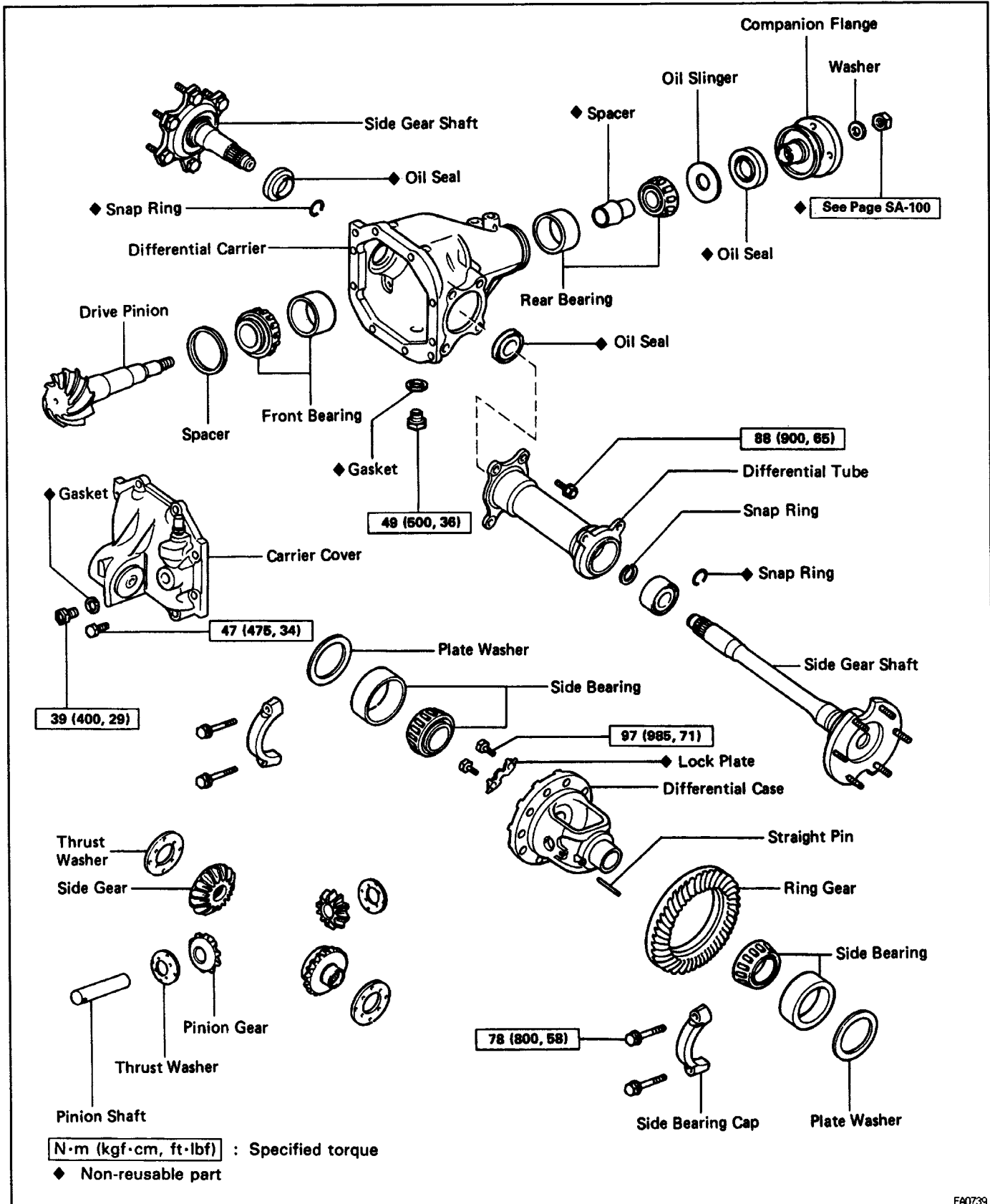
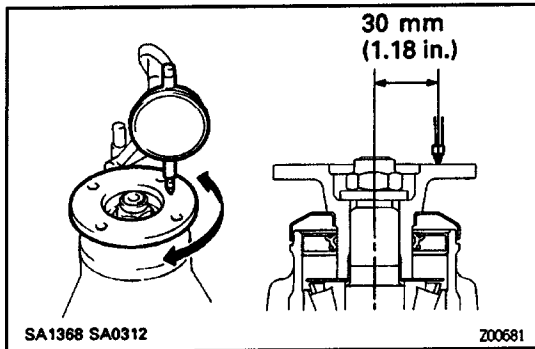


# DIFFERENTIAL CARRIER (wo A.D.D.) COMPONENTS





## DIFFERENTIAL CARRIER INSPECTION

### 1. CHECK RUNOUT OF COMPANION FLANGE

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

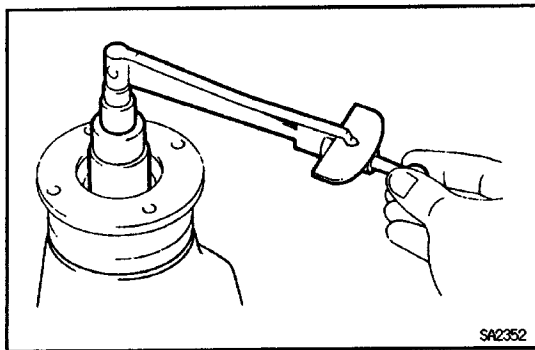
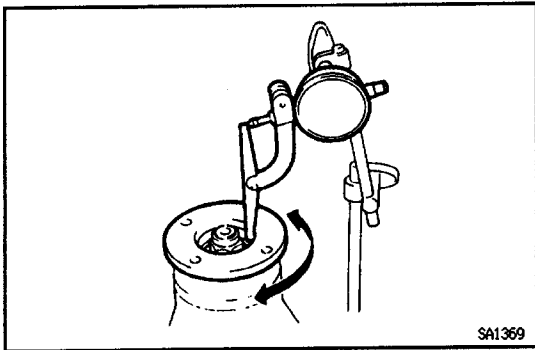
**Maximum vertical runout:**

**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.

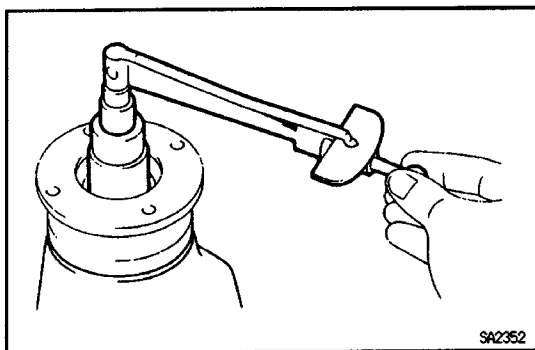


### 2. CHECK DRIVE PINION PRELOAD

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

**Preload (at starting):**

**0.6 – 1.0 N-m (6 – 10 kgf-cm, 5.2 – 8.7 in.-lbf)**



### 3. CHECK TOTAL PRELOAD

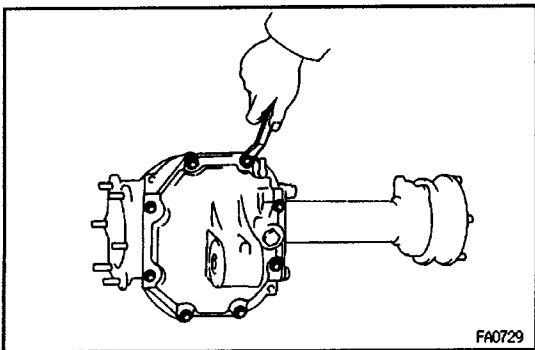
Using a torque wrench, measure the total preload.

**Total preload (at starting):**

In addition to drive pinion preload

**0.4 – 0.6 N-m (4 – 6 kgf-cm, 3.5 – 5.2 in.-lbf)**

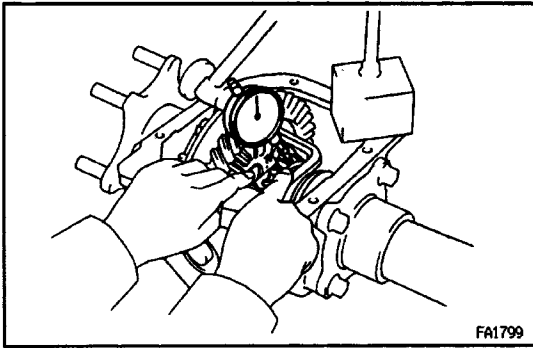
If necessary, disassemble and inspect the differential.



## DIFFERENTIAL CARRIER DISASSEMBLY

### 1. REMOVE DIFFERENTIAL CARRIER COVER

Remove the 8 bolts and tap off the cover with a plastic-faced hammer.



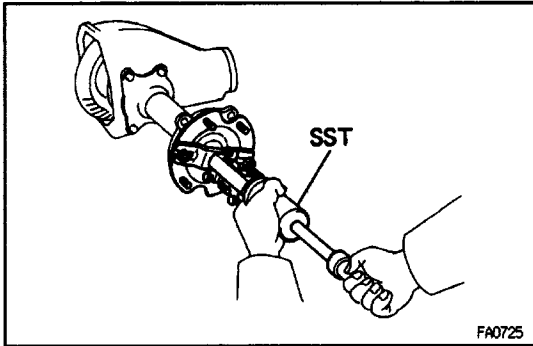
## 2. CHECK SIDE GEAR BACKLASH

Measure the side gear backlash while holding 1 pinion gear toward the case.

