

SUZUKI

TECHNICAL DEPT

VITARA

SUPPLEMENTARY SERVICE MANUAL
FOR LSD

USE THIS MANUAL WITH:
VITARA SERVICE MANUAL (99500-60A10)

SUZUKI
Caring for Customers

99501-60A31-34E
(英)

IMPORTANT

WARNING/CAUTION/NOTE

Please read this manual and follow its instructions carefully. To emphasize special information, the words **WARNING**, **CAUTION**, and **NOTE** have, special meanings. Pay special attention to the messages highlighted by these signal words.

WARNING:

Indicates a potential hazard that could result in death or injury.

CAUTION:

Indicates a potential hazard that could result in vehicle damage.

NOTE:

Indicates special information to make maintenance easier or instructions clearer.

FOREWORD

This SUPPLEMENTARY SERVICE MANUAL is a supplement to "VITARA SERVICE MANUAL".

It describes LSD (Limited Slip Differential) service information of VITARA.

Whenever servicing (disassembling, inspecting and/or reassembling) LSD, consult this supplement. For its removal and installation, refer to "VITARA SERVICE MANUAL" (99500-60A10).

All information, illustrations and specifications contained in this literature are based on the latest product information available at the time of publication approval. The right is reserved to make changes at any time without notice.

Asterisk (*) marked components in the text are applicable to the LSD installed to vehicles on and after following body numbers.

$\overline{\text{X}}$ JSAETA01V00145651 $\overline{\text{X}}$ -
 $\overline{\text{X}}$ JSAETD01V00113830 $\overline{\text{X}}$ -
 $\overline{\text{X}}$ 2S3TA01C000521324 $\overline{\text{X}}$ -

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SUZUKI MOTOR CORPORATION

*AUTOMOBILE DEPARTMENT
OVERSEAS SERVICE DIVISION*

SECTION 7E

DIFFERENTIAL (LSD, REAR)

NOTE:

This section provides information necessary for servicing LSD (Limited Slip Differential), namely, general discription, maintenance, disassembly, inspection and reassembly.

For any other service information not found here, refer to "VITARA SERVICE MANUAL".

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GENERAL DESCRIPTION

LSD has a limited slip device incorporated in it as its name indicates. In addition to the function as an ordinary differential to allow the right and left wheels to rotate by different amounts when turns are made, it has another function. When the wheel on one side starts slipping, it prevents such slip.

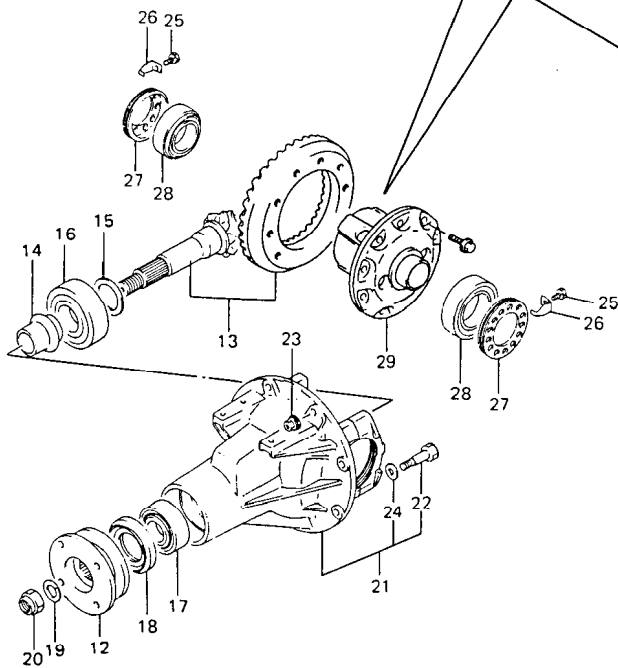
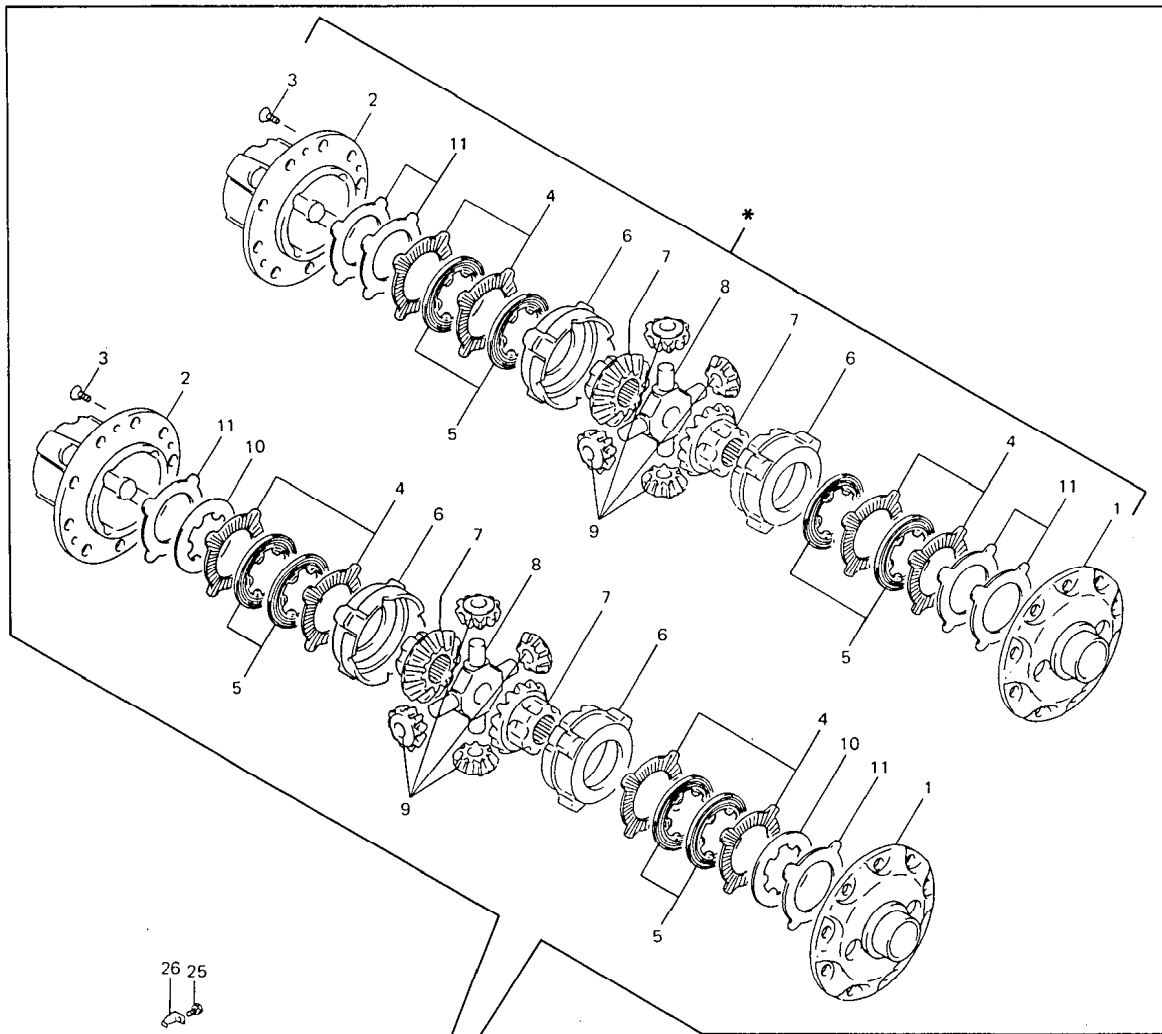
Its components are shown in Fig. 7E-1.

