NISSAN
RL4R03A/V

INDEX

AUTOMATIC TRANSMISSION SERVICE GROUP
18639 SW 107TH AVENUE
MIAMI, FLORIDA 33157
(305) 670-4161

Updated
April, 2004

INTRODUCTION

NISSAN RL4F03A - RL4F03V

The RL4F03A and RL4F03V are found in the Nissan Sentra and NX Coupe vehicles. These units are hydraulically controlled and have two solenoids, one for torque converter clutch and the other for overdrive cancel. Even though these units look similar, there are significant differences in the internal geartrain. The number of clutches will also vary between the different clutch packs. The biggest difference between the units is the viscous coupling in the final drive. The viscous coupling is found in the F03V (Viscous) transaxle.

We wish to thank Nissan Corporation for the information and illustrations that have made this booklet possible.

DALE ENGLAND
FIELD SERVICE CONSULTANT

WAYNE COLONNA
TECHNICAL SUPERVISOR

PETER LUBAN
TECHNICAL CONSULTANT

JON GLATSTEIN
TECHNICAL CONSULTANT

ROLAND ALVAREZ
TECHNICAL CONSULTANT

GERALD CAMPBELL
TECHNICAL CONSULTANT

JIM DIAL
TECHNICAL CONSULTANT

ED KRUSE
TECHNICAL CONSULTANT

GREGORY LIPNICK
TECHNICAL CONSULTANT

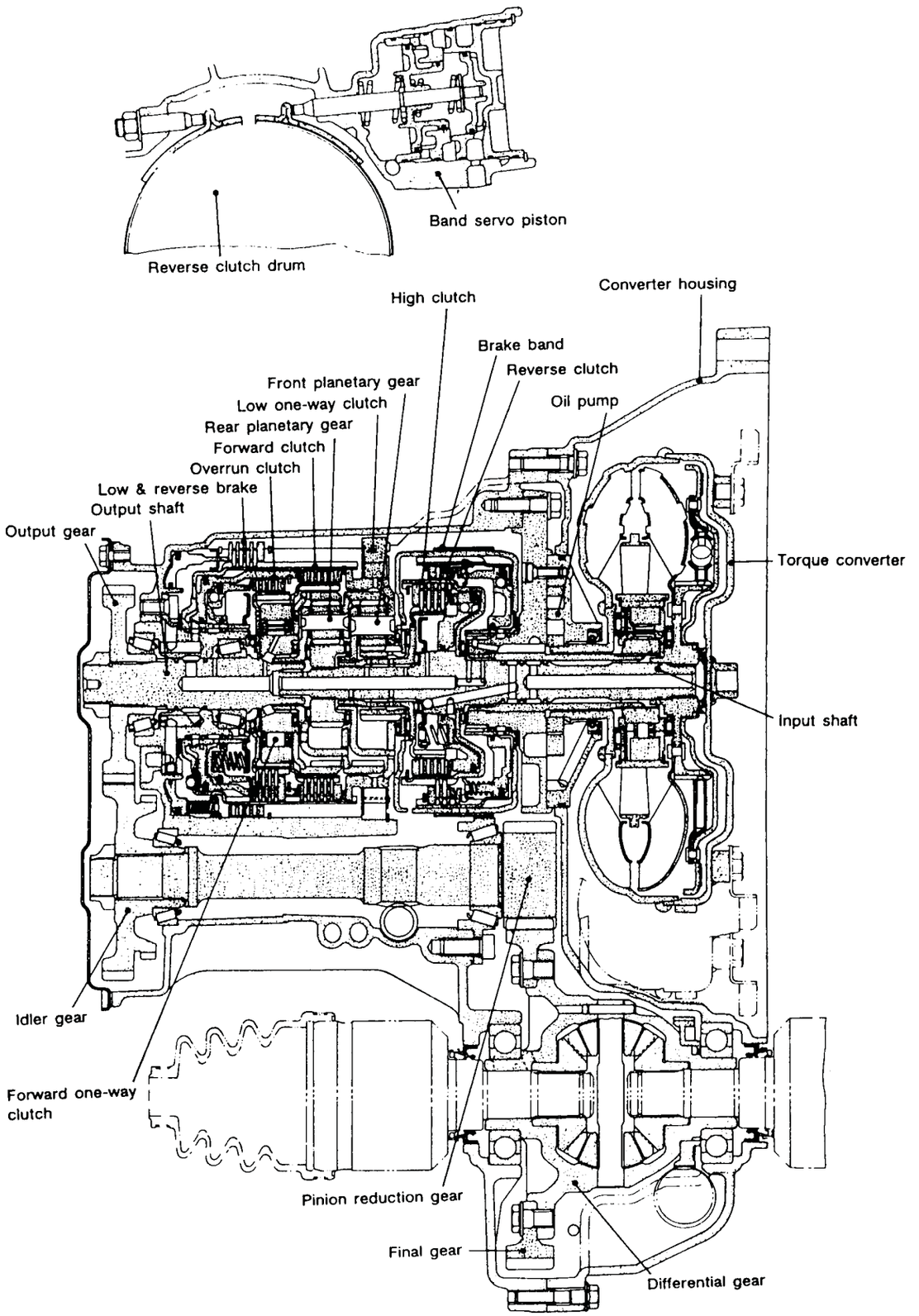
DAVID CHALKER
TECHNICAL CONSULTANT

JERRY GOTT
TECHNICAL CONSULTANT

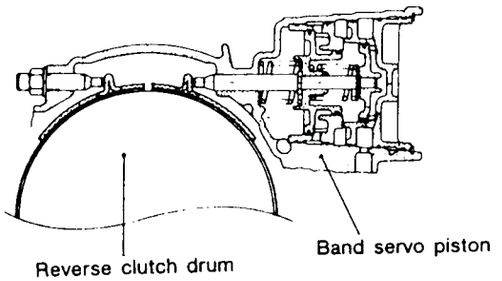
MIKE SOUZA
TECHNICAL CONSULTANT

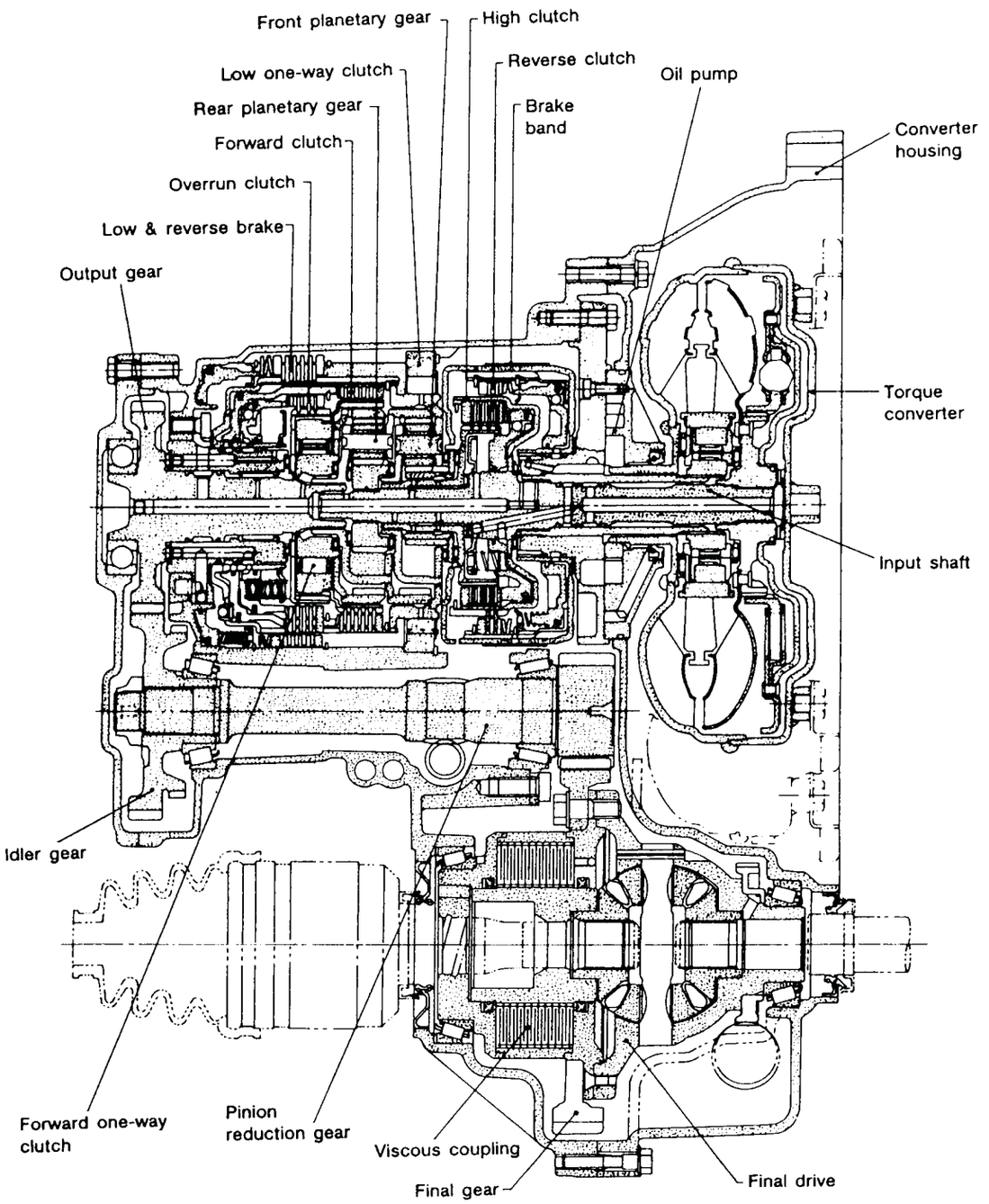
AUTOMATIC TRANSMISSION SERVICE GROUP
18639 SW 107TH AVENUE
MIAMI, FLORIDA 33157
(305) 670-4161

Cross-sectional View — RL4F03A

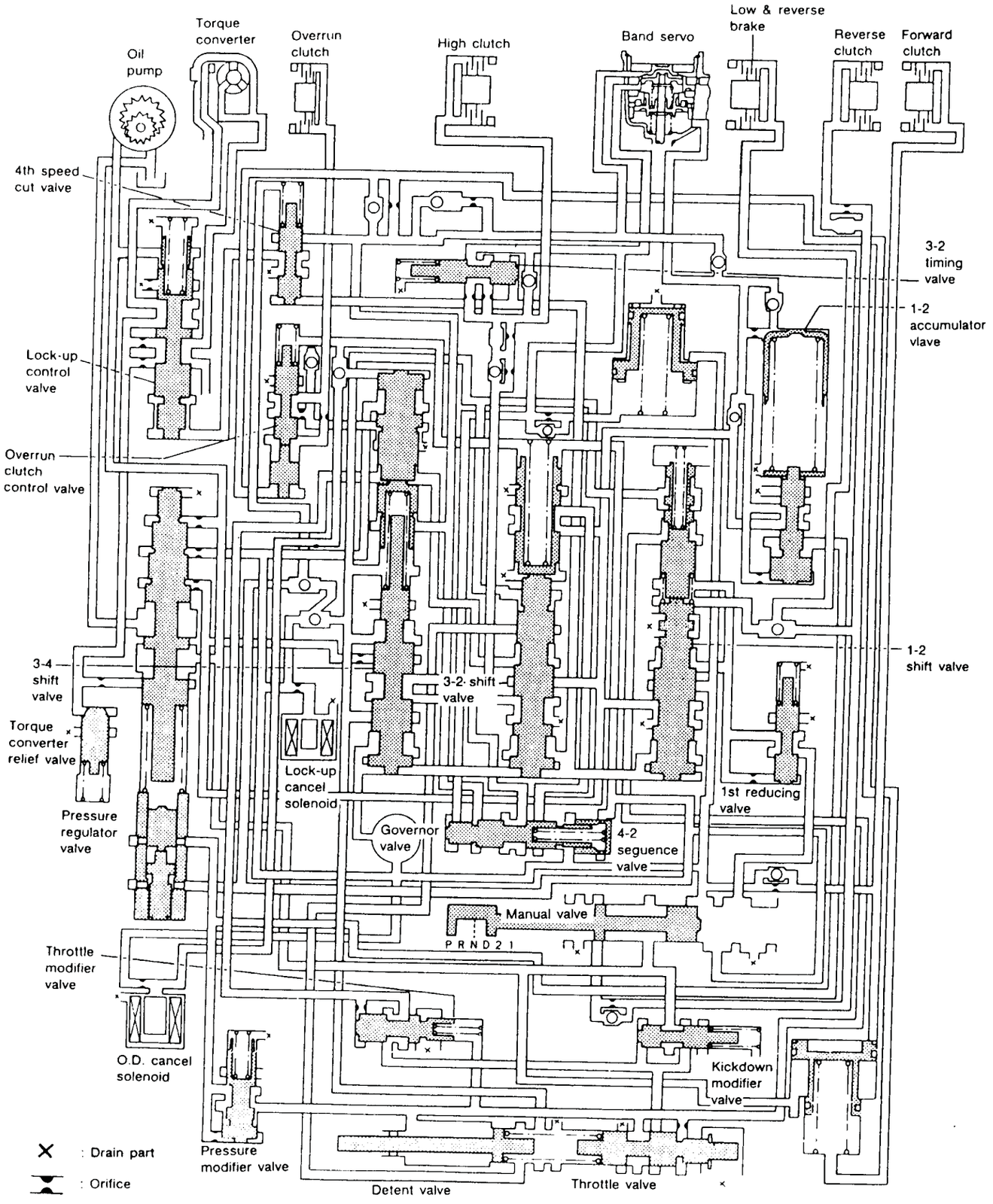


Cross-sectional View — RL4F03V





Hydraulic Control Circuit



Mechanical Operation

Shift position		Reverse clutch	High clutch	Forward clutch	Overrun clutch	Band servo			Forward one-way clutch	Low one-way clutch	Low & reverse brake	Lock-up	Remarks
						2nd apply	3rd release	4th apply					
P													PARK
R		○									○		REVERSE
N													NEUTRAL
D *4	1st			○	◎				●	●			Automatic shift 1 ↔ 2 ↔ 3 ↔ 4
	2nd			○	*1 ◎	○			●				
	3rd		○	○	◎	*2⊗	⊗		●				
	4th		○	⊗		*3⊗	⊗	○				○	
2	1st			○	○				●	●			Automatic shift 1 ↔ 2
	2nd			○	○	○			●				
1	1st			○	○				●		○		Locks (held stationary) in 1st speed 1 ← 2
	2nd			○	○	○			●				

*1 : Operates when overdrive switch is set to "OFF".
*2 : Oil pressure is applied to both 2nd "apply" side and 3rd "release" side of band servo piston. However, brake band does not contract because oil pressure area on the "release" side is greater than that on the "apply" side.
*3 : Oil pressure is applied to 4th "apply" side in condition *2 above, and brake band contracts.
*4 : A/T will not shift to 4th when overdrive switch is set to "OFF" position.
○ : Operates
◎ : Operates when throttle opening is less than 1/16.
● : Operates during "progressive" acceleration.
⊗ : Operates but does not affect power transmission.

Road Testing

Perform road tests using "Symptom" chart. Refer to page AT-38.

"P" RANGE

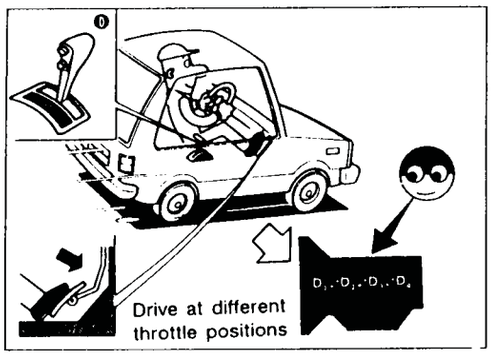
1. Place selector lever in "P" range and start engine. Stop engine and repeat the procedure in all ranges, including neutral.
2. Stop vehicle on a slight upgrade and place selector lever in "P" range. Release parking brake to make sure vehicle remains locked.

"R" RANGE

1. Manually move selector lever from "P" to "R", and note shift quality.
2. Drive vehicle in reverse long enough to detect slippage or other abnormalities.

"N" RANGE

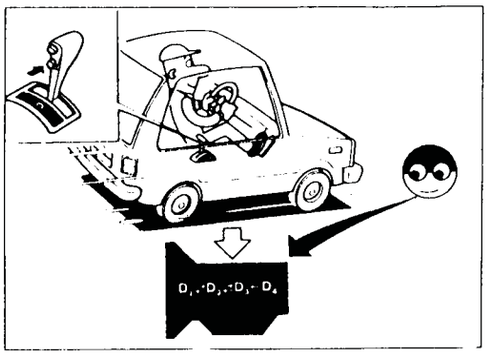
1. Manually move selector lever from "R" and "D" to "N" and note shift quality.
2. Release parking brake with selector lever in "N" range. Lightly depress accelerator pedal to make sure vehicle does not move. (When vehicle is new or soon after clutches have been replaced, vehicle may move slightly. This is not a problem.)



"D" RANGE

1. Manually shift selector lever from "N" to "D" range, and note shift quality.
2. Using the shift schedule as a reference, drive vehicle in "D" range. Record, on symptom chart, respective vehicle speeds at which up-shifting and down-shifting occur. These speeds are to be read at three different throttle positions (light, half and full), respectively. Also determine the timing at which shocks are encountered during shifting and which clutches are engaged.
3. Determine whether lock-up properly occurs while driving vehicle in proper gear position and at proper vehicle speed.

Road Testing (Cont'd)



4. Check to determine if shifting to overdrive gear cannot be made while O.D. control switch is "OFF".
5. While driving vehicle in the 60 to 70 km/h (37 to 43 MPH) range in "D_3" range at half to light throttle position, fully depress accelerator pedal to make sure transaxle downshifts from 3rd to 2nd gear.
6. While driving vehicle in the 25 to 35 km/h (16 to 22 MPH) ("D_2" range) at half to light throttle position, fully depress accelerator pedal to make sure transaxle downshifts from 2nd to 1st gear.

"2" RANGE

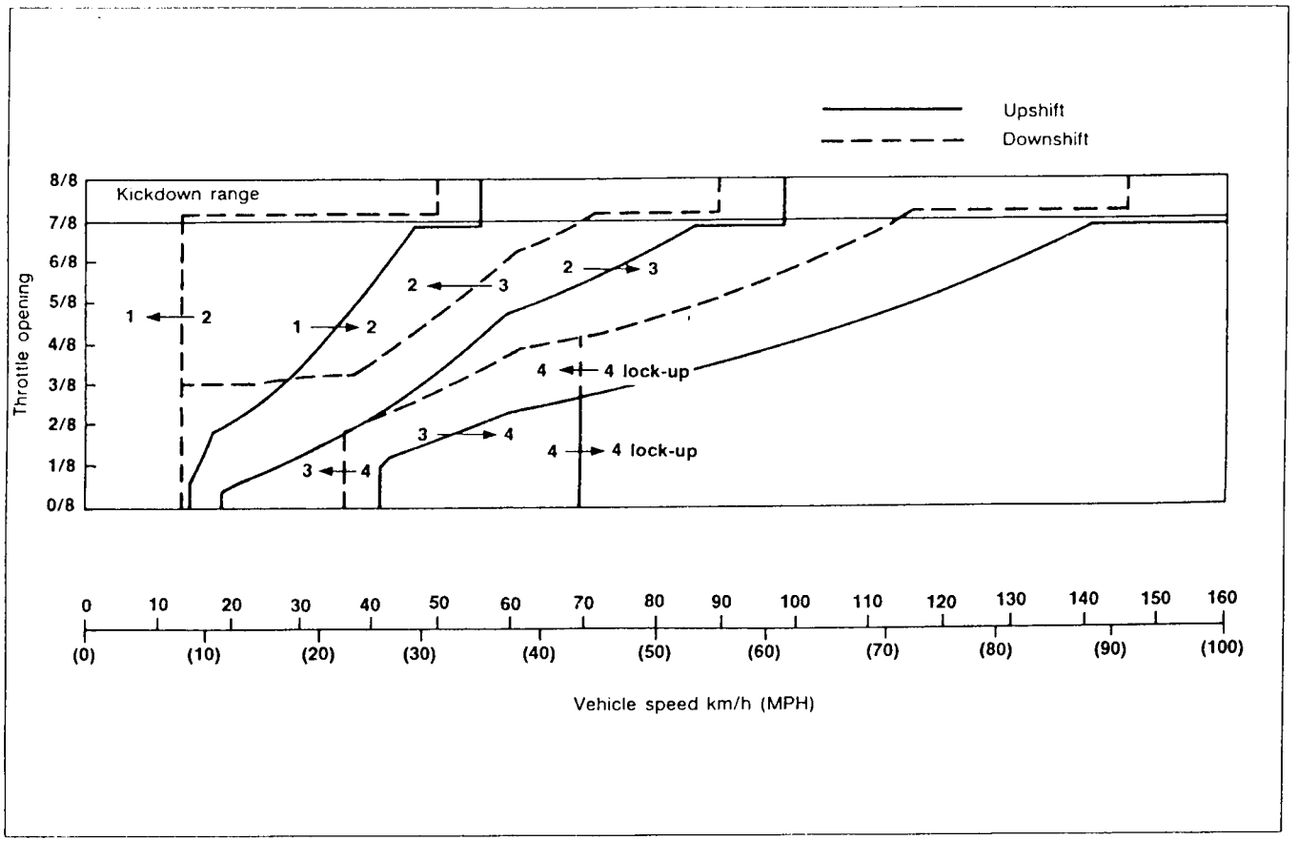
1. Shift to "2" range and make sure vehicle starts in 1st gear.
2. Increase vehicle speed to make sure transaxle upshifts from 1st to 2nd gear.
3. Further increase vehicle speed. Make sure transaxle does not upshift to 3rd gear.
4. While driving vehicle at the 25 to 35 km/h (16 to 22 MPH) with throttle at half to light position ("2_2" range), fully depress accelerator pedal to make sure transaxle downshifts from 2nd to 1st gear.
5. Allow vehicle to run idle while in "2" range to make sure that transaxle downshifts to 1st gear.
6. Move selector lever to "D" range and allow vehicle to operate at 30 to 40 km/h (19 to 25 MPH). Then, shift to "2" range to make sure transaxle downshifts to 2nd gear.

"1" RANGE

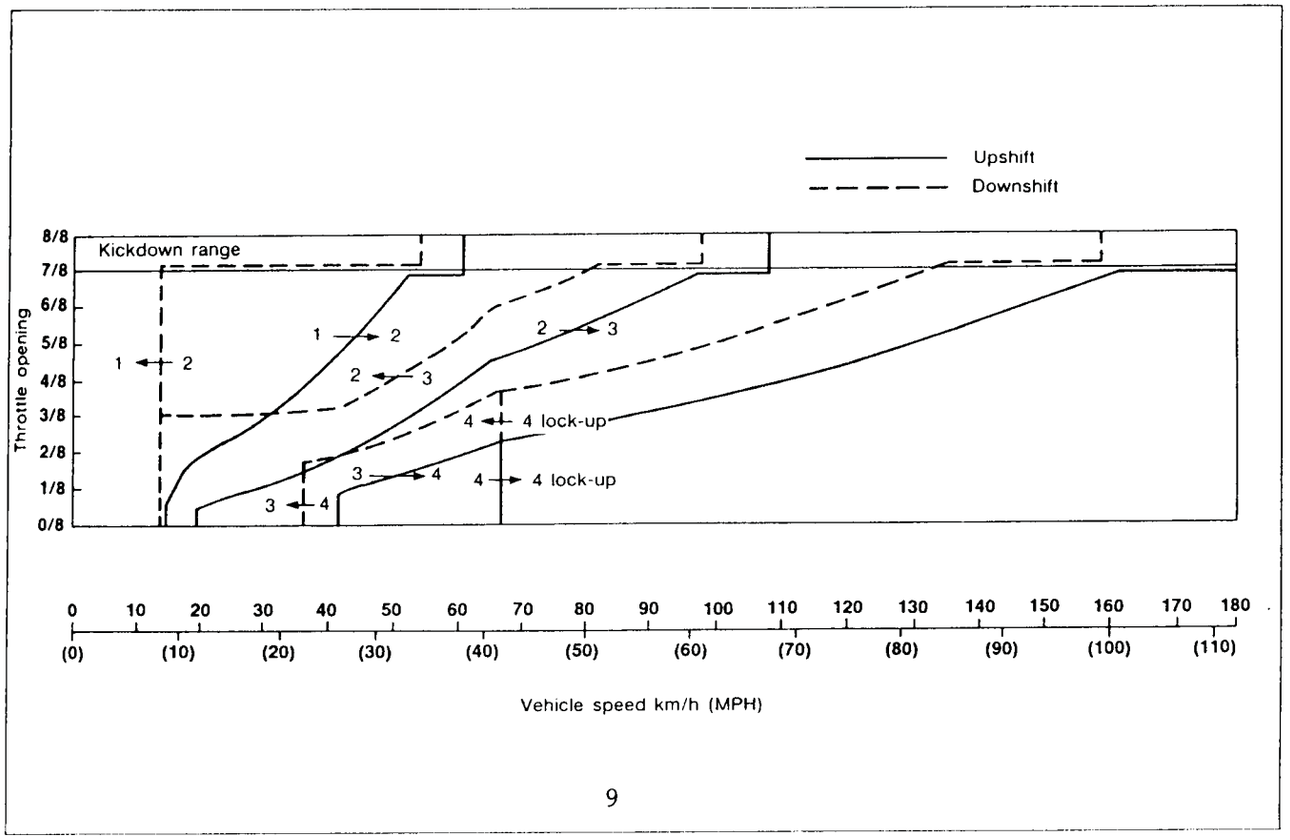
1. Place selector lever in "1" range and accelerate vehicle. Make sure transaxle does not shift from 1st to 2nd gear although vehicle speed increases.
2. While driving vehicle in "1" range, release accelerator pedal to make sure that engine compression acts as a brake.
3. Place selector lever in "D" or "2" range and allow vehicle to run at 15 to 25 km/h (9 to 16 MPH). Then move selector lever to "1" range to make sure transaxle downshifts to 1st gear.

SHIFT SCHEDULE

GA16DE engine



SR20DE engine



ROAD TEST SYMPTOM CHART

Numbers are arranged in order of probability.
Perform inspections starting with number one and work up.
Circled numbers indicate that the transaxle must be removed from the vehicle.

[ ] : Valve expected to be malfunctioning

		ON VEHICLE														
		Oil level and oil quality	Control cable	Inhibitor switch and wiring	Throttle wire	Engine idling rpm	Line pressure	Control valve	Throttle valve & detent valve	Manual valve	Pressure regulator valve	3-4 shift valve	2-3 shift valve	1-2 shift valve	Overrun clutch control valve	Pressure modifier valve
Sharp shocks in shifting from "N" to "D" range		1	2	.	5	3	4	7								
Shift shocks	When shifting from 1st to 2nd or 2nd to 3rd	1	2	.	4	.	3	6								
	When shifting from 3rd to 4th	1	2	.	4	.	3	5								
	When shifting from D to 2 and 1 range. When O.D. switch is set from "ON" to "OFF"	1	2	.	4	.	3	5								
	When shifting from 2nd to 1st in "1" range	1	2	.	4	.	3	5								
Shift slippage when upshifting	When shifting from 1st to 2nd	1	2	.	4	.	3	5								
	When shifting from 2nd to 3rd	1	2	.	4	.	3	6								
	When shifting from 3rd to 4th	1	2	.	4	.	3	5								
Shift slippage with accelerator pedal depressed	When shifting from 4th to 2nd	1	2	.	5	.	3	6								
	When shifting from 4th to 3rd	1	2	.	4	.	3	6								
	When shifting from 4th to 1st and shifting from 3rd to 1st	1	2	.	5	.	3	6								
Poor power/acceleration	When vehicle starts	1	2	.	4	.	3	6								
	When upshifting	1	2	.	4	.	3	7								
No engine braking	When shifting from "D" to "2" and "1" range	1	2	.	4	.	3	5								
	When O.D. switch is set from "ON" to "OFF"	1	2	.	4	.	3	7								
	When shifting from 2nd to 1st in "1" range	1	2	.	4	.	3	5								
Shift quality	Too low a gear change point from 2nd to 3rd and from 3rd to 2nd.	1	.	.	3	.	2	6								
	Too high a gear change point from 2nd to 3rd and from 3rd to 2nd.	1	.	.	3	.	2	6								
	Too low a gear change point from 2nd to 1st in "1" range.	1	.	.	3	.	2	6								
	Too high a gear change point from 2nd to 1st in "1" range.	1	.	.	3	.	2	6								

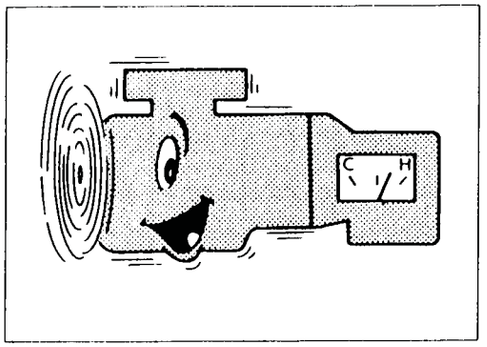
ON VEHICLE																OFF VEHICLE															
Kickdown modifier valve	1-2 accumulator valve	3-2 timing valve	1st reducing valve	Torque converter relief valve	Throttle modifier valve	4th speed cut valve	Lock-up control valve	4-2 sequence valve	Governor pressure	Governor valve	O.D. cancel solenoid	Lock-up cancel solenoid	Accumulator 3-R	Accumulator N-D	Ignition switch and starter motor	O.D. control switch and wiring	Torque converter	Oil pump	Reverse clutch	High clutch	Forward clutch	Forward one-way clutch	Overrun clutch	Low one-way clutch	Low & reverse clutch	Brake band	Parking components					
														6				9	8												
													5					8								7				
																		8					7			6				
																				8			7			6				
																		7							6					
																		7								6				
													5					9		8						7				
																		8		7						6				
									4	7							8	9	10	11	13	14	15	16	17	12					
													5					7		8			10		11	9				
									4	7								11		8		10				9				
														5				9		7	8									
									5	6								9			8									
																							6							
											6					5								8							
																							6		7					
									4	5																					
									4	5																					
									4	5																					
									4	5																					

Numbers are arranged in order of probability.
Perform inspections starting with number one and work up.
Circled numbers indicate that the transaxle must be removed from the vehicle.

[ ] : Valve expected to be malfunctioning

		ON VEHICLE														
		Oil level and oil quality	Control cable	Inhibitor switch and wiring	Throttle wire	Engine idling rpm	Line pressure	Control valve	Throttle valve & detent valve	Manual valve	Pressure regulator valve	3-4 shift valve	2-3 shift valve	1-2 shift valve	Overrun clutch control valve	Pressure modifier valve
Shift quality	Failure to change gear from 4th to 2nd with accelerator pedal depressed.	1	.	.	3	.	2	6								
	Failure to change gear from 3rd to 2nd with accelerator pedal depressed.	1	.	.	3	.	2	6								
	Failure to change gear from 1st to 2nd in "D" and "2" range.	1	.	.	3	.	2	6								
	Vehicle does not start from "1st" in "D" and "2" range.	1	.	.	3	.	2	6								
	Failure to change gear to 3rd and 4th in "D" range.	1	.	.	3	.	2	6								
	Changes gear to 1st directly when selector lever is set from "D" to "1" range.	1	.	.	3	.	2	6								
	Changes gear to 2nd in "1" range.	1	.	.	3	.	2	6								
Lock-up quality	Lock-up point is extremely high or low.	1	.	.	3	.	2	6								
	Torque converter does not lock-up.	1	.	.	3	.	2	7								
	Lock-up is not released when accelerator pedal is released.	1	.	.	.	.	.	2								
Engine does not start in "P" and "N" ranges or engine starts in ranges other than "P" and "N" ranges.		.	2	3	.	.	.	.								
Vehicle moves with selector lever in "P" range.		.	1	.	.	.	.	.								

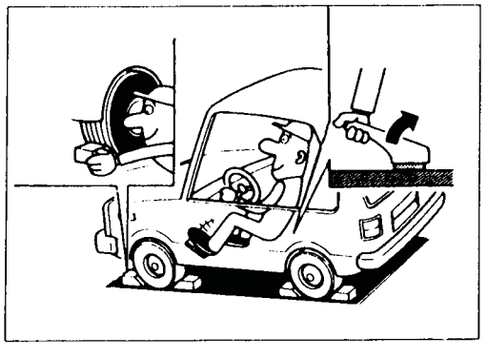
ON VEHICLE																	OFF VEHICLE									
Kickdown modifier valve	1-2 accumulator valve	3-2 timing valve	1st reducing valve	Torque converter relief valve	Throttle modifier valve	4th speed cut valve	Lock-up control valve	4-2 sequence valve	Governor pressure	Governor valve	O.D. cancel solenoid	Lock-up cancel solenoid	Accumulator 3-R	Accumulator N-D	Ignition switch and starter motor	O.D. control switch and wiring	Torque converter	Oil pump	Reverse clutch	High clutch	Forward clutch	Forward one-way clutch	Overrun clutch	Low one-way clutch	Low & reverse clutch	Brake band	Parking components
									4	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
									4	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
									4	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
									4	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
									4	5	7	.	.	.	.	8	.	.	.	.	.	.	.	.	.	.	.
									4	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
									4	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
									4	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
									4	5	.	6	.	.	.	.	8	.	.	.	.	.	.	.	.	.	.
									.	.	.	3	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.
									.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
									.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.



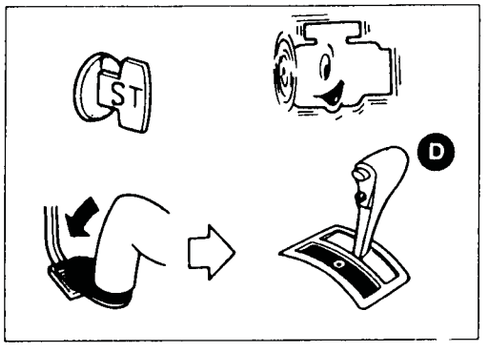
Stall Testing

STALL TEST PROCEDURE

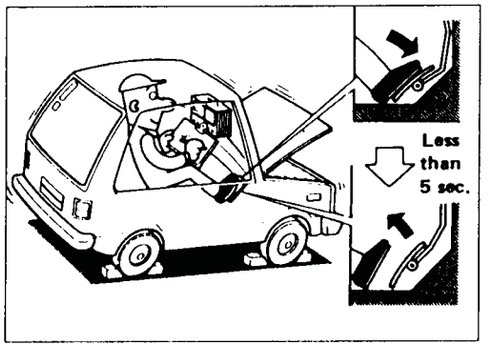
1. Check A/T and engine fluid levels. If necessary, add fluid.
2. Warm up engine until engine oil and A.T.F. reach operating temperature after vehicle has been driven approx. 10 minutes.
   A.T.F. operating temperature:
   50 - 80°C (122 - 176°F)



3. Set parking brake and block wheels.
4. Install a tachometer where it can be seen by driver during test.



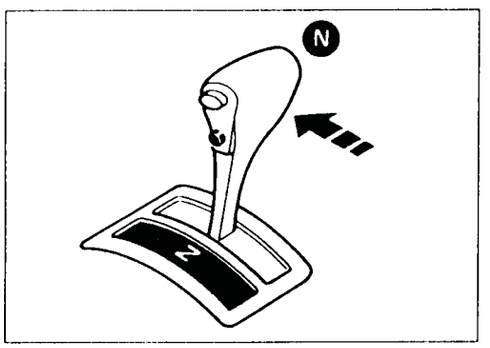
5. Start engine, apply foot brake, and place selector lever in "D" range.



6. Accelerate to wide-open throttle gradually while applying foot brake.
7. Quickly note the engine stall revolution and immediately release throttle.

- **During test, never hold throttle wide-open for more than 5 seconds.**

Stall revolution standard:
RL4F03A (GA16DE engine) 2,450 - 2,750 rpm
RL4F03V (SR20DE engine) 1,900 - 2,200 rpm



8. Shift selector lever to "N".
9. Cool off A.T.F.

- **Run engine at idle for at least one minute.**

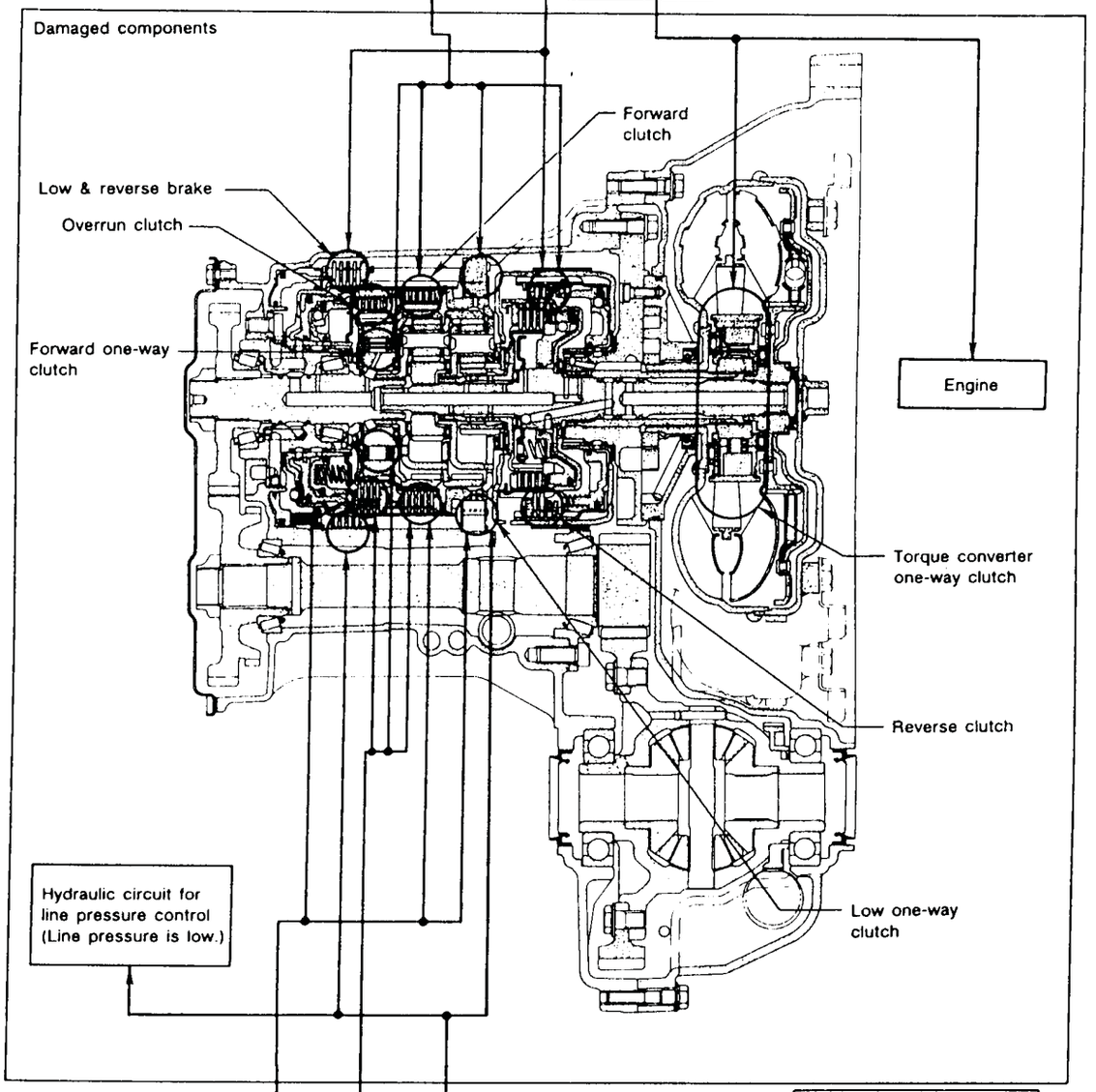
10. Perform stall tests in the same manner as in steps 5 through 9 with selector lever in "2", "1" and "R", respectively.

JUDGMENT OF STALL TEST

Judgement of stall test

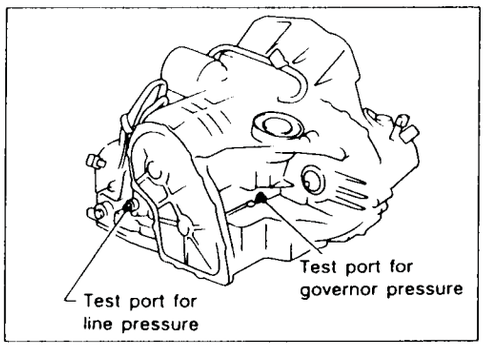
Selector lever position	Judgment		
D	H	O	L
2	H	O	L
1	O	O	L
R	H	H	L

O : Stall revolution is normal.
H : Stall revolution is higher than specified.
L : Stall revolution is lower than specified.



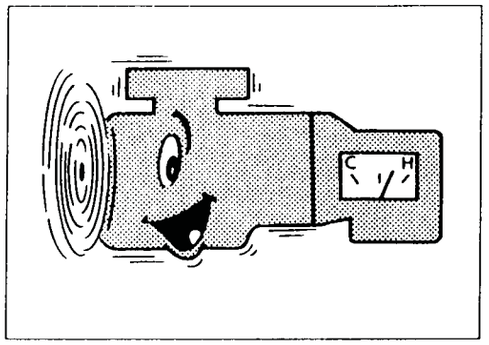
D	H	H	H	O
2	H	H	H	O
1	O	H	H	O
R	O	O	H	O
Selector lever position	Judgment			

Clutches and brakes except high clutch and brake band are O.K. (Condition of high clutch and brake band cannot be confirmed by stall test.)



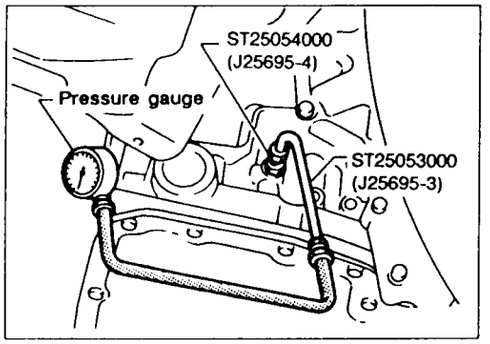
Pressure Testing

- Location of pressure test port.
- **Always replace pressure plugs as they are self-sealing bolts.**

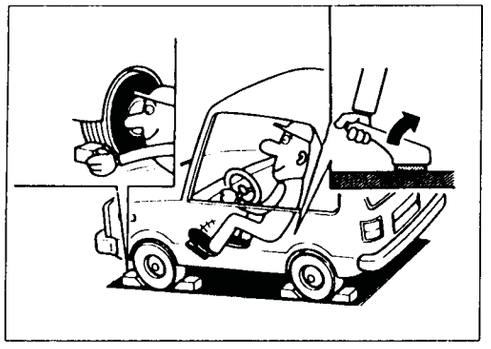


LINE PRESSURE TEST PROCEDURE

1. Check A/T and engine fluid levels. If necessary, add fluid.
2. Warm up engine until engine oil and A.T.F. reach operating temperature; after vehicle has been driven approx. 10 minutes.
   A.T.F. operating temperature:
   50 - 80°C (122 - 176°F)

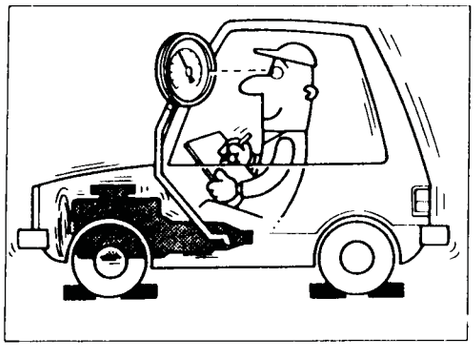


3. Install pressure gauge to line pressure port.



4. Set parking brake and block wheels.

Continue to depress brake pedal fully while performing line pressure test at stall speed.



5. Start engine and measure line pressure at idle and stall speed.

Line pressure:

Model	Engine speed rpm	Line pressure kPa (kg/cm², psi)			
		R range	D range	2 range	1 range
RL4F03A (GA engine)	Idle	883 (9.0, 128)	539 (5.5, 78)	441 (4.5, 64)	785 (8.0, 114)
	Stall	1,765 (18.0, 256)	1,079 (11.0, 156)	883 (9.0, 128)	1,079 (11.0, 156)
RL4F03V (SR engine)	Idle	883 (9.0, 128)	637 (6.5, 92)	441 (4.5, 64)	1,138 (11.6, 165)
	Stall	1,765 (18.0, 256)	1,275 (13.0, 185)	883 (9.0, 128)	1,275 (13.0, 185)

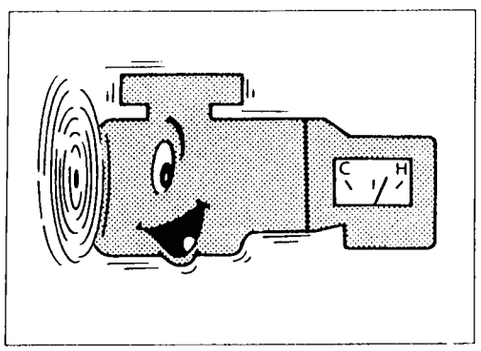
JUDGMENT OF LINE PRESSURE TEST

- **If line pressure does not rise, first check to make sure that throttle wire is connected properly.**

1) When line pressure while idling is low at all positions ("D", "2", "1", "R" and "P"), the problem may be due to:
- Wear on interior of oil pump
- Oil leakage at or around oil pump, control valve body, transmission case or governor
- Sticking pressure regulator valve
- Sticking pressure modifier valve

2) When line pressure while idling is low at a particular position, the problem may be due to the following:
- If oil leaks at or around low & reverse brake circuit, line pressure becomes low in "R" range but is normal in "P", "D", "2" or "1" range.

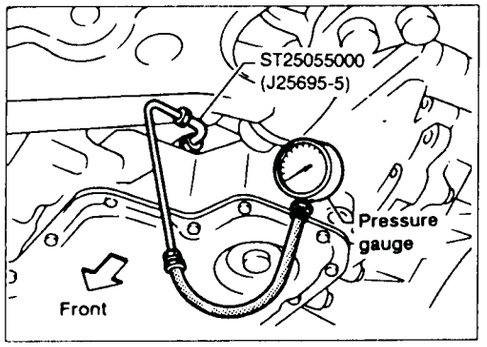
3) When line pressure is high while idling, pressure regulator valve may have stuck.



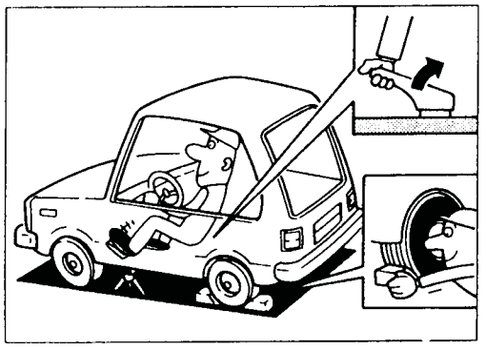
GOVERNOR PRESSURE TESTING

1. Check A/T and engine fluid levels. If necessary, add fluid.
2. Warm up engine until engine oil and A.T.F. reach operating temperature; after vehicle has been driven approx. 10 minutes.

A.T.F. operating temperature:
50 - 80°C (122 - 176°F)

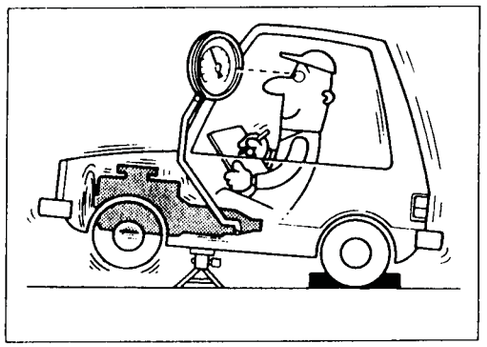


3. Install pressure gauge to governor pressure port.



4. Set parking brake and block rear wheels.
5. Jack up front wheels.
6. Set selector lever in D range and drive vehicle.

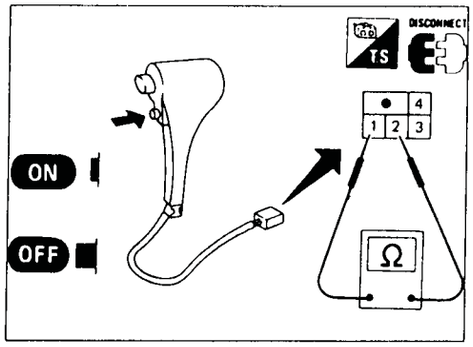
Be careful of rotating wheels.



Governor pressure:

- **Governor pressure is not generated when vehicle is stopped. (front wheels are not rotating.)**
- **Governor pressure rises gradually in response to vehicle speed. (front wheel rotating speed.)**

If not, check governor valve assembly.
Refer to "DISASSEMBLY"

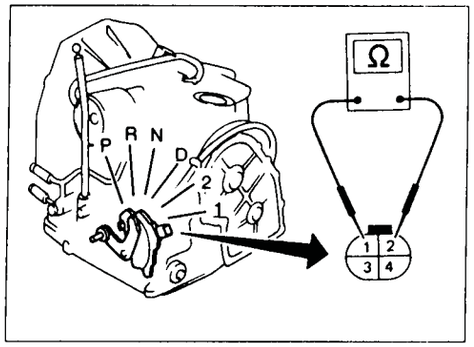


Component Check

OVERDRIVE CONTROL SWITCH

- Check continuity between two terminals.

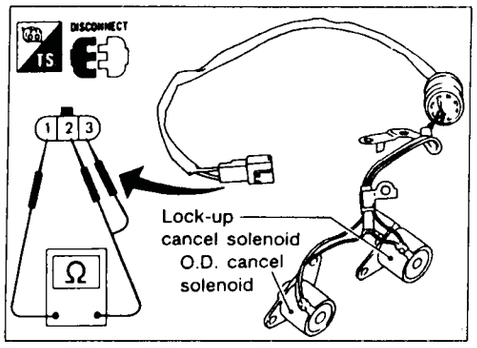
O.D. switch position	Continuity
ON	No
OFF	Yes



INHIBITOR SWITCH

- Check continuity in "N", "P" and "R" ranges.
- With manual shaft held in "N" range, turn manual shaft an equal amount in both directions to see if current flow ranges are nearly the same. (When manual lever is in each position, continuity normally exists within 1.5° in either direction.) If current flows outside normal range, or if normal flow range is out of specifications, properly adjust inhibitor switch.

Range \ Terminal No.	①	②	③	④
P.N.	○——	——○		
R			○——	——○

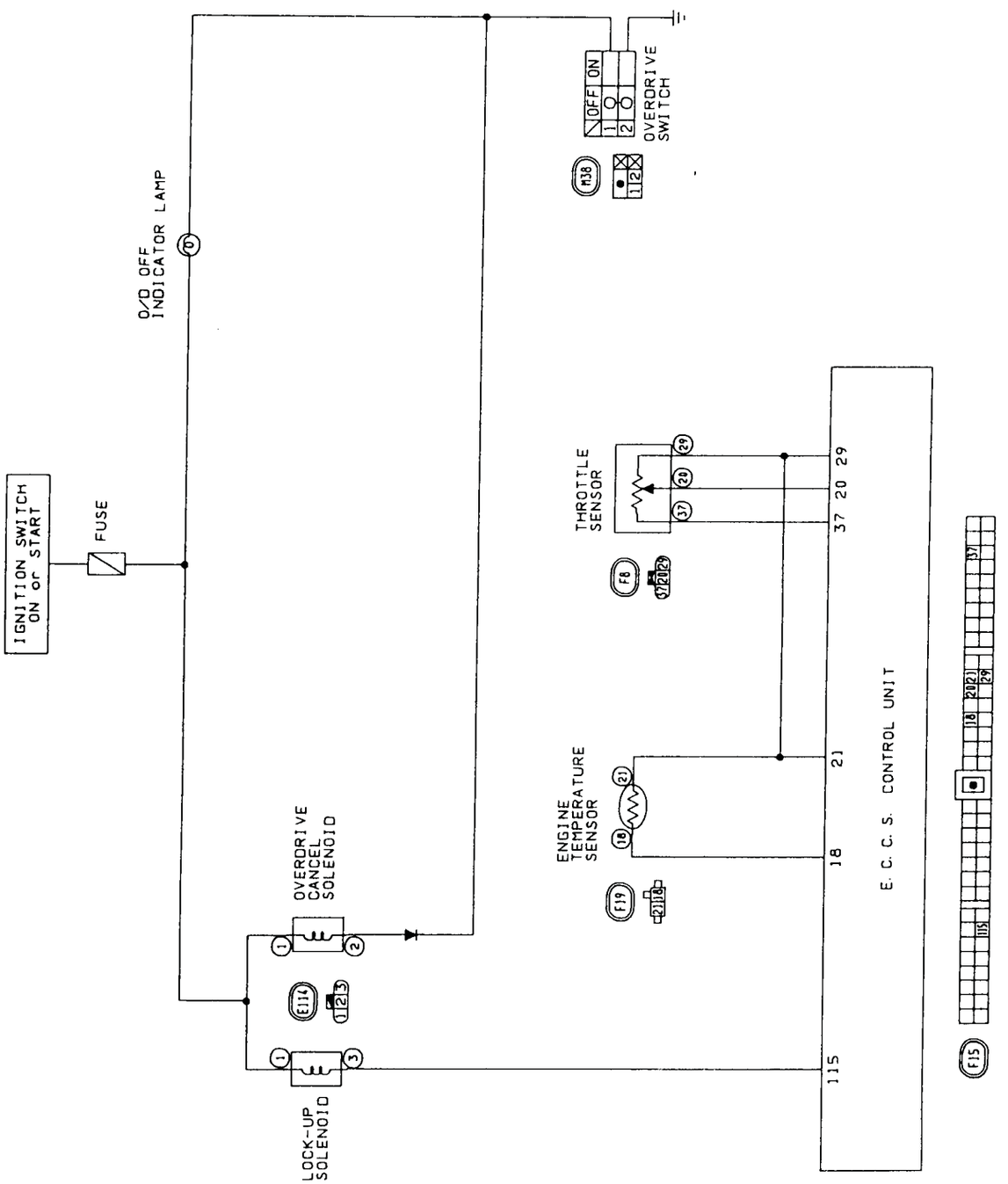


O.D. CANCEL SOLENOID AND LOCK-UP CANCEL SOLENOID

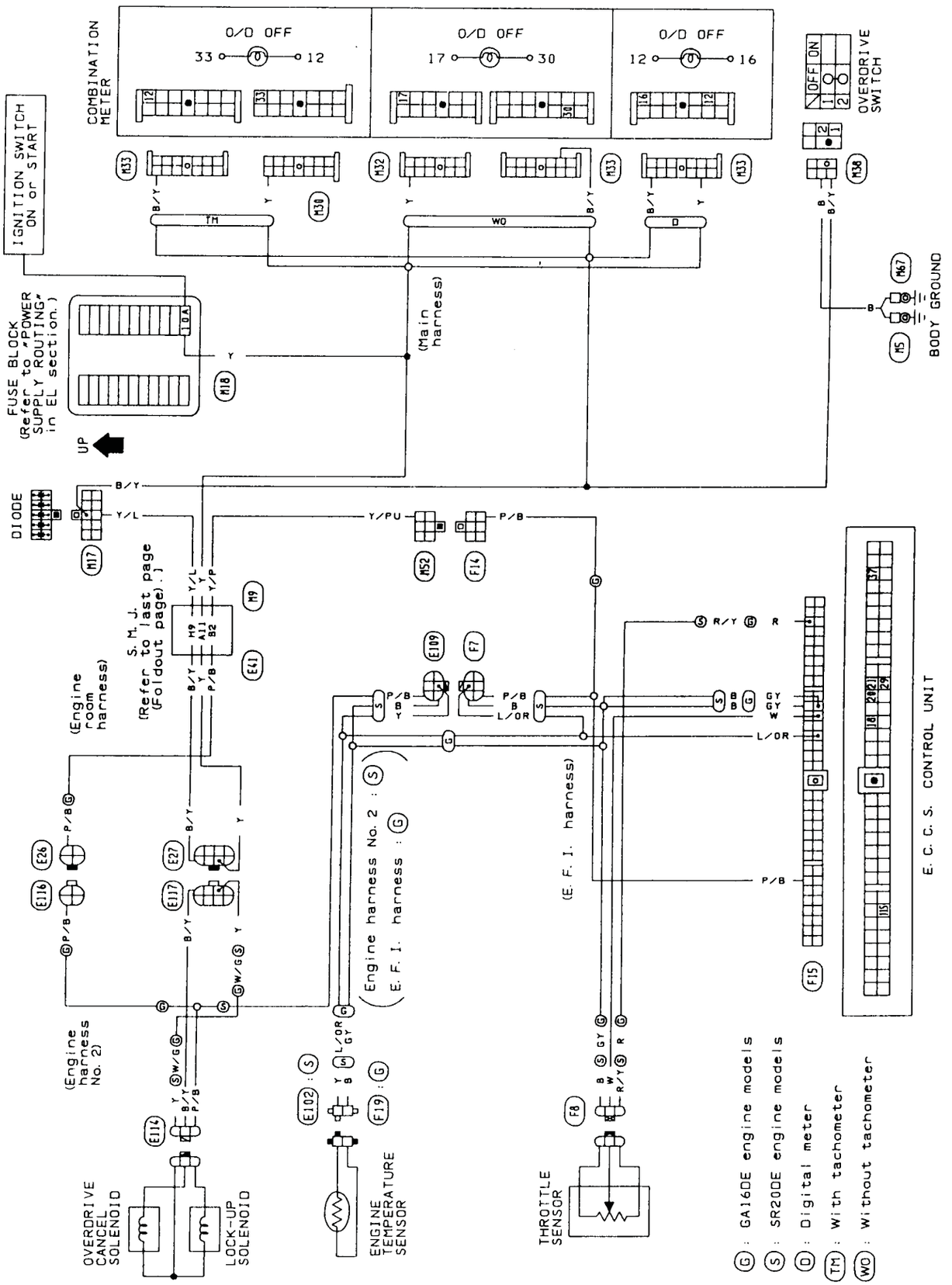
- Check resistance between terminals.

