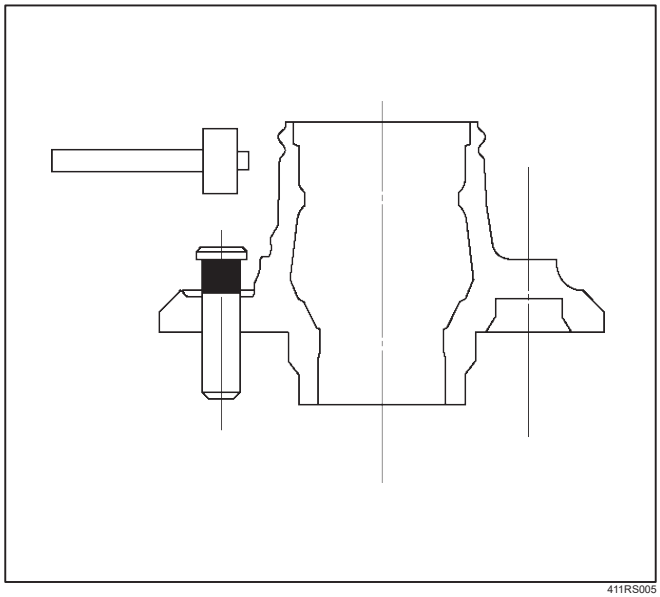
- Hub
- Hub bearing oil seal
- Knuckle spindle
- Disc
- Caliper
- ABS sensor ring

For inspection and servicing of disc caliper and related parts, refer to *Disc Brake in Brake* section.

Reassembly

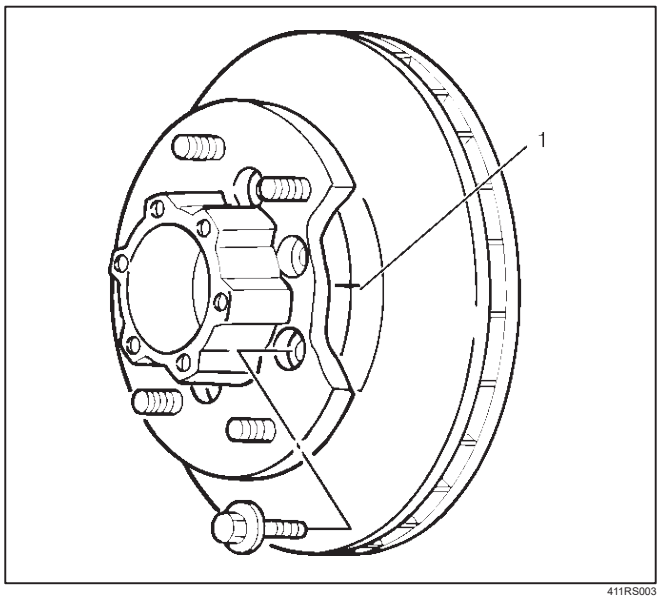
1. Install wheel pin.
   - Place hub on a wood workbench or a block of wood approx. 6” by 6” to protect the wheel stud ends and threads.
   - Install wheel stud, using a hammer.

NOTE: Be sure wheel stud is started squarely and seats completely.


411RS005

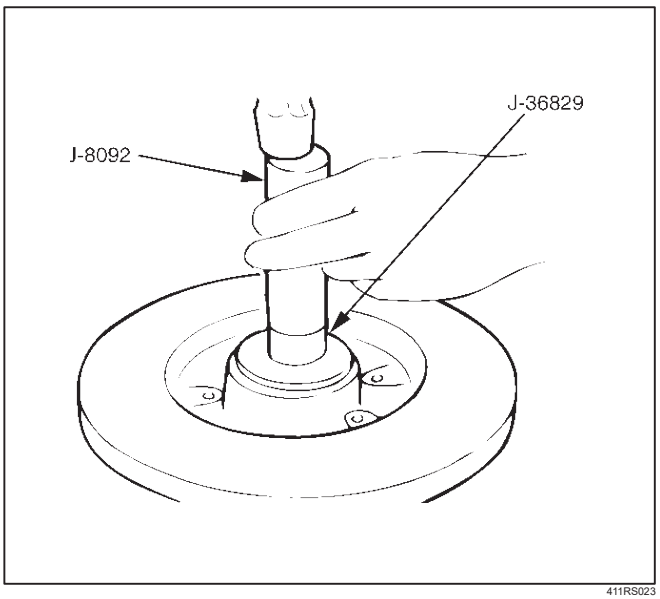
2. Align scribe marks(1) and attach the hub to disc then tighten the bolts to the specified torque.

   Torque: 103 N·m (76 lb ft)



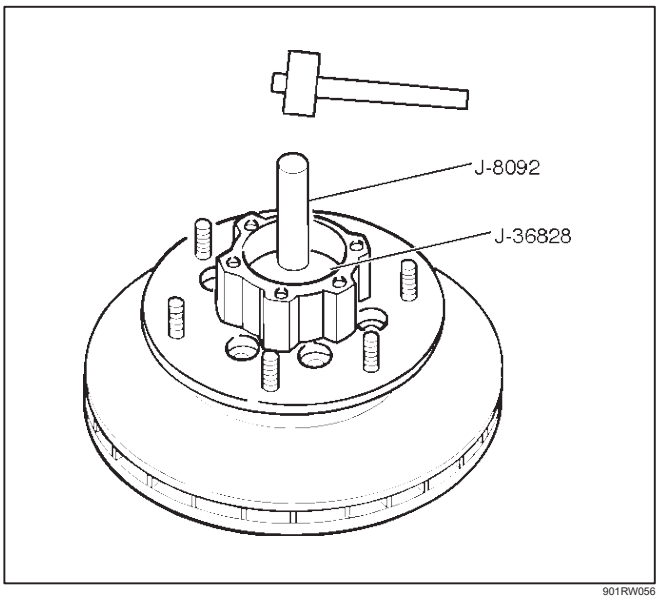
411RS003

3. Install inner bearing.
   Install the outer race by driving it into the hub by using installer J–36829 and grip J–8092.



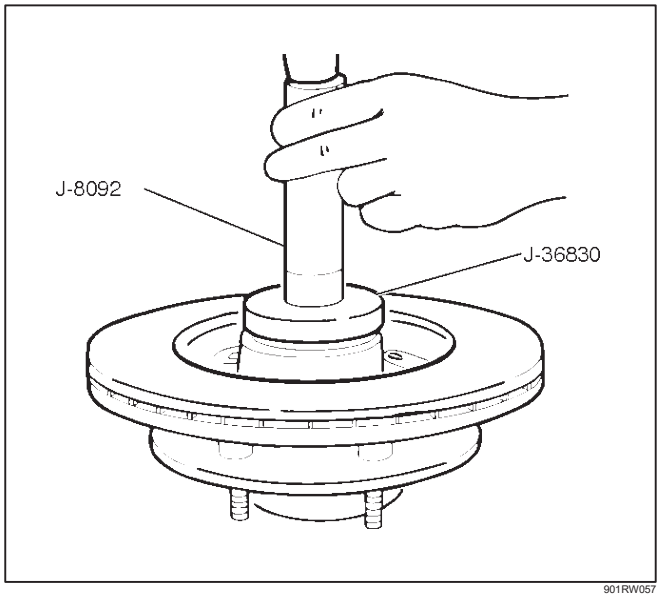
411RS023

4. Install outer bearing.
   Install the outer race by driving it into the hub by using installer J–36828 and grip J-8092.



901RW056

5. Install oil seal by using installer J–36830 and grip J–8092.
   Apply Multipurpose grease (NLGI No. 2 or equivalent) to the lip portion.



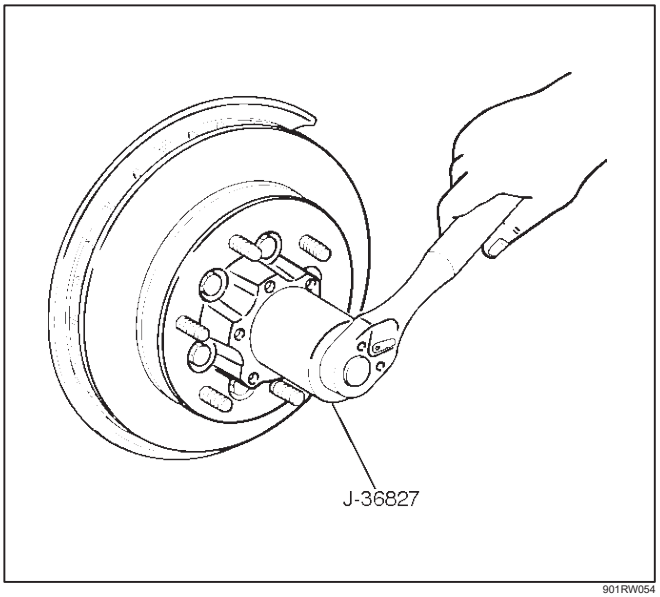
6. Inatall ABS sensor ring, then tigthen the bolts to the specified torque.

Torque: 18 N·m (13 lb ft)

7. Install hub and disc assembly.
   - Apply grease in the hub.
   - Apply wheel bearing type grease (NLGI No.2 or equivalent) to the outer and inner bearing.

Hub	35 g (1.23 oz)
Outer bearing	10 g (0.35 oz)
Inner bearing	15 g (0.53 oz)

8. Install hub nut.
   Turn the place where there is a chamfer in the tapped hole to the outer side, then attach the nut by using front hub nut wrench J–36827.



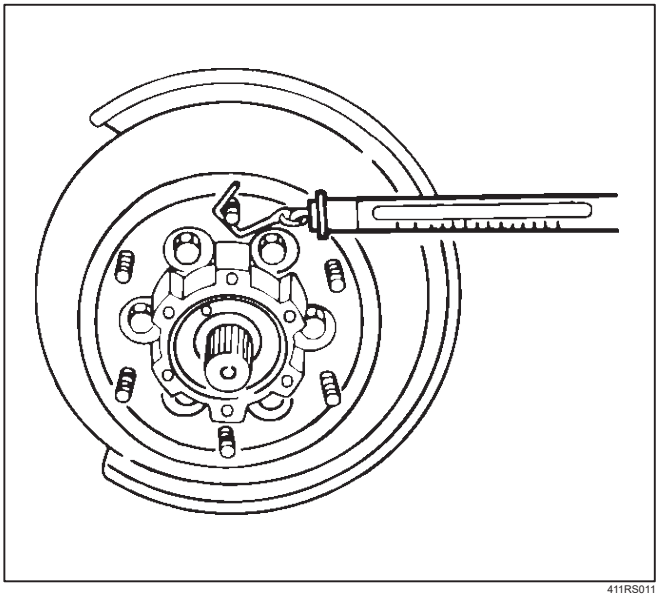
Preload Adjustment

1. Tighten the hub nut to 29.4 N·m (21.7 lb ft), then fully loosen the nut.
2. Tighten the hub nut to the value given below, using a spring scale on the wheel pin.

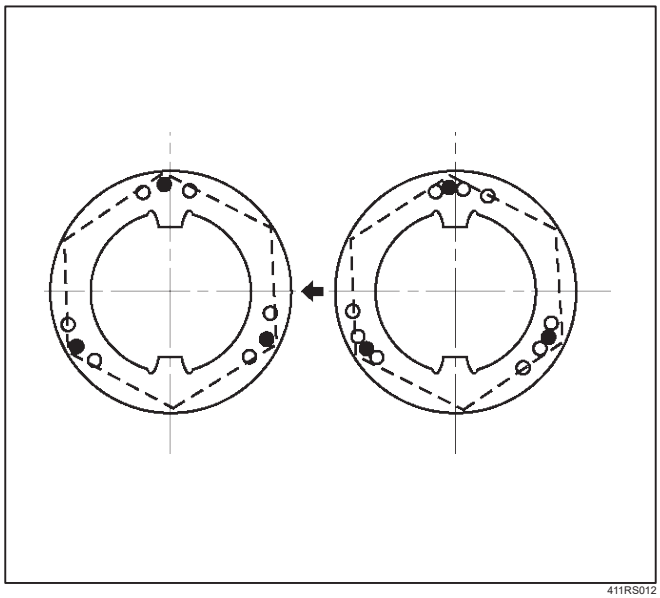
Bearing Preload

New bearing and New oil seal	19.6 – 24.5 N (4.4 – 5.5 lb)
Used bearing and New oil seal	11.8 – 17.7 N (2.6 – 4.0 lb)

If the measured bearing preload is outside the specifications, adjust it by loosening or tightening the hub nut.



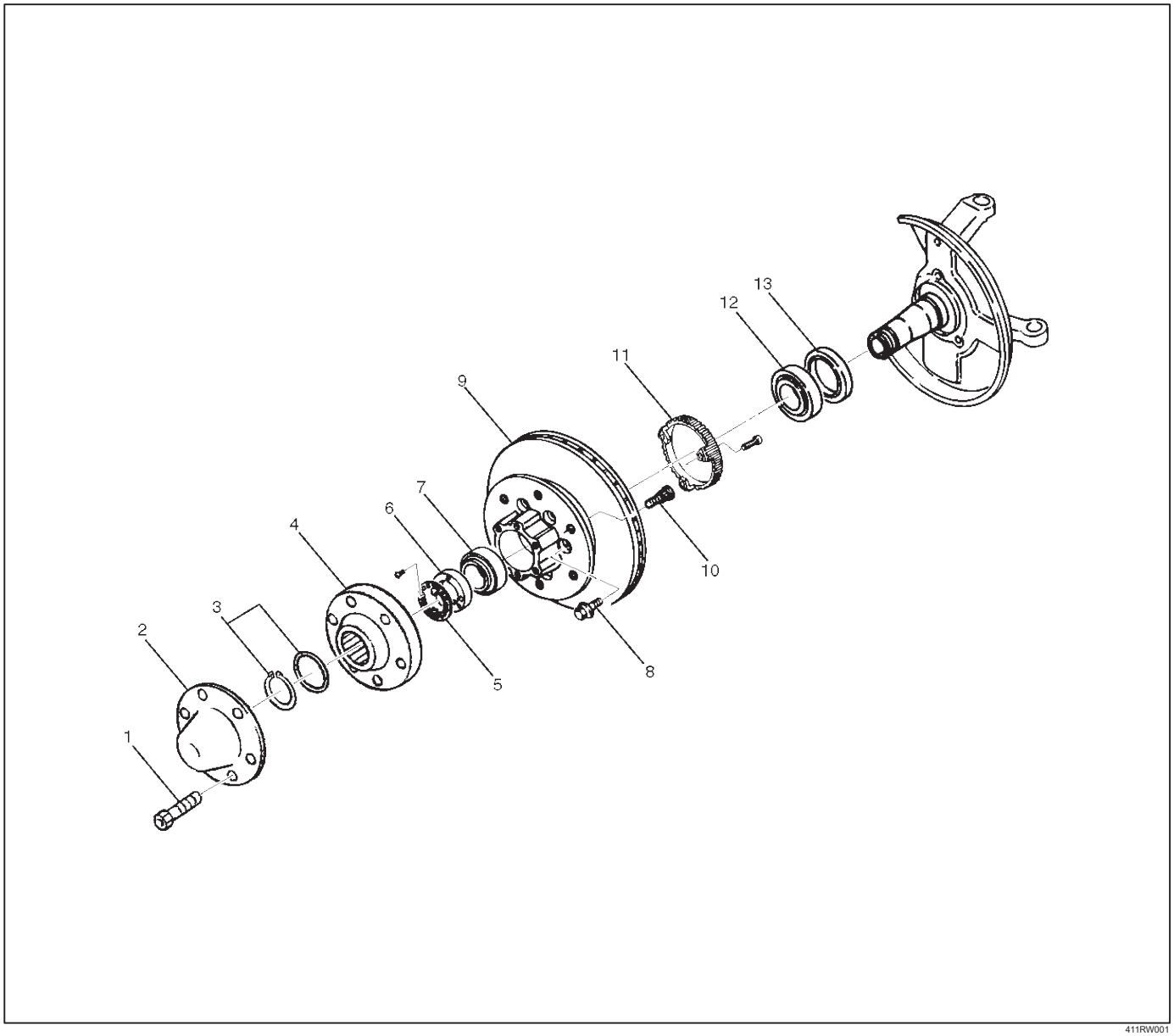
9. Install lock washer and lock screw.
   - Turn the side with larger diameter of the tapered bore to the vehicle outer side, then attach the washer.
   - If the bolt holes in the lock plate are not aligned with the corresponding holes in the nut, reverse the lock plate.
   - If the bolt holes are still out of alignment, turn in the nut just enough to obtain alignment.
   - Screw is to be fastened tightly so its head may come lower than the surface of the washer.



10. Install cover and gasket then tighten the cover bolt.
    Torque: 59 N·m (43 lb ft)
11. Install brake caliper and tighten fixing bolt.

Front Hub and Disc (4WD Model)

Disassembled View



411RW001

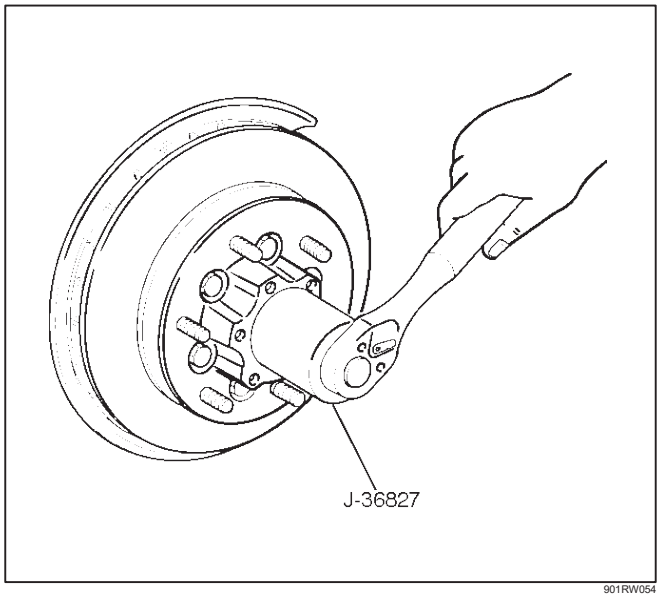
Legend

(1) Bolt
(2) Cap
(3) Snap Ring and Shim
(4) Hub Flange
(5) Lock Washer and Lock Screw
(6) Hub Nut
(7) Outer Bearing
(8) Bolt
(9) Hub and Disc Assembly
(10) Wheel Pin
(11) ABS Sensor Ring
(12) Inner Bearing
(13) Oil Seal

Disassembly

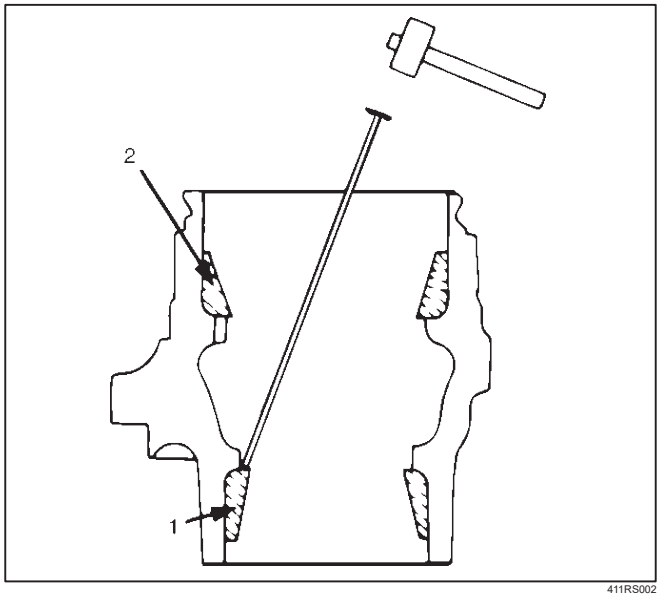
1. Before disassembly, select the 2WD position with the 4WD switch.
2. Jack up the front of vehicle and support frame with jack attached.
3. Remove the two bolts from the rear side of the knuckle arm, then remove the brake caliper, with the brake hose attached.
   Use a wire to attach the brake caliper to the upper link.
   Refer to *Disk Brakes in Brake* section.
4. Remove Bolt.
5. Remove cap.

6. Remove snap ring and shim.
7. Remove hub flange.
8. Remove lock washer and lock screw.
9. Remove hub nut, using front hub nut wrench J–36827.



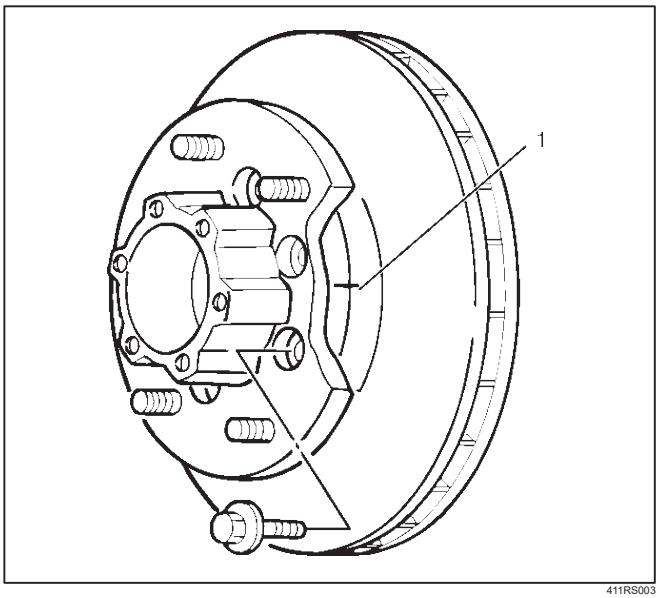
901RW054

10. Remove hub and disc assembly.
11. Remove ABS sensor ring.
12. Remove outer bearing.
13. Remove oil seal.
14. Remove inner bearing.
15. Use a brass bar to remove the outer bearing outer race(1), oil seal, inner bearing and inner bearing outer race(2) from the hub.



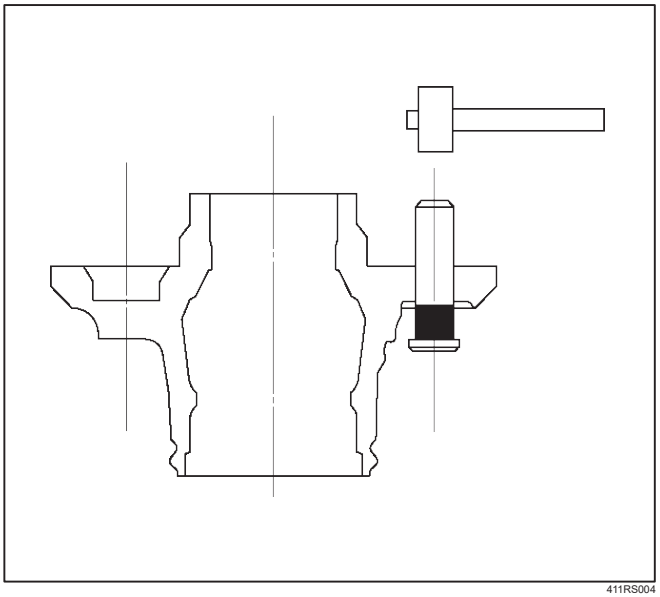
411RS002

16. Remove bolt.
    If necessary, replace the wheel pin in the following manner.
    - Scribe mark(1) on the hub to disc before disassembly to insure proper assembly.
    - Clamp the hub and disc assembly in a vise, using protective pads. Remove the 6 disc–to–hub retaining bolts.



411RS003

    - Place hub on a suitable work surface and remove wheel studs, as required, by using a hammer.


411RS004

Inspection and Repair

Make necessary correction or parts replacement if wear, damage, corrosion or any other abnormal condition are found through inspection.
Check the following parts.

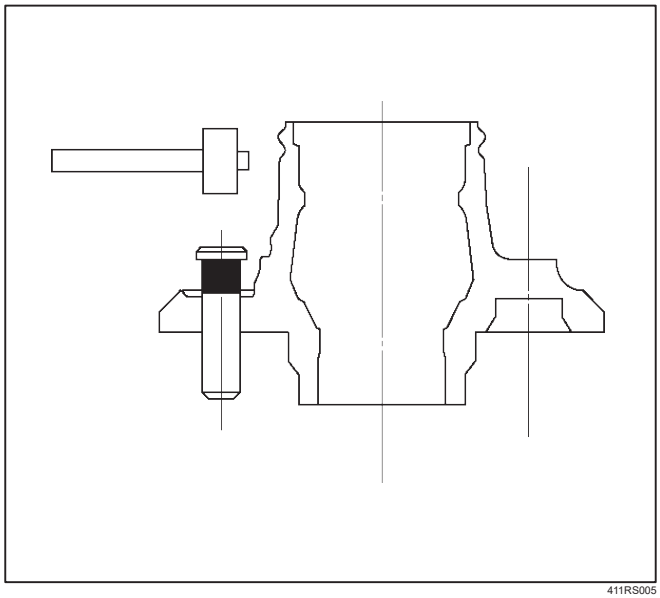
- Hub
- Hub bearing, oil seal
- Knuckle spindle
- Disc
- Caliper
- Shift on the fly system parts (Cap, Hub flange, Shim, Snap ring)
- ABS sensor ring

For inspection and servicing of disc caliper and related parts, refer to *Disc Brakes in Brake* section.

Reassembly

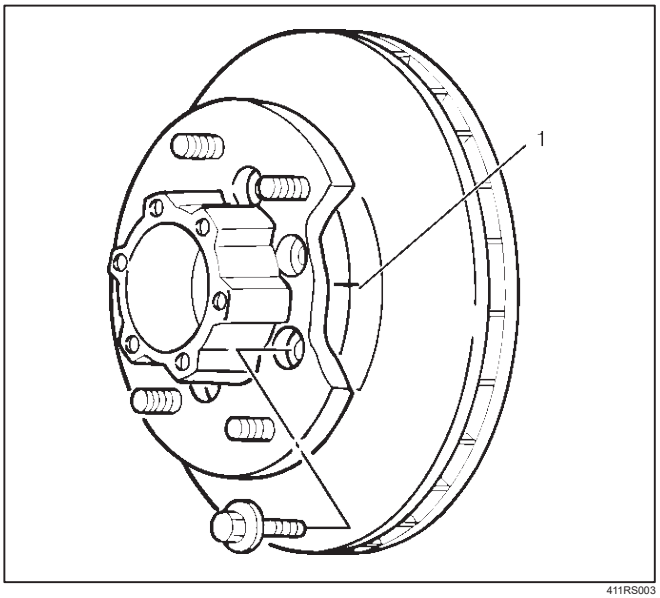
1. Install wheel pin.
   - Place the hub on a wood workbench or a block of wood approx. 6” by 6” to protect the wheel stud ends and threads.
   - Insert a wheel stud using a hammer.

NOTE: Be sure the wheel stud is started squarely and seats completely.


411RS005

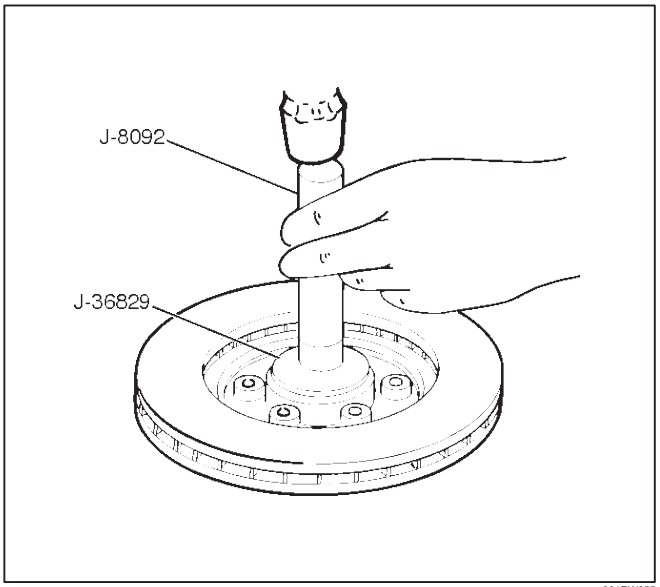
2. Align scribe marks(1) and attach the hub to the disc, then tighten the bolts to the specified torque.

   Torque: 103 N·m (76 lb ft)



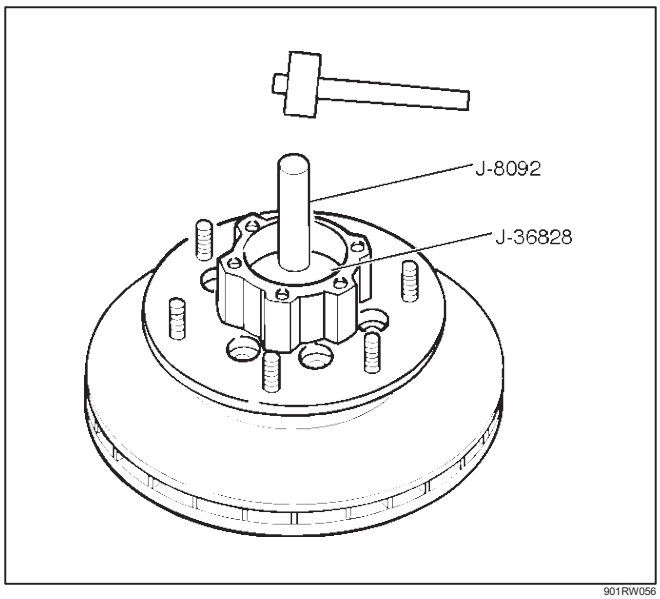
411RS003

3. Install inner bearing.
   Install the outer race by driving it into the hub by using insatller J–36829 and grip J–8092.

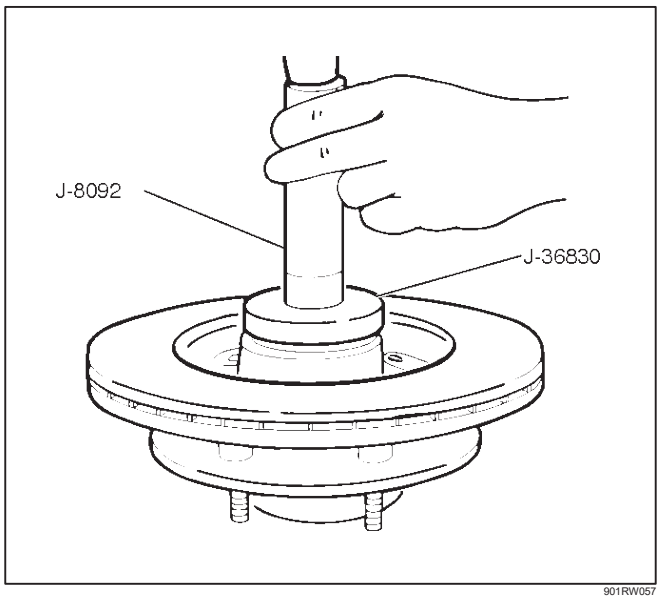


901RW055

4. Install outer bearing.
   Install the outer race by driving it into the hub by using install J–36828 and grip J–8092.



5. Install oil seal by using installer J–36830 and grip J–8092.
   Apply Multipurpose grease (NLGI No.2 or equivalent) to the lip portion.



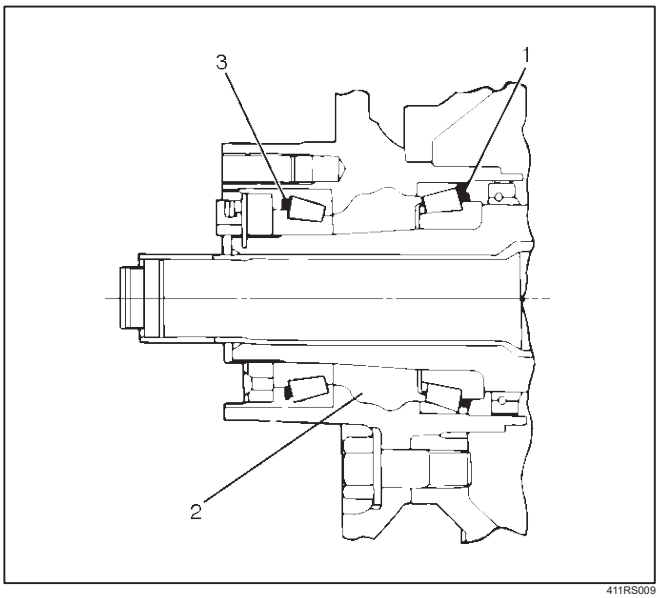
6. Install ABS sensor ring, then tighten the bolts to the specified torque.

   Torque: 18 N·m (13 lb ft)

7. Install hub and disc assembly.
   - Apply grease in the hub.
   - Apply wheel bearing type grease NLGI No. 2 or equivalent to the outer and inner bearing.

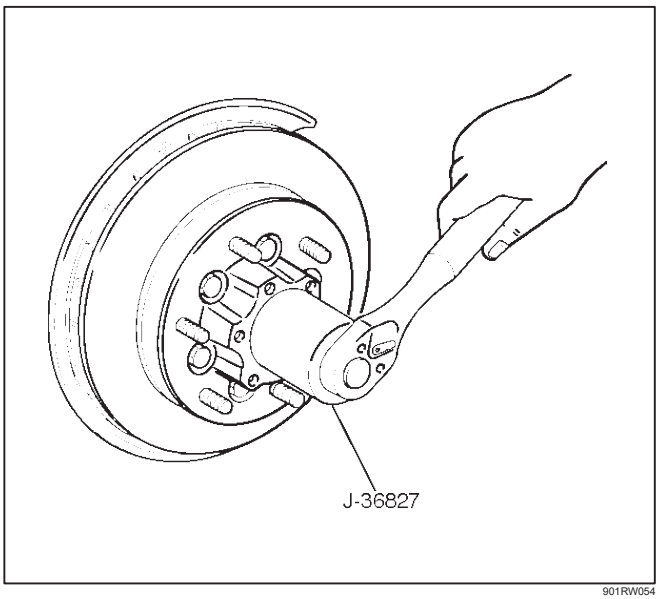
Grease Amount

Hub	35 g (1.23 oz)
Outer bearing	10 g (0.35 oz)
Inner bearing	15 g (0.53 oz)



Legend
(1) Inner Bearing
(2) Hub
(3) Outer Bearing

8. Install hub nut.
   Turn to the place where there is a chamfer in the tapped hole to the outer side, then attach the nut by using front hub nut wrench J–36827.

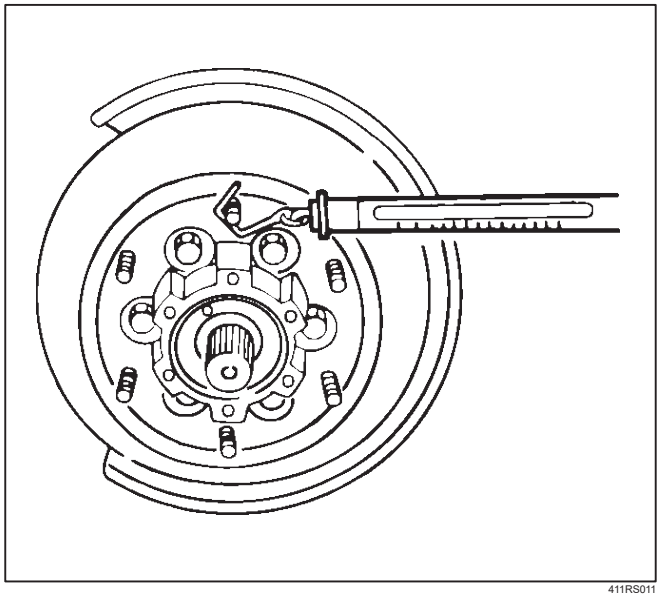


Preload Adjustment

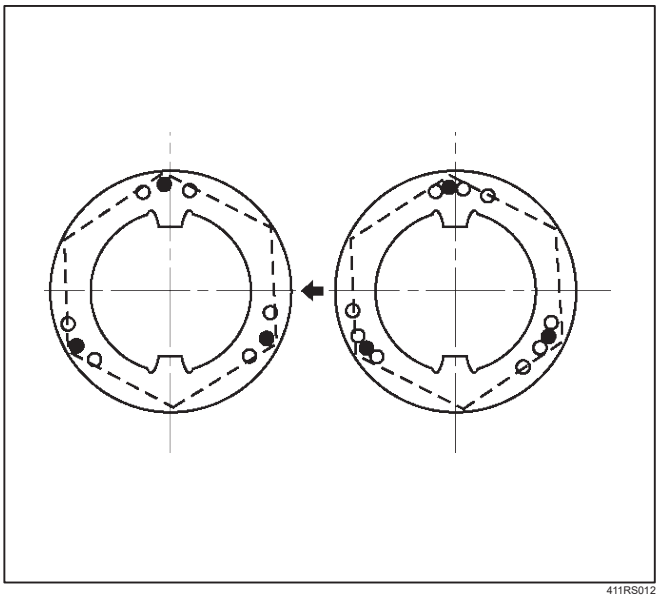
1. Tighten the hub nut to 29 N·m (22 lb ft), then fully loosen the nut.
2. Tighten the hub nut to the value given below, using a spring scale on the wheel pin.

New bearing and New oil seal	19.6 – 24.5 N (4.4 – 5.5 lb)
Used bearing and New oil seal	11.8 – 17.7 N (2.6 – 4.0 lb)

If the measured bearing preload is outside the specifications, adjust it by loosening or tightening the hub nut.


411RS011

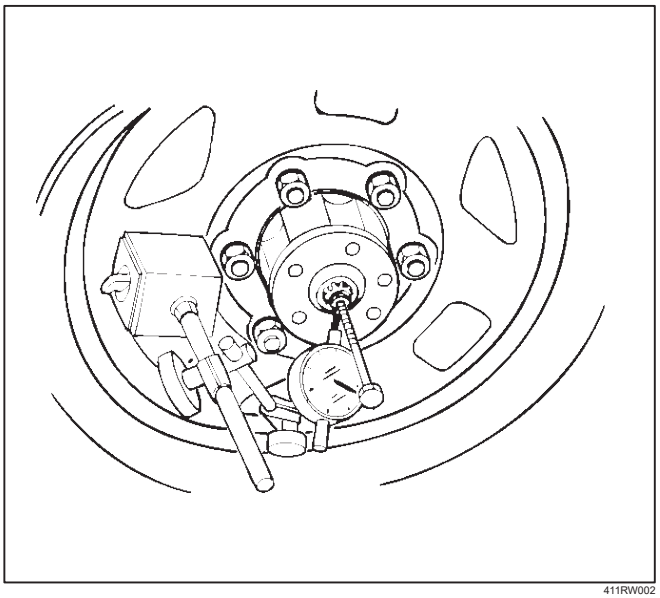
9. Install lock washer and lock screw.
   - Turn the side with larger diameter of the tapered bore to the vehicle outer side, then attach the washer.
   - If the bolt holes in the lock plate are not aligned with the corresponding holes in the nut, reverse the lock plate.
   - If the bolt holes are still out of alignment, turn in the nut just enough to obtain alignment.
   - Screw is to be fastened tightly so its head may come lower than the surface of the washer.


411RS012

10. Apply adhesive (LOCTITE 515 or equivalent) to both joining flange faces then install hub flange.
11. Install snap ring and shim.
    - Adjust the clearance between the free wheeling hub body and the snap ring.

    Clearance: 0 mm–0.3 mm (0 in–0.012 in)

    Shims Available: 0.2 mm, 0.3 mm, 0.5 mm, 1.0 mm (0.008 in, 0.012 in, 0.020 in, 0.039 in)


411RW002

12. Install hub cap.
13. Tighten the bolts to the specified torque.

    Torque: 59 N·m (43 lb ft)
14. Install brake caliper and tighten fixing bolt.

Front Drive Shaft Joint

Front Drive Shaft Joints Replacement

- Refer to *Front Drive Axle Assembly Replacement* in this section, and refer to *Front Hub and Disc Overhaul in Suspension* section.

Front Hub Bearing Preload Check

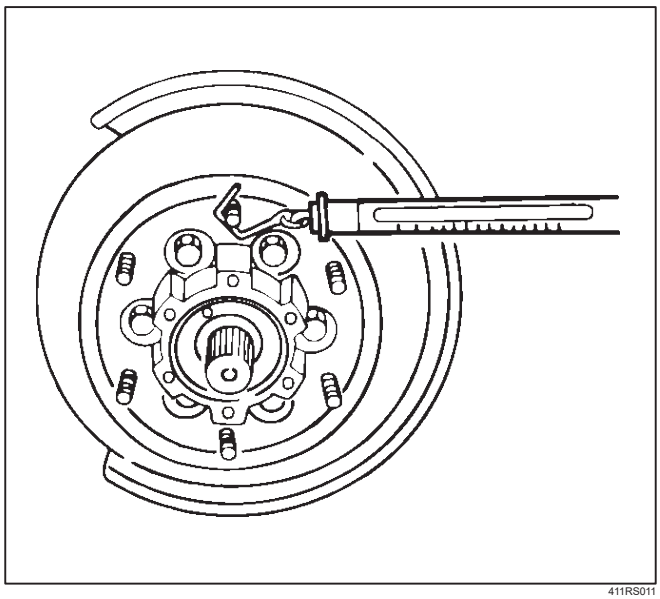
Check the hub bearing preload at the wheel pin.

New bearing and New oil seal:

19.6 – 24.5 N (4.4 – 5.5 lb)

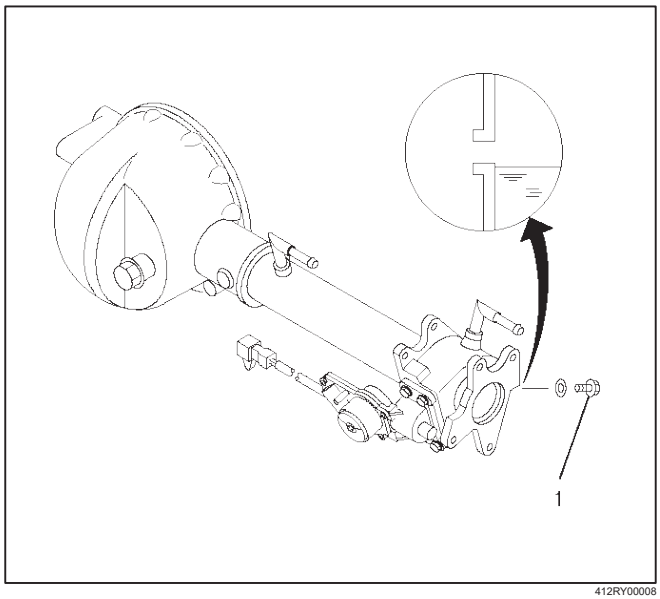
Used bearing and New oil seal:

11.8 – 17.7 N(2.6 – 4.0 lb)



411RS011

Inspection Of Shift On The Fly System Gear Oil



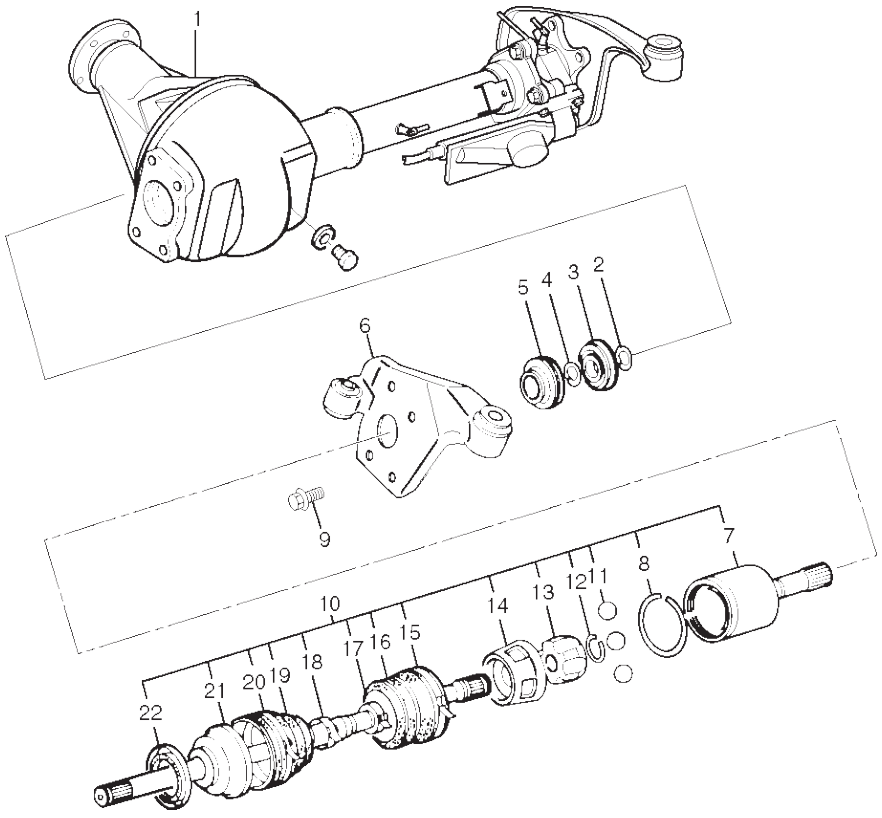
412RY00008

1. Open filler plug and make sure that the oil up to the plug port.
   If the oil is short, replenish with gear oil GL–5 grade.
2. Tighten the filler plug to specified torque.

Torque: 78 N·m (58 lb in)

Front Axle Drive Shaft

Front Axle Drive Shaft and Associated Parts



412RY00036

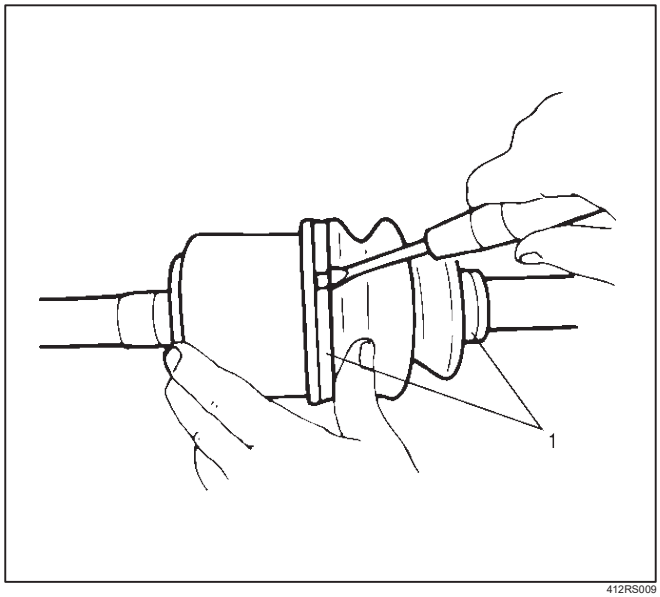
Legend

(1) Axle Case and Differential
(2) Snap Ring
(3) Bearing
(4) Snap Ring
(5) Oil Seal
(6) Bracket
(7) DOJ Case
(8) Circlip
(9) Bolt
(10) Drive Shaft Joint Assembly
(11) Ball
(12) Snap Ring
(13) Ball Retainer
(14) Ball Guide
(15) Band
(16) Bellows
(17) Band
(18) Band
(19) Bellows
(20) Band
(21) BJ Shaft
(22) Dust Seal

Disassembly

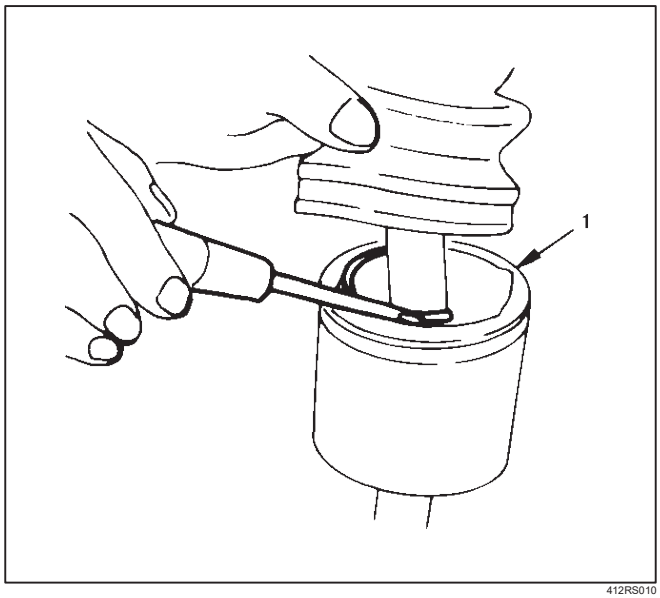
NOTE: For the left side, follow the same steps as right side.

1. Raise the hooked end of the band with a screwdriver or equivalent.



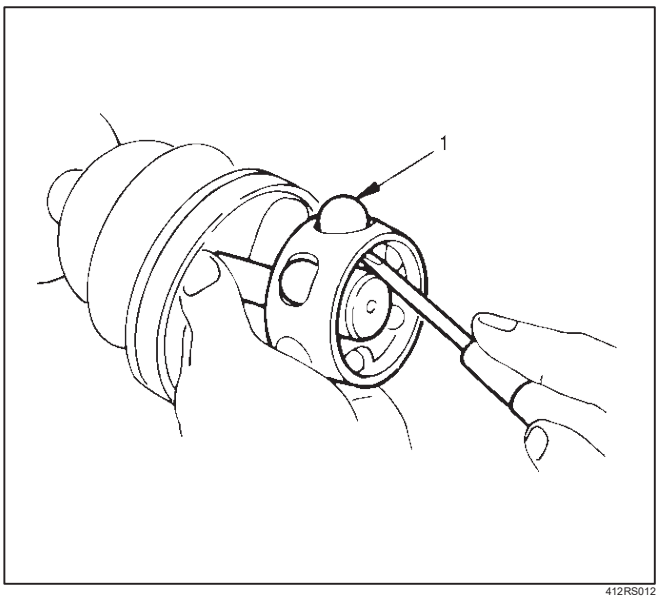
412RS009

2. Remove band(1).
3. Pry off circlip (1) with a screwdriver or equivalent.



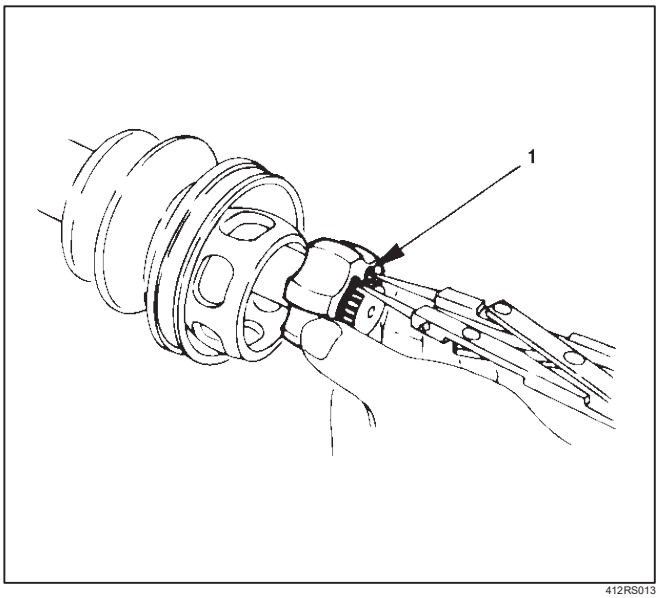
412RS010

4. Remove drive shaft joint assembly.
5. Remove the six balls (1) with a screwdriver or equivalent.



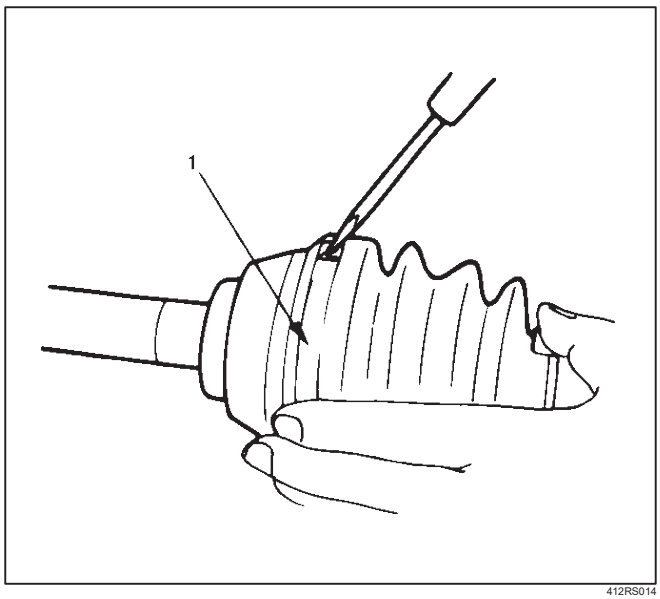
412RS012

6. Using snap ring pliers, remove the snap ring (1) fastening the ball retainer to the center shaft.



412RS013

7. Remove ball retainer, ball guide and bellows.
8. Raise the hooked end of the band with a screwdriver or equivalent.



412RS014

9. Remove band(1).
10. Remove bellows.
11. Remove dust seal.
12. Remove BJ shaft assembly.
13. Remove the mounting bracket fixing bolts, and then remove DOJ case assembly from the axle case.
14. Remove snap ring and bearing.
15. Remove snap ring and oil seal.
16. Remove bracket.

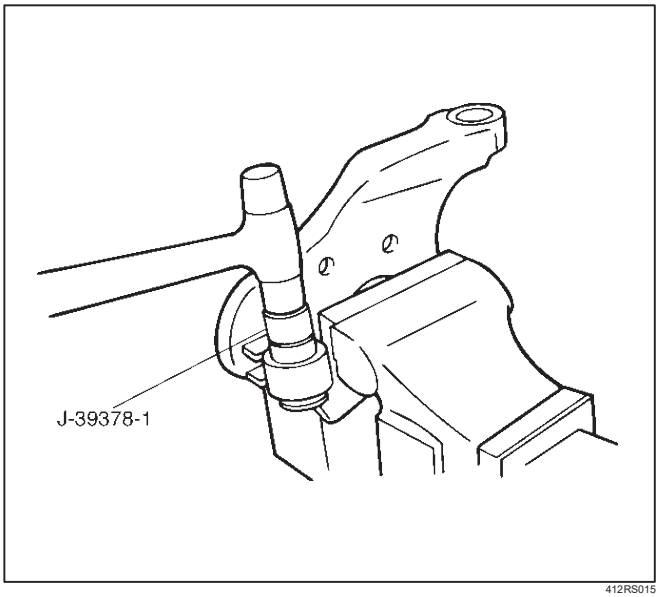
Inspection And Repair

Make necessary correction or parts replacement if wear, damage, corrosion or any other abnormal condition are found through inspection.
Check the following parts.

1. Drive shaft joint assembly
2. DOJ case, ball, ball guide, ball retainer
3. Bellows
4. Bearing
5. Dust seal, oil seal

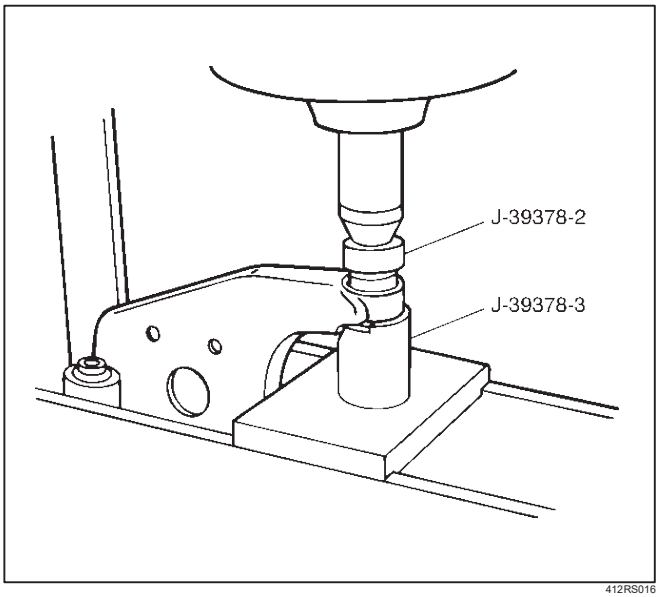
Bushing Replacement

- Remove the bushings using a remover J–39378–1 and hammer.



412RS015

- By using installer J–39378–2 and base J–39378–3, press fit the bushings into the bracket.

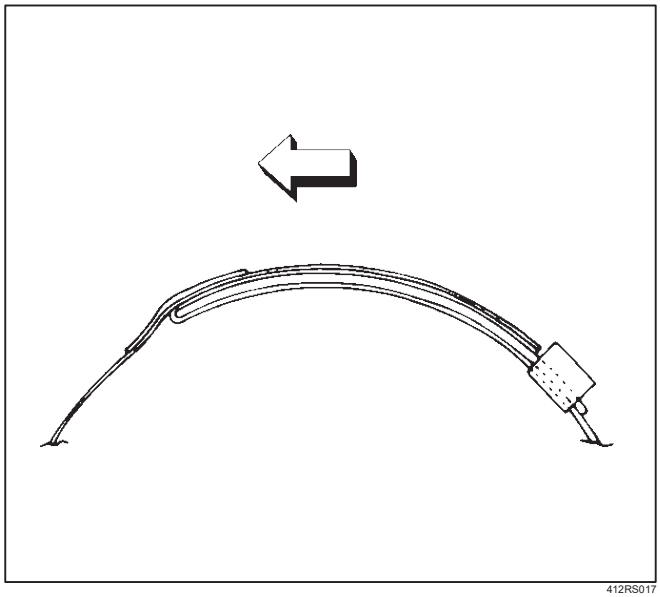


412RS016

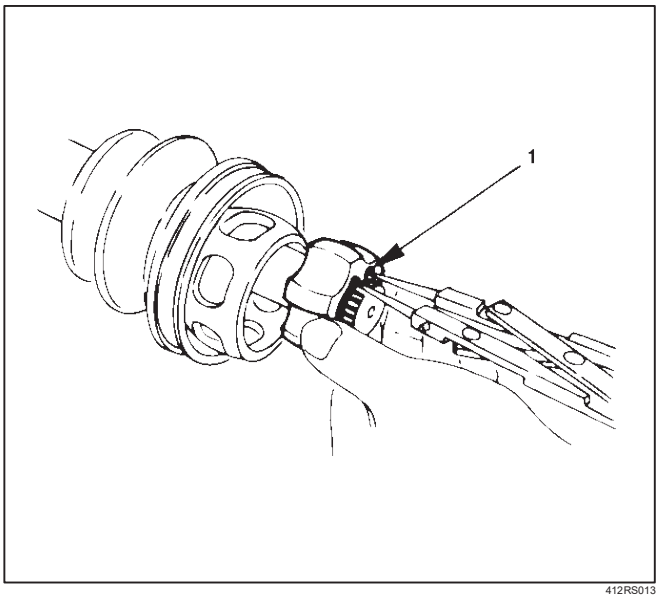
Reassembly

1. Install DOJ case to bracket.
2. Install oil seal and fix snap ring.
3. Install bearing and fix snap ring.
4. Install bracket to axle case. Tighten the bracket bolt to the specified torque.

   Torque: 116 N·m (85 lb ft)
5. Apply 150g of the specified grease in BJ.
6. Install dust seal.
7. Apply a thin coat of grease to the shaft for smooth installation then install bellows.
8. Install band. Note the setting direction. After installation, check that the bellows is free from distortion.

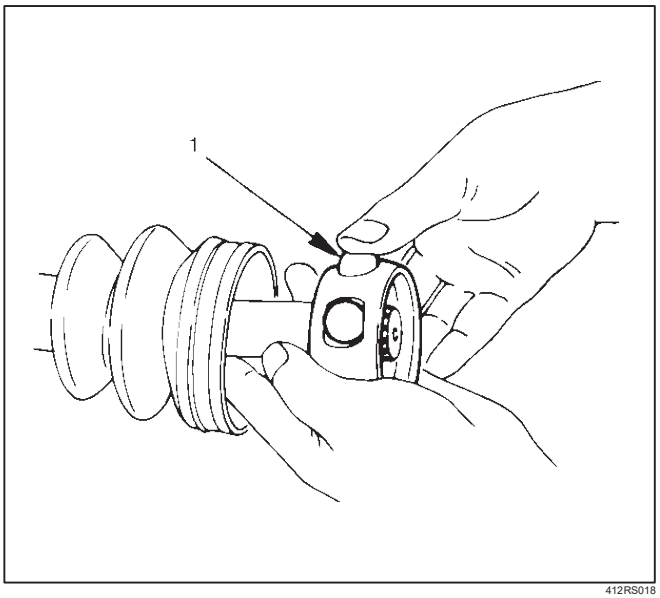

412RS017

9. Install another bellows and fix band.
10. Install the ball guide with the smaller diameter side ahead onto the shaft.
11. Install ball retainer.
12. Using snap ring pliers, install the snap ring (1) securing the ball retainer to the shaft.



412RS013

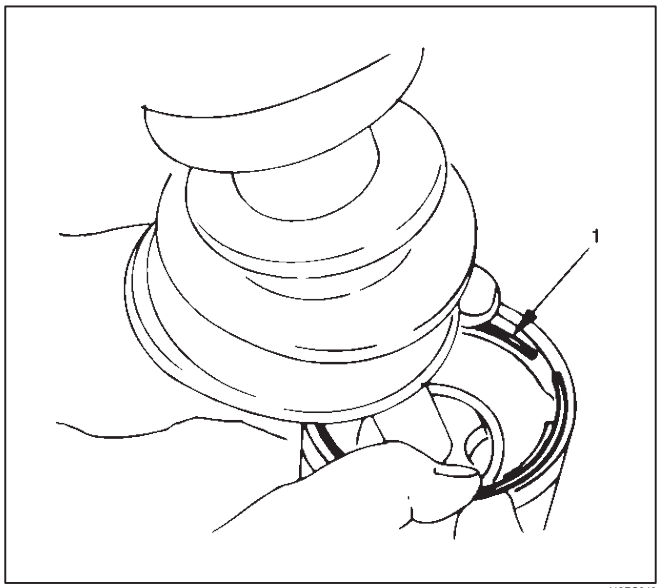
13. Align the track on the ball (1) retainer with the window in the cage, and install the six balls into position.



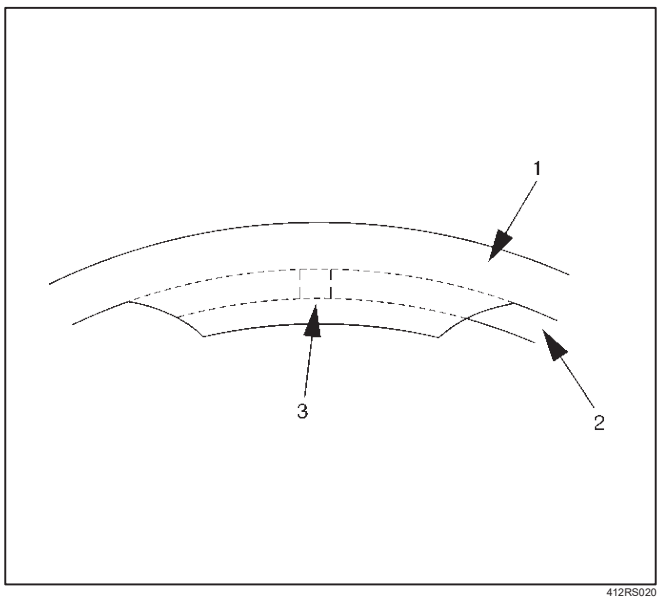
412RS018

14. Pack 150g of the specified grease in DOJ case, then install drive shaft joint assembly. After reassembly, move the DOJ longitudinally several times to get to fit.

15. Install the circlip (1) so that open ends are positioned away from the ball groove.



412RS019

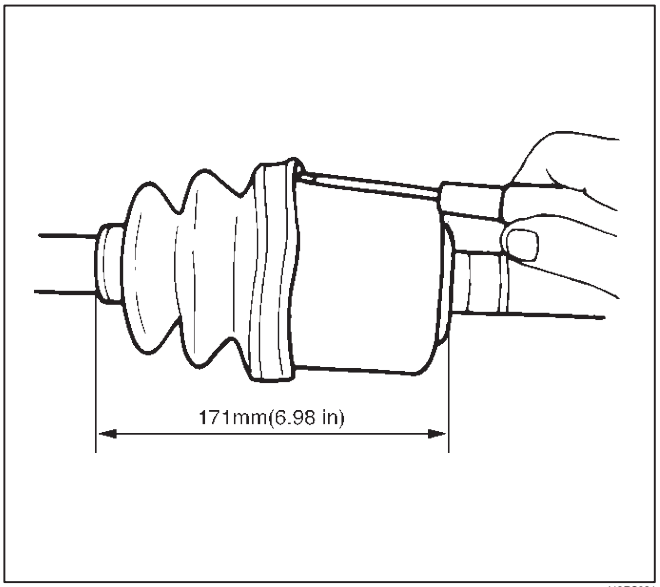


412RS020

Legend

(1) Outer Case
(2) Circlip
(3) Open Ends

16. Install bellows. Adjust the air pressure within the bellows by inserting a screwdriver or equivalent, so that it equals atmospheric pressure.

