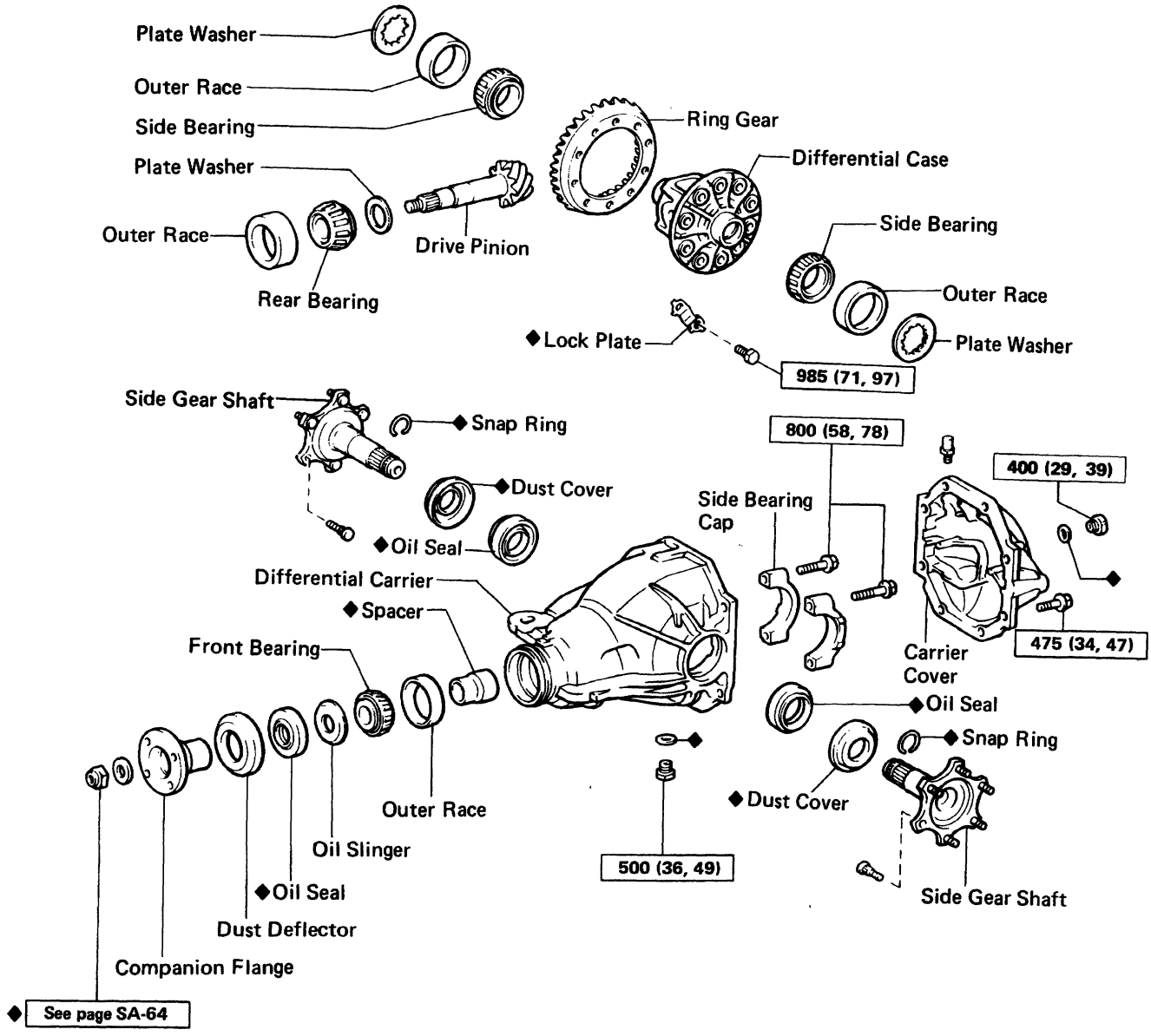
Differential Carrier

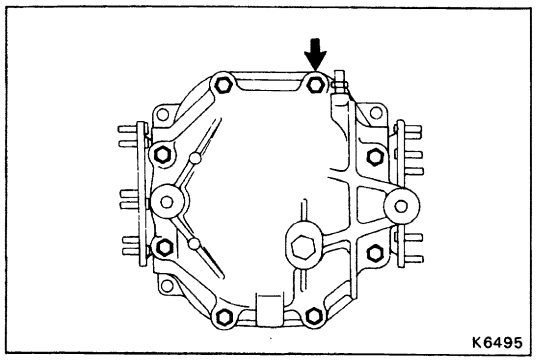
COMPONENTS



kg-cm (ft-lb, N·m) : Specified torque

◆ Non-reusable part

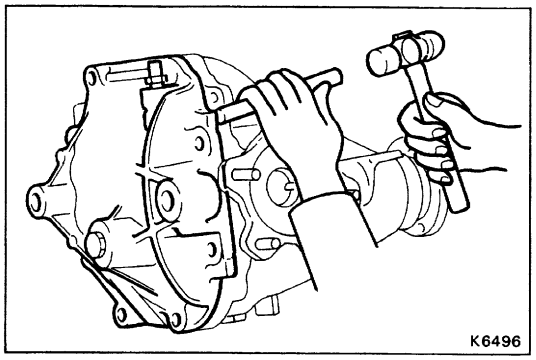
SA0453



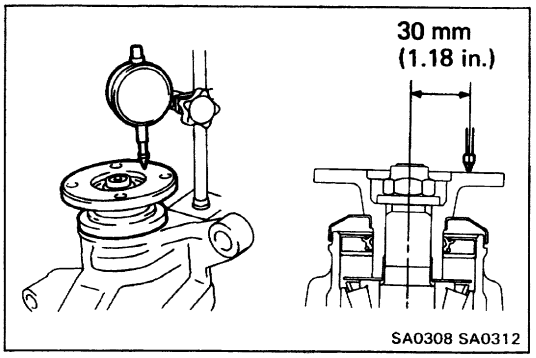
INSPECTION OF DIFFERENTIAL CARRIER

1. REMOVE DIFFERENTIAL CARRIER COVER

(a) Remove the eight bolts from carrier cover.

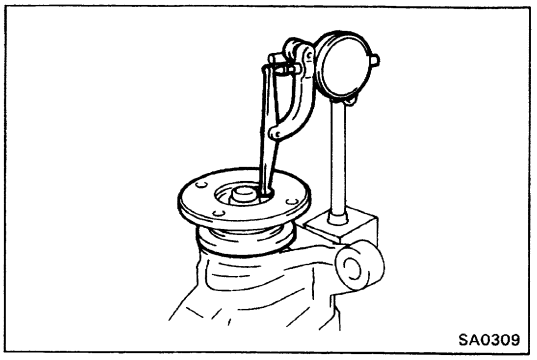


(b) Using a brass bar and hammer, separate the cover and carrier.

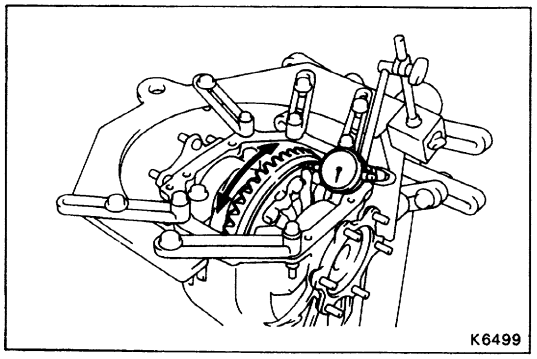


2. CHECK RUNOUT OF COMPANION FLANGE

Maximum vertical runout: 0.09 mm (0.0035 in.)