Solenoids	Terminal No.	Resistance
O.D. cancel solenoid	①—②	Approximately 25Ω
Lock-up cancel solenoid	①—③	

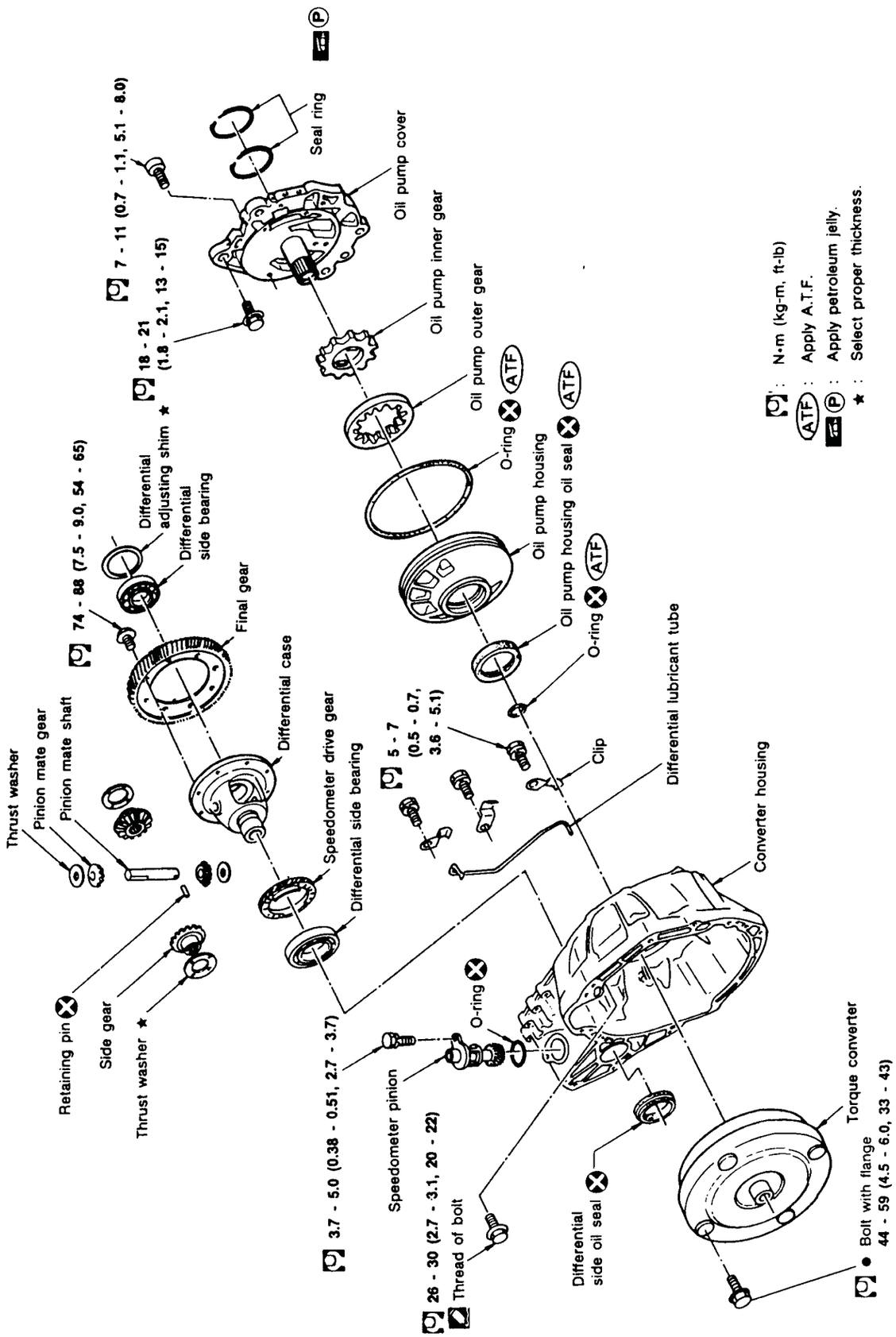
Circuit Diagram



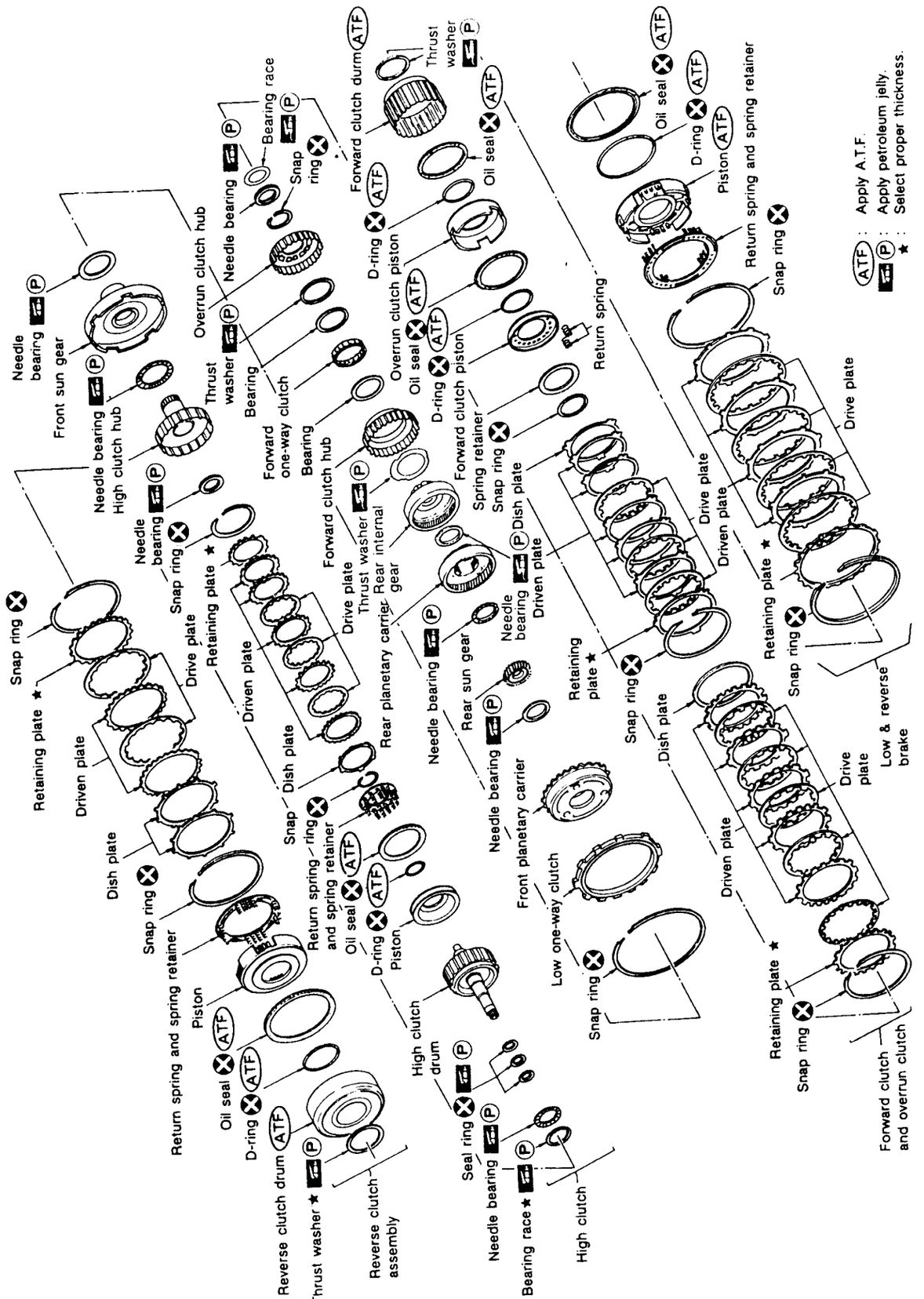
Wiring Diagram



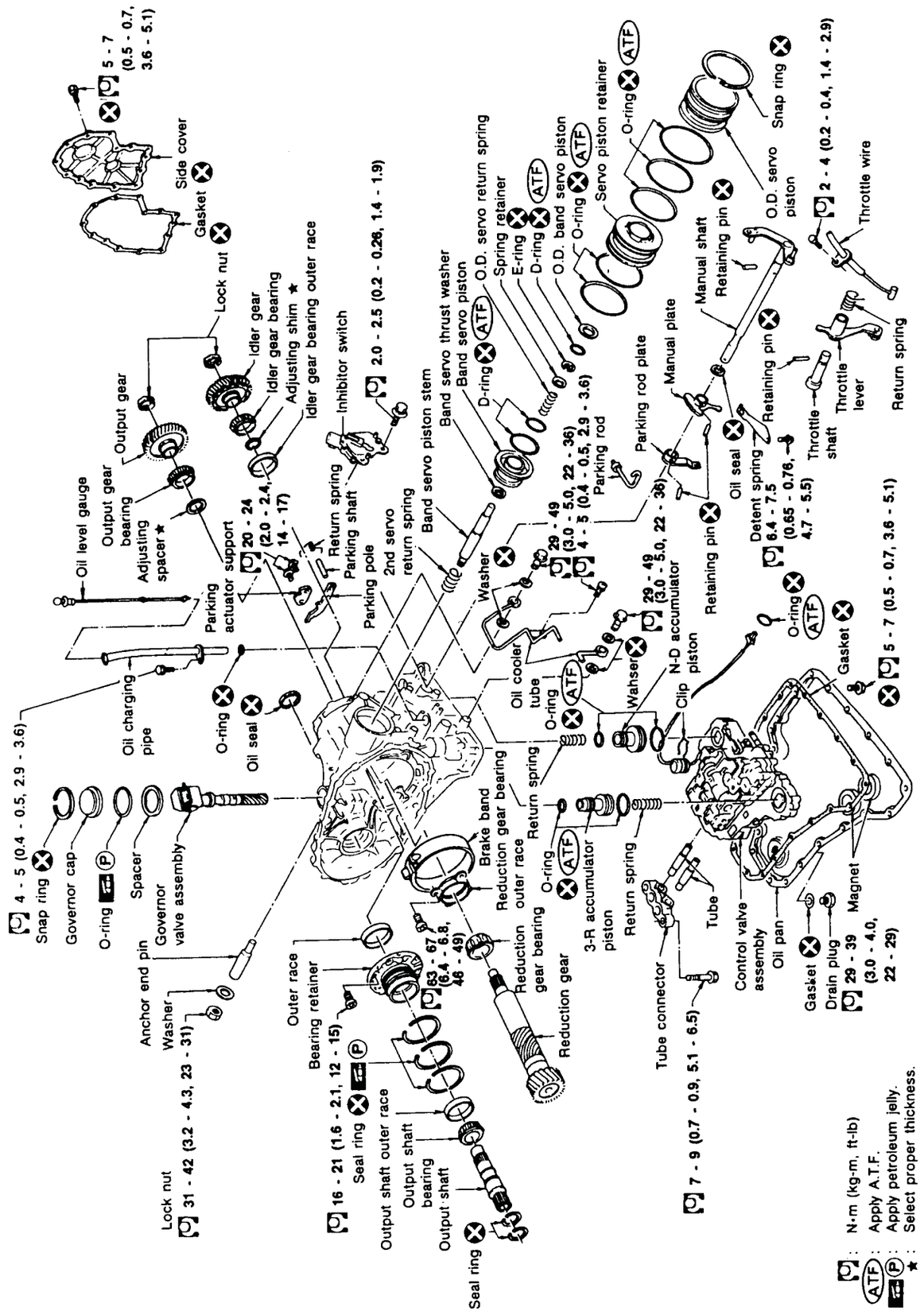
RL4F03A


Seal ring
Oil pump cover
Oil pump inner gear
Oil pump outer gear
O-ring (ATF)
Oil pump housing
Oil pump housing oil seal (ATF)
O-ring (ATF)
Clip
Differential lubricant tube
Converter housing
Torque converter
Differential side oil seal
Thread of bolt
Speedometer pinion
O-ring
Retaining pin
Side gear
Thrust washer ★
Thrust washer
Pinion mate gear
Pinion mate shaft
Differential adjusting shim ★
Differential side bearing
Final gear
Differential case
Speedometer drive gear
Differential side bearing
7 - 11 (0.7 - 1.1, 5.1 - 8.0)
18 - 21 (1.8 - 2.1, 13 - 15)
74 - 88 (7.5 - 9.0, 54 - 65)
5 - 7 (0.5 - 0.7, 3.6 - 5.1)
3.7 - 5.0 (0.38 - 0.51, 2.7 - 3.7)
26 - 30 (2.7 - 3.1, 20 - 22)
● Bolt with flange
44 - 59 (4.5 - 6.0, 33 - 43)
● Bolt without flange
39 - 49 (4 - 5, 29 - 36)
: N·m (kg-m, ft-lb)
(ATF) : Apply A.T.F.
(P) : Apply petroleum jelly.
★ : Select proper thickness.

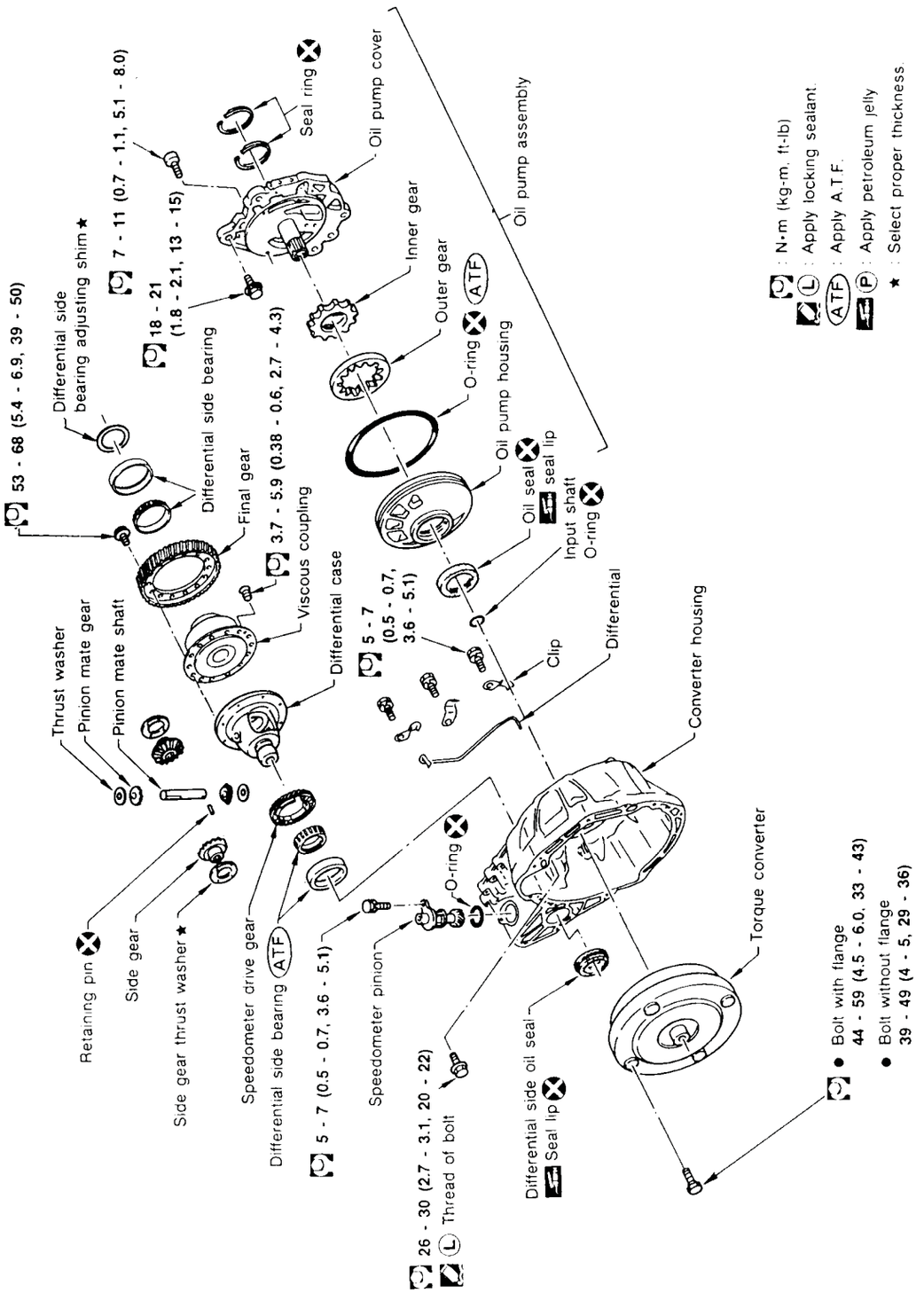
RL4F03A (Cont'd)



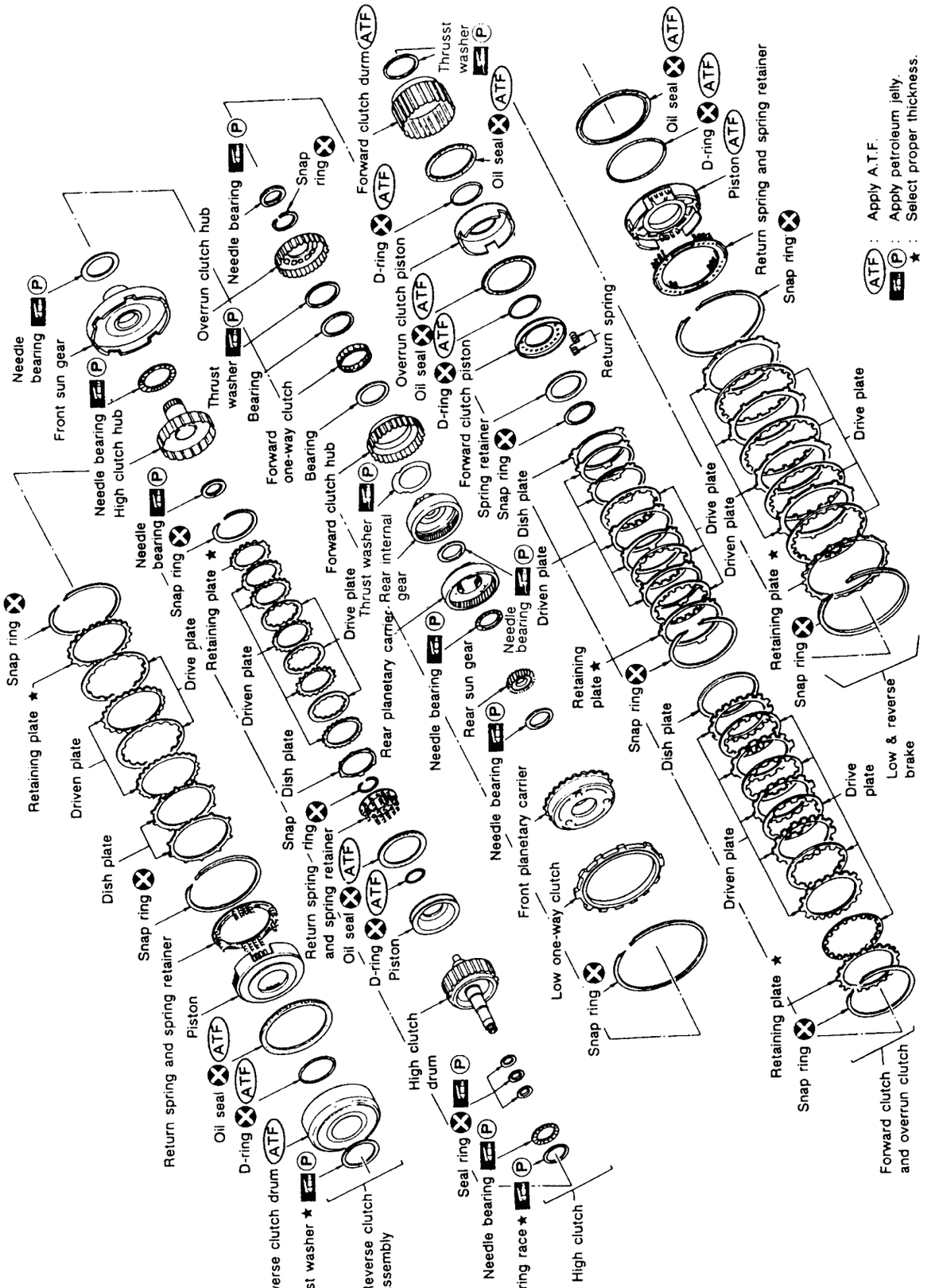
RL4F03A (Cont'd)



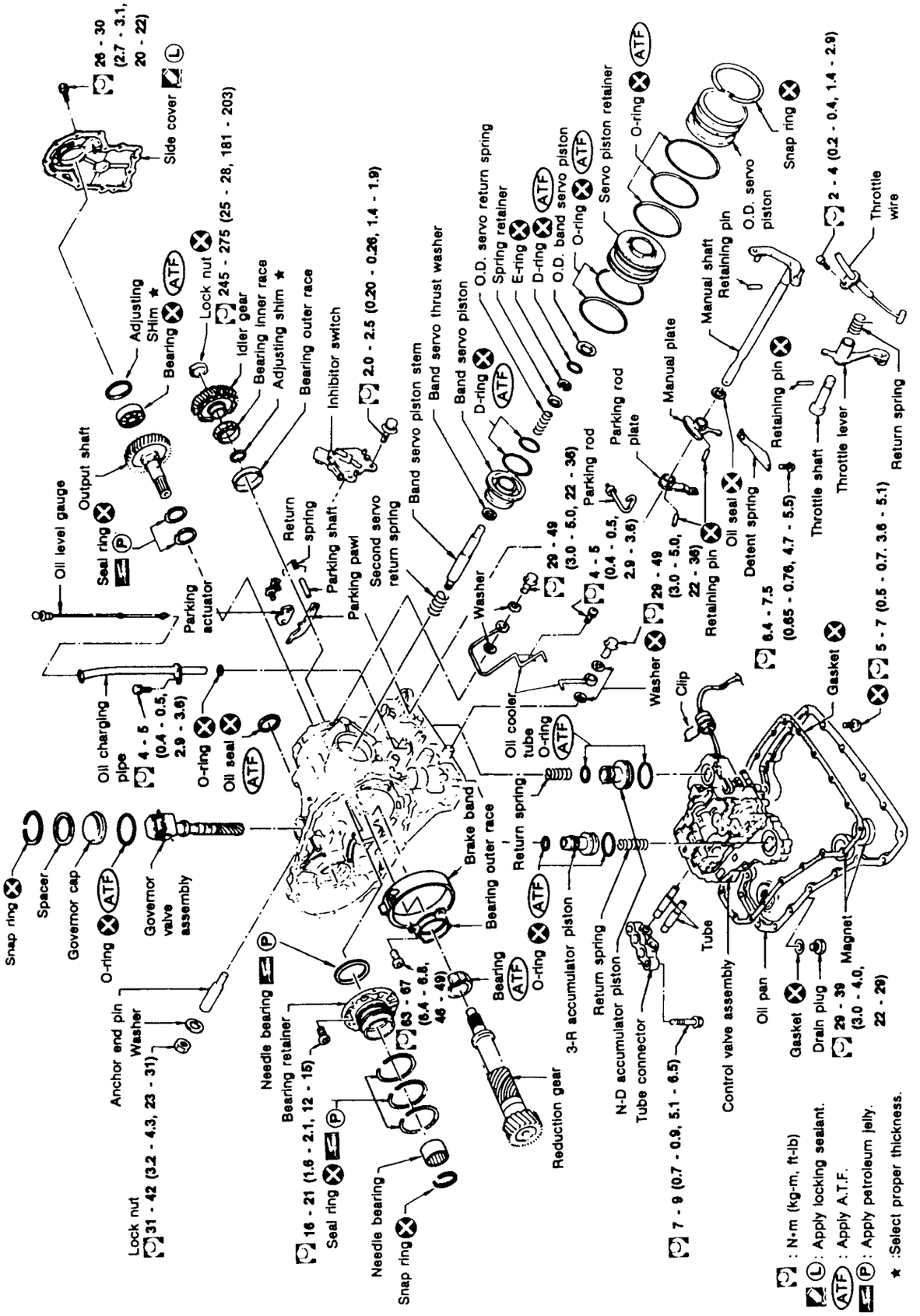
RL4F03V


53 - 68 (5.4 - 6.9, 39 - 50)
Differential side bearing adjusting shim ★
7 - 11 (0.7 - 1.1, 5.1 - 8.0)
18 - 21 (1.8 - 2.1, 13 - 15)
Differential side bearing
Seal ring
Oil pump cover
Inner gear
Outer gear
O-ring (ATF)
Oil pump assembly
Oil pump housing
Oil seal
Seal lip
Input shaft
O-ring
Final gear
3.7 - 5.9 (0.38 - 0.6, 2.7 - 4.3)
Viscous coupling
Differential case
5 - 7 (0.5 - 0.7, 3.6 - 5.1)
Clip
Differential
Converter housing
Thrust washer
Pinion mate gear
Pinion mate shaft
Retaining pin
Side gear
Side gear thrust washer ★
Speedometer drive gear
Differential side bearing (ATF)
5 - 7 (0.5 - 0.7, 3.6 - 5.1)
Speedometer pinion
O-ring
26 - 30 (2.7 - 3.1, 20 - 22)
(L) Thread of bolt
Differential side oil seal
Seal lip
Torque converter
● Bolt with flange
44 - 59 (4.5 - 6.0, 33 - 43)
● Bolt without flange
39 - 49 (4 - 5, 29 - 36)
: N·m (kg-m, ft-lb)
(L) : Apply locking sealant
(ATF) : Apply A.T.F.
(P) : Apply petroleum jelly
★ : Select proper thickness

RL4F03V (Cont'd)



RL4F03V (Cont'd)



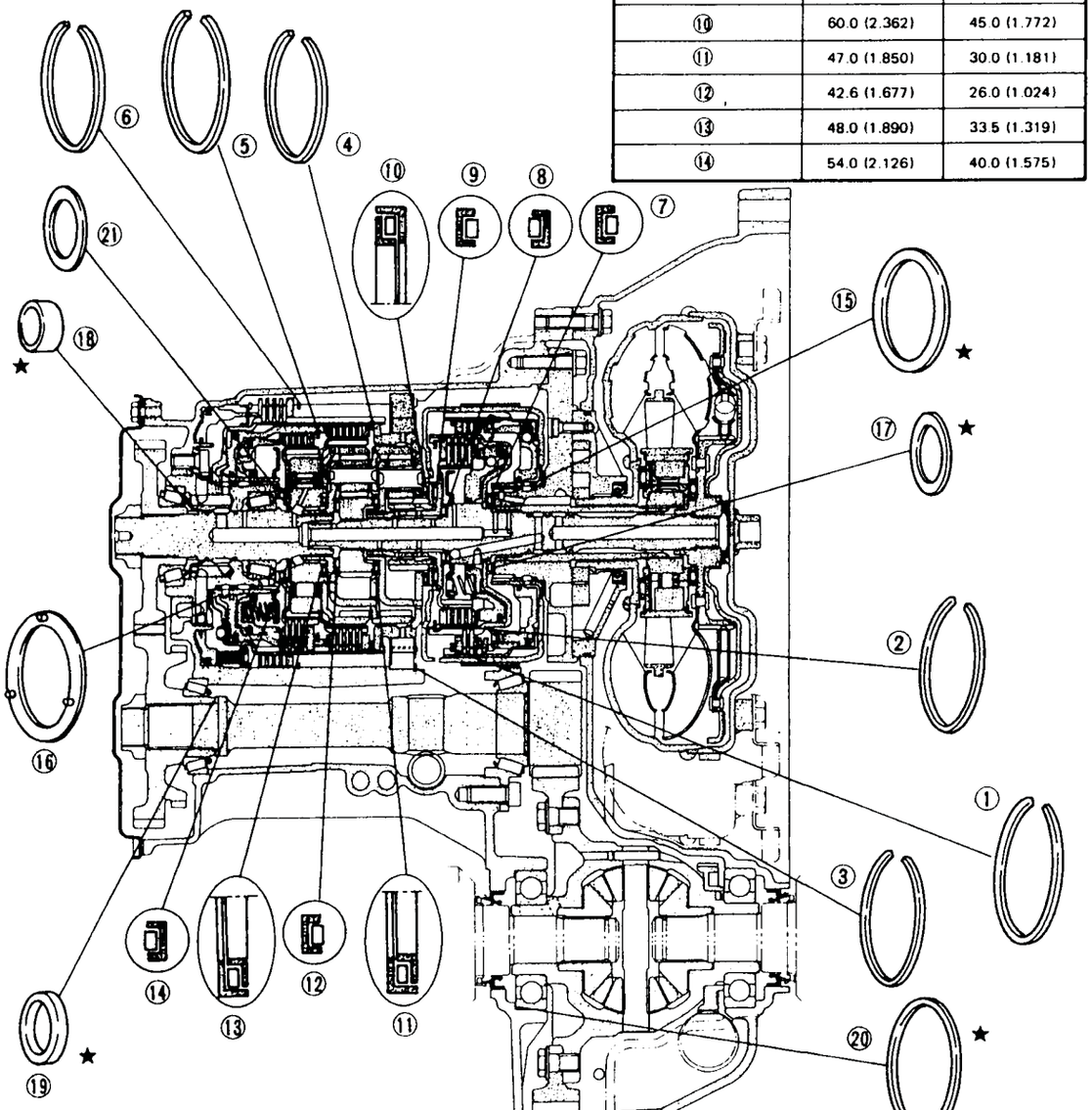
Locations of Adjusting Shims, Needle Bearings, Thrust Washers and Snap Rings — RL4F03A

Outer diameter and color of thrust washers

Item number	Outer diameter mm (in)	Color
⑮	72.0 (2.835)	black
⑯	78.5 (3.091)	

Outer and inner diameter of needle bearings

Item number	Outer diameter mm (in)	Inner diameter mm (in)
⑦	47.0 (1.850)	32.0 (1.260)
⑧	35.0 (1.378)	20.0 (0.787)
⑨	60.0 (2.362)	42.0 (1.654)
⑩	60.0 (2.362)	45.0 (1.772)
⑪	47.0 (1.850)	30.0 (1.181)
⑫	42.6 (1.677)	26.0 (1.024)
⑬	48.0 (1.890)	33.5 (1.319)
⑭	54.0 (2.126)	40.0 (1.575)



Outer & inner diameter of bearing races, adjusting shims and adjusting spacer

Item number	Outer diameter mm (in)	Inner diameter mm (in)
⑰	48.0 (1.890)	33 (1.30)
⑱	29.0 (1.142)	25.0 (0.984)
⑲	34.5 (1.358)	26.1 (1.028)
⑳	79.5 (3.130)	72.0 (2.835)
㉑	55.0 (2.165)	42.0 (1.654)

★: Select proper thickness

Outer diameter of snap rings

Item number	Outer diameter mm (in)
①	142.0 (5.59)
②	113.0 (4.45)
③	162.4 (6.39)
④	135.4 (5.33)
⑤	126.0 (4.96)
⑥	159.0 (6.26)

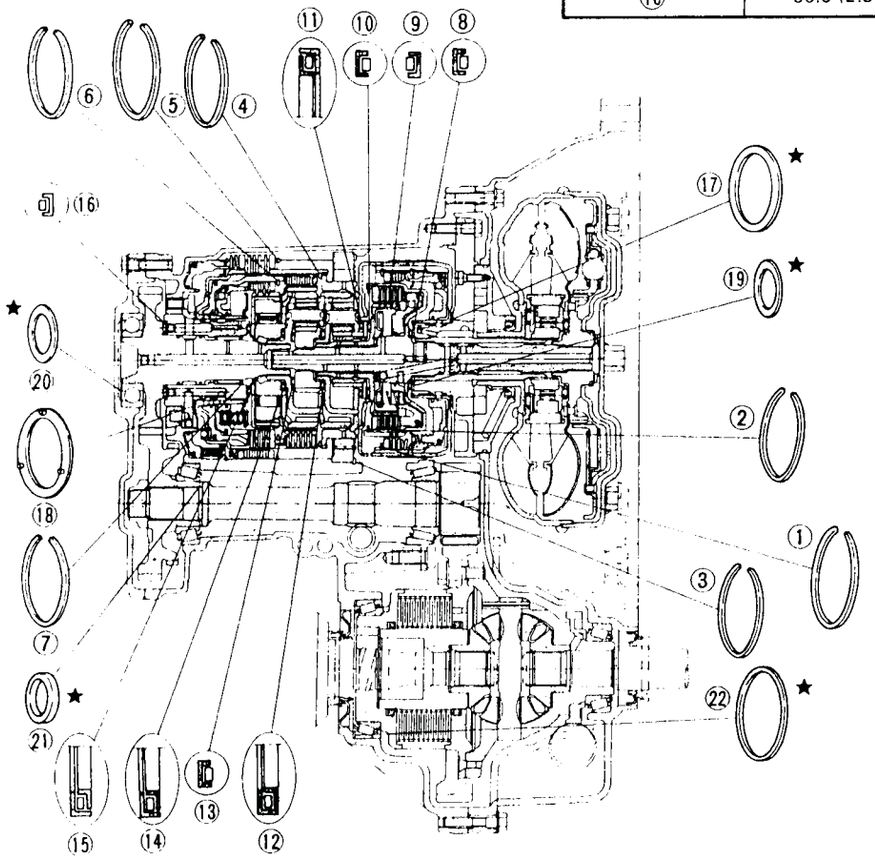
Locations of Adjusting Shims, Needle Bearings, Thrust Washers and Snap Rings — RL4F03V

Outer diameter and color of thrust washers

Item number	Outer diameter mm (in)	Color
(17)	72.0 (2.835)	Black
(18)	78.5 (3.091)	

Outer & inner diameter of needle bearings

Item number	Outer diameter mm (in)	Inner diameter mm (in)
⑧	47.0 (1.850)	32.0 (1.260)
⑨	35.0 (1.378)	20.0 (0.787)
⑩	60.0 (2.362)	42.0 (1.654)
⑪	60.0 (2.362)	45.0 (1.772)
⑫	47.0 (1.850)	30.0 (1.181)
⑬	42.6 (1.677)	26.0 (1.024)
⑭	48.0 (1.890)	33.5 (1.319)
⑮	55.0 (2.165)	40.5 (1.594)
⑯	60.0 (2.362)	40.0 (1.575)



★: Select proper thickness.

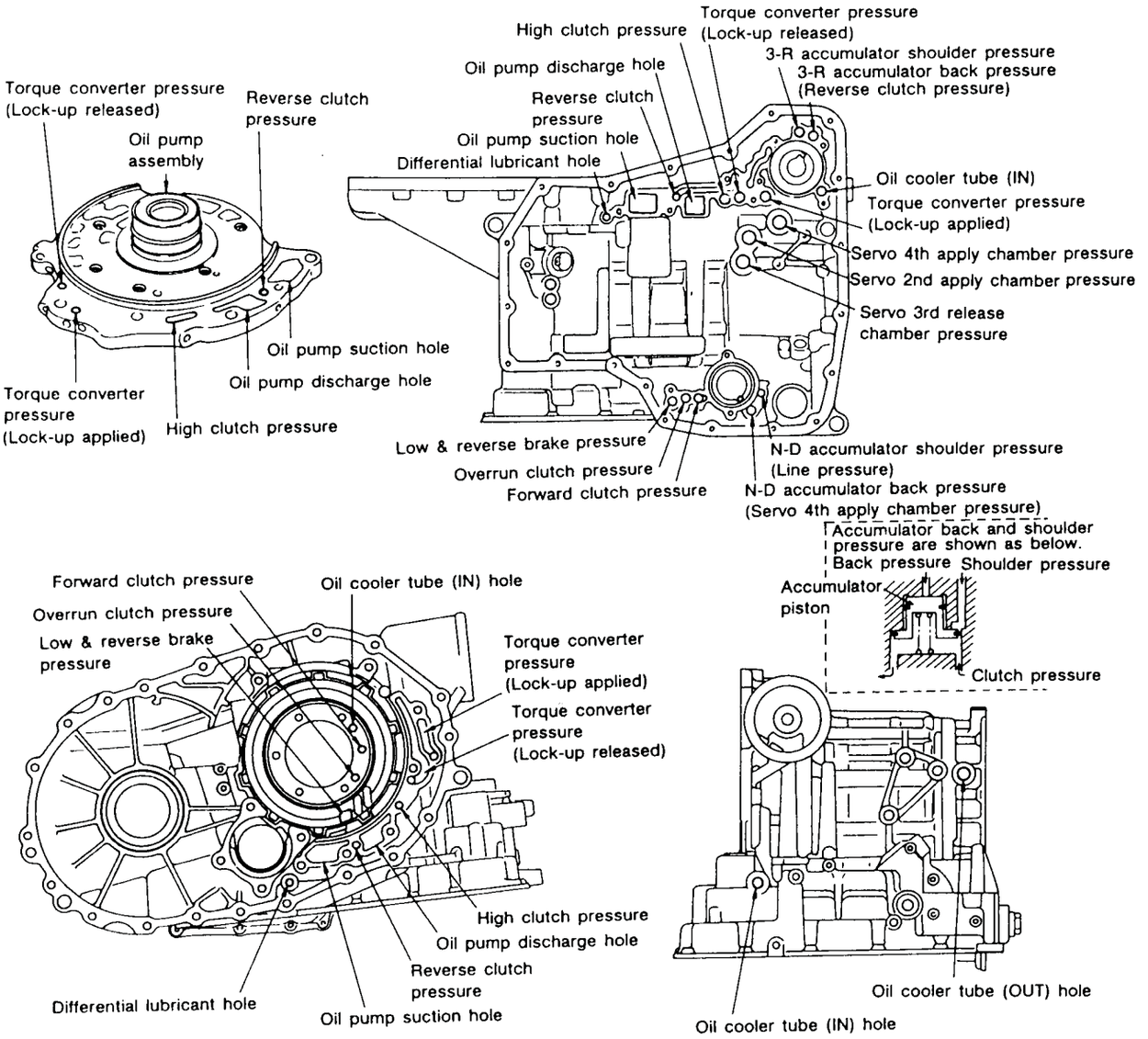
Outer & inner diameter of bearing race and adjusting shims

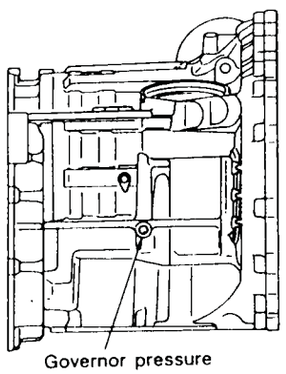
Item number	Outer diameter mm (in)	Inner diameter mm (in)
⑲	48.0 (1.890)	33.0 (1.299)
⑳	72.0 (2.835)	61.0 (2.402)
㉑	34.5 (1.358)	26.1 (1.028)
㉒	105.0 (4.13)	96.0 (3.78)

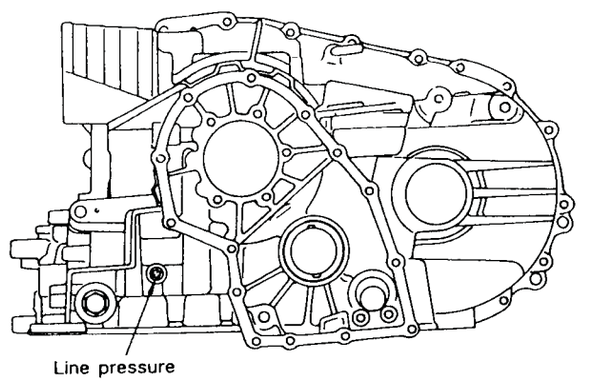
Outer diameter of snap rings

Item number	Out diameter mm (in)
①	142.0 (5.59)
②	113.0 (4.45)
③	162.4 (6.39)
④	135.4 (5.33)
⑤	159.0 (6.26)
⑥	126.0 (4.96)
⑦	40.5 (1.594)

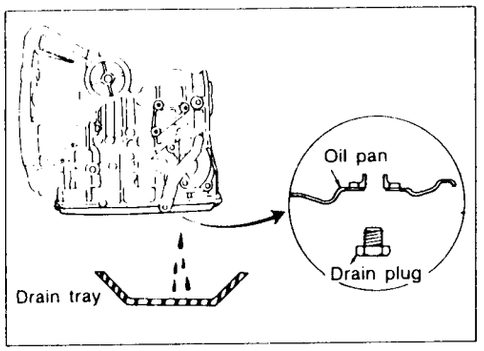
Oil Channel


Torque converter pressure (Lock-up released)
Reverse clutch pressure
Oil pump assembly
Oil pump suction hole
Oil pump discharge hole
Torque converter pressure (Lock-up applied)
High clutch pressure
High clutch pressure
Torque converter pressure (Lock-up released)
3-R accumulator shoulder pressure
3-R accumulator back pressure (Reverse clutch pressure)
Oil pump discharge hole
Reverse clutch pressure
Oil pump suction hole
Differential lubricant hole
Oil cooler tube (IN)
Torque converter pressure (Lock-up applied)
Servo 4th apply chamber pressure
Servo 2nd apply chamber pressure
Servo 3rd release chamber pressure
Low & reverse brake pressure
Overrun clutch pressure
Forward clutch pressure
N-D accumulator shoulder pressure (Line pressure)
N-D accumulator back pressure (Servo 4th apply chamber pressure)
Accumulator back and shoulder pressure are shown as below.
Back pressure
Shoulder pressure
Accumulator piston
Clutch pressure
Forward clutch pressure
Oil cooler tube (IN) hole
Overrun clutch pressure
Low & reverse brake pressure
Torque converter pressure (Lock-up applied)
Torque converter pressure (Lock-up released)
High clutch pressure
Oil pump discharge hole
Reverse clutch pressure
Differential lubricant hole
Oil pump suction hole
Oil cooler tube (OUT) hole
Oil cooler tube (IN) hole


Governor pressure

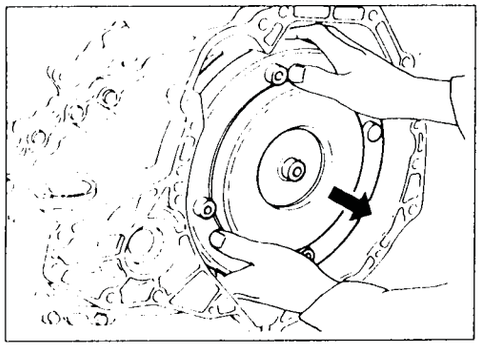

Line pressure

1



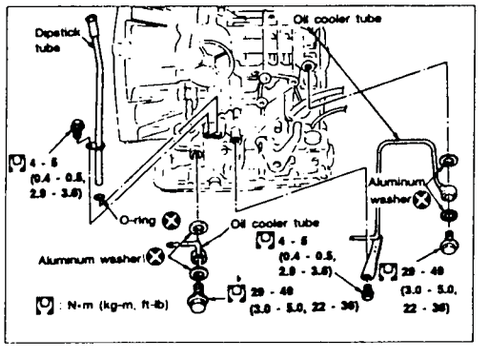
Drain A.T.F. through drain plug.

2



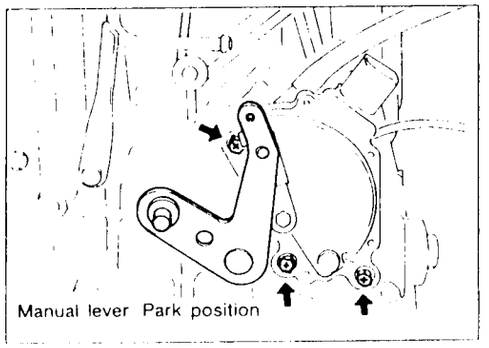
Remove torque converter.

3



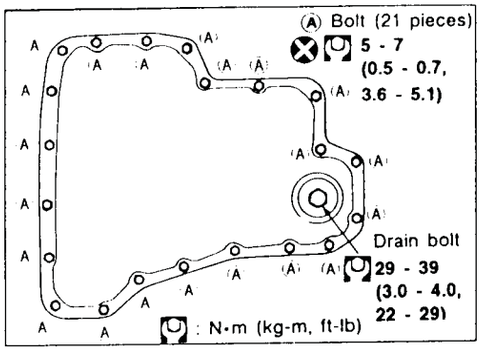
Remove oil charging pipe and oil cooler tube.

4



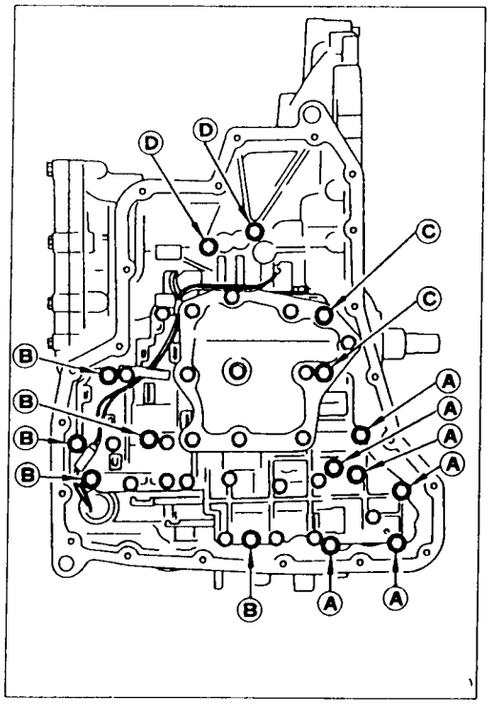
Remove inhibitor switch.

5



Remove oil pan and oil pan gasket.

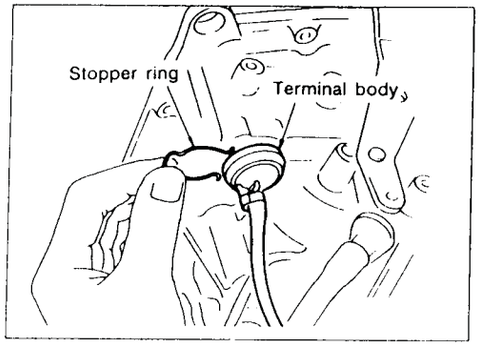
6



7

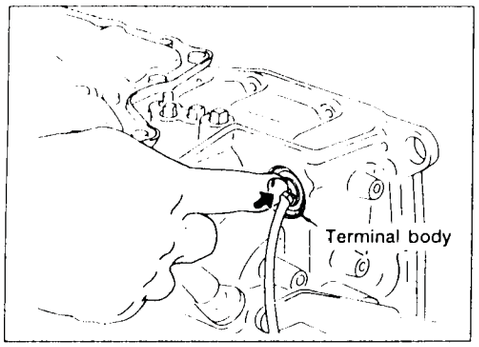
Remove control valve assembly according to the following procedures.
Remove control valve assembly mounting bolts Ⓐ, Ⓑ, Ⓒ and Ⓓ.

8



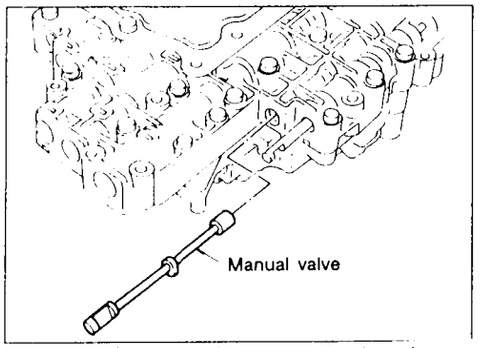
Remove stopper ring from terminal body.

9



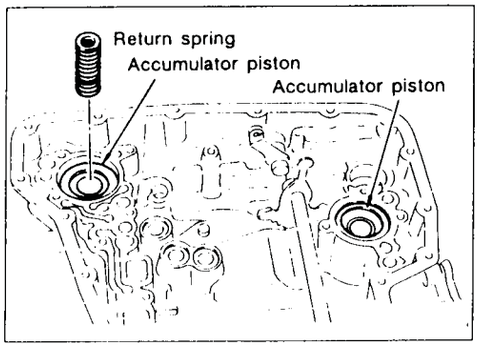
Push terminal body into transmission case and draw out solenoid harness.

10



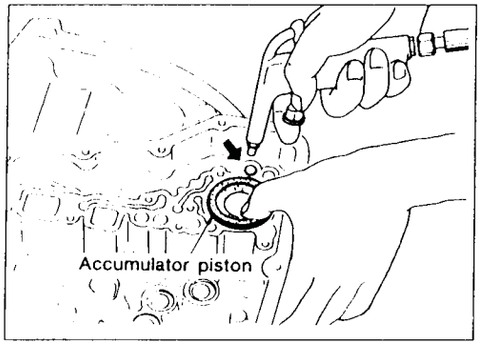
Remove manual valve from control valve assembly as a precaution.

11



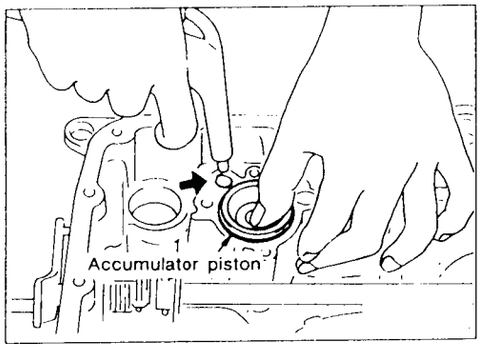
Remove return spring from 3-R accumulator piston.

12



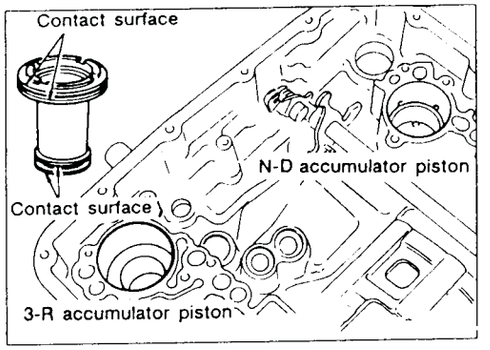
Remove 3-R accumulator piston with compressed air.
Remove O-rings from 3-R accumulator piston.

13



Remove N-D accumulator piston and return spring with compressed air.

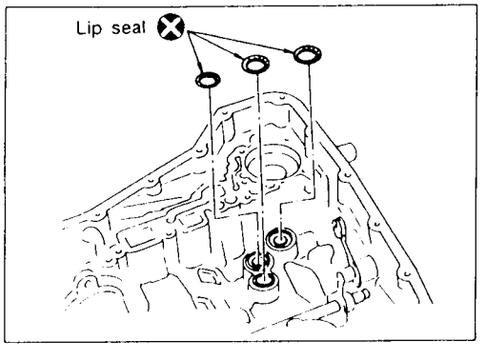
14



Unit: mm (in)

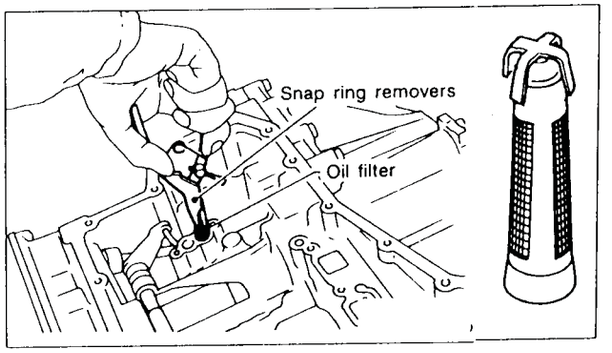
Spring	Free length	Outer diameter
3-R accumulator spring	56.4 (2.220)	21.0 (0.827)
N-D accumulator spring	43.5 (1.713)	28.0 (1.102)

15



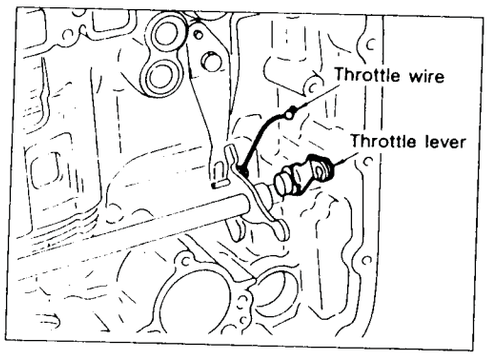
Remove lip seals from band servo oil port.

16



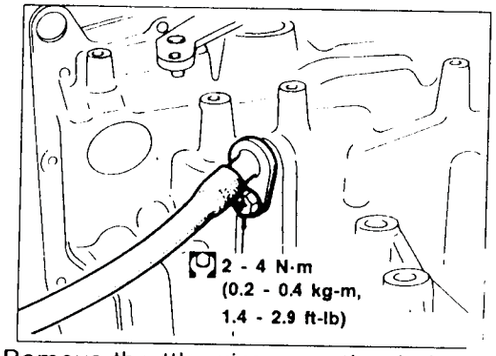
Remove oil filter for governor.

17



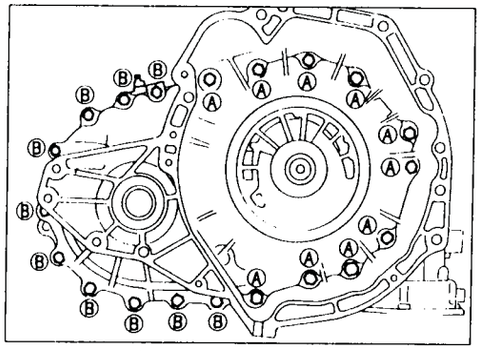
Remove throttle wire from throttle lever.

