

## DIFFERENTIAL

|                            |             |                                  |              |
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دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



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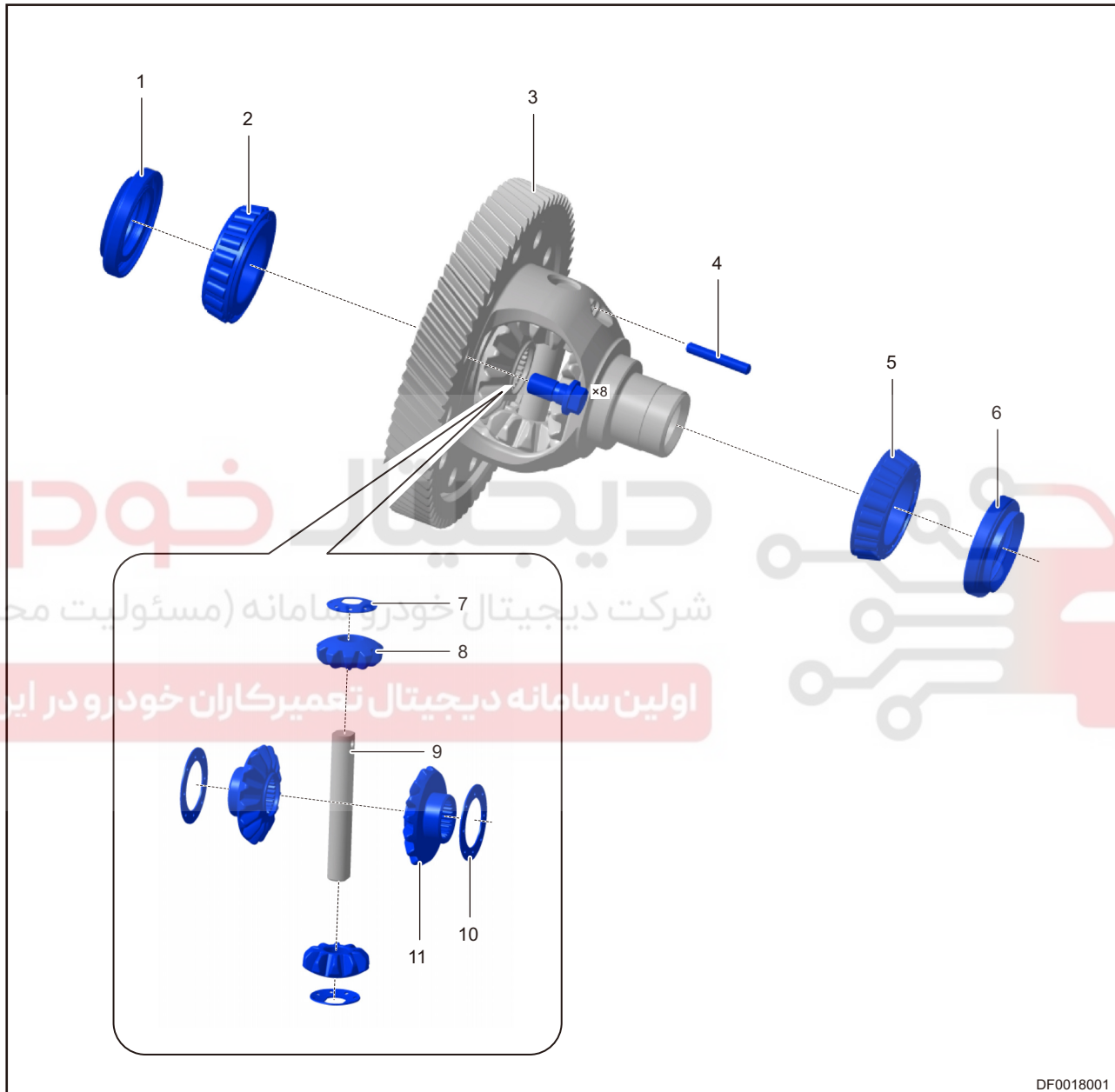