WARNING:

Do not drive wheel(s) (tire) when wheel on one side is jacked up (i.e., jacked wheel off the ground but wheel on the other side on the ground). Vehicle may start in motion.

CAUTION:

- Once wheel (tire) on one side got stuck in mud, sand, etc. and started slipping, do not drive wheels at high speed. It would allow stucked wheel to go down deeper and cause excessive wear to clutch of LSD.
- Be sure to use only specified gear oil for LSD.
- Change LSD oil at specified interval.



- 1. Differential left case
- 2. Differential right case
- 3. Screw
- 4. Outer plate (friction plate)
- 5. Inner plate (friction disk)
- 6. Pressure ring
- 7. Side gear
- 8. Pinion shaft
- 9. Pinion
- 10. Inner shim (spring disk)
- 11. Outer shim (spring plate)
- 12. Universal joint flange
- 13. Bevel pinion gear set
- 14. Bevel pinion spacer
- 15. Shim(s)
- 16. Rear bearing
- 17. Front bearing
- 18. Oil seal
- 19. Washer
- 20. Nut
- 21. Differential carrier ass'y
- 22. Bolt
- 23. Nut
- 24. Lock washer
- 25. Bolt
- 26. Lock plate
- 27. Bearing adjuster
- 28. Differential side bearing
- 29. LSD case assembly

* : Refer to FOREWORD.

Fig. 7E-1 LSD

ON VEHICLE SERVICE

MAINTENANCE SERVICE

When checking level of LSD oil or changing it, use the same manner as conventional type differential except specific type of oil as given below. For check interval and practical procedures, refer to SECTION 0B of "VITARA SERVICE MANUAL".

NOTE:

- It is absolutely necessary to use LSD gear oil for LSD.
- Use of 80W-90 LSD gear oil is recommended when it is anticipated that ambient temperature goes down below 0°C (32°F) depending on area or season.

Oil specification	LSD gear oil API GL-5 SAE 90 or 80W-90	
Oil capacity	Rear (LSD)	2.2 liters 4.6/3.9 US/Imp.pt.

UNIT REPAIR OVERHAUL

LIMITED SLIP DIFFERENTIAL (LSD, REAR)

DISMOUNTING

Refer to item "DISMOUNTING of REAR DIFFERENTIAL" in SECTION 7E of "VITARA SERVICE MANUAL". (The same dismounting procedure is applicable as conventional type rear differential.)

DISASSEMBLING

Refer to item "DISASSEMBLY of REAR DIFFERENTIAL" in SECTION 7E of "VITARA SERVICE MANUAL". (The same disassembling procedure is applicable as conventional type rear differential except LSD case assembly.)

INSPECTING OF LSD CASE ASSEMBLY

1. Using special tool, check differential torque (rotating torque) of LSD.

DIFFERENTIAL TORQUE (Rotating torque) SPECIFICATION	2.4 – 7.2 kg-m (17.4 – 52.0 lb-ft)
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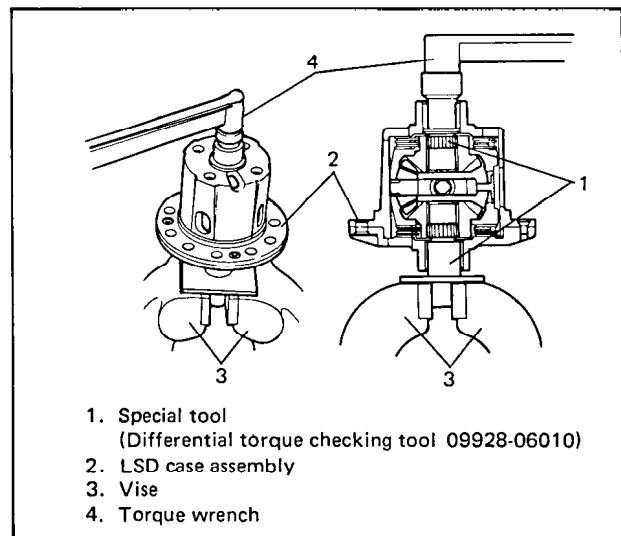


Fig. 7E-2

When measured value is not within above specification, disassemble LSD case assembly and repair or replace any defective part.

