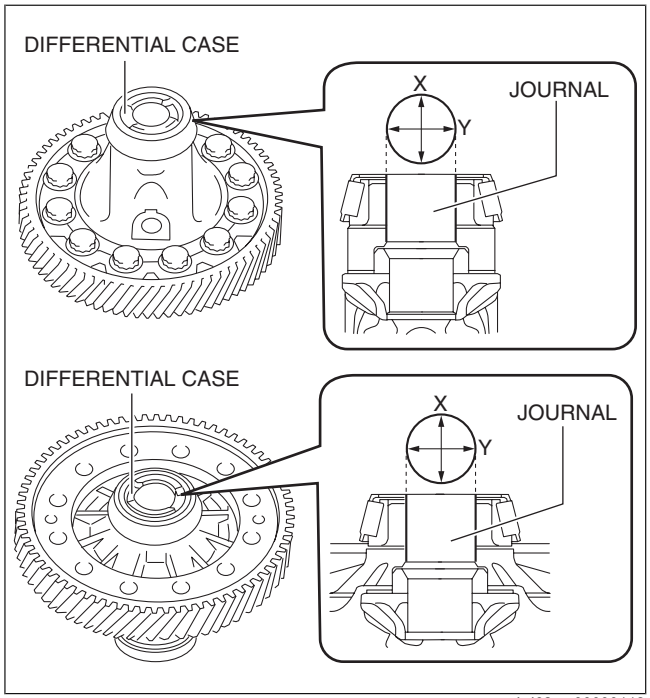
DIFFERENTIAL BACKLASH ADJUSTMENT

id051500176800

1. Measure the inner diameter of the differential case journal shown in the figure.
   - If it exceeds the maximum, replace the differential case.

   Inner diameter of the differential case journal
   Maximum: 33.546 mm {1.3207 in}



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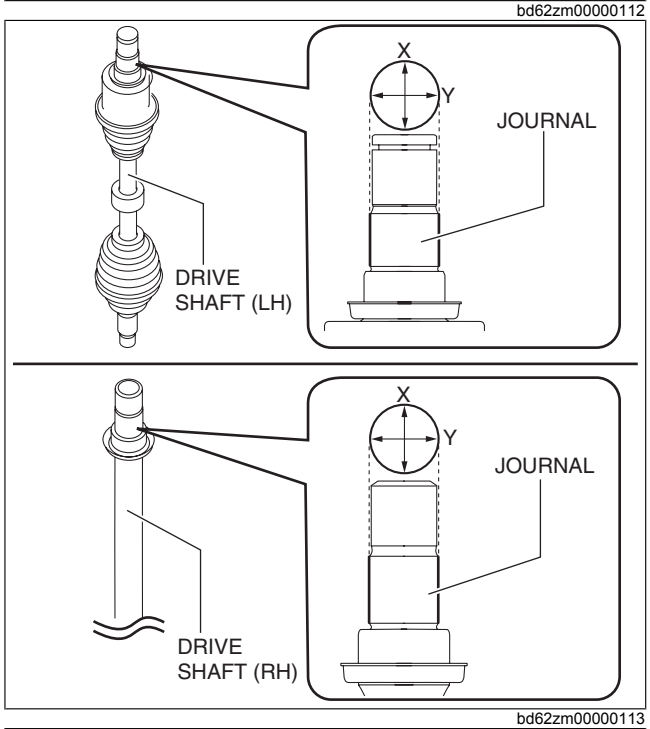
2. Measure the outer diameter of the drive shafts journal.
   - If it is less than the Minimum, repair or replace the malfunctioning location.

   Note
   - For the drive shaft disassembly/assembly procedure, verify the Workshop Manual.

   Outer diameter of the drive shaft journal (LH)
   Minimum: 33.459 mm {1.3173 in}

   Outer diameter of the drive shaft journal (RH)
   Minimum: 33.444 mm {1.3167 in}



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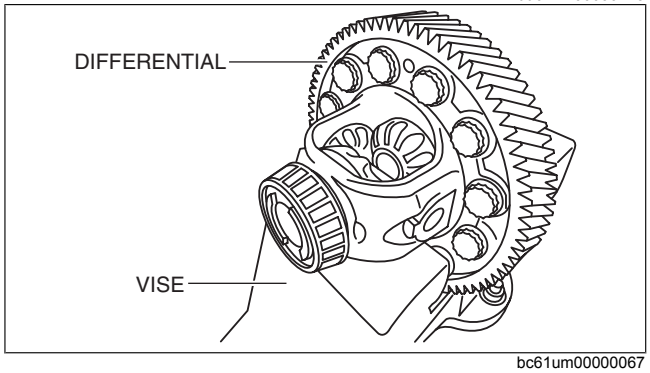
3. Secure the differential in a vice.



