REAR DIFFERENTIAL CARRIER (w/ LSD)

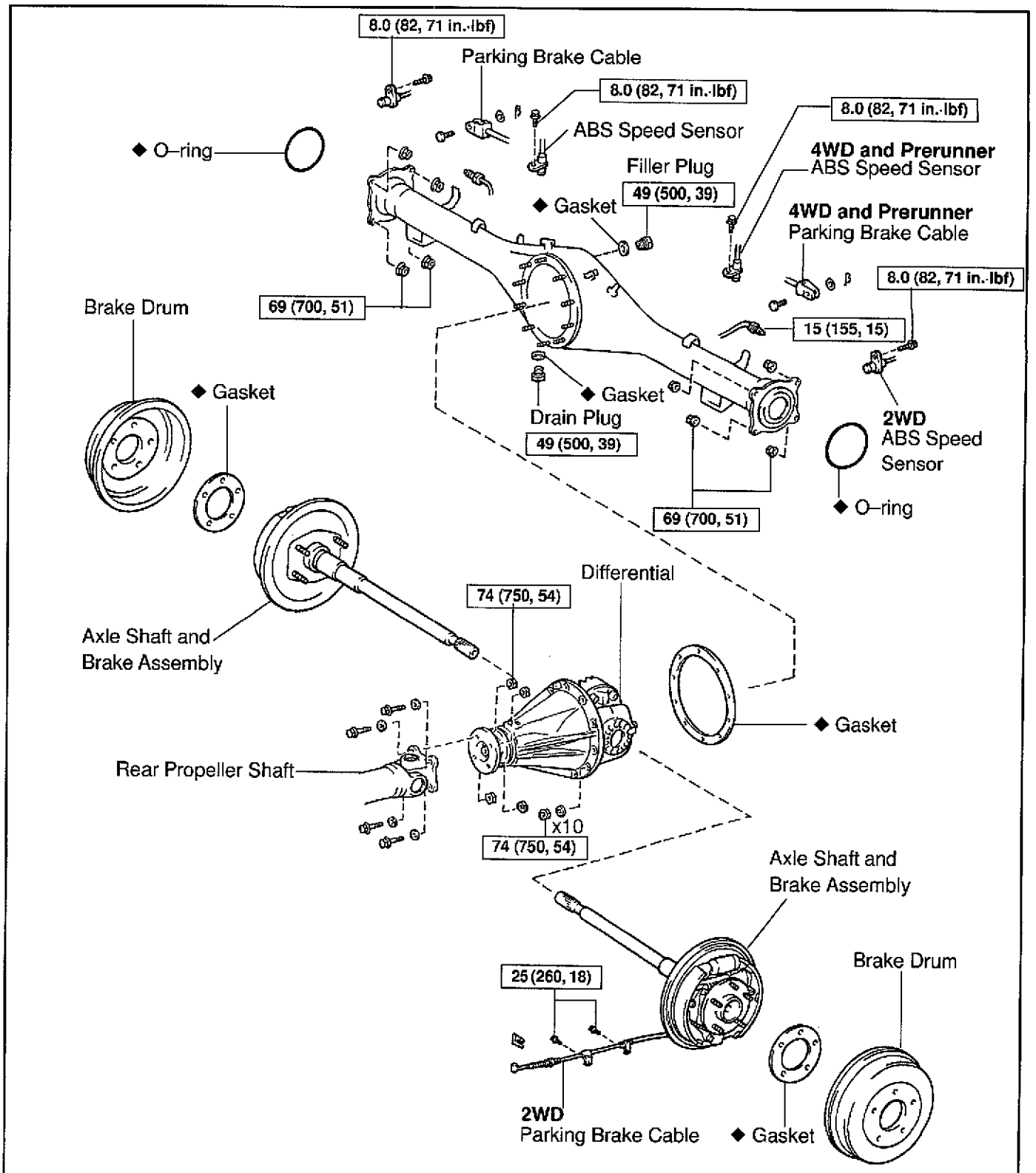
COMPONENTS

SA000-01

HINT:

Prerunner is the model described below.

