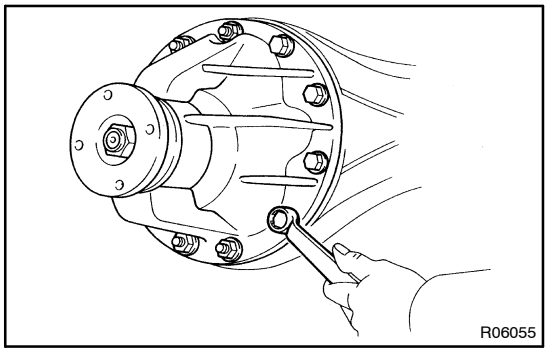
2907S–01

OVERHAUL

1. DRAIN DIFFERENTIAL OIL
2. REMOVE REAR AXLE SHAFT (See page 30–72 or 30–75)
3. REMOVE PROPELLER SHAFT ASSY (See page 30–4 or 30–11)

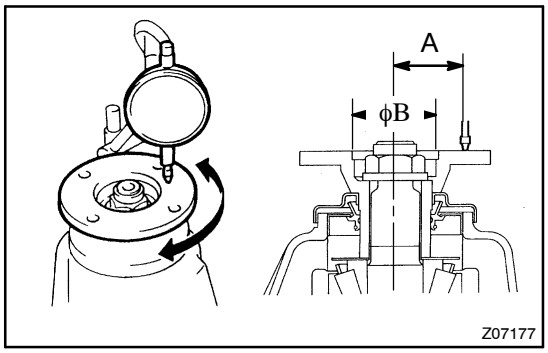


4. REMOVE DIFFERENTIAL CARRIER ASSY REAR

(a) Remove the 8 bolts, 4 nuts, 4 washers and the differential carrier assy, and then remove the gasket.

NOTICE:

Be careful not to damage the installation surface.



5. INSPECT DIFFERENTIAL CARRIER ASSY REAR

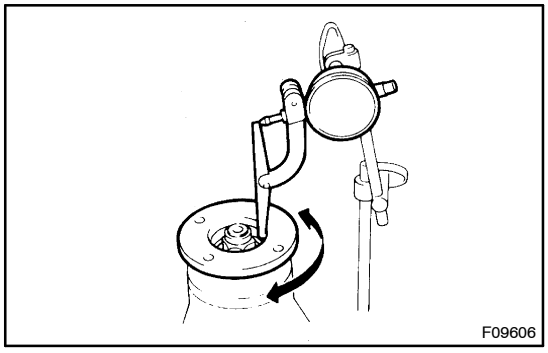
(a) Check the companion flange.

(1) Using a dial indicator, measure the longitudinal run-out.

Maximum longitudinal runout:

ϕB=ϕ46, A=35: 0.10 mm (0.0039 in.)

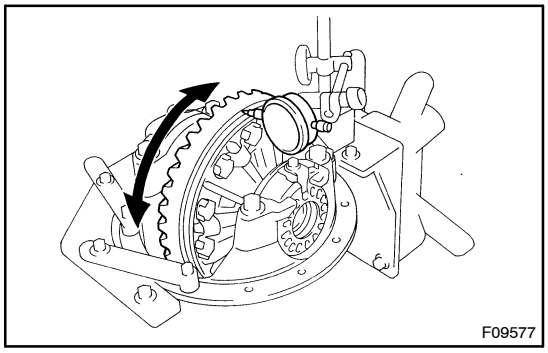
ϕB=ϕ70, A=38: 0.11 mm (0.0043 in.)



(2) Using a dial indicator, measure the lateral runout .

Maximum lateral runout: 0.10 mm (0.0039 in.)

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

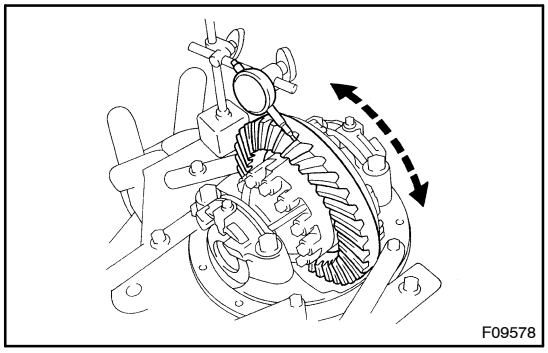


(b) Check the ring gear.

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

Maximum runout: 0.10 mm (0.0039 in.)

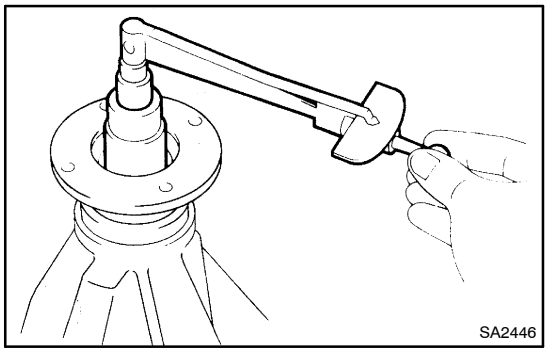
If the runout is greater than the maximum, replace the ring gear.


F09578

(2) Using a dial indicator, measure the ring gear backlash.

Backlash: 0.15 – 0.20 mm (0.0059 – 0.0079 in.)

HINT:
Perform the measurements at 3 or more positions around the circumference of the ring gear.
If the backlash is not as specified, adjust the side bearing preload as necessary.


SA2446

(c) Check the drive pinion preload.
(1) Using a torque wrench, measure the maximum torque within the backlash between the drive pinion and ring gear when the companion flange begins to rotate.

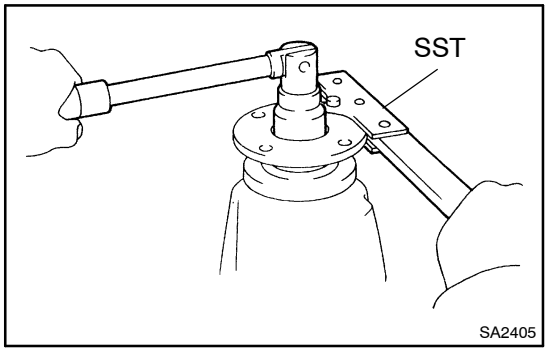
Drive pinion preload:
0.78 – 1.27 N·m (8 – 13 kgf·cm, 6.9 – 11.3 in.·lbf)

If the preload is not as specified, check around the drive pinion bearings.

(d) Check the total preload.
(1) Using a torque wrench, measure the maximum torque without the backlash between the drive pinion and ring gear when the companion flange begins to rotate.

Total preload:
0.98 – 1.66 N·m (10 – 17 kgf·cm, 8.7 –14.7 in.·lbf)

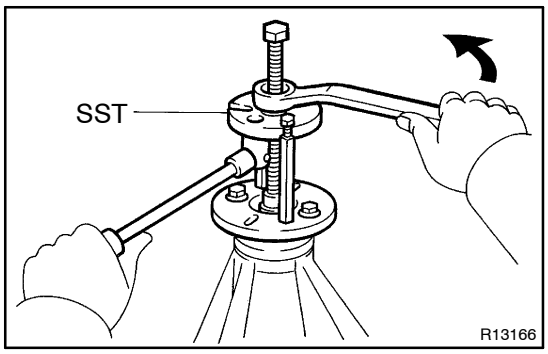
If the preload is not as specified, inspect the differential carrier assembly.