18



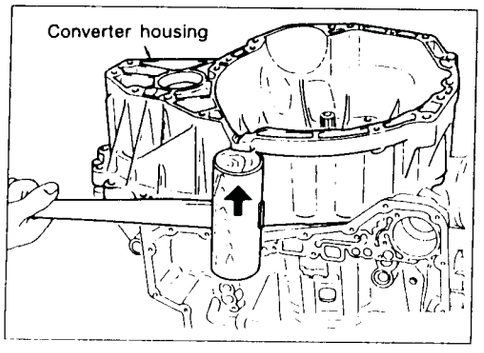
Remove throttle wire mounting bolt.
Draw out throttle wire from transmission case.

19



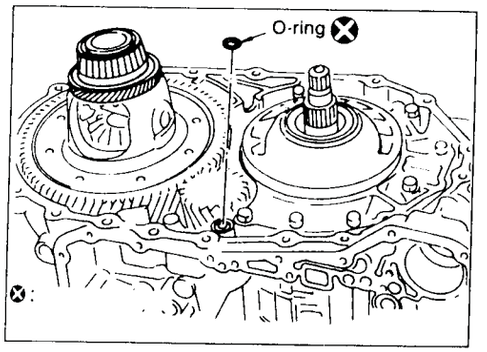
Remove converter housing according to the following procedures.
Remove converter housing mounting bolts Ⓐ and Ⓑ.

20



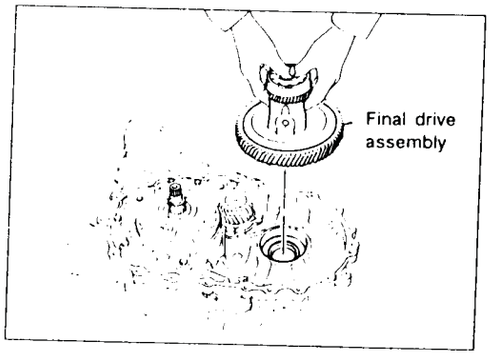
Remove converter housing.

21



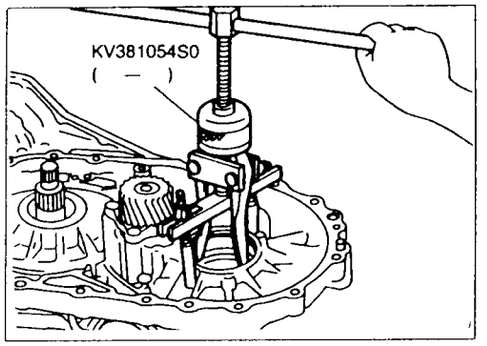
Remove O-ring from differential oil port.

22



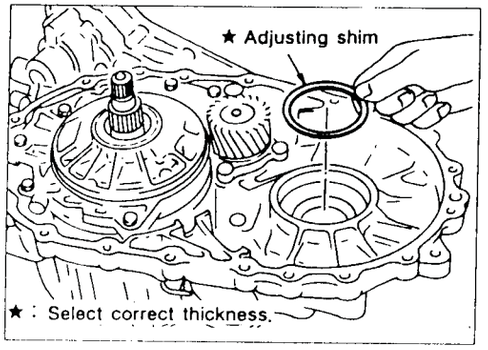
Remove final drive assembly from transmission case.
If it is difficult to lift up by hand, tap final drive slightly with a soft hammer (RL4F03A).

23

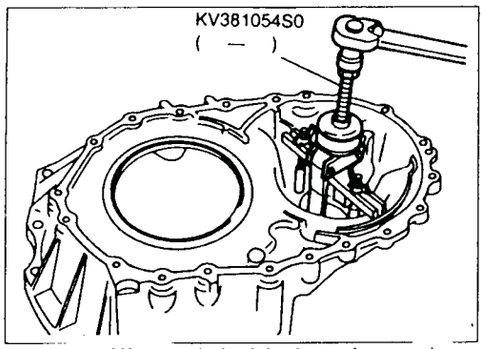


Remove differential side bearing outer race from transmission case (RL4F03V).

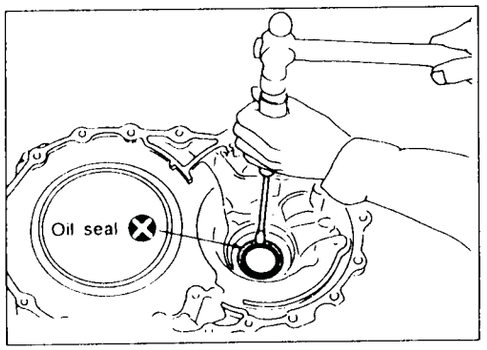
24



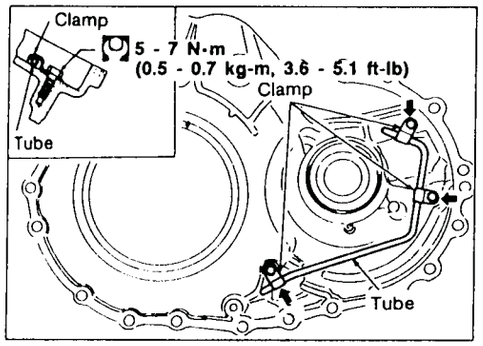
Remove differential side bearing adjusting shim from transmission case.

25 

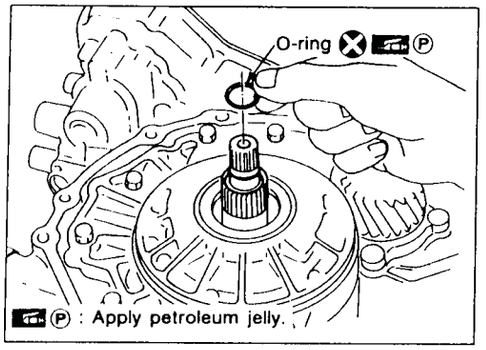
Remove differential side bearing outer race from converter housing (RL4F03V).

26 

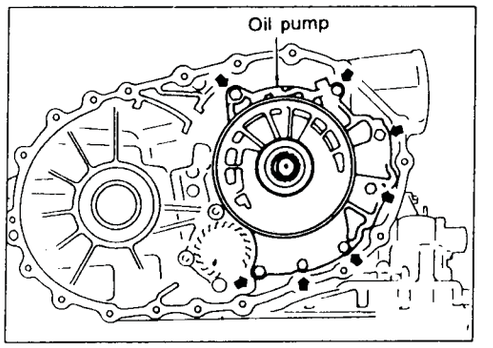
Remove oil seal from converter housing using a screwdriver.

27 

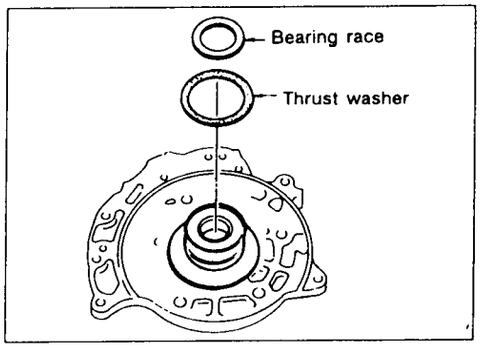
Remove oil tube from converter housing.

28 

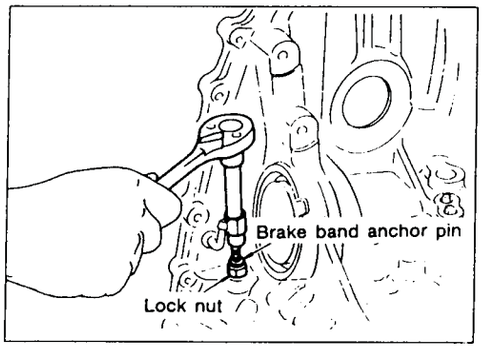
Remove oil pump according to the following procedures. Remove O-ring from input shaft.

29 

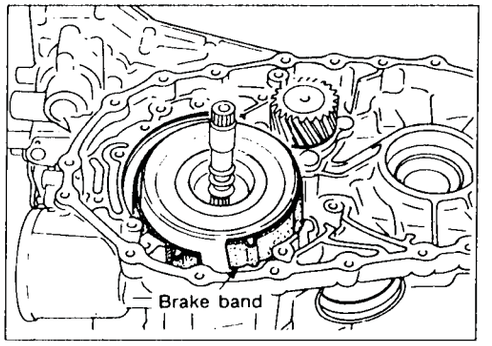
Remove oil pump assembly from transmission case.

30 

Remove thrust washer and bearing race from oil pump assembly.

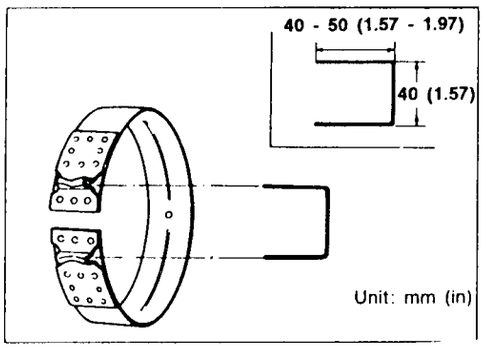
31 

Remove brake band according to the following procedures. Loosen lock nut, then back off band servo anchor end pin.

32 

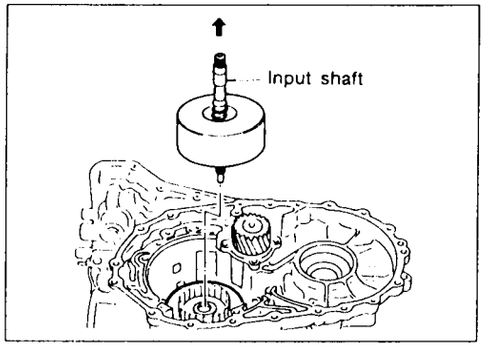
Remove brake band from transmission case.

33



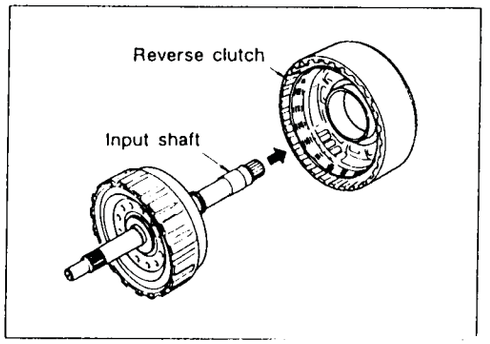
Check brake band facing for damage, cracks, wear or burns.

34



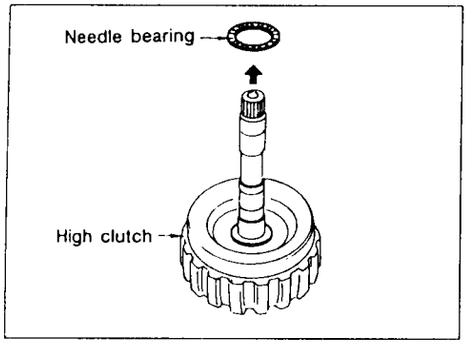
Remove input shaft assembly (high clutch) with reverse clutch.

35



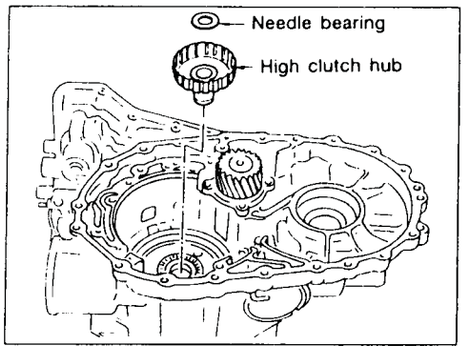
Remove input shaft assembly (high clutch) from reverse clutch.

36



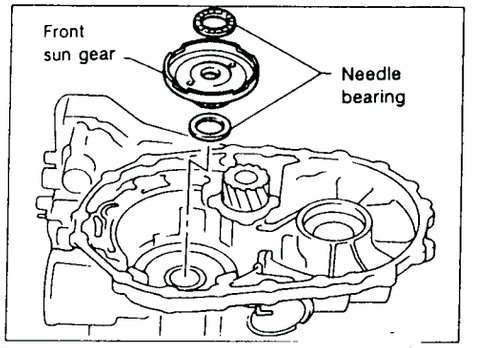
Remove needle bearing from high clutch drum.

37



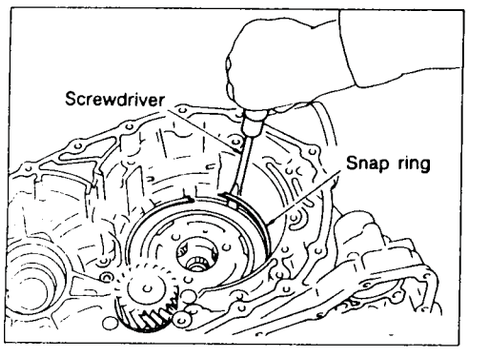
Remove high clutch hub and needle bearing from transmission case.

38



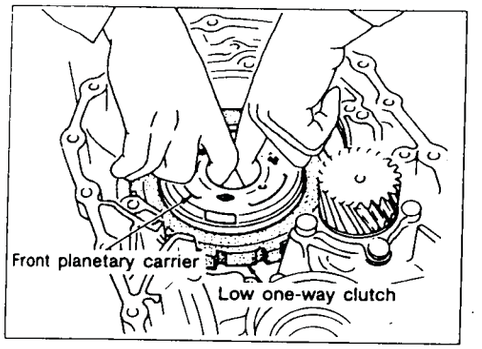
Remove front sun gear and needle bearings from transmission case.

39



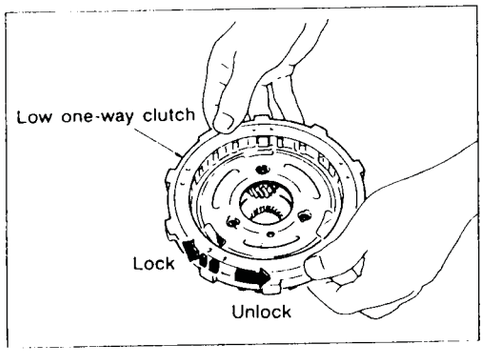
Remove snap ring using a screwdriver.

40



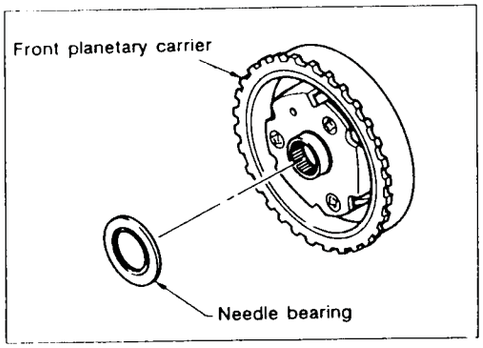
Remove front planetary carrier with low one-way clutch.

41



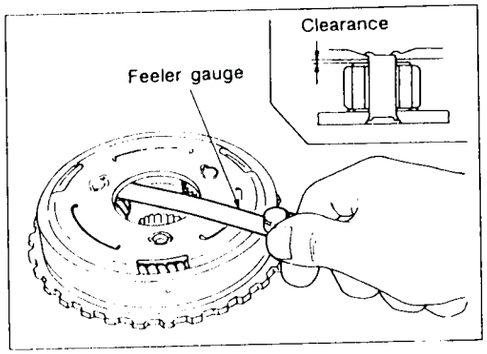
Check that low one-way clutch rotates in the direction of the arrow and locks in the opposite direction.

42



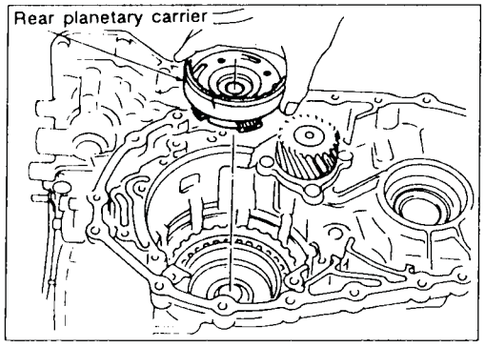
Remove needle bearing from front planetary carrier.

43



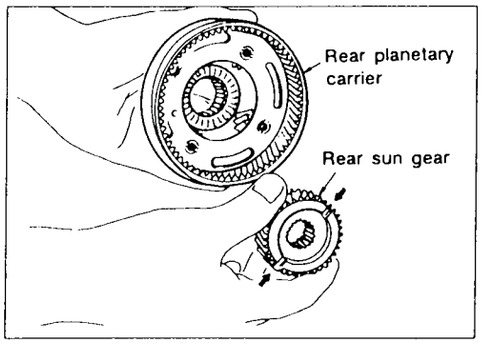
Standard clearance:
0.15 - 0.70 mm (0.0059 - 0.0276 in)

44



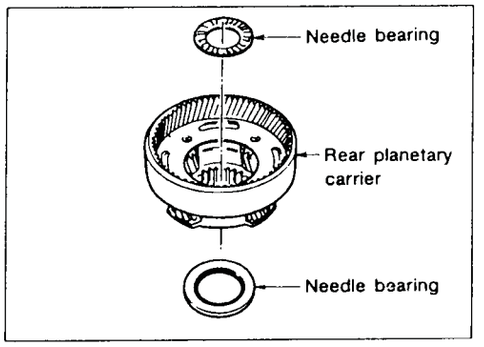
Remove rear planetary carrier assembly from transmission case.

45



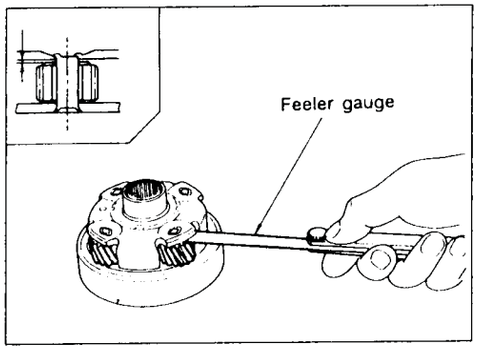
Remove rear sun gear from rear planetary carrier.

46



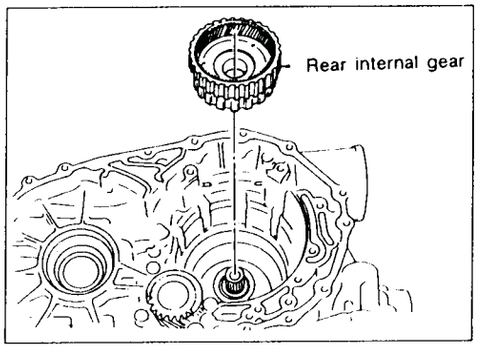
Remove needle bearings from rear planetary carrier assembly.

47



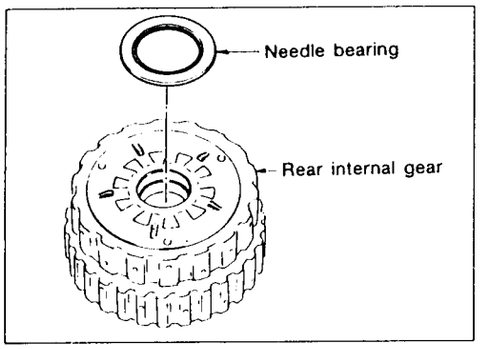
Standard clearance:
0.15 - 0.70 mm (0.0059 - 0.0276 in)

48



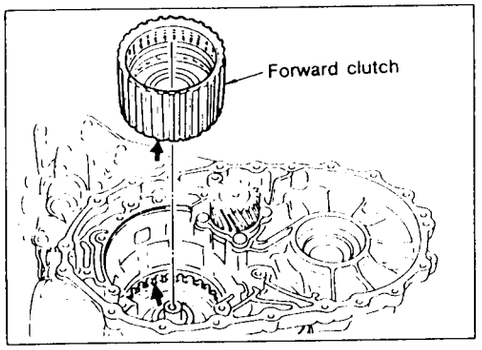
Remove rear internal gear from transmission case.

49



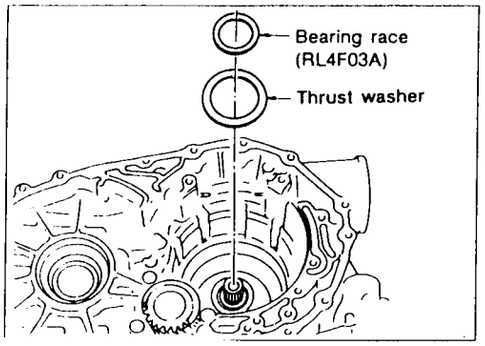
Remove needle bearing from rear internal gear.

50



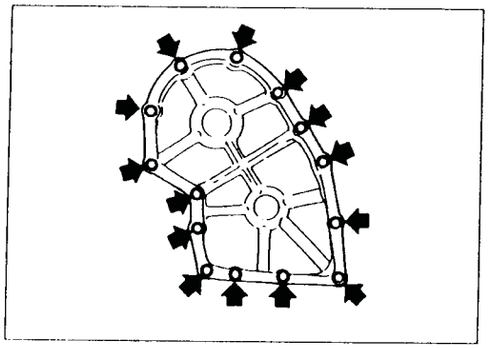
Remove forward clutch assembly from transmission case.

51



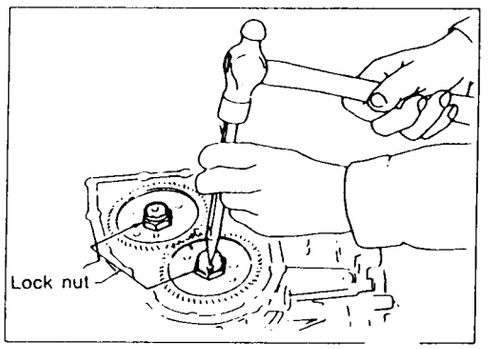
Remove thrust washer and bearing race from transmission case. (only RL4F03A)

52



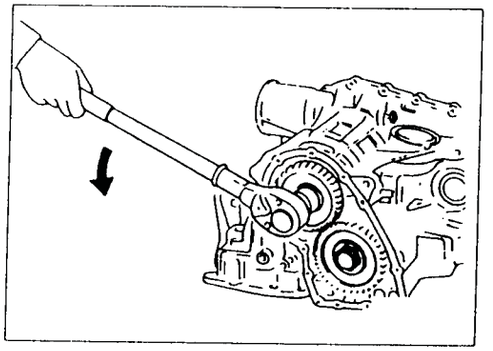
RL4F03A — Remove side cover.

53



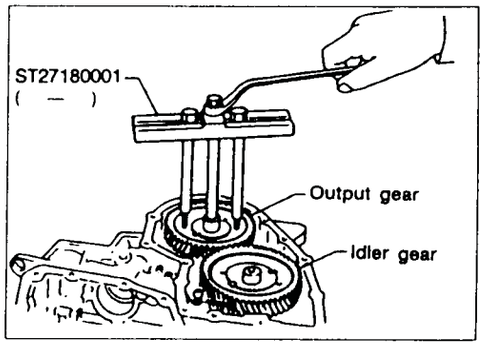
Unlock both idler gear and output gear lock nuts using a pin punch.

54



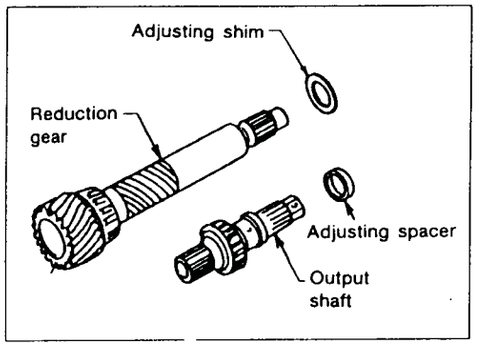
Remove idler gear and output gear lock nuts.

55



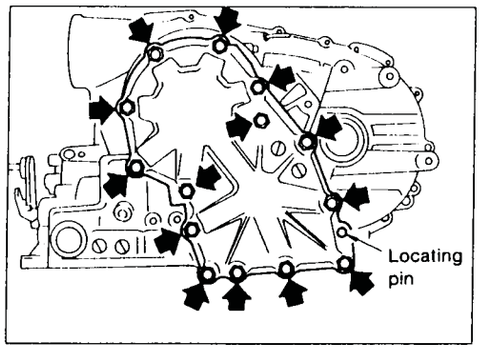
Remove idler gear and output gear using a puller.

56



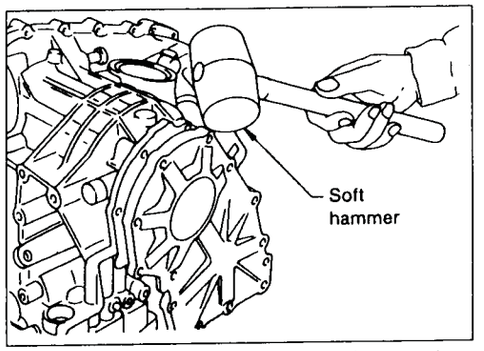
Remove reduction gear and output shaft.
Remove adjusting shim from reduction gear.
Remove adjusting spacer from output shaft.

57



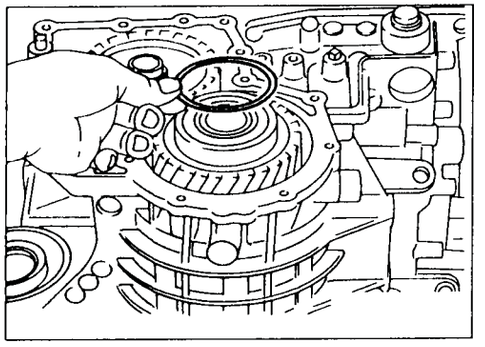
— **RL4F03V** — Remove side cover bolts.

58



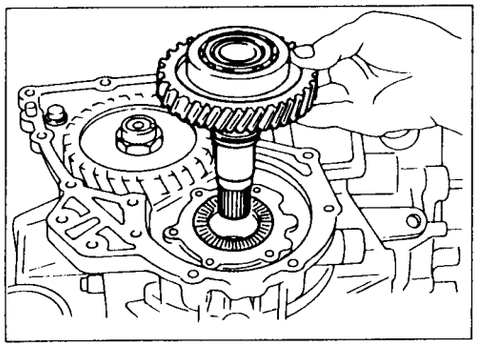
Remove side cover by lightly tapping it with a soft hammer.

59



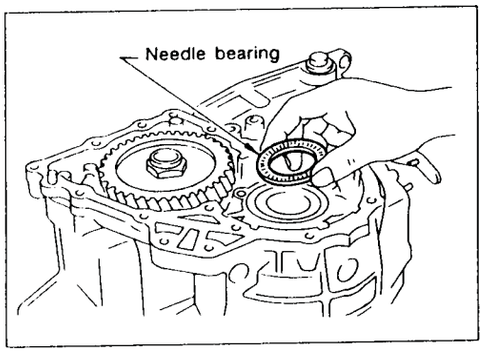
Remove adjusting shim.

60



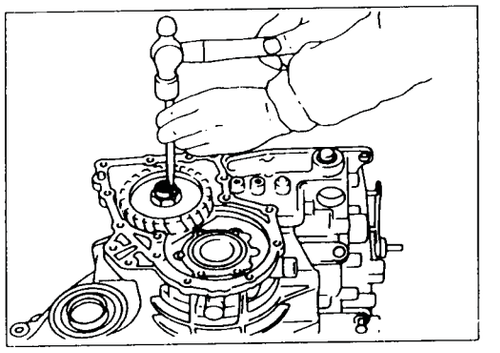
Remove output shaft assembly.

61



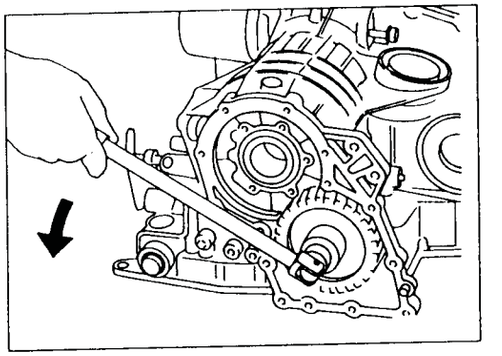
Remove needle bearing.

62



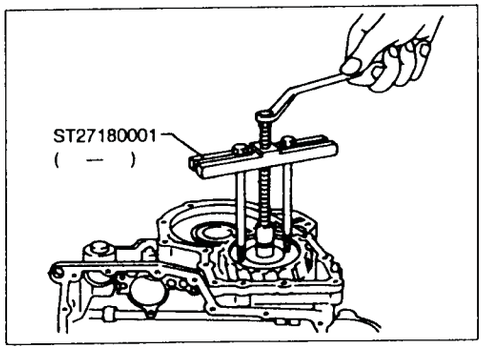
Unlock idler gear lock nut using a pin punch.

63



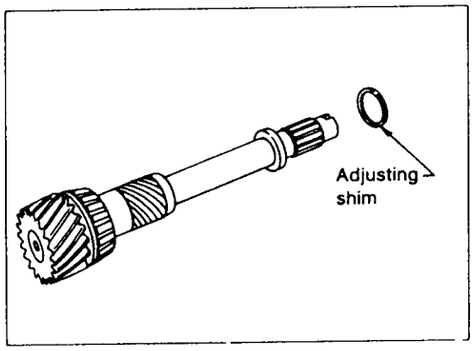
Remove idler gear lock nut.

64



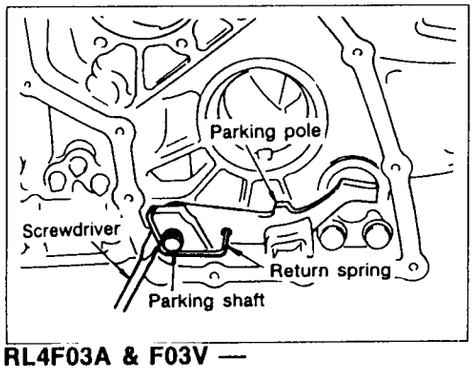
Remove idler gear with puller.

65



Remove adjusting shim from reduction gear.

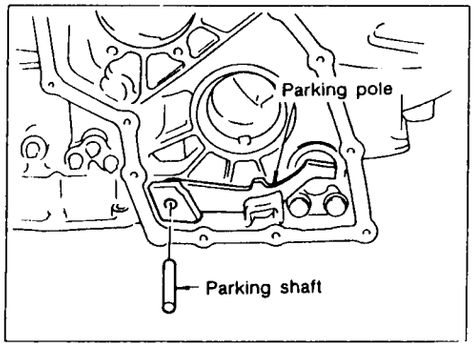
66



RL4F03A & F03V —

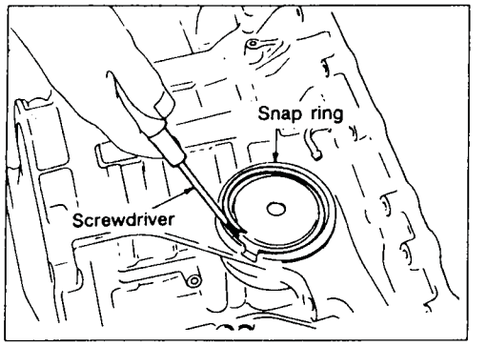
Remove return spring from parking shaft using a screw

67



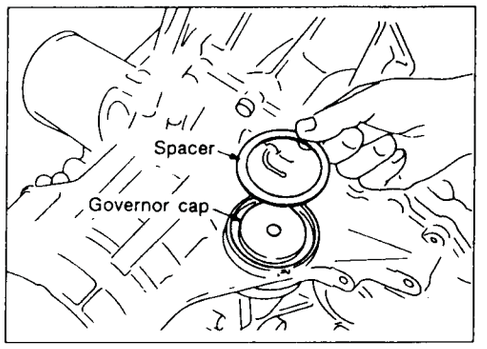
Draw out parking shaft and remove parking pole from transmission case.

68



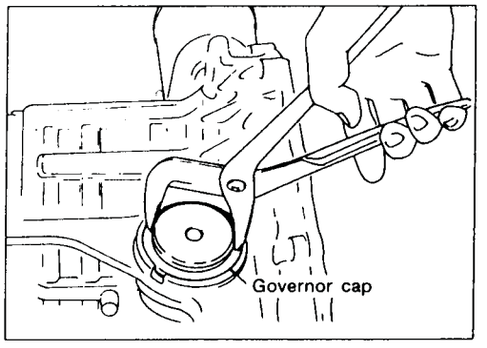
Remove snap ring using a screwdriver.

69



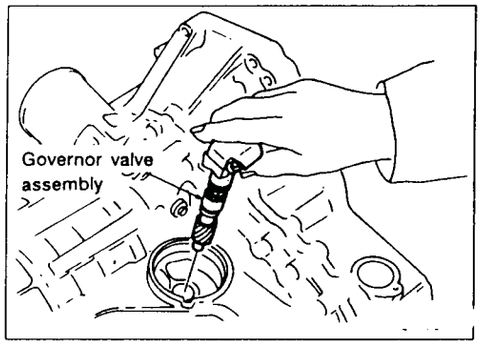
Remove spacer from governor cap.

70



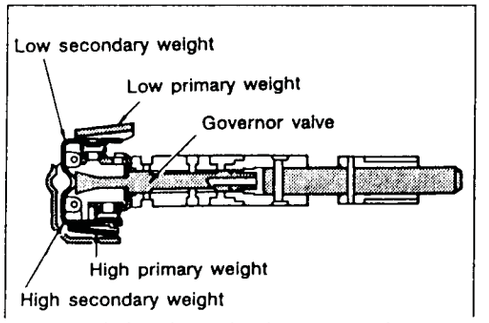
Remove governor cap using water pump pliers.

71



Remove governor valve assembly.

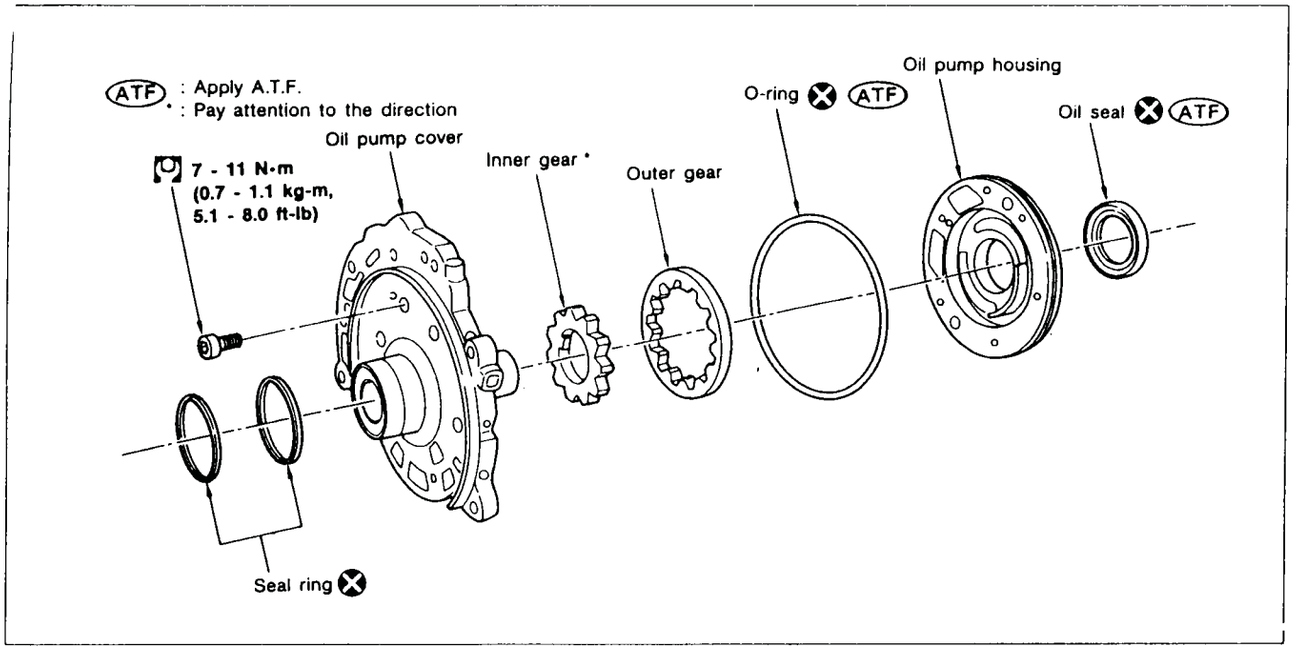
72

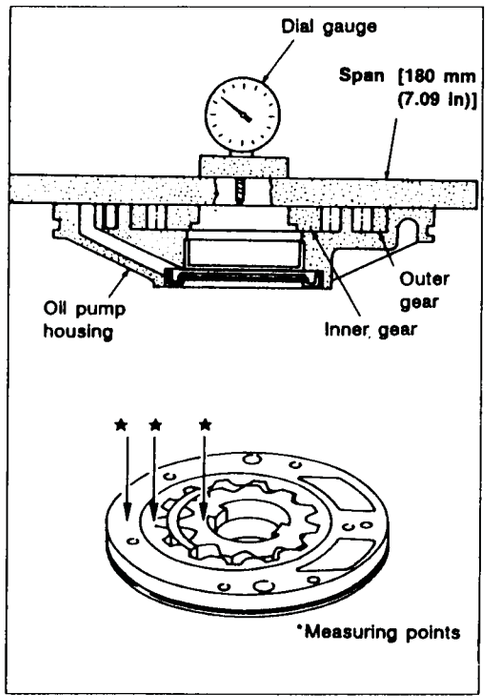


With low primary weight closed, place top of governor valv assembly down to make sure governor valve proper lowers under its own weight.

Place top of governor assembly down. Operate both lo and high secondary weights to make sure governor valv functions properly.

Oil Pump

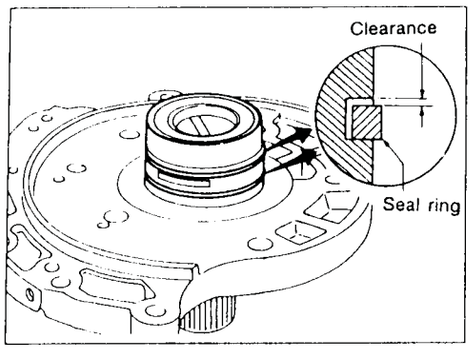




Side clearance

- Measure side clearance between end of oil pump housing and inner and outer gears in at least four places along their circumferences. Maximum measured values should be within specified ranges.
  Standard clearance:
  0.02 - 0.04 mm (0.0008 - 0.0016 in)
- If clearance is less than standard, select inner and outer gear as a set so that clearance is within specifications.
  Inner and outer gear:
  Refer to S.D.S.
- If clearance is more than standard, replace whole oil pump assembly except oil pump cover.

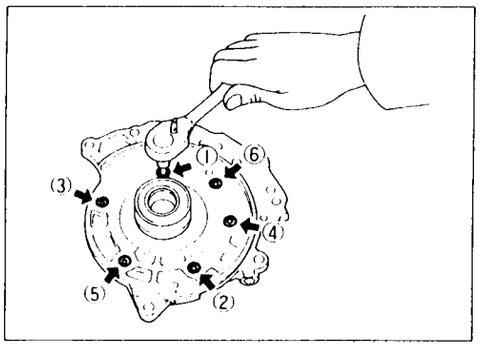
1



Seal ring clearance

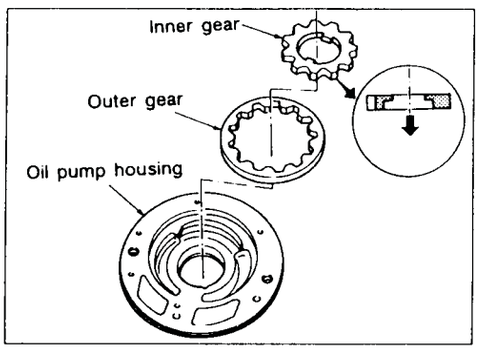
- Install new seal rings onto oil pump cover.
- Measure clearance between seal ring and ring groove.
  Standard clearance:
  0.07 - 0.19 mm (0.0028 - 0.0075 in)
  Allowable limit:
  0.19 mm (0.0075 in)
- If not within wear limit, replace oil pump cover assembly.

2



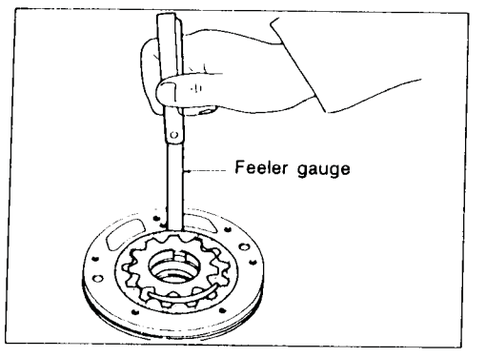
Loosen bolts in numerical order and remove oil pump cover.

3



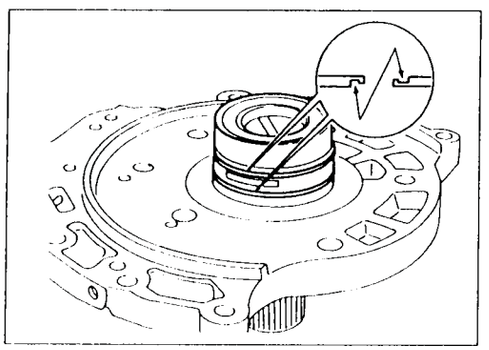
Remove inner and outer gear from oil pump housing.

4



- Measure clearance between outer gear and oil pump housing.
  Standard clearance:
  0.08 - 0.15 mm (0.0031 - 0.0059 in)
- If not within standard clearance, replace whole oil pump assembly except oil pump cover.

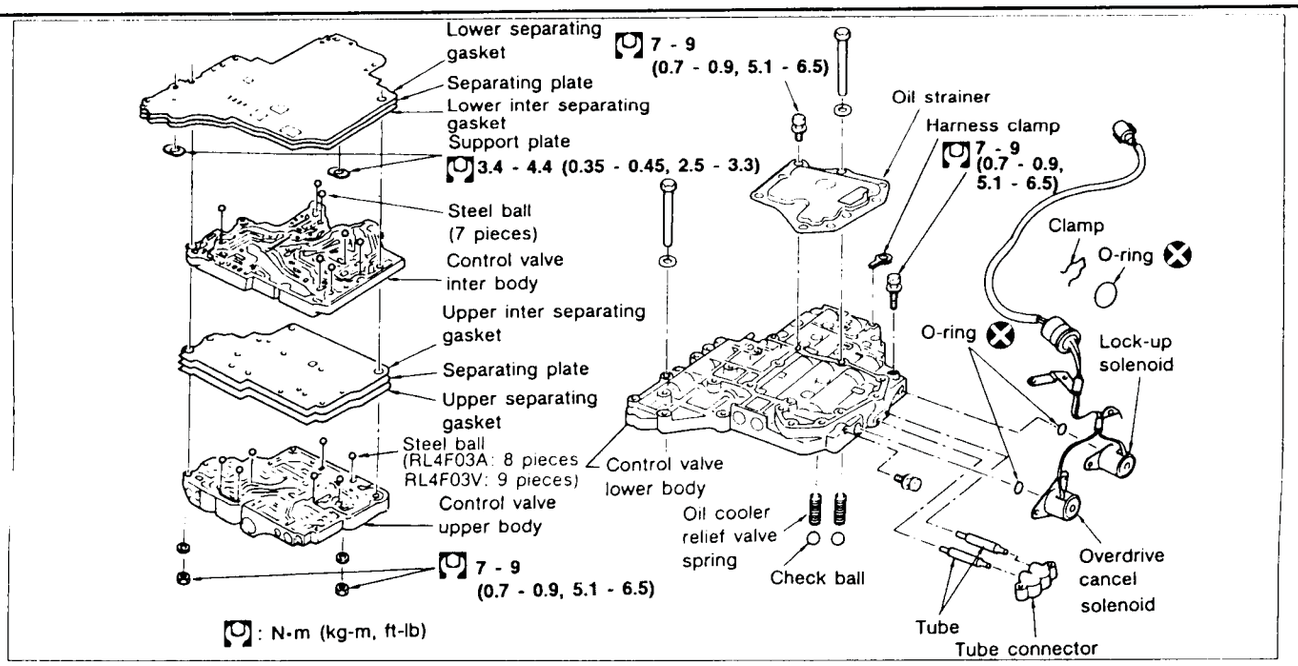
5



Install new seal rings carefully after packing ring groove with petroleum jelly and connect hooks.

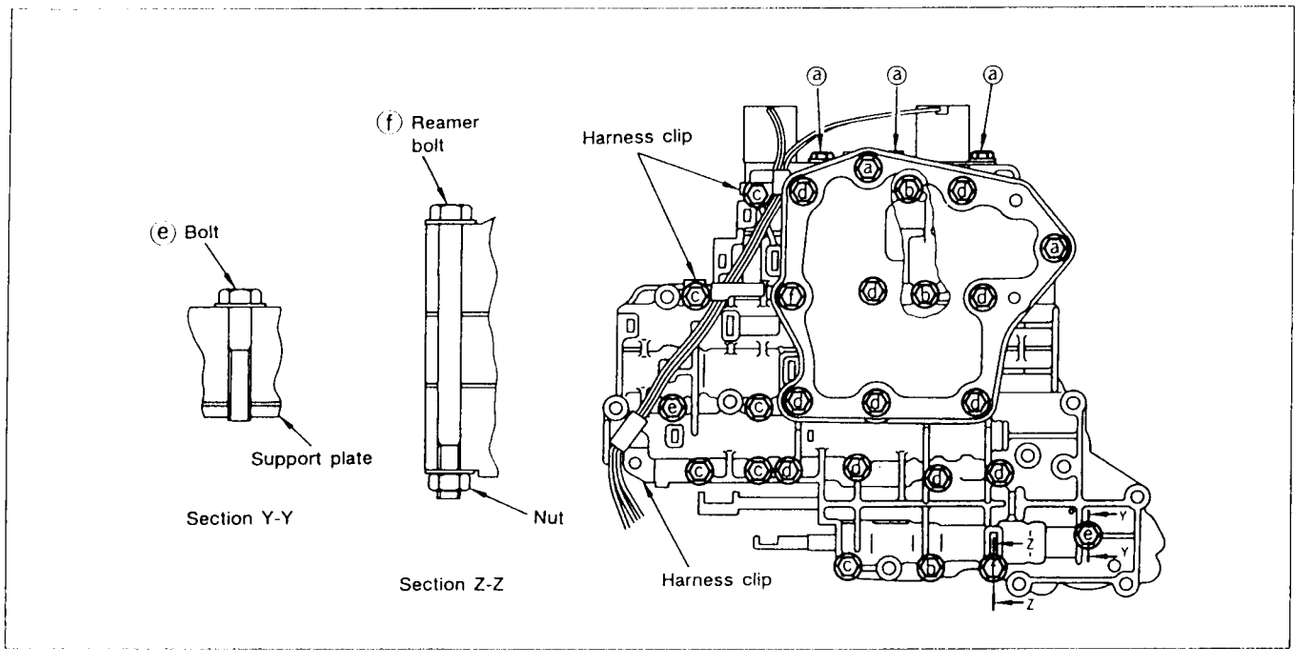
- **Do not spread gap of seal ring excessively while installing. It may deform the ring.**

Control Valve Assembly

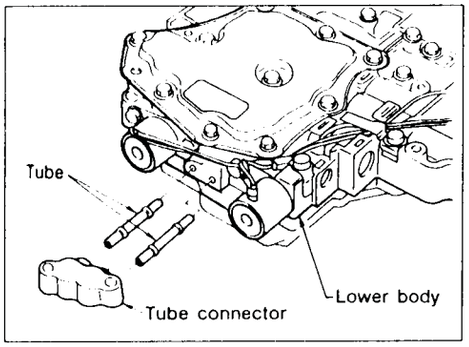


Bolt length, number and location:

Bolt symbol	a	b	c	d	e	f
Bolt length "ℓ" mm (in)	13.5 (0.531)	58.0 (2.283)	40.0 (1.575)	66.0 (2.598)	33.0 (1.299)	78.0 (3.071)
Number of bolts	5	3	6	11	2	2

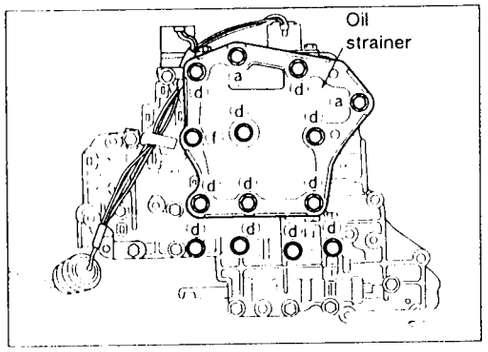


1



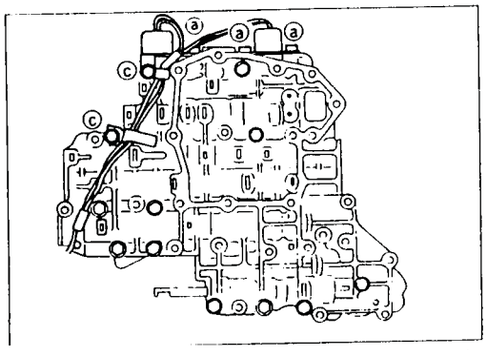
Remove tube connector and tube from control valve lower body.

2



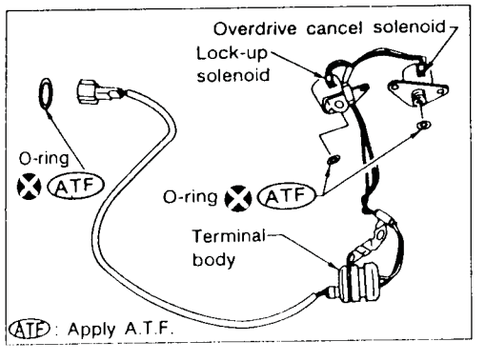
Remove bolts ⓐ, ⓓ and ⓕ and remove oil strainer from control valve assembly.

3



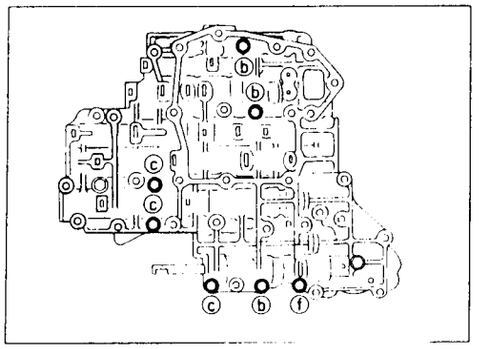
Remove O.D. cancel solenoid and lock-up cancel solenoid from control valve assembly.

4



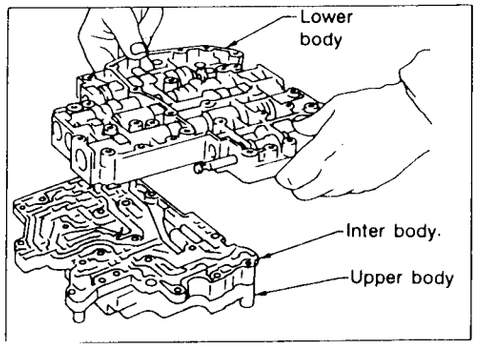
Remove O-rings from O.D. cancel solenoid, lock-up cancel solenoid and harness terminal body.

5



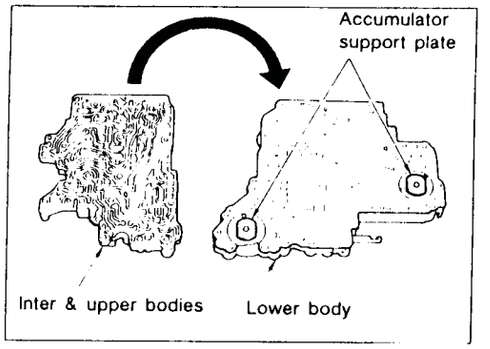
Place upper body facedown, and remove bolts ⓑ, ⓒ and ⓕ.

6



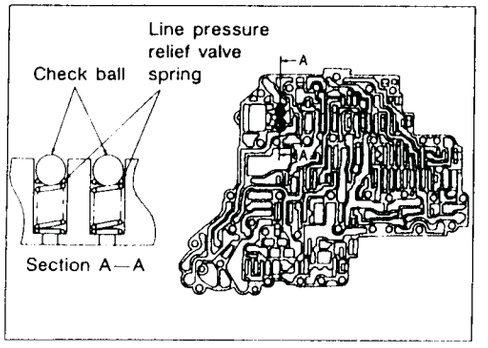
Remove inter body from lower body.

7



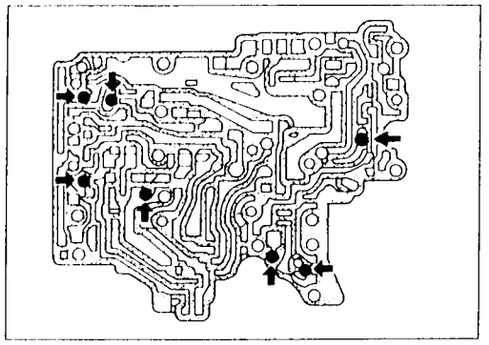
Turn over lower body, and remove accumulator support plate.

8



Be careful not to lose steel balls and relief valve springs.

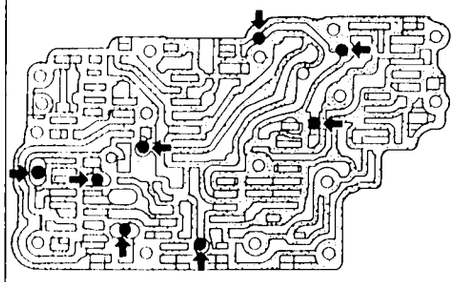
9



Be careful not to lose steel balls.

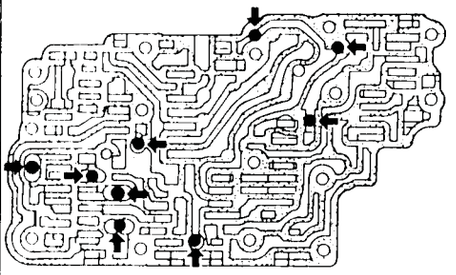
10

RL4F03A



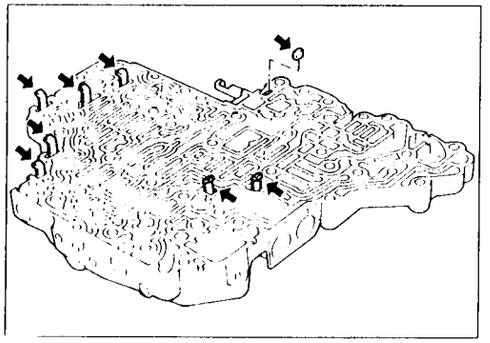
11

RL4F03V



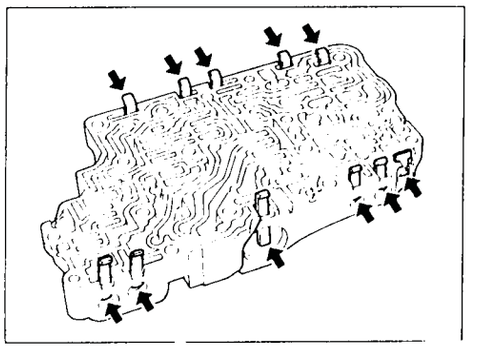
Check to see that steel balls are properly positioned in upper body and then remove them from upper body.

12



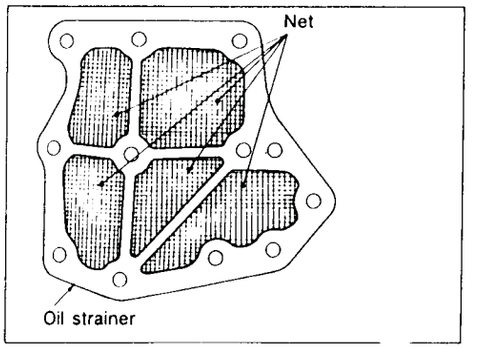
Check to see that retainer plates are properly positioned in lower body.

