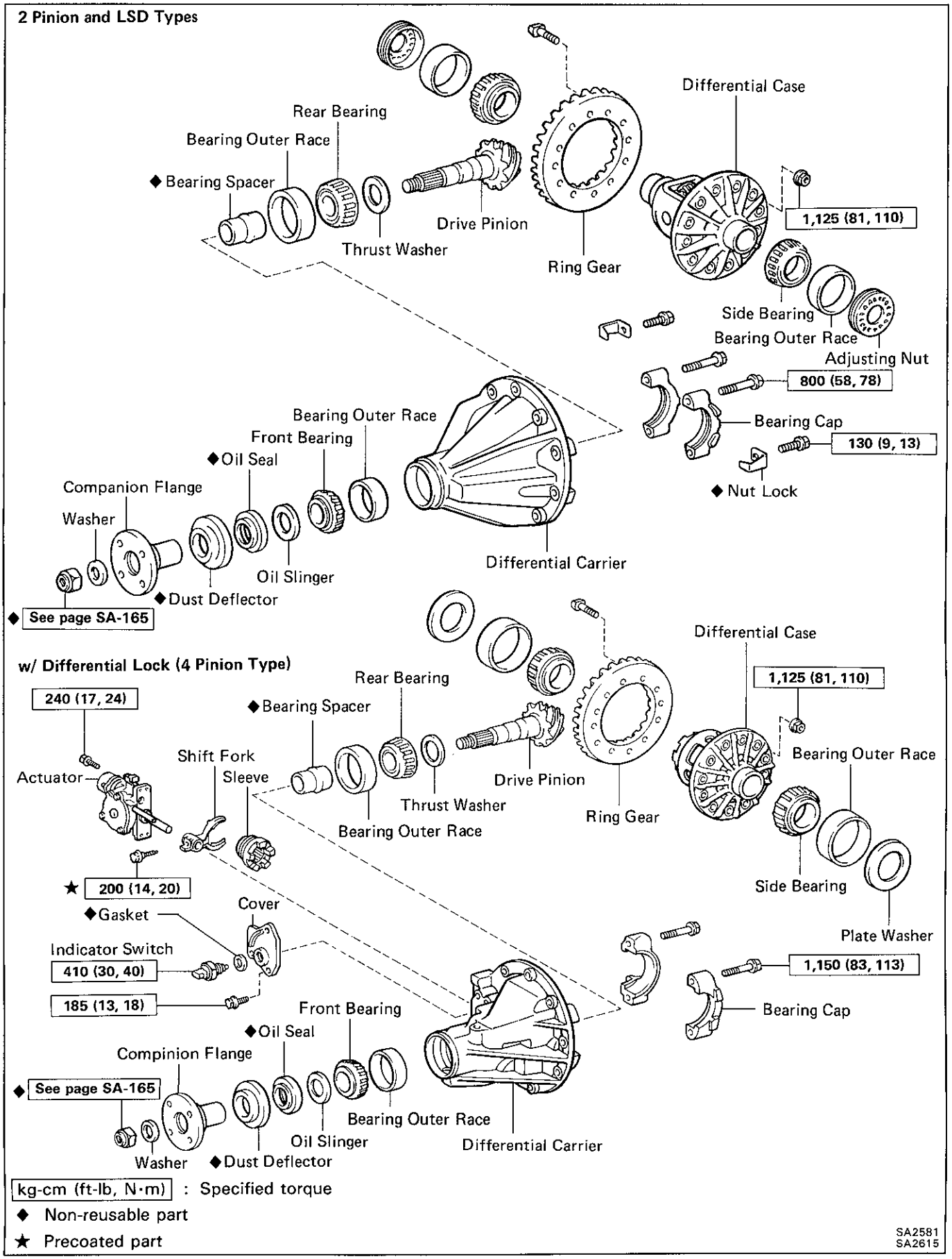
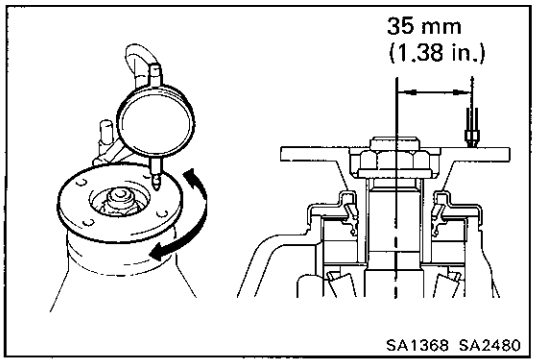
Differential Carrier

COMPONENTS



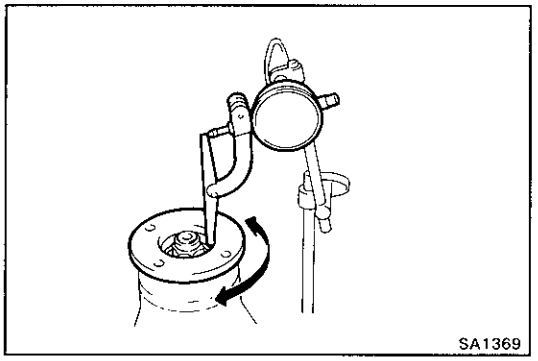


INSPECTION OF DIFFERENTIAL CARRIER

1. CHECK RUNOUT OF COMPANION FLANGE

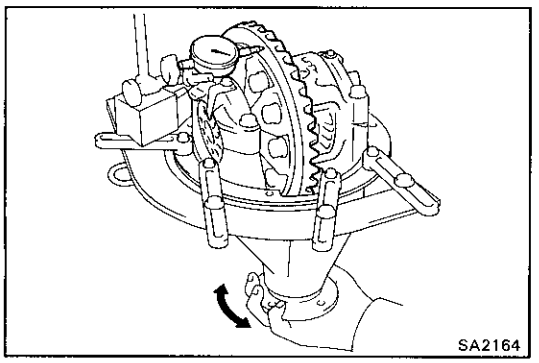
Using a dial indicator, measure the vertical and lateral runout of the companion flange.

Maximum vertical runout: 0.10 mm (0.0039 in.)



Maximum lateral runout: 0.10 mm (0.0039 in.)

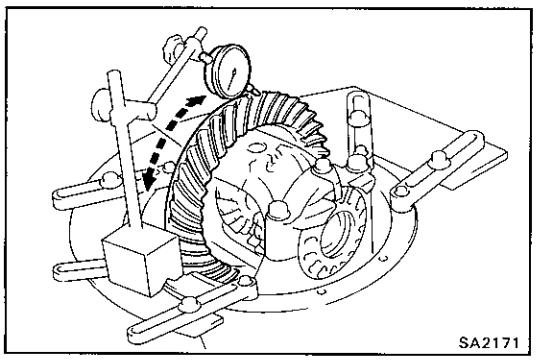
If the runout is greater than the maximum, replace the companion flange.



2. CHECK RING GEAR RUNOUT

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

Maximum runout: 0.10 mm (0.0039 in.)

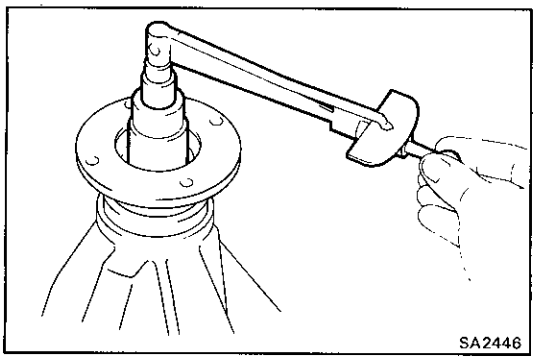


3. CHECK RING GEAR BACKLASH

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

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

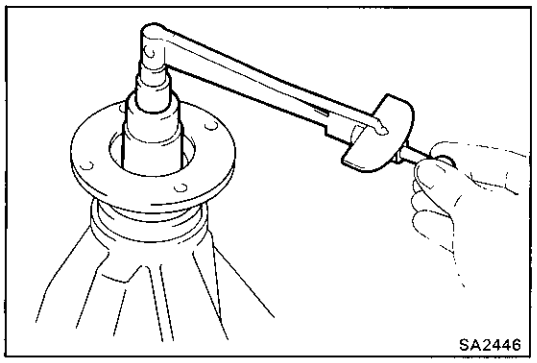
HINT: Perform the measurements at three or more positions around the circumference of the ring gear.



4. MEASURE DRIVE PINION PRELOAD

Measure the drive pinion preload using the backlash between the drive pinion and ring gear.

Preload (at starting): 7 — 10 kg-cm
(6.1 — 8.7 in.-lb, 0.7 — 1.0 N·m)



5. **CHECK TOTAL PRELOAD**

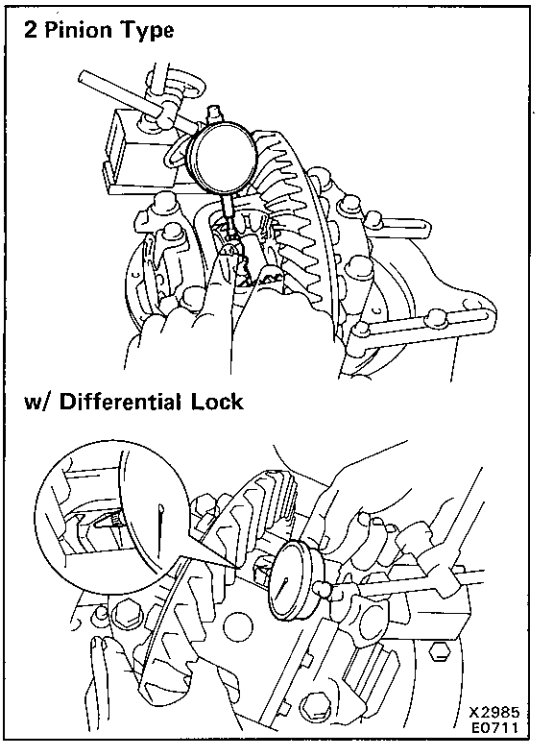
Using a torque meter, measure the total preload.

Total preload: In addition to drive pinion preload

2 pinion and LSD types
4 — 6 kg-cm (3.5 — 5.2 in.-lb, 0.4 — 0.6 N·m)

w/ Differential lock
3 — 7 kg-cm (2.6 — 6.1 in.-lb, 0.3 — 0.7 N·m)

If necessary, disassemble and inspect a differential.