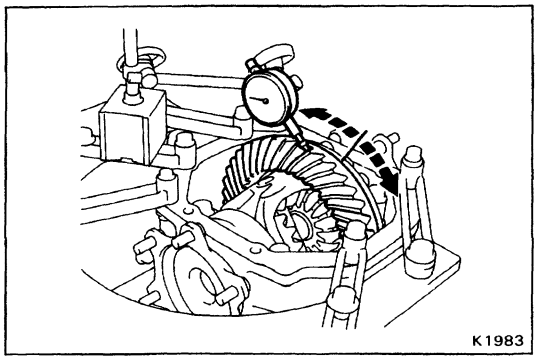
Maximum lateral runout: 0.09 mm (0.0035 in.)



3. CHECK RING GEAR RUNOUT

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

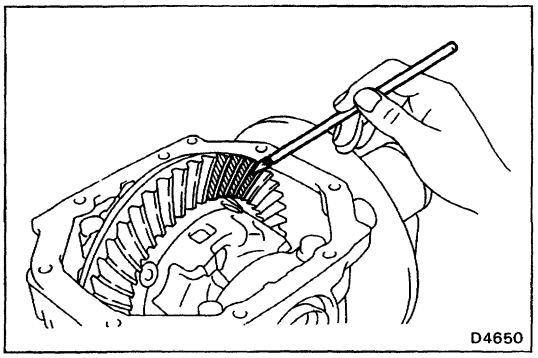
Maximum runout: 0.10 mm (0.0039 in.)



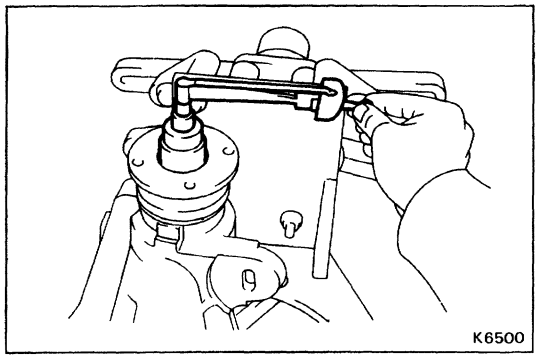
4. CHECK RING GEAR BACKLASH

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

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



5. CHECK TOOTH CONTACT (See page SA–63)



6. MEASURE DRIVE PINION PRELOAD

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

Preload (at starting):

5 – 8 kg–cm (4.3 – 6.9 in.–lb, 0.5 – 0.8 N–m)

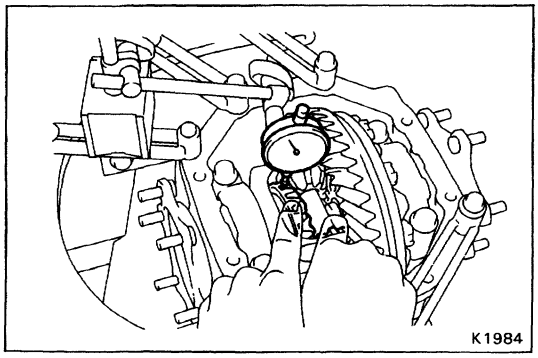
7. CHECK TOTAL PRELOAD

Using a torque wrench, measure the total preload.

Total preload:In addition to drive pinion preload

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

If necessary, disassemble and inspect a differential.



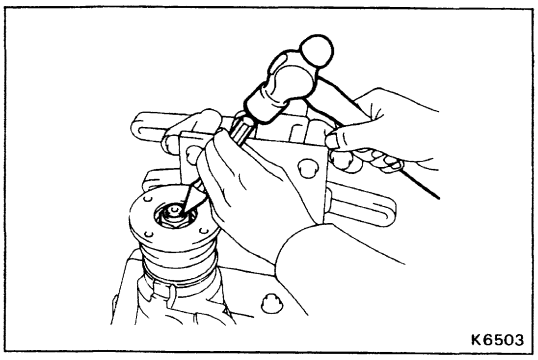
8. CHECK SIDE GEAR BACKLASH

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

Standard backlash: 0.05 – 0.20 mm

(0.0020 – 0.0079 in)

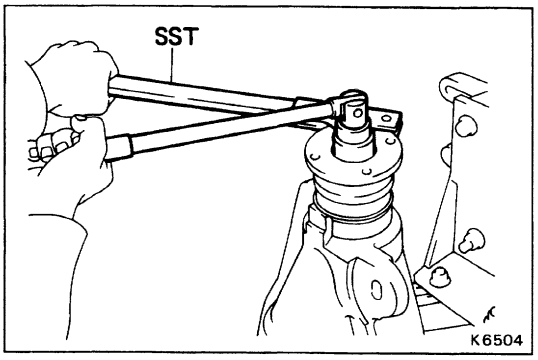
If the backlash is out of specification, install the correct thrust washers. (See page SA–68)



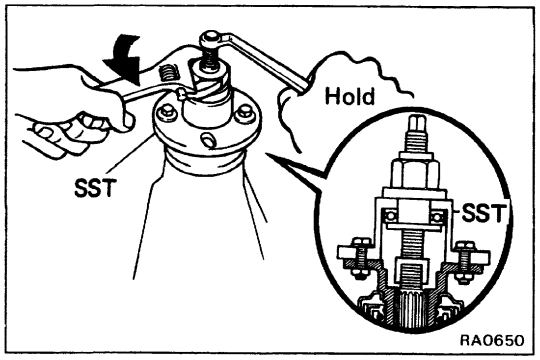
DISASSEMBLY OF DIFFERENTIAL CARRIER

1. REMOVE COMPANION FLANGE

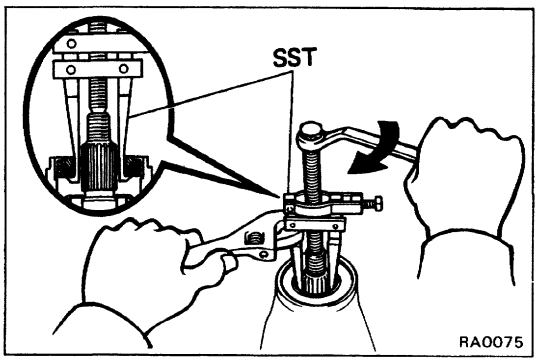
(a) Using a hammer and chisel, loosen the staked part of the nut.



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



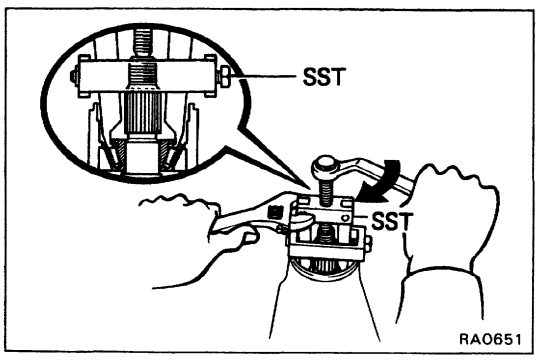
(c) Using SST, remove the companion flange.
SST 09557–22022 (09557–22050)



2. REMOVE FRONT OIL SEAL AND OIL SLINGER

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

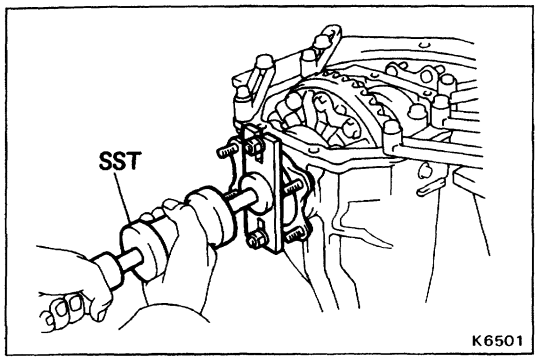
(b) Remove the oil slinger.