13



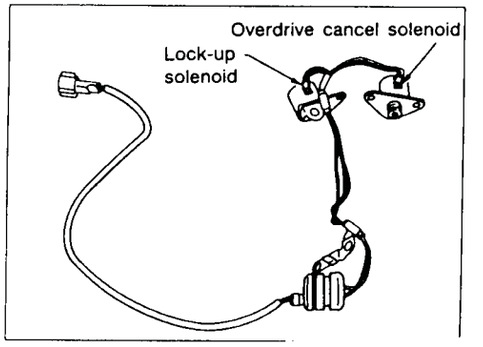
Check to see that retainer plates are properly positioned in upper body.

14



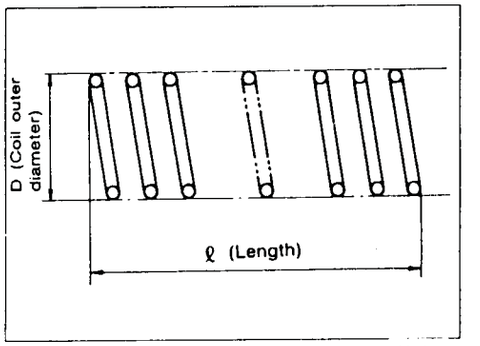
Check wire netting of oil strainer for damage.

15



O.D. cancel solenoid and lock-up cancel solenoid

16

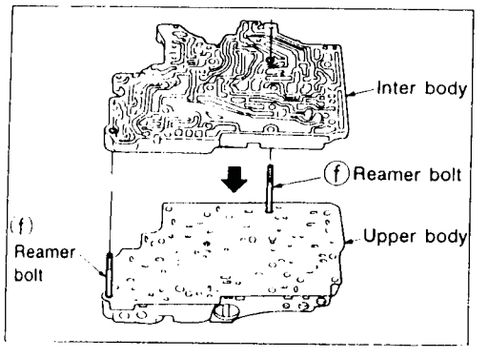


Oil cooler relief valve spring.

Unit: mm (in)

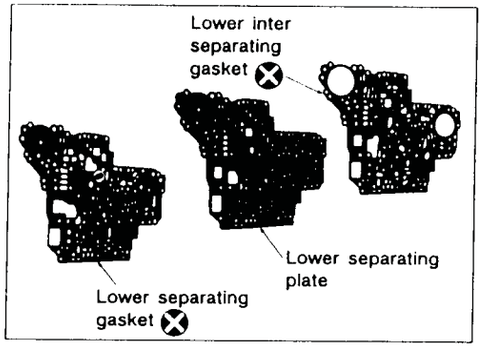
Part No.	ℓ	D
31872-31X00	17.02 (0.6701)	8.0 (0.315)

17



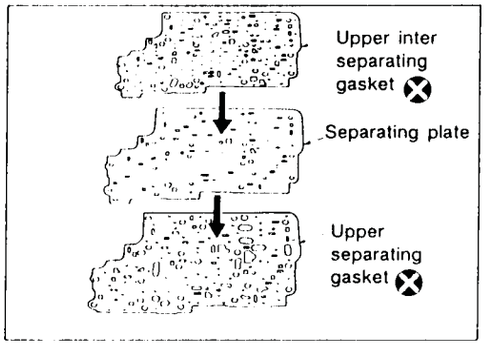
Install inter body on upper body using reamer bolts ⓕ as guides.

18



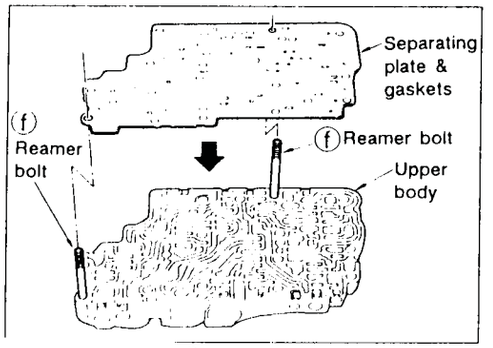
Install lower separating gasket, inter separating gasket and lower separating plate in order shown.

19



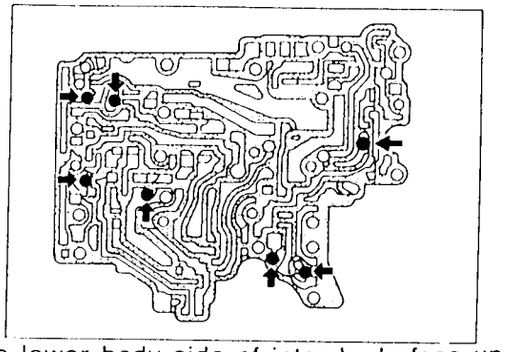
Install upper separating gasket, upper inter separating gasket and upper separating plate in order shown

20



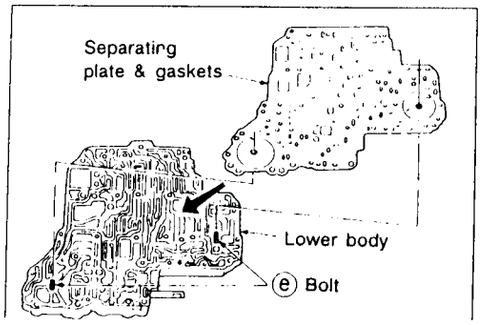
Install reamer bolts ⓕ from bottom of upper body and install separating gaskets and separating plate as a set on upper body using reamer bolts as guides.

21



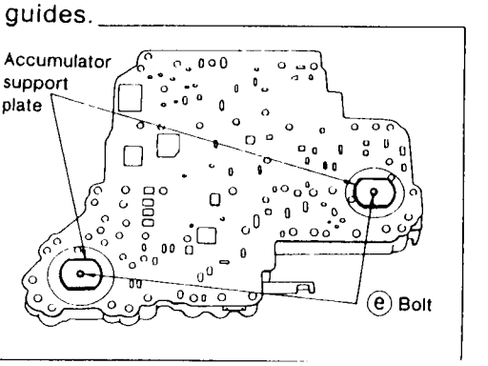
Place lower body side of inter body face up. Install steel balls in their proper positions.

22



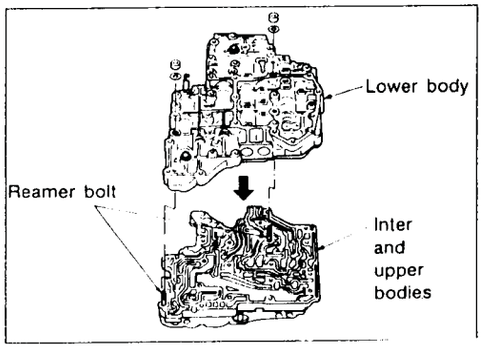
Install support plate fixing bolts ⓔ from bottom of lower body and install separating gaskets and separating plate as a set on lower body using bolts ⓔ as guides.

23



Temporarily install support plates on lower body.

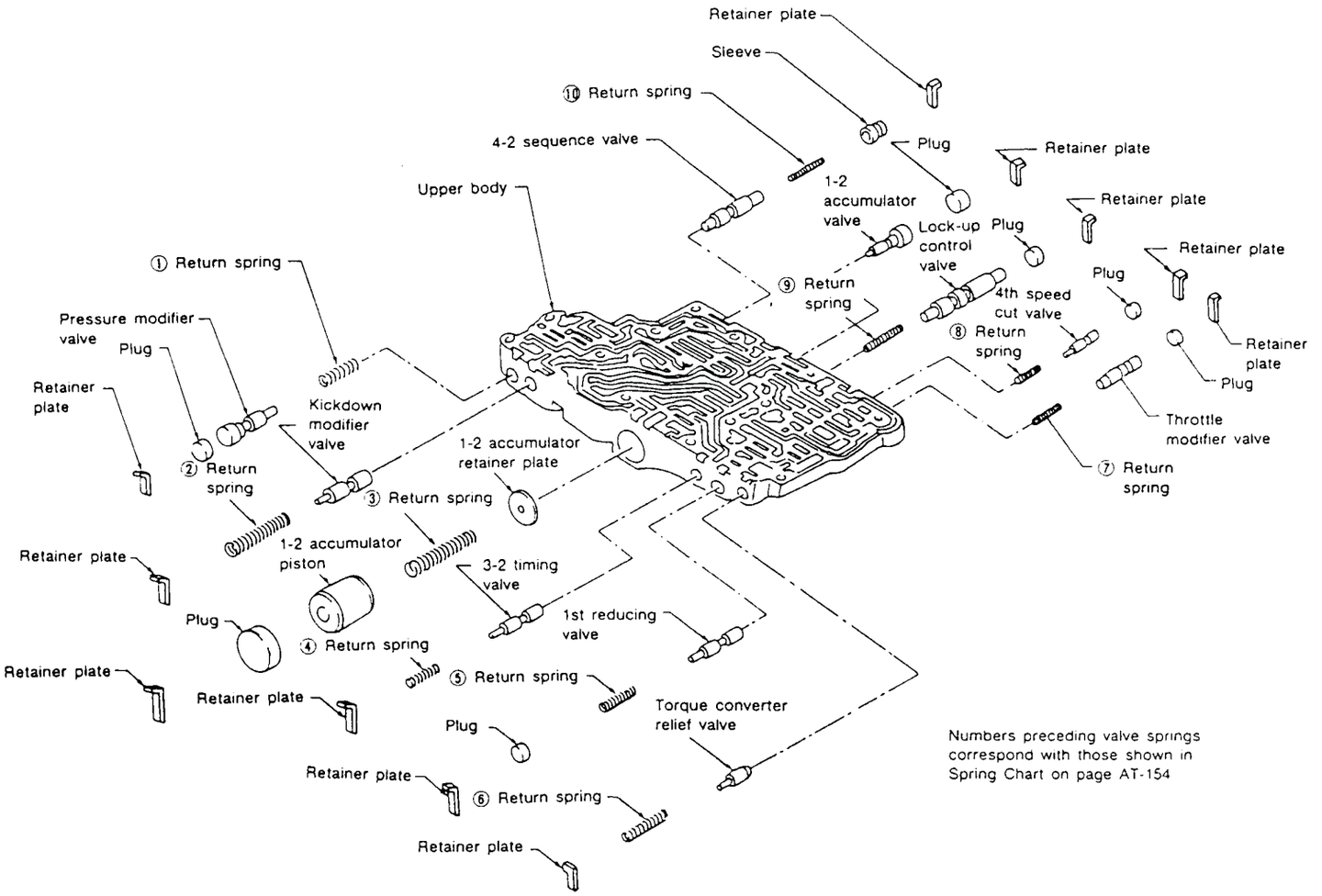
24



Install lower body on inter body using reamer bolts ⓕ as guides and tighten reamer bolts ⓕ slightly.

Technical Service Information

Control Valve Upper Body



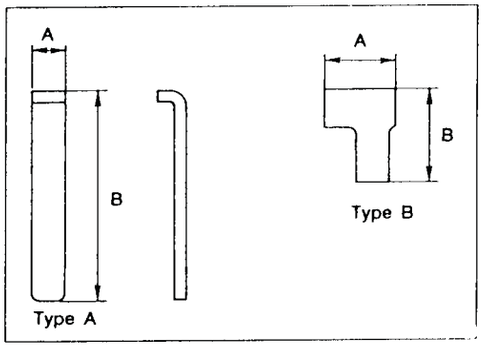
Numbers preceding valve springs correspond with those shown in Spring Chart on page AT-154

Apply A.T.F. to all components before their installation.

Retainer plate:

Unit: mm (in)

Name of control valves	Length A	Length B	Type
Pressure modifier valve	6.0 (0.236)	28.0 (1.102)	A
Lock-up control valve			
4-2 sequence valve			
Kickdown modifier valve	6.0 (0.236)	21.5 (0.846)	
3-2 timing valve			
1st reducing valve			
Throttle modifier valve			
4th speed cut valve			
1-2 accumulator valve	6.0 (0.236)	37.5 (1.476)	
Torque converter relief valve	13.0 (0.512)	17.0 (0.669)	B



RL4F03A (GA engine models)

Unit: mm (in)

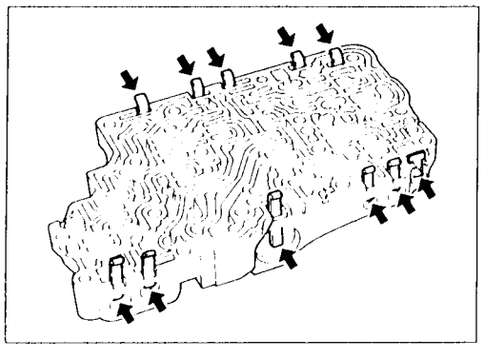
Parts / Item		Part No.	ℓ	D
①	Pressure modifier valve spring	31742-31X10	25.0 (0.984)	8.2 (0.323)
②	Kickdown modifier valve spring	31742-31X03	40.5 (1.594)	9.0 (0.354)
③	1-2 accumulator valve spring	31742-31X63	50.9 (2.004)	12.6 (0.496)
④	3-2 timing valve spring	31736-21X00	26.3 (1.035)	7.2 (0.283)
⑤	1st reducing valve spring	31835-21X08	22.6 (0.890)	7.3 (0.287)
⑥	Torque converter relief valve spring	31742-31X06	23.5 (0.925)	7.4 (0.291)
⑦	Throttle modifier valve spring	31742-31X07	29.5 (1.161)	5.5 (0.217)
⑧	4th speed cut valve spring	31756-21X01	23.4 (0.921)	6.7 (0.264)
⑨	Lock-up control valve spring	31742-31X08	39.5 (1.555)	5.0 (0.197)
⑩	4-2 sequence valve spring	31742-31X09	39.5 (1.555)	5.1 (0.201)

RL4F03V (SR engine models)

Unit: mm (in)

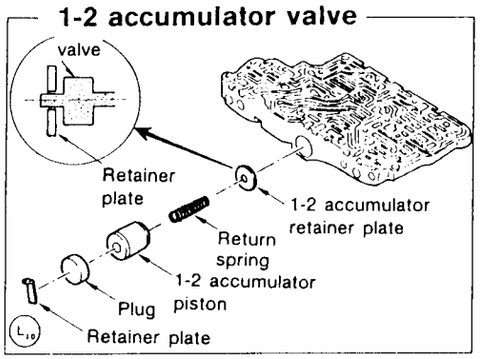
Parts / Item		Part No.	ℓ	D
①	Pressure modifier valve spring	31742-31X64	25.0 (0.984)	8.2 (0.323)
②	Kickdown modifier valve spring	31742-31X03	40.5 (1.594)	9.0 (0.354)
③	1-2 accumulator valve spring	31742-31X63	50.9 (2.004)	12.6 (0.496)
④	3-2 timing valve spring	31736-21X00	26.3 (1.035)	7.2 (0.283)
⑤	1st reducing valve spring	31835-21X08	22.6 (0.890)	7.3 (0.287)
⑥	Torque converter relief valve spring	31742-31X06	23.5 (0.925)	7.4 (0.291)
⑦	Throttle modifier valve spring	31742-31X07	29.5 (1.161)	5.5 (0.217)
⑧	4th speed cut valve spring	31835-21X02	23.3 (0.917)	6.2 (0.244)
⑨	Lock-up control valve spring	31742-31X08	39.5 (1.555)	5.0 (0.197)
⑩	4-2 sequence valve spring	31742-31X09	39.5 (1.555)	5.1 (0.201)

2



Remove valves at retainer plates.
Do not use a magnetic "hand".

3



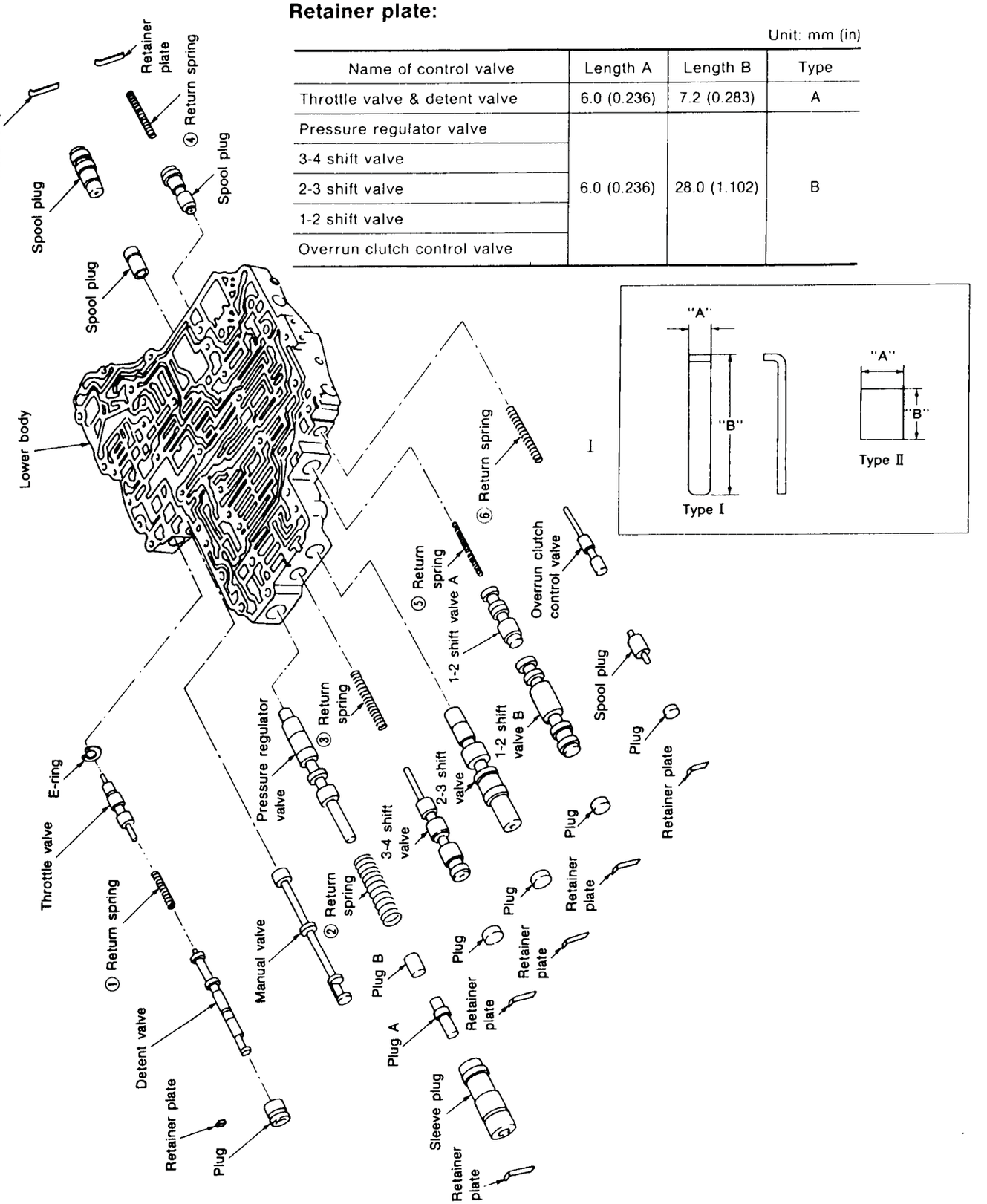
Install 1-2 accumulator valve and then align 1-2 accumulator retainer plate with 1-2 accumulator valve from opposite side of control valve body.
Install return spring and 1-2 accumulator piston.

Control Valve Lower Body

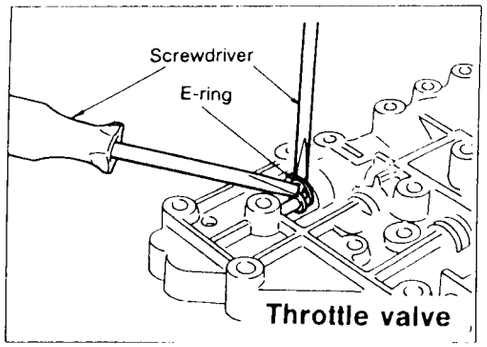
Retainer plate:

Unit: mm (in)

Name of control valve	Length A	Length B	Type
Throttle valve & detent valve	6.0 (0.236)	7.2 (0.283)	A
Pressure regulator valve	6.0 (0.236)	28.0 (1.102)	B
3-4 shift valve			
2-3 shift valve			
1-2 shift valve			
Overrun clutch control valve			

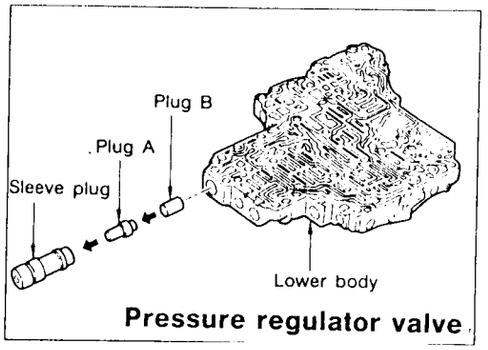


2



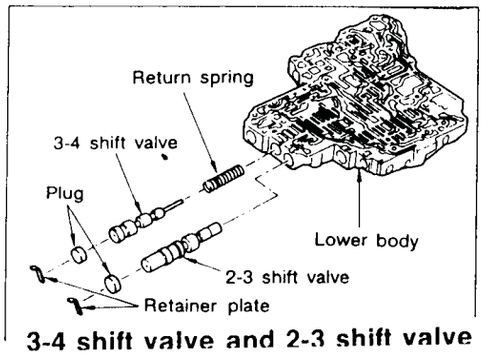
Insert throttle valve to control valve body and then install E-ring to throttle valve.

3



Install pressure regulator valve after assembling sleeve plug, plug A and plug B.

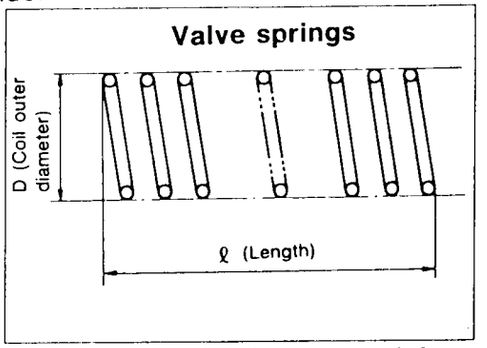
4



3-4 shift valve and 2-3 shift valve

Install 3-4 shift valve and 2-3 shift valve after fixing plugs to retainer plates on the opposite side.

5



Check each valve spring for damage or deformation. measure free length and outer diameter.

RL4F03A (GA engine models)

Unit: mm (in)

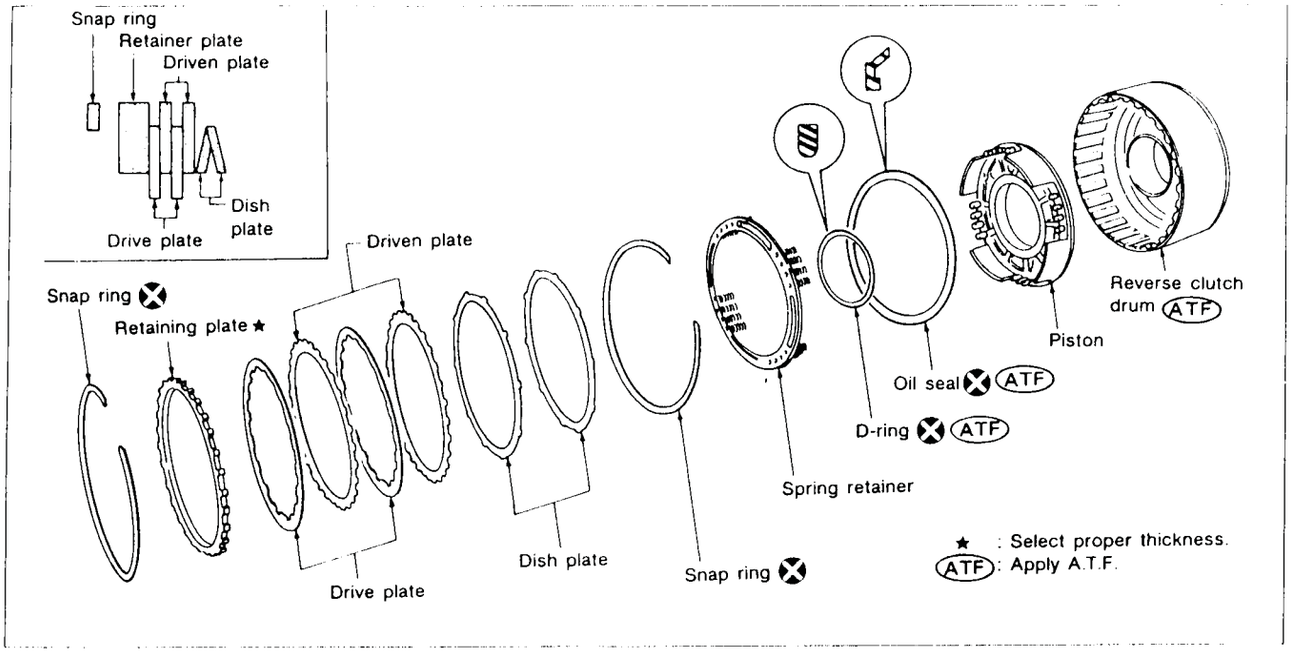
Parts \ Item		Part No.	ℓ	D
(1)	Throttle valve & detent valve spring	31802-31X01	33.0 (1.299)	10.0 (0.394)
(2)	Pressure regulator valve spring	31742-31X00	52.24 (2.0567)	15.0 (0.591)
(3)	3-4 shift valve spring	31762-31X00	52.0 (2.047)	8.0 (0.315)
(4)	2-3 shift valve spring	31762-31X01	52.7 (2.075)	7.0 (0.276)
(5)	1-2 shift valve spring	31762-31X09	44.5 (1.752)	5.3 (0.209)
(6)	Overrun clutch control valve spring	31742-31X60	48.9 (1.925)	7.0 (0.276)

RL4F03V (SR engine models)

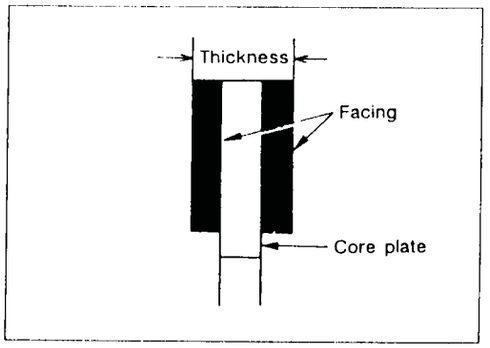
Unit: mm (in)

Parts \ Item		Part No.	ℓ	D
(1)	Throttle valve & detent valve spring	31802-31X06	32.0 (1.260)	10.0 (0.394)
(2)	Pressure regulator valve spring	31742-31X00	52.24 (2.0567)	15.0 (0.591)
(3)	3-4 shift valve spring	31762-31X11	52.0 (2.047)	8.0 (0.315)
(4)	2-3 shift valve spring	31762-31X01	52.7 (2.075)	7.0 (0.276)
(5)	1-2 shift valve spring	31762-31X09	44.5 (1.752)	5.3 (0.209)
(6)	Overrun clutch control valve spring	31742-31X60	48.9 (1.925)	7.0 (0.276)

Reverse Clutch

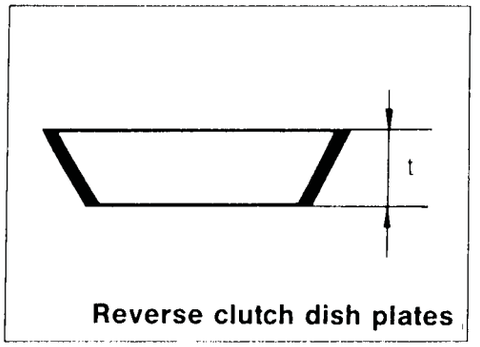


1



Thickness of drive plate:
Standard value: 2.0 mm (0.079 in)
Wear limit: 1.8 mm (0.071 in)

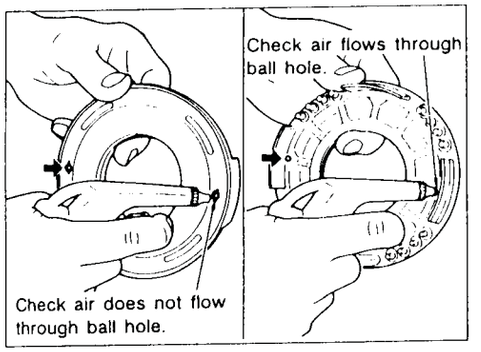
2



Reverse clutch dish plates

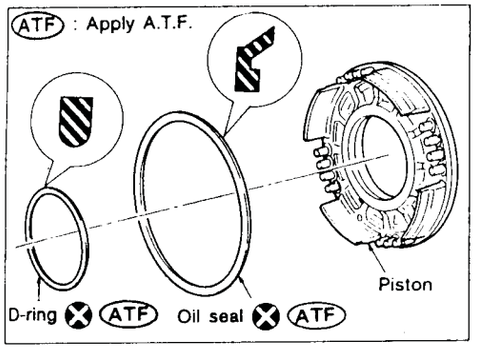
Check for deformation or damage.
Measure thickness of dish plate.
Thickness of dish plate: 2.8 mm (0.110 in)
If deformed or fatigued, replace.

3



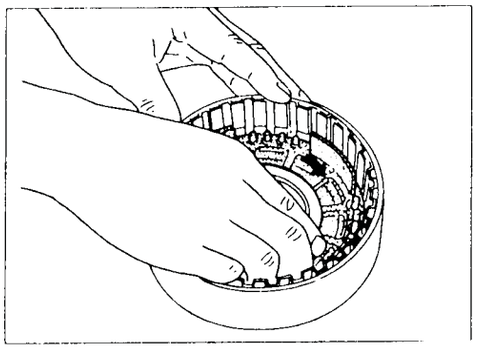
Reverse clutch piston
Make sure check balls are not fixed.

4



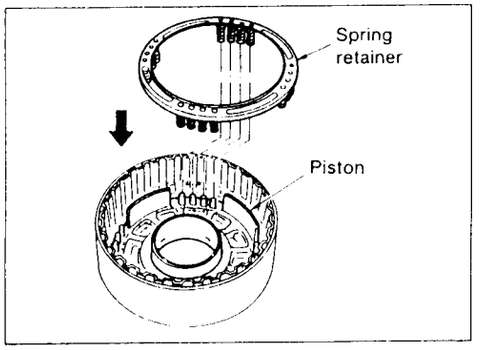
1. Install D-ring and oil seal on piston.
- **Take care with the direction of the oil seal.**
- **Apply A.T.F. to both parts.**

5



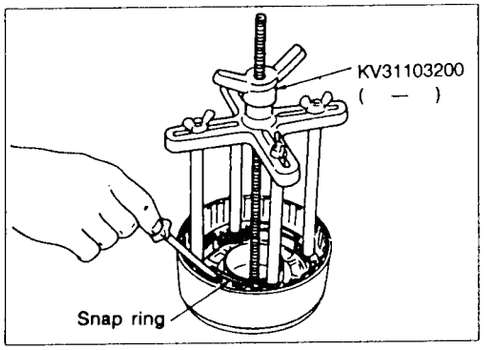
Install piston assembly by turning it slowly.

6



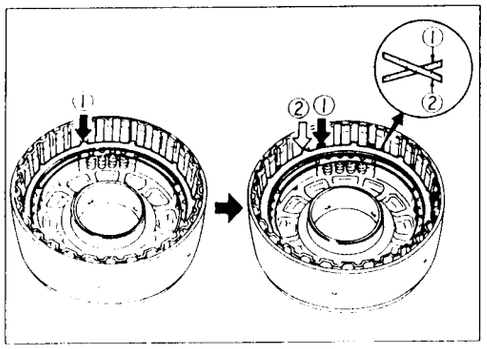
Install return springs and spring retainer on piston.

7



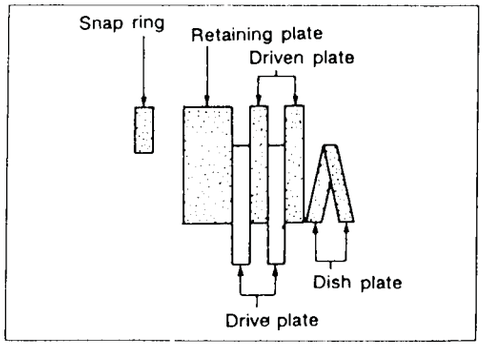
Set Tool directly above return springs.

8



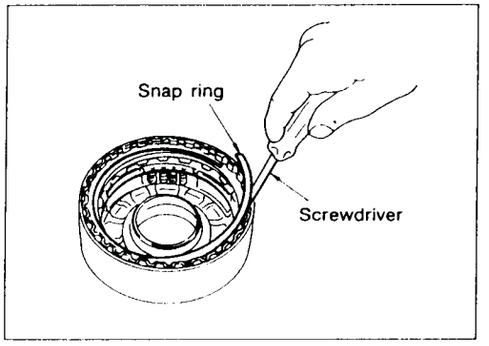
Do not align the projections of any two dish plates.

9



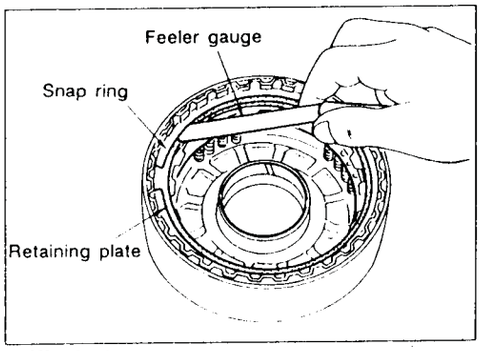
Install drive plates, driven plates, retaining plate and dish plates.

10



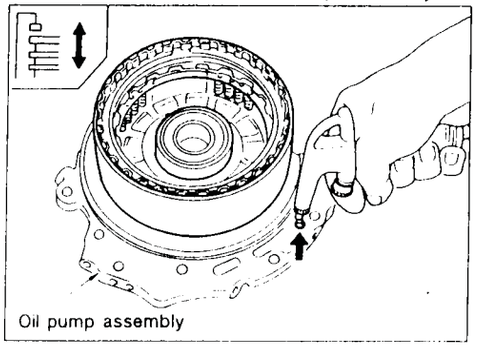
Install snap ring.

11



Specified clearance:
Standard: 0.5 - 0.8 mm (0.020 - 0.031 in)
Allowable limit: 1.2 mm (0.047 in)

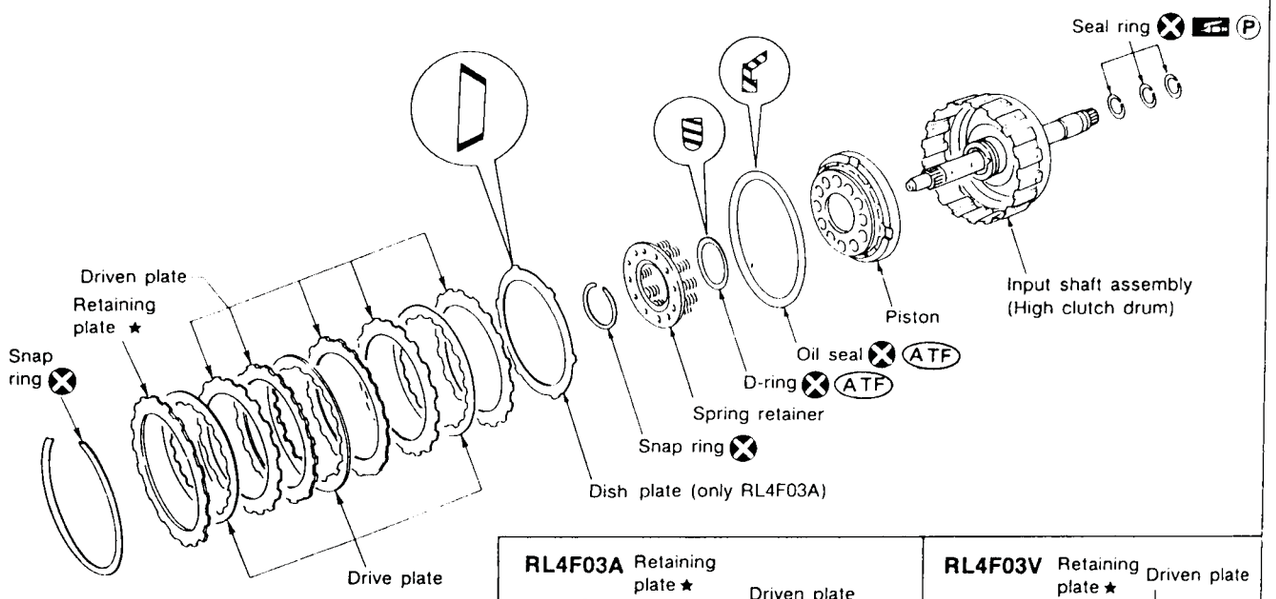
12



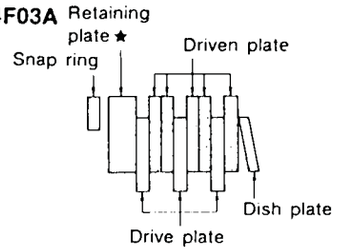
Check operation of reverse clutch.

High Clutch

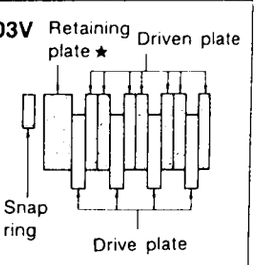
For the number of clutch sheets (drive plates and driven plates), refer to the below cross-section.



RL4F03A

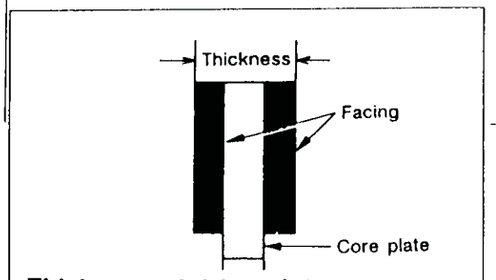


RL4F03V



(P) : Apply petroleum jelly.
(ATF) : Apply A.T.F.
★ : Select proper thickness

1



Thickness of drive plate:

RL4F03A

Standard value: 2.0 mm (0.079 in)

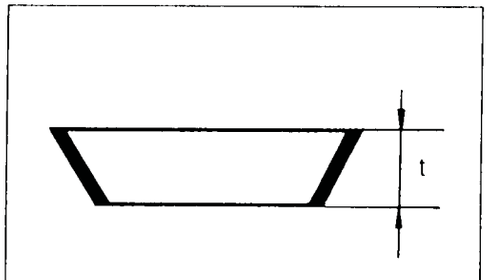
Wear limit: 1.8 mm (0.071 in)

RL4F03V

Standard value: 1.6 mm (0.063 in)

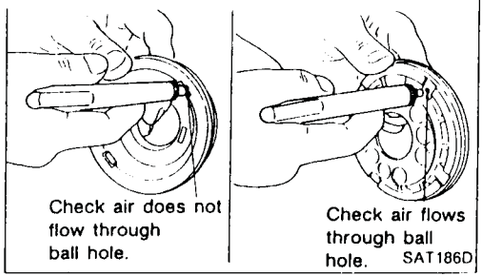
Wear limit: 1.4 mm (0.055 in)

2



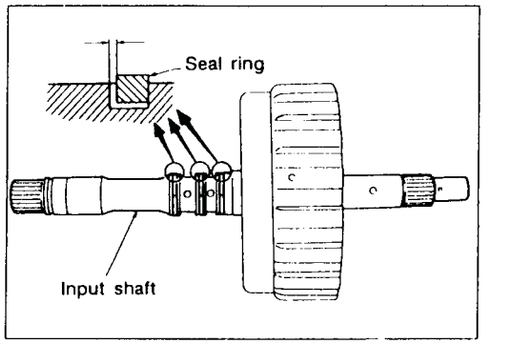
Thickness of dish plate: 2.7 mm (0.106 in)

3



Make sure check balls are not fixed.

4



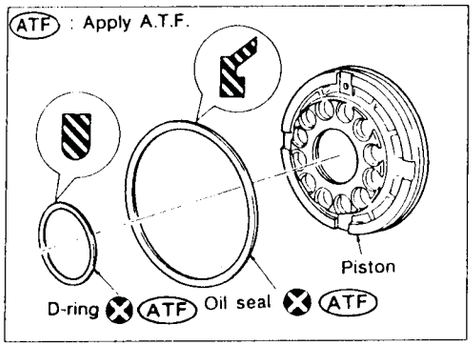
Standard clearance:

0.08 - 0.23 mm (0.0031 - 0.0091 in)

Allowable limit:

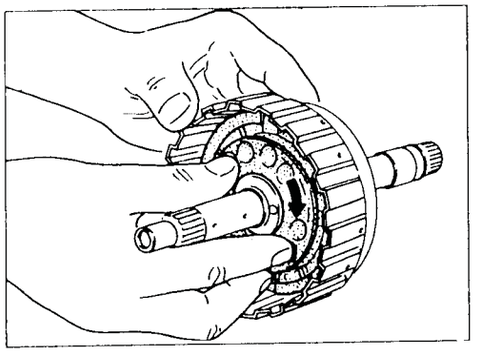
0.23 mm (0.0091 in)

5



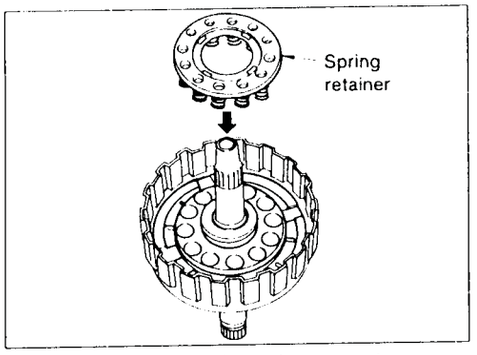
Install D-ring and oil seal on piston.

6



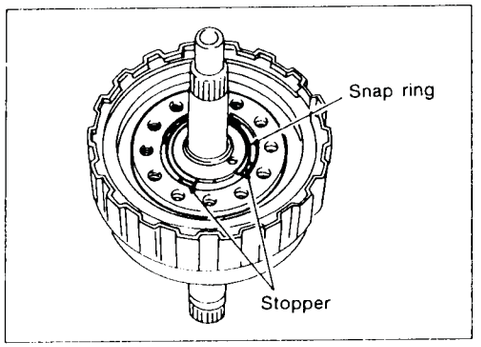
Install piston assembly by turning it slowly.

7



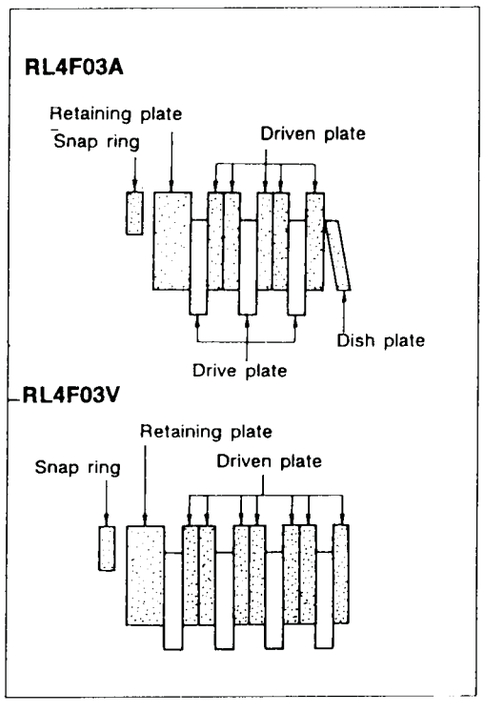
Install return springs and spring retainer on piston.

8



Do not align snap ring gap with spring retainer stopper.

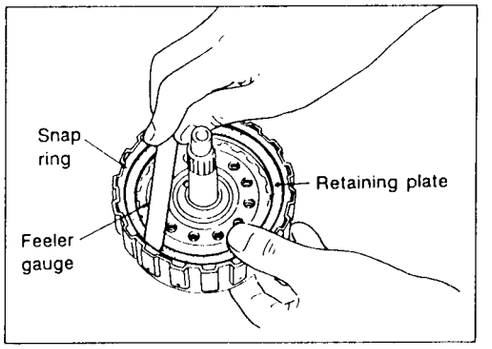
9



10

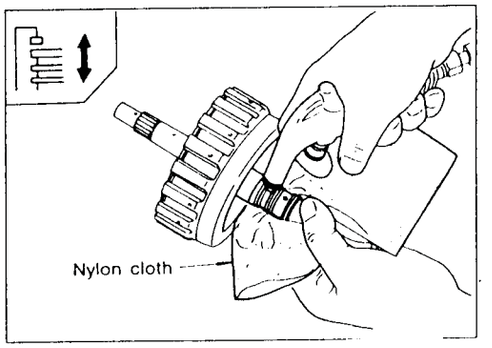
Install drive plates, driven plates, retaining plate and dish plate.

11



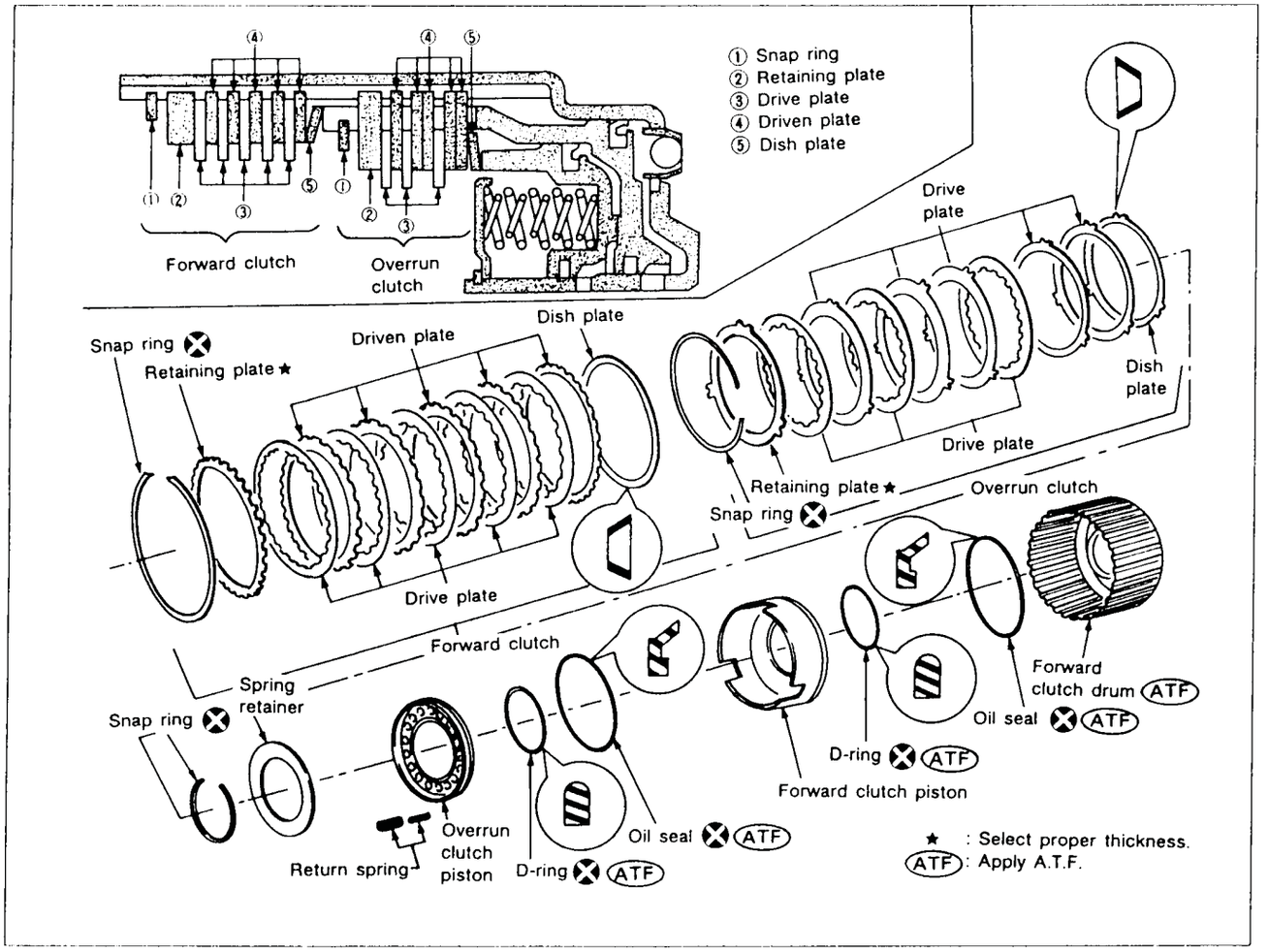
Specified clearance:
Standard: 1.4 - 1.8 mm (0.055 - 0.071 in)
Allowable limit:
RL4F03A 2.4 mm (0.094 in)
RL4F03V 2.6 mm (0.102 in)

12

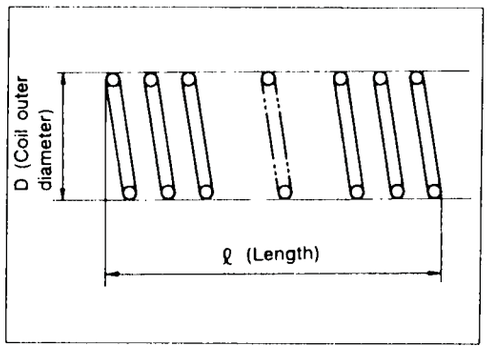


Check operation of high clutch.

Forward Clutch and Overrun Clutch



1



Forward clutch and overrun clutch return springs

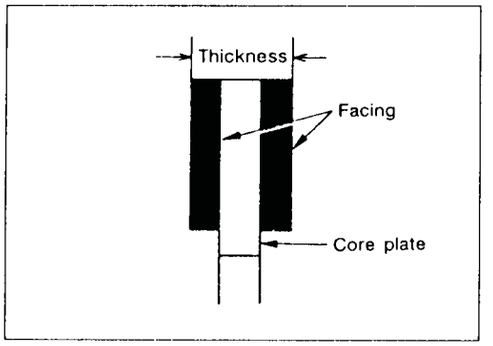
- Check for deformation or damage.
- Measure free length and outer diameter.

Inspection standard:

Unit: mm (in)

Parts		Part No.	ℓ	D
Return spring	Inner	31505-31X03	26.3 (1.035)	7.7 (0.303)
	Outer	31505-31X02	26.6 (1.047)	10.6 (0.417)

2



Forward clutch and overrun clutch drive plates

- Check facing for burns, cracks or damage.
- Measure thickness of facing.

Thickness of drive plate:

Forward clutch

Standard value: 1.8 mm (0.071 in)

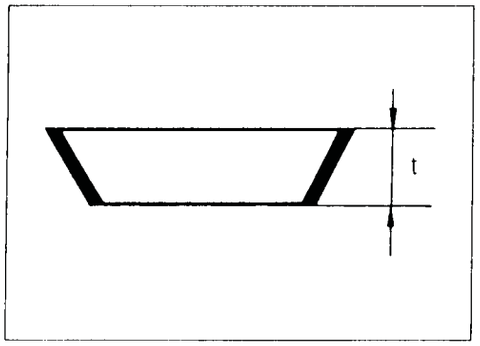
Wear limit: 1.6 mm (0.063 in)

Overrun clutch

Standard value: 1.6 mm (0.063 in)

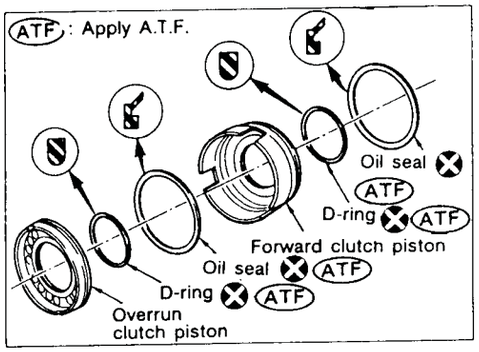
Wear limit: 1.4 mm (0.055 in)

3



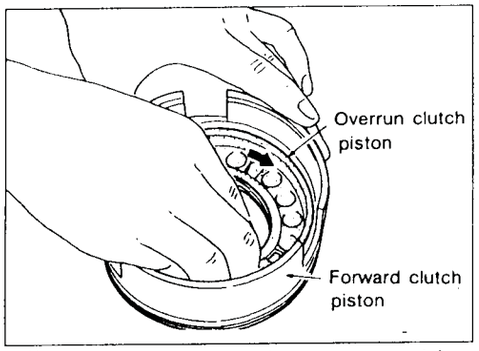
Thickness of dish plate:
Forward clutch: 2.5 mm (0.098 in)
Overrun clutch: 2.15 mm (0.0846 in)

4



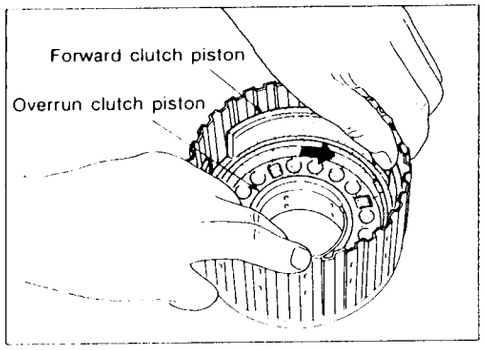
Install D-rings and oil seals on forward clutch piston and overrun clutch piston.

5



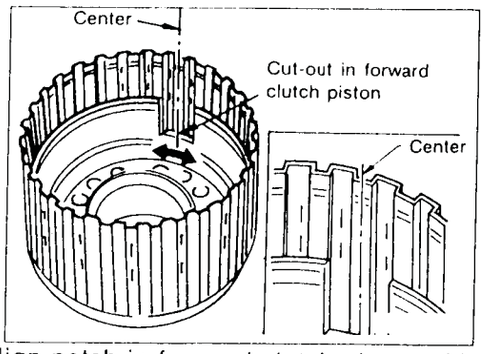
Install overrun clutch piston assembly on forward clutch piston while turning it slowly.

6



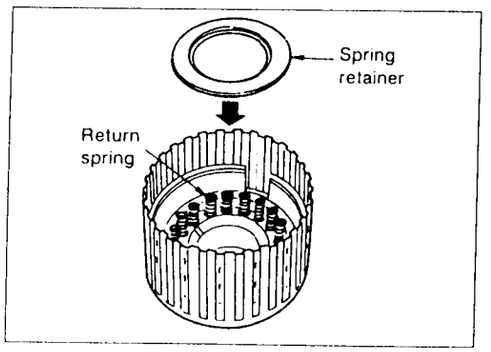
Install forward clutch piston assembly on forward clutch drum while turning it slowly.

7



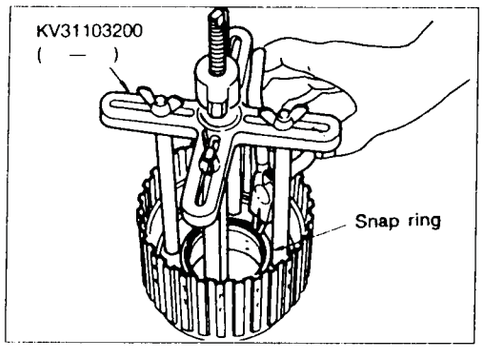
Align notch in forward clutch piston with groove in forward clutch drum.

8



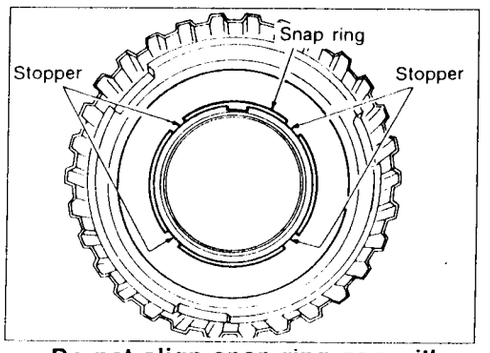
Install return spring on piston.
Install spring retainer on return springs.