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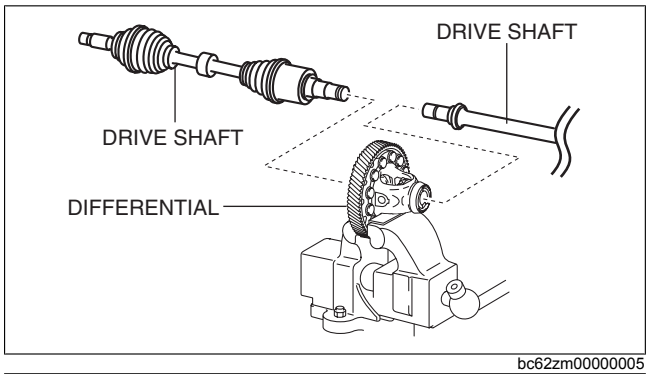
4. Assemble the drive shafts to the differential.



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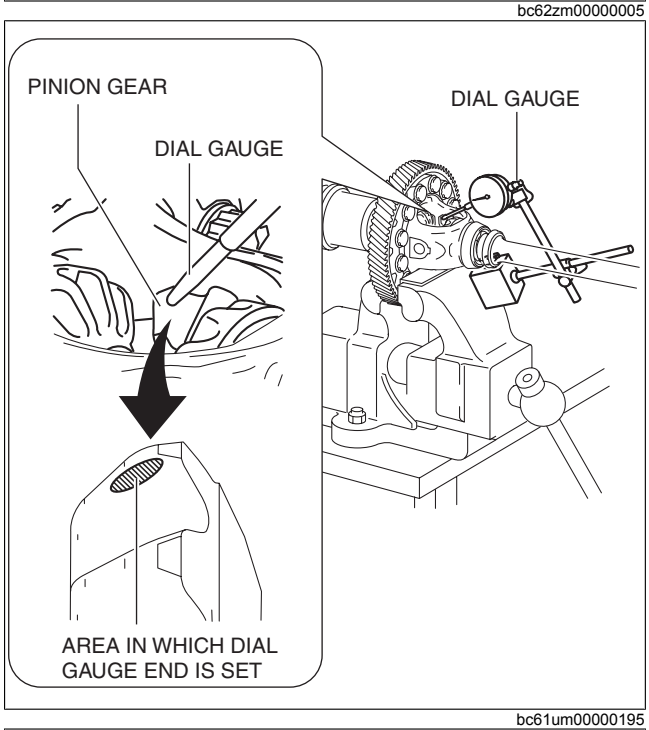
5. Set the dial gauge with the measuring probe attached perpendicularly to the area shown in the figure for the pinion gear.



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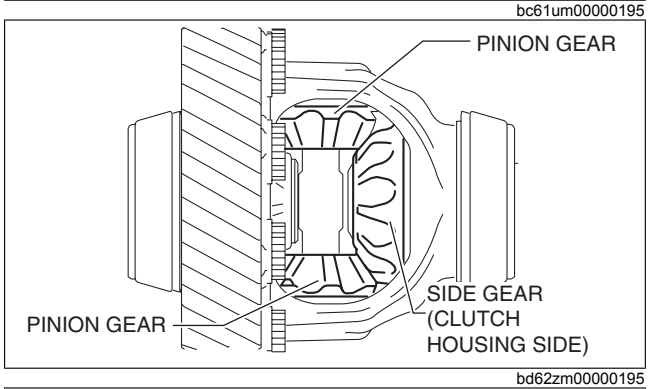
6. Measure the side gear on the drive shaft (RH) side and the pinion gear backlash using the following procedure:
   (1) Affix the side gear on the drive shaft (RH) side by hand.



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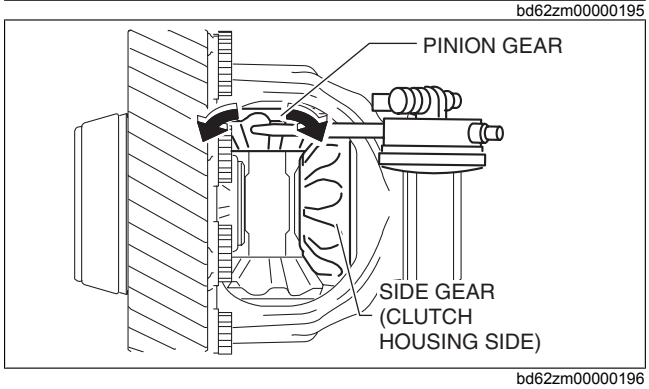
   (2) Measure the backlash by moving the pinion gear with the dial gauge that has been set and determine measured value A.