### Backlash:

**0.05 – 0.20 mm (0.0020 – 0.0079 in.)**

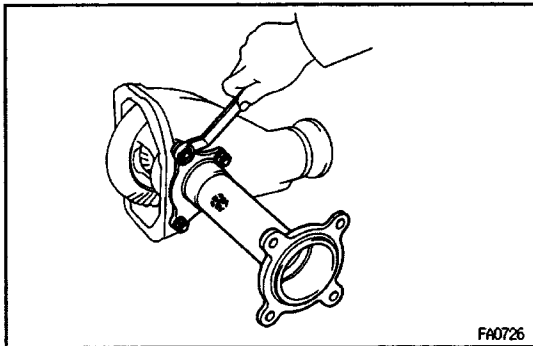
If the backlash is out of specification, install the correct thrust washers. (See page [SA-92](#))



## 3. REMOVE SIDE GEAR SHAFTS

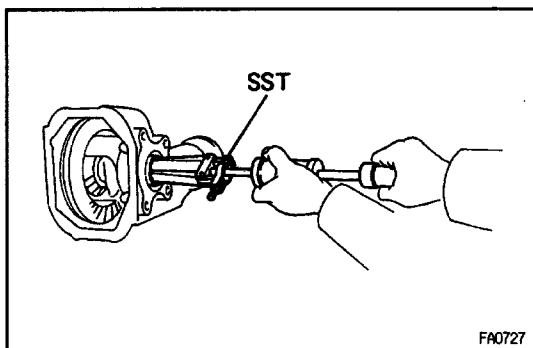
Using SST, remove the side gear shafts.

SST 09910-00015 (09911-00011, 09912-00010, 09914-00011)



## 4. REMOVE DIFFERENTIAL TUBE

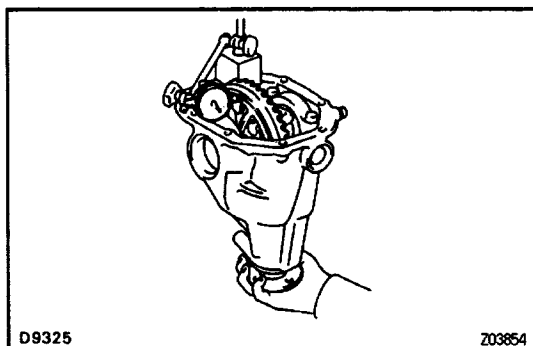
Remove the 4 bolts and differential tube.



## 5. REMOVE SIDE GEAR SHAFT OIL SEALS

Using SST, remove the right and left side gear shaft oil seals.

SST 09308 - 00010



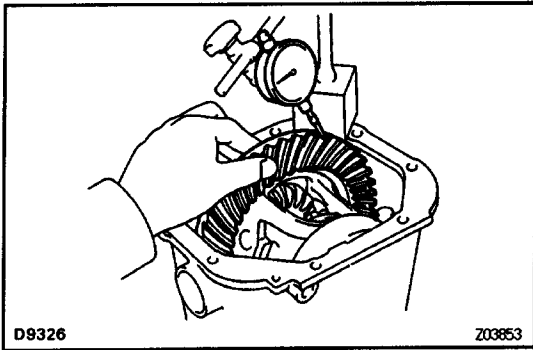
## 6. CHECK RING GEAR RUNOUT

Using a dial indicator, measure the ring gear runout.

### Maximum runout:

**0.07 mm (0.0028 in.)**

If the runout is greater than the maximum, replace the ring gear and drive pinion as a set.



### 7. CHECK RING GEAR BACKLASH

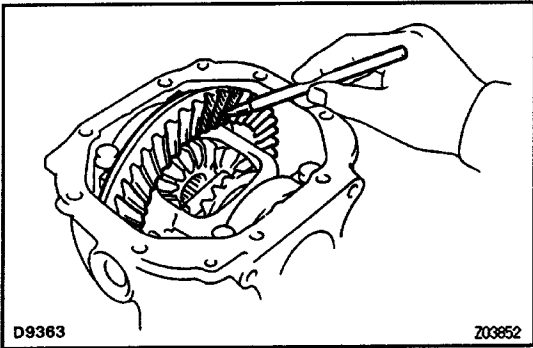
- (a) Fix the dial indicator on the tooth surface at a 90° angle.
- (b) Holding the drive pinion flange, measure the ring gear backlash.

#### Backlash:

**0.13 – 0.18 mm (0.0051 – 0.0071 in.)**

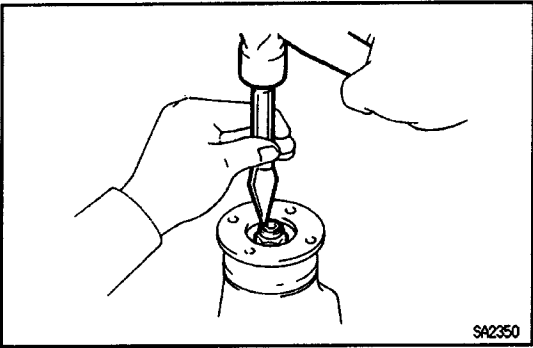
If the backlash is not within specification, adjust the ring gear backlash.

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



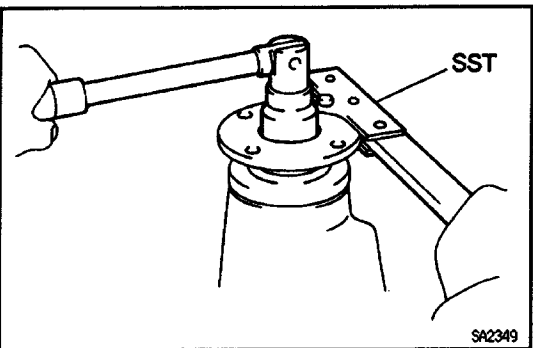
### 8. CHECK TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION

(See page [SA-99](#))



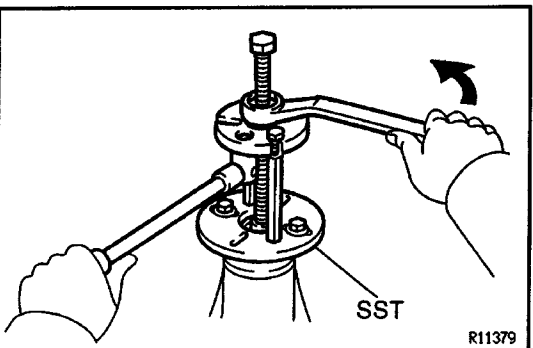
### 9. REMOVE COMPANION FLANGE

- (a) Using a chisel and hammer, unstick the nut.



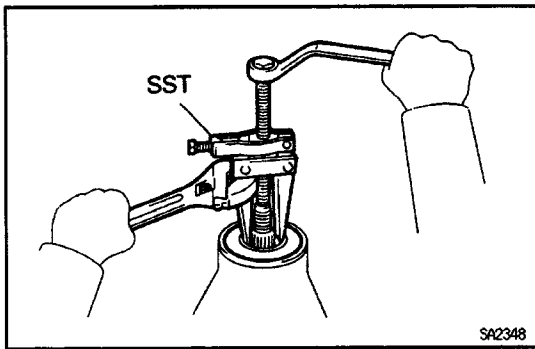
- (b) Using SST to hold the flange, remove the nut and plate washer.

SST 09330-00021



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

SST 09950-30010

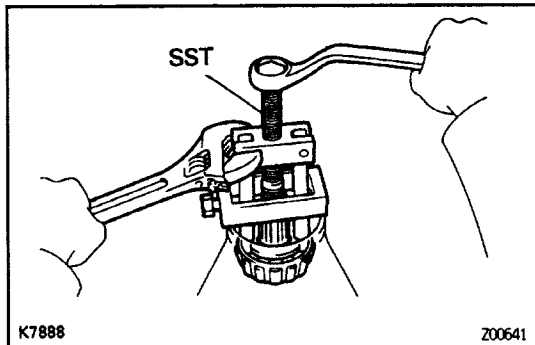


## 10. REMOVE OIL SEAL AND OIL SLINGER

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

SST 09308-10010

(b) Remove the oil slinger.

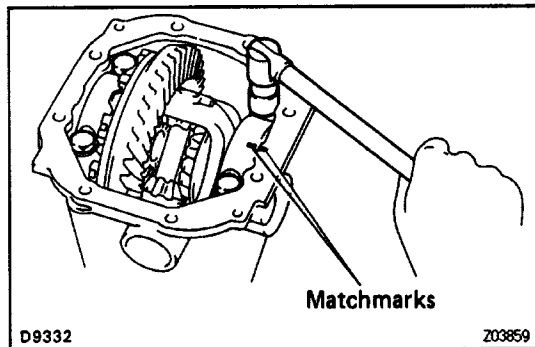


## 11. REMOVE REAR BEARING AND BEARING SPACER

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

SST 09658-30010

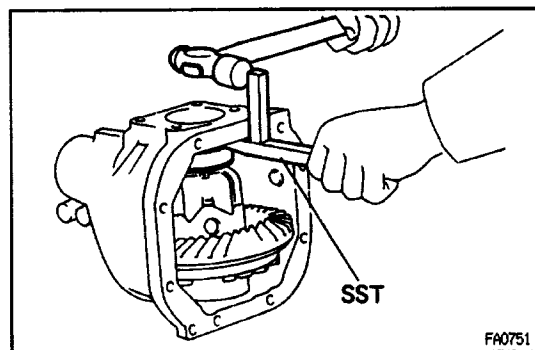
(b) Remove the bearing spacer.