9



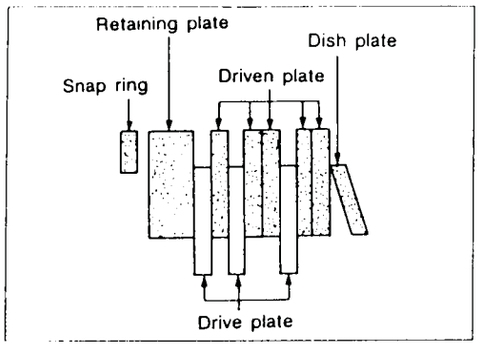
Set Tool directly above return springs.

10



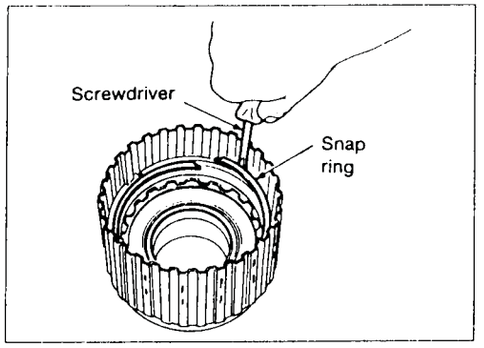
Do not align snap ring gap with spring retainer stopper.

11



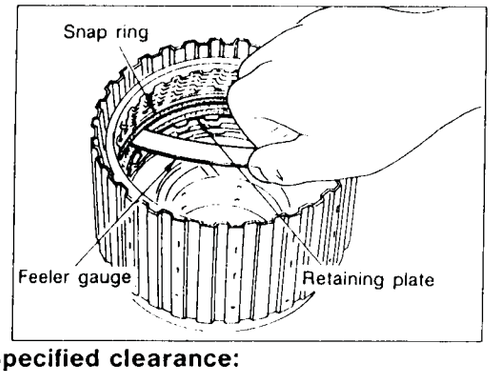
Install drive plates, driven plates, retaining plate and dish plate for overrun clutch.

12



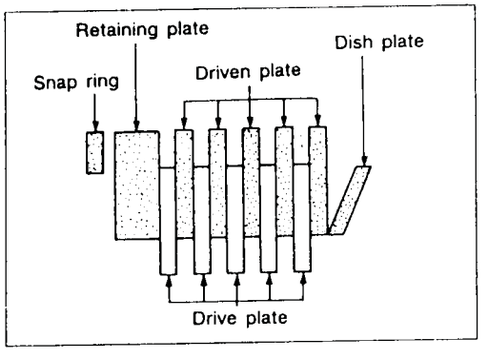
Install snap ring for overrun clutch.

13



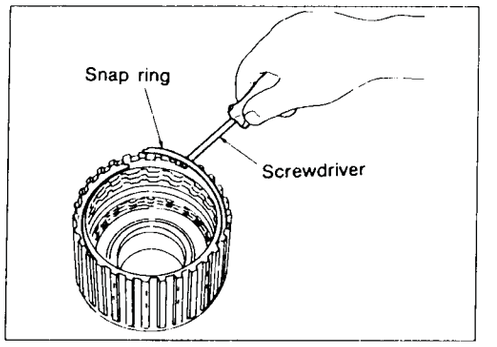
Specified clearance:
Standard: 1.0 - 1.4 mm (0.039 - 0.055 in)
Allowable limit: 1.45 mm (0.0571 in)

14



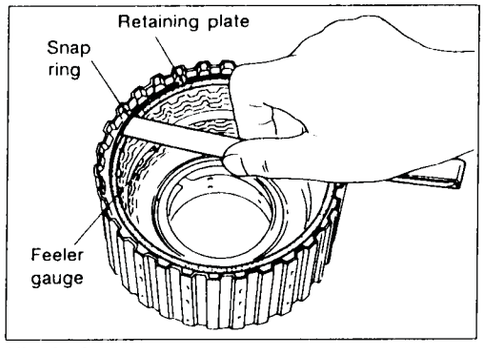
Install drive plates, driven plates. retaining plate and dish plate for forward clutch.

15



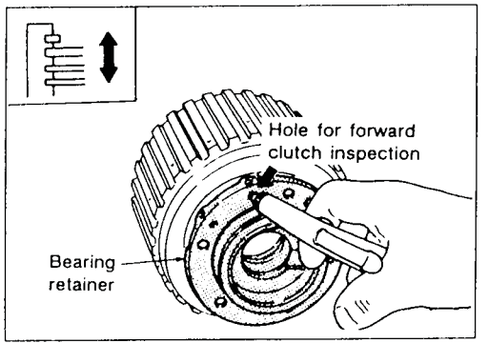
Install snap ring for forward clutch.

16



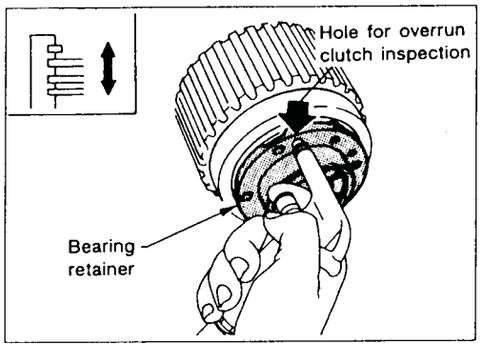
Specified clearance:
Standard: 0.45 - 0.85 mm (0.0177 - 0.0335 in)
Allowable limit: 1.85 mm (0.0728 in)

17



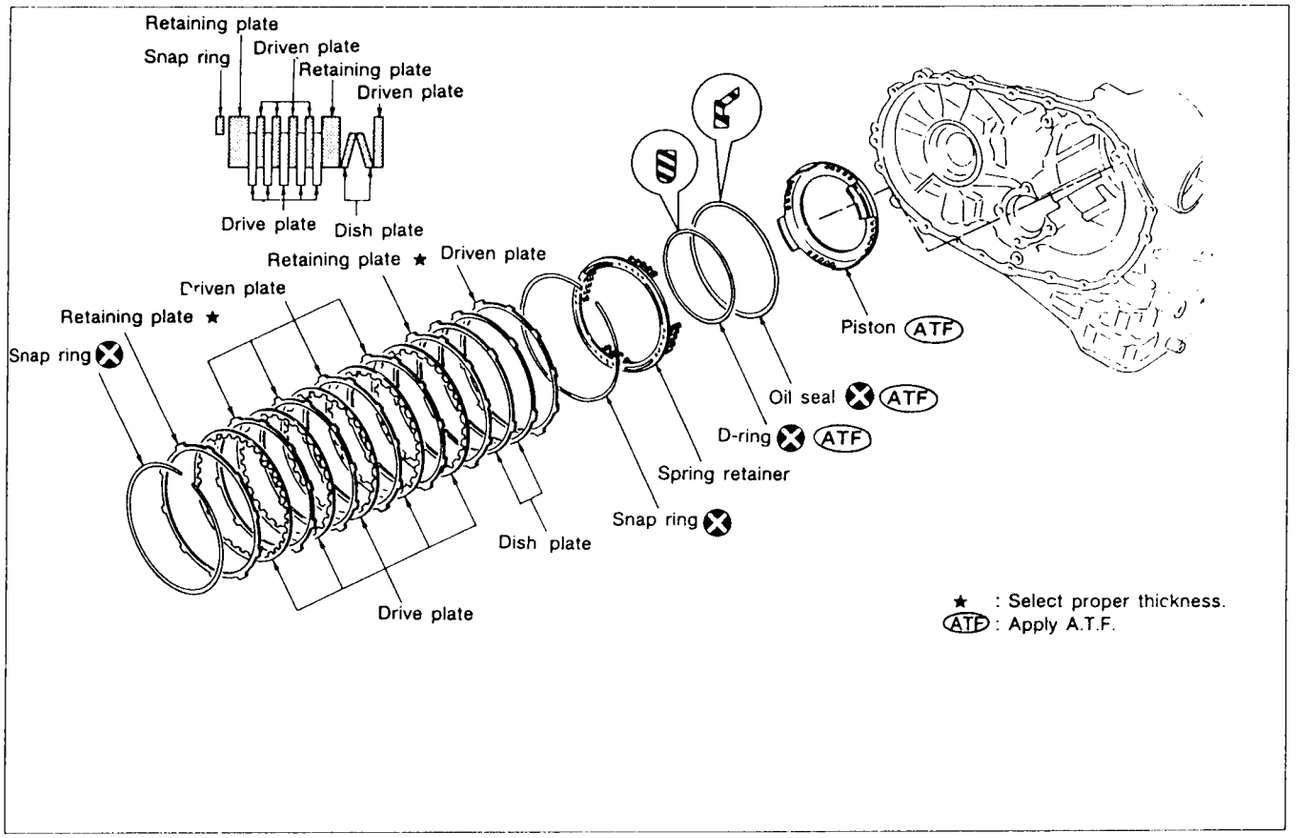
Check operation of forward clutch.

18

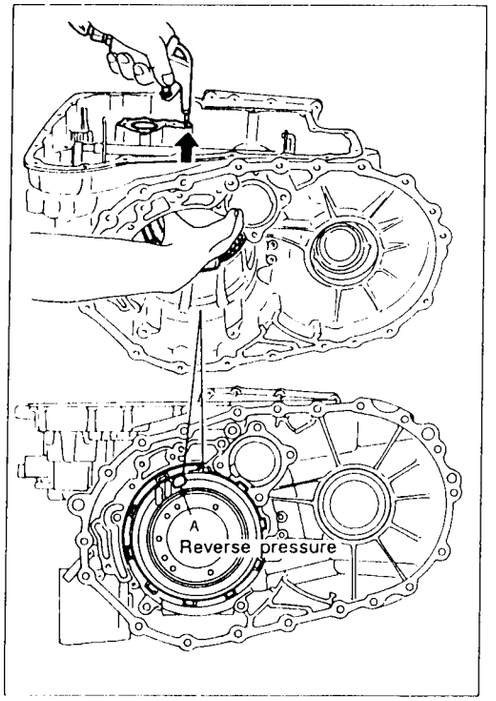


Check operation of overrun clutch.

Low & Reverse Brake

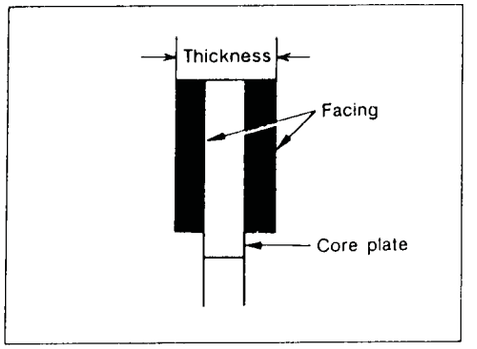


1



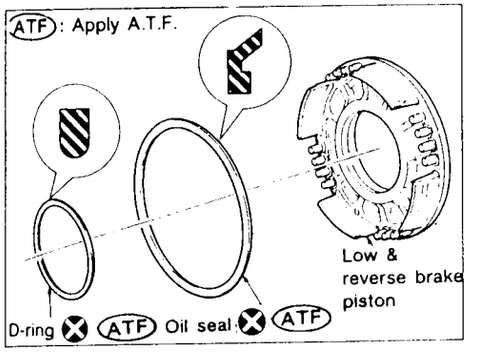
Apply compressed air to oil hole of transmission case while holding piston.
Remove piston from transmission case by turning it.

2



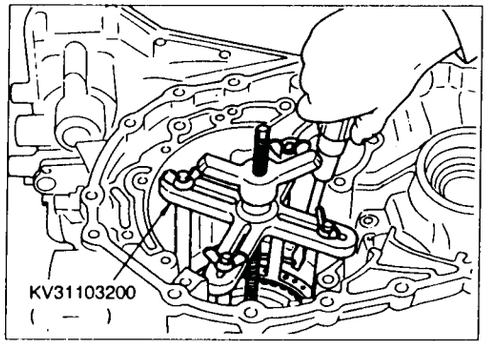
Thickness of drive plate:
Standard value: 2.0 mm (0.079 in)
Wear limit: 1.8 mm (0.071 in)

3



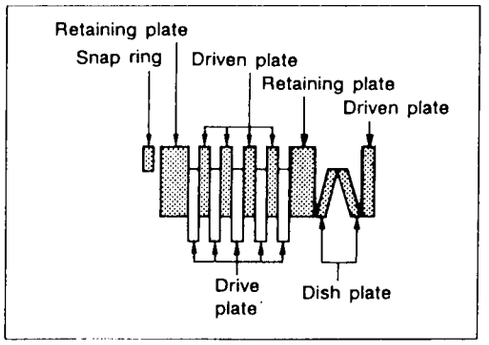
Install D-ring and oil seal on piston.

4



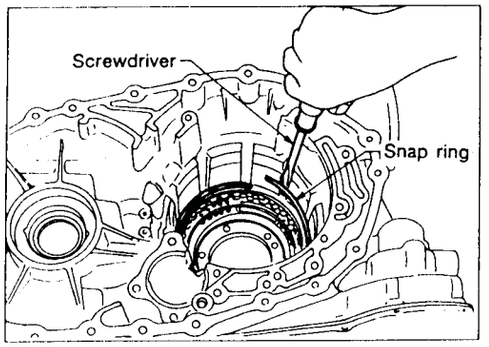
Set Tool directly above return springs.

5



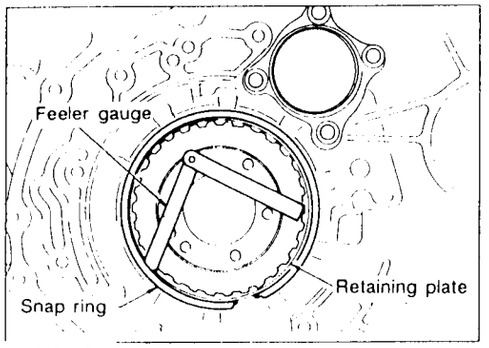
Install drive plates, driven plates and retaining plate.

6



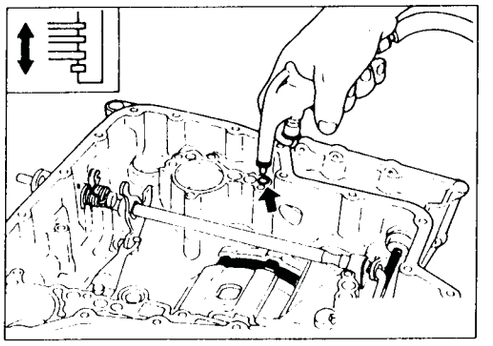
Install snap ring.

7



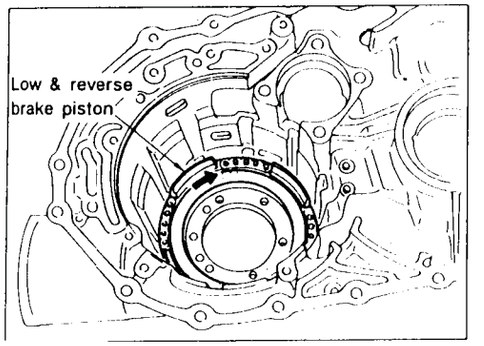
Specified clearance:
Standard: 1.4 - 1.8 mm (0.055 - 0.071 in)
Allowable limit:
2.8 mm (0.110 in)

8



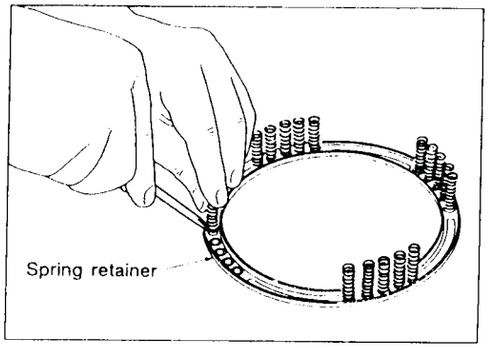
Check operation of low & reverse brake.

9



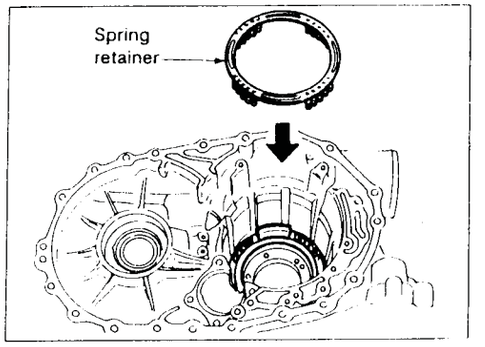
Install piston assembly on transmission case while turning it slowly.

10



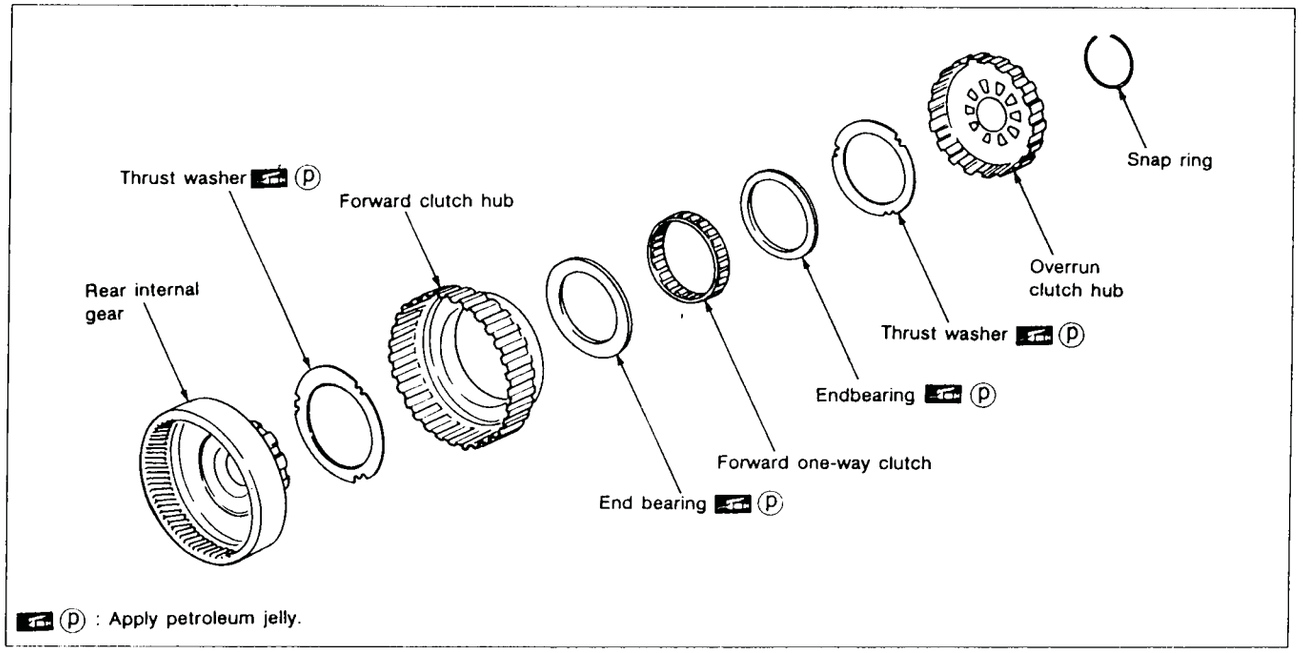
Do not remove return springs from spring retainer.

11

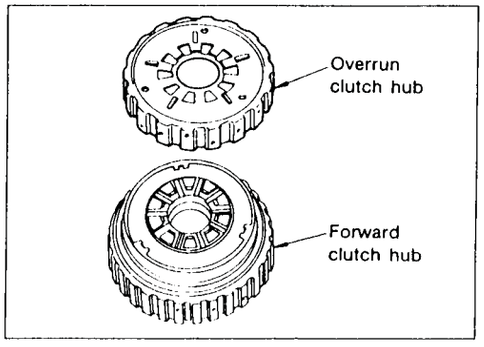


Install return springs and spring retainer on piston.

Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub

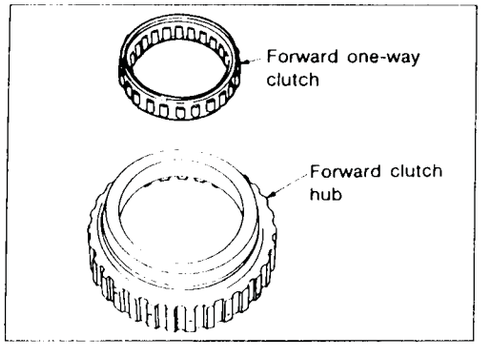


1



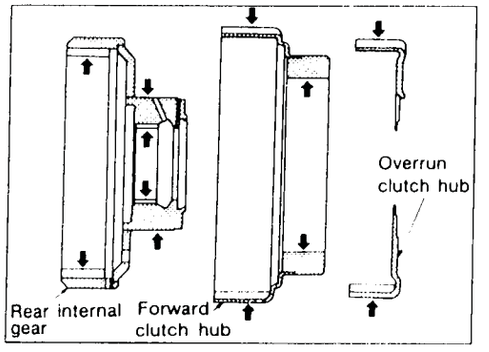
Remove overrun clutch hub from forward clutch hub.

2



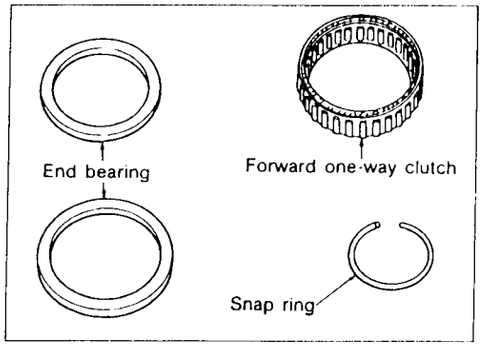
Remove one-way clutch from forward clutch hub.

3



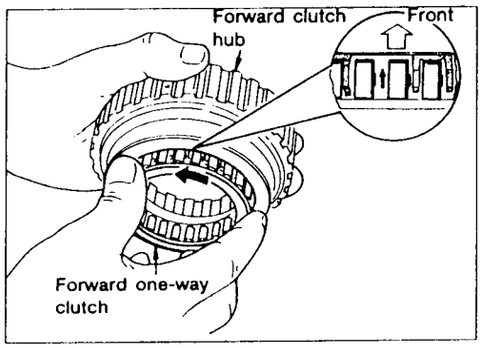
Check rubbing surface for wear or damage.

4



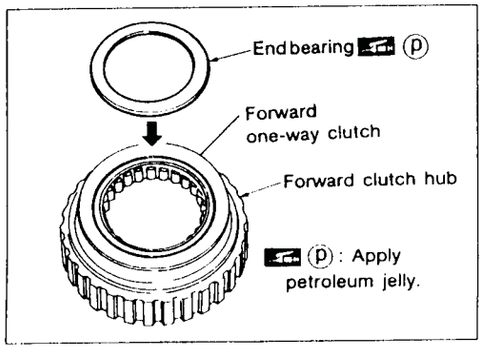
Check snap ring and end bearings for deformation damage.
Check forward one-way clutch for wear and damage.

5



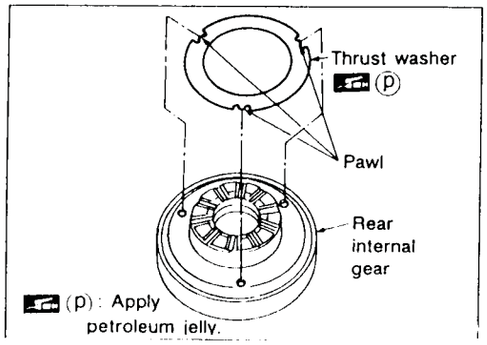
Install forward one-way clutch on forward clutch.
Take care with the direction of the forward one-way clutch.

6



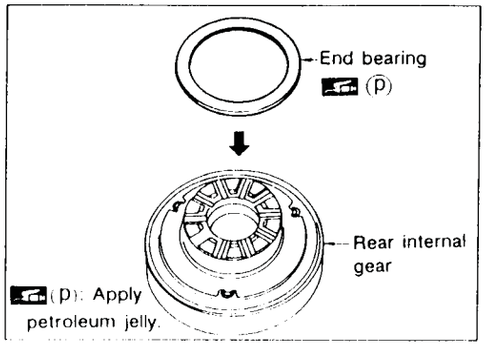
Install end bearing on forward one-way clutch.

7



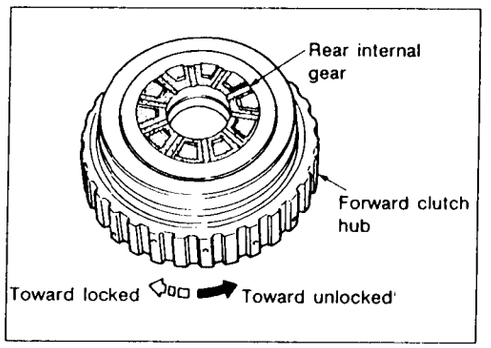
Align pawls of thrust washer with holes of rear internal gear.

8



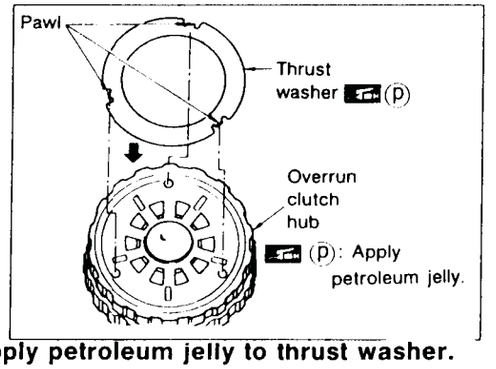
Install end bearing on rear internal gear.

9



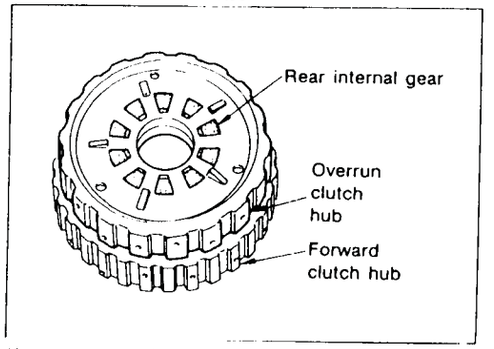
Install forward clutch hub on rear internal gear.
Check operation of forward one-way clutch.

10



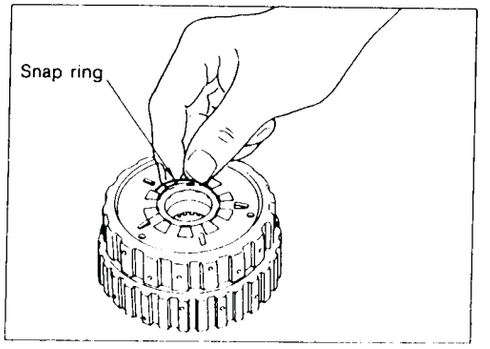
Apply petroleum jelly to thrust washer.
Align pawls of thrust washer with holes of overrun clutch hub.

11



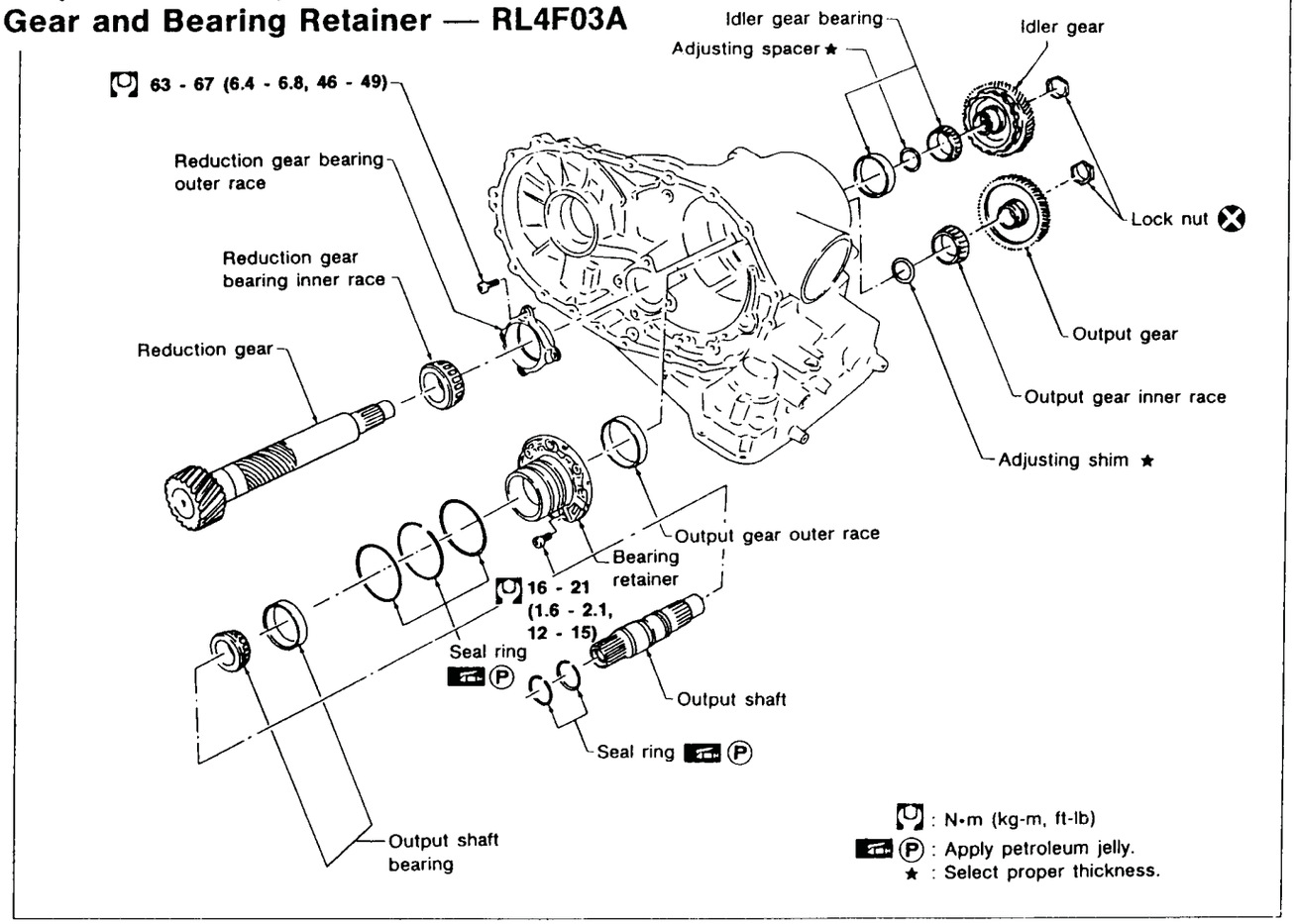
Install overrun clutch hub on rear internal gear.
Align projections of rear internal gear with holes of overrun clutch hub.

12

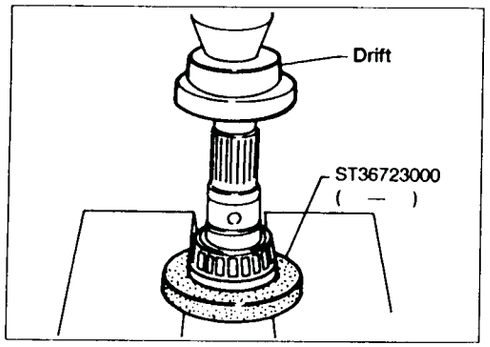


Install snap ring to groove of rear internal gear.

Output Shaft, Output Gear, Idler Gear, Reduction Gear and Bearing Retainer — RL4F03A

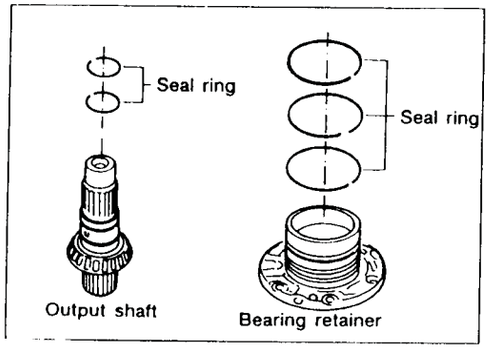


1



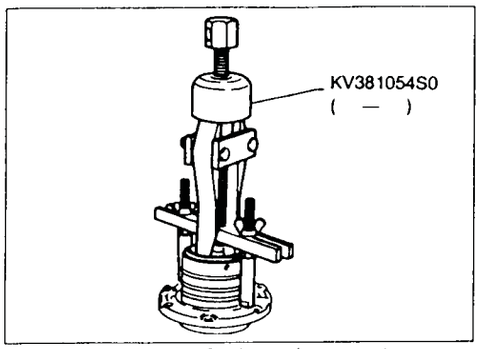
Press out output shaft bearing inner race.

2



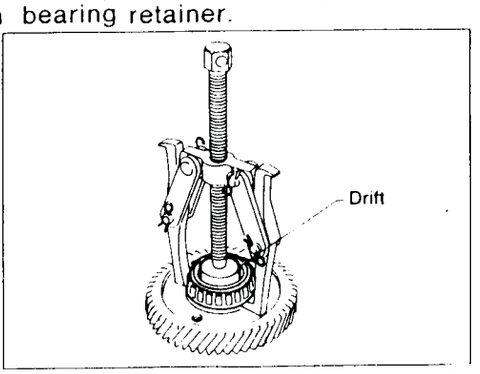
Remove seal rings from output shaft and bearing retainer.

3



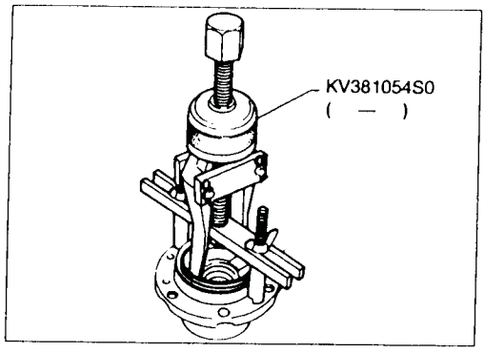
Remove output shaft bearing outer race from bearing retainer.

4



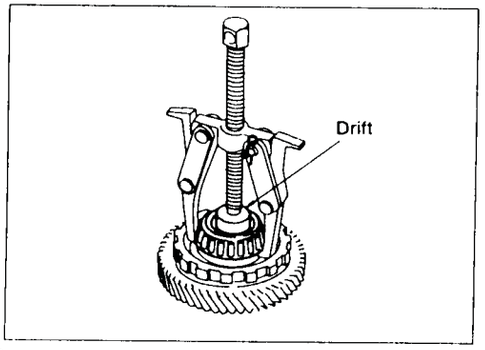
Remove output gear bearing inner race.

5



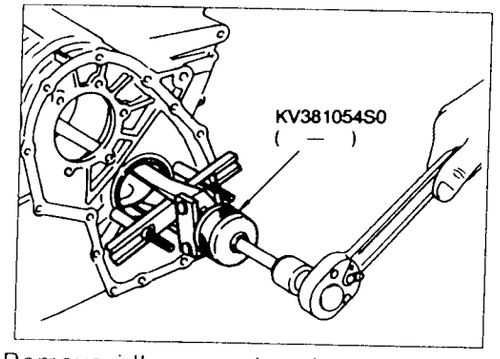
Remove output gear bearing outer race from bearing.

6



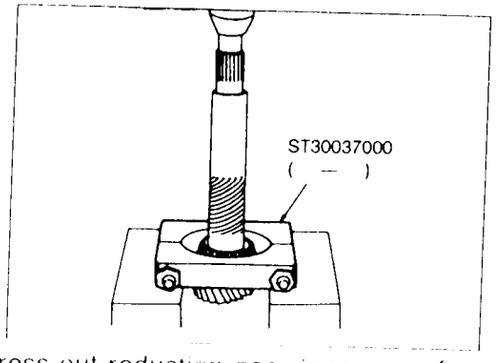
Remove idler gear bearing inner race.

7



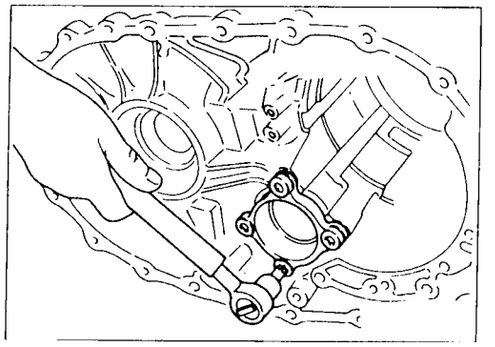
Remove idler gear bearing outer race from transmission case.

8



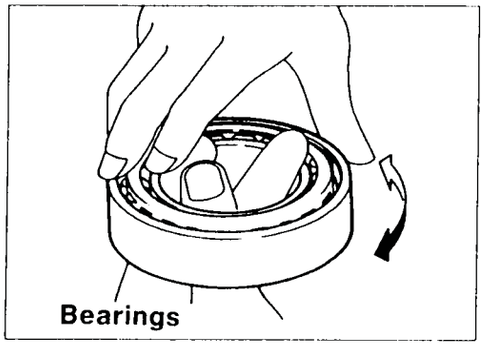
Press out reduction gear inner race from reduction gear.

9



Remove reduction gear bearing outer race from transmission case.

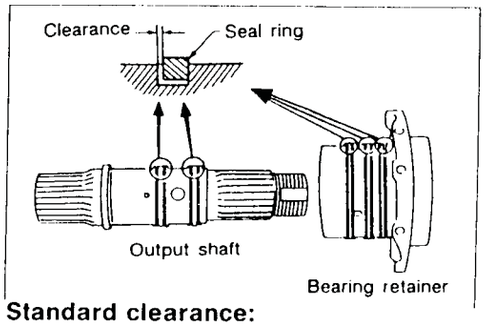
10



Make sure bearings roll freely and are free from noise, cracks, pitting or wear.

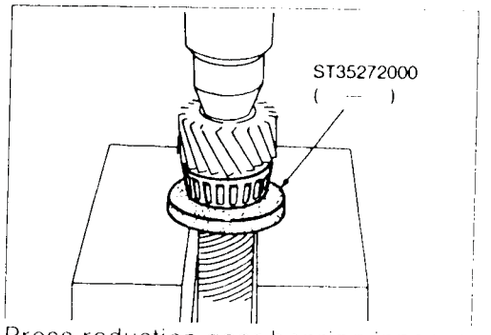
When replacing taper roller bearing, replace inner and outer race as a set.

11



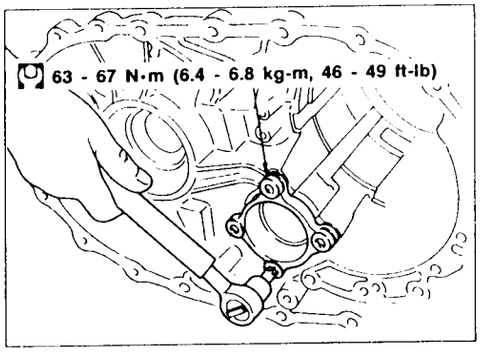
Standard clearance:
0.10 - 0.25 mm (0.0039 - 0.0098 in)
Wear limit:
0.25 mm (0.0098 in)

12



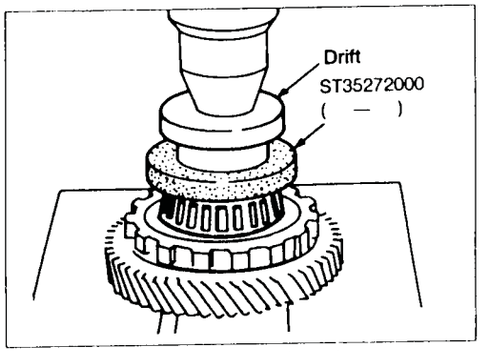
Press reduction gear bearing inner race on reduction gear.

13



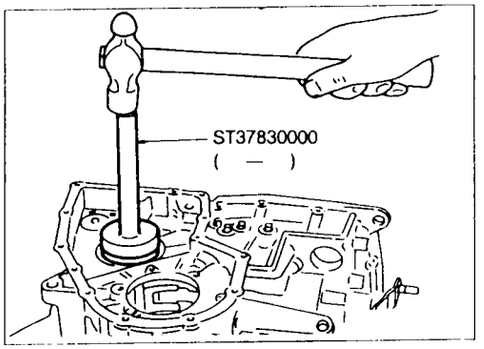
Install reduction gear bearing outer race on transmission case.

14



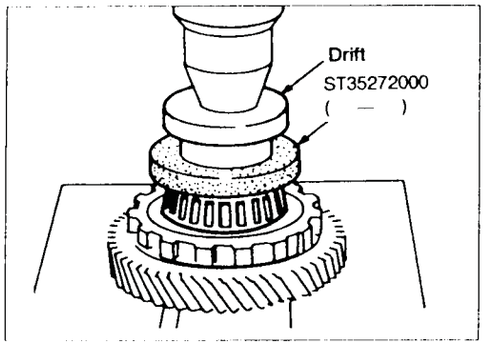
Press idler gear bearing inner race on idler gear.

15



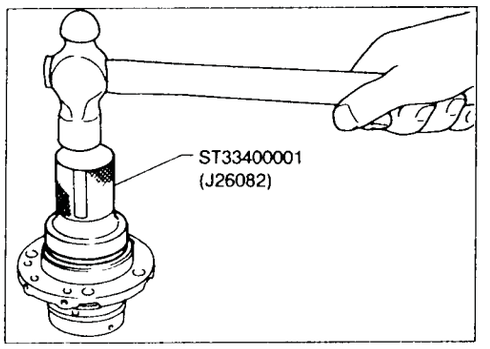
Install idler gear bearing outer race on transmission case.

16



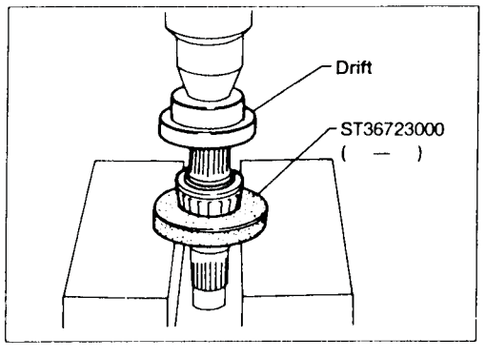
Press output gear bearing inner race on output gear.

17



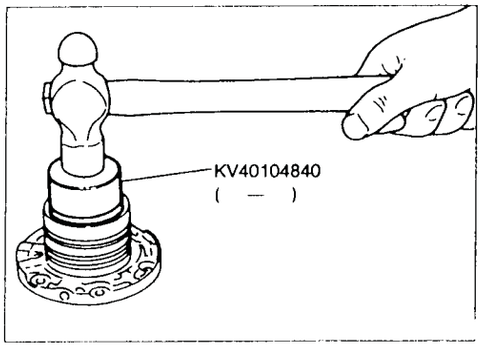
Install output gear bearing outer race on bearing retainer.

18



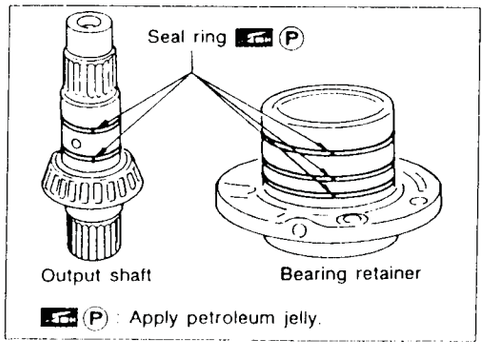
Press output shaft bearing inner race on output shaft.

19



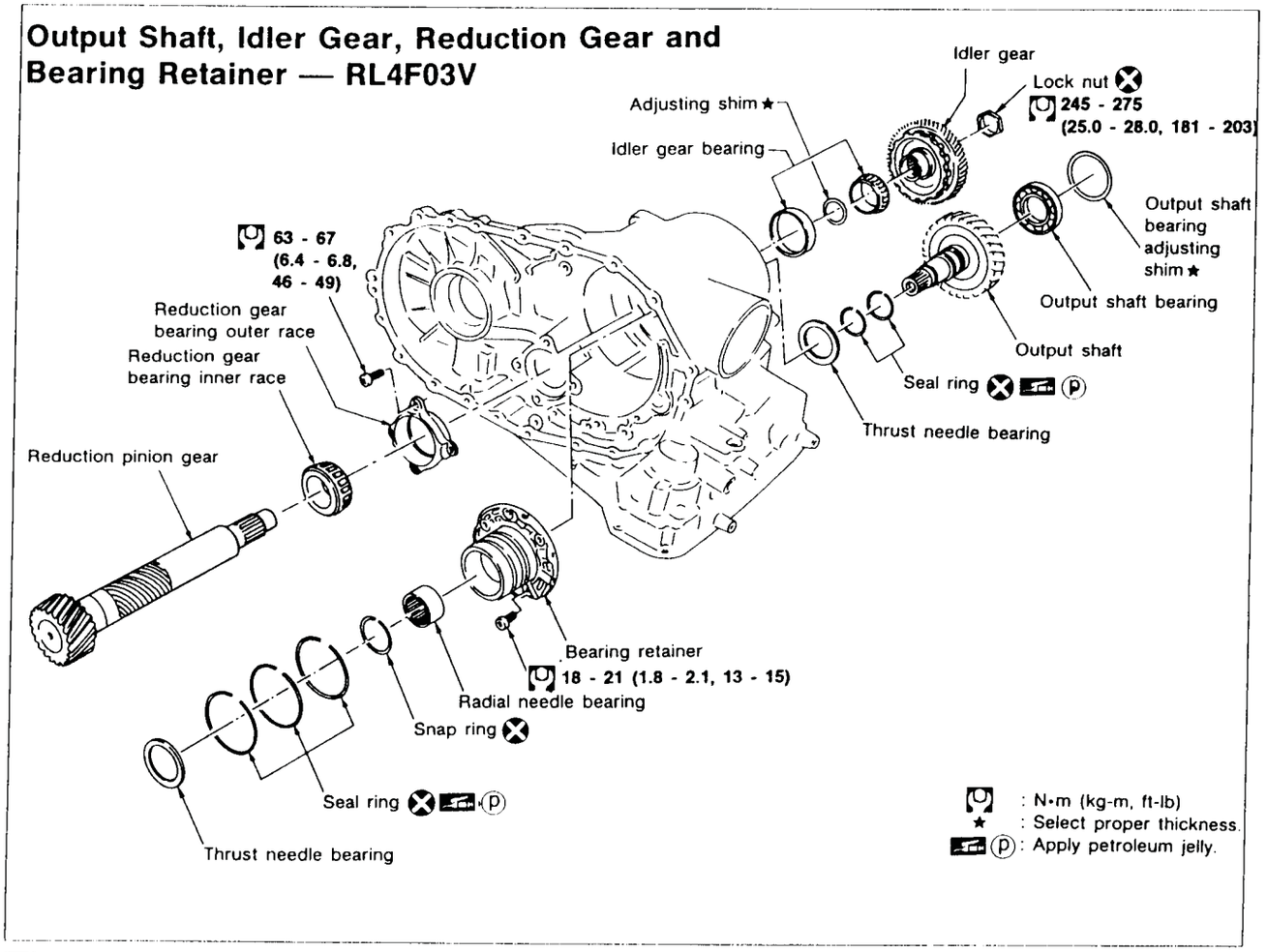
Install output shaft bearing outer race on bearing retainer.

20

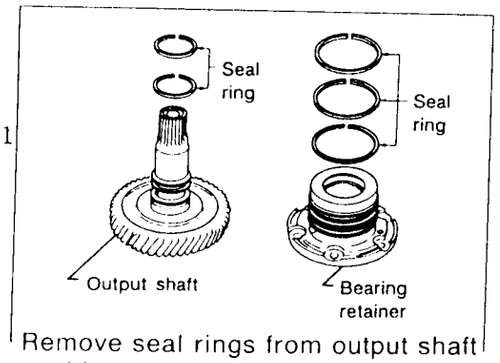


Install new seal rings onto output shaft and bearing retainer.

Output Shaft, Idler Gear, Reduction Gear and Bearing Retainer — RL4F03V

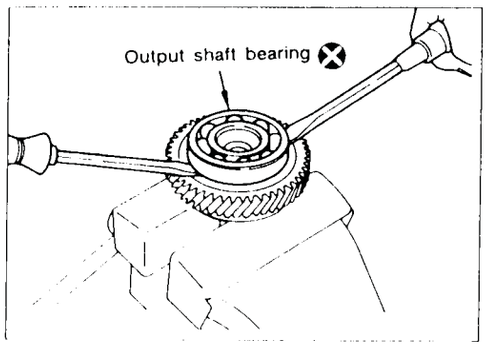


1



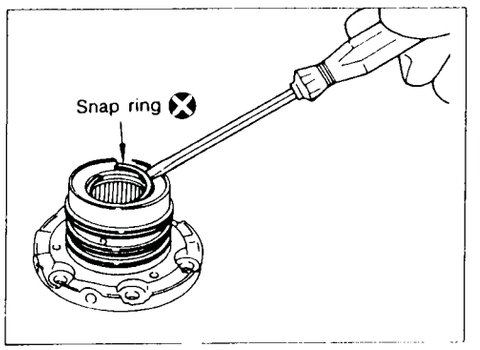
Remove seal rings from output shaft and bearing retainer.

2



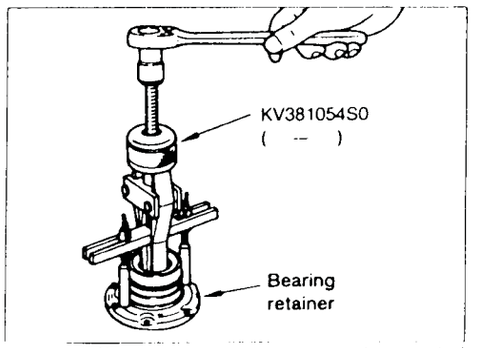
Remove output shaft bearing with screwdrivers.

3



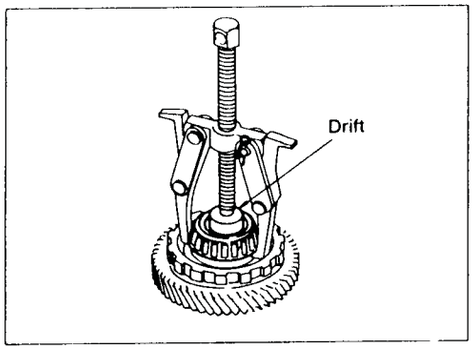
Remove snap ring from bearing retainer.

4



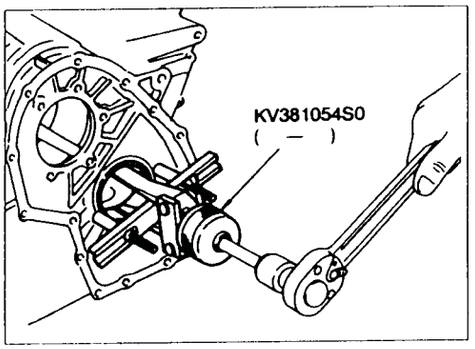
Remove needle bearing from bearing retainer.

5



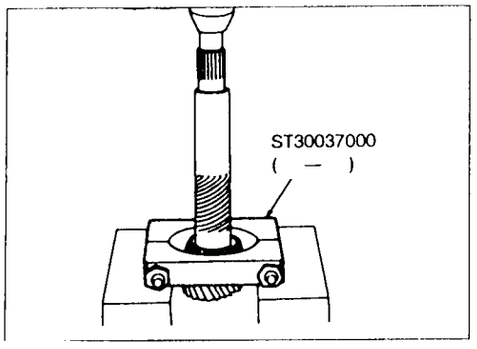
Remove idler gear bearing inner race from idler gear.

6



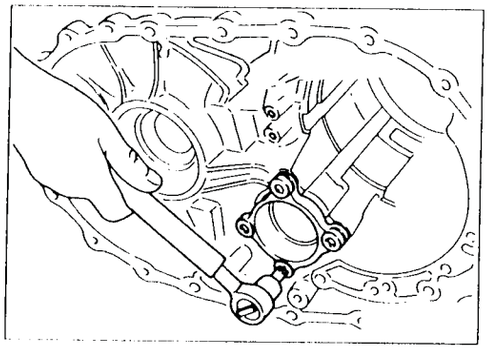
Remove idler gear bearing outer race from transmission case.

7



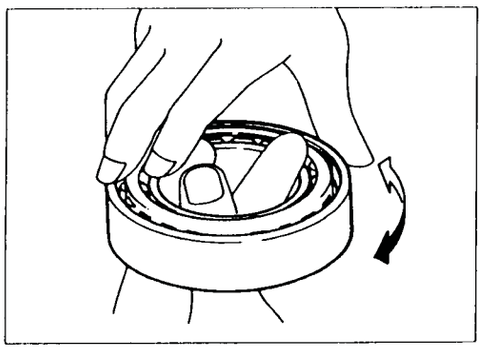
Press out reduction gear bearing inner race from reduction gear.

8



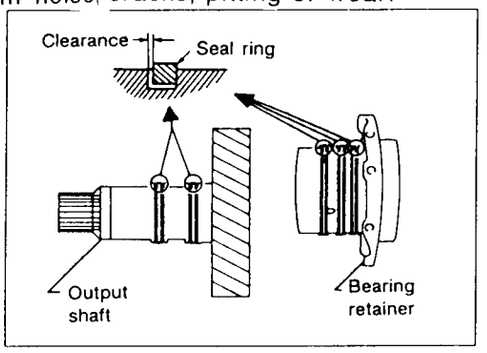
Remove reduction gear bearing outer race from transmission case.

9



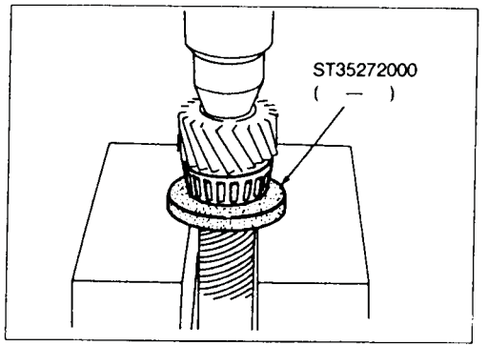
Make sure bearings roll freely and are free from noise, cracks, pitting or wear.

10



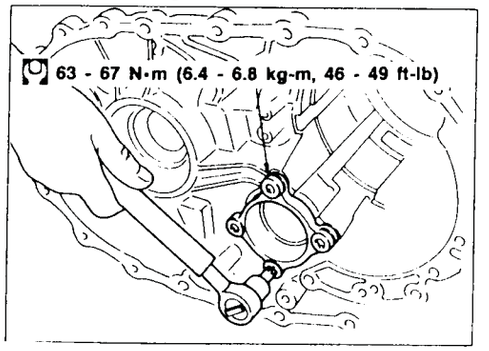
Standard clearance:
0.10 - 0.25 mm (0.0039 - 0.0098 in)
Allowable limit:
0.25 mm (0.0098 in)

11



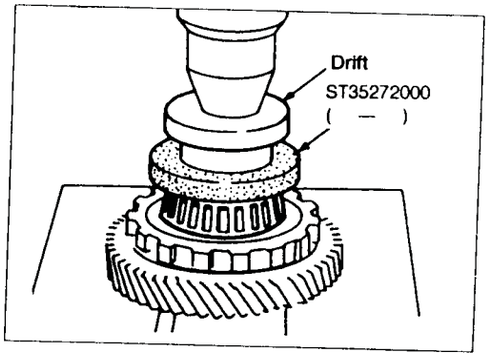
Press reduction gear bearing inner race on reduction gear.

12



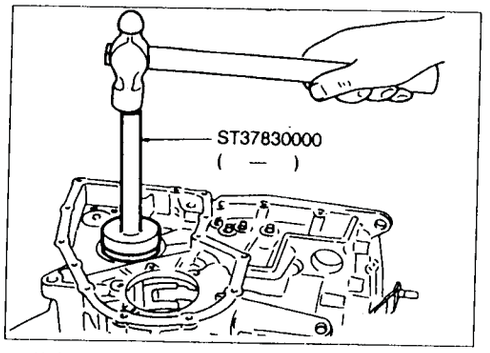
Install reduction gear bearing outer race on transmission case.