Caution
- **Because a difference occurs in the backlash measurement value if the secured side gear moves, move the pinion gear by hand so that the secured side gear does not move.**



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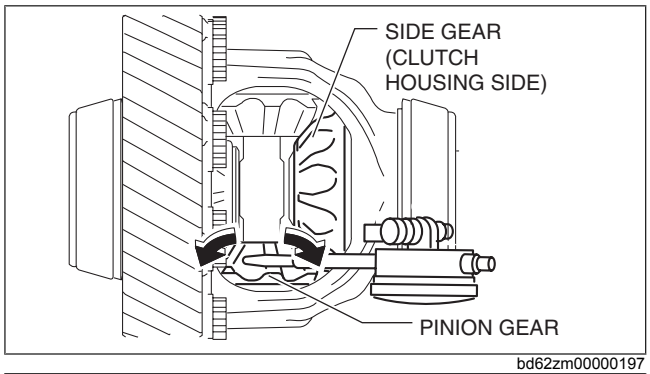
(3) Measure the opposite of the pinion gear backlash in the same way as procedure 2 in Step 4 and determine measured value B.
(4) Calculate the average value of measured values A and B using the following formula and determine the backlash measurement value on the drive shaft (RH) side of the pinion gear.
- (Measured value A + measured value B)/2 = backlash measurement value on drive shaft (RH) side



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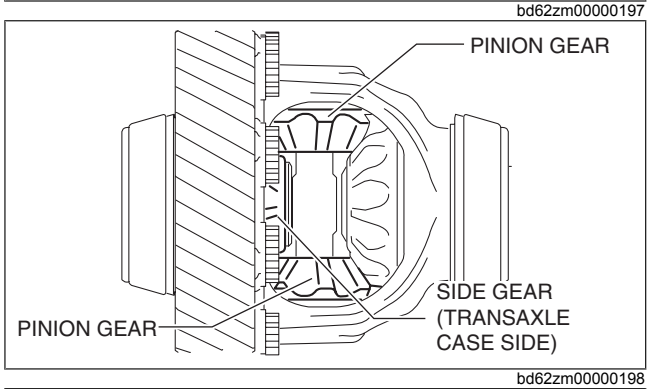
7. Measure the side gear on the drive shaft (LH) side and the pinion gear backlash using the following procedure:
(1) Affix the side gear on the drive shaft (LH) side by hand.



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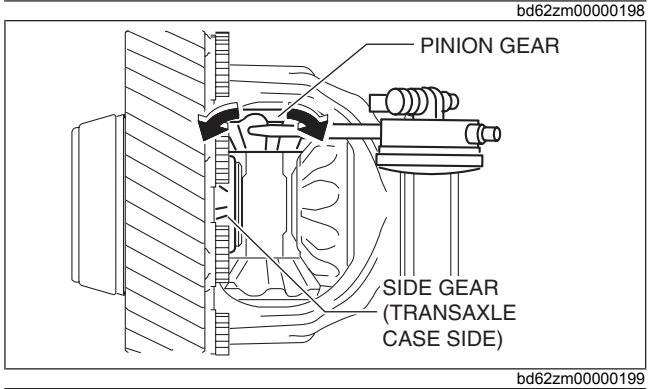
(2) Measure the backlash by moving the pinion gear that the dial gauge has been set and determine measured value C.

Caution
- **Because a difference occurs in the backlash measurement value if the secured side gear moves, move the pinion gear by hand so that the secured side gear does not move.**



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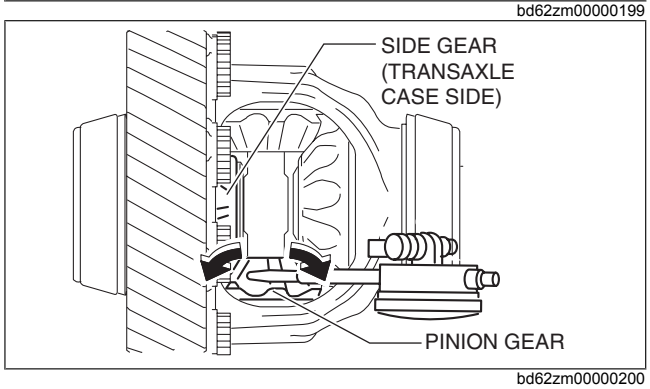
(3) Measure the opposite of the pinion gear backlash in the same way as procedure 2 in Step 5 and determine measured value D.
(4) Calculate the average value of measured values C and D using the following formula and determine the backlash measurement value on the drive shaft (LH) side of the pinion gear.
- (Measured value C + measured value D)/2 = backlash measurement value on drive shaft (LH) side