3. REMOVE FRONT BEARING AND BEARING SPACER

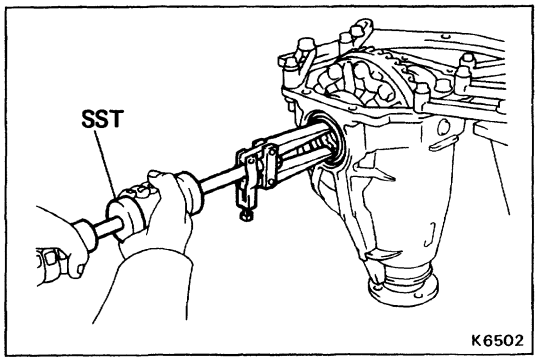
(a) Using SST, remove the bearing from the housing.
SST 09556–22010

(b) Remove the bearing spacer.



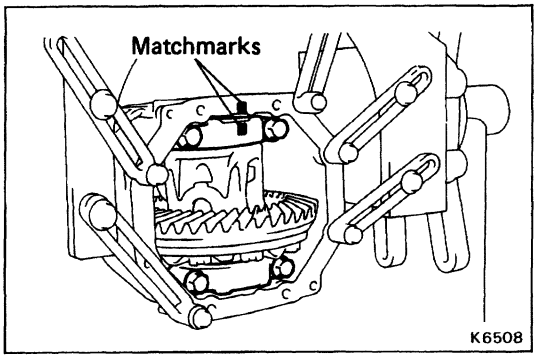
4. REMOVE SIDE GEAR SHAFT

Using SST, pull out the side gear shaft from the differential.
SST 09520–24010



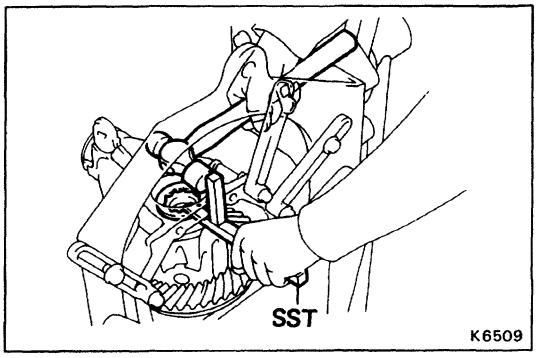
5. REMOVE SIDE GEAR SHAFT OIL SEAL

Using SST, remove the oil seal from the carrier.
SST 09308–00010

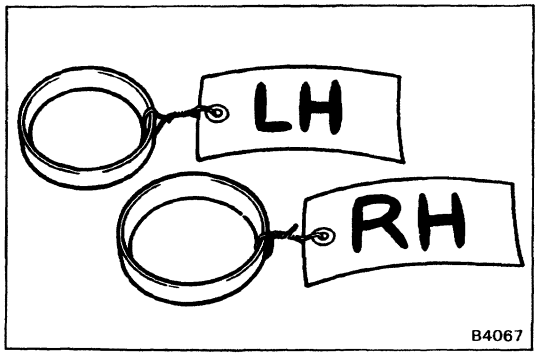


6. REMOVE DIFFERENTIAL CASE

(a) Place matchmarks on the bearing cap and differential carrier.
(b) Remove the two bearing caps.

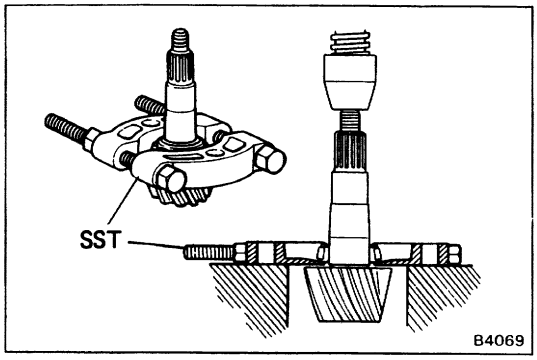


(c) Using SST, remove the two side bearing preload adjusting plates.
SST 09504–22011
HINT: Measure the adjusting plate washer and note the thickness.



(d) Remove the differential case and bearing outer race from the carrier.
HINT: Tag the bearing outer races to show the location for reassembly.

7. REMOVE DRIVE PINION FROM DIFFERENTIAL CARRIER

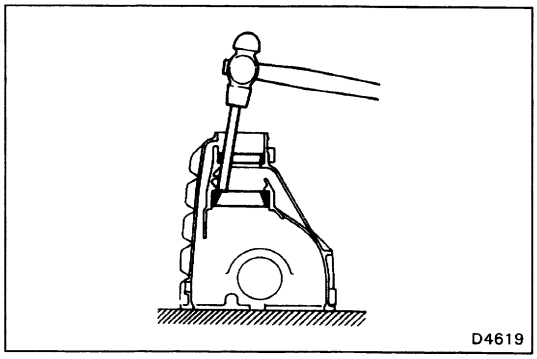


8. REMOVE DRIVE PINION REAR BEARING

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

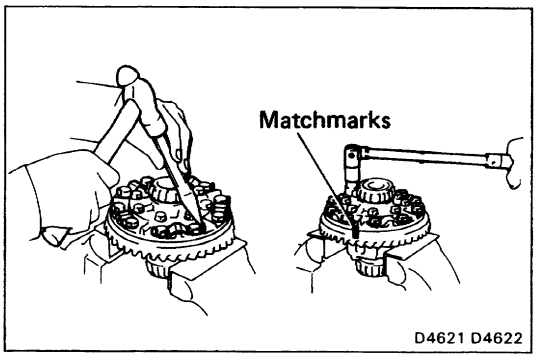
SST 09950–00020

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



9. REMOVE FRONT AND REAR BEARING OUTER RACE

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

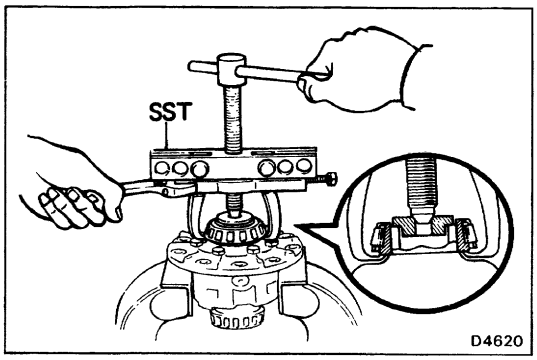


10. REMOVE RING GEAR

(a) Remove the ring gear set bolts and lock plates.

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

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



11. REMOVE SIDE BEARING

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

SST 09950–20017

12. DISASSEMBLE DIFFERENTIAL CASE

(Conventional type: See page SA–67)

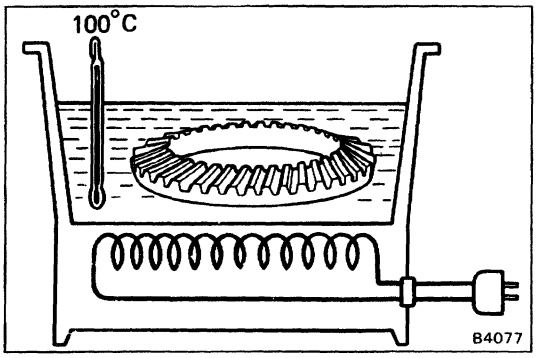
(LSD type: See page SA–69)

ASSEMBLY OF DIFFERENTIAL CARRIER

(See page SA–51)

1. ASSEMBLE DIFFERENTIAL CASE

(Conventional type: See page SA–68)
(LSD type: See page SA–73)



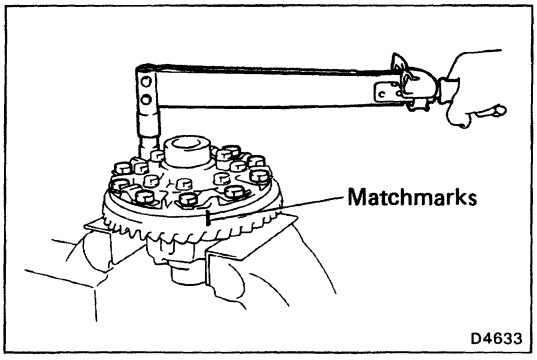
2. INSTALL RING GEAR ON DIFFERENTIAL CASE

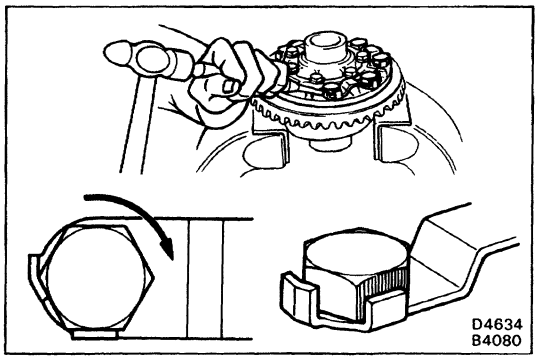
(a) Clean the contact surface of the differential case.
(b) Heat the ring gear to about 100°C (212°F) in an oil bath.

