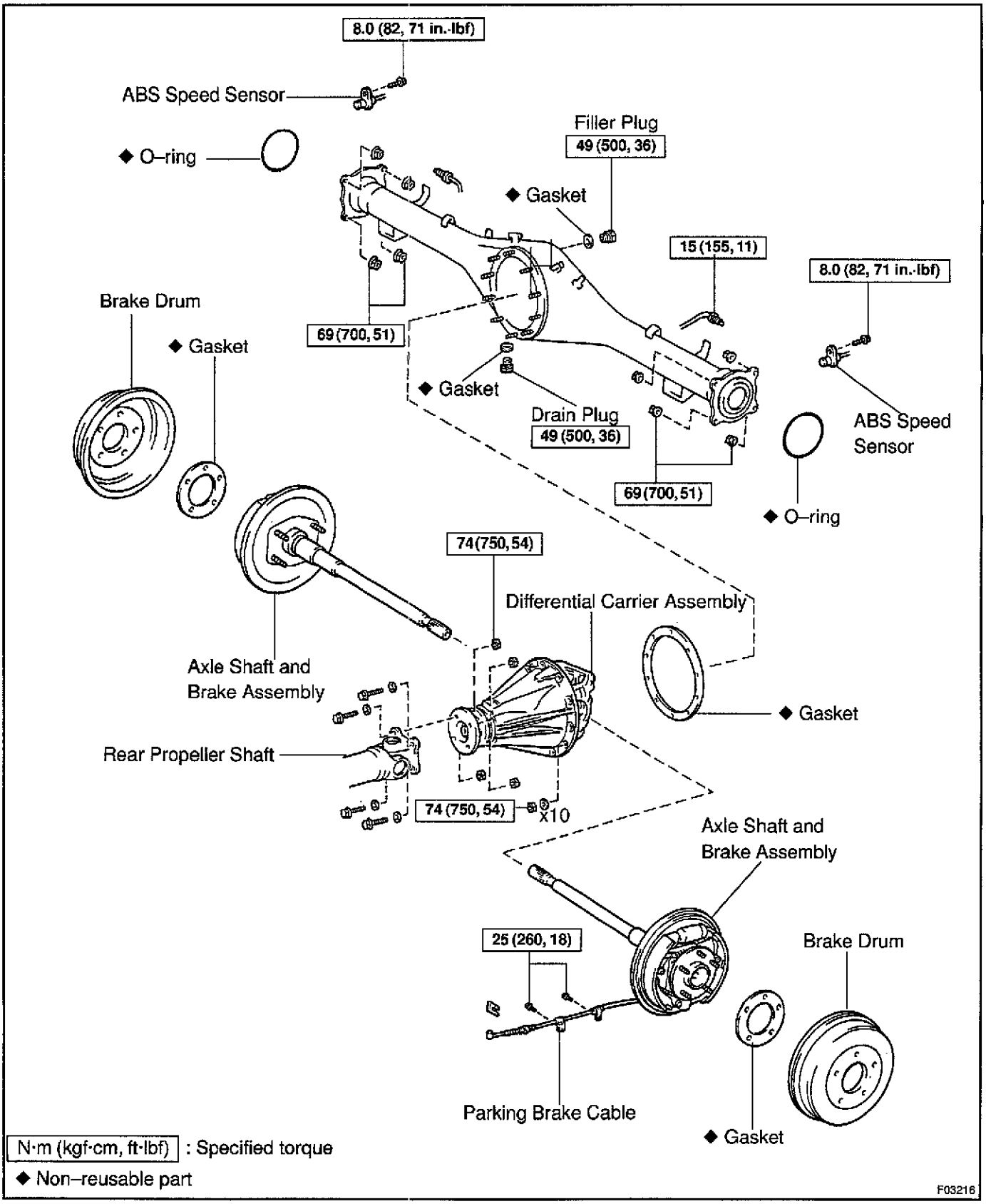
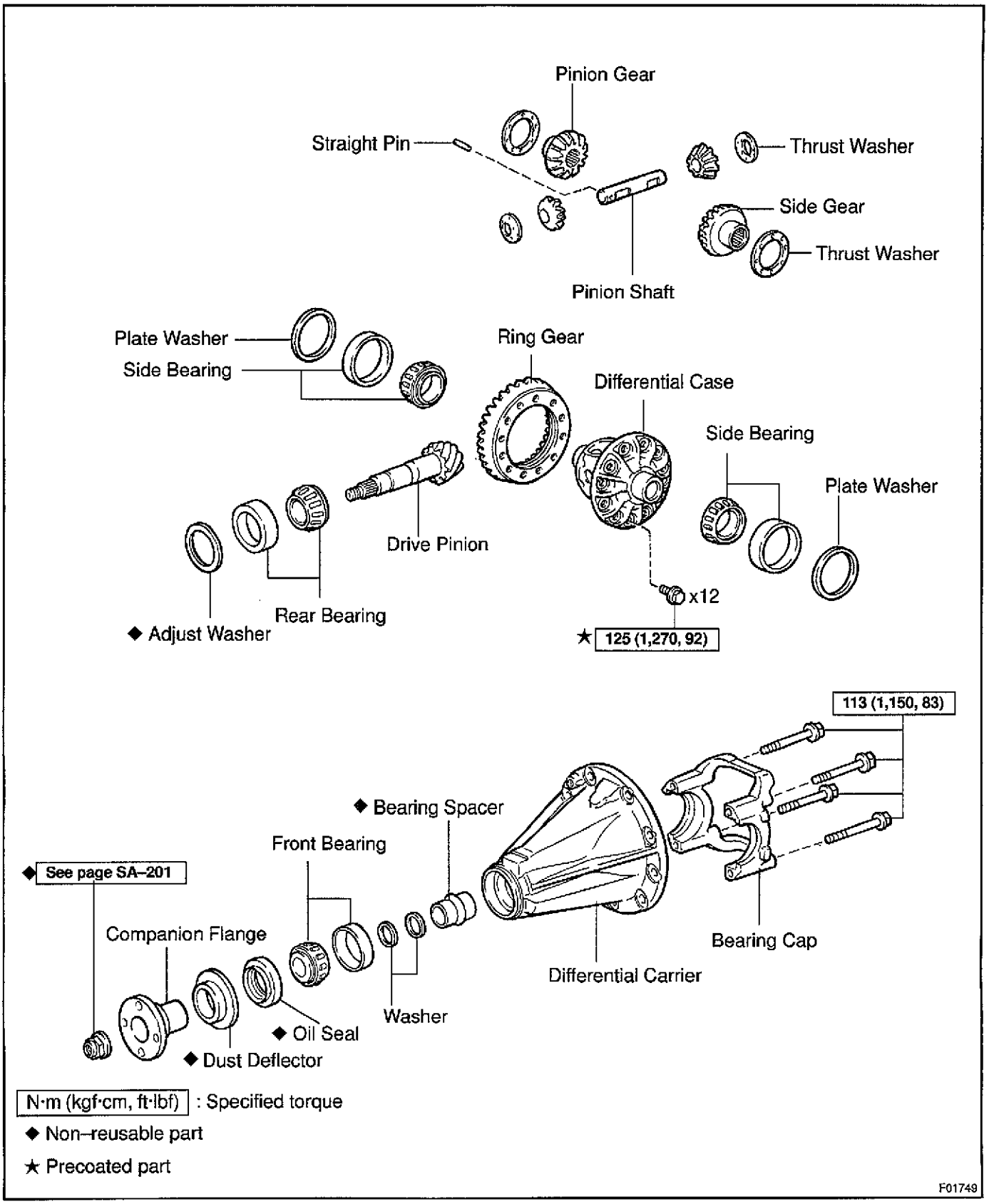
REAR DIFFERENTIAL CARRIER (G.C.C. Countries 2WD)