## GENERAL INFORMATION

### Overview

### Description

### Differential Set



DF0018001

17

|   |  |
|---|--|
| 1 - Differential Tapered Roller Bearing Outer Race    | 2 - Differential Tapered Roller Bearing            |
| 3 - Differential Case with Driven Gear of Final Drive | 4 - Dowel Pin                                      |
| 5 - Differential Tapered Roller Bearing               | 6 - Differential Tapered Roller Bearing Outer Race |
| 7 - Planetary Gear Washer                             | 8 - Planetary Gear                                 |
| 9 - Planetary Gear Shaft                              | 10 - Drive Shaft Gear                              |
| 11 - Drive Shaft Gear Washer                          |  |

Differential case contains 2 drive shaft gears, planetary gear shaft and 2 planetary gears. Driven gear of final drive is linked up with the differential case by bolts. Planetary gear shaft, which is fixed on differential case, drives planetary gears to rotate when differential operates, thus driving the drive shaft gears to turn. Drive shaft gears are connected with drive shaft to transmit effort to wheels.

## Operation

- When driving on a bumpy road or turning, the travel distance of outside wheels is longer than that of inside wheels, so the speed of outside wheels is faster, which breaks the balance of vehicle drive train.
- The planetary gear mechanism in differential can transmit the speed difference between outside and inside wheels via drive shaft when turning. It forces the planetary gears to rotate, thus allowing inside and outside wheels to spin at two different speeds in order to balance the speed difference and keep vehicle moving smoothly.
- Final drive is a component to reduce the rotation speed and increase the torque of drive train.

## Specifications

### Torque Specification

| Description                  | Torque (N·m) |
|------------------------------|--------------|
| Final Drive Driven Gear Bolt | 137 ± 3      |

### Clearance Specification

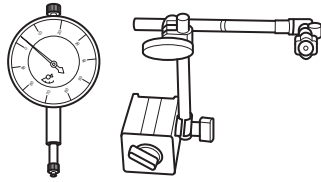
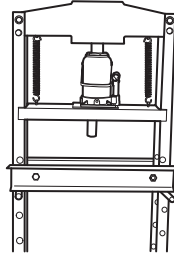
| Description  | Acceptable Range (mm) |
|--|-----------------------|
| Clearance Between Differential Case and Planetary Gear | 0.025 - 0.150         |

## Tools

### Special Tools

|                 |          |  |
|-----------------|----------|--|
| Bearing Remover | CH-30057 | <br>011 |
| Punch           | CH-30040 | <br>073 |

## General Tools

|                                    |  |
|------------------------------------|--|
| Dial Indicator and Magnetic Holder | <br>023 |
| Hydraulic Press                    | <br>012 |

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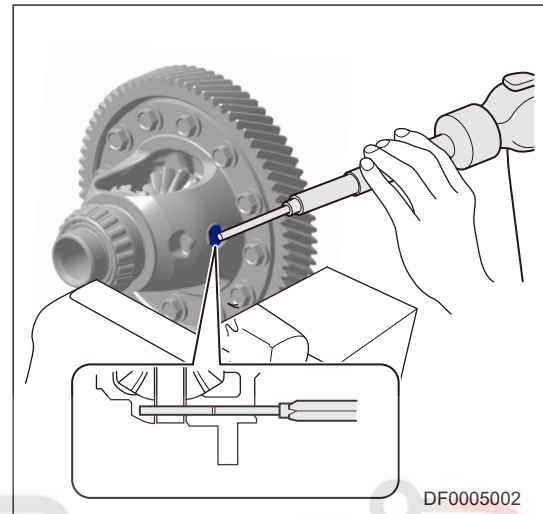


## ON-VEHICLE SERVICE

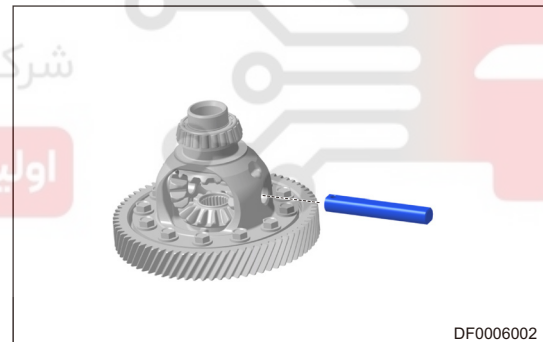
### Differential assembly

#### Removal

1. Remove the straight pin.
  - (a) Hold differential assembly in a vise between aluminum plates.
  - (b) Remove straight pin from differential assembly using 5 mm pin punch and hammer.



