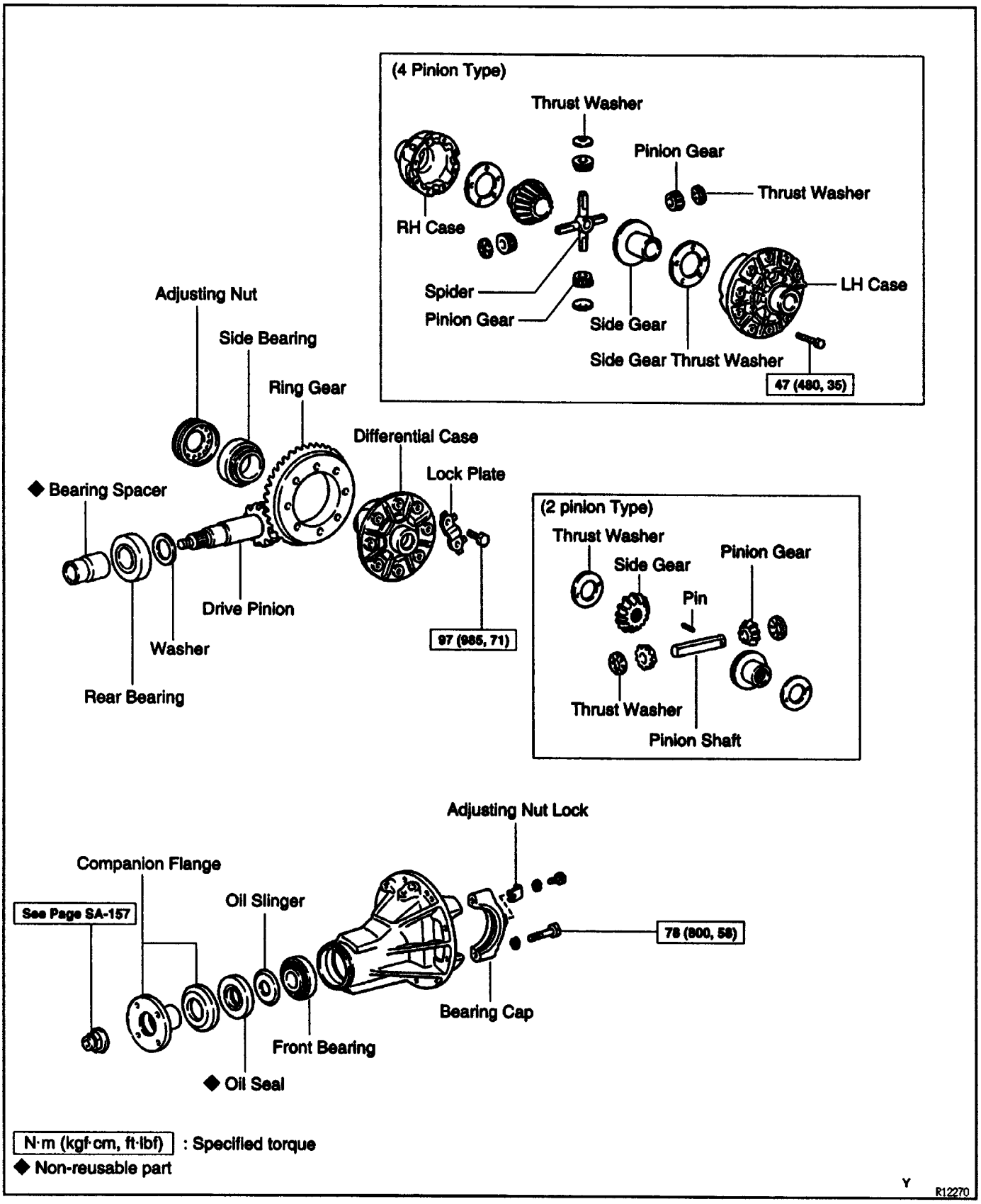
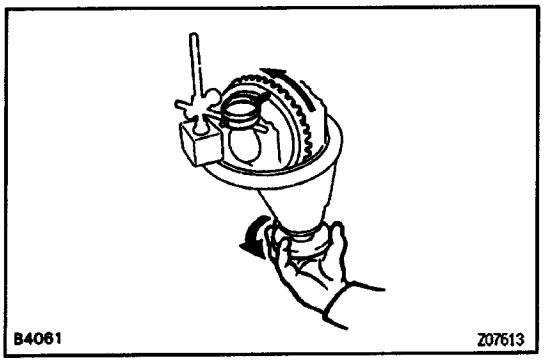
DIFFERENTIAL CARRIER

COMPONENTS





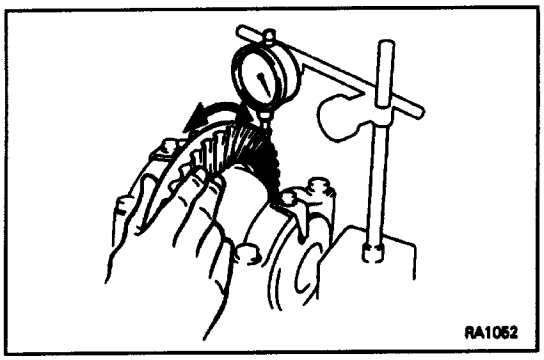
DIFFERENTIAL INSPECTION

1. CHECK RING GEAR RUNOUT

If the runout is greater than the maximum, install a new ring gear.

Maximum runout:

0.10 mm (0.0039 in.)



2. CHECK RING GEAR BACKLASH

If the backlash is not within specifications, adjust the side bearing preload or repair as necessary.

(See page SA–149)

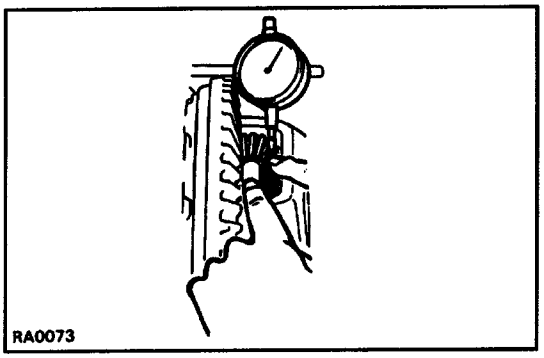
Backlash:

0.13 – 0.18 mm (0.0051 – 0.0071 In.)

3. INSPECT TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION

(See page SA–155)

Note the tooth contact position.



4. 2 PINION TYPE:

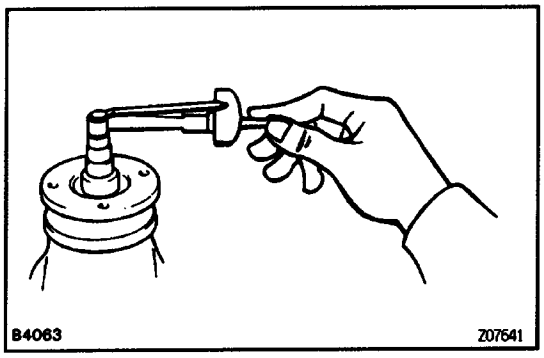
CHECK SIDE GEAR BACKLASH

Measure the side gear backlash while holding 1 pinion gear toward the case.

Backlash:

0.05 – 0.20 mm (0.0020 – 0.0079 In.)

If the backlash is not within specification, install the proper thrust washers.



5. MEASURE DRIVE PINION PRELOAD

Using a torque wrench, measure the preload of backlash between the drive pinion and ring gear.