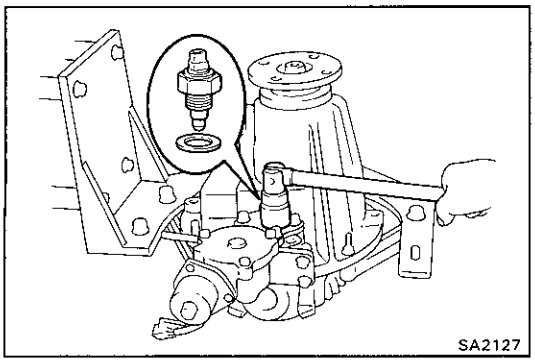
6. **CHECK SIDE GEAR BACKLASH**

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

Standard backlash: 0.02 — 0.20 mm
(0.0008 — 0.0079 in.)

If the backlash is out of specification, install the correct thrust washers. (See pages SA-170, 173)

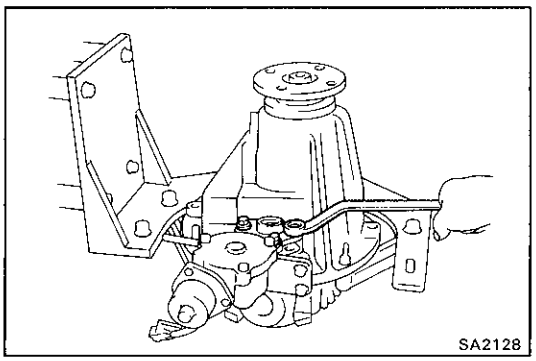
7. **INSPECT TEETH CONTACT BETWEEN RING GEAR AND DRIVE PINION**
(See step 14 on page SA-163)



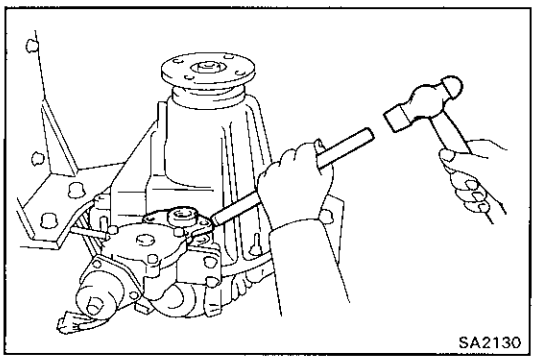
DISASSEMBLY OF DIFFERENTIAL CARRIER

(See page SA-146)

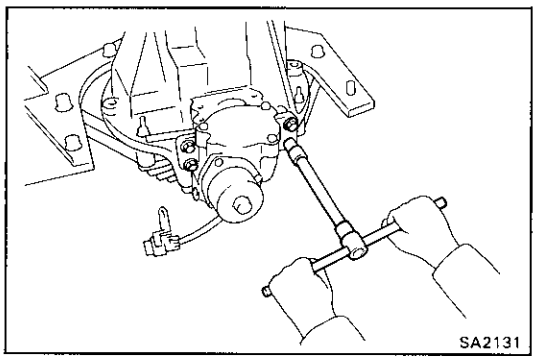
1. **(w/ DIFFERENTIAL LOCK)**
   REMOVE INDICATOR SWITCH



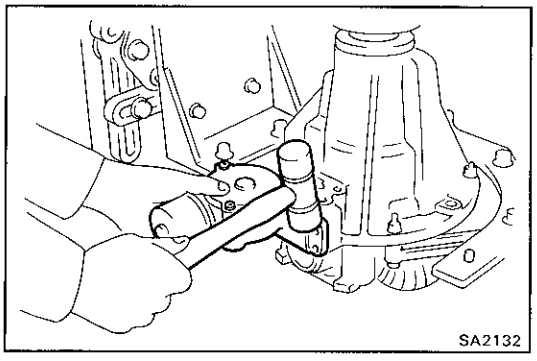
2. **(w/ DIFFERENTIAL LOCK)**
   REMOVE COVER
   (a) Remove the three bolts.



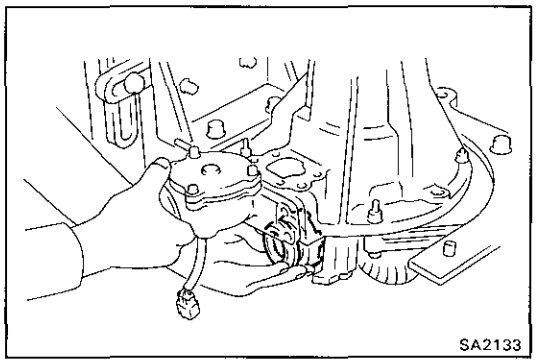
   (b) Using a brass bar and hammer, remove the cover.



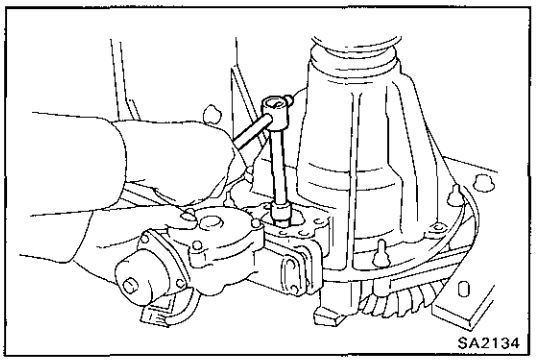
3. **(w/ DIFFERENTIAL LOCK)**
   REMOVE SLEEVE
   (a) Remove the four bolts.



   (b) Using a plastic hammer, tap off the actuator.

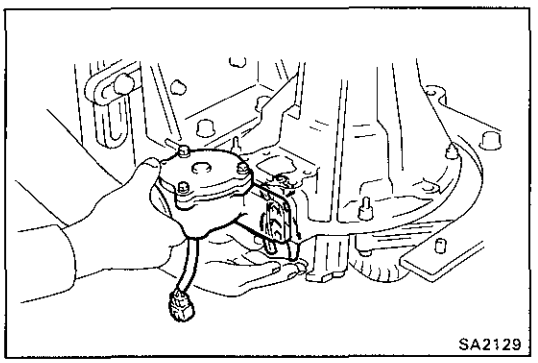


(c) Pull the actuator, remove the sleeve.

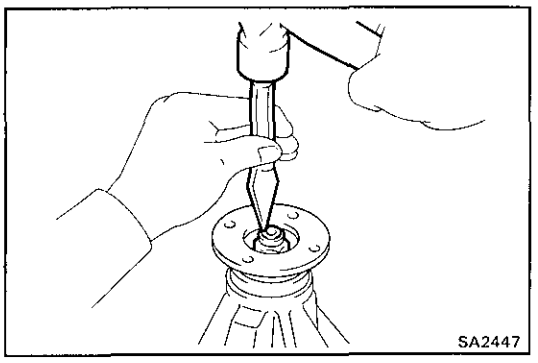


4. (w/ DIFFERENTIAL LOCK) REMOVE ACTUATOR AND SHIFT FORK

(a) Remove the shift fork shaft bolt.

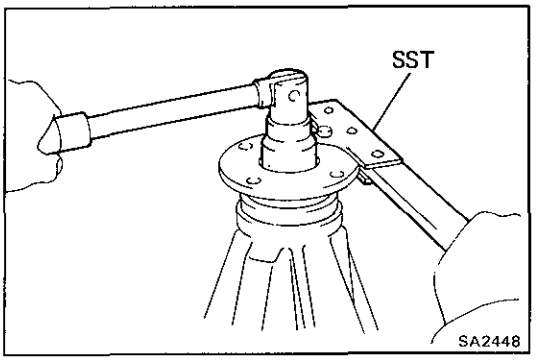


(b) Pull out the actuator, remove the shift fork.



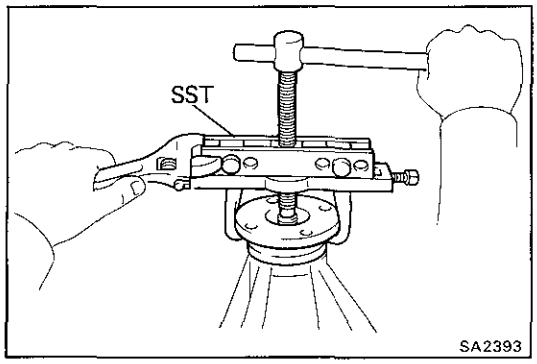
5. REMOVE COMPANION FLANGE

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

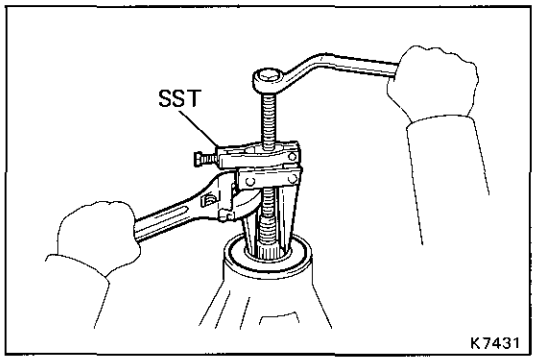


(b) Using SST to hold the flange, remove the nut and plate washer.

SST 09330-00021



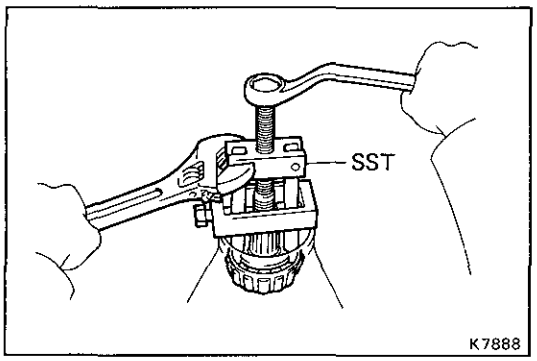
(c) Using SST, remove the companion flange.
SST 09950-20017



6. REMOVE FRONT OIL SEAL AND OIL SLINGER

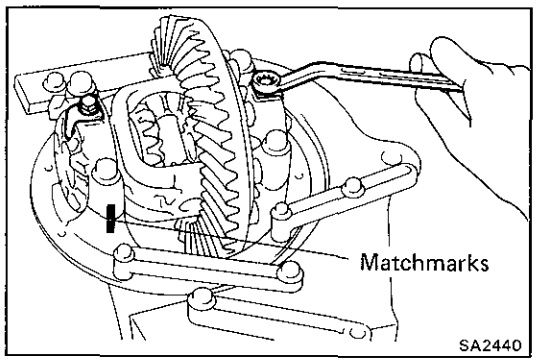
(a) Using SST, remove the oil seal from the housing .
SST 09308-10010

(b) Remove the oil slinger.