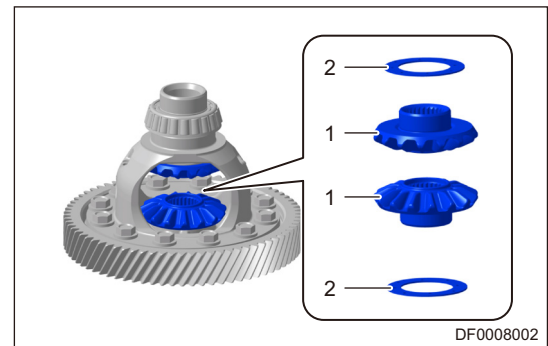
2. Remove the planetary gear shaft.
  - (a) Remove planetary gear shaft from differential assembly.



3. Remove the drive shaft gear.
  - (a) Turn planetary gear and drive shaft gear, then remove 2 planetary gears and 2 spherical washers from differential case.

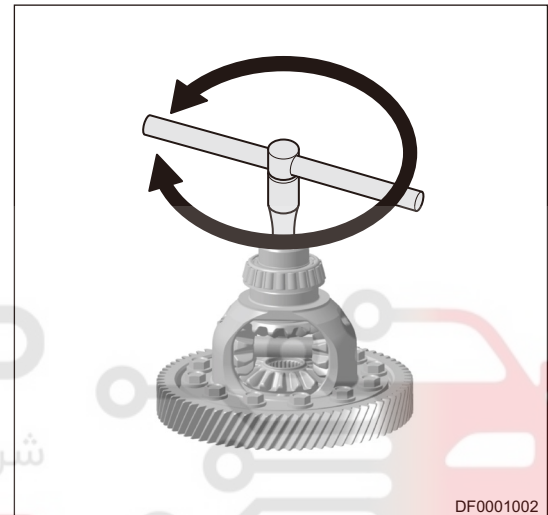


- (b) Remove 2 drive shaft gears and 2 adjusting washers from differential case.



### Differential Assembly Inspection

1. Check operation of differential assembly.  
Use a tool to turn the drive shaft gear as shown in the illustration.



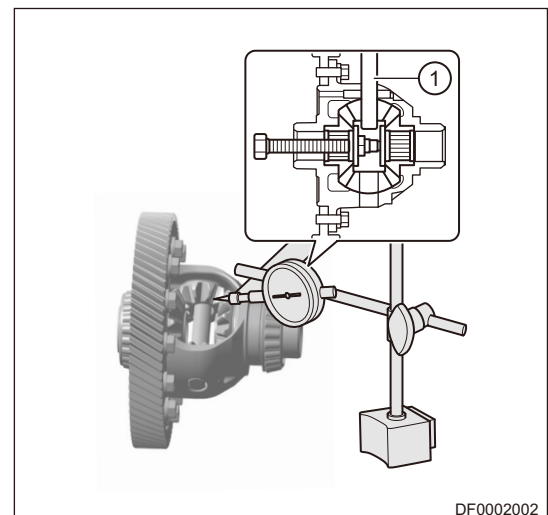
#### Standard

Drive shaft gear may not lock when turning in any direction.

#### Caution:

- If drive shaft gear locks, perform all inspections. If drive shaft gear still locks after faulty part is replaced, replace the differential assembly.

2. Check planetary gear backlash.
  - (a) Hold differential assembly in a vise between aluminum plates.



- (b) Install planetary gear shaft to planetary gear as shown in illustration.

- (c) Using a dial indicator, measure clearance of planetary gear.

**Gear clearance**

0.05 ~ 0.2 mm

**Caution:**

- If gear clearance is not as specified, replace adjusting washer with one of different thickness. Refer to the table, select the adjusting washer that can ensure that the backlash is within the specified range.
- Select adjusting washers with same thickness for right and left sides.

3. Check the spherical gasket.

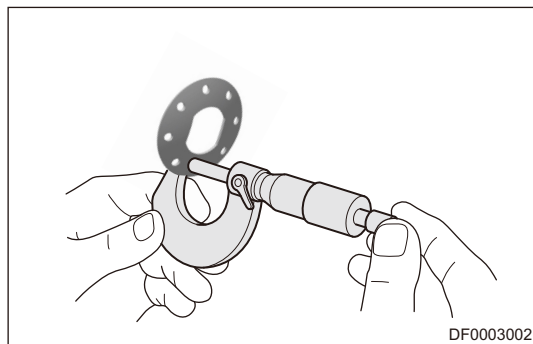
- (a) Using a micrometer, measure thickness of spherical washer.