Preload (starting):

2 pinion type:

0.9 – 1.3 N–m

(9 – 13 kgf–cm, 7.8 – 11.3 in.–lbf)

4 pinion type:

0.5 – 0.8 N–m

(5 m– 8 kgf–cm, 4.3 – 6.9in.–lbf)

6. CHECK TOTAL PRELOAD

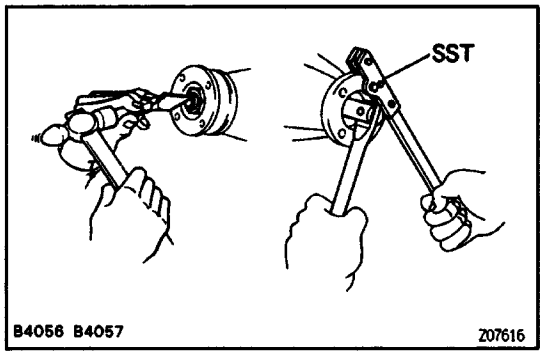
Using a torque wrench, measure the total preload.

Total preload (starting):

Add drive pinion preload

0.4 – 0.6 N–m

(4 – 6 kgf–cm, 3.5 – 5.2 in.–lbf)



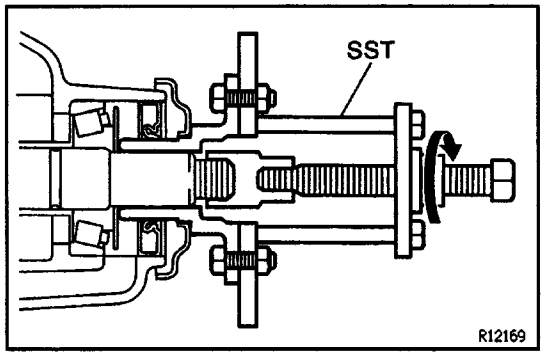
DIFFERENTIAL CARRIER DISASSEMBLY

1. REMOVE COMPANION FLANGE

(a) Using a hammer and chisel, loosen the staked part of the nut.

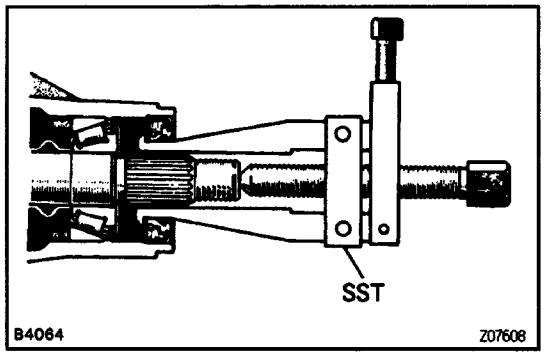
(b) Using SST to hold the flange, remove the nut.

SST 09330–00021



(c) Using SST, remove the companion flange.

SST 09950–30010

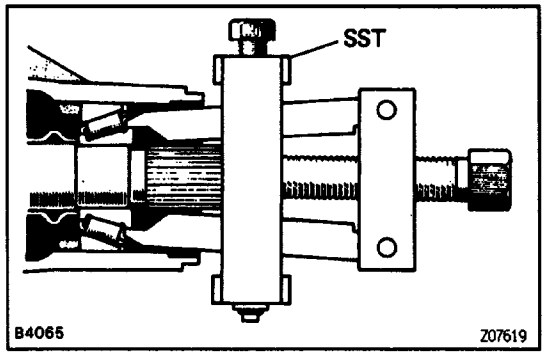


2. REMOVE OIL SEAL AND OIL SLINGER

(a) Using SST, remove the oil seal from the housing.

SST 09308–10010

(b) Remove the oil slinger.



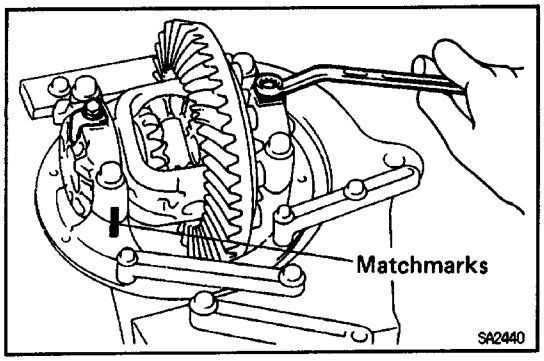
3. REMOVE FRONT BEARING AND BEARING SPACER

(a) Using SST, remove the front bearing from the drive pinion.

SST 09556 – 30010

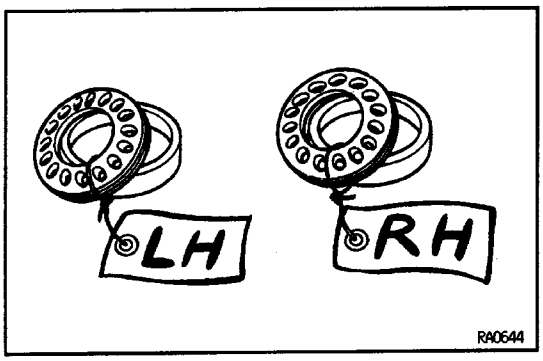
(b) Remove the bearing spacer.

If the front bearing is damaged or worn, replace the bearing.

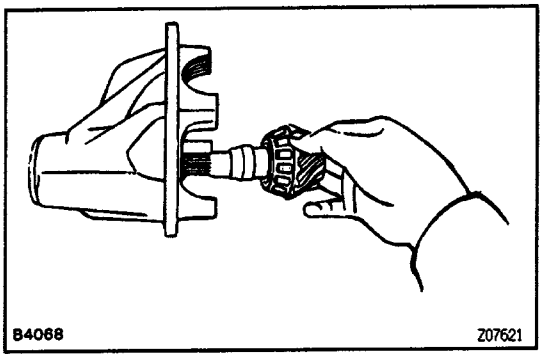


4. REMOVE DIFFERENTIAL CASE AND RING GEAR

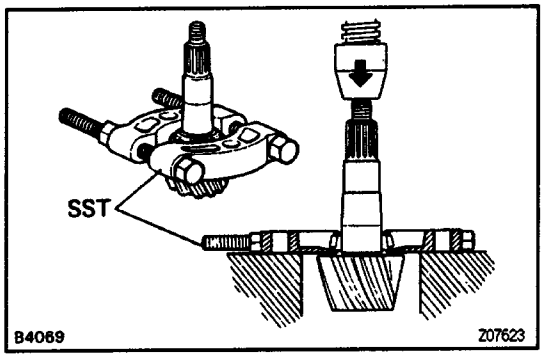
(a) Place matchmarks on the bearing cap and differential carrier.
(b) Remove the 2 adjusting nut locks.
(c) Remove the 2 bearing caps and 2 adjusting nuts.
(d) Remove the bearing outer races.
(e) Remove the differential case from the carrier.



HINT: Tag the disassembled parts to show the location for reassembly.