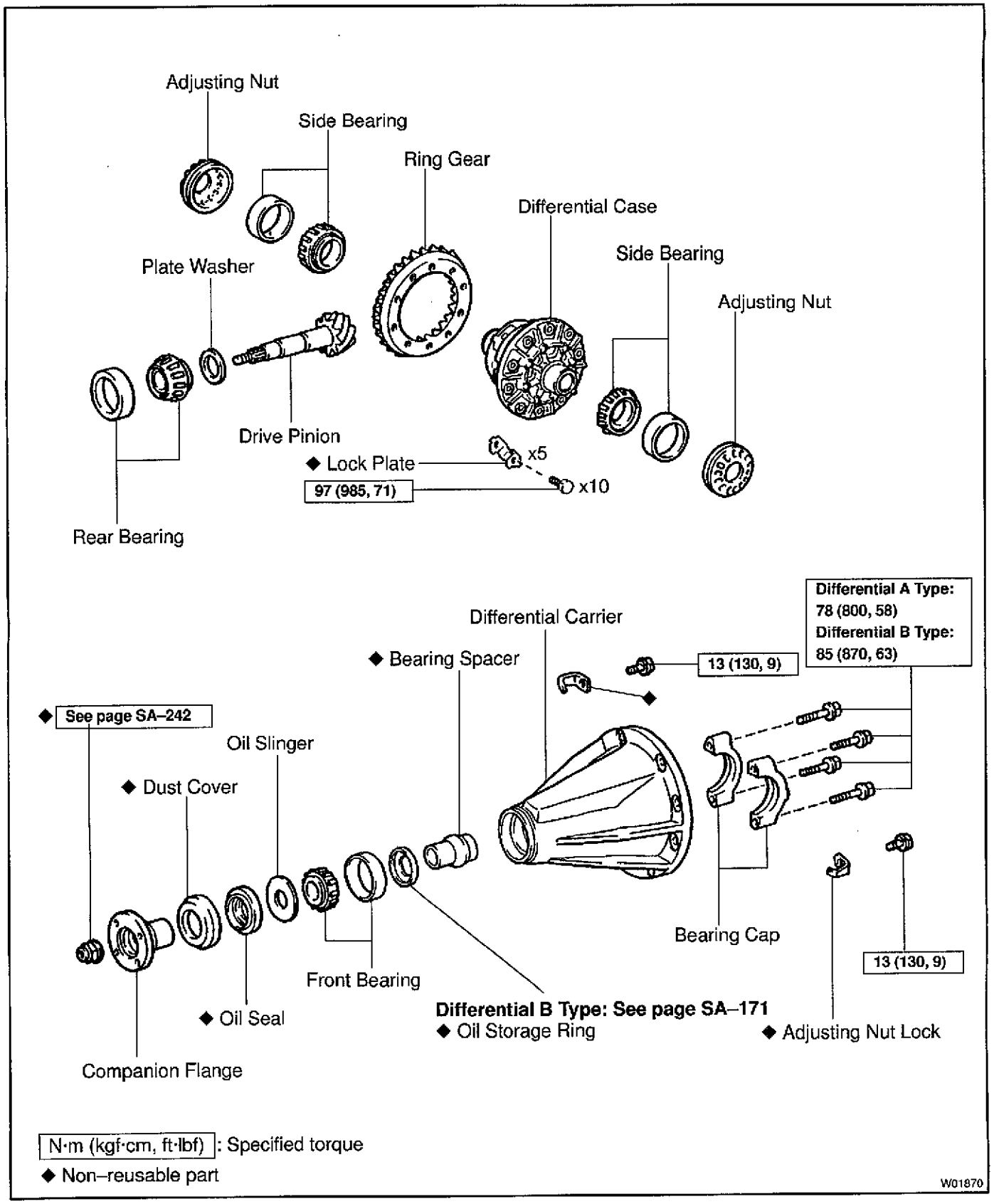
RZN193L–PRMDK, LN191L–PRMDS



N·m (kgf·cm, ft·lbf) : Specified torque

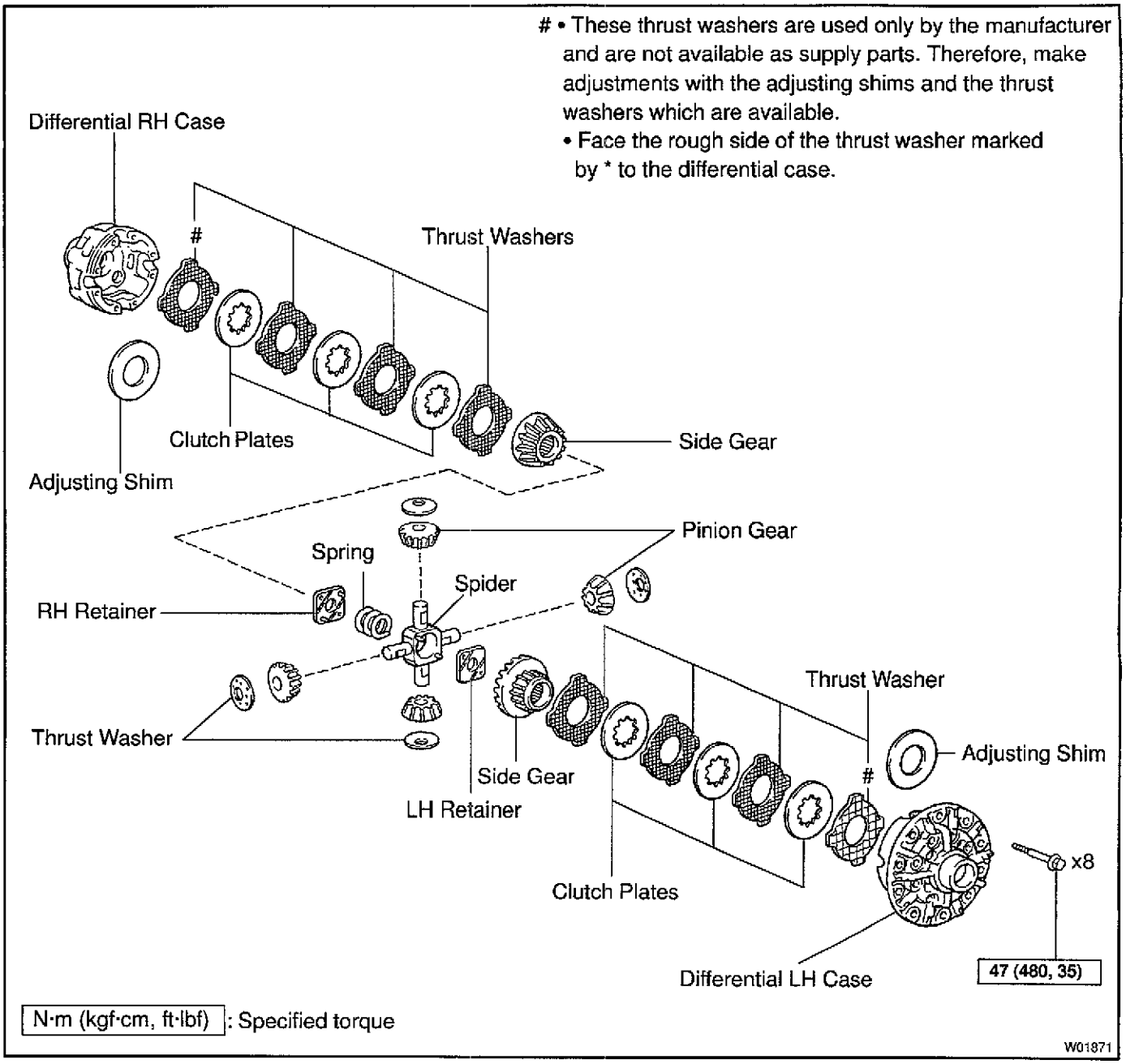
◆ Non–reusable part

F03222



N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part

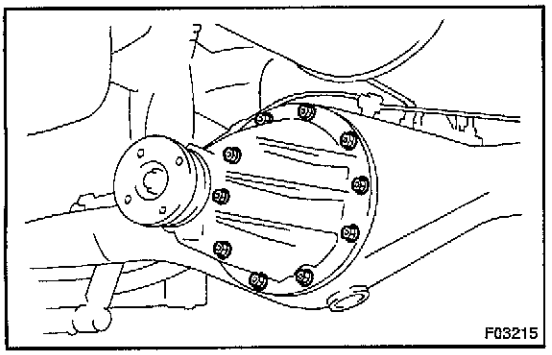
W01870


• These thrust washers are used only by the manufacturer and are not available as supply parts. Therefore, make adjustments with the adjusting shims and the thrust washers which are available.
• Face the rough side of the thrust washer marked by * to the differential case.
Differential RH Case
#
Thrust Washers
Clutch Plates
Side Gear
Adjusting Shim
Pinion Gear
Spring
Spider
RH Retainer
Thrust Washer
Thrust Washer
Adjusting Shim
#
Side Gear
LH Retainer
Clutch Plates
x8
Differential LH Case
47 (480, 35)
N·m (kgf·cm, ft·lbf) : Specified torque
W01871

SA0OE-01

REMOVAL

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



4. **REMOVE DIFFERENTIAL CARRIER ASSEMBLY**

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

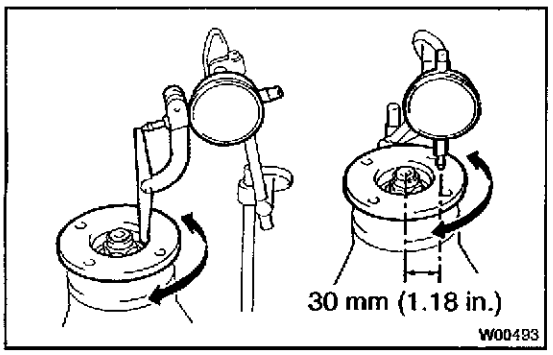
NOTICE:

Be careful not to damage the installation suface.

Torque: 74 N·m (750 kgf·cm, 54 ft·lbf)

SA00F-01

DISASSEMBLY



1. CHECK RUNOUT OF COMPANION FLANGE

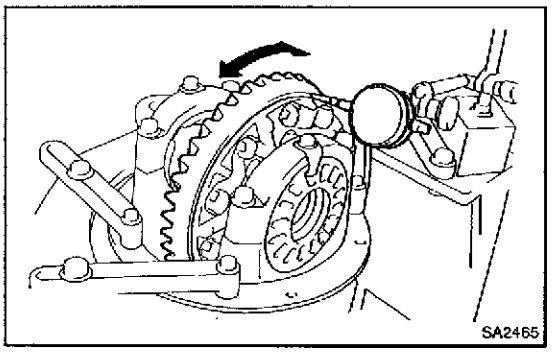
Using a dial indicator, measure the vertical and lateral runout of the companion flange.

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.

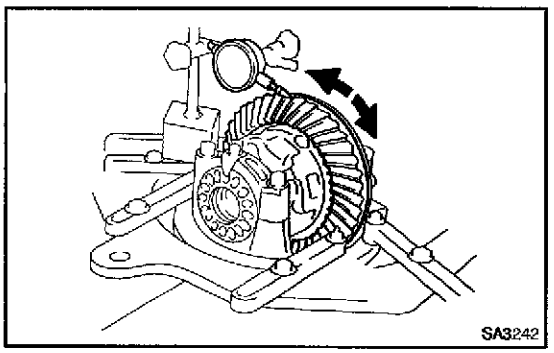


2. CHECK RING GEAR RUNOUT

Using a dial indicator, measure the ring gear runout.

Maximum runout: 0.07 mm (0.0028 in.)

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

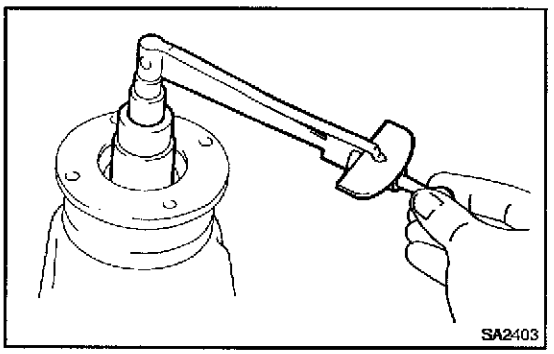


3. CHECK RING GEAR BACKLASH

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 as necessary.



4. MEASURE DRIVE PINION PRELOAD

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

Preload (at starting):

0.5 – 0.8 N·m (5 – 8 kgf·cm, 4.3 – 6.9 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.

