SERVICE SPECIFICATIONS

ERVICE DATE

il Pump

Body clearance	STD	0.07 - 0.15 mm	0.0028 - 0.0059 in.
	Maximum	0.3 mm	0.012 in.
Tip clearance	STD	0.11 - 0.14 mm	0.0043 - 0.0055 in.
	Maximum	0.3 mm	0.012 in.
Side clearance	STD	0.02 - 0.05 mm	0.0008 - 0.0020 in.
	Maximum	0.1 mm	0.004 in.
Pump body bushing inside diameter	Maximum	38.19 mm	1.5035 in.
Stator shaft bushing inside diameter			
Front side	Maximum	21.58 mm	0.8496 in.
Rear side	Maximum	23.10 mm	0.9094 in.

Overdrive Direct Clutch

Clutch drum bushing inside diameter	Maximum	23.14 mm	0.9110 in.
Overdrive direct clutch piston stroke		1.77 - 2.58 mm	0.0697 - 0.1016 in.
Overdrive planetary gear bushing	Maximum	11.27 mm	0.4437 in.
Planetary pinion gear thrust clearance	STD	0.20 - 0.50 mm	0.0079 - 0.0197 in.

Overdrive Brake

Pack clearance	0.35 - 1.91 mm	0.0138 - 0.0752 in.

Front Clutch

Piston stroke	1.40 - 2.48 mm	0.0551 - 0.0976 in.
Flange thickness	1.8 mm	0.071 in.
	2.0 mm	0.079 in.

Rear Clutch

Piston stroke	0.90 - 1.75 mm	0.0354 - 0.0689 in.

No. 1 Brake

Piston stroke		0.80 - 1.73 mm	0.0315 - 0.0681 in.
Center support bushing inside diameter	Maximum	36.46 mm	1.4354 in.

No. 2 Brake

Piston stroke	1.01 - 2.25 mm	0.0398 - 0.0886 in.

Planetary Sun Gear

Maximum inside diameter	21.58 mm	0.8496 in.

Front Planetary Gear

Planetary pinion gear thrust clearance	0.20 - 0.50 mm	0.0079 - 0.0197 in.

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Rear Planetary Gear

Planetary pinion gear thrust clearance	0.20 - 0.50 mm	0.0079 - 0.0197 in.

No. 3 Brake

Pack clearance	0.61 - 2.64 mm	0.0240 - 0.1039 in.

Valve Body Spring

Spring	Free length and Coil outer diameter mm (in.)		Total No. of coils and Color	
(Front upper valve body)				
Secondary regulator valve	71.3 (2.807)	17.4 (0.685)	17.0	Green
Down shift plug	39.6 (1.590)	10.9 (0.429)	11.4	Green
Throttle valve	21.9 (0.862)	8.6 (0.339)	10.0	None
Cut-back valve	23.0 (0.906)	6.9 (0.272)	12.5	Green
(Rear upper valve body)				
2 - 3 shift valve	29.2 (1.150)	8.9 (0.350)	12.0	Blue
3 - 4 shift valve	29.2 (1.150)	8.9 (0.350)	12.0	Blue
1 - 2 shift valve	29.2 (1.150)	8.9 (0.350)	12.0	Blue
Reverse clutch sequence valve	37.6 (1.480)	9.2 (0.362)	16.5	None
(Lower valve body)				
Low coast modulator valve	42.4 (1.669)	9.2 (0.362)	17.0	None
Check ball (Cooler return)	13.7 (0.539)	10.5 (0.413)	10.0	None
Cooler by-pass valve	28.0 (1.102)	13.6 (0.535)	8.0	Blue
Check ball (Damping check ball)	20.0 (0.787)	5.0 (0.196)	18.0	None
Intermediate modulator valve	35.4 (1.394)	8.8 (0.346)	16.4	Red
Lock-up relay valve	32.6 (1.283)	11.4 (0.449)	10.3	Green
Pressure relief valve	32.1 (1.264)	13.1 (0.516)	11.0	None
Primary regulator valve	50.3 (1.980)	17.0 (0.669)	12.5	Blue

Valve Body Key

Retainer	Height mm (in.)	Width mm (in.)	Thickness mm (in.)
(Front upper valve body)			
Cut-back valve	19.0 (0.748)	5.0 (0.197)	3.2 (0.126)
(Rear upper valve body)			
2 - 3 shift valve	10.0 (0.394)	5.0 (0.197)	3.2 (0.126)
3 - 4 shift valve	10.0 (0.394)	5.0 (0.197)	3.2 (0.126)
(Lower valve body)			
Primary regulator valve	17.5 (0.689)	14.0 (0.551)	3.2 (0.126)

Transmission Case

Transmission case bushing	Maximum	38.19 mm	1.5035 in.

Extension Housing

Extension housing bushing	Maximum	38.09 mm	1.4996 in.