## 12. REMOVE DIFFERENTIAL CASE ASSEMBLY

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

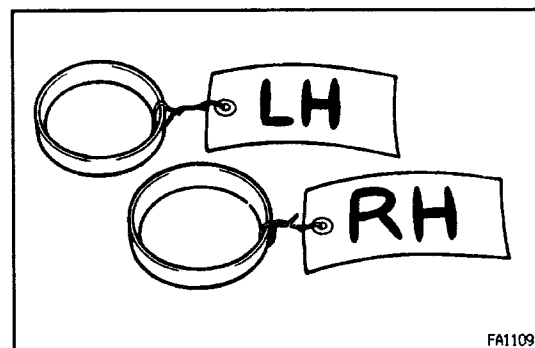
(b) Remove the 4 bolts and 2 bearing caps.



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

SST 09504 - 22011

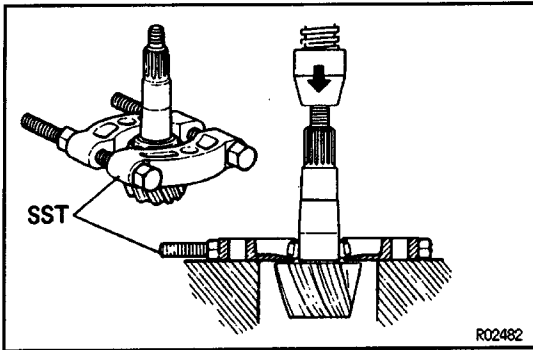
HINT: Measure the plate washer and note the thickness.



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

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

## 13. REMOVE DRIVE PINION FROM DIFFERENTIAL CARRIER

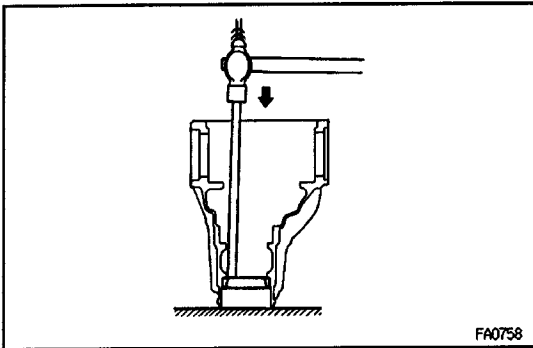


#### 14. REMOVE DRIVE PINION FRONT BEARING

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

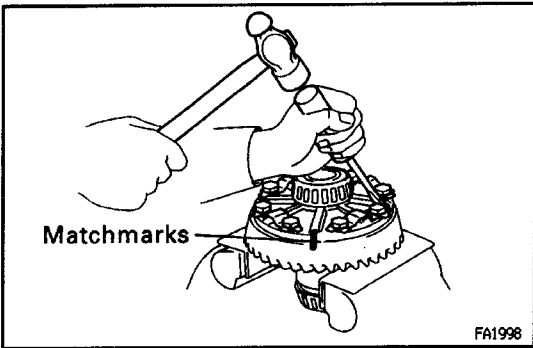
SST 09950-00020

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



#### 15. REMOVE DRIVE PINION BEARING OUTER RACES

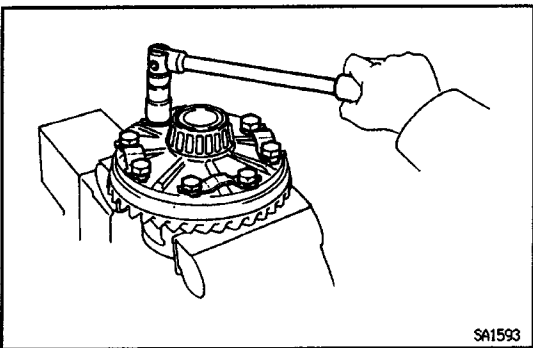
Using a brass bar and hammer, drive out the outer races from the differential carrier.



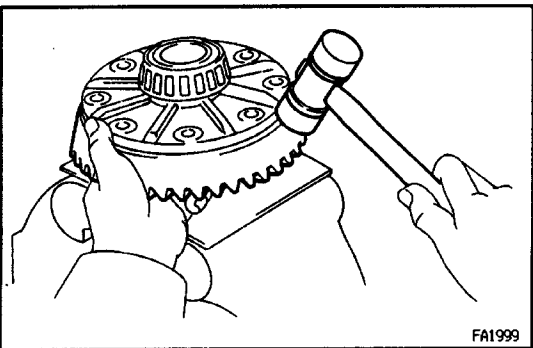
#### 16. REMOVE RING GEAR

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

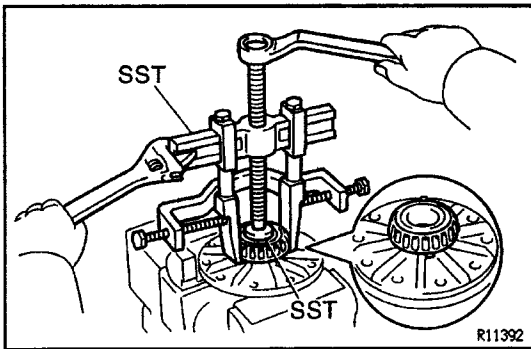
(b) Using a screwdriver and hammer, unstake the lock plates.



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



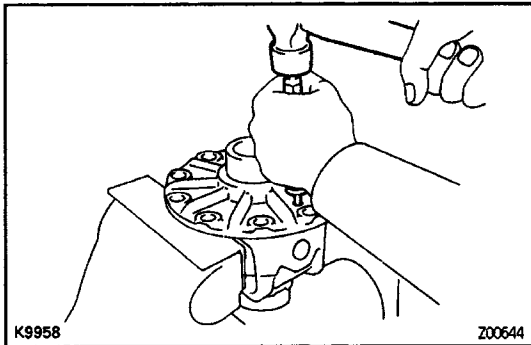
(d) Using a plastic-faced hammer, tap on the ring gear to separate it from the differential case.

**17. REMOVE SIDE BEARINGS**

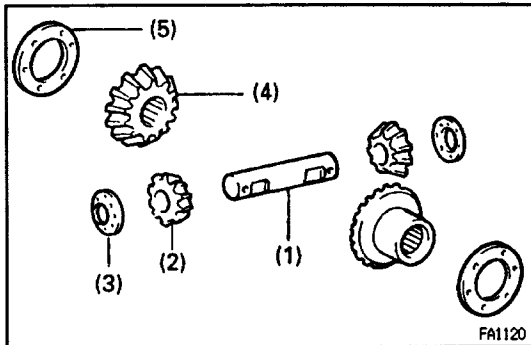
Using SST, remove the side bearings from the differential case.

SST 09608-30012 (09608-04060),  
09950-40010

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

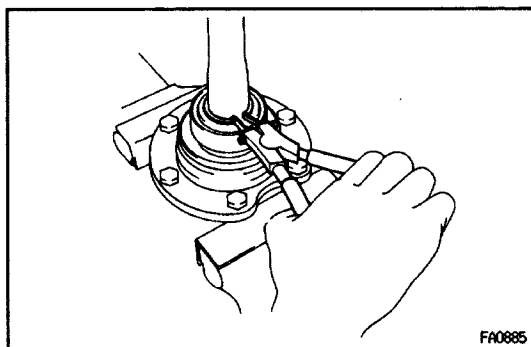
**18. DISASSEMBLE DIFFERENTIAL CASE ASSEMBLY**

(a) Using a pin punch and hammer, drive out the straight pin.

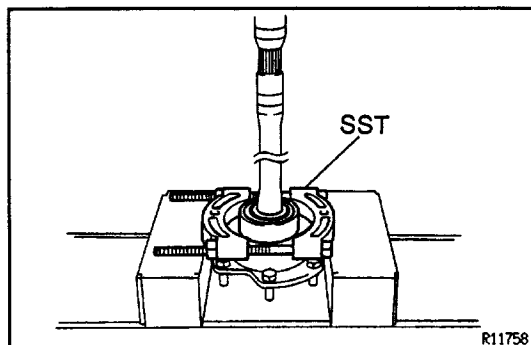


(b) Remove these parts:

- (1) Pinion shaft
- (2) Pinion gears
- (3) Pinion gear thrust washers
- (4) Side gears
- (5) Side gear thrust washers

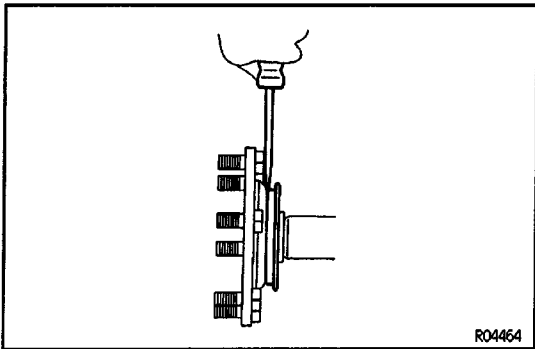
**SIDE GEAR SHAFT BEARING AND DUST COVER REPLACEMENT****1. REPLACE LH SIDE GEAR SHAFT BEARING AND DUST COVER**

(a) Using a snap ring expander, remove the snap ring.