NOTICE: Do not heat the ring gear above 110°C (230°F).

(c) Clean the contact surface of the ring gear with cleaning solvent.
(d) Then quickly install the ring gear on the differential case.
(e) Align the matchrnarks on the ring gear and differential case.
(f) Coat the ring gear set bolts with gear oil.
(g) Temporarily install the lock plates and set bolts.
(h) After the ring gear cools down enough, tighten the set bolts uniformly and a little at a time.

Torque: 985 kg–cm (71 ft–lb, 97 N–m)





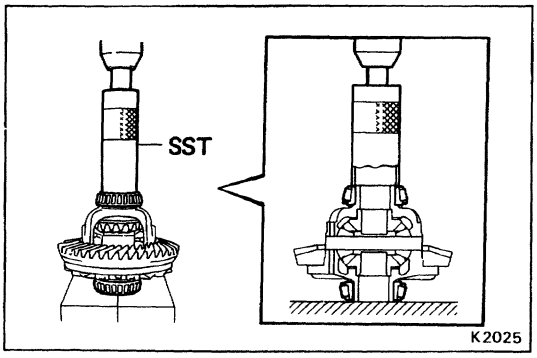
(i) Using a hammer and drift punch, stake the lock plates.

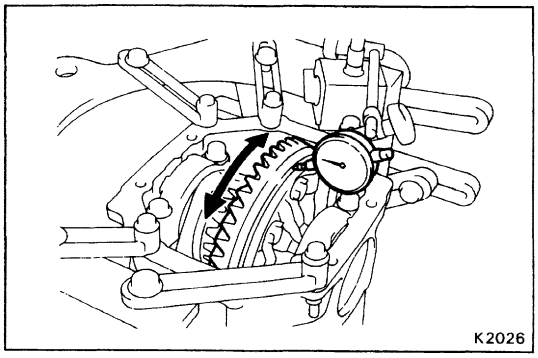
HINT: Stake one claw flush with the flat surface of the nut. For the claw contacting the protruding portion of the nut, stake the half on the tightening side.

3. INSTALL NEW SIDE BEARING

Using SST and a press, install new side bearings to the differential case.

SST 09316–60010 (09316–00010)

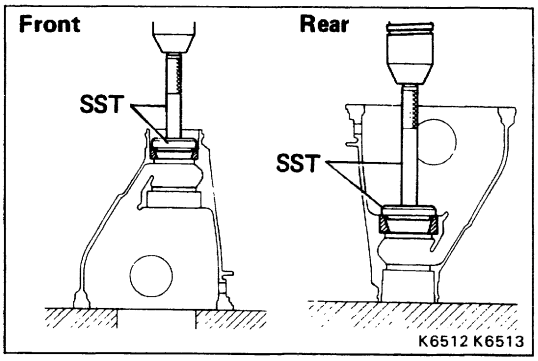




4. INSPECT RING GEAR RUNOUT

Maximum runout: 0.10 mm (0.0039 in.)

Install the differential case onto the carrier and install the plate washers which eliminate any clearance between the outer races and carrier.



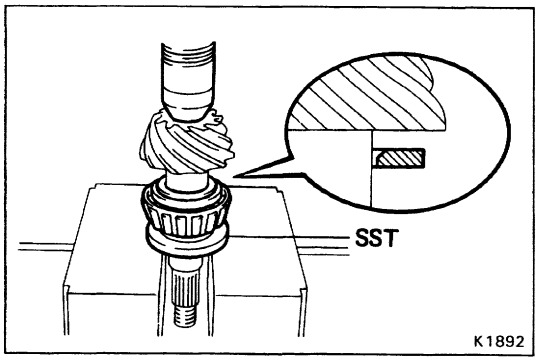
5. INSTALL FRONT AND REAR BEARING OUTER RACE

Using SST, drive in a new outer race to the carrier.

SST 09608–35014

Front (09608–06020, 09608–06110)

Rear (09608–06020, 09608–06180)

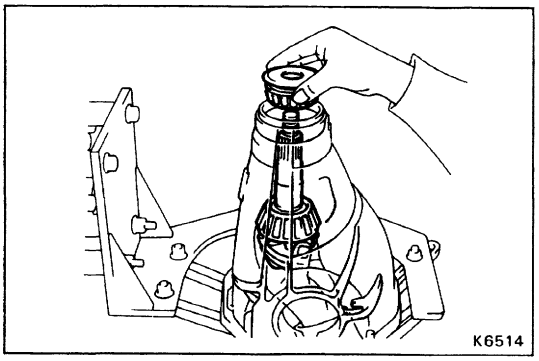


6. INSTALL DRIVE PINION REAR BEARING

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

(b) Using SST, press in the reused washer and rear bearing onto the drive pinion.

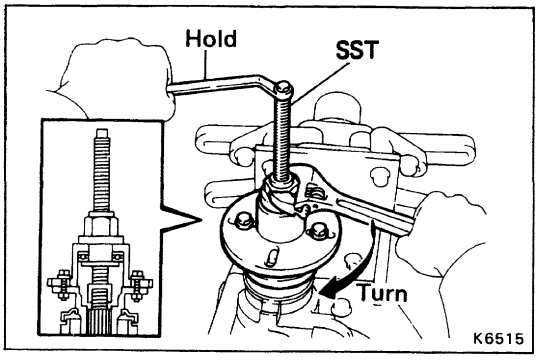
SST 09506–30012



7. TEMPORARILY ADJUST DRIVE PINION PRELOAD

(a) Install the drive pinion and front bearing.

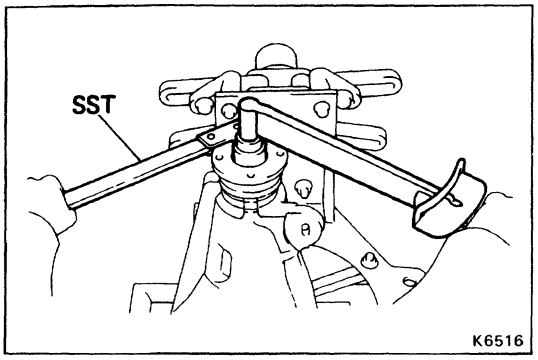
HINT: Assemble the spacer, oil slinger and oil seal after adjusting the gear contact pattern.



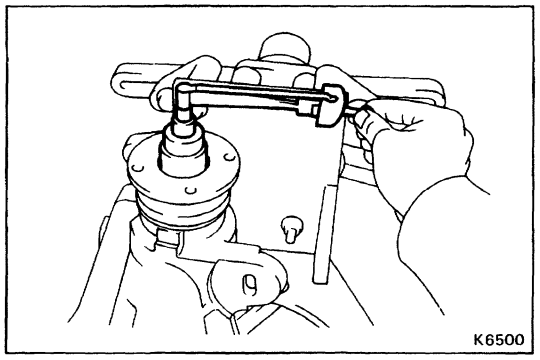
(b) Using SST, install the companion flange.