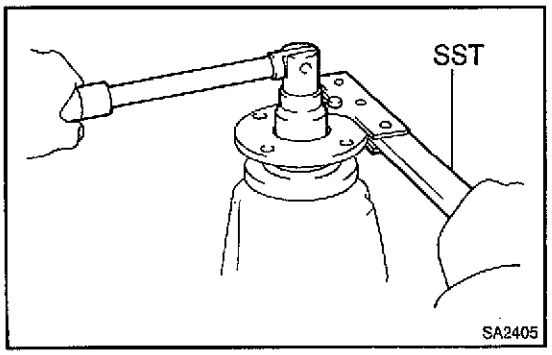
Total preload (at starting):

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 the differential.

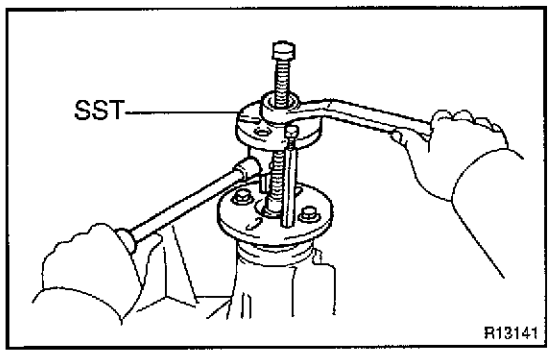
6. CHECK TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION (See page SA–242)



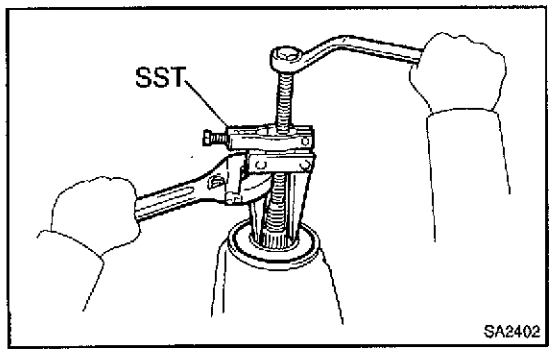
7. REMOVE COMPANION FLANGE

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

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



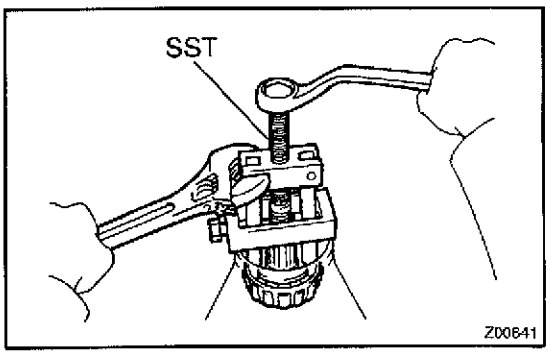
(c) Using SST, remove the companion flange.
SST 09950–30010 (09951–03010, 09953–03010, 09954–03010, 09955–03030, 09956–03050)



8. REMOVE OIL SEAL AND OIL SLINGER

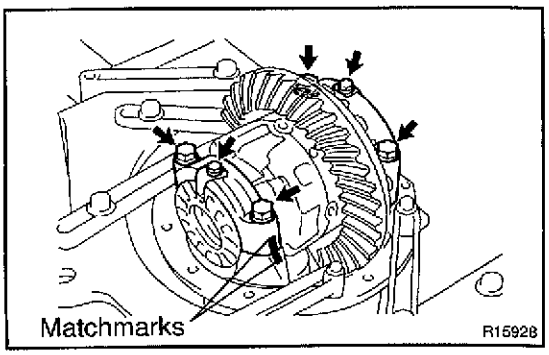
(a) Using SST, remove the oil seal from the differential carrier.
SST 09308–10010

(b) Remove the oil slinger.



9. REMOVE FRONT BEARING

Using SST, remove the front bearing from the drive pinion.
SST 09556–22010



10. 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.

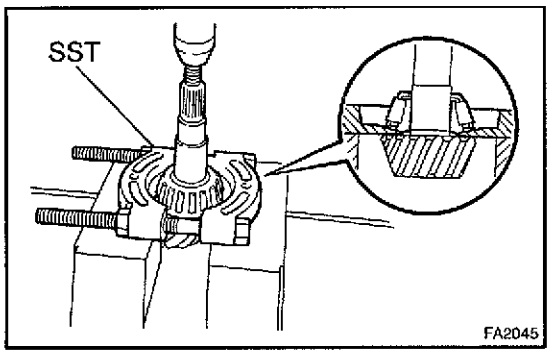
HINT:

Tag the disassembled parts to show the location for reassembling.

11. REMOVE DRIVE PINION AND BEARING SPACER

(a) Remove the drive pinion with the rear bearing.

(b) Remove the bearing spacer.



12. REMOVE DRIVE PINION REAR BEARING

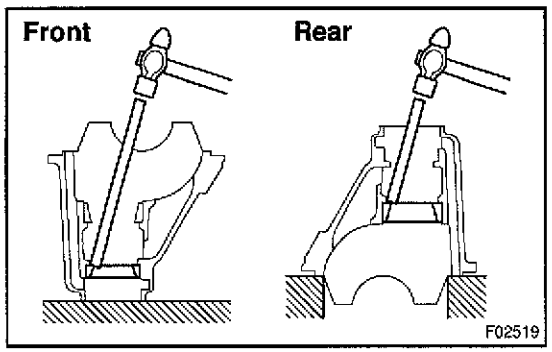
(a) Using SST and a press, remove the bearing from the drive pinion.

SST 09950–00020

HINT:

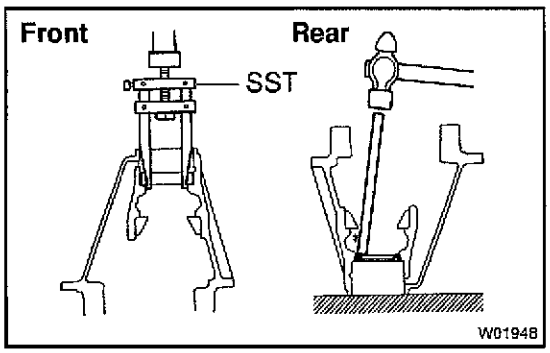
If the drive pinion or ring gear is damaged, replace them as a set.

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



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

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



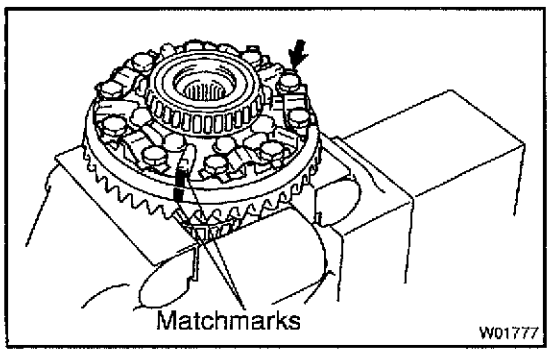
14. Differential B Type: (See page SA–171) REMOVE FRONT AND REAR BEARING OUTER RACES AND OIL STORAGE RING

(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.



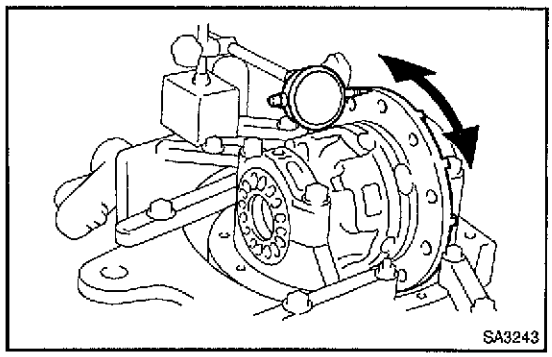
15. REMOVE RING GEAR

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

(b) Using a screwdriver and hammer, unstake the 5 lock plates.

(c) Remove the 10 ring gear set bolts and 5 lock plates.

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



16. 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 no play left in the side bearings, install the plate washers.