DISASSEMBLING OF LSD CASE ASSEMBLY

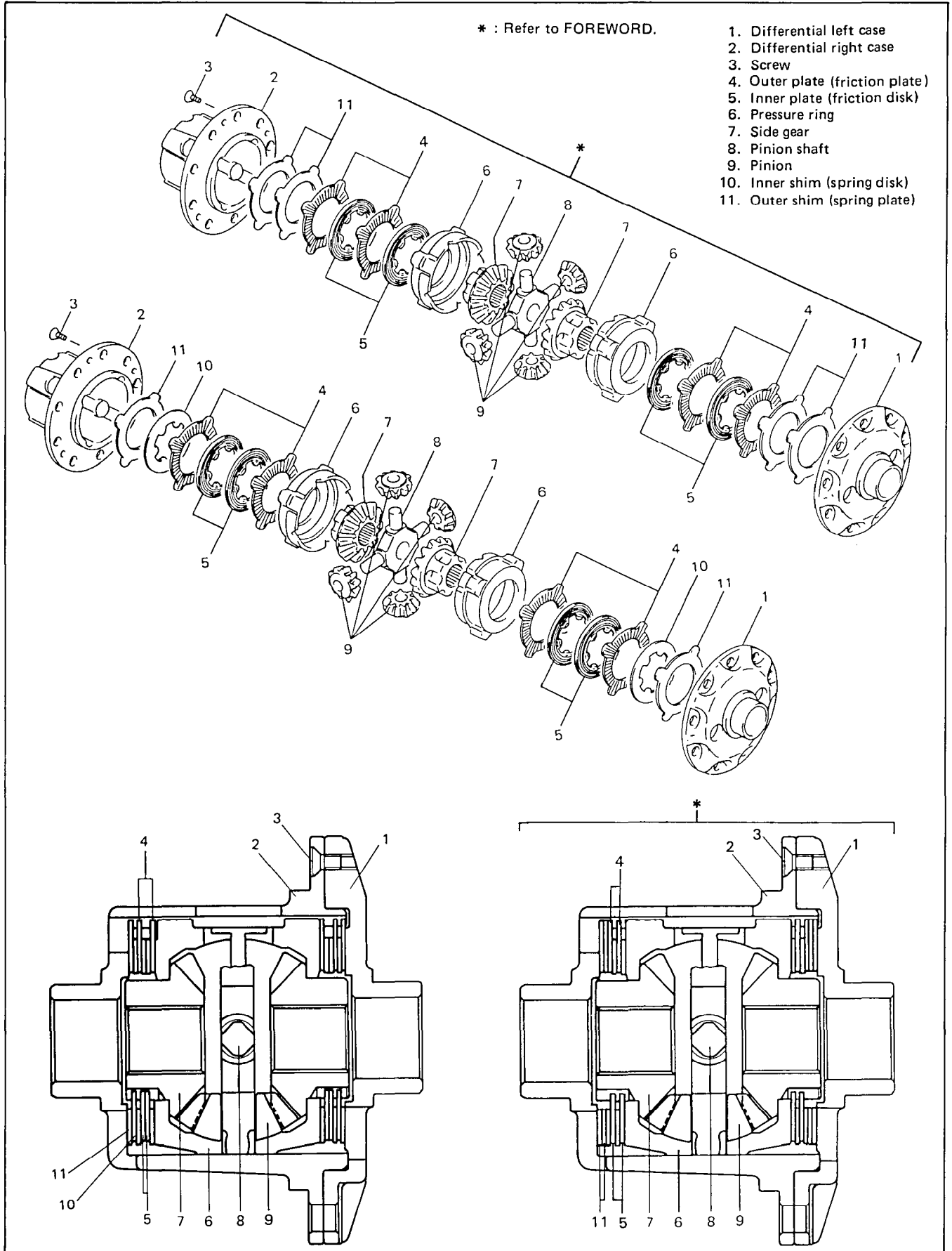


Fig. 7E-3 LSD Case Assembly

1. Check that match mark is stamped on each differential case (right and left). If not, put such marks. (Refer to Fig. 7E-4.)
2. Loosen differential case screws by turns evenly and a little at a time.

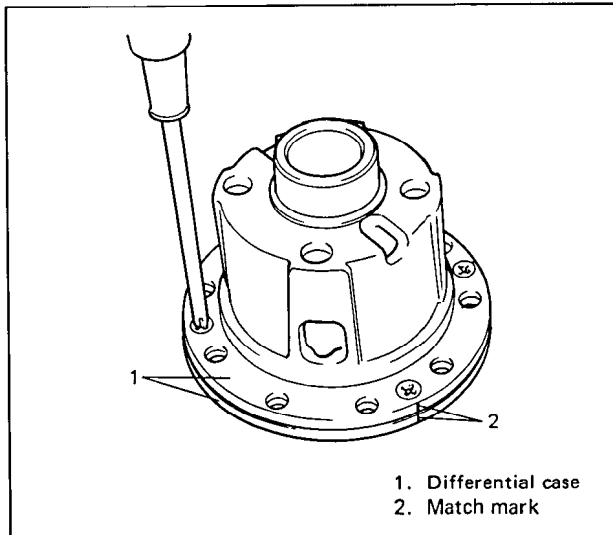


Fig. 7E-4

NOTE:

When it is hard to loosen screws, try loosening them while applying pressure (no more than 400 kg, 882 lb) to cases by using special tool and hydraulic press.