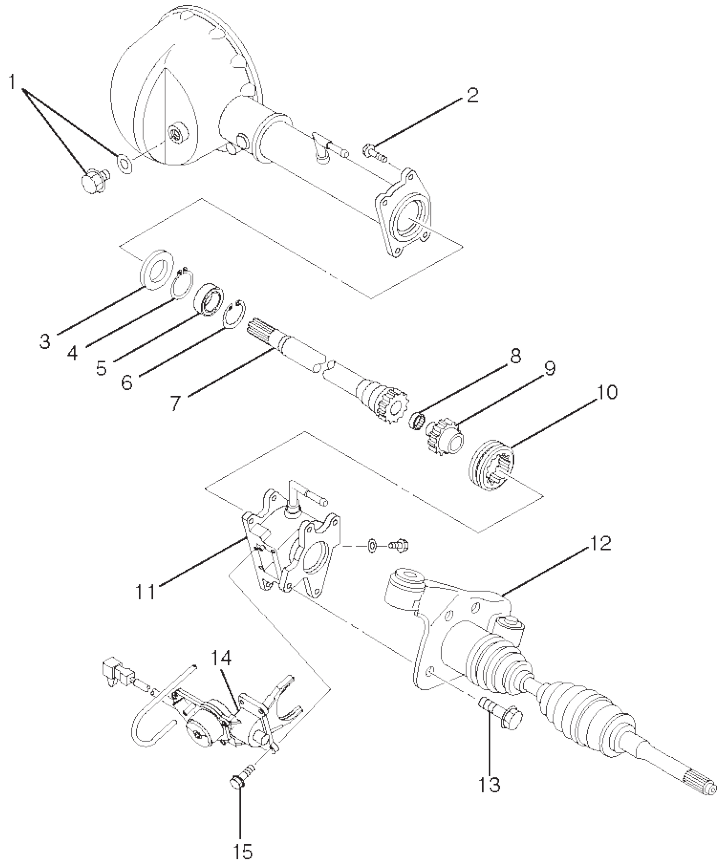


412RS021

17. Install band. After installation, check that the bellows is free from distortion.

Shift On The Fly System

Shift On The Fly System and Associated Parts



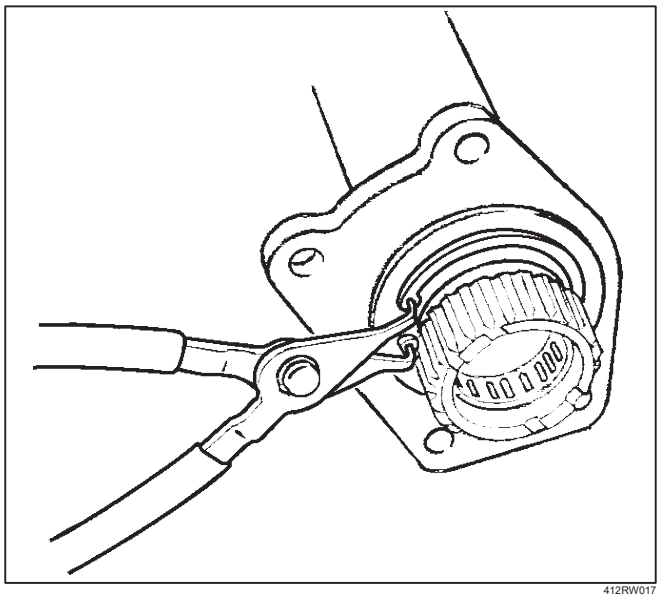
412RY00007

Legend

(1) Filler Plug
(2) Bolt
(3) Oil Seal
(4) Snap Ring(External)
(5) Inner Shaft Bearing
(6) Snap Ring(Internal)
(7) Inner Shaft
(8) Needle Bearing
(9) Clutch Gear
(10) Sleeve
(11) Housing
(12) Front Axle Drive Shaft(LH side) with Bracket
(13) Bolt
(14) Actuator Assembly
(15) Bolt

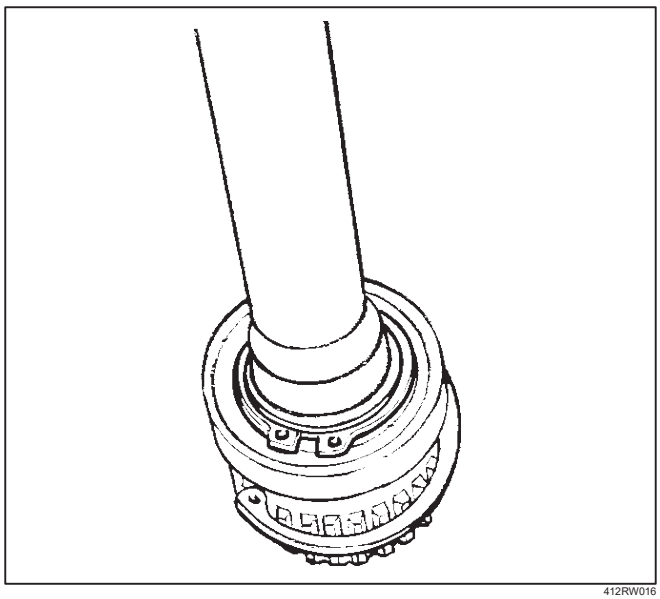
Disassembly

1. Remove filler plug and gasket, drain oil.
2. Loosen mounting bracket fitting bolts and remove front axle drive shaft from front axle case.
3. Remove actuator assembly and draw out actuator ASM.
4. Remove housing.
5. Remove sleeve.
6. Remove clutch gear.
7. Remove snap ring from front axle case by using snap ring pliers.



412RW017

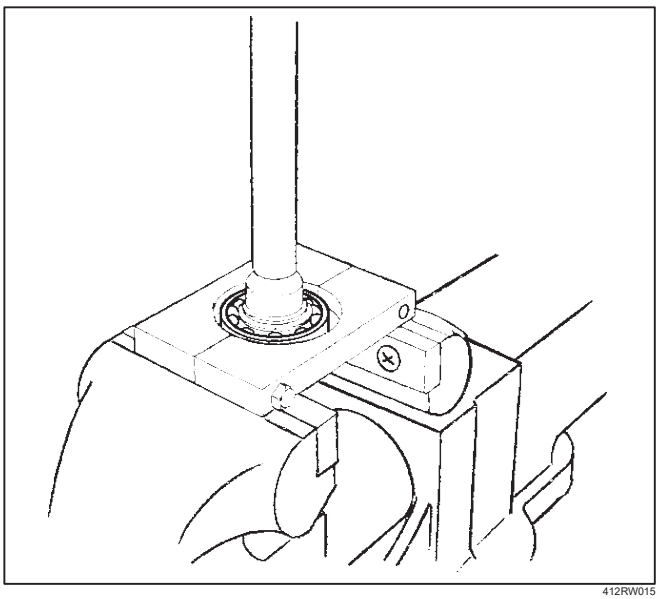
8. Take out inner shaft from front axle case.
9. Remove snap ring from inner shaft by using snap ring pliers.



412RW016

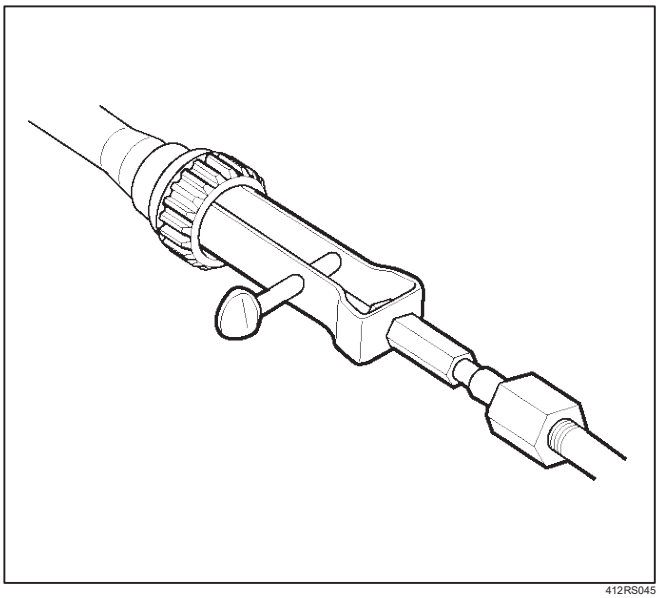
10. Remove inner shaft bearing.

NOTE: Be careful not to damage the shaft.



412RW015

11. Remove needle bearing from inner shaft by using a remover J–26941 and sliding hammer J–2619–01.



412RS045

12. Remove oil seal from front axle case.

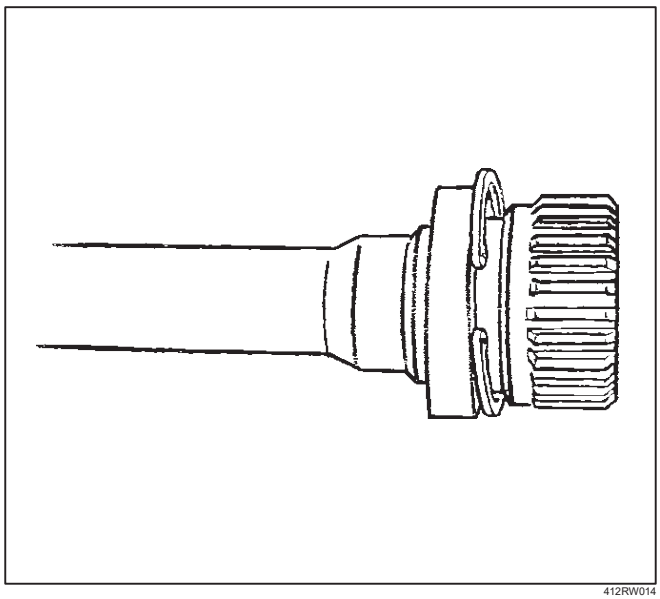
NOTE: Be careful not to damage the front axle case.

Inspection And Repair

Inspect the removed parts. If there are abnormalities such as wear and damage, take corrective action or replace.

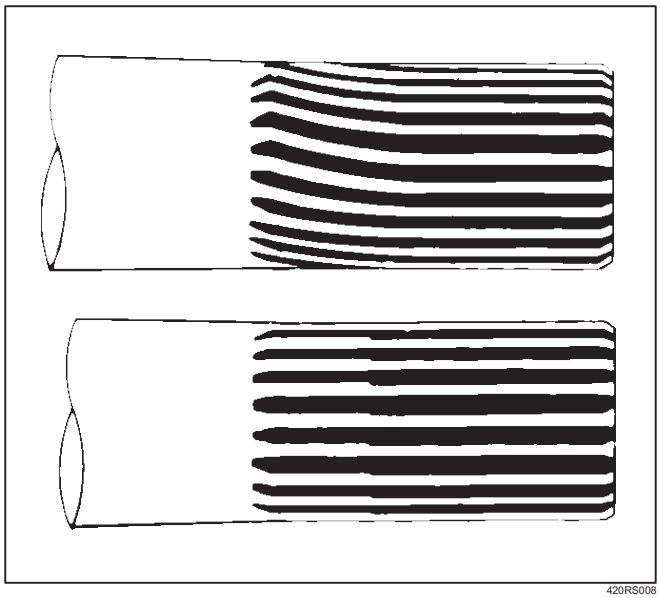
Visual Check

1. Check and see if the inner shaft has such abnormalities as wear and damage.



412RW014

2. Replace the shaft if any signs of deterioration in the gear is present.



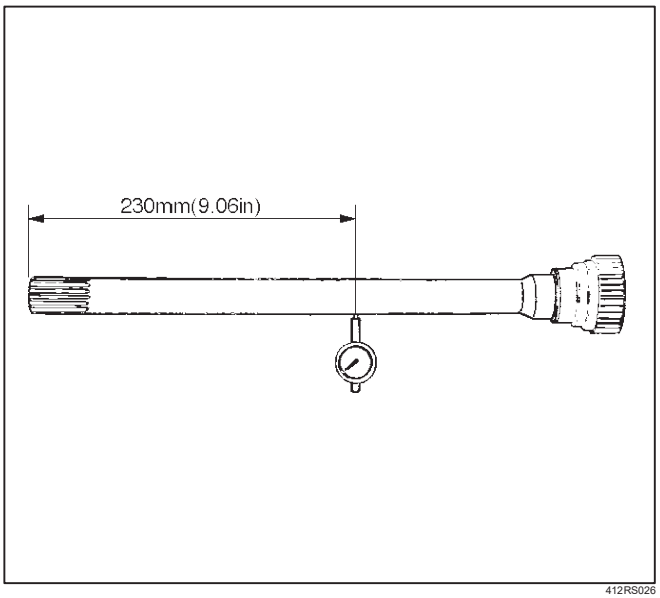
420RS008

Inner Shaft Run–Out

With both end centers supported, rotate the shaft slowly and measure deflection with a dial gauge.

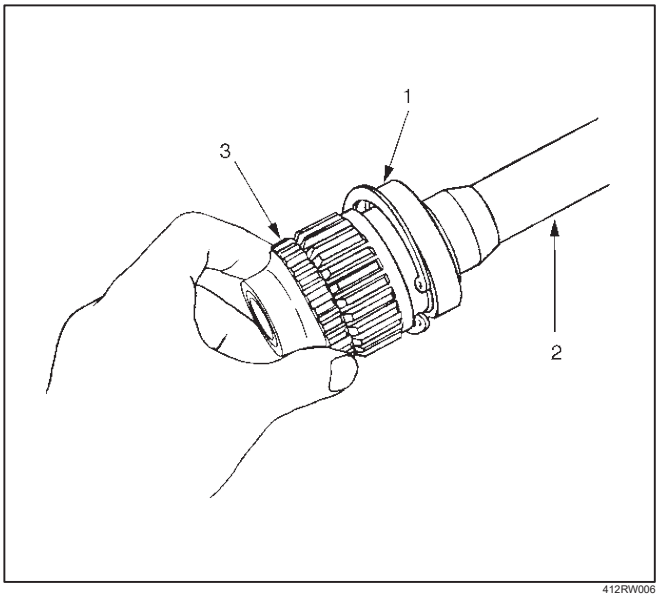
Limit: 0.5 mm (0.02 in)

NOTE: Do not heat the shaft to correct its bend.



412RS026

Inner Shaft Bearing



412RW006

Legend

(1) Inner Shaft Bearing
(2) Inner Shaft
(3) Clutch Gear

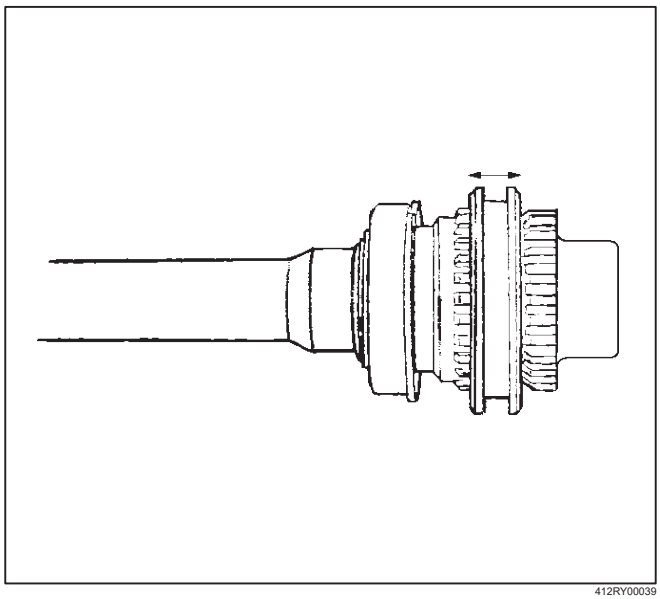
1. Inspect the inner shaft bearing for any signs of deterioration, replace if uneven.
2. Insert the clutch gear and inspect the needle bearing.
3. Replace the needle bearing if found to be uneven.

Sleeve Condition

Check and see that there is not wear damage, or cracking in the sleeve.

NOTE: Close inspection of the groove and inner gear are required because those are important parts.

Sleeve Function

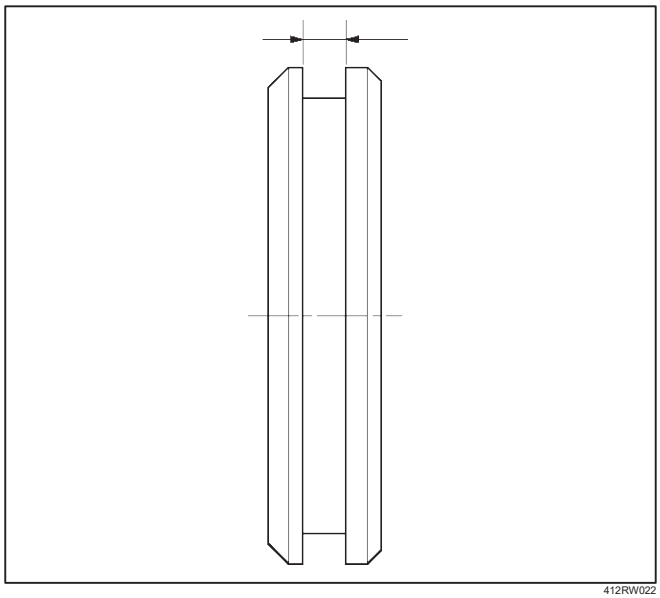

412RY00039

Test the sleeve for smoothness by sliding it between the inner shaft and the clutch gear, replace the sleeve if its difficult to slide.

NOTE: Gear oil should be applied to the contact surface of gear.

Check the width of sleeve center groove.

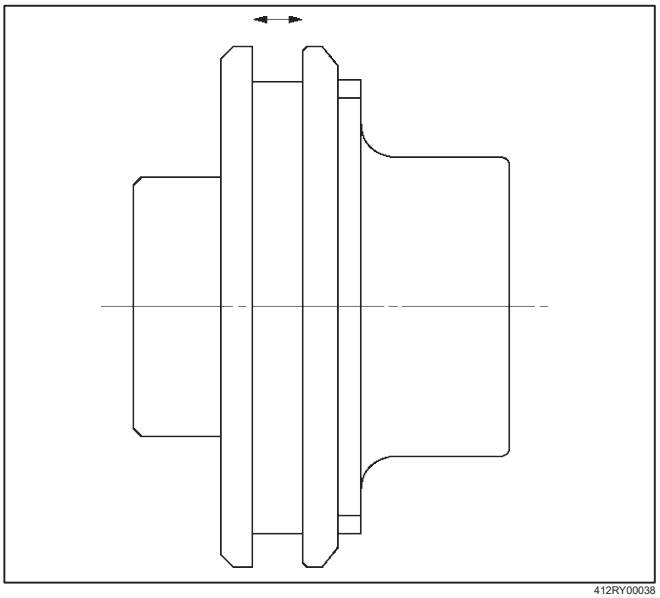
Limit: 7.1 mm (0.28 in)


412RW022

Clutch Gear Condition

Check for wear, damage, crack or any other deterioration in the clutch gear.

Clutch Gear Function


412RY00038

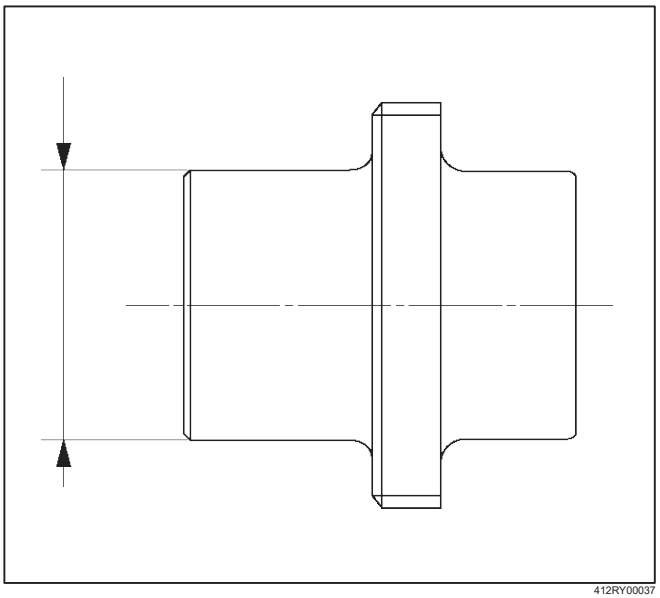
Test the sleeve for smoothness by sliding it across the clutch gear, replace the clutch gear if its difficult to slide.

NOTE: When inspecting, gear oil should be applied to the contact surface of gear.

Clutch Gear Journal Diameter

Make sure of the size illustrated.

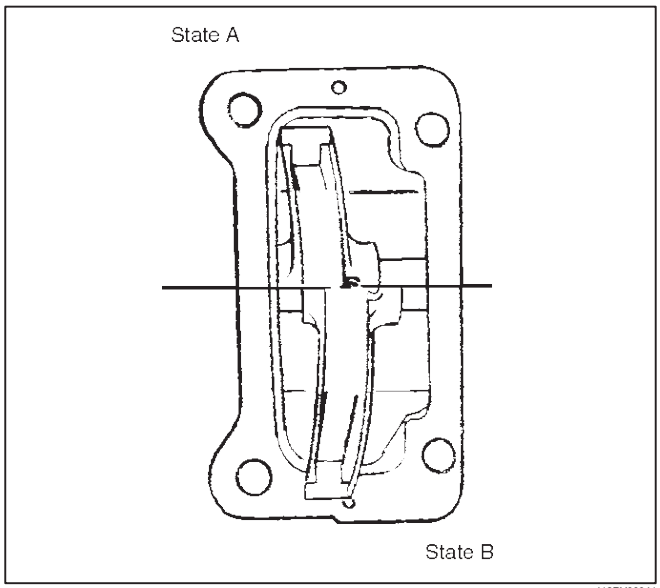
Limit: 36.98 mm (1.456 in)


412RY00037

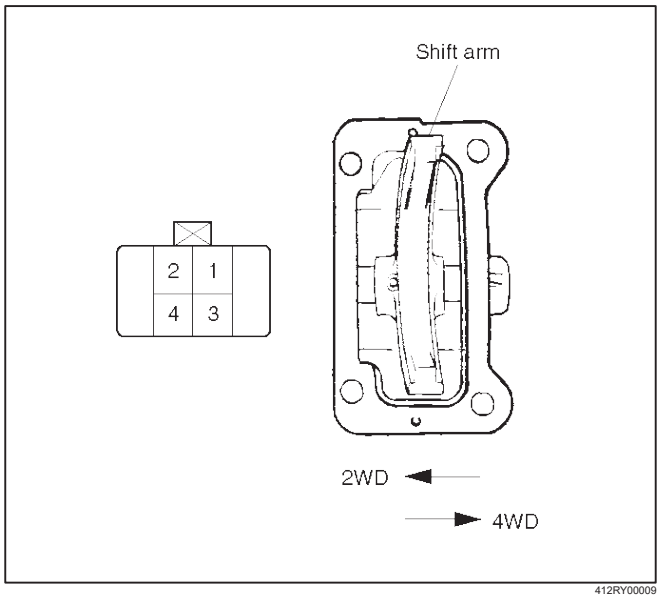
Actuator

Check for damage, cracking or other abnormality.

Functional Check



412RY00041



412RY00009

Verify functionality by applying voltage (12V) to terminals 3 and 4 and set the tester to terminal 1 and 2 according to the table bellow.

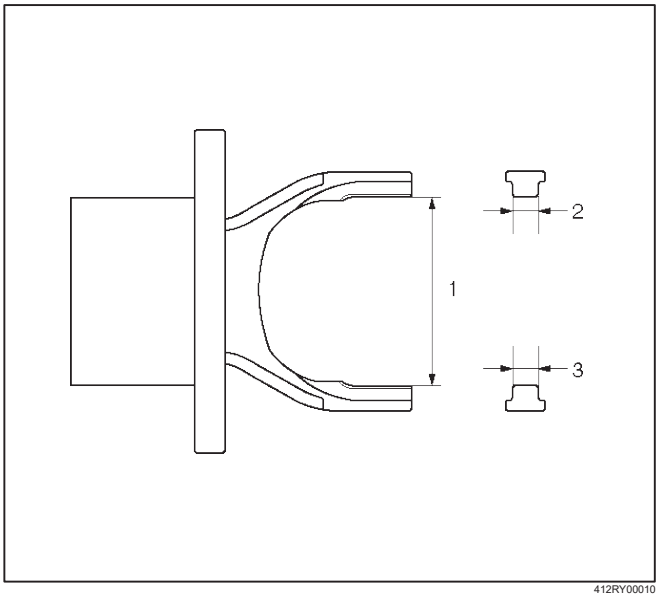
State	Trminal 3	Trminal 4	Electric circuit between terminal 1 & 2	Functio n
A	+12V	Ground	OK	2WD
B	Ground	+12V	NONE	4WD

If there is an abnormality, replace the actuator as an assembly.

NOTE: Be careful not to permit the entry of water or dust into of the actuator.

Dimentional Check

Measure illustrated sizes 1, 2, and 3.



412RY00010

Limit

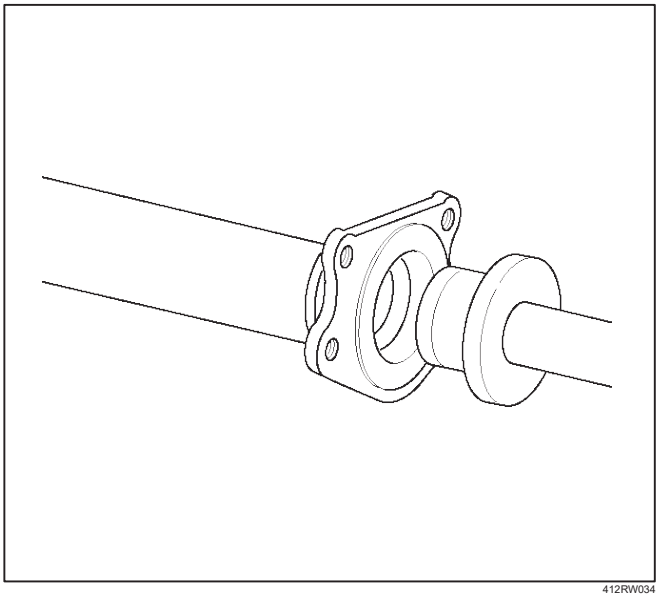
1=64.3 mm (2.53 in)

2=6.7 mm (0.26 in)

3=6.7 mm (0.26 in)

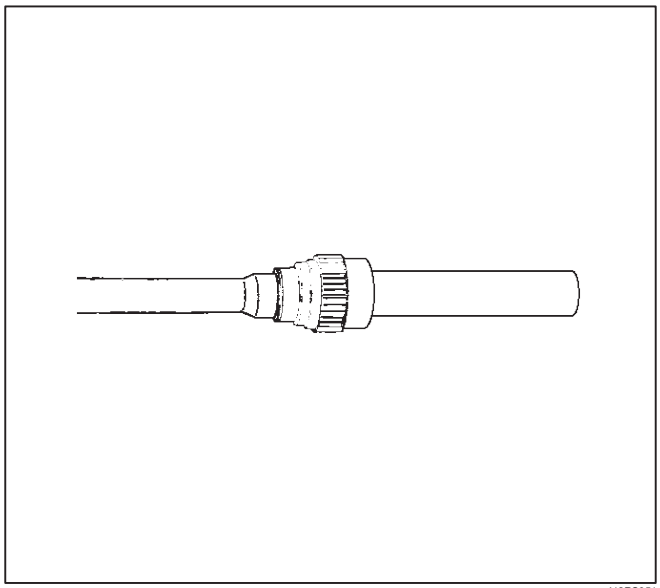
Reassembly

1. Install the new oil seal which has been immersed in differential gear oil, by using an oil seal installer J–41693 and grip J–8092.

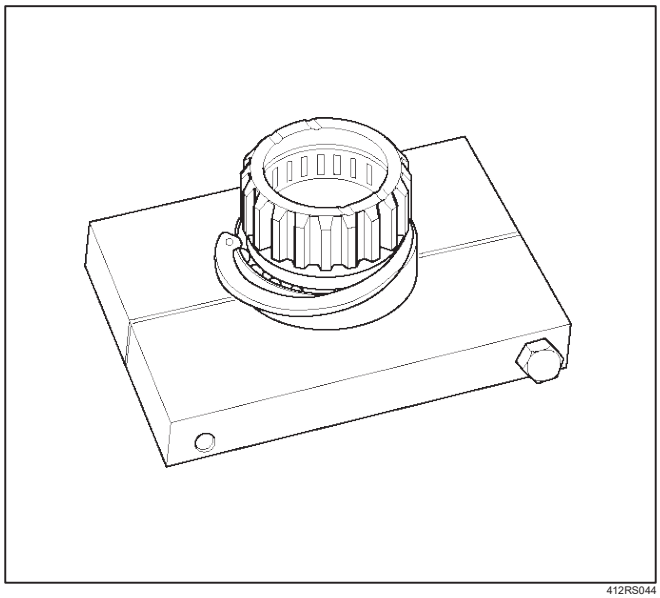


412RW034

2. Install a new needle bearing into inner shaft by using a Installer J–41694 and grip J–8092.


412RS051

3. Place a new snap ring(internal) in inner shaft.
   Install a new inner shaft bearing into the inner shaft.


412RS044

4. Install snap ring(external).

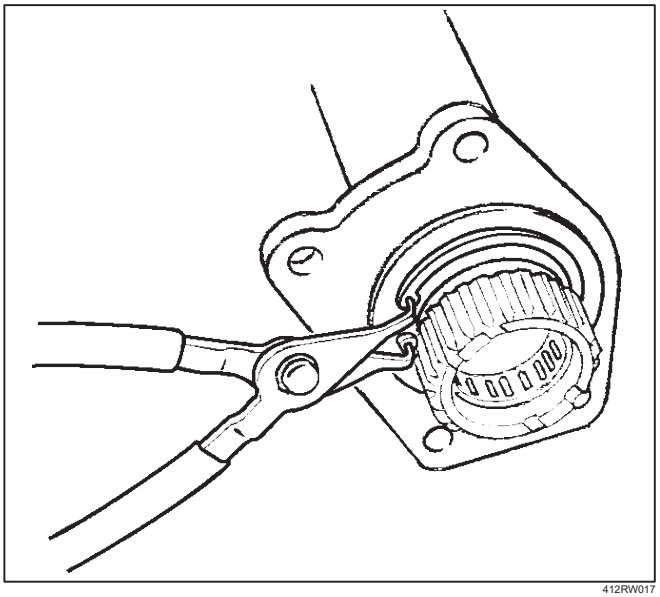
NOTE: Be careful not to damage the inner shaft.

5. Clean the housing contact surface of the front axle case and insert inner shaft assembly into the front axle case.

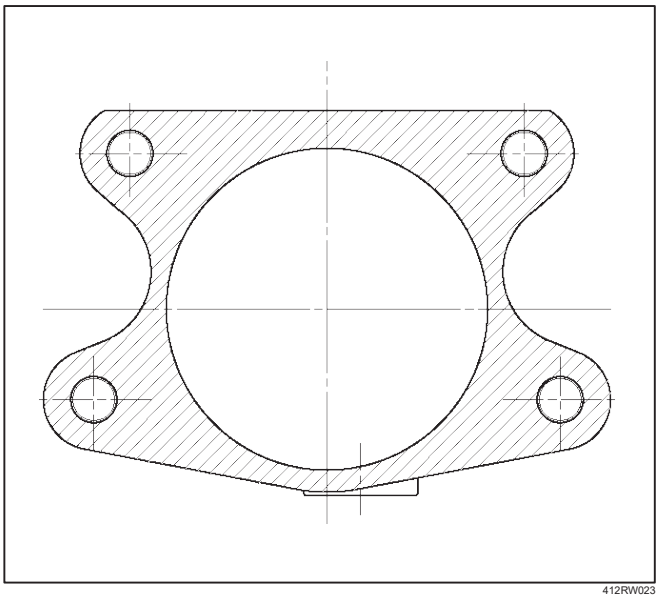
NOTE: Be careful not to damage seal.

6. Install snap ring internal in the groove of front axle case.

NOTE: Be sure to install the snap ring properly.


412RW017

7. Apply differential gear oil to clutch gear, then install clutch gear.
8. Apply differential gear oil to sleeve, then install sleeve.
9. Clean contact surface with the front axle and actuator mounting surface. Apply liquid gasket to the contact surface on the front axle case, then install in the housing.


412RW023

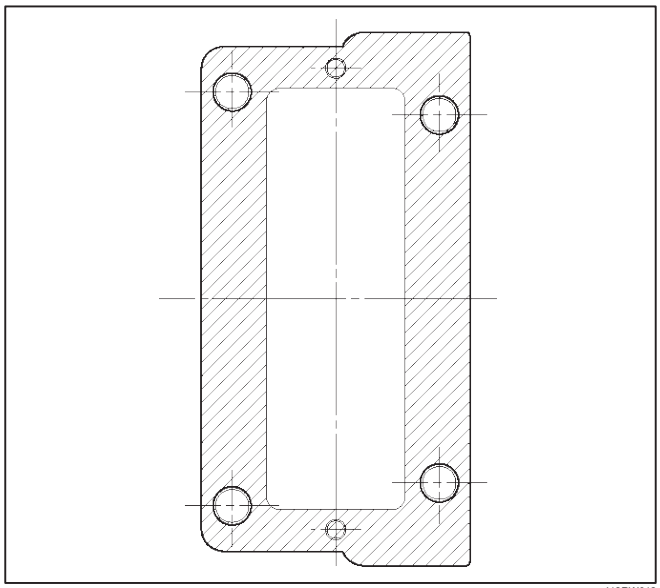
10. Tighten bolts to specified torque.

    Torque: 75N·m(55 lb ft)

11. Clean the actuator contact surface with the housing then Install and tighten shift position switch to specified torque.

    Torque: 39N·m (29 lb ft)

12. Apply liquid gasket to the contact surface on the actuator side.


412RW012

13. Align shift arm with the groove of sleeve and install the actuator.
14. Tighten bolts to specified torque.

    Torque: 9N·m(78 lb in)
15. Install front axle drive shaft and mounting bracket. Tighten fitting bolts to specified torque.

    Torque: 116N·m (85 lb ft)
16. Pour specified amount of differential gear oil to filler plug.

    Front Differential

    Oil Capacity: 1.4lit (1.48US qt)

    Actuator Housing

    Oil Capacity: 0.12lit(0.13US qt)
17. Install filler plug through gasket and tighten to specified torque.

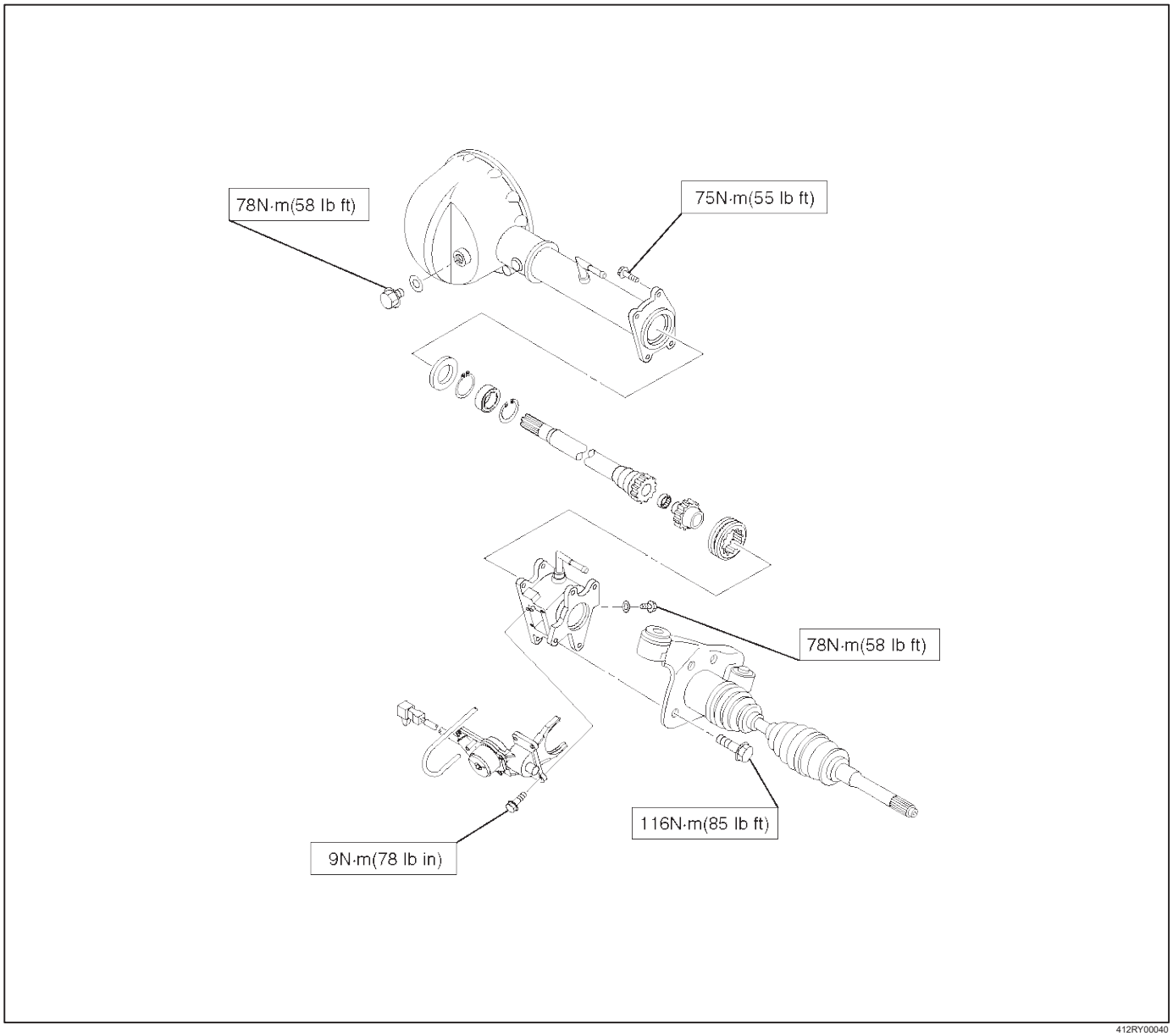
    Torque: 78N·m (58lb ft)

Main Data and Specifications

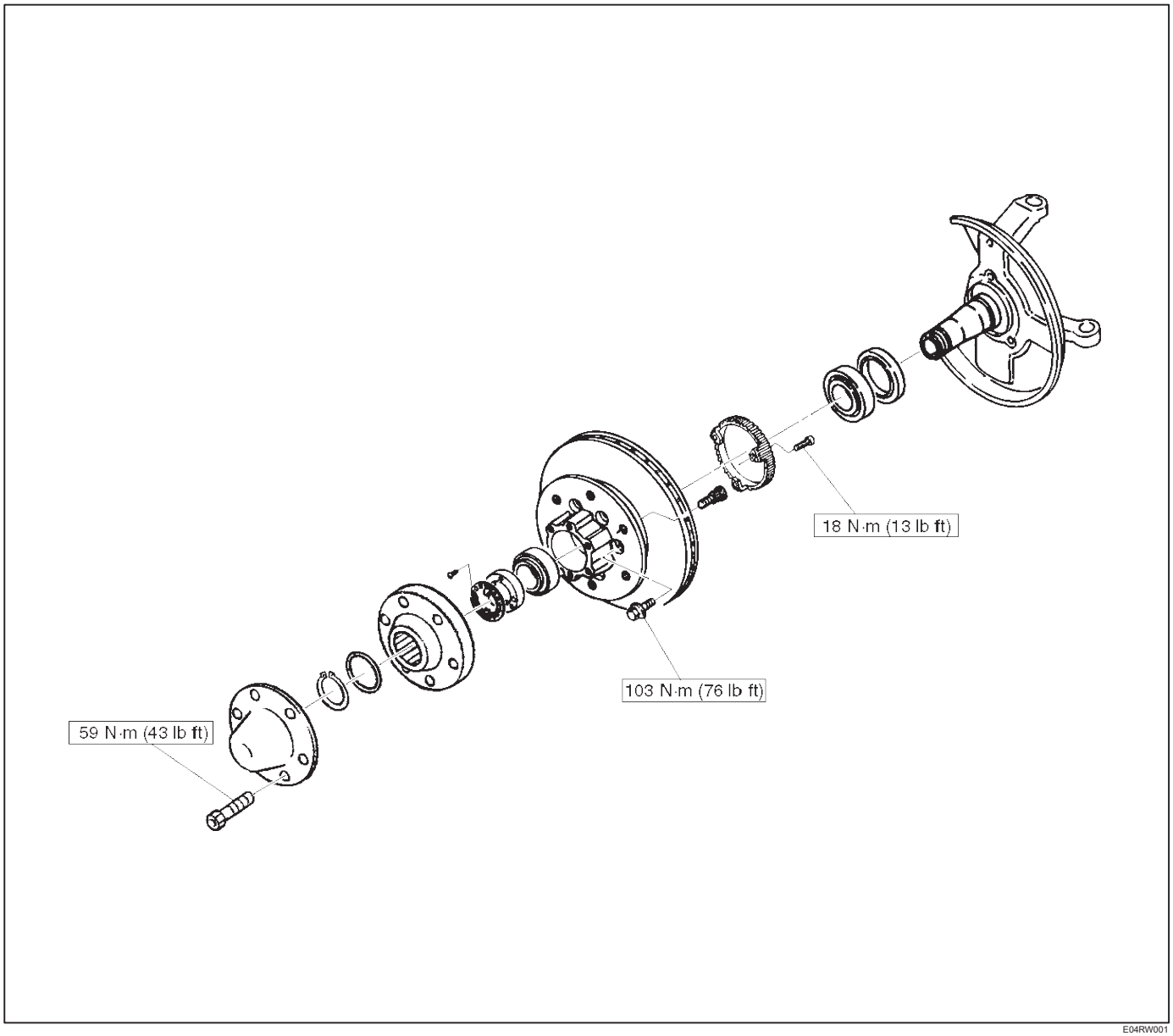
General Specifications

Front drive axle oil capacity	1.25 liter (1.32 US qt)(Differential)
	0.12 liter (0.13 US qt)(Actuator Housing:Shift on the fly)
Type of lubricant	GL–5 (75W–90) Refer to *chart in General Information*
Axle shaft type	Constant velocity joint(Birfield joint type and double offset joint)

Torque Specifications



412RY00040



E04RW001

Special Tools

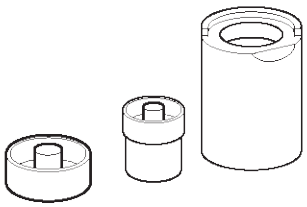
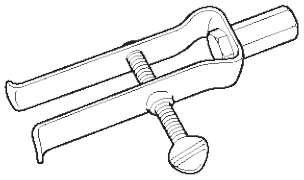
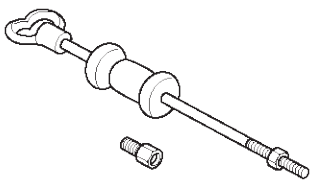
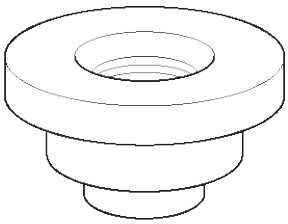
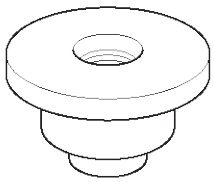
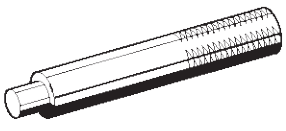
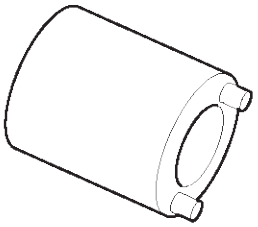
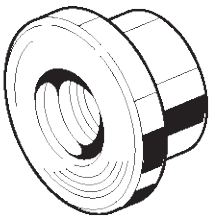
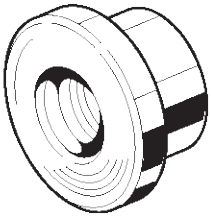
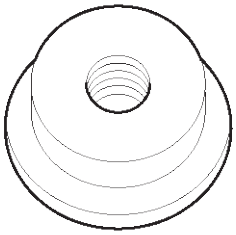
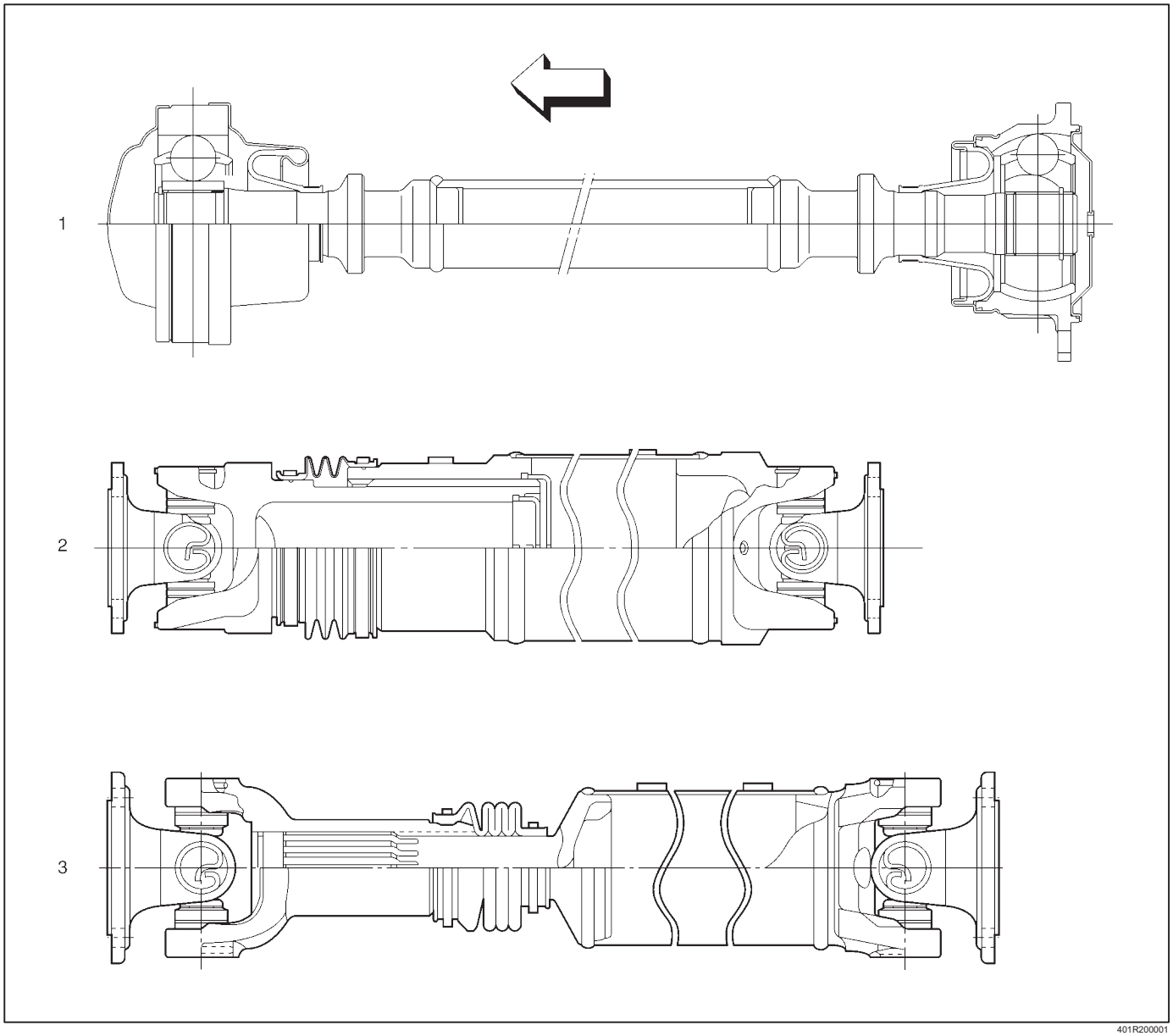
ILLUSTRATION	TOOL NO. TOOL NAME
 901RS233	**J–39378** Remover and Installer; Front Axle mount bushing
 901RS234	**J– 26941** Remover; Bearing needle
 901RS235	**J–2619–01** Hammer; Sliding
 901RS236	**J–41693** Installer; Oil seal
 901RS177	**J–41694** Installer; Bearing needle
 901RS285	**J–8092** Grip

ILLUSTRATION	TOOL NO. TOOL NAME
 901RS246	**J–36827** Wrench; Hub nut
 901RS247	**J–36829** Installer; Inner bearing
 901RS248	**J–36828** Installer; Outer bearing
 901RS249	**J–36830** Installer; Oil seal

Propeller Shaft

General Description



401R200001

Legend

(1) Front Propeller Shaft
(2) Rear Propeller Shaft;
Aluminum Tube with Flange Yoke Type (for 4×2 model)
(3) Rear Propeller Shaft;
Steel Tube Type (for 4×4 model)

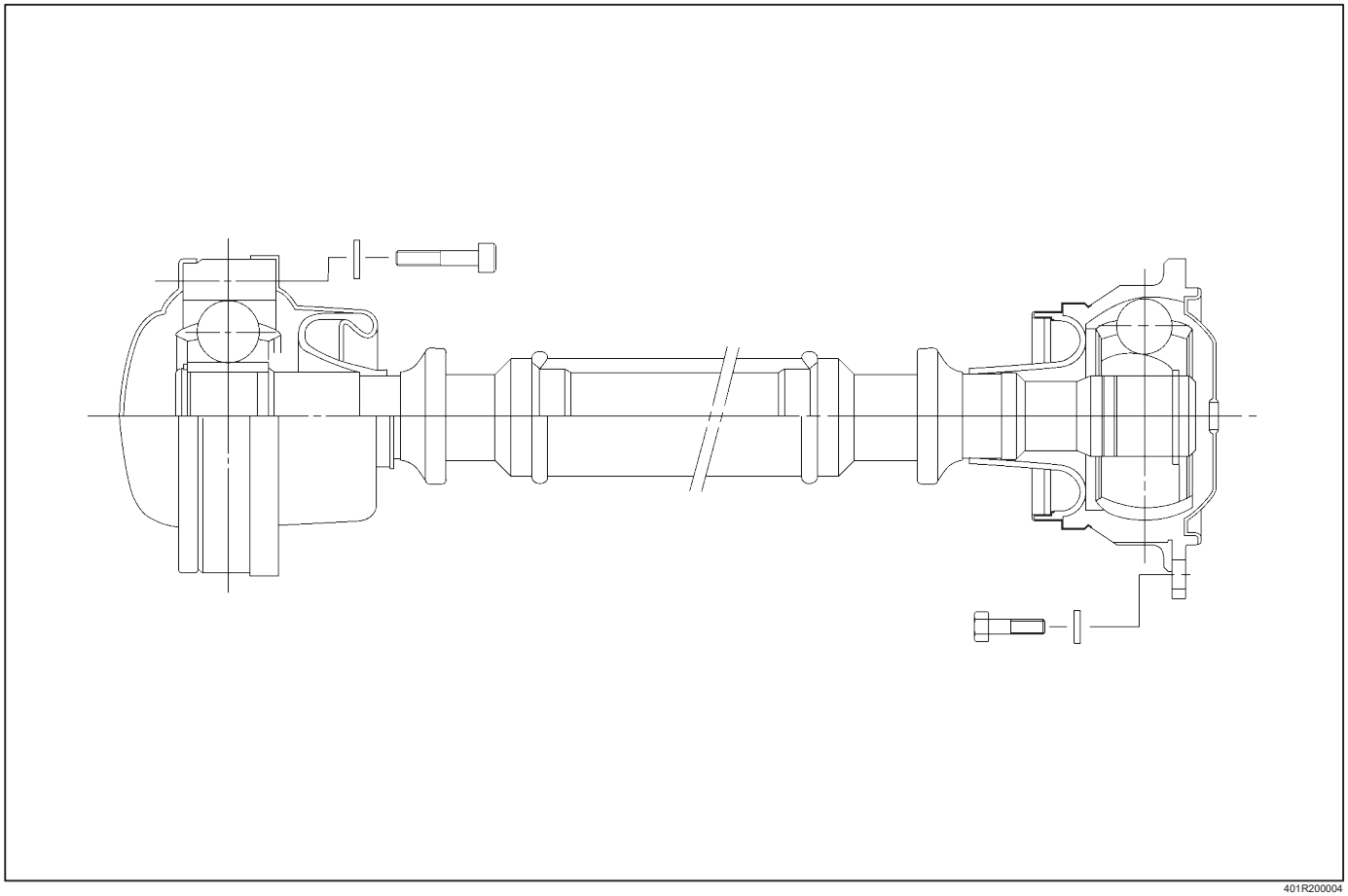
Torque is transmitted from the transmission to the axle through the propeller shaft and universal joint assembles. All propeller shafts are the balanced tubular type. A splined slip joint is provided in some drivelines.

- Since the propeller shaft is balanced carefully, welding or any other modification is not permitted.
- Alignment marks should be applied to each propeller shaft before removal.
- Park, turn the engine off and apply the parking brake to secure the vehicle.
- Carefully attach the propeller shaft to the vise, do not overtighten the vise when securing the propeller shaft, this may cause deformation.

Front Propeller Shaft

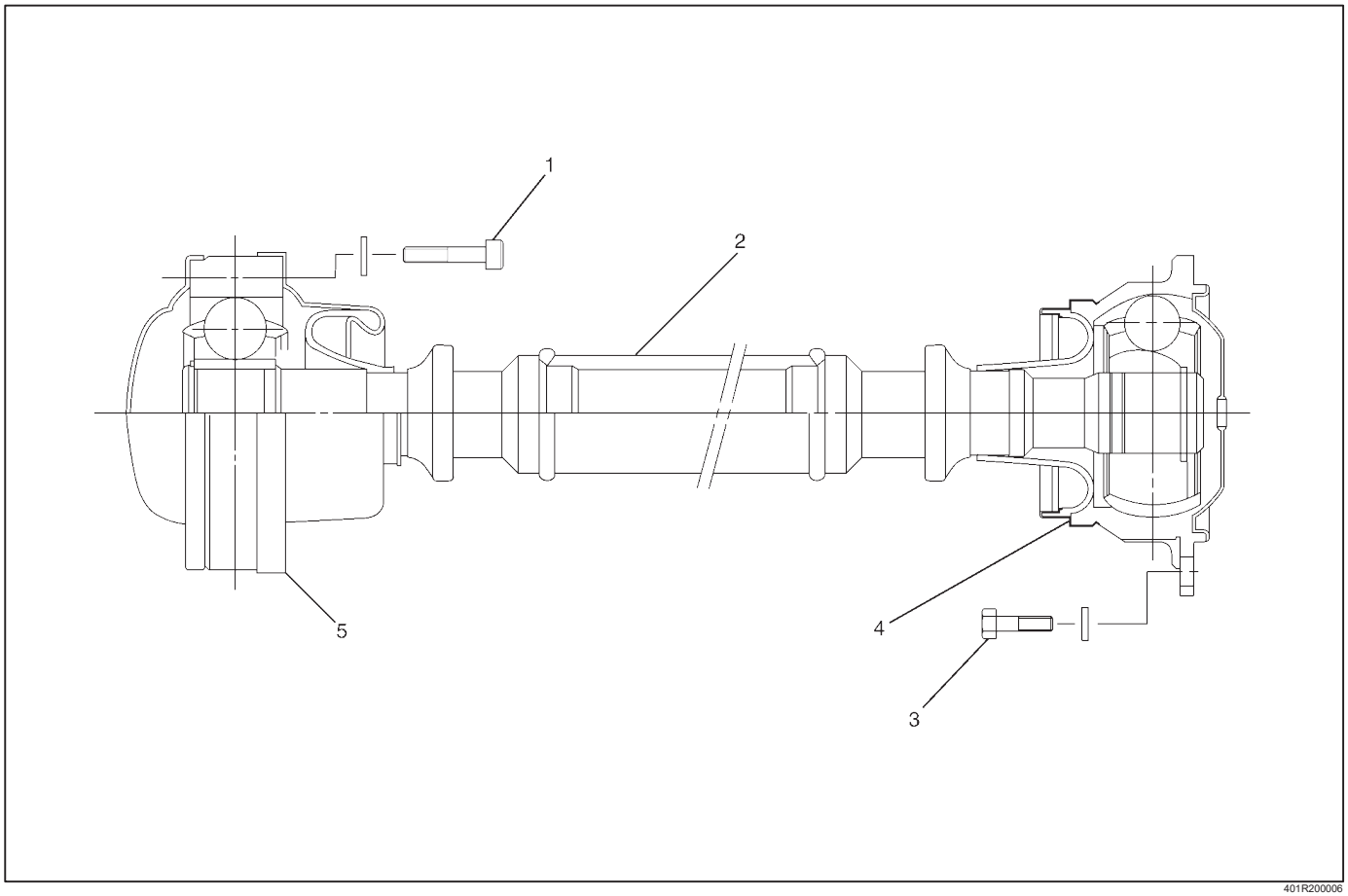
General Description

Since the propeller shaft is balanced carefully, welding or any other modifications are not permitted.
Alignment marks should be applied to each propeller shaft before removal.



401R200004

Front Propeller Shaft and Associated Parts



401R200006

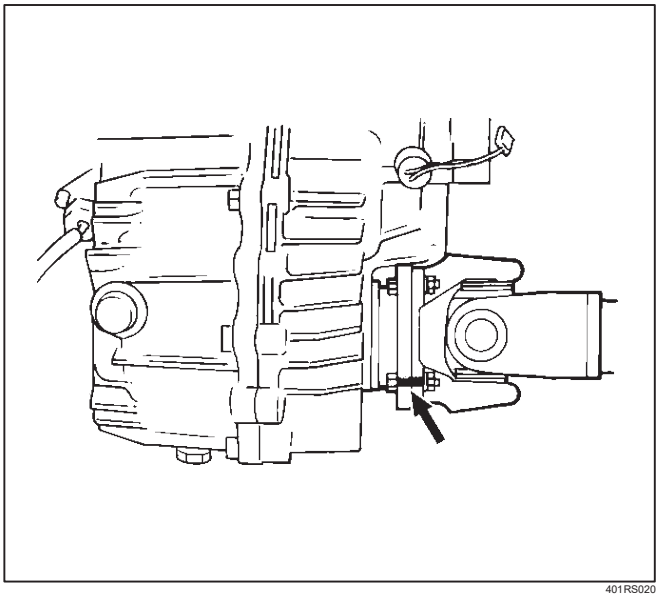
Legend

(1) Bolt, and Washer (Front Axle Side)
(2) Front Propeller Shaft (with TOD)
(3) Bolt and Washer (Transfer Side)
(4) BJ Constant Velocity Joint
(5) LJ Constant Velocity Joint

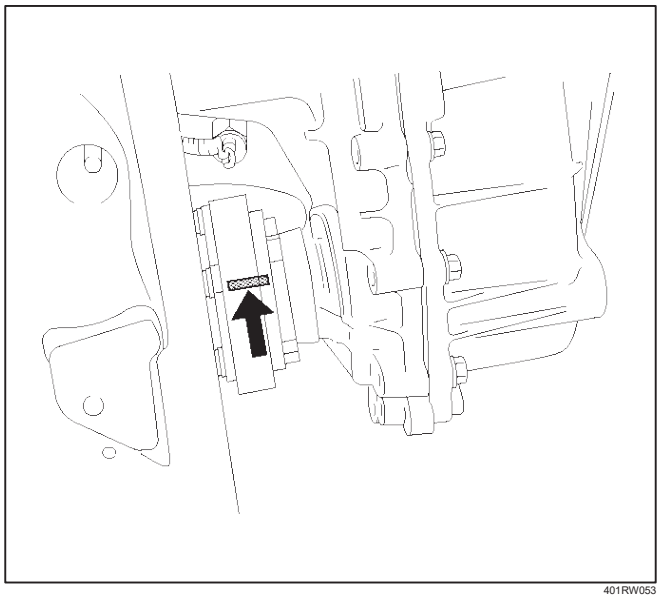
Removal

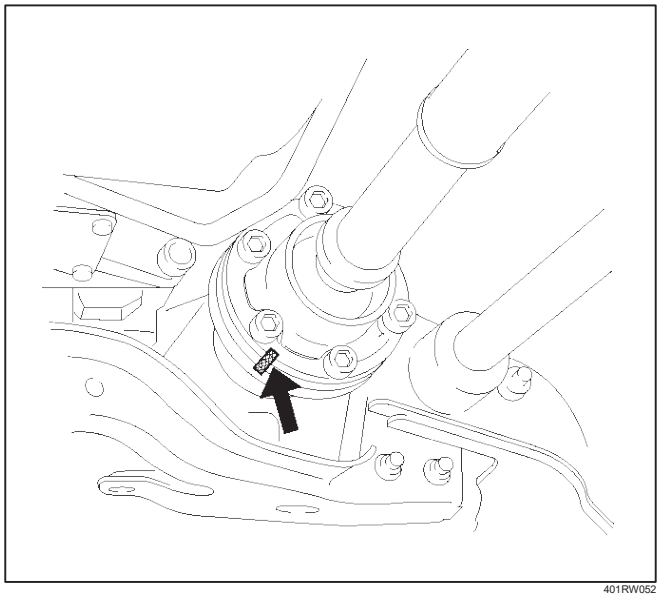
1. Jack up the vehicle and support it on the chassis stands.
2. Gear shift lever should be placed in neutral position and parking brake released.
3. Remove the exhaust and transfer protectors.

NOTE: Apply alignment marks on the flange at the front propeller shaft both front and rear side.



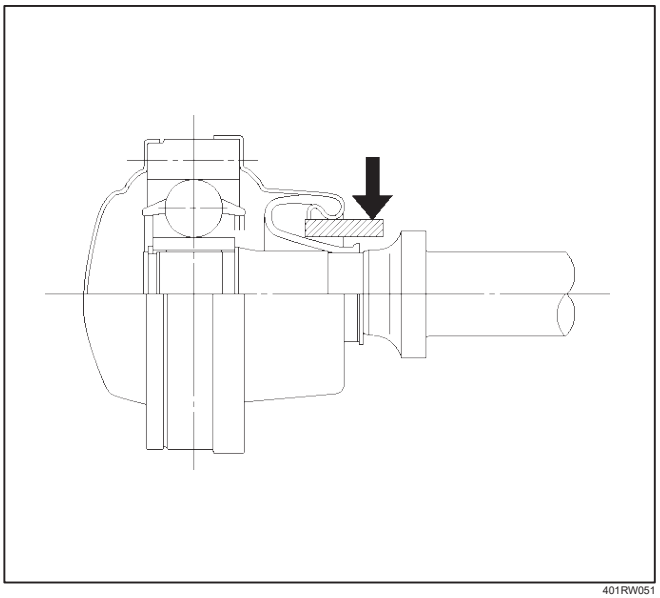
401RS020


401RW053


401RW052

4. Remove bolt, nut and washer (Front axle side).
5. Remove bolt, nut and washer (Transfer side).
6. Remove front propeller shaft.

NOTE: When removing, installing or carring the front propeller shaft, be sure to wrap a piece of cloth around the part of the boot with which fittings may interfere so that the boot can be protected. The boot may be damaged if bending force is applied to the constant velocity joint of the shaft.


401RW051

Installation

NOTE: Never install the shaft assembly backwards. Completely remove the black paint from the connecting surface of flange coupling on each end of propeller shaft. Clean so that no foreign matter will be caught in between.

1. Align the mark which was applied at removal. Install front propeller shaft and tighten the bolts to the specified torque.

   Torque: 63 N·m (46 lb ft)

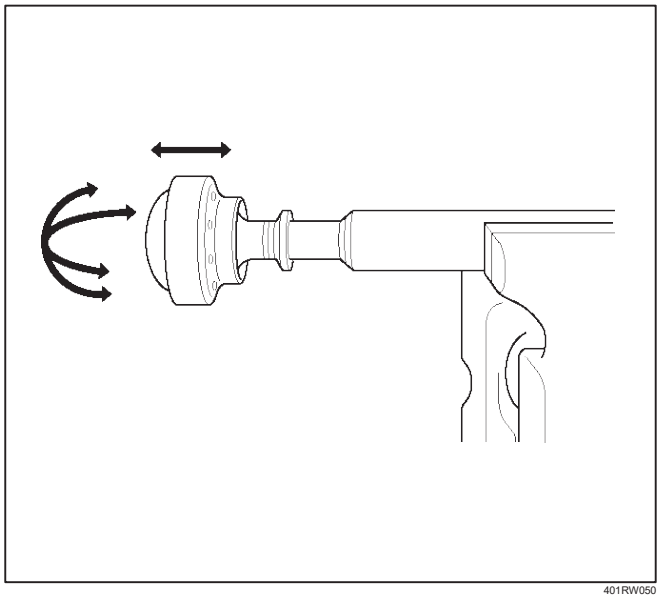
2. Install the exhaust and transfer protectors.

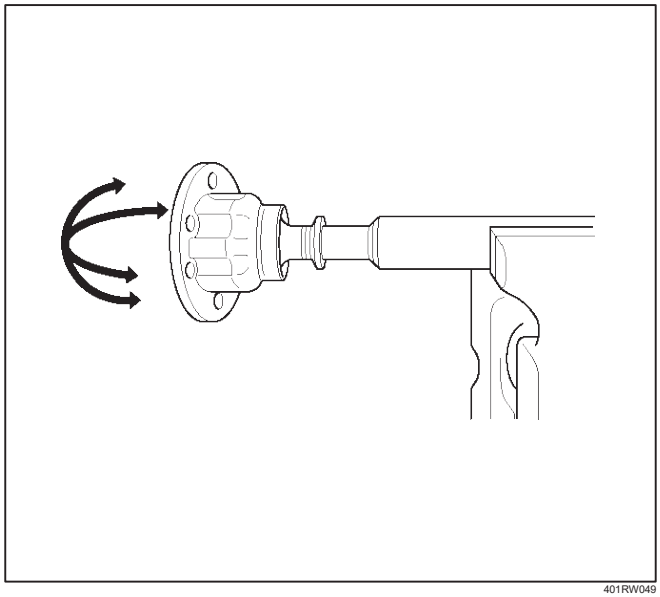
Constant Velocity Joint

NOTE: LJ and BJ constant velocity joints are unremovable types. Check the joint for play and the boot for damage, wear, and leak of grease. If abnormality is found, replace propeller shaft as an assembly.

Play in Constant Velocity Joint

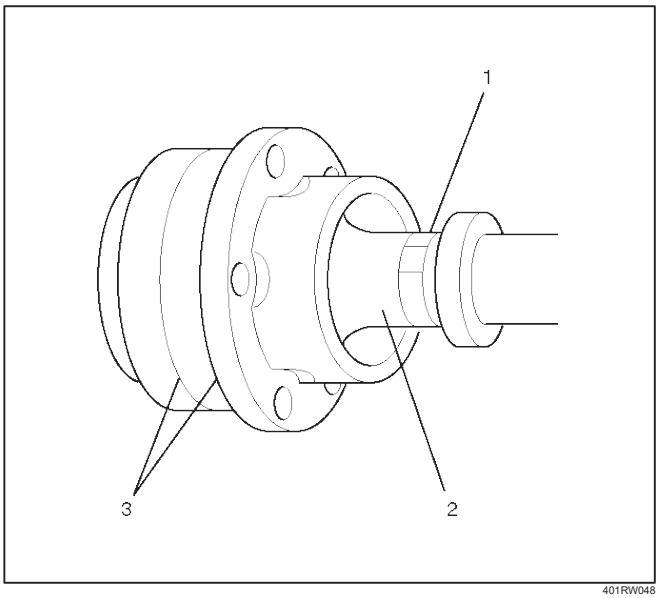
Position the shaft in a vise between two pieces of wood, then secure.
Test for shaft movement by attempting to move back and forth, and side to side.
Secure as needed.


401RW050

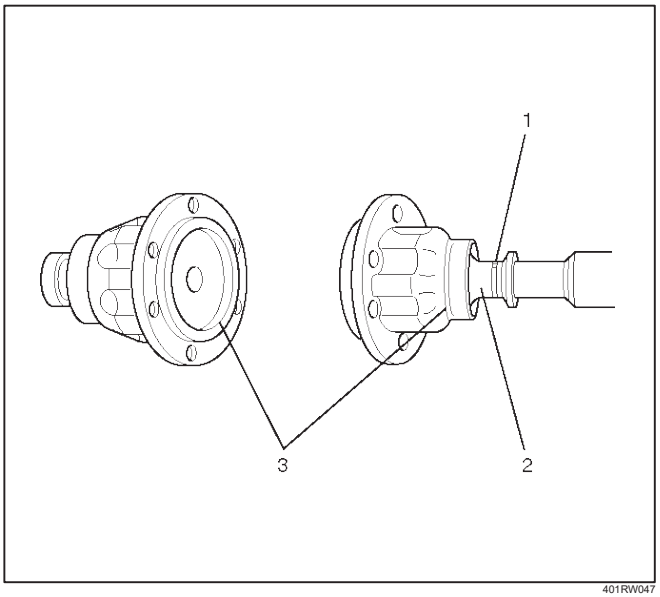

401RW049

Boot of Constant Velocity Joint

Check the following: boot (2) for crack, damage and grease leakage, the boot band (1) for looseness and damage, and both sides of the joint for gease leakage coming from the cover press-in parts (3).