SA2405

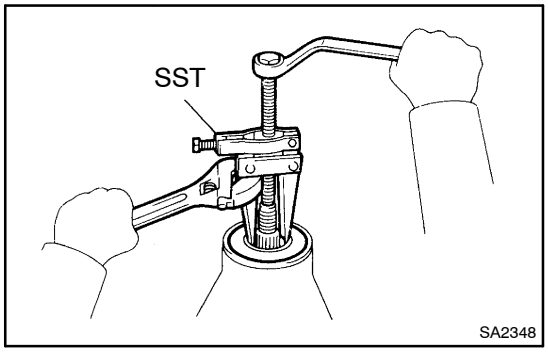
6. REMOVE REAR DRIVE PINION COMPANION FLANGE SUB–ASSY REAR

(a) Using a chisel and a hammer, unstake the nut.
(b) Using SST, hold the flange and remove the nut.
SST 09330–00021



R13166

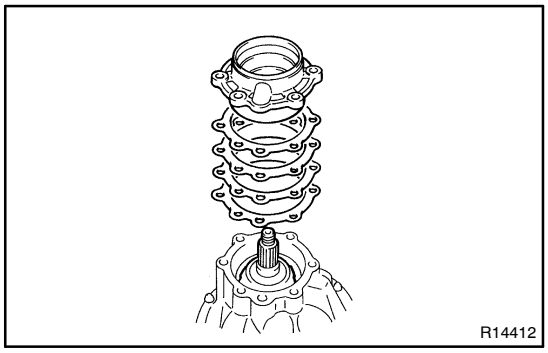
(c) Using SST, remove the companion flange.
SST 09950–30011 (09951–03010, 09953–03010, 09954–03010, 09955–03030, 09956–03050)



7. REMOVE REAR DIFFERENTIAL CARRIER OIL SEAL

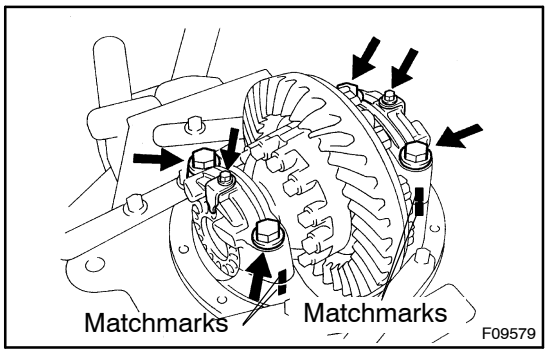
(a) Using SST, remove the oil seal from the differential carrier.
SST 09308–10010

8. REMOVE REAR DIFFERENTIAL DRIVE PINION OIL SLINGER



9. REMOVE DIFFERENTIAL DRIVE PINION BEARING CAGE

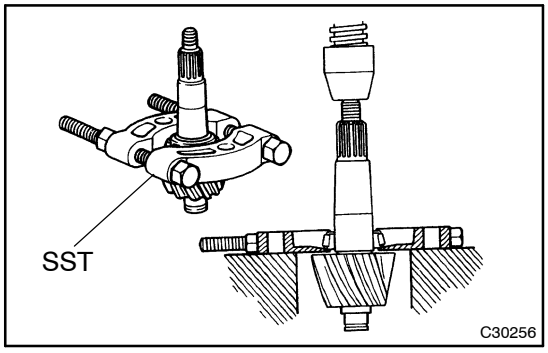
(a) Remove the 6 bolts, 6 washers and drive pinion cage.
(b) Remove the 2 gaskets, cage adjusting shims, front bearing and drive pinion.



10. REMOVE REAR DIFFERENTIAL CASE SUB–ASSY

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

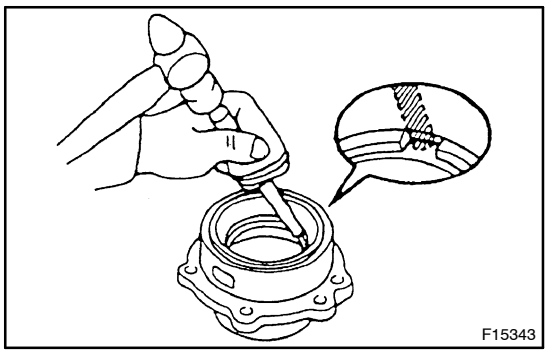
HINT:
Tag the removed parts to show the location for installation.



11. REMOVE DRIVE PINION REAR BEARING

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

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

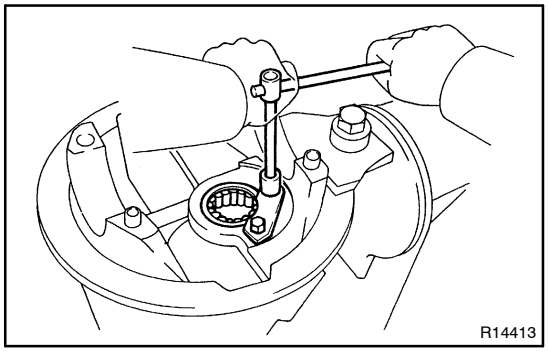


12. REMOVE FRONT BEARING OUTER RACE

(a) Using a brass bar and a hammer, tap out the bearing outer race by hitting it on the groove of the bearing cage.

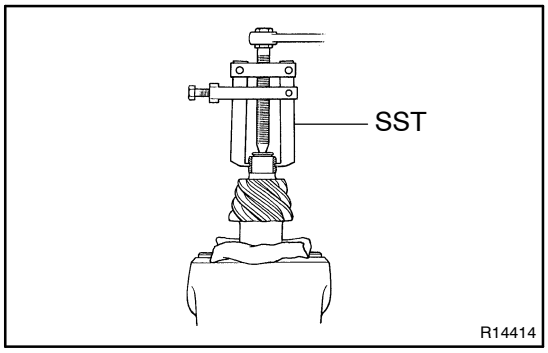
NOTICE:
Do not damage the inner surface of the cage.

13. REMOVE REAR BEARING OUTER RACE

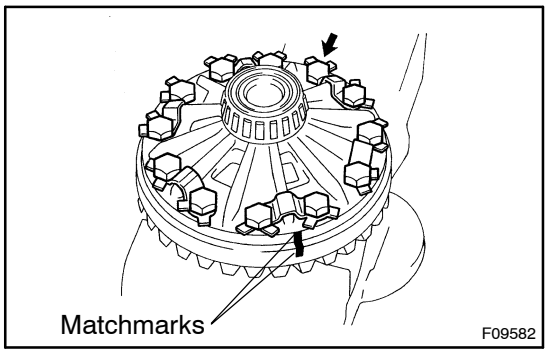


14. REMOVE DIFFERENTIAL DRIVE PINION CYLINDRICAL ROLLER BEARING

(a) Remove the 2 bolts, 2 nuts and 2 bearing retainers.
(b) Remove the bearing from the differential carrier.

