REAR DIFFERENTIAL CARRIER

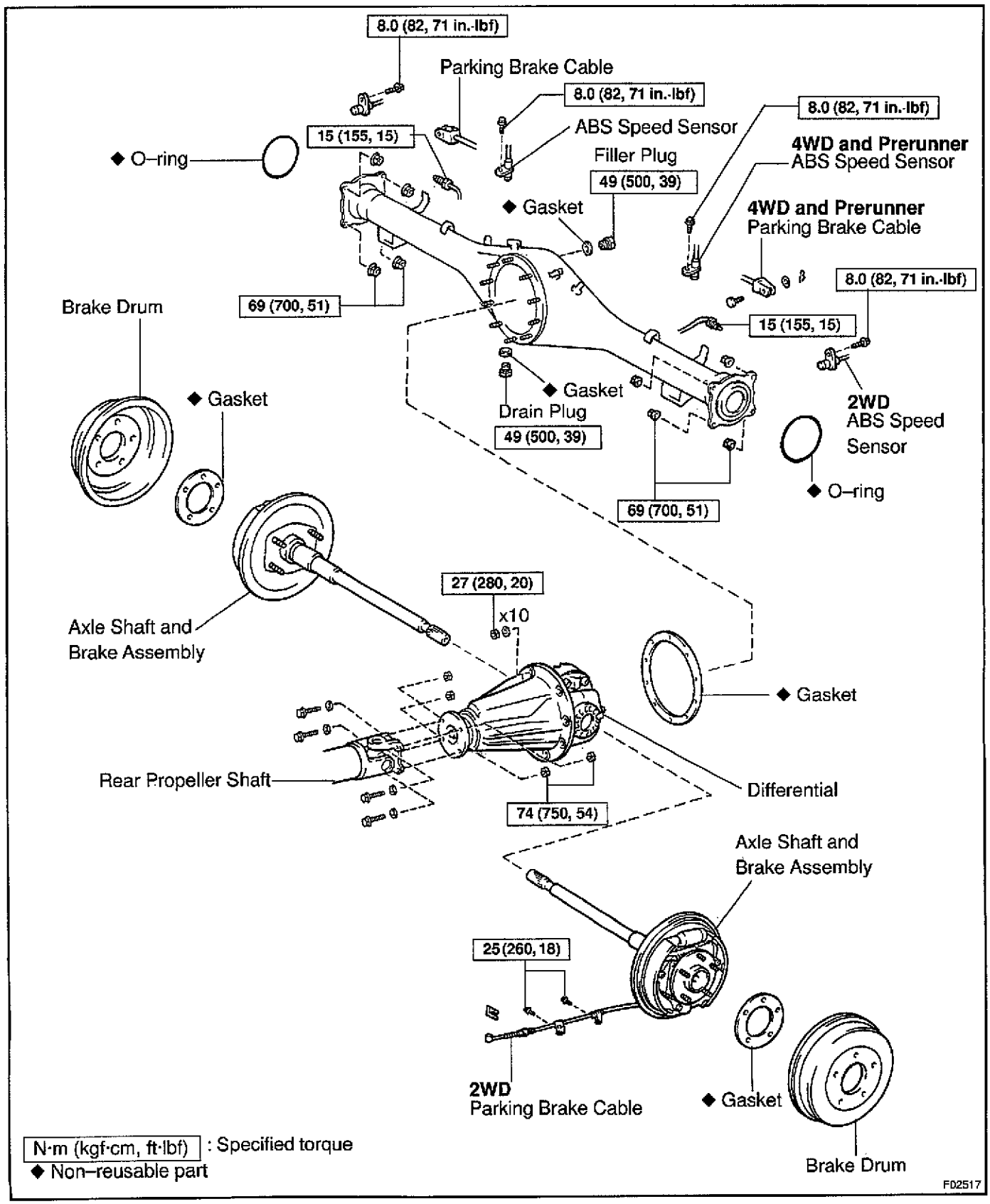
SA0BH-02

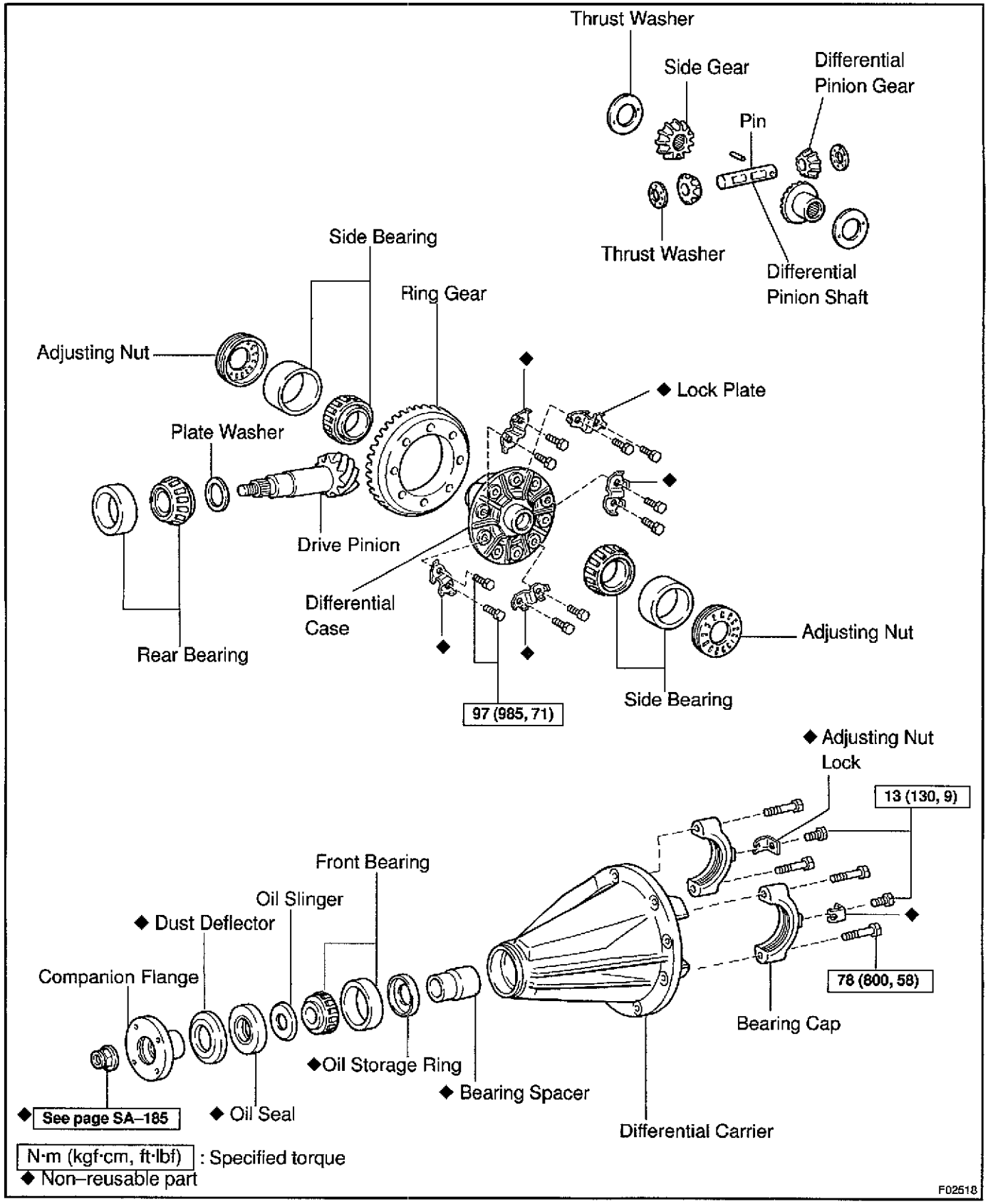
COMPONENTS

HINT:

Prerunner is the model described below.