SA007-02

COMPONENTS

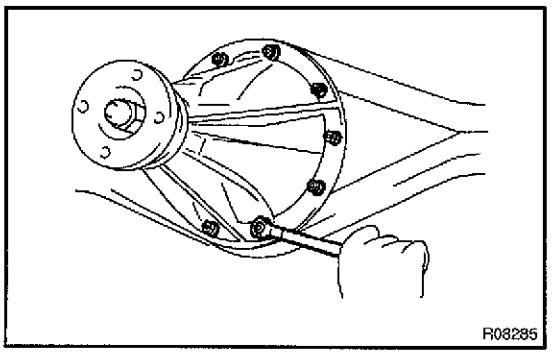



Pinion Gear
Straight Pin
Thrust Washer
Side Gear
Thrust Washer
Pinion Shaft
Plate Washer
Side Bearing
Ring Gear
Differential Case
Side Bearing
Plate Washer
Drive Pinion
x12
◆ Adjust Washer
Rear Bearing
★ 125 (1,270, 92)
113 (1,150, 83)
◆ Bearing Spacer
Front Bearing
◆ See page SA–201
Companion Flange
Bearing Cap
Differential Carrier
Washer
◆ Oil Seal
◆ Dust Deflector
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part
★ Precoated part
F01749

SA0C8-01

REMOVAL

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



4. **REMOVE DIFFERENTIAL CARRIER ASSEMBLY**

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

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

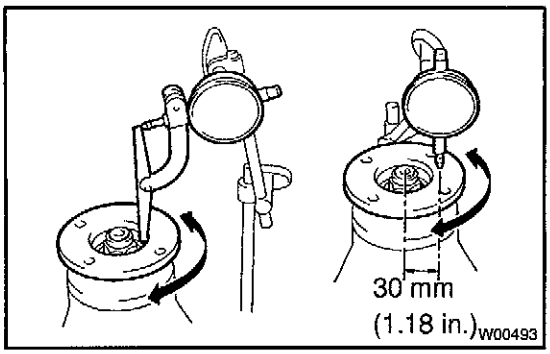
NOTICE:

Be careful not to damage the installation surface.

(b) Remove the gasket.

SADC9–01

DISASSEMBLY



1. CHECK RUNOUT OF COMPANION FLANGE

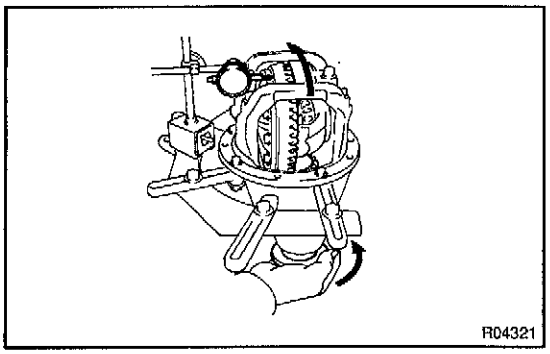
Using a dial indicator, measure the vertical and lateral runout of the companion.

Maximum:

Vertical runout: 0.09 mm (0.0035 in.)

Lateral runout: 0.09 mm (0.0035 in.)

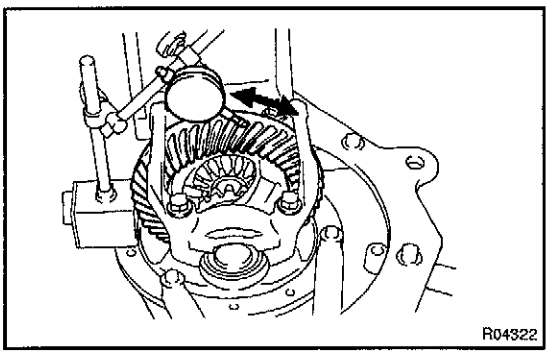
If the runout is greater than the maximum, replace the companion flange.



2. CHECK RING GEAR RUNOUT

Using a dial indicator, measure the ring gear runout.

Maximum runout: 0.05 mm (0.0020 in.)



3. CHECK RING GEAR BACKLASH

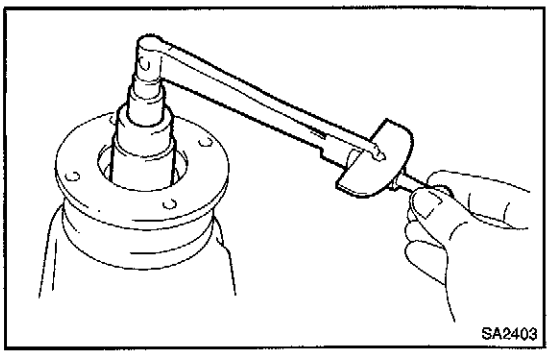
Using a dial indicator, measure the ring gear backlash.

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

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

HINT:

Measure from 3 or more places on the circumference of the ring gear.



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.

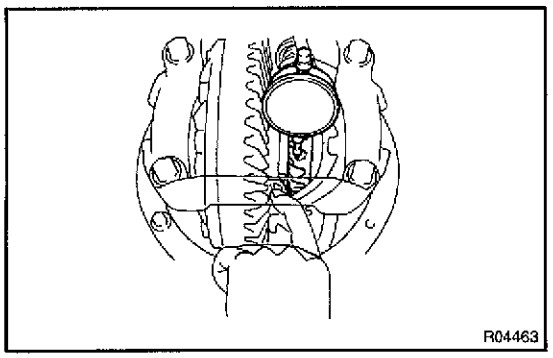
Total preload (at starting):

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–201)

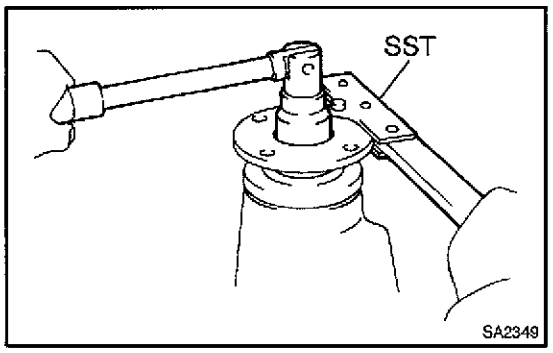


7. CHECK SIDE GEAR BACKLASH

Using a dial indicator, measure the side gear backlash with holding one pinion gear toward the case.

