

DATSUN**Model S110 Series****SECTION PD****PROPELLER SHAFT &
DIFFERENTIAL CARRIER****CONTENTS****PROPELLER SHAFT**

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**TROUBLE DIAGNOSES AND
CORRECTIONS**

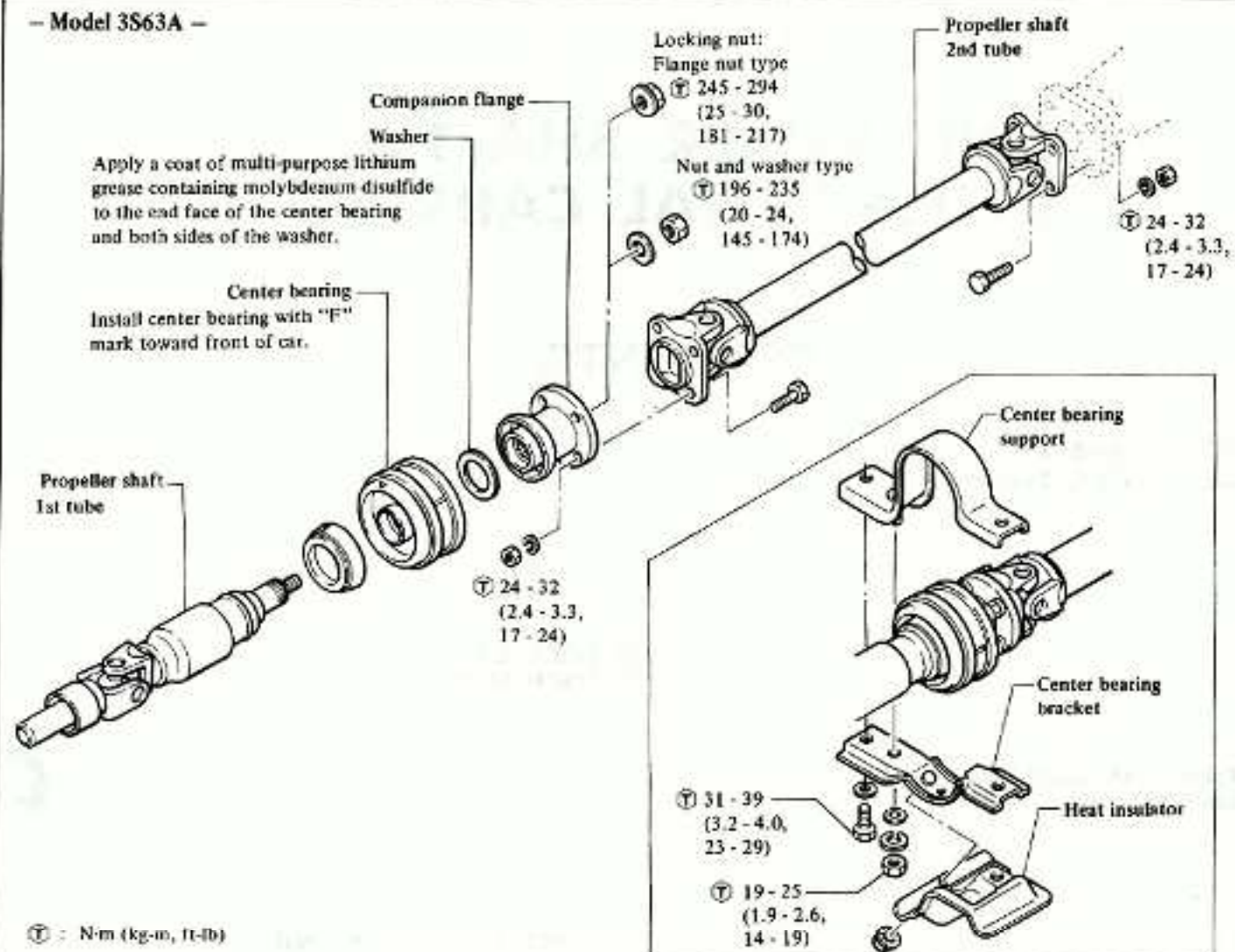
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PD*Z·ONE·DATSUN*

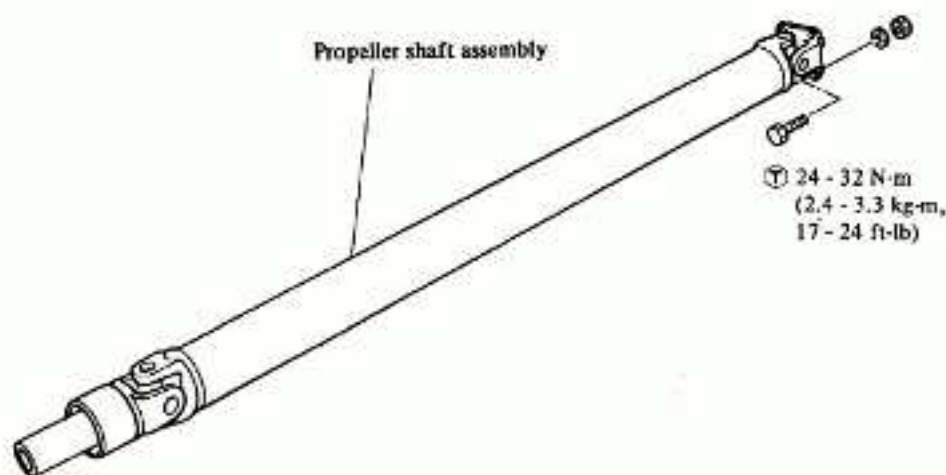
PROPELLER SHAFT — Model : 3S63A, 2S63A —

— Model 3S63A —



SPD119

— Model 2S63A —



SPD120

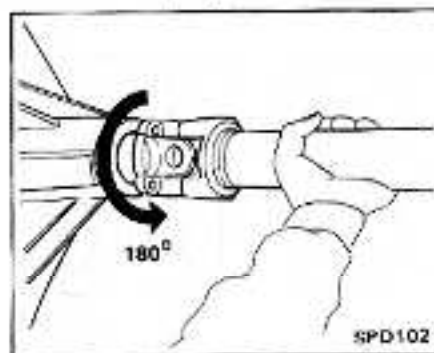
GENERAL INSPECTION

- Inspect propeller shaft tube surface for dents or cracks.
If damaged, replace propeller shaft assembly.
- If center bearing is noisy or damaged, replace center bearing. (3S63A)
- If journal is damaged or worn, replace propeller shaft assembly.

PROPELLER SHAFT VIBRATION

To check and correct an unbalanced propeller shaft, proceed as follows:

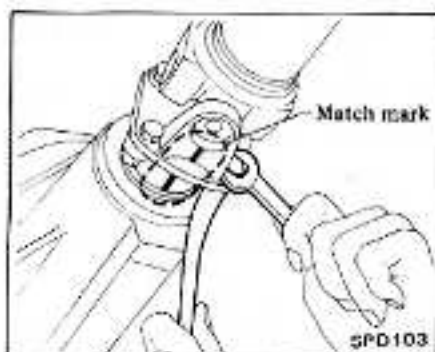
1. Remove undercoating and other foreign material which could upset shaft balance, and check shaft vibration by road test.
2. If shaft vibration is noted during road test, disconnect propeller shaft at differential carrier companion flange, rotate companion flange 180 degrees and reconnect propeller shaft.



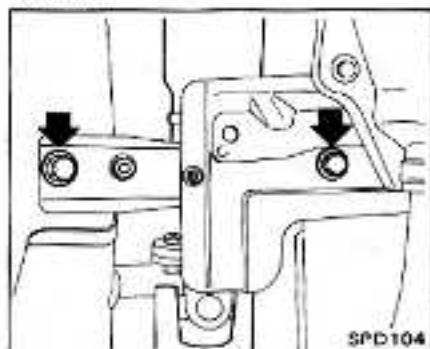
3. Again check shaft vibration. If vibration still persists, replace propeller shaft assembly.

REMOVAL AND INSTALLATION

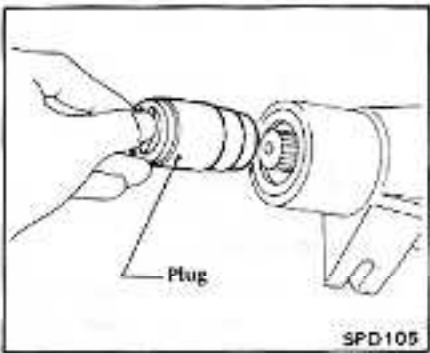
1. Put match marks on flanges, and separate propeller shaft from differential carrier.



2. Remove center bearing bracket. (3S63A)

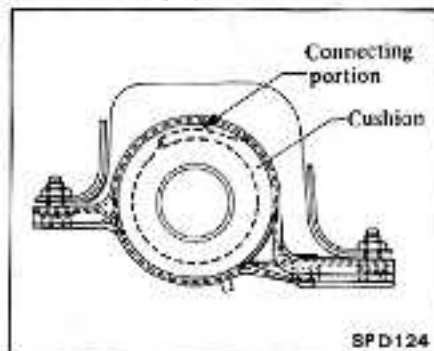


3. Draw out propeller shaft from transmission and plug up rear end of transmission rear extension housing.



4. To install, reverse the foregoing procedure using reference marks in removal

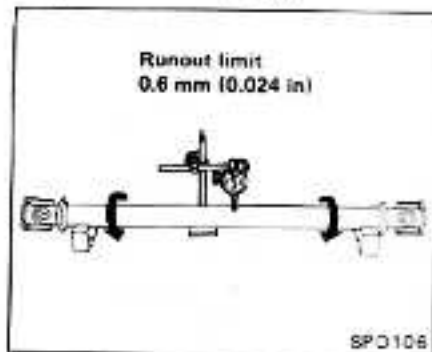
Install the center bearing on the bracket with the contact surface of the cushion facing upward. (3S63A)



INSPECTION

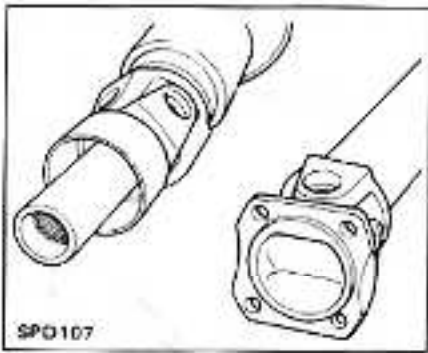
PROPELLER SHAFT RUNOUT

Inspect propeller shaft runout. If runout exceeds specifications, replace propeller shaft assembly.