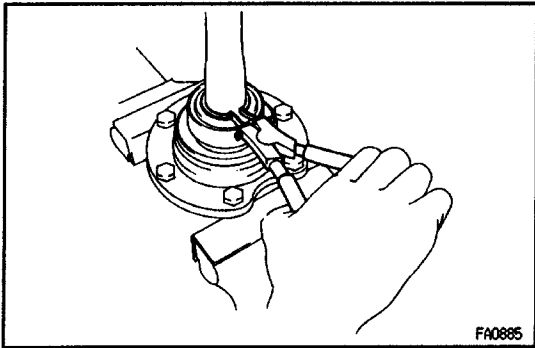


(b) Using SST and a press, remove the bearing.

SST 09950-00020



(c) Using a screwdriver and hammer, remove the dust cover.



(d) Using a snap ring expander, install a new snap ring.



## DIFFERENTIAL CARRIER ASSEMBLY

### 1. ADJUST DIFFERENTIAL SIDE GEAR SHAFT BACKLASH

- (a) Install the proper thrust washers on the side gears.  
**HINT:** Using the table below, select thrust washers which will ensure that the backlash is within specifications.

Washer thickness

Thickness mm (in.)	Thickness mm (in.)
<b>0.96 – 1.04 (0.0378 – 0.0409)</b>	<b>1.16 – 1.24 (0.0457 – 0.0488)</b>
<b>1.06 – 1.14 (0.0417 – 0.0449)</b>	<b>1.26 – 1.34 (0.0496 – 0.0528)</b>

- (b) Install the side gears, pinion gears, pinion gear thrust washers and pinion shaft in the differential case.  
**HINT:** Align the holes of the differential case and pinion shaft.

- (c) Push the side gear shafts gently into the differential case by hand and install them.

- (d) Measure the side gear backlash while holding 1 pinion gear toward the differential case.

**Backlash:**

**0.05 – 0.20 mm (0.0020 – 0.0079 in.)**

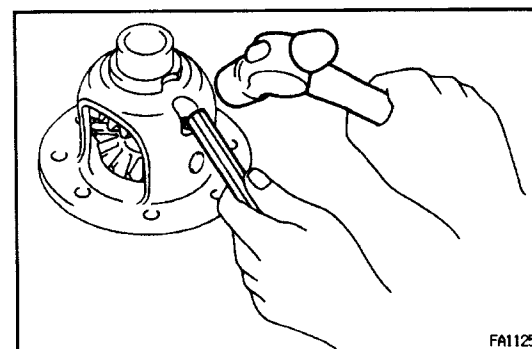
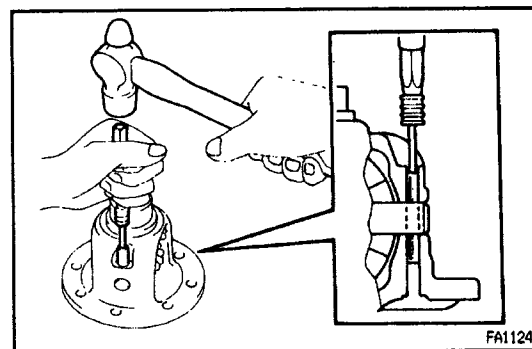
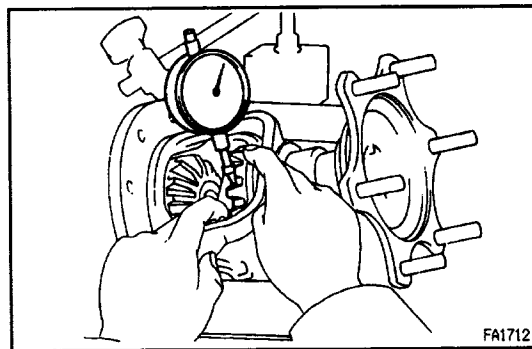
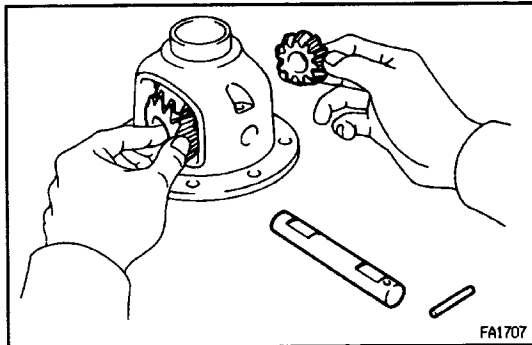
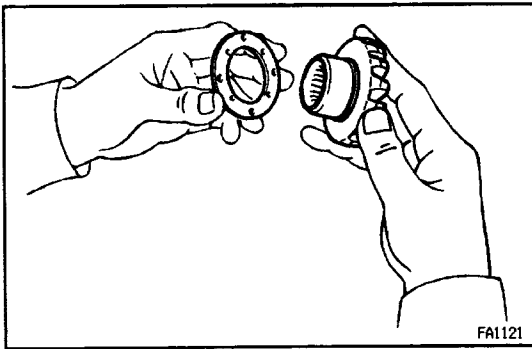
If the backlash is not within specification, install side gear thrust washers with different thicknesses.

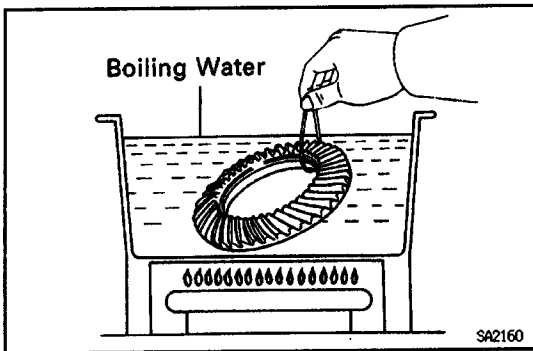
- (e) Remove the side gear shaft.

### 2. INSTALL STRAIGHT PIN AND STAKE DIFFERENTIAL CASE

- (a) Using a hammer and punch, install the straight pin through the differential case and hole of the pinion shaft.

- (b) Stake the differential case.

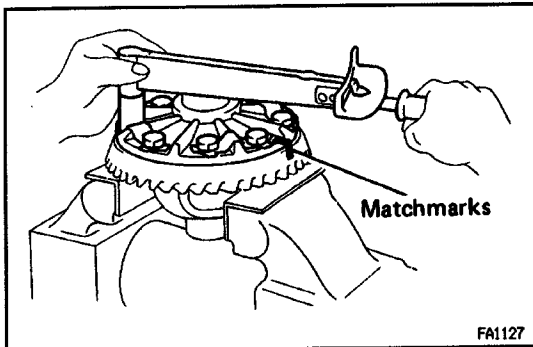




### 3. INSTALL RING GEAR ON DIFFERENTIAL CASE

- Clean the contact surfaces of the differential case and ring gear.
- Heat the ring gear to about 100°C (212°F) in boiling water.
- Carefully remove the ring gear from the water.
- 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.



- Temporarily install 5 new lock plates and 10 bolts so that the bolt holes in the ring gear and differential case are not misaligned.

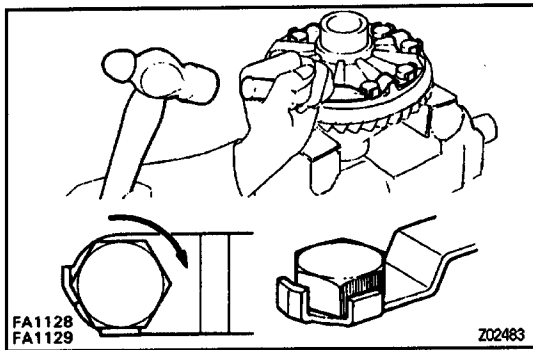
**NOTICE: The ring gear seat bolts should not be tightened until the ring gear has cooled sufficiently.**

- After the ring gear has cooled sufficiently, torque the ring gear set bolts.

**Torque: 97 N·m (985 kgf·cm, 71 ft·lbf)**

- Using a hammer and drift punch, stake the lock plates.

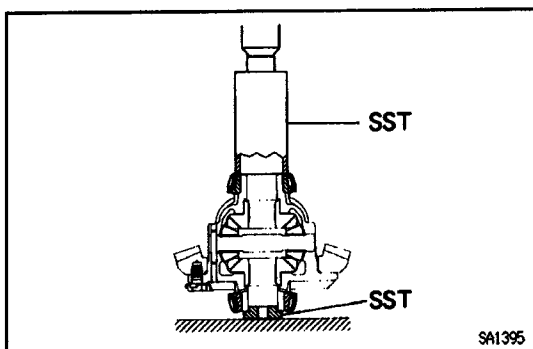
HINT: Stake 1 claw flush with the flat surface of the nut. For the claw contacting the protruding portion of the nut, stake only the half portion of the tightening side.



### 4. INSTALL SIDE BEARINGS

Using SST and a press, press the bearing into the differential case.