13



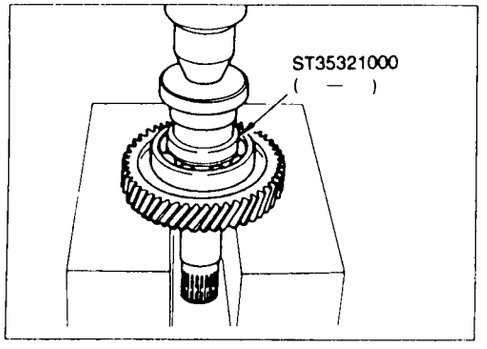
Press idler gear bearing inner race on idler gear.

14



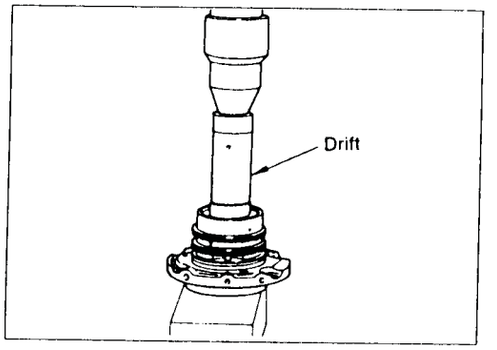
Install idler gear bearing outer race on transmission case.

15



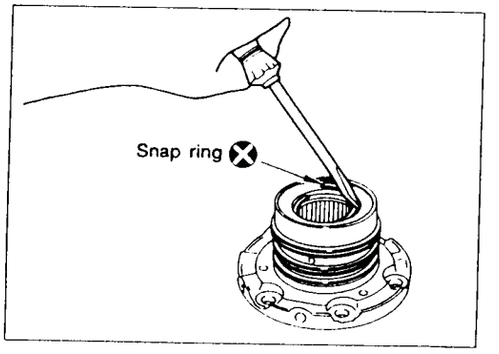
Press output shaft bearing on output shaft.

16



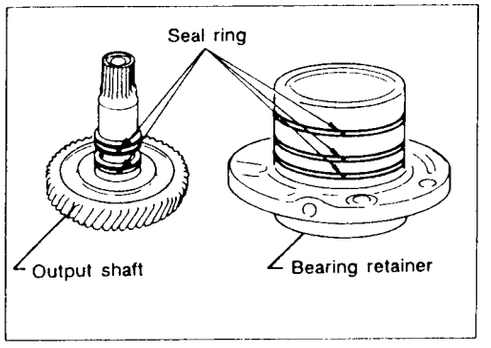
Press needle bearing on bearing retainer.

17

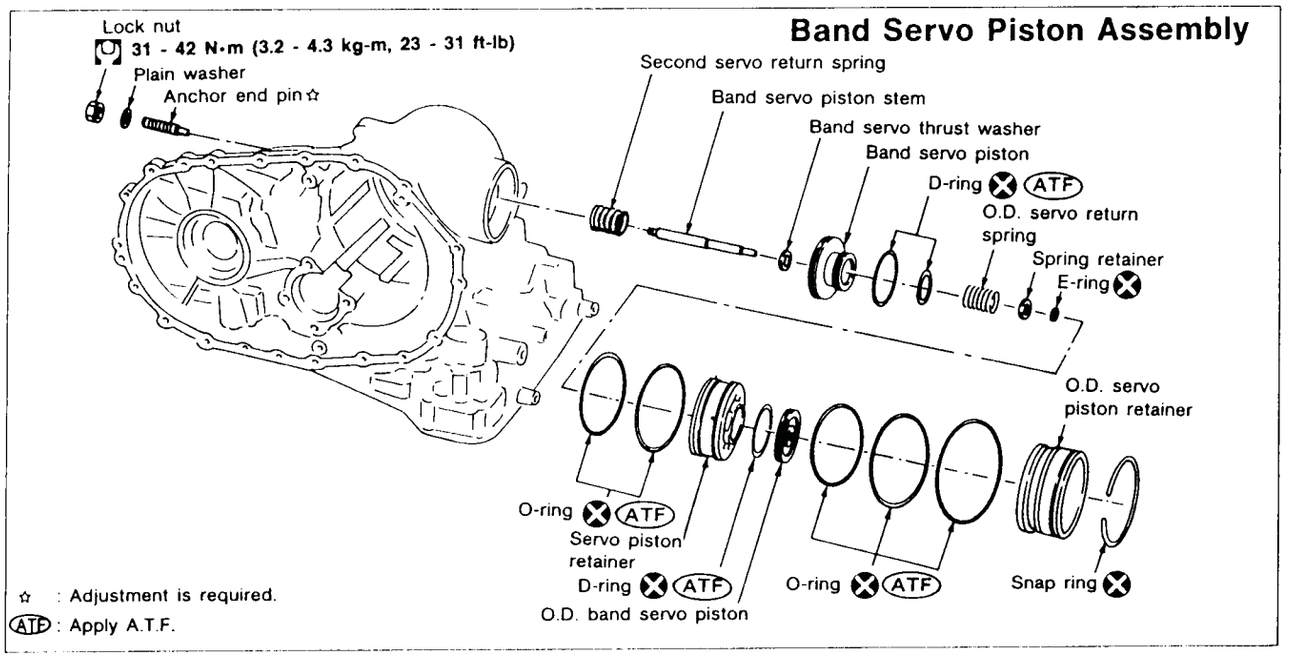


Install snap ring to bearing retainer.

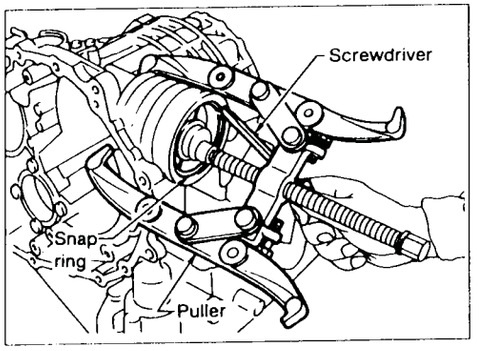
18



Install new seal rings to output shaft and bearing retainer carefully

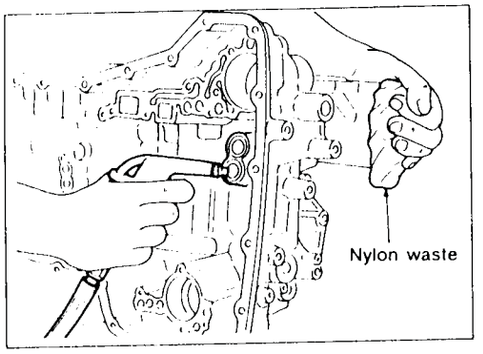


1



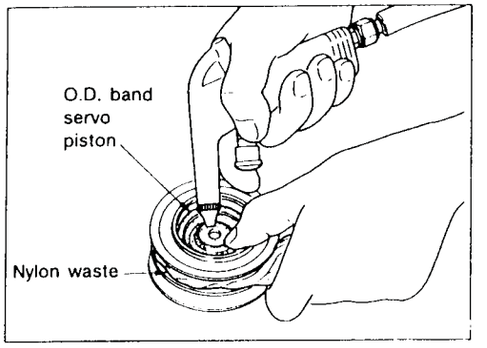
Remove band servo piston snap ring.

2



Apply compressed air to oil hole in transmission case to remove O.D. servo piston retainer and band servo piston assembly.

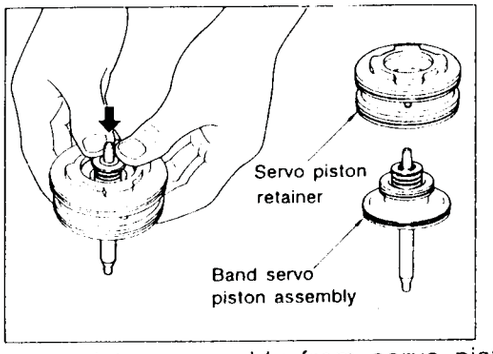
3



Apply compressed air to oil hole in O.D. servo piston retainer to remove O.D. band servo piston from retainer.

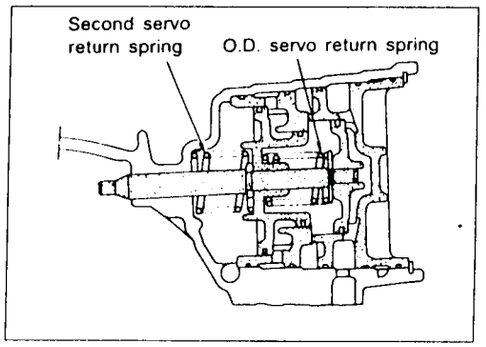
Hold O.D. band servo piston while applying compressed air.

4

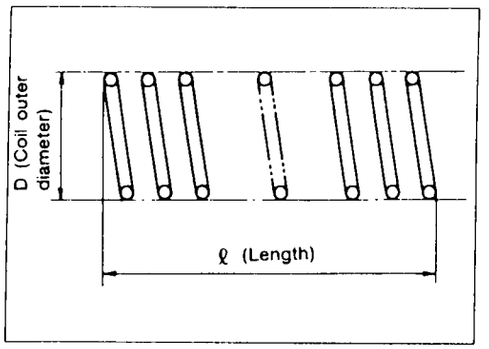


Remove band servo piston assembly from servo piston retainer by pushing it forward.

5



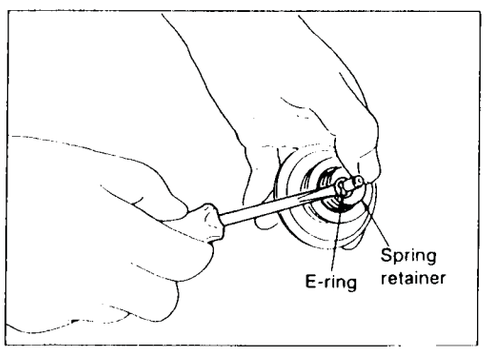
6



Unit: mm (in)

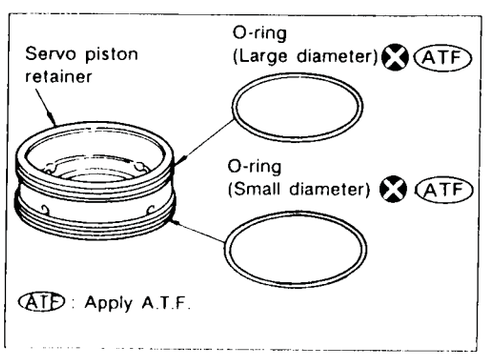
Parts	Free length	Outer diameter
2nd servo return spring	32.5 (1.280)	25.9 (1.020)
O.D. servo return spring	31.0 (1.220)	21.7 (0.854)

7



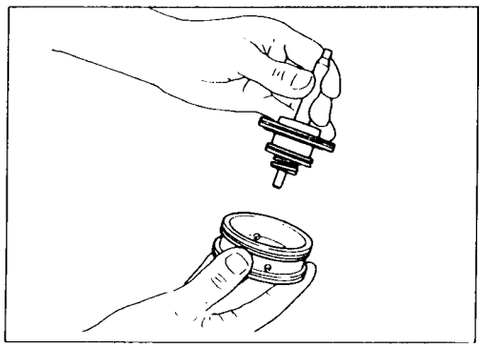
Place piston stem end on a wooden block. While pushing servo piston spring retainer down, install E-ring.

8



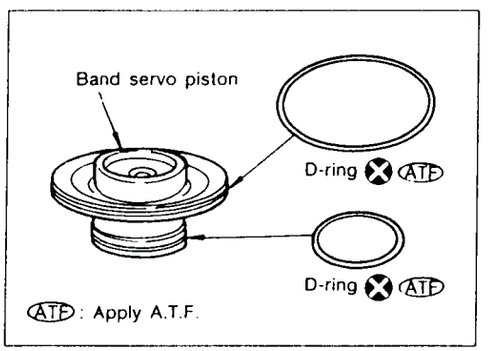
Install O-rings to servo piston retainer.

9



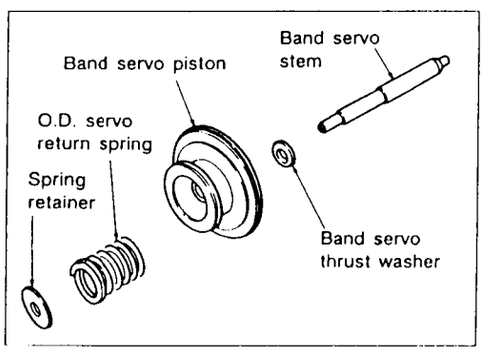
Install band servo piston assembly to servo piston retainer by pushing it inward.

10



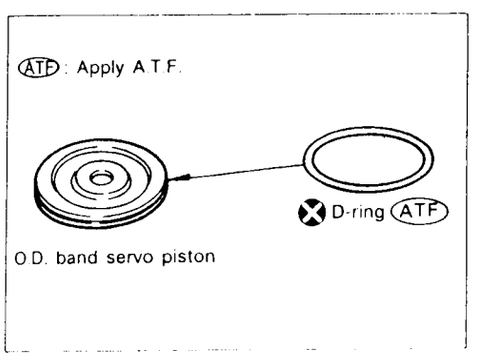
Install D-rings to servo piston retainer.

11



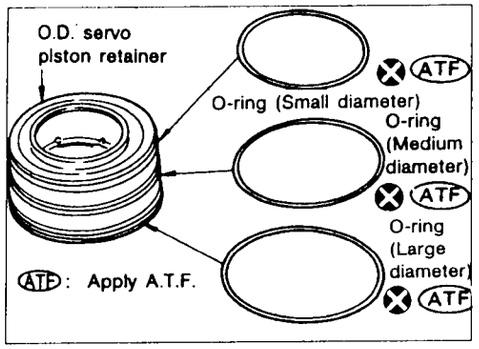
Install band servo piston stem, band servo thrust washer, O.D. servo return spring and spring retainer to band servo piston.

12



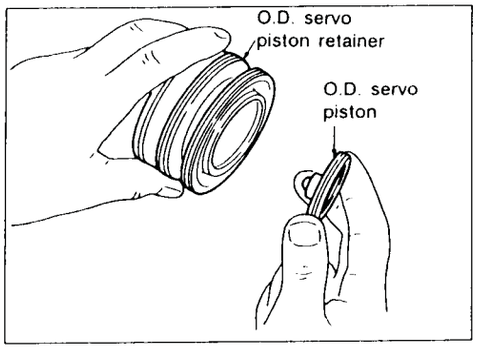
Install D-ring to O.D. band servo piston.

13



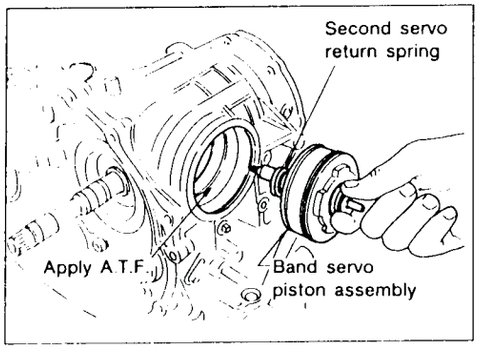
Install O-rings to O.D. servo piston retainer.
Apply A.T.F. to O-rings.
Pay attention to the positions of the O-rings.

14



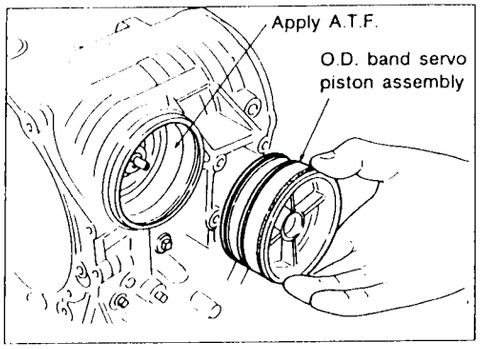
Install O.D. band servo piston to O.D. servo piston retainer.

15



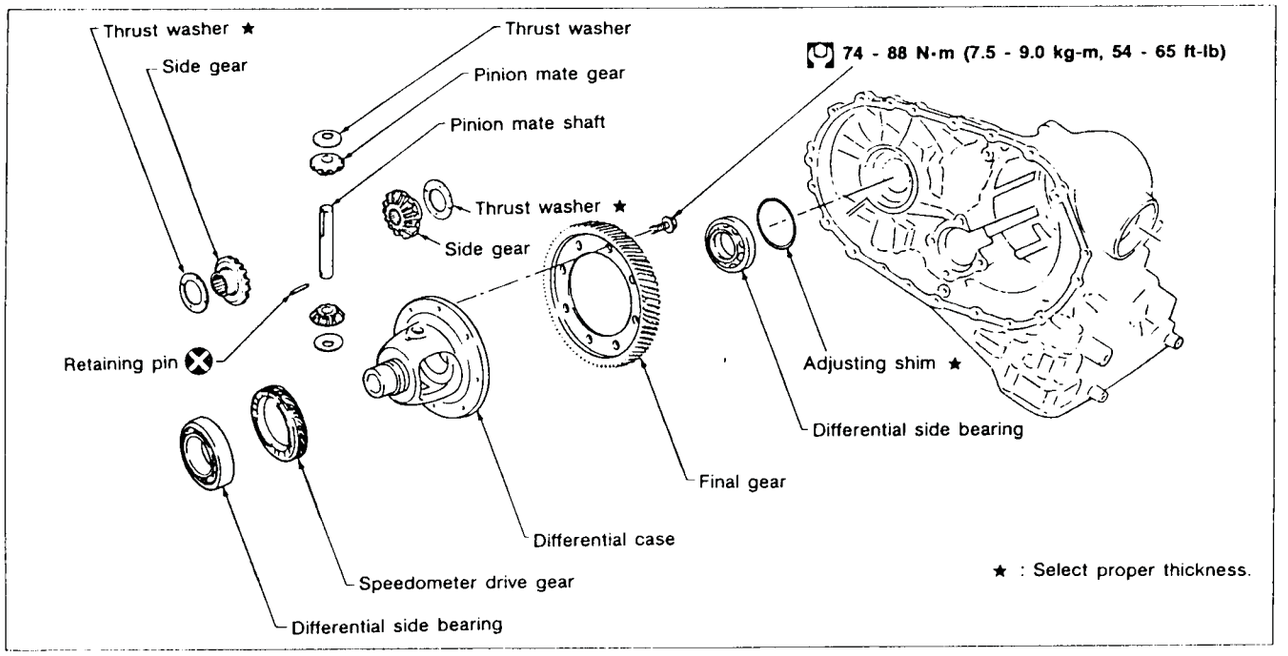
Install band servo piston assembly and 2nd servo return spring to transmission case.
Apply A.T.F. to O-ring of band servo piston and transmission case.

16

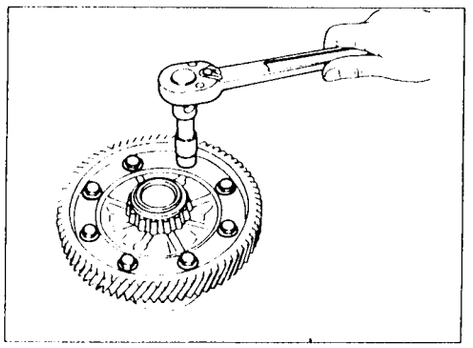


Install O.D. band servo piston assembly to transmission case.
Install band servo piston snap ring to transmission case.

Final Drive — RL4F03A

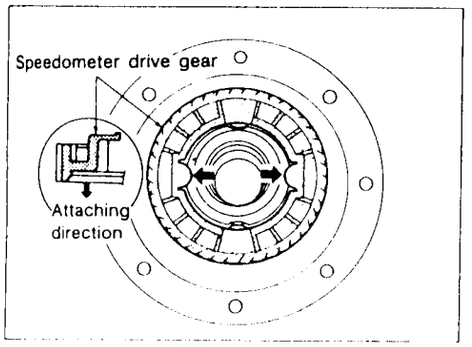


1



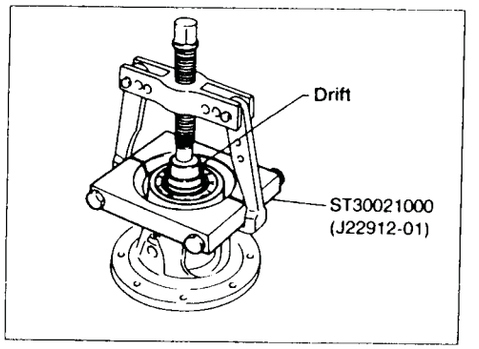
Remove final gear.

2



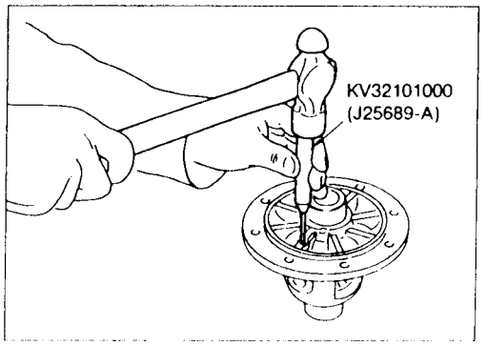
Press out differential side bearings.

3



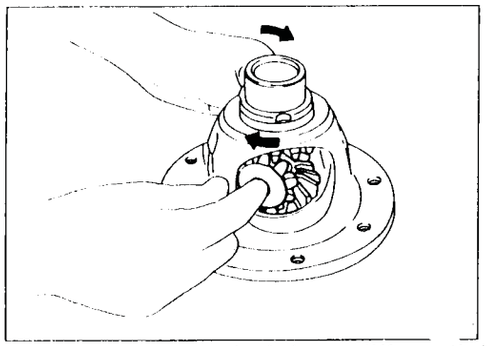
Remove speedometer drive gear.

4



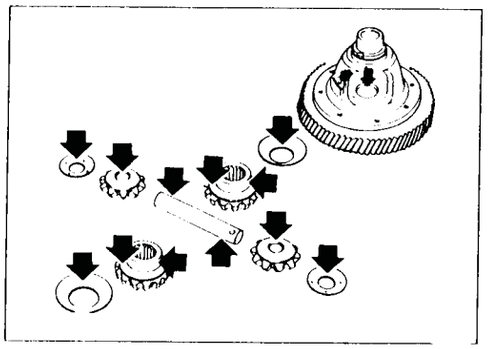
Drive out pinion mate shaft retaining pin.

5



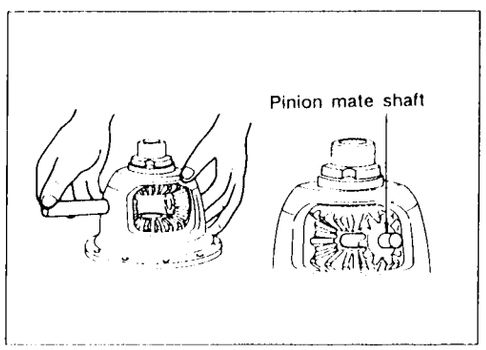
Draw out pinion mate shaft from differential case. Remove pinion mate gears and side gears.

6



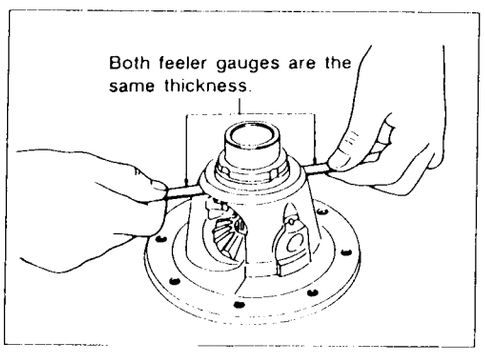
Check mating surfaces of differential case, side gears and pinion mate gears.

7



Install side gears and thrust washers in differential case. Install pinion mate gears and thrust washers in the differential case while rotating them.

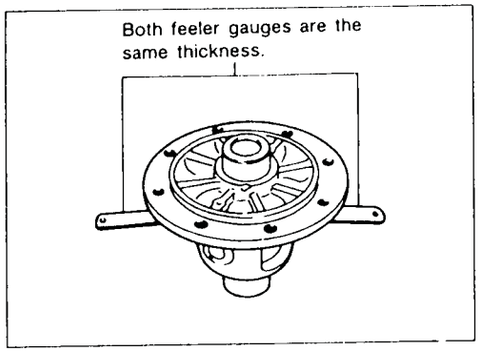
8



Clearance between side gear and differential case with washers:

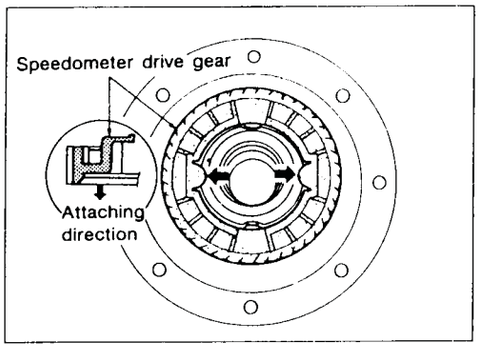
0.1 - 0.2 mm (0.004 - 0.008 in)

9



If not within specification, adjust clearance by changing thickness of side gear thrust washers.

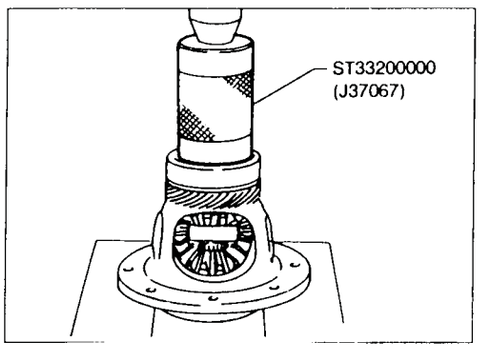
10



Install retaining pin.

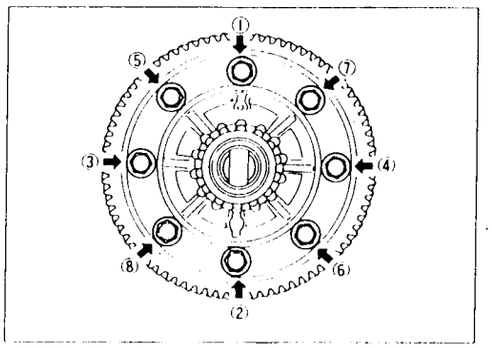
Align projection of speedometer drive gear with groove of differential case.

11



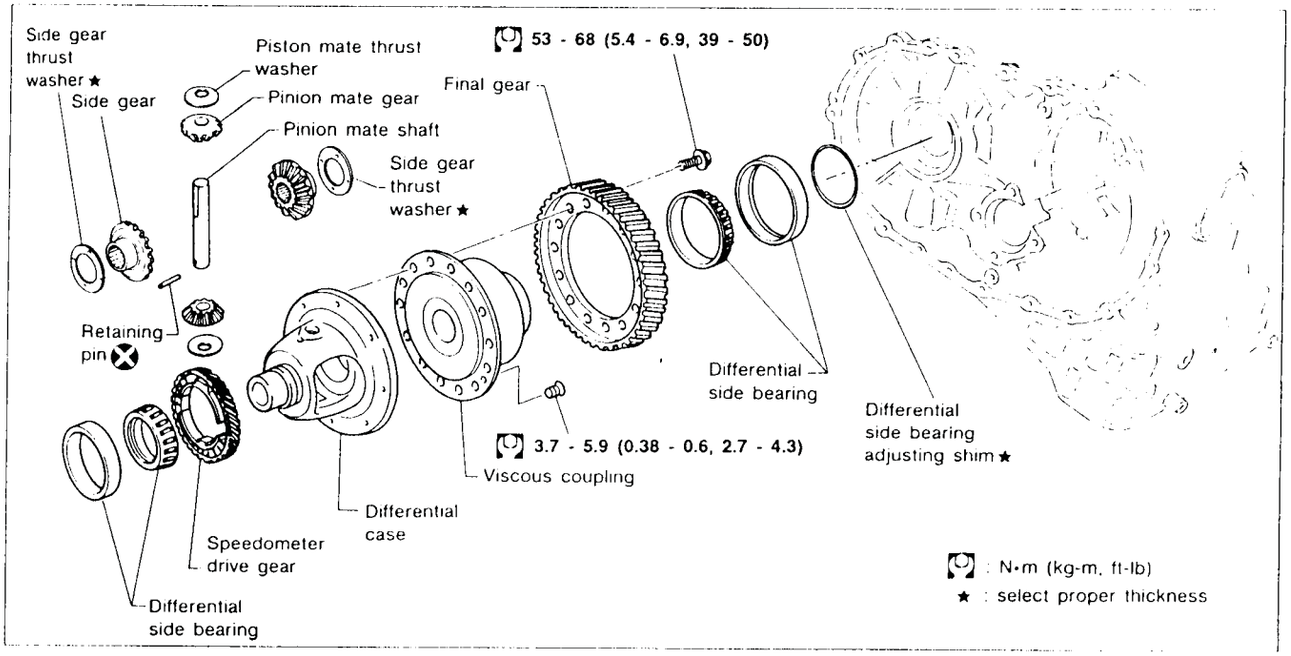
Press differential side bearings on differential case.

12

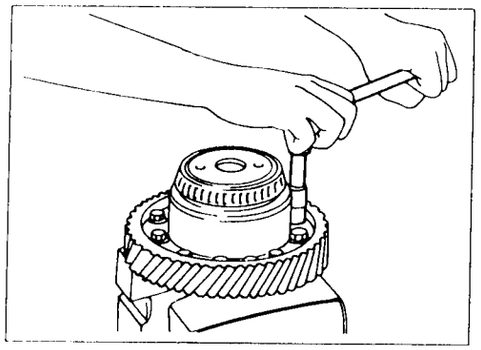


Install final gear and tighten fixing bolts in numerical order.

Final Drive — RL4F03V

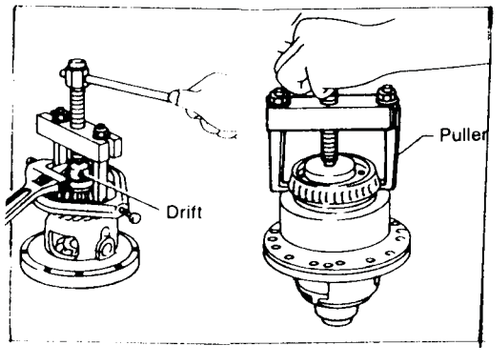


1



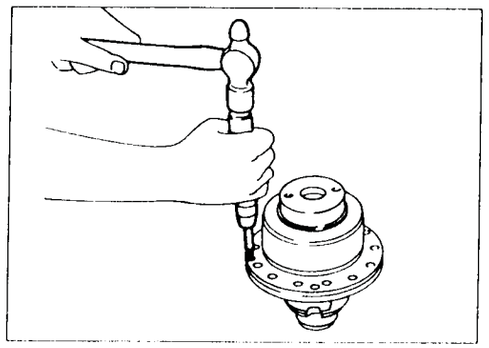
Remove final gear.

2



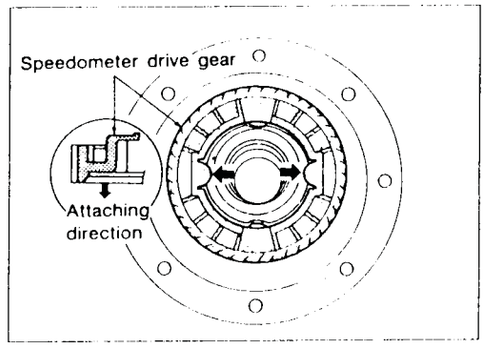
Press out differential side bearings.

3



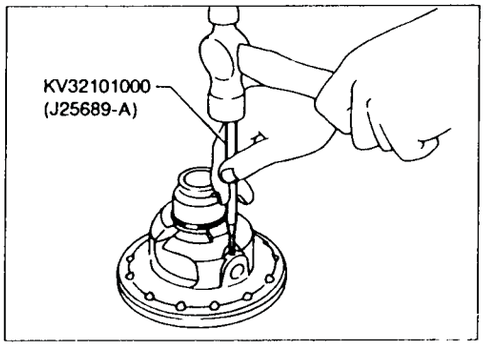
Remove viscous coupling.

4



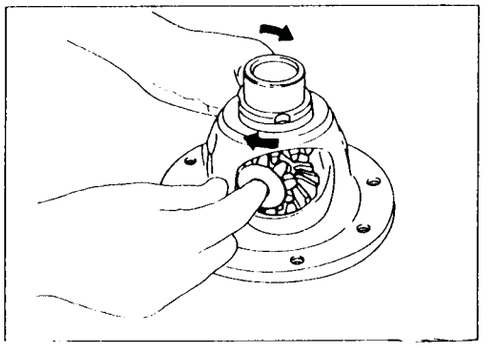
Remove speedometer drive gear.

5



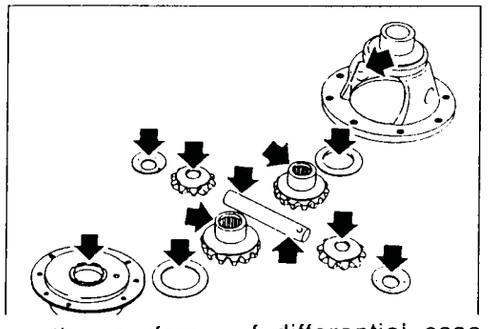
Drive out pinion mate shaft retaining pin.

6



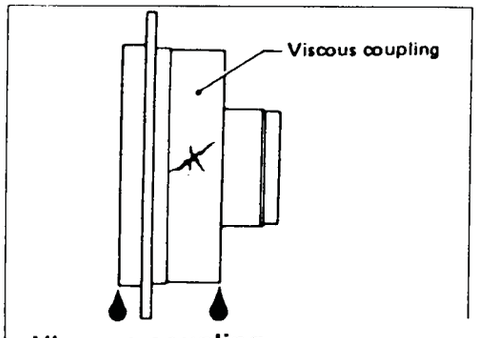
Draw out pinion mate shaft from differential case
Remove pinion mate gears and side gears.

7



Check mating surfaces of differential case, side gears, pinion mate gears and viscous coupling.
Check washers for wear.

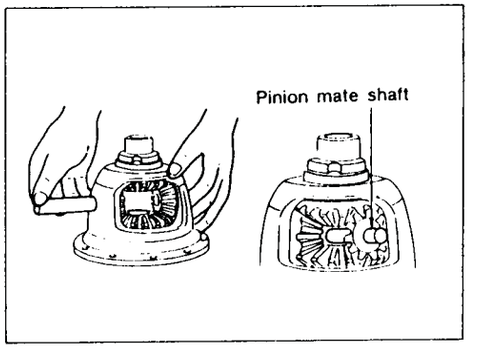
8



Viscous coupling

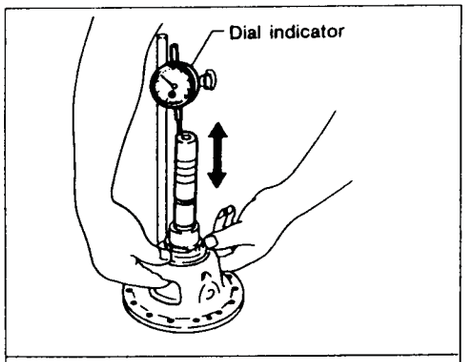
- Check case for cracks.
- Check silicone oil for leakage.

9

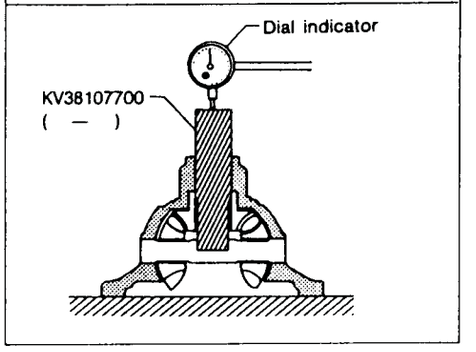


Install side gear and thrust washers in differential case.
Install pinion mate gears and thrust washers in differential case while rotating them.

10



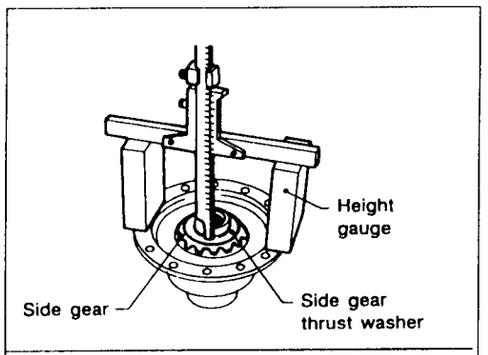
11



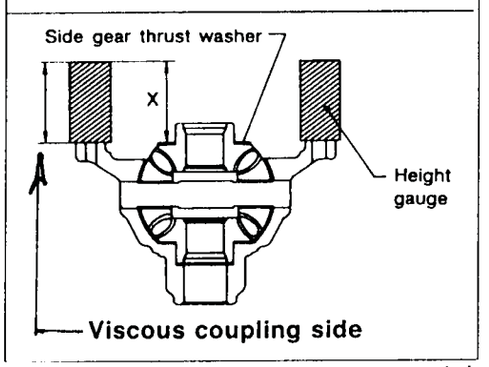
Measure clearance between side gear and differential case & viscous coupling with washers using the following procedure:

Clearance between side gear and differential case with washers:
0.1 - 0.2 mm (0.004 - 0.008 in)

12



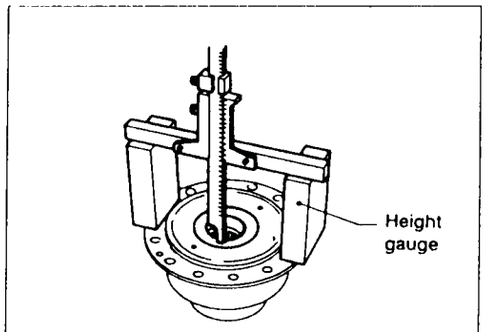
13



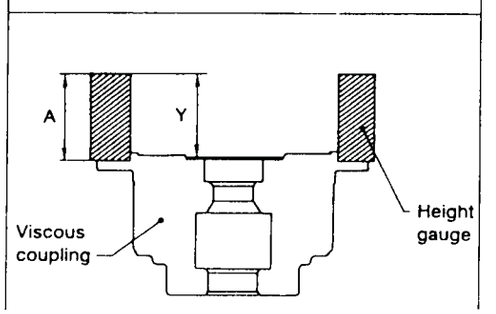
Place side gear and thrust washer on pinion mate gears installed on differential case.

Measure dimension X in at least two places.

14



15



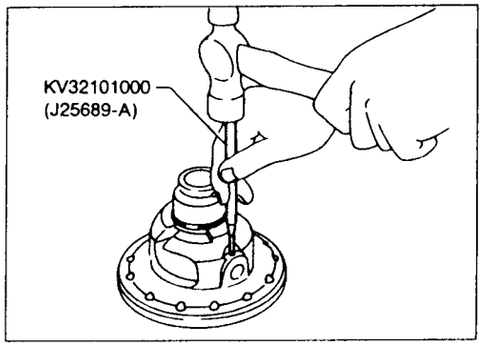
Measure dimension Y in at least two places.

Clearance between side gear and viscous coupling = X + Y − 2A: 0.1 - 0.2 mm (0.004 - 0.008 in)

A: Height of gauge

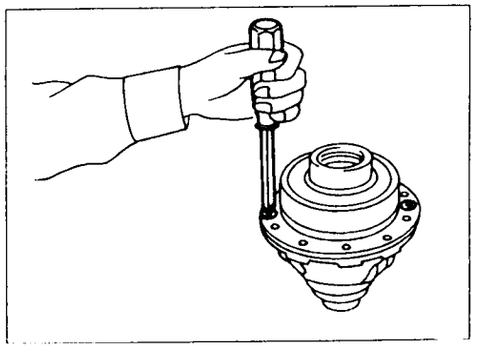
If not within specification, adjust clearance by changing thickness of side gear thrust washer.

16



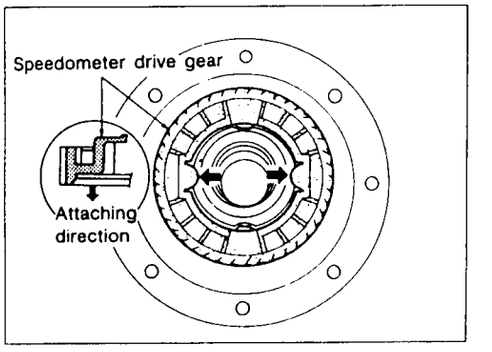
Install retaining pin.

17



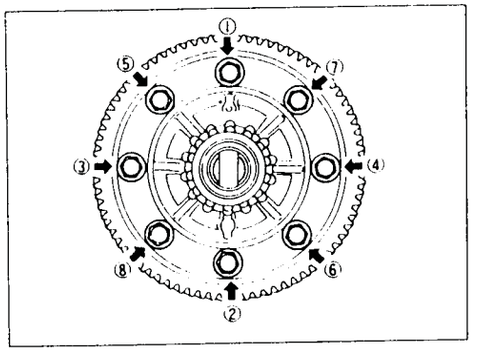
Install side gear (viscous coupling side) on differential case and then install viscous coupling.

18



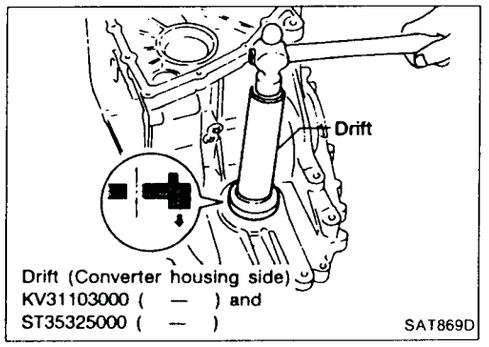
Align the projection of speedometer drive gear with the groove of differential case.

19



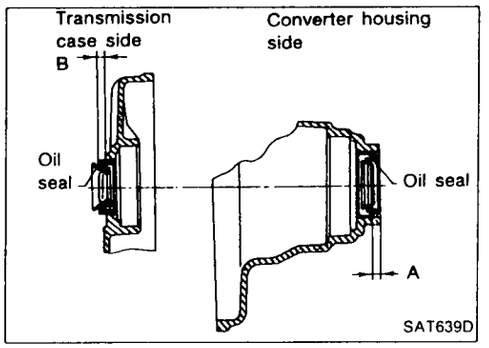
Install final gear and tighten fixing bolts in numerical order.

Press on differential side bearings.



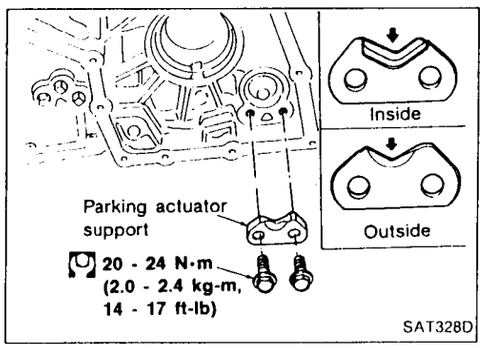
Assembly

1. Install differential side oil seals on transmission case and converter housing, so that "A" and "B" are within specifications.

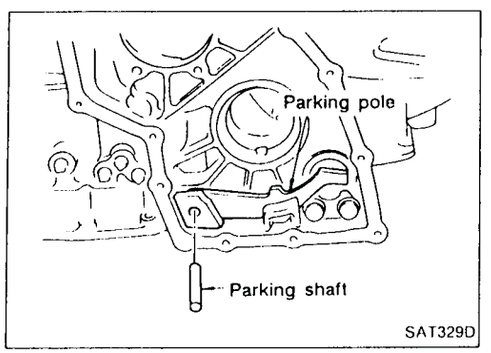


Unit: mm (in)

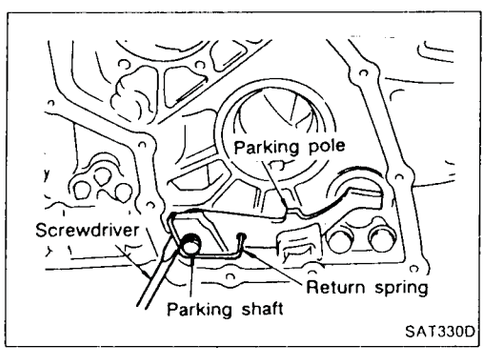
A	B
5.5 - 6.5 (0.217 - 0.256)	0.5 (0.020) or less



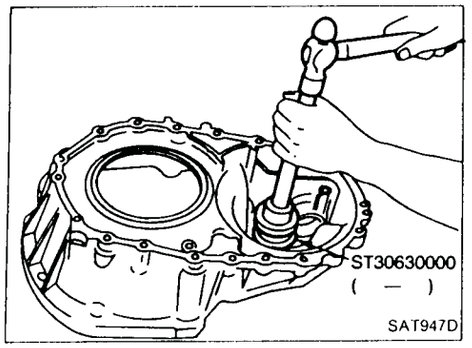
2. Install parking actuator support to transmission case.
- **Pay attention to direction of parking actuator support.**



3. Install parking pawl on transmission case and fix it with parking shaft.



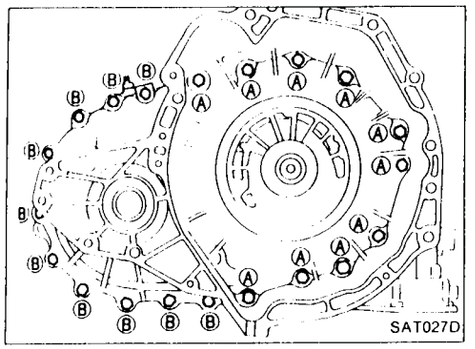
4. Install return spring.



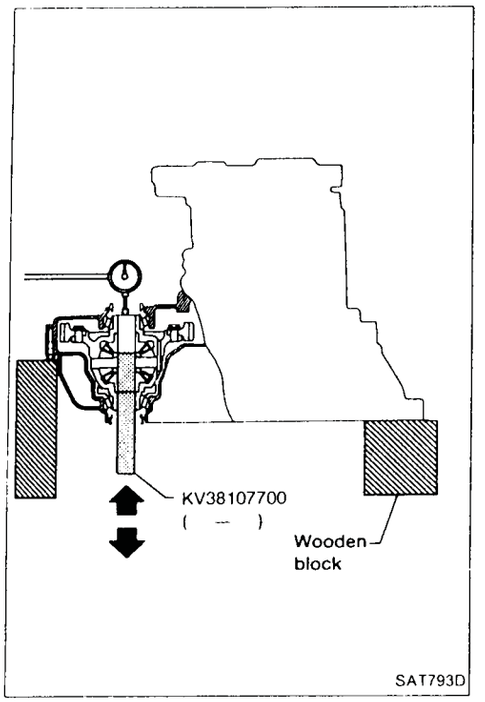
Adjustment

DIFFERENTIAL SIDE BEARING PRELOAD — RL4F03V

1. Install differential side bearing outer race without adjusting shim on transmission case.
2. Install differential side bearing outer race on converter housing.

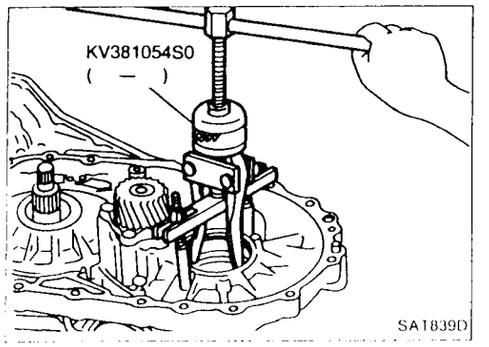


3. Place final drive assembly on transmission case.
4. Install transmission case on converter housing and tighten transmission case fixing bolts Ⓐ and Ⓑ to the specified torque.

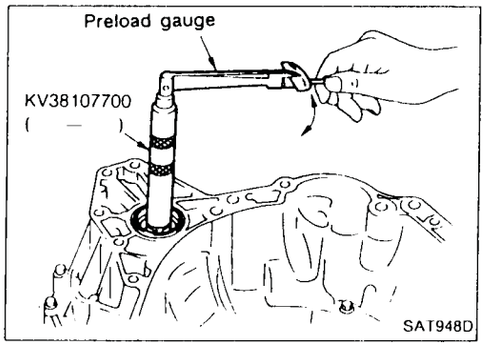


5. Attach dial indicator on differential case at transmission case side.
6. Insert Tool into differential side gear from converter housing.
7. Move Tool up and down and measure dial indicator deflection.
8. Select proper thickness of differential side bearing adjusting shim(s) using S.D.S. table as a guide.

Differential side bearing adjusting shim: Refer to S.D.S.



9. Remove converter housing from transmission case.
10. Remove final drive assembly from transmission case.
11. Remove differential side bearing outer race from transmission case.
12. Reinstall differential side bearing outer race and shim(s) selected from S.D.S. table on transmission case.
13. Reinstall converter housing on transmission case and tighten transmission case fixing bolts to the specified torque.



14. Insert Tool into differential case and measure turning torque of final drive assembly.

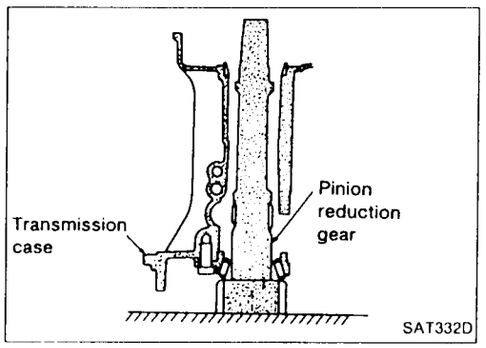
- **When measuring turning torque, turn final drive assembly in both directions several times to seat bearing rollers correctly.**

  Turning torque of final drive assembly (New bearing):
  0.49 - 1.08 N·m (5.0 - 11.0 kg-cm, 4.3 - 9.5 in-lb)
- **When old bearing is used again, turning torque will be slightly less than the above.**
- **Make sure torque is close to the specified range.**

REDUCTION GEAR BEARING PRELOAD

1. Remove transmission case and final drive assembly from converter housing.
2. Select proper thickness of reduction gear bearing adjusting shim using the following procedures.

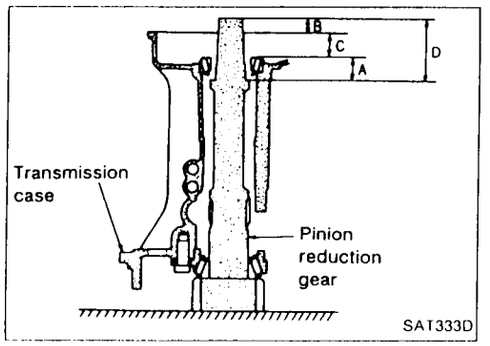
a. Place reduction gear on transmission case as shown.



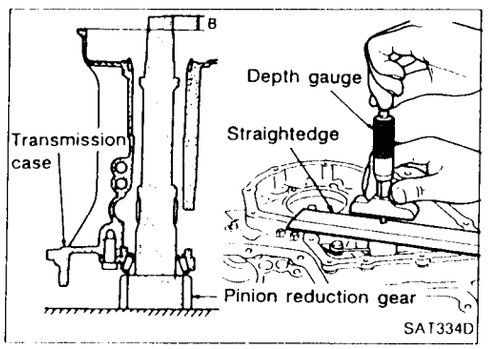
b. Place idler gear bearing on transmission case.
c. Measure dimensions "B" "C" and "D" and calculate dimension "A".

A = D – (B + C)

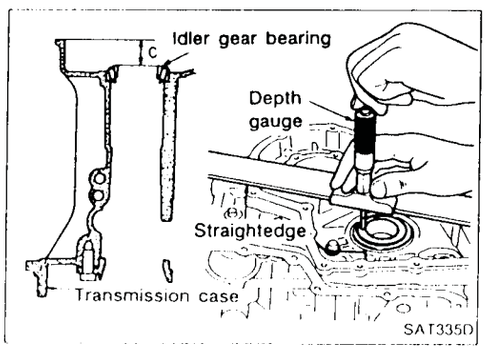
"A": Distance between the surface of idler gear bearing inner race and the adjusting shim mating surface of reduction gear.

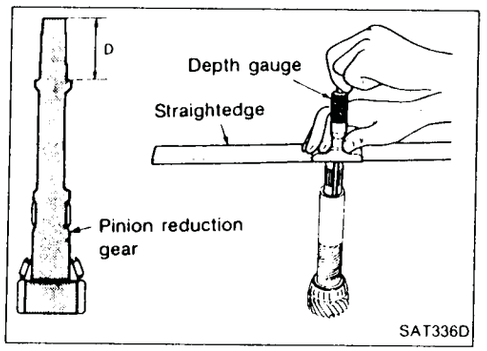


- Measure dimension "B" between the end of reduction gear and the surface of transmission case.
- **Measure dimension "B" in at least two places.**

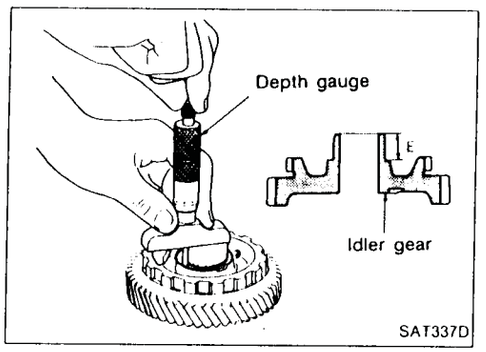


- Measure dimension "C" between the surface of idler gear bearing inner race and the surface of transmission case.
- **Measure dimension "C" in at least two places.**





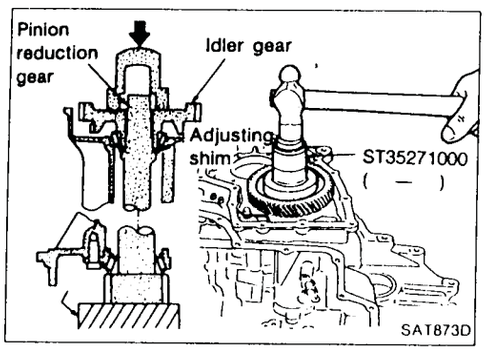
- Measure dimension "D" between the end of reduction gear and the adjusting shim mating surface of reduction gear.
- **Measure dimension "D" in at least two places.**
- Calculate dimension "A"
  A = D – (B + C)



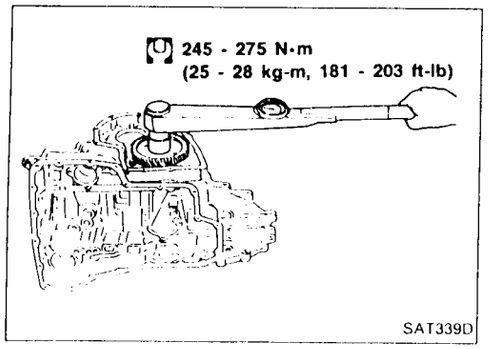
d. Measure dimension "E" between the end of idler gear and the idler gear bearing inner race mating surface of idler gear.
- **Measure dimension "E" in at least two places.**

e. Calculate "T" and select proper thickness of reduction gear bearing adjusting shim using S.D.S. table as a guide.
  T = A – E

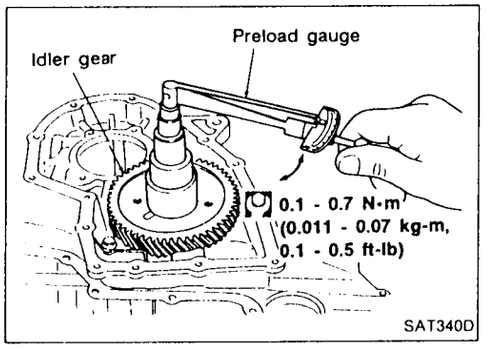
Reduction gear bearing adjusting shim: Refer to S.D.S.