7. REMOVE FRONT BEARING

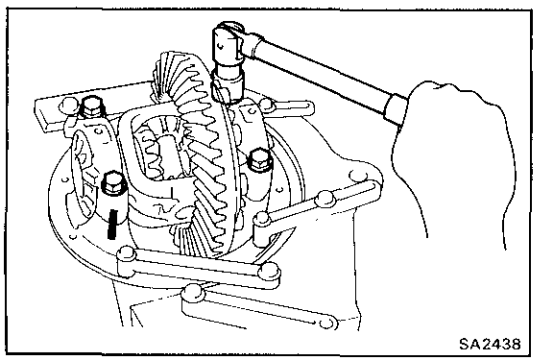
Using SST, remove the bearing from the housing.
SST 09556-22010



8. REMOVE DIFFERENTIAL CASE (2 PINION AND LSD TYPES)

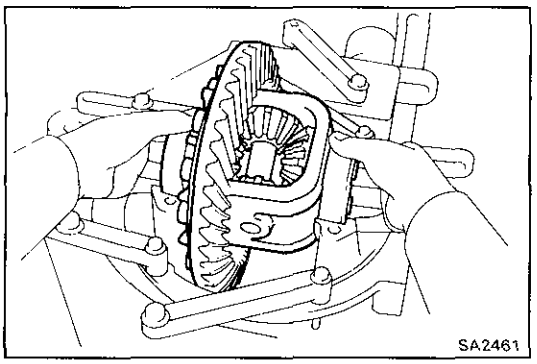
(a) Place matchmarks on the bearing cap and differential carrier.

(b) Remove the two adjusting nut locks.

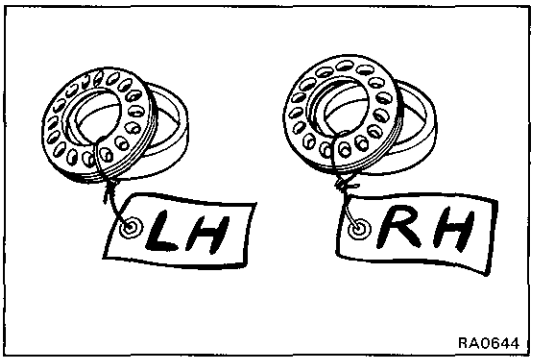


(c) Remove the four bolts and the two bearing caps.

(d) Remove the two adjusting nuts.



(e) Remove the differential case with the side bearing outer races from the differential carrier.

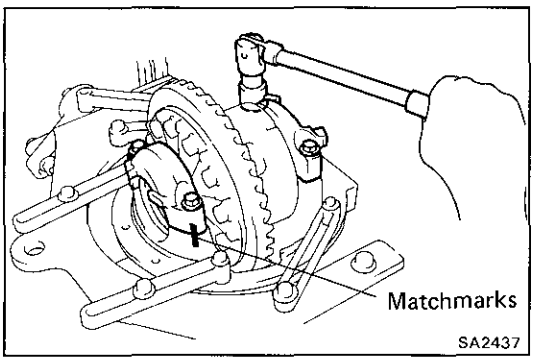


HINT: Tag the disassembled parts to show the location for reassembly.

(w/ DIFFERENTIAL LOCK)

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

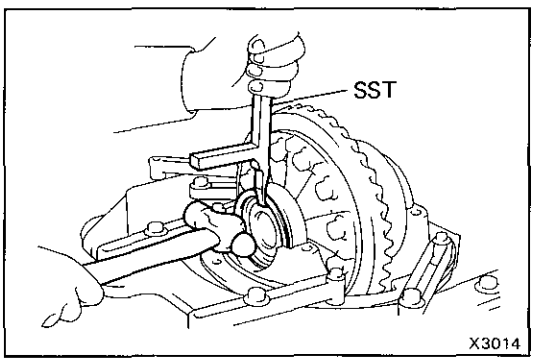
(b) Remove the four bolts and the two bearing caps.



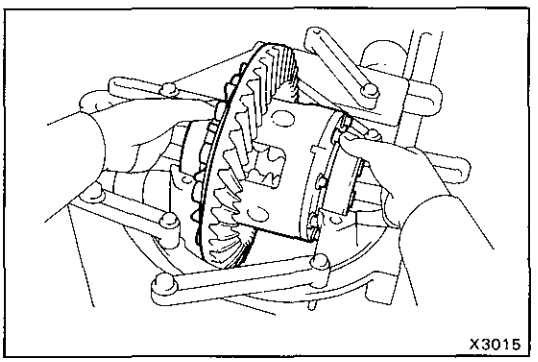
(c) Using SST, remove the plate washer.

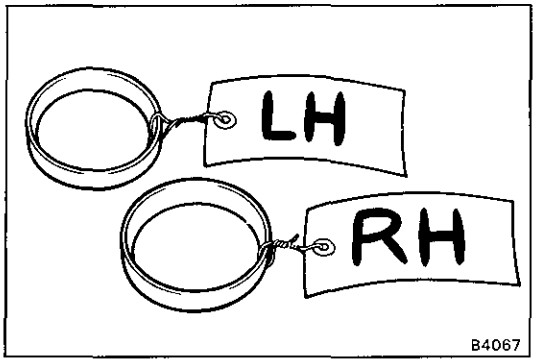
SST 09504-22011

HINT: Measure the plate washer thickness and note it.

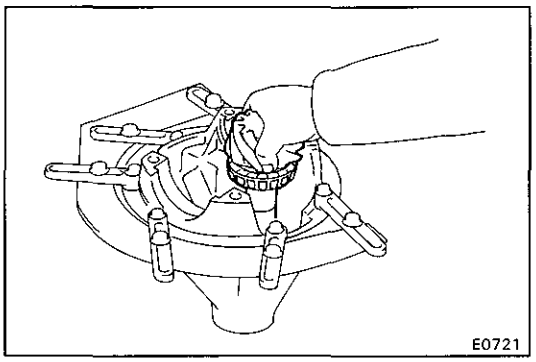


(d) Remove the differential case with the side bearing outer races from the differential carrier.





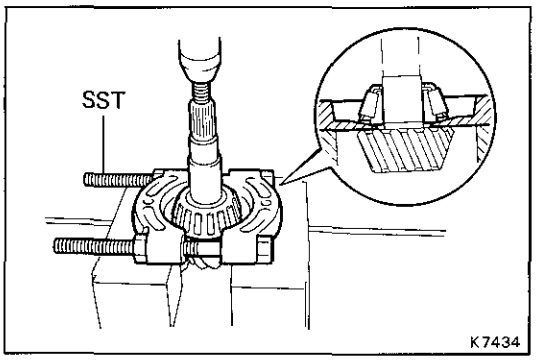
HINT: Tag the bearing outer races to show the location for reassembly.



9. REMOVE DRIVE PINION AND BEARING SPACER

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

(b) Remove the bearing spacer.



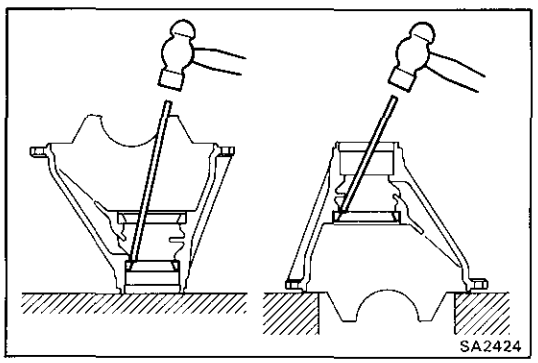
10. REMOVE DRIVE PINION REAR BEARING

(a) Using SST, press out the rear bearing from the drive pinion.

SST 09950-00020

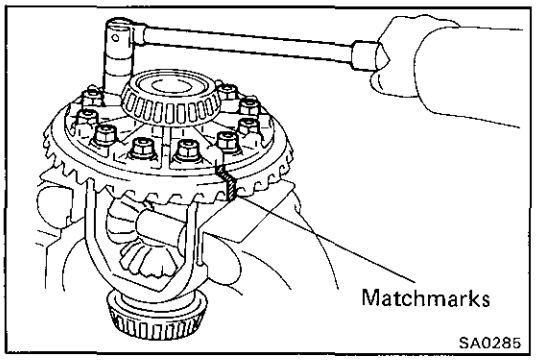
HINT: If the drive pinion or ring gear are damaged replace them as a set.

(b) Remove the washer from the drive pinion.



11. REMOVE FRONT AND REAR BEARING OUTER RACES

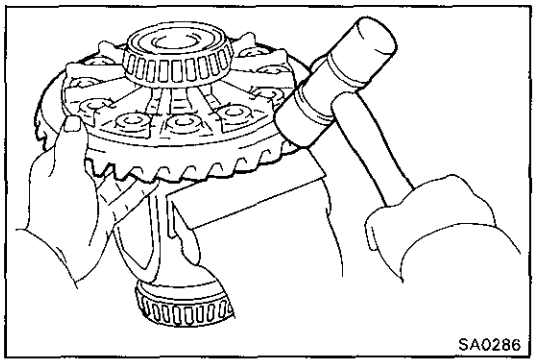
Using a hammer and brass bar, drive out the outer race from the carrier.



12. REMOVE RING GEAR

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

(b) Remove the twelve nuts and twelve bolts.


SA0286

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

13. 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 adjusting nuts.

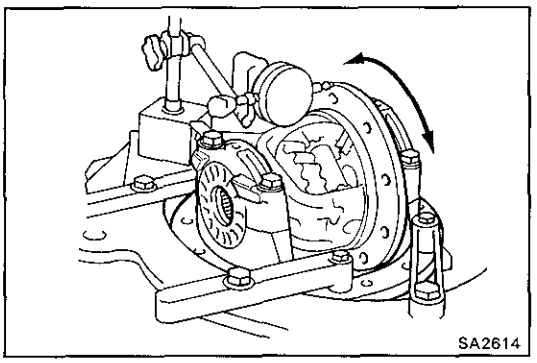
(d) Align matchmarks on the bearing cap and differential carrier.

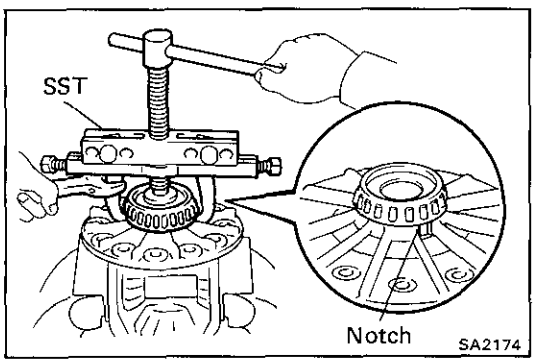
(e) Install and uniformly tighten the four bearing cap bolts in several passes.

(f) Using a dial indicator, measure the differential case runout.

Maximum runout: 0.07 mm (0.0028 in.)