RZN193L–PRMDK, LN191L–PRMDS

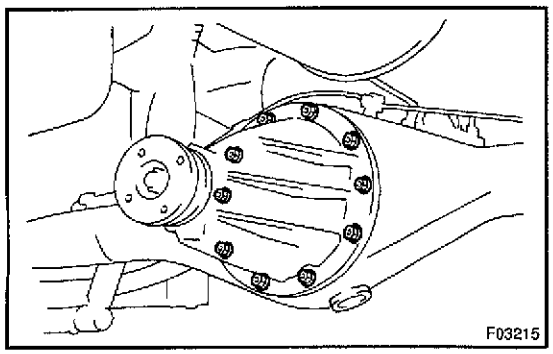



Thrust Washer
Side Gear
Differential Pinion Gear
Pin
Thrust Washer
Differential Pinion Shaft
Side Bearing
Ring Gear
Adjusting Nut
◆ Lock Plate
Plate Washer
Drive Pinion
Differential Case
Rear Bearing
Adjusting Nut
97 (985, 71)
Side Bearing
◆ Adjusting Nut Lock
13 (130, 9)
Front Bearing
Oil Slinger
◆ Dust Deflector
Companion Flange
78 (800, 58)
Bearing Cap
◆Oil Storage Ring
◆ Bearing Spacer
◆ See page SA–185
◆ Oil Seal
Differential Carrier
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part
F02518

SA0D4–01

REMOVAL

1. **DRAIN HYPOID GEAR OIL**
2. **REMOVE REAR AXLE SHAFTS (See page SA–165)**
3. **DISCONNECT REAR PROPELLER SHAFT**
   2WD: See page PR–3
   4WD: See page PR–11



4. **REMOVE DIFFERENTIAL CARRIER ASSEMBLY**

(a) Remove the 10 nuts, washers and differential carrier assembly.

NOTICE:

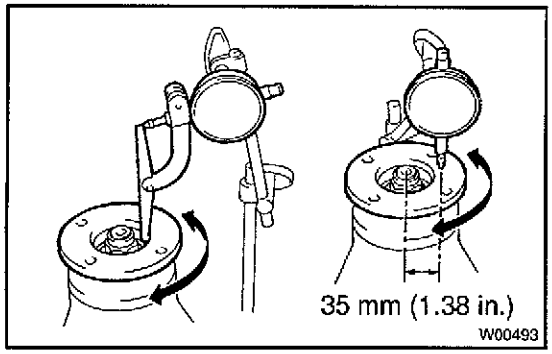
Be careful not to damage the installation surface.

Torque: 27 N·m (280 kgf·cm, 20 ft·lbf)

(b) Remove the gasket.

SA005-01

DISASSEMBLY



1. CHECK RUNOUT OF COMPANION FLANGE

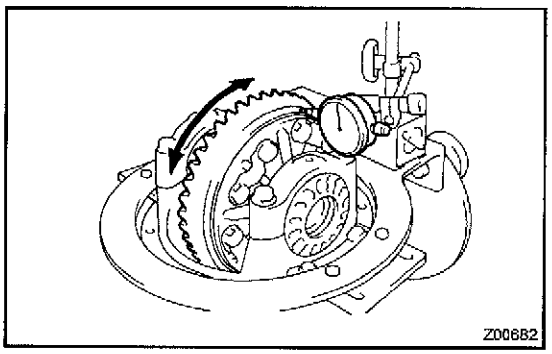
Using a dial indicator, measure the vertical and lateral runout of the companion flange.

Maximum:

Vertical runout: 0.10 mm (0.0039 in.)

Lateral runout: 0.10 mm (0.0039 in.)

If the runout is not within the specification, replace the companion flange.

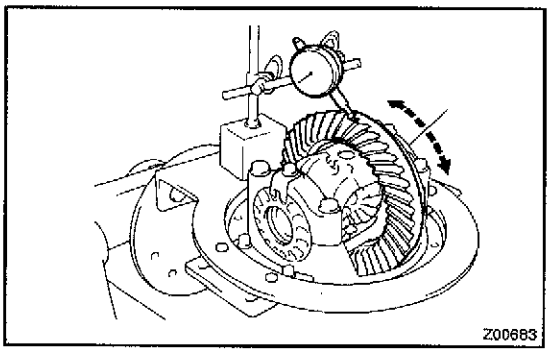


2. CHECK RING GEAR RUNOUT

Using a dial indicator, measure the ring gear runout.

Maximum runout: 0.10 mm (0.0039 in.)

If the runout is not within the specification, replace the ring gear.

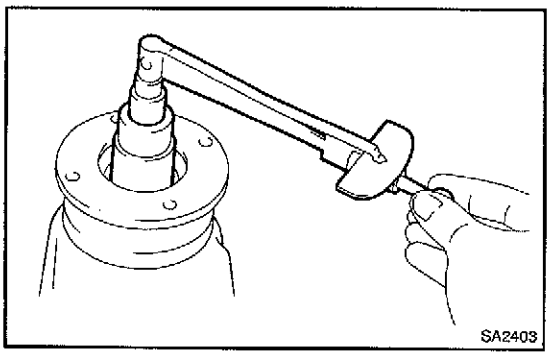


3. CHECK RING GEAR BACKLASH

Using a dial indicator, measure the ring gear backlash.

Backlash: 0.13 – 0.18 mm (0.0051 – 0.0071 in.)

If the backlash is not within the specification, adjust the side bearing preload or repair if necessary.



4. MEASURE DRIVE PINION PRELOAD

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

Preload (at starting):

0.9 – 1.3 N·m (9 – 13 kgf·cm, 7.8 – 11.3 in.·lbf)

5. CHECK TOTAL PRELOAD

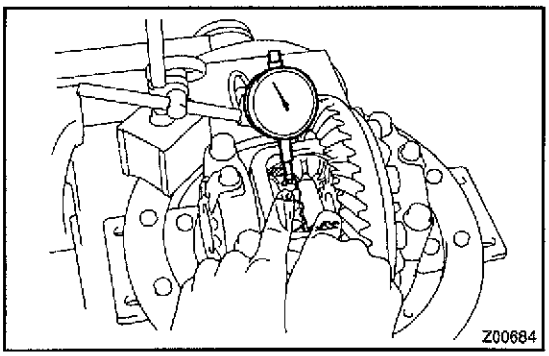
Using a torque wrench, measure the preload with the teeth of the drive pinion and ring gear in contact.

Total preload (at starting):

Drive pinion preload plus

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

If necessary, disassemble and inspect a differential.



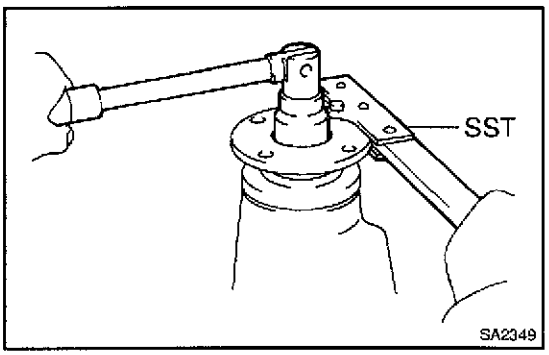
6. CHECK SIDE GEAR BACKLASH

Measure the side gear backlash with holding one pinion gear toward the case.