Coat the threads of the nut with MP grease.

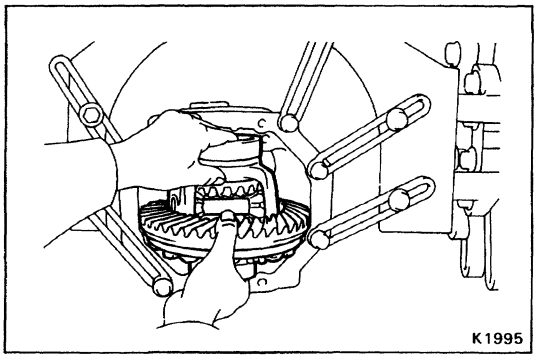
SST 09557–22022 (09557–22050)



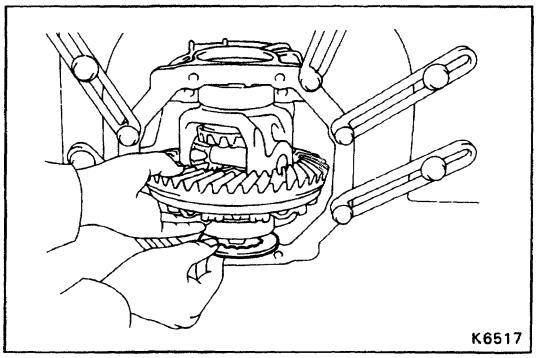
(c) Adjust the drive pinion preload by tightening the companion flange nut.
Using SST to hold the flange, tighten the nut.
SST 09330–00021
NOTICE: As there is no spacer, tighten a little at a time, being careful not to overtighten it.



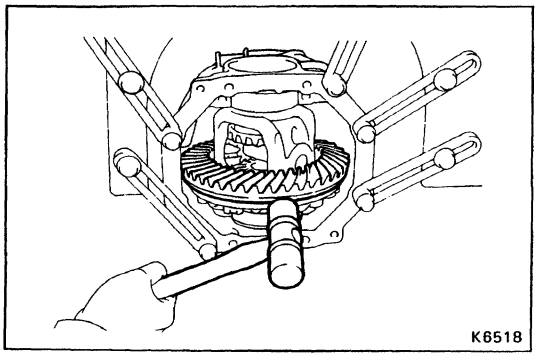
(d) Using a torque wrench, measure the preload.
Preload :
New bearing 10 – 16 kg–cm
(8.7 – 13.9 in. –lb, 1.0 – 1.6 N–m)
Reused bearing 5 – 8 kg–cm
(4.3–6.9in.–tb,0.5–0.8N–m)



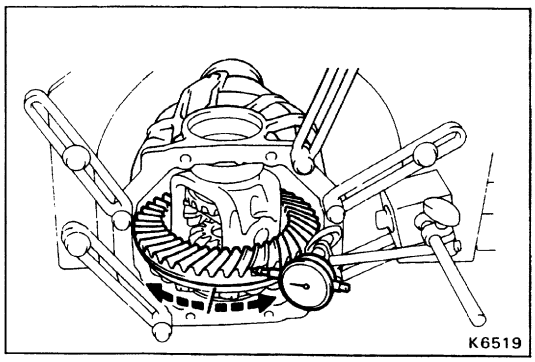
8. INSTALL DIFFERENTIAL CASE IN CARRIER
(a) Place the bearing outer races on their respective bearings. Make sure the left and right races are not interchanged.
(b) Install the differential case in the carrier.



9. ADJUST RING GEAR BACKLASH
(a) Install only the plate washer on the ring gear back side.
HINT: Insure that the plate has a backlash.

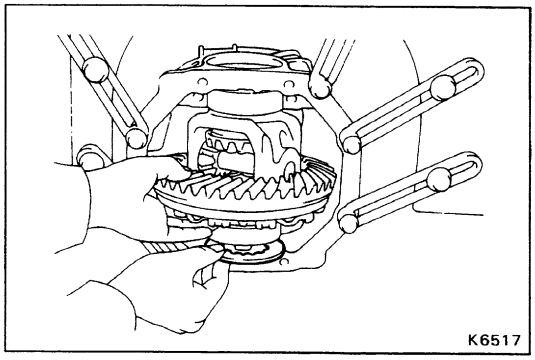


(b) Snug down the washer and bearing by tapping on the ring gear with a plastic hammer.

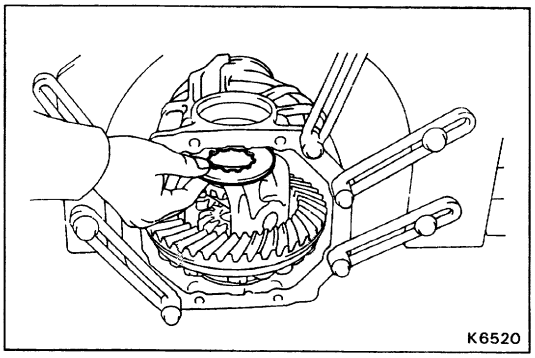


(c) Hold the side bearing boss on the teeth surface of the ring gear and measure the backlash.

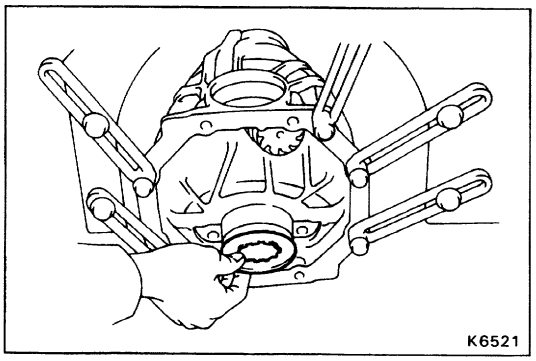
Backlash (reference): 0.10 mm (0.0039 in.)



(d) Select a ring gear side plate washer so that the backlash is 0.10 mm (0.0039 in.).
(See table on page SA–62)

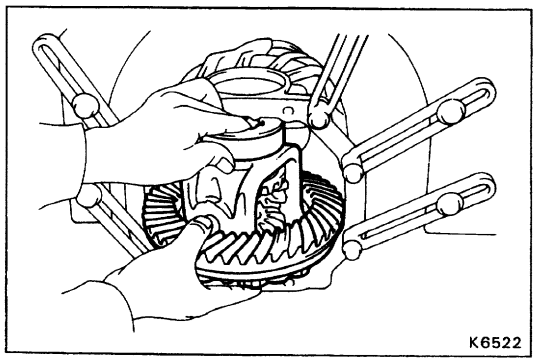


(e) Select a pinion gear side washer of a thickness which eliminates any clearance between the outer race and carrier.

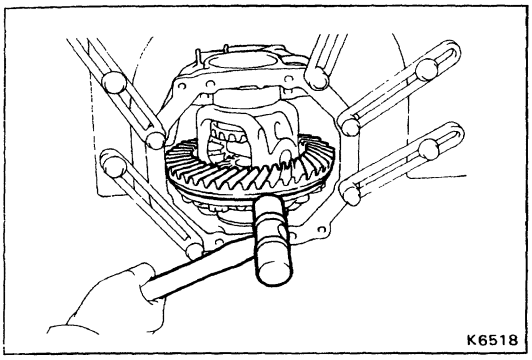


(f) Remove the plate washers and differential case.