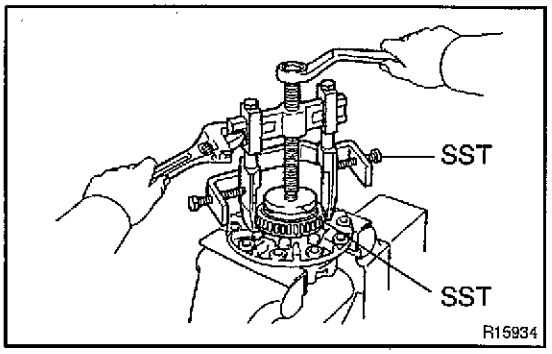
(d) Align the matchmarks on the bearing cap and differential carrier.

(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.



17. REMOVE SIDE BEARING FROM DIFFERENTIAL CASE

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

Using SST, remove the side bearing 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 notches in the differential case.

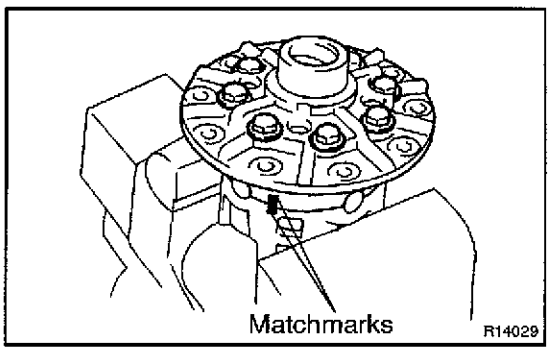
(b) Differential B type: (See page SA–171)

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 notches in the differential case.

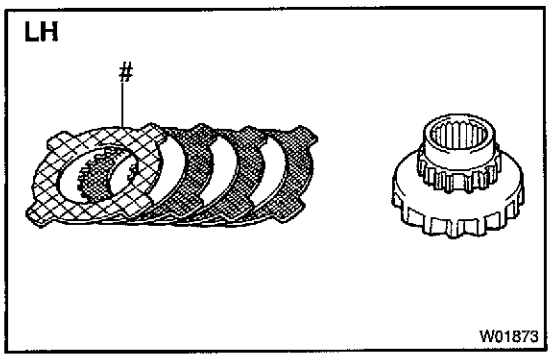


18. DISASSEMBLE DIFFERENTIAL CASE

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

(b) Remove the 8 bolts uniformly, a little at a time.

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



19. REMOVE THESE PARTS FROM DIFFERENTIAL LH AND RH CASES:

HINT:

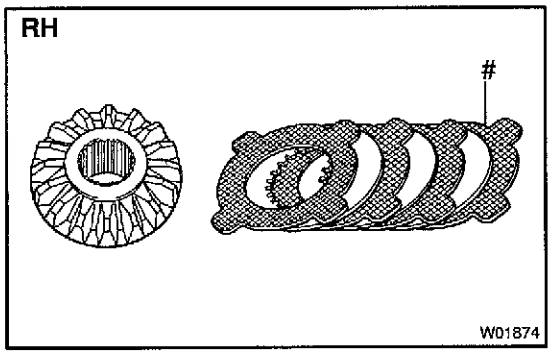
Keep the disassembled parts in order.

(a) Remove these parts from the LH case:

HINT:

Face the rough side of the thrust washer marked by "#" to the differential case.

- Side gear
- 4 side gear thrust washers
- 3 clutch plates



(b) Remove these parts from the RH case:

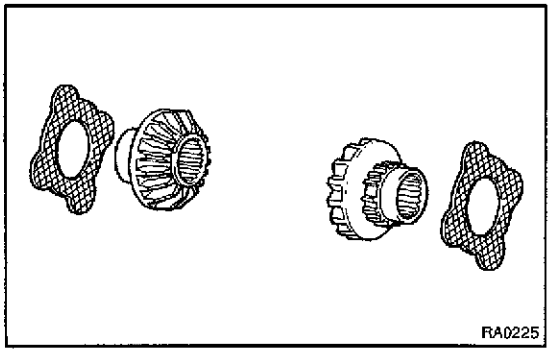
HINT:

Face the rough side of the thrust washer marked by "#" to the differential case.

- Spring LH retainer
- Compression spring
- Spider with pinion gear
- Spring RH retainer
- Side gear
- 4 side gear thrust washers
- 3 clutch plates

SA0CH-01

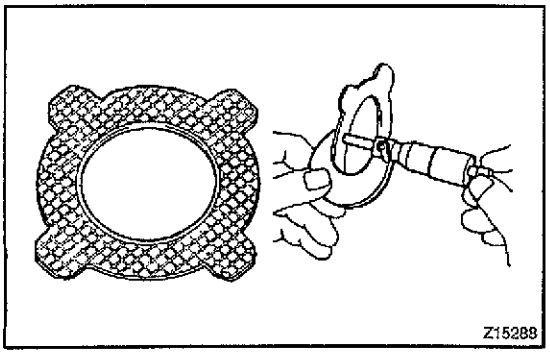
INSPECTION



1. REPLACE PARTS THAT ARE DAMAGED OR WORN

HINT:

If replacing the side gear, also replace the thrust washer that contacts with it.



2. INSPECT SIDE GEAR THRUST WASHERS FOR WEAR OR DAMAGE

Using a micrometer, measure that the contact surface of the thrust washer is even and check that no bare metal is showing.

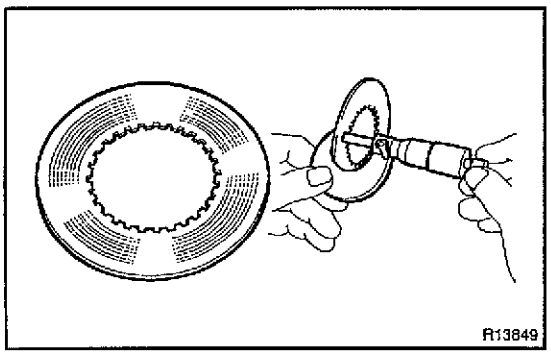
Thickness (For reference):

1.77 – 1.86 mm (0.0697 – 0.0732 in.)

If necessary, replace the thrust washers.

HINT:

If replacing the thrust washer, also replace the clutch plate that contacts with it.



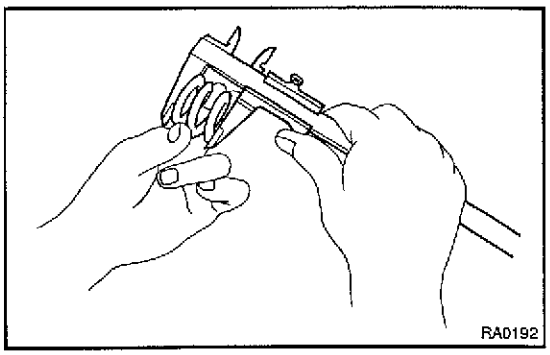
3. INSPECT CLUTCH PLATE FOR WEAR OR DAMAGE

Using a micrometer, measure the contact surface of the clutch plate and check that there is no abnormal wear.

Thickness (For reference):

1.57 – 1.63 mm (0.0618 – 0.0642 in.)

If necessary, replace the clutch plate.

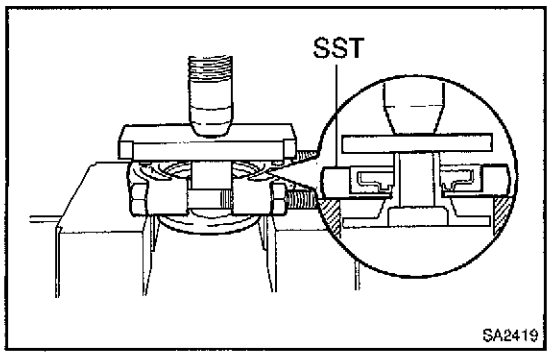


4. INSPECT COMPRESSION SPRING FREE LENGTH

Using vernier calipers, measure the free length of the spring.

Length (For reference): 27.0 mm (1.063 in.)