SST 09226-10010, 09550-10012 (09558- 10010)

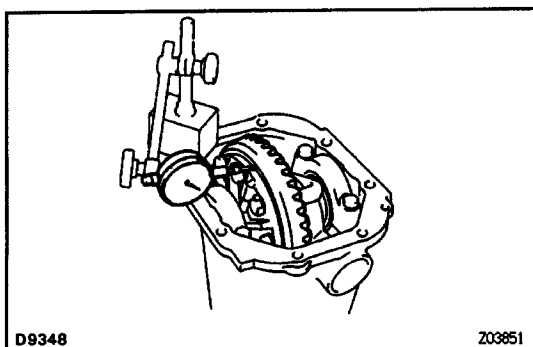


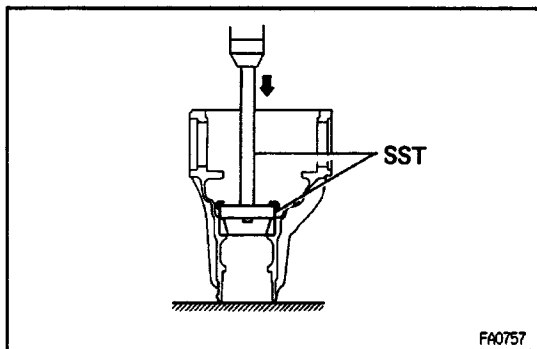
### 6. CHECK RING GEAR RUNOUT

- Install the differential case onto the carrier and install the plate washers to where there is no play in the bearing. (See page SA-95)
- Install bearing caps. (See page SA-98)
- Using a dial indicator, measure the runout of ring gear.

**Maximum runout:**

**0.07 mm (0.0028 in.)**





## 6. INSTALL DRIVE PINION FRONT AND REAR BEARING OUTER RACES

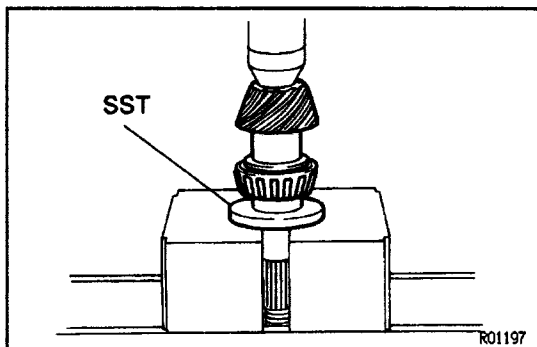
Using SST and a press, install new outer races.

Front:

SST 09608-35014 (09608-06020, 09608-06120)

Rear:

SST 09608 - 35014 (09608 - 06020, 09608 - 04110)



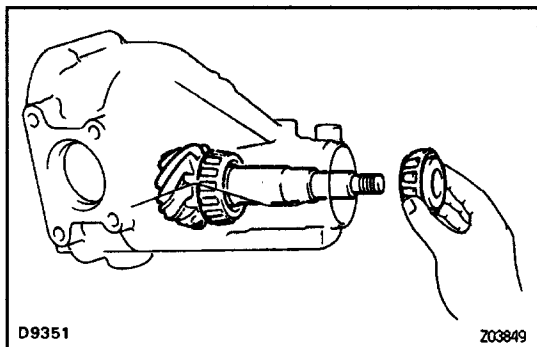
## 7. INSTALL DRIVE PINION FRONT BEARING

(a) Install the washer on the drive pinion.

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

(b) Using SST, press in the front bearing onto the drive pinion.

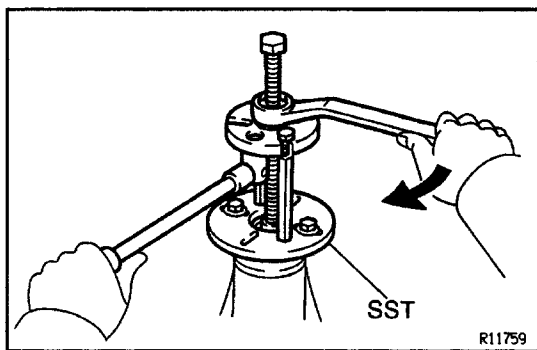
SST 09506-30012



## 8. TEMPORARILY ADJUST DRIVE PINION PRELOAD

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

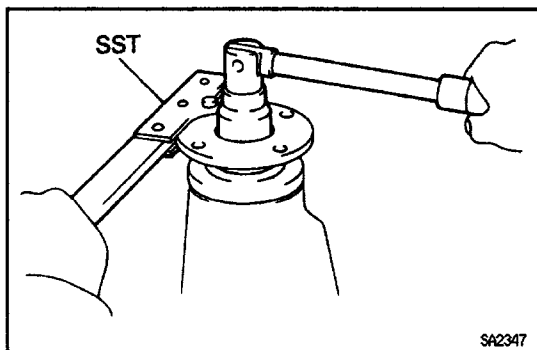
HINT: Assemble the spacer and oil seal after adjusting the gear contact pattern.



(b) Using SST, install the companion flange.

SST 09950-30010

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

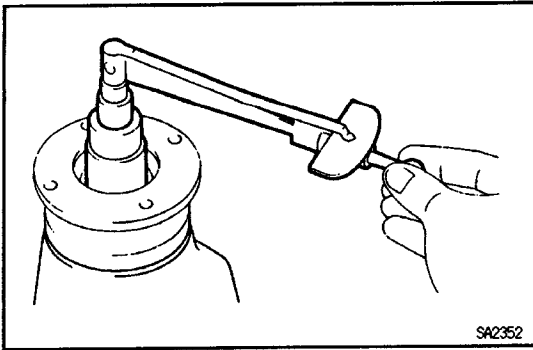


(d) Adjust the drive pinion preload by tightening the companion flange nut.

Using SST to hold the flange, tighten the nut.

SST 09330-00021

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



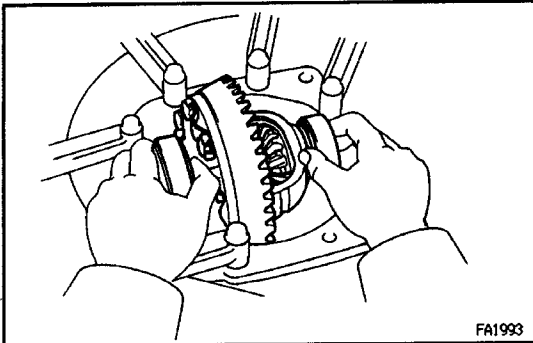
(e) Using a torque wrench, measure the preload.

**New bearing preload (at starting):**

**1.2 – 1.9 N-m (12 – 18 kgf-cm, 10.4 – 16.5 in.-lbf)**

**Reused bearing preload (at starting):**

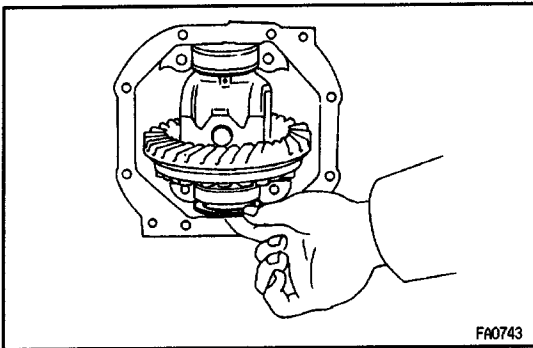
**0.6 – 1.0 N-m (6 – 10 kgf/cm, 5.2 – 8.7 in.-lbf)**



## 9. INSTALL DIFFERENTIAL CASE IN DIFFERENTIAL CARRIER

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

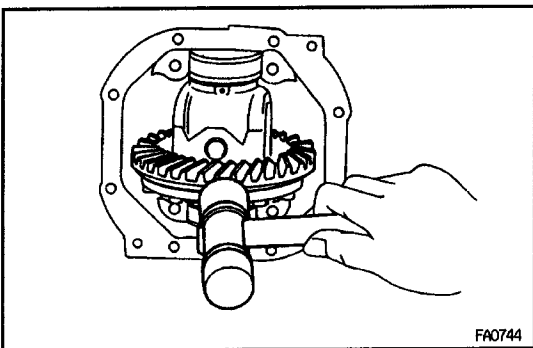
(b) Install the differential case in the differential carrier.



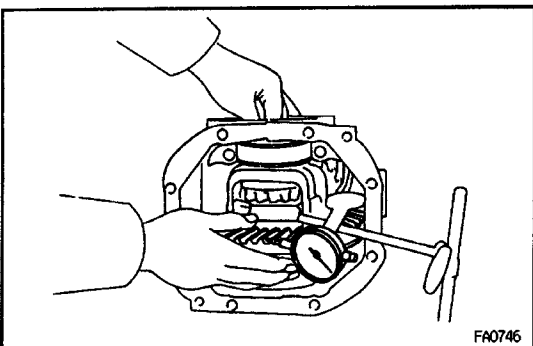
## 10. ADJUST RING GEAR BACKLASH

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

**HINT:** Ensure that the ring gear has backlash.



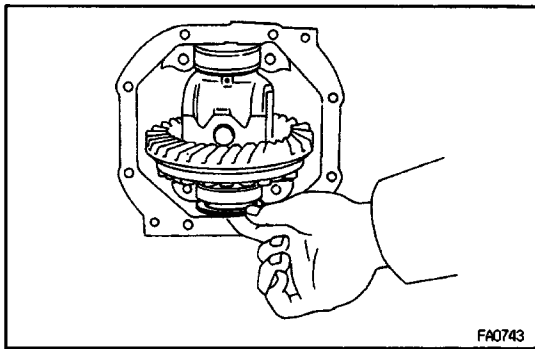
(b) Tap on the ring gear with a plastic-faced hammer so that the washer fit to the bearing.