3. Install reduction gear and reduction gear bearing adjusting shim selected in step 2-e on transmission case.
4. Press idler gear bearing inner race on idler gear.
5. Press idler gear on reduction gear.
- **Press idler gear so that idler gear can be locked by parking pawl.**



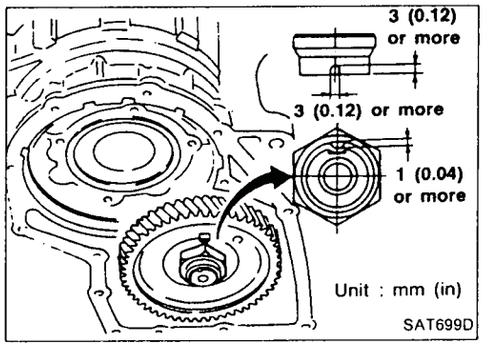
6. Tighten idler gear lock nut to the specified torque.
- **Lock idler gear with parking pawl when tightening lock nut.**



7. Measure turning torque of reduction gear.

- **When measuring turning torque, turn reduction gear in both directions several times to seat bearing rollers correctly.**

Turning torque of reduction gear:
0.11 - 0.69 N·m (1.1 - 7.0 kg-cm, 0.95 - 6.08 in-lb)



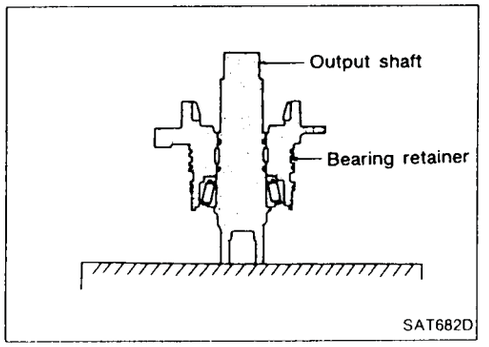
8. After properly adjusting turning torque, clinch idler gear lock nut as shown (only RL4F03V).

OUTPUT SHAFT BEARING PRELOAD — RL4F03A

1. Select proper thickness of output shaft bearing adjusting spacer using the following procedures.

a. Remove paper rolled around output shaft.

b. Place bearing retainer on output shaft.

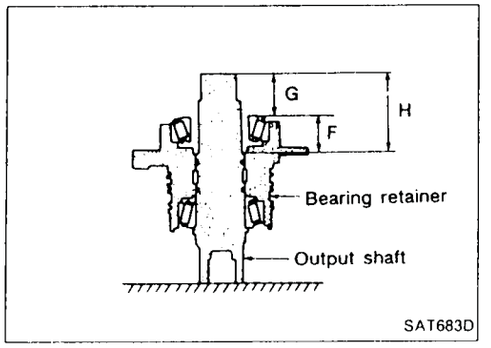


c. Place output gear bearing inner race on bearing retainer.

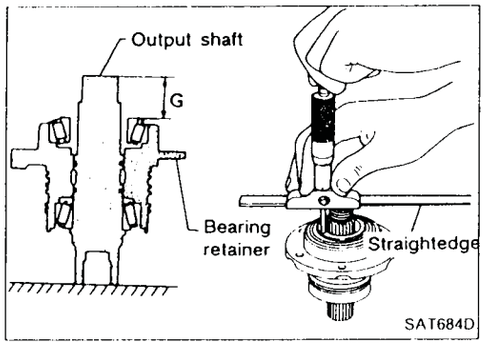
d. Measure dimensions "G" and "H" and calculate dimension "F".

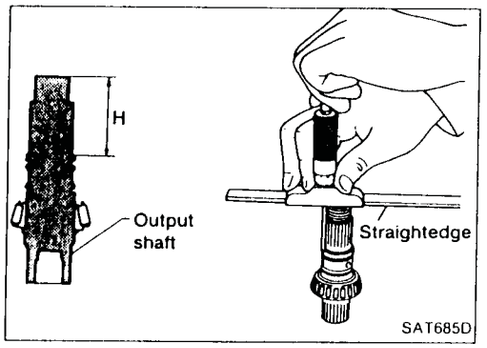
"F": Distance between the surface of output gear bearing inner race and adjusting shim mating surface of output shaft.

F = H – G

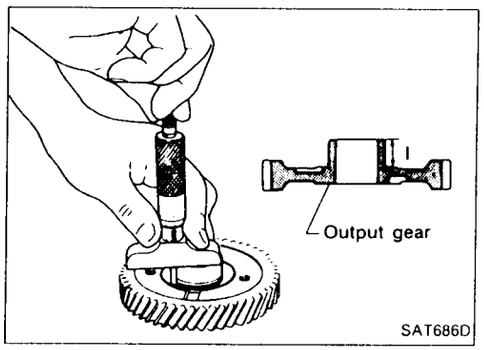


- Measure dimension "G" between end of output shaft and surface of output gear bearing inner race.
- **Measure in at least two places.**





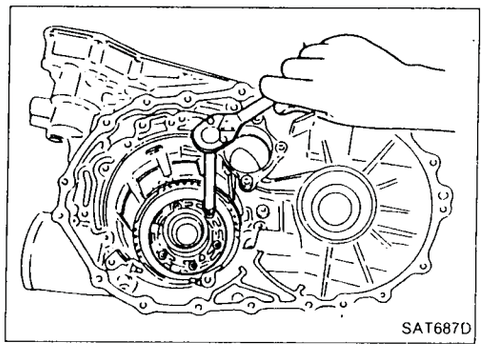
- Measure dimension "H" between end of output shaft and adjusting spacer mating surface of output shaft.
- **Measure in at least two places.**
- Calculate dimension "F".
  F = H – G



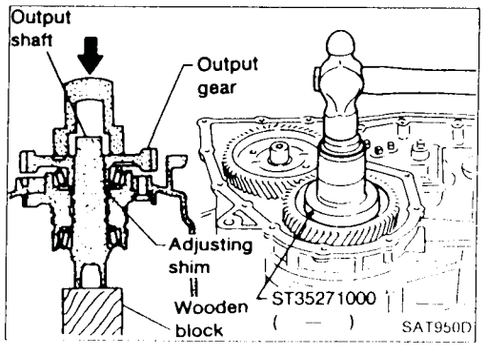
e. Measure distance "I" between end of output gear (adjusting spacer mating surface) and bearing inner race fitting surface.

f. Calculate dimension "T_2".
   "T_2": Distance between adjusting spacer mating surface of output gear and output shaft
   $T_2 = F - I$

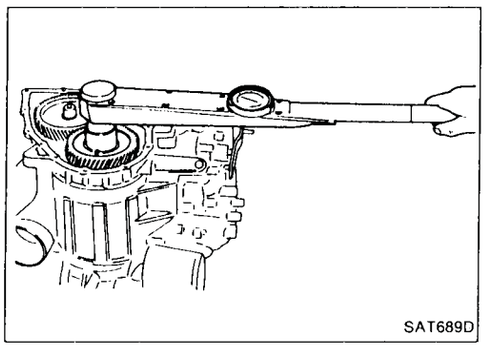
g. Select proper thickness of output shaft bearing adjusting spacer using S.D.S. table as a guide.
   Output shaft bearing adjusting spacer:
   Refer to S.D.S.



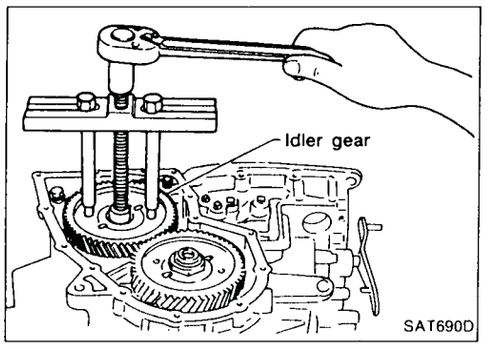
2. Install bearing retainer on transmission case.



3. Place output shaft on bearing retainer.
4. Place output shaft bearing adjusting spacer selected in step 1-g on output shaft.
5. Press output gear bearing inner race on output gear.
6. Press output gear on output shaft.

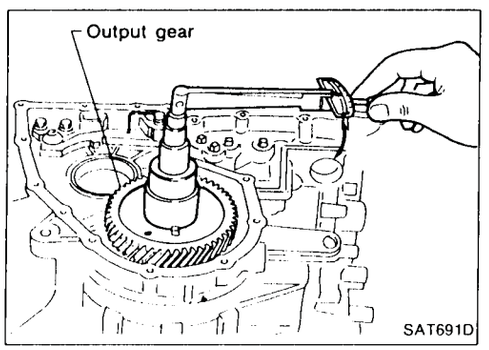

SAT689D

7. Tighten output gear lock nut to specified torque.



SAT690D

8. Remove idler gear to measure output shaft preload.



SAT691D

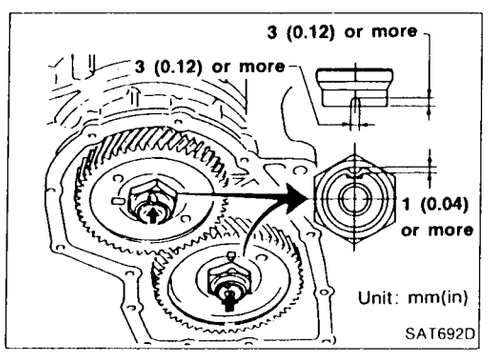
9. Measure turning torque of output shaft.

- **When measuring turning torque, turn output shaft in both directions several times to seat bearing rollers correctly.**

  Turning torque of output shaft:

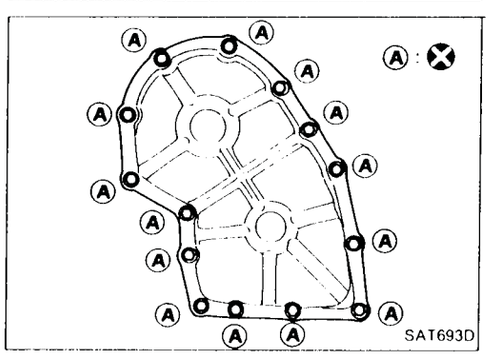
  0.25 - 0.88 N·m

  (2.5 - 9.0 kg-cm, 2.2 - 7.8 in-lb)



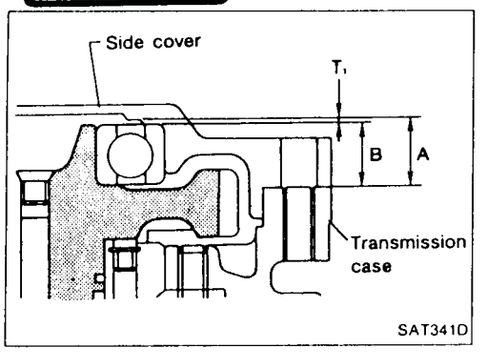
SAT692D

10. Install idler gear and tighten lock nut to specified torque.
11. After properly adjusting "turning" torque, clinch idler gear and output gear lock nuts as shown.



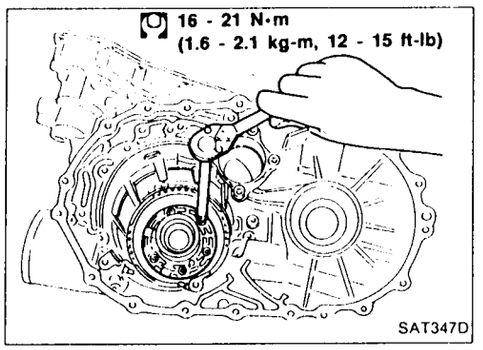
SAT693D

12. Install new gasket and side cover on transmission case.

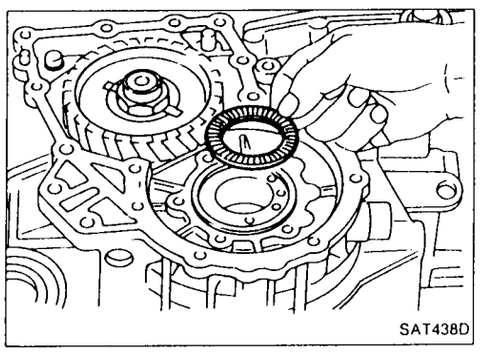


OUTPUT SHAFT END PLAY — RL4F03V

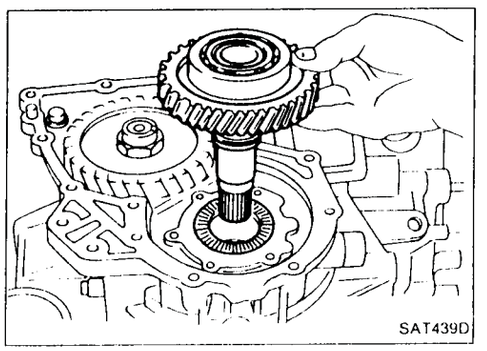
- Measure clearance between side cover and the end of the output shaft bearing.
- Select proper thickness of adjusting shim so that clearance is within specifications.



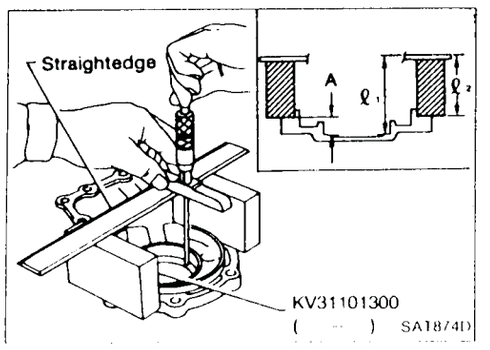
1. Install bearing retainer for output shaft.



2. Install output shaft thrust needle bearing on bearing retainer.



3. Install output shaft on transmission case.

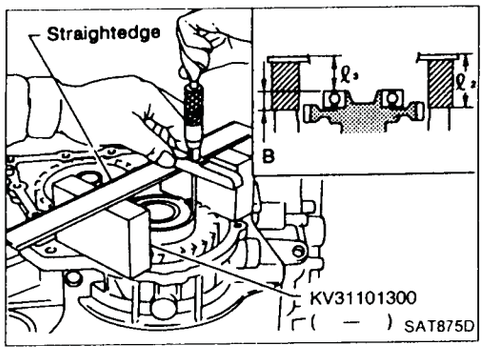


4. Measure dimensions "ℓ_1" and "ℓ_2" at side cover and then calculate dimension "A".

- **Measure dimension "ℓ_1" and "ℓ_2" in at least two places.**

"A": Distance between transmission case fitting surface and adjusting shim mating surface.

A = $\ell_1 - \ell_2$ ℓ_2: Height of gauge

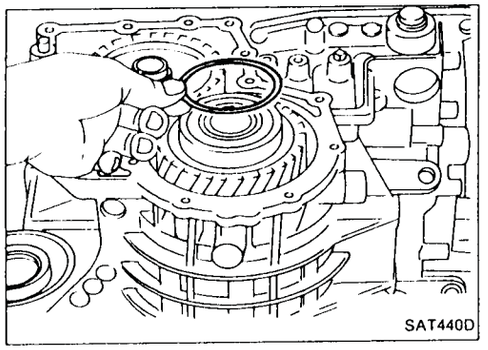


5. Measure dimensions "ℓ_2" and "ℓ_3" and then calculate dimension "B".

Measure "ℓ_2" and "ℓ_3" in at least two places.

"B": Distance between the end of output shaft bearing outer race and the side cover fitting surface of transmission case.

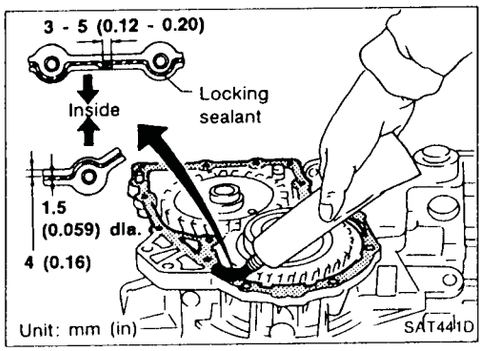
B = $\ell_2 - \ell_3$ **ℓ_2: Height of gauge**



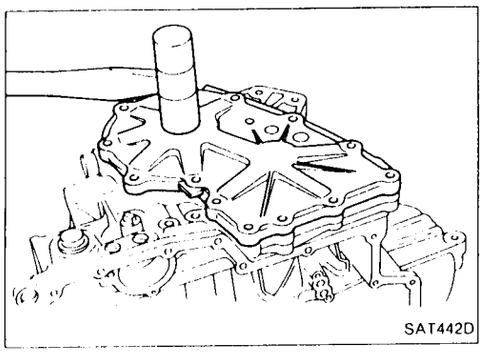
6. Select proper thickness of adjusting shim so that output shaft end play (clearance between side cover and output shaft bearing) is within specifications.

Output shaft end play (A – B):
0 - 0.5 mm (0 - 0.020 in)
Output shaft end play adjusting shim:
Refer to S.D.S.

7. Install adjusting shim on output shaft bearing.

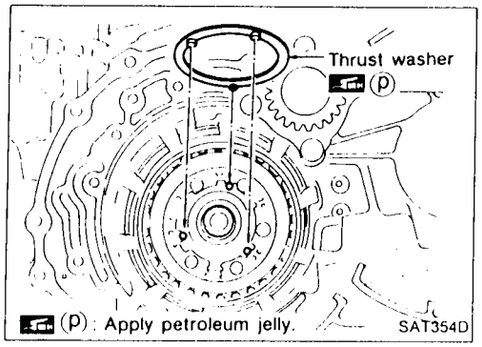


8. Apply locking sealant to transmission case as shown in illustration.



9. Install side cover on transmission case and tighten fixing bolt to the specified torque.

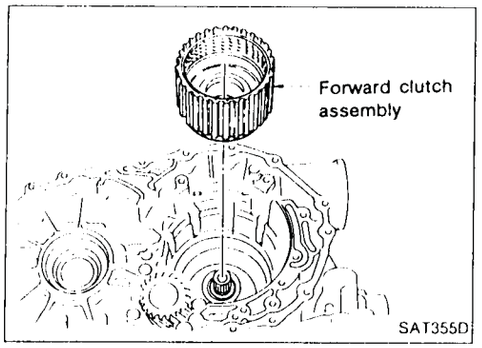
- **Apply locking sealant to the mating surface of transmission case.**



Assembly

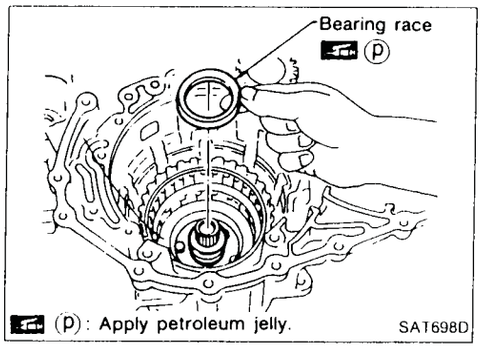
1. Remove paper rolled around bearing retainer.
2. Install thrust washer on bearing retainer.

- **Apply petroleum jelly to thrust washer.**



3. Install forward clutch assembly.

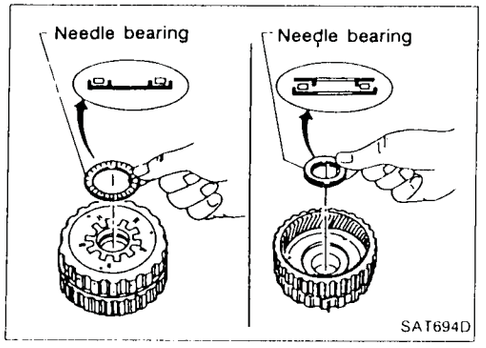
- **Align teeth of low & reverse brake drive plates before installing.**
- **Make sure that bearing retainer seal rings are not spread.**



— RL4F03A —

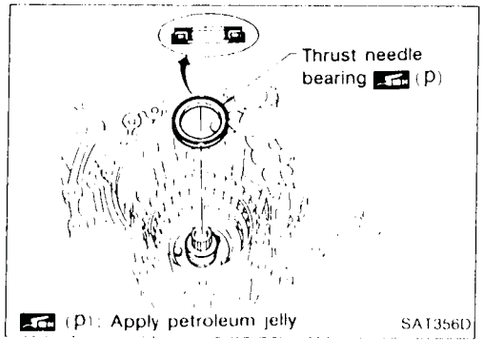
4. Install bearing race on bearing retainer.

- **Apply petroleum jelly to bearing race.**



5. Install needle bearings on rear internal gear.

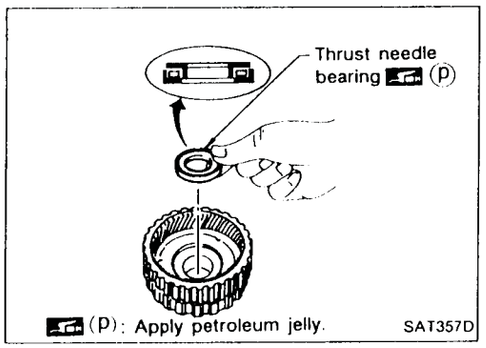
- **Apply petroleum jelly to needle bearings.**
- **Pay attention to direction of needle bearing.**



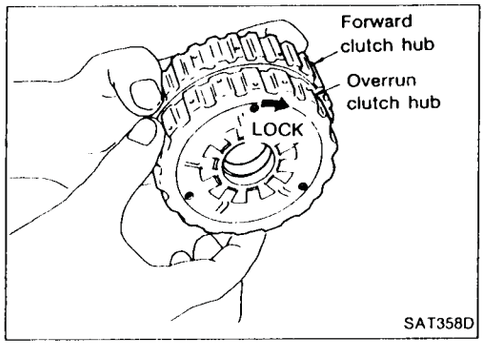
— RL4F03V —

4. Install thrust needle bearing on bearing retainer.

- **Apply petroleum jelly to thrust bearing.**
- **Pay attention to direction of thrust needle bearing.**

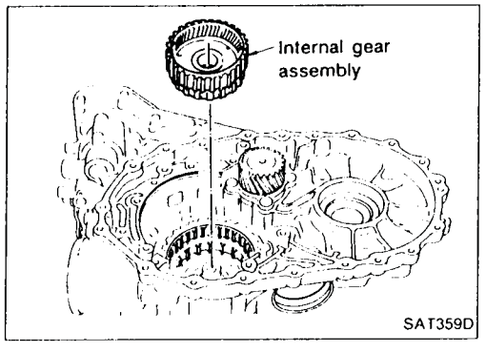


5. Install thrust needle bearing on rear internal gear.
- **Apply petroleum jelly to thrust needle bearing.**
- **Pay attention to direction of thrust needle bearing.**

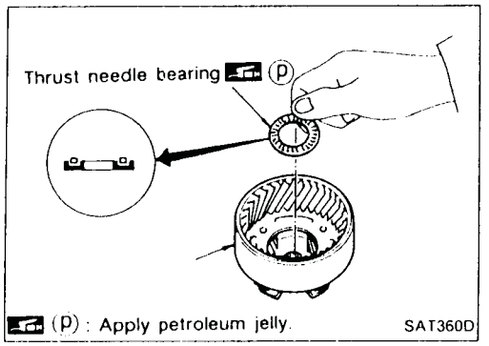


— RL4F03A & F03V —

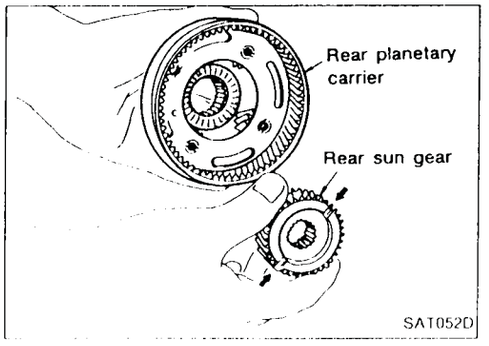
6. Hold forward clutch hub and turn overrun clutch hub. Check overrun clutch hub for directions of lock and unlock.
- If not as shown in illustration, check installed direction of forward one-way clutch.



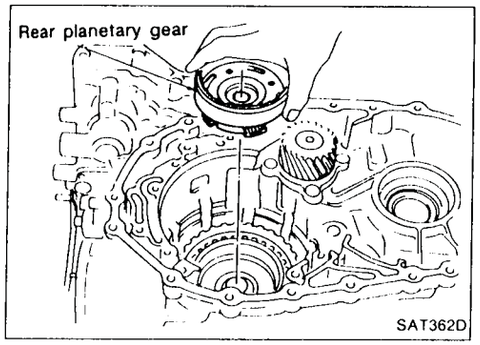
7. Install rear internal gear assembly.
- **Align teeth of forward clutch and overrun clutch drive plate.**



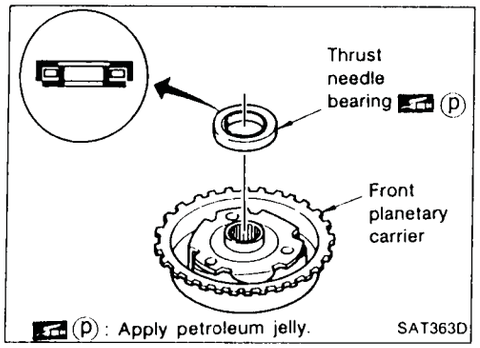
8. Install needle bearing on rear planetary carrier.
- **Apply petroleum jelly to needle bearing.**
- **Pay attention to direction of needle bearing.**



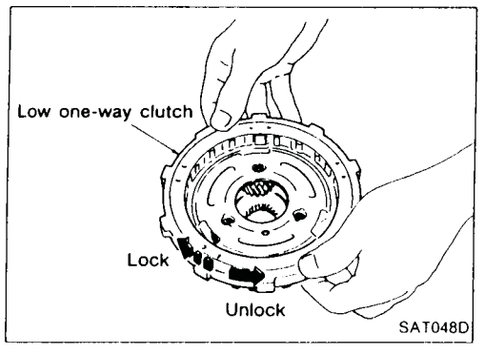
9. Install rear sun gear on rear planetary carrier.
- **Pay attention to direction of rear sun gear.**



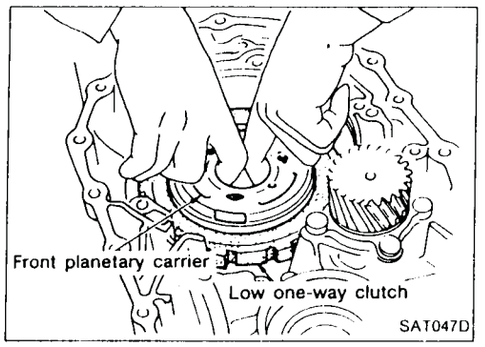
10. Install rear planetary carrier on transmission case.



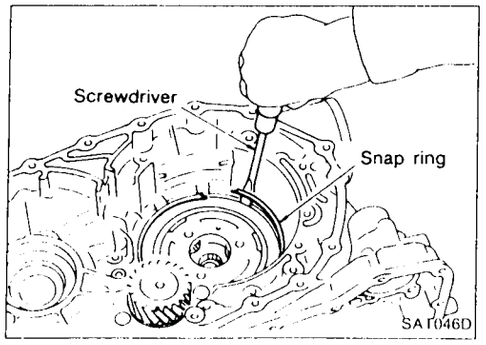
11. Install thrust needle bearing on front planetary carrier.
- **Apply petroleum jelly to thrust needle bearing.**
- **Pay attention to direction of thrust needle bearing.**



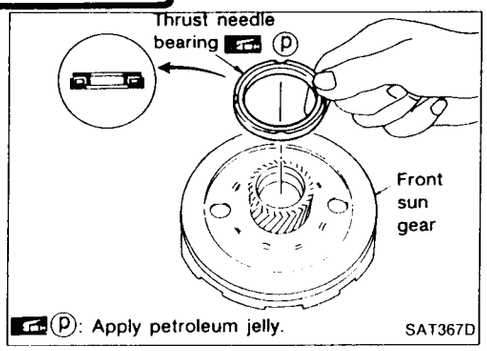
12. Install low one-way clutch to front planetary carrier by turning it in the direction of the arrow as shown.
13. While holding front planetary carrier, turn low one-way clutch.
    Check low one-way clutch for correct directions of lock and unlock.



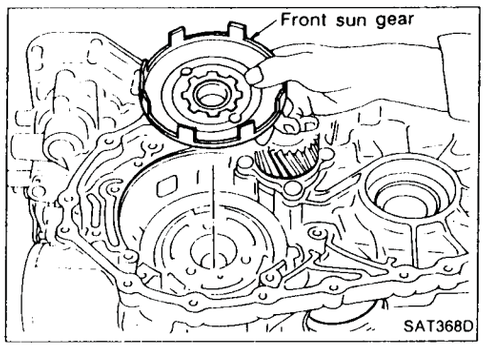
14. Install front planetary carrier assembly on transmission case.



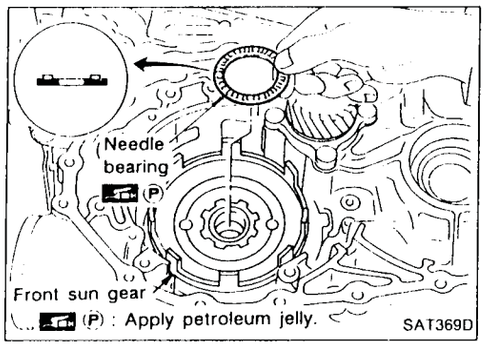
15. Install snap ring with screwdriver.
- **If forward clutch and bearings are not installed correctly, snap ring will not fit groove of transmission case.**



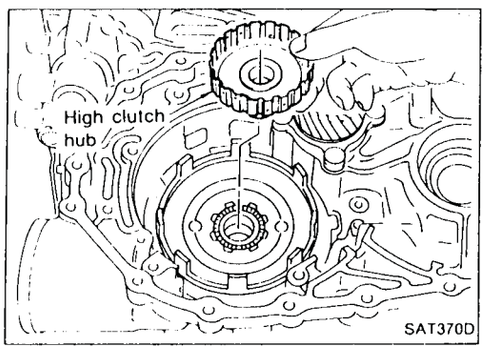
16. Install needle bearing on front sun gear.
- **Apply petroleum jelly to needle bearing.**
- **Pay attention to direction of needle bearing.**



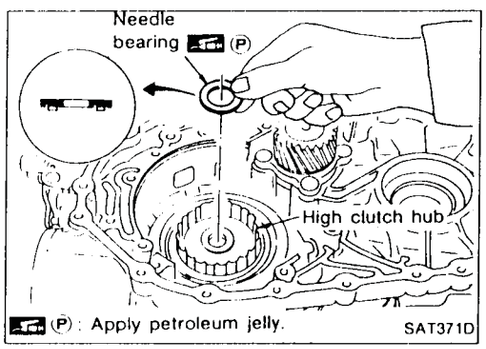
17. Install front sun gear on front planetary carrier.



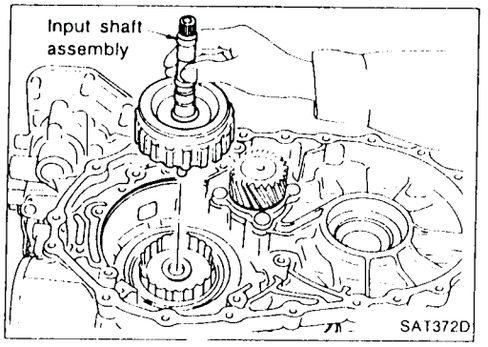
18. Install needle bearing on front sun gear.
- **Apply petroleum jelly to needle bearing.**
- **Pay attention to direction of needle bearing.**



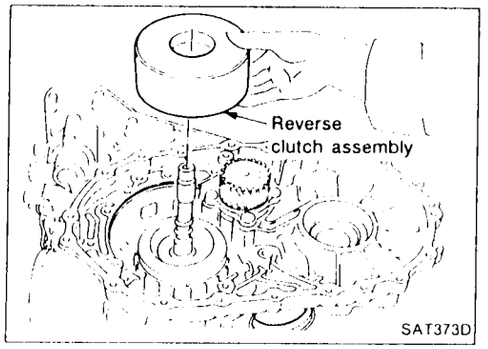
19. Install high clutch hub on front sun gear.



20. Install needle bearing on high clutch hub.
- **Apply petroleum jelly to needle bearing.**
- **Pay attention to direction of needle bearing.**



21. Remove paper rolled around input shaft.
22. Install input shaft assembly.
- **Align teeth of high clutch drive plates before installing.**

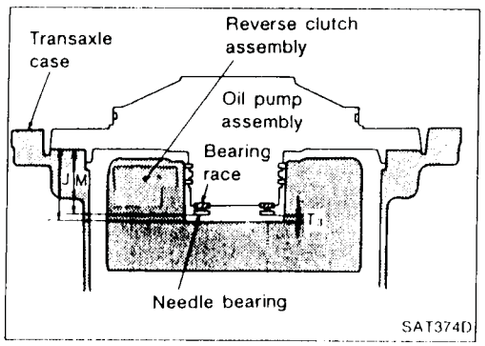


23. Install reverse clutch assembly.
- **Align teeth of reverse clutch drive plates before installing.**

Adjustment

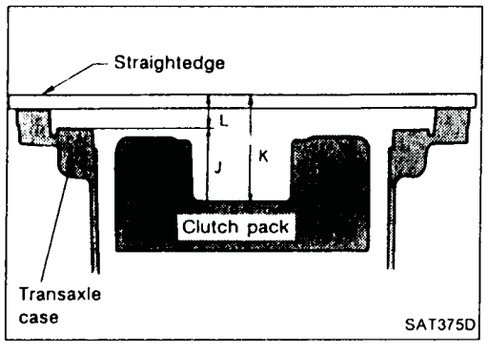
When any parts listed in the following table are replaced, total end play or reverse clutch end play must be adjusted.

Part name \ Item	Total end play	Reverse clutch end play
Transmission case	•	•
Overrun clutch hub	•	•
Rear internal gear	•	•
Rear planetary carrier	•	•
Rear sun gear	•	•
Front planetary carrier	•	•
Front sun gear	•	•
High clutch hub	•	•
High clutch drum	•	•
Oil pump cover	•	•
Reverse clutch drum	•	•

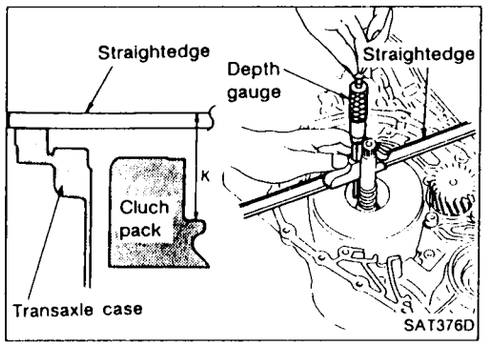


TOTAL END PLAY

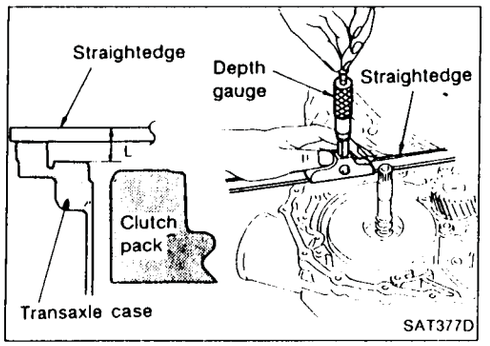
- Measure clearance between reverse clutch drum and needle bearing for oil pump cover.
- Select proper thickness of bearing race so that end play is within specifications.



1. Measure dimensions "K" and "L" and then calculate dimension "J".



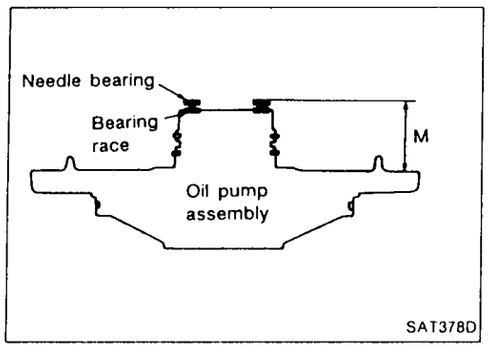
a. Measure dimension "K".



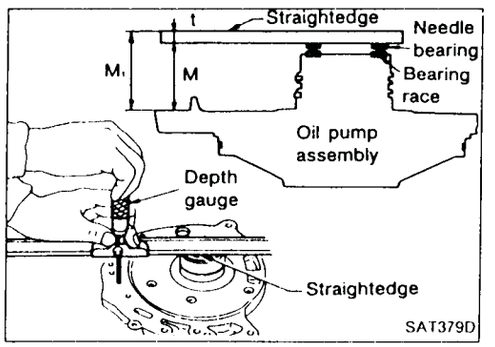
b. Measure dimension "L".
c. Calculate dimension "J".

"J": Distance between oil pump fitting surface of transmission case and needle bearing mating surface of high clutch drum.

J = K – L



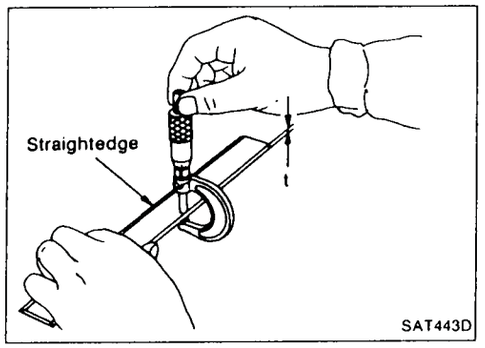
2. Measure dimension "M".
a. Place bearing race and needle bearing on oil pump assembly.



b. Measure dimension "M".

"M": Distance between transmission case fitting surface and needle bearing on oil pump cover.

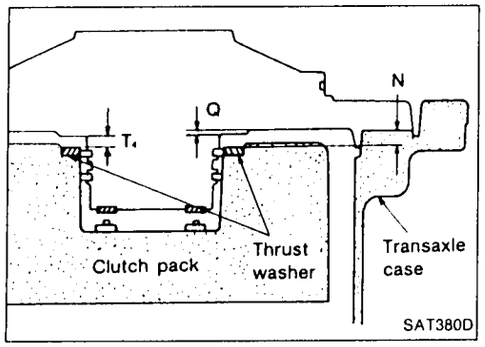
M_1: Indication of gauge.



c. Measure thickness of straightedge "t".
M = M_1 – t

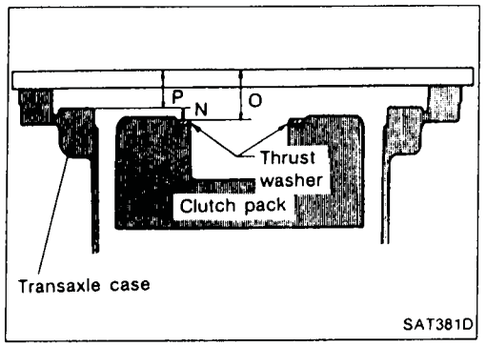
3. Adjust total end play "T_3".
T_3 = J – M
Total end play "T_3":
0.25 - 0.55 mm (0.0098 - 0.0217 in)

- Select proper thickness of bearing race so that total end play is within specifications.
Bearing races: Refer to S.D.S.

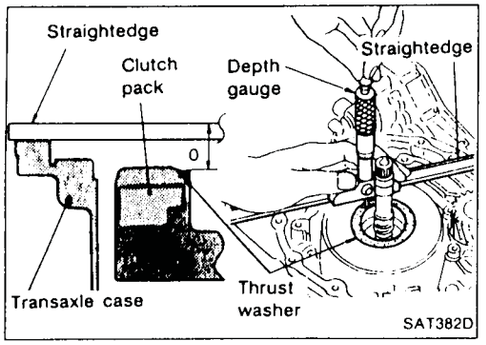


REVERSE CLUTCH END PLAY

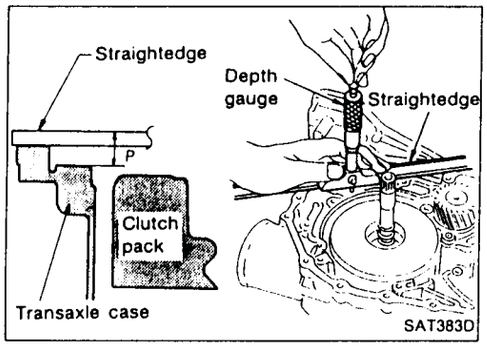
- Measure clearance between oil pump cover and thrust washer for reverse clutch drum.
- Select proper thickness of thrust washer so that end play is within specifications.



1. Measure dimensions "O" and "P" and then calculate dimension "N".

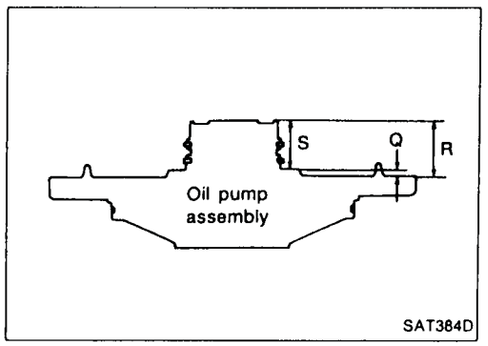


a. Place thrust washer on reverse clutch drum.
b. Measure dimension "O".

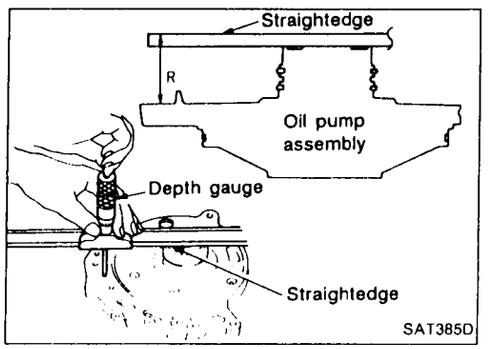


c. Measure dimension "P".
d. Calculate dimension "N".

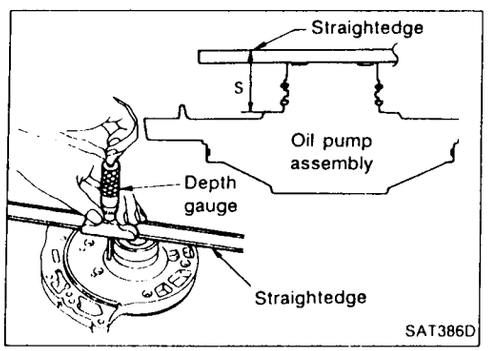
"N": Distance between oil pump fitting surface of transmission case and thrust washer on reverse clutch drum.
N = O – P



2. Measure dimensions "R" and "S" and then calculate dimension "Q".



a. Measure dimension "R".

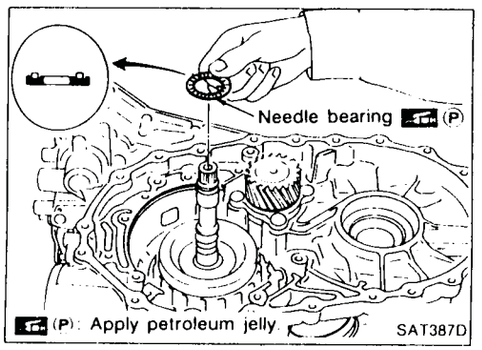


b. Measure dimension "S".
c. Calculate dimension "Q".

"Q": Distance between transmission case fitting surface and thrust washer mating surface.
Q = R – S

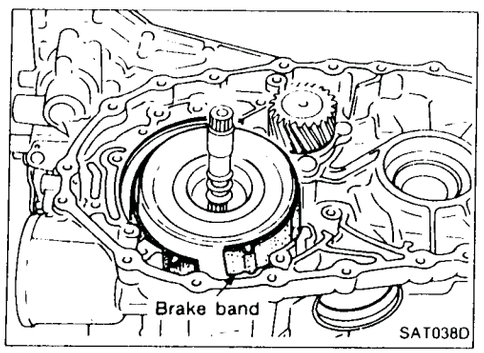
3. Adjust reverse clutch end play "T_4".
T_4 = N – Q
Reverse clutch end play:
0.65 - 1.00 mm (0.0256 - 0.0394 in)

- Select proper thickness of thrust washer so that reverse clutch end play is within specifications.
Thrust washer: Refer to S.D.S.

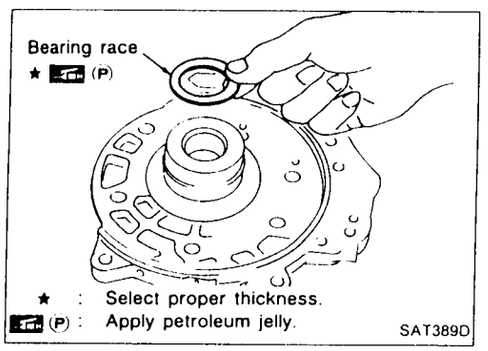


Assembly

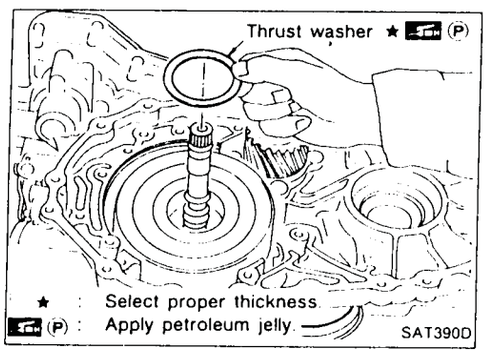
1. Remove reverse clutch assembly and install needle bearing on high clutch assembly.
- **Pay attention to direction of needle bearing.**
2. Install reverse clutch assembly.



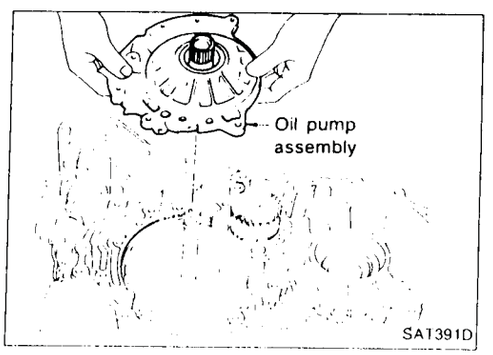
3. Install anchor end pin, washer and lock nut on transmission case.
4. Place brake band on periphery of reverse clutch drum. Then, tighten anchor end pin just enough so that brake band is fitted on periphery of reverse clutch drum uniformly.



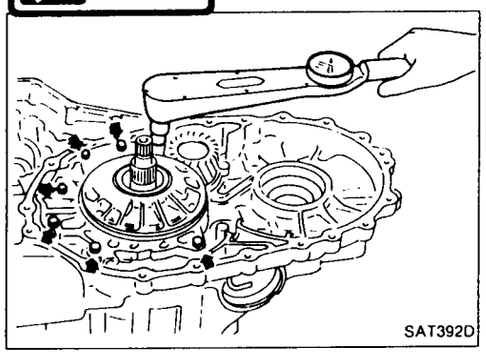
5. Place bearing race selected in total end play adjustment step on oil pump cover.
- **Apply petroleum jelly to bearing race.**



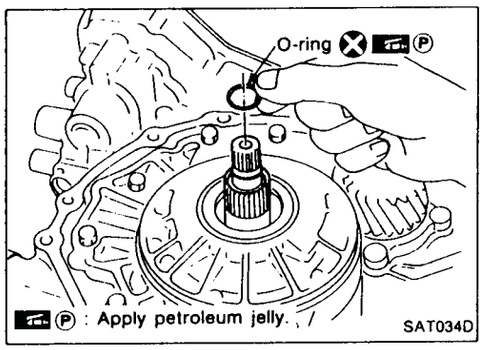
6. Place thrust washer selected in reverse clutch end play step on reverse clutch drum.
- **Apply petroleum jelly to thrust washer.**



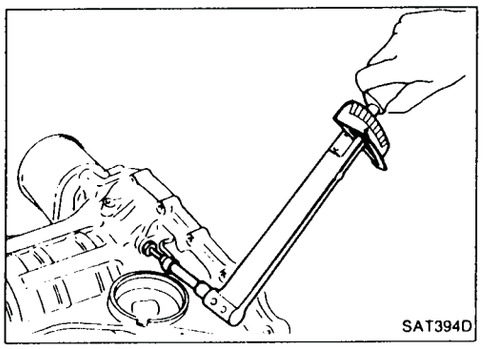
7. Install oil pump assembly on transmission case.



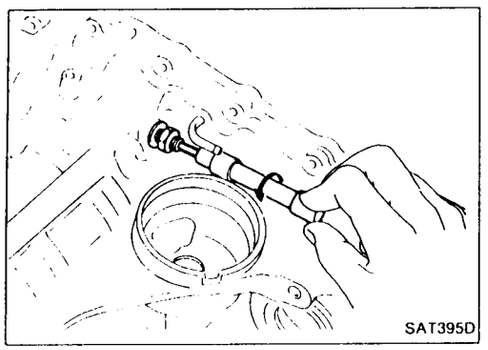
8. Tighten oil pump fixing bolts to specified torque.



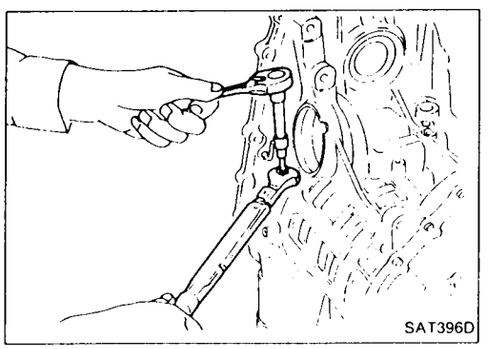
9. Install O-ring to input shaft.
- **Apply A.T.F. to O-ring.**



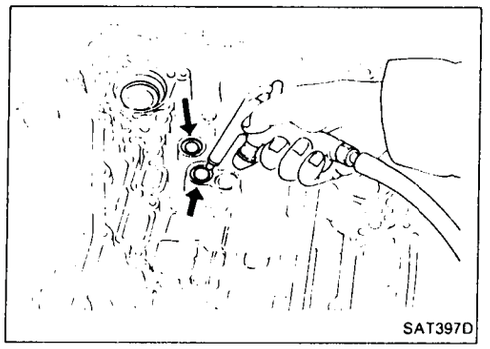
10. Adjust brake band.
a. Tighten anchor end pin to specified torque.
Anchor end pin:
4 - 6 N·m (0.4 - 0.6 kg-m, 2.9 - 4.3 ft-lb)



b. Back off anchor end pin two and a half turns.



c. While holding anchor end pin, tighten lock nut.

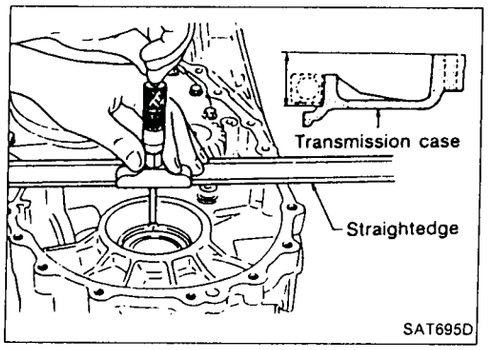

SAT397D

11. Apply compressed air to oil holes of transmission case and check operation of brake band.

Adjustment

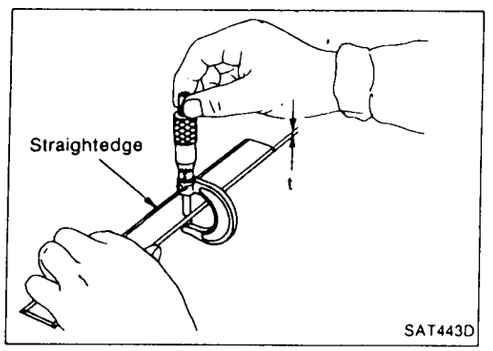
FINAL DRIVE END PLAY — RL4F03A

- Measure clearance between differential side bearing and transmission case.
- Select proper thickness of adjusting shim so that end play is within specifications.



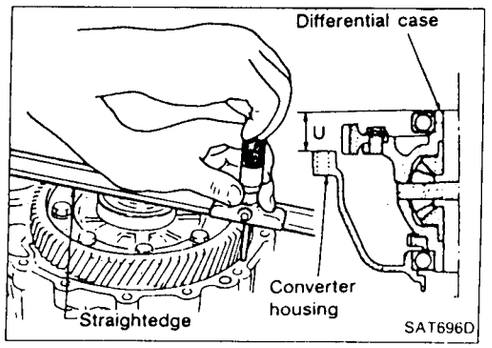
SAT695D

1. Measure dimension "T" between side bearing fitting surface of transmission case and converter housing fitting surface of transmission case.
   "T_1": indication of gauge



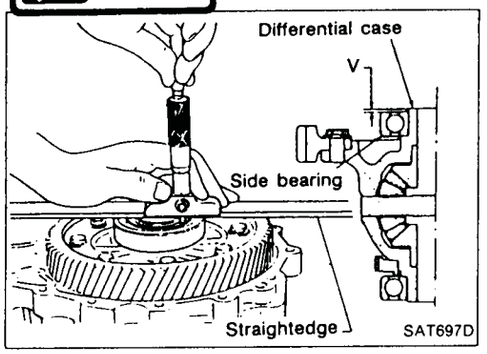
SAT443D

2. Measure thickness of straightedge "t".
   $T = T_1 - t$

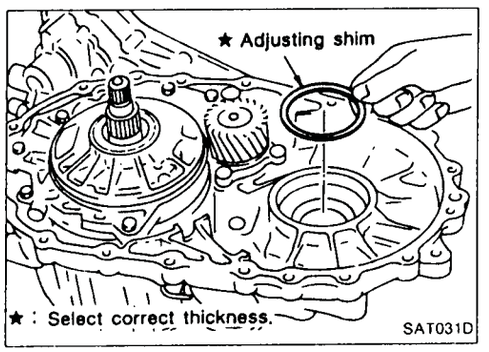


SAT696D

3. Place final drive assembly on converter housing.
4. Measure dimension "U" between end of differential case and transmission case fitting surface of converter housing.

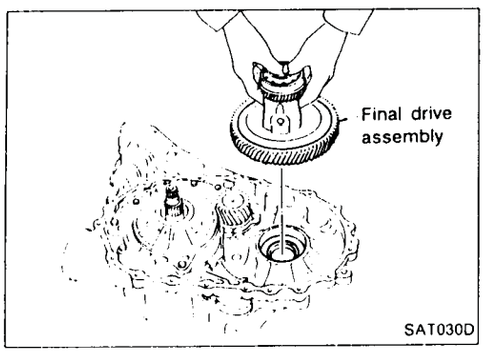


5. Measure dimension "V" between end of differential case and adjusting shim mating surface of differential side bearing.
6. Calculate final drive end play.
   Final drive end play:
   T – U + V
7. Select proper thickness of differential side bearing adjusting shim so that final drive end play is within specifications.
   Final drive end play:
   0 - 0.15 mm (0 - 0.0059 in)
   Differential side bearing adjusting shim:
   Refer to S.D.S.

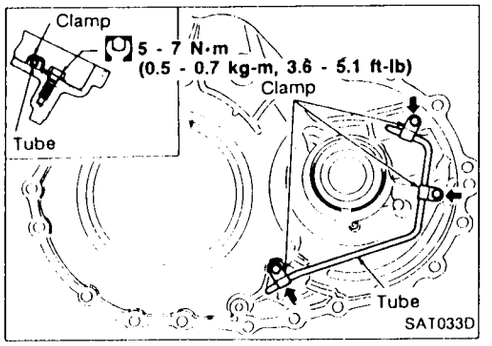


Assembly

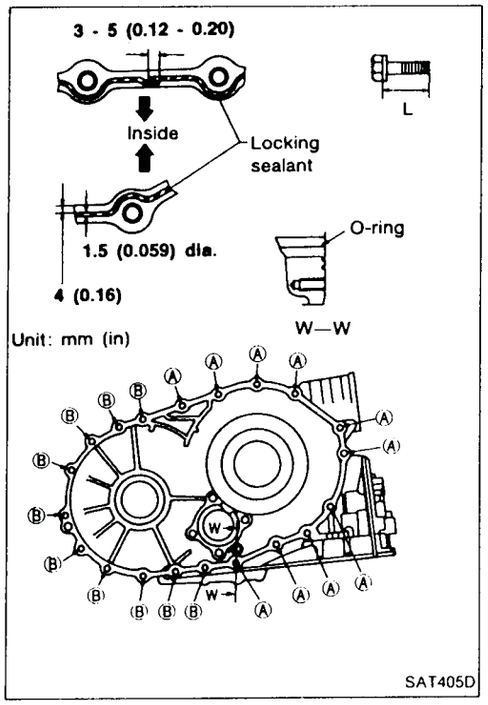
1. Install differential side bearing adjusting shim selected in final drive end play adjustment step on transmission case (only RL4F03A).