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

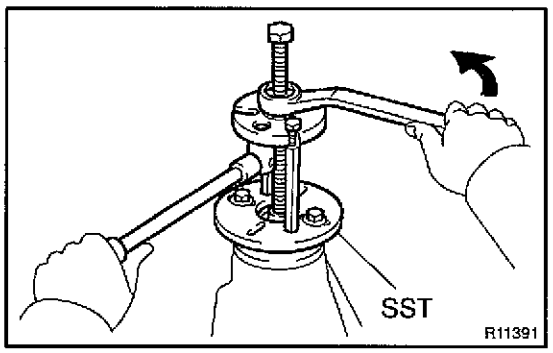
If the backlash is not within the specification, install the correct thrust washers (See page SA–201).



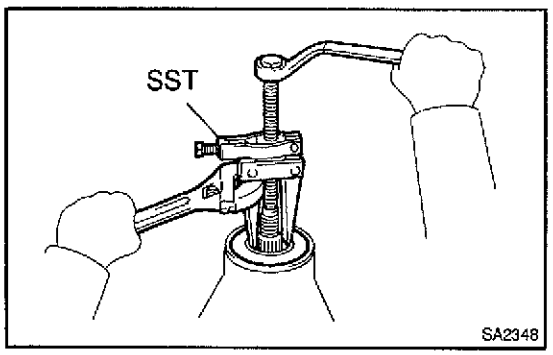
8. REMOVE COMPANION FLANGE

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

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

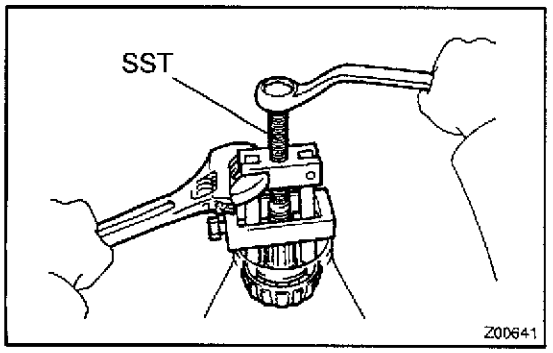


(c) Using SST, remove the companion flange.
SST 09950–30010 (09951–03010, 09953–03010, 09954–03010, 09955–03030, 09956–03030)



9. REMOVE FRONT OIL SEAL

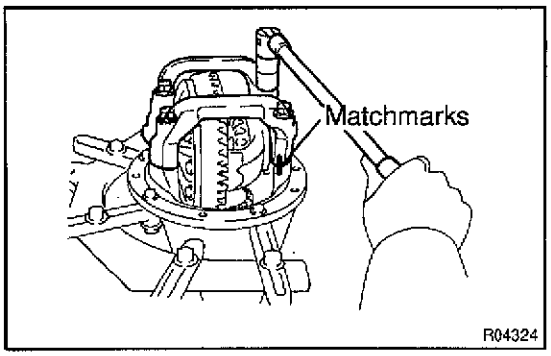
Using SST, remove the oil seal from the differential carrier.
SST 09308–10010



10. REMOVE FRONT BEARING AND BEARING SPACER

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

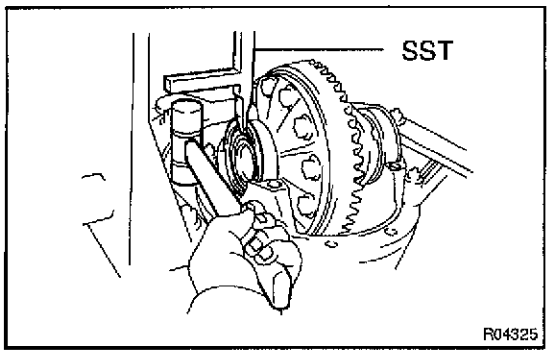
(b) Remove the 2 washers and bearing spacer. If the front bearing is damaged or worn, replace the bearing.



11. REMOVE DIFFERENTIAL CASE

(a) Place matchmarks on the bearing cap and differential carrier.

(b) Remove the 4 bolts and bearing cap.



(c) Using SST and a hammer, remove the 2 side bearing plate washers.

SST 09504–22011

HINT:

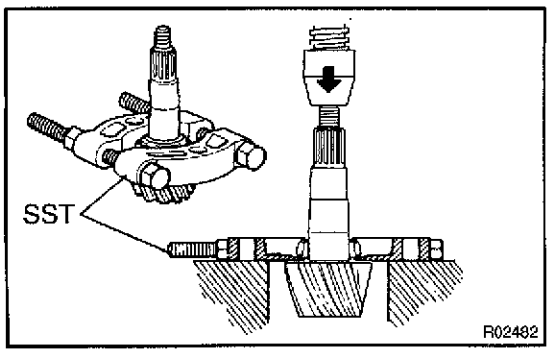
Measure the plate washer and note down the thickness.

(d) Remove the differential case and 2 bearing outer races from the carrier.

HINT:

Tag the bearing outer races to show the location for reassembling.

12. REMOVE DRIVE PINION FROM DIFFERENTIAL CARRIER



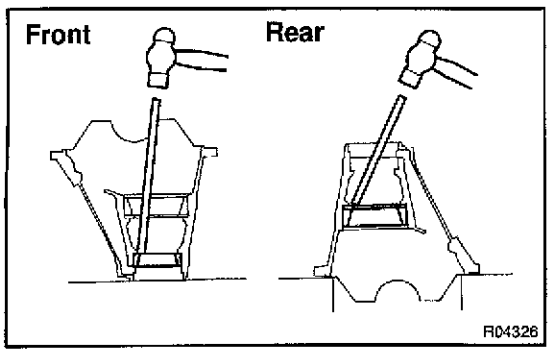
13. REMOVE DRIVE PINION REAR BEARING

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.



14. REMOVE FRONT AND REAR BEARING OUTER RACES

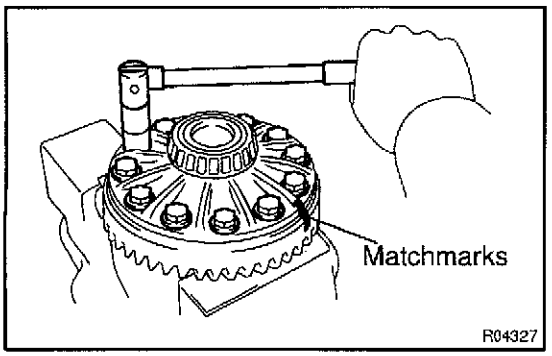
NOTICE:

Do not remove the outer races except when replacing the bearings.