(g) Remove the differential case.
(See step 8 on page SA-151)


SA2614



SA2174

14. REMOVE SIDE BEARINGS (2 PINION AND LSD TYPES)

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

SST 09950-20017

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

(w/ DIFFERENTIAL LOCK)

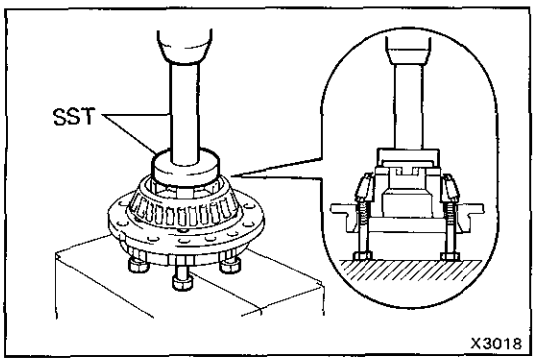
(a) Using SST, remove the side bearing (ring gear side) .

SST 09950-20017

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

(b) Using four bolts and SST, remove the side bearing (cover side).

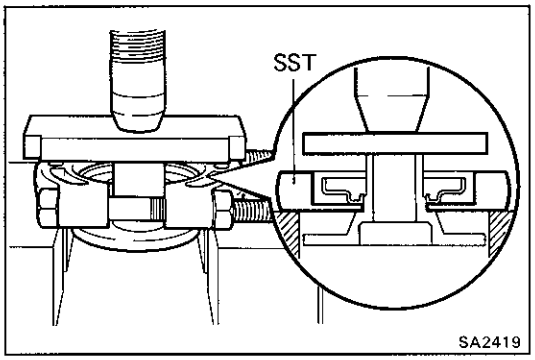
SST 09550-10012 (09252-10010, 09557-10010)



X3018

15. DISASSEMBLE DIFFERENTIAL CASE

2 pinion type: See page SA-169.
w/ Differential lock
(4 pinion type): See page SA-171.
LSD type: See page SA-174.

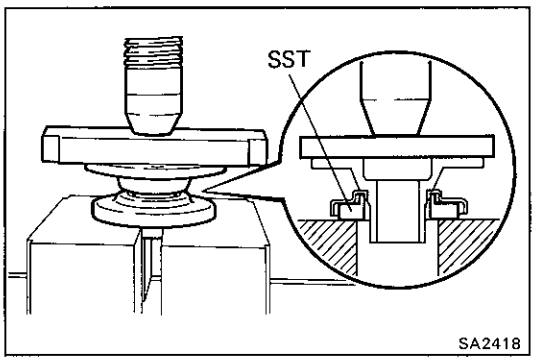


REPLACEMENT OF DIFFERENTIAL COMPONENTS

REPLACE COMPANION FLANGE DUST DEFLECTOR

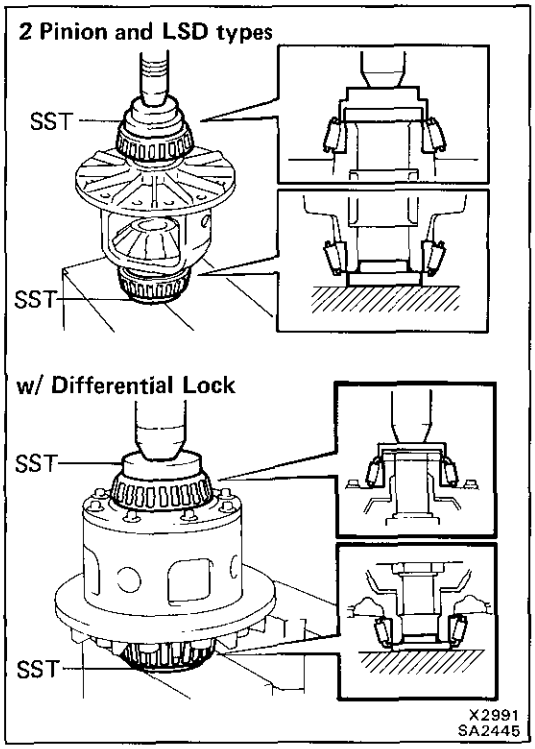
(a) Using SST and a press, remove the dust deflector.

SST 09950-00020



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

SST 09726-40010



ASSEMBLY OF DIFFERENTIAL CARRIER

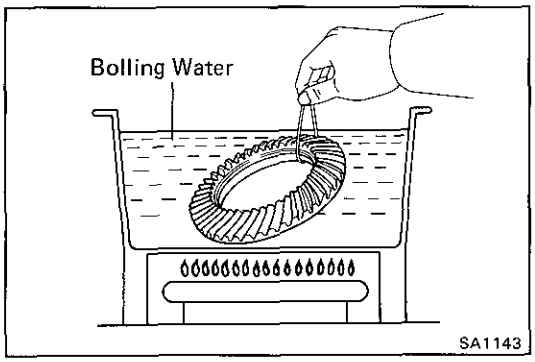
(See page SA-146)

1. INSTALL SIDE BEARINGS

Using SST and a press, install the two side bearings on the differential case.

SST 2 pinion and LSD types
09315-00021 and 09550-10012
(09558-10010)

w/ Differential lock (4 pinion type)
09550-60010 and 09550-10012
(09558-10010)



2. INSTALL RING GEAR ON DIFFERENTIAL CASE

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

(b) Heat the ring gear in boiling water.

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

HINT: Align matchmarks on the ring gear and the differential case.

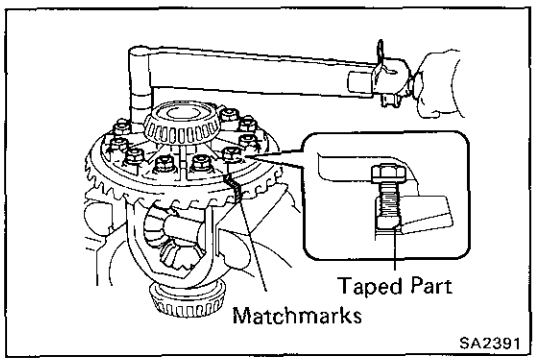
(d) Temporarily install the twelve nuts so that the bolt holes in the ring gear and differential case are not misaligned.

NOTICE:

- **The ring gear set bolts should not be tighten until the ring gear has cooled sufficiently.**
- **Install the bolts so that the taped part of the bolt is on the ring gear side.**

(e) After the ring gear has cooled sufficiently, torque the ring gear set nuts.

Torque: 1,125 kg-cm (81 ft-lb, 110 N·m)



3. INSPECT RING GEAR RUNOUT

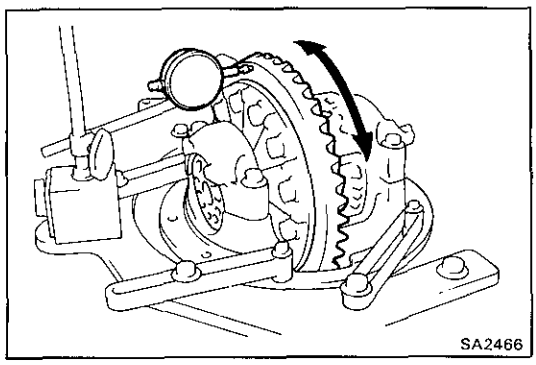
(a) Install the differential case onto the carrier.

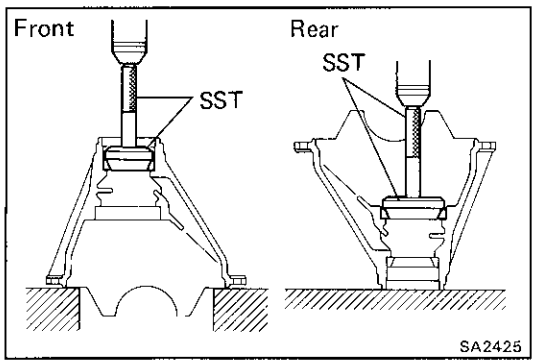
(b) Install bearing caps. (See page SA-161)

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

Maximum runout: 0.10 mm (0.0039 in.)

(d) Remove the differential case.
(See step 8 on page SA-151)



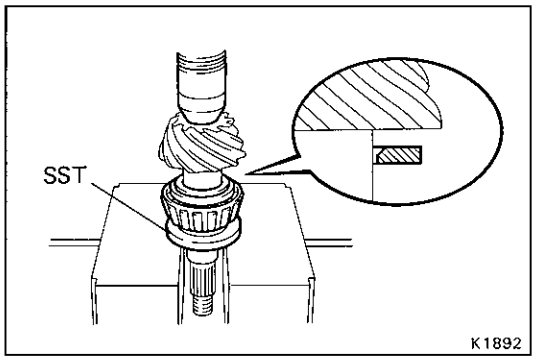


4. INSTALL DRIVE PINION FRONT AND REAR BEARING OUTER RACES

Using SST and a press, install the outer races.

SST 09608-35014

Front (09608-06020, 09608-06110)
Rear (09608-06020, 09608-06180)



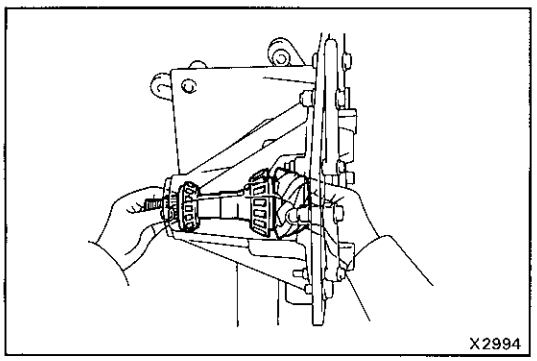
5. INSTALL DRIVE PINION REAR BEARING

(a) Install the washer on the drive pinion with the chamfered end facing the pinion gear.

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

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

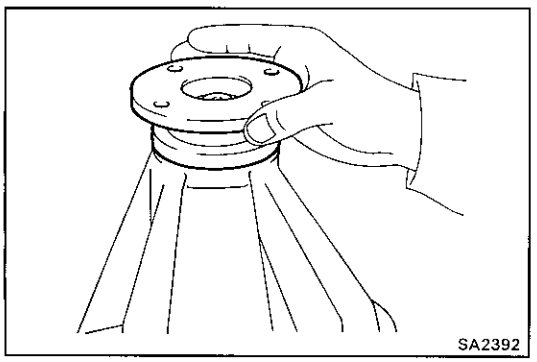
SST 09506-35010



6. TEMPORARILY ADJUST DRIVE PINION PRELOAD

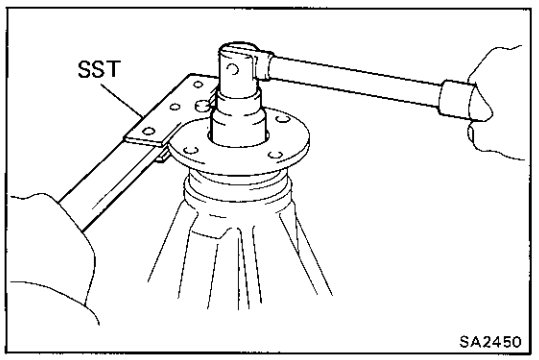
(a) Install the drive pinion, front bearing and oil slinger.