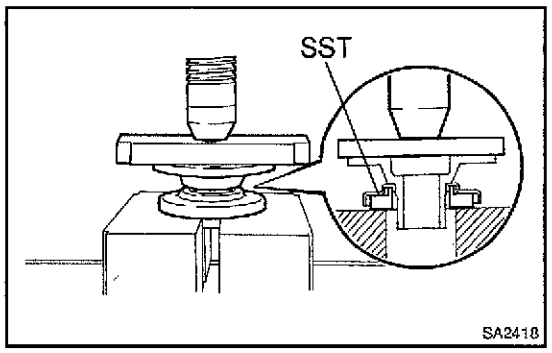
SA0G3-01



REPLACEMENT

REPLACE COMPANION FLANGE DUST DEFLECTOR

(a) Using SST and a press, remove the dust deflector.
SST 09950–00020



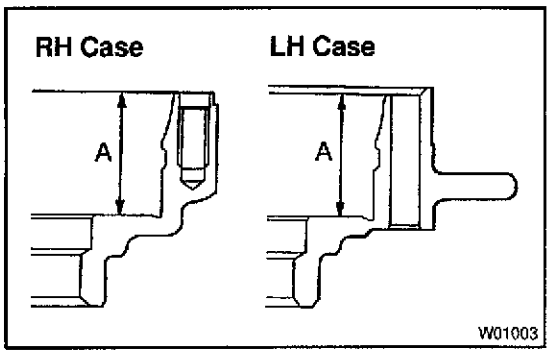
(b) Using SST and a press, install a new dust deflector.
SST 09726–40010

SA0OI-01

REASSEMBLY

HINT:

- When reusing the side gear, thrust washers and clutch plates, skip the STEP 1.
- Using a shop rag, clean off any foreign object from the parts.
- Apply all of the sliding and rotating surfaces with LSD oil.



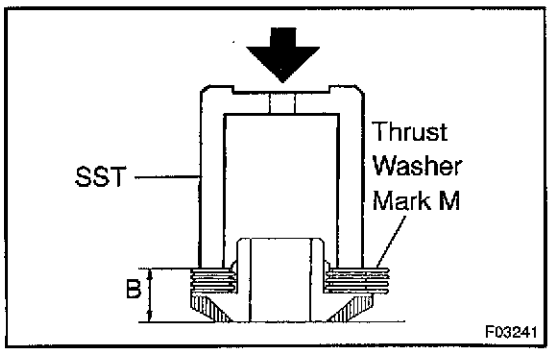
1. SELECT ADJUSTING SHIM(S)

(a) Measure the differential case dimension "A", as shown in the illustration.

(b) Install the thrust washers (face their fine side to the side gear) and clutch plates on the side gear.

HINT:

Install the new thrust washer (Mark M) instead of the thrust washers (Mark B – L) to the differential case side.



(c) Using SST to press down the thrust washers and clutch plates with about pressure of 10 kgf (22 lbf), measure dimension "B", as shown in the illustration.

SST 09649–17010

(d) Referring to the following selection table on the next page, select the proper adjusting shim(s).

Adjusting shim thickness =
A – B – 16.175 mm (0.63681 in.)

A mm (in.) / B mm (in.)	41.48 (1.6331)	41.50 (1.6339)	41.52 (1.6346)	41.54 (1.6354)	41.56 (1.6362)	41.58 (1.6370)	41.60 (1.6378)	41.62 (1.6386)	41.64 (1.6394)	41.66 (1.6402)	41.68 (1.6409)	41.70 (1.6417)	41.72 (1.6425)
24.66 (0.9709)												C + C + E	
24.68 (0.9717)													
24.70 (0.9724)													
24.72 (0.9732)													
24.74 (0.9740)												C + C + A	
24.76 (0.9748)											C + C + C		
24.78 (0.9756)													
24.80 (0.9764)													
24.82 (0.9772)											E + E		
24.84 (0.9780)										D + E			
24.86 (0.9787)													
24.88 (0.9795)													
24.90 (0.9803)										D + D			
24.92 (0.9811)									C + D				
24.94 (0.9819)													
24.96 (0.9827)													
24.98 (0.9835)									C + C				
25.00 (0.9843)													
25.02 (0.9850)													
25.04 (0.9858)									B + C				
25.06 (0.9866)													
25.08 (0.9874)									B + B				
25.10 (0.9882)													
25.12 (0.9890)								E					
25.14 (0.9898)								D					
25.16 (0.9905)	A		B			C							
25.18 (0.9913)													

Adjusting shim mark and thickness				mm (in.)
A 0.15 (0.0059)	B 0.20 (0.0079)	C 0.25 (0.0098)	D 0.30 (0.0118)	E 0.35 (0.0138)

F02520

2. CHECK SIDE GEAR BACKLASH

(a) Install the clutch plates, thrust washers and side gear to the LH and RH differential cases.

HINT:

If necessary, install the adjusting shim(s).

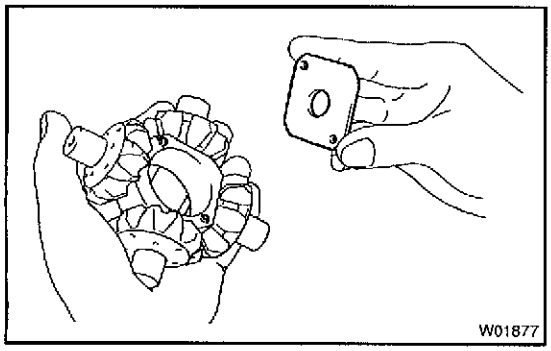
(b) Install the 4 pinion gears and thrust washers to the spider.

(c) Align the spring LH retainer holes with the spider knock pins and install the LH retainer.

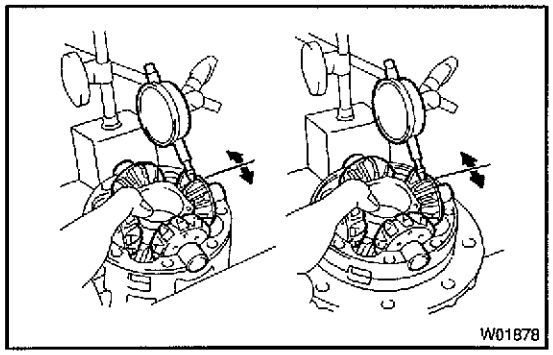
(d) Install the pinion gear and spider to the differential LH case.

HINT:

Install the spider to the LH case tightly and do not move the spring retainer.



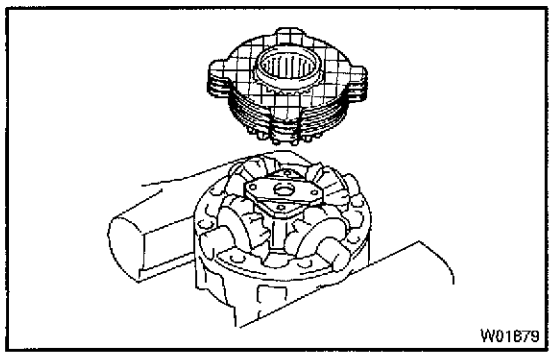
W01877



(e) Using a dial indicator, check the side gear backlash with holding the side gear and spider.
Backlash: 0.05 – 0.20 mm (0.0019 – 0.0079 in.)

HINT:
- Measure at all 4 locations.
- Measure the backlash at the LH case and at the RH case.

If the backlash is not within the specification, select the adjusting shim(s).



3. ASSEMBLE DIFFERENTIAL CASE

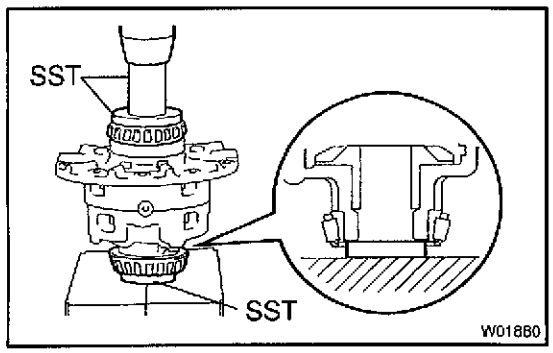
(a) Reinstall the spider and spring LH retainer to the differential LH case.

HINT:
Install the spider to the LH case tightly and do not move the spring retainer.

(b) Install the compression spring and spring RH retainer.
(c) Install the side gear, thrust washers and clutch plates.
(d) Align the matchmarks and assemble the RH and LH cases.

HINT:
Be careful not to drop the side gear and check the pinion and side gear alignment.