2. Install final drive assembly on transmission case.



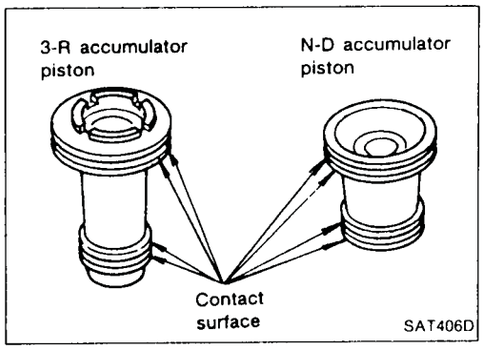
3. Install oil tube on converter housing.



4. Install O-ring on differential oil port of transmission case.
5. Install converter housing on transmission case.

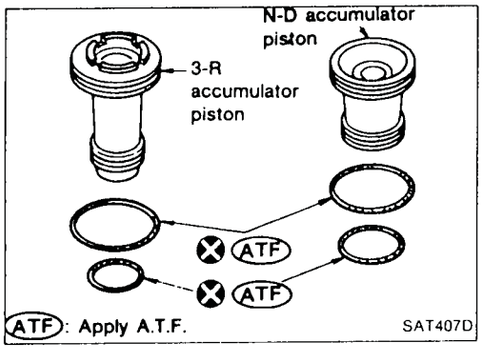
- **Apply locking sealant to mating surface of converter housing.**

Bolt	Length mm (in)
Ⓐ	30 (1.18)
Ⓑ	40 (1.57)



6. Install accumulator piston.

a. Check contact surface of accumulator piston for damage.



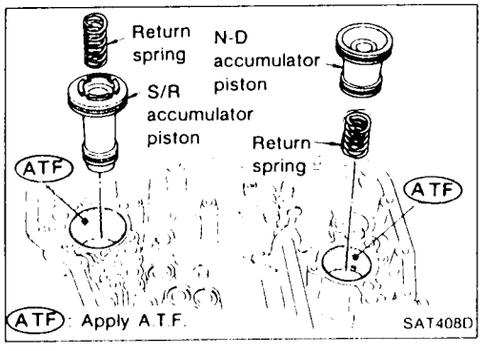
b. Install O-rings on accumulator piston.

- Apply A.T.F. to O-rings.

Accumulator piston O-rings:

Unit: mm (in)

Accumulator	Inner diameter (Small)	Inner diameter (Large)
3-R accumulator	26.9 (1.059)	44.2 (1.740)
N-D accumulator	34.6 (1.362)	39.4 (1.551)



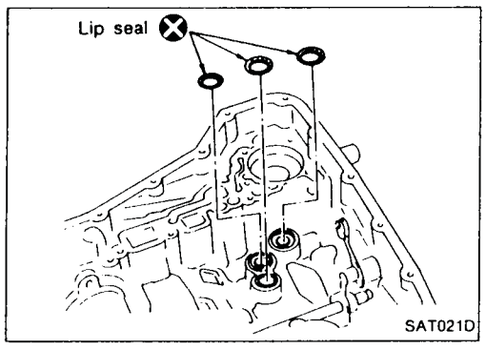
c. Install accumulator pistons and return springs on transmission case.

- **Apply A.T.F. to inner surface of transmission case.**

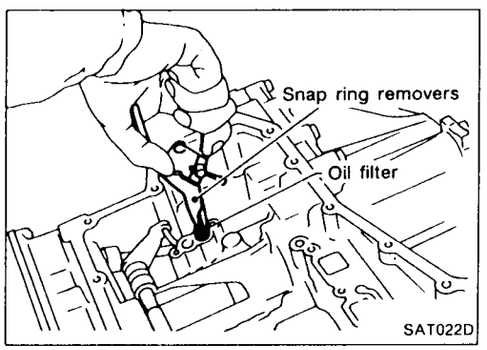
Return springs:

Unit: mm (in)

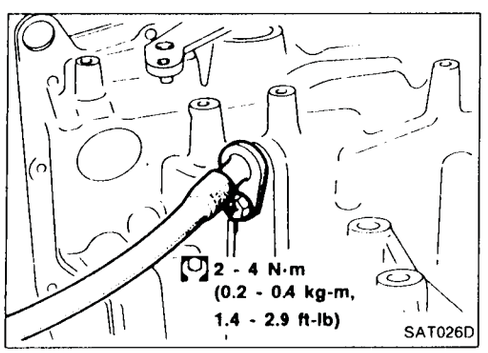
Spring	Free length	Outer diameter
3-R accumulator spring	56.4 (2.220)	21.0 (0.827)
N-D accumulator spring	43.5 (1.713)	28.0 (1.102)



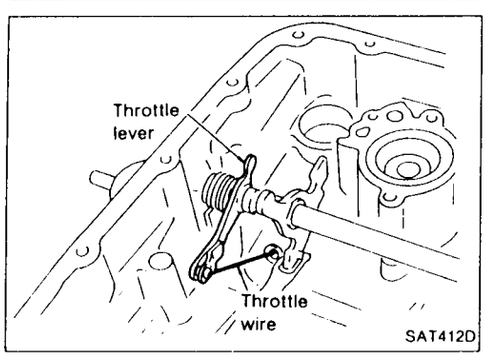
7. Install lip seals for band servo oil holes on transmission case.
- **Apply petroleum jelly to lip seals.**



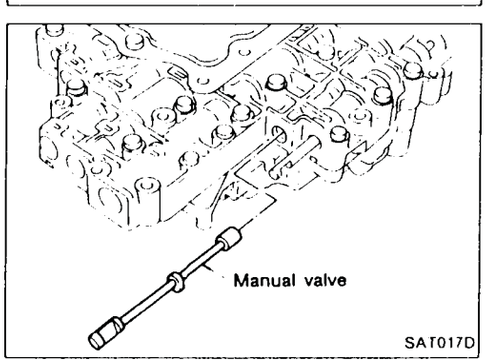
8. Install oil filter for governor valve.
- **Take care with its direction.**



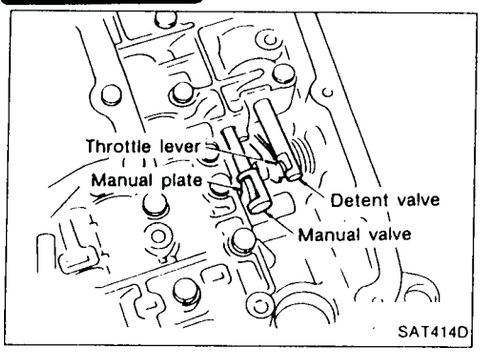
9. Install throttle wire to transmission case.



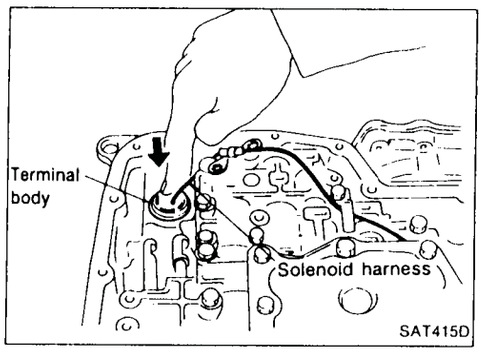
10. Install throttle wire to throttle lever.



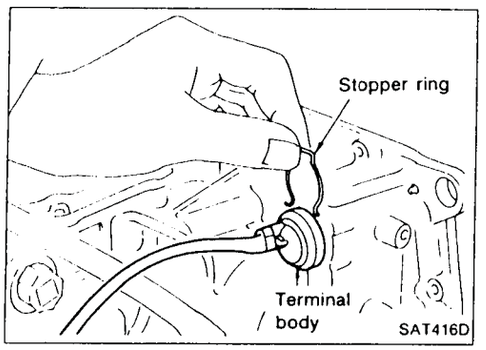
11. Install control valve assembly.
a. Insert manual valve into control valve assembly.
- **Apply A.T.F. to manual valve.**



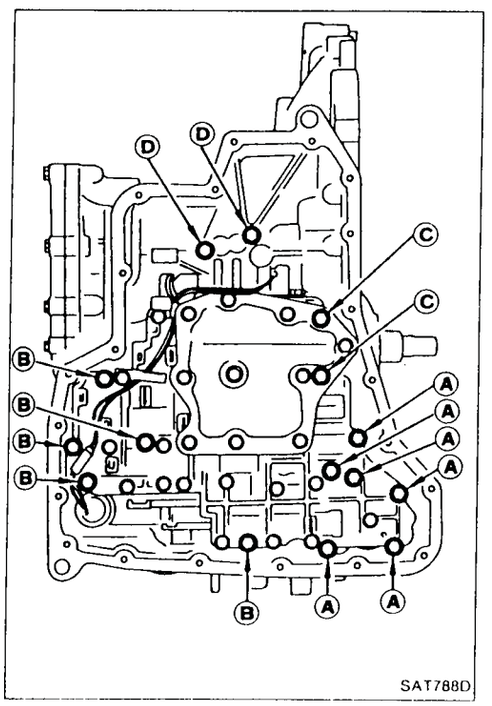
b. Set manual shaft in Neutral position.
c. Install control valve assembly on transmission case while aligning manual valve with manual plate and detent valve with throttle lever.



d. Pass solenoid harness through transmission case and install terminal body on transmission case by pushing it.



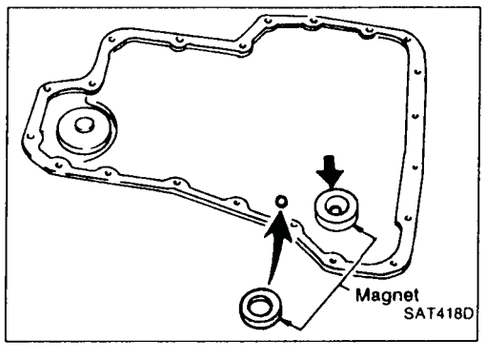
e. Install clip to terminal body.



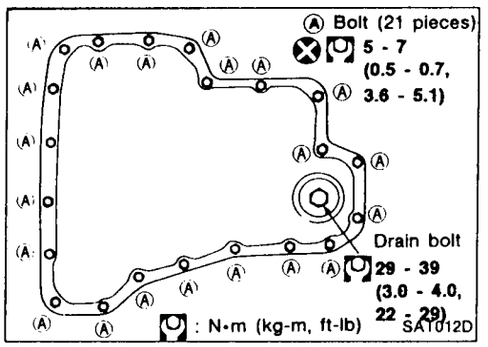
f. Tighten bolts Ⓐ, Ⓑ, Ⓒ and Ⓓ.

Bolt length, number and location:

Bolt	Ⓐ	Ⓑ	Ⓒ	Ⓓ
Bolt length "ℓ" mm (in)	25.0 (0.984)	33.0 (1.299)	40.0 (1.575)	43.5 (1.713)
Number of bolts	2	6	5	2

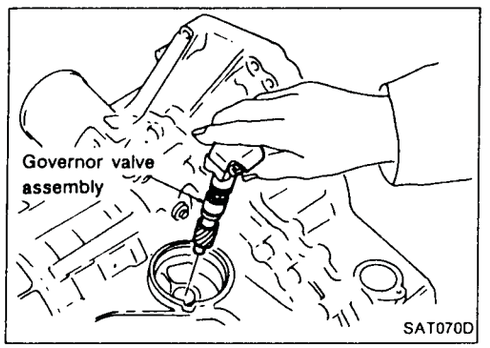


12. Install oil pan.
a. Attach magnet to oil pan.

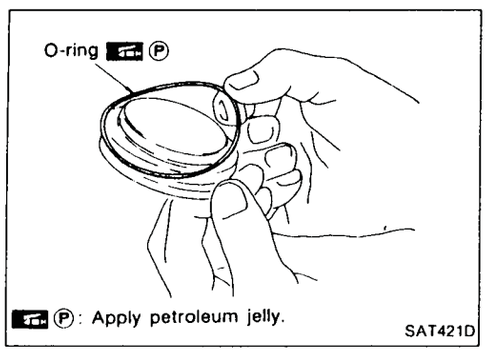


b. Install new oil pan gasket on transmission case.
c. Install oil pan on transmission case.
- **Always replace oil pan bolts as they are self-sealing bolts.**
- **Tighten the four bolts in a criss-cross pattern to prevent dislocation of gasket.**

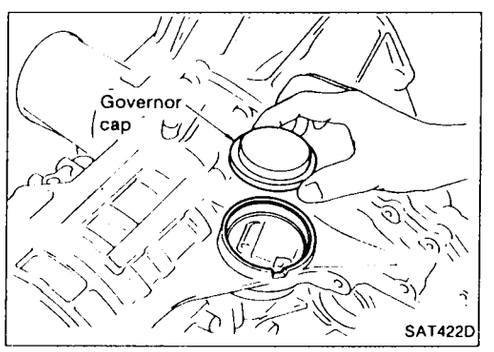
d. Tighten drain plug to specified torque.



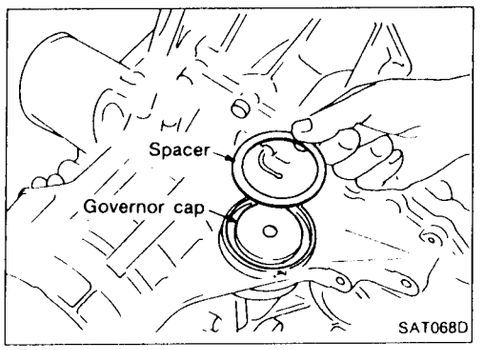
13. Install governor valve.
a. Install governor valve assembly into transmission case.



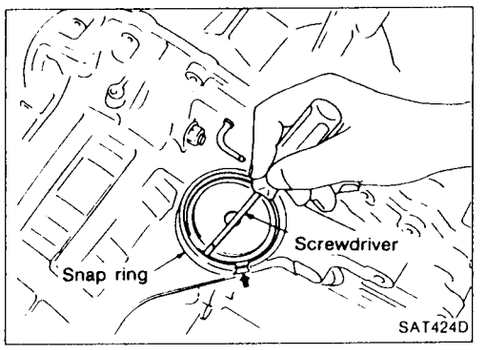
b. Install O-ring to governor cap.
- **Apply A.T.F. to O-ring.**



c. Install governor cap onto transmission case.

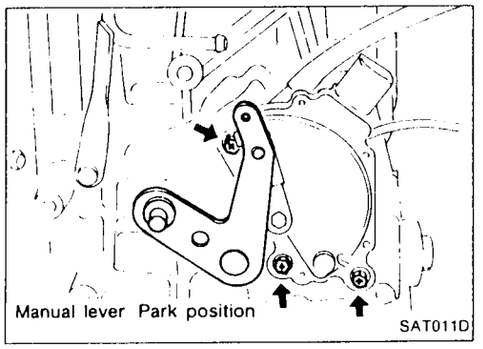


d. Place spacer on governor cap.

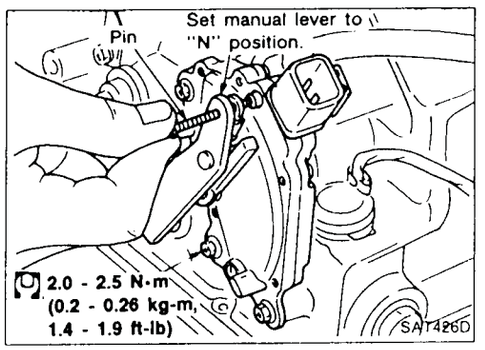


e. Install snap ring onto transmission case with a screwdriver.

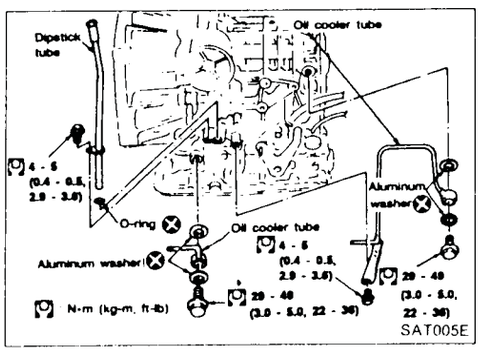
- **Align snap ring gap with the notch of transmission case.**



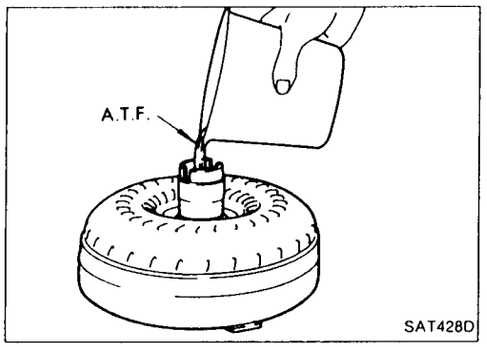
14. Install inhibitor switch.
a. Set manual lever in "P" position.
b. Temporarily install inhibitor switch on manual shaft.
c. Move selector lever to "N" position.



d. Insert 4.0 mm (0.157 in) dia. pin into adjustment hole in both inhibitor switch and manual shaft as near vertically as possible.
e. Tighten inhibitor switch fixing bolts.
f. Remove pin from adjustment hole after adjusting inhibitor switch.

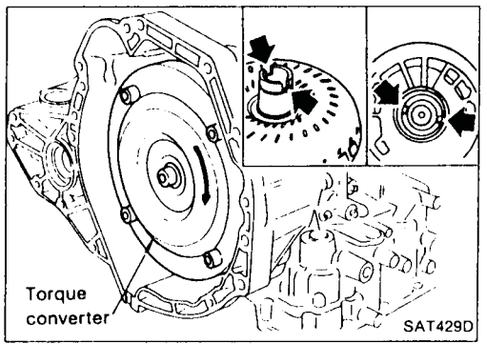


15. Install oil charging pipe and oil cooler tube to transmission case.

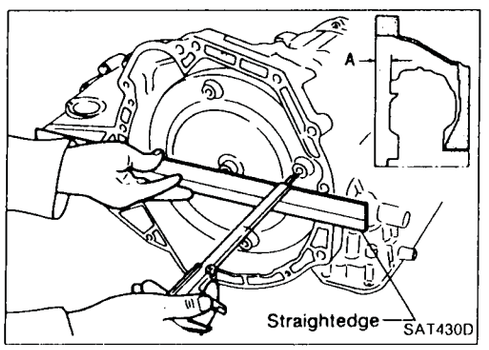


16. Install torque converter.
a. Pour A.T.F. into torque converter.

- **Approximately 1 liter (1 - 1/8 US qt, 7/8 Imp qt) of fluid is required for a new torque converter.**
- **When reusing old torque converter, add the same amount of fluid as was drained.**



b. Install torque converter while aligning notches of torque converter with notches of oil pump.



c. Measure distance "A" to check that torque converter is in proper position.

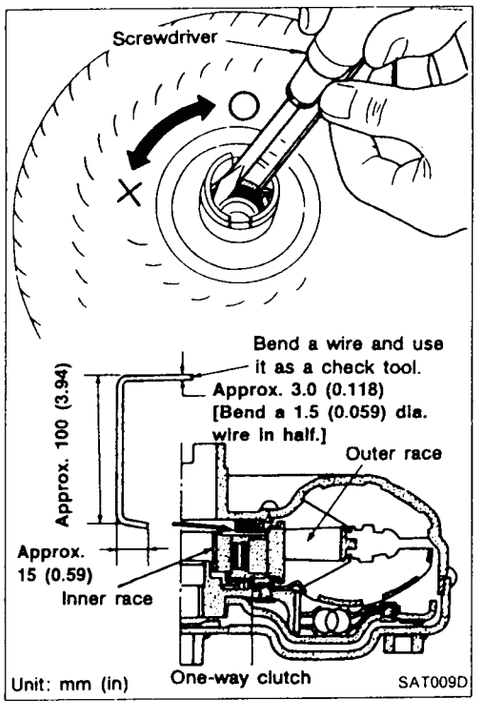
Distance "A":

GA engine models

21.1 mm (0.831 in) or more

SR engine models

15.9 mm (0.626 in) or more



Check torque converter one-way clutch using check tool as shown at left.
Insert check tool into the groove of bearing support built into one-way clutch outer race.
While fixing bearing support with check tool, rotate one-way clutch spline using flat-bladed screwdriver.
Check inner race rotates clockwise only. If not, replace torque converter assembly.

Specifications and Adjustments — RL4F03A & F03V

VEHICLE SPEED WHEN SHIFTING GEARS

Model 31X23

Throttle position	Vehicle speed km/h (MPH)						
	$D_1 \rightarrow D_2$	$D_2 \rightarrow D_3$	$D_3 \rightarrow D_4$	$D_4 \rightarrow D_3$	$D_3 \rightarrow D_2$	$D_2 \rightarrow D_1$	$1_2 \rightarrow 1_1$
Full throttle	51 - 59 (32 - 37)	94 - 102 (58 - 63)	—	141 - 149 (88 - 93)	85 - 93 (53 - 58)	45 - 53 (28 - 33)	48 - 56 (30 - 35)
Half throttle	29 - 37 (18 - 23)	50 - 58 (31 - 36)	98 - 106 (61 - 66)	62 - 70 (39 - 43)	40 - 48 (25 - 30)	9 - 17 (6 - 11)	48 - 56 (30 - 35)

Model 31X60

Throttle position	Vehicle speed km/h (MPH)						
	$D_1 \rightarrow D_2$	$D_2 \rightarrow D_3$	$D_3 \rightarrow D_4$	$D_4 \rightarrow D_3$	$D_3 \rightarrow D_2$	$D_2 \rightarrow D_1$	$1_2 \rightarrow 1_1$
Full throttle	56 - 64 (35 - 40)	103 - 111 (64 - 69)	—	155 - 163 (96 - 101)	93 - 101 (58 - 63)	50 - 58 (31 - 36)	52 - 60 (32 - 37)
Half throttle	31 - 39 (19 - 24)	55 - 63 (34 - 39)	114 - 122 (71 - 76)	66 - 74 (41 - 46)	43 - 51 (27 - 32)	9 - 17 (6 - 11)	52 - 60 (32 - 37)

VEHICLE SPEED WHEN PERFORMING LOCK-UP

Model 31X23

Throttle opening	Gear position	Vehicle speed km/h (MPH)	
		Lock-up "ON"	Lock-up "OFF"
2/8	D_4	66 - 74 (41 - 46)	62 - 70 (39 - 43)

Model 31X60

Throttle opening	Gear position	Vehicle speed km/h (MPH)	
		Lock-up "ON"	Lock-up "OFF"
2/8	D_4	62 - 70 (39 - 43)	58 - 64 (36 - 40)

STALL REVOLUTION

Engine	Stall revolution rpm
GA16DE	2,450 - 2,750
SR20DE	1,900 - 2,200

THROTTLE WIRE ADJUSTMENT

Throttle wire stroke	mm (in)	39 - 43 (1.54 - 1.69)

LINE PRESSURE

Model 31X23

Engine speed rpm	Line pressure kPa (kg/cm², psi)			
	R range	D range	2 range	1 range
Idle	883 (9.0, 128)	539 (5.5, 78)	441 (4.5, 64)	785 (8.0, 114)
Stall	1,765 (18.0, 256)	1,079 (11.0, 156)	883 (9.0, 128)	1,079 (11.0, 156)

Model 31X60

Engine speed rpm	Line pressure kPa (kg/cm², psi)			
	R range	D range	2 range	1 range
Idle	883 (9.0, 128)	637 (6.5, 92)	441 (4.5, 64)	1,138 (11.6, 165)
Stall	1,765 (18.0, 256)	1,275 (13.0, 185)	883 (9.0, 128)	1,275 (13.0, 185)

CONTROL VALVES

Control valve return springs

Unit: mm (in)

Parts		Model	Part No.	Free length	Outer diameter
Upper body	Pressure modifier valve spring	31X23	31742-31X10	25.0 (0.984)	8.2 (0.323)
		31X60	31742-31X64	25.0 (0.984)	7.9 (0.311)
	Kickdown modifier valve spring		31742-31X03	40.5 (1.594)	9.0 (0.354)
	1-2 accumulator valve spring		31742-31X63	50.9 (2.0039)	12.6 (0.496)
	3-2 timing valve spring		31736-21X00	26.3 (1.035)	7.2 (0.283)
	1st reducing valve spring		31835-21X08	22.6 (0.890)	7.3 (0.287)
	Torque converter relief valve spring		31742-31X06	23.5 (0.925)	7.4 (0.291)
	Throttle modifier valve spring		31742-31X07	29.5 (1.161)	5.5 (0.217)
	4th speed cut valve spring	31X23	31756-21X01	23.4 (0.921)	6.7 (0.264)
		31X60	31835-21X02	23.3 (0.917)	6.2 (0.244)
	Lock-up control valve spring		31742-31X08	39.5 (1.555)	5.0 (0.197)
	4-2 sequence valve spring		31742-31X09	39.5 (1.555)	5.1 (0.201)
	Oil cooler relief valve spring		31872-31X00	17.02 (0.6701)	8.0 (0.315)
Lower body	Throttle valve and detent valve spring	31X23	31802-31X01	33.0 (1.299)	10.0 (0.394)
		31X60	31802-31X06	32.0 (1.260)	10.0 (0.394)
	Pressure regulator valve spring		31742-31X00	52.24 (2.0567)	15.0 (0.591)
	3-4 shift valve spring	31X23	31762-31X00	52.0 (2.047)	8.0 (0.315)
		31X60	31762-31X11	52.0 (2.047)	8.0 (0.315)
	2-3 shift valve spring		31762-31X01	52.7 (2.075)	7.0 (0.276)
	1-2 shift valve spring		31762-31X09	44.5 (1.752)	5.3 (0.209)
	Overrun clutch control valve spring		31742-31X60	48.9 (1.925)	7.0 (0.276)

CLUTCHES AND BRAKES

Model	31X23	31X60
Reverse clutch		
Number of drive plates	2	
Number of driven plates	2	
Drive plate thickness mm (in)		
Standard	2.0 (0.079)	
Allowable limit	1.8 (0.071)	
Clearance mm (in)		
Standard	0.5 - 0.8 (0.020 - 0.031)	
Allowable limit	1.2 (0.047)	
Thickness of retaining plates	Thickness mm (in)	Part number
	4.4 (0.173)	31537-31X00
	4.6 (0.181)	31537-31X01
	4.8 (0.189)	31537-31X02
	5.0 (0.197)	31537-31X03
	5.2 (0.205)	31537-31X04
High clutch		
Number of drive plates	5	7
Number of driven plates	3	4
Drive plate thickness mm (in)		
Standard	2.0 (0.079)	1.6 (0.063)
Allowable limit	1.8 (0.071)	1.4 (0.055)
Clearance mm (in)		
Standard	1.4 - 1.8 (0.055 - 0.071)	1.4 - 1.8 (0.055 - 0.071)
Allowable limit	2.4 (0.094)	2.6 (0.102)
Thickness of retaining plates	Thickness mm (in) / Part number	Thickness mm (in) / Part number
	3.6 (0.142) / 31537-31X10	3.6 (0.142) / 31537-31X10
	3.8 (0.150) / 31537-31X11	3.8 (0.150) / 31537-31X11
	4.0 (0.157) / 31537-31X12	4.0 (0.157) / 31537-31X12
	4.2 (0.165) / 31537-31X13	4.2 (0.165) / 31537-31X13
	4.4 (0.173) / 31537-31X14	4.4 (0.173) / 31537-31X14
	4.6 (0.181) / 31537-31X15	4.6 (0.181) / 31537-31X15
	4.8 (0.189) / 31537-31X16	4.8 (0.189) / 31537-31X16
		5.0 (0.197) / 31537-31X17

Model	31X23	31X60
Forward clutch		
Number of drive plates	5	
Number of driven plates	5	
Drive plate thickness mm (in)		
Standard	1.8 (0.071)	
Allowable limit	1.6 (0.063)	
Clearance mm (in)		
Standard	1.0 - 1.4 (0.039 - 0.055)	
Allowable limit	1.85 (0.0728)	
Thickness of retaining plate	Thickness mm (in)	Part number
	3.6 (0.142)	31537-31X60
	3.8 (0.150)	31537-31X61
	4.0 (0.157)	31537-31X62
	4.2 (0.165)	31537-31X63
	4.4 (0.173)	31537-31X64
	4.6 (0.181)	31537-31X65
Overrun clutch		
Number of drive plates	5	
Number of driven plates	3	
Drive plate thickness mm (in)		
Standard	1.6 (0.063)	
Allowable limit	1.4 (0.055)	
Clearance mm (in)		
Standard	1.0 - 1.4 (0.039 - 0.055)	
Allowable limit	1.45 (0.0571)	
Thickness of retaining plate	Thickness mm (in)	Part number
	3.6 (0.142)	31537-31X70
	3.8 (0.150)	31537-31X71
	4.0 (0.157)	31537-31X72
	4.2 (0.165)	31537-31X73
	4.4 (0.173)	31537-31X74

Model	31X23	31X60
Low & reverse brake		
Number of drive plates	5	
Number of driven plates	5	
Drive plate thickness mm (in)		
Standard	2.0 (0.079)	
Allowable limit	1.8 (0.071)	
Clearance mm (in)		
Standard	1.4 - 1.8 (0.055 - 0.071)	
Allowable limit	2.8 (0.110)	
Thickness of retaining plate	Thickness mm (in)	Part number
	3.6 (0.142)	31667-31X10
	3.8 (0.150)	31667-31X11
	4.0 (0.157)	31667-31X12
	4.2 (0.165)	31667-31X13
	4.4 (0.173)	31667-31X14
	4.6 (0.181)	31667-31X15
Brake band		
Anchor end bolt tightening torque N·m (kg-m, ft-lb)	4 - 6 (0.4 - 0.6, 2.9 - 4.3)	
Number of returning revolutions for anchor end bolt	2.5 ± 0.125	
Lock nut tightening torque N·m (kg-m, ft-lb)	31 - 42 (3.2 - 4.3, 23 - 31)	

Clutch and brake return springs

Unit: mm (in)

Parts		Free length	Outer diameter
Forward clutch (Overrun clutch) (16 pcs)	Outer	26.6 (1.047)	10.6 (0.417)
	Inner	26.3 (1.035)	7.7 (0.303)

OIL PUMP

Oil pump side clearance mm (in)	0.02 - 0.04 (0.0008 - 0.0016)	
Thickness of inner gears and outer gears	Inner gear	
	Thickness mm (in)	Part number
	9.99 - 10.00 (0.3933 - 0.3937)	31346-31X00
	9.98 - 9.99 (0.3929 - 0.3933)	31346-31X01
	9.97 - 9.98 (0.3925 - 0.3929)	31346-31X02
	Outer gear	
	Thickness mm (in)	Part number
	9.99 - 10.00 (0.3933 - 0.3937)	31347-31X00
	9.98 - 9.99 (0.3929 - 0.3933)	31347-31X01
	9.97 - 9.98 (0.3925 - 0.3929)	31347-31X02
Clearance between oil pump housing and outer gear mm (in)		
Standard	0.08 - 0.15 (0.0031 - 0.0059)	
Allowable limit	0.15 (0.0059)	
Oil pump cover seal ring clearance mm (in)		
Standard	0.07 - 0.19 (0.0028 - 0.0075)	
Allowable limit	0.19 (0.0075)	

INPUT SHAFT

Input shaft seal ring clearance mm (in)	
Standard	0.08 - 0.23 (0.0031 - 0.0091)
Allowable limit	0.23 (0.0091)

PLANETARY CARRIER

Clearance between planetary carrier and pinion washer mm (in)	
Standard	0.15 - 0.70 (0.0059 - 0.0276)
Allowable limit	0.80 (0.0315)

FINAL DRIVE — RL4F03A

Differential side gear clearance

Clearance between side gear and differential case with washer mm (in)	0.1 - 0.2 (0.004 - 0.008)

Differential side gear thrust washers

Thickness mm (in)	Part number
0.75 - 0.80 (0.0295 - 0.0315)	38424-D2111
0.80 - 0.85 (0.0315 - 0.0335)	38424-D2112
0.85 - 0.90 (0.0335 - 0.0354)	38424-D2113
0.90 - 0.95 (0.0354 - 0.0374)	38424-D2114
0.95 - 1.00 (0.0374 - 0.0394)	38424-D2115

Differential case end play

Differential case end play mm (in)	0 - 0.15 (0 - 0.0059)

Differential side bearing adjusting shims

Thickness mm (in)	Part number
0.44 (0.0173)	38454-M8000
0.48 (0.0189)	38454-M8001
0.56 (0.0220)	38454-M8003
0.60 (0.0236)	38454-M8004
0.64 (0.0252)	38454-M8005
0.68 (0.0268)	38454-M8006
0.72 (0.0283)	38454-M8007
0.76 (0.0299)	38454-M8008
0.80 (0.0315)	38454-M8009
0.84 (0.0331)	38454-M8010
0.88 (0.0346)	38454-M8011

FINAL DRIVE — RL4F03V

Differential side gear clearance

Clearance between side gear and differential case with washer mm (in)	0.1 - 0.2 (0.004 - 0.008)

Differential side gear thrust washers

Thickness mm (in)		Part number
Viscous coupling side	0.70 - 0.75 (0.0276 - 0.0295)	38424-D2110
	0.75 - 0.80 (0.0295 - 0.0315)	38424-D2111
	0.80 - 0.85 (0.0315 - 0.0335)	38424-D2112
	0.85 - 0.90 (0.0335 - 0.0354)	38424-D2113
	0.90 - 0.95 (0.0354 - 0.0374)	38424-D2114
	0.95 - 1.00 (0.0374 - 0.0394)	38424-D2115
	1.00 - 1.05 (0.0394 - 0.0413)	38424-D2116
	1.05 - 1.10 (0.0413 - 0.0433)	38424-D2117
	1.10 - 1.15 (0.0433 - 0.0453)	38424-D2118
	1.15 - 1.20 (0.0453 - 0.0472)	38424-D2119
	1.20 - 1.25 (0.0472 - 0.0492)	38424-D2120
	1.25 - 1.30 (0.0492 - 0.0512)	38424-D2121
	1.30 - 1.35 (0.0512 - 0.0531)	38424-D2122
Differential case side	0.75 - 0.80 (0.0295 - 0.0315)	38424-D2111
	0.80 - 0.85 (0.0315 - 0.0335)	38424-D2112
	0.85 - 0.90 (0.0335 - 0.0354)	38424-D2113
	0.90 - 0.95 (0.0354 - 0.0374)	38424-D2114
	0.95 - 1.00 (0.0374 - 0.0394)	38424-D2115

Bearing preload

Differential side bearing preload "T" mm (in)	0.04 - 0.09 (0.0016 - 0.0035)

Turning torque

Turning torque of final drive assembly N·m (kg-cm, in-lb)	0.49 - 1.08 (5.0 - 11.0, 4.3 - 9.5)

Differential side bearing adjusting shims

Thickness mm (in)	Part number
0.28 (0.0110)	31439-31X00
0.32 (0.0126)	31439-31X01
0.36 (0.0142)	31439-31X02
0.40 (0.0157)	31439-31X03
0.44 (0.0173)	31439-31X04
0.48 (0.0189)	31439-31X05
0.52 (0.0205)	31439-31X06
0.56 (0.0220)	31439-31X07
0.60 (0.0236)	31439-31X08
0.64 (0.0252)	31439-31X09
0.68 (0.0268)	31439-31X10
0.72 (0.0283)	31439-31X11
0.76 (0.0299)	31439-31X12
0.80 (0.0315)	31439-31X13
0.84 (0.0331)	31439-31X14
0.88 (0.0346)	31439-31X15
0.92 (0.0362)	31439-31X16
0.96 (0.0378)	31439-31X17
1.44 (0.0567)	31439-31X18

Table for selecting differential side bearing adjusting shim(s)

Unit: mm (in)

Dial indicator deflection	Suitable shim(s)
0.19 - 0.23 (0.0075 - 0.0091)	0.28 (0.0110)
0.23 - 0.27 (0.0091 - 0.0106)	0.32 (0.0126)
0.27 - 0.31 (0.0106 - 0.0122)	0.36 (0.0142)
0.31 - 0.35 (0.0122 - 0.0138)	0.40 (0.0157)
0.35 - 0.39 (0.0138 - 0.0154)	0.44 (0.0173)
0.39 - 0.43 (0.0154 - 0.0169)	0.48 (0.0189)
0.43 - 0.47 (0.0169 - 0.0185)	0.52 (0.0205)
0.47 - 0.51 (0.0185 - 0.0201)	0.56 (0.0220)
0.51 - 0.55 (0.0201 - 0.0217)	0.60 (0.0236)
0.55 - 0.59 (0.0217 - 0.0232)	0.64 (0.0252)
0.59 - 0.63 (0.0232 - 0.0248)	0.68 (0.0268)
0.63 - 0.67 (0.0248 - 0.0264)	0.72 (0.0283)
0.67 - 0.71 (0.0264 - 0.0280)	0.76 (0.0299)
0.71 - 0.75 (0.0280 - 0.0295)	0.80 (0.0315)
0.75 - 0.79 (0.0295 - 0.0311)	0.84 (0.0331)
0.79 - 0.83 (0.0311 - 0.0327)	0.88 (0.0346)
0.83 - 0.87 (0.0327 - 0.0343)	0.92 (0.0362)
0.87 - 0.91 (0.0343 - 0.0358)	0.48 (0.0189) + 0.48 (0.0189)
0.91 - 0.95 (0.0358 - 0.0374)	0.48 (0.0189) + 0.52 (0.0205)
0.95 - 0.99 (0.0374 - 0.0390)	0.52 (0.0205) + 0.52 (0.0205)
0.99 - 1.03 (0.0390 - 0.0406)	0.52 (0.0205) + 0.56 (0.0220)
1.03 - 1.07 (0.0406 - 0.0421)	0.56 (0.0220) + 0.56 (0.0220)
1.07 - 1.11 (0.0421 - 0.0437)	0.56 (0.0220) + 0.60 (0.0236)
1.11 - 1.15 (0.0437 - 0.0453)	0.60 (0.0236) + 0.60 (0.0236)
1.15 - 1.19 (0.0453 - 0.0469)	0.60 (0.0236) + 0.64 (0.0252)
1.19 - 1.23 (0.0469 - 0.0484)	0.64 (0.0252) + 0.64 (0.0252)
1.23 - 1.27 (0.0484 - 0.0500)	0.64 (0.0252) + 0.68 (0.0268)
1.27 - 1.31 (0.0500 - 0.0516)	0.68 (0.0268) + 0.68 (0.0268)
1.31 - 1.35 (0.0516 - 0.0531)	0.68 (0.0268) + 0.72 (0.0283)
1.35 - 1.39 (0.0531 - 0.0547)	1.44 (0.0567)
1.39 - 1.43 (0.0547 - 0.0563)	0.72 (0.0283) + 0.76 (0.0299)
1.43 - 1.47 (0.0563 - 0.0579)	0.76 (0.0299) + 0.76 (0.0299)
1.47 - 1.51 (0.0579 - 0.0594)	0.76 (0.0299) + 0.80 (0.0315)
1.51 - 1.55 (0.0594 - 0.0610)	0.80 (0.0315) + 0.80 (0.0315)
1.55 - 1.59 (0.0610 - 0.0626)	0.80 (0.0315) + 0.84 (0.0331)
1.59 - 1.63 (0.0626 - 0.0642)	0.84 (0.0331) + 0.84 (0.0331)
1.63 - 1.67 (0.0642 - 0.0657)	0.84 (0.0331) + 0.88 (0.0346)
1.67 - 1.71 (0.0657 - 0.0673)	0.88 (0.0346) + 0.88 (0.0346)
1.71 - 1.75 (0.0673 - 0.0689)	0.88 (0.0346) + 0.92 (0.0362)
1.75 - 1.79 (0.0689 - 0.0705)	0.92 (0.0362) + 0.92 (0.0362)
1.79 - 1.83 (0.0705 - 0.0720)	0.92 (0.0362) + 0.96 (0.0378)
1.83 - 1.87 (0.0720 - 0.0736)	0.96 (0.0378) + 0.96 (0.0378)
1.87 - 1.91 (0.0736 - 0.0752)	0.52 (0.0205) + 1.44 (0.0567)
1.91 - 1.95 (0.0752 - 0.0768)	0.56 (0.0220) + 1.44 (0.0567)

REDUCTION GEAR

Bearing preload

Reduction gear bearing preload mm (in)	0.05 (0.0020)

Turning torque

Turning torque of reduction gear N·m (kg-cm, in-lb)	0.11 - 0.69 (1.1 - 7.0, 0.95 - 6.08)

Reduction gear bearing adjusting shims

Thickness mm (in)	Part number
1.10 (0.0433)	31438-31X00
1.14 (0.0449)	31438-31X01
1.18 (0.0465)	31438-31X02
1.22 (0.0480)	31438-31X03
1.26 (0.0496)	31438-31X04
1.30 (0.0512)	31438-31X05
1.34 (0.0528)	31438-31X06
1.38 (0.0543)	31438-31X07
1.42 (0.0559)	31438-31X08
1.46 (0.0575)	31438-31X09
1.50 (0.0591)	31438-31X10
1.54 (0.0606)	31438-31X11
1.58 (0.0622)	31438-31X12
1.62 (0.0638)	31438-31X13
1.66 (0.0654)	31438-31X14
1.70 (0.0669)	31438-31X15
1.74 (0.0685)	31438-31X16
1.78 (0.0701)	31438-31X17
1.82 (0.0717)	31438-31X18
1.86 (0.0732)	31438-31X19
1.90 (0.0748)	31438-31X20
1.92 (0.0756)	31439-31X60
1.94 (0.0764)	31438-31X21
1.96 (0.0772)	31439-31X61
1.98 (0.0780)	31438-31X22
2.00 (0.0787)	31439-31X62
2.02 (0.0795)	31438-31X23
2.04 (0.0803)	31439-31X63
2.06 (0.0811)	31438-31X24
2.08 (0.0819)	31439-31X64
2.10 (0.0827)	31438-31X60
2.12 (0.0835)	31439-31X65
2.14 (0.0843)	31438-31X61
2.16 (0.0850)	31439-31X66
2.18 (0.0858)	31438-31X62
2.20 (0.0866)	31439-31X67
2.22 (0.0874)	31438-31X63
2.24 (0.0882)	31439-31X68
2.26 (0.0890)	31438-31X64
2.28 (0.0898)	31439-31X69
2.30 (0.0906)	31438-31X65
2.34 (0.0921)	31438-31X66
2.38 (0.0937)	31438-31X67
2.42 (0.0953)	31438-31X68
2.46 (0.0969)	31438-31X69
2.50 (0.0984)	31438-31X70
2.54 (0.1000)	31438-31X71
2.58 (0.1016)	31438-31X72
2.62 (0.1031)	31438-31X73
2.66 (0.1047)	31438-31X74
2.70 (0.1063)	31438-31X75
2.74 (0.1079)	31438-31X76
2.78 (0.1094)	31438-31X77
2.82 (0.1110)	31438-31X78

Table for selecting reduction gear bearing adjusting shim

Unit: mm (in)

Dimension "T"	Suitable shim(s)
1.13 - 1.17 (0.0445 - 0.0461)	1.10 (0.0433)
1.17 - 1.21 (0.0461 - 0.0476)	1.14 (0.0449)
1.21 - 1.25 (0.0476 - 0.0492)	1.18 (0.0465)
1.25 - 1.29 (0.0492 - 0.0508)	1.22 (0.0480)
1.29 - 1.33 (0.0508 - 0.0524)	1.26 (0.0496)
1.33 - 1.37 (0.0524 - 0.0539)	1.30 (0.0512)
1.37 - 1.41 (0.0539 - 0.0555)	1.34 (0.0528)
1.41 - 1.45 (0.0555 - 0.0571)	1.38 (0.0543)
1.45 - 1.49 (0.0571 - 0.0587)	1.42 (0.0559)
1.49 - 1.53 (0.0587 - 0.0602)	1.46 (0.0575)
1.53 - 1.57 (0.0602 - 0.0618)	1.50 (0.0591)
1.57 - 1.61 (0.0618 - 0.0634)	1.54 (0.0606)
1.61 - 1.65 (0.0634 - 0.0650)	1.58 (0.0622)
1.65 - 1.69 (0.0650 - 0.0665)	1.62 (0.0638)
1.69 - 1.73 (0.0665 - 0.0681)	1.66 (0.0654)
1.73 - 1.77 (0.0681 - 0.0697)	1.70 (0.0669)
1.77 - 1.81 (0.0697 - 0.0713)	1.74 (0.0685)
1.81 - 1.85 (0.0713 - 0.0728)	1.78 (0.0701)
1.85 - 1.89 (0.0728 - 0.0744)	1.82 (0.0717)
1.89 - 1.93 (0.0744 - 0.0760)	1.86 (0.0732)
1.93 - 1.97 (0.0760 - 0.0776)	1.90 (0.0748)
1.97 - 2.01 (0.0776 - 0.0791)	1.94 (0.0764)
2.01 - 2.05 (0.0791 - 0.0807)	1.98 (0.0780)
2.05 - 2.09 (0.0807 - 0.0823)	2.02 (0.0795)
2.09 - 2.13 (0.0823 - 0.0839)	2.06 (0.0811)
2.13 - 2.17 (0.0839 - 0.0854)	2.10 (0.0827)
2.17 - 2.21 (0.0854 - 0.0870)	2.14 (0.0843)
2.21 - 2.25 (0.0870 - 0.0886)	2.18 (0.0858)
2.25 - 2.29 (0.0886 - 0.0902)	2.22 (0.0874)
2.29 - 2.33 (0.0902 - 0.0917)	2.26 (0.0890)
2.33 - 2.37 (0.0917 - 0.0933)	2.30 (0.0906)
2.37 - 2.41 (0.0933 - 0.0949)	2.34 (0.0921)
2.41 - 2.45 (0.0949 - 0.0965)	2.38 (0.0937)
2.45 - 2.49 (0.0965 - 0.0980)	2.42 (0.0953)
2.49 - 2.53 (0.0980 - 0.0996)	2.46 (0.0969)
2.53 - 2.57 (0.0996 - 0.1012)	2.50 (0.0984)
2.57 - 2.61 (0.1012 - 0.1028)	2.54 (0.1000)
2.61 - 2.65 (0.1028 - 0.1043)	2.58 (0.1016)
2.65 - 2.69 (0.1043 - 0.1059)	2.62 (0.1031)
2.69 - 2.73 (0.1059 - 0.1075)	2.66 (0.1047)
2.73 - 2.77 (0.1075 - 0.1091)	2.70 (0.1063)
2.77 - 2.81 (0.1091 - 0.1106)	2.74 (0.1079)
2.81 - 2.85 (0.1106 - 0.1122)	2.78 (0.1094)
2.85 - 2.89 (0.1122 - 0.1138)	2.82 (0.1110)

Output shaft bearing adjusting spacers

Thickness mm (in)	Part number
5.62 (0.2213)	31437-31X00
5.66 (0.2228)	31437-31X01
5.70 (0.2244)	31437-31X02
5.74 (0.2260)	31437-31X03
5.78 (0.2276)	31437-31X04
5.82 (0.2291)	31437-31X05
5.86 (0.2307)	31437-31X06
5.90 (0.2323)	31437-31X07
5.94 (0.2339)	31437-31X08
5.98 (0.2354)	31437-31X09
6.02 (0.2370)	31437-31X10
6.06 (0.2386)	31437-31X11
6.10 (0.2402)	31437-31X12
6.14 (0.2417)	31437-31X13
6.18 (0.2433)	31437-31X14
6.22 (0.2449)	31437-31X15
6.26 (0.2465)	31437-31X16
6.30 (0.2480)	31437-31X17
6.34 (0.2496)	31437-31X18
6.38 (0.2512)	31437-31X19
6.42 (0.2528)	31437-31X20
6.46 (0.2543)	31437-31X21
6.50 (0.2559)	31437-31X22
6.54 (0.2575)	31437-31X23
6.58 (0.2591)	31437-31X24
6.62 (0.2606)	31437-31X60
6.64 (0.2614)	31437-31X78
6.66 (0.2622)	31437-31X61
6.68 (0.2630)	31437-31X79
6.70 (0.2638)	31437-31X62
6.72 (0.2646)	31437-31X80
6.74 (0.2654)	31437-31X63
6.76 (0.2661)	31437-31X81
6.78 (0.2669)	31437-31X64
6.80 (0.2677)	31437-31X82
6.82 (0.2685)	31437-31X65
6.84 (0.2693)	31437-31X83
6.86 (0.2701)	31437-31X66
6.88 (0.2709)	31437-31X84
6.90 (0.2717)	31437-31X67
6.92 (0.2724)	31437-31X46
6.94 (0.2732)	31437-31X68
6.96 (0.2740)	31437-31X47
6.98 (0.2748)	31437-31X69
7.00 (0.2756)	31437-31X48
7.02 (0.2764)	31437-31X70
7.06 (0.2780)	31437-31X71
7.10 (0.2795)	31437-31X72
7.14 (0.2811)	31437-31X73
7.18 (0.2827)	31437-31X74
7.22 (0.2843)	31437-31X75

Table for selecting output shaft bearing adjusting spacer

Unit: mm (in)

Dimension "T"	Suitable spacer
5.65 - 5.69 (0.2224 - 0.2240)	5.62 (0.2213)
5.69 - 5.73 (0.2240 - 0.2256)	5.66 (0.2228)
5.73 - 5.77 (0.2256 - 0.2272)	5.70 (0.2244)
5.77 - 5.81 (0.2272 - 0.2287)	5.74 (0.2260)
5.81 - 5.85 (0.2287 - 0.2303)	5.78 (0.2276)
5.85 - 5.89 (0.2303 - 0.2319)	5.82 (0.2291)
5.89 - 5.93 (0.2319 - 0.2335)	5.86 (0.2307)
5.93 - 5.97 (0.2335 - 0.2350)	5.90 (0.2323)
5.97 - 6.01 (0.2350 - 0.2366)	5.94 (0.2339)
6.01 - 6.05 (0.2366 - 0.2382)	5.98 (0.2354)
6.05 - 6.09 (0.2382 - 0.2398)	6.02 (0.2370)
6.09 - 6.13 (0.2398 - 0.2413)	6.06 (0.2386)
6.13 - 6.17 (0.2413 - 0.2429)	6.10 (0.2402)
6.17 - 6.21 (0.2429 - 0.2445)	6.14 (0.2417)
6.21 - 6.25 (0.2445 - 0.2461)	6.18 (0.2433)
6.25 - 6.29 (0.2461 - 0.2476)	6.22 (0.2449)
6.29 - 6.33 (0.2476 - 0.2492)	6.26 (0.2465)
6.33 - 6.37 (0.2492 - 0.2508)	6.30 (0.2480)
6.37 - 6.41 (0.2508 - 0.2524)	6.34 (0.2496)
6.41 - 6.45 (0.2524 - 0.2539)	6.38 (0.2512)
6.45 - 6.49 (0.2539 - 0.2555)	6.42 (0.2528)
6.49 - 6.53 (0.2555 - 0.2571)	6.46 (0.2543)
6.53 - 6.57 (0.2571 - 0.2587)	6.50 (0.2559)
6.57 - 6.61 (0.2587 - 0.2602)	6.54 (0.2575)
6.61 - 6.65 (0.2602 - 0.2618)	6.58 (0.2591)
6.65 - 6.69 (0.2618 - 0.2634)	6.62 (0.2606)
6.69 - 6.73 (0.2634 - 0.2650)	6.66 (0.2622)
6.73 - 6.77 (0.2650 - 0.2665)	6.70 (0.2638)
6.77 - 6.81 (0.2665 - 0.2681)	6.74 (0.2654)
6.81 - 6.85 (0.2681 - 0.2697)	6.78 (0.2669)
6.85 - 6.89 (0.2697 - 0.2713)	6.82 (0.2685)
6.89 - 6.93 (0.2713 - 0.2728)	6.86 (0.2701)
6.93 - 6.97 (0.2728 - 0.2744)	6.90 (0.2717)
6.97 - 7.01 (0.2744 - 0.2760)	6.94 (0.2732)
7.01 - 7.05 (0.2760 - 0.2776)	6.98 (0.2748)
7.05 - 7.09 (0.2776 - 0.2791)	7.02 (0.2764)
7.09 - 7.13 (0.2791 - 0.2807)	7.06 (0.2780)
7.13 - 7.17 (0.2807 - 0.2823)	7.10 (0.2795)
7.17 - 7.21 (0.2823 - 0.2839)	7.14 (0.2811)
7.21 - 7.25 (0.2839 - 0.2854)	7.18 (0.2827)
7.25 - 7.29 (0.2854 - 0.2870)	7.22 (0.2843)

REVERSE CLUTCH END PLAY

Reverse clutch end play mm (in)	0.65 - 1.00 (0.0256 - 0.0394)

Thrust washers for adjusting reverse clutch end play

Thickness mm (in)	Part number
0.65 (0.0256)	31508-31X00
0.80 (0.0315)	31508-31X01
0.95 (0.0374)	31508-31X02
1.10 (0.0433)	31508-31X03
1.25 (0.0492)	31508-31X04
1.40 (0.0551)	31508-31X05
1.55 (0.0610)	31508-31X06

ACCUMULATOR

O-ring

Unit: mm (in)

Accumulator	Diameter (Small)	Diameter (Large)
3-R accumulator	26.9 (1.059)	44.2 (1.740)
N-D accumulator	34.6 (1.362)	39.4 (1.551)

Return spring

Unit: mm (in)

Accumulator	Free length	Outer diameter
3-R accumulator spring	56.4 (2.220)	21.0 (0.827)
N-D accumulator spring	43.5 (1.713)	28.0 (1.102)

OUTPUT SHAFT — RL4F03A

Seal ring clearance

Output shaft seal ring clearance mm (in)	
Standard	0.10 - 0.25 (0.0039 - 0.0098)
Allowable limit	0.25 (0.0098)

Bearing preload

Output shaft bearing preload mm (in)	0.03 - 0.08 (0.0012 - 0.0031)

Turning torque

Turning torque of output shaft N·m (kg-cm, in-lb)	0.25 - 0.88 (2.5 - 9.0, 2.2 - 7.8)

BAND SERVO

Return spring

Unit: mm (in)

Return spring	Free length	Outer diameter
2nd servo return spring	32.5 (1.280)	25.9 (1.020)
O.D. servo return spring	31.0 (1.220)	21.7 (0.854)

OUTPUT SHAFT — RL4F03V

Seal ring clearance

Output shaft seal ring clearance mm (in)	
Standard	0.10 - 0.25 (0.0039 - 0.0098)
Allowable limit	0.25 (0.0098)

End play

Output shaft end play mm (in)	0 - 0.5 (0 - 0.020)

Output shaft adjusting shims

Thickness mm (in)	Part number
0.56 (0.0220)	31438-31X46
0.96 (0.0378)	31438-31X47
1.36 (0.0535)	31438-31X48

BEARING RETAINER

Seal ring clearance

Bearing retainer seal ring clearance mm (in)	
Standard	0.10 - 0.25 (0.0039 - 0.0098)
Allowable limit	0.25 (0.0098)

TOTAL END PLAY

Total end play mm (in)	0.25 - 0.55 (0.0098 - 0.0217)

Bearing race for adjusting total end play

Thickness mm (in)	Part number
0.6 (0.024)	31435-31X01
0.8 (0.031)	31435-31X02
1.0 (0.039)	31435-31X03
1.2 (0.047)	31435-31X04
1.4 (0.055)	31435-31X05
1.6 (0.063)	31435-31X06
1.8 (0.071)	31435-31X07
2.0 (0.079)	31435-31X08
2.2 (0.087)	31435-31X09