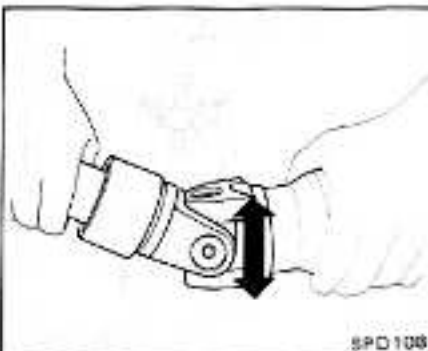
FLANGE YOKE AND SLEEVE YOKE

If flange yoke and sleeve yoke are damaged or worn, replace propeller shaft assembly.



JOURNAL AXIAL PLAY

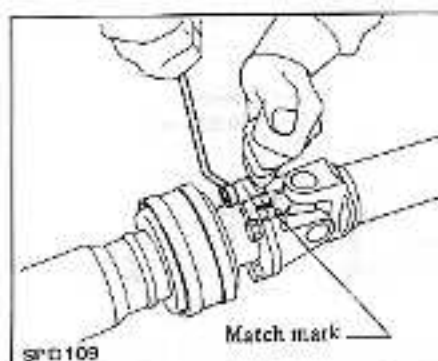
Inspect journal for axial play, if there is play, replace propeller shaft assembly.



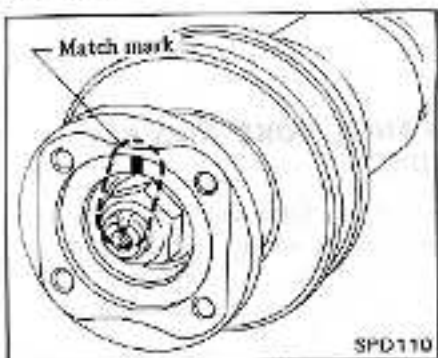
REPAIR

CENTER BEARING (3S63A)

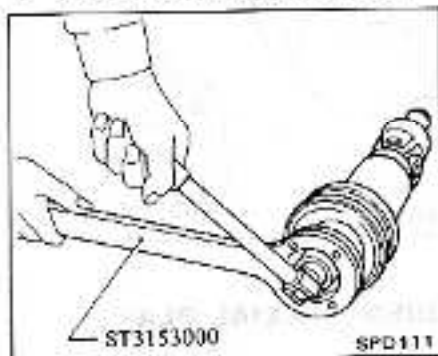
1. Put match marks on flanges, and separate 2nd tube from 1st tube.



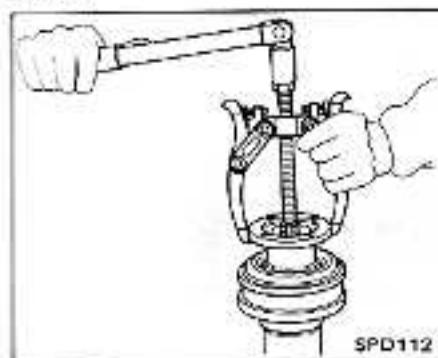
2. Put match marks on the flange and shaft.



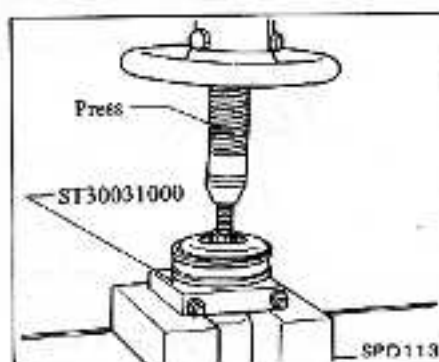
3. Remove locking nut with Tool.



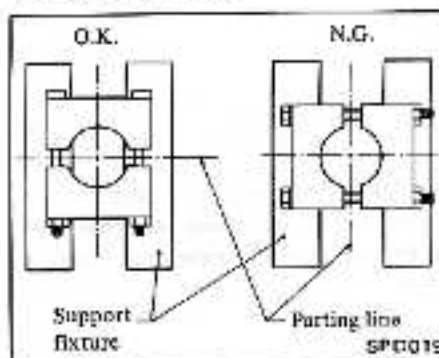
4. Remove companion flange with puller.



5. Remove center bearing with Tool and press.

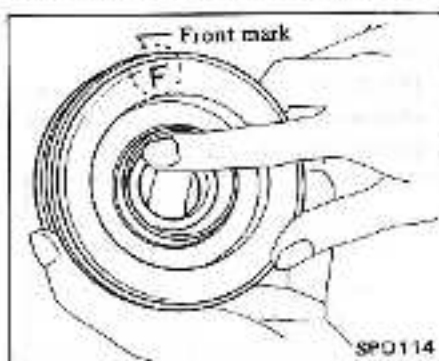


Care should be taken when setting Tool in press to make sure that parting line of Tool is right angle to support fixture of press. This is to prevent Tool from bending.



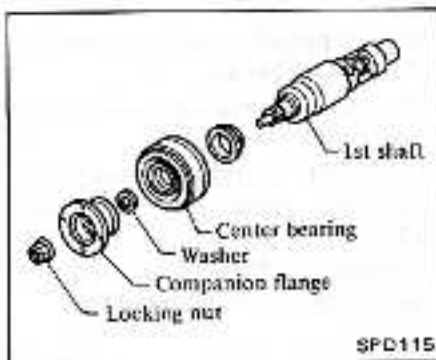
6. Install new center bearing. Be sure to install center bearing with "F" mark toward front of car.

Apply a coat of multi-purpose lithium grease containing molybdenum disulfide to the end face of the center bearing and both sides of the washer.

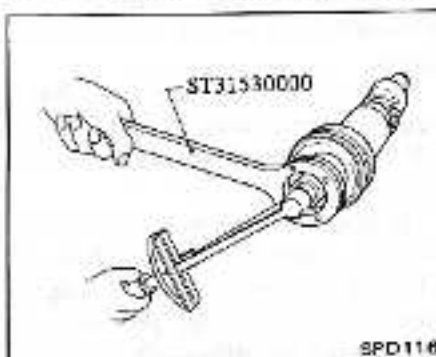


7. Insert the washer into the end of the center bearing. Align the mark on

the companion flange and install the companion flange.



8. Tighten locking nut using Tool.

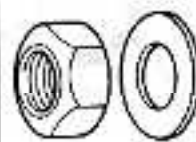


①: Center bearing locking nut

Flange nut type
245 - 294 N·m
(25 - 30 kg·m,
181 - 217 ft·lb)

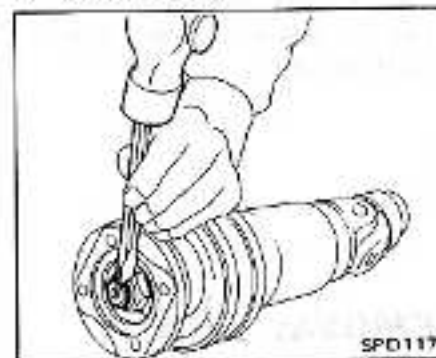


Nut and washer type
196 - 235 N·m
(20 - 24 kg·m,
145 - 174 ft·lb)



SPD125

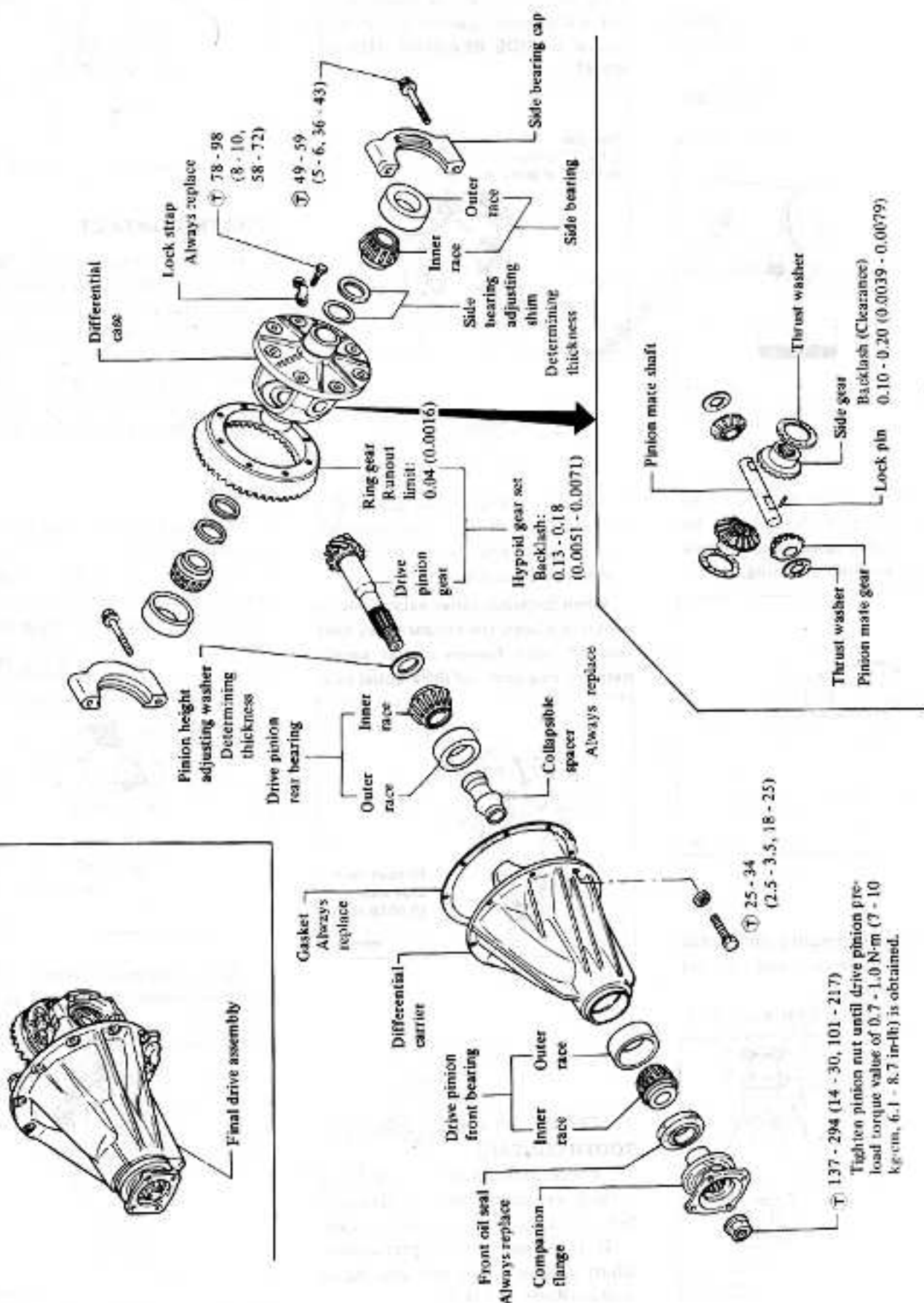
9. Stake the nut.