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



(b) Install the companion flange.

(c) Coat the threads of the nut with MP grease.

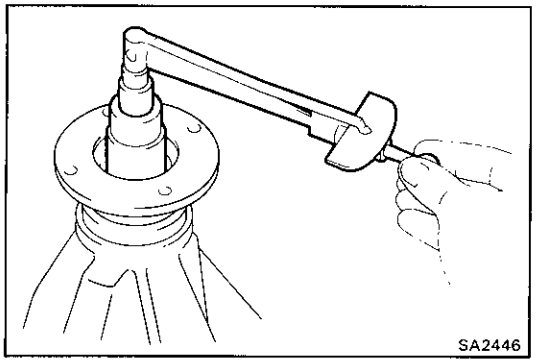


(d) Adjust the drive pinion preload by tightening the plate washer and companion flange nut.

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

SST 09330-00021

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


SA2446

(e) Using a torque meter, measure the drive pinion preload.

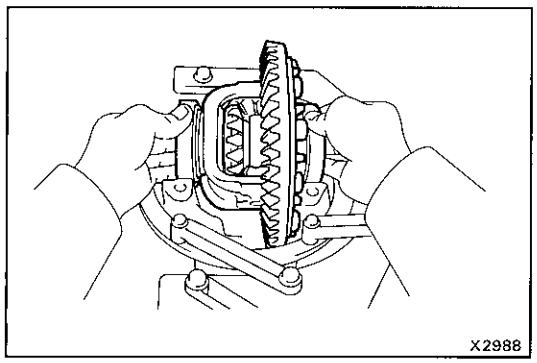
Preload (at starting):

New bearing

13 — 20 kg-cm
(11.3 — 17.4 in.-lb, 1.3 — 2.0 N·m)

Reused bearing

7 — 10 kg-cm
(6.1 — 8.7 in.-lb, 0.7 — 1.0 N·m)

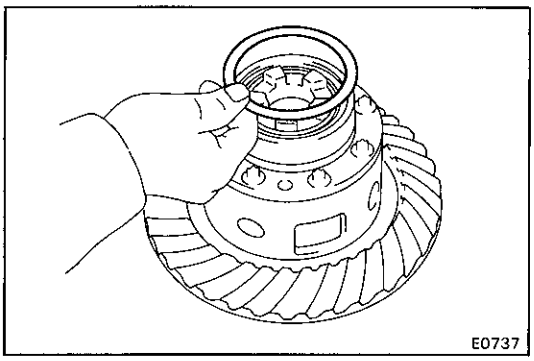

X2988

7. INSTALL DIFFERENTIAL CASE IN CARRIER (2 PINION AND LSD TYPES)

(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.

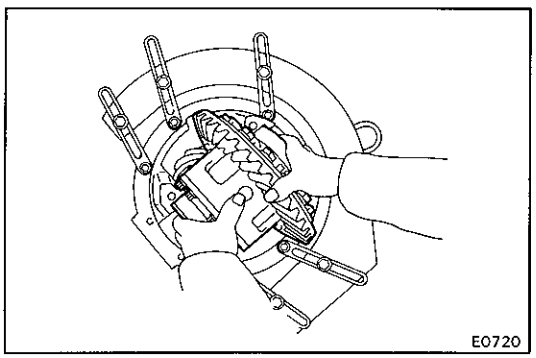
HINT: Make sure that there is backlash between the ring gear and drive pinion.


E0737

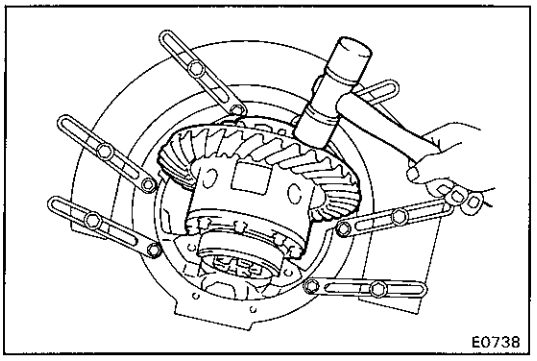
(w/ DIFFERENTIAL LOCK)

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

(b) Install the assembled plate washer onto the side bearing.

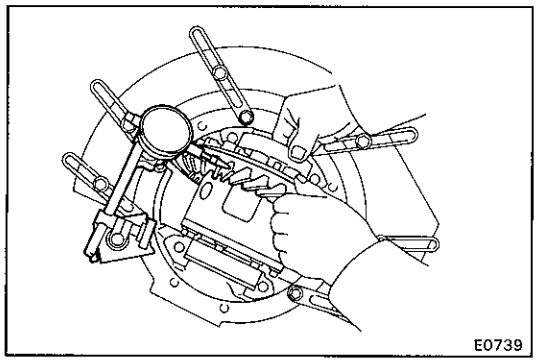

E0720

(c) Install the differential case in the carrier.


E0738

(d) Snug down the washer and bearing by tapping on the ring gear with a plastic hammer.

HINT: If it is difficult to install the differential case into the carrier, replace the plate washer with a thinner one. However, select a plate washer that allows no clearance between it and the carrier.



8. **(w/ DIFFERENTIAL LOCK)**
ADJUST RING GEAR BACKLASH

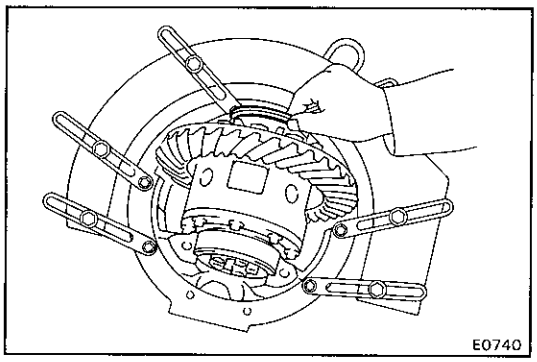
(a) Hold the side bearing of the ring gear side and measure the backlash.

Backlash (reference): 0.15 mm (0.0059 in.)

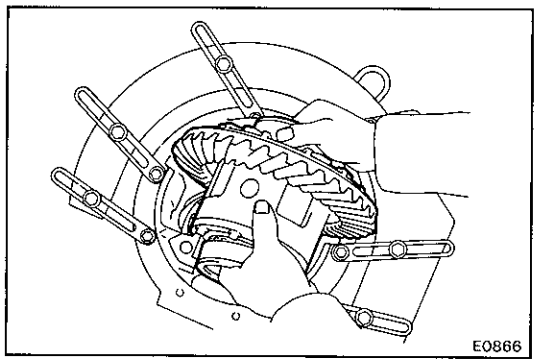
(b) Select a case cover side plate washer using the backlash as reference.

Side plate washer thickness

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)	Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
1	2.67 (0.1051)	7	2.85 (0.1122)	13	3.03 (0.1193)	19	3.21 (0.1264)
2	2.70 (0.1063)	8	2.88 (0.1134)	14	3.06 (0.1205)	20	3.24 (0.1276)
3	2.73 (0.1075)	9	2.91 (0.1146)	15	3.09 (0.1217)	21	3.27 (0.1287)
4	2.76 (0.1087)	10	2.94 (0.1157)	16	3.12 (0.1228)	22	3.30 (0.1299)
5	2.79 (0.1098)	11	2.97 (0.1169)	17	3.15 (0.1240)	23	3.33 (0.1311)
6	2.82 (0.1110)	12	3.00 (0.1181)	18	3.18 (0.1252)		

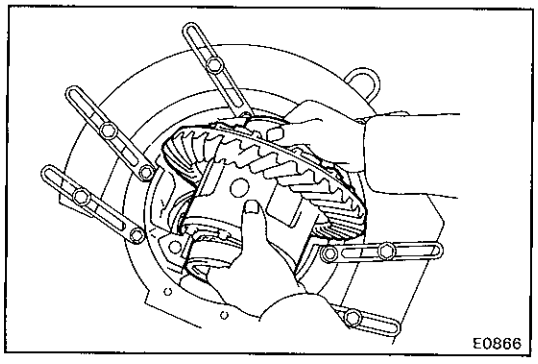


(c) Select a ring gear side plate washer of a thickness which eliminates any clearance between the plate washer and carrier.

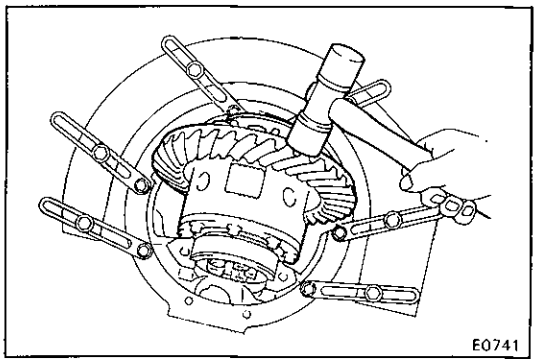


(d) Remove the plate washers and differential case.

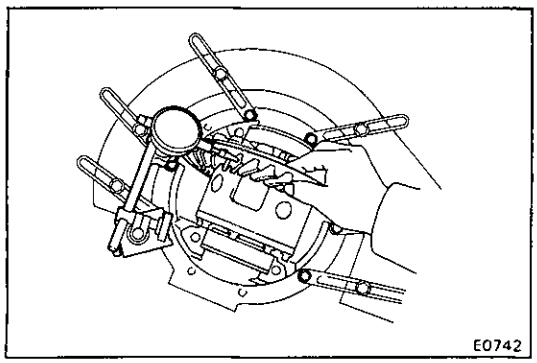
(e) Install the plate washer into the lower part of the carrier.



(f) Place the plate washer onto the differential case together with the outer race, and install the differential case with the outer race into the carrier.



(g) Using a plastic hammer, snug down the washer and bearing by tapping the ring gear.



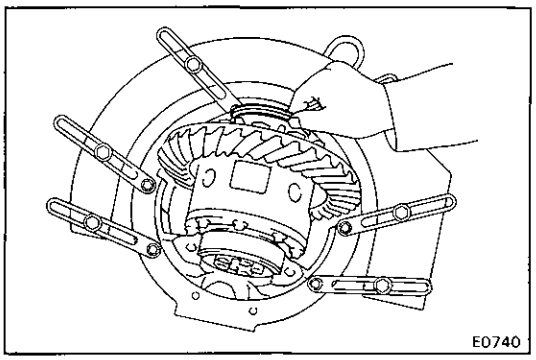
(h) Measure the ring gear backlash.

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

If not within specification, adjust by either increasing or decreasing the number of washers on both sides by an equal amount.