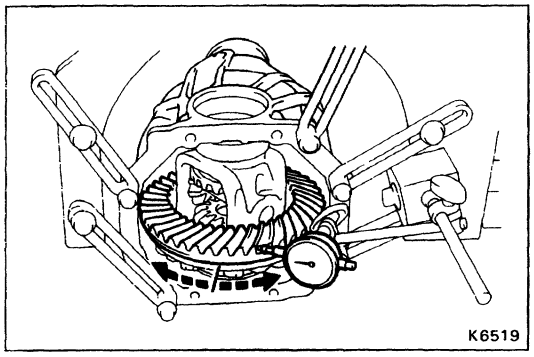
(g) Install the plate washer into the lower part of the carrier.



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

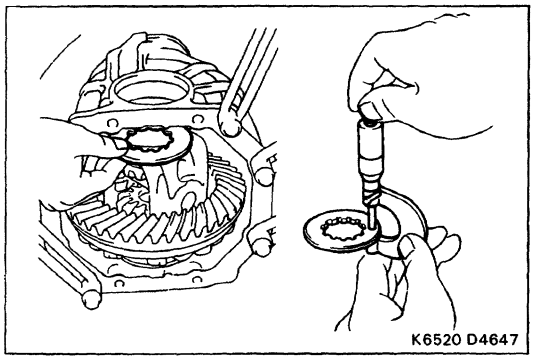


(i) Using a plastic hammer, snug down the washer and bearing by tapping the ring gear.



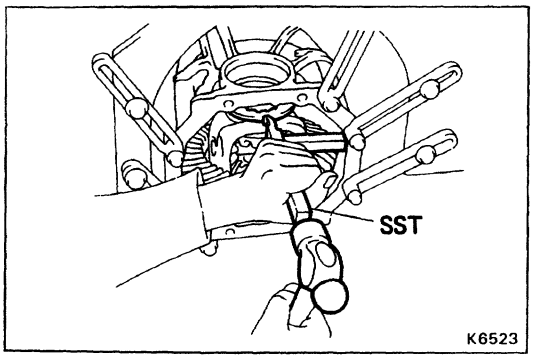
(j) Using a dial indicator, measure the ring gear backlash.
Backlash: 0.13 – 0.18 mm (0.0051 – 0.0071 in.)

(k) 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.

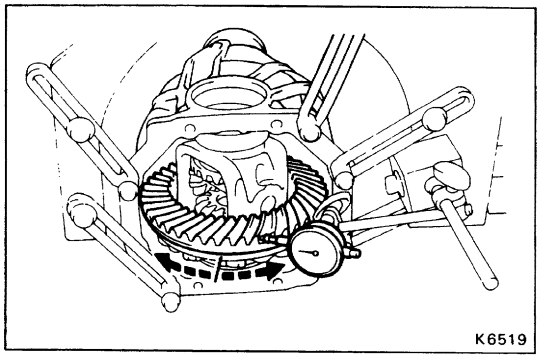


10. ADJUST SIDE BEARING PRELOAD

(a) After adjustment with the backlash as reference, remove the ring gear teeth plate washer and measure the thickness.



(b) Install a new washer of 0.06 – 0.09 mm (0.0024 – 0.0035 in.) thicker than the washer removed.
HINT: Select a washer which can be pressed in 2I3 of the way by finger.
(c) Using SST and a plastic hammer, tap in the side washer.
SST 09504–22011

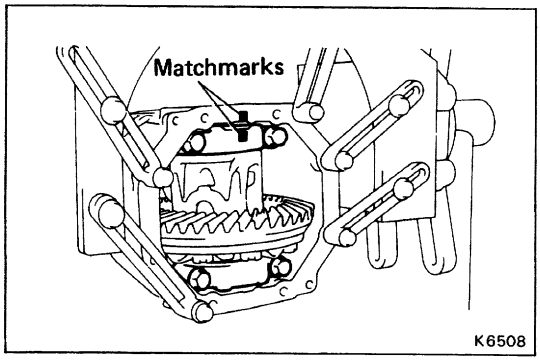


(d) Recheck the ring gear backlash.
Backlash: 0.13 – 0.18 mm (0.0051 – 0.0071 in.)
(e) If not within standard, adjust by either increasing or decreasing the washers on both sides by equal amount.

HINT: The backlash will change about 0.02 mm (0.0008 in.) with 0.03 mm (0.0012 in.) alteration of the side washer.

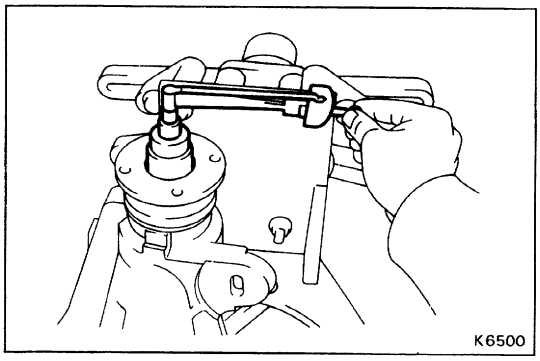
Washer thickness

Thickness		mm (in.)
2.57 – 2.59 (0.1012 – 0.1020)	2.90 – 2.92 (0.1142 – 0.1150)	3.23 – 3.25 (0.1272 – 0.1280)
2.60 – 2.62 (0.1024 – 0.1031)	2.93 – 2.95 (0.1154 – 0.1161)	3.26 – 3.28 (0.1283 – 0.1291)
2.63 – 2.65 (0.1035 – 0.1043)	2.96 – 2.98 (0.1165 – 0.1173)	3.29 – 3.31 (0.1295 – 0.1303)
2.66 – 2.68 (0.1047 – 0.1055)	2.99 – 3.01 (0.1177 – 0.1185)	3.32 – 3.34 (0.1307 – 0.1315)
2.69 – 2.71 (0.1059 – 0.1067)	3.02 – 3.04 (0.1189 – 0.1197)	3.35 – 3.37 (0.1319 – 0.1327)
2.72 – 2.74 (0.1071 – 0.1079)	3.05 – 3.07 (0.1201 – 0.1209)	3.38 – 3.40 (0.1331 – 0.1339)
2.75 – 2.77 (0.1083 – 0.1091)	3.08 – 3.10 (0.1213 – 0.1220)	3.41 – 3.43 (0.1343 – 0.1350)
2.78 – 2.80 (0.1094 – 0.1102)	3.11 – 3.13 (0.1224 – 0.1232)	3.44 – 3.46 (0.1354 – 0.1362)
2.81 – 2.83 (0.1106 – 0.1114)	3.14 – 3.16 (0.1236 – 0.1244)	3.47 – 3.49 (0.1366 – 0.1374)
2.84 – 2.86 (0.1118 – 0.1126)	3.17 – 3.19 (0.1248 – 0.1256)	
2.87 – 2.89 (0.1130 – 0.1138)	3.20 – 3.22 (0.1260 – 0.1268)	



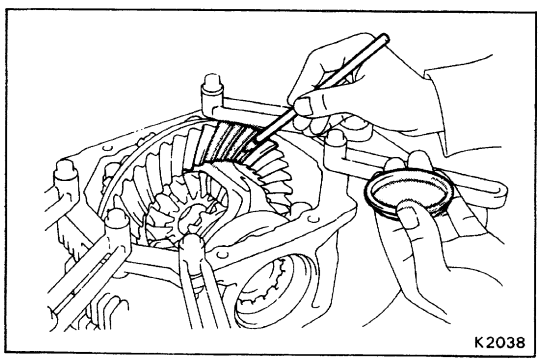
11. INSTALL SIDE BEARING CAPS

Align the marks on the cap and carrier.
Torque: 800 kg–cm (58 ft–lb, 78 N–m)