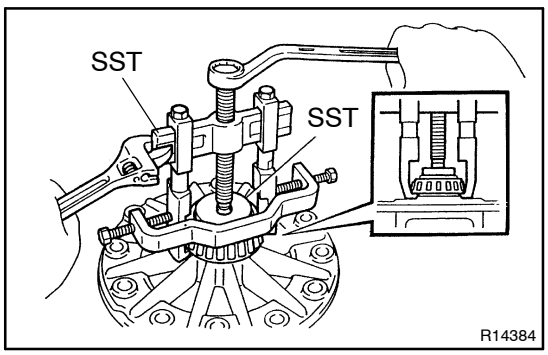


(c) Using a snap ring expander, remove the snap ring.
(d) Using a grinder, make groove on the inner race.
(e) Using SST, remove the inner race from the drive pinion.
SST 09286–46011



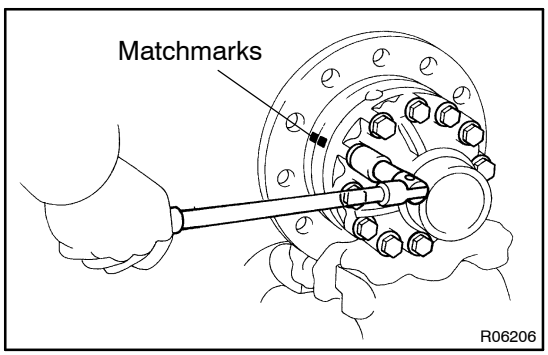
15. REMOVE RING GEAR

(a) Place matchmarks on the ring gear and differential case.
(b) Using a screwdriver, unstake the lock plates.
(c) Remove the 12 bolts and 6 lock plates.
(d) Using a plastic hammer, remove the ring gear to separate it from the differential case.



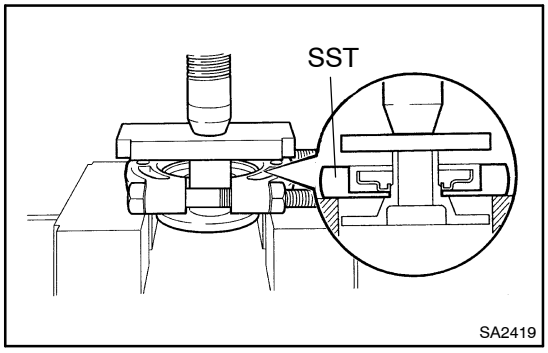
16. REMOVE REAR DIFFERENTIAL CASE BEARING

(a) Using SST, remove the 2 side bearings from the differential case.
SST 09950–40011 (09951–04010, 09952–04010, 09953–04020, 09954–04010, 09955–04061, 09957–04010, 09958–04011) 09950–60010 (09951–00560)



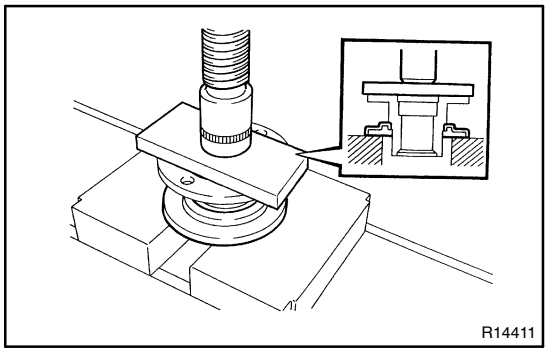
17. REMOVE PINION AND SIDE GEARS

(a) Place matchmarks on the LH and RH cases.
(b) Protect the ring gear attaching face with a cloth and secure it in a vice. Then, remove the 12 bolts.
(c) Using a plastic hammer, separate the LH and RH cases.
(d) Remove the 4 pinion gear thrust washers.
(e) Remove the 4 pinion gears.
(f) Remove the 2 side gears.
(g) Remove the 2 side gears thrust washers.
(h) Remove the spider.



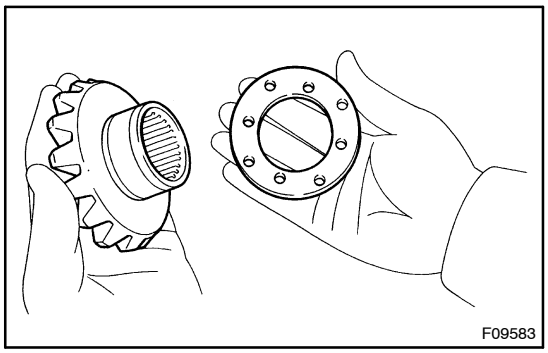
18. REMOVE REAR DIFFERENTIAL DUST DEFLECTOR

(a) Using SST and a press, press out the dust deflector from the companion flange.
SST 09950–00020



19. INSTALL REAR DIFFERENTIAL DUST DEFLECTOR

(a) Using a press, press out a new dust deflector.



20. ADJUST DIFFERENTIAL SIDE GEAR BACKLASH

(a) Install the thrust washer on the side gears.

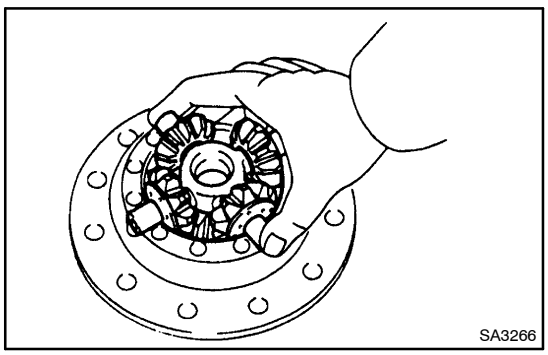
HINT:

Select thrust washers that allow the backlash to be within the specification.

Thrust washer:

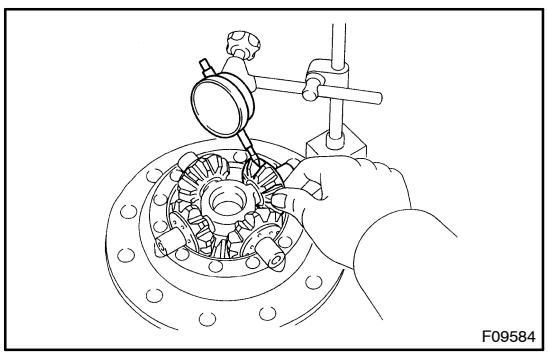
1.40 mm (0.0551 in.)	1.50 mm (0.0591 in.)
1.60 mm (0.0630 in.)	1.70 mm (0.0699 in.)

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



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

(d) Install the spider with the pinion gears to the LH case.



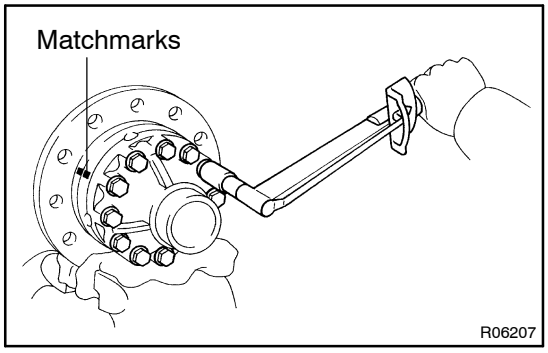
(e) Holding the side gear, measure the side gear backlash.
Backlash: 0.02 – 0.20 mm (0.0008 – 0.0079 in.)

HINT:

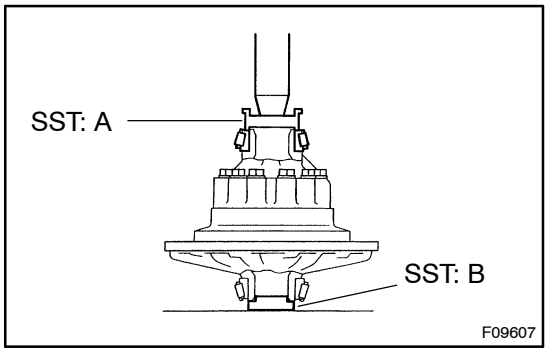
- Measure the backlash at the RH case and LH case.
- If the backlash is not within the specification, install a thrust washer with a different thickness.
- Use thrust washers with the same thickness on both the right and left sides.