Note that applied pressure should never exceed 400 kg (882 lb).

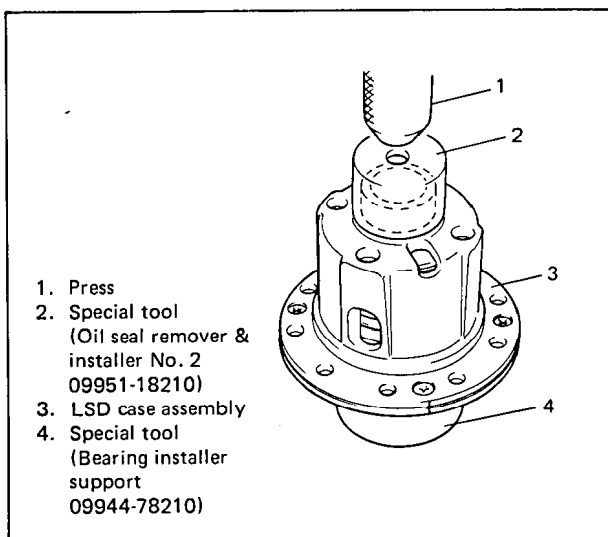


Fig. 7E-5

3. Separate differential cases (right and left). Take out all parts from each case. Place all parts in such order as they are removed and in two separate groups, right side parts and left side ones. (Refer to Fig. 7E-3.)

INSPECTING OF LSD CASE COMPONENT PARTS

NOTE:

Wash disassembled parts thoroughly and dry them with compressed air before inspection.

Side Gear and Pinion

- Check each gear tooth for wear, damage and breakage.
- Check spline of side gear for wear and damage.

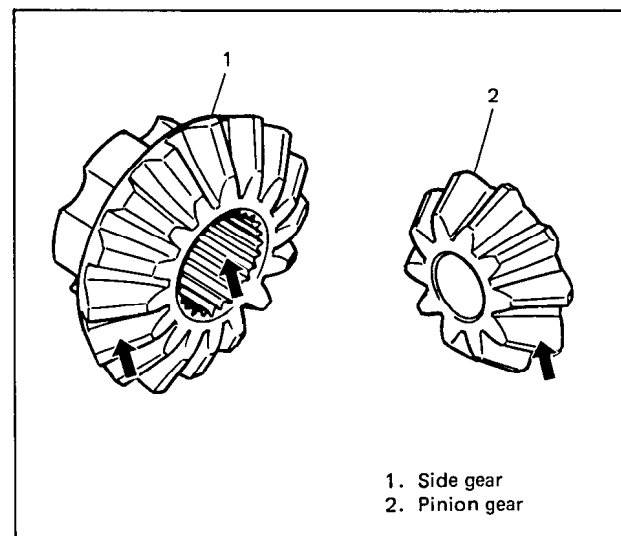


Fig. 7E-6

Plates, Shims and Pressure Rings

- Each plate and shim has either 4 (outside) or 6 (inside) lugs. Check them for crack, nick and any other damage. If nick is found, correct it with oil stone. Replace part with uncorrectable nick or any other defect with new one.
- Check rubbing or sliding surface of each plate and shim for excessive wear and faulty condition caused by heat such as discoloration. If discoloration or excessive wear is noted, replace with new part.
- Check sliding surface of pressure ring against outer plate for nick and damage. Try to correct defective part by using oil stone and compound on surface plate. If uncorrectable, replace with new part.

NOTE:

There may be a sign as if something had struck hard on inside of rubbing or sliding surface of each plate, shim and pressure ring. As it is caused by spring force of shims, do not take it as abnormal wear.

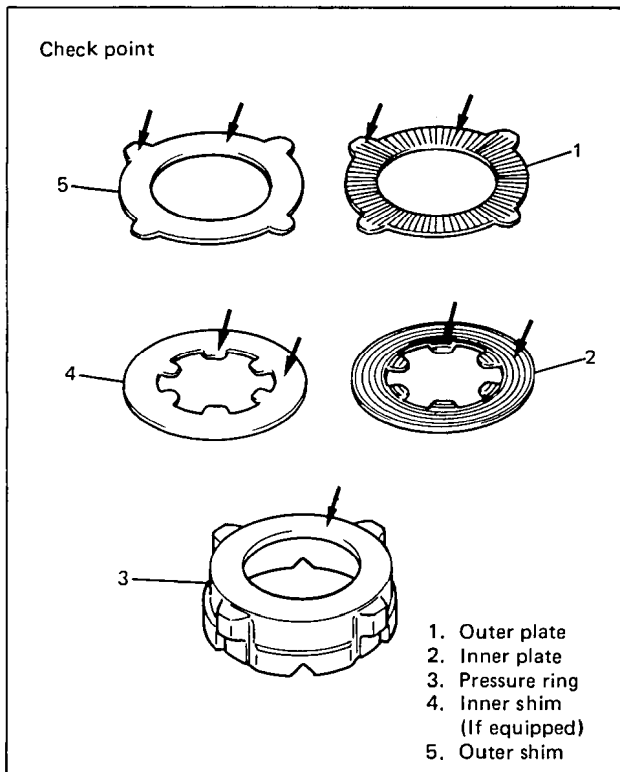


Fig. 7E-7

- On each plate and shim, measure thickness at sliding surface ("a" in figure below) and at lug ("b" in figure below) to obtain their difference. Take several measurement at different places. When difference ("b" - "a") exceeds below, replace with new part.