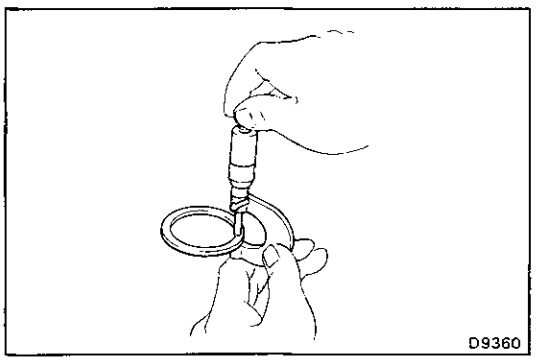
HINT: There should be no clearance between the plate washer and case.

Insure that there is ring gear backlash.



9. (w/ DIFFERENTIAL LOCK)
ADJUST SIDE BEARING PRELOAD

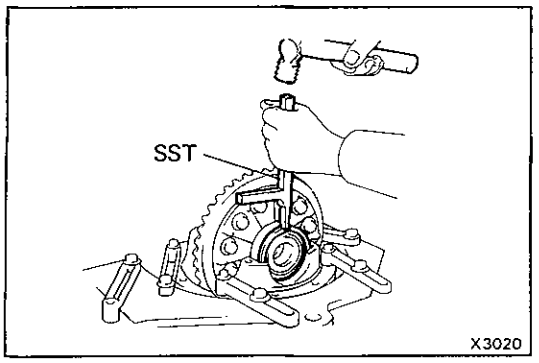
(a) After adjustment with the backlash as reference, remove the ring gear side plate washer.



(b) Measure the thickness of the removed plate washer.

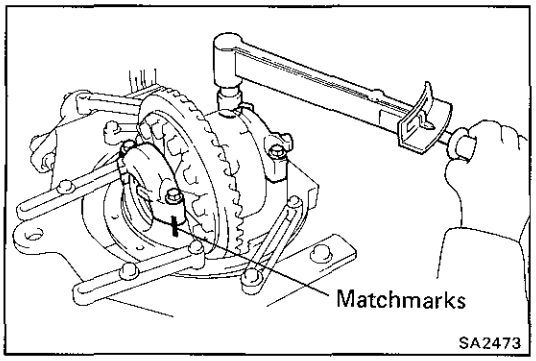
(c) Install a new thicker washer of 0.06 — 0.09 mm (0.0024 — 0.0035 in.) than the washer removed.

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



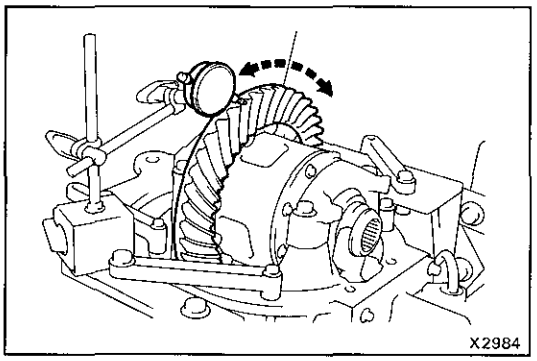
(d) Using SST, tap in the plate washer.

SST 09504-22011



(e) Align matchmarks on the cap and carrier. Tighten the four bearing cap bolts to the specified torque.

Torque: 1,150 kg-cm (83 ft-lb, 113 N·m)



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

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

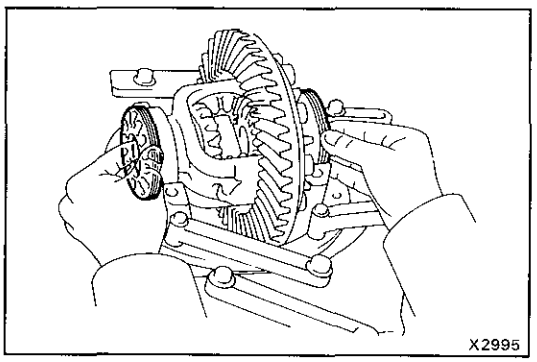
If not within standard, follow the procedure listed below.

If backlash is greater than specification:

Replace the cover side washer with a thinner washer. When doing so replace the ring gear side plate washer with one having a thickness equaling the amount the cover side plate washer thickness was decreased.

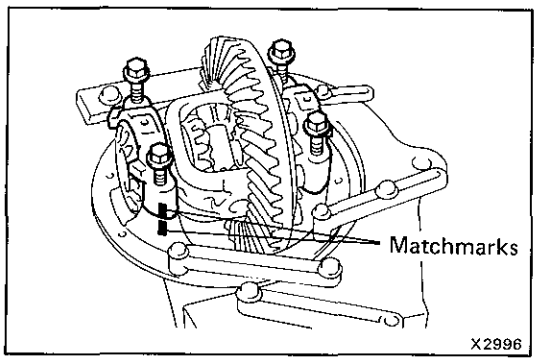
If backlash is less than specification:

Replace the cover side plate washer with a thicker washer. When doing so replace the ring gear side plate washer with one having a thinness equaling the amount the cover side plate washer thickness was increased.



10. (2 PINION AND LSD TYPES) INSTALL ADJUSTING NUTS

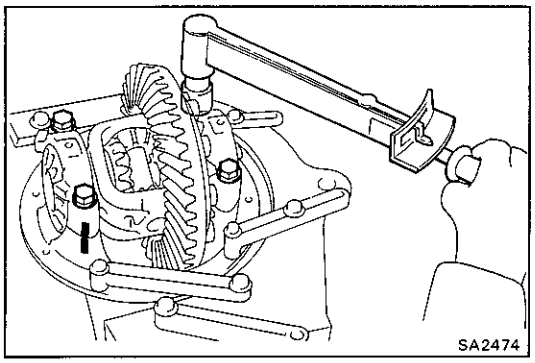
Install the adjusting nuts on the carrier, making sure that the nuts are threaded properly.



11. (2 PINION AND LSD TYPES) INSTALL BEARING CAPS

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

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

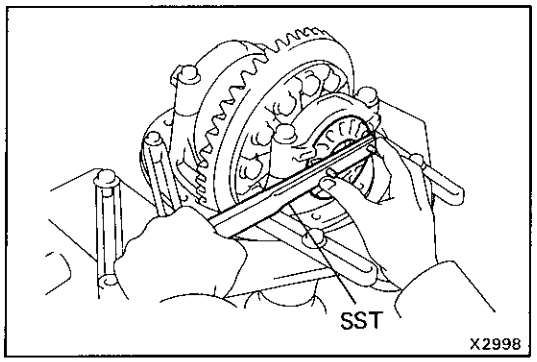


12. **(2 PINION AND LSD TYPES)**
ADJUST SIDE BEARING PRELOAD

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

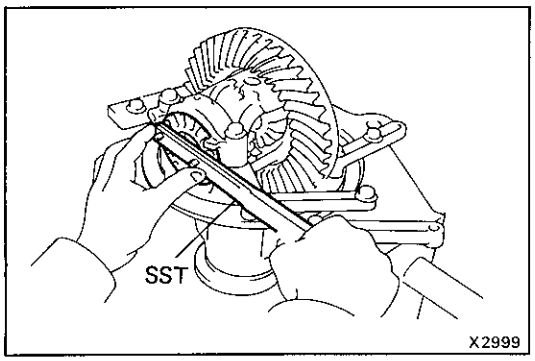
Torque: 800 kg-cm (58 ft-lb, 78 N·m)

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



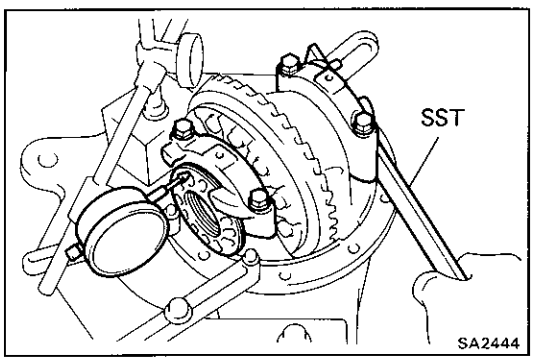
(c) Using SST, tighten the adjusting nut on the ring gear side until the ring gear has a backlash of about 0.2 mm (0.008 in.).

SST 09504-00011



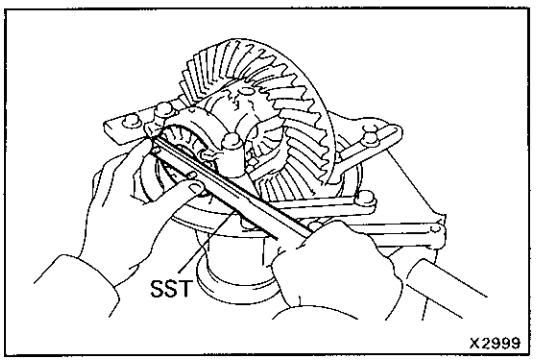
(d) While turning the ring gear, use SST to fully tighten the adjusting nut on the drive pinion side. After the bearings are settled, loosen the adjusting nut on the drive pinion side.

SST 09504-00011

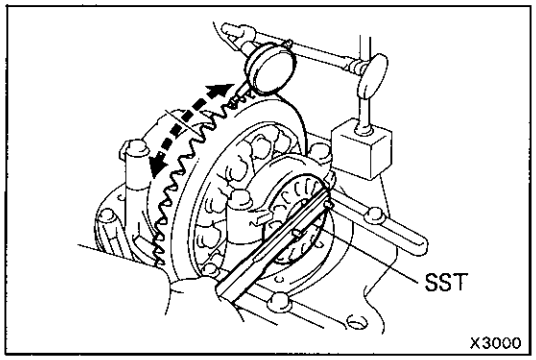


(e) Place a dial indicator on the top of the adjusting nut on the ring gear side.

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



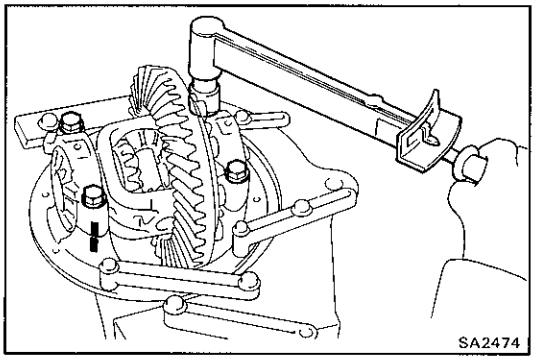
(g) Tighten the adjusting nut 1 - 1 1/2 notches from the zero preload position.