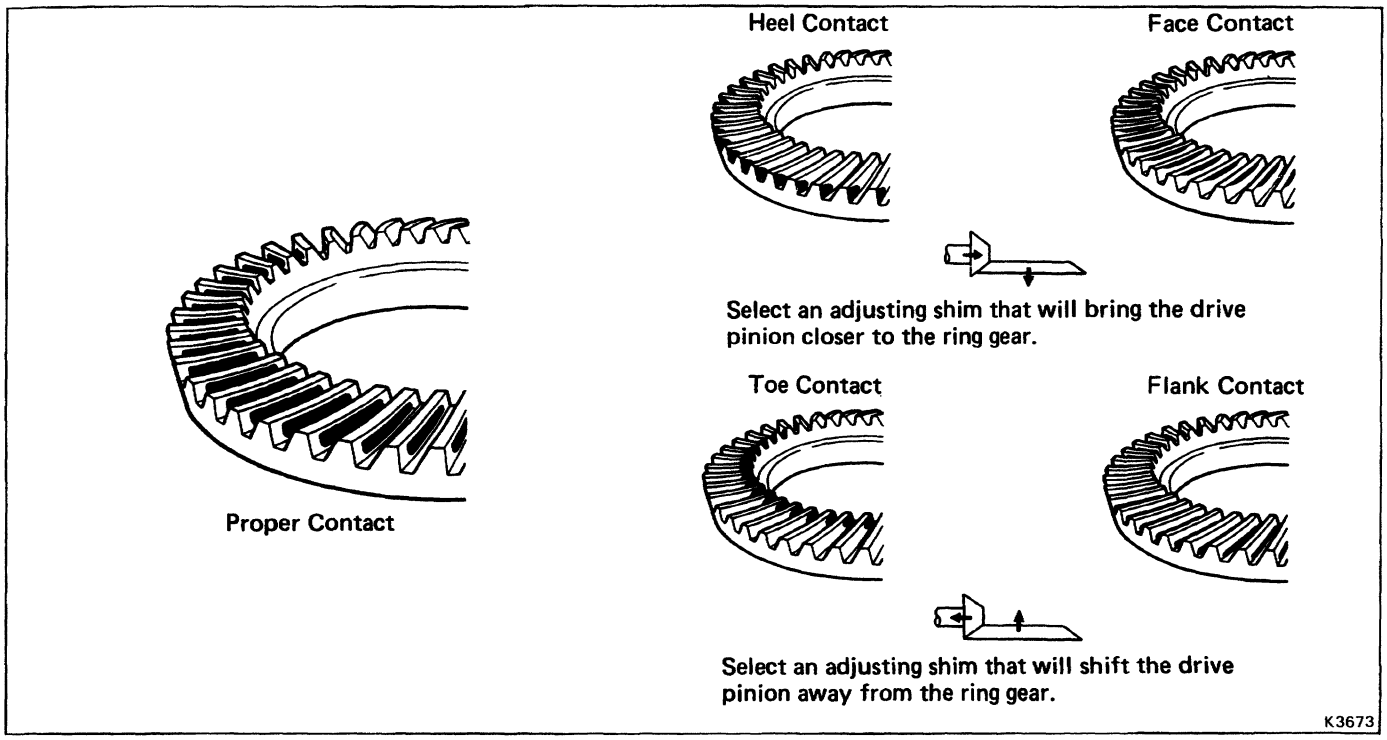
12. MEASURE TOTAL PRELOAD

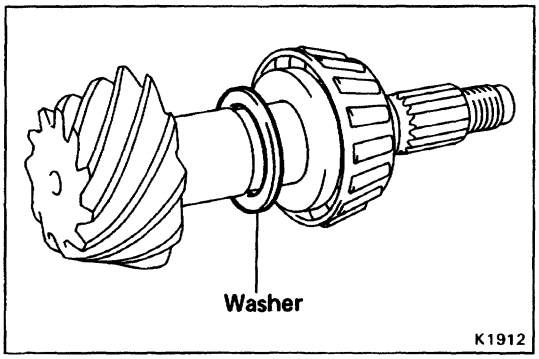
Using a torque wrench, measure the total preload.
Total preload: In addition to drive pinion preload
4–6kg–cm (3.5–5.2in.–lb, 0.4–0.6N–m)

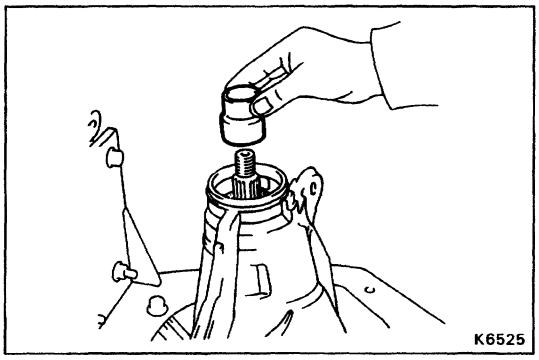


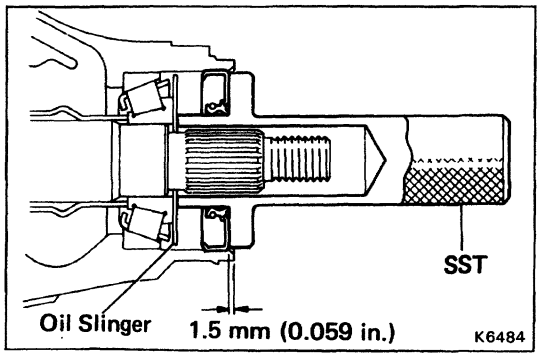
13. INSPECT TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION

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









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

Washer thickness

Thickness mm (in.)	
1.70 (0.0669)	2.03 (0.0799)
1.73 (0.0681)	2.06 (0.0811)
1.76 (0.0693)	2.09 (0.0823)
1.79 (0.0705)	2.12 (0.0835)
1.82 (0.0717)	2.15 (0.0846)
1.85 (0.0728)	2.18 (0.0858)
1.88 (0.0740)	2.21 (0.0870)
1.91 (0.0752)	2.24 (0.0882)
1.94 (0.0764)	2.27 (0.0894)
1.97 (0.0776)	2.30 (0.0906)
2.00 (0.0787)	2.33 (0.0917)

14. REMOVE COMPANION FLANGE
(See page SA–54)

15. REMOVE FRONT BEARING (See page SA–54)

16. INSTALL NEW BEARING SPACER AND FRONT BEARING

17. INSTALL OIL SLINGER AND NEW FRONT OIL SEAL

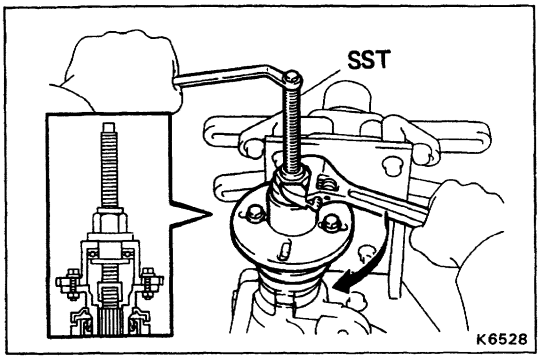
(a) Install the oil slinger.

(b) Using SST, drive in a new oil seal.

SST 09554–30011

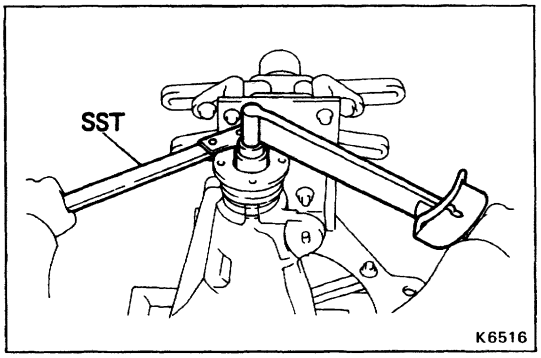
Oil seal drive in depth: 1.5 mm (0.059 in.)