10. Align the mark and connect 1st and 2nd tubes.

DIFFERENTIAL CARRIER (Final drive) —Model : H165B—

SPD 118



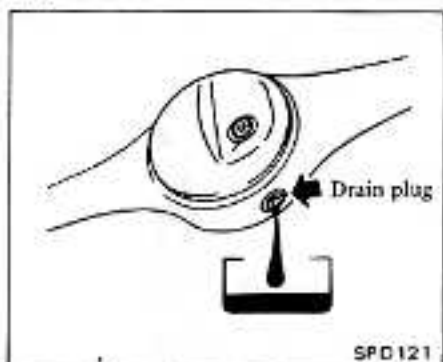
⑦ : N·m (kg·cm, ft·lb)

Unit: mm (in)

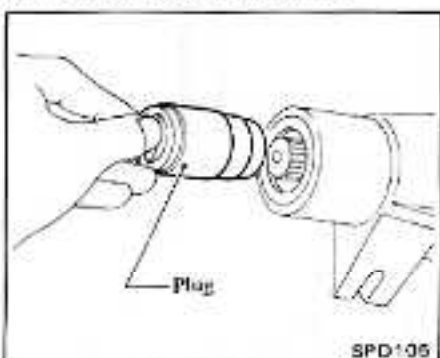
PREPARATION FOR DISASSEMBLY

REMOVAL

1. Jack up rear of car and support it by placing safety stands under rear axle case, referring to section G1.
2. Remove drain plug and drain gear oil.

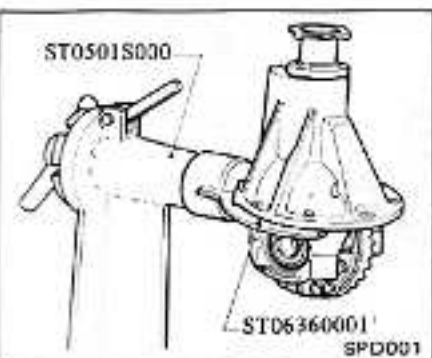


3. Remove propeller shaft and rear axle shafts (Refer to Section RA for removal) and plug up rear end of transmission rear extension housing.



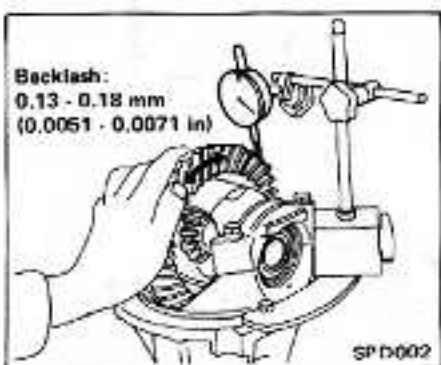
4. Loosen bolts securing differential carrier to rear axle case, and take out differential carrier.

5. Mount differential carrier on Tool.



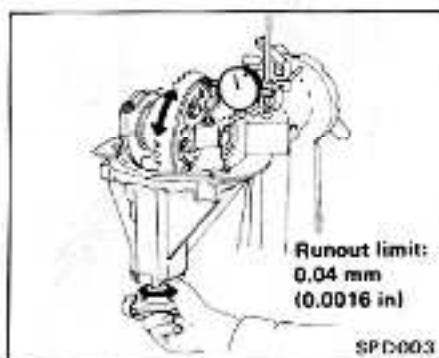
PRE-DISASSEMBLY INSPECTION

1. Check backlash of ring gear with a dial indicator at several points. If it is not within specification, adjust it referring to **SIDE BEARING ADJUSTMENT**.



2. Check runout of ring gear with a dial indicator. If it is over specification, hypoid gear set or differential case should be replaced.

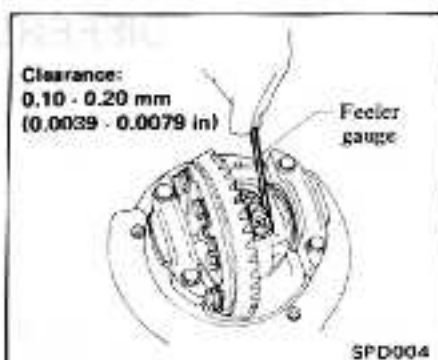
When backlash varies excessively in different places, the variance may have resulted from foreign matter caught between ring gear and differential case.



3. Check tooth contact, referring to **TOOTH CONTACT**.

4. Check backlash of side gear. Using a thickness gauge, measure clearance between side gear and differential case.

If it is not within specification, adjust it by selecting side gear thrust washer (Refer to S.D.S.).



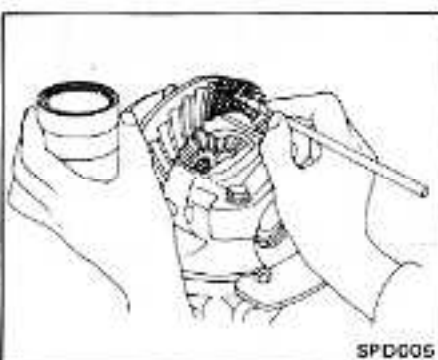
TOOTH CONTACT

Gear tooth contact pattern check is necessary to verify correct relationship between ring gear and drive pinion.

Hypoid gear set which are not positioned properly may be noisy, or have short life or both. With a pattern check, the most desirable contact for low noise level and long life can be assured.

Check

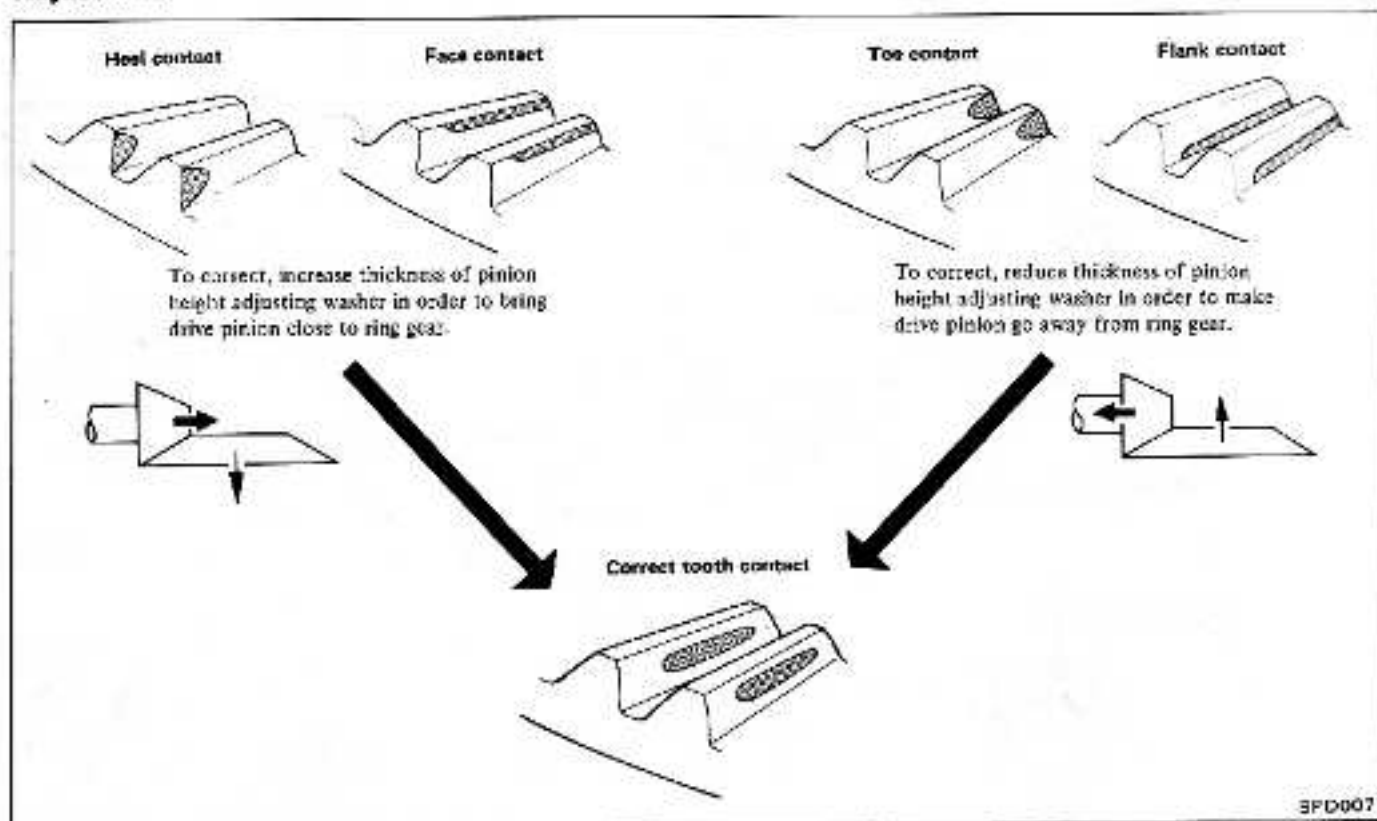
1. Thoroughly clean ring gear and drive pinion teeth.
2. Sparingly apply a mixture of powdered ferric oxide and oil or equivalent to 3 or 4 teeth of ring gear drive side.