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utput Shaft

End play		0.3 - 0.9 mm	0.012 - 0.035 in.
Output shaft bushing	Maximum	18.08 mm	0.7118 in.

ccumulator Spring

Spring	Free length / Outer diameter mm (in.)	Color
C_1	64.4 (2.535) / 17.5 (0.689)	None
C_2	57.4 (2.260) / 15.9 (0.626)	None
B_2	32.0 (1.260) / 15.4 (0.606)	Yellow

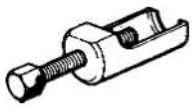
TORQUE SPECIFICATION

Part tightened		N-m	kgf-cm	ft-lbf
Stator shaft · Oil pump body		7.4	75	65 in.-lbf
Lower valve body · Front upper valve body		5.4	55	48 in.-lbf
Lower valve body · Rear upper valve body		5.4	55	48 in.-lbf
Center support · Transmission case		25	260	19
Transmission housing · Transmission case	10 mm bolt	34	345	25
	12 mm bolt	57	580	42
Oil pump · Transmission case		21	215	16
Parking lock pawl bracket		7.4	75	65 in.-lbf
Valve body · Transmission case		10	100	7
Oil strainer · Valve body		5.4	55	48 in.-lbf
Oil pan · Transmission case		4.4	45	39 in.-lbf
Governor body lock plate		3.9	40	35 in.-lbf
Extension housing · Transmission case		34	345	25
Union		34	345	25
Park/Neutral position switch		3.9	40	35 in.-lbf
Park/Neutral position switch adjusting bolt		5.4	55	48 in.-lbf

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PREPARATION

SST (SPECIAL SERVICE TOOLS)

	09350 - 20015	TOYOTA Automatic Transmission Tool Set	
	(09350 - 06120)	No. 2 Measure Terminal	
	(09361 - 30011)	Manual Valve Lever Shaft Oil Seal Replacer	
	(09362 - 30011)	Guide Bolt	
	(09363 - 20010)	Oil Pump Body Setting Band	
	(09369 - 20040)	Piston Spring Compressor Set	
	(09370 - 12010)	Clutch Drum Thrust Play Gauge	
	09350 - 30020	TOYOTA Automatic Transmission Tool Set	
	(09350 - 07080)	Brake Reaction Sleeve Puller	
	(09350 - 07090)	Brake No. 1 Piston Puller	
	09610 - 20012	Pitman Arm Puller	Remove the oil pump.

RECOMMENDED TOOLS

	09031 - 00030	Pin Punch	

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QUIPMENT

Feeler gauge	
Vernier calipers	
Dial indicator or dial indicator with magnetic base	
Dial indicator	
Straight edge	
Torque wrench	
Cylinder gauge	

LUBRICANT

Item	Capacity	Classification
Dry fill Drain and refill	5.7 liters (6.0 US qts, 5.0 Imp. qts) 2.4 liters (2.5 US qts, 2.1 Imp. qts)	ATF DEXRON◆ II

SSM (SPECIAL SERVICE MATERIALS)

08833 - 00080	Adhesive 1344, THREE BOND 1344, LOCTITE 242 or equivalent	Oil pump set bolt Extension housing set bolt

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SERVICE SPECIFICATIONS

SERVICE DATE

Oil Pump

Body clearance	STD	0.07 - 0.15 mm	0.0028 - 0.0059 in.
	Maximum	0.3 mm	0.012 in.
Tip clearance	STD	0.11 - 0.14 mm	0.0043 - 0.0055 in.
	Maximum	0.3 mm	0.012 in.
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	Maximum	0.1 mm	0.004 in.
Pump body bushing inside diameter	Maximum	38.19 mm	1.5035 in.
Stator shaft bushing inside diameter			
Front side	Maximum	21.58 mm	0.8496 in.
Rear side	Maximum	23.10 mm	0.9094 in.

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Clutch drum bushing inside diameter	Maximum	23.14 mm	0.9110 in.
Overdrive direct clutch piston stroke		1.77 - 2.58 mm	0.0697 - 0.1016 in.
Overdrive planetary gear bushing	Maximum	11.27 mm	0.4437 in.
Planetary pinion gear thrust clearance	STD	0.20 - 0.50 mm	0.0079 - 0.0197 in.

Overdrive Brake

Pack clearance	0.35 - 1.91 mm	0.0138 - 0.0752 in.

Front Clutch

Piston stroke	1.40 - 2.48 mm	0.0551 - 0.0976 in.
Flange thickness	1.8 mm	0.071 in.
	2.0 mm	0.079 in.

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Piston stroke	0.90 - 1.75 mm	0.0354 - 0.0689 in.

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Piston stroke		0.80 - 1.73 mm	0.0315 - 0.0681 in.
Center support bushing inside diameter	Maximum	36.46 mm	1.4354 in.

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Piston stroke	1.01 - 2.25 mm	0.0398 - 0.0886 in.

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o. 3 Brake

Pack clearance	0.61 - 2.64 mm	0.0240 - 0.1039 in.