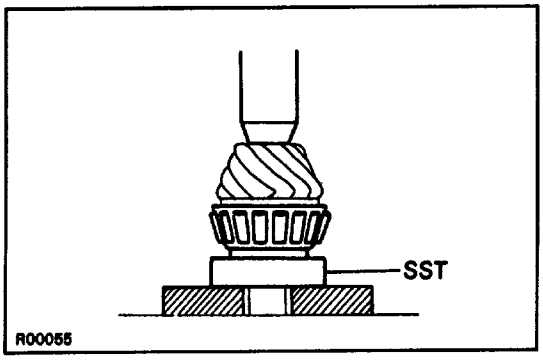


5. REMOVE DRIVE PINION FROM DIFFERENTIAL CARRIER

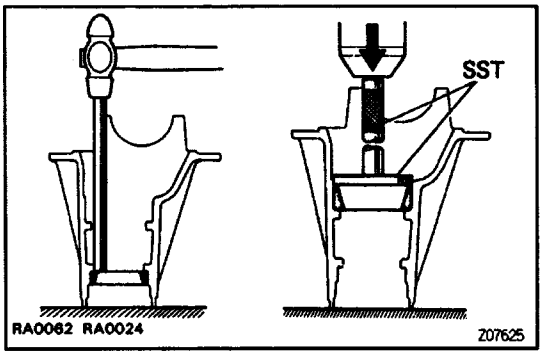


6. REPLACE DRIVE PINION REAR BEARING

(a) Using a press and SST, pull out the rear bearing from the drive pinion.
SST 09950–00020



(b) Using SST and a press, press the reused washer and new rear bearing on the drive pinion.
SST 09506–30012



7. REPLACE DRIVE PINION FRONT AND REAR BEARING OUTER RACES

(a) Using a hammer and brass bar, drive out the outer race.

(b) Using SST and a press, drive in a new outer race.

SST

Front side:

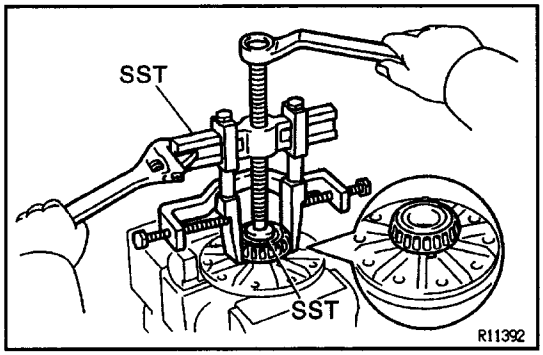
09608 – 35014 (09608 – 06020, 09608 – 06110)

Rear side 4 pinion type:

09608–35014 (09608–06020, 09608–06180)

Rear side 2 pinion type:

09608–35014 (09608–06020, 09608–06120)

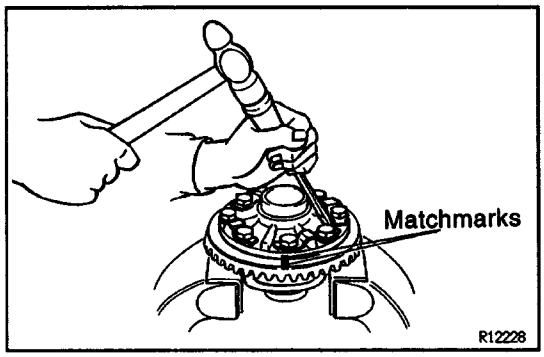


8. REMOVE SIDE BEARINGS FROM DIFFERENTIAL CASE

Using SST, pull the side bearing from the differential case.

SST 09710–14012 (09710–00010), 09950–40010

HINT: Fix the claws of SST to the notches in the differential case.



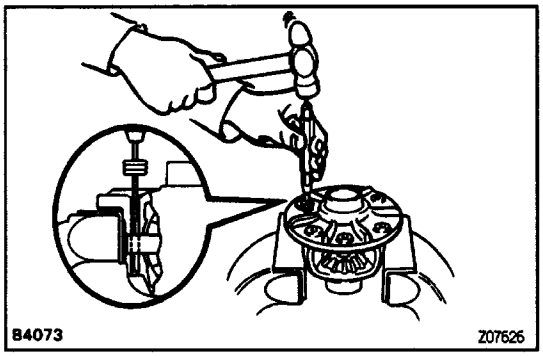
9. REMOVE RING GEAR

(a) Using a chisel and hammer, unstake the plates.

(b) Remove the ring gear set bolts and lock plates.

(c) Place alignment matchmarks on the ring gear and differential case.

(d) Using plastic or copper hammer, tap on the ring gear to separate it from the differential case.

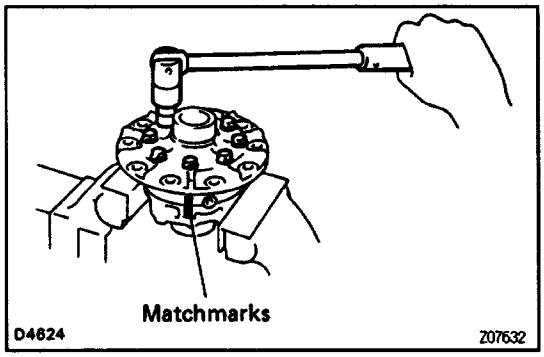


10. 2 Pinion Type:

DISASSEMBLE DIFFERENTIAL CASE

Using a pin punch and hammer, drive out the straight pin.

Remove the pinion shaft, 2 pinion gears, 2 side gears and 2 thrust washers.

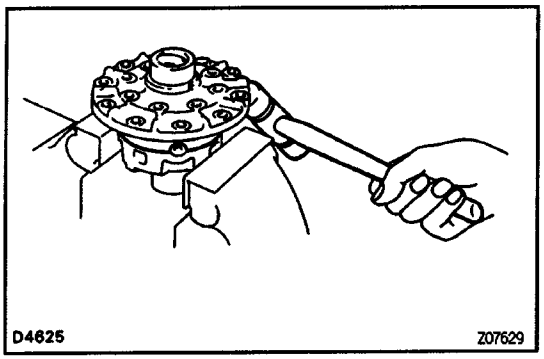


11. 4 Pinion Type:

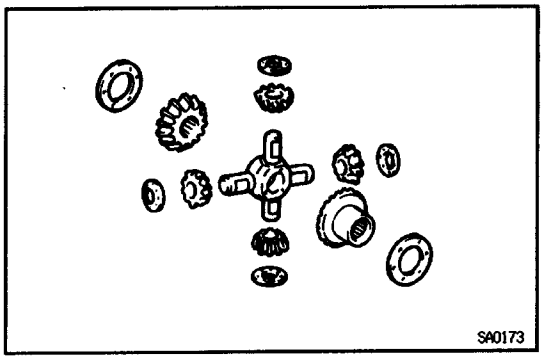
DISASSEMBLE DIFFERENTIAL CASE

(a) Place the matchmarks on the LH and RH cases.

(b) Remove the 8 bolts.

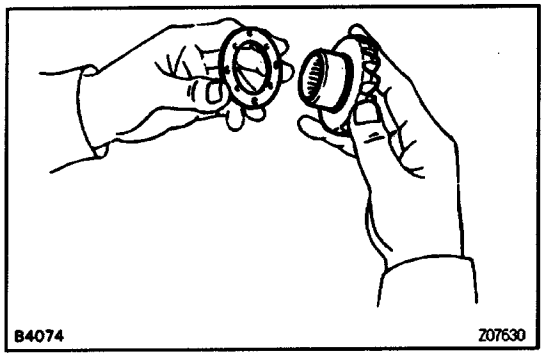


(c) Using a plastic hammer, separate the LH and RH cases.



(d) Remove these parts:

- 2 side gears
  2 side gears thrust washers
- Spider
- 4 pinion gears
- 4 pinion gears thrust washers



DIFFERENTIAL CARRIER ASSEMBLY

1. 2 Pinion Type:

ASSEMBLE DIFFERENTIAL CASE

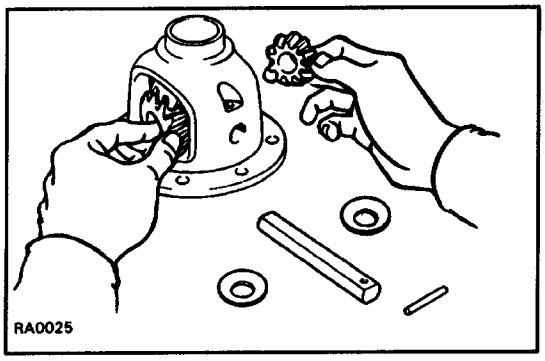
(a) Install the proper thrust washers and side gears.
Using the table below, select thrust washers which will ensure that the backlash is within specification.
Try to select washers of the same size for both sides.