Backlash: 0.05 – 0.20 mm (0.0020 – 0.0079 in.)

If the backlash is not within the specification, install the correct thrust washers (See page SA–185).

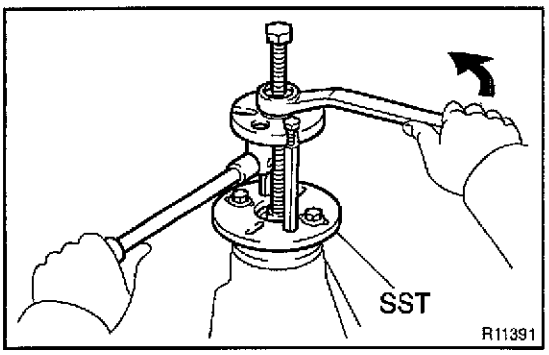
7. CHECK TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION (See page SA–185)



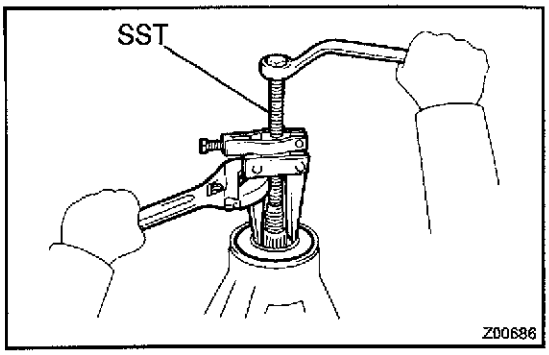
8. REMOVE COMPANION FLANGE

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

(b) Using SST to hold the flange, remove the nut.
SST 09330–00021



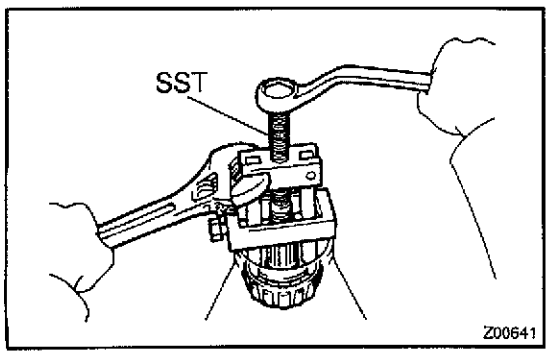
(c) Using SST, remove the companion flange.
SST 09950–30010 (09951–03010, 09953–03010, 09954–03010, 09955–03030, 09956–03030)



9. REMOVE FRONT OIL SEAL AND OIL SLINGER

(a) Using SST, remove the oil seal from the differential carrier.
SST 09308–10010

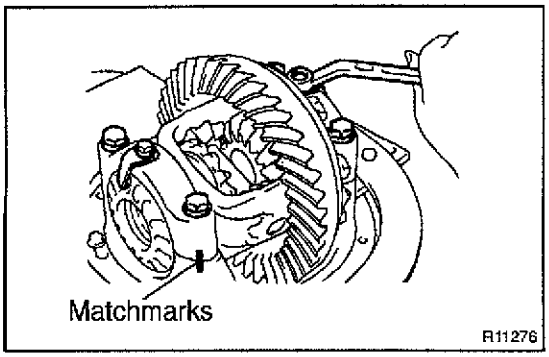
(b) Remove the oil slinger.



10. REMOVE FRONT BEARING AND BEARING SPACER

(a) Using SST, remove the bearing from the drive pinion.
SST 09556–22010

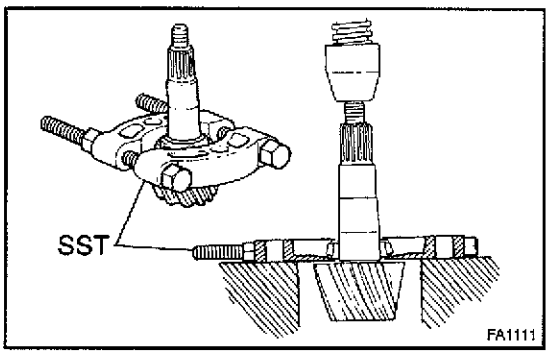
(b) Remove the bearing spacer.



11. REMOVE DIFFERENTIAL CASE

(a) Place matchmarks on the bearing cap and differential carrier.
(b) Remove the 2 adjusting nut locks.
(c) Remove the 4 bolts and 2 bearing caps.
(d) Remove the 2 adjusting nuts.
(e) Remove the differential case with the side bearing outer races from the differential carrier.

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



12. REMOVE DRIVE PINION

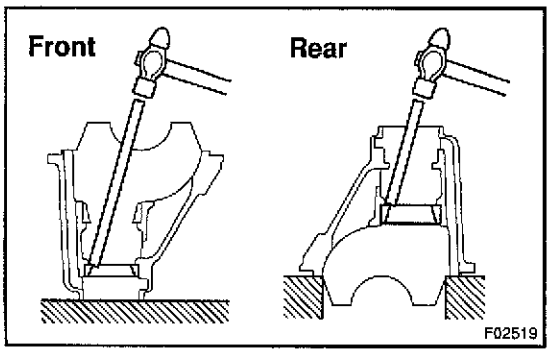
Remove the drive pinion with the rear bearing.

13. REMOVE DRIVE PINION REAR BEARING

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

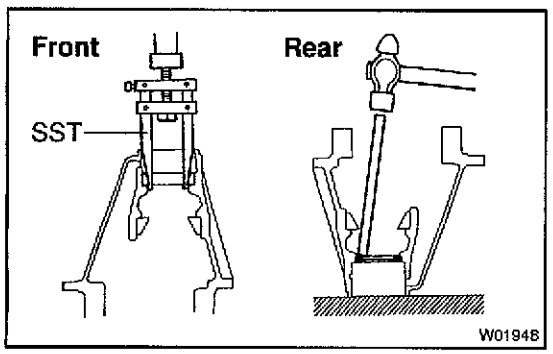
HINT:
If the drive pinion or ring gear is damaged, replace them as a set.

(b) Remove the plate washer from the drive pinion.



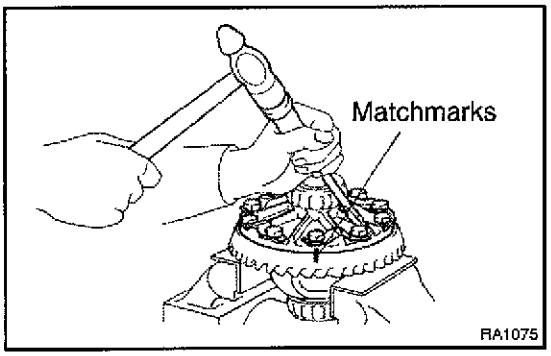
14. Differential A Type: (See page SA–171)
REMOVE FRONT AND REAR BEARING OUTER RACE

Using a brass bar and hammer, remove the outer races from the carrier.



15. Differential B Type: (See page SA–171)
REMOVE FRONT AND REAR BEARING OUTER RACES AND OIL SEAL STORAGE RING

(a) Using SST, remove the front bearing outer race.
SST 09308–00010
(b) Using a brass bar and hammer, remove the oil storage ring.
(c) Using a brass bar and hammer, remove the rear bearing outer race.