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

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

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

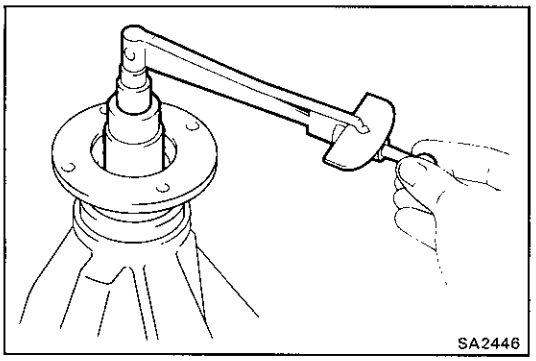


(i) Torque the bearing cap bolts.

Torque: 800 kg-cm (58 ft-lb, 78 N·m)

(j) Recheck the ring gear backlash.

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



13. MEASURE TOTAL PRELOAD

Using a torque meter, measure the total preload.

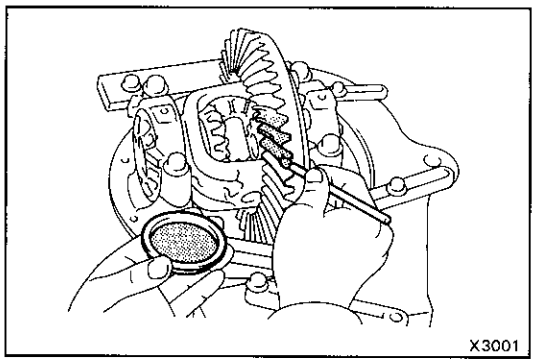
Total preload: In addition to drive pinion preload

2 pinion and LSD types

4 — 6 kg-cm (3.5 — 5.2 in.-lb, 0.4 — 0.6 N·m)

w/ Differential lock

3 — 7 kg-cm (2.6 — 6.1 in.-lb, 0.3 — 0.7 N·m)

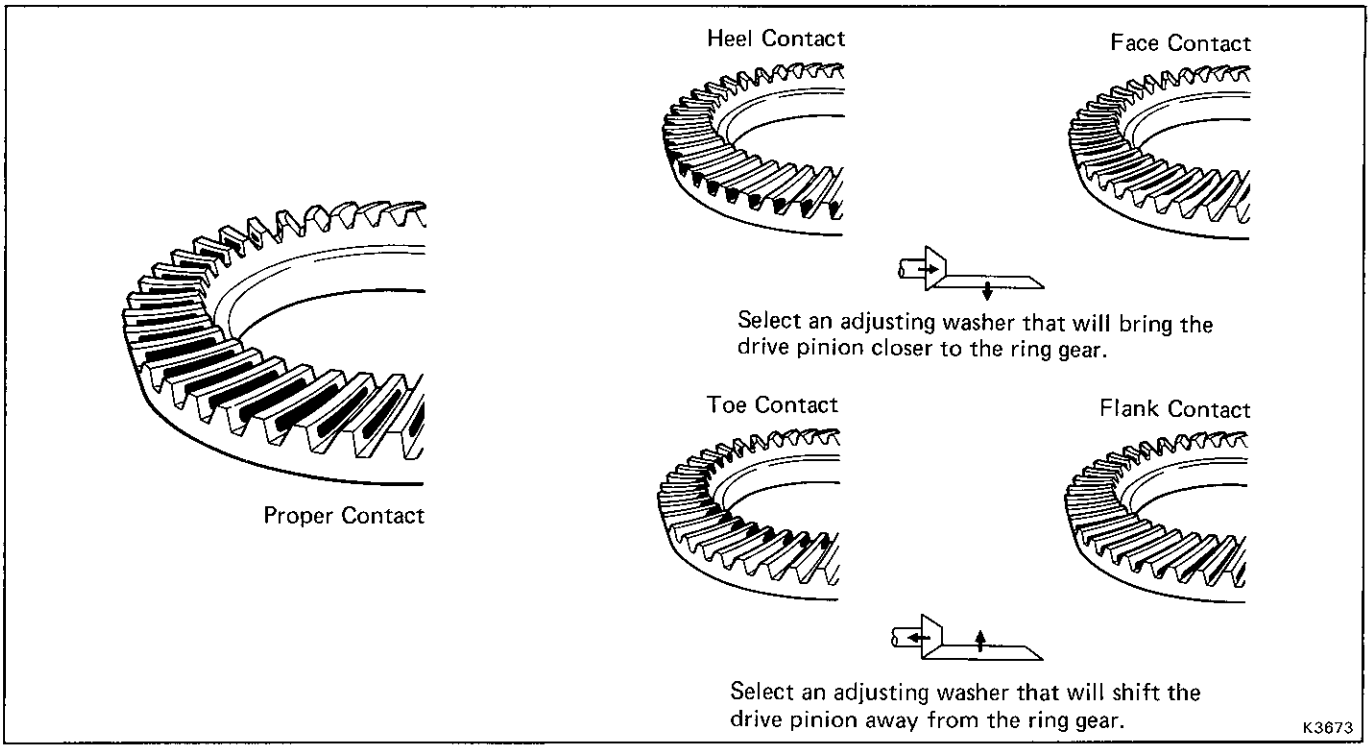


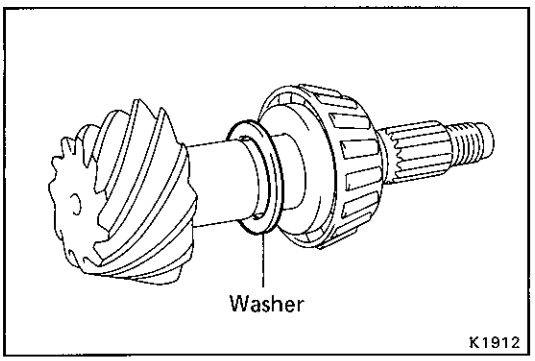
14. INSPECT TEETH CONTACT BETWEEN RING GEAR AND DRIVE PINION

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

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

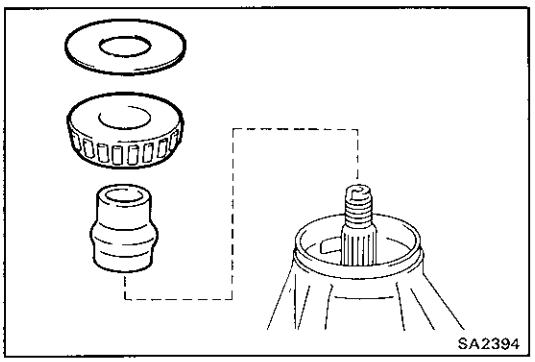
(c) Inspect the teeth pattern.





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

Washer thickness mm (in.)	
1.05 (0.0413)	1.35 (0.0531)
1.10 (0.0433)	1.40 (0.0551)
1.15 (0.0453)	1.45 (0.0571)
1.20 (0.0472)	1.50 (0.0591)
1.25 (0.0492)	1.55 (0.0610)
1.30 (0.0512)	



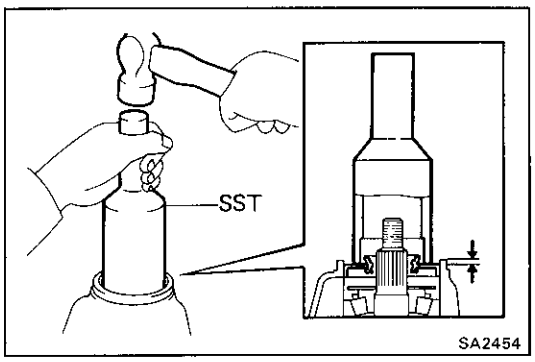
15. INSTALL BEARING SPACER

(a) Remove the companion flange.
(See step 5 on page SA-150)

(b) Remove the oil slinger and front bearing.
(See steps 6,7 on page SA-151)

(c) Install a new bearing spacer.

(d) Install the front bearing and oil slinger.



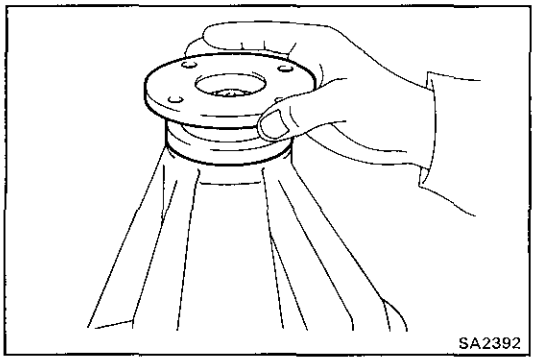
16. INSTALL OIL SEAL

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

SST 09214-76011

Oil seal drive in depth: 1.0 mm (0.0039 in.)

(b) Coat the lip of oil seal with MP grease.

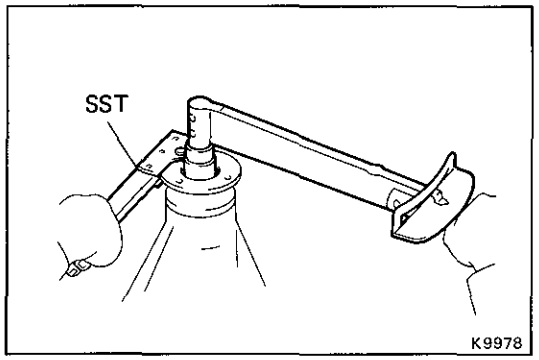


17. INSTALL COMPANION FLANGE

(a) Install the companion flange.

(b) Install the plate washer and a new nut.

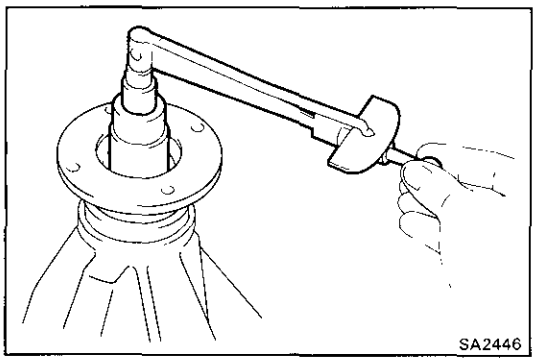
HINT: Coat the threads of nut with gear oil.



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

SST 09330-00021

Torque: 2,500 kg-cm (181 ft-lb, 245 N·m)



18. ADJUST DRIVE PINION PRELOAD

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

Preload (at starting):

New bearing

13 — 20 kg-cm
(11.3 — 17.4 in.-lb, 1.3 — 2.0 N·m)

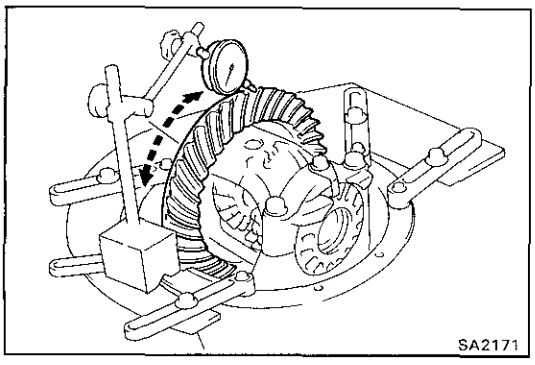
Reused bearing

7 — 10 kg-cm
(6.1 — 8.7 in.-lb, 0.7 — 1.0 N·m)

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

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.