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

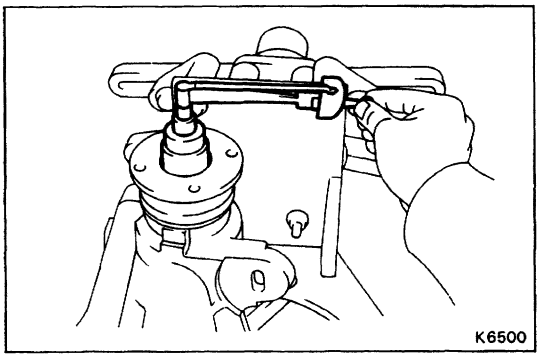


18. INSTALL COMPANION FLANGE

(a) Using SST, install the companion flange on the shaft.
SST 09557–22022 (09557–22050)



(b) Coat the threads of a new nut with MP grease.
(c) Using SST to hold the flange, tighten the nut.
SST 09330–00021
Torque: 1,850 kg–cm (134 ft–ib, 181 N–m)



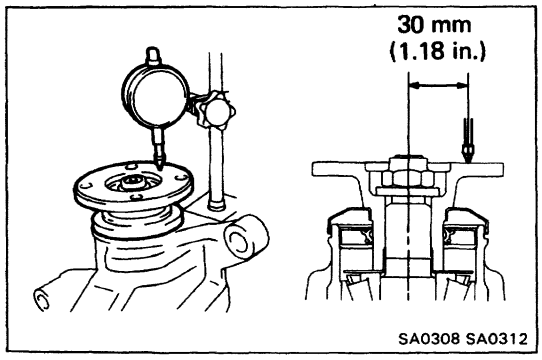
19. CHECK FRONT BEARING PRELOAD

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

New bearing 10 – 16 kg–cm (8.7 – 13.9 in.lb, 1.0 – 1.6 N–m)
Reused bearing 5 – 8 kg–cm (4.3–6.9 in.lb,0.5–0.8N–m)

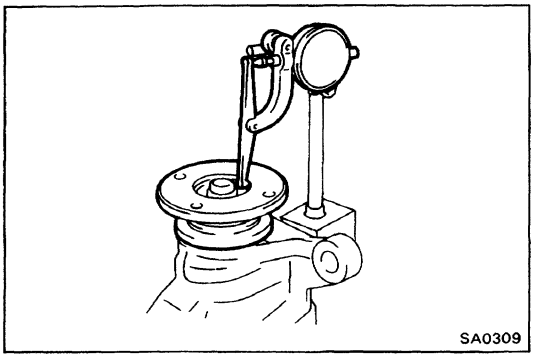
- **If preload is greater than specification, replace the bearing spacer.**
- **if preload is less than specification, retighten the nut 130 kg–cm (9 ft–lb, 13 N–m) at a time until the specified preload is reached.**

If the maximum torque is exceed 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: 3,450 kg–cm (250 ft–lb, 338 N–m)

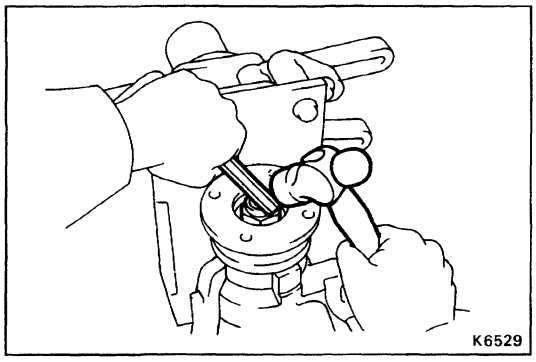


20. CHECK RUNOUT OF COMPANION FLANGE

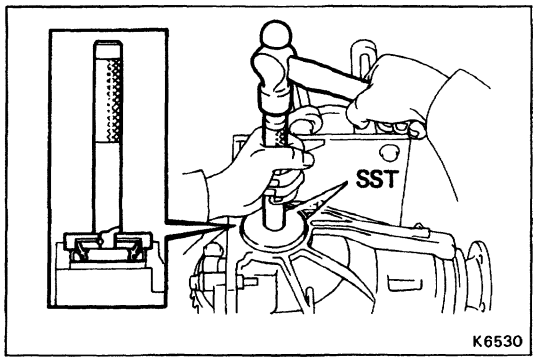
Using a dial indicator, measure the vertical and lateral runout of the companion flange.
Maximum vertical runout: 0.10 mm (0.0039 in.)


SA0309

Maximum lateral runout: 0.10 mm l0.0039 in.)
If the runout is greater than maximum, inspect the bearings.


K6529

21. STAKE DRIVE PINION NUT

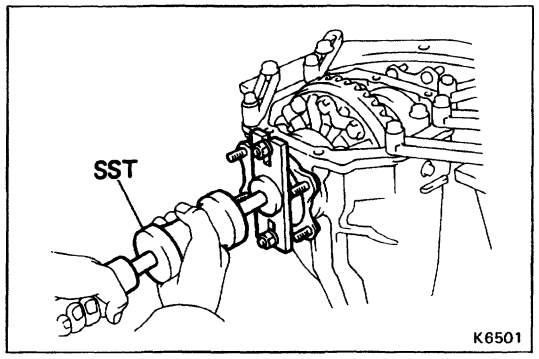


K6530

22. INSTALL SIDE GEAR SHAFT OIL SEAL
(a) Coat the oil seal lip with MP grease.
(b) Using SST, drive in the oil seal until it is flush with the carrier end surface.
SST 09550–22011 t09550–00020, 09550–00031)

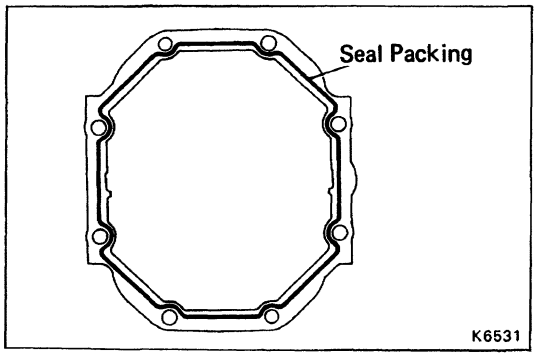
23. INSTALL SIDE GEAR SHAFT
(a) Install a new snap ring to the side gear shaft.
(b) Using SST, drive in the side gear shaft until it contacts the pinion shaft.
SST 09520–24010

24. CHECK INSTALLATION OF SIDE GEAR SHAFT
(a) Check that there is 2 – 3 mm (0.08 – 0.12 in.) of play in axial direction.
(b) Check that the side gear shaft will not come out by trying to pull it completely out by hand.



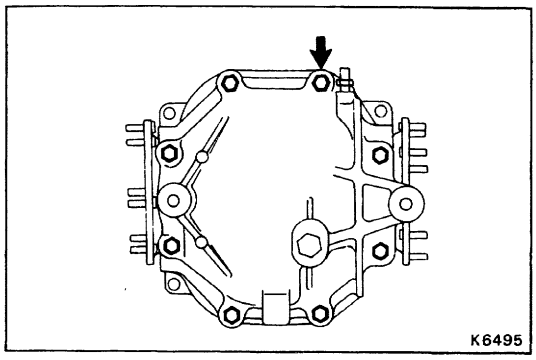
K6501

25. INSTALL DIFFERENTIAL CARRIER COVER
(a) Clean contacting surfaces of any residual packing material using gasoline or alcohol.
(b) Apply seal packing to the carrier.
Seal packing: Part No. 08826–00090, THREE BOND 1281 or equivalent



K6531

HINT:
- Install the carrier cover within 3 minutes after applying seal packing.
- After installing the cover, wait at least one hour before filling oil or running the vehicle. Also avoid
sudden acceleration/deceleration with twelve hours of installing the cover.



(c) Torque the set bolts.
Torque: 475 kg–cm (34 ft–lb, 47 N–m)