### SECTION 8

### DIFFERENTIAL

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### A. Description

The differential is driven directly by the final drive gear which is an integral part of the transmission countershaft. By this arrangement, the differential is enclosed in the crankcase together with the transmission and the crankshaft; all being lubricated by the engine oil. The principal gears used are a helical type, which afforts quiet operation.

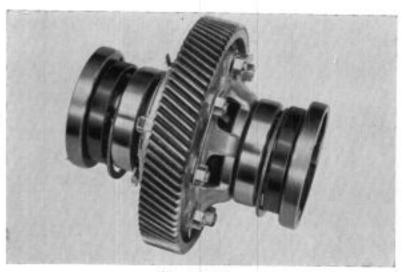


Fig. 8A-1

### B. Technical Data

Reduction Gear Type

Reduction Ratio N360

LN360

A360 N400/N600

A600

Defferential Gear Type and Number

Backlash

Pinion to Side Gear

Clearance

Pinion Shaft to Pinion Inside Diameter Pinion Side to Differential Gear Case

Final Driven Gear Eccentricity

Helical Gear

3.192

3.954

3.542

3.037

3.542

Straight Bevel, 2 ea.

0.1 to 0.4 mm

(0.0039 to 0.0158 in)

0.03 to 0.09 mm (0.0012 to 0.0035 in) 0.1 to 0.2 mm (0.0039 to 0.0079 in)

0 to 0.07 mm (0 to 0.0027 in)

#### 8-2 DIFFERENTIAL

#### C. Maintenance

#### a. Disassembly

Disassemble the differential unit refering to the Fig. 8C-1 below.

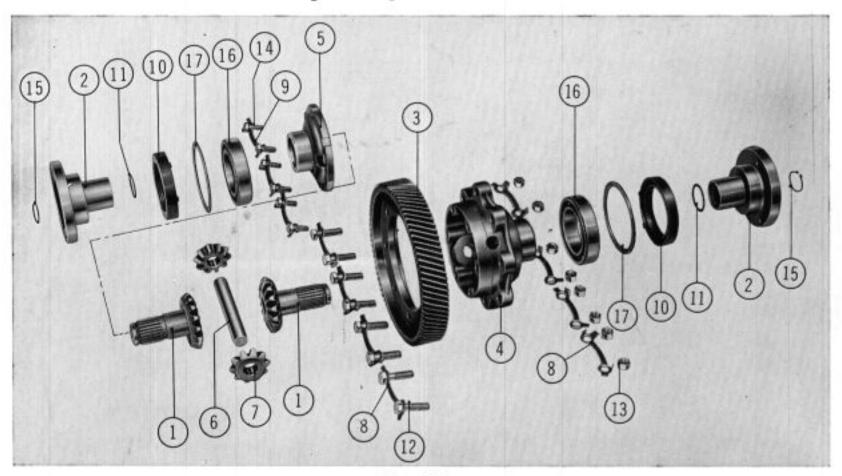


Fig. 8C-1

- 1 Differential side gear
- 2 Joint Flange
- 3 Final driven gear
- 4 Differential gear case
- 5 Differential gear case cap
- 6 Differential pinion gear shaft
- 7 Pinion gear
- 8 Lock plate
- 9 Lock plate

- 10 Oil seal (54 x 75 x 12)
- 11 O-ring
- 12 Setting bolt
- 13 Setting nut
- 14 Setting bolt
- 15 Circlip
- 16 Ball bearing
- 17 Thrust plate



Fig. 8C-2

#### b. Inspection and Adjustment

1. Checking the backlash

Lock the ring gear and one side of the joint flange, and check the backlash by moving the opposite joint flange and take measurement using a dial gauge.

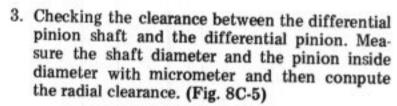
Standard tolerance:

0.1 to 0.4mm (0.0039 to 0.0158 in)

If the backlash is excessive, perform the following corrective action. Check the wear of the spline on the differential side gear and if found to be excessive, replace with a new part.

Check the side clearance of the pinion gear with a thickness gauge. (Fig. 8C-3)
It should be 0.1 to 0.2mm (0.0039 to 0.0079 in), if found to be greater than 0.3mm (0.0118 in), install shims to obtain the proper clearance. (Fig. 8C-3)

Checking the ring gear for eccentricity
Rotate the ring gear and check the entire
circumference of the ring gear to determine if
the gear is eccentrically mounted. If it is found
to be improperly mounted, remove the ring
gear from the differential case and remount.