Backlash:

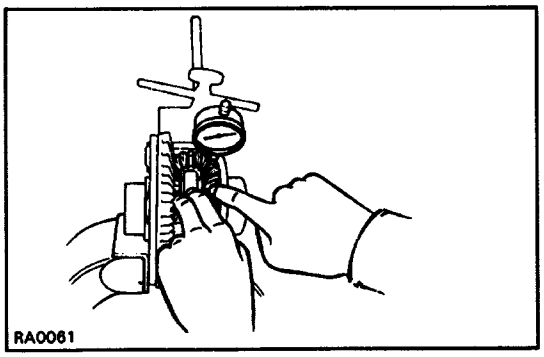
0.05 – 0.20 mm (0.0020 – 0.0079 in.)

Thrust washer thickness

Thickness mm (in.)	Thickness mm (in.)
1.6 (0.063)	**1.8 (0.071)**
1.7 (0.067)	**–**



(b) Install thrust washers and side gears in the differential case.

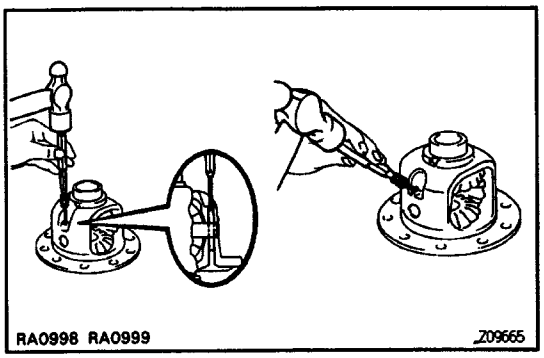


(c) Check the side gear backlash.
Measure the side gear backlash while holding 1 pinion gear toward the case.

Backlash:

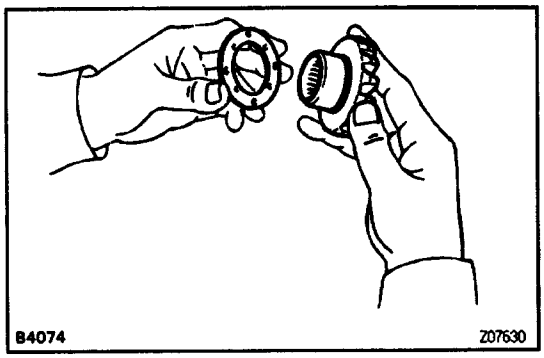
0.05 – 0.20 mm (0.0020 – 0.0079 In.)

If the backlash is not within specification, install a thrust washer of different thickness.



(d) Install the straight pin.
Using a pin punch and hammer, drive the straight pin through the case and hole in the pinion shaft.

Stake the pin and differential case.

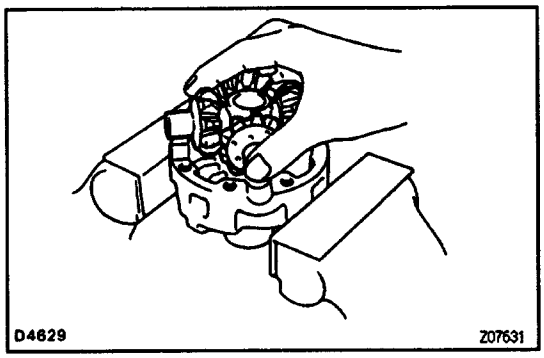


2. 4 Pinion Type:

ASSEMBLE DIFFERENTIAL CASE

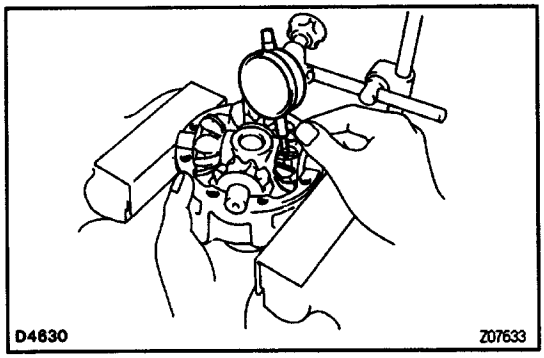
(a) Install the thrust washer to the side gear.

(b) Install the side gear to the RH case.



(c) Install the 4 pinion gears and thrust washers to the spider.

(d) Install the pinion gear and spider to the RH case.



(e) Hold the side gear, measure the side gear backlash.

Backlash:

0.05 – 0.20 mm (0.0020 – 0.0079 in.)

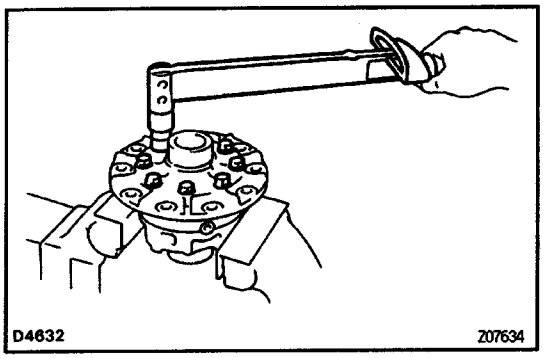
HINT: Measure the backlash at the RH case at the LH case.

(f) If the backlash is not within specification, install a thrust washer of a different thickness.

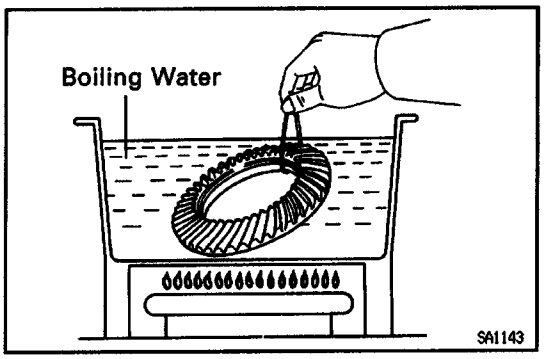
HINT: Use washer of the same thickness on both the right and left sides.

Thickness mm (in.)	Thickness mm (in.)
0.9 (0.035)	**1.2 (0.047)**
1.0 (0.039)	**1.3 (0.051)**
1.1 (0.043)	**–**

(g) Install the side gear and thrust washer to the RH case.
(h) Install the pinion gears and spider to the RH case.
(i) Install the side gear and thrust washer to the LH case.
(j) Apply gear oil to the each parts.