401RW048

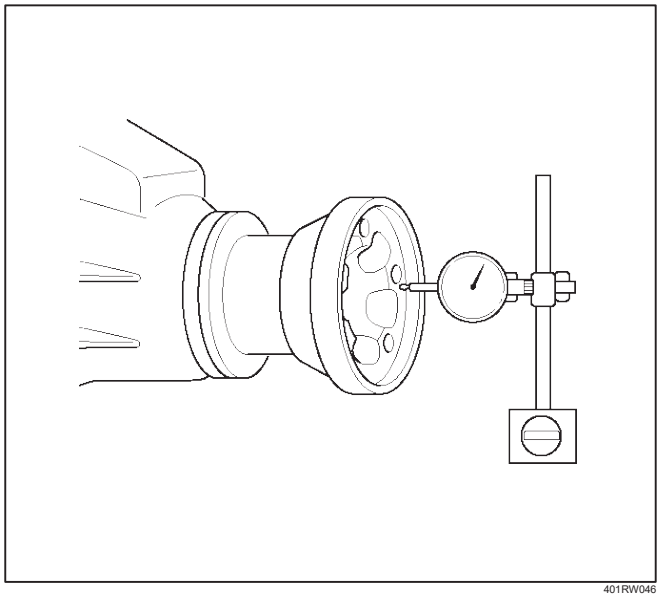


401RW047

Front Axle Flange Run-out

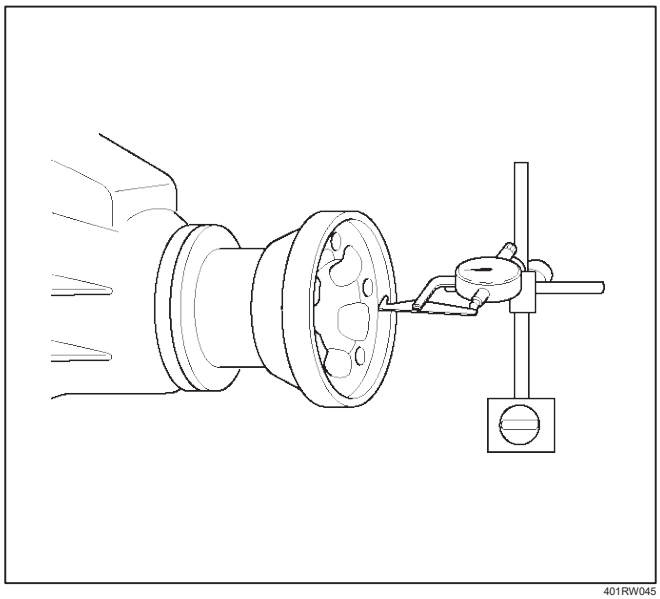
1. Set a dial gage at right angle near the outer circumference of the flange face and check the run-out of the flange face.

Limit: 0.15 mm (0.006 in)

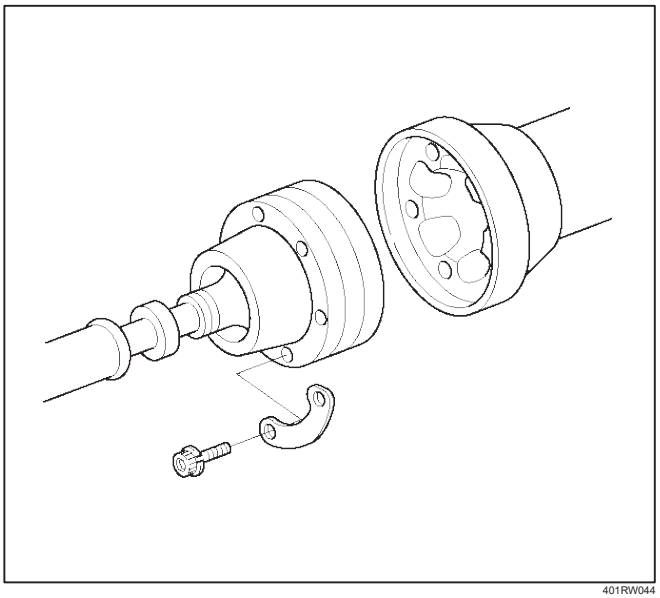

401RW046

2. Set a dial gage at right angle near the inner circumference and check the run-out of the flange.

Limit: 0.15 mm (0.006 in)


401RW045

3. If vibration is felt during the 4H AUTO drive, disconnct the propeller shaft at the front axle. Reinstall the propeller shaft at 60˚, 120˚, 180˚, 240˚, and 300˚ and conduct test drive in each position and check if there is vibration.

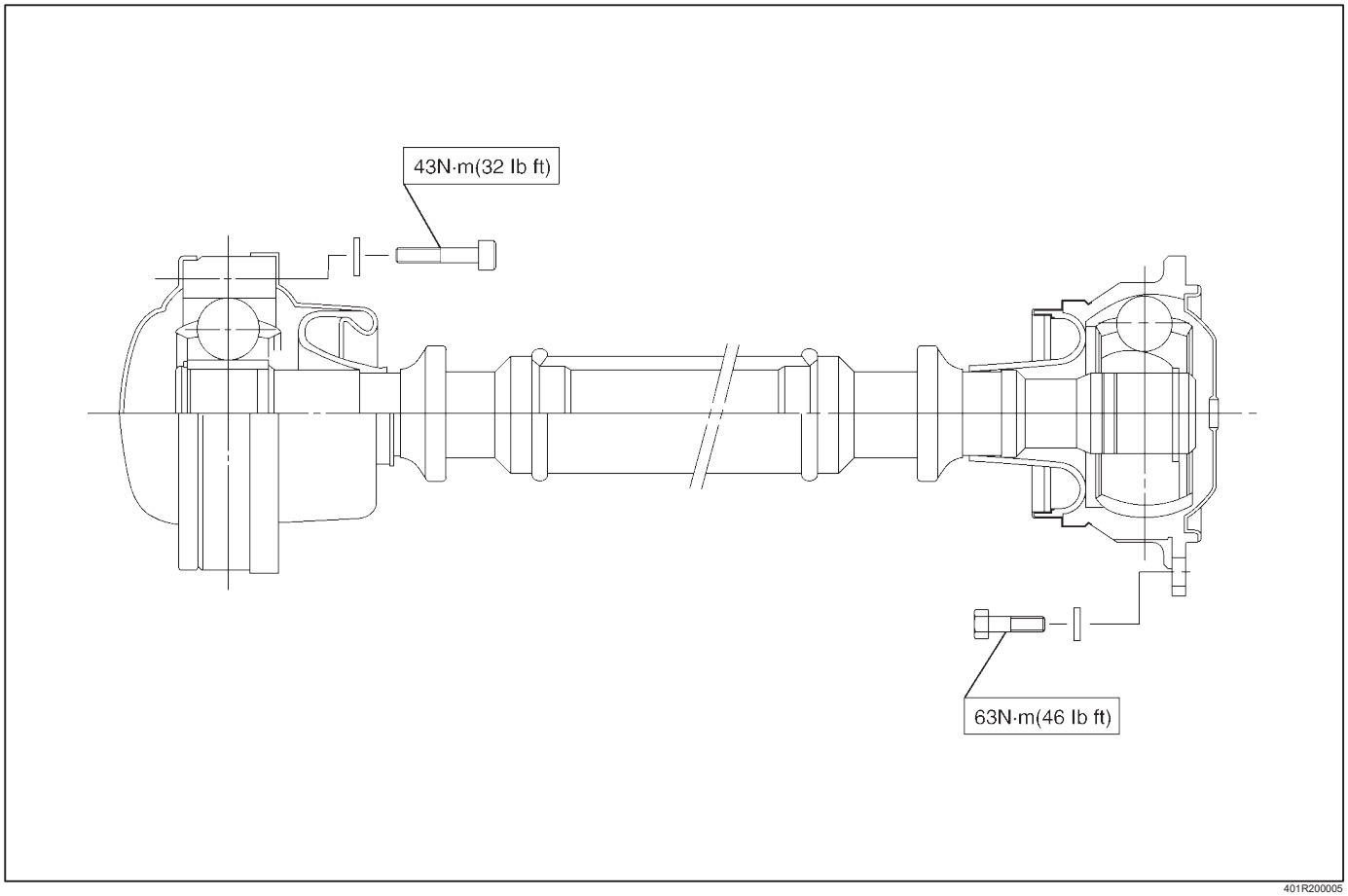

401RW044

Main Data and Specifications

General Specifications

Engine	6VE1(3.5 L)
Transmission	A/T with TOD
Construction	Hollow steel tube with constant velocty joints.
Outside diameter	40.0 mm (1.57 in)
Length	597 mm (23.50 in)

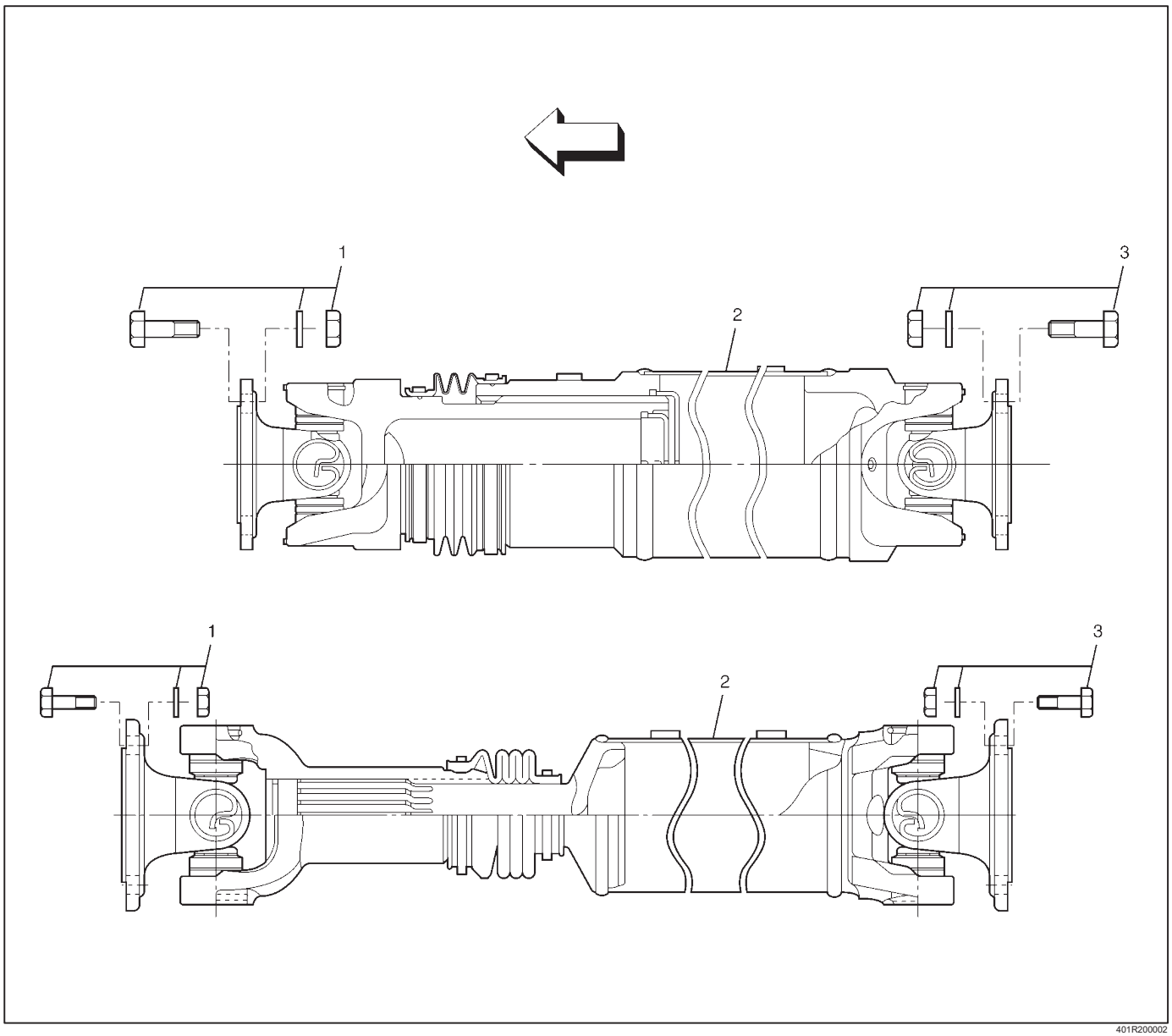
Torque Specifications



401R200005

Rear Propeller Shaft

Rear Propeller Shaft and Associated Parts



401R200002

Legend

(1) Bolt, Nut and Washer (Transfer Side)
(2) Rear Propeller Shaft
(3) Bolt, Nut and Washer (Rear Axle Side)

Removal

1. Raise the vehicle on a hoist.

NOTE: Apply alignment marks on the flange at the rear propeller shaft both front and rear side.

2. Remove transfer side bolt, nut and washer (except spline yoke type).
3. Remove rear axle side bolt, nut and washer.
4. Remove rear propeller shaft.

NOTE: Plug the hole of the transmission rear end to prevent oil leakage (spline yoke type only).

Installation

NOTE: Never install the shaft assembly backwards.

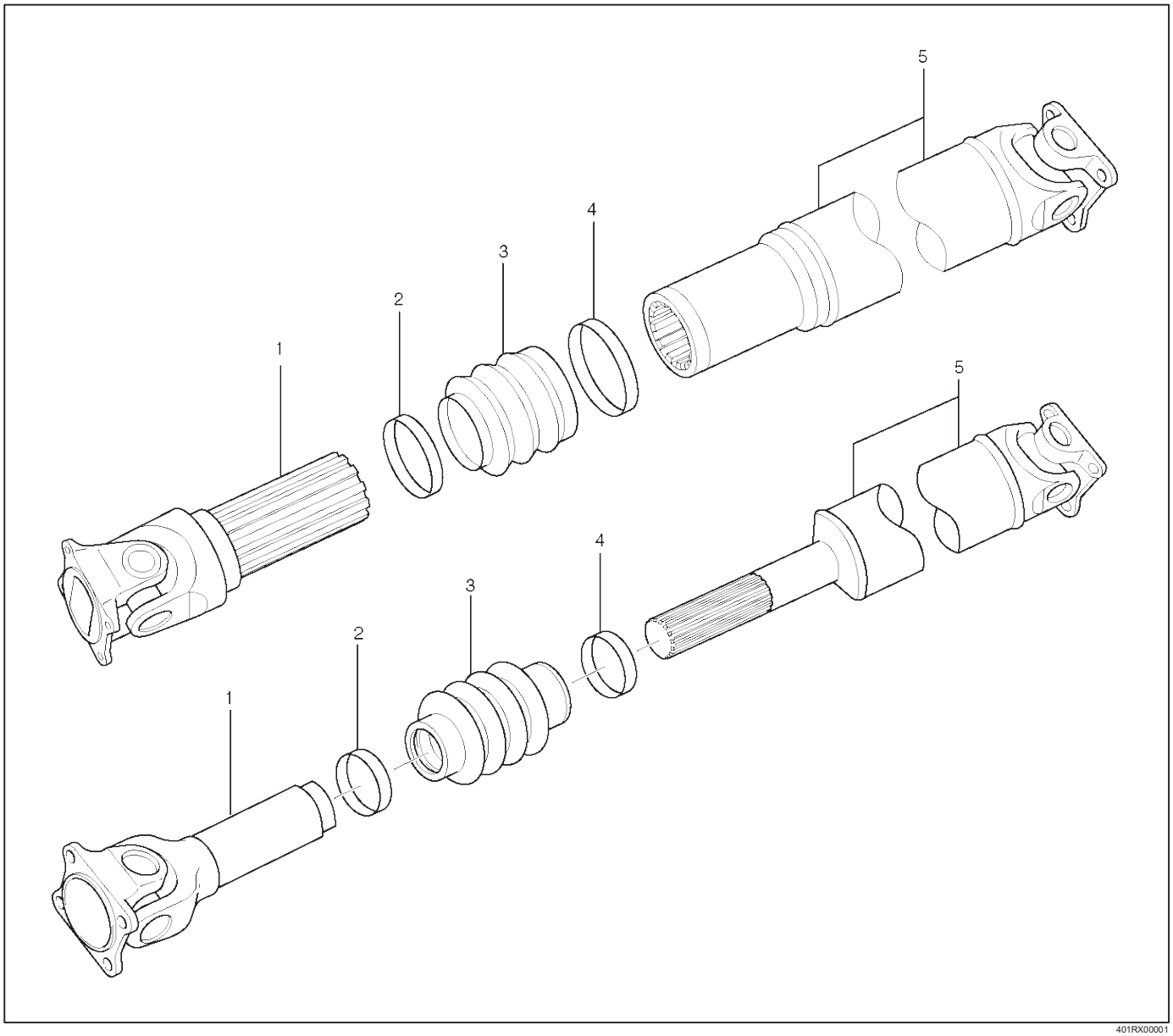
Never insert bar between yoke lugs when tightening or removing bolts.

Completely remove the dust or foreign matter from the connecting surface of flange coupling on each end of the propeller shaft.

1. Align the mark which is applied at removal.
2. Install rear propeller shaft and tighten the bolts to the specified torque.

Torque: 63 N·m(46 lb ft)

Slip Joint Disassembly



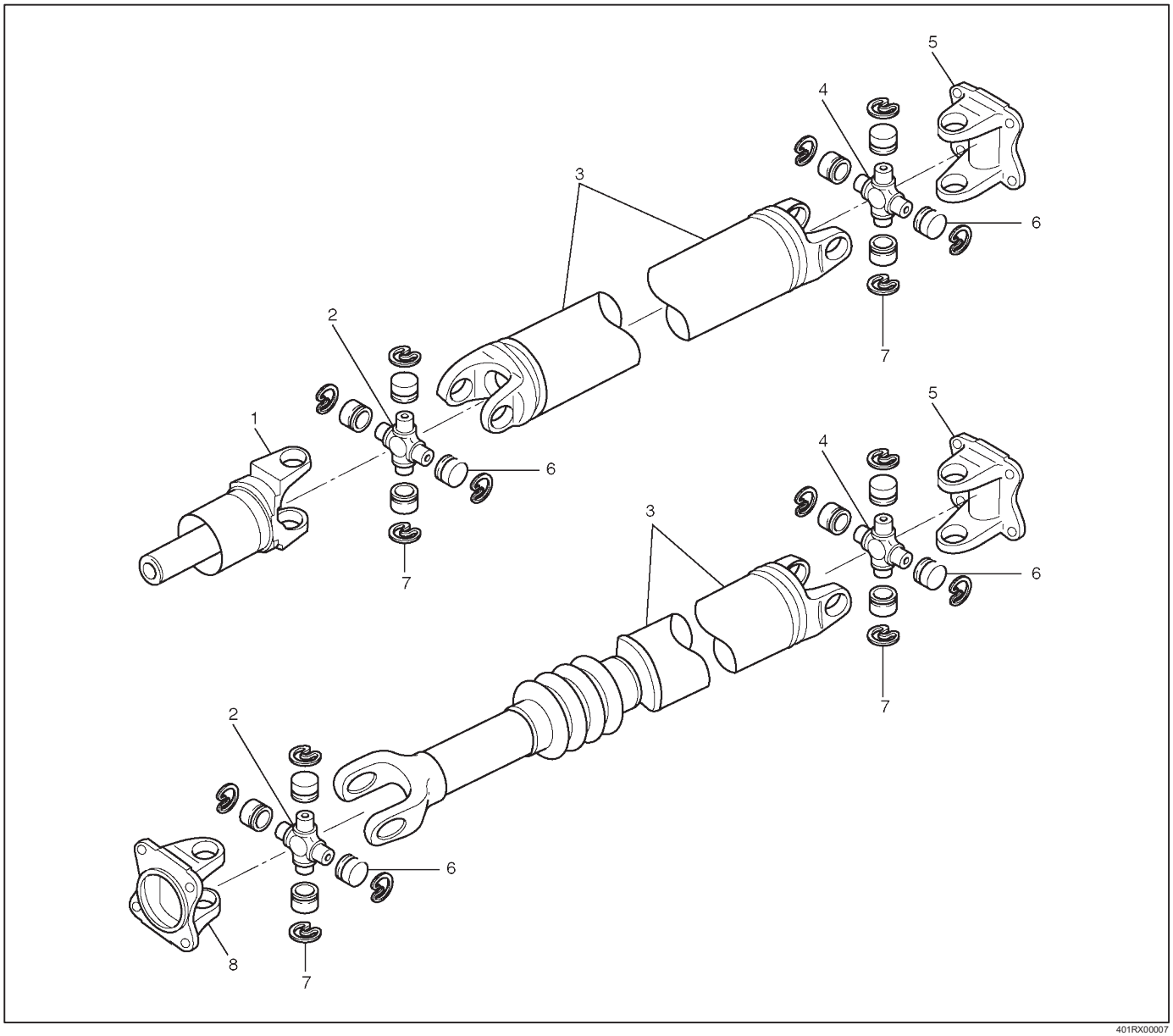
401RX00001

Legend

(1) Spline Yoke and Universal Joint Assembly
(2) Clamp
(3) Boot
(4) Clamp
(5) Tube and Universal Joint Assembly

1. Lay the shaft horizontally on a bench and secure.
2. Indicate the original assembled position by marking the phasing of the shaft prior to disassembly.
3. Using the flat blade of a screwdriver, pry the loose end of the boot clamp upwards and away from the propeller shaft boot. Be careful not to damage the boot.
4. When boot clamps becomes loose, remove by hand.
5. Repeat for the other boot clamp.
6. Remove the slip yoke assembly from the driveshaft, by securing the boot with one hand and pulling on the slip yoke.
7. Remove the boot from the shaft assembly.

Universal Joint Disassembly



401RX00007

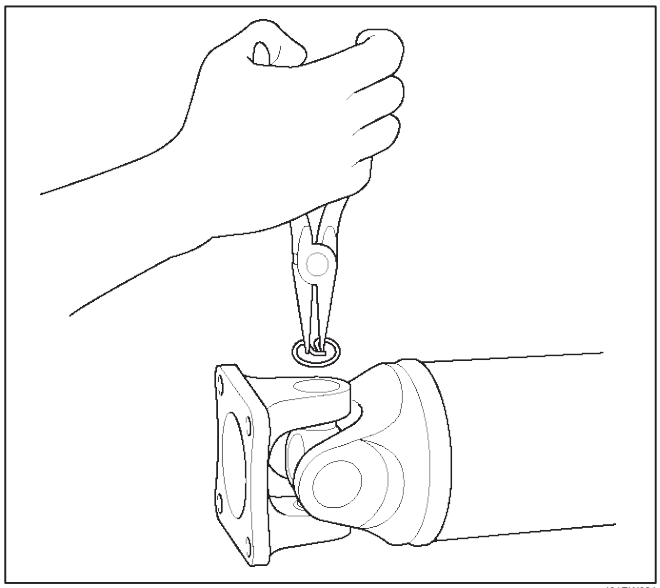
Legend

(1) Spline Yoke
(2) Spider
(3) Propeller Shaft Assembly
(4) Spider
(5) Flange Yoke
(6) Bearing
(7) Snap Ring
(8) Flange Yoke

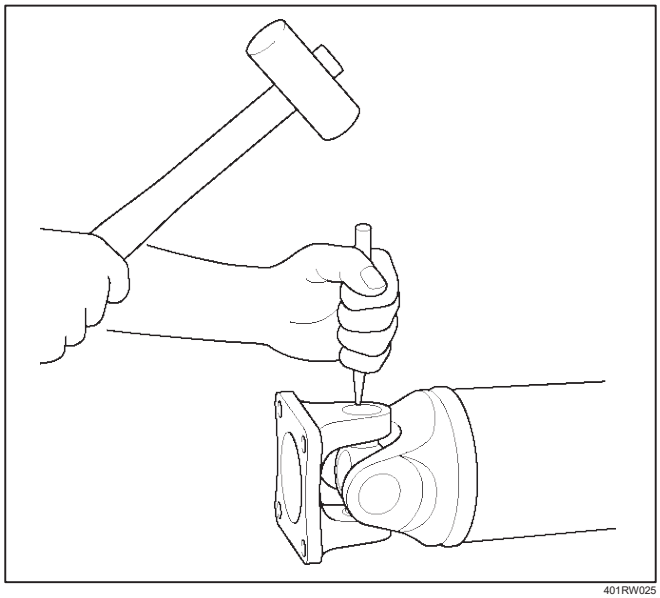
NOTE: Aluminum is softer than steel. Care must be taken not to remove excessive material or damage bearing holes.

If the vehicle has aluminum tube type propeller shaft, flange yoke, boot kit, journal kit can be replaced. If other parts are damaged, replace propeller shaft assembly.

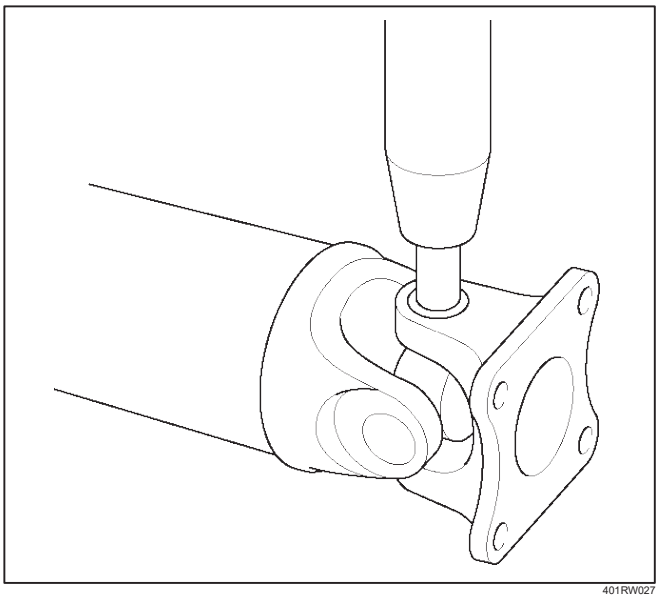
1. Apply alignment marks on the yokes of the universal joint, then remove the snap ring.


401RW024

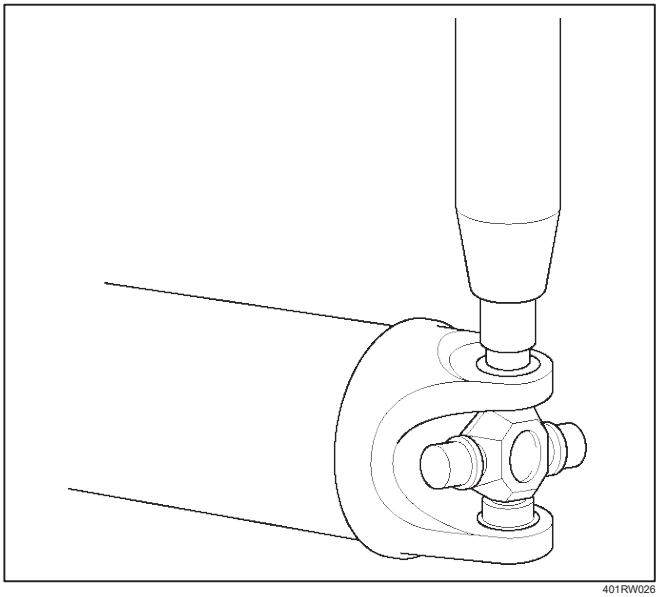
If the snap ring is stuck in position, remove paint from the hole in the yoke or tap around the edge of the bearing lightly with a soft drift.


401RW025

2. Set the yoke in the arbor press with a piece of tube stock beneath it.
   Place a solid plug on the upper bearing and press it through to release the lower bearing.


401RW027

3. If the bearing will not pull out by hand after pressing, tap the base of the lug near the bearing to dislodge it.
4. To remove the opposite bearing, turn the yoke over and straighten the spider in the open spider hole. Then carefully press on the end of the spider so the remaining bearing moves straight out of the bearing spider hole. If the spider or bearing are cocked, the bearing will score the walls of the spider hole and ruin it.


401RW026

5. Repeat this procedure on the remaining bearing to remove the spider from the yoke.

Inspection

- Propeller shaft for run-out Aluminum tube type.

  Static run-out limit : 1.0 mm(0.04 in)

  TIR full length of tubing maximum.

  (TIR : Total Indicator Reading)

- Propeller shaft for runout (Steel tube type).

  Static runout limit : 0.13 mm(0.005 in)

  TIR on the neck of the slip tube shaft (with a boot).

  0.25 mm(0.010 in)

  TIR on the ends of the tubing 3 inch from the welds.

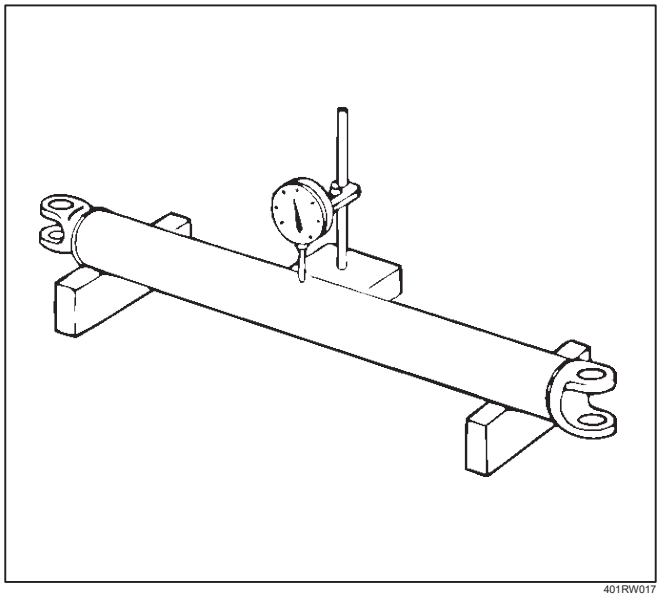
  0.38 mm(0.015 in)

  TIR at the linear center of the tube.

  0.38 mm(0.015 in)

  TIR for the full length of tube with 30” or less of tubing.

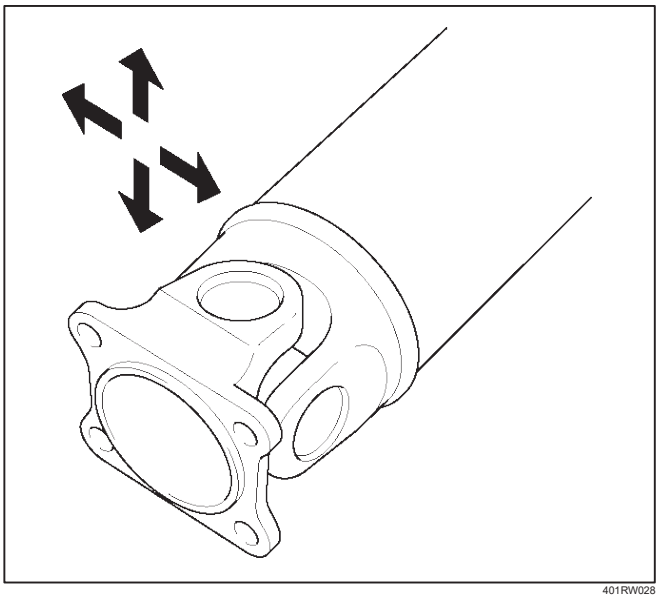
  (TIR: Total Indicator Reading)


401RW017

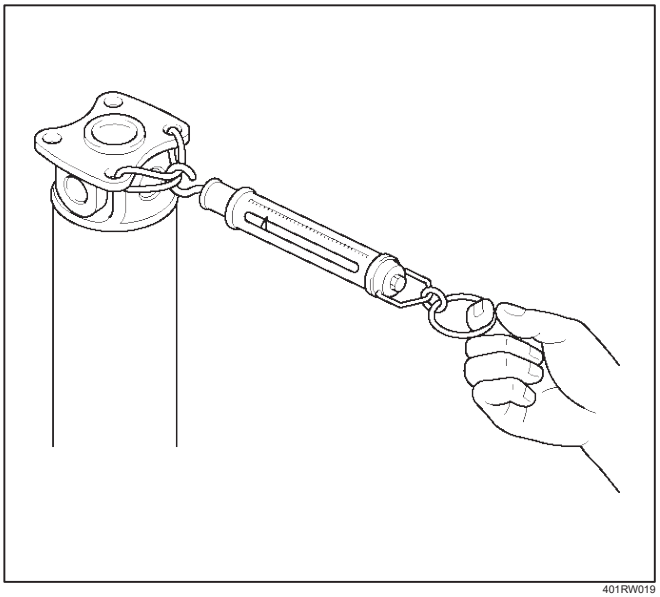
- Play in universal joint.

  Limit: Less than 0.15 mm(0.006 in)

- Spider pin should be smooth and free from fretting or galling.
  Visible signs of needle presence is normal, but wear should not be felt.

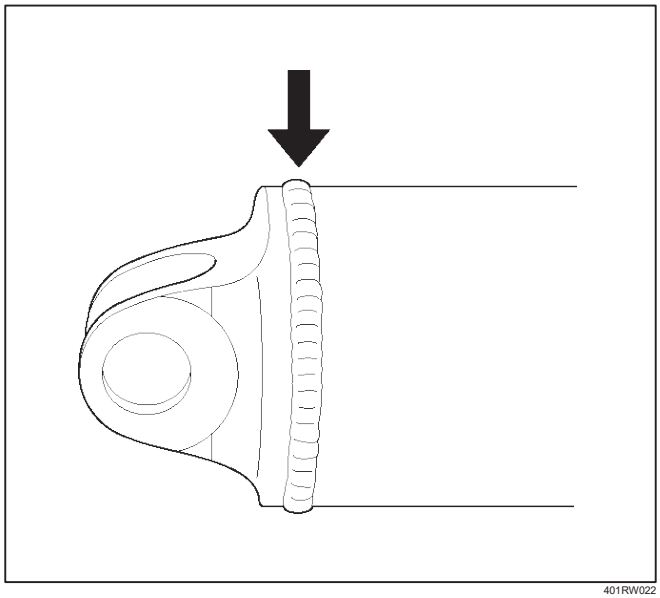

401RW028

- Preload of the universal joint.
  Preload should be 0 to 49 N (0 to 11.0 lb).
  Joints should rotate smoothly and freely and should exhibit no rough or ratchety movement.


401RW019

- Inspect splines of slip joint for wear.
  The nylon-coated spline should be free from nicks and dings and the underlying steel spline should not be visible.
  After cleaning the nylon coating spline, the coating should exhibit only slight indication of wear.
  Grease volume is approximately 10 grams of grease in total. Grease should be evenly applied to both the female and the male slip splines using a small brush. After assembly of the slip joint, the sliding joint should be fully worked from the full collapsed to the full extended position.

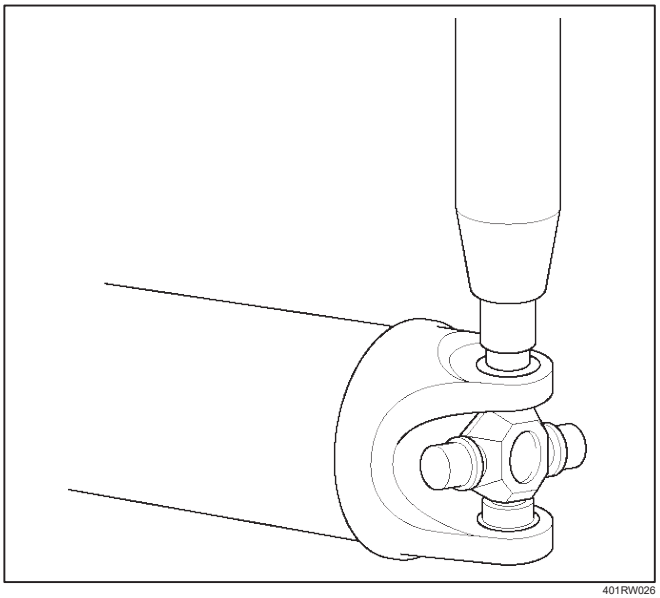
- Aluminum tube type only: Inspect the aluminum tubing for surface scratches and dents. These scratches may not exceed 0.2 mm (0.008 in) in depth.



- Aluminum tube type only: Visually inspect the circle welds and fittings for any signs of cracks or signs of deterioration. If there are any cracks that exceed 0.2 mm (0.008 in) in depth, the assembly must be replaced.
- Aluminum tube type only: Check to be sure there are no missing balance weights. If balance weights are missing and void has occurred in the aluminum tubing greater than 0.2 mm (0.008 in), the assembly must be replaced.

Universal Joint Reassembly

1. Pack the four grease cavities of the spider with a high quality, extreme pressure N.L.G.I. Grade 2 grease. Do not add additional grease to bearing cup assembly.
2. Move one end of the spider to cause a trunnion to project through the spider hole beyond the outer machined face of the yoke lug. Place a bearing over the trunnion diameter and align it to the spider hole.
   Using an arbor press, hold the trunnion in alignment with the spider hole and place a solid plug on the upper bearing. Press the bearing into the spider hole enough to install a snap ring.

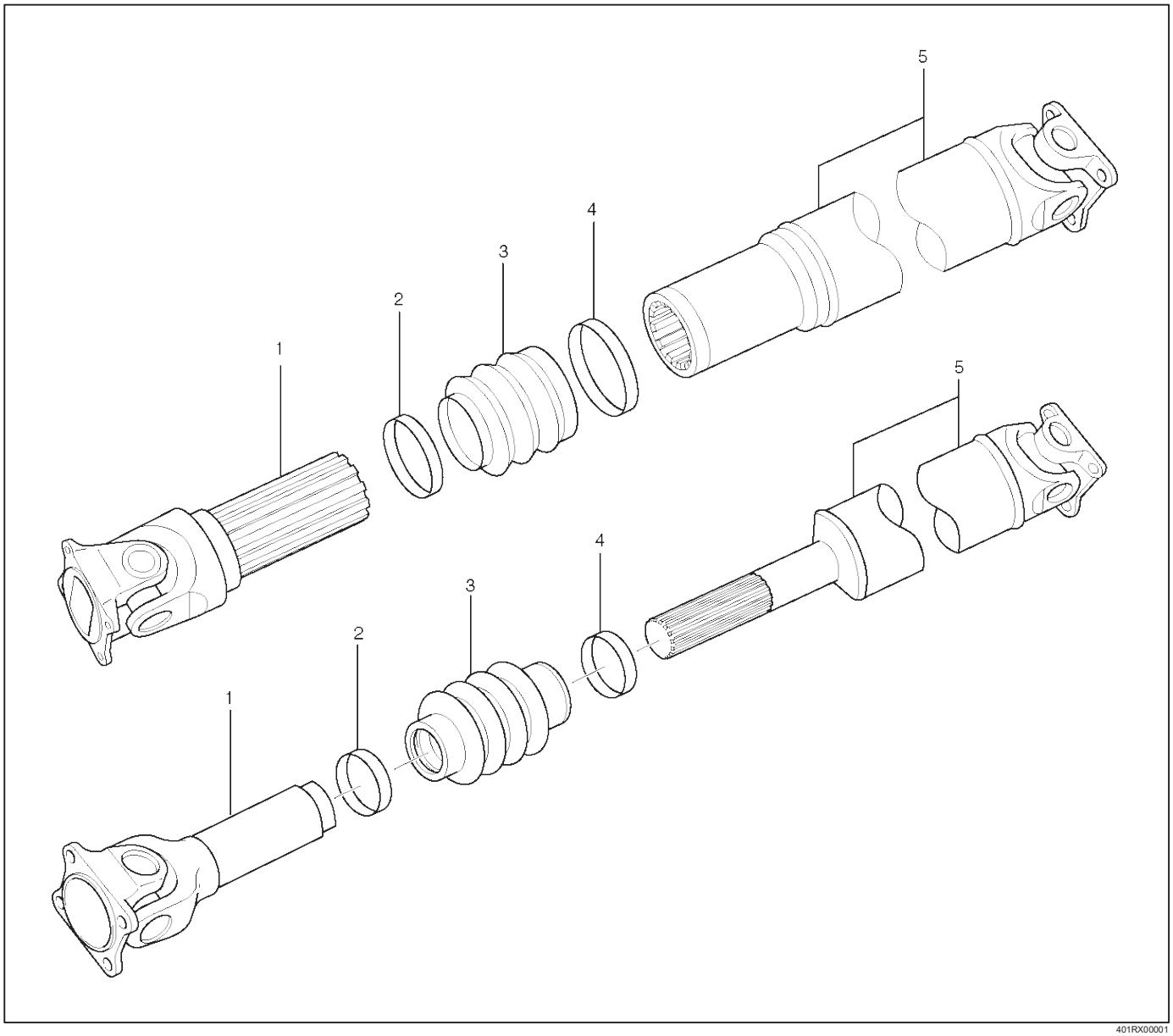


3. Install a snap ring.

NOTE: Be sure the snap rings are properly seated in the grooves.

4. Repeat steps 2 and 3 to install the opposite bearing. If the joint is stiff, strike the yoke ears with a soft hammer to seat the bearing.
5. Align the setting marks and join the yokes.

Slip Joint Reassembly



401RX00001

Legend

(1) Spline Yoke and Universal Joint Assembly
(2) Clamp
(3) Boot
(4) Clamp
(5) Tube and Universal Joint Assembly

1. Apply grease evenly to both the female and male splines.
2. Apply a small amount of grease by finger to the outer lips of the boot.
3. Slide the boot (smaller diameter side) onto the spline yoke shaft being careful not to damage the spline coating or boot.
4. Insert the spline yoke shaft spline into the tube assembly being careful to maintain proper phasing. The spider holes should be in line as originally marked prior to disassembly.
5. Position boot onto tube and yoke shaft in its assembled position.
6. Attach boot clamps and secure using pliers.
7. Be sure clamp is properly seated and secure.

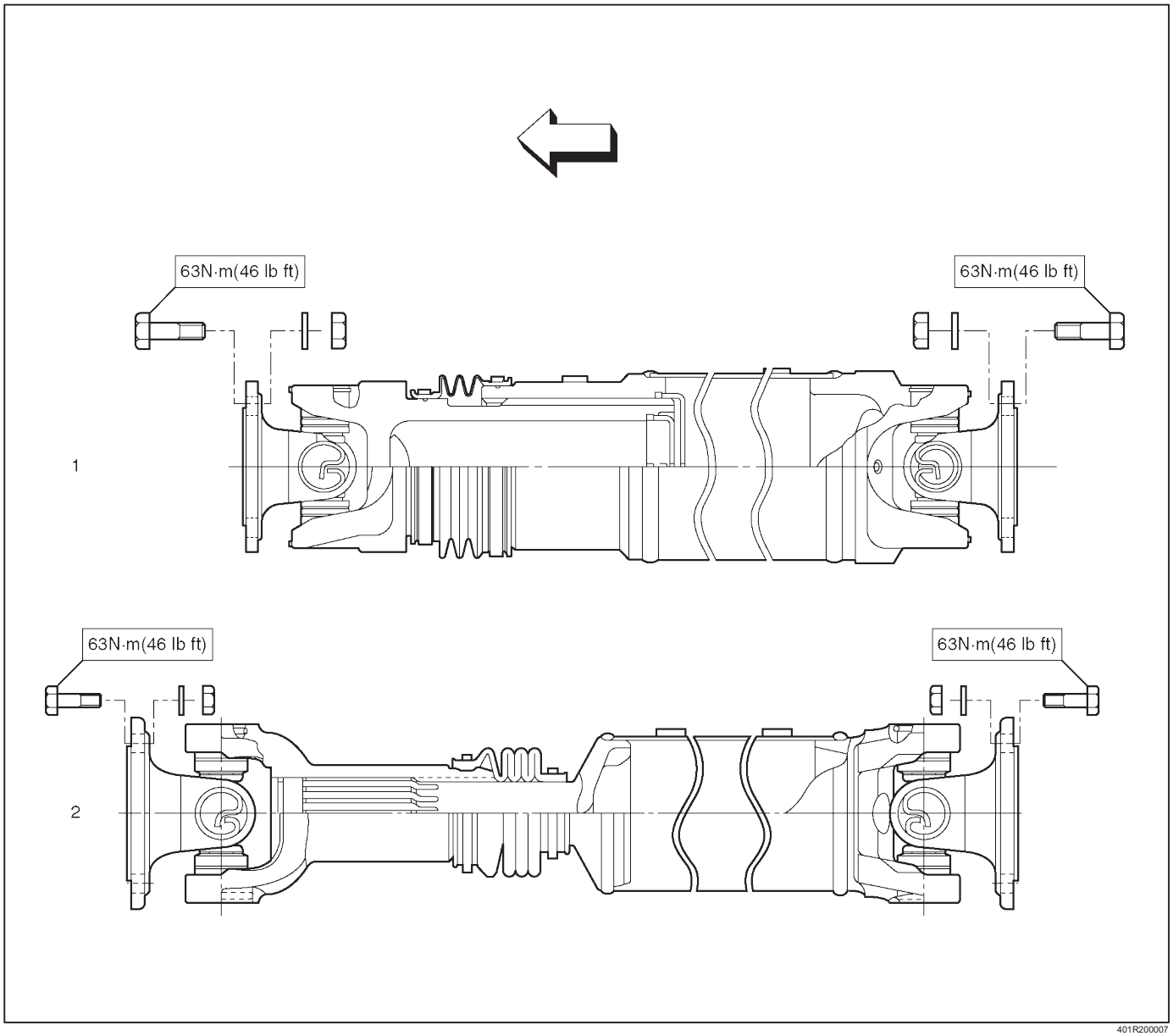
CAUTION: Only use a similar type or same as the original type clamp. Using any other clamp may create an imbalanced shaft or lead to grease leakage.

Main Data and Specifications

General Specifications

	2WD Model	4WD Model
Engine	6VD1	6VD1
Transmission	A/T	A/T
Type (See illustration)	1	2
Length between two spiders center)	1323.0mm (52.09in)	1030.0mm (40.55in)
Universal joint type	Cardan type	

Torque Specifications



401R200007

AXIOM (Vehicles Produced After Aug./1/2001)

DRIVE SHAFT SYSTEM

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Service Precaution

WARNING: THIS VEHICLE HAS A SUPPLEMENTAL RESTRAINT SYSTEM(SRS). REFER TO THE *SRS COMPONENT AND WIRING LOCATION VIEW* IN ORDER TO DETERMINE WHETHER YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING. WHEN YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING, REFER TO THE *SRS SERVICE INFORMATION.* FAILURE TO FOLLOW WARNINGS COULD RESULT IN POSSIBLE AIR BAG DEPLOYMENT, PERSONAL INJURY, OR OTHERWISE UNNEEDED SRS SYSTEM REPAIRS.

CAUTION: Always use the correct fastener in the proper location. When you replace a fastener, use ONLY the exact part number for that application. ISUZU will call out those fasteners that require a replacement after removal. ISUZU will also call out the fasteners that require thread lockers or thread sealant. UNLESS OTHERWISE SPECIFIED , do not use supplemental coatings (Paints, greases, or other corrosion inhibitors) on threaded fasteners or fastener joint interfaces. Generally, such coatings adversely affect the fastener torque and the joint clamping force, and may damage the fastener. When you install fasteners, use the correct tightening sequence and specifications. Following these instructions can help you avoid damage to parts and systems.

General Description

This publication contains essential removal, installation, adjustment and maintenance procedures.
The front axle utilizes a central disconnect type front axle/transfer case system.

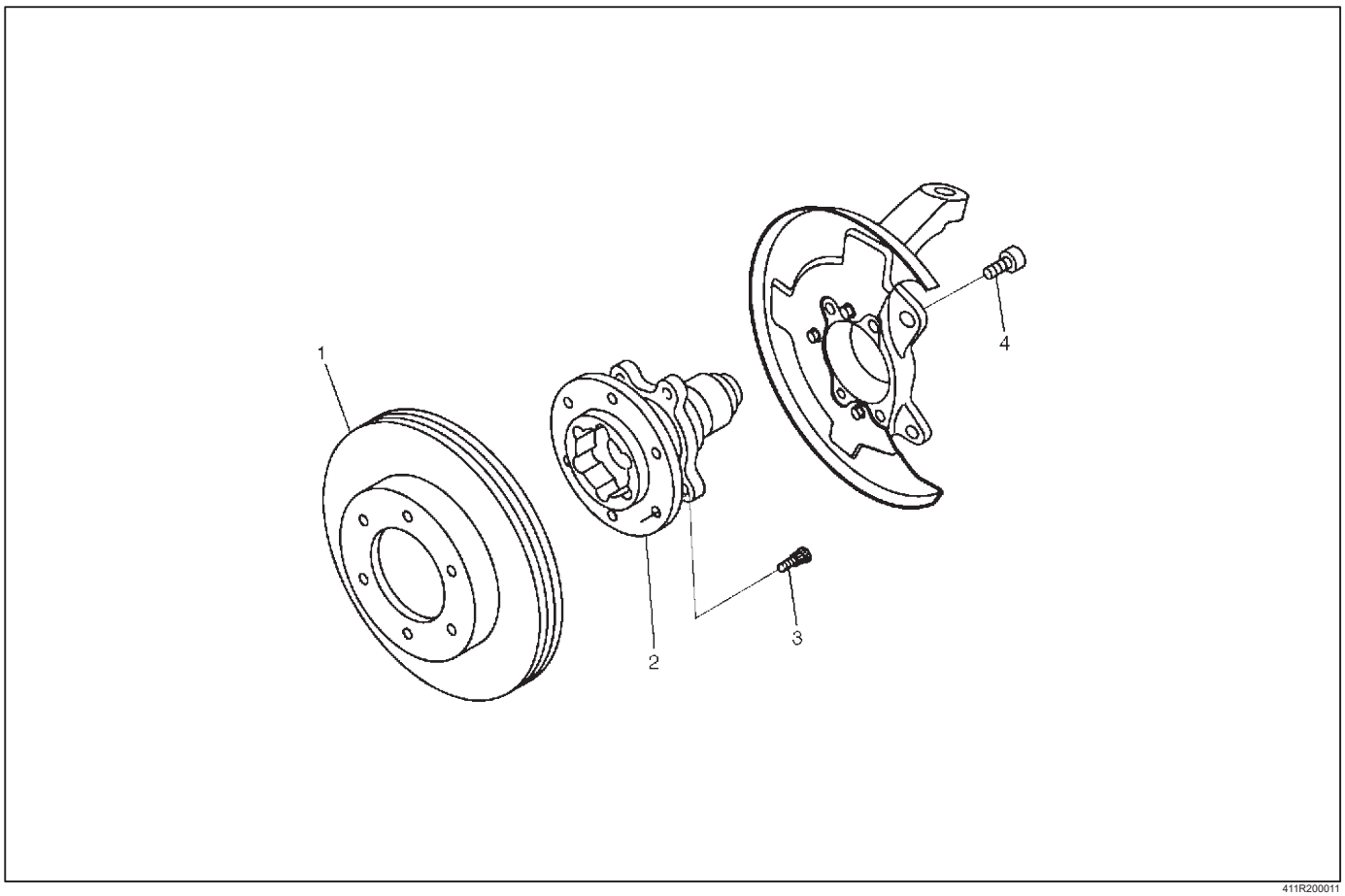
The drive axles are completely flexible assemblies, consisting of inner and outer constant velocity (CV) drive shaft joints connected by an axle shaft.
For description of front propeller shaft and universal joint, refer to *Front Propeller Shaft* in this section.

Diagnosis

Condition	Possible cause	Correction
Oil Leak At Front Axle	Worn or defective oil seal.	Replace the oil seal.
	Front axle housing cracked.	Repair or replace.
Oil Leak At Pinion Shaft	Too much gear oil.	Correct the oil level.
	Oil seal worn or defective.	Replace the oil seal.
	Pinion flange loose or damaged.	Tighten or replace.
Noises In Front Axle Drive Shaft Joint	Broken or worn drive shaft joints and bellows (BJ and DOJ).	Replace the drive shaft joints and bellows.
“Clank” When Accelerating From “Coast”	Loose drive shaft joint to output shaft bolts.	Tighten.
	Damaged inner drive shaft joint.	Replace.
Shudder or Vibration During Acceleration	Excessive drive shaft joint angle.	Repair.
	Worn or damaged drive shaft joints.	Replace.
	Sticking spider assembly (inner drive shaft joint).	Lubricate or replace.
	Sticking joint assembly (outer drive shaft joint).	Lubricate or replace.
Vibration At Highway Speeds	Out of balance or out of round tires.	Balance or replace.
	Front end out of alignment.	Align.
Noises in Front Axle	Insufficient gear oil.	Replenish the gear oil.
	Wrong or poor grade gear oil.	Replace the gear oil.
	Drive pinion to ring gear backlash incorrect.	Adjust the backlash.
	Worn or chipped ring gear, pinion gear or side gear.	Replace the ring gear, pinion gear or side gear.
	Pinion shaft bearing worn.	Replace the pinion shaft bearing.
	Hub unit bearing worn.	Replace the hub unit bearing.
	Differential bearing loose or worn.	Tighten or replace.
Wanders and Pulls	Incorrect front alignment.	Adjust the front alignment.
	Steering unit loose or worn.	Tighten or replace.
	Tire worn or improperly inflated.	Adjust the inflation or replace.
	Front or rear suspension parts loose or broken.	Tighten or replace.
Front Wheel Shimmy	Hub unit bearing worn.	Replace.
	Incorrect front alignment.	Adjust the front alignment.
	Worn ball joint or bush.	Replace the ball joint or bush.
	Steering unit loose or worn.	Tighten or replace.
	Tire worn or improperly inflated.	Replace or adjust the inflation.
	Shock absorber worn.	Replace the shock absorber.

Front Hub and Disc (2WD Model)

Disassembled View



411R200011

Legend

(1) Disc Rotor
(2) Hub unit, Bearing
(3) Wheel Pin
(4) Bolt

Disassembly

1. Raise the vehicle with a jack. Support the frame with chassis stands.
2. Remove the brake caliper from the bracket. Secure the caliper with a wire so that it does not interfere with the work process.

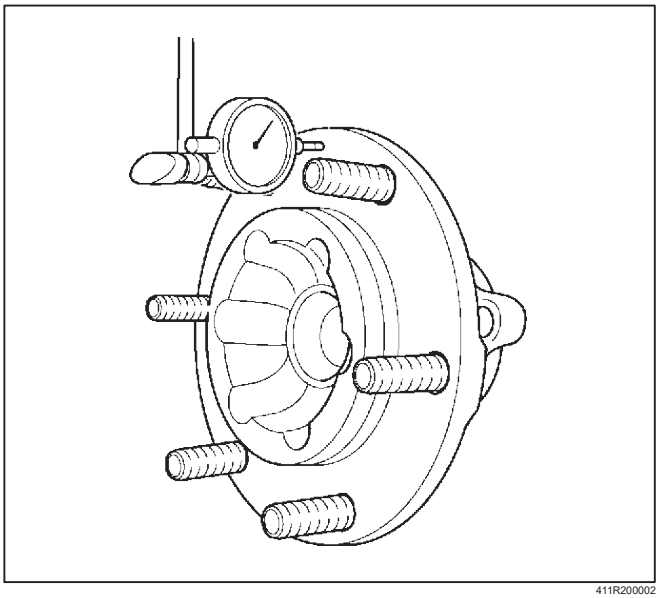
Refer to *Front disc caliper assembly* in Section 5C of this Manual.

3. Remove the disk rotor

Apply penetrating oil to the bearing and disc rotor contact surfaces if the surfaces are stuck together because of rust.

4. Inspect the hub unit bearing. Refer to *Inspection* below.
5. Use a dial gauge to measure the bearing axial rattle.

Bearing axial rattle: 0.05 mm max

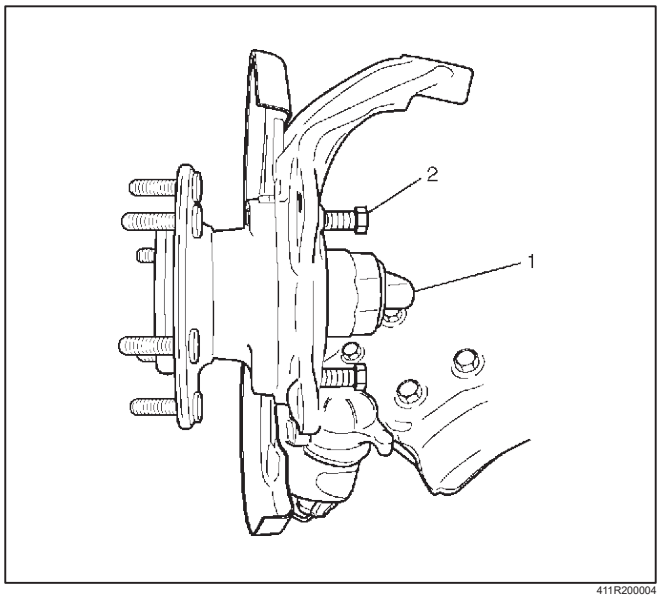


411R200002

If abnormal conditions are discovered during inspection, go to Step 6. If there are no abnormal conditions, reassemble the front disc rotor and caliper.

NOTE: Hub, wheel bearing and spindle is integrated to the hub unit bearing so it must not be disassembled. If it has abnormal rattle or noise, replace the hub unit bearing.

6. Remove the ABS sensor connector.



411R200004

Legend
(1) ABS Sensor Connector
(2) Bolt

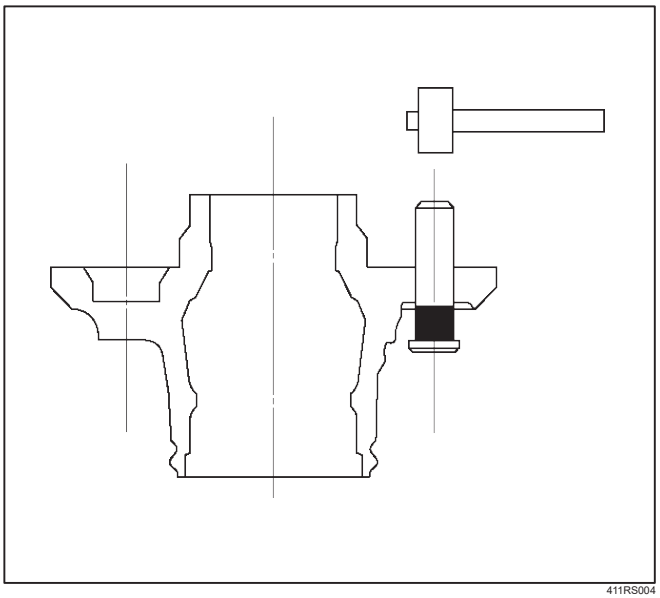
7. Remove the 4 bolts fixing the hub unit bearing to the knuckle.

Apply penetrating oil to the bearing and knuckle contact surfaces if the surfaces are stuck together because of rust.

8. Temporarily install long bolts to 2 of the fixing bolt holes (the bolts must have the same diameter and thread width).
9. Strike the long bolts with a hammer to loosen and remove the hub unit bearing from the knuckle.

Take care not to drop the bearing.

10. If necessary, replace the wheel pin in the following manner.
    - Place hub on a suitable work surface and remove wheel studs, as required, using a hammer.


411RS004

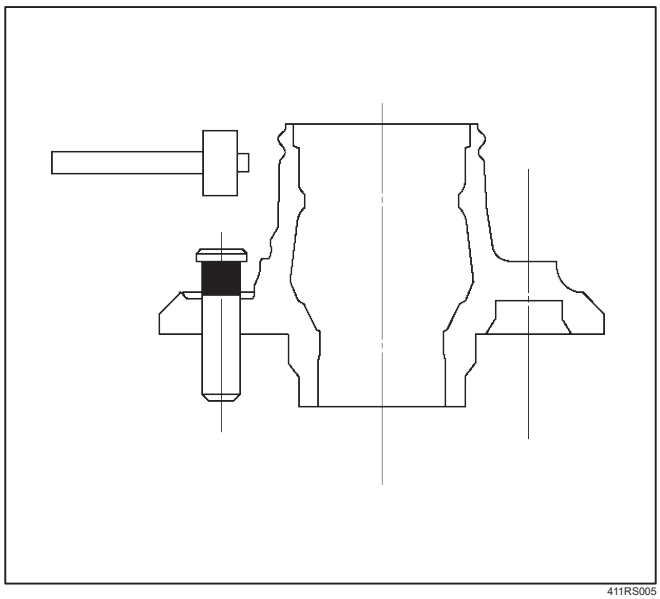
Inspection

Inspect the parts listed below for abrasion, breakage, and other abnormal conditions.
Repair, or replace the parts as required.

- Disc
- Caliper
- Wheel pin
- Hub unit bearing

Reassembly

1. Install wheel pin.



- Place hub on a wood workbench or a block of wood approx. 6” by 6” to protect the wheel stud ends and threads.
- Install wheel stud, using a hammer.

NOTE: Be sure wheel stud is started squarely and seats completely.

2. Install the hub unit bearing to the knuckle.
   Tighten the bolts to the specified torque.

Hub unit bearing bolt

Torque: 103±10 N·m (10.5 ± 1 kg·m)

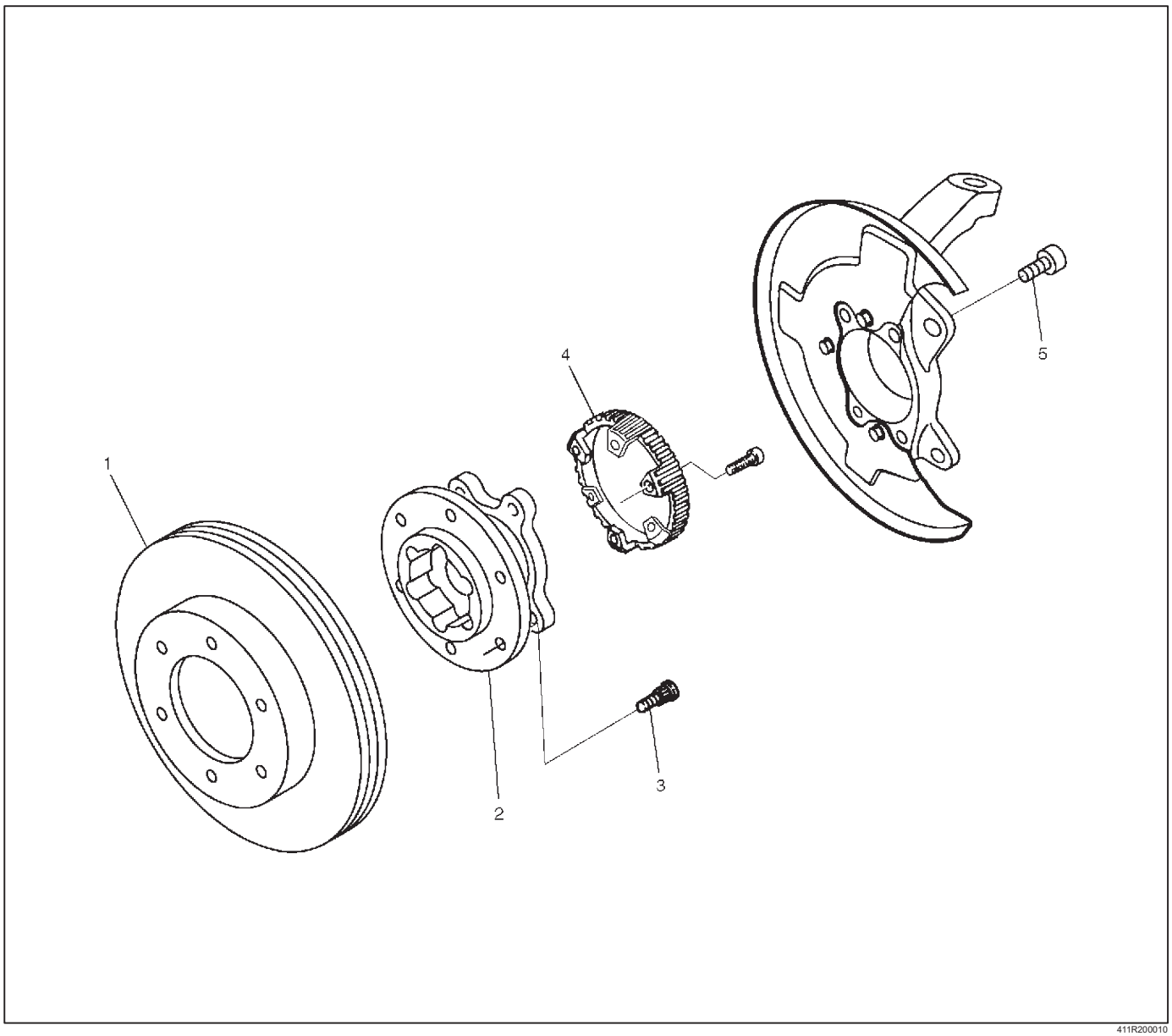
If there is rust on the bearing and knuckle contact surfaces, use sandpaper to remove it before installation.

3. Install the ABS sensor connector.
4. Install the disc rotor.
5. Install the brake caliper to the bracket.

Refer to *Front disc caliper assembly* in Section 5C of this Manual.

Front Hub and Disc (4WD Model)

Disassembled View



411R200010

Legend

(1) Disc Rotor
(2) Hub Unit, Bearing
(3) Wheel Pin
(4) ABS Sensor Ring
(5) Bolt

Disassembly

1. Move the transfer case lever to the 2WD position.
2. Raise the vehicle with a jack. Support the frame with chassis stands.
3. Remove the brake caliper from the bracket. Secure the caliper with a wire that it does not interfare with the work process.

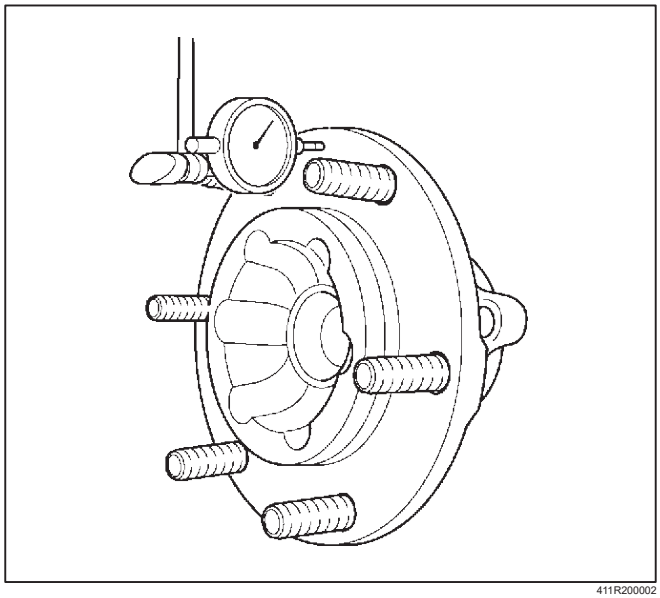
Refer to *Front disc caliper assembly* in Section 5C of this Manual.