Standard clearance:

0.03 to 0.09mm (0.0012 to 0.0035 in)

If the clearance is greater than 0.15mm (0.0059 in), replace the worn part.

4. Measure the eccentricity of the differential final gear. Support the bearings on both sides with V-blocks, and measure the eccentricity of the gear in at least four different positions at interval of 90°. If eccentricity exceeds 0.1mm (0.0039 in) loosen the gear retaining bolt and adjust it with a plastic hammer. If eccentricity is excessive, replace the gear with a new one.

Standard tolerance:

0 to 0.07mm (0 to 0.0027 in)

Serviceable limit:

Repair if over 0.1mm (0.0089 in)

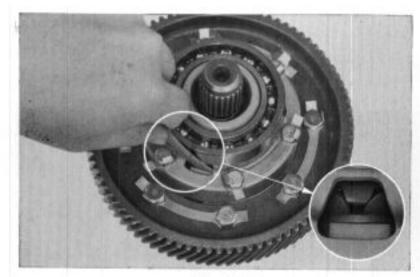


Fig. 8C-3

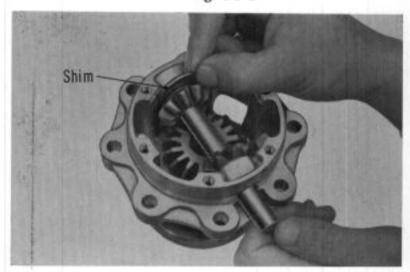


Fig. 8C-4



Fig. 8C-5



Fig. 8C-6

#### 8-4 DIFFERENTIAL

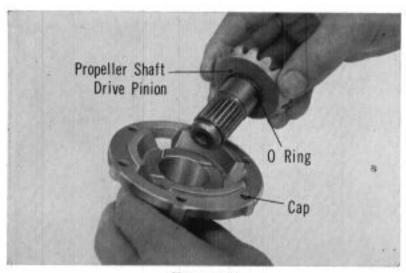


Fig. 8C-7



Refer to the exploded view in Fig. 8C-1 to make assembly. Before installing the differential side gear check the  $24.8 \times 1.8$  O-ring which is used as an oil seal to assure that it is not damaged.

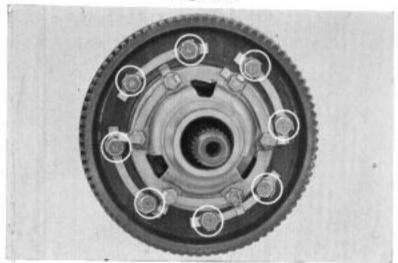


Fig. 8C-8

Assemble the ring gear into the differential case, install and torque the 8mm mounting bolts to from 2.8 to 3.0kg-m (20.25 to 21.70 ft-lb). Use all new lock washers.

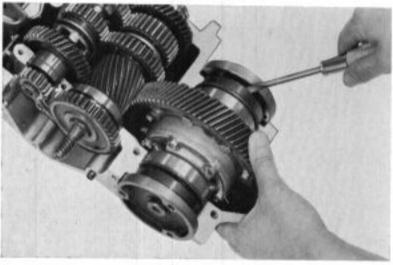


Fig. 8C-9

Before assembling the differential assembly into the lower crankcase make sure that the oil seals are mounted against the bearings. (Fig. 8C-9)
Oil seals can be replaced with the engine mounted on the chassis.

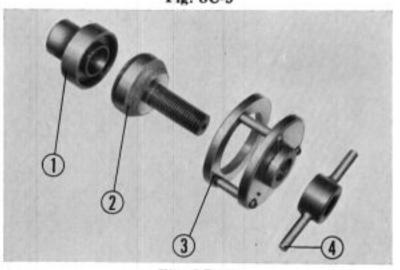


Fig. 8C-10

# d. Replacement of differential oil seal (54 x 75 x 12)

Oil leakage from the differential gear is mainly due to a worn oil seal (54x75x12) or a defective O-ring. If the oil seal is found defective upon checking, replace it using the oil seal driver C (special tool). When this replacement is made with the engine unit disassembled, use of the tool is unnecessary. For an engine installed in a vehicle, however, observe the following procedure: (Fig. 8C-10)

- Jack up the vehicle, and drain the engine oil (approximately 1.5 litters).
- Clean the linkage between the drive shaft and the differential shaft and in the neighboring vicinity.
- Disconnect the drive shaft from the differential joint flange. (Refer to SECTION 9. DRIVE SHAFT)
- Remove the external circlip (22mm) with snap ring pliers and remove the joint flange by pulling it out with the bolt attached. (Fig. 8C-11)

#### Note:

The oil may spill out at this time, so position a container to catch it beforehand.