3. Hold companion flange steady by hand and rotate the ring gear in both directions.



Adjustment

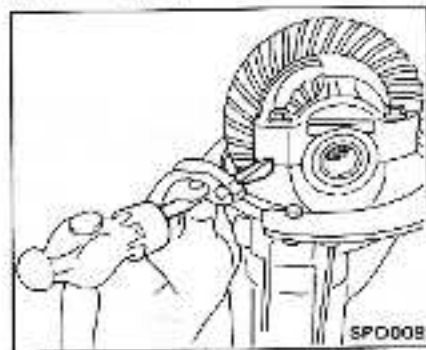


DISASSEMBLY

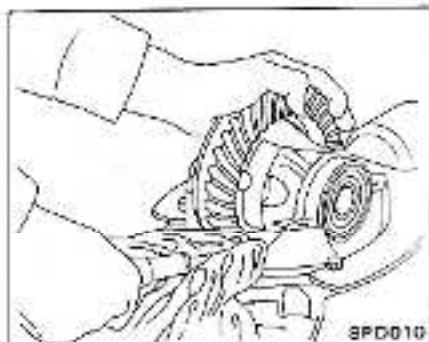
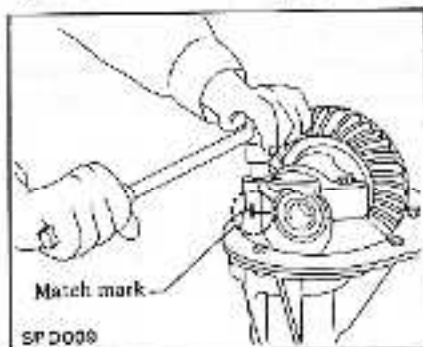
DIFFERENTIAL CARRIER

1. Put match marks on one side of side bearing cap with paint or punch to ensure that it is replaced in proper position during reassembly.

Bearing caps are line-bored during manufacture and should be put back in their original places.

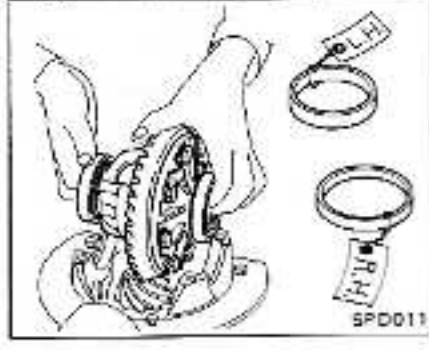


2. Remove side bearing caps.

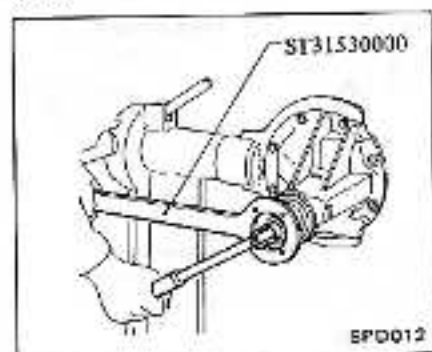


3. Using a pry bar, remove differential case assembly.

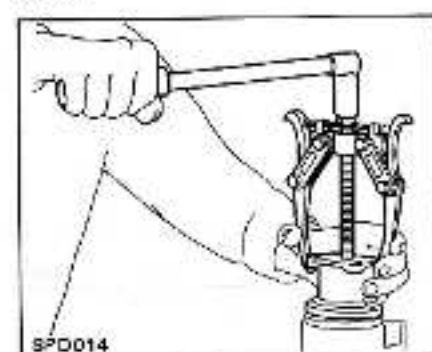
Be careful to keep the side bearing outer races together with inner race — don't mix them up.



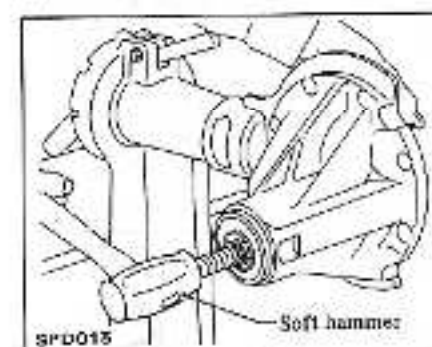
4. Remove drive pinion nut with Tool.



5. Remove companion flange with puller.



6. Remove drive pinion with soft hammer.

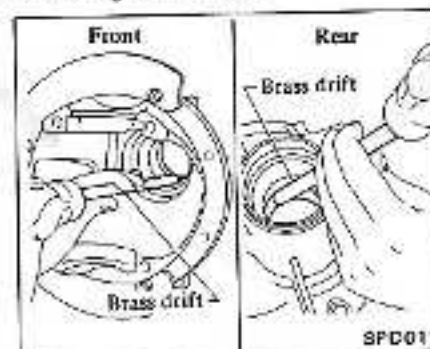


7. Remove oil seal by prying up with a large screwdriver, and remove front pinion bearing inner race.

Do this carefully, so as not to scratch seal bore with screwdriver. Cover end of screwdriver with a rag.



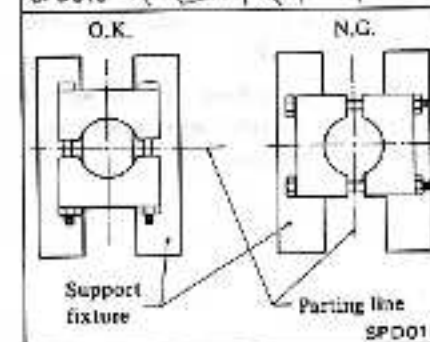
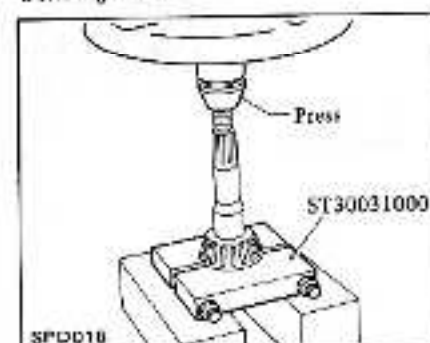
8. Remove pinion bearing outer race using a brass drift.



9. Remove collapsible spacer from drive pinion.

10. Pull out rear bearing inner race with a press and Tool.

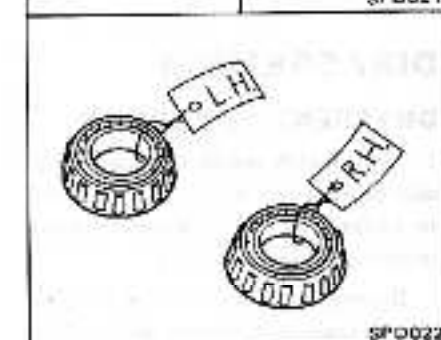
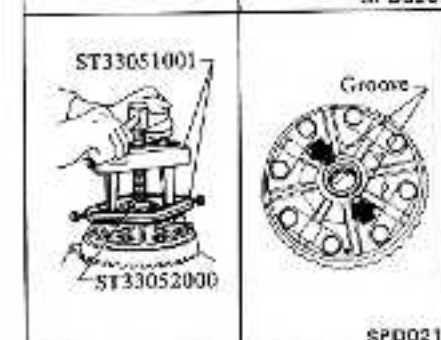
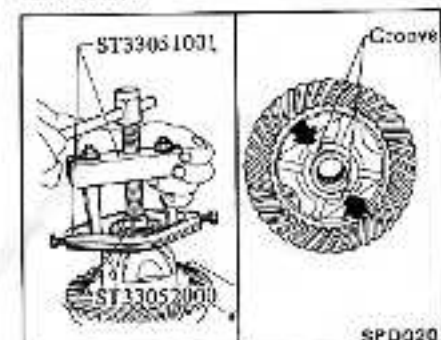
Care should be taken when setting Tool in press to make sure that parting line of Tool is a right angle to support fixture of press. This is to prevent bending Tool.



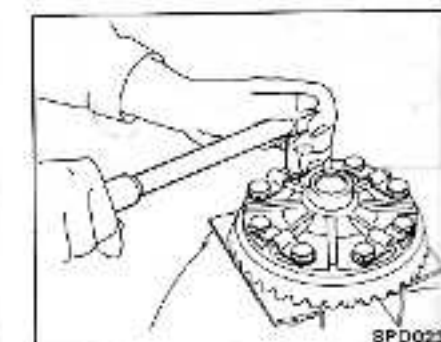
DIFFERENTIAL CASE

1. Remove side bearing inner race with Tool.

To prevent damage to bearing, engage puller paws with groove. Be careful not to confuse left and right hand parts.

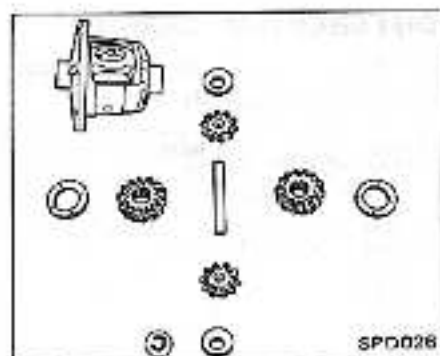
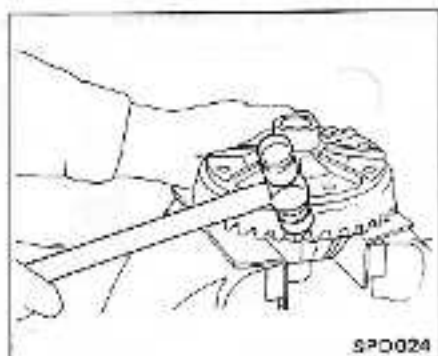


2. Remove ring gear by spreading out lock straps and loosening ring gear bolts in a criss-cross fashion.



3. Tap ring gear off gear case using a soft hammer.

Tap evenly all around to keep ring gear from binding.

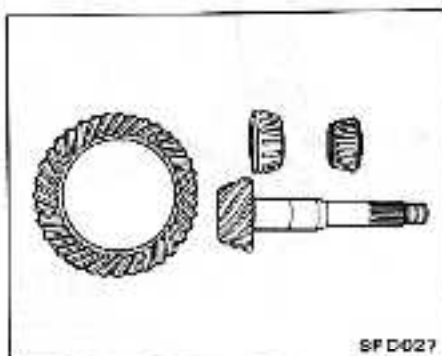


INSPECTION

1. Clean disassembled parts completely.

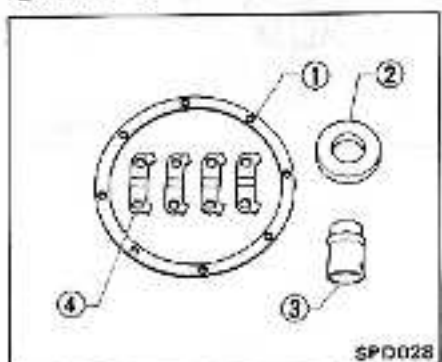
Repair or replace any damaged or faulty parts.

When replacing drive pinion or ring gear, replace with a new hypoid gear set.