4. Remove the disk rotor.

Apply penetrating oil to the bearing and disc rotor contact surfaces if the surfaces are stuck together because of rust.

5. Inspect the hub unit bearing. Refer to *inspection* below.

6. Use a dial gauge to measure the bearing axial rattle.
   Bearing axial rattle: 0.05 mm max



411R200002

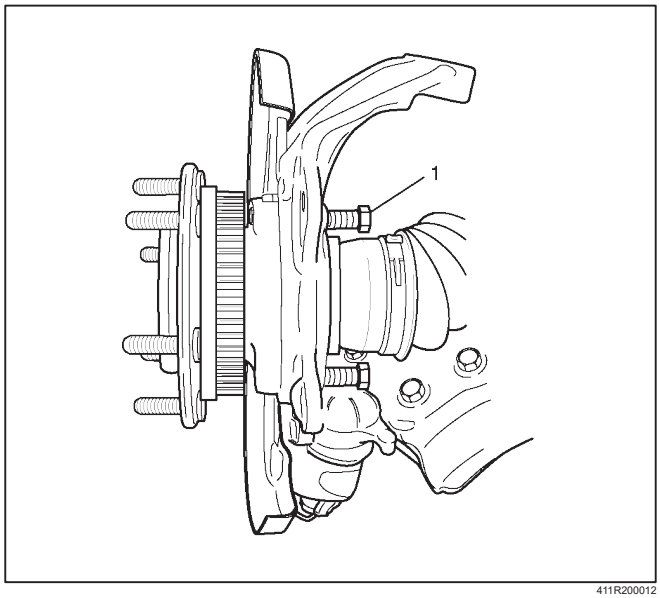
If abnormal conditins are discovered during inspection, go to Step 7. If there are no abnormal conditions, reassemble the front discrotor and caliper.

NOTE: Hub, wheel bearing and spindle is integrated to the hub unit bearing so it must not be disassembled. If it has abnormal rattle or noize, replace the hub unit bearing.

7. Loosen the caulking around the front drive shaft nuts.
8. Remove the nuts and discard them (they cannot be reused).
9. Remove the 4 bolts fixing the hub unit bearing to the knuckle.

Apply penetrating oil to the bearing and knuckle contact surfaces if the surfaces are stuck together because of rust.

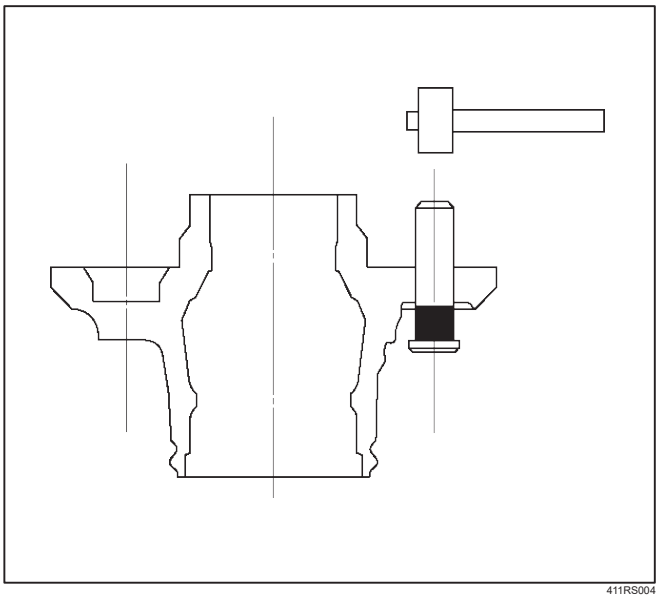
10. Temporarily install long bolts to 2 of the fixing bolt holes (the bolts must have the same diameter and thread width).



411R200012

Legend
(1) Bolt

11. Strike the long bolts with a hammer to loosen and remove the hub unit bearing from the knuckle.
    - Take care not to strike the front drive shaft.
    - Take care not to drop the bearing.
12. Remove the ABS rotor sensor from the bearing.
13. If necessary, replace the wheel pin in the following manner.
    - Place hub on a suitable work surface and remove wheel studs, as required, using a hammer.



411RS004

Inspection

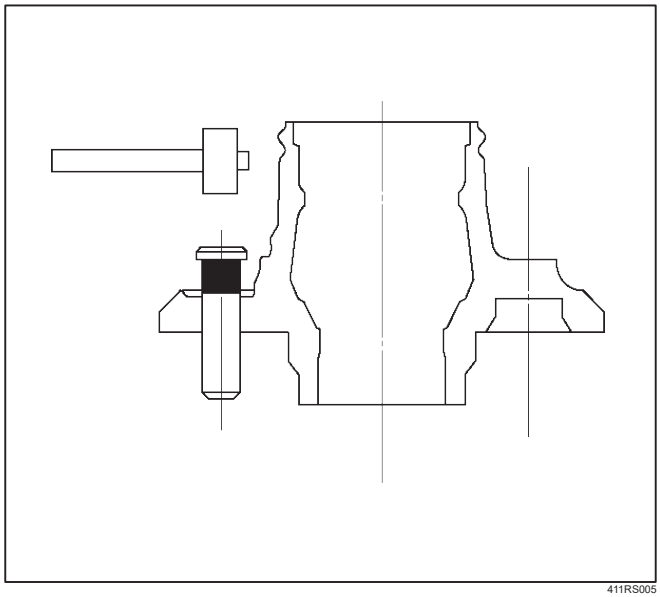
Inspect the parts listed below for abrasion, breakage, and other abnormal conditions.
Repair or replace the parts as required.

- Disc
- Caliper
- Drive shaft oil seal
- ABS sensor rotor
- Wheel pin
- Hub unit bearing

Reassembly

1. Install the wheel pin.
   - Place hub on a wood workbench or a block of wood approx. 6” by 6” to protect the wheel stud ends and threads.
   - Install the wheel stud, using a hammer.

NOTE: Be sure wheel stud is started squarely and seats completely.


411RS005

2. Install the ABS rotor sensor to the hub unit bearing. Tighten the bolts to the specified torque.

   ABS rotor sensor bolt

   Torque: 18.7±5 N·m (1.9±0.5 kg·m)

3. Install the hub unit bearing to the knuckle. Tighten the bolts to the specified torque.

   Hub unit bearing bolt

   Torque: 103±10 N·m (10.5±1 kg·m)

If there is rust on the bearing and knuckle contact surfaces, use sandpaper to remove it before installation. Take care not to push the front drive shaft and oil seal out of position.

4. Hand tighten the front drive shaft nuts.

Use new nuts.

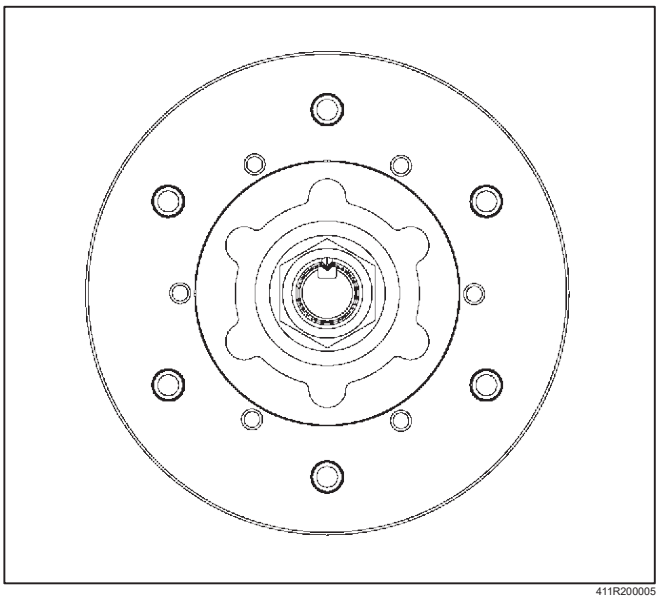
5. Install the disc rotor.
6. Install the brake caliper to the bracket.

Refer to *Front disc caliper assembly* in Section 5C of this Manual.

7. Tighten the front drive shaft nuts to the specified torque.

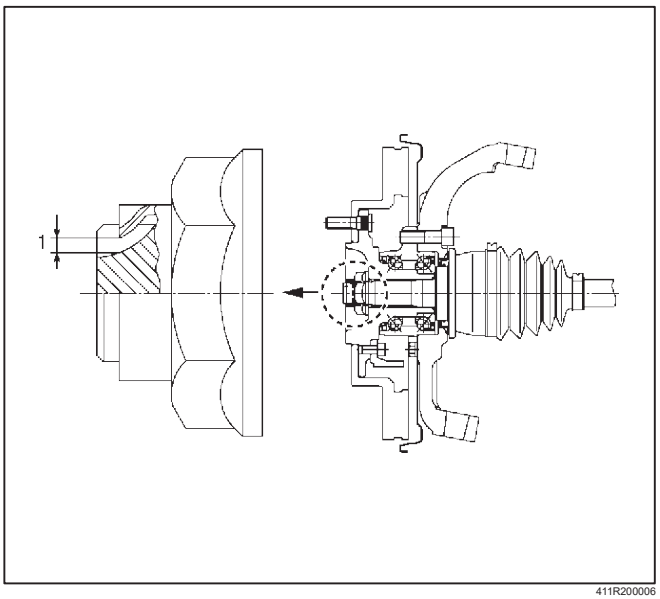
   Front drive shaft nut

   Torque: 245±19.6 N·m (25±2 kg·m)


411R200005

8. Caulk the front drive shaft nuts.

The caulking must be free of cracks.



411R200006

Front Drive Shaft Joint

Front Drive Shaft Joints Replacement

- Refer to *Front Drive Axle Assembly Replacement* in this section, and refer to *Front Hub and Disc Overhaul* in Suspension section.

Front Hub Bearing Preload Check

Check the hub bearing preload at the wheel pin.

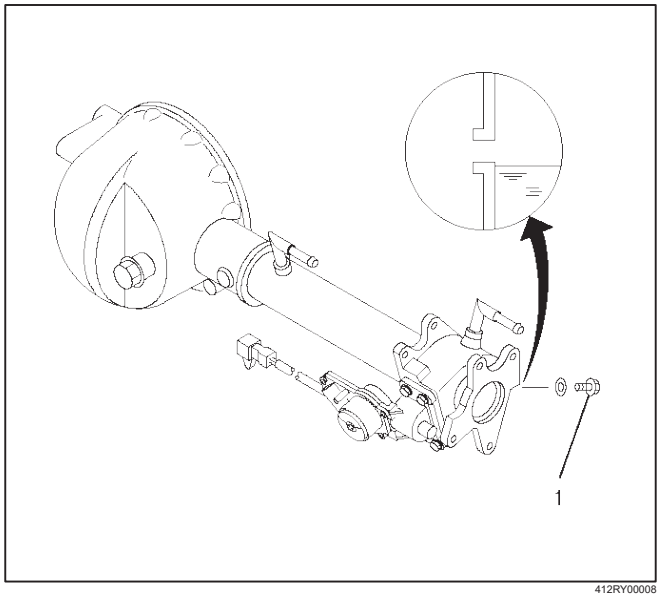
New bearing and New oil seal:

24.5 N (4.4 – 5.5 lb)

Used bearing and New oil seal:

11.8– 17.7 N(2.6 – 4.0 lb)

Inspection Of Shift On The Fly System Gear Oil



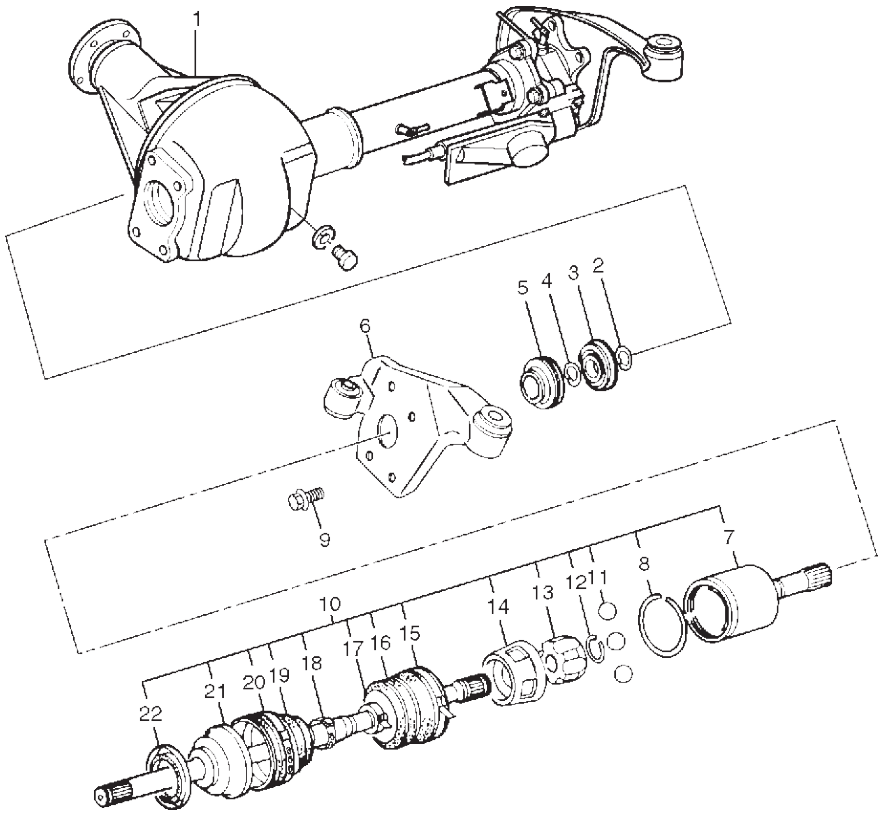
412RY00008

1. Open filler plug and make sure that the oil is up to the plug port.
   If the oil is short, replenish with gear oil GL–5 grade.
2. Tighten the filler plug to the specified torque.

   Torque: 78 N·m (58 lb in)

Front Axle Drive Shaft

Front Axle Drive Shaft and Associated Parts



412R200009

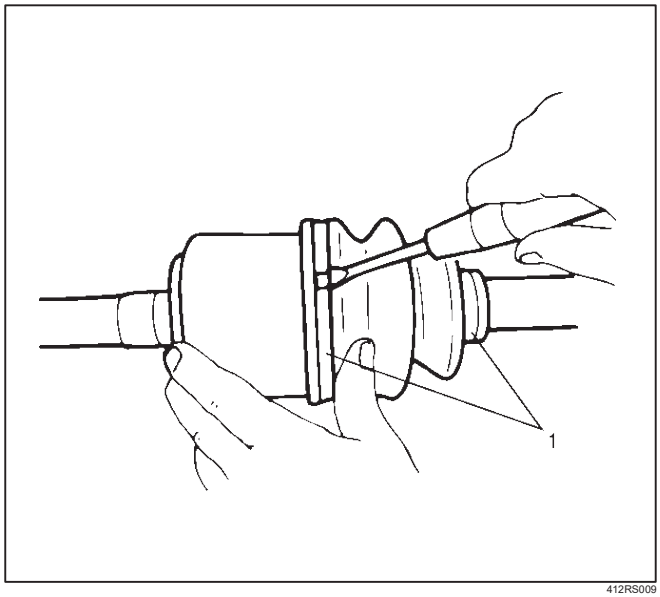
Legend

(1) Axle Case and Differential
(2) Snap Ring
(3) Bearing
(4) Snap Ring
(5) Oil Seal
(6) Bracket
(7) DOJ Case
(8) Circlip
(9) Bolt
(10) Drive Shaft Joint Assembly
(11) Ball
(12) Snap Ring
(13) Ball Retainer
(14) Ball Guide
(15) Band
(16) Bellows
(17) Band
(18) Band
(19) Bellows
(20) Band
(21) BJ Shaft
(22) Dust Seal

Disassembly

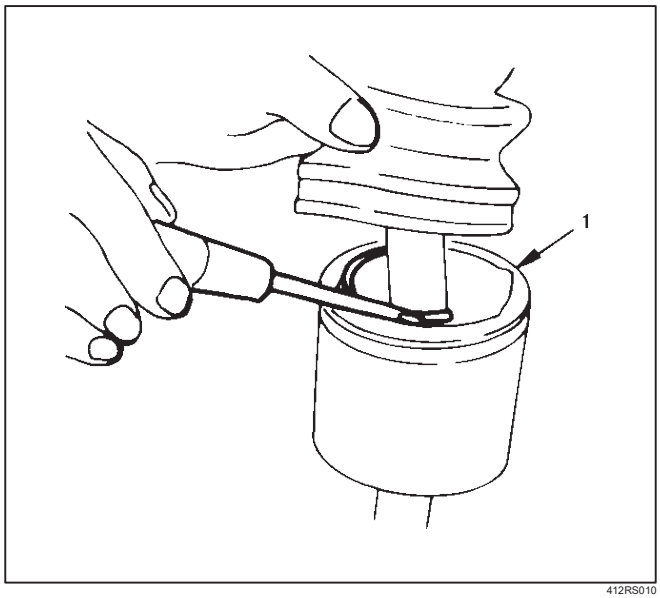
NOTE: For the left side, follow the same steps as right side.

1. Raise the hooked end of the band with a screwdriver or equivalent.



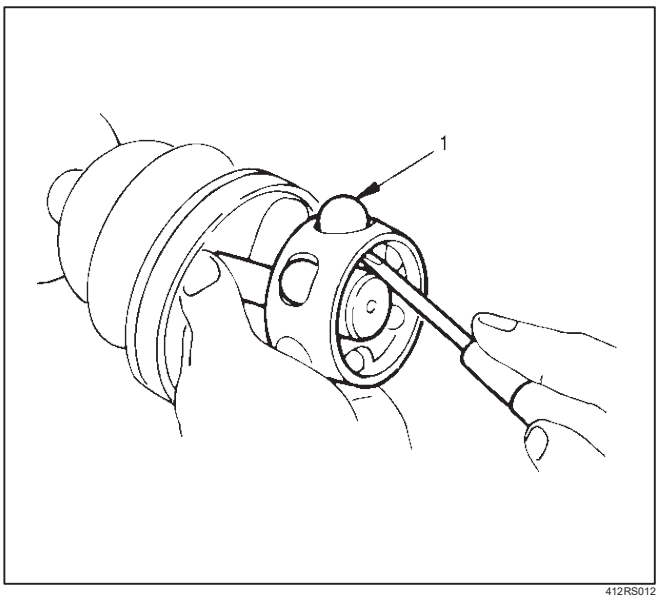
412RS009

2. Remove band(1).
3. Pry off circlip (1) with a screwdriver or equivalent.



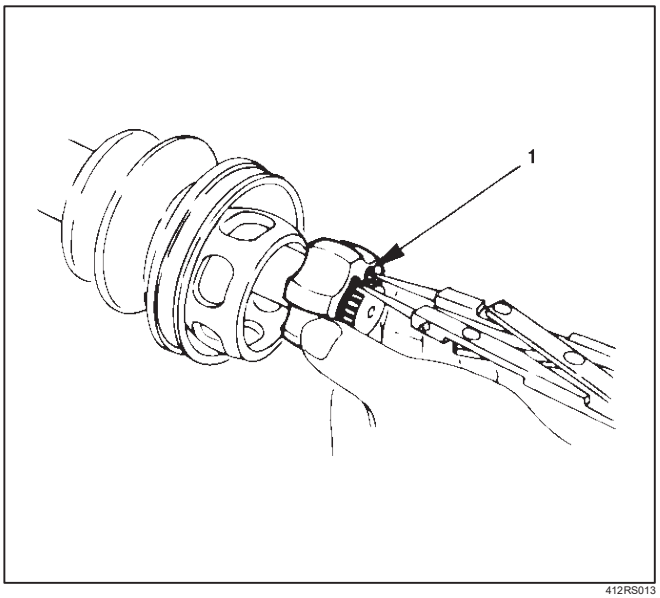
412RS010

4. Remove drive shaft joint assembly.
5. Remove the six balls (1) with a screwdriver or equivalent.



412RS012

6. Using snap ring pliers, remove the snap ring (1) fastening the ball retainer to the center shaft.

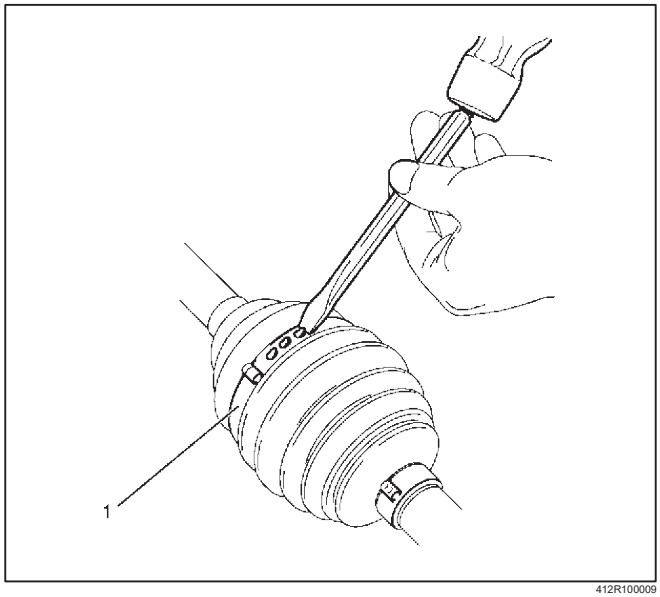


412RS013

7. Remove ball retainer, ball guide and bellows.

8. Use a hammer and chisel to remove the 3 pawls (above the large and small boot bands on the BJ side).

CAUTION: Take care not to damage the bellows during band removal.



412R100009

9. Remove band(1).
10. Remove bellows.
11. Remove dust seal from BJ.
12. Remove BJ shaft assembly.
13. Remove the mounting bracket fixing bolts, and then remove DOJ case assembly from the axle case.
14. Remove snap ring and bearing.
15. Remove snap ring and oil seal.
16. Remove bracket.

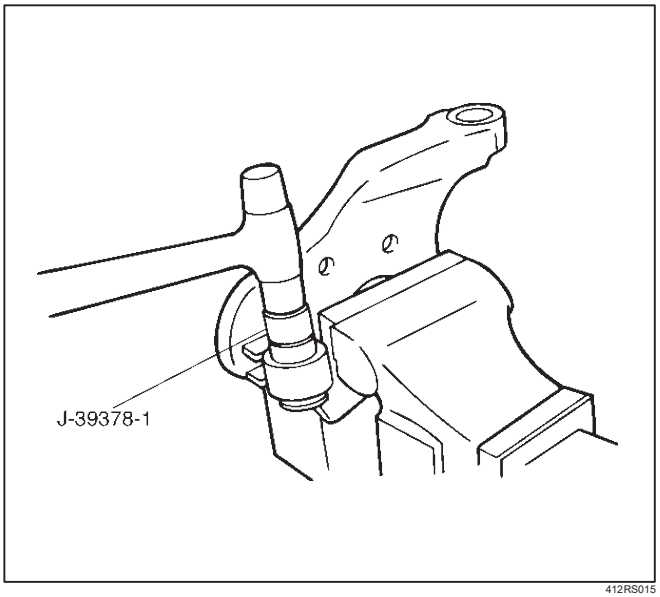
Inspection And Repair

Make necessary correction or parts replacement if wear, damage, corrosion or any other abnormal condition are found through inspection.
Check the following parts.

1. Drive shaft joint assembly
2. DOJ case, ball, ball guide, ball retainer
3. Bellows
4. Bearing
5. Dust seal, oil seal

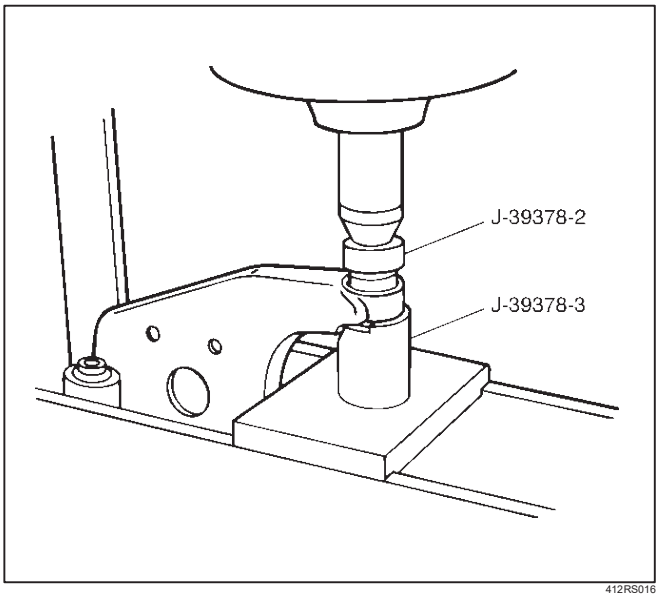
Bushing Replacement

- Remove the bushings using a remover J–39378–1 and hammer.



412RS015

- By using installer J–39378–2 and base J–39378–3, press fit the bushings into the bracket.



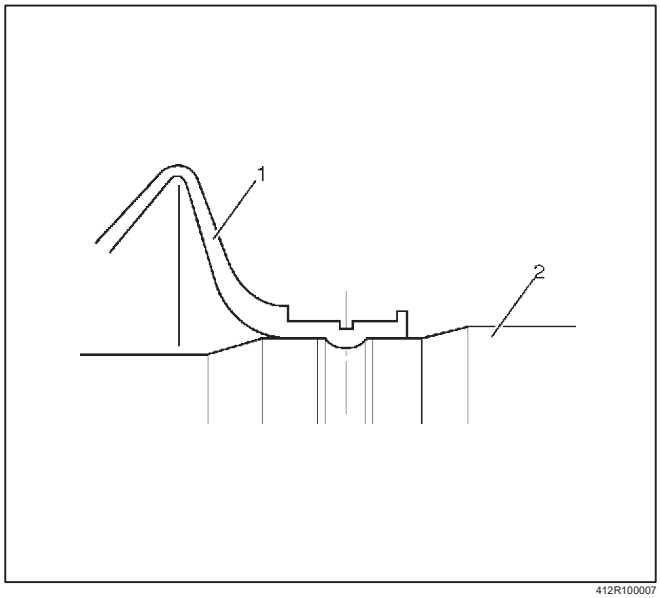
412RS016

Reassembly

1. Install DOJ case to bracket.
2. Install oil seal and fix snap ring.
3. Install bearing and fix snap ring.
4. Install bracket to axle case. Tighten the bracket bolt to the specified torque.

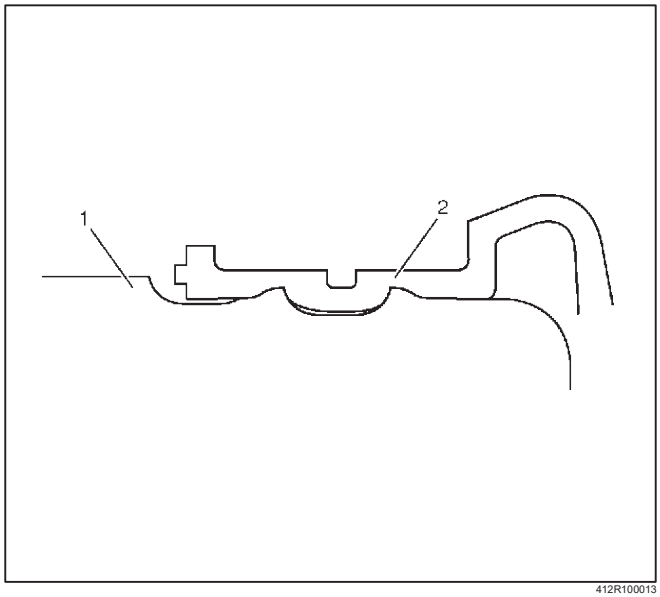
   Torque: 116 N·m (85 lb ft)
5. Apply 150g of the specified grease in BJ.
6. Install dust seal for BJ.
7. Apply a thin coat of grease to the shaft for smooth installation then install bellows.

CAUTION: During bellows assembly, be sure to insert both ends of the bellows into the BJ ASM and shaft grooves.



412R100007

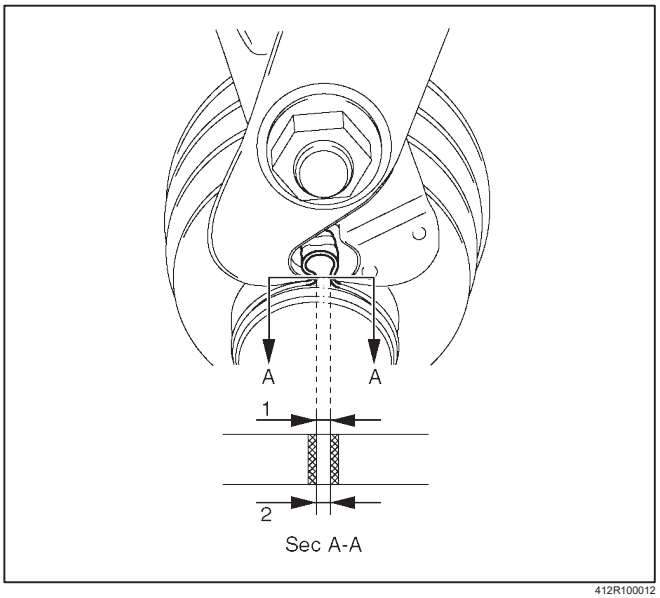
Legend
(1) Bellows
(2) Shaft



412R100013

Legend
(1) BJ ASM
(2) Bellows

8. Install band. Note the setting direction. After installation, check Standard Caulk Measure.Use the special tool pliers J–35910 to caulk the bands to the specified value.

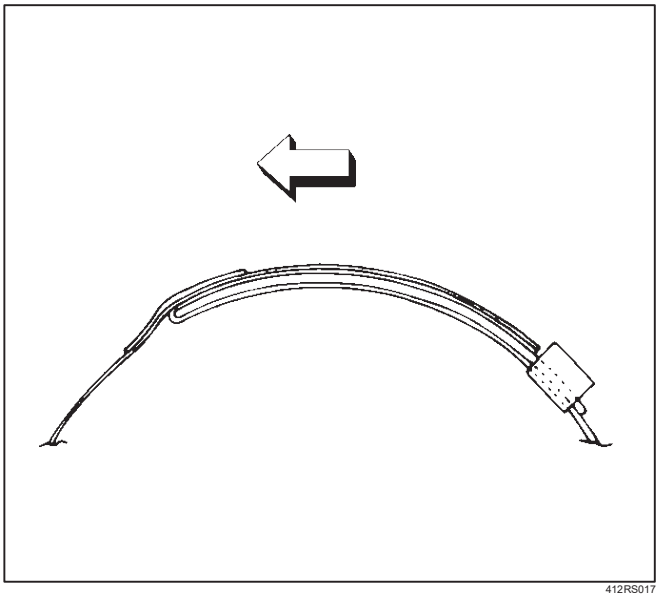


412R100012

Standard Caulk Measure

- 1.2mm (0.05in) <= (1) and (2) <= 4.0mm (0.16in)
- (1) – (2) or (2) – (1) <= 0.4mm (0.016in)

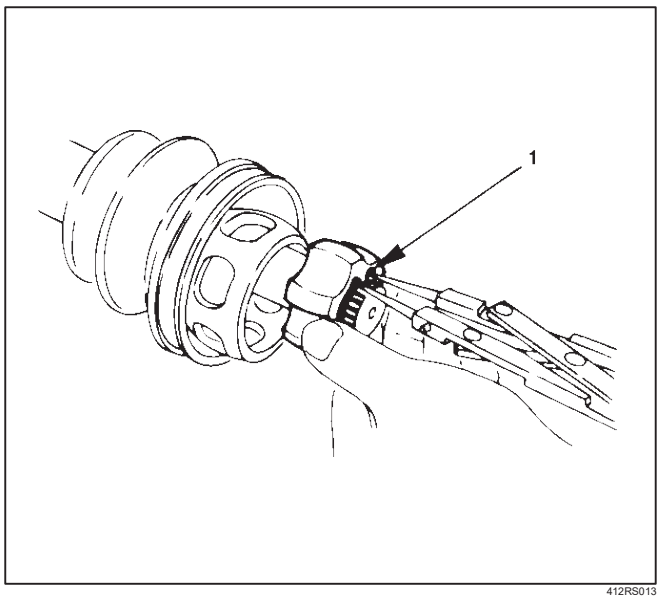
9. Install another bellows and fix band.
10. Install band. Note the setting direction. After installation, check that the bellows is free from distortion. (DOJ SIDE ONLY)



412RS017

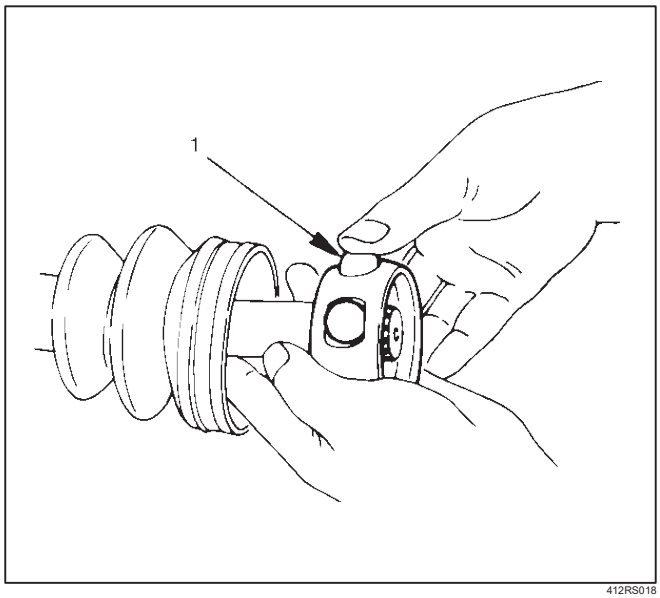
11. Install another bellows and fix band.
12. Install the ball guide with the smaller diameter side ahead onto the shaft.

13. Install ball retainer.
14. Using snap ring pliers, install the snap ring (1) securing the ball retainer to the shaft.



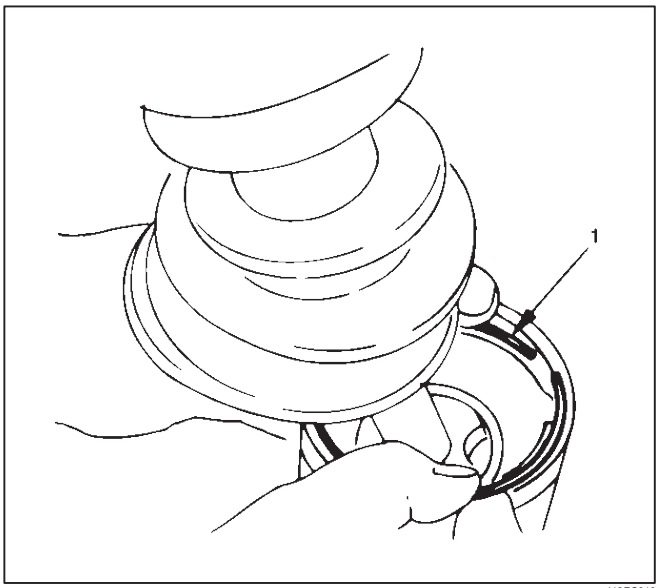
412RS013

15. Align the track on the ball (1) retainer with the window in the cage, and install the six balls into position.

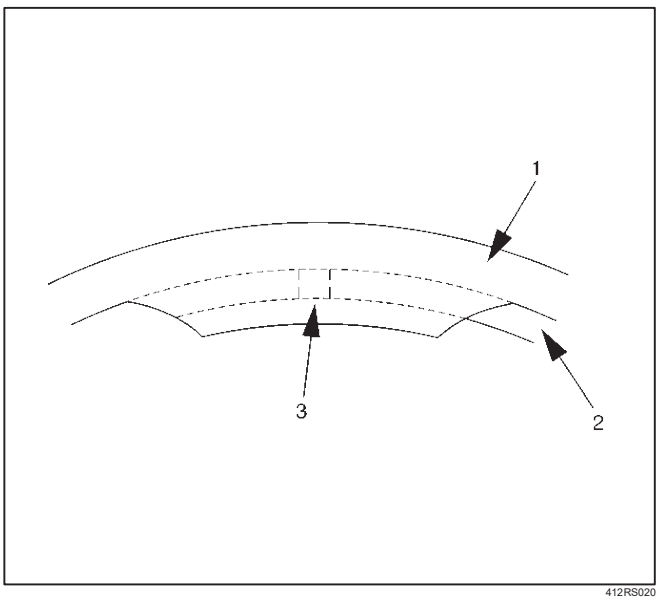


412RS018

16. Pack 150g of the specified grease in DOJ case, then install drive shaft joint assembly. After reassembly, move the DOJ longitudinally several times to get to fit.
17. Install the circlip (1) so that open ends are positioned away from the ball groove.



412RS019

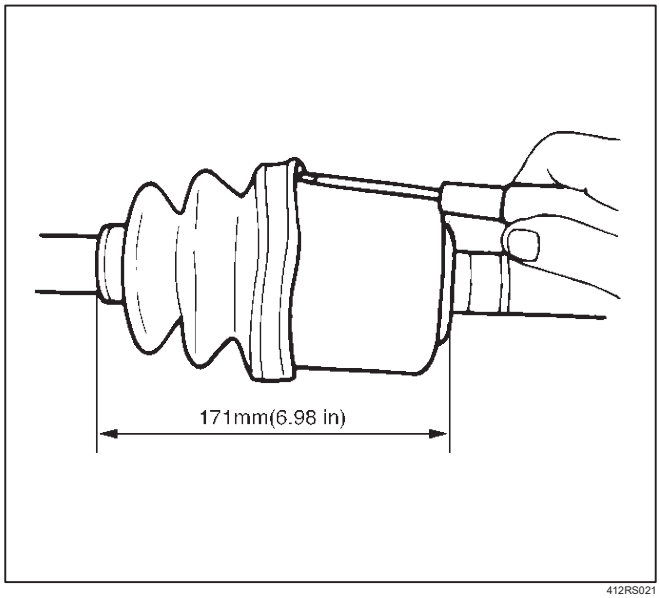


412RS020

Legend

(1) Outer Case
(2) Circlip
(3) Open Ends

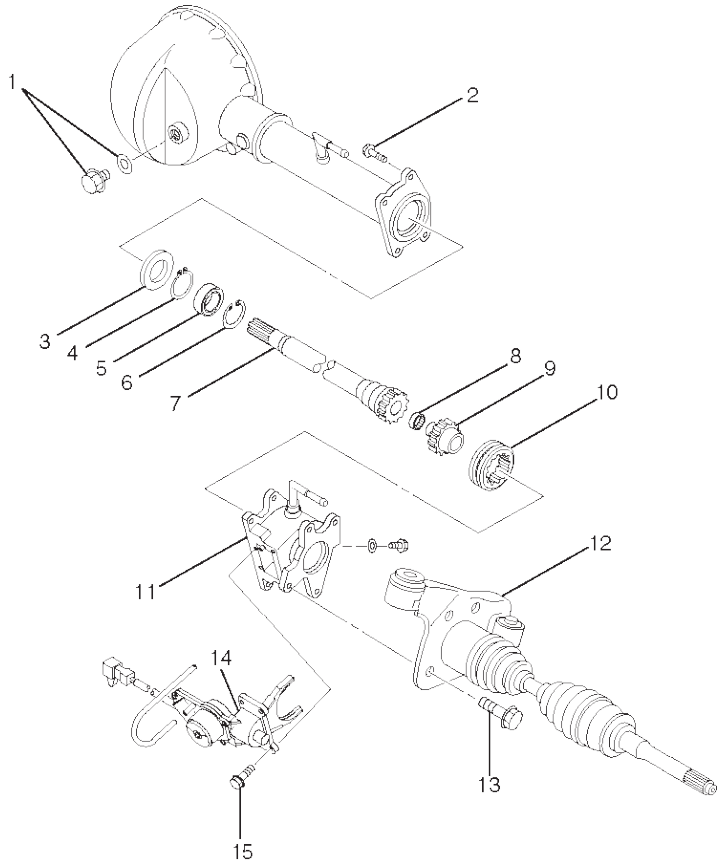
18. Install bellows. Adjust the air pressure within the bellows by inserting a screwdriver or equivalent, so that it equals atmospheric pressure.



19. Install band. After installation, check that the bellows is free from distortion.

Shift On The Fly System

Shift On The Fly System and Associated Parts



412RY00007

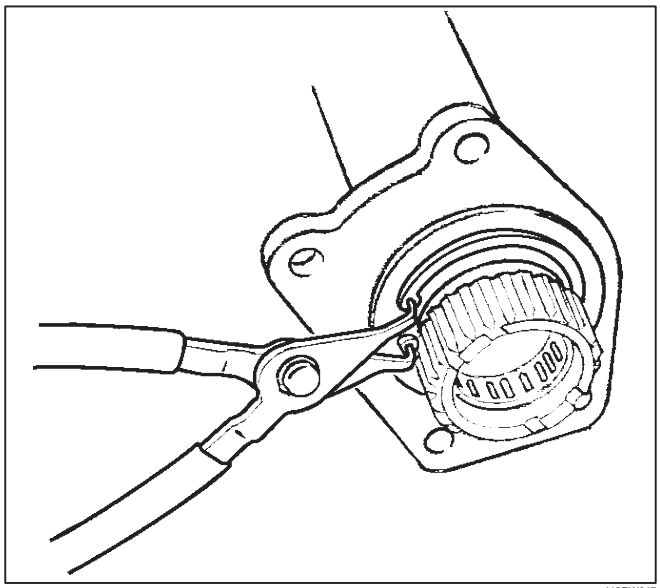
Legend

(1) Filler Plug
(2) Bolt
(3) Oil Seal
(4) Snap Ring(External)
(5) Inner Shaft Bearing
(6) Snap Ring(Internal)
(7) Inner Shaft
(8) Needle Bearing
(9) Clutch Gear
(10) Sleeve
(11) Housing
(12) Front Axle Drive Shaft(LH side) with Bracket
(13) Bolt
(14) Actuator Assembly
(15) Bolt

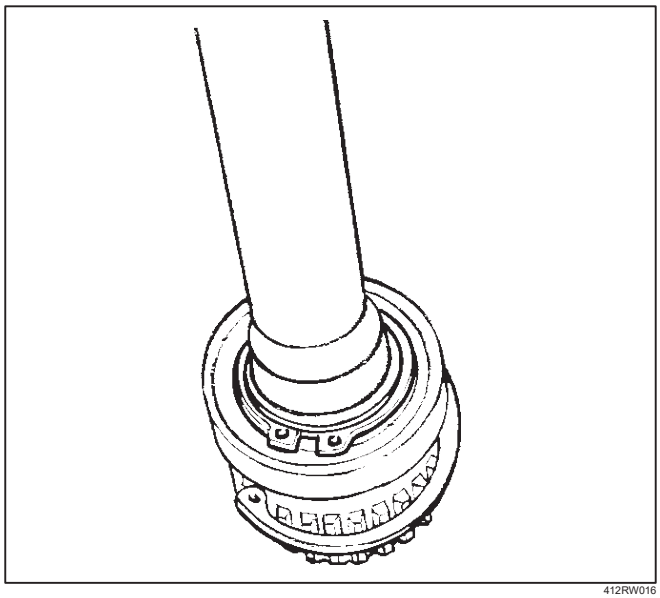
Disassembly

1. Remove filler plug and gasket, drain oil.
2. Loosen mounting bracket fitting bolts and remove front axle drive shaft from front axle case.
3. Remove actuator assembly and draw out actuator ASM.
4. Remove housing.
5. Remove sleeve.
6. Remove clutch gear.

7. Remove snap ring from front axle case by using snap ring pliers.

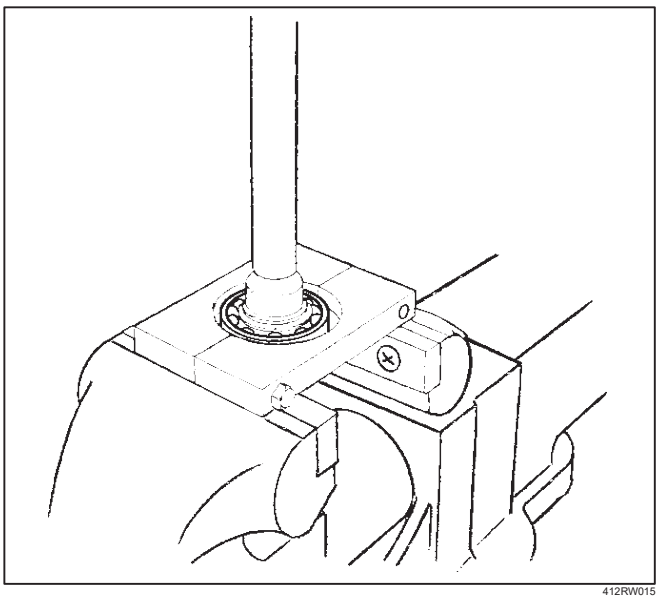

412RW017

8. Take out inner shaft from front axle case.
9. Remove snap ring from inner shaft by using snap ring pliers.

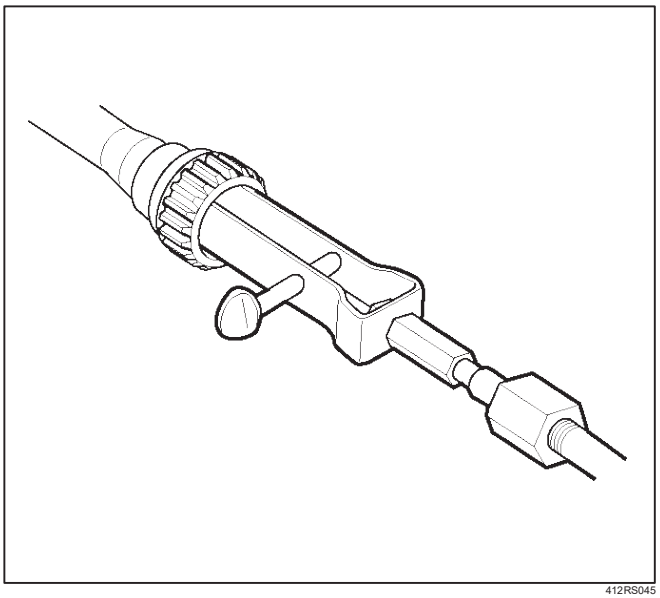

412RW016

10. Remove inner shaft bearing.

NOTE: Be careful not to damage the shaft.


412RW015

11. Remove needle bearing from inner shaft by using a remover J–26941 and sliding hammer J–2619–01.


412RS045

12. Remove oil seal from front axle case.

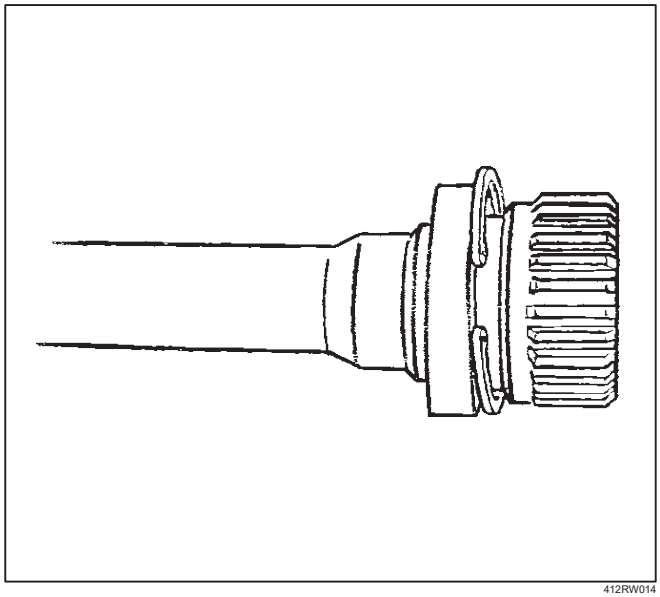
NOTE: Be careful not to damage the front axle case.

Inspection And Repair

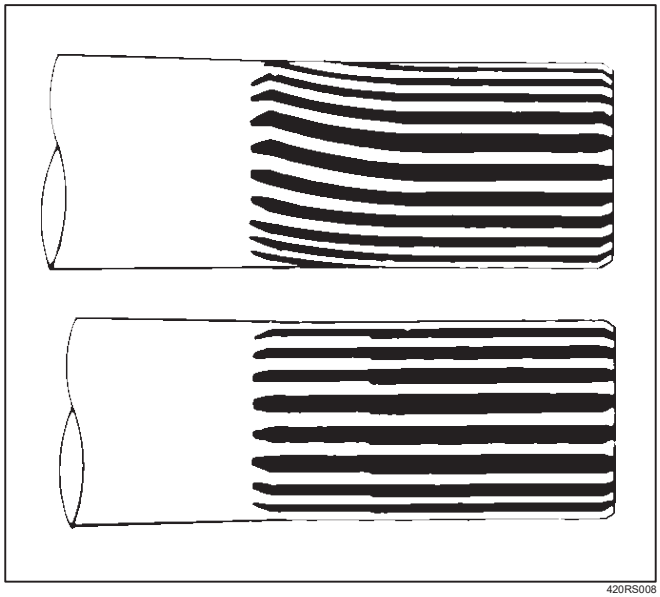
Inspect the removed parts. If there are abnormalities such as wear and damage, take corrective action or replace.

Visual Check

1. Inspect the inner shaft for wear and damage.


412RW014

2. Replace the shaft if any signs of deterioration in the gear is present.

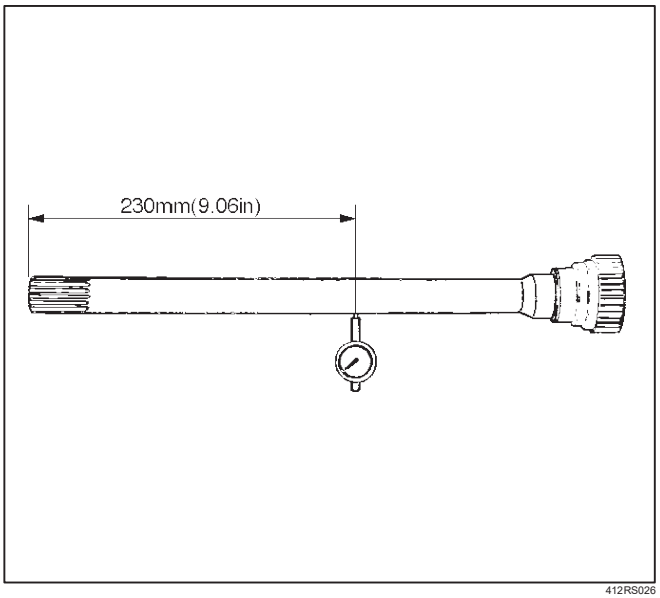

420RS008

Inner Shaft Run–Out

With both end centers supported, rotate the shaft slowly and measure deflection with a dial gauge.

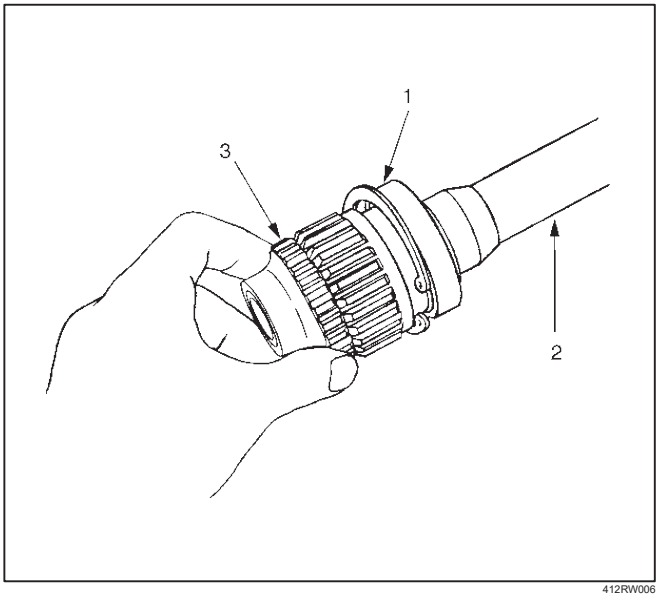
Limit: 0.5 mm (0.02 in)

NOTE: Do not heat the shaft to correct its bend.



412RS026

Inner Shaft Bearing



412RW006

Legend

(1) Inner Shaft Bearing
(2) Inner Shaft
(3) Clutch Gear

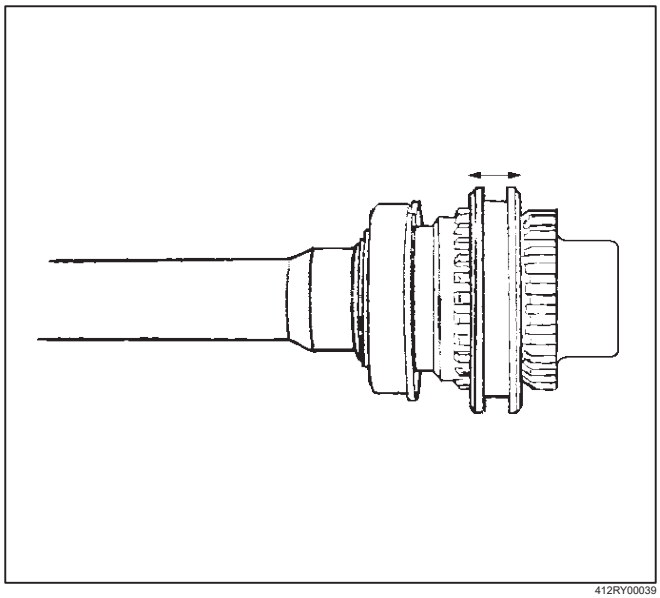
1. Inspect the inner shaft bearing for any signs of deterioration, replace if uneven.
2. Insert the clutch gear and inspect the needle bearing.
3. Replace the needle bearing if found to be uneven.

Sleeve Condition

Check for wear damage, or cracking in the sleeve.

NOTE: Close inspection of the groove and inner gear are required because those are important parts.

Sleeve Function

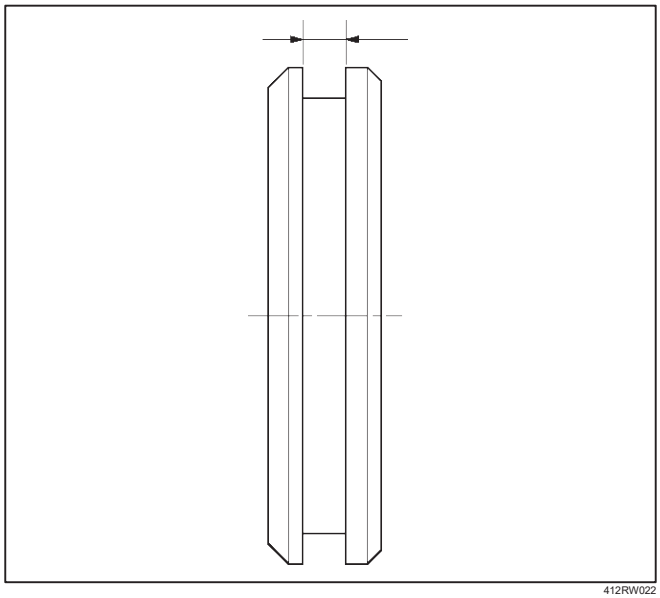

412RY00039

Test the sleeve for smoothness by sliding it between the inner shaft and the clutch gear, replace the sleeve if its difficult to slide.

NOTE: Gear oil should be applied to the contact surface of gear.

Check the width of sleeve center groove.

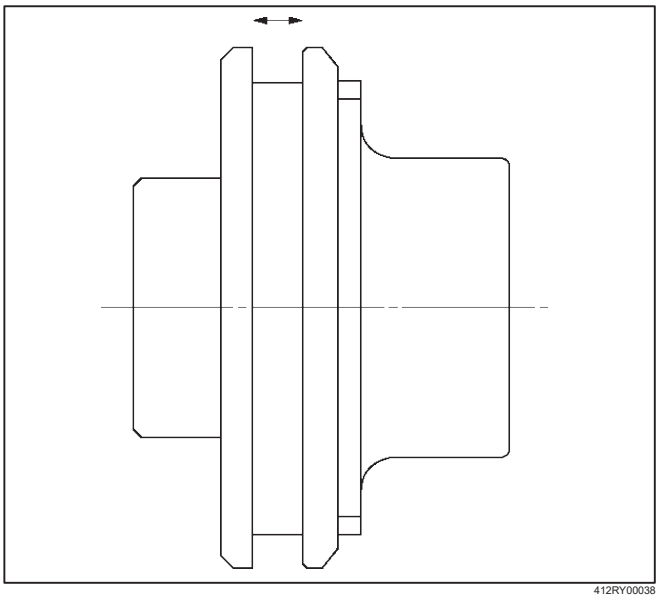
Limit: 7.1 mm (0.28 in)


412RW022

Clutch Gear Condition

Check for wear, damage, crack or any other deterioration in the clutch gear.

Clutch Gear Function


412RY00038

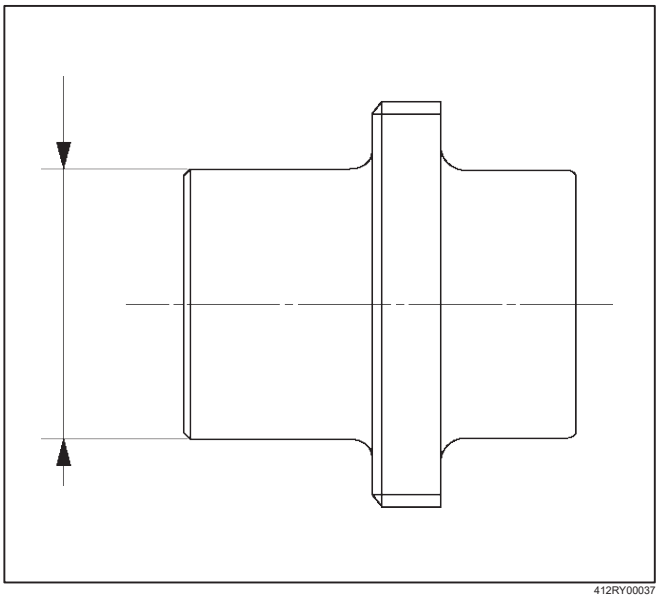
Test the sleeve for smoothness by sliding it across the clutch gear, replace the clutch gear if its difficult to slide.

NOTE: When inspecting, gear oil should be applied to the contact surface of gear.

Clutch Gear Journal Diameter

Make sure of the size illustrated.

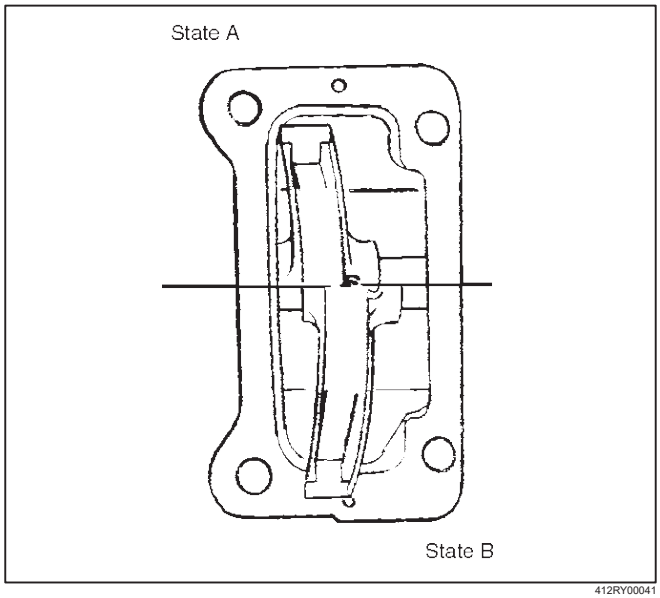
Limit: 36.98 mm (1.456 in)


412RY00037

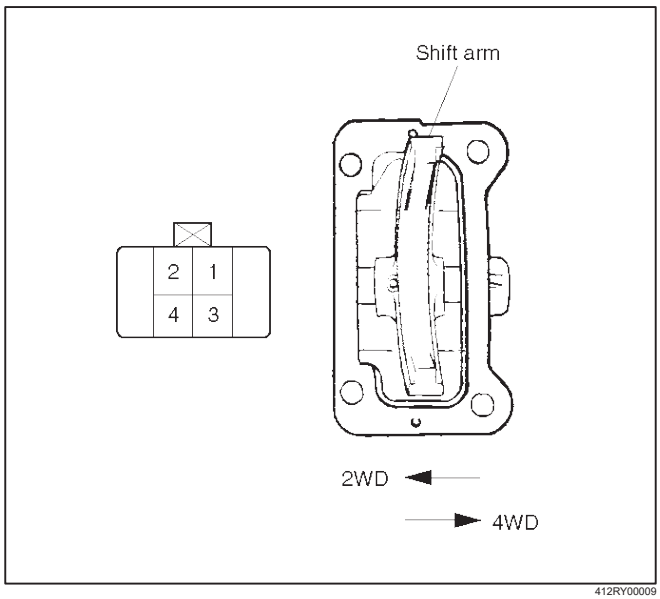
Actuator

Check for damage, cracking, or other abnormality.

Functional Check



412RY00041



412RY00009

Verify functionality by applying voltage (12V) to terminals 3 and 4 and set the tester to terminal 1 and 2 according to the table bellow.

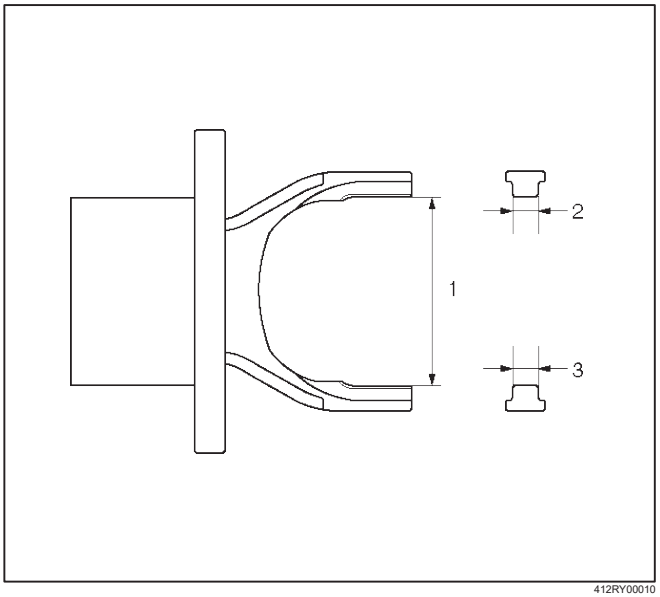
State	Trminal 3	Trminal 4	Electric circuit between terminal 1 & 2	Function
A	+12V	Ground	OK	2WD
B	Ground	+12V	NONE	4WD

If there is an abnormality, replace the actuator as an assembly.

NOTE: Be careful not to permit the entry of water or dust into of the actuator.

Dimentional Check

Measure illustrated sizes 1, 2, and 3.



412RY00010

Limit

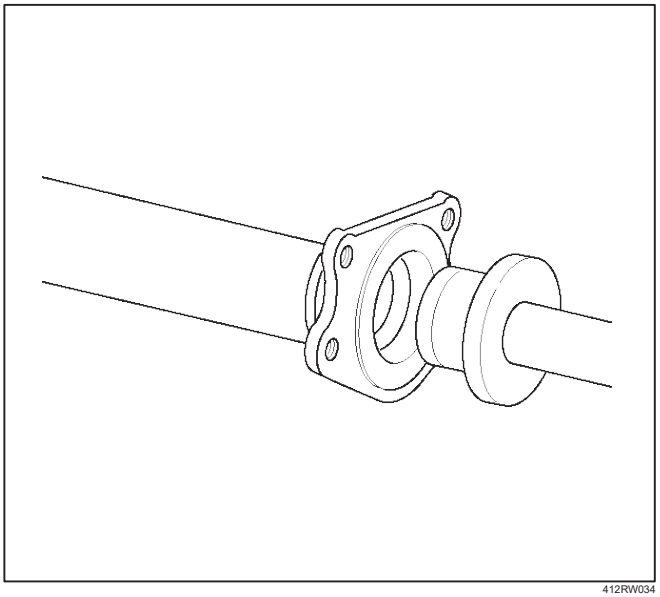
1=64.3 mm (2.53 in)

2=6.7 mm (0.26 in)

3=6.7 mm (0.26 in)

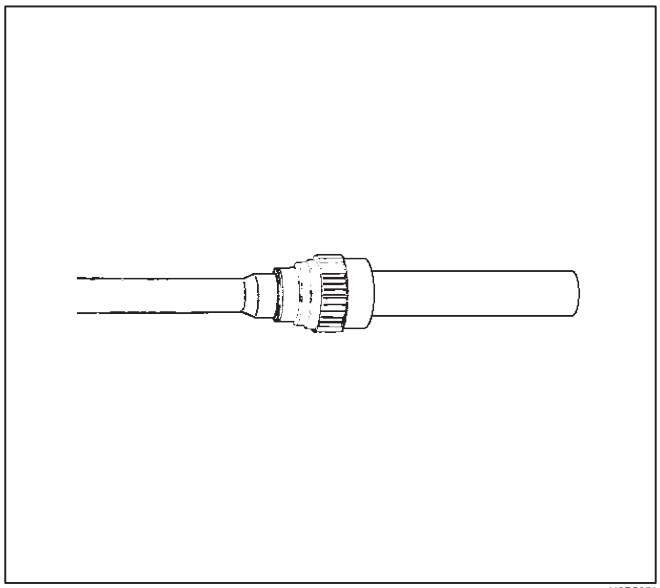
Reassembly

1. Install the new oil seal which has been immersed in differential gear oil, by using an oil seal installer J–41693 and grip J–8092.