(f) Install the side gear and thrust washer to the RH case.

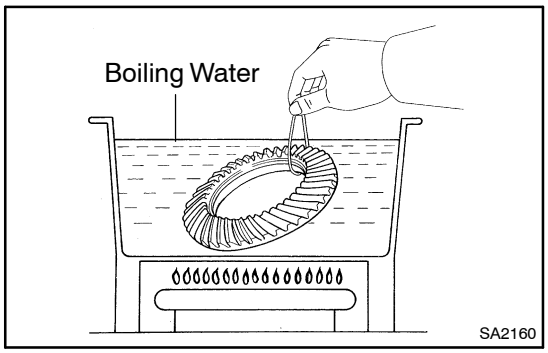
(g) Apply gear oil to each part.



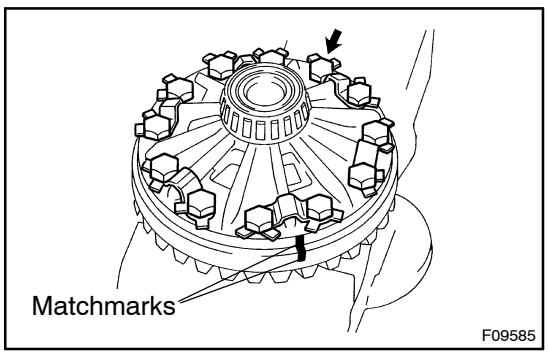
(h) Align the matchmarks on the LH and RH cases.
(i) Install the 12 bolts.
Torque: 98 N·m (1,000 kgf·cm, 72 ft·lbf)



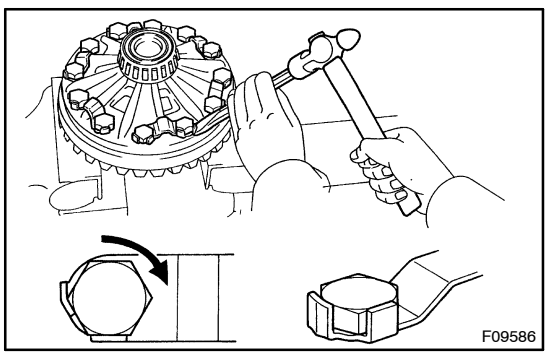
21. INSTALL REAR DIFFERENTIAL CASE BEARING
(a) Using SST and a press, press in the 2 side bearings to the differential case.
SST A: 09608–32010
B: 09950–60010 (09951–00560)



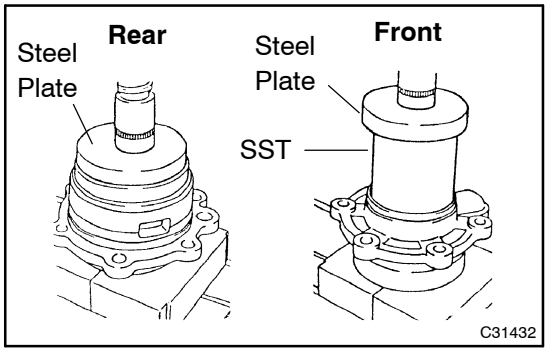
22. INSTALL RING GEAR
(a) Heat the ring gear in boiling water.
(b) Clean the contact surfaces of the differential case and ring gear.
(c) After the moisture on the ring gear has completely evaporated, quickly install the ring gear to the differential case.
HINT:
Align the matchmarks on the ring gear and the differential case.



(d) Install 6 new lock plates and temporarily install the 12 bolts so that the bolt holes in the ring gear and differential case are not misaligned.
NOTICE:
The ring gear set bolts should not be tightened until the ring gear has sufficiently cooled down.
(e) After the ring gear has sufficiently cooled down, tighten the ring gear set bolts.
Torque: 304 N·m (3,100 kgf·cm, 224 ft·lbf)

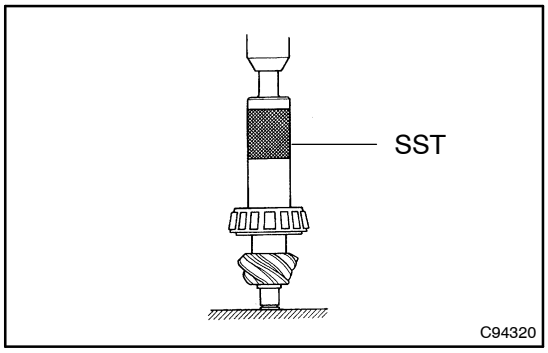


(f) Using a hammer and a chisel, stake the lock plates.
HINT:
Stake one claw flush with the flat surface of the nut. Since the claw touches the protruding portion of the nut, stake the half of it on the tightening side.



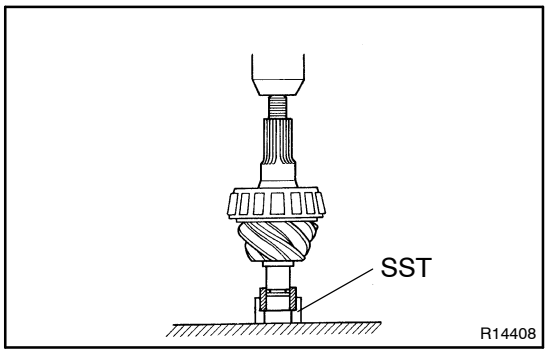
23. INSTALL FRONT AND REAR BEARING OUTER RACE

(a) Using SST and a press, press in new outer races.
SST 09527–17011



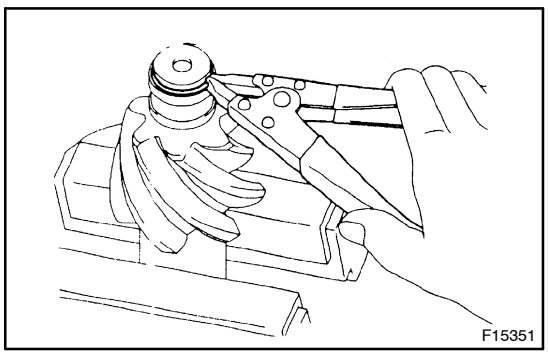
24. INSTALL REAR DRIVE PINION FRONT TAPERED ROLLER BEARING

(a) Using SST and a press, press in the rear bearing onto the drive pinion.
SST 09316–60011 (09316–00011)



25. INSTALL DIFFERENTIAL DRIVE PINION CYLINDLICAL ROLLER BEARING

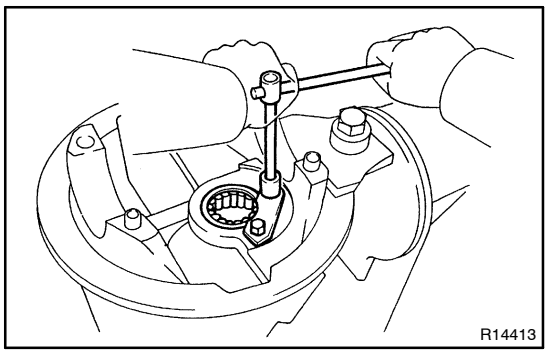
(a) Using SST and a press, press in a new bearing inner race.
SST 09710–22021 (09710–01051)



(b) Using a snap ring expander, install a new snap ring in the groove on the drive pinion tip.