Wear limit of plate and shim (b - a)	0.1 mm (0.004 in.)
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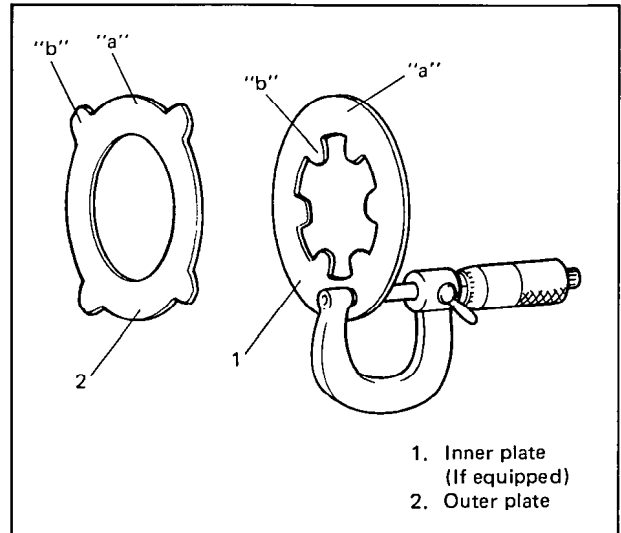


Fig. 7E-8

- Check each plate (both inner and outer) for distortion (flatness) by taking measurement while turning plate on surface plate as shown below. When pointer deflection exceeds below limit, replace with new plate.

Distortion (deflection) limit of plate	0.08 mm (0.003 in.)
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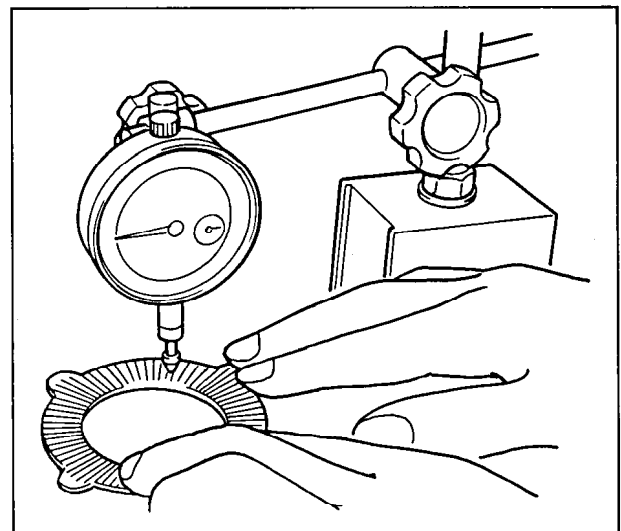


Fig. 7E-9

Differential Case Inner Parts

Check following parts for burr and nick. Correct them with oil stone, if any.

- (a) Differential case contact surface with outer shim
- (b) Grooves in inside of differential right case
- (c) Contact surfaces of pressure ring (outside) and differential right case (inside)
- (d) Inner surface of pressure ring and spherical surface of differential pinion
- (e) V-shaped groove of pressure ring and V-shaped part of pinion shaft
- (f) Sliding surfaces of side gear (outside) and pressure ring
- (g) Grooves in side gear (outside)
- (h) Sliding surfaces of pinion shaft and differential pinion
- (i) Projecting part of pressure ring (outside)

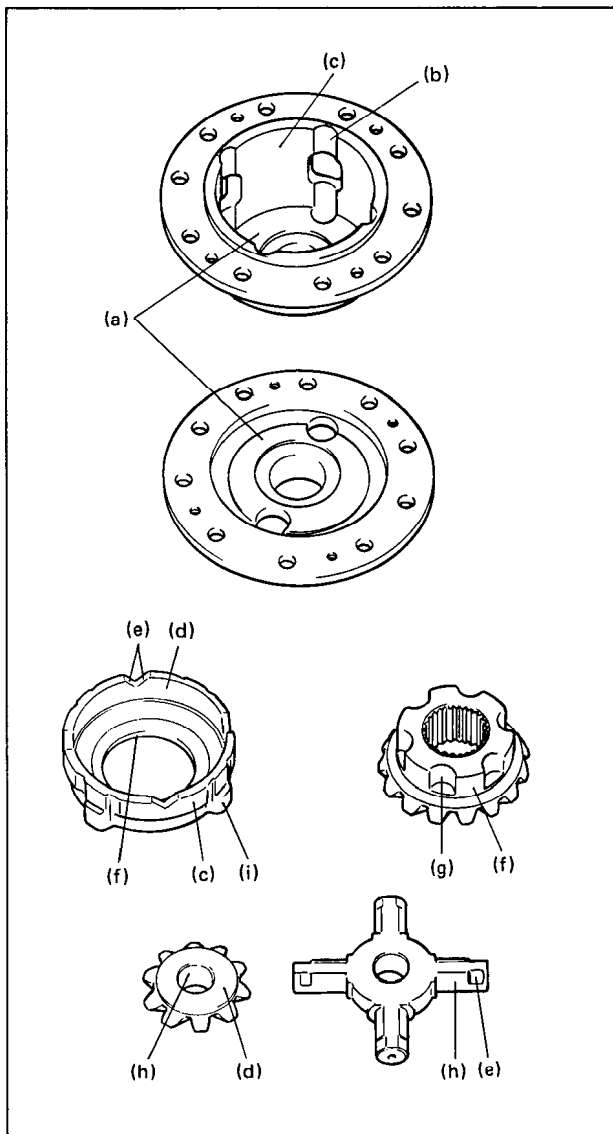


Fig. 7E-10

REASSEMBLING OF LSD CASE ASSEMBLY

1. Before installing parts in differential case, measure them and check clearance between outer shim and differential case as described below and then adjust it as necessary.