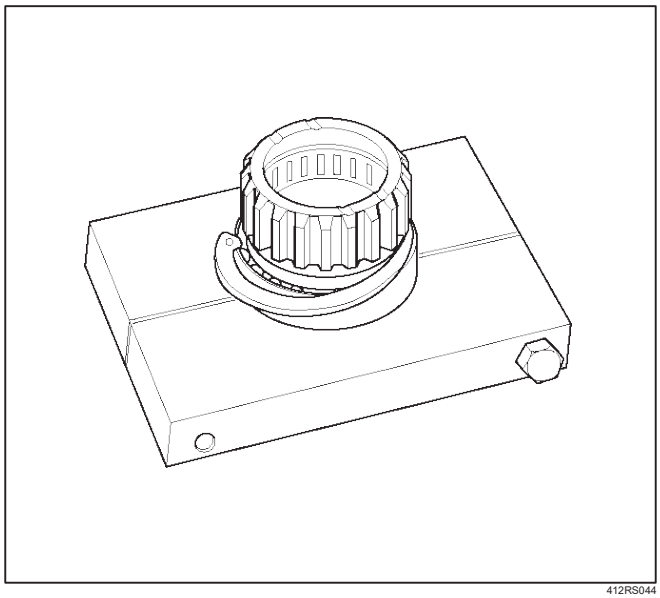


412RW034

2. Install a new needle bearing into inner shaft by using a Installer J–41694 and grip J–8092.


412RS051

3. Place a new snap ring(internal) in inner shaft.
   Install a new inner shaft bearing into the inner shaft.


412RS044

4. Install snap ring(external).

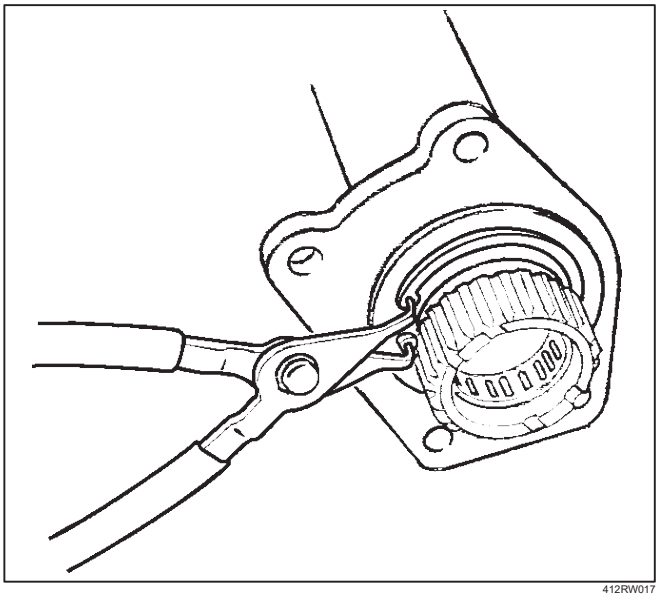
NOTE: Be careful not to damage the inner shaft.

5. Clean the housing contact surface of the front axle case and insert inner shaft assembly into the front axle case.

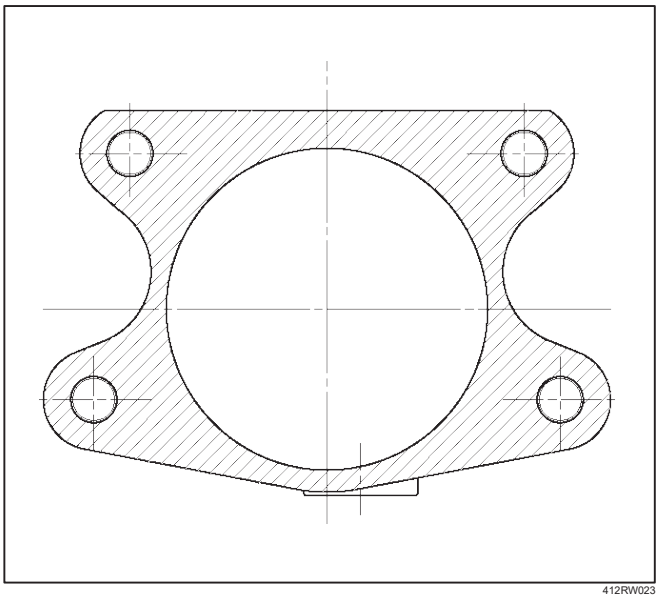
NOTE: Be careful not to damage seal.

6. Install snap ring internal in the groove of front axle case.

NOTE: Be sure to install the snap ring properly.


412RW017

7. Apply differential gear oil to clutch gear, then install clutch gear.
8. Apply differential gear oil to sleeve, then install sleeve.
9. Clean contact surface with the front axle and actuator mounting surface. Apply liquid gasket to the contact surface on the front axle case, then install in the housing.


412RW023

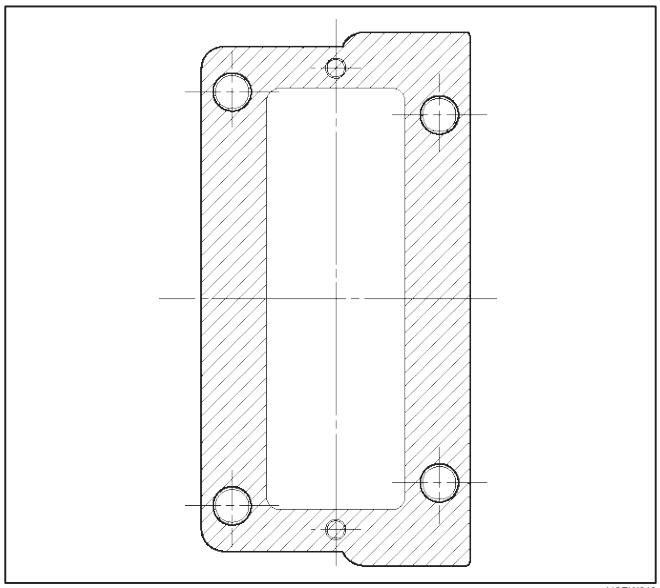
10. Tighten bolts to specified torque.

    Torque: 75N·m(55 lb ft)

11. Clean the actuator contact surface with the housing then Install and tighten shift position switch to the specified torque.

    Torque: 39N·m (29 lb ft)

12. Apply liquid gasket to the contact surface on the actuator side.


412RW012

13. Align shift arm with the groove of sleeve and install the actuator.
14. Tighten bolts to specified torque.

    Torque: 9N·m(78 lb in)
15. Install front axle drive shaft and mounting bracket. Tighten fitting bolts to specified torque.

    Torque: 116N·m (85 lb ft)
16. Pour specified amount of differential gear oil to filler plug.

    Front Differential

    Oil Capacity: 1.25lit (1.32US qt)

    Actuator Housing

    Oil Capacity: 0.12lit(0.13US qt)
17. Install filler plug through gasket and tighten to specified torque.

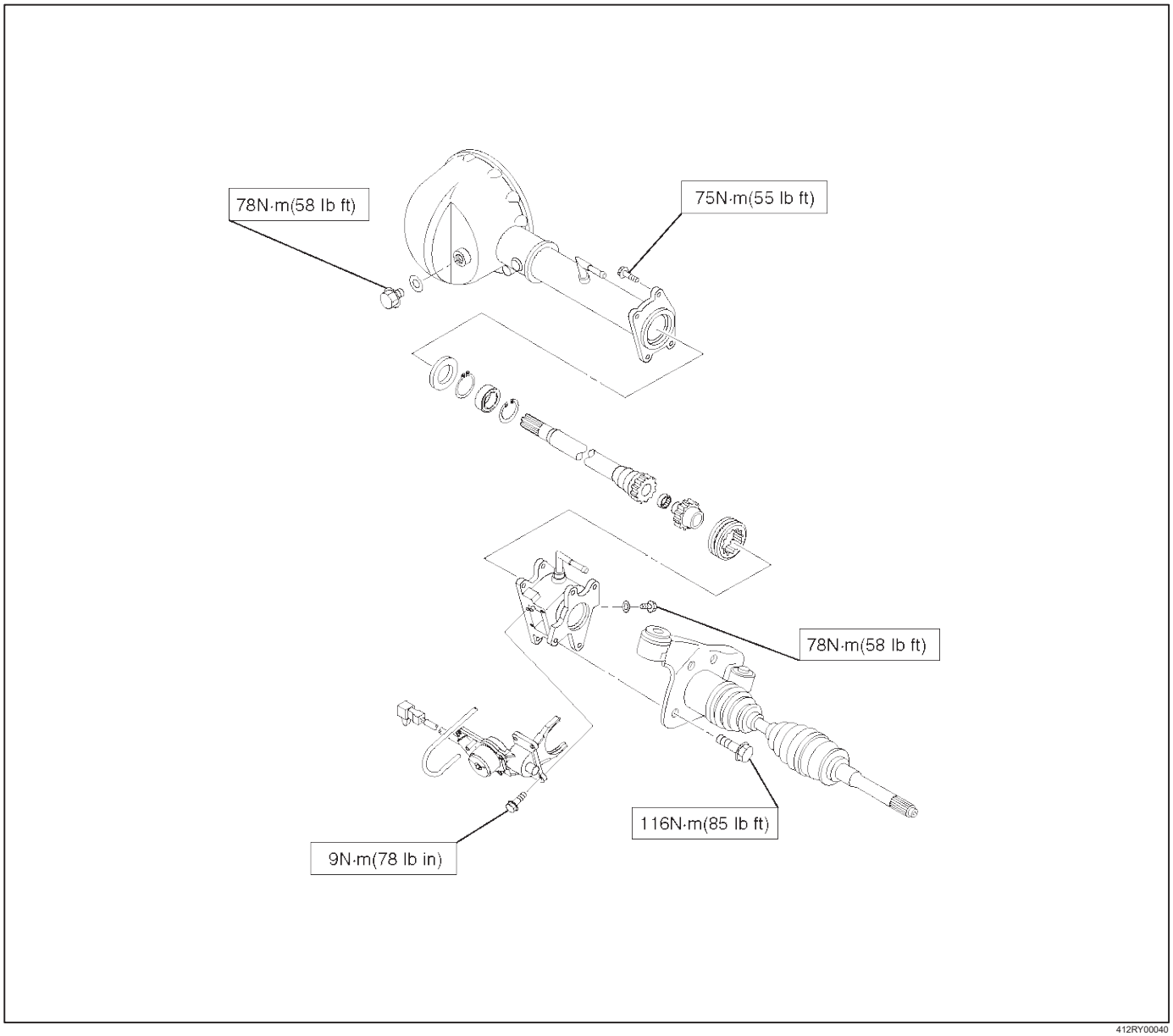
    Torque: 78N·m (58lb ft)

Main Data and Specifications

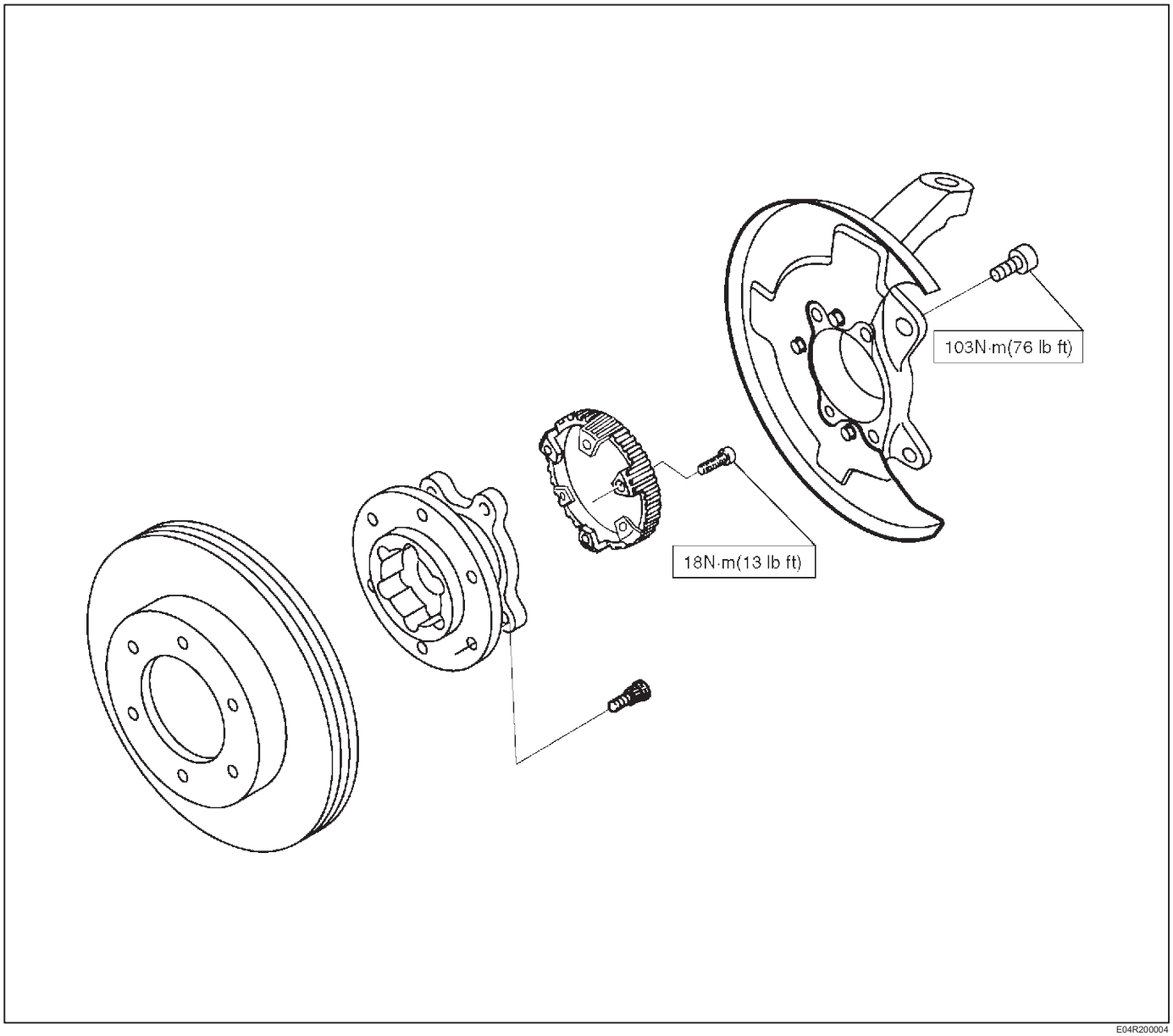
General Specifications

Front drive axle oil capacity	1.25 liter (1.32 US qt)(Differential)
	0.12 liter (0.13 US qt)(Actuator Housing:Shift on the fly)
Type of lubricant	GL–5 (75W–90) Refer to *chart in General Information*
Axle shaft type	Constant velocity joint(Birfield joint type and double offset joint)

Torque Specifications



412RY00040



E04R200004

Special Tools

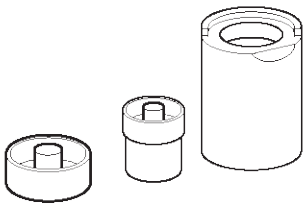
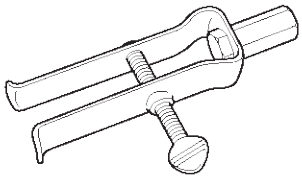
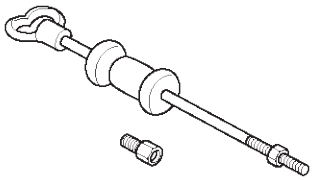
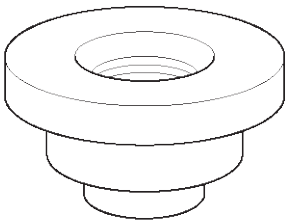
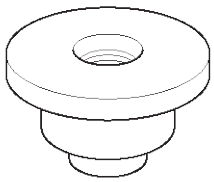
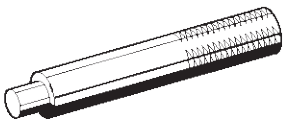
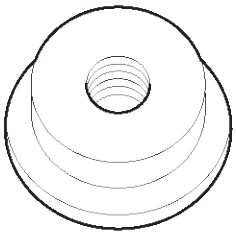
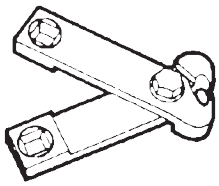
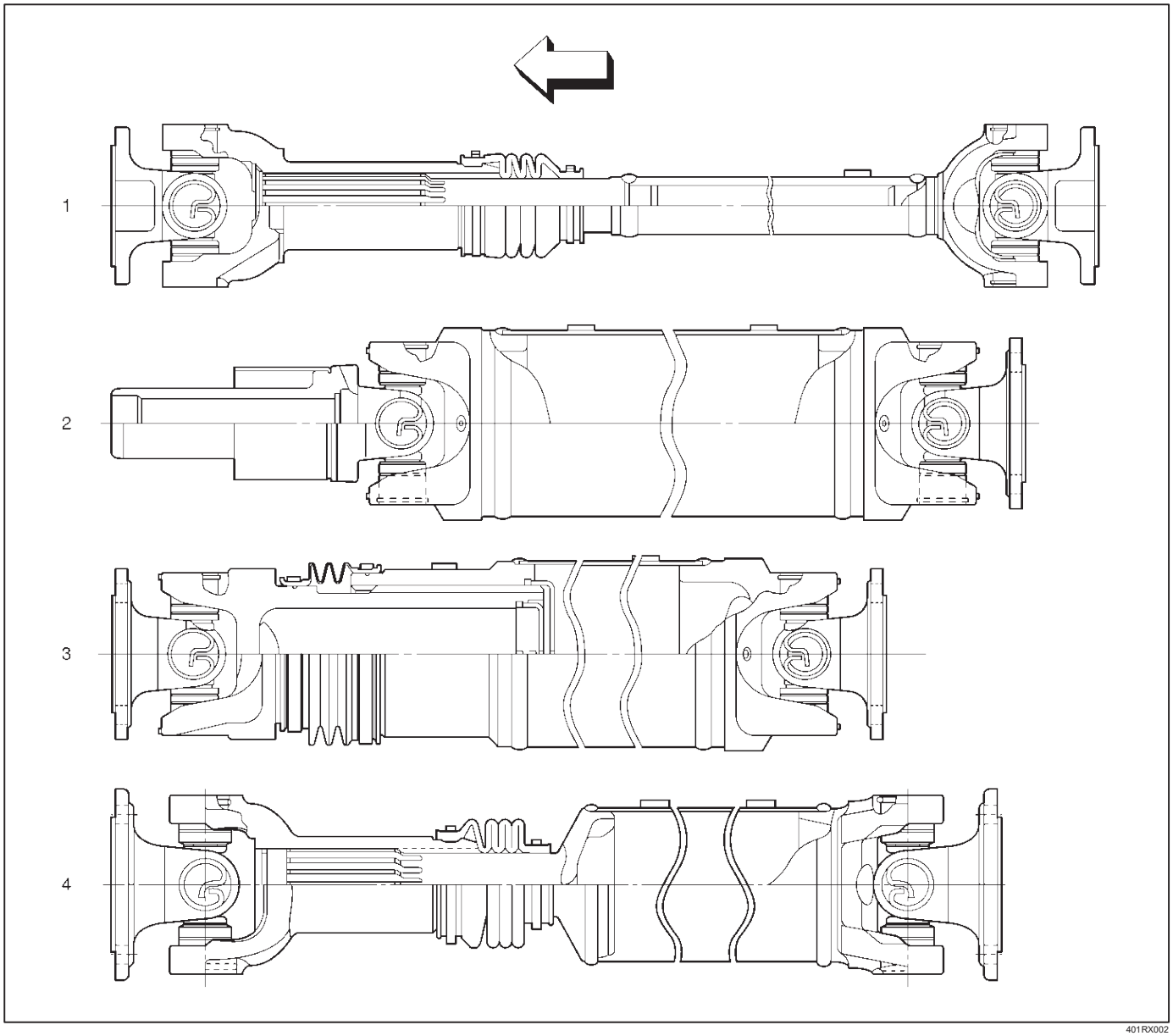
ILLUSTRATION	TOOL NO. TOOL NAME
 901RS233	**J–39378** Remover and Installer; Front Axle mount bushing
 901RS234	**J– 26941** Remover; Bearing needle
 901RS235	**J–2619–01** Hammer; Sliding
 901RS236	**J–41693** Installer; Oil seal
 901RS177	**J–41694** Installer; Bearing needle
 901RS285	**J–8092** Grip

ILLUSTRATION	TOOL NO. TOOL NAME
 901RS249	**J–36830** Installer; Oil seal
 588402745D	**J–35910** Pliers; Band bellows, drive shaft

Propeller Shaft

General Description



401RX002

Legend

(1) Front Propeller Shaft
(2) Rear Propeller Shaft;
Aluminum Tube with Spline Yoke Type
(3) Rear Propeller Shaft;
Aluminum Tube with Flange Yoke Type
(4) Rear Propeller Shaft;
Steel Tube Type (for 4×4, 6VD1, A/T model)

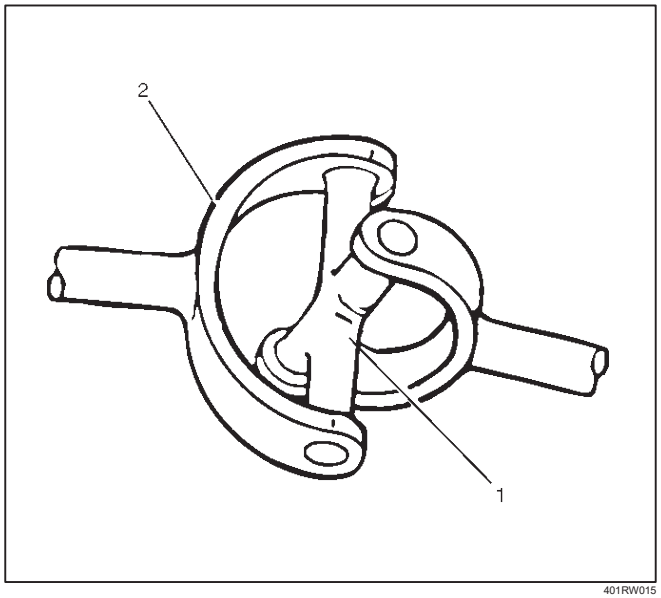
Torque is transmitted from the transmission to the axle through the propeller shaft and universal joint assembles. All propeller shafts are the balanced tubular type. A splined slip joint is provided in some drivelines.

- Since the propeller shaft is balanced carefully, welding or any other modification is not permitted.
- Alignment marks should be applied to each propeller shaft before removal.
- Park, turn the engine off and apply the parking brake to secure the vehicle.
- Carefully attach the propeller shaft to the vise, do not overtighten the vise when securing the propeller shaft, this may cause deformation.

Phasing

The propeller shaft is designed and built with the yoke lugs (ears) in line with each other. This design produces the smoothest running shaft possible, called phasing.Vibration can be caused by an out–of–phase propeller shaft.The propeller shaft will absorb vibrations from speeding up and slowing down each time the universal joint spins.This vibration would be the same as a person snapping a rope and watching the ”wave” reaction flow to the end.A propeller shaft working in phase would be similar to two persons snapping a rope at the same time, and watching the ”waves” meet and cancel each other out.In comparison, this would be the same as the universal joints on a propeller shaft.A total cancellation of vibration produces a smooth flow of power in the driveline.It is very important to apply a reference mark to the propeller shaft before removal, to assure installation alignment.

Universal Joint



401RW015

Legend

(1) Spider
(2) Yoke

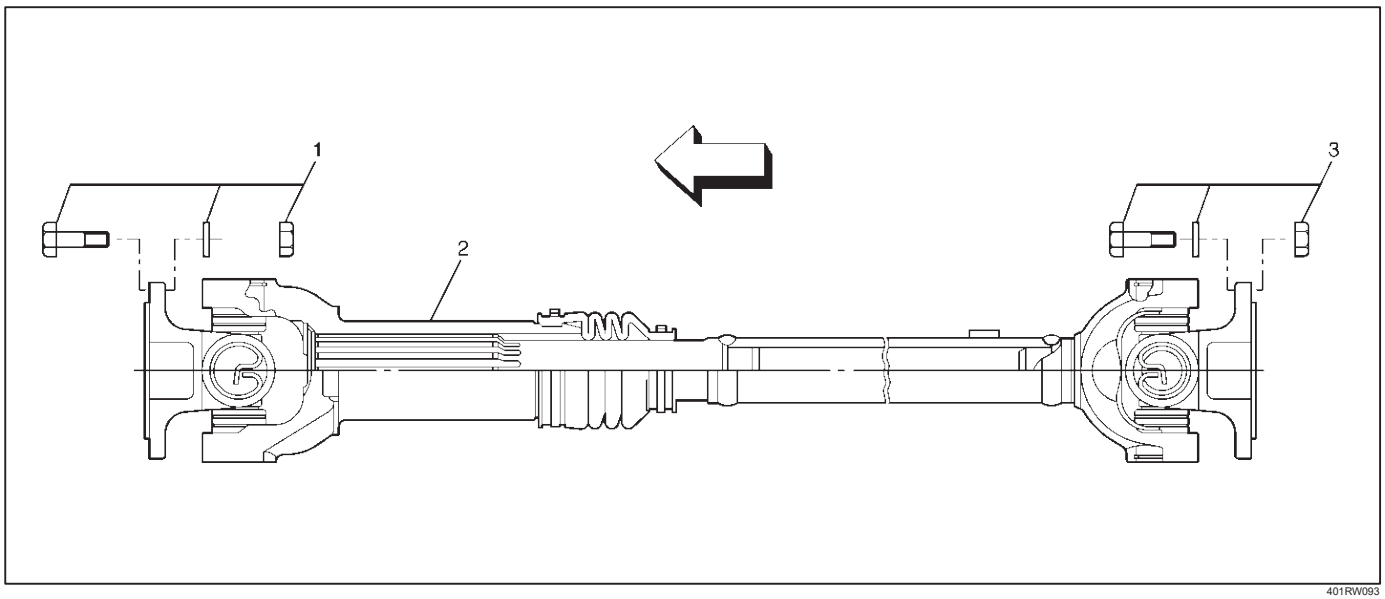
A universal joint consists of two Y-shaped yokes connected by a crossmember called a spider.
The spider is shaped like a cross. Universal joints are designed to handle the effects of various loadings and front or rear axle windup during acceleration. Within the designed angle variations, the universal joint will operate efficiently and safely. When the design angle is changed or exceeded the operational life of the joint may decrease.
The bearings used in universal joints are of the needle roller type. The needle rollers are held in place on the trunnions by round bearing cups. The bearing cups are held in the yokes by snap rings.

Diagnosis of Propeller Shaft and Universal Joint

Condition	Possible cause	Correction
Universal Joint Noise.	Worn universal joint bearings.	Replace.
	Improper lubrication.	Lubricate as directed.
	Loose flange bolts.	Tighten to specifications.
Ping, Snap, or Click in Drive Line (Usually Heard on Initial Load after the Transmission is in Forward or Reverse Gear)	Loose bushing bolts on the rear springs or upper and lower control arms.	Tighten the bolts to specified torque.
	Loose or out-of-phase end yoke.	Remove end yoke, turn 180 degrees from its original position, lubricate the splines and reinstall. Tighten the bolts and pinion nut to specified torque.
Knocking or Clanking Noise in the Driveline when in High or Neutral Gear at 16km/h(10mph)	Worn or damaged universal joint	Replace the universal joint.
Squeak	Lack of lubricant.	Lubricate joints and splines. Also check for worn or brinelled parts.
Shudder on Acceleration (Low Speed)	Loose or missing bolts at the flanges.	Replace or tighten bolts to specified torque.
	Incorrectly set front joint angle.	Install shim under the transmission support mount to change the front joint angle.
	Worn universal joint.	Replace.
Vibration	Incorrect shaft runout.	Replace.
	Shaft out of balance.	Adjust.
	Transmission rear housing bushing, transfer case housing bushing worn.	Replace.
	Yoke spline jammed.	Replace.
Excessive Leak at the Front Spline Yoke of Rear Propeller Shaft	Rough surface on splined yoke; burred nicked or worn.	Replace the seal. Minor burrs can be Smoothed by careful use of crocus cloth or fine stone honing. Replace the yoke if badly burred.
	Defective transmission rear oil seal.	Replace the transmission rear oil seal and replenish the transmission oil.

Front Propeller Shaft

Front Propeller Shaft and Associated Parts

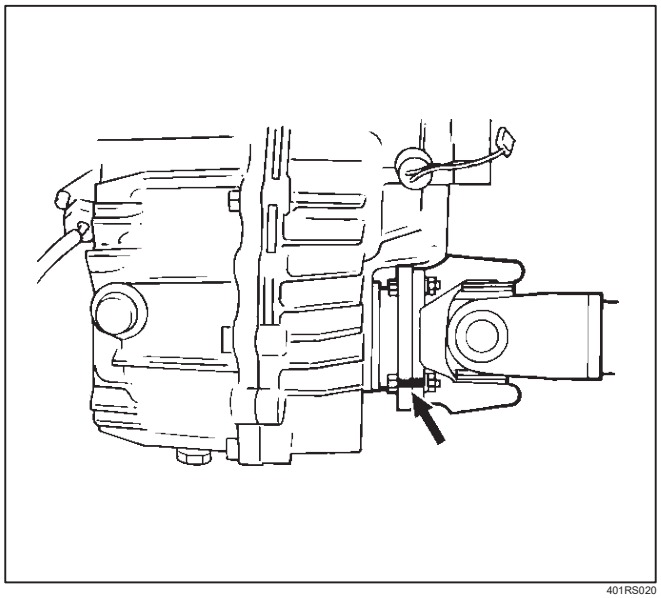


Legend
(1) Bolt, Nut and Washer (Front Axle Side)
(2) Front Propeller Shaft
(3) Bolt, Nut and Washer (Transfer Side)

Removal

1. Raise the vehicle on a hoist.

NOTE: Apply alignment marks on the flange at the front propeller shaft both front and rear side.



2. Remove bolt, nut and washer (Front axle side).
3. Remove bolt, nut and washer (Transfer side).
4. Remove front propeller shaft.

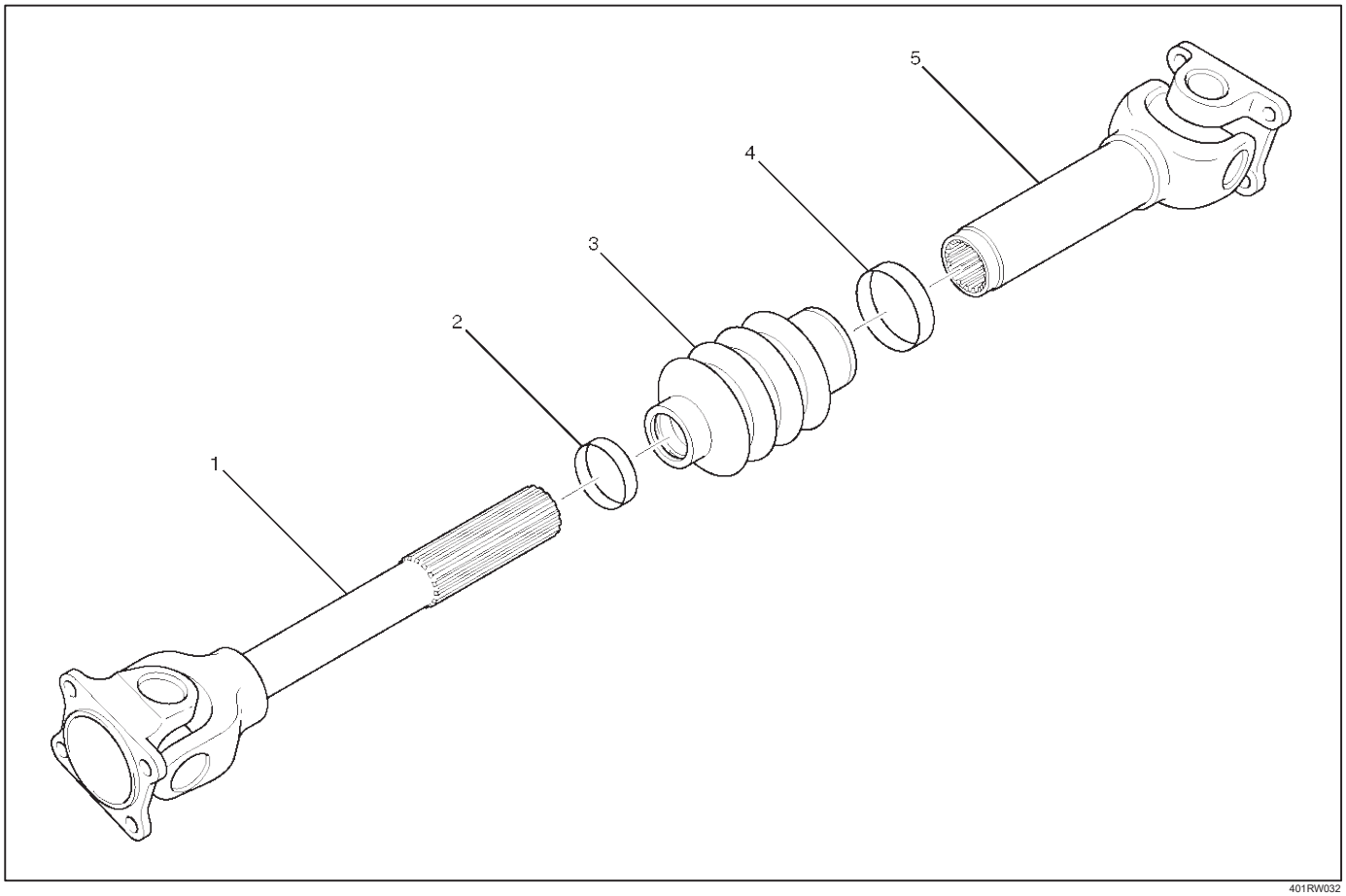
Installation

NOTE: Never install the shaft assembly backwards. Never insert bar between yoke lugs when tightening or removing bolts. Completely remove the black paint from the connecting surface of flange coupling on each end of propeller shaft. Clean so that no foreign matter will be caught in between.

1. Align the mark which is applied at removal. Install front propeller shaft and tighten the bolts to the specified torque.

Torque: 63 N·m (46 lb ft)

Disassembly

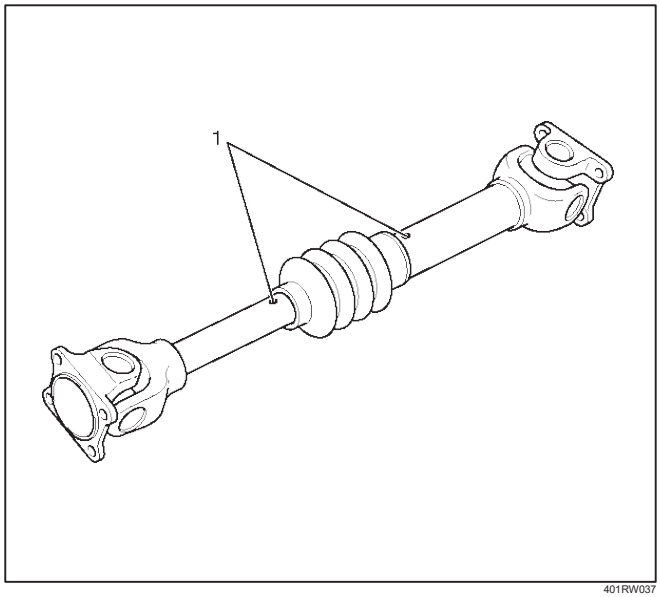


401RW032

Legend

(1) Sleeve Yoke
(2) Clamp
(3) Boot
(4) Clamp
(5) Tube Assembly

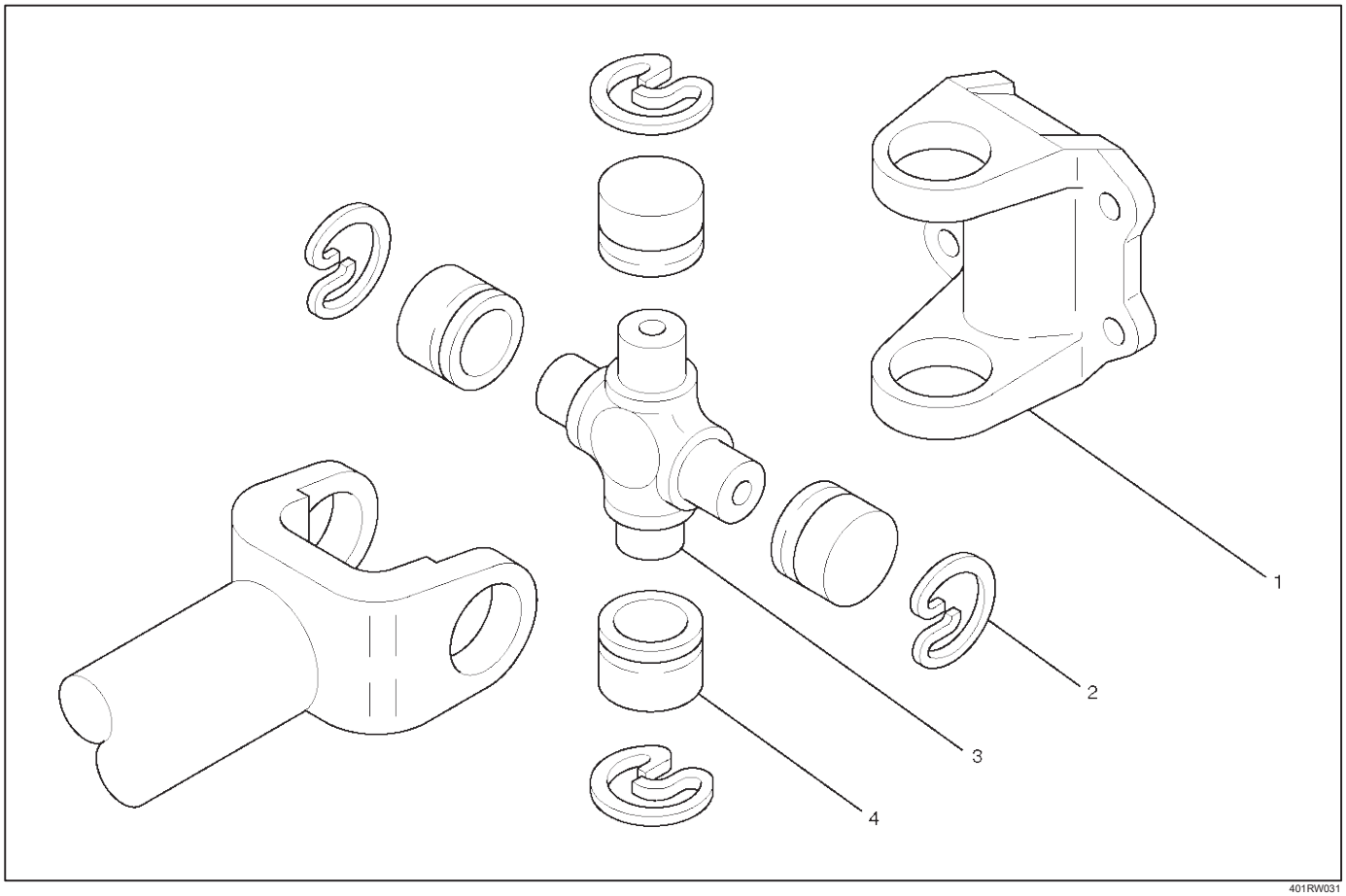
1. Lay the shaft horizontally on a bench and secure.
2. Indicate the original assembled position (1) by marking the phasing of the shaft prior to disassembly.



401RW037

3. Using the flat blade of a screwdriver, pry the loose end of the boot clamp upwards and away from the propeller shaft boot. Be careful not to damage the boot.
4. When boot clamps becomes loose, remove by hand.
5. Repeat for the other boot clamp.
6. Remove the slip yoke assembly from the driveshaft, by securing the boot with one hand and pulling on the slip yoke.
7. Remove the boot from the shaft assembly.

Universal Joint Disassembly

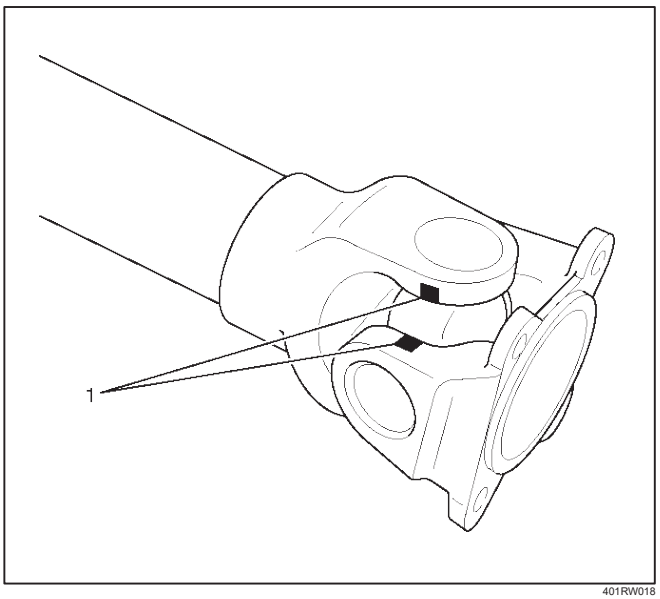


401RW031

Legend

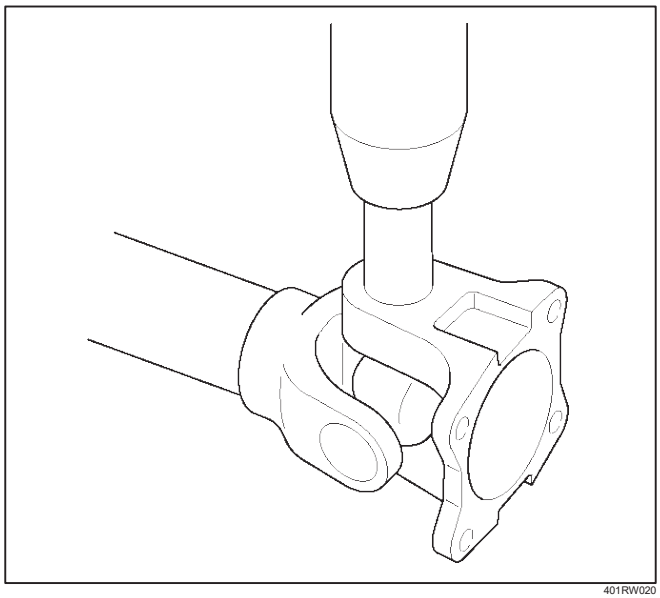
(1) Flange Yoke
(2) Snap Ring
(3) Spider
(4) Needle Roller Bearing

1. Using a soft drift, tap the outside of the bearing cup assembly to loosen snap ring. Tap bearing only hard enough to break assembly away from snap ring.
   Remove snap ring from yoke. Turn joint over, tap bearing away from snap ring, then remove opposite snap ring.
   Apply alignment marks (1) on the yokes of the universal joint, then remove snap ring.



401RW018

2. Set the yoke in the arbor press with a piece of tube stock beneath it.
   Place a solid plug on the upper bearing assembly and press it through to release the lower bearing assembly.


401RW020

3. If the bearing assembly will not pull out by hand after pressing, tap the base of the lug near the bearing assembly to dislodge it.
4. To remove the opposite bearing, turn the yoke over and straighten the spider in the open hole. Then carefully press on the end of the spider so the remaining bearing moves straight out of the bearing spider hole. If the spider or bearing are cocked, the bearing will score the walls of the spider hole and ruin the yoke.
5. Repeat this procedure on the remaining bearing to remove the spider from the yoke.
6. Make sure of proper position for reinstallation by applying setting marks, then remove spider .

Inspection and Repair

Make necessary correction or parts replacement if wear, damage, corrosion or any other abnormal condition is found through inspection.

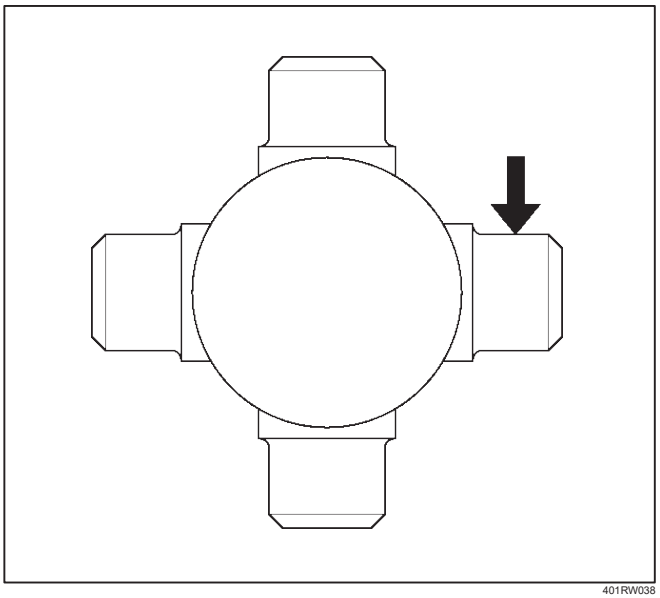
NOTE: When any part of the journal assembly (spider, needle roller bearing) requires replacement, be sure to replace the entire assembly.

Check the following parts for wear, damage, noise or any other abnormal conditions.

1. Spider
2. Needle roller bearing
3. Yoke
4. Flange
5. Boot

Spider pin for wear

Spider pin should be smooth and free from fretting or galling. Visible signs of needle presence is normal, but wear should not be felt.


401RW038

Propeller shaft run–out

Support the propeller shaft on V-blocks (2) and check for run-out by holding the probe of a dial indicator (1) in contact with the shaft.

Static run-out limit:

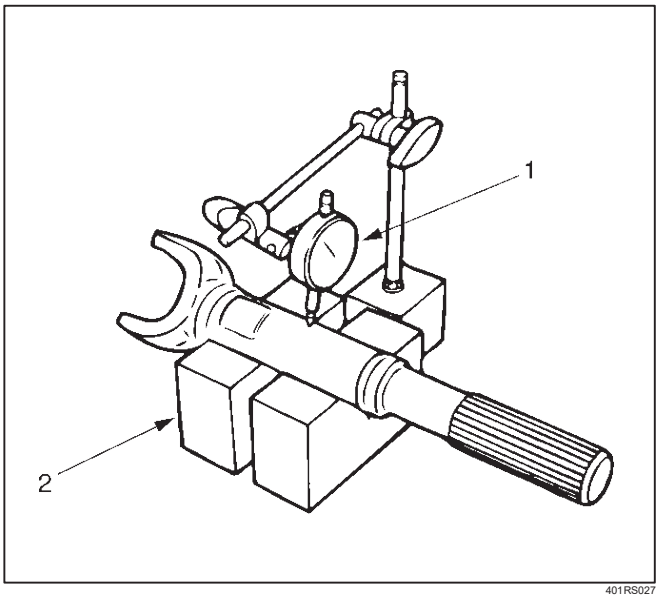
0.13 mm (0.005 in)
TIR on the neck of the slip tube shaft (with a boot).

0.25 mm (0.010 in)
TIR on the ends of the tubing 3 inch from the welds.

0.38 mm (0.015 in)
TIR at the linear center of the tube.

0.38 mm (0.015 in)
TIR for the full length of tube with 30” or less of tubing.

(TIR : Total Indicator Reading)



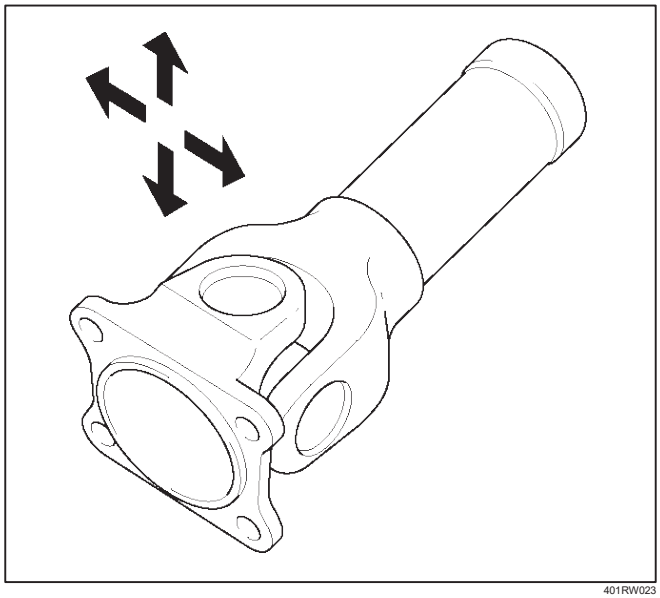
401RS027

Spline

The nylon-coated spline should be free from nicks and dings and the underlying steel spline should not be visible. After cleaning the nylon coating spline, the coating should exhibit only slight indicator of wear.
Grease volume is approximately 10 grams of grease in total. Grease should be evenly applied to both the female and the male slip splines using a small brush. After assembly of the slip joint, the sliding joint should be fully worked from the full collapsed to the full extended position.

Play in the universal joint

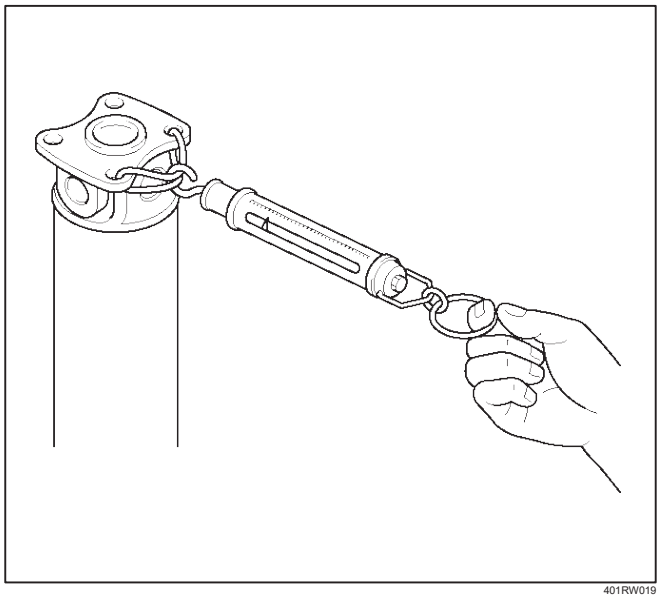
Limit: Less than 0.15 mm (0.006 in)



401RW023

Preload of the universal joint

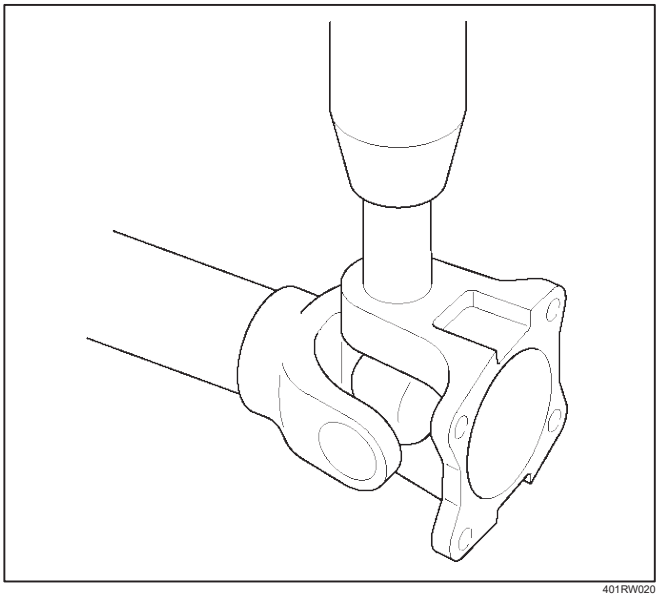
Preload should be 0 to 49 N(0 to11.0 lb). Joints should rotate smoothly and freely and should exhibit no rough or ratchety movement.



401RW019

Universal Joint Reassembly

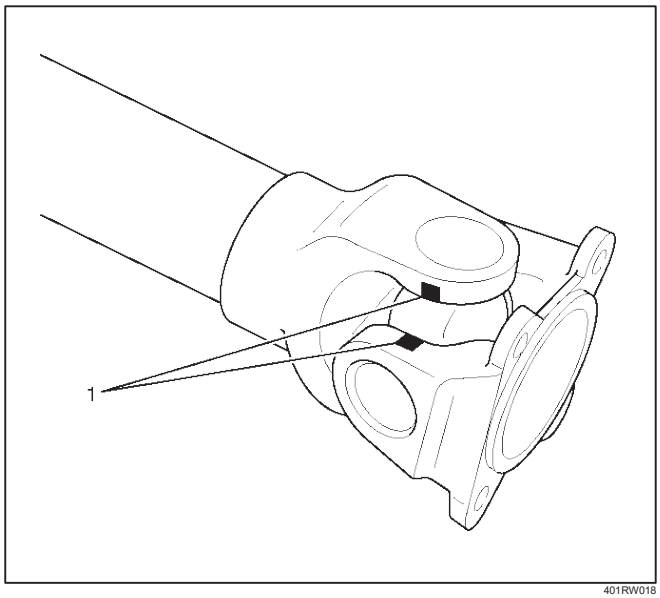
1. Install spider to flange yoke. Be sure to install the spider by aligning the setting marks made during disassembly.
2. Pack the four grease cavities of the spider with a high quality, extreme pressure N.L.G.I. Grade 2 grease. Do not add additional grease to the bearing cup assembly.
3. Move one end of the spider to cause a trunnion to project through the spider hole beyond the outer machined face of the yoke lug. Place a bearing over the trunnion diameter and align it to the spider hole. Using an arbor press, hold the trunnion in alignment with the spider hole and place a solid plug on the upper bearing. Press the bearing into the spider hole enough to install a snap ring.



401RW020

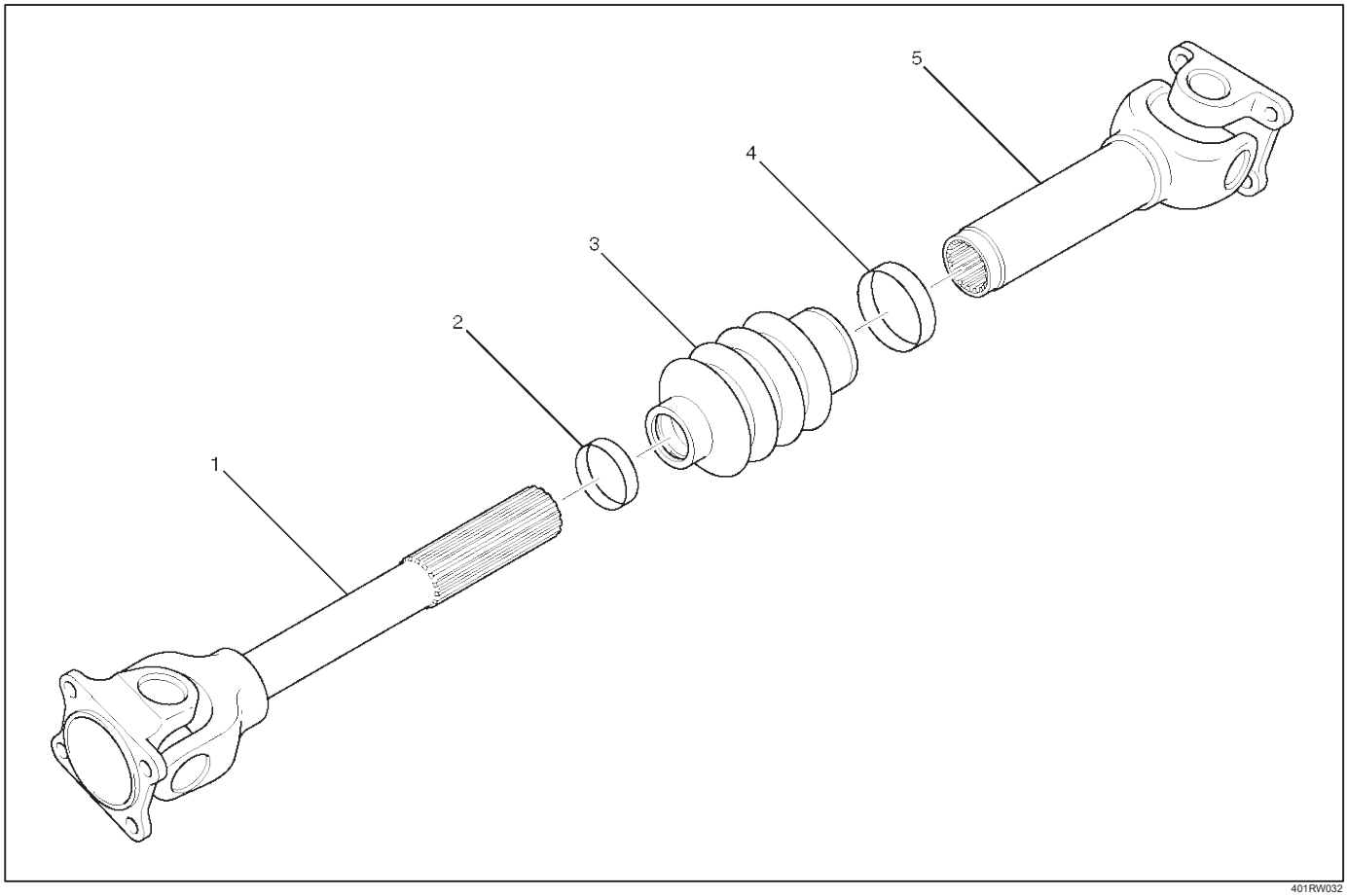
4. Install a snap ring.
   Be sure the snap rings are properly seated in the grooves.
5. Repeat steps 3 and 4 to install the opposite bearing. If the joint is stiff, strike the yoke ears with a soft hammer to seat needle bearings.

6. Align setting marks (1) and join the yokes.



7. Install snap ring.

Reassembly



Legend

(1) Sleeve Yoke
(2) Clamp
(3) Boot
(4) Clamp
(5) Tube Assembly

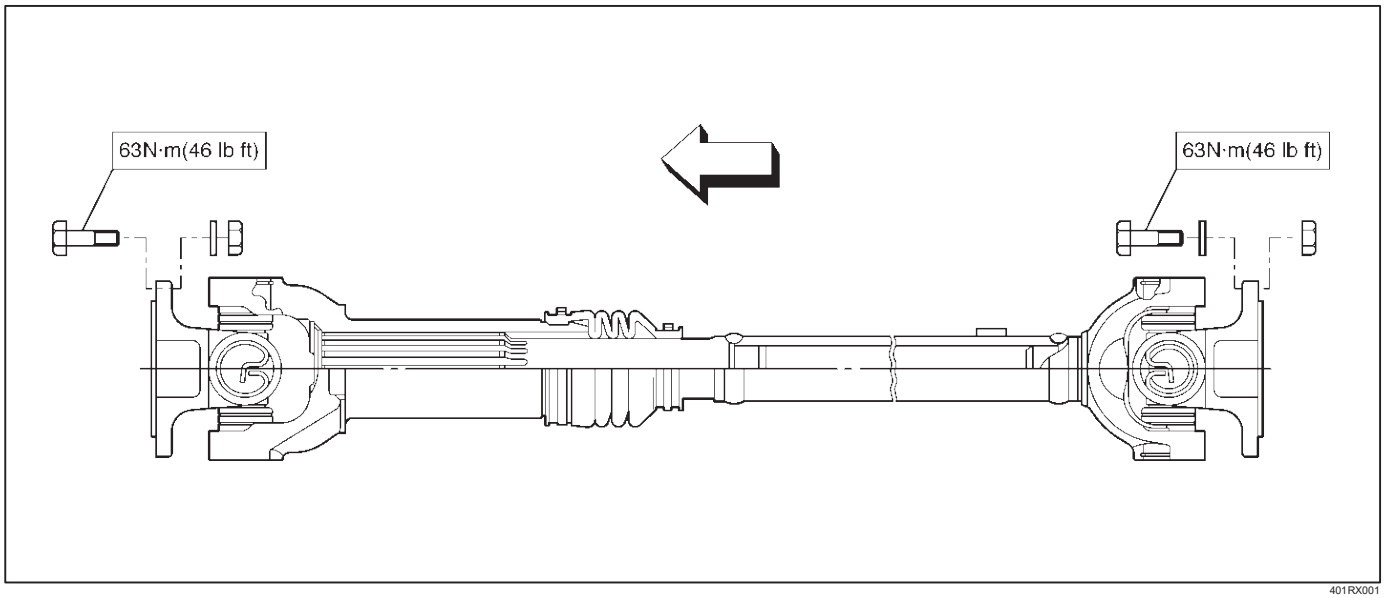
1. Apply grease evenly to both the female and male splines.
2. Apply a small amount of grease by finger to the outer lips of the boot.
3. Slide the boot onto the yoke shaft being careful not to damage the spline coating or boot.
4. Insert the yoke shaft spline into the sleeve being careful to maintain proper phasing. The spider holes should be in line and as per originally marked prior to disassembly.
5. Position boot onto sleeve and yoke shaft in final position over boot grooves.
6. Attach boot clamps and secure using pliers.
7. Be sure clamp is properly seated and secure.

Main Data and Specifications

General Specifications

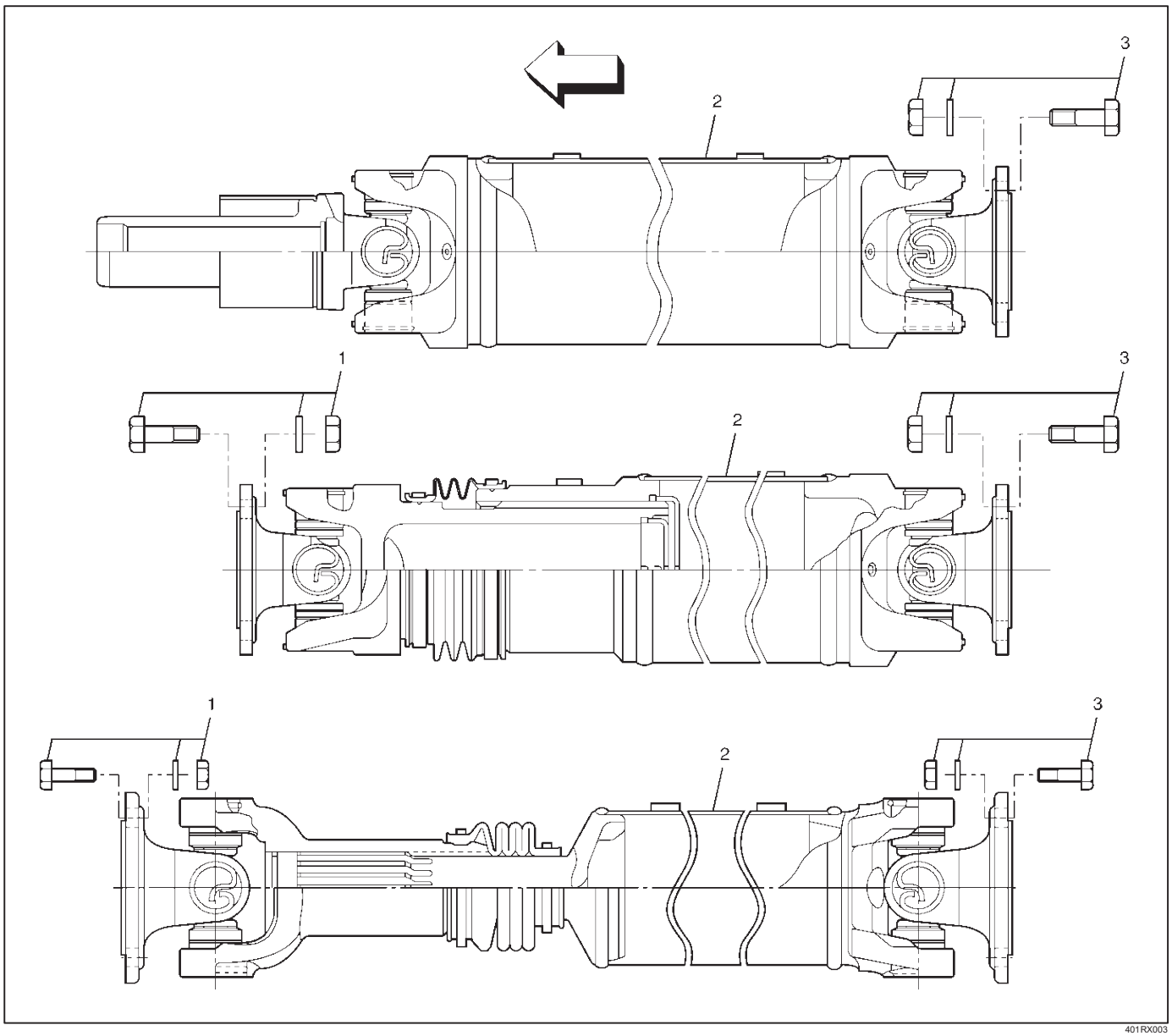
Transmission	M/T	A/T
Length (between two spiders center)	367.2 mm (14.81 in)	542.2 mm (21.35 in)

Torque Specifications



Rear Propeller Shaft

Rear Propeller Shaft and Associated Parts



Legend

(1) Bolt, Nut and Washer (Transfer Side)
(2) Rear Propeller Shaft
(3) Bolt, Nut and Washer (Rear Axle Side)

Removal

1. Raise the vehicle on a hoist.

NOTE: Apply alignment marks on the flange at the rear propeller shaft both front and rear side.

2. Remove transfer side bolt, nut and washer (except spline yoke type).
3. Remove rear axle side bolt, nut and washer.
4. Remove rear propeller shaft.

NOTE: Plug the hole of the transmission rear end to prevent oil leakage (spline yoke type only).

Installation

NOTE: Never install the shaft assembly backwards.

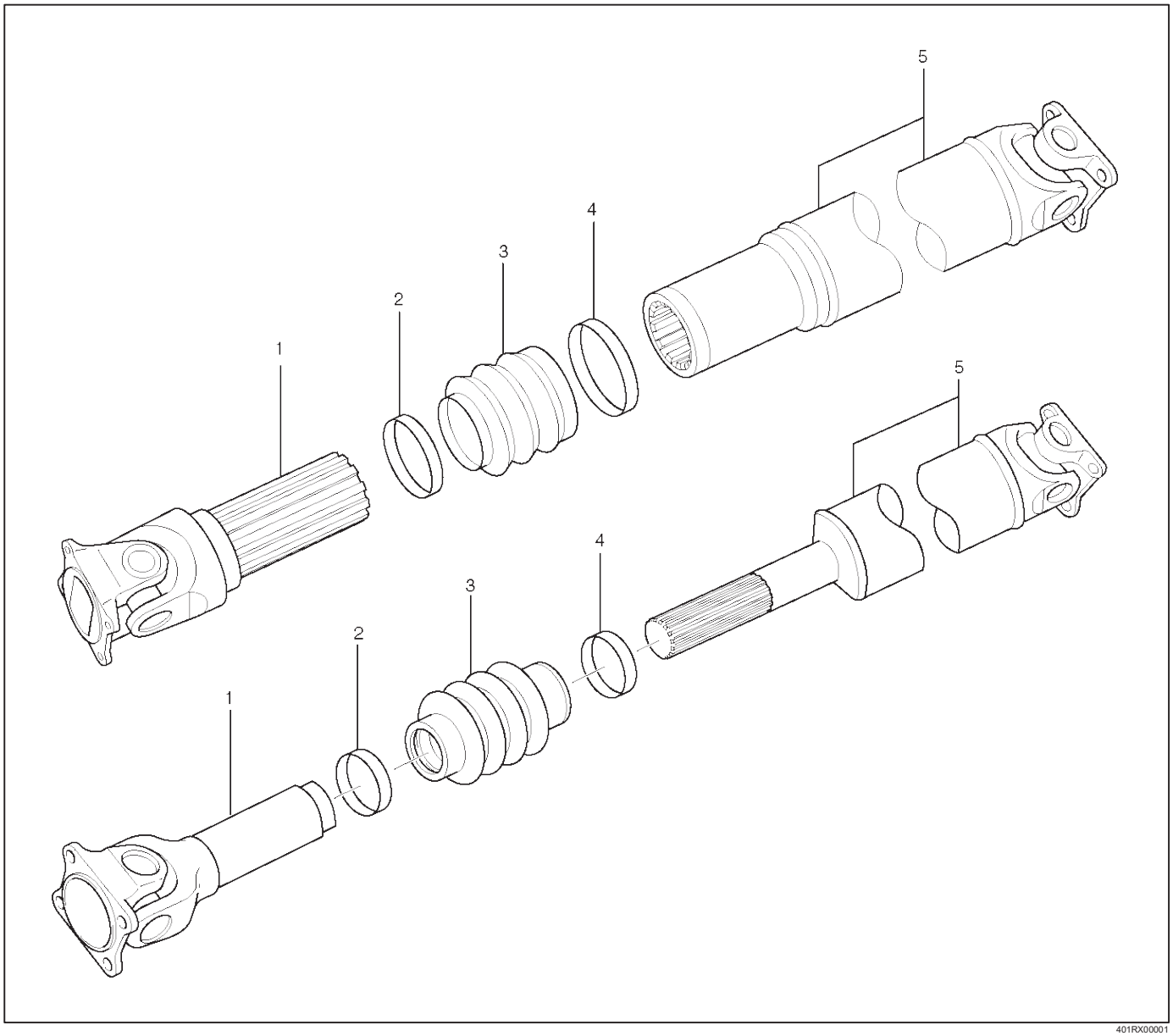
Never insert bar between yoke lugs when tightening or removing bolts.