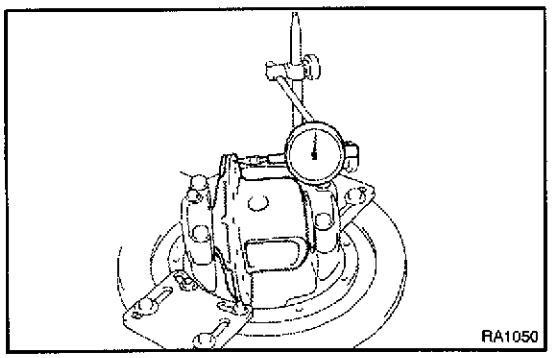


16. REMOVE RING GEAR

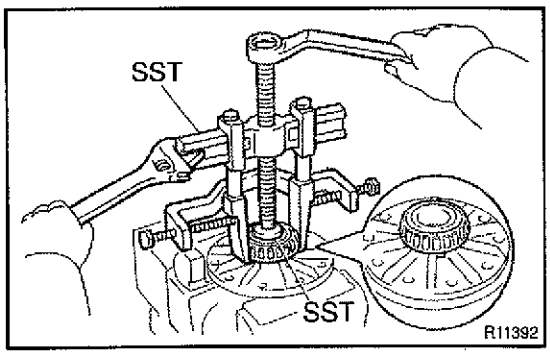
(a) Place matchmarks on the ring gear and differential case.
(b) Using a screwdriver and hammer, unstake the lock plates.
(c) Remove the 10 bolts and 5 lock plates.
(d) Using a plastic hammer, tap on the ring gear to separate it from the differential case.

17. CHECK DIFFERENTIAL CASE RUNOUT

(a) Place the bearing outer races on their respective bearings. Check that the left and right outer races are not interchanged.
(b) Install the differential case in the differential carrier.
(c) When there is not play left in the side bearings, install the plate washers.
(d) Align the matchmarks on the bearing cap and differential carrier.



(e) Install and uniformly tighten the 4 bearing cap bolts in several passes.
(f) Using a dial indicator, measure the differential case runout.
Maximum runout: 0.07 mm (0.0028 in.)
(g) Remove the differential case.



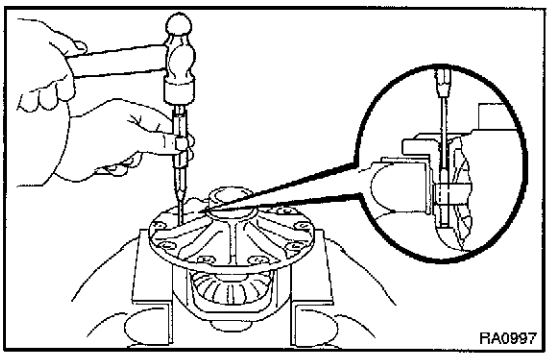
18. REMOVE SIDE BEARINGS

(a) Differential A type: (See page SA–171)
Using SST, remove the 2 side bearings from the differential case.
SST 09950–40010 (09951–04010, 09952–04010, 09953–04020, 09954–04010, 09955–04060, 09957–04010, 09958–04010), 09950–60010 (09951–00440)

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

(b) Differential B type: (See page SA–171)
Using SST, remove the 2 side bearings from the differential case.
SST 09950–40010 (09951–04010, 09952–04010, 09953–04020, 09954–04010, 09955–04060, 09957–04010, 09958–04010), 09950–60010 (09951–00480)

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



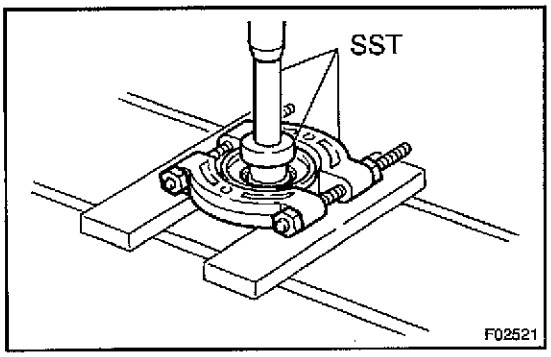
19. DISASSEMBLE DIFFERENTIAL CASE ASSEMBLY

(a) Using a pin punch and hammer, remove the straight pin.

(b) Remove these parts from the differential case:

- Pinion shaft
- 2 pinion gears
- 2 pinion gear thrust washers
- 2 side gears
- 2 side gear thrust washers

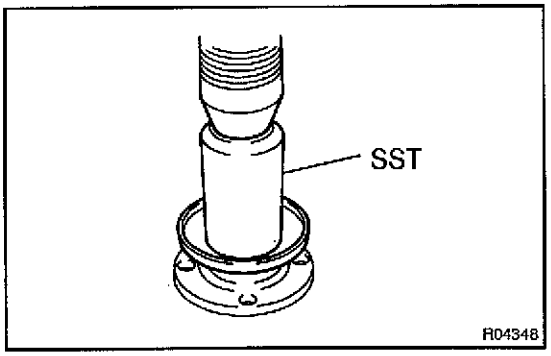
SA0EK-02



REPLACEMENT

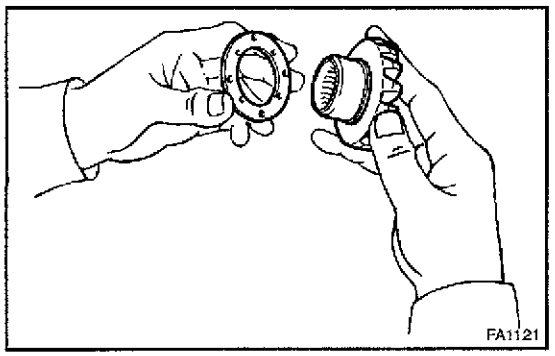
REPLACE COMPANION FLANGE DUST DEFLECTOR

(a) Using SST, a socket and a press, remove the dust deflector.
SST 09950–00020, 09950–60010 (09951–00360), 09950–70010 (09951–07100)



(b) Using SST and a press, install a new dust deflector.
SST 09636–20010

SA0G6-01


FA1121

REASSEMBLY

1. ASSEMBLE DIFFERENTIAL SIDE

(a) Install the proper thrust washers on the side gears.

HINT:

Refer to the table below to select thrust washers which will ensure that the backlash is within the specification.

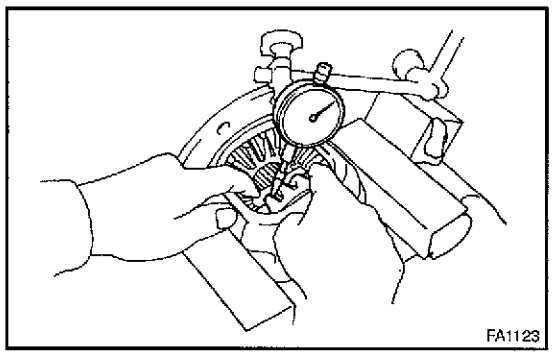
Washer thickness

Thickness mm (in.)	Thickness mm (in.)
1.57 – 1.63 (0.062 – 0.064)	1.77 – 1.83 (0.070 – 0.072)
1.67 – 1.73 (0.066 – 0.068)	–

(b) Install the side gears, pinion gears, pinion gear thrust washers and pinion shaft in the differential case.