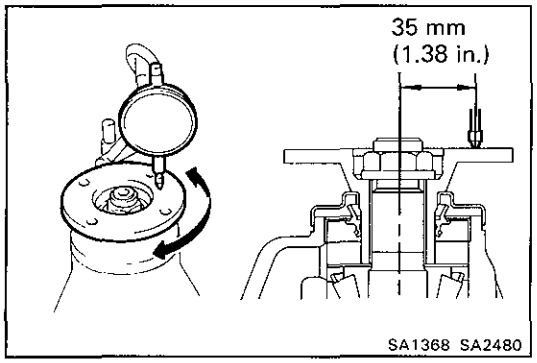
Maximum torque: 4,500 kg-cm (326 ft-lb, 441 N·m)



19. RECHECK RING GEAR BACKLASH
(See step 3 on page SA-147)

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

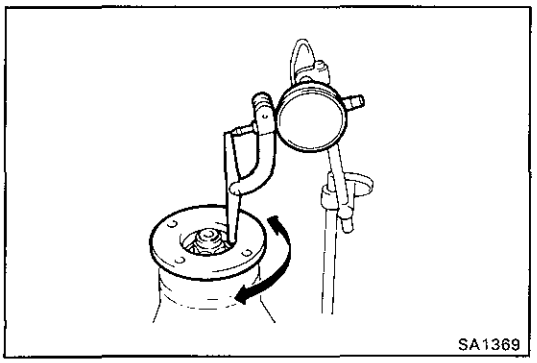
20. RECHECK TEETH CONTACT BETWEEN RING GEAR AND DRIVE PINION
(See step 14 on page SA-163)



21. CHECK RUNOUT OF COMPANION FLANGE

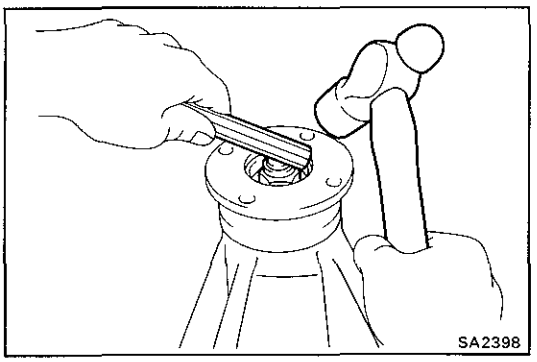
Using a dial indicator, measure the vertical and lateral runout of the companion flange.

Maximum vertical runout: 0.10 mm (0.0039 in.)

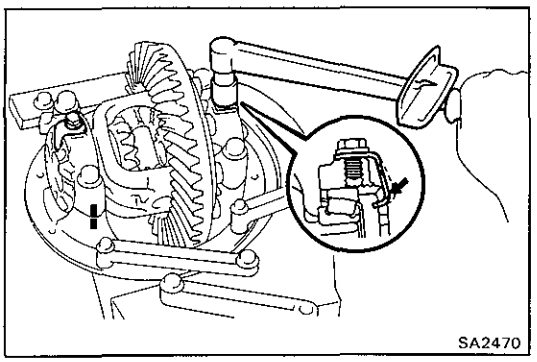


Maximum lateral runout: 0.10 mm (0.0039 in.)

If the runout is greater than the maximum, inspect the bearing.



22. STAKE DRIVE PINION NUT

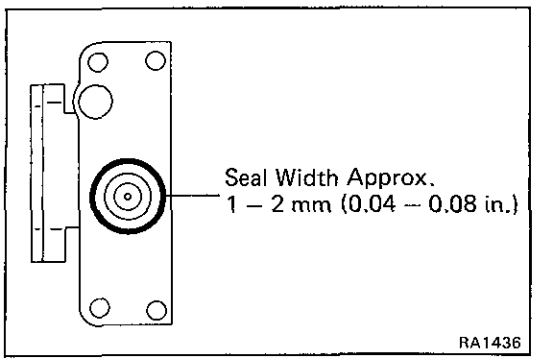


23. (2 PINION AND LSD TYPES)
INSTALL ADJUSTING NUT LOCKS

(a) Install two new lock nuts on the bearing caps.

Torque: 130 kg-cm (9 ft-lb, 13 N·m)

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



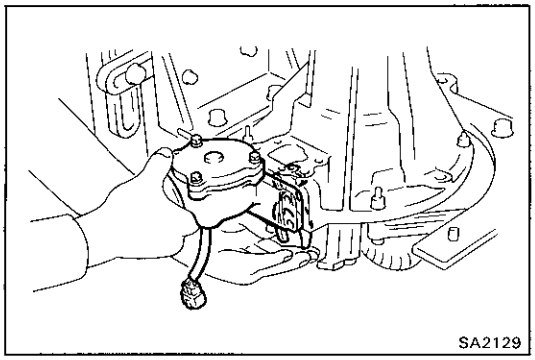
24. (w/ DIFFERENTIAL LOCK)
INSTALL ACTUATOR, SHIFT FORK AND SLEEVE

(a) Clean contacting surfaces of any residual packing material using gasoline or alcohol.

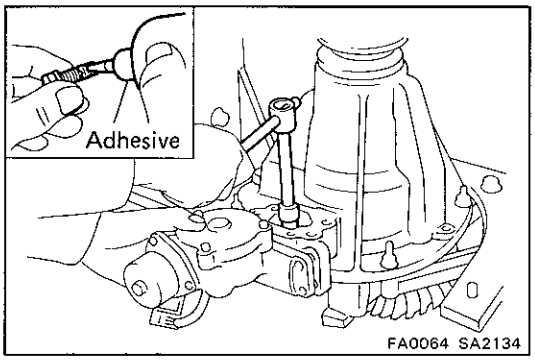
(b) Apply seal packing to the actuator.

Seal packing: Part No. 08826-00090, THREE BOND 1281 or equivalent

HINT: Install the actuator within ten minutes after applying seal packing.


SA2129

(c) Install the actuator to the differential and match the shaft with the shaft fork hole.



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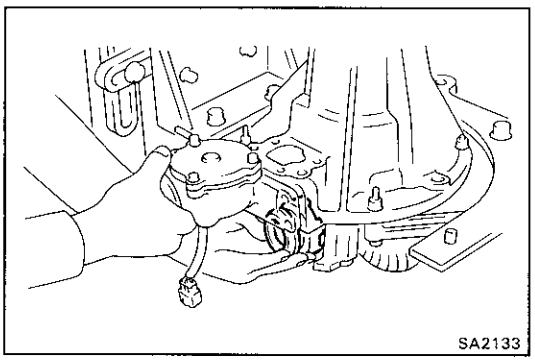
(d) Clean the threads of the set bolt and fork shaft with the white gasoline.

Coat the threads of the set bolt with adhesive.

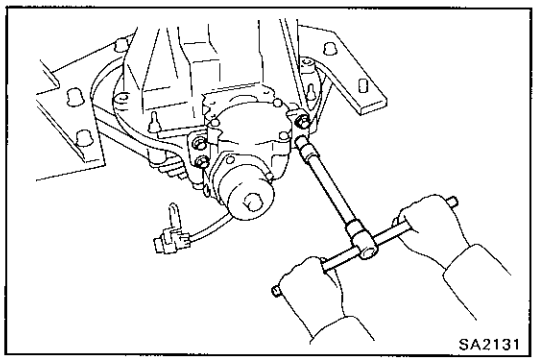
Adhesive: Part No. 08833-00070, THREE BOND 1324 or equivalent

(e) Tighten the shift fork shaft set bolt.

Torque: 200 kg-cm (14 ft-lb, 20 N·m)

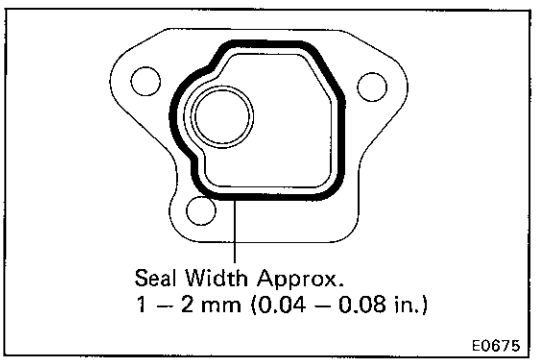

SA2133

(f) Engage the sleeve with the dog clutch of the differential case.


SA2131

(g) Tighten the four bolts.

Torque: 240 kg-cm (17 ft-lb, 24 N·m)



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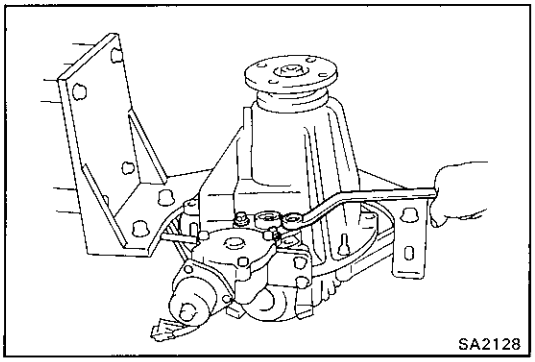
25. (w/ DIFFERENTIAL LOCK) INSTALL COVER

(a) Clean contacting surfaces of any residual packing material using gasoline or alcohol.

(b) Apply seal packing to the cover.

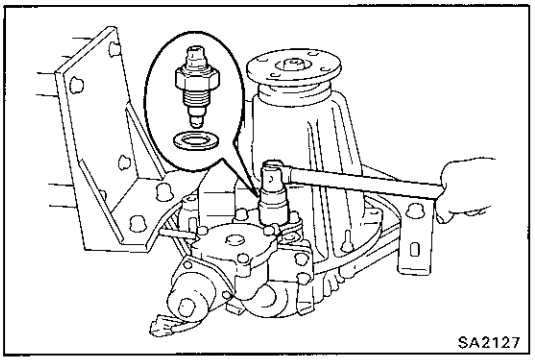
Seal packing: Part No. 08826-00090, THREE BOND 1281 or equivalent

HINT: Install the cover within ten minutes after applying seal packing.



(c) Tighten the three bolts.

Torque: 185 kg-cm (13 ft-lb, 18 N·m)



26. (w/ DIFFERENTIAL LOCK)
INSTALL INDICATOR SWITCH

Install the indicator switch with a new gasket.

Torque: 410 kg-cm (30 ft-lb, 40 N·m)