Using a brass bar and hammer, remove the 2 outer races and adjusting washer from the carrier.

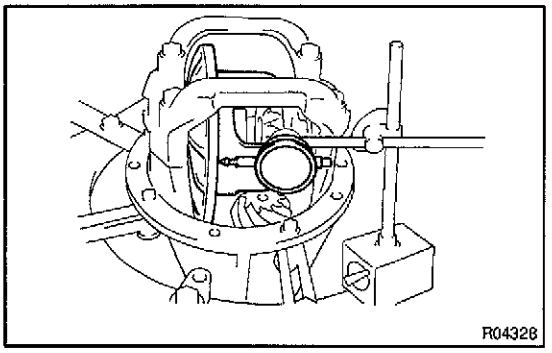
HINT:

Measure the adjusting washer and note down the thickness.



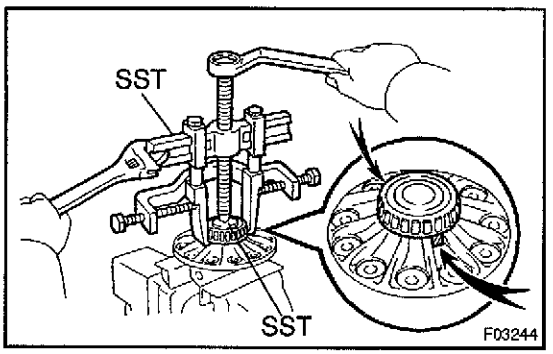
15. REMOVE RING GEAR

(a) Place matchmarks on the ring gear and differential case.
(b) Remove the 12 ring gear set bolts.
(c) Using a plastic hammer, tap on the ring gear to separate it from the differential case.



16. CHECK DIFFERENTIAL CASE RUNOUT

(a) Install the differential case in the differential carrier (See page SA–201).
(b) Using a dial indicator, measure the differential case runout.
Maximum case runout: 0.04 mm (0.0016 in.)
(c) Remove the differential case.

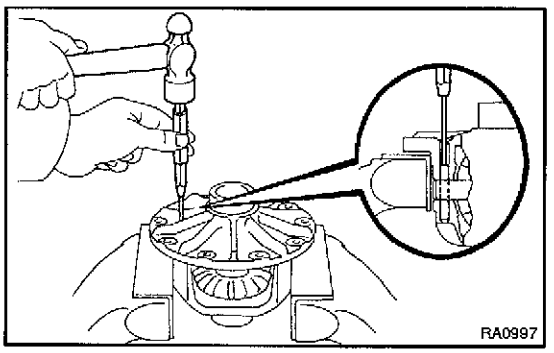


17. REMOVE SIDE BEARINGS

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 (09951–00450)

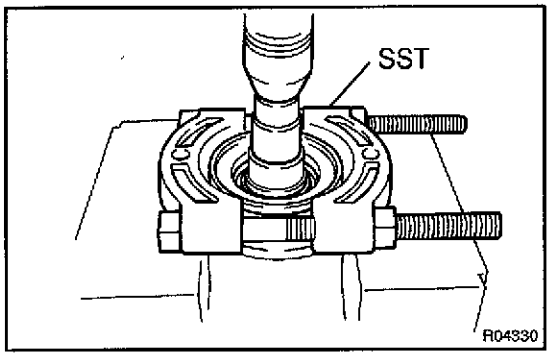
HINT:
Fix the claws of SST to the notch in the differential case.



18. 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

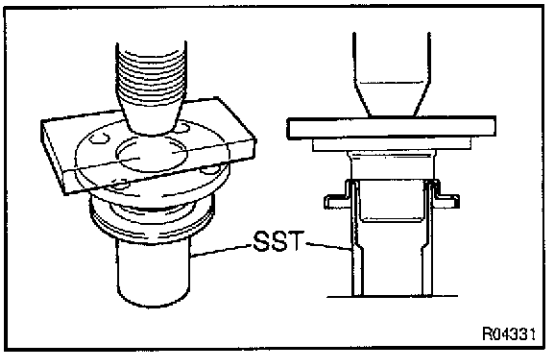
SA6OA–01



REPLACEMENT

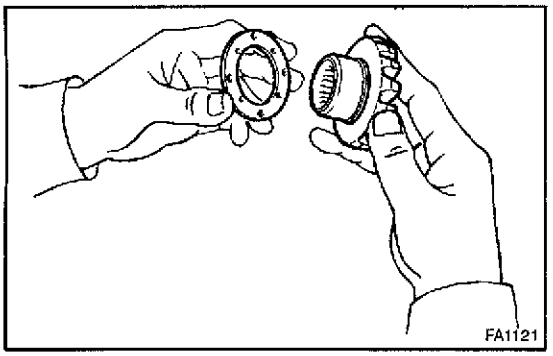
REPLACE COMPANION FLANGE DUST DEFLECTOR

(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 09523–36010

SA00B-01


FA1121

REASSEMBLY

1. ASSEMBLE DIFFERENTIAL CASE

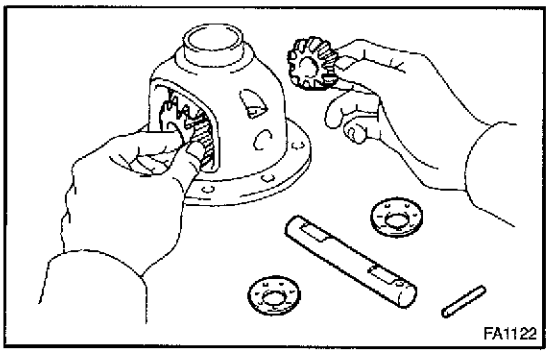
(a) Install the 2 proper thrust washers to the side gears.

HINT:

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

Washer thickness

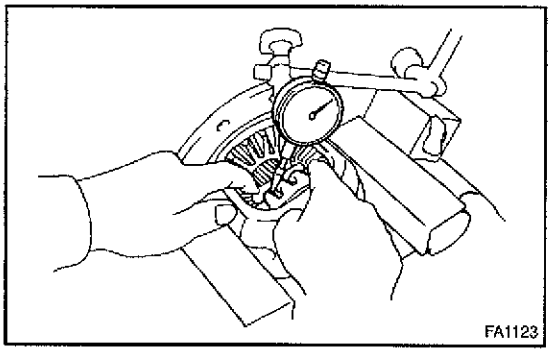
Thickness mm (in.)	Thickness mm (in.)
1.50 (0.0590)	1.75 (0.0689)
1.55 (0.0610)	1.80 (0.0709)
1.60 (0.0630)	1.85 (0.0728)
1.65 (0.0650)	1.90 (0.0748)
1.70 (0.0669)	–


FA1122

(b) Install the 2 side gears with the thrust washers, pinion gears, pinion gear thrust washers and pinion shaft.