HINT:

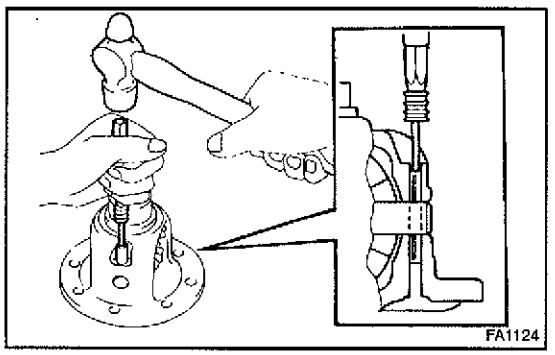
Align the holes of the differential case and pinion shaft.


FA1123

(c) Measure the side gear backlash with holding one pinion gear toward the differential case.

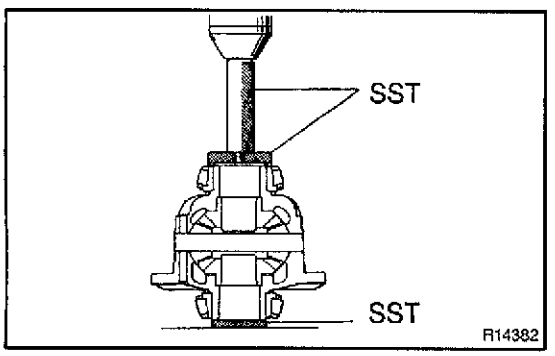
Backlash: 0.05 – 0.20 mm (0.0020 – 0.0079 in.)

If the backlash is not within the specification, select an appropriate thickness for the side gear thrust washer.


FA1124

(d) Using a pin punch and hammer, install the straight pin through the differential case and hole of the pinion shaft.

(e) Using a chisel and hammer, stake the outside of the differential case pin hole.



R14382

2. INSTALL SIDE BEARINGS

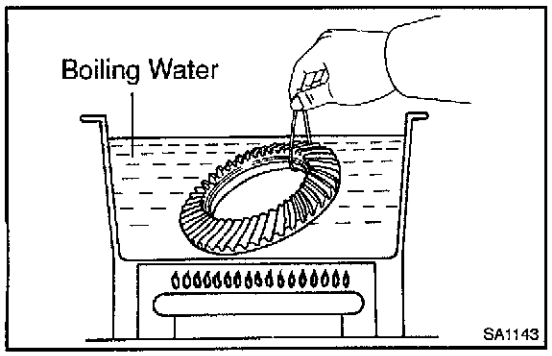
(a) Differential A type: (See page SA–171)

Using SST and a press, install the 2 side bearings into the differential case.

SST 09550–10012 (09252–10010, 09557–10010), 09950–60010 (09951–00440)

(b) Differential B type: (See page SA–171)

SST 09550–60010 (09951–00480, 09951–00550), 09950–70010 (09951–07150)



3. INSTALL RING GEAR ON DIFFERENTIAL CASE

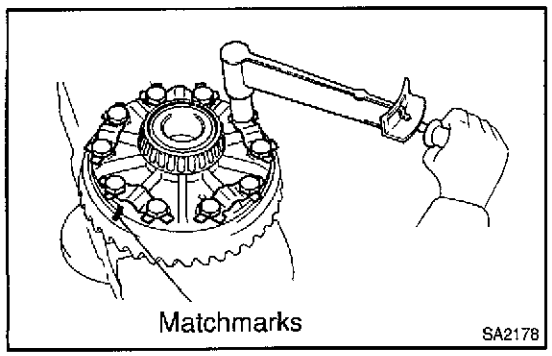
(a) Clean the contact surfaces of the differential case and ring gear.

(b) Heat the ring gear to approx. 100°C (212°F) in boiling water.

(c) Carefully take the ring gear out of the boiling water.

(d) After the moisture on the ring gear has completely evaporated, quickly install the ring gear to the differential case.

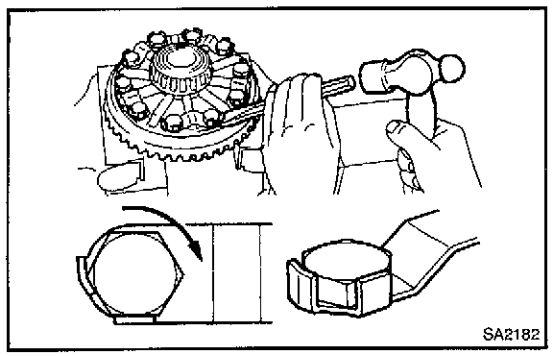
(e) Align the matchmarks on the ring gear and the differential case.



(f) Temporarily install 5 new lock plates and the 10 bolts so that the bolt holes in the ring gear and differential case are not misaligned.

(g) After the ring gear has cooled sufficiently, torque the ring gear set bolts.

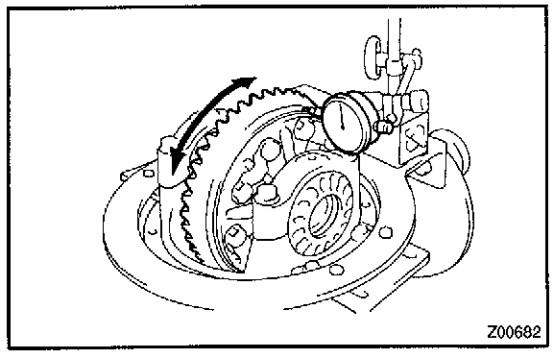
Torque: 97 N·m (985 kgf·cm, 71 ft·lbf)



(h) Using a chisel and hammer, stake the lock plates.

HINT:

Stake the claws of the lock plates to fix the bolts. For the claw contacting the protruding portion of the bolt, stake only the half of it along the tightening direction.

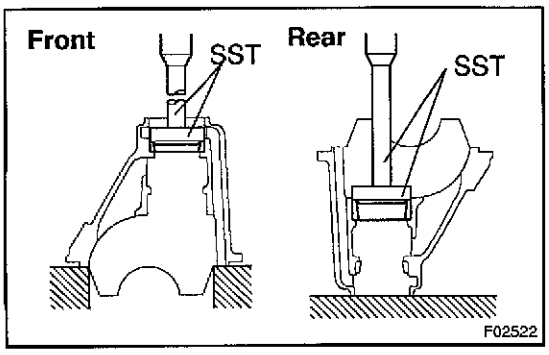


4. CHECK RING GEAR RUNOUT

(a) Install the differential case in the differential carrier and tighten the adjusting nut just to make sure the no play is in the bearing (See page SA–185).

(b) Using a dial indicator, measure the runout of the ring gear.

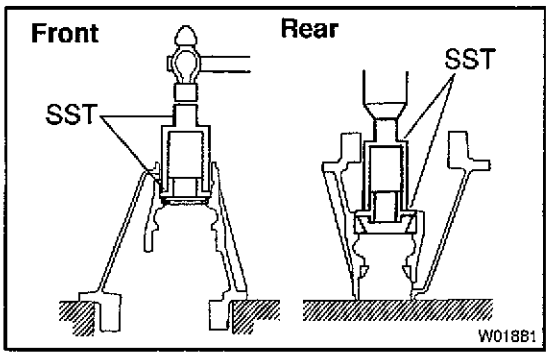
Maximum runout: 0.10 mm (0.0039 in.)



5. Differential A Type: (See page SA–171) INSTALL DRIVE PINION BEARING OUTER RACES

Using SST and a press, install the outer races.