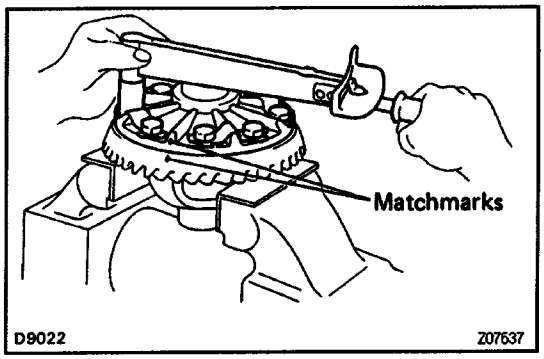


(k) Align the matchmarks on the LH and RH case.
(1) Torque the 8 bolts.
Torque: 47 N–m (480 kgf–cm, 35 ft–lbf)

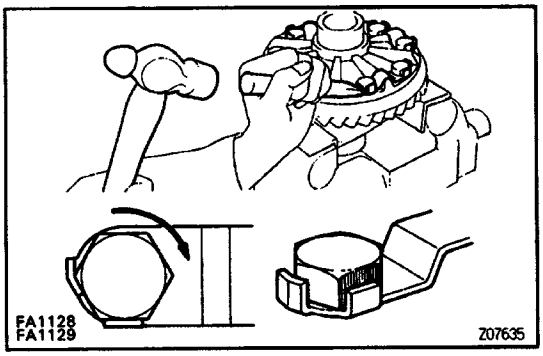


3. INSTALL RING GEAR ON DIFFERENTIAL CASE

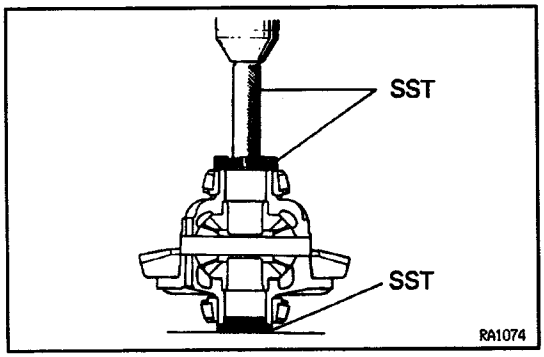
(a) Clean the contact surfaces of the differential case and ring gear.
(b) Heat the ring gear in boiling water.
(c) Carefully remove the ring gear from the water.
(d) After the moisture on the ring gear has completely evaporated, quickly install the ring gear to the differential case.



(e) Align the matchmarks on the ring gear and differential case.
(f) Coat the ring gear set bolts with gear oil.
(g) Temporarily install the lock plates and set bolts.
(h) After the ring gear cools down enough, tighten the set bolts uniformly and a little at a time.
Torque: 97 N–m (985 kgf–cm, 71 ft–lbf)

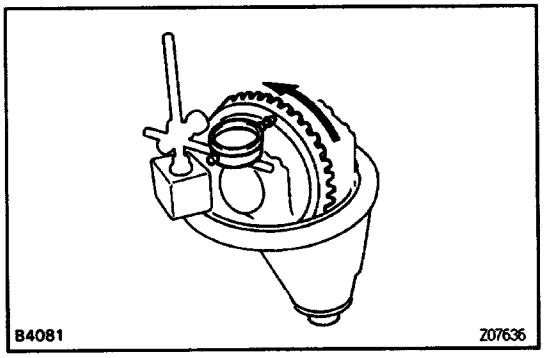


Using a hammer and drift punch, stake the lock plates.
HINT: Stake 1 claw flush with the flat surface of the bolt. For the claw contacting the protruding portion of the bolt, stake only the half portion of the tightening side.



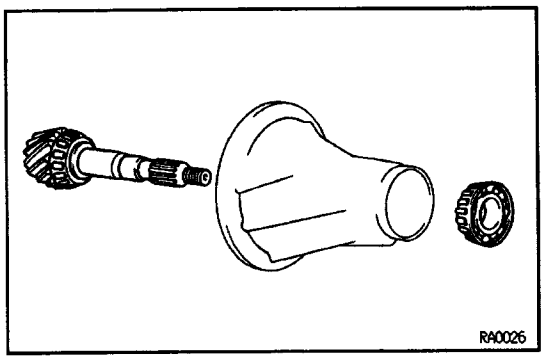
4. INSTALL SIDE BEARING

Using SST and a press, press the side bearing on the differential case.
SST 09550 –10012 (09252 –10010, 09557 –10010, 09558–10010)



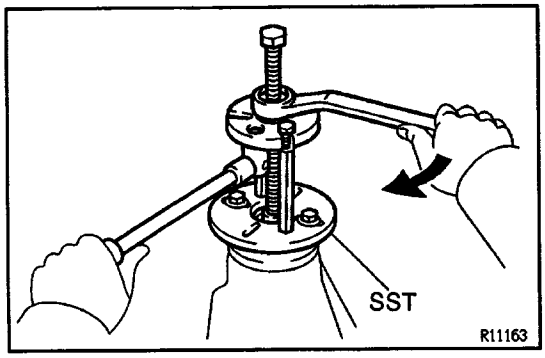
5. CHECK RING GEAR RUNOUT

(a) Install the differential case onto the carrier and tighten the adjusting nut just to where there is no play in the bearings.
(b) Check the ring gear runout.
Maximum runout:
0.10 mm (0.0039 in.)

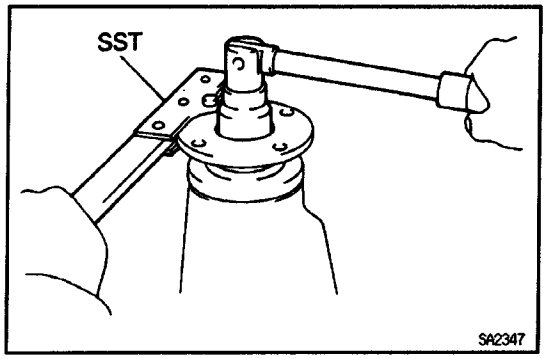


6. TEMPORARILY ADJUST DRIVE PINION PRELOAD

(a) Install these parts:
Drive pinion
Front bearing
HINT: Assemble the spacer, oil slinger and oil sea after adjusting the gear contact pattern.

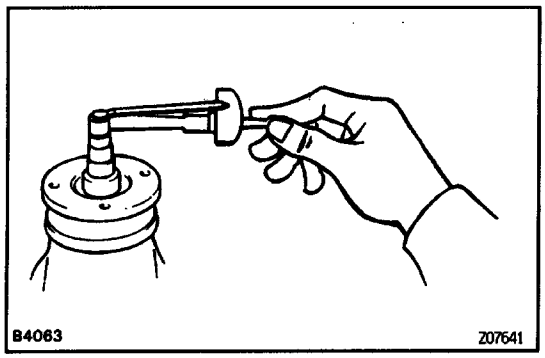


(b) Install the companion flange with the SST.
SST 09950–30010



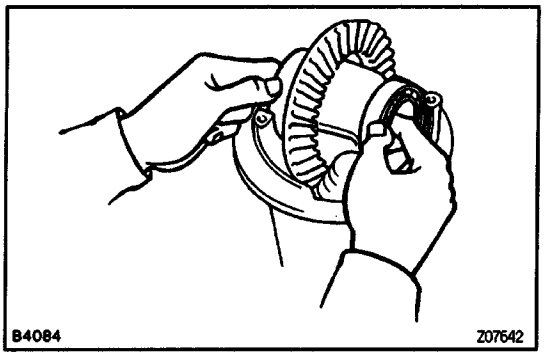
(c) Adjust the drive pinion preload by tightening the companion flange nut.
Using SST to hold the flange, tighten the nut.
SST 09330–00021

NOTICE: As there is no spacer, tighten a little at a time, being careful not to overtighten.



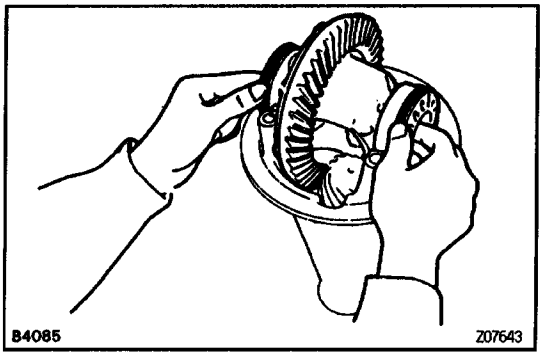
(d) Using a torque wrench, measure the preload.