Completely remove the dust or foreign matter from the connecting surface of flange coupling on each end of the propeller shaft.

1. Align the mark which is applied at removal.
2. Install rear propeller shaft and tighten the bolts to the specified torque.

Torque: 63 N·m(46 lb ft)

Slip Joint Disassembly



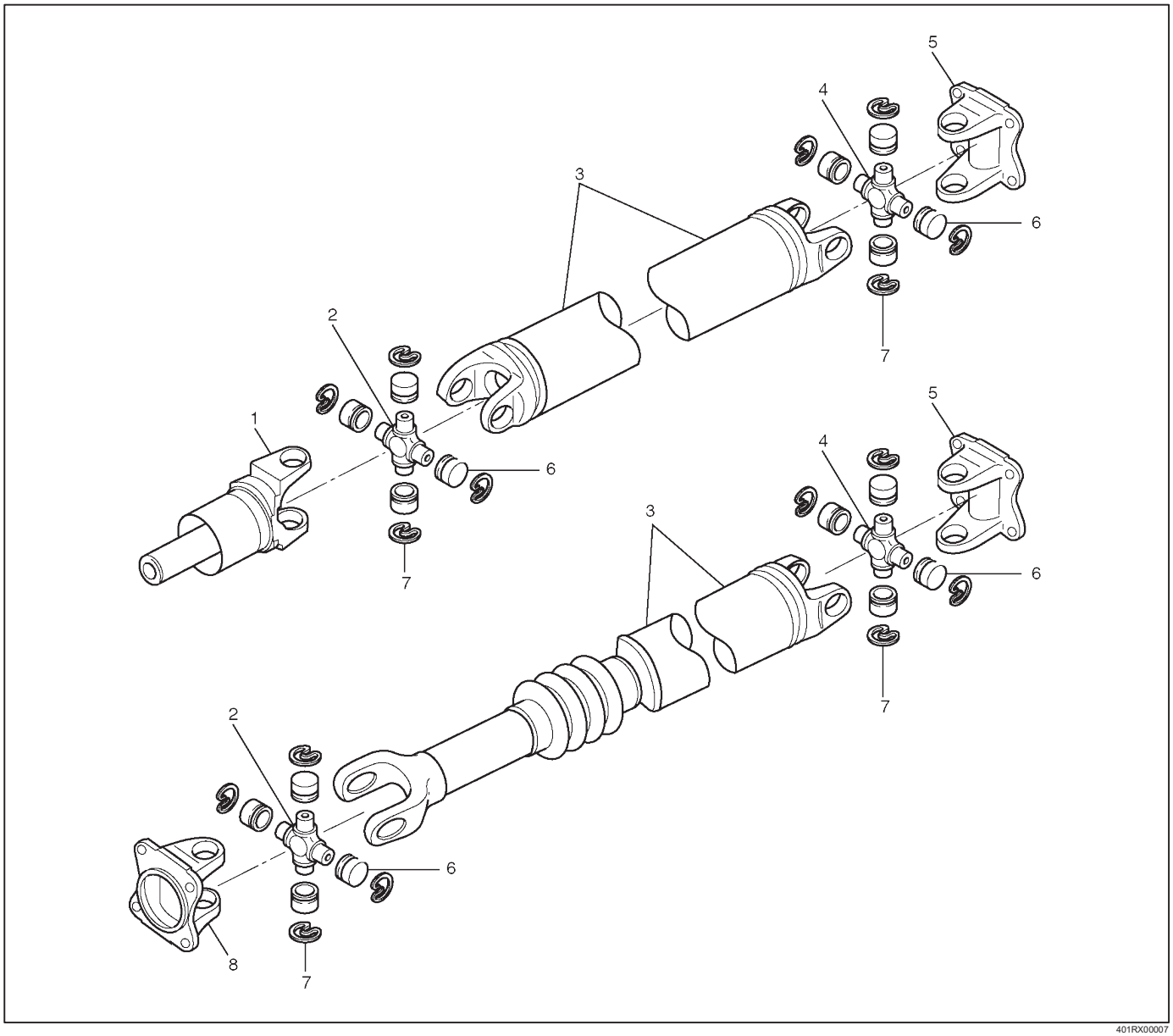
401RX00001

Legend

(1) Spline Yoke and Universal Joint Assembly
(2) Clamp
(3) Boot
(4) Clamp
(5) Tube and Universal Joint Assembly

1. Lay the shaft horizontally on a bench and secure.
2. Indicate the original assembled position by marking the phasing of the shaft prior to disassembly.
3. Using the flat blade of a screwdriver, pry the loose end of the boot clamp upwards and away from the propeller shaft boot. Be careful not to damage the boot.
4. When boot clamps becomes loose, remove by hand.
5. Repeat for the other boot clamp.
6. Remove the slip yoke assembly from the driveshaft, by securing the boot with one hand and pulling on the slip yoke.
7. Remove the boot from the shaft assembly.

Universal Joint Disassembly



401RX00007

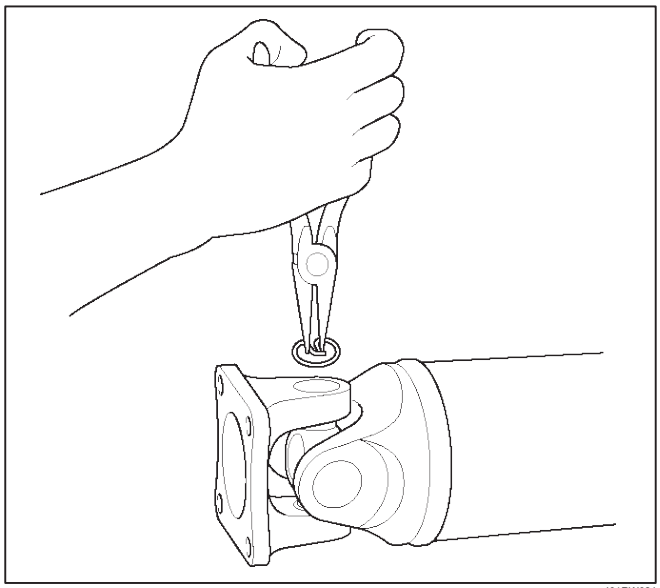
Legend

(1) Spline Yoke
(2) Spider
(3) Propeller Shaft Assembly
(4) Spider
(5) Flange Yoke
(6) Bearing
(7) Snap Ring
(8) Flange Yoke

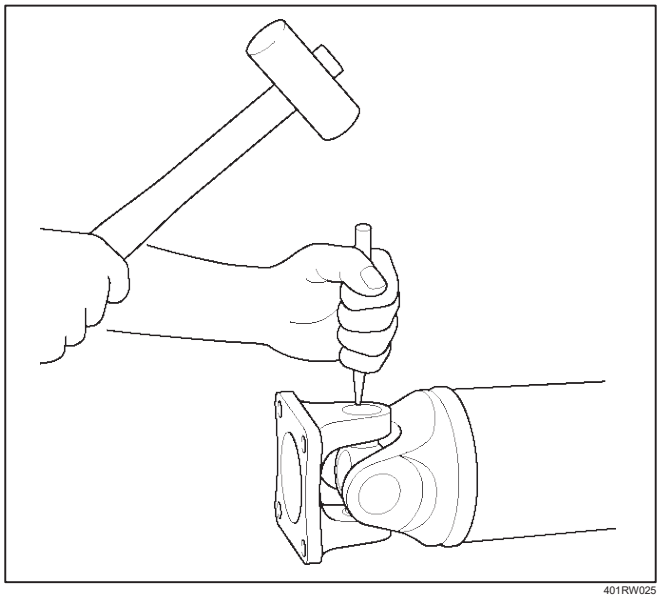
NOTE: Aluminum is softer than steel. Care must be taken not to remove excessive material or damage bearing holes.

If the vehicle has aluminum tube type propeller shaft, flange yoke, boot kit, journal kit can be replaced. If other parts are damaged, replace propeller shaft as assembly.

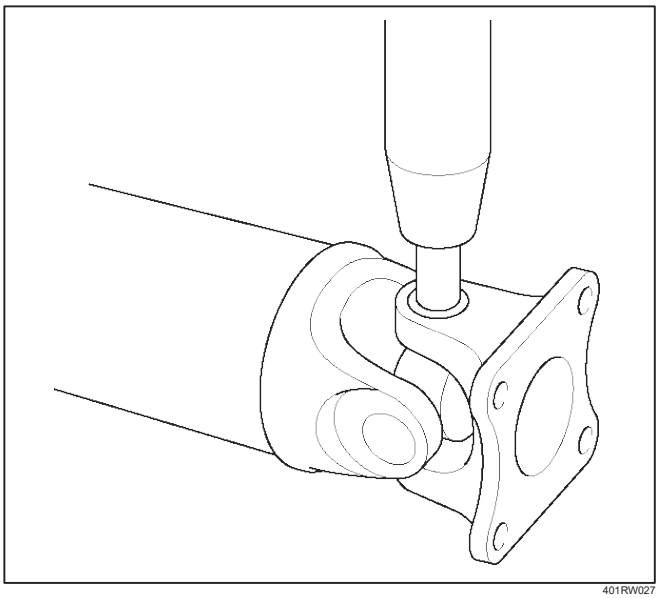
1. Apply alignment marks on the yokes of the universal joint, then remove the snap ring.


401RW024

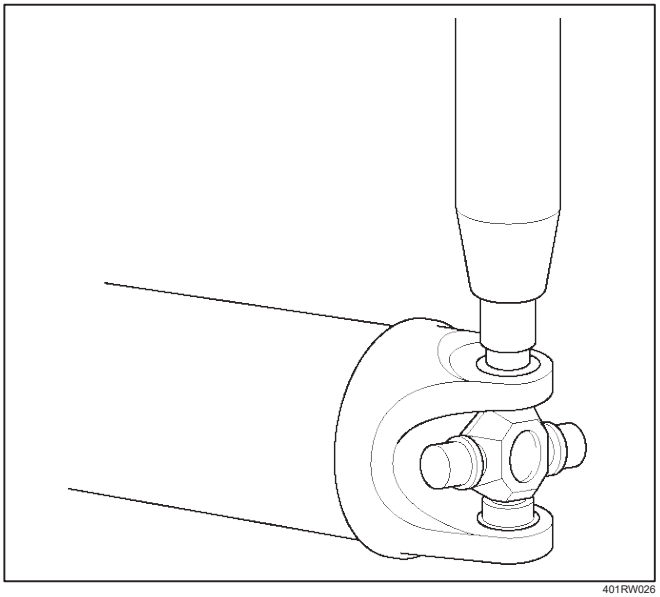
If the snap ring is stuck in position, remove paint from the hole in the yoke or tap around the edge of the bearing lightly with a soft drift.


401RW025

2. Set the yoke in the arbor press with a piece of tube stock beneath it.
   Place a solid plug on the upper bearing and press it through to release the lower bearing.


401RW027

3. If the bearing will not pull out by hand after pressing, tap the base of the lug near the bearing to dislodge it.
4. To remove the opposite bearing, turn the yoke over and straighten the spider in the open spider hole. Then carefully press on the end of the spider so the remaining bearing moves straight out of the bearing spider hole. If the spider or bearing are cocked, the bearing will score the walls of the spider hole and ruin it.


401RW026

5. Repeat this procedure on the remaining bearing to remove the spider from the yoke.

Inspection

- Propeller shaft for run-out Aluminum tube type.

  Static run-out limit : 1.0 mm(0.04 in)

  TIR full length of tubing maximum.

  (TIR : Total Indicator Reading)

- Propeller shaft for runout (Steel tube type).

  Static runout limit : 0.13 mm(0.005 in)

  TIR on the neck of the slip tube shaft (with a boot).

  0.25 mm(0.010 in)

  TIR on the ends of the tubing 3 inch from the welds.

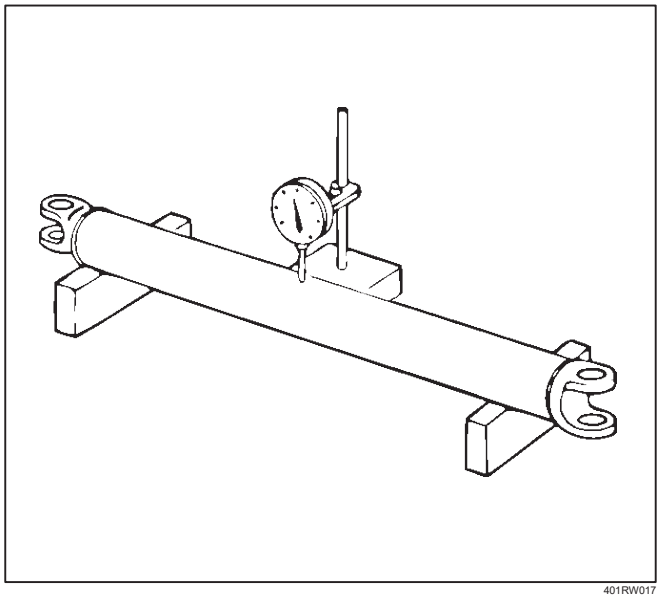
  0.38 mm(0.015 in)

  TIR at the linear center of the tube.

  0.38 mm(0.015 in)

  TIR for the full length of tube with 30” or less of tubing.

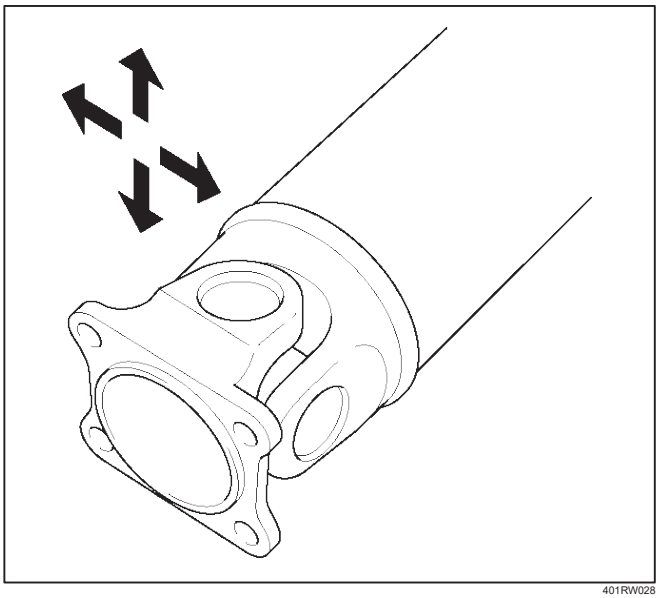
  (TIR: Total Indicator Reading)


401RW017

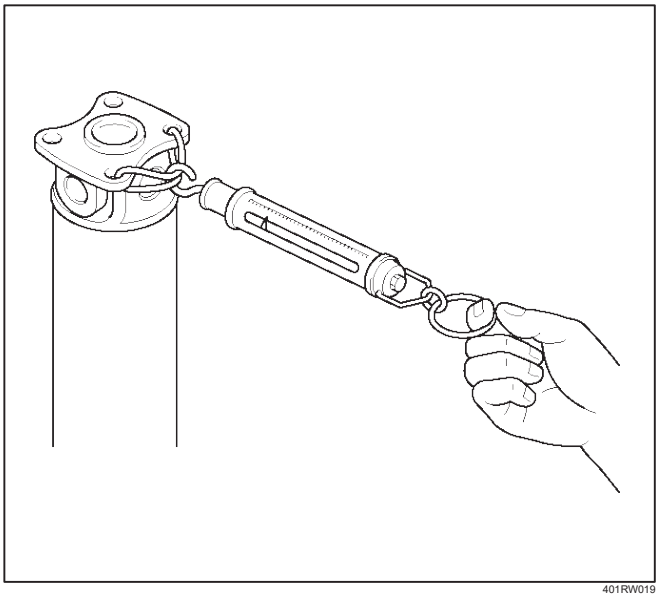
- Play in universal joint.

  Limit: Less than 0.15 mm(0.006 in)

- Spider pin should be smooth and free from fretting or galling.
  Visible signs of needle presence is normal, but wear should not be felt.

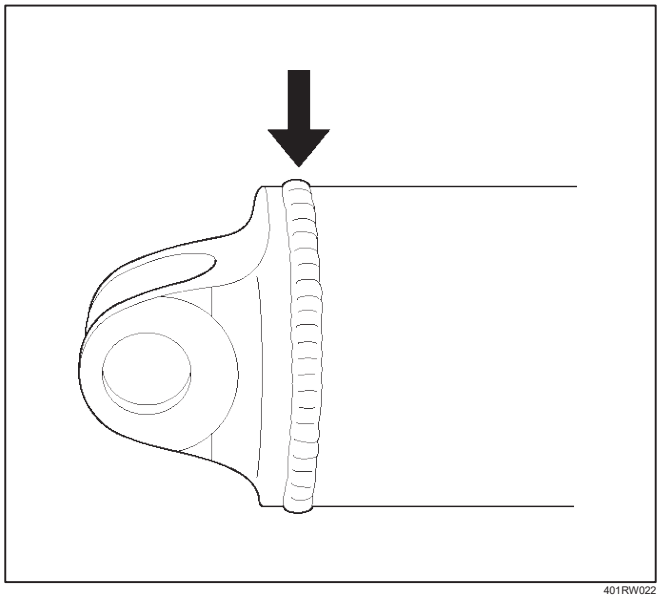

401RW028

- Preload of the universal joint.
  Preload should be 0 to 49 N (0 to 11.0 lb).
  Joints should rotate smoothly and freely and should exhibit no rough or ratchety movement.


401RW019

- Inspect splines of slip joint for wear.
  The nylon-coated spline should be free from nicks and dings and the underlying steel spline should not be visible.
  After cleaning the nylon coating spline, the coating should exhibit only slight indication of wear.
  Grease volume is approximately 10 grams of grease in total. Grease should be evenly applied to both the female and the male slip splines using a small brush. After assembly of the slip joint, the sliding joint should be fully worked from the full collapsed to the full extended position.

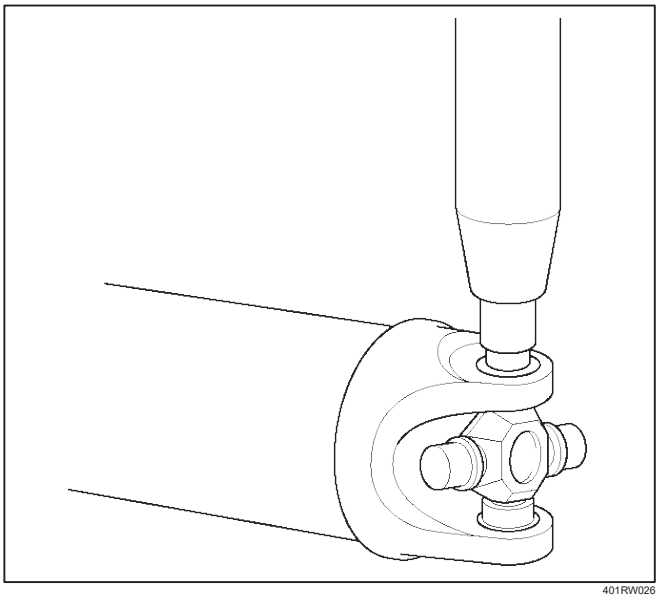
- Aluminum tube type only: Inspect the aluminum tubing for surface scratches and dents. These scratches may not exceed 0.2 mm (0.008 in) in depth.


401RW022

- Aluminum tube type only: Visually inspect the circle welds and fittings for any signs of cracks or signs of deterioration. If there are any cracks that exceed 0.2 mm (0.008 in) in depth, the assembly must be replaced.
- Aluminum tube type only: Check to be sure there are no missing balance weights. If balance weights are missing and void has occurred in the aluminum tubing greater than 0.2 mm (0.008 in), the assembly must be replaced.

Universal Joint Reassembly

1. Pack the four grease cavities of the spider with a high quality, extreme pressure N.L.G.I. Grade 2 grease. Do not add additional grease to bearing cup assembly.
2. Move one end of the spider to cause a trunnion to project through the spider hole beyond the outer machined face of the yoke lug. Place a bearing over the trunnion diameter and align it to the spider hole.
   Using an arbor press, hold the trunnion in alignment with the spider hole and place a solid plug on the upper bearing. Press the bearing into the spider hole enough to install snap ring.

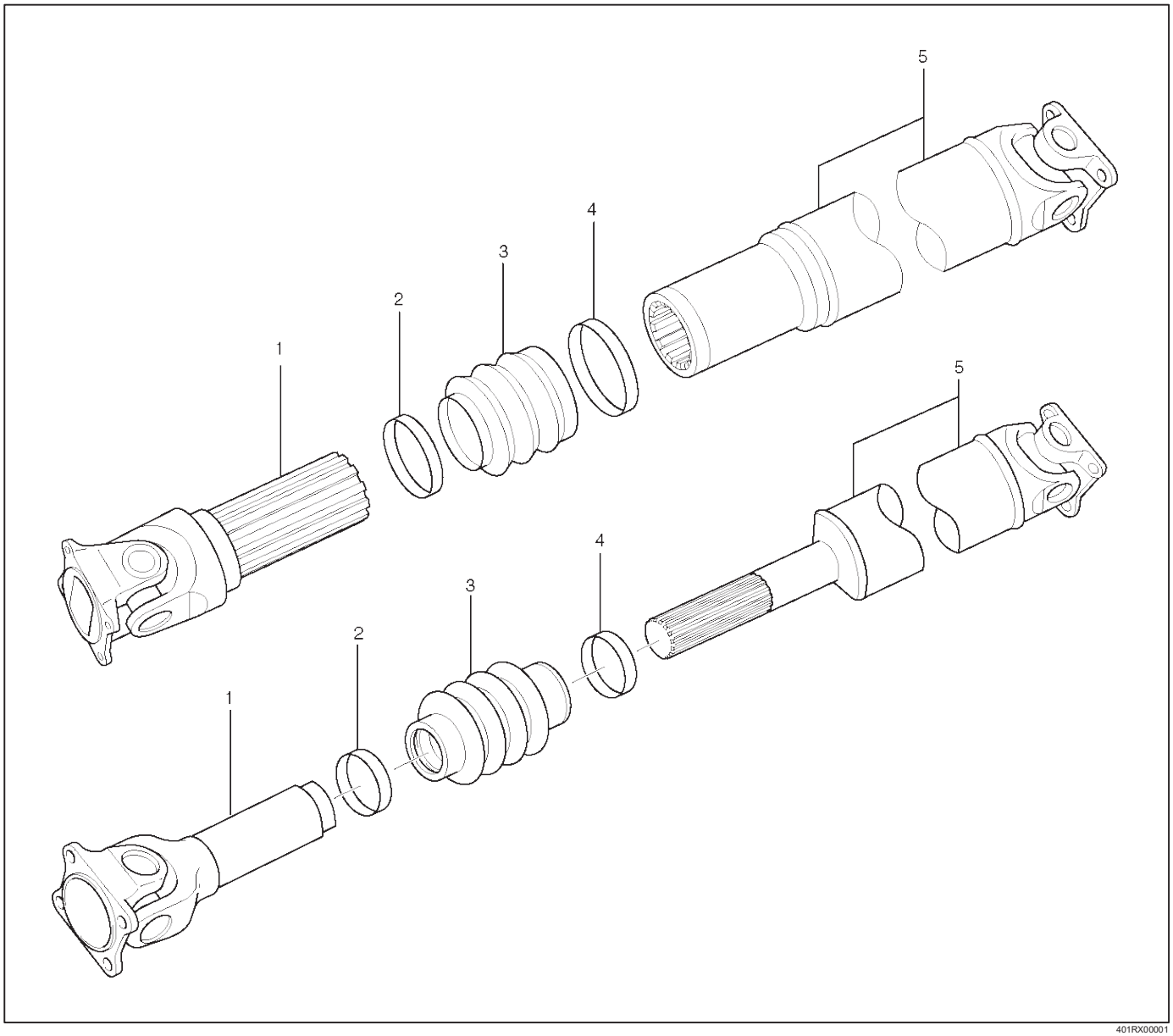

401RW026

3. Install a snap ring.

NOTE: Be sure the snap rings are properly seated in the grooves.

4. Repeat steps 2 and 3 to install the opposite bearing. If the joint is stiff, strike the yoke ears with a soft hammer to seat the bearing.
5. Align the setting marks and join the yokes.

Slip Joint Reassembly



401RX00001

Legend

(1) Spline Yoke and Universal Joint Assembly
(2) Clamp
(3) Boot
(4) Clamp
(5) Tube and Universal Joint Assembly

1. Apply grease evenly to both the female and male splines.
2. Apply a small amount of grease by finger to the outer lips of the boot.
3. Slide the boot (smaller diameter side) onto the spline yoke shaft being careful not to damage the spline coating or boot.
4. Insert the spline yoke shaft spline into the tube assembly being careful to maintain proper phasing. The spider holes should be in line as originally marked prior to disassembly.
5. Position boot onto tube and yoke shaft in its assembled position.
6. Attach boot clamps and secure using pliers.
7. Be sure clamp is properly seated and secure.

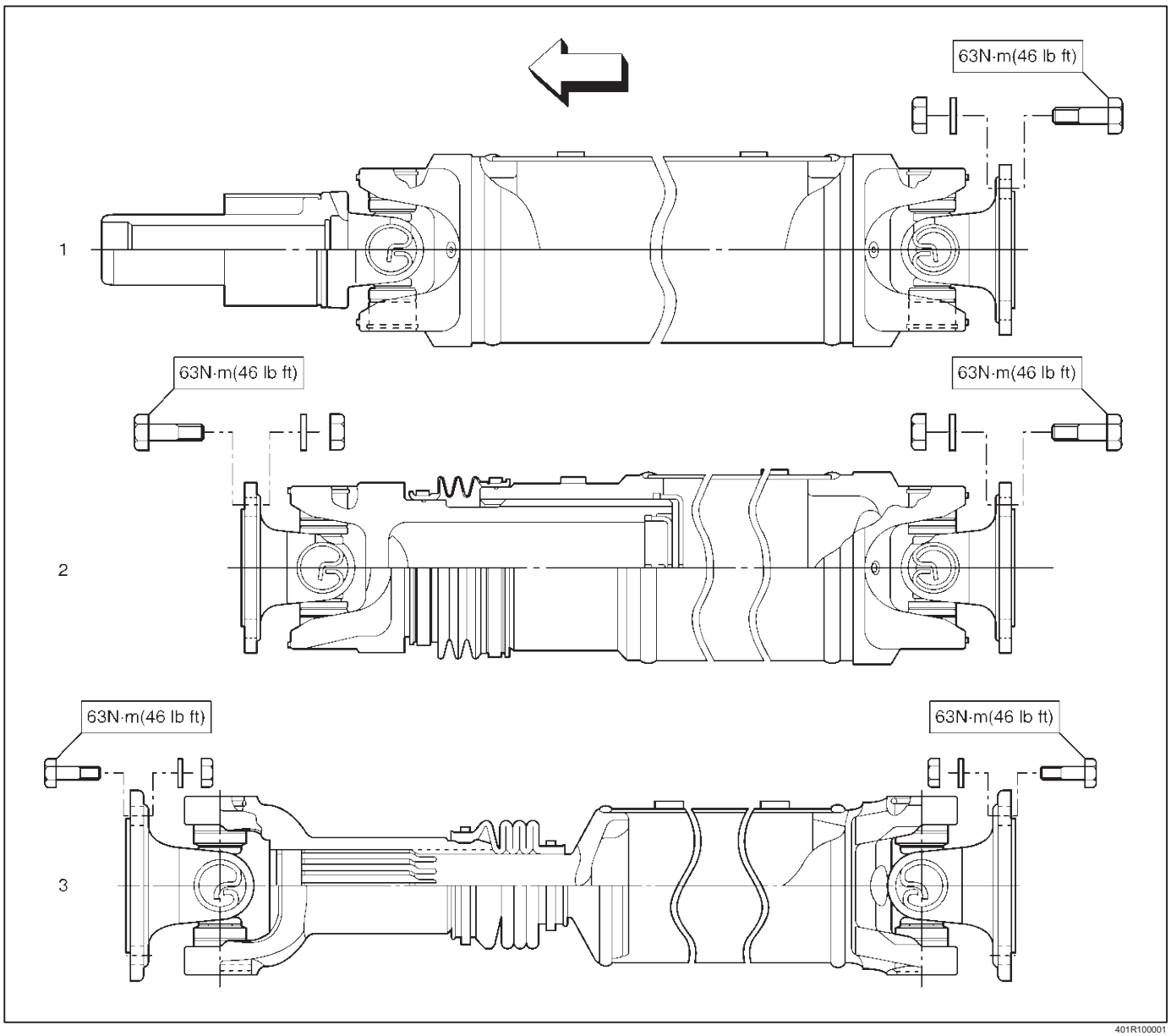
CAUTION: Only use a similar type or same as the original type clamp. Using any other clamp may create an imbalanced shaft or lead to grease leakage.

Main Data and Specifications

General Specifications

	2WD Model				4WD Model	
Engine	Y22SE		6VD1		6VD1	
Transmission	M/T	A/T	M/T	A/T	M/T	A/T
Type (See illustration)	1	2	1	2	2	3
Length between two spiders center)	1314.4mm (51.75in)	1334.7mm (52.55in)	1298.4mm (51.12in)	1323.0mm (52.09in)	1191.2mm (46.9in)	1021.2mm (40.21in)
Universal joint type	Cardan type					

Torque Specifications



AXIOM

DRIVELINE/AXLE

TRANSFER CASE (TOD)

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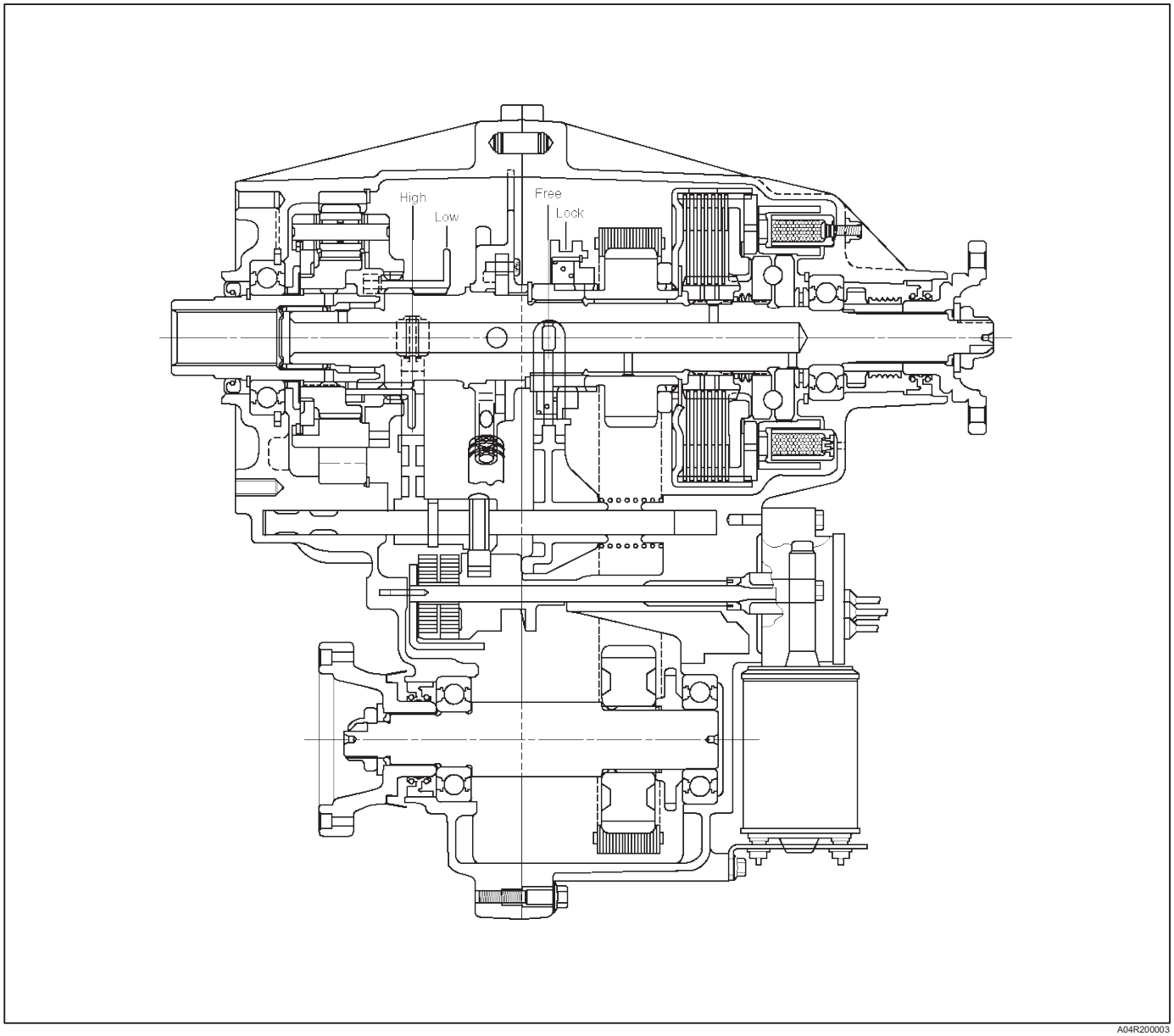
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Service Precaution

WARNING: THIS VEHICLE HAS A SUPPLEMENTAL RESTRAINT SYSTEM (SRS). REFER TO THE SRS COMPONENT AND WIRING LOCATION VIEW IN ORDER TO DETERMINE WHETHER YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING. WHEN YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING, REFER TO THE SRS SERVICE INFORMATION. FAILURE TO FOLLOW WARNINGS COULD RESULT IN POSSIBLE AIR BAG DEPLOYMENT, PERSONAL INJURY, OR OTHERWISE UNNEEDED SRS SYSTEM REPAIRS.

CAUTION: Always use the correct fastener in the proper location. When you replace a fastener, use ONLY the exact part number for that application. ISUZU will call out those fasteners that require a replacement after removal. ISUZU will also call out the fasteners that require thread lockers or thread sealant. UNLESS OTHERWISE SPECIFIED, do not use supplemental coatings (Paints, greases, or other corrosion inhibitors) on threaded fasteners or fastener joint interfaces. Generally, such coatings adversely affect the fastener torque and the joint clamping force, and may damage the fastener. When you install fasteners, use the correct tightening sequence and specifications. Following these instructions can help you avoid damage to parts and systems.

General Description



A04R200003

The Torque-On-Demand (TOD) is an electronically-controlled torque-split 4-wheel drive system with the following features.

Shifting Between High and Low Ranges

The shifting mechanism consists of the cam and shaft rail assembly, the high/low shift motor and the encoder. The encoder is built-in to the motor.

The encoder senses high/low range shift motor rotation position and sends this data to the TOD control unit. Based on this data, the TOD control unit adjusts motor rotation speed or stops the motor.

The shifting between the high and low ranges using the TOD switch only is possible. The vehicle must be stopped or nearly stopped (vehicle speed less than 2 km/h (1.2 mph) and engine speed less than 1,500 rpm), the automatic transmission selector level must be in the neutral (N) position, and the brakes must be applied.

Electronically-controlled Wet-type Multiple Disc Clutch

The clutch automatically provides the optimum drive power to the front wheels of the vehicle in response to varying road surface conditions when the vehicle is operated in the TOD mode. The delivered power ranges from 0% to 100% of power train output. Superior operational stability is maintained over a wide range of operating conditions.

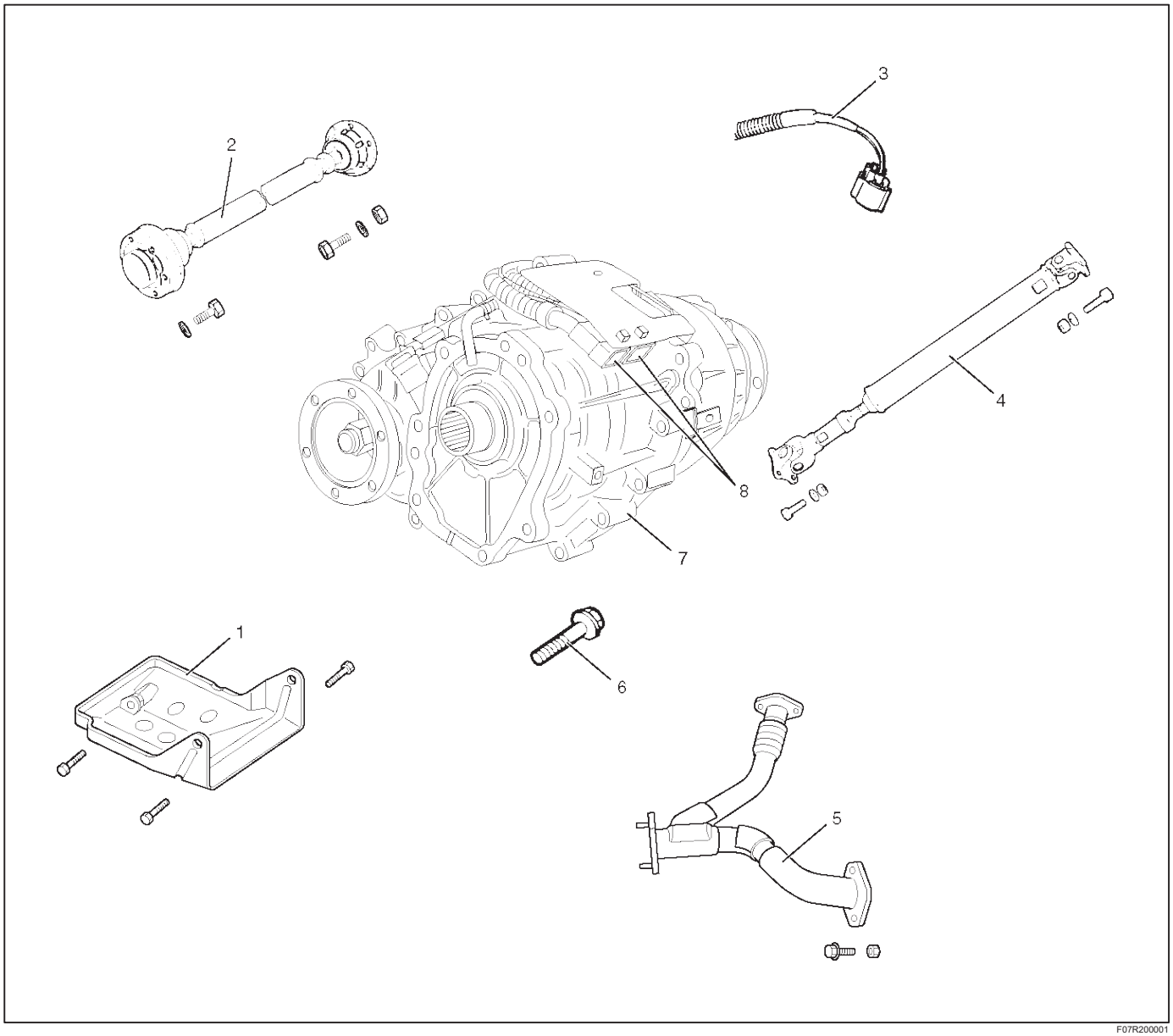
Front Output Drive

Front output drive is provided by a chain. This reduces the loud noise associated with 4-wheel drive operation.

Oil Pump Lubrication

An oil pump is used to lubricate the transfer. This ensures stable multiple-disc clutch operation and maintains the lubricating oil at a constant temperature.

Removal and Installation of Tfansfer Case Assembly



F07R200001

Legend

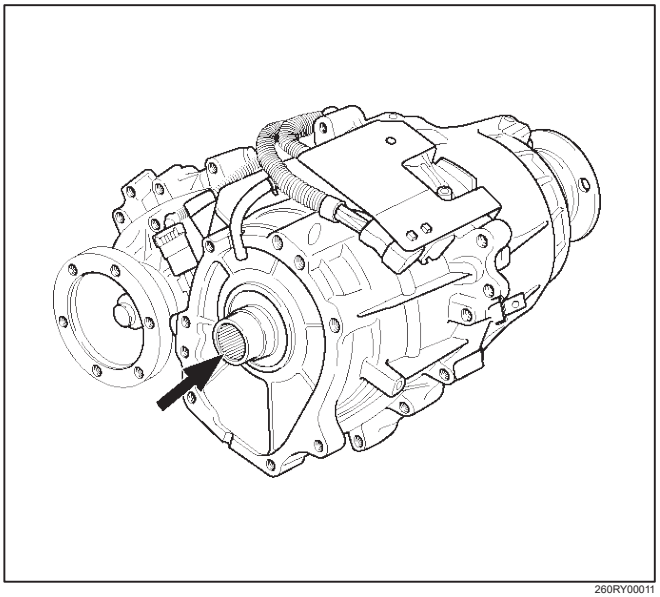
(1) Transfer Protector
(2) Front Propeller Shaft Assembly
(3) Speedometer Sensor Harness Connector
(4) Rear Propeller Shaft Assembly
(5) Center Exhaust Pipe
(6) Transfer Case Bolt
(7) Transfer Case Assembly
(8) Transfer Case Harness Connector

Removal

1. Disconnect the battery ground cable.
2. Remove the transfer protector.
3. Disconnect the rear propeller shaft assembly from the transfer case.
4. Disconnect the front propeller shaft assembly from the transfer case.
5. Remove the center exhaust pipe.
6. Disconnect the speedometer sensor harness connector from the speedometer sensor, and remove the harness clamp from the connector bracket of the transfer case.
7. Disconnect the engine harness connector from the transfer harness connector.
8. Support the transfer case with a transmission jack.
9. Remove the transfer bolts.
10. Remove the transfer case assembly.

Installation

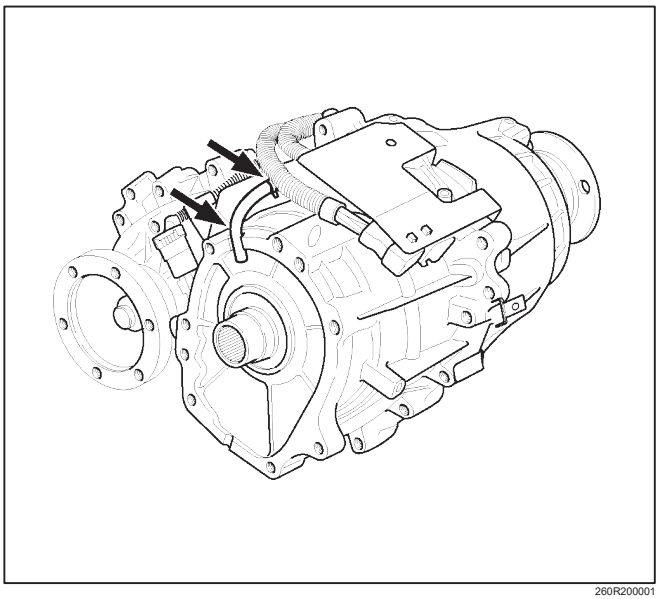
1. Apply grease (Besco L2 or its equivalent) to the input shaft spline.



260RY00011

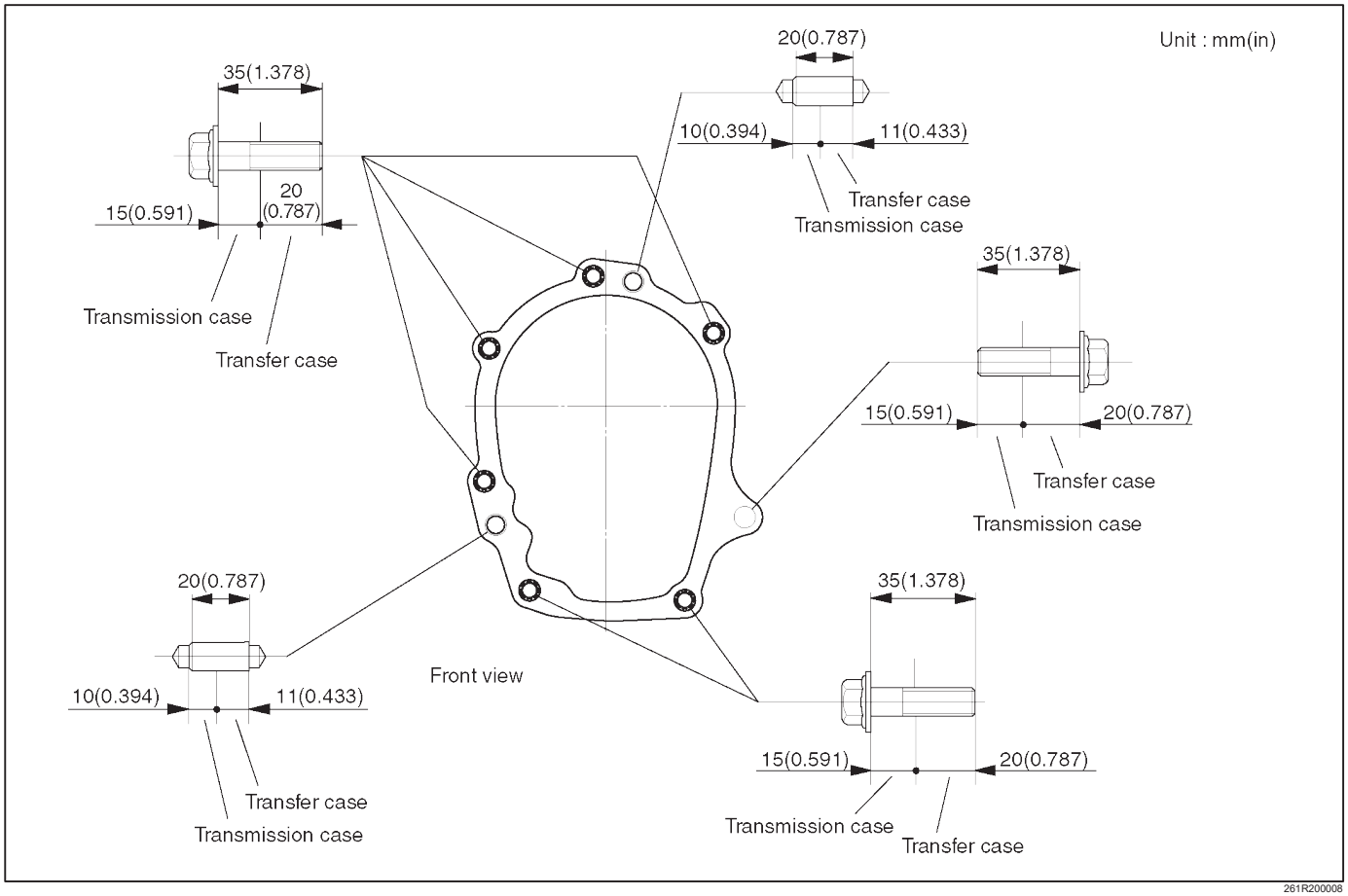
2. Install the transfer case assembly to the transmission assembly.
3. Install the transfer bolts to the specified torque (Refer to *next page*).

   Torque: 46 N·m (34 lb ft)
4. Connect the engine harness connector to the transfer harness connector.
5. Install the breather hose up to bottom of the transfer case breather and clip them firmly.
6. Securely insert the breather hose into the cutout portion of the transfer case.



260R200001

7. Install the speedometer harness clamp to the connector bracket of the transfer case, and then connect the harness connector to the speedometer sensor.



8. Install the center exhaust pipe.

   Torque: 43 N·m (32 lb ft)

9. Connect the front and rear propeller shaft assembly to the transfer case.

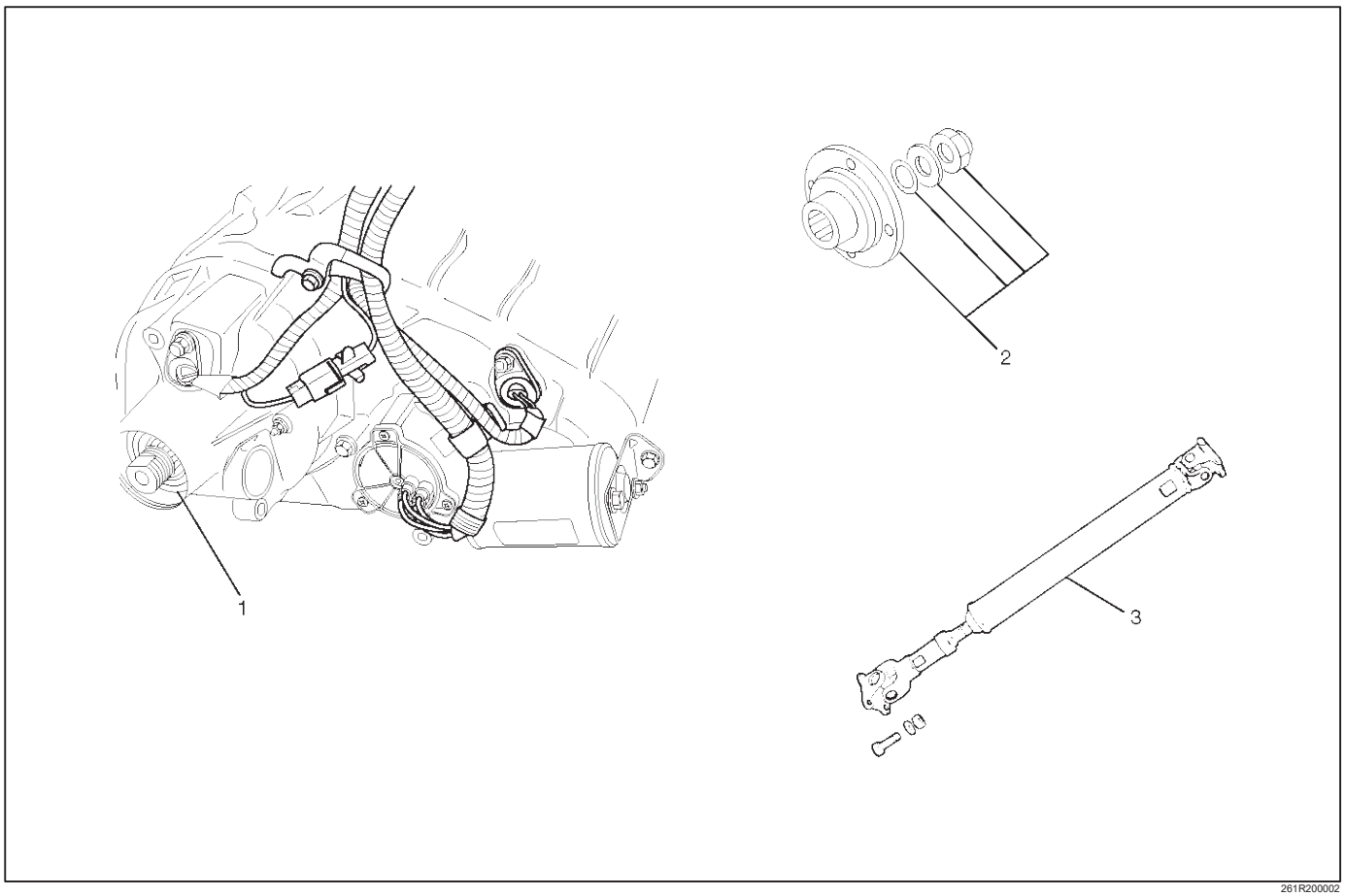
   Torque: 63 N·m (46 lb ft)

10. Install the transfer protector.

    Torque: 37 N·m (27 lb ft)

11. Connect the battery ground cable.

Transfer Rear Oil Seal



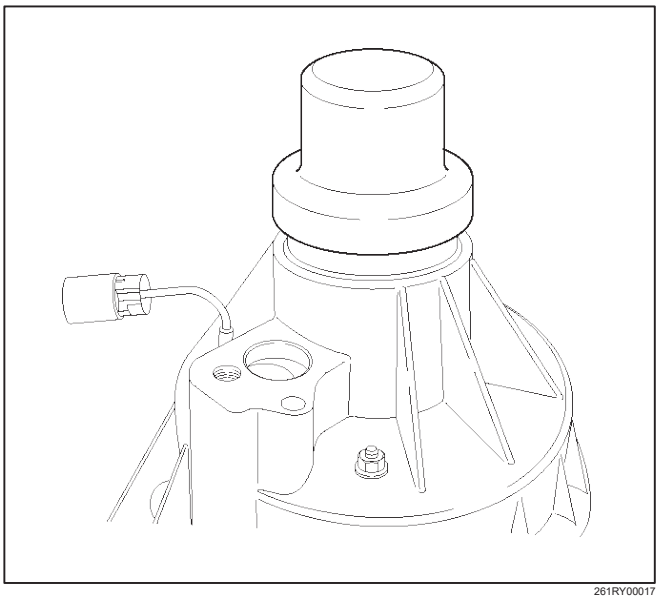
261R200002

Legend

(1) Transfer Rear Oil Seal
(2) End Nut, Washer, Oil Seal and Rear Companion Flange
(3) Rear Propeller Shaft Assembly

Removal

1. Disconnect the rear propeller shaft assembly from the transfer case.
2. Using the flange holder J–8614–11, remove the end nut.
3. Using the universal puller, remove the companion flange, washer and oil seal.
4. Remove the transfer rear oil seal from the transfer case.

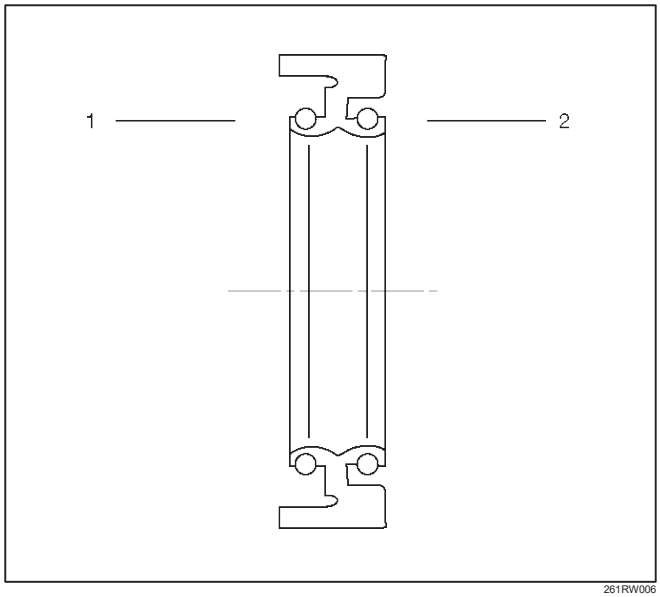


261RY00017

Installation

1. Apply oil to the circumference of the transfer rear oil seal.Fill the oil seal lip with grease (Besco L2 or its equivalent).
2. Using the oil seal installer J–42804, install the transfer rear oil seal to the transfer case.

NOTE: When installing the oil seal, pay attention to the direction.



261RW006

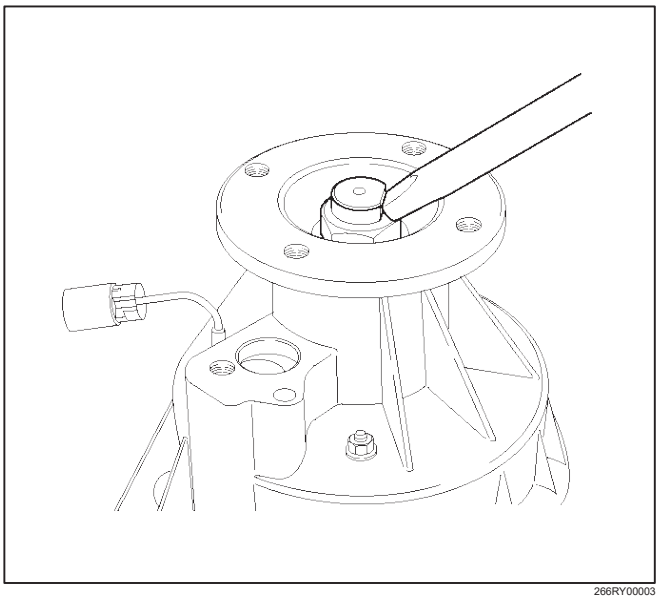
Legend
(1) Inside
(2) Outside

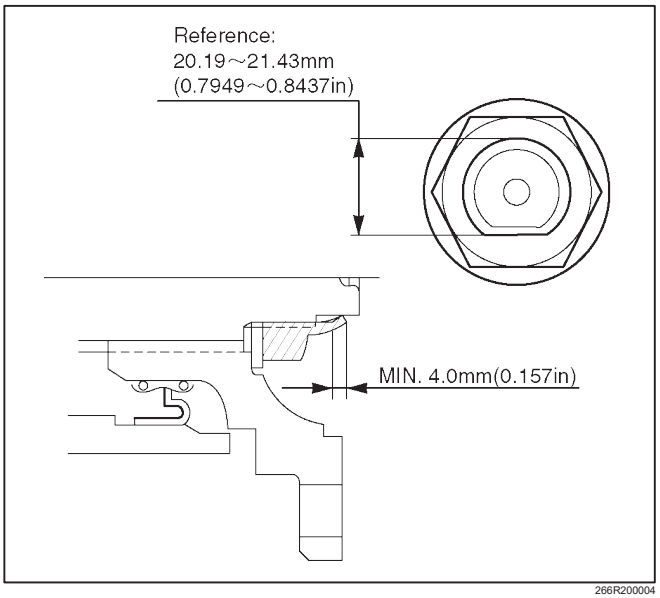
3. Install the companion flange.
4. Install the oil seal and washer, and using the flange holder J–8614–11, install the new end nut to the specified torque.

Torque: 167 N·m (123 lb ft)

5. Securely stake the end nut at one spot.

NOTE: Be sure to confirm that there is no clack at the staked portion of the end nut after staking.


266RY00003

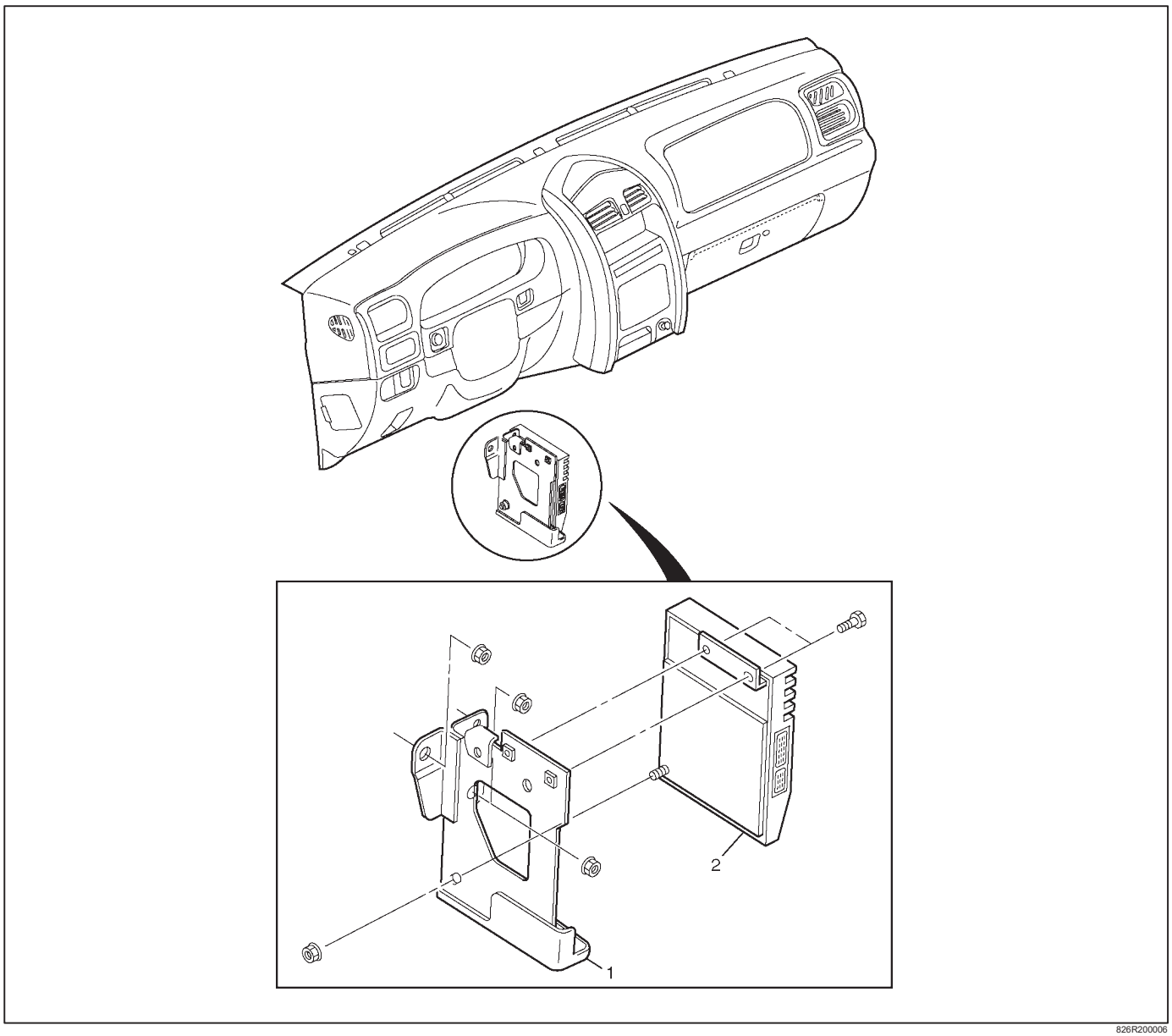


266R200004

6. Connect the rear propeller shaft assembly to the transfer case.

Torque: 63 N·m (46 lb ft)

TOD Control Unit



826R200006

Legend

(1) Bracket
(2) TOD Control Unit

Removal

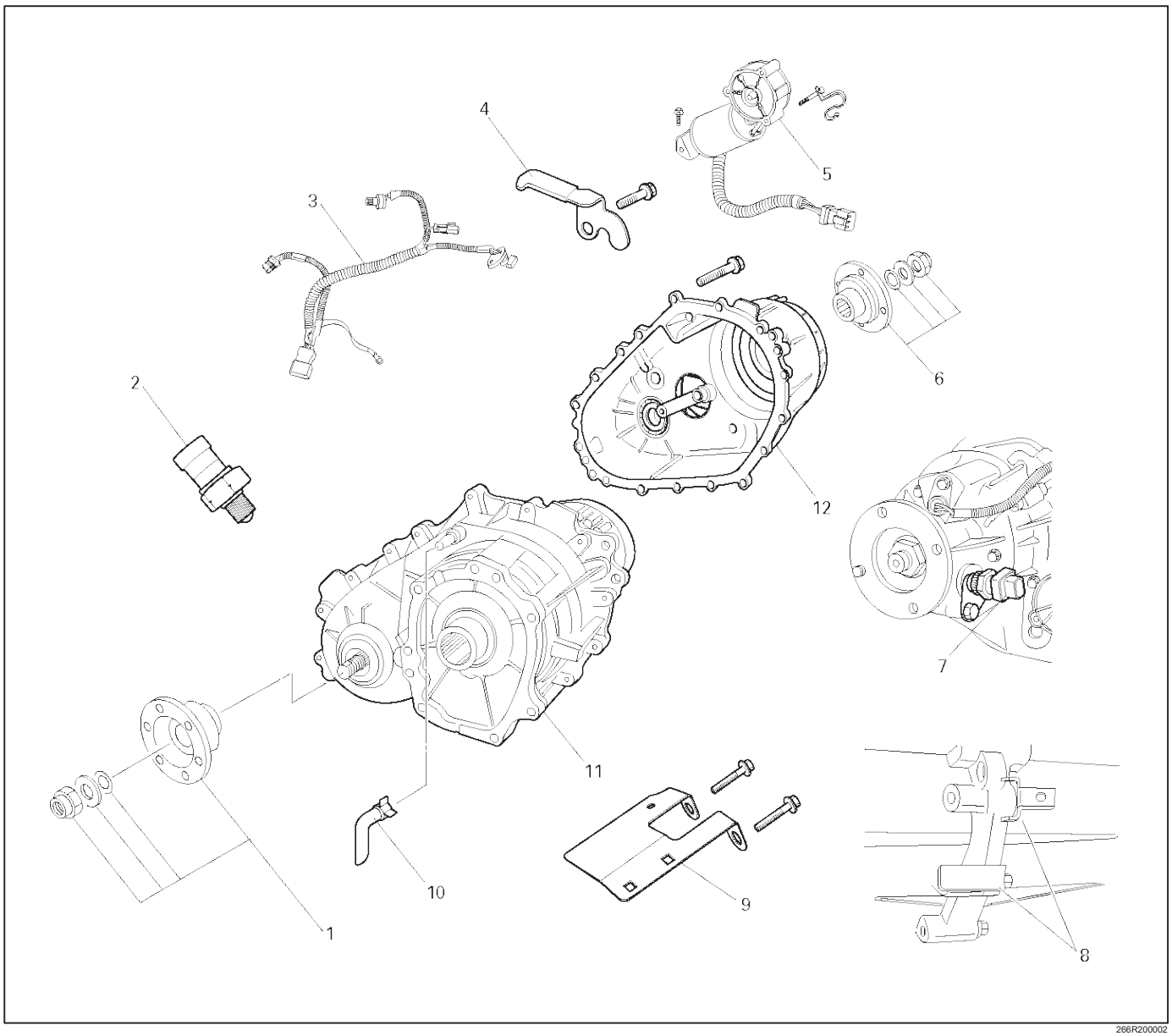
1. Disconnect the battery ground cable.
2. Disconnect the harness connector from the TOD control unit.
3. Remove the bracket retaining nuts (3 pieces) and the bracket with TOD control unit.
4. Remove the TOD control unit from the bracket.

Installation

1. Install the TOD control unit to the bracket.
2. Install the bracket with TOD control unit to the chassis.
3. Connect the harness connector to the TOD control unit.
4. Connect the battery ground cable.