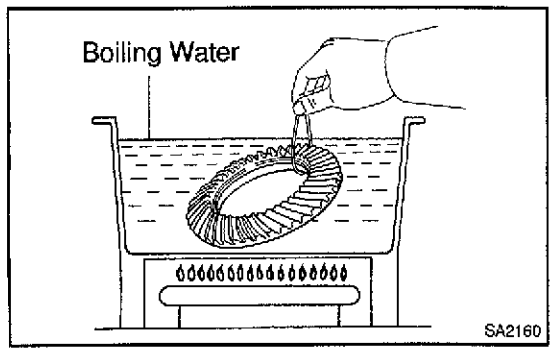
(e) Tighten the 8 bolts uniformly, a little at a time.
Torque: 47 N·m (480 kgf·cm, 35 ft·lbf)



4. INSTALL SIDE BEARINGS

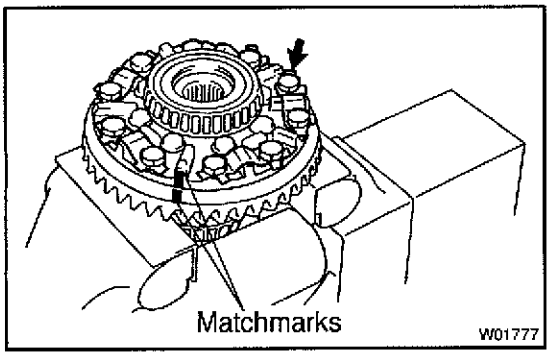
(a) Differential A type: (See page SA–171)
Using SST and a press, install the side bearings into the differential case.
SST 09550–10012 (09252–10010, 09957–10010)

(b) Differential B type: (See page SA–171)
SST 09950–60010 (09951–00480, 09951–00550), 09950–70010 (09951–07150)

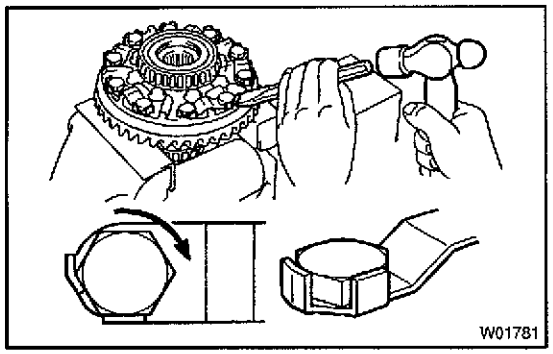


5. INSTALL RING GEAR ON DIFFERENTIAL CASE

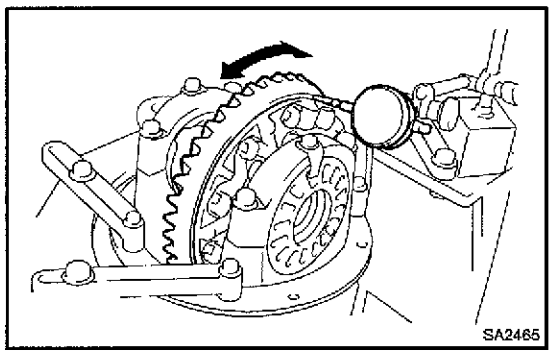
(a) Clean the contact surfaces of the differential case and ring gear.
(b) Heat the ring gear to about 100 °C (212 °F) in boiling water.
(c) Carefully remove the ring gear from the boiling water.
(d) After the moisture on the ring gear has completely evaporated, quickly install the ring gear to the differential case.
(e) Align the matchmarks on the ring gear and differential case.



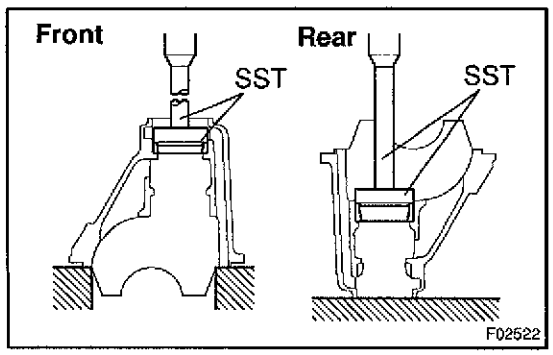
(f) Temporarily install 5 new lock plates and 10 set bolts.
(g) After the ring gear cools down enough, tighten the set bolts uniformly and a little at a time.
Torque: 97 N·m (985 kgf·cm, 71 ft·lbf)



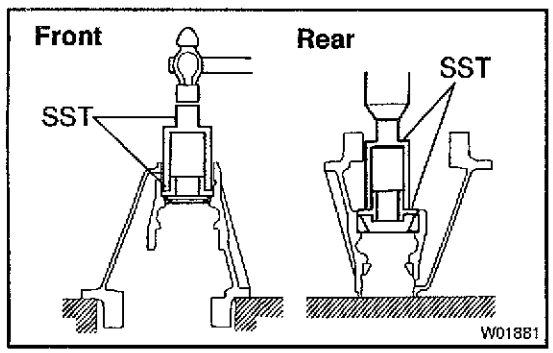
(h) Using a drift punch and hammer, stake the 10 lock plates.
HINT:
Stake the claws of lock plates to fix the bolts. For the claw contacting the protruding portion of the bolt, stake only the half of it along on the tightening direction.



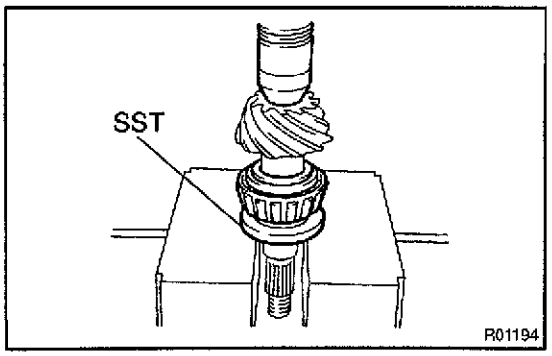
6. CHECK RING GEAR RUNOUT
(a) Install the differential case onto the carrier and tighten the adjusting nut just to where there is no play in the bearing.
(b) Using a dial indicator, check the ring gear runout.
Maximum runout: 0.07 mm (0.0028 in.)
(c) Remove the differential case from the carrier.



7. Differential A Type: (See page SA–171)
INSTALL DRIVE PINION BEARING OUTER RACES
Using SST and a press, install the 2 outer races
SST 09950–60020 (09951–00710, 09951–00790), 09950–70010 (09951–07150)



8. 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 outer races.
SST 09316–60011 (09316–00011, 09316–00021, 09316–00051)

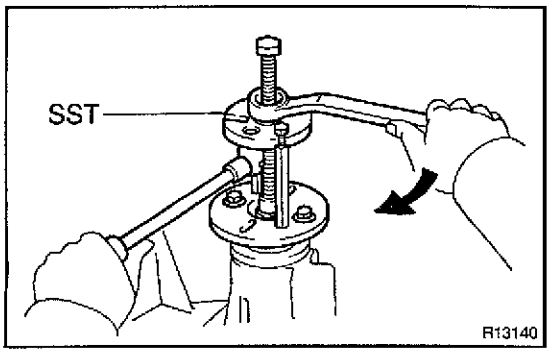


9. INSTALL DRIVE PINION FRONT BEARING

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

(b) Using SST and a press, install the rear bearing onto the drive pinion.

SST 09506–30012



10. TEMPORARILY ADJUST DRIVE PINION PRELOAD

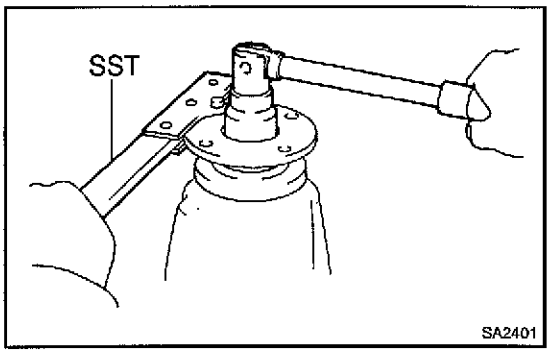
(a) Install the drive pinion, front bearing and oil slinger.

HINT:

Assemble the spacer and oil seal after adjusting the gear contact pattern.

(b) Install the companion flange with SST.