Preload (starting):
New bearing:
2 pinion type:
1.9 – 2.5 N . m
(19 – 26 kgf–cm, 16.5 – 22.6 in.–lbf)
4 pinion type:
1.0 – 1.6 N–m
(10 – 16 kgf–cm, 8.7 – 13.9 in.–lbf)
Reused bearing:
2 pinion type:
0.9 – 1.3 N–m
(9 – 13 kgf–cm, 7.8 – 11.3 in.–lbf)
4 pinion type:
0.5 – 0.8 N – m
(5 – 8 kgf–cm, 4.3 – 6.9 in.–lbf)



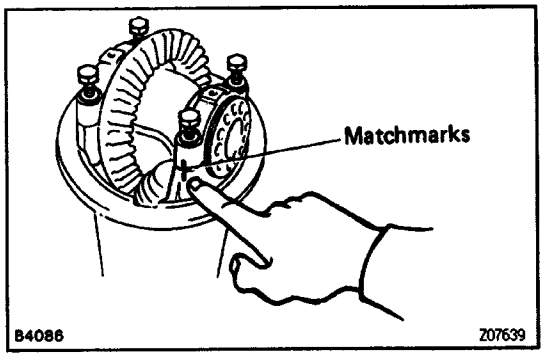
7. INSTALL DIFFERENTIAL CASE IN CARRIER

(a) Place the bearing outer races on their respective bearings. Make sure the left and right outer races are not interchanged.
(b) Install the case in the carrier.
HINT: Make sure that there is backlash between the ring gear and drive pinion.



8. INSTALL ADJUSTING NUTS

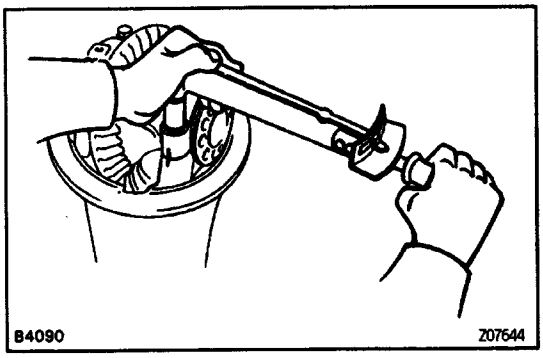
Install the adjusting nuts on the carrier, making sure the nuts are threaded properly.



9. INSTALL BEARING CAPS

Align the matchmarks on the cap and carrier. Screw in the 2 bearing cap bolts 2 or 3 turns and press down the bearing cap by hand.

HINT: If the bearing cap does not fit tightly on the carrier, the adjusting nuts are not threaded properly. Reinstall the adjusting nuts if necessary.

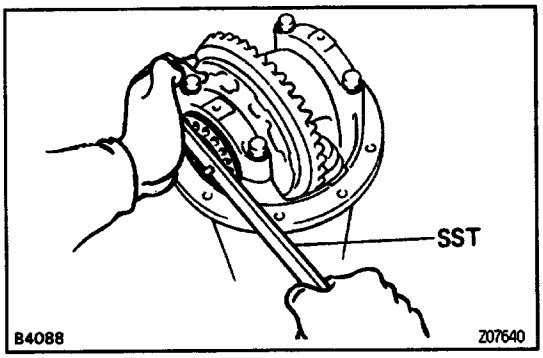


10. ADJUST SIDE BEARING PRELOAD

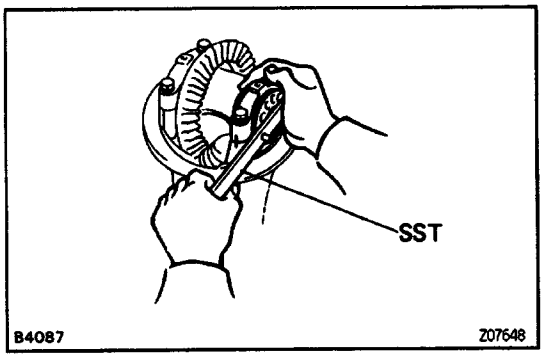
(a) Tighten the 4 bearing cap bolts to the specified torque, then loosen them to the point where they can be turned by hand.

Torque: 78 N–m (800 kgf–cm, 58 ft–lbf)

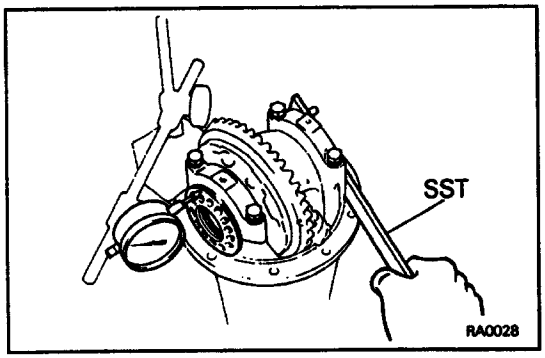
(b) Fully tighten the 4 bearing cap bolts by hand.



(c) Using SST, tighten the adjusting nut on the ring gear side until the ring gear has a backlash of about 0.2 mm (0.008 in.).
SST 09504–00011

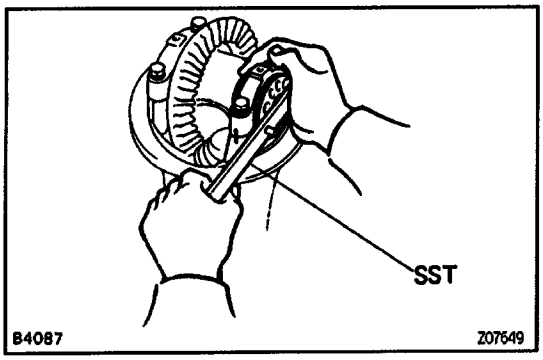


(d) While turning the ring gear, use SST to fully tighter the adjusting nut on the drive pinion side. After the bearing are settled, loosen the adjusting nut on the drive pinion side.
SST 09504–00011

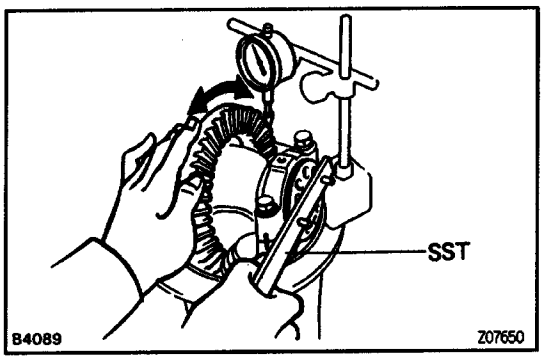


(e) Place a dial indicator on the top of the adjusting nut on the ring gear side.

(f) Adjust the side bearing for zero preload by tightening the other adjusting nut until the pointer on the indicator begins to move.



(g) Tighten the adjusting nut 1 – 1.5 notches from the zero preload position.

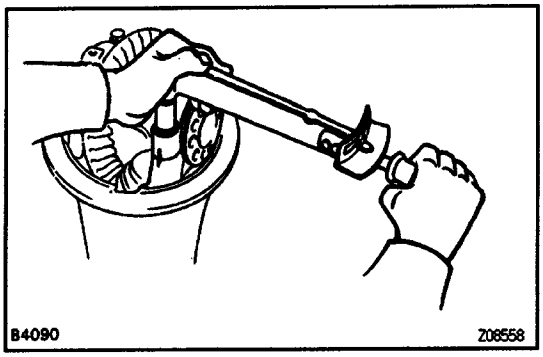


(h) Using a dial indicator, adjust the ring gear backlash within specification.