HINT:

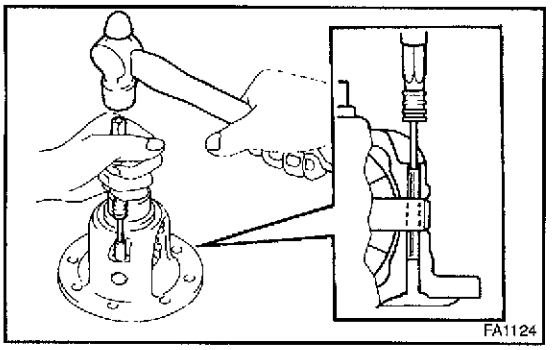
Align the holes of the differential case and pinion shaft.


FA1123

(c) Using a dial indicator, measure the side gear backlash with holding one pinion gear toward the case.

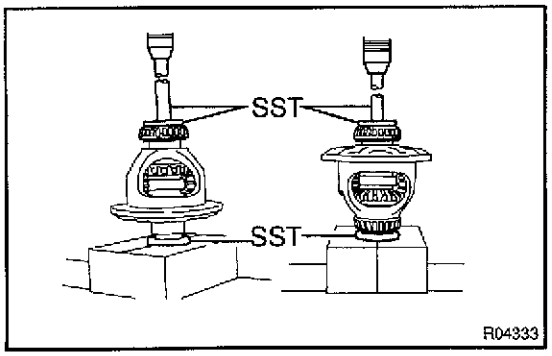
Backlash: 0.05 – 0.20 mm (0.0020 – 0.0079 in.)

If the backlash is not within specification, replace the thrust washers.


FA1124

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

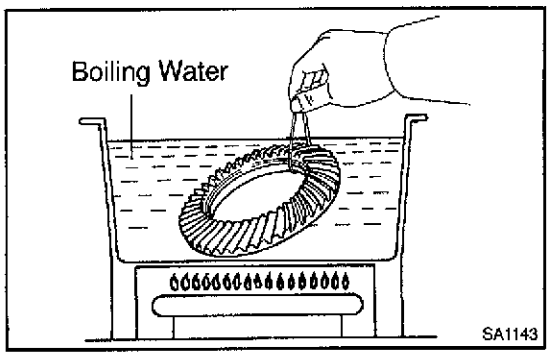
(e) Using a chisel and hammer, stake the outside of the differential case pin hole.



2. INSTALL SIDE BEARINGS

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

SST 09506–35010, 09950–60010 (09951–00480), 09950–70010 (09951–07150)



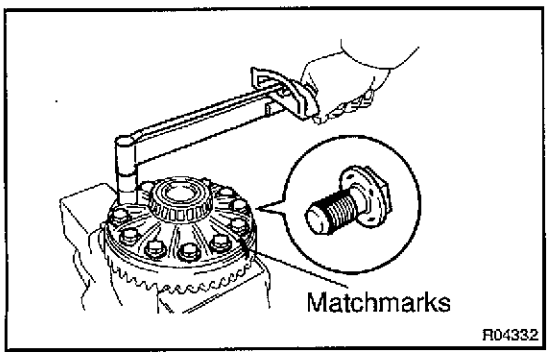
3. INSTALL RING GEAR ON DIFFERENTIAL CASE

(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.

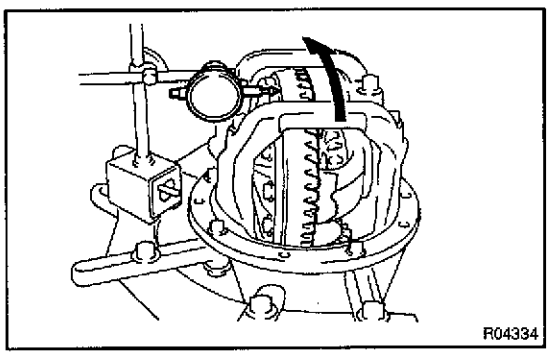
(d) After the moisture on the ring gear has completely evaporated, quickly install the ring gear to the differential case.



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

(f) After the ring gear cools down enough, torque the set bolts to which thread lock has been applied.

Thread lock:
Part No. 08833–00100, THREE BOND 1360K or equivalent.
Torque: 125 N·m (1,270 kgf·cm, 92 ft·lbf)

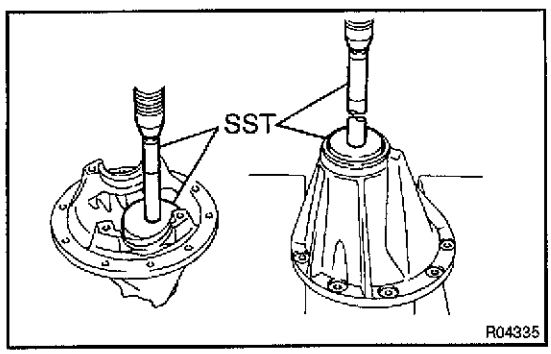


4. INSPECT RING GEAR RUNOUT

(a) Install the differential case into the carrier and install the plate washers to make sure the play is in the bearing (See page SA–201).

(b) Install bearing cap (See page SA–201).

(c) Using a dial indicator, measure the runout of ring gear.
Maximum runout: 0.05 mm (0.0020 in.)



5. INSTALL DRIVE PINION BEARING OUTER RACES AND ADJUSTING WASHER

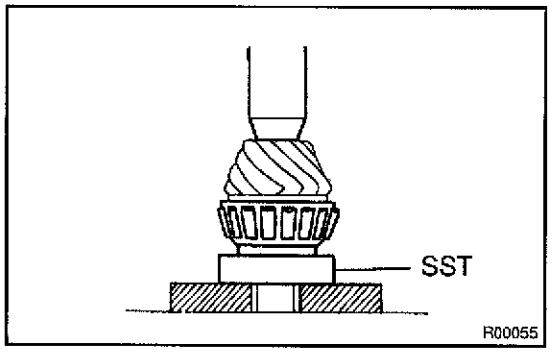
(a) Using SST, install a new front bearing outer race to the carrier.

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

(b) Using SST, install a new adjusting washer and install a new rear bearing outer race to the carrier.

SST 09950–60020 (09951–00910), 09950–70010 (09951–07150)

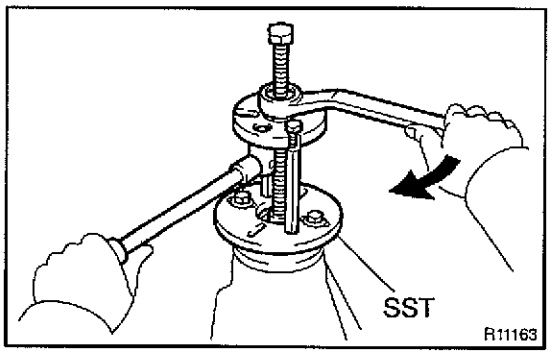
HINT:
First fit a washer with the same thickness as the washer which was removed, then after checking the tooth contact pattern, replace the washer with one of a different thickness if necessary.