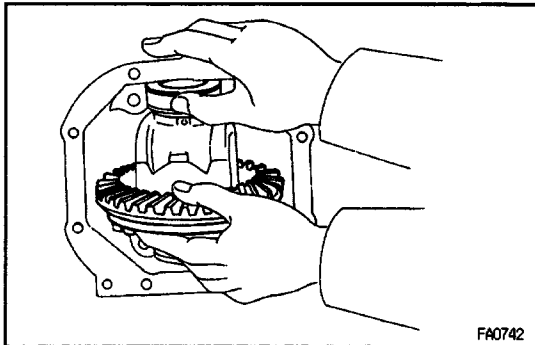
(c) Hold the side bearing boss on the teeth surface of the ring gear and measure the backlash.

**Backlash (reference):**

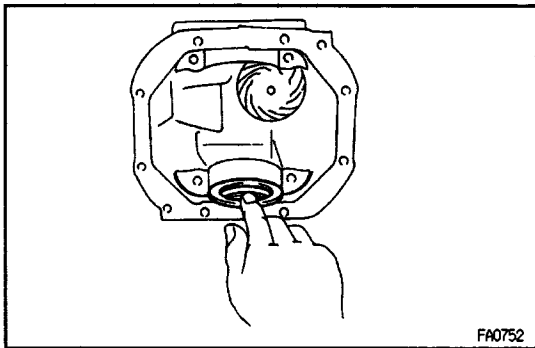
**0.13 mm (0.0051 in.)**



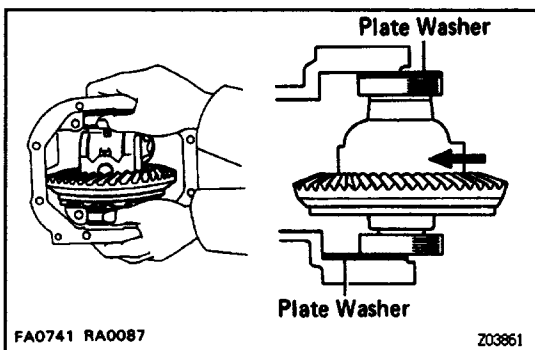
- (d) Using the backlash as reference, select a ring gear back side plate washer. (See page SA-98)



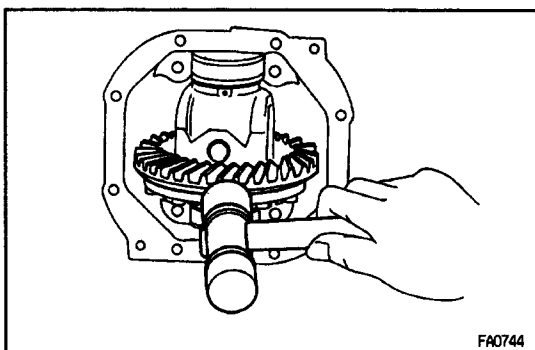
- (e) Select a ring gear teeth side plate washer with a thickness which eliminates any clearance between the outer race and case.



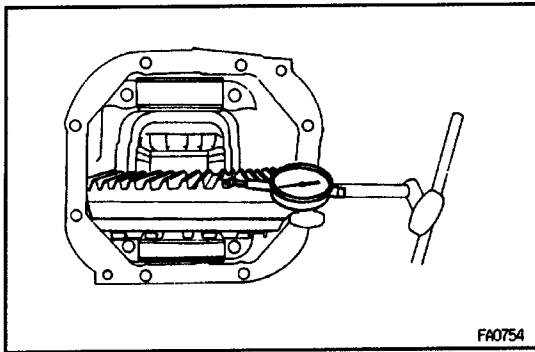
- (f) Remove the plate washers and differential case.  
 (g) Install the plate washer into the ring gear back side of the carrier.



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



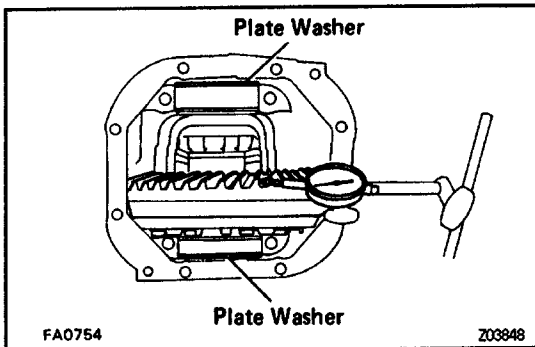
- (i) Tap on the ring gear with a plastic-faced hammer so that the washer fit to the bearing.



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

**Backlash:**

**0.13 – 0.18 mm (0.0051 – 0.0071 in.)**

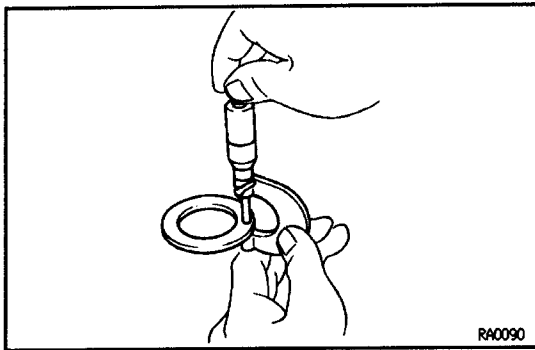


(k) If the backlash is not within specification, adjust by either increasing or decreasing the number of washers on both sides by an equal amount.

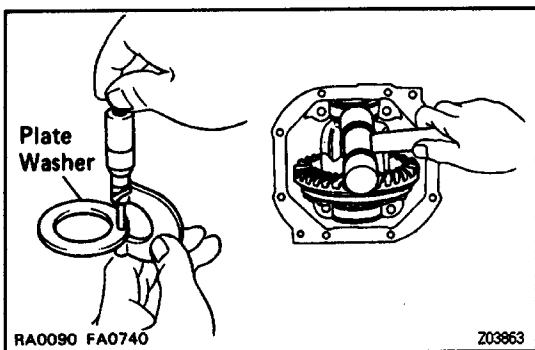
HINT: There should be no clearance between the plate washer and case.

Ensure that there is ring gear backlash.

## 11. ADJUST SIDE BEARING PRELOAD



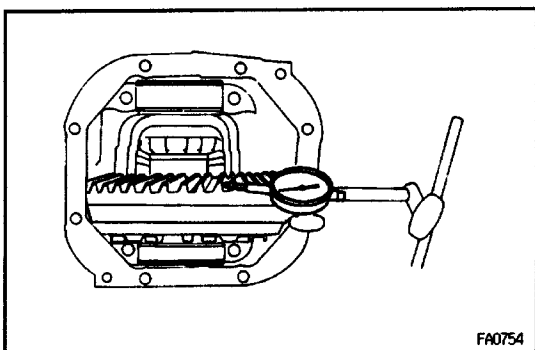
(a) Remove the ring gear teeth side plate washer and using a micrometer, measure the thickness.



(b) Using the backlash as a reference, 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 2/3 of the way with your finger.

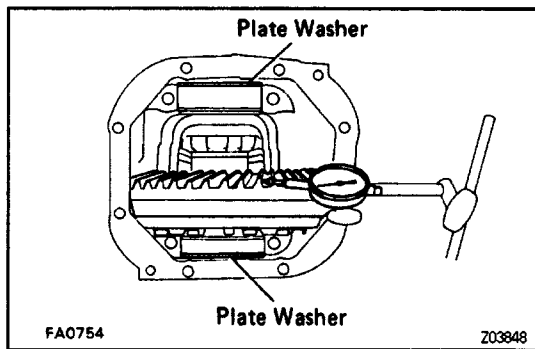
(c) Using a plastic – faced hammer, tap in the plate washer.



(d) Recheck the ring gear backlash.

**Backlash:**

**0.13 – 0.18 mm (0.0051 – 0.0071 in.)**

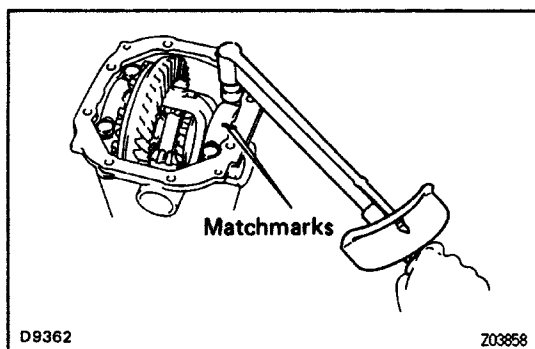


(e) If not within specification, adjust by either increasing or decreasing the washers on both sides by an equal amount.