Ba**cklash:**

0.13 – 0.18 mm (0.0051 – 0.0071 in.)

HINT: The backlash is adjusted by turning the left and right adjusting nuts equal amounts. For example, loosen the nut on the left side 1 notch and tighten the nut on the right side one notch.



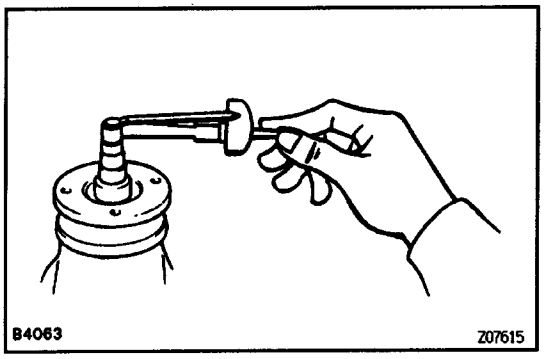
(i) Torque the bearing cap bolts.

Torque: 78 N–m (800 kgf–cm, 58 ft–lbf)

(j) Recheck the ring gear backlash.

Backlash:

0.13 – 0.18 mm (0.0051 – 0.0071 in.)



(k) Using a torque wrench, measure the total preload.

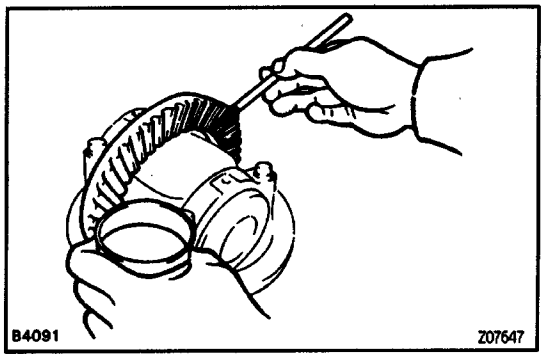
Total preload (starting):

Add drive pinion preload

0.4 – 0.6 N–m (4 –6 kgf–cm, 3.5 – 5.2 in.–lbf)

Backlash:

0.13 – 0.18 mm (0.0051 – 0.0071 in.)

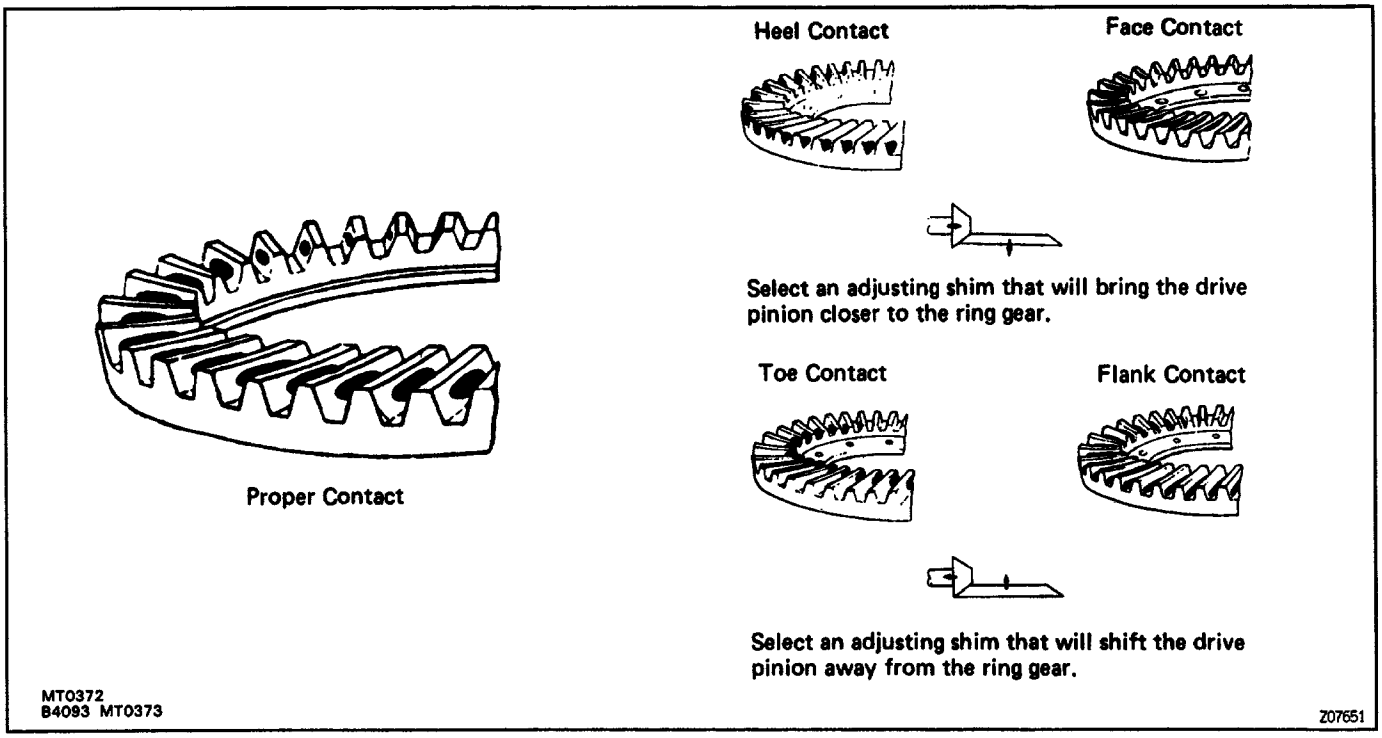


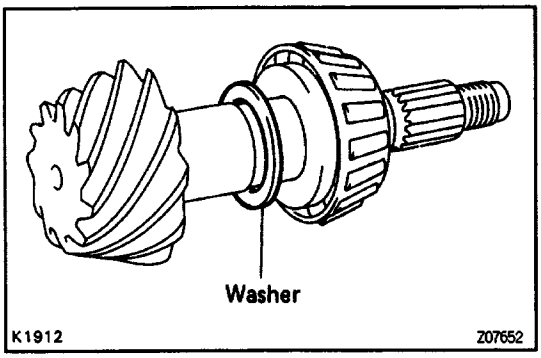
11. INSPECT TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION

(a) Coat 3 or 4 teeth at three different positions on the ring gear with red lead.

(b) Hold the companion flange firmly and rotate the ring gear in both directions.

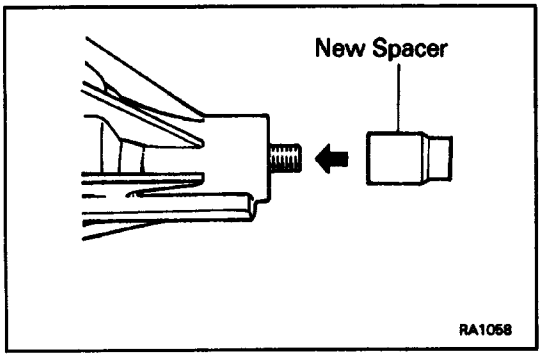
(c) Inspect the tooth pattern.