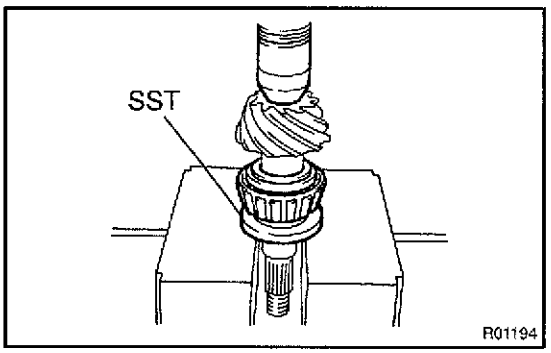
SST 09950–60020 (09951–00710, 09951–00790), 09950–70010 (09951–07150)



6. Differential B Type: (See page SA–171)
INSTALL NEW OIL STORAGE RING AND DRIVE PINION FRONT AND REAR BEARING OUTER RACES

(a) Using SST and a hammer, install a new oil storage ring.
SST 09316–60011 (09316–00011, 09316–00021)

(b) Using SST and a press, install the 2 outer races.
SST 09316–60011 (09316–00011, 09316–00021, 09316–00051)

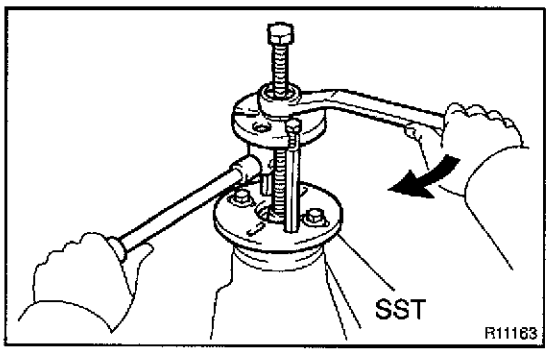


7. INSTALL DRIVE PINION REAR BEARING

(a) Install the plate washer on the drive pinion.

HINT:
First fit a washer with the same thickness as the washer which was removed, then after checking the tooth contact pattern, replace the washer with one of a different thickness if necessary.

(b) Using SST and a press, install the rear bearing to the drive pinion.
SST 09506–30012



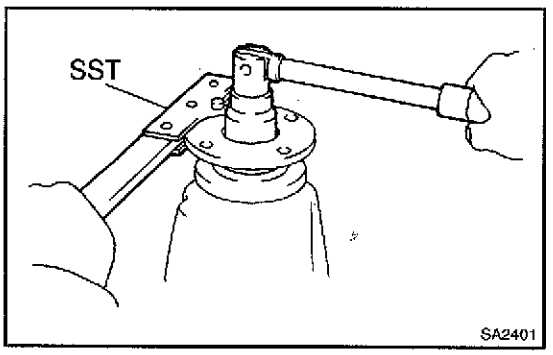
8. TEMPORARILY ADJUST DRIVE PINION PRELOAD

(a) Place the drive pinion and front bearing.

HINT:
Assemble the spacer and oil seal after adjusting the tooth contact pattern.

(b) Install the oil slinger.

(c) Using SST, install the companion flange.
SST 09950–30010 (09951–03010, 09953–03010, 09954–03010, 09955–03030, 09956–03030)

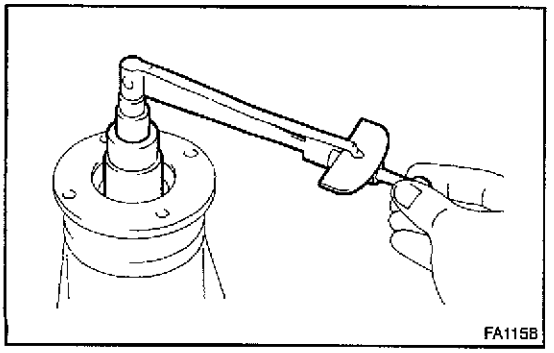


(d) Coat the threads of the nut with hypoid gear oil.

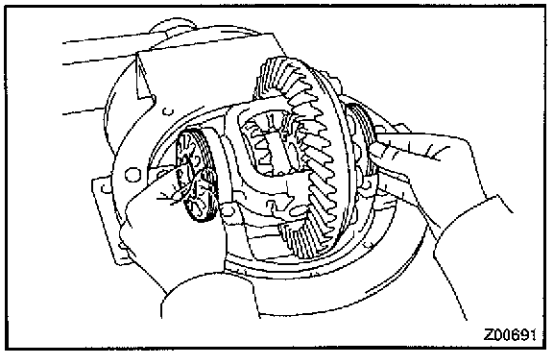
(e) Adjust the drive pinion preload by tightening the companion flange nut.

HINT:
Using SST to hold the flange, tighten the nut.
SST 09330–00021

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



(f) Using a torque wrench, measure the preload.
Preload (at starting):
New bearing:
1.9 – 2.6 N·m (19 – 26 kgf·cm, 16.4 – 22.6 in.·lbf)
Reused bearing:
0.9 – 1.3 N·m (9 – 13 kgf·cm, 7.8 – 11.3 in.·lbf)



9. INSTALL DIFFERENTIAL CASE IN CARRIER

(a) Place the 2 bearing outer races on their respective bearings. Make sure the left and right outer races are not interchanged.

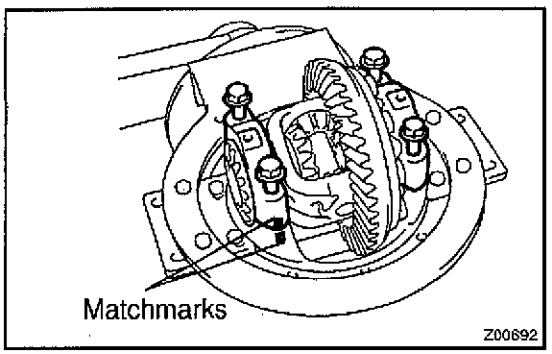
(b) Install the case in the carrier.

HINT:

Make sure that there is a backlash between the ring gear and drive pinion.

10. INSTALL ADJUSTING NUTS

Install the 2 adjusting nuts on the carrier, making sure the nuts are threaded properly.



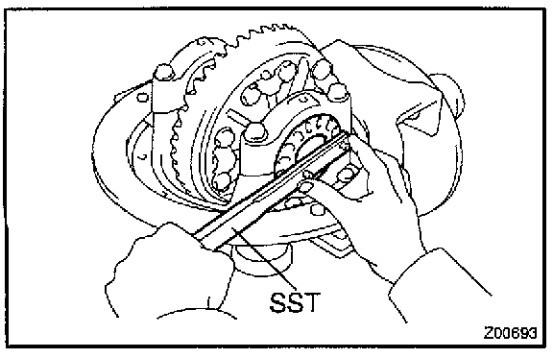
11. INSTALL BEARING CAPS

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.



12. ADJUST SIDE BEARING PRELOAD

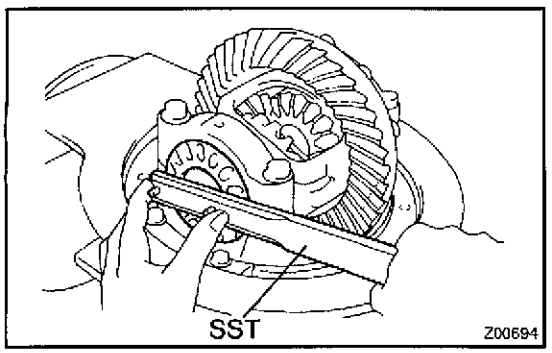
(a) Tighten the 4 bearing cap bolts to the specified torque, then loosen them to the point where they can be turned by hand.

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 back side until the ring gear has a backlash of approx. 0.2 mm (0.008 in.).