- 1) Take measurements "A", "B" and "C" of differential case (right and left) and obtain dimension "D" by using equation given below.

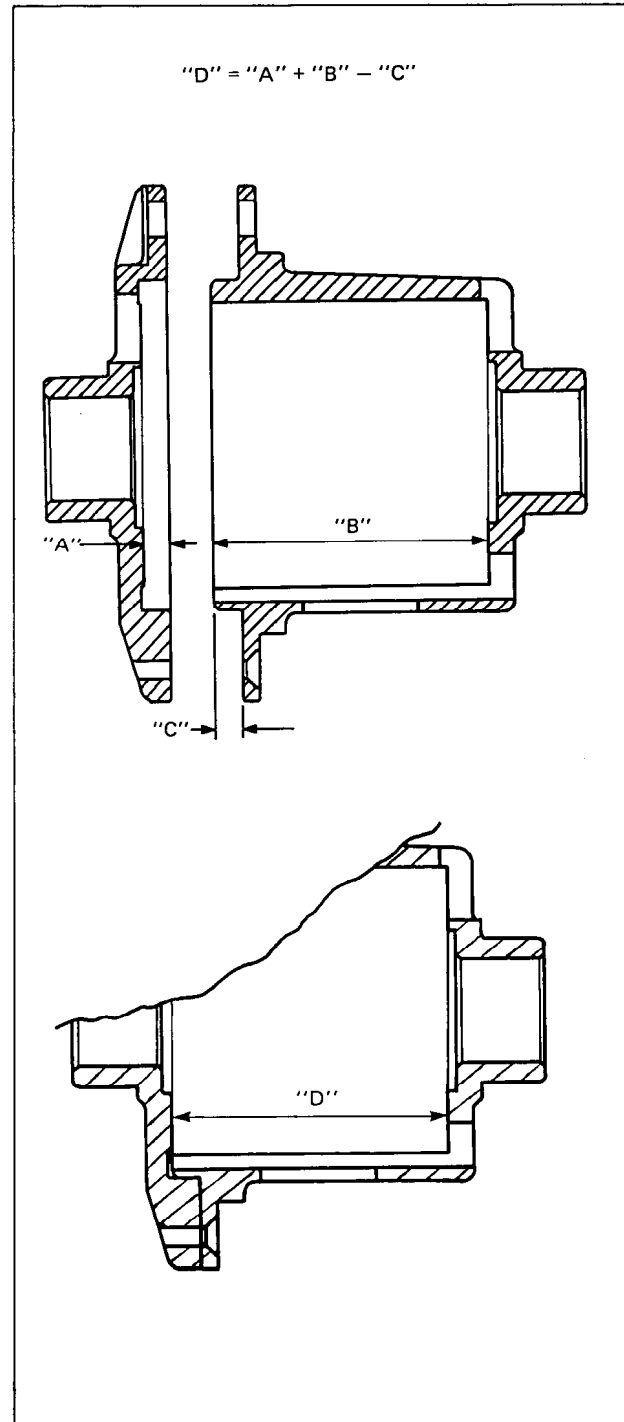


Fig. 7E-11

2) Put inner and outer shims (one each on the same side) or outer shims together as shown below and measure thickness "E" of each set (right and left) by using micrometer. Then comparing thickness of both sets, make their difference as small as possible by selecting shims.

NOTE:

One new shim (whether outer or inner) is 1.7 mm (0.067 in.) thick. Use this data as reference when using new one.

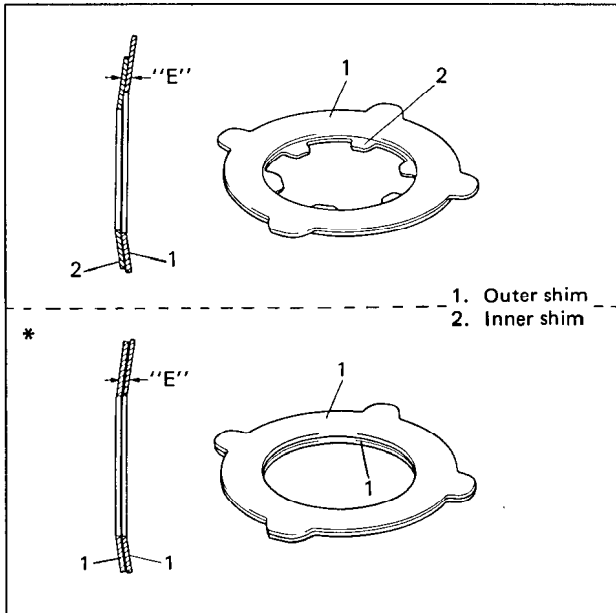


Fig. 7E-12

3) Put inner and outer plates (one each on the same side) together as shown below and measure thickness of each set (right and left) by using micrometer. Then comparing thickness of both sets, select inner and outer plates combination so that their thickness difference is within following specification.

NOTE:

- There are two types of plate (whether inner or outer); one is 1.7 mm (0.067 in.) thick and the other 1.8 mm (0.071 in.). Use these data as reference when using new plate.
- There is no difference between both sides of each plate.