SST 09950–30010 (09951–03010, 09953–03010, 09954–03010, 09955–03030, 09956–03050)



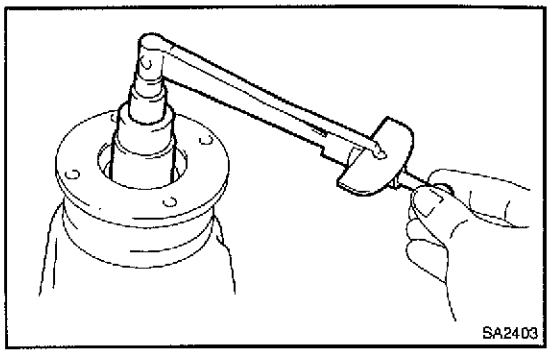
(c) Adjust the drive pinion preload by tightening the companion flange nut.

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 (at starting):

New bearing:

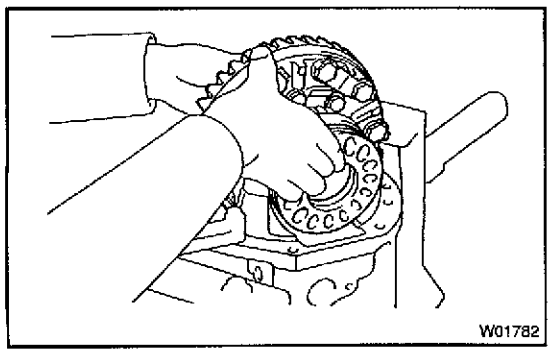
0.9 – 1.6 N·m (10 – 16 kgf·cm, 8.7 – 13.9 in.·lbf)

Reused bearing:

0.5 – 0.8 N·m (5 – 8 kgf·cm, 4.3 – 6.9 in.·lbf)

HINT:

Measure the total preload after first turning the bearing clockwise and counterclockwise several times to make the bearing smooth.



11. INSTALL DIFFERENTIAL CASE IN CARRIER

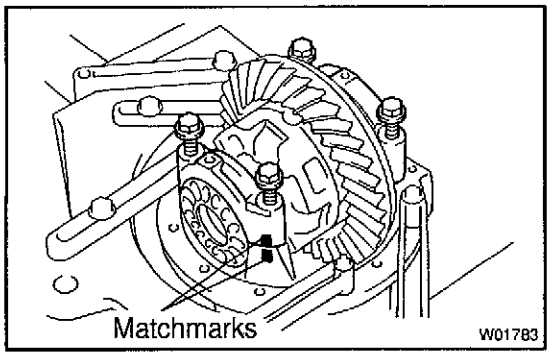
(a) Place the bearing outer races on their respective bearings. Make sure that the left and right outer races are not interchanged.

(b) Install the case in the carrier.

HINT:

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

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

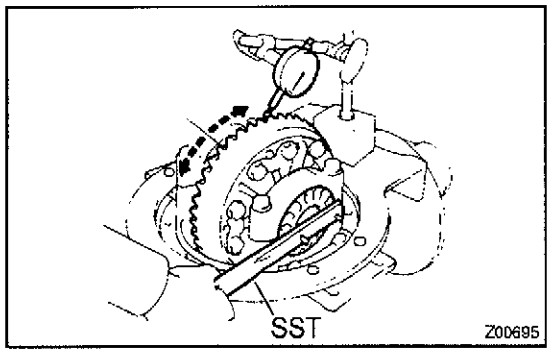


12. INSTALL BEARING CAPS

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.



13. ADJUST SIDE BEARING PRELOAD

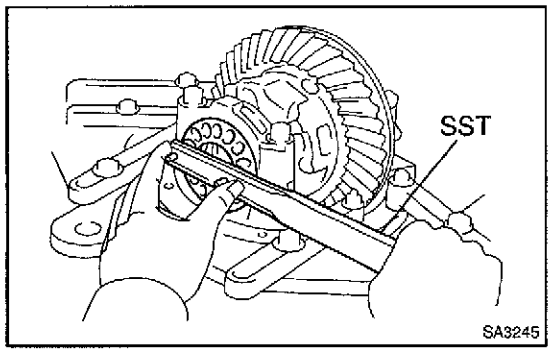
(a) Tighten the 4 bearing cap bolts to the specified torque, and loosen them to the point where they can be turned by hand.

Torque: 85 N·m (870 kgf·cm, 63 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.).

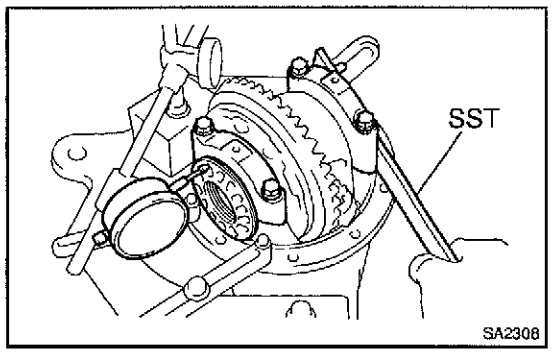
SST 09504–00011



(d) While 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.

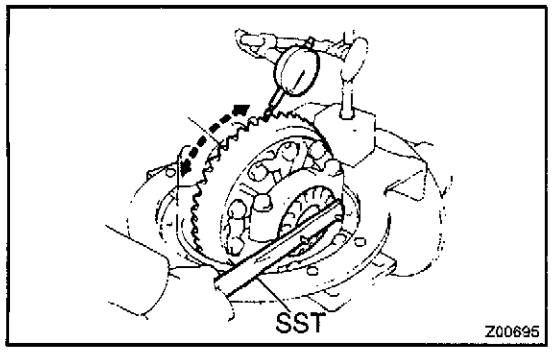
SST 09504–00011



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



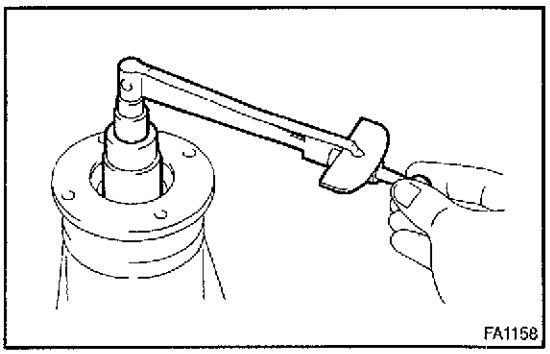
(h) Using a dial indicator, adjust the ring gear backlash until it is within the specification.

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

HINT:

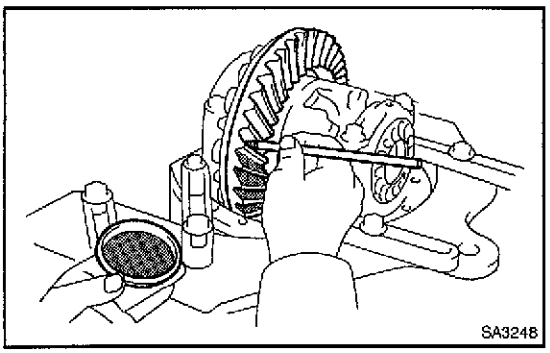
The backlash is adjusted by turning the left and right adjusting nuts by an equal amounts. For example, loosen the nut of the left side one notch and tighten the nut on the right side one notch.

(i) Torque the bearing cap bolts.
Torque:
Differential A Type: 78 N·m (800 kgf·cm, 58 ft·lbf)
Differential B Type: 85 N·m (870 kgf·cm, 63 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)