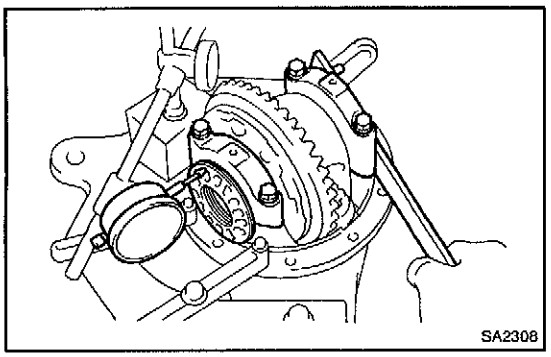
SST 09504–00011



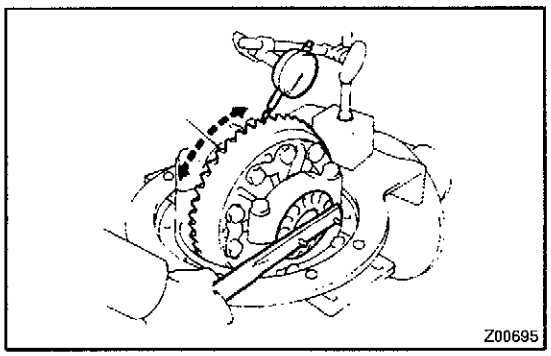
(d) With turning the ring gear, use SST to fully tighten the adjusting nut on the ring gear teeth side.

After the bearings are settled, loosen the adjusting nut on the drive pinion side.

SST 09504–00011


SA2308

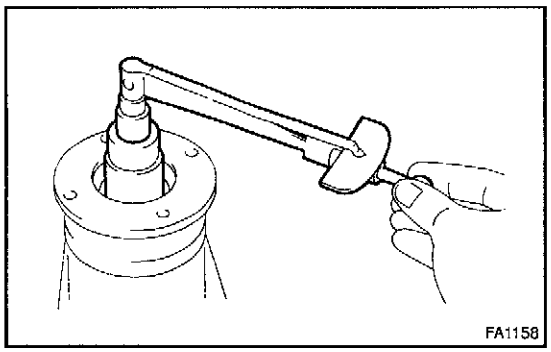
(e) Place a dial indicator on the top of the adjusting nut on the ring gear back side.
(f) Adjust the side bearing to zero preload by tightening the other adjusting nut until the pointer on the indicator begins to move.
(g) Tighten the adjusting nut 1 – 1.5 notches from the zero preload position.


Z00695

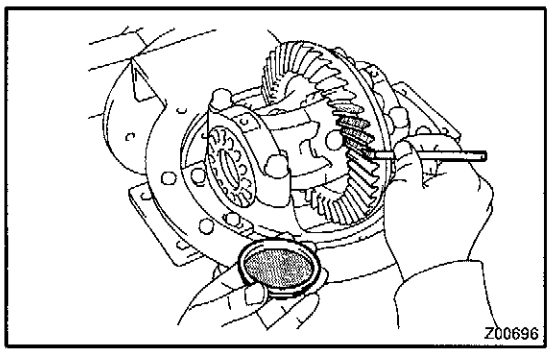
(h) Using a dial indicator, adjust the ring gear backlash until it is within the specification.
Backlash: 0.13 – 0.18 mm (0.0051 – 0.0071 in.)

HINT:
The backlash is adjusted by turning the left and right adjusting nuts by an equal amount. For example, loosen the nut of the left side one 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)

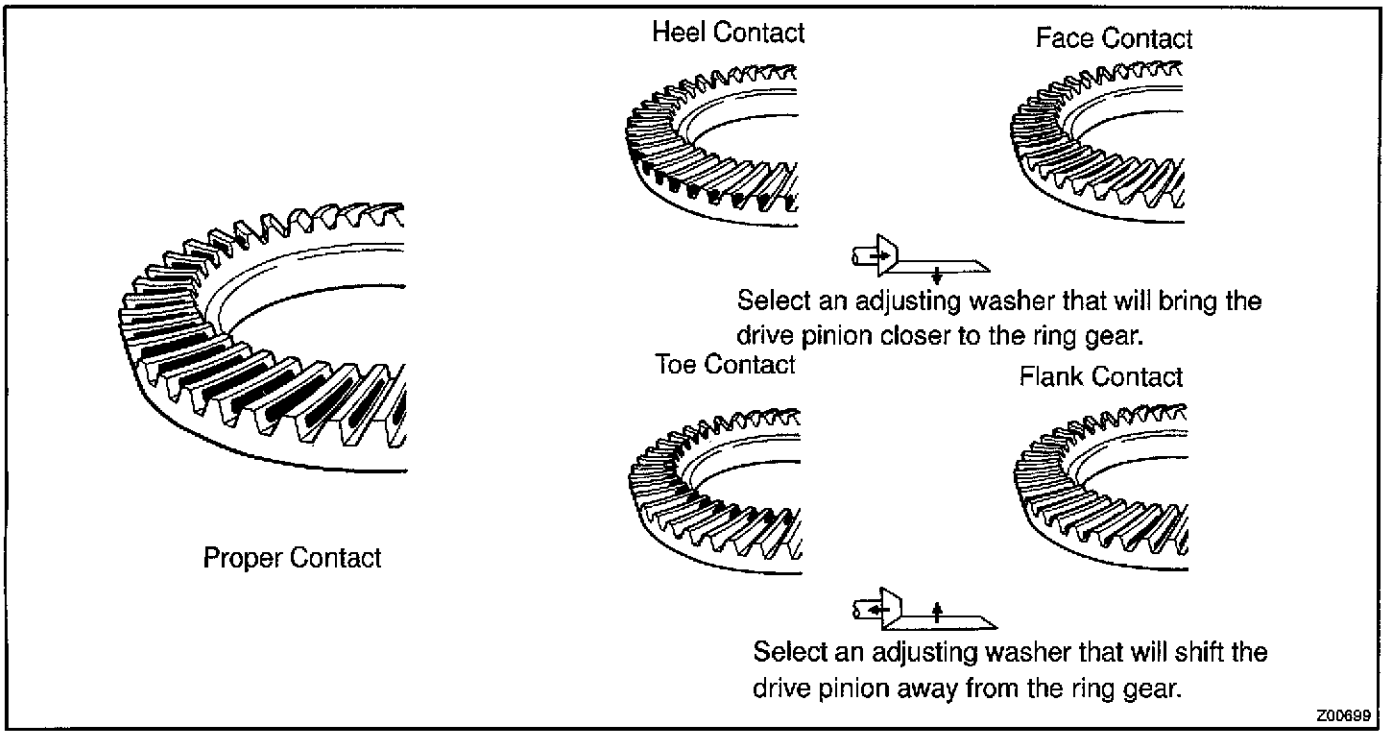

FA1158

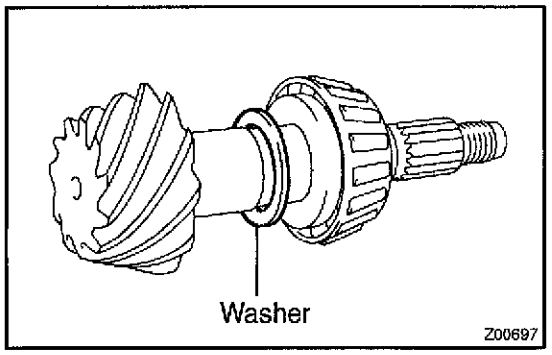
(j) Recheck the ring gear backlash.
Backlash: 0.13 – 0.18 mm (0.0051 – 0.0071 in.)
(k) Using a torque wrench, measure the preload with the teeth of the drive pinion and ring gear in contact.
Total preload (at starting):
Drive pinion preload plus
0.4 – 0.6 N·m (4 – 6 kgf·cm, 3.5 – 5.2 in.·lbf)


Z00696

13. INSPECT TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION

(a) Coat 3 or 4 teeth at 3 different positions on the ring gear with red lead primer.
(b) Hold the companion flange firmly and rotate the ring gear in both directions.
(c) Inspect the tooth pattern.