**Minimum thickness**

0.92 mm

**Caution:**

- If thickness is less than minimum value, replace the spherical washer.



4. Check planetary gear shaft.

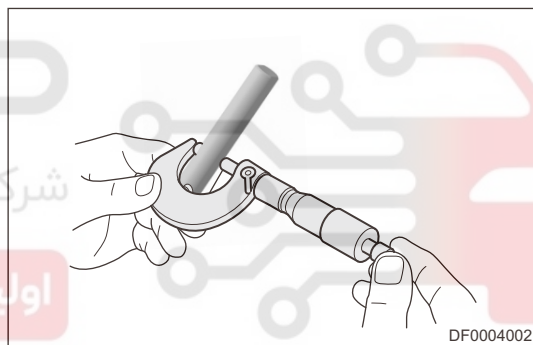
- (a) Using a micrometer, measure outer diameter of planetary gear shaft.

**Minimum outer diameter**

16.982 mm

**Caution:**

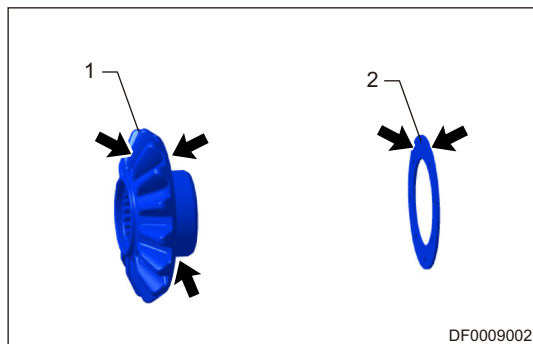
- If outer diameter is less than minimum value, replace the planetary gear shaft.



## Installation

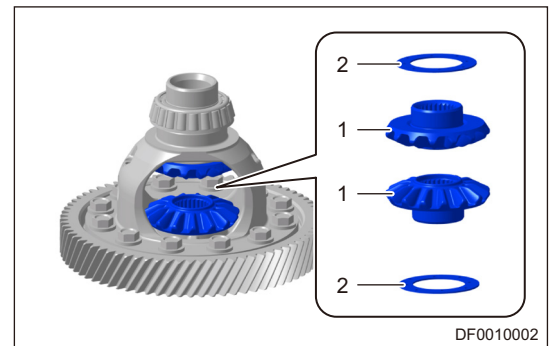
- 17 1. Install the planetary gear.

- (a) Apply gear oil (arrow) to drive shaft gear (1) and adjusting washer (2).

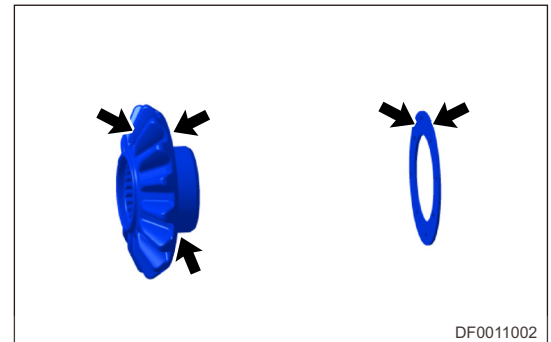




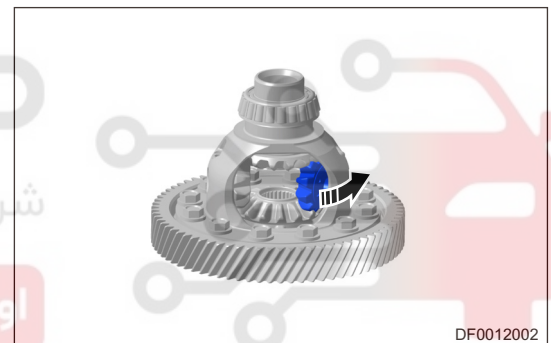
- (b) Install 2 drive shaft gears (1) and 2 adjusting washers (2) into differential case.



- (c) Apply gear oil (arrow) to planetary gear and spherical washer.