6. INSTALL DRIVE PINION REAR BEARING

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

SST 09506–35010



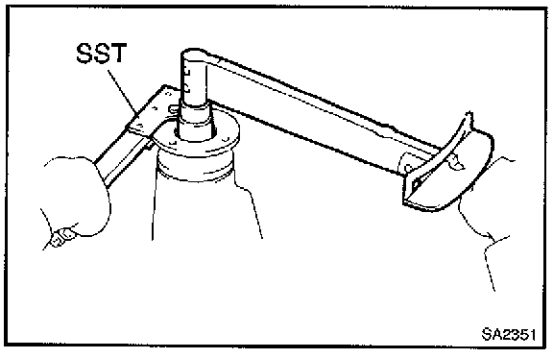
7. TEMPORARILY ADJUST DRIVE PINION PRELOAD

(a) Install the drive pinion and front bearing.

HINT:
Assemble the spacer, washers and oil seal after adjusting the gear contact pattern.

(b) Using SST, install the companion flange.

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



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

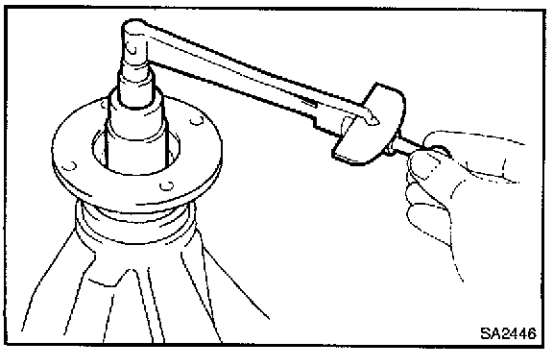
(d) Adjust the drive pinion preload by tightening the companion flange nut.

Using SST to hold the flange, torque the nut.

SST 09330–00021

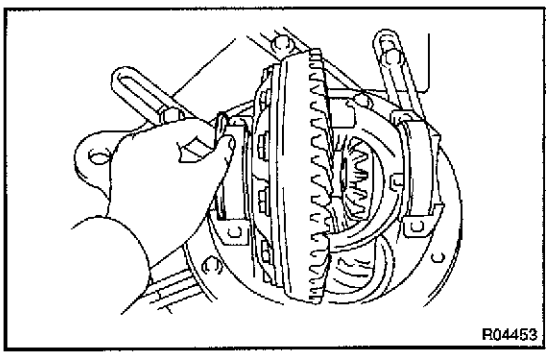
NOTICE:

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



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

Preload (at starting):
New bearing:
1.0 – 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)



8. INSTALL DIFFERENTIAL CASE IN CARRIER

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

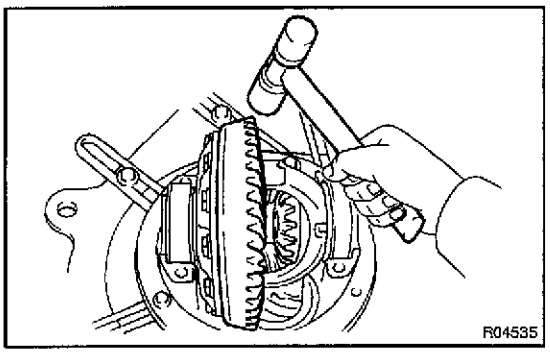
(b) Install the differential case in the carrier.

9. ADJUST RING GEAR BACKLASH

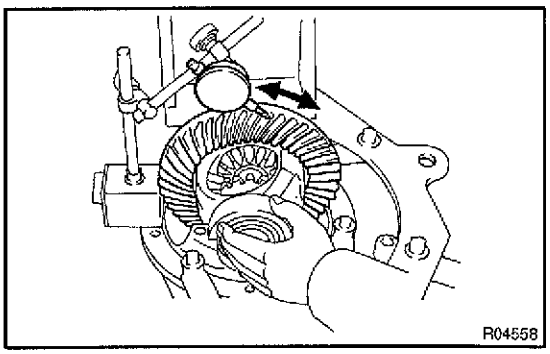
(a) Only install the plate washer on the ring gear back side.

HINT:

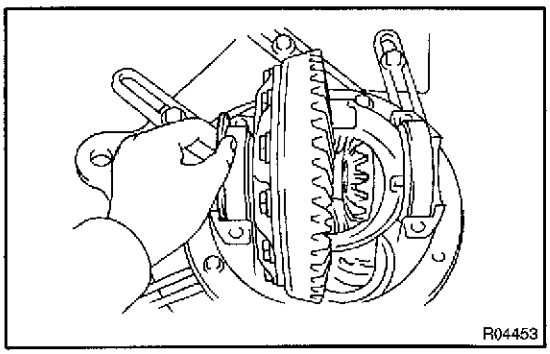
Ensure that the ring gear has no backlash.



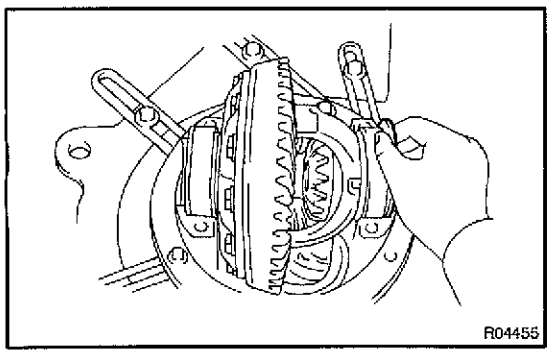
(b) Tap on the ring gear with a plastic hammer so that the washer fit to the bearing.



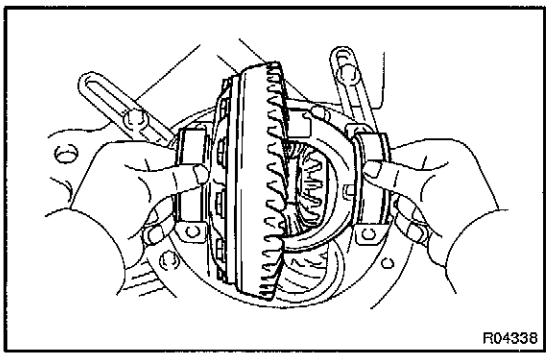
(c) Using a dial indicator, hold the side bearing boss on the teeth surface of the ring gear and measure the backlash.
Backlash: 0.13 – 0.18 mm (0.0051 – 0.0071 in.)



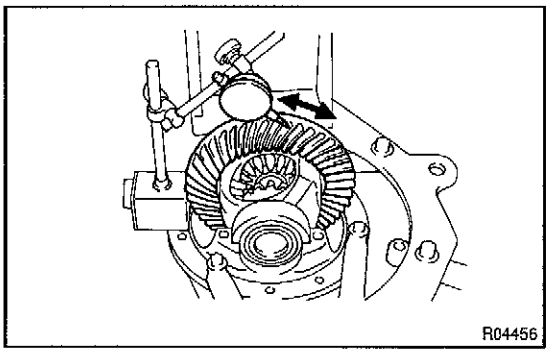
(d) Select a plate washer for back side ring gear, using the backlash as reference (See page SA–201).