Thickness difference between right and left sets	STD
	0 – 0.05 mm (0 – 0.002 in.)

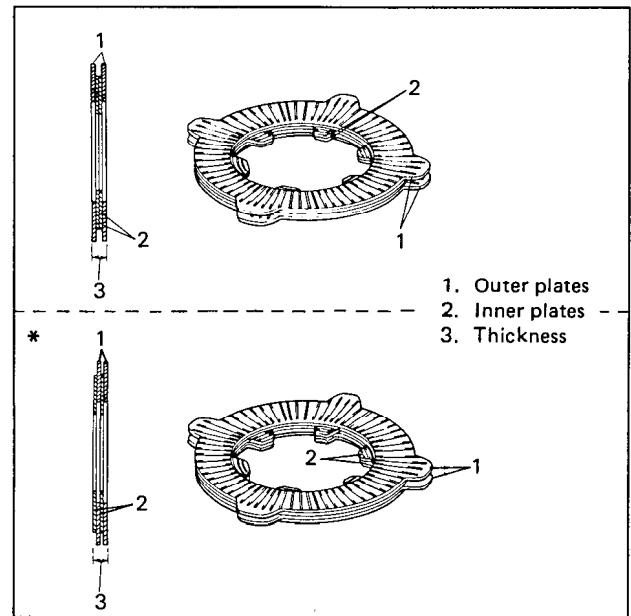


Fig. 7E-13

4) Install pressure rings, differential pinion shaft, pinions, side gears and plates as shown below and measure width "F". Then add "F" and "E" (thickness of inner and outer shims together) on both sides. Sum is dimension "G".

NOTE:

- When taking measurement "F", make sure that V-shaped groove in pressure ring is in close contact with pinion shaft.
- For accurate measurement, check to make sure no oil is on each part.

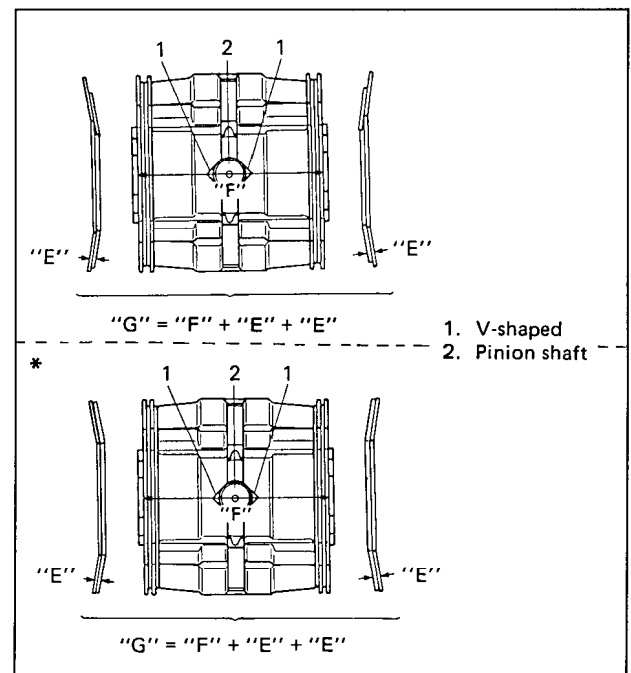


Fig. 7E-14

Next, subtract above "G" from "D" obtained in step 1). Difference is clearance between differential case and shim. If it is not within below specification, change inner and outer plates so that specified value is attained.

Clearance between shim and case (D - G)	0.06 - 0.20 mm (0.0023 - 0.0078 in.)
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- Apply specified gear oil to each part before installation, particularly in ample amount to contact surface and sliding surface.
- Install outer plates and inner plates making sure that they are in proper order and then inner and outer shims using care for their installing direction.

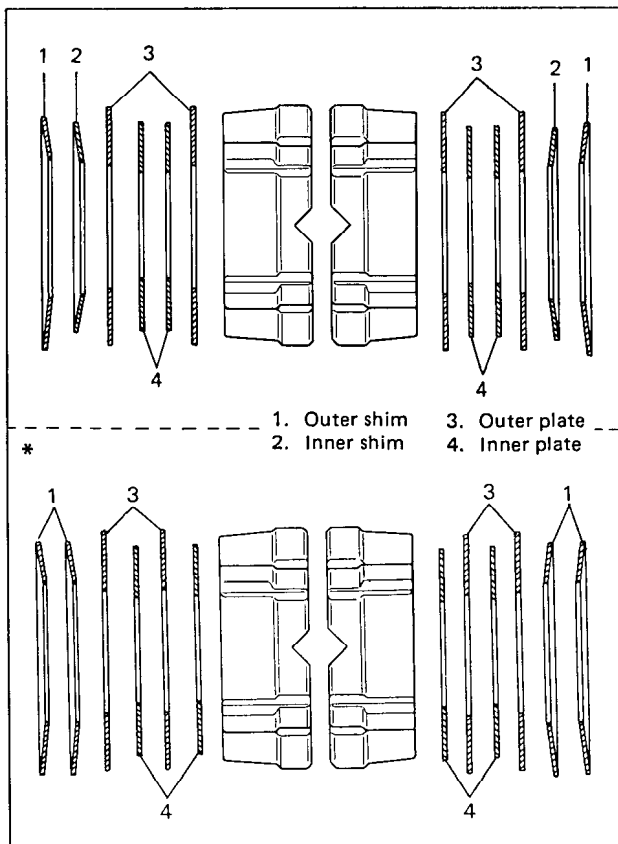


Fig. 7E-15

- Put differential cases (right and left) together by aligning their match marks. Before tightening screws, check that shim is properly positioned so that its lugs would fit in grooves in right case when screws are tightened.