Unit Repair

Disassembly and Reassembly of Major Components



266R200002

Legend

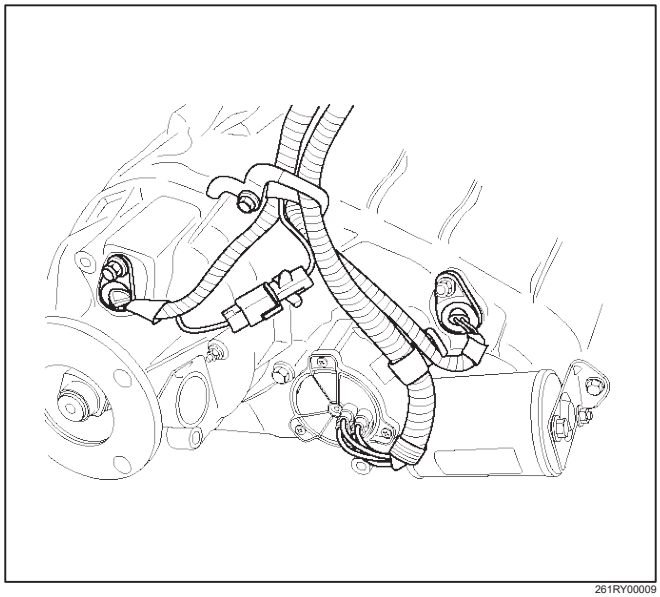
(1) Front Companion Flange, Oil Seal, Washer, and End Nut
(2) 4H and 4L Switch
(3) Harness Assembly
(4) Harness Bracket
(5) Shift Motor Assembly
(6) Rear Companion Flange, Oil Seal, Washer and End Nut
(7) Speedometer Sensor and Driven Gear
(8) Plate and Bracket
(9) Connector Bracket
(10) Breather Hose
(11) Transfer Case Assembly
(12) Transfer Cover Assembly

Disassembly

1. Remove the drain plug from the transfer case and drain the oil.
2. Remove the speedometer sensor and driven gear.
3. Remove the front and rear speed sensor of the harness assembly from the transfer cover assembly.

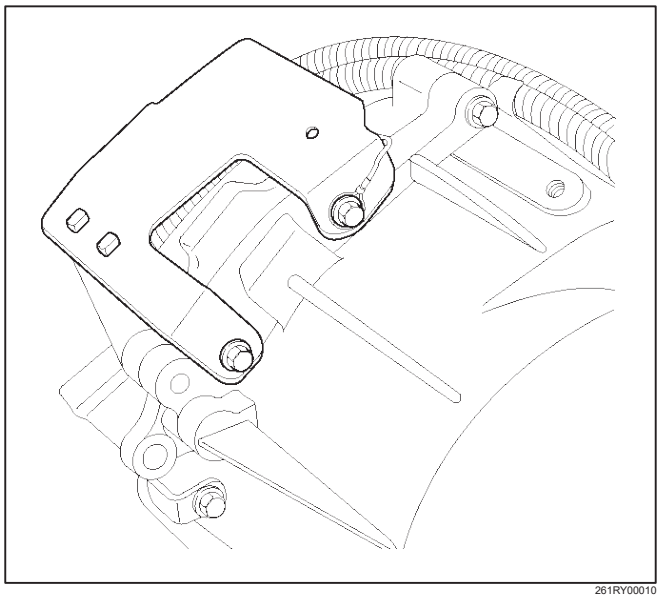
NOTE: Use care to prevent damage to speed sensor when removing speed sensor.

4. Disconnect the clutch solenoid coil, 4H and 4L switch harness connector.
   - Remove the harness bracket from the transfer cover.



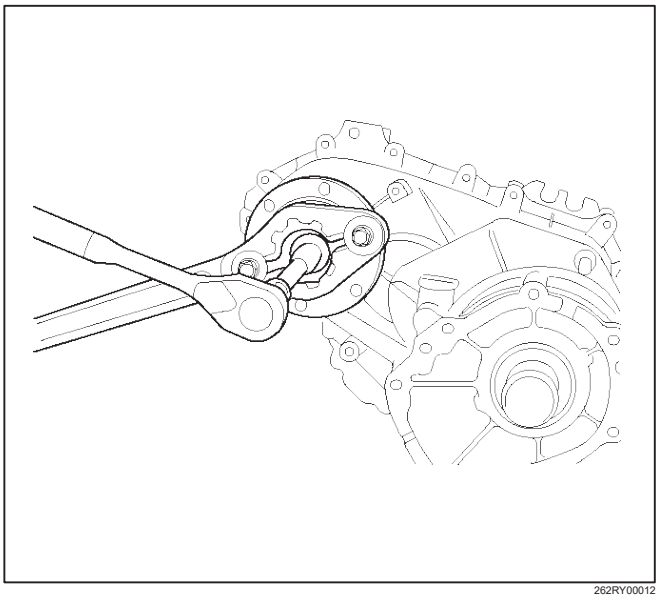
261RY00009

5. Remove the connector bracket from the transfer case.
   - Remove the harness assembly and shift motor harness connector from the connector bracket.



261RY00010

6. Remove the 4H and 4L switch from the transfer case.
7. Remove the shift motor assembly from the transfer cover.
8. Using the flange holder J–8614–11, remove the end nut.
   Remove the washers, oil seals, front and rear companion flange.



262RY00012

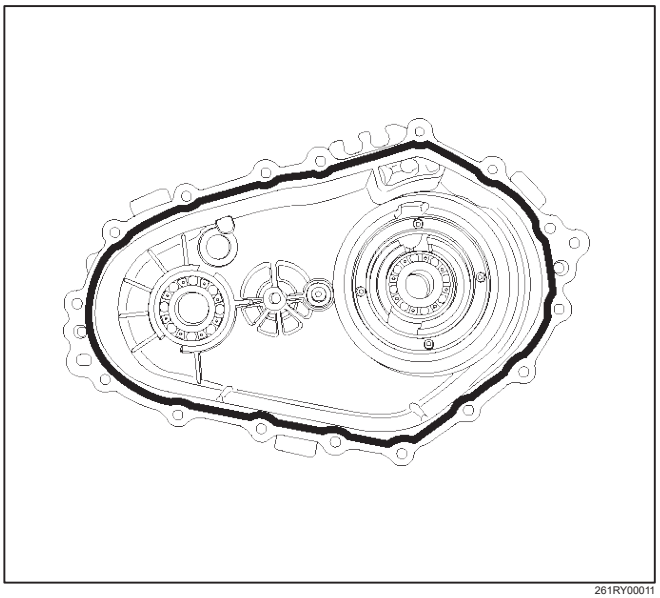
9. Remove the transfer cover retaining bolts and the transfer cover assembly from the transfer case assembly.

NOTE: When removing the transfer cover assembly, use care to prevent damage to oil seal.

10. Remove the breather hose from the transfer case.

Reassembly

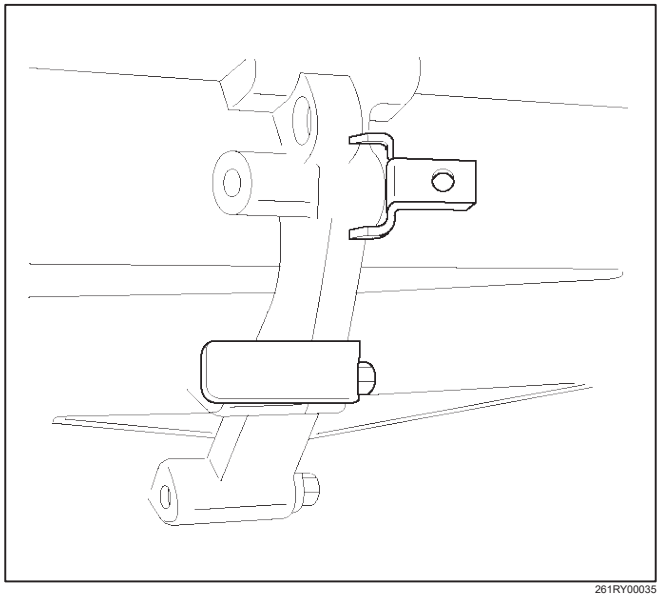
1. Apply recommended liquid gasket (LOCTITE 598 or its equivalent) uniformly to the transfer case and cover fitting surface.



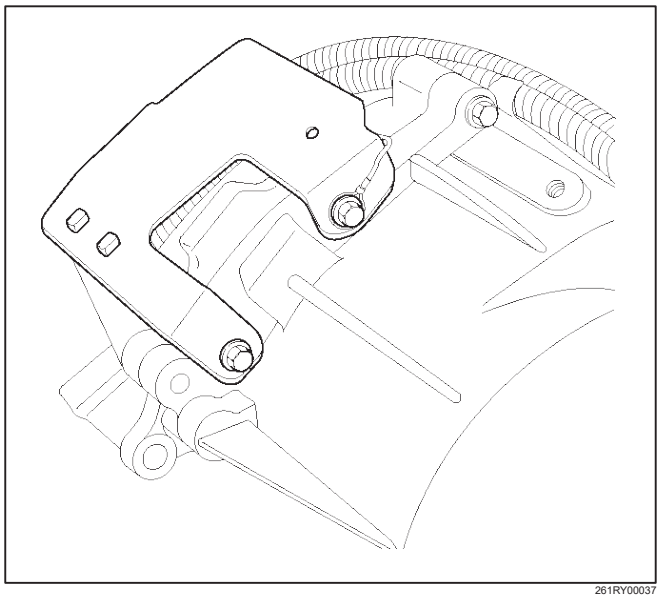
261RY00011

2. Install the plate, bracket, connector bracket and ground cable of the harness assembly, and tighten the transfer cover retaining bolts (16 pieces) to specified torque.

Torque: 31 N·m (23 lb ft)



261RY00035



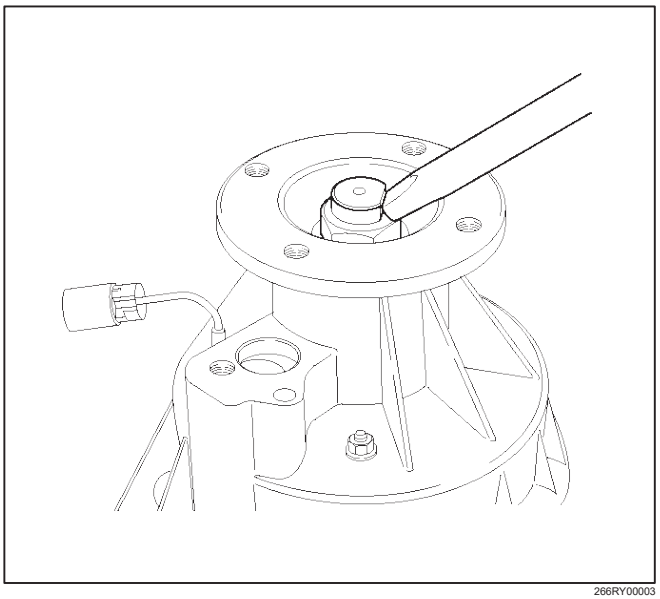
261RY00037

3. Install the front and rear companion flange.
4. Install the oil seal and washer, and using the flange holder J–8614–11, install the new end nut to the specified torque.

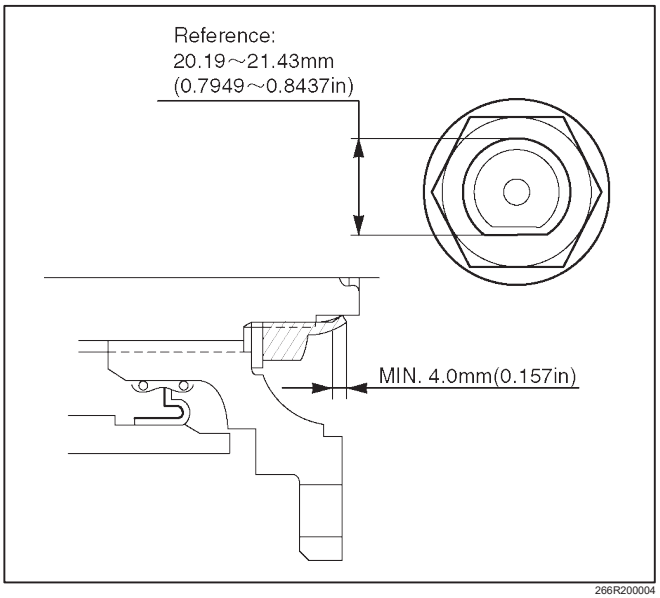
Torque: 167 N·m (123 lb ft)

5. Securely stake the end nut at one spot.

NOTE: Be sure to confirm that there is no clack at the staked portion of the end nut after staking.

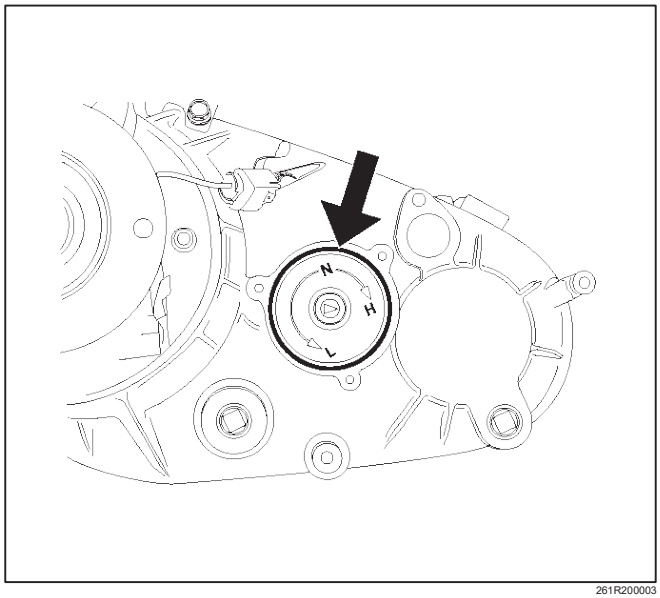


266RY00003



266R200004

6. Apply recommended liquid gasket (LOCTITE 598 or its equivalent) to the transfer cover and shift motor assembly fitting surface.



261R200003

7. Install the shift motor assembly to the transfer cover assembly.

   Torque: 10 N·m (87 lb in)

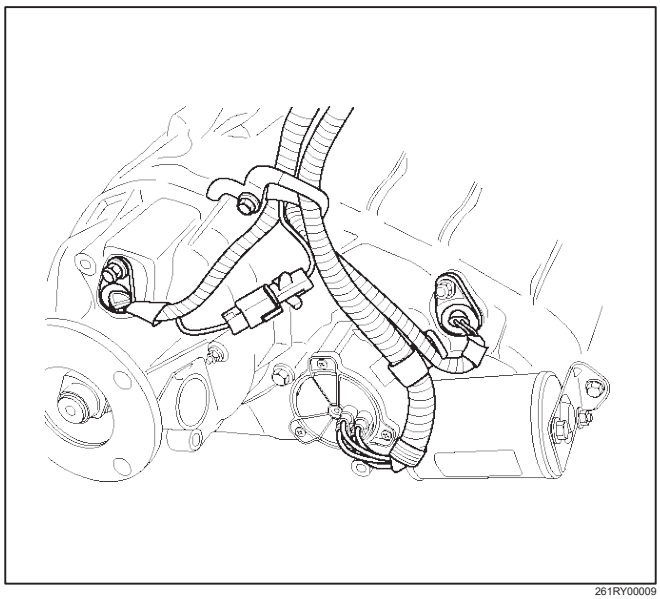
8. Install the 4H and 4L switch.

   Torque: 24 N·m (17 lb ft)

9. Install the harness assembly and shift motor harness connector to the connector bracket.
10. Install the front and rear speed sensors to the transfer cover.

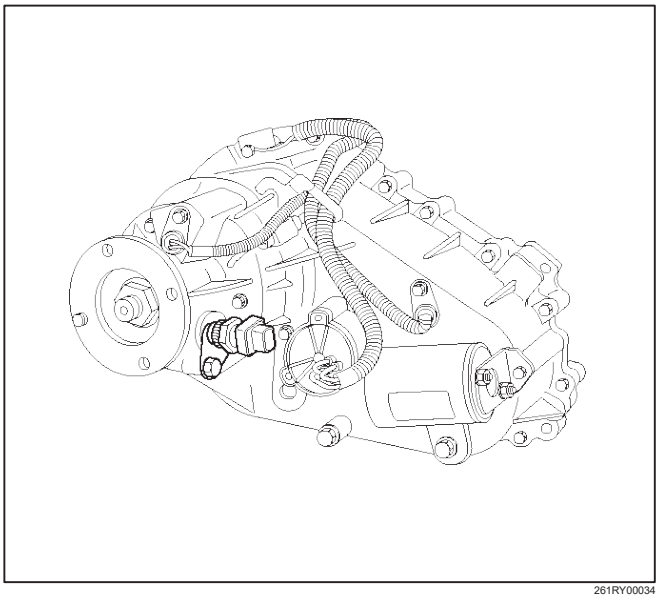
    Torque: 5 N·m (43 lb in)

11. Connect the harness assembly connector to the clutch solenoid coil harness connector and 4H and 4L switch.
    - Fix the harness with harness bracket.


261RY00009

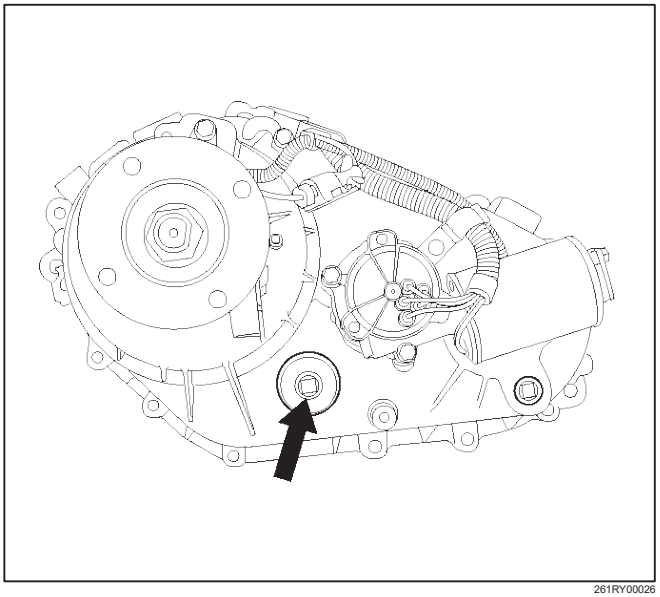
12. Install the driven gear and speedometer sensor to the transfer case.

    Torque: 25 N·m (19 lb ft)


261RY00034

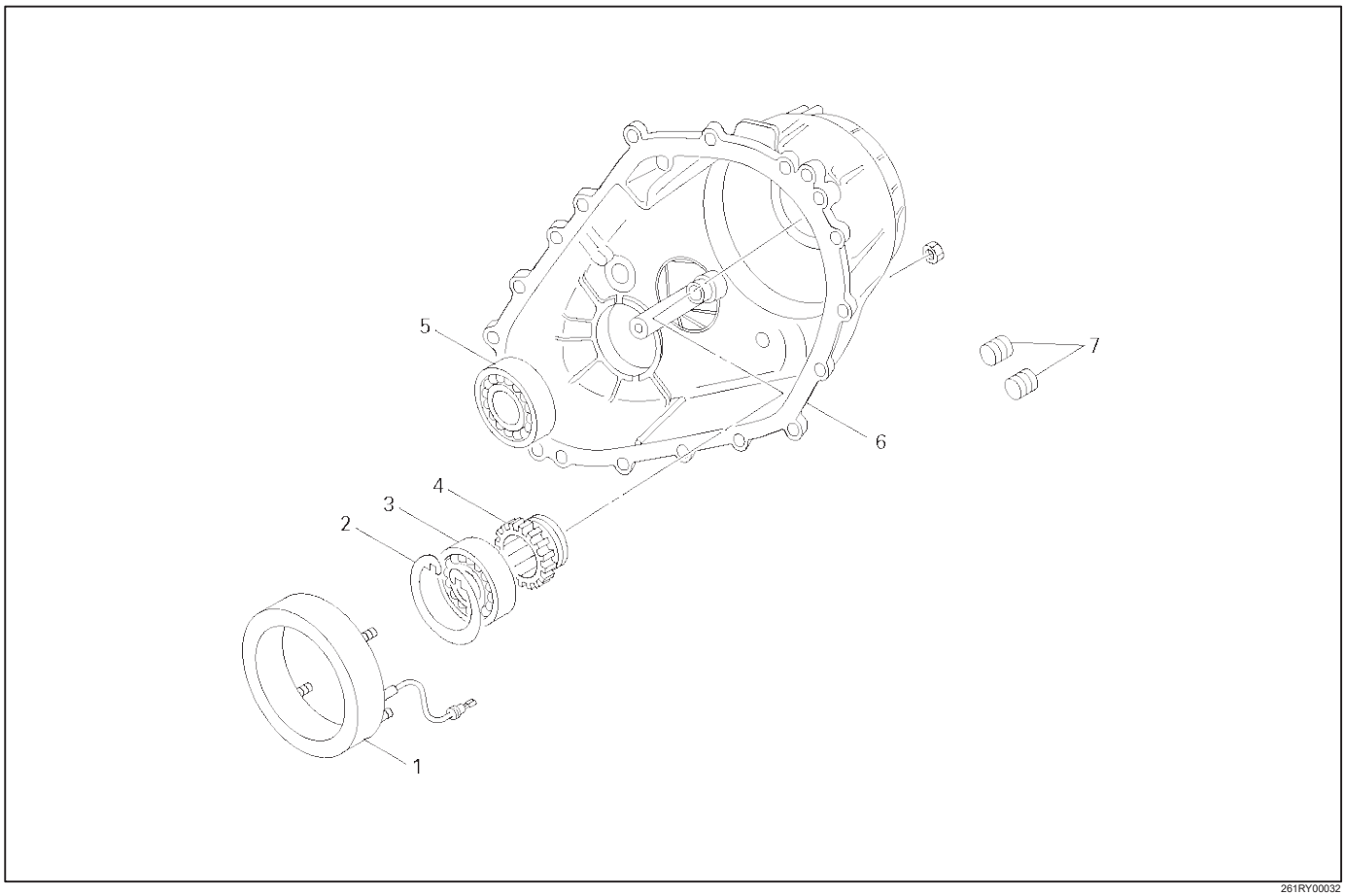
13. Remove the filler plug and fill the transfer case with ATF DEXRON®–II or III.
14. Wind the sealing tape around the filler plug thread and tighten the plug to the specified torque.

    Torque: 25 N·m (19 lb ft)


261RY00026

15. Install the breather hose to the transfer case.

Transfer Cover Assembly



261RY00032

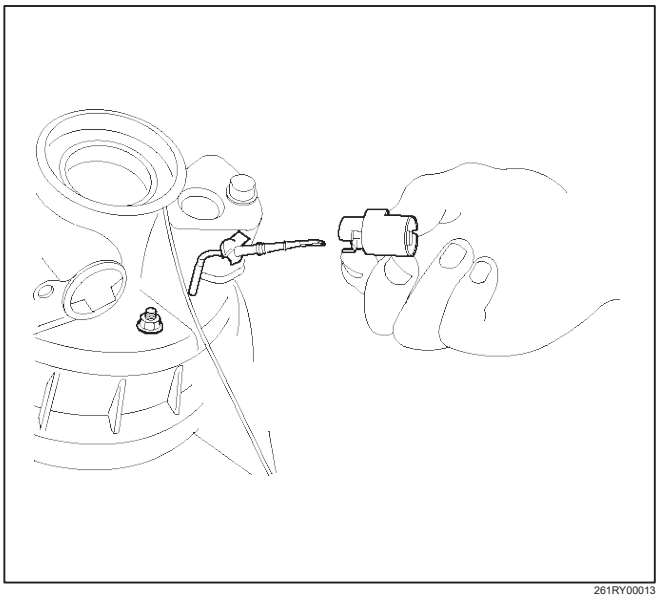
Legend

(1) Coil Assembly
(2) Snap Ring
(3) Ball Bearing
(4) Speed Gear and Tone Wheel
(5) Ball Bearing
(6) Transfer Cover (With Oil Seal)
(7) Oil Drain Plug and Oil Filler Plug

Disassembly

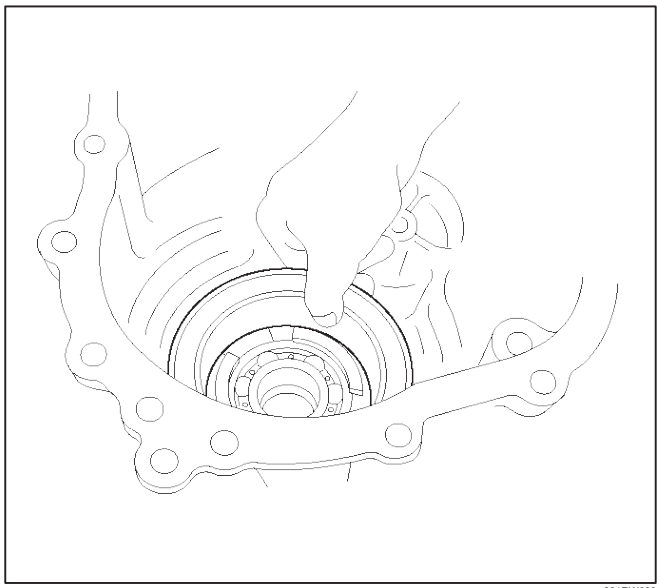
1. Using a precision screwdriver or a suitable tool, push down the lock to unlatch the terminal for the coil assembly, and pull the terminal out.

NOTE: Use care to prevent damage to harness terminal and connector.



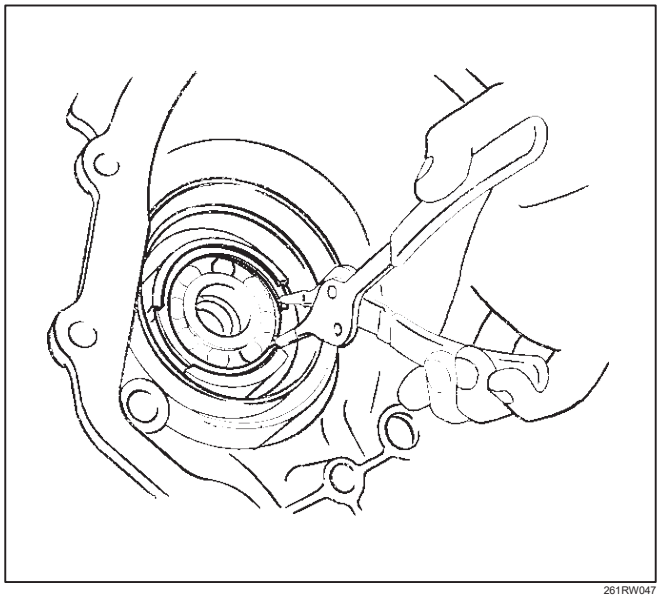
261RY00013

2. Remove the coil assembly set nuts (3 pieces) and coil assembly from the transfer cover.



261RW030

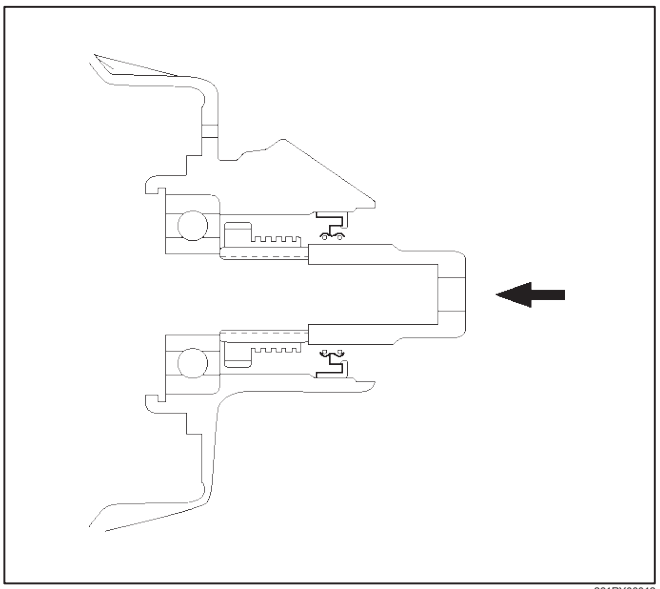
3. Using snap ring pliers, remove the snap ring from the transfer cover.



261RW047

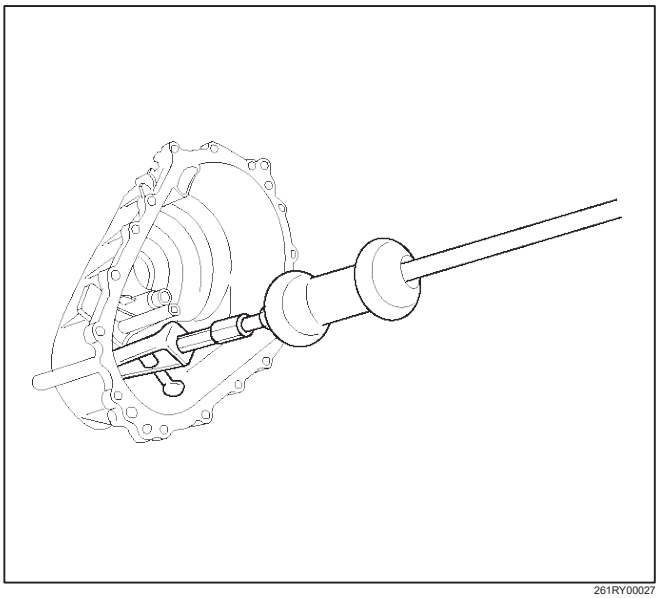
4. Strike the speed gear and tone wheel with a rod or other appropriate tool from the rear side of the transfer cover assembly, and remove the ball bearing, speed gear and tone wheel.

NOTE: Use care to prevent damage to the speed gear teeth.



261RY00012

5. Using the bearing remover J–42805 and slide hammer J–2619–01, remove the ball bearing of the front output shaft from the transfer cover.



261RY00027

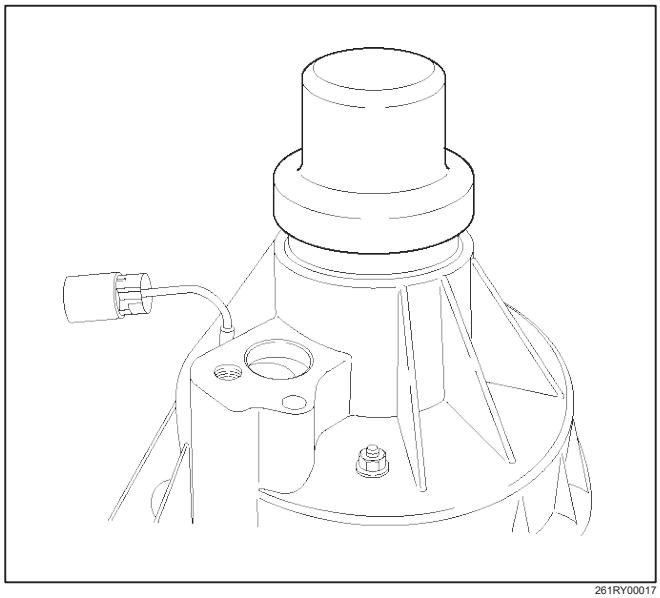
Inspection and Repair

Refer to *"Inspection and Repair (Transfer Case Assembly)" in this section.*

Reassembly

Transfer cover oil seal replacement

1. Remove the oil seal from the transfer cover assembly.
2. Apply oil to the circumference of the new oil seal and fill the lip with grease (BESCO L2 or its equivalent).
3. Using the oil seal installer J–42804, install the oil seal to the transfer cover assembly.

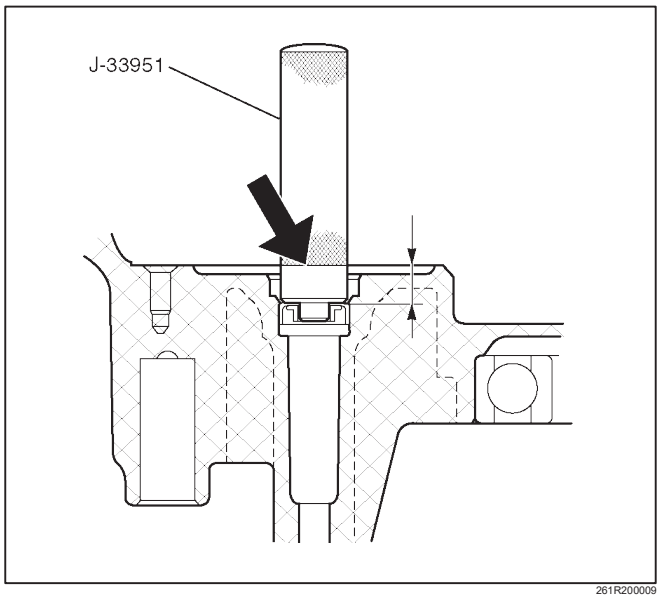


261RY00017

Shift shaft oil seal replacement

4. Remove the oil seal from the transfer cover assembly.
5. Apply oil the circumference of the new oil seal.
6. Using the oil seal installer J–33951, install the oil seal to the transfer cover assembly.
   The drive in depth must be 9.4 ~ 10.4 mm (0.370 ~ 0.409 in). The knurled end of the installer (indicated by the arrow) must be flush with the oil seal installation surface.

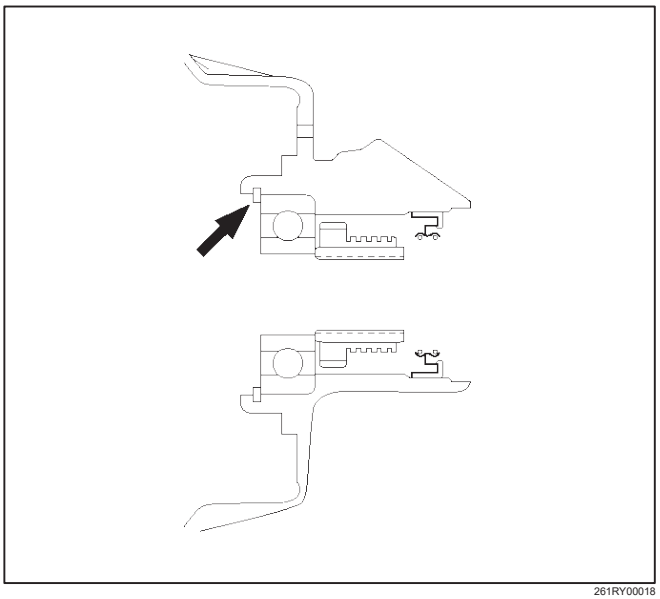
NOTE: Use care to prevent tilt to oil seal when installing oil seal to the case.



261R200009

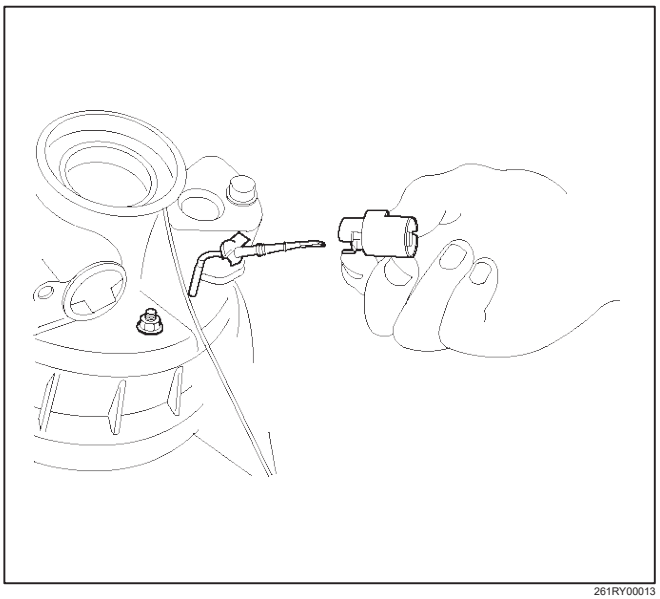
7. Install the ball bearing of the front output shaft to the transfer cover.
8. Install the speed gear and tone wheel.
9. Install the ball bearing to the transfer cover.
10. Using snap ring pliers, install the snap ring to the transfer cover.

NOTE: The snap ring must be fully inserted into the transfer cover snap ring groove.



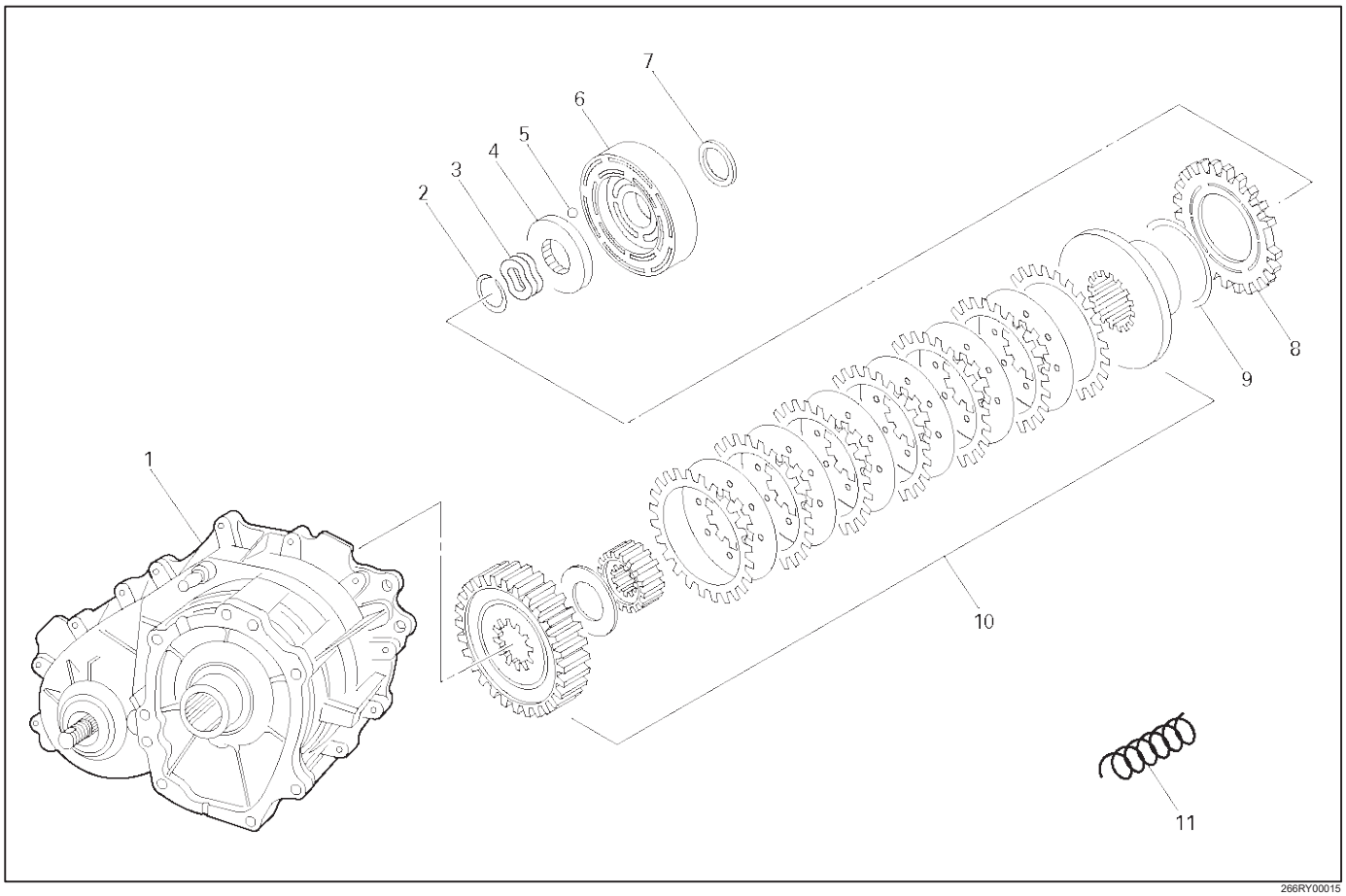
261RY00018

11. Install the coil assembly to the transfer cover and tighten the set nuts (3 pieces) to the specified torque.
    Torque: 10 N·m (87 lb in)
12. Install the connector to the harness terminal of the coil assembly.



261RY00013

Clutch Pack and Clutch Cam (Transfer Case Assembly)



266RY00015

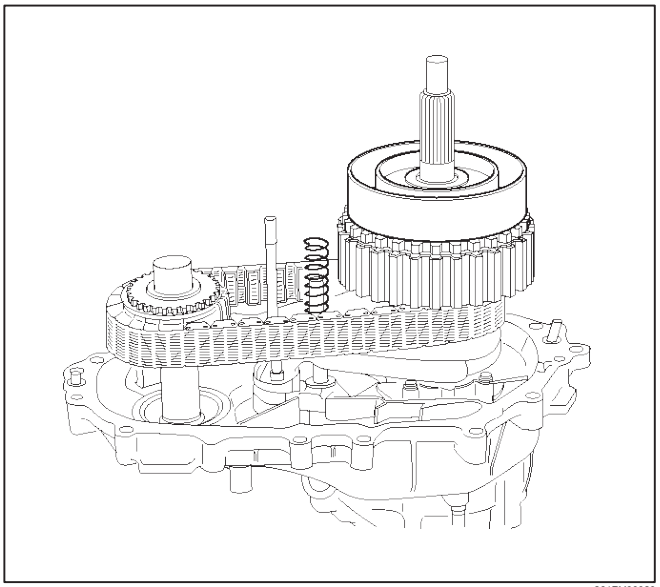
Legend

(1) Transfer Case Assembly
(2) Snap Ring
(3) Wave Spring
(4) Cam Pulley
(5) Cam Ball
(6) Cam and Coil Housing Assembly
(7) Thrust Bearing
(8) Armature Plate
(9) Insulator Washer
(10) Clutch Pack Assembly
(11) Lockup Fork Spring

Disassembly

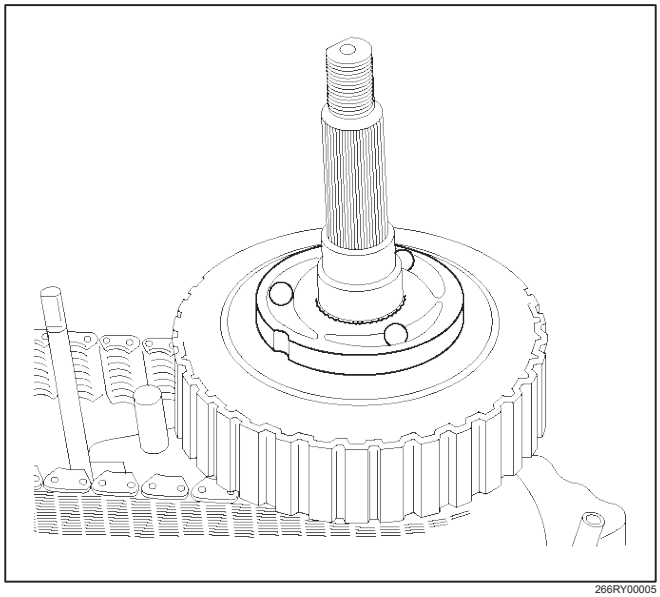
1. Remove the lockup fork spring.
2. Remove the thrust bearing and cam and coil housing assembly from the output shaft.

NOTE: When the cam and coil housing assembly is removed, the cam balls may be detached together with the housing. Pay attention not to lose the ball.

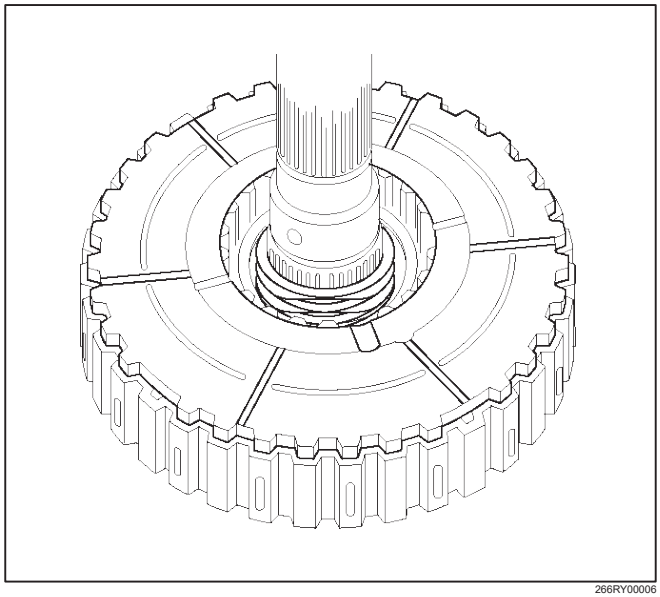


261RY00020

3. Remove the cam ball (3 pieces).
4. Remove the cam pulley.

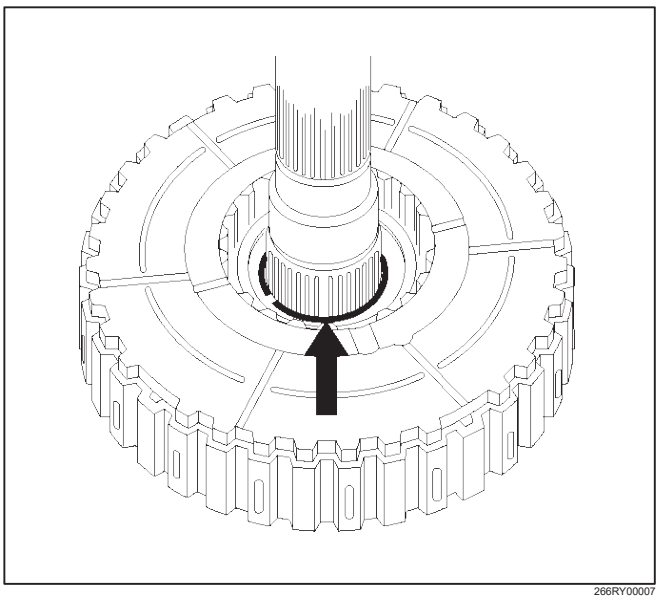

266RY00005

5. Remove the wave spring.

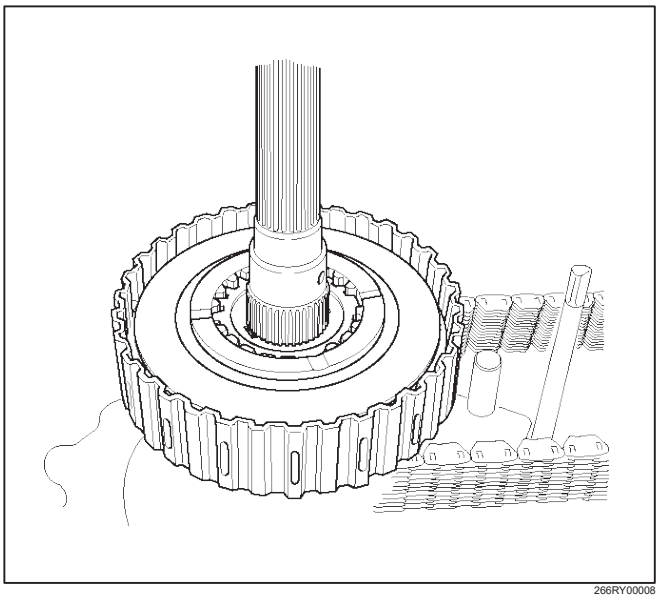

266RY00006

6. Using snap ring pliers, remove the snap ring.

NOTE: Use care to prevent damage to snap ring.


266RY00007

7. Remove the armature plate, insulator washer and clutch pack assembly as a package.

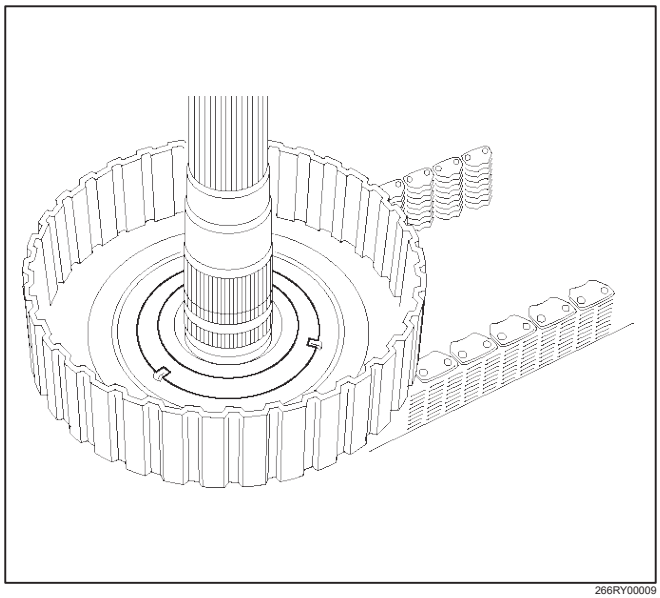

266RY00008

Reassembly

1. Install the clutch pack assembly which the multi clutch plate is orderly installed to the output shaft.

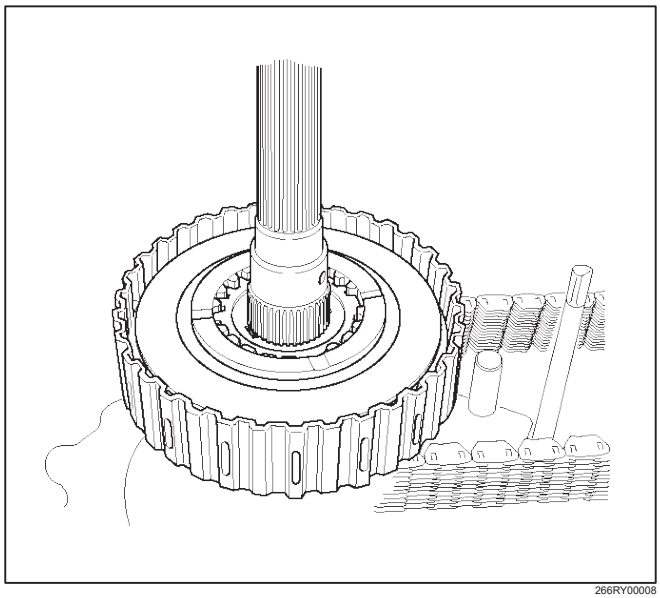
NOTE:

- Install the clutch pack assembly while adjusting the phase of both the clutch housing and drive sprocket.
- During installation, the plate of the clutch pack assembly may slide out of this fixed position (the correct position is shown in the illustration). If this occurs, remove all of the clutch plates of the clutch pack assembly and reinstall them to their correct position.



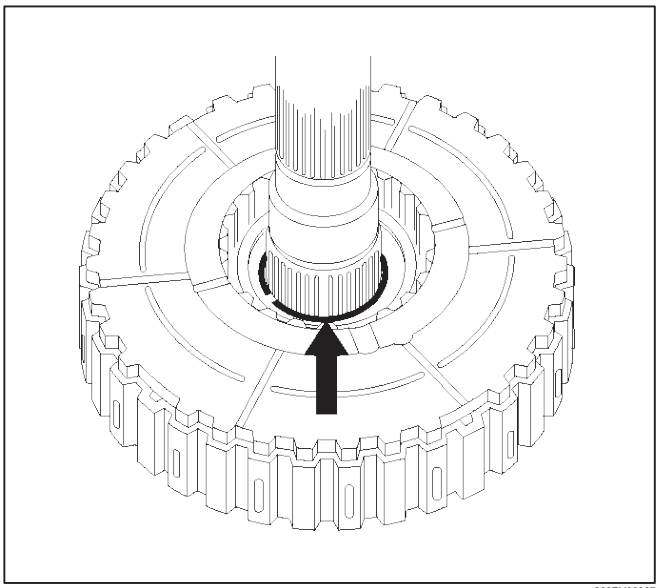
266RY00009

2. Install the insulator washer and armature plate to the clutch pack assembly.



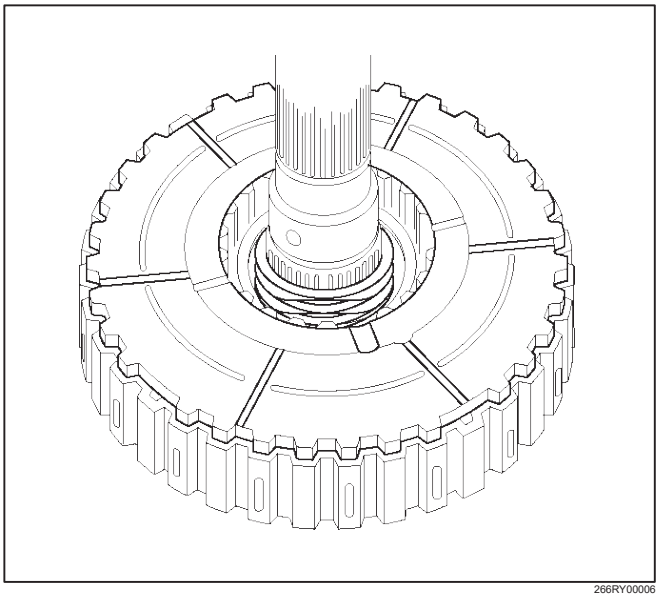
266RY00008

3. Using snap ring pliers, install the snap ring to the output shaft.



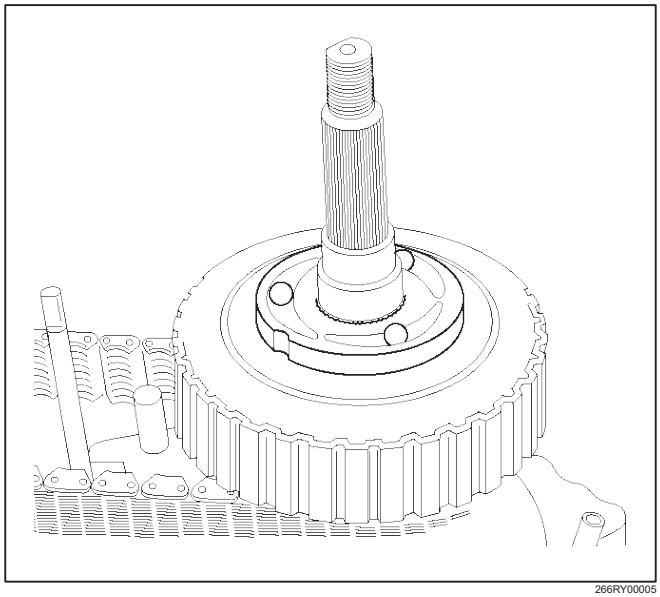
266RY00007

4. Install the wave spring to the output shaft.

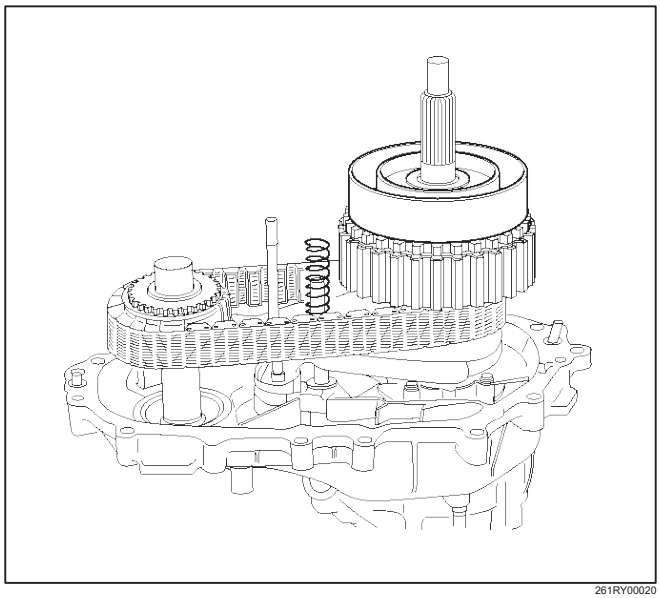


266RY00006

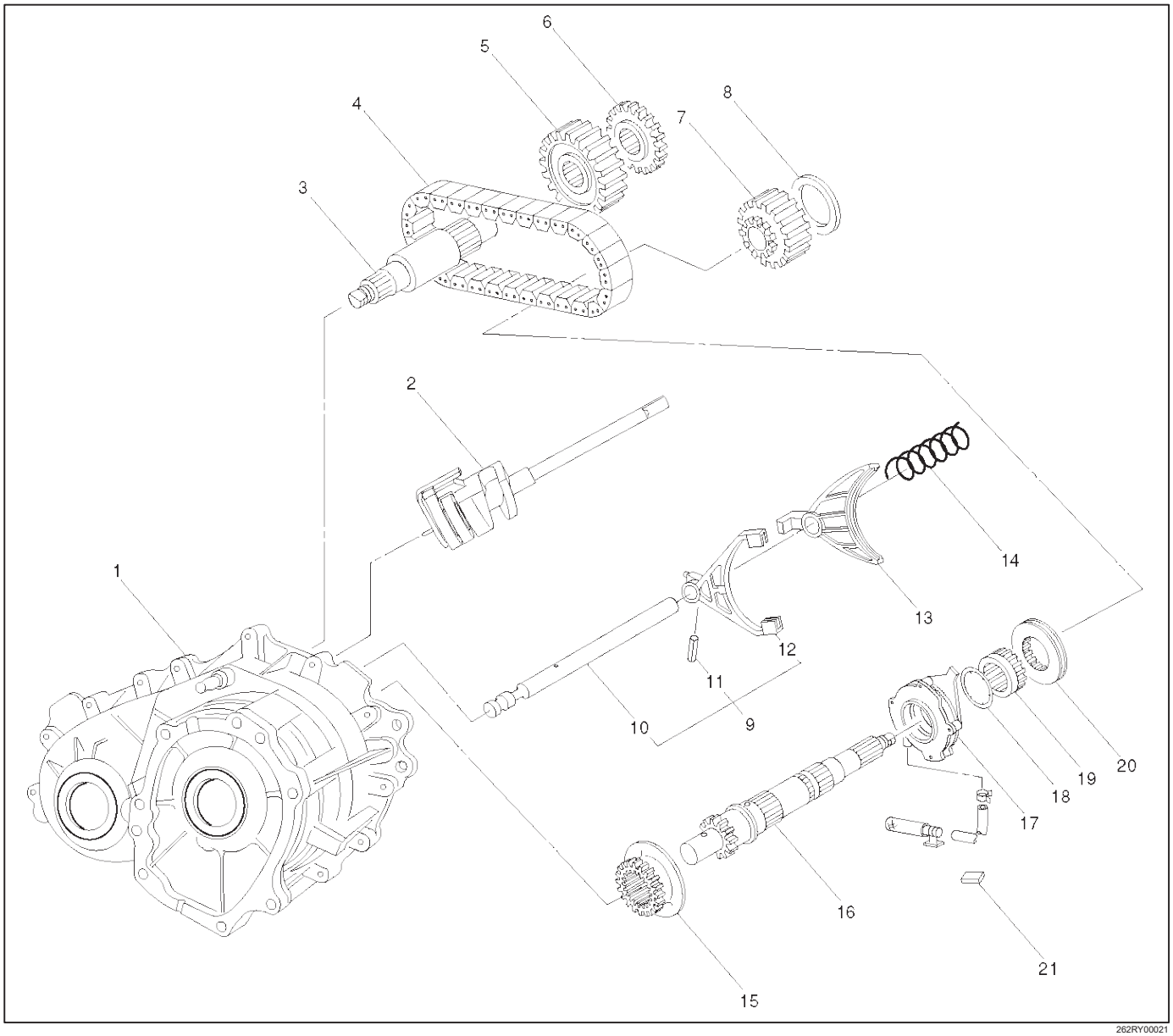
5. Install the cam pulley.
6. Place a ball on each groove of the cam pulley.


266RY00005

7. Install the cam and coil housing to the output shaft.
8. Install the thrust bearing.
9. Install the lockup fork spring.


261RY00020

Chain, Sprocket and Mechanical Lock (Transfer Case Assembly)

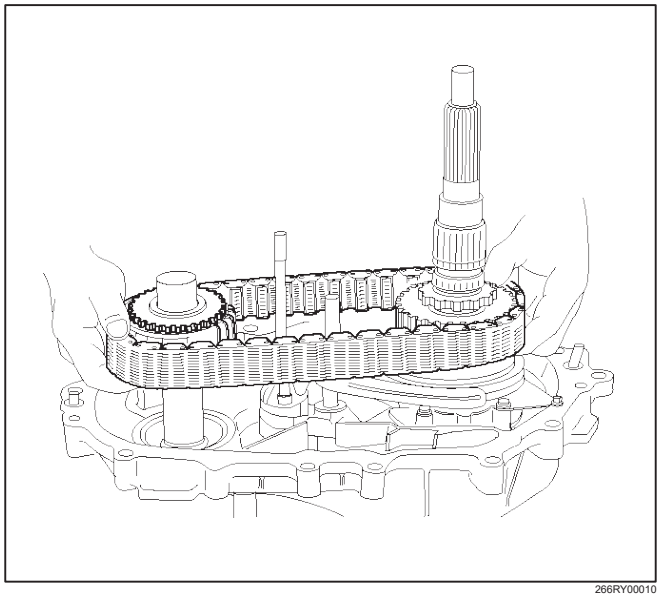


Legend

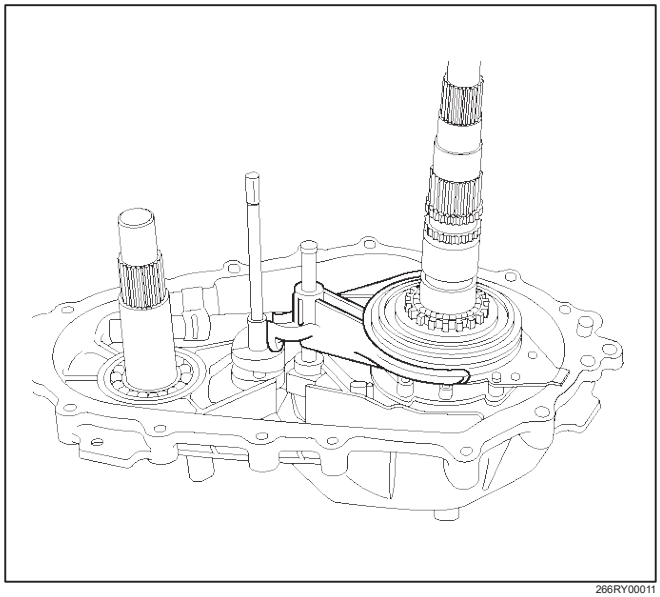
(1) Transfer Case Assembly
(2) Cam and Shaft Rail Assembly
(3) Front Output Shaft
(4) Chain
(5) Lower Drive Sprocket
(6) Front Tone Wheel
(7) Drive Sprocket
(8) Spacer
(9) Shift Fork and Rail Assembly
(10) Lockup Rail
(11) Spring Pin
(12) Shift Fork Assembly
(13) Lockup Fork
(14) Lockup Fork Spring
(15) Reduction Hub
(16) Rear Output Shaft
(17) Oil Pump Assembly (with Strainer)
(18) Thrust Washer
(19) Lockup Hub
(20) Lockup Collar Assembly
(21) Magnet

Disassembly

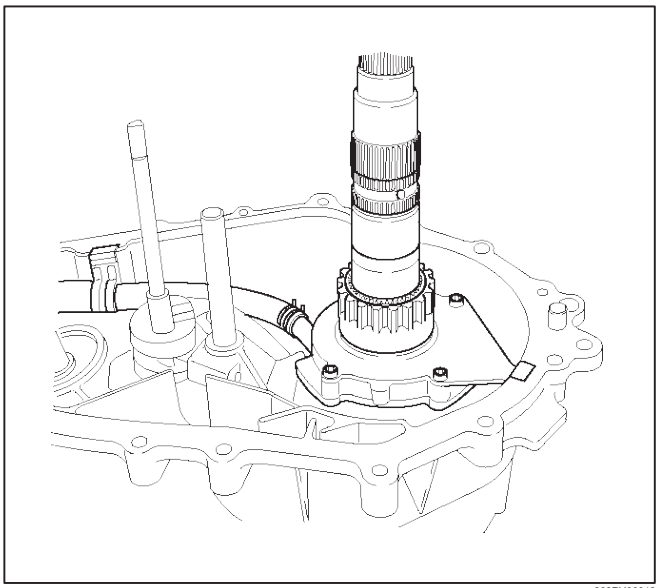
1. Remove the spacer.
2. Remove the front tone wheel, lower drive sprocket, drive sprocket and chain together from the front and rear output shaft.


266RY00010

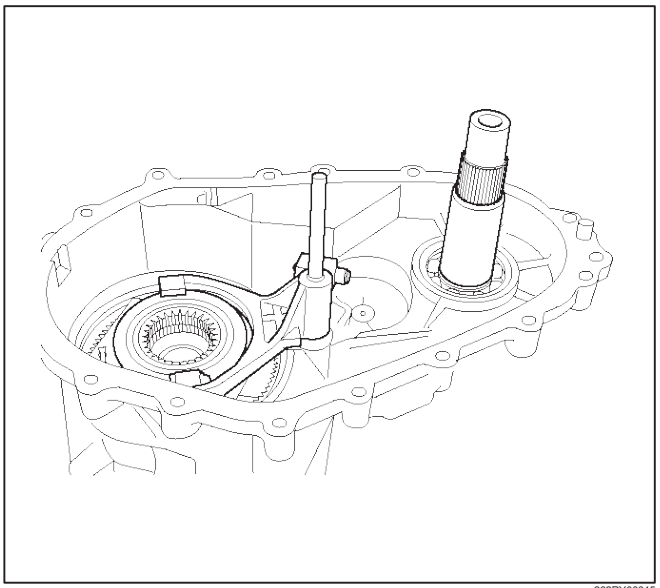
3. Remove the lockup collar assembly and lockup fork together.


266RY00011

4. Remove the lockup hub.
5. Remove the thrust washer.
6. Remove the magnet from the strainer set position together with the oil pump assembly.


266RY00012

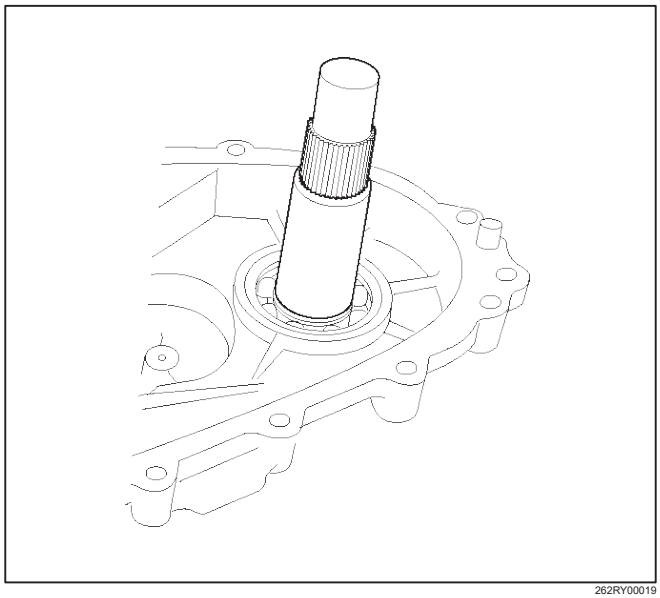
7. Remove the output shaft.
8. Remove the cam and shaft rail assembly.