(e) Select a ring gear teeth side plate washer of a thickness which eliminates any clearance between the outer race and case.

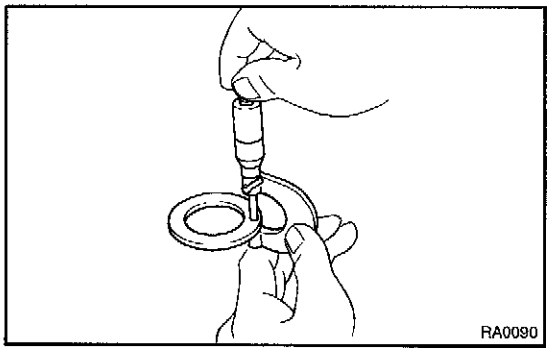


(f) Remove the plate washers and differential case.
(g) Install the plate washer into the ring gear back side of the carrier.
(h) Place the other plate washer onto the differential case together with the outer race, and install the differential case with the outer race into the carrier.
(i) Tap on the ring gear with a plastic hammer so that the washer fit to the bearing.



(j) Using a dial indicator, measure the ring gear backlash.
Backlash: 0.13 – 0.18 mm (0.0051 – 0.0071 in.)
(k) If the backlash is not within specification, adjust by either increasing or decreasing the thickness of washers on both sides by an equal amount.

HINT:
There should be no clearance between the plate washer and case.
Make sure that there is ring gear backlash.

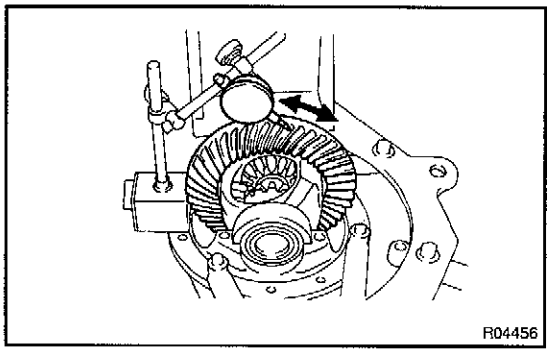


10. ADJUST SIDE BEARING PRELOAD
(a) After adjustment using the backlash as reference, remove the ring gear teeth side plate washer and measure the thickness.
(b) Install a new washer of 0.06 – 0.09 mm (0.00024 – 0.0035 in.) thicker than the washer removed.

HINT:
Select a washer which can be pressed in by 2/3 of the way with fingers.

(c) Using a plastic hammer, tap in the plate washer.
(d) Recheck the ring gear backlash.
Backlash: 0.13 – 0.18 mm (0.0051 – 0.0071 in.)
(e) If the backlash is not within the specification, adjust by either increasing or decreasing the thickness washers on both sides by an equal amount.

HINT:
The backlash will change by about 0.20 mm (0.0008 in.) with every 0.03 mm (0.0012 in.) change in the side washer.



Washer thickness

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
58	2.58 (0.1015)	90	2.90 (0.1142)	22	3.22 (0.1268)
60	2.60 (0.1024)	92	2.92 (0.1150)	24	3.24 (0.1276)
62	2.62 (0.1031)	94	2.94 (0.1157)	26	3.26 (0.1283)
64	2.64 (0.1039)	96	2.96 (0.1165)	28	3.28 (0.1291)
66	2.66 (0.1047)	98	2.98 (0.1173)	30	3.30 (0.1299)
68	2.68 (0.1055)	00	3.00 (0.1181)	32	3.32 (0.1307)
70	2.70 (0.1063)	02	3.02 (0.1189)	34	3.34 (0.1315)
72	2.72 (0.1071)	04	3.04 (0.1197)	36	3.36 (0.1323)
74	2.74 (0.1079)	06	3.06 (0.1205)	38	3.38 (0.1331)
76	2.76 (0.1087)	08	3.08 (0.1213)	40	3.40 (0.1339)
78	2.78 (0.1094)	10	3.10 (0.1220)	42	3.42 (0.1346)
80	2.80 (0.1102)	12	3.12 (0.1228)	44	3.44 (0.1354)
82	2.82 (0.1110)	14	3.14 (0.1236)	46	3.46 (0.1362)
84	2.84 (0.1118)	16	3.16 (0.1244)	48	3.48 (0.1370)
86	2.86 (0.1126)	18	3.18 (0.1252)	–	
88	2.88 (0.1134)	20	3.20 (0.1260)	–	

11. INSTALL BEARING CAPS

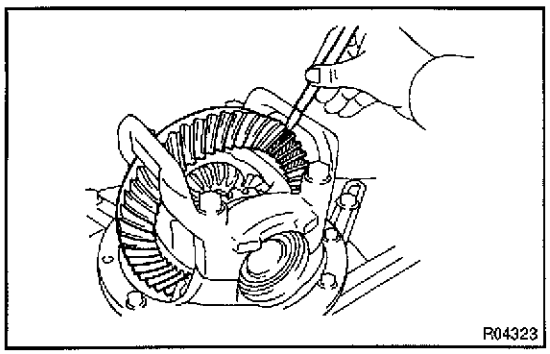
Align the matchmarks on the 2 caps and carrier and torque the 4 bolts.

Torque: 113 N·m (1,150 kgf·cm, 83 ft·lbf)

12. MEASURE TOTAL PRELOAD

Using a torque wrench, measure the total preload.

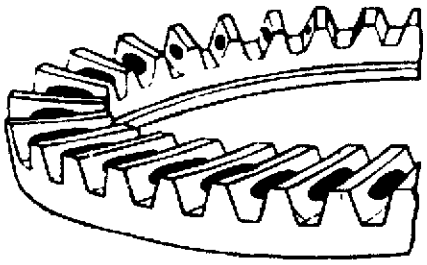
Total preload (at starting):
Drive pinion preload plus
0.4 – 0.6 N·m (4 – 6 kgf·cm, 3.5 – 5.2 in.·lbf)



13. INSPECT TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION

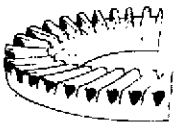
(a) Coat 3 or 4 teeth at three different positions on the ring gear with red lead primer.

(b) Turn the companion flange in both directions to inspect the ring gear for proper tooth contact.

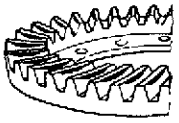


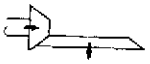
Proper Contact

Heel Contact



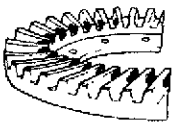
Face Contact



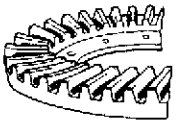


Select an adjusting shim that will bring the drive pinion closer to the ring gear.