2. The following parts should be replaced by new ones each time they are removed.

- ① Gasket
- ② Front oil seal
- ③ Collapsible spacer
- ④ Lock strap



ASSEMBLY

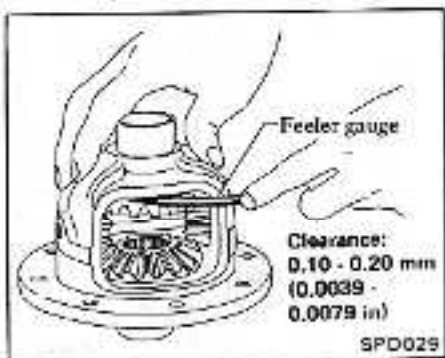
Assembly should be done in the reverse order of disassembly, while making any necessary inspections and adjustments.

PRECAUTION:

- a. Arrange shims and washers to install them correctly.
- b. Thoroughly clean the surfaces on which shims, washers bearings and bearing caps are installed.
- c. Apply gear oil when installing bearings.
- d. Pack recommended multi-purpose grease into cavity between lips when fitting oil seal.

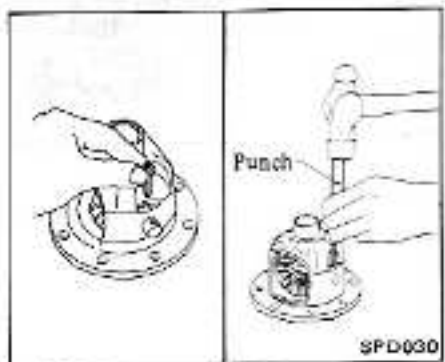
DIFFERENTIAL CASE

- 1. Install pinion mate gears, side gears and thrust washers into differential case.
- 2. Fit pinion mate shaft.
- 3. Adjust clearance between rear face of side gear and thrust washer by selecting side gear thrust washer (Refer to S.D.S.).

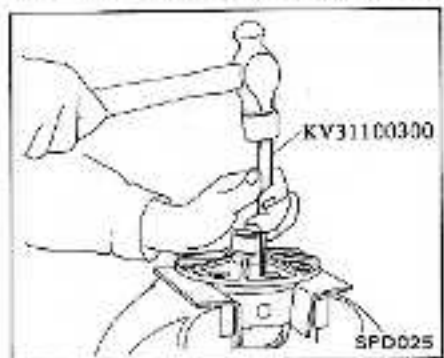


- 4. Install pinion mate shaft lock pin using a punch.

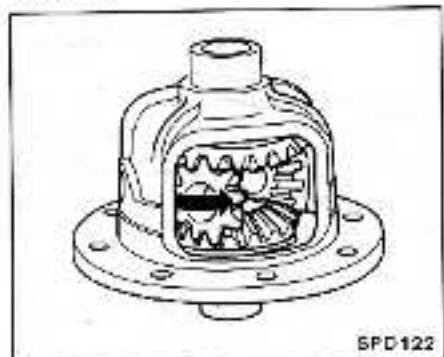
Make sure lock pin is flush with case.



4. Drive out pinion mate shaft lock pin, with Tool from ring gear side.



5. Draw out pinion mate shaft, and rotate pinion mate gears out of the case and remove side gears and thrust washers.

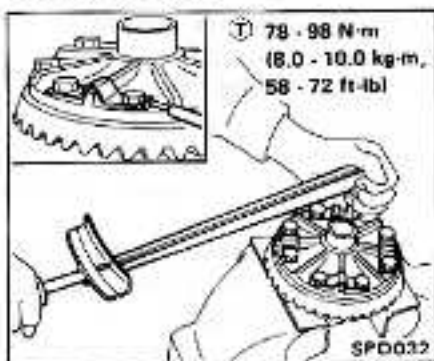


Put marks on gears and thrust washers so that they can be reinstalled in their original positions from which they were removed.

5. Place ring gear on differential case and install new lock straps and bolts.

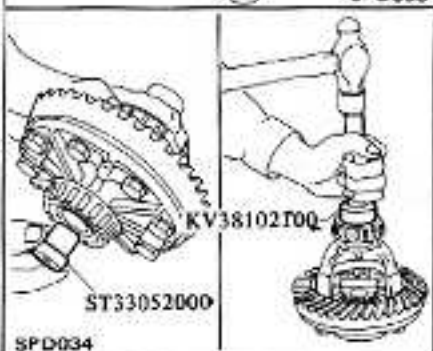
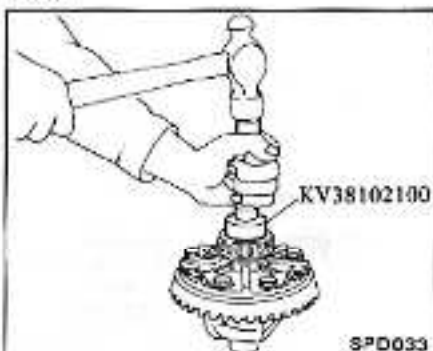
Tighten bolts in a criss-cross fashion, lightly tapping bolt head with a hammer.

Then bend up lock straps to lock the bolts in place.



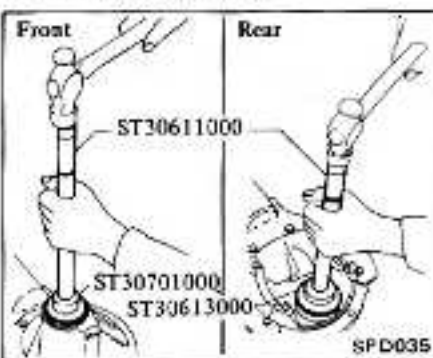
6. Select side bearing adjusting shims, referring to **SIDE BEARING ADJUSTMENT**.

7. Install the shims behind each bearing and press on the bearings, using Tool.



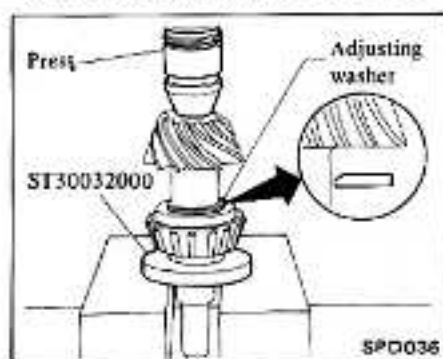
DIFFERENTIAL CARRIER

1. Press fit front and rear bearing outer races using Tools.

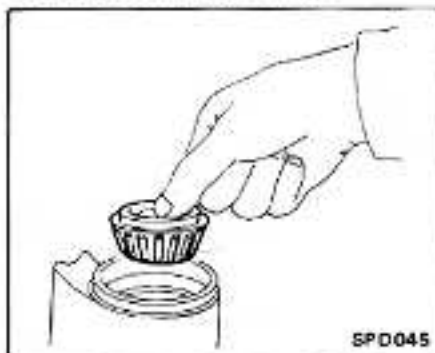


2. Select pinion height adjusting washer, referring to **PINION HEIGHT ADJUSTMENT**.

3. Install pinion height adjusting washer in drive pinion, bevel side toward gear, and press fit rear bearing inner race in it, using press and Tool.

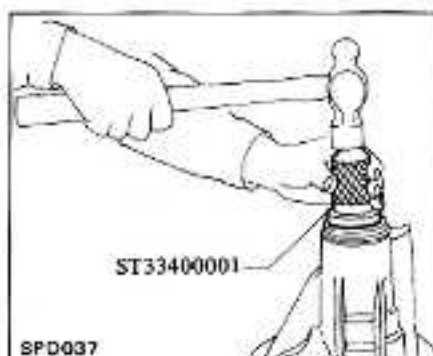


4. Lubricate front bearing with gear oil and place it in gear carrier.

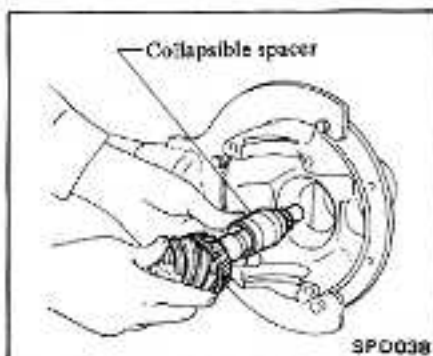


5. Using Tool, carefully fit a new oil seal into carrier.

Make sure oil seal is flush with end of carrier and apply multi-purpose grease into cavity between lips.



6. Place a new collapsible spacer on drive pinion and lubricate rear bearing with gear oil, and insert it in gear carrier.

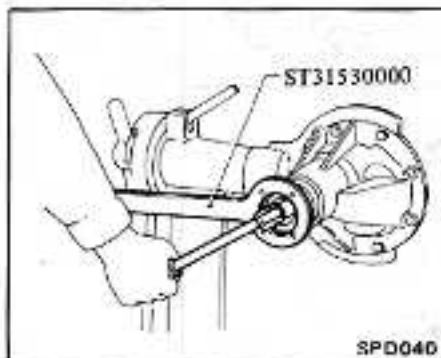


7. Install companion flange and hold it firmly. Insert drive pinion into companion flange by tapping its head with a soft hammer.



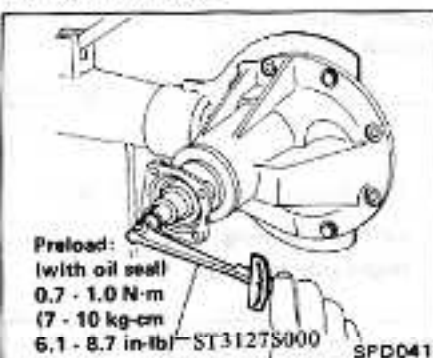
8. Hold companion flange with Tool and temporarily tighten pinion nut, until there is no axial play.

Ascertain that threaded portion of drive pinion and pinion nut are free from oil or grease.



9. Tighten pinion nut by degrees to the specified preload while checking the preload with Tools.

When checking preload, turn drive pinion in both directions several times set bearing rollers.



① : Drive pinion nut
137 - 294 N·m
(14 - 30 kg·m,
101 - 217 ft·lb)

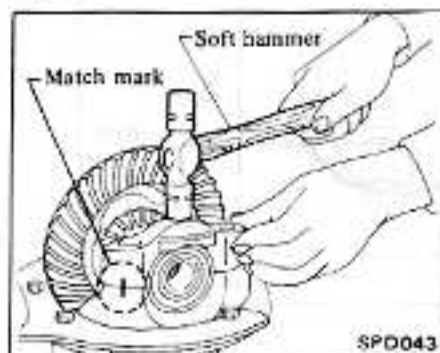
CAUTION:

The preload is achieved by using the permanent set of collapsible spacer. So here, if an over-preload results from excessive turning of the pinion nut, the spacer should be replaced by new one.