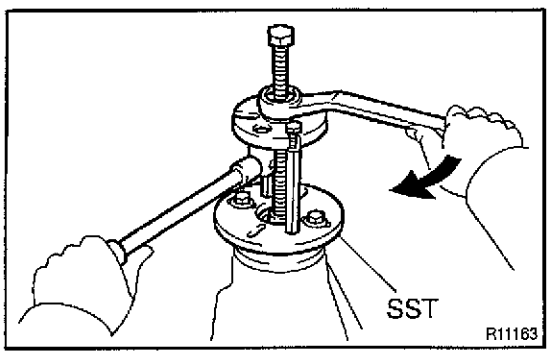
If the teeth are not contacting properly, use the following table to select a proper washer for correction.

Washer thickness

Thickness mm (in.)	Thickness mm (in.)
1.69 – 1.71 (0.0665 – 0.0673)	2.02 – 2.04 (0.0795 – 0.0803)
1.72 – 1.74 (0.0677 – 0.0685)	2.05 – 2.07 (0.0807 – 0.0815)
1.75 – 1.77 (0.0689 – 0.0697)	2.08 – 2.10 (0.0819 – 0.0827)
1.78 – 1.80 (0.0701 – 0.0709)	2.11 – 2.13 (0.0831 – 0.0839)
1.81 – 1.83 (0.0713 – 0.0720)	2.14 – 2.16 (0.0843– 0.0850)
1.84 – 1.86 (0.0724 – 0.0732)	2.17 – 2.19 (0.0854 – 0.0862)
1.87 – 1.89 (0.0736 – 0.0744)	2.20 – 2.22 (0.0866 – 0.0874)
1.90 – 1.92 (0.0748 – 0.0756)	2.23 – 2.25 (0.0878 – 0.0886)
1.93 – 1.95 (0.0760 – 0.0768)	2.26 – 2.28 (0.0890 – 0.0898)
1.96 – 1.98 (0.0772 – 0.0780)	2.29 – 2.31 (0.0902 – 0.0909)
1.99 – 2.01 (0.0783 – 0.0791)	2.32 – 2.34 (0.0913 – 0.0921)

14. REMOVE COMPANION FLANGE AND OIL SLINGER (See page SA–179)

15. REMOVE FRONT BEARING (See page SA–179)

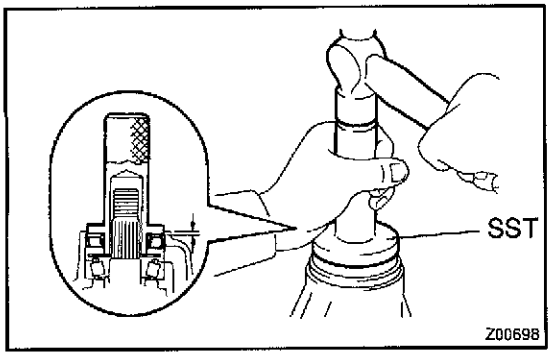


16. INSTALL NEW BEARING SPACER, FRONT BEARING AND OIL SLINGER

(a) Install a new bearing spacer and place the front bearing and oil slinger.

(b) Using SST and the companion flange, install the front bearing then remove the companion flange.

SST 09950–30010 (09951–03010, 09953–03010, 09954–03010, 09955–03030, 09956–03030)



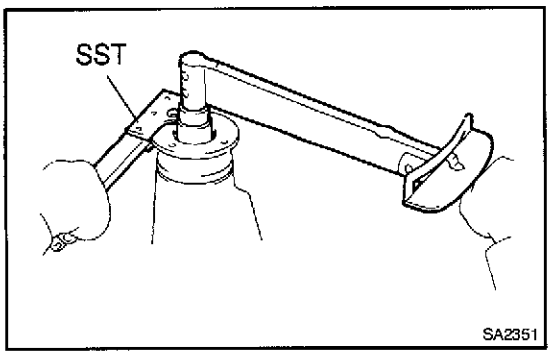
17. INSTALL NEW OIL SEAL

(a) Coat a new oil seal lip with MP grease.

(b) Using SST and a hammer, install the oil seal.

SST 09554–30011

Oil seal drive in depth: 1.0 mm (0.039 in.)



18. INSTALL COMPANION FLANGE

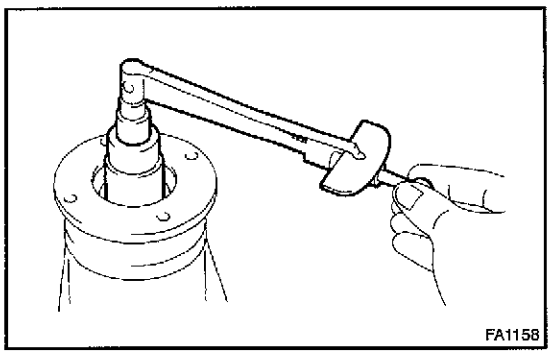
(a) Place the companion flange.

(b) Coat the threads of a new nut with hypoid gear oil.

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

SST 09330–00021

Torque: 108 N·m (1,100 kgf·cm, 80 ft·lbf)



19. ADJUST DRIVE PINION PRELOAD

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

Preload (at starting):

New bearing:

1.9 – 2.6 N·m (19 – 26 kgf·cm, 16.4 – 22.6 in.·lbf)

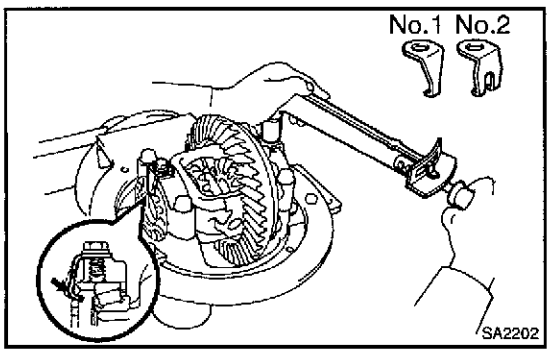
Reused bearing:

0.9 – 1.3 N·m (9 – 13 kgf·cm, 7.8 – 11.3 in.·lbf)

- If the preload is larger than the specification, replace the bearing spacer.
- If the preload is less than the specification, retighten the nut to 13 N·m (130 kgf·cm, 9 ft·lbf) a little at a time until the specified preload is reached.

Torque: 343 N·m (3,500 kgf·cm, 253 ft·lbf) or less

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



20. CHECK RUNOUT OF COMPANION FLANGE
(See page SA–179)

21. STAKE DRIVE PINION NUT

22. INSTALL ADJUSTING NUT LOCKS

(a) Select either a lock No.1 or No.2, whichever will fit the adjusting nuts.

(b) Install new nut locks on the bearing caps.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

SADBM–02

INSTALLATION

Installation is in the reverse order of removal (See page SA–178).
AFTER INSTALLATION, FILL DIFFERENTIAL WITH HYPOID GEAR OIL (See page SA–172)