NOTICE:

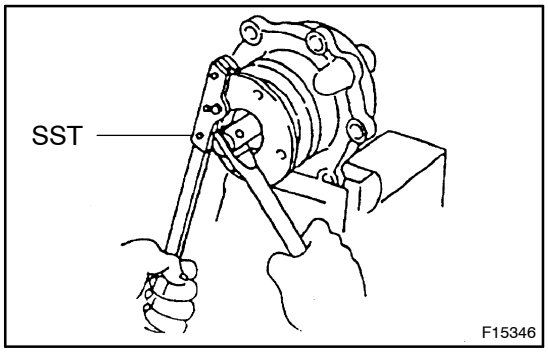
Use a cloth or similar object as a cover, at the time of snap ring installation, to prevent the snap ring from flying off.



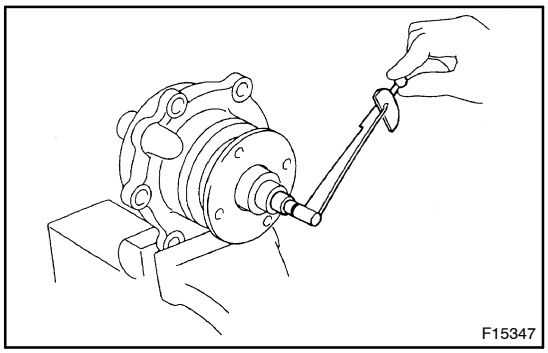
(c) Install the bearing with the 2 retainers, 2 bolts and 2 nuts.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

26. ADJUST DRIVE PINION PRELOAD (REUSING BEARING)

(a) Install the drive pinion to the bearing cage.
(b) Install the bearing spacer to the bearing cage.
(c) Install the bearing shims A and B to the bearing cage.
(d) Install the front bearing to the bearing cage.
(e) Install the oil slinger to the bearing cage.
(f) Install the companion flange to the bearing cage.
(g) Using rags, fix the bearing cage in a vice.
(h) Apply hypoid gear oil to a new nut.



(i) Using SST, hold the flange and tighten the pinion nut.
SST 09330–00021
Torque: 270 N·m (2,750 kgf·cm, 199 ft·lbf)
(j) Turn the companion flange several times forward and backward to settle the bearing.



(k) Using a torque wrench, measure the drive pinion preload.
Drive pinion preload:
0.78 – 1.27 N·m (8 – 13 kgf·cm, 6.9 – 11.3 in.·lbf)

HINT:
Record the measured value for recording the total preload.

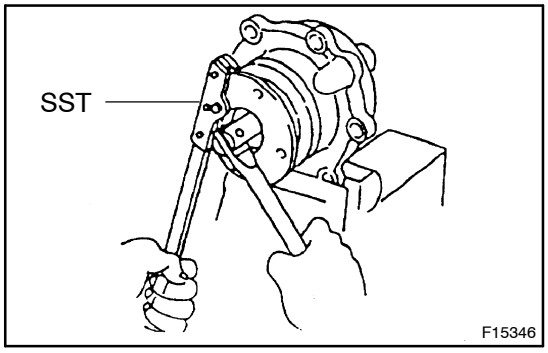
(l) When the measured value is not within the range of the standard value, increase or decrease the number of the shims to adjust the preload so that it will be within the range of the reference value.

Shim thickness: **mm (in.)**

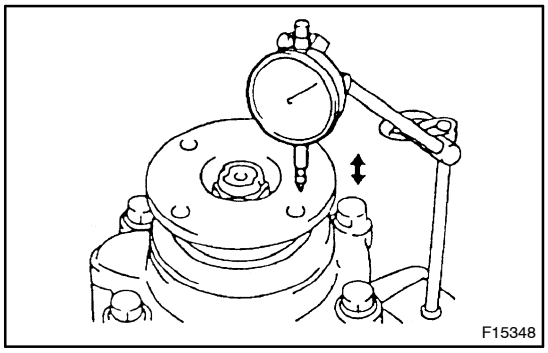
Shim A (interval of 0.1 mm (0.0039 in.))			Shim B (interval of 0.01 mm (0.0004 in.))		
1.90 (0.0748)	2.00 (0.0787)	2.10 (0.0827)	1.80 (0.0709)	1.81 (0.0713)	1.82 (0.0717)
2.20 (0.0866)	2.30 (0.0906)	2.40 (0.0945)	1.83 (0.0720)	1.84 (0.0724)	1.85 (0.0728)
2.50 (0.0948)	2.60 (0.1024)	2.70 (0.1063)	1.86 (0.0732)	1.87 (0.0736)	1.88 (0.0740)
2.80 (0.1102)	2.90 (0.1142)	3.00 (0.1181)	1.89 (0.0744)	–	–
3.10 (0.1220)	3.20 (0.1260)	3.30 (0.1299)	–	–	–

27. ADJUST DRIVE PINION PRELOAD (USING NEW BEARING)

(a) Install the drive pinion to the bearing cage.
(b) Install the bearing spacer to the bearing cage.
(c) Install the bearing shims A and B to the bearing cage.
Shim A: 90564–45039, Shim B: 90564–45050
(d) Install the front bearing to the bearing cage.
(e) Install the oil slinger to the bearing cage.
(f) Install the companion flange to the bearing cage.
(g) Using rags, fix the bearing cage in a vice.
(h) Apply hypoid gear oil to a new nut.



(i) Using SST, hold the flange, and then tighten the pinion nut.
SST 09330–00021
Torque: 270 N·m (2,750 kgf·cm, 199 ft·lbf)



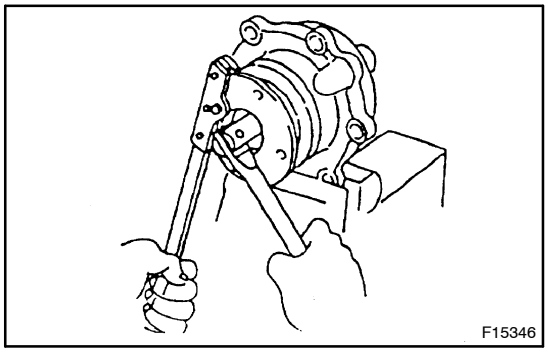
(j) Set a dial gauge at the right angle to the companion flange surface and measure the bearing play in the vertical direction.
(k) Subtract the measured play from the total thickness of the installed shims A and B and select the shim with the thickness closest to this value.

Shims thickness: **mm (in.)**

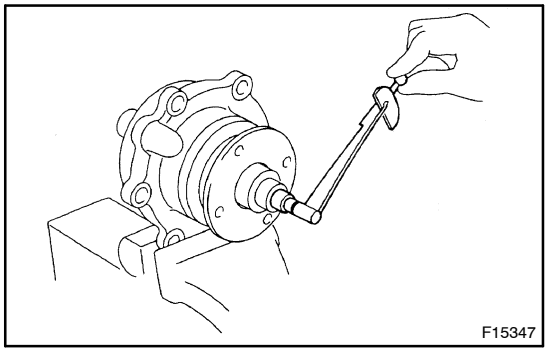
Shim A (interval of 0.1 mm (0.0039 in.))			Shim B (interval of 0.01 mm (0.0004 in.))		
1.90 (0.0748)	2.00 (0.0787)	2.10 (0.0827)	1.80 (0.0709)	1.81 (0.0713)	1.82 (0.0717)
2.20 (0.0866)	2.30 (0.0906)	2.40 (0.0945)	1.83 (0.0720)	1.84 (0.0724)	1.85 (0.0728)
2.50 (0.0948)	2.60 (0.1024)	2.70 (0.1063)	1.86 (0.0732)	1.87 (0.0736)	1.88 (0.0740)
2.80 (0.1102)	2.90 (0.1142)	3.00 (0.1181)	1.89 (0.0744)	–	–
3.10 (0.1220)	3.20 (0.1260)	3.30 (0.1299)	–	–	–

Reference:
Shim A (max. thickness) + shim B (max. thickness) – bearing play = Approximate value of the total shim thickness to be obtained.