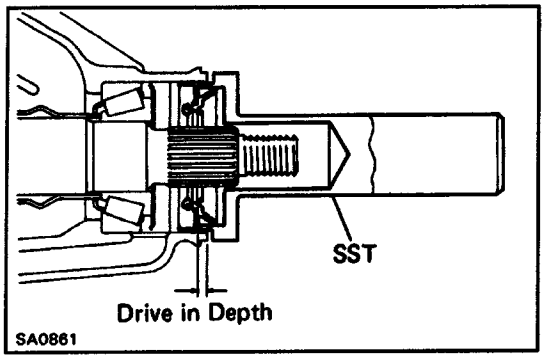


If the teeth are not contacting properly, use the following chart to select a proper washer for correction.
Washer thickness

Thickness mm (in.)	Thickness mm (in.)
1.70 (0.0669)	**2.03 (0.0799)**
1.73 (0.0681)	**2.06 (0.0811)**
1.76 (0.0693)	**2.09 (0.0823)**
1.79 (0.0705)	**2.12 (0.0835)**
1.82 (0.0717)	**2.15 (0.0846)**
1.85 (0.0728)	**2.18 (0.0858)**
1.88 (0.0740)	**2.21 (0.0870)**
1.91 (0.0752)	**2.24 (0.0882)**
1.94 (0.0764)	**2.27 (0.0894)**
1.97 (0.0776)	**2.30 (0.0906)**
2.00 (0.0787)	**2.33 (0.0917)**



12. REMOVE COMPANION FLANGE
(See page SA–146)
13. REMOVE FRONT BEARING
(See page SA–146)
14. INSTALL NEW BEARING SPACER AND FRONT BEARING
(a) Install a new bearing spacer on the shaft.
(b) Install the front bearing on the shaft.



15. INSTALL OIL SLINGER AND NEW OIL SEAL

(a) Install the oil slinger facing, as shown.

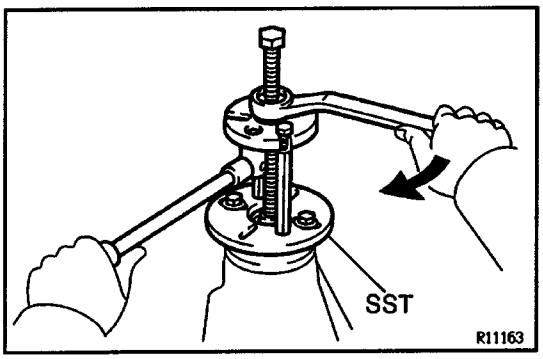
(b) Using SST, drive in a new oil seal, as shown.

SST 09554–22010

Oil seal drive in depth:

1.0 mm (0.039 in.)

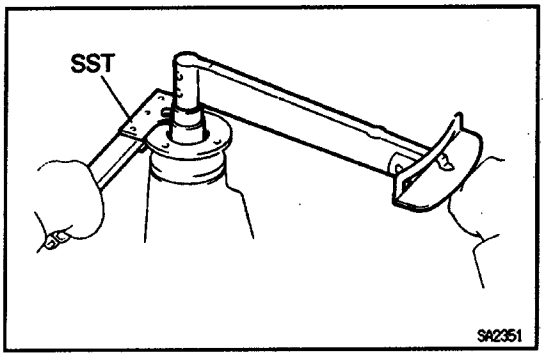
(c) Apply MP grease to the oil seal lip.



16. INSTALL COMPANION FLANGE

(a) Install the companion flange with the SST.

SST 09950–30010

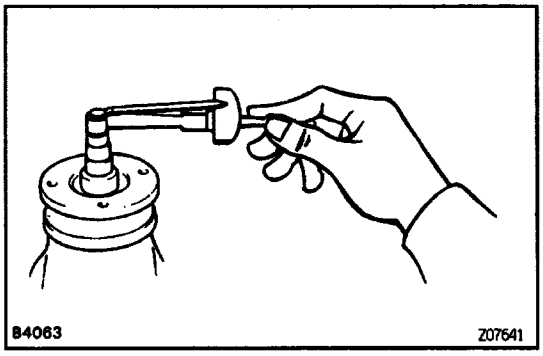


(b) Coat the threads of a new nut with MP grease.

(c) Using SST to hold the flange, tighten the nut.

SST. 09330–00021

Torque: 196 N–m (2.000 kgf–cm, 145 ft–lbf)



17. ADJUST DRIVE PINION PRELOAD

Using a torque meter, measure the preload of the backlash between the drive pinion and ring gear.

Preload (starting):

New bearing

2 pinion type:

1.9 – 2.5 N–m

(19 – 26 kgf–cm, 16.5 – 22.6 in.–lbf)

4 pinion type:

1.4 – 1.6 N–m

(10 – 16 kgf–cm, 8.7 – 13.9 in.–lbf)

Reused bearing

2 pinion type:

0.9 – 1.3 N – m

(9 – 13 kgf–cm, 7.8 – 11.3 in.–lbf)

4 pinion type:

0.5 – 0.8 N – m

(5 – 8 kgf–cm, 4.3 – 6.9 in.–lbf)

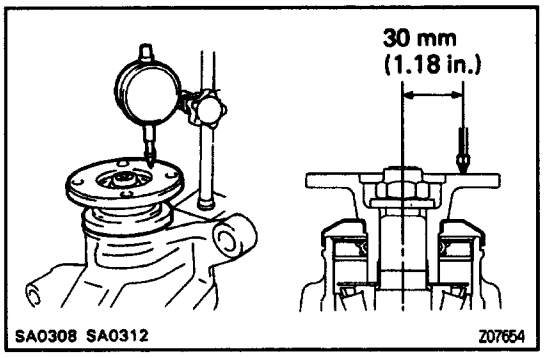
(a) If preload is greater than specification, replace the bearing spacer.

(b) If preload is less than specification, retighten the nut a little at a time with a torque of 13 N–m (1130 kgf–cm, 9 ft–lbf) until the specification preload is reached.

Maximum torque:

343 N–m (3,500 kgf–cm, 253 ft–lbf)

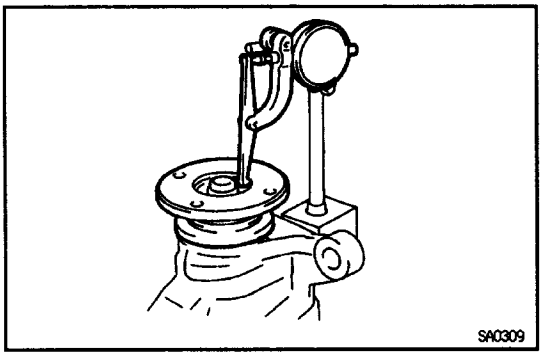
If the maximum torque is exceeded while retightening the nut, replace the bearing spacer and repeat the preload procedure. Do not back off the pinion nut to reduce the preload.



18. CHECK RUNOUT OF COMPANION FLANGE

Maximum vertical runout:

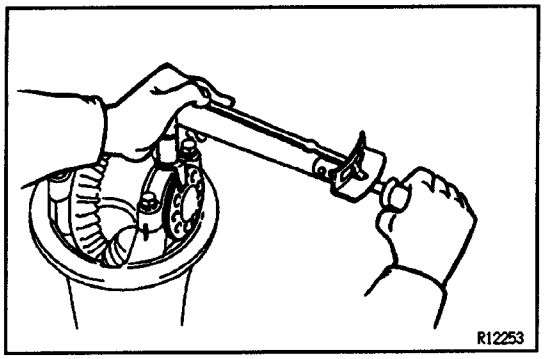
0.10 mm (0.0039 in.)



Maximum lateral runout:

0.10 mm (0.0039 in.)

19. STAKE DRIVE PINION NUT



20. INSTALL ADJUSTING NUT LOCKS

Install the lock on the bearing caps.

Torque: 13 N–m (130 kgf–cm, 9 ft–lbf)