10. Install differential case assembly and side bearing outer races into differential carrier, and install side bearing cap.

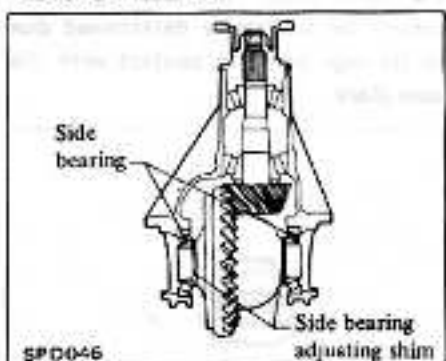
Tap on the cap with a soft hammer to settle it in the carrier.

The bearing cap should be installed with the marks put at disassembly aligned.



ADJUSTMENT

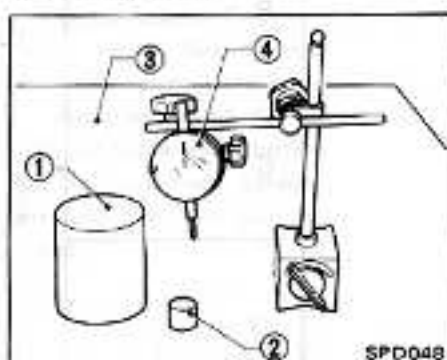
SIDE BEARING ADJUSTMENT



When the differential case, side bearing, or gear carrier is replaced, or when the ring gear backlash or side bearing preload is out of specifications, side bearing shims of proper thickness should be installed.

– Required Tools –

- ① Weight Block (ST32501000)
- ② Master Gauge (ST33741000)
- ③ Base Plate
- ④ Dial Indicator.



1. Thickness of shim can be calculated by following equation.

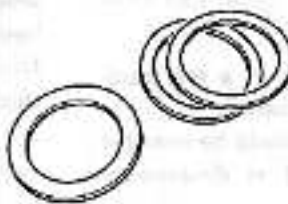
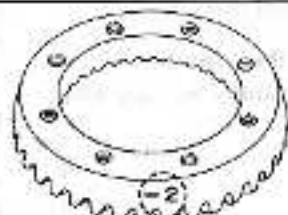
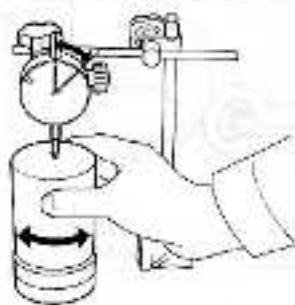
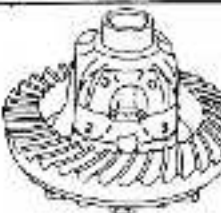
$$\text{Left side: } T_1 = (A - C + D - H') \times 0.01 + 0.20 + E$$

$$\text{Right side: } T_2 = (B - D + H') \times 0.01 + 0.09 + F$$

CAUTION:

To avoid any confusion while calculating, it is absolutely necessary to stay with metric system. If you measure anything in inches, the results should be converted into the metric system.

Where:

$T_1 =$ (Left side)		$H' =$		
$T_2 =$ (Right side)				
$A =$	 Stamped on differential carrier	$E =$ mm (Left Side Bearing)	 Differences between width of left (E) or right (F) side bearing and standard width.	
$B =$		$F =$ mm (Right Side Bearing)		
$C =$	 Stamped on differential case			
$D =$		A, B, C, D and H' are dimensional variations in a unit of 1/100 mm against each standard value.		

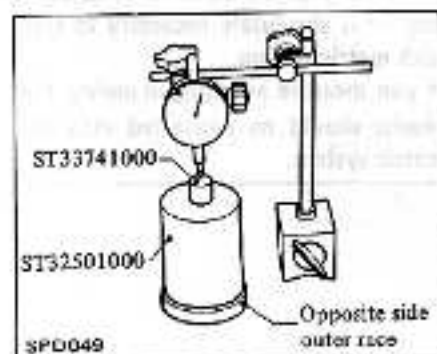
SPD 126

SPD125

2. Measure values E and F.

- (1) Attach a dial indicator to the base plate.
- (2) Place the outer race of the opposite side bearing to be measured.
- (3) Place a weight block on that outer race, and a master gauge on that block.

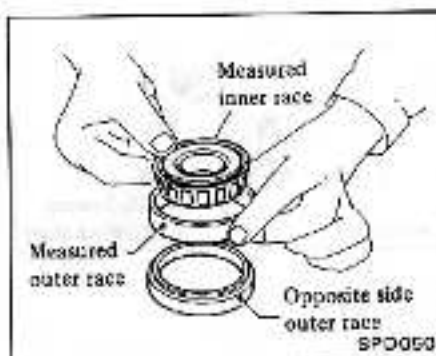
Then adjust the dial indicator scale to zero with its tip on the master gauge.



- (4) Remove the master gauge and weight block. Place the bearing outer

race and inner race to be measured on the opposite side outer race, and place the weight block on that bearing assembly.

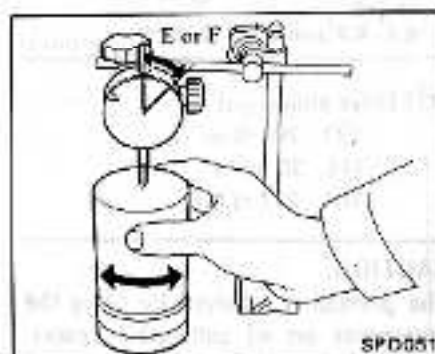
If the bearing assembly is placed on the base plate, the bearing width cannot be accurately determined due to its cage being in contact with the base plate.



- (5) Turn the bearing several times to settle it, and then read the indication of the dial indicator.

The indication should be E or F.

Left side bearing: E
Right side bearing: F



3. Substitute these values into the equation to calculate the thickness of the shim.

If values signifying A, B, C, D and H' are not given, regard them as zero and calculate.

After assembly, check to see that preload and backlash are specifications. If not, readjust.

Example:

$$\begin{aligned} A &= 1 & H' &= -2 \\ B &= 2 & E &= 0.11 \\ C &= 2 & F &= 0.20 \\ D &= 3 \end{aligned}$$

Left side:

$$\begin{aligned} T_1 &= (A - C + D - H') \times 0.01 \\ &\quad + 0.20 + E \\ &= [1 - 2 + 3 - (-2)] \times 0.01 \\ &\quad + 0.20 + 0.11 \end{aligned}$$

(1)	A	1
	-C	-2
		-1
	+D	+3
		2
	-H'	-(-2)
		4

(2)		4
	x 0.01	
		0.04

(3)		0.04
	+ 0.20	
		0.24

(4)		0.24
	+E	+0.11
		0.35

$$\therefore T_1 = 0.35 \text{ mm}$$

Right side:

$$\begin{aligned} T_2 &= (B - D + H') \times 0.01 \\ &\quad + 0.09 + F \\ &= [2 - 3 + (-2)] \times 0.01 \\ &\quad + 0.09 + 0.20 \end{aligned}$$

(1)	B	2
	-D	-3
		-1
	+H'	+(-2)
		-3

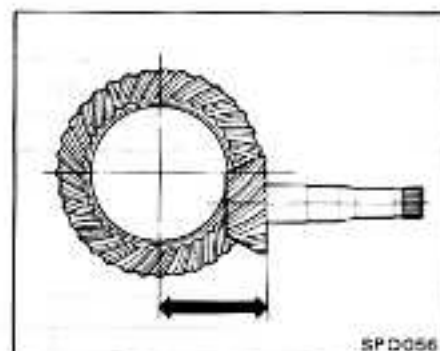
(2)		-3
	x 0.01	
		-0.03

(3)		-0.03
	+ 0.09	
		0.06

(4)		0.06
	+F	+0.20
		0.26

$$\therefore T_2 = 0.26 \text{ mm}$$

PINION HEIGHT ADJUSTMENT



When replacing the hypoid gear set, drive pinion bearing or gear carrier, be sure to adjust the pinion height.

Adjustment of the pinion height can be made by adjusting the washer to be installed between the rear bearing inner race and the drive pinion head.



4. Select the proper shims (Refer to S.D.S.).

If you cannot find the desired thickness of shims, use shims so that the total thickness is the closest to the calculated value.

Example:

Left side

Calculated value ... $T_1 = 0.35 \text{ mm}$

Used shims

Thickness	Quantity	
0.20	x 1	= 0.20
0.10	x 1	= 0.10
0.05	x 1	= 0.05
Total thickness		0.35 mm

Right side

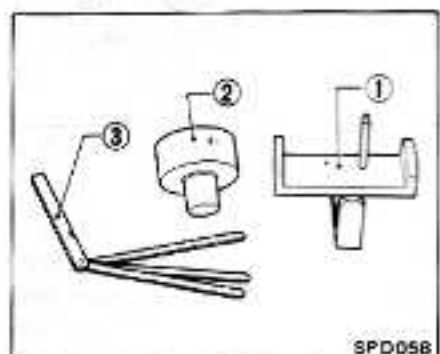
Calculated value ... $T_2 = 0.26 \text{ mm}$

Used shims

Thickness	Quantity	
0.07	x 3	= 0.21
0.05	x 1	= 0.05
Total thickness		0.26 mm

– Required Tools –

- ① Height Gauge (ST31141000)
- ② Dummy Shaft (ST31942000)
- ③ Feeler Gauge.



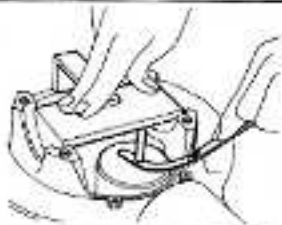
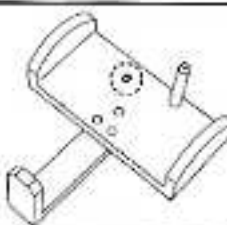
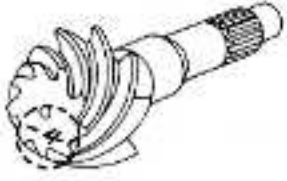
1. Thickness of washer can be calculated by following equation.

$$T = N - [(H - D' - S) \times 0.01] + 2.98$$

CAUTION:

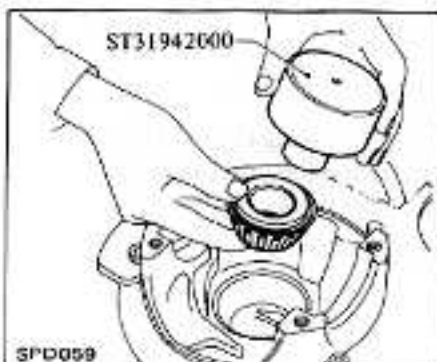
To avoid any confusion while calculating, it is necessary to stay with the metric system. If you measure anything in inches, the result should be converted to the metric system.