(l) Remove the provisionally installed shims A and B, and install the selected shims A and B (See the above step on the chart).



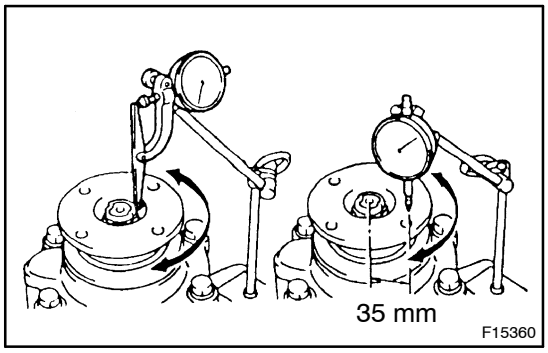
(m) Using SST, hold the flange and tighten the pinion nut.
SST 09330–00021
Torque: 270 N·m (2,750 kgf·cm, 199 ft·lbf)
(n) Turn the companion flange several times forward and backward to settle the bearing.



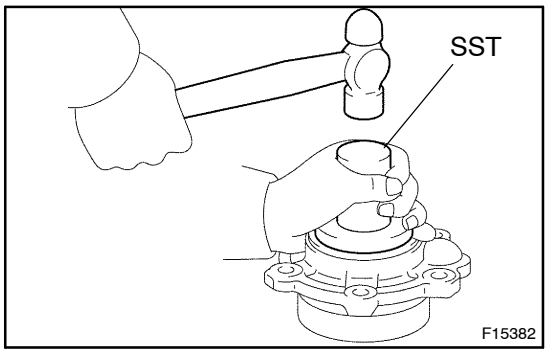
(o) Using a torque wrench, measure the drive pinion preload.
Drive pinion preload:
1.47 – 5.00 N·m (15 – 51 kgf·cm, 13 – 44 in.·lbf)

HINT:
Record the measured value for recording the total preload.

(p) When the measured value is not within the range of the standard value, increase or decrease the number of the shims to adjust the preload so that it will be within the range of the reference value.



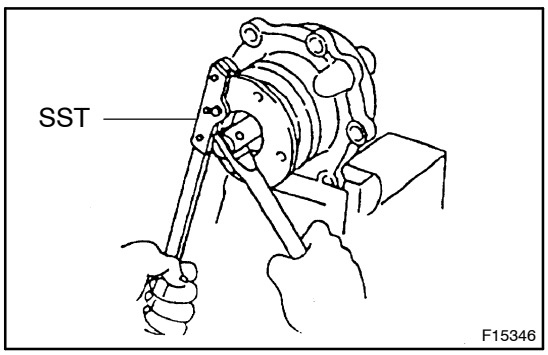
28. INSPECT REAR DRIVE PINION COMPANION FLANGE SUB–ASSY REAR (See step 5)



29. INSTALL REAR DIFFERENTIAL CARRIER OIL SEAL

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

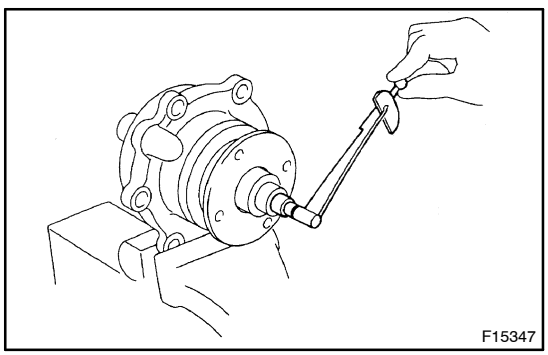
(b) Using SST and a hammer, tap in a new oil seal to the bearing cage.
SST 09223–78010



30. INSTALL REAR DRIVE PINION COMPANION FLANGE SUB–ASSY REAR

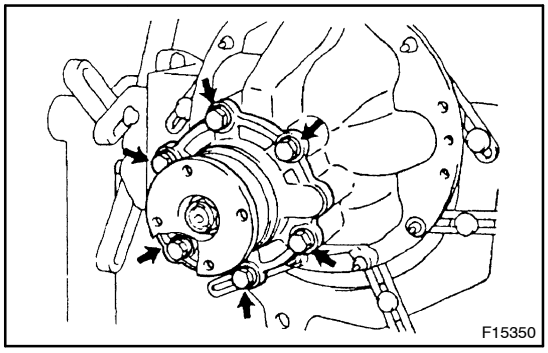
(a) Install the companion flange and plate washer to the drive pinion.

(b) Using SST, hold the flange and tighten the pinion nut.
SST 09330–00021
Torque: 270 N·m (2,750 kgf·cm, 199 ft·lbf)



(c) Using a torque wrench, measure the drive pinion preload.
Drive pinion preload:

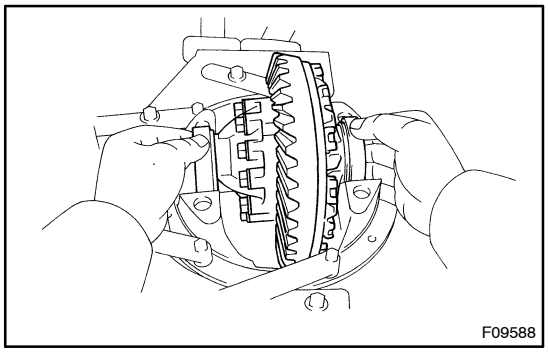
Using new bearing	1.47 – 5.00 N·m (15 – 51 kgf·cm, 13 – 44 in.·lbf)
Reusing bearing	0.78 – 1.27 N·m (8 – 13 kgf·cm, 6.9 – 11.3 in.·lbf)



31. INSTALL DIFFERENTIAL DRIVE PINION BEARING CAGE

(a) Install the differential drive pinion bearing cage with the 6 bolts.

Torque: 103 N·m (1,050 kgf·cm,76 ft·lbf)



32. INSTALL REAR DIFFERENTIAL CASE SUB–ASSY

(a) Place the bearing outer races on their respective bearings.

NOTICE:

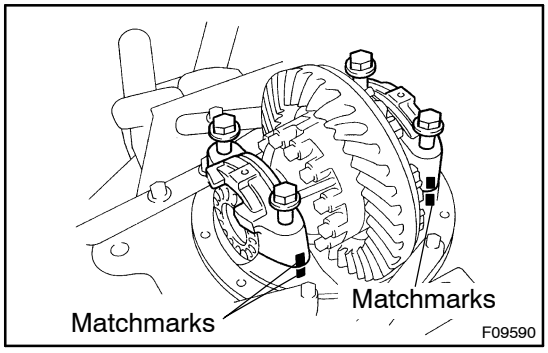
Check that the left and right outer races are not interchanged.

(b) Install the differential case.