Toe Contact



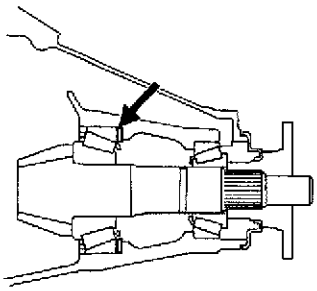
Flank Contact





Select an adjusting shim that will shift the drive pinion away from the gear.

R02495

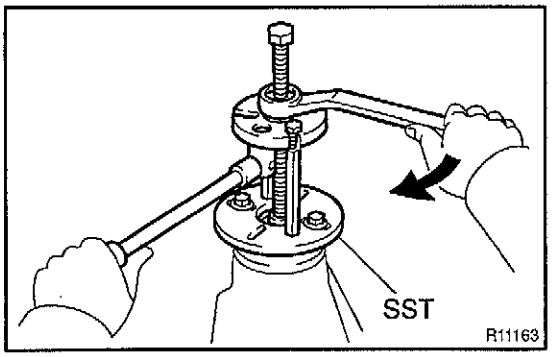


R04554

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

Washer thickness

Thickness		Thickness		Thickness	
Mark	mm (in.)	Mark	mm (in.)	Mark	mm (in.)
87	1.87 (0.0736)	01	2.01 (0.0791)	15	2.15 (0.0846)
88	1.88 (0.0740)	02	2.02 (0.0795)	16	2.16 (0.0850)
89	1.89 (0.0744)	03	2.03 (0.0799)	17	2.17 (0.0854)
90	1.90 (0.0748)	04	2.04 (0.0803)	18	2.18 (0.0858)
91	1.91 (0.0752)	05	2.05 (0.0807)	19	2.19 (0.0862)
92	1.92 (0.0756)	06	2.06 (0.0811)	20	2.20 (0.0866)
93	1.93 (0.0760)	07	2.07 (0.0815)	21	2.21 (0.0870)
94	1.94 (0.0764)	08	2.08 (0.0819)	22	2.22 (0.0874)
95	1.95 (0.0768)	09	2.09 (0.0823)	23	2.23 (0.0878)
96	1.96 (0.0772)	10	2.10 (0.0827)	24	2.24 (0.0882)
97	1.97 (0.0776)	11	2.11 (0.0831)	25	2.25 (0.0886)
98	1.98 (0.0780)	12	2.12 (0.0835)	26	2.26 (0.0890)
99	1.99 (0.0783)	13	2.13 (0.0839)	27	2.27 (0.0894)
00	2.00 (0.0787)	14	2.14 (0.0843)	28	2.28 (0.0898)



14. REMOVE COMPANION FLANGE (See page SA–196)

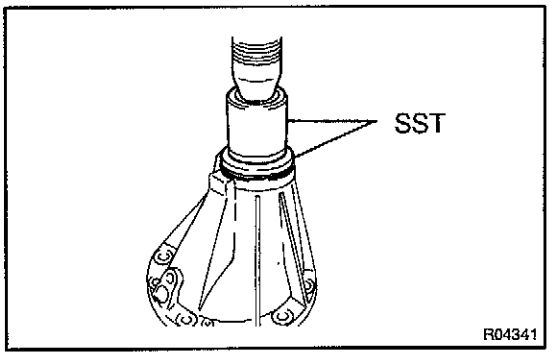
15. REMOVE FRONT BEARING (See page SA–196)

16. INSTALL NEW BEARING SPACER, WASHERS AND FRONT BEARING

(a) Install a new bearing spacer and 2 washers, and place the front bearing.

(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

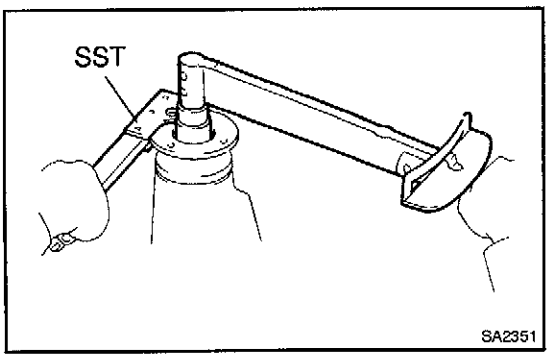
(a) Coat a new oil seal lip with MP grease.

(b) Using SST and a press, tap in the oil seal until its surface is flush with the differential carrier end.

SST 09316–12010, 09649–17010

HINT:

Connect SST with vinyl tape.



18. INSTALL COMPANION FLANGE

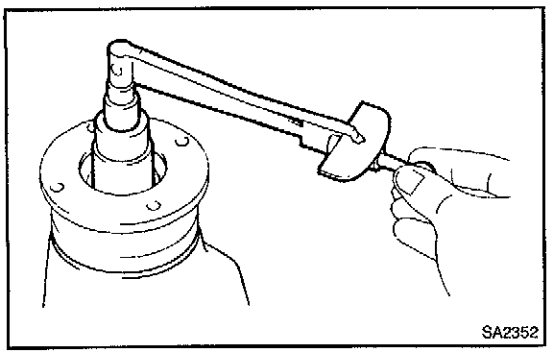
(a) Install the companion flange on the shaft.

(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: 147 N·m (1,500 kgf·cm, 109 ft·lbf)



19. ADJUST DRIVE PINION PRELOAD

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

Preload (at starting):

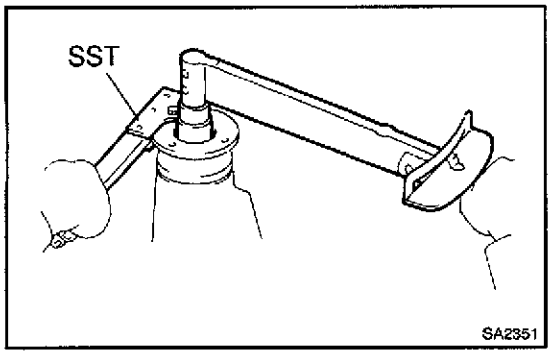
New bearing:

1.0 – 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, retorque 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.



Torque: 451 N·m (4,600 kgf·cm, 333 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. **INSTALL DIFFERENTIAL CASE IN CARRIER (See page SA–201)**
21. **RECHECK TOTAL PRELOAD (See page SA–201)**
22. **RECHECK RING GEAR BACKLASH (See page SA–201)**
23. **RECHECK TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION (See page SA–201)**
24. **CHECK RUNOUT OF COMPANION FLANGE (See page SA–196)**
25. **STAKE DRIVE PINION NUT**

SA0DC–01

INSTALLATION

Installation is in the reverse order of removal (See page SA–195).
AFTER INSTALLATION, FILL DIFFERENTIAL WITH HYPOID GEAR OIL (See page SA–172)