Where:

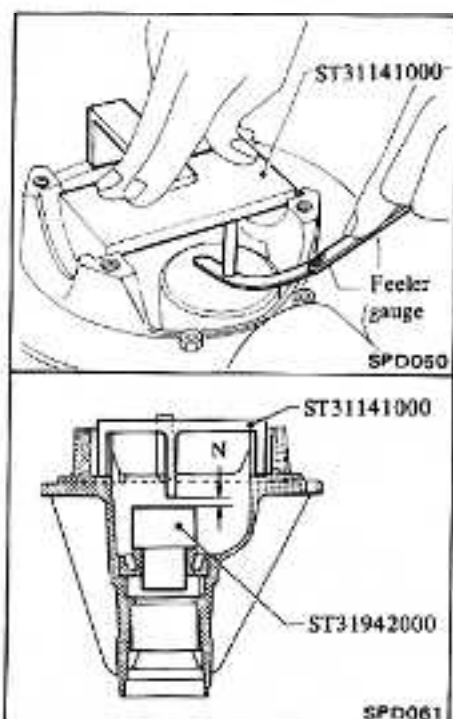
T = mm		D' =	
N = mm		S =	
H =		H, D' and S are dimensional variations in a unit of 1/100 mm against each standard value.	

SPD127

2. Assemble Dummy shaft on rear bearing inner race, and fit it into carrier.



3. Attach Height Gauge to carrier.
Using a feeler gauge, measure the clearance between the height gauge tip and the dummy shaft face,



4. Substitute these values into the equation to calculate the thickness of the washer.

If values signifying H, D' and S are not given, regard them as zero and calculate.

After assembly, check to see that tooth contact is correct. If not, readjust.

Example:

$$\begin{aligned} N &= 0.35 \\ H &= -4 \\ D' &= -3 \\ S &= 0 \end{aligned}$$

$$\begin{aligned} T &= N - [(H - D' - S) \times 0.01] \\ &\quad + 2.98 \\ &= 0.35 - [(-4) - (-3) - 0] \\ &\quad \times 0.01 + 2.98 \end{aligned}$$

(1)	H		(-4)
	-D'		-(-3)
			-1
	-S		-0
			-1

(2)			-1
		x 0.01	
			-0.01

(3)	N		0.35
			-(-0.01)
			0.36

(4)			0.36
			+2.98
			3.34

$$\therefore T = 3.34$$

5. Select the proper washer (Refer to S.D.S.).

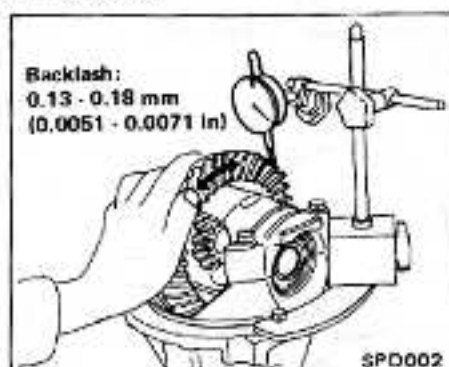
If you cannot find the desired thickness of washer, use washer so that thickness is the closest to the calculate value.

Example:

Calculated value ... $T = 3.34$ mm
Used washer ... $T = 3.33$ mm

FINAL VERIFICATION

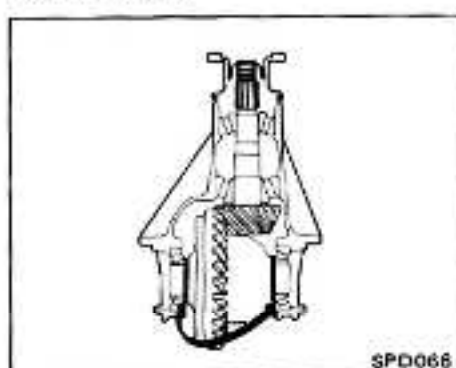
1. Check backlash of ring gear with a dial indicator.



If backlash is too small, decrease thickness of left shim and increase thickness of right shim by the same amount.

If backlash is too great, reverse the above procedure.

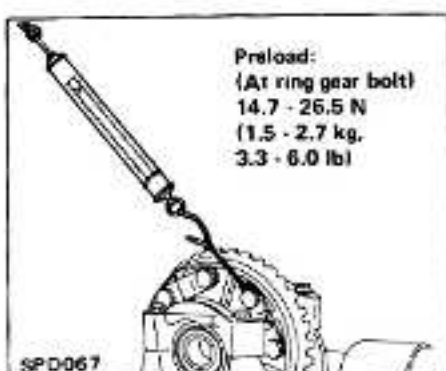
Never add or remove from the total amount of shims or bearing preload will be changed.



2. Check side bearing preload.

Hook the tip of a spring balancer on a ring gear bolt.

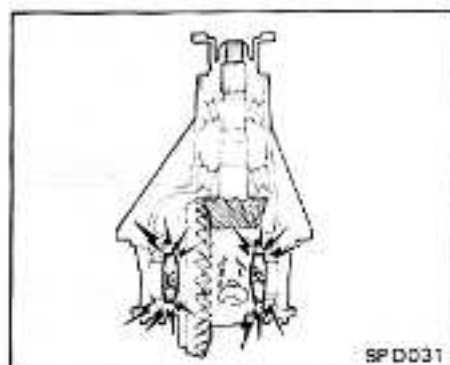
Check the preload by measuring the rotating resistance in a backlash.



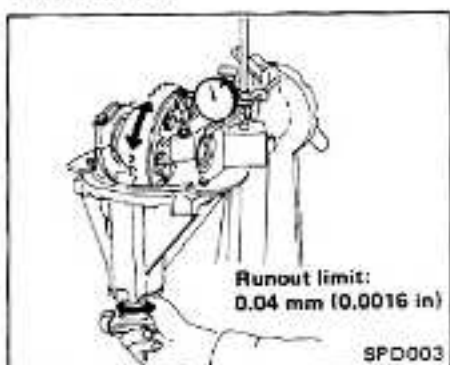
If preload is too great, remove the same amount of shims to each side.

If preload is too small, add the same amount of shims to each side.

Never add or remove different amount of shims to each side or ring gear backlash will be changed.



3. Check runout of ring gear with a dial indicator.



If backlash varies excessively in different places, the variance may have resulted from foreign matter caught between the ring gear and the differential case.

If the backlash varies greatly when the runout of the ring gear is within a specified range, the hypoid gear set or differential case should be replaced.

4. Finally, check for tooth contact pattern.

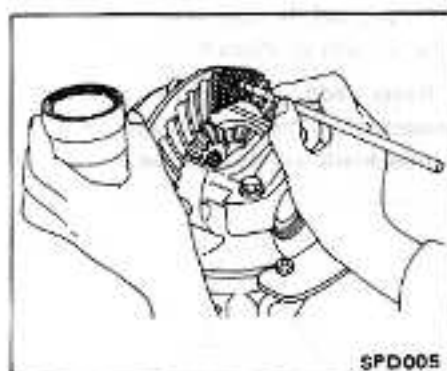
Refer to TOOTH CONTACT.

Usually the pattern will be correct if you have calculated the shims correctly and the backlash is correct.

However, in extremely rare cases you will have to use trial-and-error processes until you get a good tooth contact pattern.

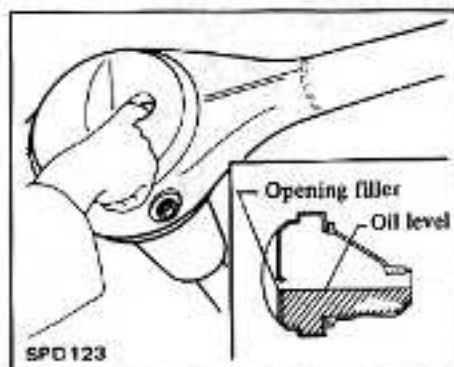
The tooth pattern is the best

indication of how well a differential has been set up.



Gasket should be replaced by new one each time the differential carrier is removed.

Then fill with gear oil, referring to Recommended Lubricants (Section MA).



5. Install the differential carrier in the car.

Ⓙ : Differential carrier fixing bolt

25 - 34 N·m
(2.5 - 3.5 kg·m,
18 - 25 ft·lb)

Drain and filler plugs

59 - 98 N·m
(6 - 10 kg·m,
43 - 72 ft·lb)

Gear oil capacity:

1.1 liters
(2 Imp pt)

SERVICE DATA AND SPECIFICATIONS

PROPELLER SHAFT

GENERAL SPECIFICATIONS

Unit: mm (in)

Applied model		Europe	Except Europe		
			5-speed M/T	A/T	4-speed M/T
			Option*		
Model		3563A		2S63A	
Number of joints		3		2	
Coupling method with transmission		Sleeve type			
Distance between yokes		63 (2.48)			
Type of journal bearing		Shell type (Non-disassembly type)			
Shaft length (Spider to spider)	1st	320 (12.60)	1,060 (41.34)	1,180 (46.46)	
	2nd	730 (28.74)			
Shaft outer diameter	1st	75 (2.96)	63.5 (2.500)	70.0 (2.756)	
	2nd	50.8 (2.000)			

*: Except for Europe models equipped with a set of differential carrier with gear ratio of 4.111 and 3563A propeller shaft.