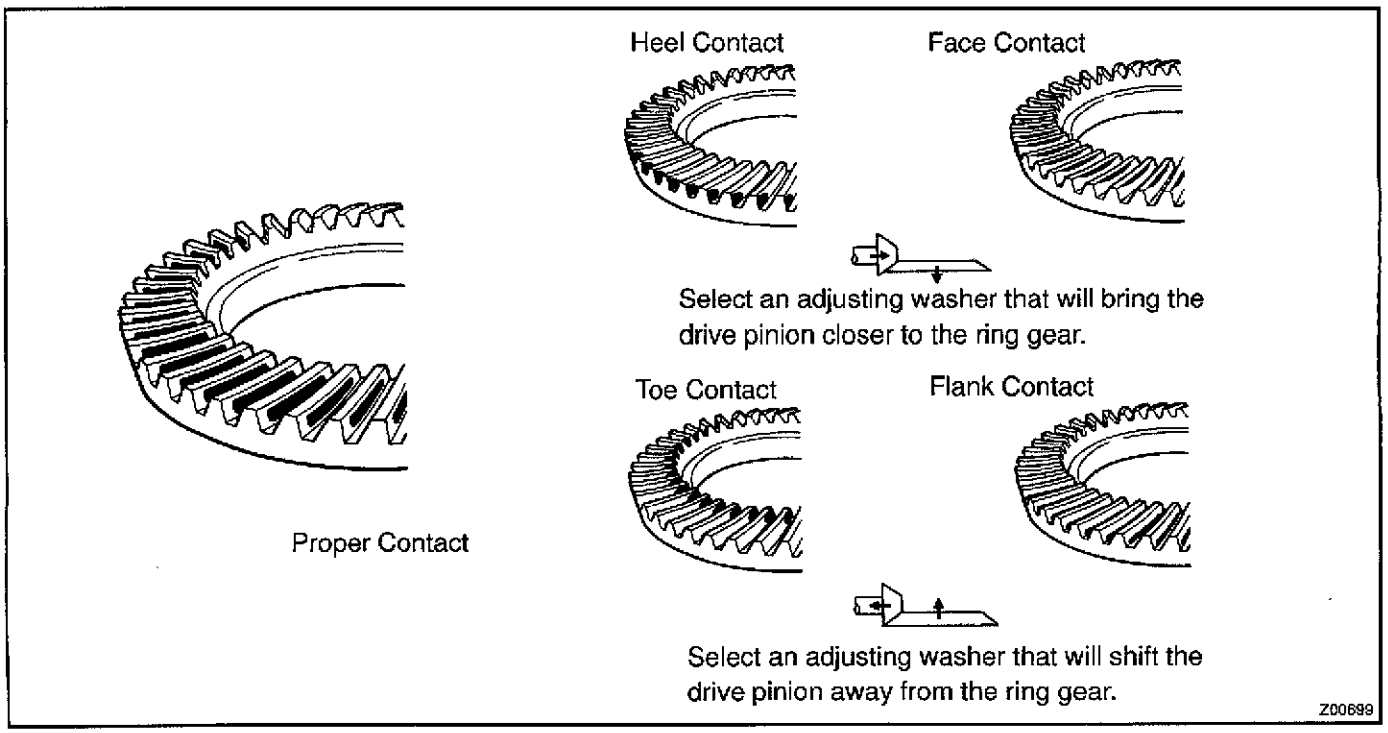

SA3248

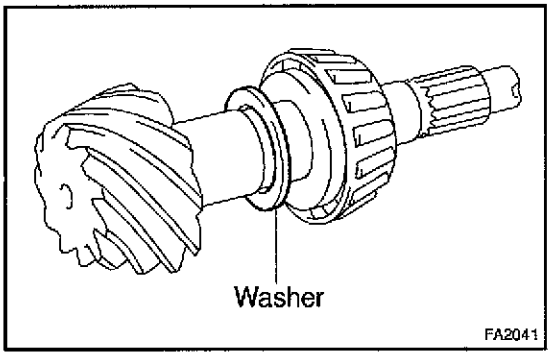
14. INSPECT TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION

(a) Coat 3 or 4 teeth at the 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.



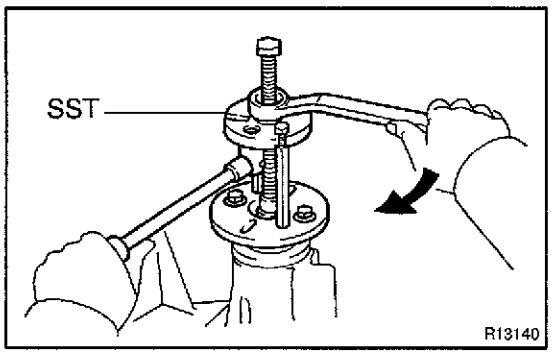


If the teeth are not contacting properly, use the following table to select a proper washer for correction.

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)

15. REMOVE COMPANION FLANGE (See page SA–235)

16. REMOVE OIL SLINGER AND FRONT BEARING (See page SA–235)



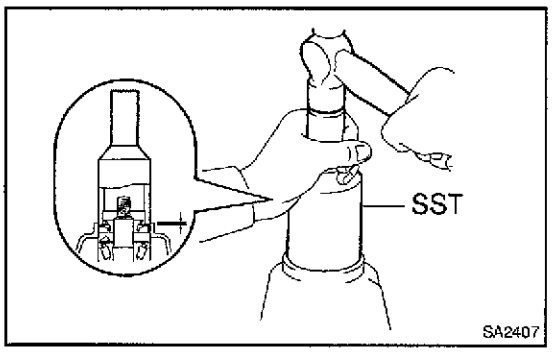
17. INSTALL BEARING SPACER AND FRONT BEARING

(a) Place a new bearing spacer on the shaft.

(b) Place the front bearing and oil slinger.

(c) 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, 09956–03050)



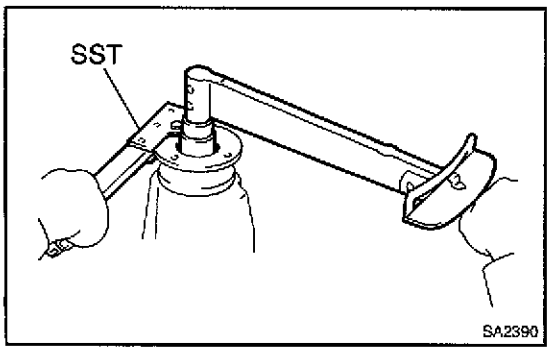
18. INSTALL OIL SEAL

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

(b) Using SST, install a new oil seal.

SST 09214–76011

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



19. INSTALL COMPANION FLANGE

(a) Place the companion flange on the drive pinion.

(b) Install a new nut.

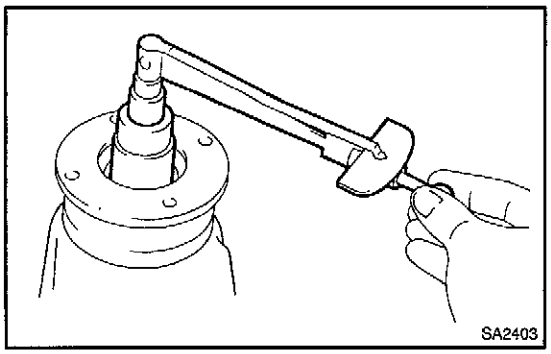
HINT:

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

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

SST 09330–00021

Torque: 196 N·m (2,000 kgf·cm, 145 ft·lbf)


SA2403

20. ADJUST DRIVE PINION PRELOAD

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

Preload (at starting):
New bearing:
0.9 – 1.6 N·m (10 – 16 kgf·cm, 8.7 – 13.9 in.·lbf)
Reused bearing:
0.5 – 0.8 N·m (5 – 8 kgf·cm, 4.3 – 6.9 in.·lbf)

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

Maximum torque: 343 N·m (3,500 kgf·cm, 253 ft·lbf)

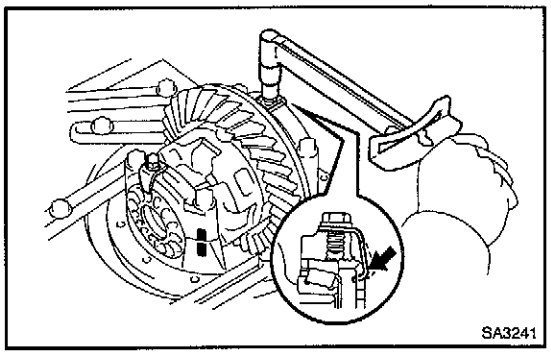
If the maximum torque is exceeded while retightening the nut, replace the bearing spacer and repeat the preload procedure. Do not back off the pinion nut to reduce the preload.

21. RECHECK RING GEAR BACKLASH
(See page SA–235)

22. RECHECK TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION (See page SA–242)

23. CHECK RUNOUT OF COMPANION FLANGE
(See page SA–235)

24. STAKE DRIVE PINION NUT


SA3241

25. INSTALL ADJUSTING NUT LOCKS

(a) Install 2 new nut locks on the bearing caps.
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

(b) After tightening bolts, bend the nut locks.

SA0CJ–01

INSTALLATION

Installation is in the reverse order of removal (See page SA–234).
AFTER INSTALLATION, FILL DIFFERENTIAL WITH HYPOID GEAR OIL (See page SA–172)