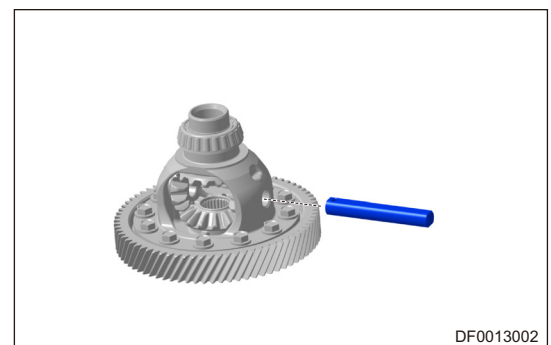


- (d) Turn drive shaft gear, and install 2 planetary gears and 2 spherical washers.

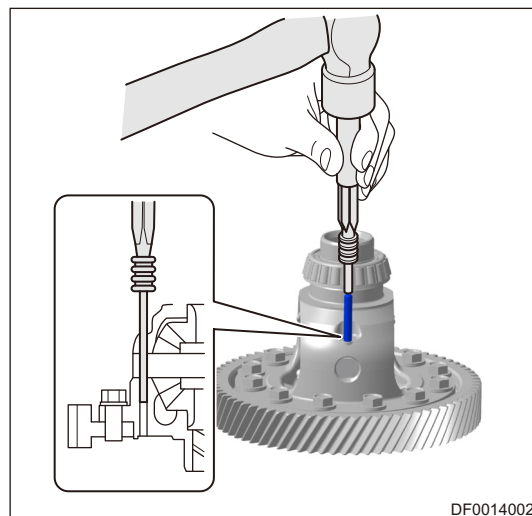


2. Install the planetary gear shaft.

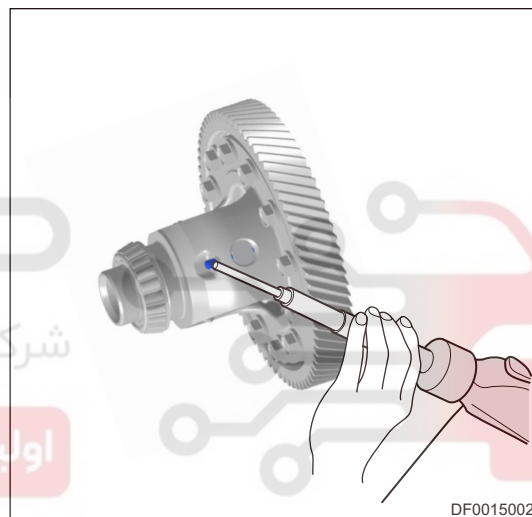
- (a) Apply gear oil to planetary gear shaft.
- (b) Install planetary gear shaft to differential assembly so that the straight pin hole of planetary gear shaft is aligned with differential case hole.



3. Install the straight pin.
- (a) Install straight pin to differential sub-assembly using 5 mm pin punch and hammer.



- (b) Install straight pin into differential case using punch and hammer.



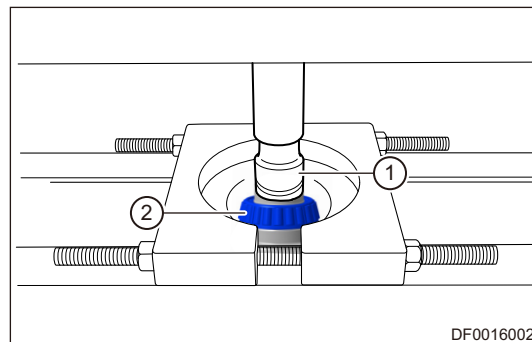
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## Differential Bearing

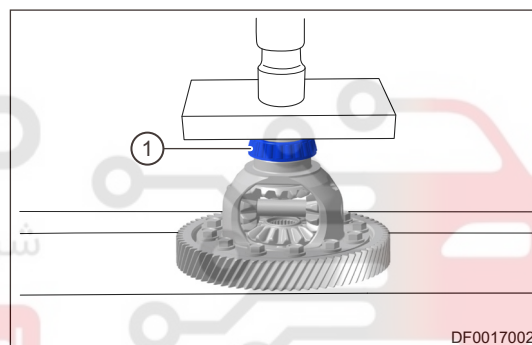
### Removal

1. Remove the differential (arrow) (See page 17-6).
2. Remove the differential bearing.
  - (a) Using hydraulic press (1) and bearing remover, separate the bearing (2) from differential.



### Installation

1. Install the differential bearing
  - (a) Using a hydraulic press, press the bearing (1) into differential.



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