HINT:

Check that there is backlash between the ring gear and drive pinion.

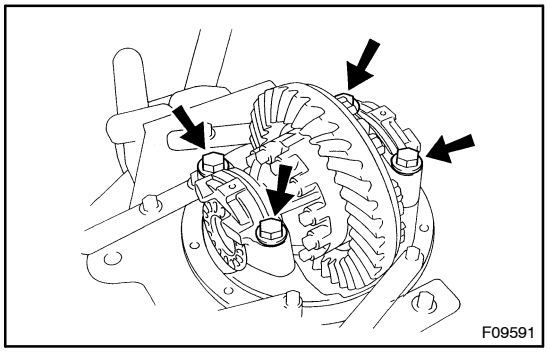
(c) Install the 2 adjusting nuts on the carrier, making sure that the nuts are properly threaded.



(d) 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 tightly fit the carrier, the adjusting nuts way not be properly threaded. Reinstall the adjusting nuts if necessary.



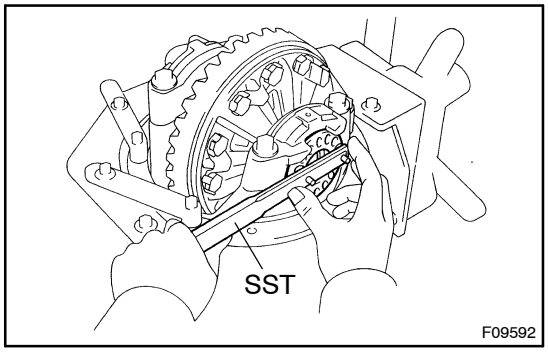
33. ADJUST SIDE BEARING PRELOAD

(a) Tighten the 4 bearing cap bolts to the specified torque, and then loosen them to the point where the adjusting nuts can be turned using SST.

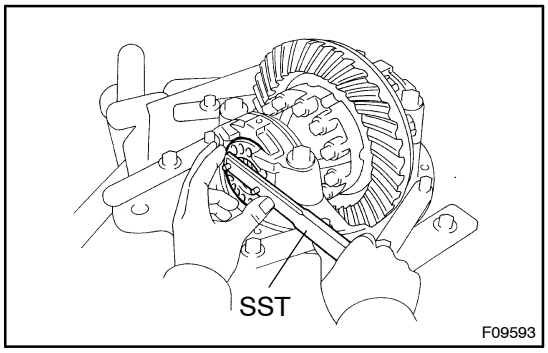
SST 09504–00011

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

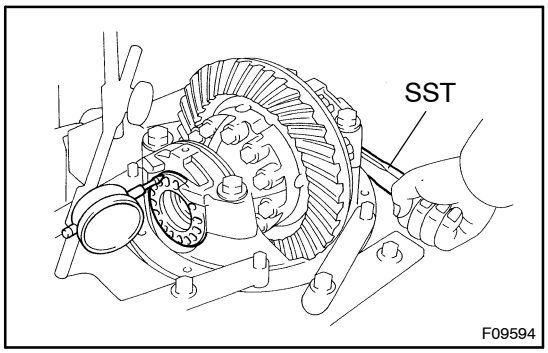
(b) Fully tighten the 4 bearing cap bolts by hand.



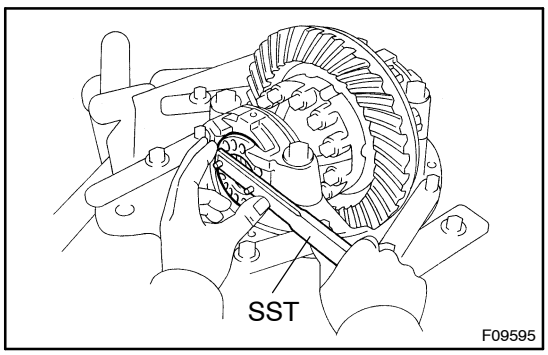
(c) Using SST, tighten the adjusting nut on the ring gear side until the ring has a backlash of approx. 0.18 mm (0.0072 in.).
SST 09504–00011.



(d) While turning the ring gear, use the SST to fully tighten the adjusting nut on the drive pinion side.
(e) After the bearings are settled, loosen the adjusting nut on the drive pinion side.

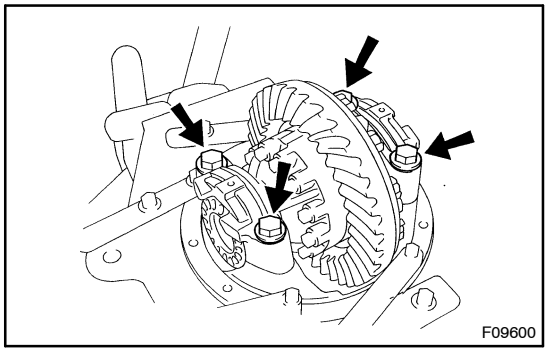


(f) Place a dial indicator on the top of the bearing inner race on the ring gear side.
(g) Adjust the side bearing for zero preload by tightening the other adjusting nut until the pointer on the indicator begins to move.

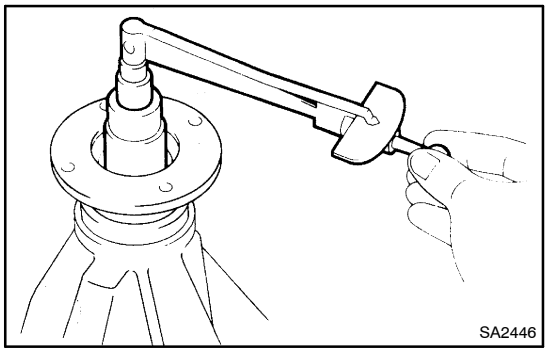


(h) Using SST, tighten the adjusting nut 1 – 1.5 notches from the zero preload position.
SST 09504–00011
(i) Using a dial indicator, adjust the ring gear backlash so that it will be within the specification.
Backlash: 0.15 – 0.20 mm (0.0059 – 0.0079 in.)

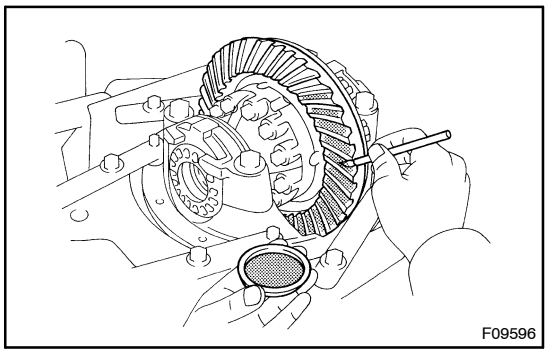
HINT:
The backlash should be adjusted by turning the left and right adjusting nuts by equal amounts. For example, loosen the nut on the left side one notch and torque the nut on the right side one notch.