- Draw out the defective oil seal with a puller.
   Check to see if any springs have been left in the differential gear case after removal. (Fig. 8C-12)
- Relocate the O-ring on the side gear to the location adjacent to the spline using a thin wire for correct sealing.
- Insert ① of oil seal driver C into the side gear, and fit the external circlip (22mm). (Fig. 8C-13)

#### Note:

The circlip must be securely inserted.

- 8. Thread ② of the tool into ①. (Fig. 8C-14)
- 9. The oil seal has grooves (refer to the Fig. 8C-15) for return of oil into the differential gear and to prevent leakage. Because of this, has to be installed correctly. The arrow mark and the R and L mark on the side of the oil seal, indicate the direction of rotation and position of installation, respectively: "R" for right side, "L" for left side. (Fig. 8C-15)

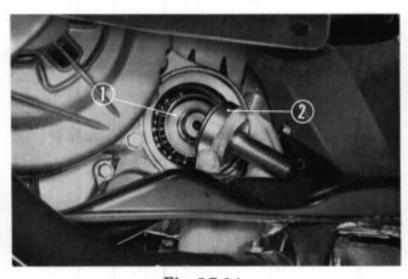


Fig. 8C-14

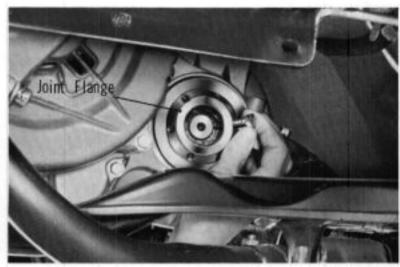


Fig. 8C-11

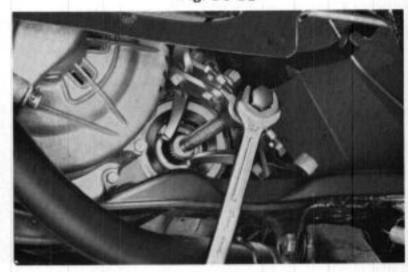


Fig. 8C-12

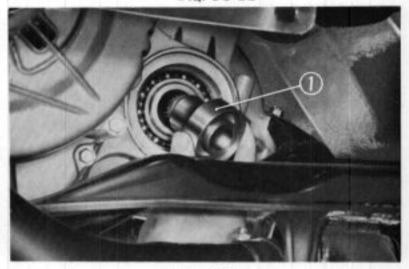


Fig. 8C-13

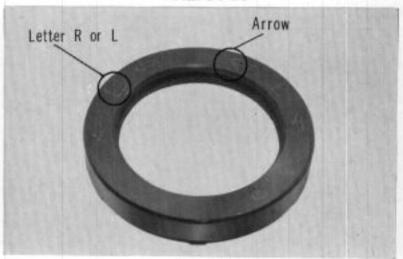
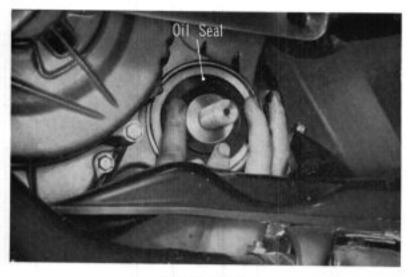


Fig. 8C-15

#### 8-6 DIFFERENTIAL



 After confirming right and left positions fit the oil seal over the entire circumference, and apply a soapy water solution or grease to the outer periphery of the oil seal to facilitate fitting. (Fig. 8C-16)





Fig. 8C-17

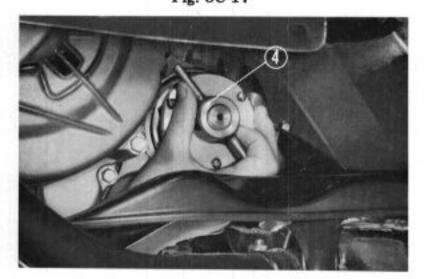


Fig. 8C-18

11. Attach ③ of the tool to the oil seal. (Fig. 8C-17)

- Force the oil seal into position by threading handle 4 of the oil seal driver C onto 3. (Fig. 8C-18)
- After confirming the oil seal fitted completely, remove the tool and fit the external circlip 22mm.

# D. Special Tool



07054-56801 Oil seal driver C

# MEMO