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

Washer thickness

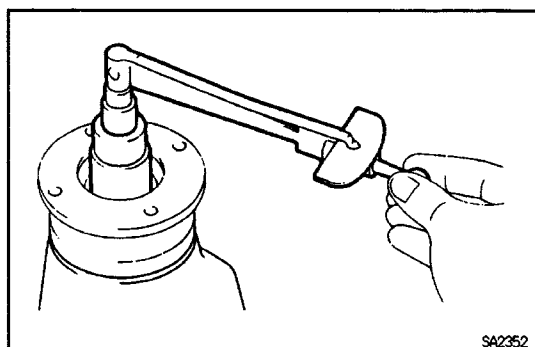
Thickness mm (in.)	Thickness mm (in.)
2.57–2.59 (0.1012–0.1020)	2.93–2.95 (0.1154–0.1161)
2.60–2.62 (0.1024–0.1031)	2.96–2.98 (0.1165–0.1173)
2.63–2.65 (0.1035–0.1043)	2.99–3.01 (0.1177–0.1185)
2.66–2.68 (0.1047–0.1055)	3.02–3.04 (0.1189–0.1197)
2.69–2.71 (0.1059–0.1067)	3.05–3.07 (0.1201–0.1209)
2.72–2.74 (0.1071–0.1079)	3.08–3.10 (0.1213–0.1220)
2.75–2.77 (0.1083–0.1091)	3.11–3.13 (0.1224–0.1232)
2.78–2.80 (0.1094–0.1102)	3.14–3.16 (0.1236–0.1244)
2.81–2.83 (0.1106–0.1114)	3.17–3.19 (0.1248–0.1256)
2.84–2.86 (0.1118–0.1126)	3.20–3.22 (0.1260–0.1268)
2.87–2.89 (0.1130–0.1138)	3.23–3.25 (0.1272–0.1280)
2.90–2.92 (0.1142–0.1150)	



## 12. INSTALL BEARING CAPS

Align the matchmarks on the cap and carrier.

Torque: 78 N-m (800 kgf-cm, 58 ft-lbf)



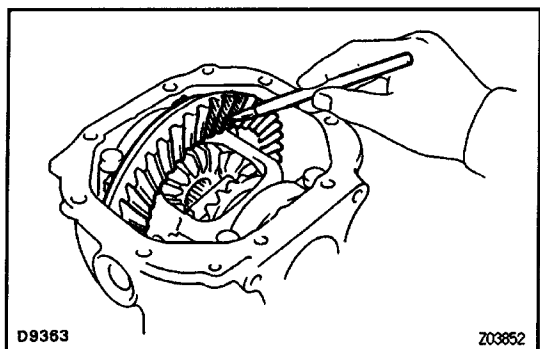
## 13. MEASURE TOTAL PRELOAD

Using a torque wrench, measure the total preload.

**Total preload (at starting):**

Add drive pinion preload

**0.4 – 0.6 N-m (4 – 6 kgf-cm, 3.5 – 5.2 in.-lbf)**



D9363

Z03852

**14. 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) Hold the companion flange firmly and rotate the ring gear in both directions.
- (c) Inspect the tooth pattern.

**Heel Contact**

**Face Contact**

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

**Toe Contact**

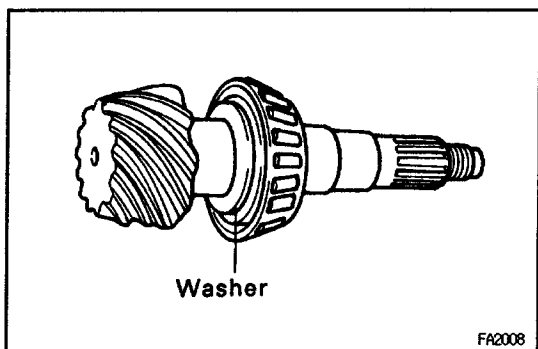
**Flank Contact**

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

**Proper Contact**

MT0372  
B4093 MT0373

Z07651

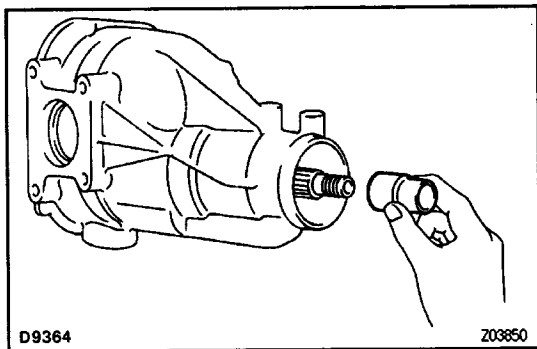


FA2008

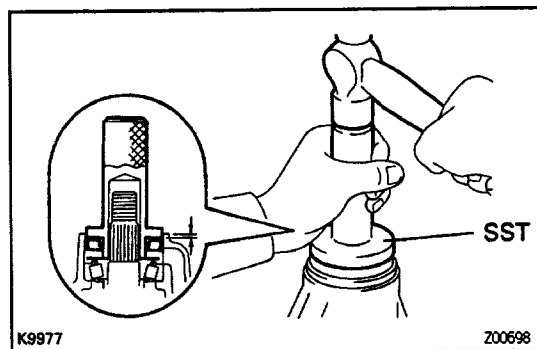
If the teeth are not contacting properly, use the following chart to select a proper washer for correction.  
Washer thickness

Thickness mm (in.)	Thickness mm (in.)
2.24 (0.0882)	2.51 (0.0988)
2.27 (0.0894)	2.54 (0.1000)
2.30 (0.0906)	2.57 (0.1012)
2.33 (0.0917)	2.60 (0.1024)
2.36 (0.0929)	2.63 (0.1035)
2.39 (0.0941)	2.66 (0.1047)
2.42 (0.0953)	2.69 (0.1059)
2.45 (0.0965)	2.72 (0.1071)
2.48 (0.0976)	



**15. INSTALL BEARING SPACER**

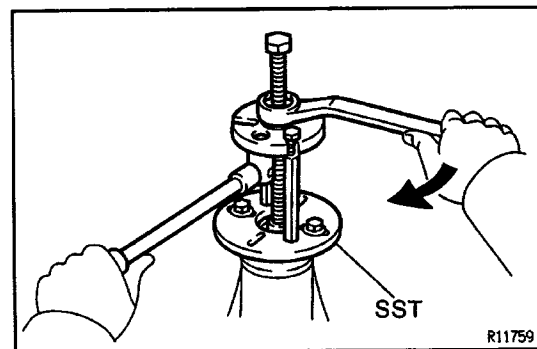
- (a) Remove the companion flange.  
(See page SA-87)
- (b) Remove the oil slinger and rear bearing.  
(See page SA-88)
- (c) Install a new bearing spacer.
- (d) Install the rear bearing and oil slinger.

**16. INSTALL OIL SEAL**

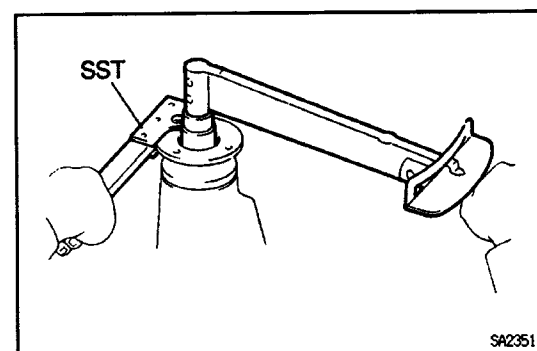
- (a) Using SST and a hammer, tap in a new oil seal.  
SST 09554-30011

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

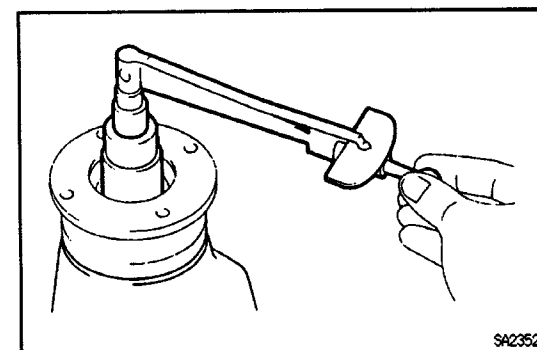
- (b) Apply MP grease to the oil seal lip.

**17. INSTALL COMPANION FLANGE**

- (a) Using SST, install the companion flange.  
SST 09950-30010

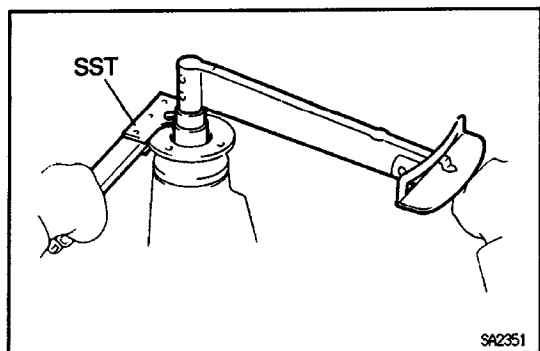


- (b) Install the plate washer.
- (c) Coat the threads of a new nut with MP grease and install it.
- (d) Using SST to hold the flange, tighten the nut.  
SST 09330-00021

**Torque: 120 N-m (1,226 kgf-cm, 89 ft-lbf)****18. CHECK DRIVE PINION PRELOAD**

Using a torque wrench, measure the drive pinion pre load using the backlash of the drive pinion and ring gear.