SERVICE DATA

Unit: mm (in)

Propeller shaft runout limit	0.6 (0.024)
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TIGHTENING TORQUE

Unit		N·m	kg·m	ft·lb
Flange yoke to companion flange		24 - 32	2.4 - 3.3	17 - 24
3563A	Center bearing locking nut			
	Flange nut type	245 - 294	25 - 30	181 - 217
	Nut and washer type	196 - 235	20 - 24	145 - 174
	Center bearing support to bracket	8.8 - 11.6	0.9 - 1.2	6.5 - 8.7
Center bearing bracket to body		25 - 39	2.6 - 4.0	19 - 29

DIFFERENTIAL CARRIER

GENERAL SPECIFICATIONS

Applied model	Standard	Option
Model	H165B	
Type	Rigid axle suspension (Banjo type)	
Ring gear pitch diameter mm (in)	165 (6.50)	
Gear ratio	3.869	4.111
Number of teeth (Ring gear/Drive pinion)	35/9	37/9
Oil capacity ℓ (imp pt)	1.1 (2)	

SERVICE DATA

Drive pinion bearing adjusting method		Collapsible spacer
Drive pinion preload (with front oil seal) N·m (kg·cm, in·lb)		0.7 - 1.0 (7 - 10, 6.1 - 8.7)
Side bearing adjusting method		Shim
Backlash	Drive pinion to ring gear mm (in)	0.13 - 0.18 (0.0051 - 0.0071)
	Side gear to pinion mate gear (Clearance between side gear to differential case) mm (in)	0.10 - 0.20 (0.0039 - 0.0079)
Ring gear runout limit mm (in)		0.04 (0.0016)
Side bearing preload (at ring gear bolt) N (kg, lb)		14.7 - 26.5 (1.5 - 2.7, 3.3 - 6.0)

Side bearing adjusting shim

Thickness mm (in)	Part No.
0.05 (0.0020)	38453 - 28500
0.07 (0.0028)	38454 - 28500
0.10 (0.0039)	38455 - 28500
0.20 (0.0079)	38456 - 28500
0.50 (0.0197)	38457 - 28500

Pinion height adjusting washer

Thickness mm (in)	Part No.
3.09 (0.1217)	38154 - U1500
3.12 (0.1228)	38154 - U1501
3.15 (0.1240)	38154 - U1502
3.18 (0.1252)	38154 - U1503
3.21 (0.1264)	38154 - U1504
3.24 (0.1276)	38154 - U1505
3.27 (0.1287)	38154 - U1506
3.30 (0.1299)	38154 - U1507
3.33 (0.1311)	38154 - U1508
3.36 (0.1323)	38154 - U1509
3.39 (0.1335)	38154 - U1510
3.42 (0.1346)	38154 - U1511
3.45 (0.1358)	38154 - U1512
3.48 (0.1370)	38154 - U1513
3.51 (0.1382)	38154 - U1514
3.54 (0.1394)	38154 - U1515
3.57 (0.1406)	38154 - U1516
3.60 (0.1417)	38154 - U1517
3.63 (0.1429)	38154 - U1518
3.66 (0.1441)	38154 - U1519

Side gear thrust washer

Thickness mm (in)	Part No.
0.785 (0.0309)	38424 - 04101
0.835 (0.0329)	38424 - 08000
0.885 (0.0348)	38424 - 08001
1.035 (0.0407)	38424 - 08002
1.185 (0.0467)	38424 - 08003

TIGHTENING TORQUE

Unit	N·m	kg·m	ft·lb
Drive pinion nut	137 - 234	14 - 30	101 - 217
Ring gear bolt	78 - 99	8 - 10	58 - 72
Side bearing cap bolt	48 - 59	5 - 6	35 - 43
Drain and filler plugs	59 - 88	6 - 10	43 - 72
Companion flange to propeller shaft	24 - 32	2.4 - 3.3	17 - 24
Differential carrier to rear axle case	25 - 34	2.5 - 3.5	18 - 25

TROUBLE DIAGNOSES AND CORRECTIONS**PROPELLER SHAFT**

Condition	Probable cause	Corrective action
Vibration during at medium or high speed.	Worn or damaged journal bearing. Unbalance due to bent or dented propeller shaft. Loose propeller shaft installation. Worn transmission rear extension bushing. Damaged center bearing (3S63A). Undercoating or mud on the shaft causing unbalance. Balance weights missing.	Replace propeller shaft assembly. Replace propeller shaft assembly. Retighten. Replace. Replace. Clean up shaft. Replace propeller shaft assembly
Knocking sound during starting or noise during coasting on propeller shaft.	Worn or damaged journal. Worn sleeve yoke and mainshaft spline. Loose propeller shaft installation. Loose joint installation. Damaged center bearing or insulator (3S63A). Loose or missing bolts at center bearing bracket to body (3S63A).	Replace propeller shaft assembly. Replace propeller shaft assembly. Retighten. Replace propeller shaft assembly. Replace center bearing. Replace or tighten bolts.
Scraping noise.	Dust cover on sleeve yoke rubbing on transmission rear extension.	Straighten out dust cover to remove interference.
Whine or whistle.	Damaged center bearing (3S63A).	Replace center bearing.

DIFFERENTIAL CARRIER

When a differential carrier is suspected of being noisy, it is advisable to make a thorough test to determine whether the noise originates in the

tires, road surface, exhaust, universal joint, propeller shaft, wheel bearings, engine, transmission, or differential carrier. Noise which originates in other

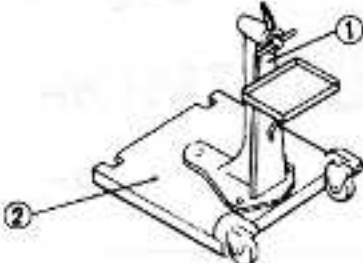
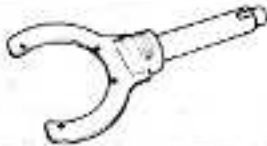
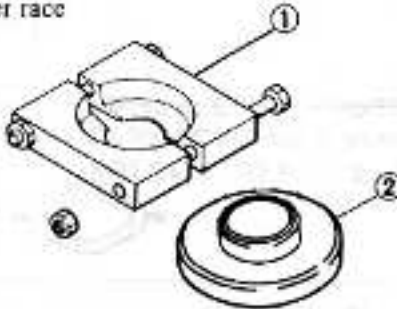
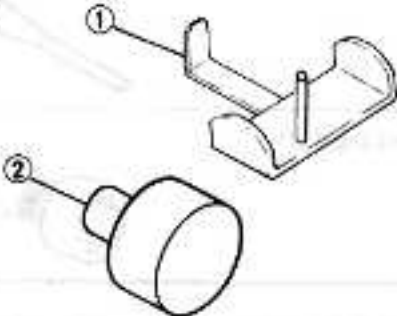
places cannot be corrected by adjustment or replacement of parts in differential carrier.

Condition	Probable cause	Corrective action
Noise on drive, coast and float.	Shortage of oil. Incorrect tooth contact between ring gear and drive pinion. Incorrect backlash between ring gear and drive pinion. Seized up or damaged ring gear and drive pinion.	Supply gear oil. Rebuild gear carrier if necessary. Adjust tooth contact or replace the hypoid gear set. Adjust backlash or replace the hypoid gear set if necessary. Replace the hypoid gear set.

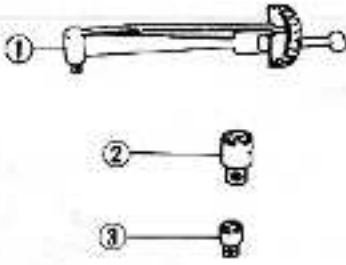
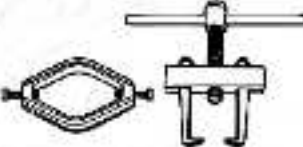
Trouble Diagnoses and Corrections – PROPELLER SHAFT & DIFFERENTIAL CARRIER

Condition	Probable cause	Corrective action
Noise on drive, coast and float.	Seized up, damaged or broken drive pinion bearing.	Replace the pinion bearing and faulty parts.
	Seized up, damaged or broken side bearing. Loose clamp bolts or nuts holding ring gear, bearing cap, etc.	Replace the side bearing and faulty parts. Clamp them to specified torque, and replace faulty parts.
Noise on turn.	Seized up, damaged or broken side gear and pinion mate gear.	Replace faulty parts.
	Seized up, damaged or broken side gear and pinion mate gear thrust washers.	Replace faulty parts.
	Pinion mate gears too tight on their shaft.	Replace faulty parts.
Knocking sound during starting or gear shifting.	Excessive backlash.	Adjust backlash.
	Incorrect backlash ring gear-to-drive pinion or side gear-to-pinion mate gear.	Replace worn parts.
	Worn gears or case.	Replace worn parts.
	Worn rear axle shaft and side gear spline.	Adjust preload.
	Pinion bearing under preload. Loose drive pinion nut. Loose bolts and nuts, such as ring gear bolts.	Replace or tighten bolt. Replace faulty parts or tighten bolts.
Seizure or breakage.	Shortage of oil or use of unsuitable oil.	Replace faulty parts and use recommended gear oil.
	Excessively small backlash.	Adjust backlash and replace as required.
	Incorrect adjustment of bearings or gears	Replace faulty parts.
	Severe service due to an excessive loading, improper use of clutch Loose bolts and nuts, such as ring gear bolts.	Replace faulty parts. Replace faulty parts or tighten bolts.
Oil leakage.	Worn-out, damaged or improperly driven front oil seal, or bruised, dented or abnormally worn slide face of companion flange.	Replace damaged oil seal. Repair flange with sandpaper or replace if necessary.
	Damaged gasket.	Replace.
	Loose filler or drain plug.	Tighten.
	Clogged or damaged breather.	Repair or replace.

SPECIAL SERVICE TOOLS

Tool number	Tool name
ST0501S000 ① ST05011000 ② ST05012000	Engine stand Engine stand Base 
ST06360001	Diff. attachment 
ST3003S000 ① ST30031000 ② ST30032000	Drive pinion rear bearing inner race puller set Puller Base 
ST30611000	Drive pinion bearing outer race drift bar 
ST30613000	Drive pinion rear bearing outer race drift 
ST30701000	Drive pinion front bearing outer race drift 
ST3114S000 ① ST31141000 ② ST31942000	Drive pinion setting gauge set Height gauge Dummy shaft 

Special Service Tools – PROPELLER SHAFT & DIFFERENTIAL CARRIER

Tool number	Tool name
ST31278000 ① GG91030000 ② HT62900000 ③ HT62940000	Preload gauge Torque wrench Socket adapter (1/2") Socket adapter (3/8") 
ST31530000	Drive pinion flange wrench 
ST32501000	Weight block 
ST33051001	Diff. side bearing puller 
ST33052000	Adapter 
ST33400001	Oil seal fitting tool 
ST33741000	Master gauge [18.5 mm (0.728 in)] 
KV31100300	Solid punch 
KV38102100	Diff. side bearing drift 