8. Verify that the backlash of each sides is within the specification.



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Differential pinion gear backlash
Specification: 0.02—0.14 mm {0.0008—0.0055 in}

- If the measured backlash for each is within the specification, the thrust washer thickness is the same as the removed one and there is no problem, therefore the "DIFFERENTIAL BACKLASH ADJUSUTMENT" procedure is finished.
- If not within the specification, perform "Thrust Washer Selection Calculation". (See Thrust Washer Selection Calculation.)
- If it exceeds the specification even when a **0.95 mm {0.037 in}** thick thrust washer is used, replace the differential case.

Thrust Washer Selection Calculation

Note
- Perform the thrust washer selection calculation for each sides.

1. Calculate the backlash gap by subtracting constant number A from backlash measurement value.
   - Constant number A = **0.080 mm {0.0031 in}**
   - Backlash measurement value - **0.080 mm {0.0031 in}**= backlash gap

   Calculation example
   - Backlash measurement value = 0.165 mm {0.00650 in}
   - **0.165 mm {0.00650 in}** - **0.080 mm {0.0031 in}** = **0.085 mm {0.0033 in}**
2. Calculate the thrust washer thickness gap by multiplying the backlash gap by constant number B.

   Calculation method [mm]
   - Constant number B = **1.25**
   - Backlash gap × **1.25** = thrust washer thickness gap

   Calculation example
   - Backlash gap = **0.085 mm**
   - **0.085 mm** × **1.25** = **0.11 mm**

   Calculation method [in]
   - Constant number B = **13**
   - Backlash gap × **13** = thrust washer thickness gap

   Calculation example
   - Backlash gap = 0.0033 in
   - **0.0033 in** × **13** = **0.0043 in**
3. Calculate the thrust washer thickness calculated value by adding the thrust washer thickness gap to the thickness of the thrust washer used in the measurement.
   - Thickness of thrust washer used in measurement + thrust washer thickness gap = thrust washer thickness calculated value

   Calculation example
   - Thickness of thrust washer used in measurement = **0.810 mm {0.0319 in}**
   - Thrust washer thickness gap = **0.11 mm {0.0043 in}**
   - **0.810 mm {0.0319 in}** + **0.11 mm {0.0043 in}** = **0.920 mm {0.0362 in}**
4. Calculate the thrust washer thickness on the opposite side in the same way.
5. Based on each thrust washer thickness calculated value, select each thrust washer of the appropriate thickness.

Caution
- **Select the same thickness of the thrust washers of each sides.However, if the measurement value cannot be adjusted within the specification, select the different thickness of the thrust washer.**

Thrust washer thickness calculated value		Appropriate thrust washer thickness (mm {in})
Equal to or more (mm {in})	Less than (mm {in})	
0.925 {0.0364}	1.025 {0.04035}	0.95 {0.037}
0.875 {0.0344}	0.925 {0.0364}	0.90 {0.035}
0.825 {0.0325}	0.875 {0.0344}	0.85 {0.033}
0.775 {0.0305}	0.825 {0.0325}	0.80 {0.031}
0.675 {0.0266}	0.775 {0.0305}	0.75 {0.030}

Selection example
- Because shim thickness calculated value **0.920 mm {0.0362 in}** applies to **0.875 mm {0.0344 in}** or more and less than **0.925 mm {0.0364 in}**, a shim of **0.90 mm {0.035 in}** thickness is selected.

Note
- Constant number A, **0.080 mm {0.0031 in}** is the backlash median value of the specification.
- The backlash gap is the difference between the backlash median value of the specification and the backlash measurement value.
- Constant number B is the thrust washer thickness which varies each time the backlash changes by **1.0 mm {0.039 in}**.Because the thrust washer thickness changes **0.1 mm {0.004 in}** when the backlash changes **0.08 mm {0.003 in}**, the quotient is **1.25 mm/mm {13 in/in}**.
- The thrust washer thickness gap is the difference between the thickness of the thrust washer used in the measurement and the thickness of an appropriate thrust washer.In the formula to calculate the thrust washer thickness gap, the thrust washer thickness gap is calculated by multiplying the backlash gap with constant number B.