**Now bearing preload (at starting):****1.2 – 1.9 N-m (12 – 19 kgf-cm, 10.4 – 16.5 in.-lbf)****Reused bearing preload (at starting):****0.6 – 1.0 N-m (6 – 10 kgf-cm, 5.2 – 8.7 in.-lbf)**



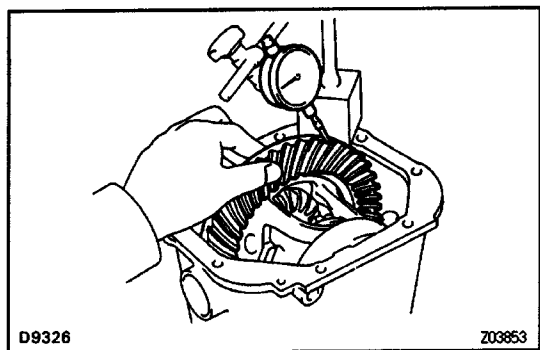
If the preload is greater than the specification, replace the spacer.

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

**Maximum torque:**

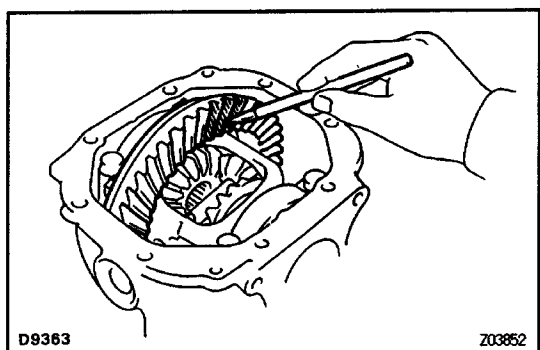
**223 N-m (2,275 kgf-cm, 165 ft-lbf)**

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



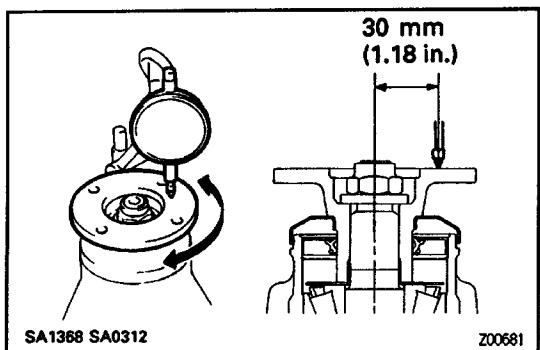
**19. RECHECK RING GEAR BACKLASH**

(See page [SA-87](#))



**20. RECHECK TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION**

(See page [SA-99](#))

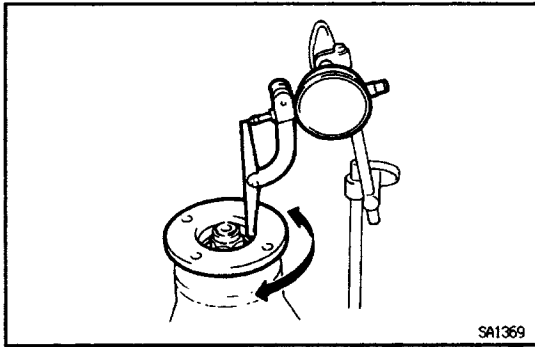


**21. CHECK RUNOUT OF COMPANION FLANGE**

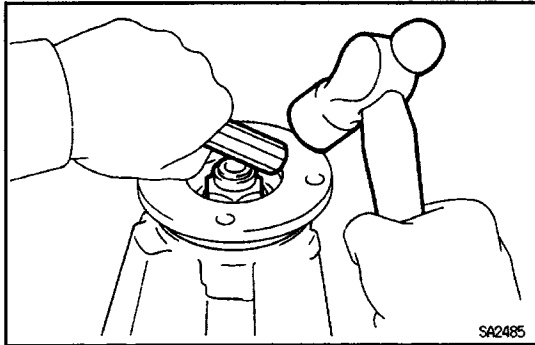
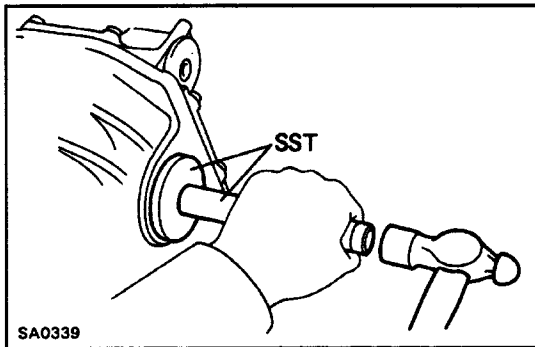
Using a dial indicator, measure the vertical and lateral runout of the companion flange.

**Maximum vertical runout:**

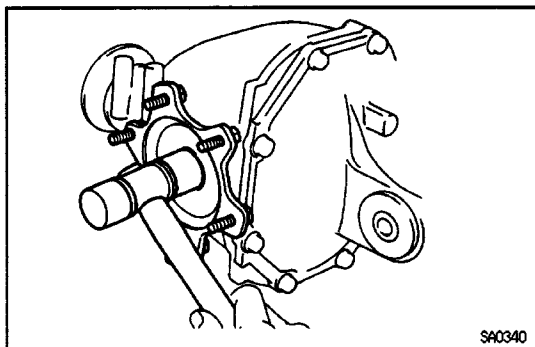
**0.10 mm (0.0039 in.)**

**Maximum lateral runout:****0.10 mm (0.0039 in.)**

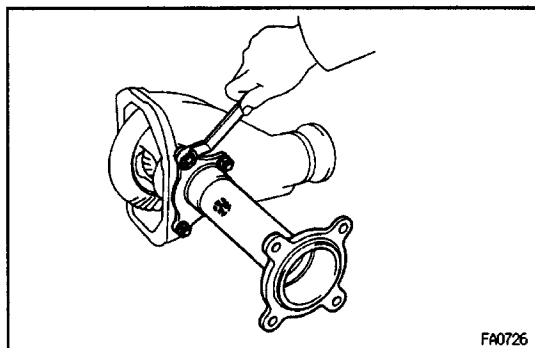
If the runout is greater than the maximum, inspect the bearings.

**22. STAKE DRIVE PINION NUT****23. INSTALL SIDE GEAR SHAFT OIL SEALS**

- (a) Using SST and a hammer, tap in a new oil seal until its surface is flush with the differential carrier end.  
SST 09550-22011 (09550-00020, 09550-00031)
- (b) Apply MP grease to the oil seal lip.

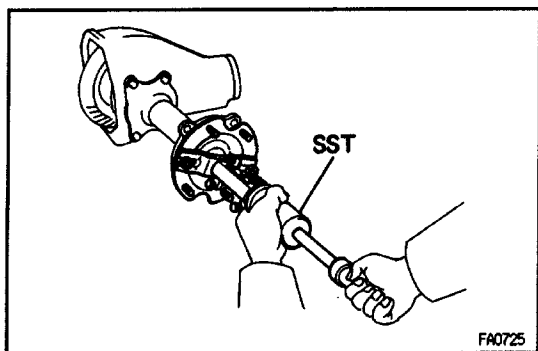
**24. INSTALL RH SIDE GEAR SHAFT**

- (a) Install a new snap ring to the side gear shaft.
- (b) Using a plastic-faced hammer, tap in the side gear shaft.

**25. INSTALL DIFFERENTIAL TUBE**

Install the differential tube to the differential carrier with the 4 bolts.

**Torque: 88 N-m (900 kgf-cm, 65 ft-lbf)**



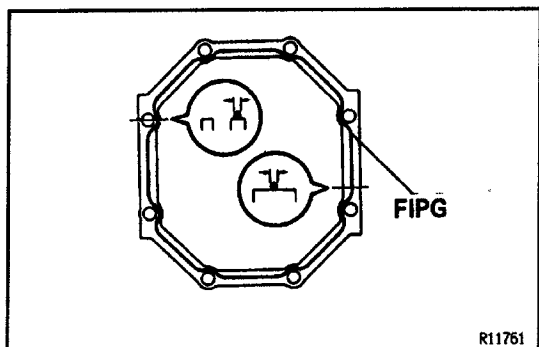
## 26. INSTALL LH SIDE GEAR SHAFT

- (a) Install a new snap ring to the side gear shaft.
- (b) Using SST, install the side gear shaft to the differential carrier.

SST 09910 - 00015 (09911 - 00011, 09912 - 00010, 09914-00011)

## 27. CHECK INSTALLATION OF SIDE GEAR SHAFTS

- (a) Check that there is 2 - 3 mm (0.08 - 0.12 in.) of play in axial direction.
- (b) Check that the side gear shafts can not be pulled out by hand.



## 28. INSTALL DIFFERENTIAL CARRIER COVER

- (a) Remove any old FIPG material and be careful not to drop oil on the contact surfaces of the differential carrier and carrier cover.
- (b) Clean contacting surfaces of any residual FIPG material using gasoline or alcohol.
- (c) Apply FIPG to the carrier cover, as shown.

### FIPG:

**Part No. 08826-00090, THREE BOND 1281 or equivalent**

### FIPG width approx

**1-2 mm (0.04-0.08 in.)**

**HINT:** Install the carrier cover within 10 minutes after applying FIPG.

- (d) Install the differential carrier cover with the 8 bolts.

**Torque: 47 N-m (475 kgf-cm, 34 ft-lbf)**