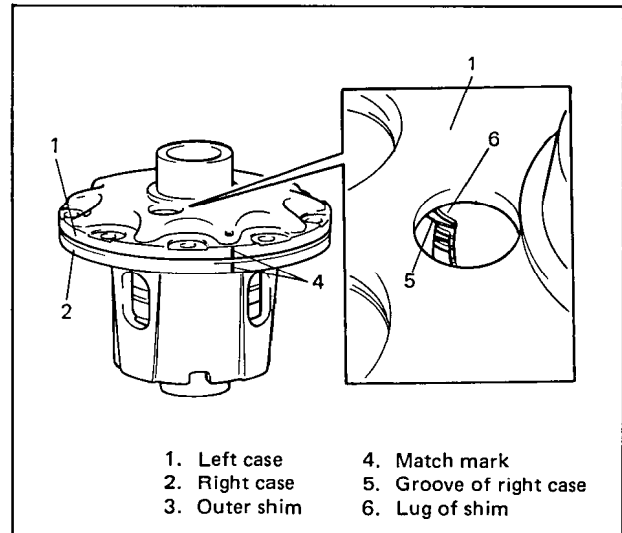


Fig. 7E-16

- Tighten LSD case screws in diagonal order evenly a little at a time.

NOTE:

If cases do not fit tightly even after screws were tightened, it is because lugs of shim is not in grooves of case properly. (Shim is caught between cases.) In such case, reinstall shim and cases.

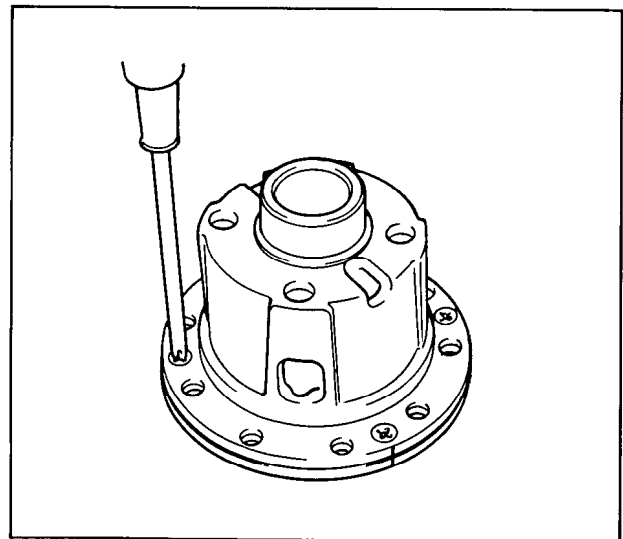


Fig. 7E-17

6. After installation, measure differential torque (rotating torque) with special tool so as to check friction force of plates (clutch).

NOTE:

For accurate value, turn gear to run it in before taking measurement.

DIFFERENTIAL TORQUE SPECIFICATION	
When new plates installed	4.8 – 7.2 kg-m (34.7 – 52.0 lb-ft)
When used plates installed	2.4 – 7.2 kg-m (17.4 – 52.0 lb-ft)

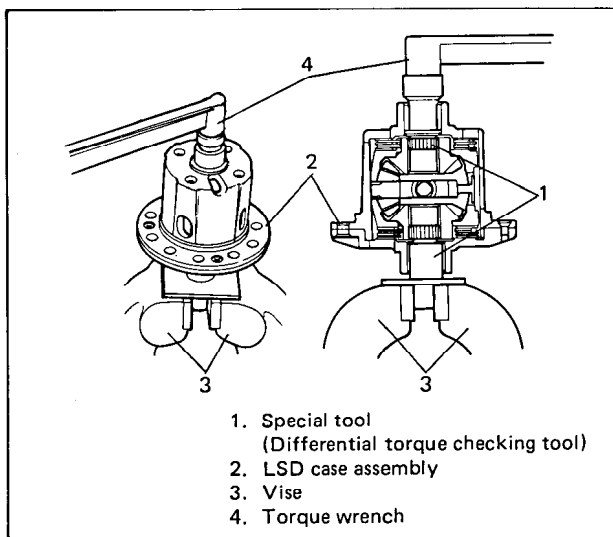


Fig. 7E-18

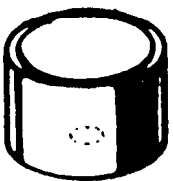
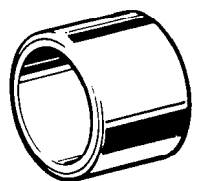
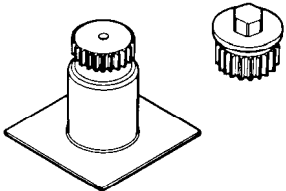
ADJUSTMENT AND REASSEMBLY

For inspection, adjustment and reassembly of drive bevel gear, drive bevel pinion and differential carrier, refer to SECTION 7E of "VITARA SERVICE MANUAL". (The same adjustment and reassembly procedures are applicable as conventional type rear differential.)

REMountING

For installation of LSD to rear axle housing (differential housing), refer to SECTION 7E of "VITARA SERVICE MANUAL". (The same remounting procedure is applicable as conventional type rear differential.)

SPECIAL TOOLS

 <p>09951-18210 Oil seal remover & installer No. 2</p>	 <p>09944-78210 Bearing installer support</p>	 <p>09928-06010 Differential torque checking tool</p>	
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Prepared by

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