262RY00015

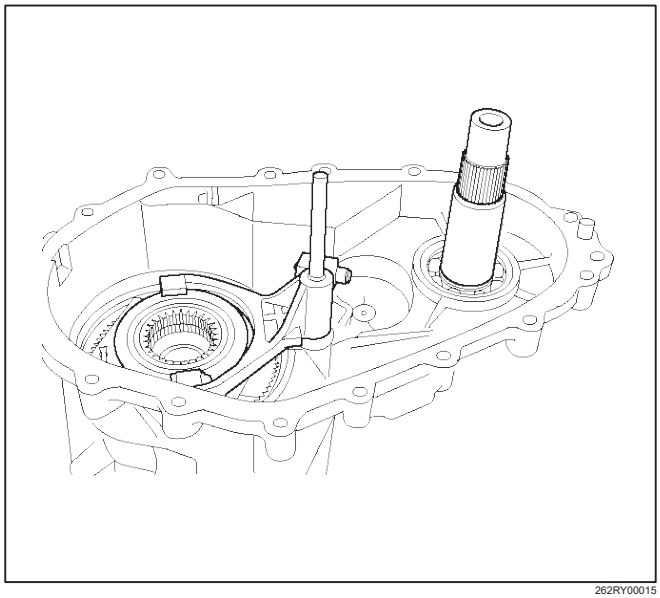
9. Remove the shift fork and rail assembly, and reduction hub.
10. Remove the spring pin from the shift fork and rail assembly.
11. Remove the shift fork assembly from the lockup rail.
12. Remove the front output shaft from the transfer case.

Reassembly

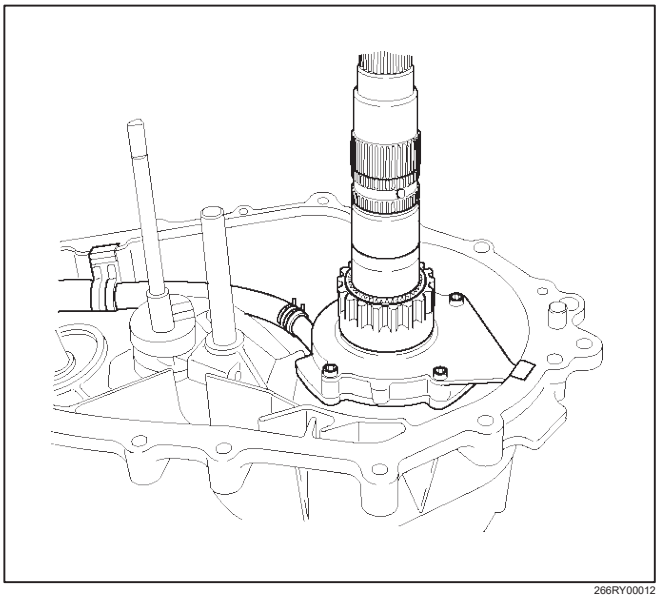
1. Apply ATF to the inside of the ball bearing.
2. Install the front output shaft to the transfer case.


262RY00019

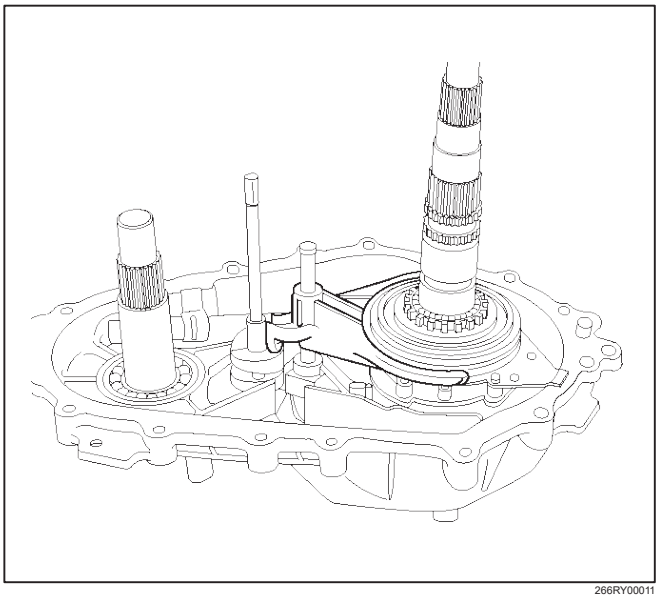
3. Install the shift fork assembly to the lockup rail and fix the assembly with the snap ring.
4. Install the shaft fork and rail assembly and reduction hub to the transfer case.


262RY00015

5. Install the output shaft to the transfer case.
6. Install the oil pump assembly to the output shaft and attach the magnet to the strainer set position.
7. Install the thrust washer.
8. Install the lockup hub.
9. Install the cam and shaft rail assembly.


266RY00012

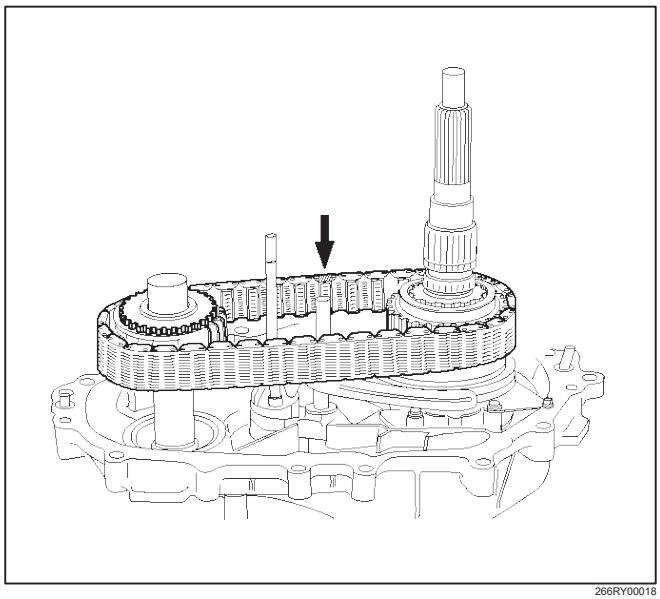
10. Install the lockup collar assembly and lockup fork together.


266RY00011

11. Apply ATF to the chain and engage it to both sprockets.
12. Mount the chain and sprocket assembly to both output shafts.

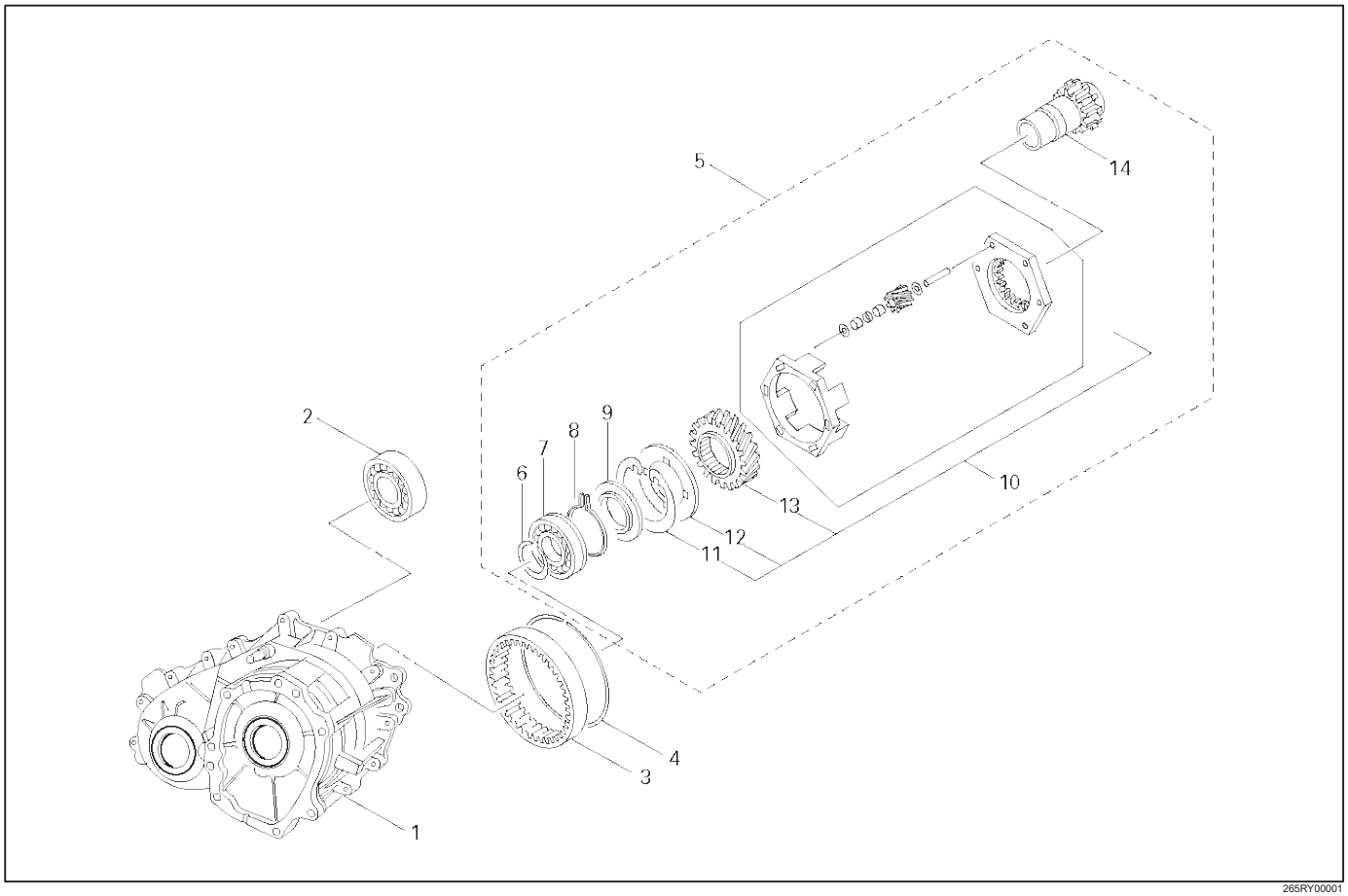
NOTE: When installing chain, the copper colored ring of the chain (indicated by the arrow) to be installed in direction of rear.

13. Install the front torn wheel to the front output shaft.
14. Install the spacer to the drive sprocket assembly.



266RY00018

Transfer Case Assembly



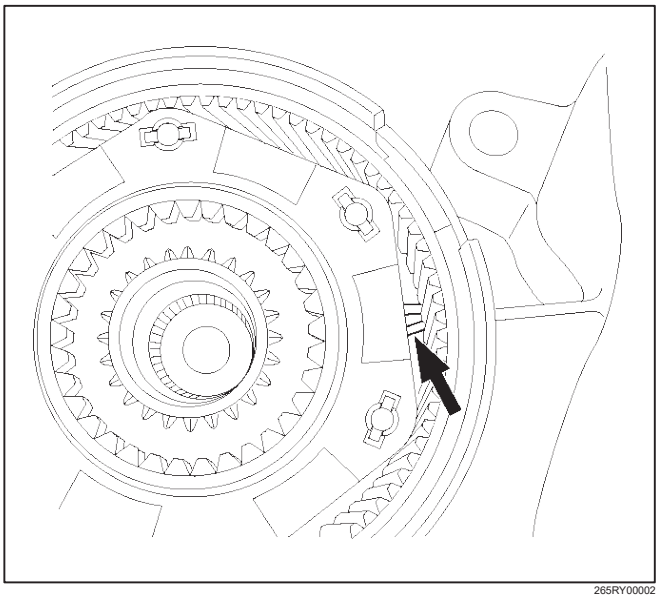
265RY00001

Legend

(1) Transfer Case (with Oil Seal)
(2) Ball Bearing
(3) Ring Gear
(4) Snap Ring
(5) Input Shaft and Carrier Assembly
(6) Snap Ring
(7) Ball Bearing
(8) Snap Ring
(9) Circular Hub
(10) Carrier Assembly
(11) Snap Ring
(12) Thrust Plate
(13) Sun Gear
(14) Input Shaft Assembly (with Bearing and Bushing)

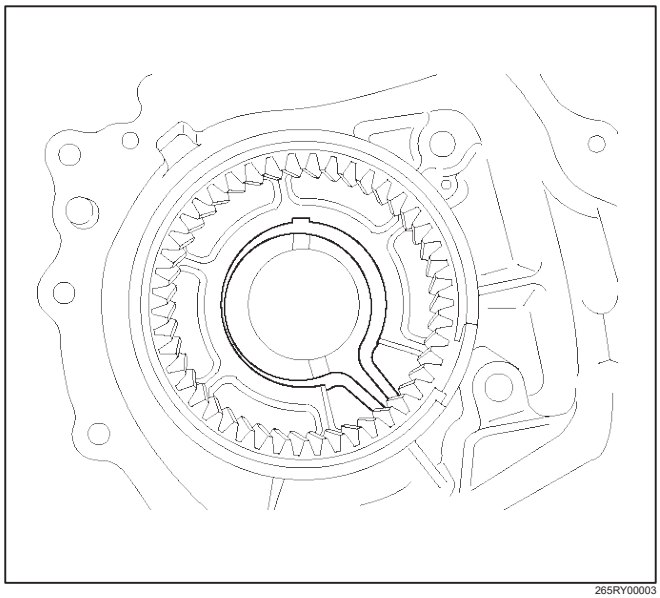
Disassembly

1. Using snap ring pliers, open the snap ring from the gap on the carrier assembly.
   While opening the snap ring, remove the input shaft assembly, carrier assembly and thrust plate together from the transfer case.



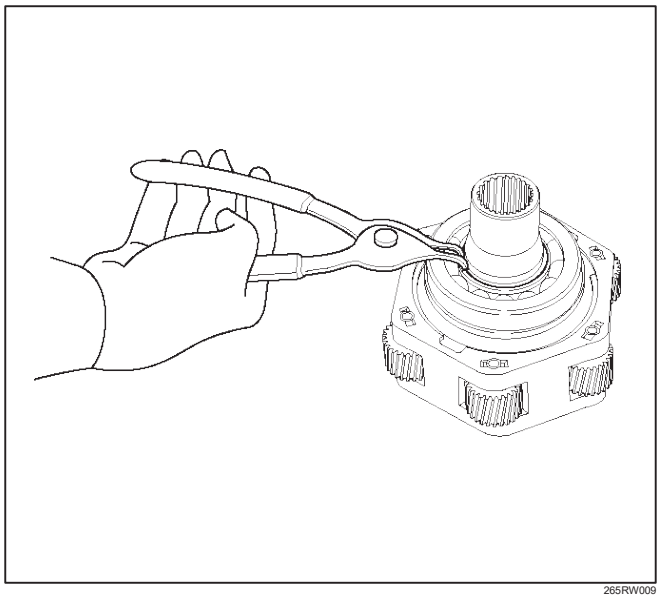
265RY00002

2. Remove the snap ring from the transfer case.



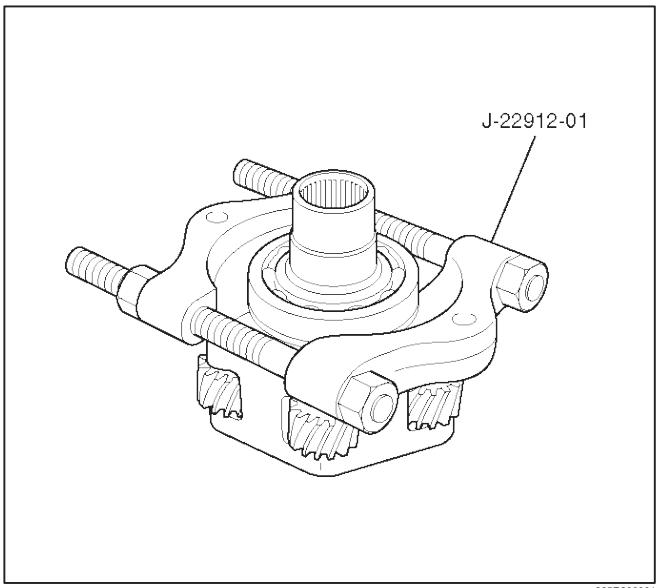
265RY00003

3. Using snap ring pliers, remove the snap ring.



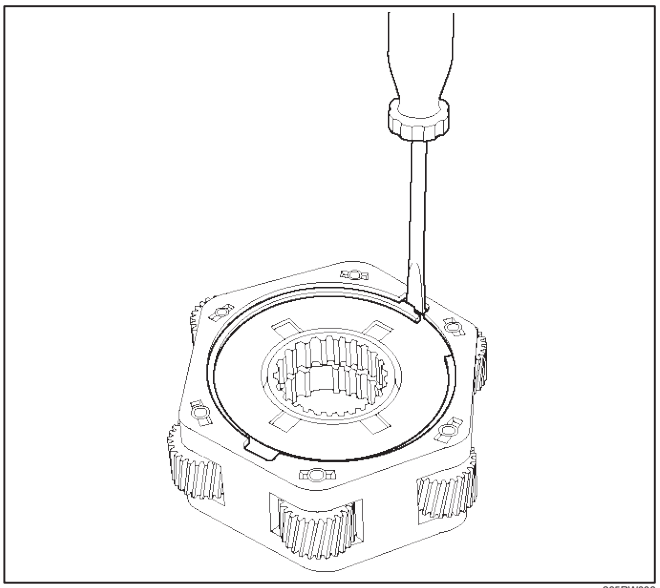
265RW009

4. Using the bearing remover J–22912–01, remove the ball bearing from the input shaft.



265R200001

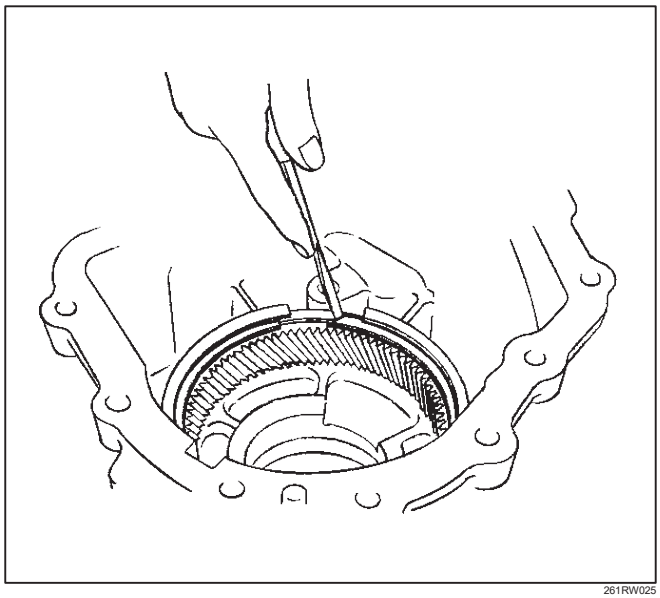
5. Remove the circular hub.
6. Remove the snap ring from the carrier assembly.



265RW006

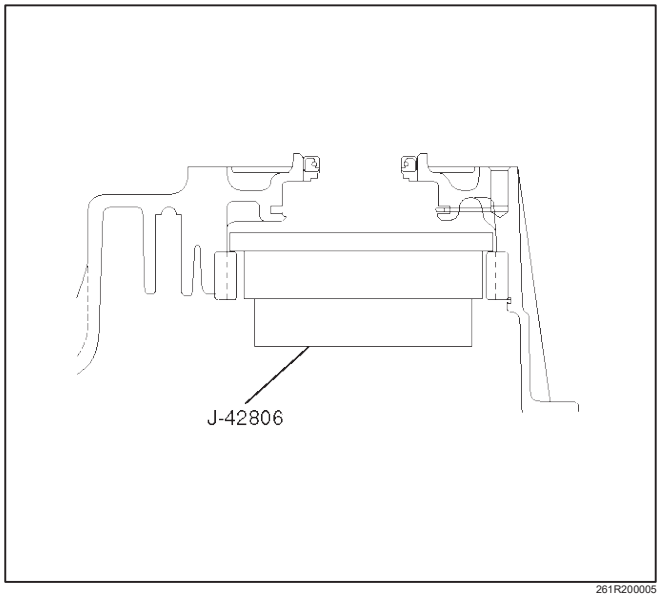
7. Remove the thrust plate from the carrier assembly.

8. Remove the snap ring before the ring gear.



261RW025

9. Using the ring gear remover J–42806 and a bench press, remove the ring gear from the transfer case.



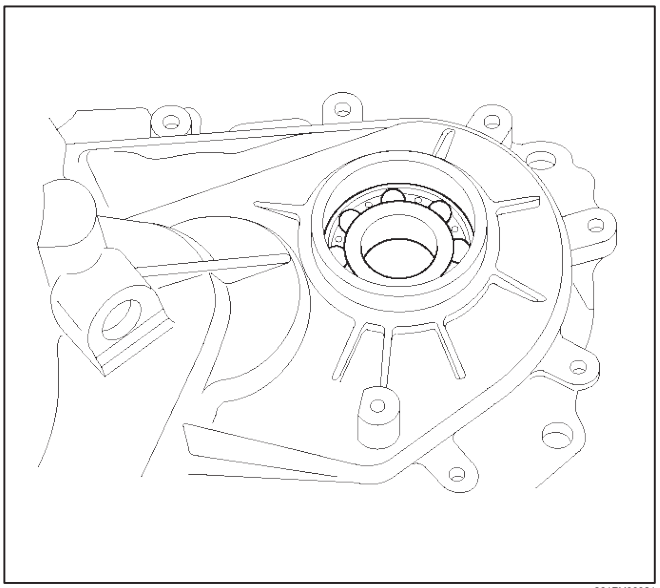
261R200005

NOTE: Removing ring gear needs a high-load press.

This means the transfer case may be damaged.

To remove and replace the ring gear, it is recommended that the transfer case assembly should be replaced.

10. Remove the ball bearing of the front output shaft from the transfer case.

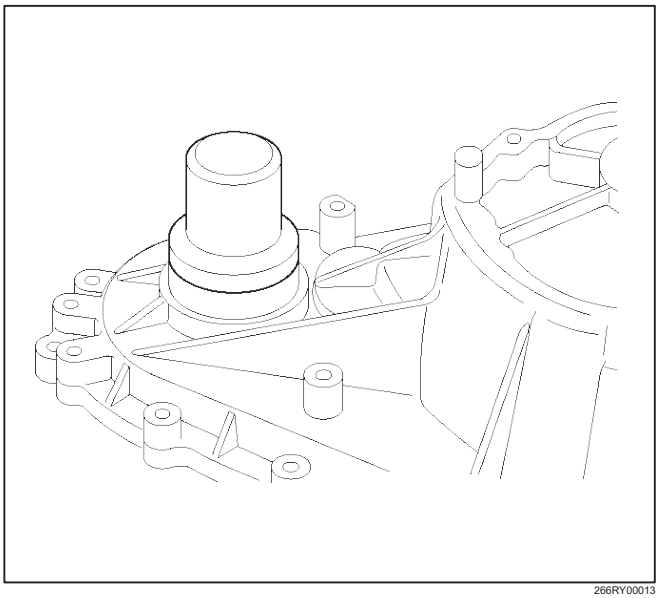


261RY00021

Reassembly

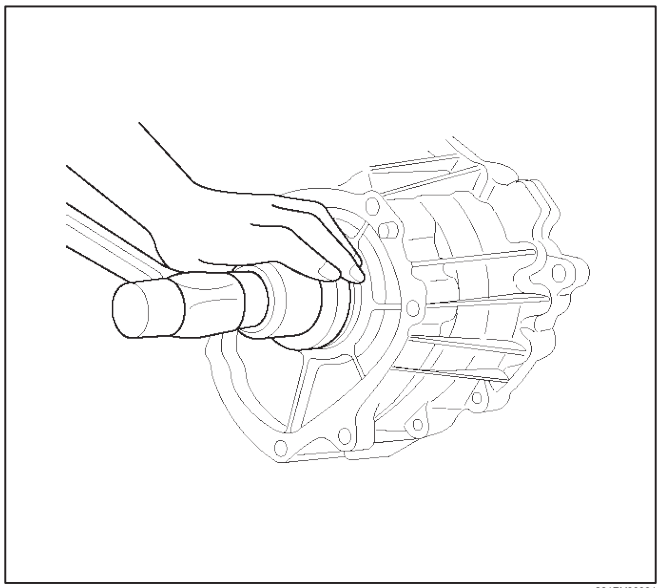
Oil Seal Replacement

1. Remove the oil seal of the front output shaft and input shaft from the transfer case.
2. Apply the circumference of the new oil seal and fill the lip with grease (BESCO L2 or its equivalent).
3. Using the oil seal installer J–42807, install the front output shaft oil seal to the transfer case.



266RY00013

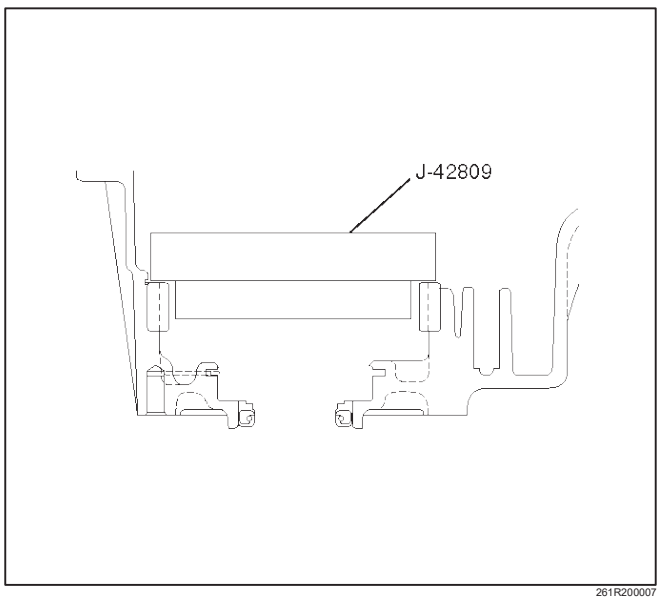
4. Using the oil seal installer J–42808, install the input shaft oil seal to the transfer case.


261RY00031

5. Using the ring gear installer J–42809 and a bench press, install the ring gear to the transfer case.

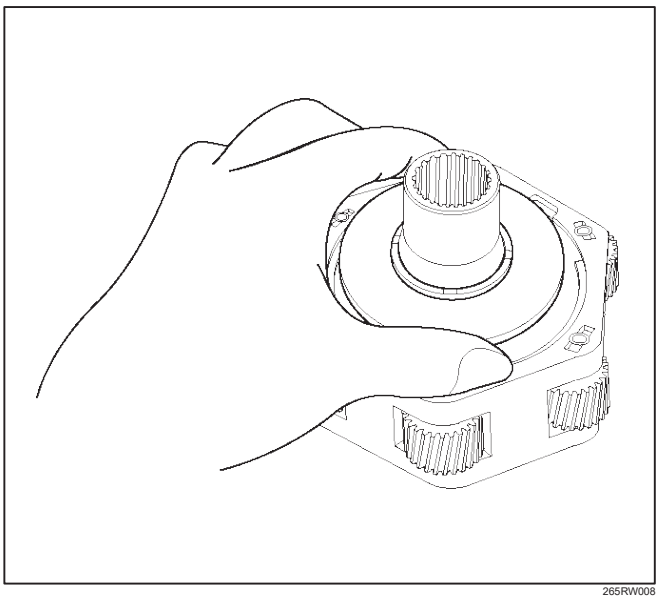
NOTE: Pay attention to the following points.

- Identify the correct direction of gear.
- Do not damage the gear.
- Do not press-fit the ring gear slantingly.
- Press-fit the ring gear to the innermost.
- Remove burrs generated by press-fitting.
- If the transfer case has serrations, match them with those of the gear and press-fit the gear.

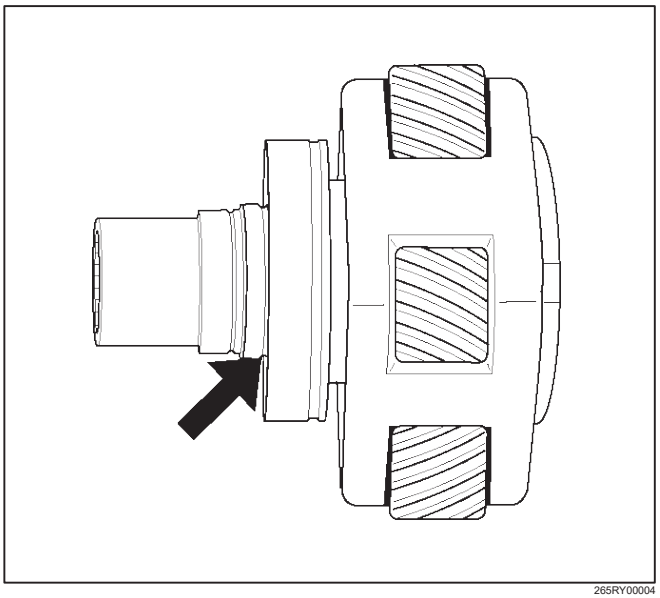


261R200007

6. Install the snap ring.
7. Install the thrust plate to the carrier assembly. Attach the snap ring to the carrier assembly.
8. Install the carrier assembly to the input shaft.
9. With care the direction of circular hub, mount it to the input shaft.

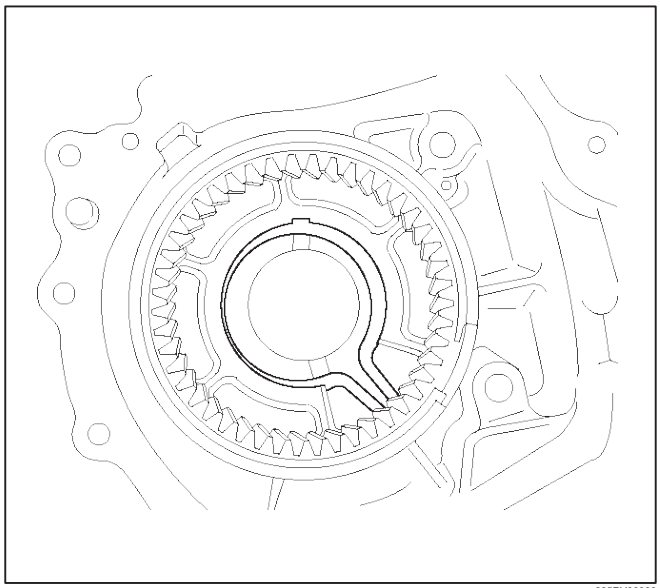

265RW008

10. Press the ball bearing to the input shaft so that the snap ring will be attached to the input shaft.


265RY00004

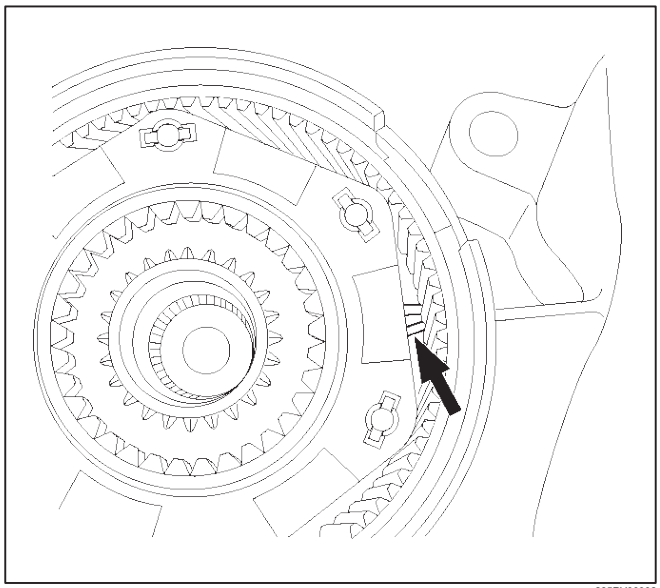
11. Install the snap ring to the input shaft.
12. Install the ball bearing of the front output shaft to the transfer case.

13. Install the snap ring of the input shaft bearing to the transfer case.



265RY00003

14. Using snap ring pliers, open the snap ring from the gap on the carrier assembly.
    While opening the snap ring, securely attach the input shaft and carrier assembly to the transfer case.



265RY00002

Inspection and Repair (Transfer Case Assembly)

When wear, damage, or any other defects are observed during the inspection, the part or parts must be repaired or replaced. Wash all the parts with clean detergent, and check that old oil, metallic particles, dirt, or foreign materials are completely removed. Blow the air into oil holes and grooves to remove foreign materials or residual detergent.

Chain

- Check whether the face that contacts the sprocket is free from excessive wear or damage. If defects are observed, replace the part.
- If the chain interference mark is found on the inside wall of the transfer cover or the chain is so slack that a skipped engagement occurs between the chain and sprocket, replace the chain.

Sprocket

- Check whether the sprocket tooth surface is excessively worn or damaged, and there is evidence of burrs, chipping, wear, or damage on the gear spline. Remove minor flaws or scratches with oil stone. If excessive wear or damage is observed, replace the part.
- If excessive wear or damage is observed on the sprocket inside sliding surface, replace the part.

Gear

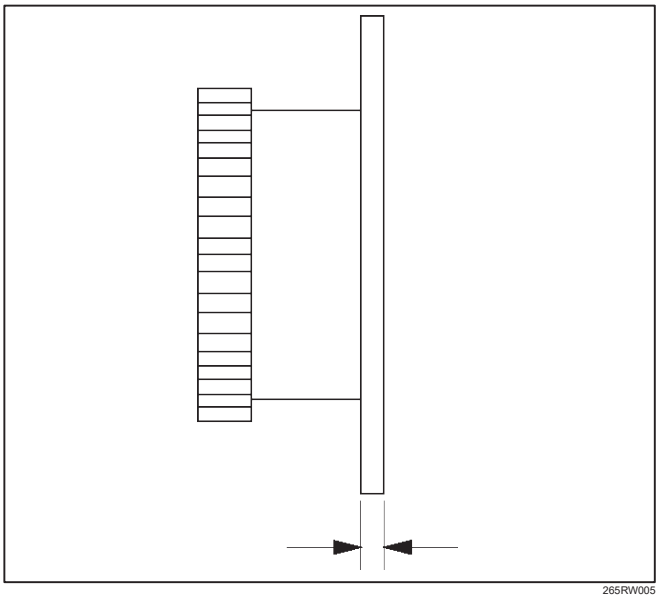
- Check whether the gear tooth surface is excessively worn or damaged, and there is evidence of burrs, chipping, wear, or damage on the gear spline.
  Remove minor flaws or scratches with oil stone. If excessive wear or damage is observed, replace the part.

Thickness of Reduction Hub

- Measure the thickness with a micrometer.
- If the measurement exceeds the limit, replace the reduction hub.

  Standard : 3.05–3.30 mm (0.120–0.130 in)

  Allowable limit : 2.5 mm (0.098 in)



265RW005

Lockup Collar Assembly

- Install the lockup hub, drive sprocket assembly, and lockup collar assembly to the output shaft.
- If the lockup collar assembly does not move smoothly, replace the lockup collar assembly.

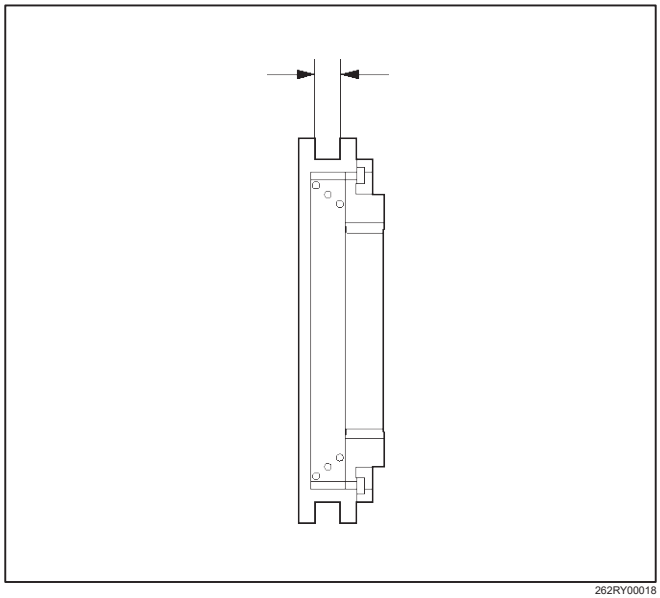
NOTE: Apply ATF to the rear engaging the gear.

Width of Lockup Collar

- Using calipers, measure the lockup collar groove for width of wear.
- If the measurement exceeds the limit, replace the lockup collar assembly.

Standard : 7.16–7.32 mm (0.282–0.288 in)

Allowable limit : 7.9 mm (0.311 in)



262RY00018

Shift Fork and Rail Assembly

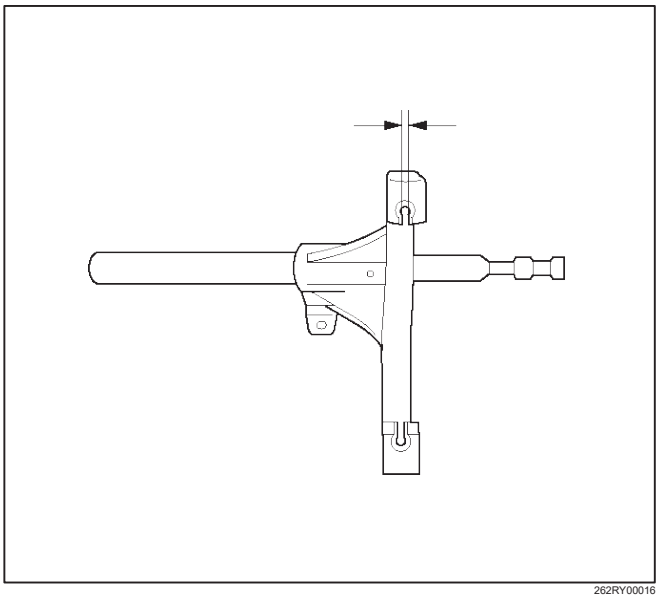
Check the shift fork and rail for wear, distortion, and scratches. If defects are observed, replace the parts.

Thickness of Shift Fork

- If the measurement exceeds the limit, replace the shift fork.

Standard : 3.41–3.79 mm (0.134–0.149 in)

Allowable limit : 4.4 mm (0.173 in)



262RY00016

Lockup Fork and Rail

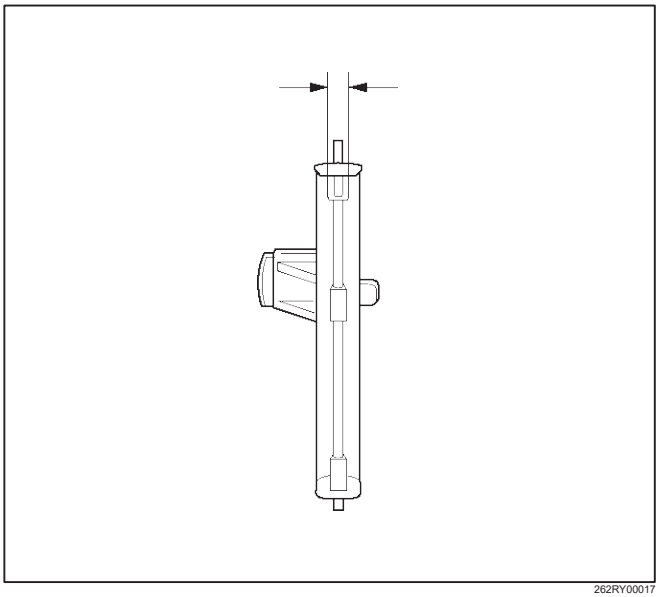
- Check the lockup fork and rail for wear, distortion, and scratches. If defects are observed, replace the parts.

Thickness Lockup Fork

If the measurement exceeds the limit, replace the lockup fork.

Standard : 6.99–7.09 mm (0.275–0.279 in)

Allowable limit : 6.3 mm (0.248 in)



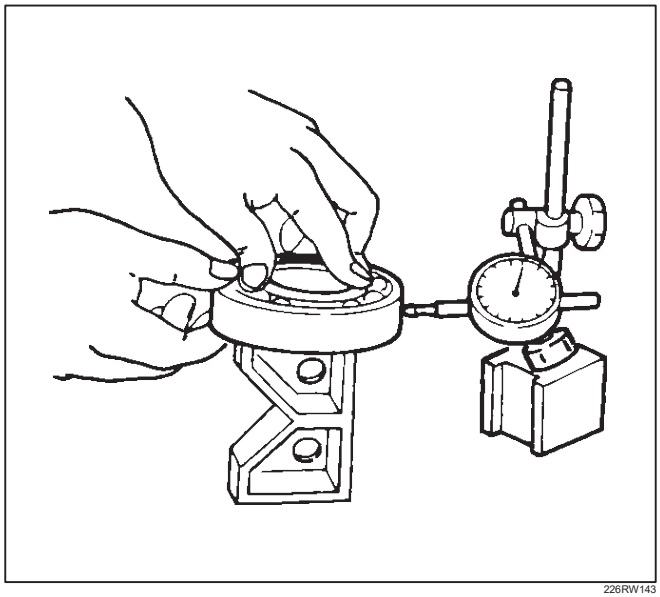
262RY00017

Bearing

Check the profile of the needle, roller, ball, and thrust bearings. Wash the bearings with clean detergent completely, and dry with air.

NOTE: If the bearing is rotated excessively, the rollers may be damaged. So, rotate the bearing slowly with your hand. Apply grease to the bearing, and check the smoothness of the bearing while slowly rotating the race with your hand.

Allowable limit : 0.23 mm (0.009 in)



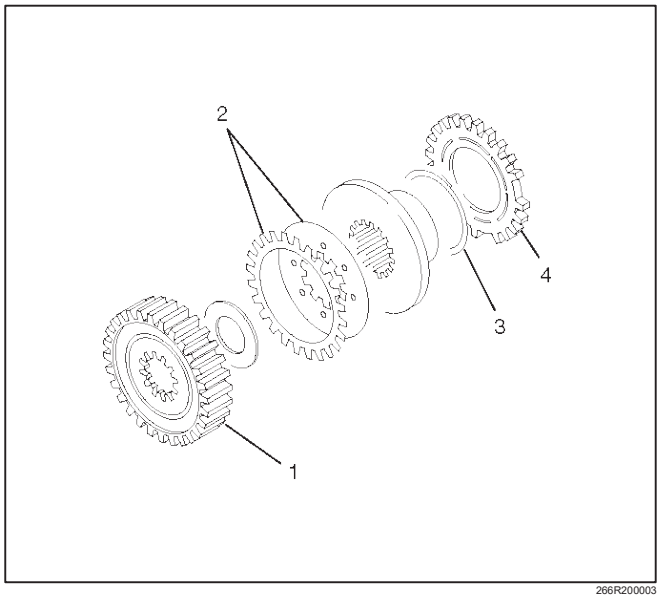
226RW143

Lockup Fork Spring

Check the lockup fork spring for distortion, cracking, and wear. If defects are observed, replace the part.

Multi Plate Disk Clutch

- If the burned, mirror-surfaced clutch facing, or scraping is observed on the clutch plates, clutch housing, armature plate, and insulator washer, replace the parts.



266R200003

Legend

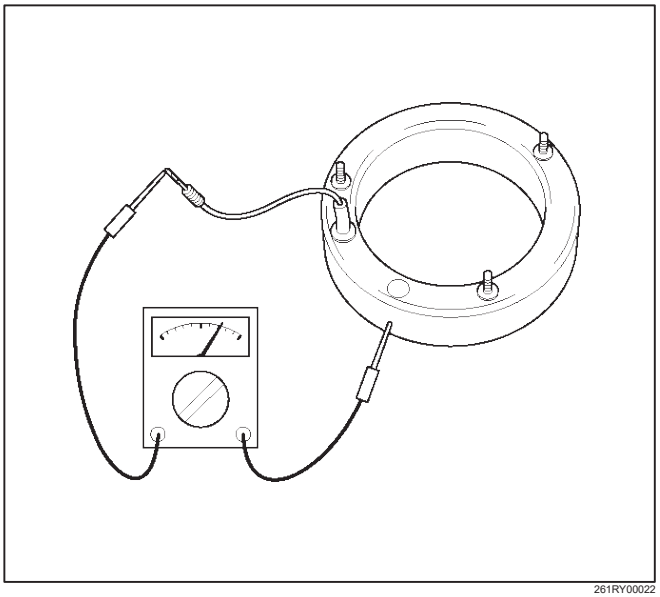
(1) Clutch Housing
(2) Clutch Plate
(3) Insulator Washer
(4) Armature Plate

Coil Assembly

- Check the resistance of the coil with a tester. If defects are observed, replace the coil assembly.

Standard : 1.7±0.3Ω (at ordinary temperature)

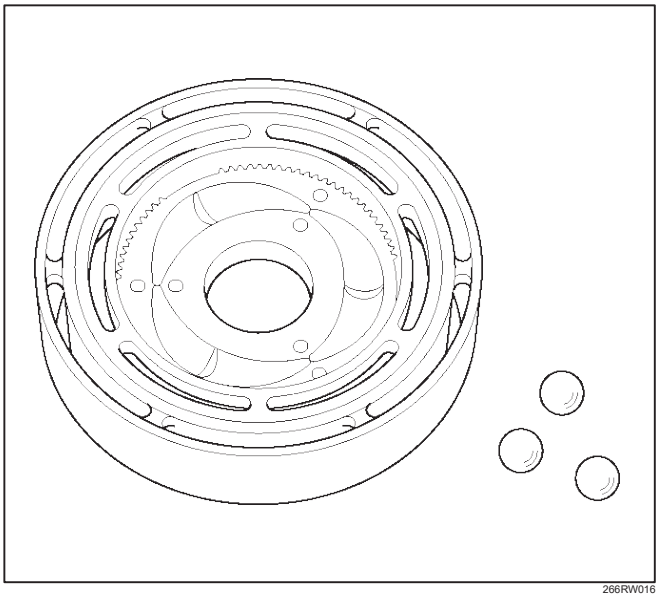
Allowable limit : 1.0~5.0Ω



261RY00022

Cam Pulley, Cam Ball, and Cam & Coil Housing

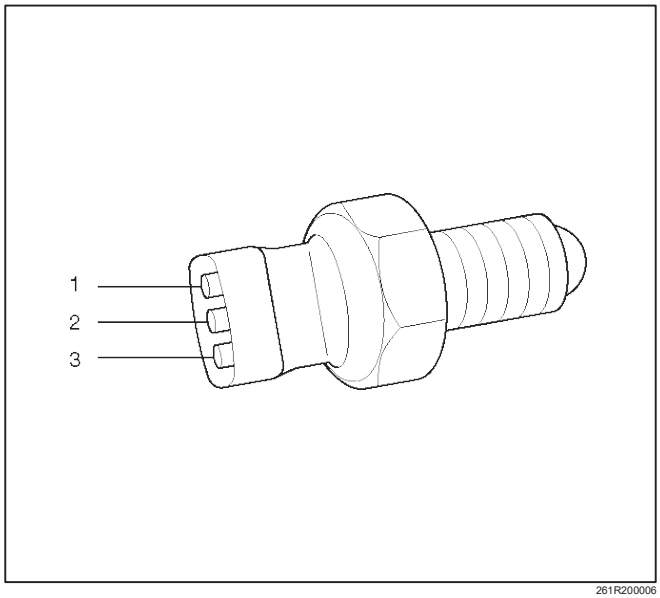
- Check the cam balls and cam for excessive wear or damage. If defective, replace the parts.



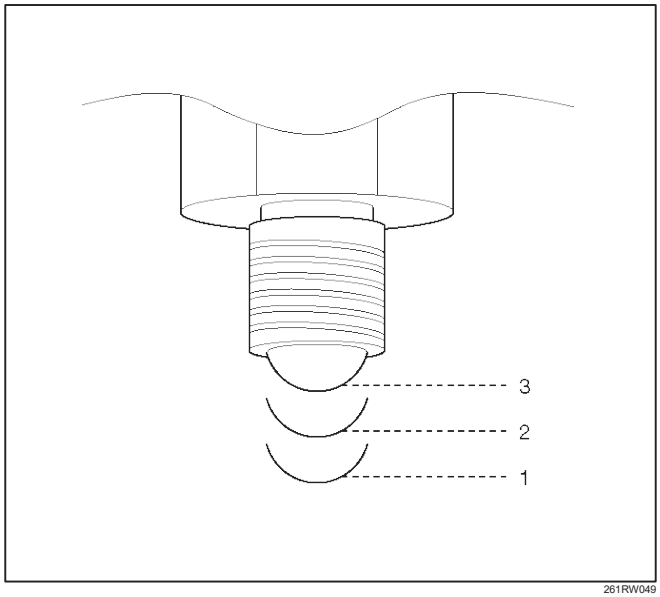
266RW016

4H and 4L Switch

- Check the continuity of 4H and 4L switch.
  If defects are observed, replace the 4H and 4L switch.



261R200006



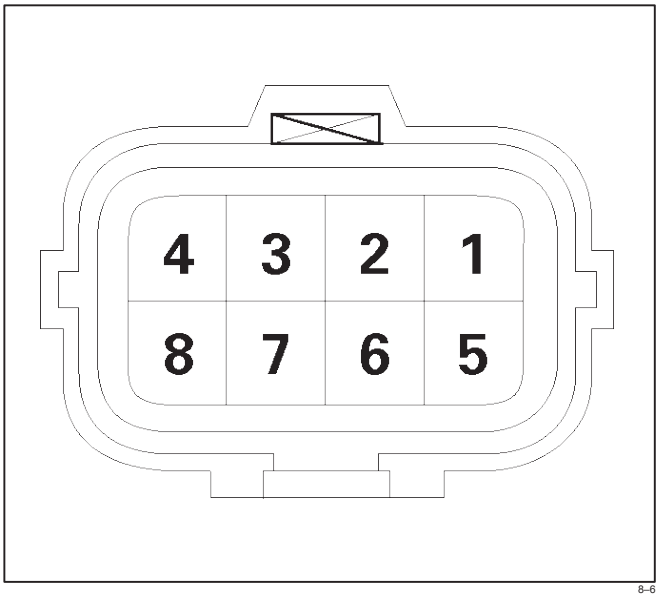
261RW049

Switch Stroke	4H Switch Signal	4L Switch Signal	The corresponding position of TOD switch
	Terminal 2 to Switch Body	Terminal 1 to 3	
1	Open	Open	2H, TOD
2	Open	Close	4L
3	Close	Close	Neutral

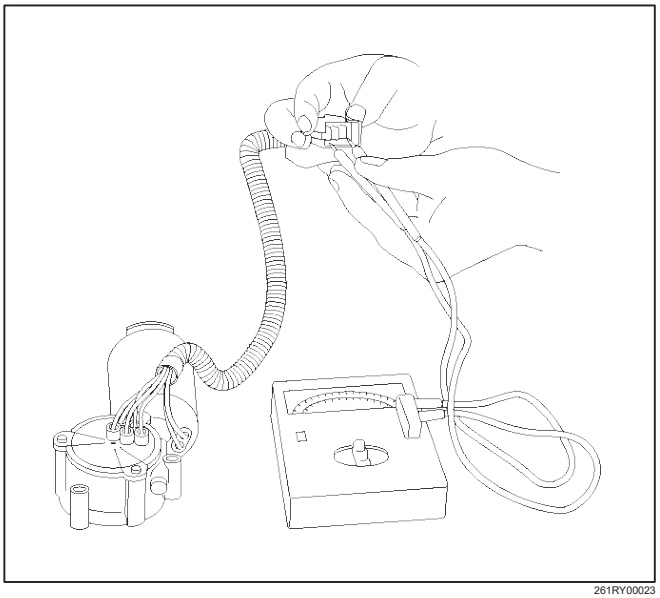
Shift Motor Assembly

- Check the resistance of the shift motor assembly (between terminal 4 to 7) with a tester.
  If defects are observed, replace the shift motor assembly.

Standard : 0.63±0.2Ω (at ordinary temperature)



8–6



261RY00023

Oil Pump

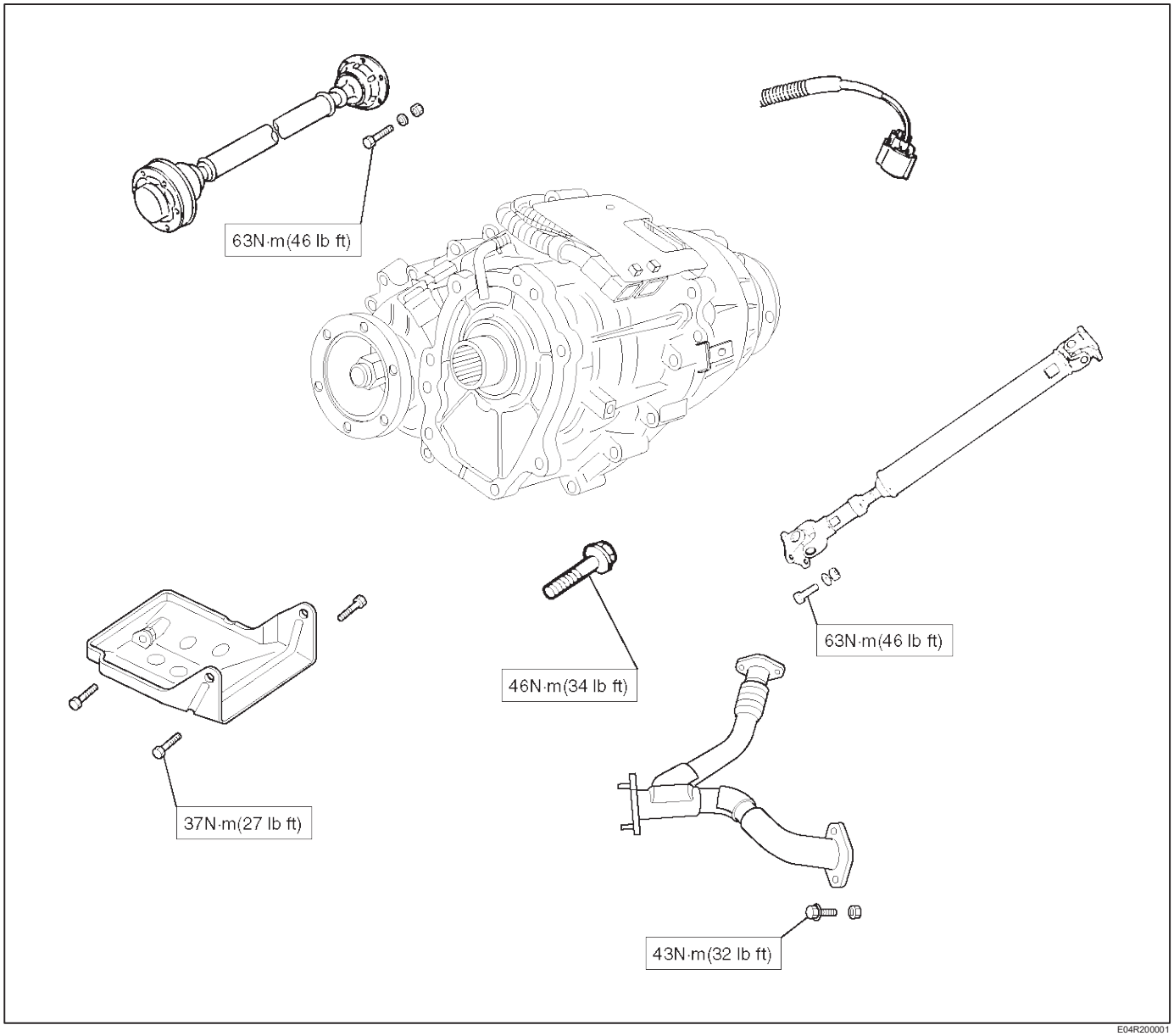
- Remove foreign materials from the strainer. If the strainer is damaged, replace it.
- If the area into which the shaft is inserted is excessively worn or damaged, replace the oil pump assembly.

Main Data and Specification

General Specification

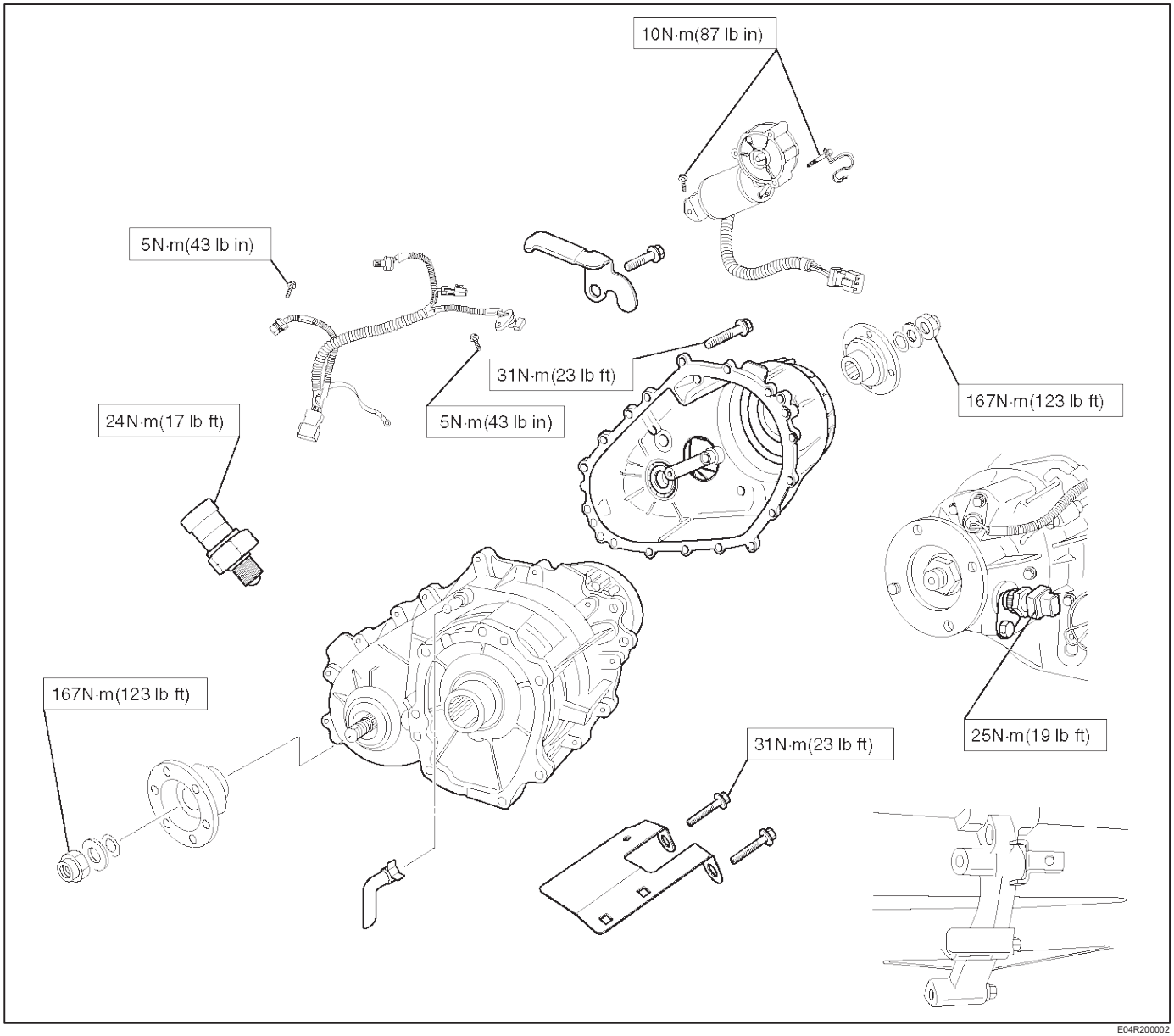
Type	Electronically controlled torque split four wheel drive with two wheel drive.
	2WD: Rear two wheel drive
	TOD: Electronically controlled torque split four wheel drive.
	4L: Low speed mechanical lockup four wheel drive.
	Rear drive: Direct drive
	Front drive: Chain drive
	Low range deceleration: Planetary gear drive
Control system	Switch control
Gear ratio	High: 1.000
	Low: 2.480
Lubrication system	Built-in oil pump
	Forced lubrication
Type of lubricant	ATF DEXRON®–II or III
Oil capacity	1.35 liters. (1.43 US.quart)
Clutch discs number	13
Planetary gear teeth number	Sun gear: 58
	Pinion gear: 15
	Ring gear: 86

Torque Specifications

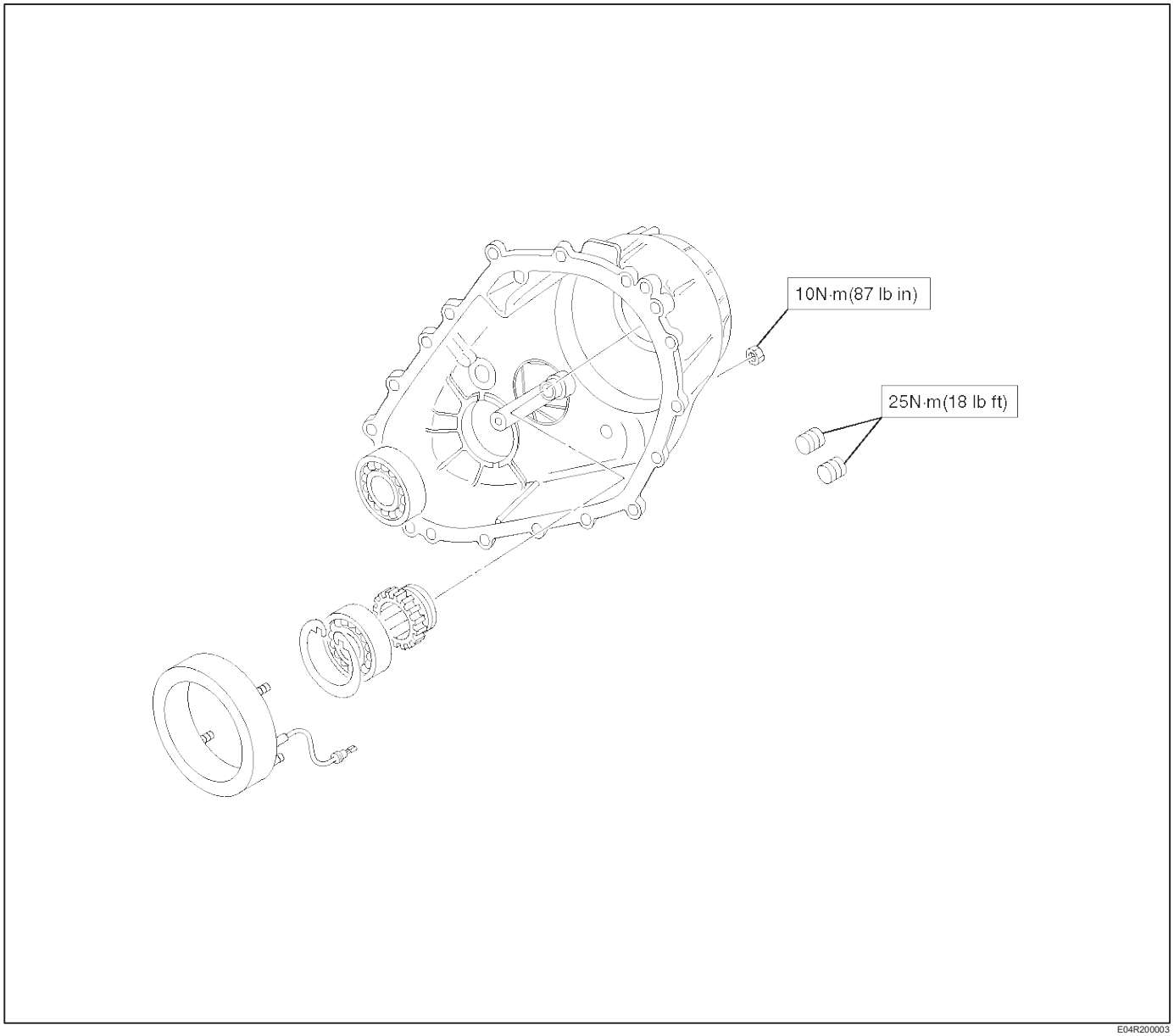


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Torque Specifications (Cont'd)



Torque Specifications (Cont'd)



E04R200003

Special Tools

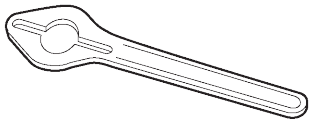
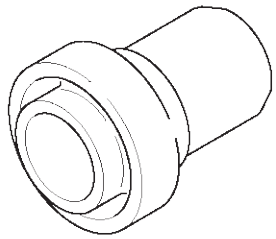
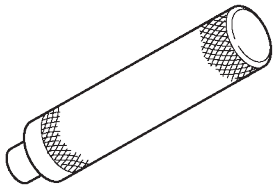
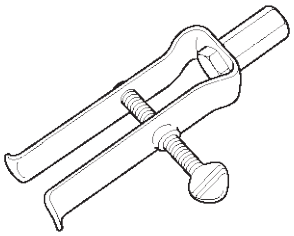
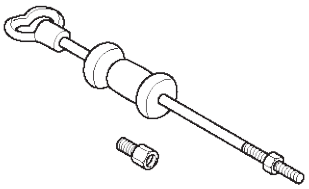
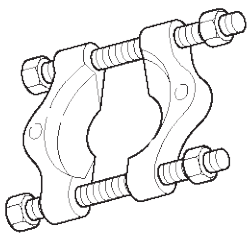
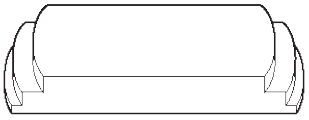
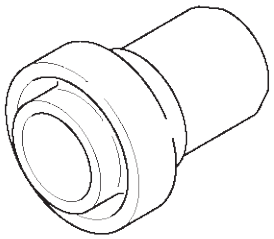
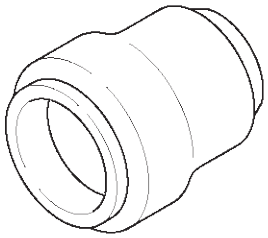
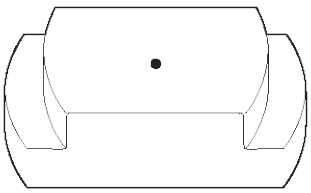
ILLUSTRATION	TOOL NO. TOOL NAME
 901RW071	**J–8614–11** Flange Holder
 901RW095	**J–42804** Rear Oil Seal Installer
 5884003520	**J–33951** Shift Shaft Oil Seal Installer
 901RW094	**J–42805** Bearing Remover
 901RW096	**J–2619–01** Slide Hammer
 901RW091	**J–22912–01** Bearing Remover

ILLUSTRATION	TOOL NO. TOOL NAME
 901RW093	**J–42806** Ring Gear Remover
 901RW095	**J–42807** Front Output Shaft Oil Seal Installer
 901RW097	**J–42808** Input Shaft Oil Seal Installer
 901RW098	**J–42809** Ring Gear Installer