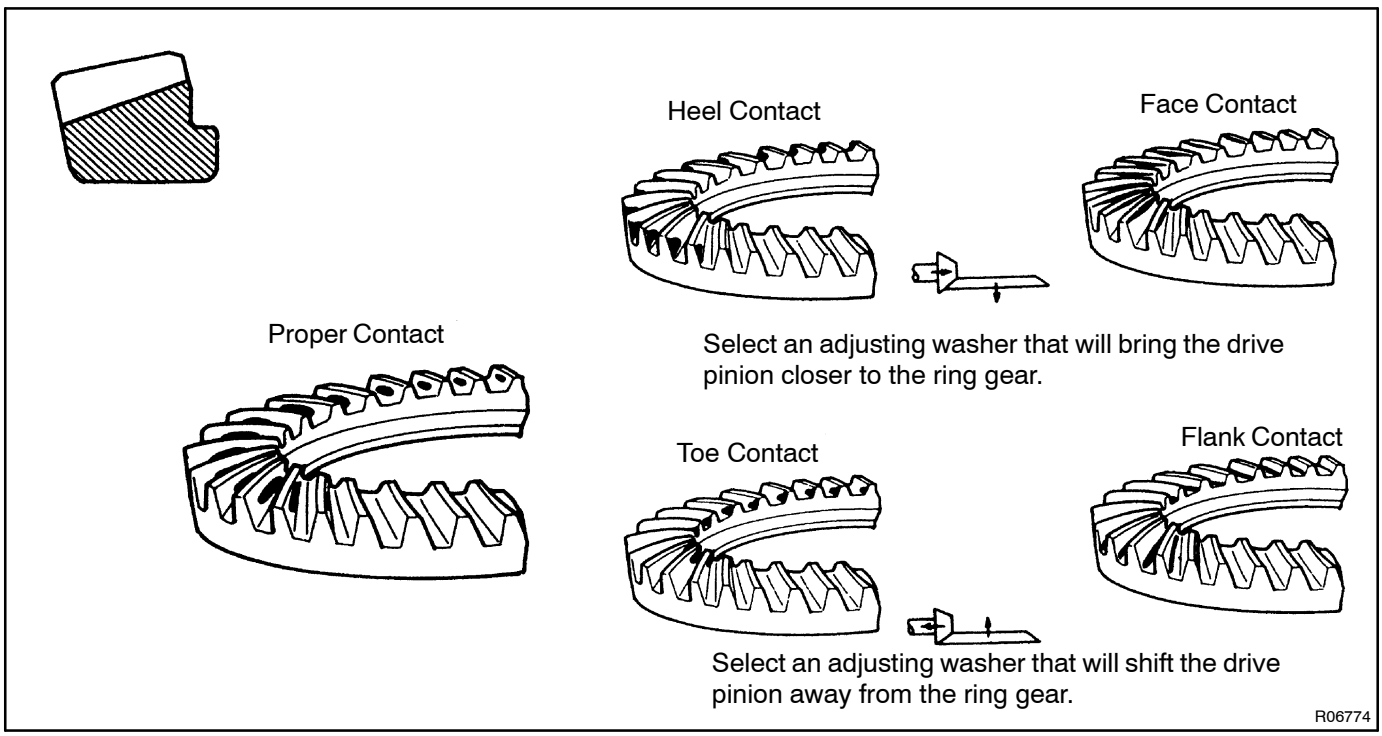
(j) Tighten the bearing cap bolts.
Torque: 196 N·m (2,000 kgf·cm, 145 ft·lbf)
(k) Recheck the ring gear backlash.
Backlash: 0.15 – 0.20 mm (0.0059 – 0.0079 in.)

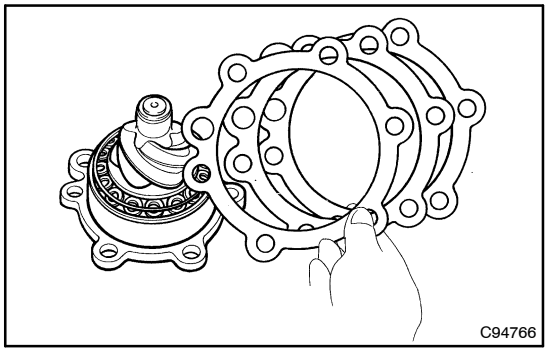


34. MEASURE TOTAL PRELOAD
(a) Using a torque wrench, measure the total preload.
Total preload:
Drive pinion preload + (0.2 – 0.39 N·m, 2 – 4 kgf·cm, 1.7 – 3.5 in.·lbf)



35. 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.
(b) Turn the companion flange in both directions to inspect the ring gear for proper tooth contact.




C94766

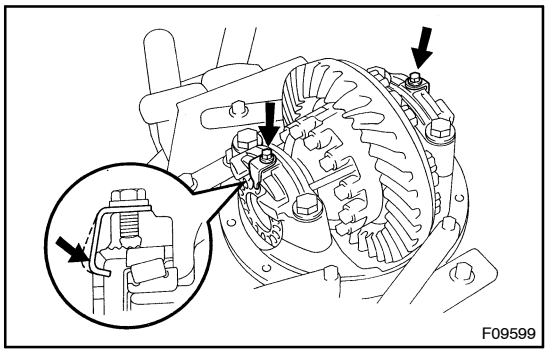
If the teeth are not properly contacting, use the value below to select a proper shim for correction.

Thickness:

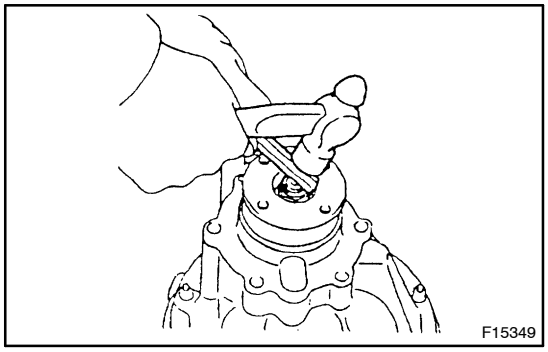
0.10 mm (0.0039 in.)	1.15 mm (0.0059 in.)
0.25 mm (0.0098 in.)	0.45 mm (0.0177 in.)

HINT:
Use one or more shims for adjustment.

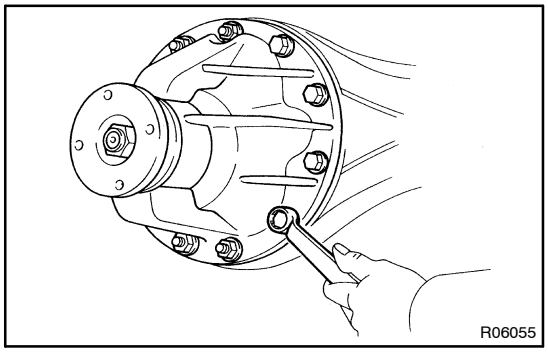
36. CHECK TOTAL PRELOAD (See step 34)
37. CHECK RING GEAR BACKLASH (See step 5)
38. CHECK TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION (See step 35)
39. CHECK RUNOUT OF COMPANION FLANGE (See step 5)


F09599

40. INSTALL ADJUSTING NUT LOCKS
(a) Install 2 new nut locks on the bearing caps.
Torque: 14 N·m (140 kgf·cm, 10 ft·lbf)


F15349

41. STAKE DRIVE PINION NUT
(a) Using a chisel and a hammer, caulk the nut.


R06055

42. INSTALL DIFFERENTIAL CARRIER ASSY REAR
(a) Clean the contact surface of the differential case and rear axle housing.
Part No. 08833–00100, THREE BOND 1360K or equivalent
(b) Apply sealant to the 8 bolts and a new gasket.
(c) Install the differential carrier assy with the 8 bolts, 4 nuts and 4 washers.
Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)

43. INSTALL PROPELLER SHAFT ASSY (See page 30–4 or 30–11)
44. INSTALL REAR AXLE SHAFT (See page 30–72 or 30–75)
45. ADD DIFFERENTIAL OIL (See page 29–2)