Valve Body Spring

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Throttle valve	21.9 (0.862)	8.6 (0.339)	10.0	None
Cut-back valve	23.0 (0.906)	6.9 (0.272)	12.5	Green
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3 - 4 shift valve	29.2 (1.150)	8.9 (0.350)	12.0	Blue
1 - 2 shift valve	29.2 (1.150)	8.9 (0.350)	12.0	Blue
Reverse clutch sequence valve	37.6 (1.480)	9.2 (0.362)	16.5	None
(Lower valve body)				
Low coast modulator valve	42.4 (1.669)	9.2 (0.362)	17.0	None
Check ball (Cooler return)	13.7 (0.539)	10.5 (0.413)	10.0	None
Cooler by-pass valve	28.0 (1.102)	13.6 (0.535)	8.0	Blue
Check ball (Damping check ball)	20.0 (0.787)	5.0 (0.196)	18.0	None
Intermediate modulator valve	35.4 (1.394)	8.8 (0.346)	16.4	Red
Lock-up relay valve	32.6 (1.283)	11.4 (0.449)	10.3	Green
Pressure relief valve	32.1 (1.264)	13.1 (0.516)	11.0	None
Primary regulator valve	50.3 (1.980)	17.0 (0.669)	12.5	Blue

Valve Body Key

Retainer	Height mm (in.)	Width mm (in.)	Thickness mm (in.)
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Cut-back valve	19.0 (0.748)	5.0 (0.197)	3.2 (0.126)
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(Lower valve body)			
Primary regulator valve	17.5 (0.689)	14.0 (0.551)	3.2 (0.126)

Transmission Case

Transmission case bushing	Maximum	38.19 mm	1.5035 in.

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utput Shaft

End play		0.3 - 0.9 mm	0.012 - 0.035 in.
Output shaft bushing	Maximum	18.08 mm	0.7118 in.

ccumulator Spring

Spring	Free length / Outer diameter mm (in.)	Color
C_1	64.4 (2.535) / 17.5 (0.689)	None
C_2	57.4 (2.260) / 15.9 (0.626)	None
B_2	32.0 (1.260) / 15.4 (0.606)	Yellow

TORQUE SPECIFICATION

Part tightened		N-m	kgf-cm	ft-lbf
Stator shaft · Oil pump body		7.4	75	65 in.-lbf
Lower valve body · Front upper valve body		5.4	55	48 in.-lbf
Lower valve body · Rear upper valve body		5.4	55	48 in.-lbf
Center support · Transmission case		25	260	19
Transmission housing · Transmission case	10 mm bolt	34	345	25
	12 mm bolt	57	580	42
Oil pump · Transmission case		21	215	16
Parking lock pawl bracket		7.4	75	65 in.-lbf
Valve body · Transmission case		10	100	7
Oil strainer · Valve body		5.4	55	48 in.-lbf
Oil pan · Transmission case		4.4	45	39 in.-lbf
Governor body lock plate		3.9	40	35 in.-lbf
Transfer adapter · Transmission case		34	345	25
Transfer adapter · Transfer		45	455	33
Elbow		34	350	25
A/T oil temperature sensor · Front elbow		34	350	25
Park/Neutral position switch		3.9	40	35 in.-lbf
Park/Neutral position switch adjusting bolt		5.4	55	48 in.-lbf

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PREPARATION

SST (SPECIAL SERVICE TOOLS)

	09350 - 20015	TOYOTA Automatic Transmission Tool Set	
	(09350 - 06120)	No. 2 Measure Terminal	
	09361 - 30011	Manual Valve Lever Shaft Oil Seal Replacer	
	(09362 - 30011)	Guide Bolt	
	09363 - 20010	Oil Pump Body Setting Band	
	(09369 - 20040)	Piston Spring Compressor Set	
	(09370 - 12010)	Clutch Drum Thrust Play Gauge	
	09350 - 30020	TOYOTA Automatic Transmission Tool Set	
	(09350 - 07080)	Brake Reaction Sleeve Puller	
	(09350 - 07090)	Brake No. 1 Piston Puller	
	09610 - 20012	Pitman Arm Puller	Remove the oil pump.

RECOMMENDED TOOLS

	09031 - 00030	Pin Punch	

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EQUIPMENT

Feeler gauge	
Vernier calipers	
Dial indicator or dial indicator with magnetic base	
Dial indicator	
Straight edge	
Torque wrench	
Cylinder gauge	

LUBRICANT

Item	Capacity	Classification
Dry fill	5.7 liters (6.0 US qts, 5.0 Imp. qts)	ATF DEXRON◆ II
Drain and refill	2.4 liters (2.5 US qts, 2.1 Imp. qts)	

SSM (SPECIAL SERVICE MATERIALS)

08833 - 00080	Adhesive 1344, THREE BOND 1344, LOCTITE 242 or equivalent	Oil pump set bolt Transfer adaptor set bolt

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ABBREVIATIONS USED IN THIS MANUAL

ATF	Automatic Transaxle Fluid
B_0	Overdrive Brake
B_1	No. 1 Brake
B_2	No. 2 Brake
B_3	No. 3 Brake
C_0	Overdrive Clutch
C_1	Front Clutch
C_2	Rear Clutch
D	Disc
F_0	O/D One-way Clutch
F_1	No. 1 One-way Clutch
F_2	No. 2 One-way Clutch
O/D	Overdrive
P	Plate
SSM	Special Service Materials
SST	Special Service Tools

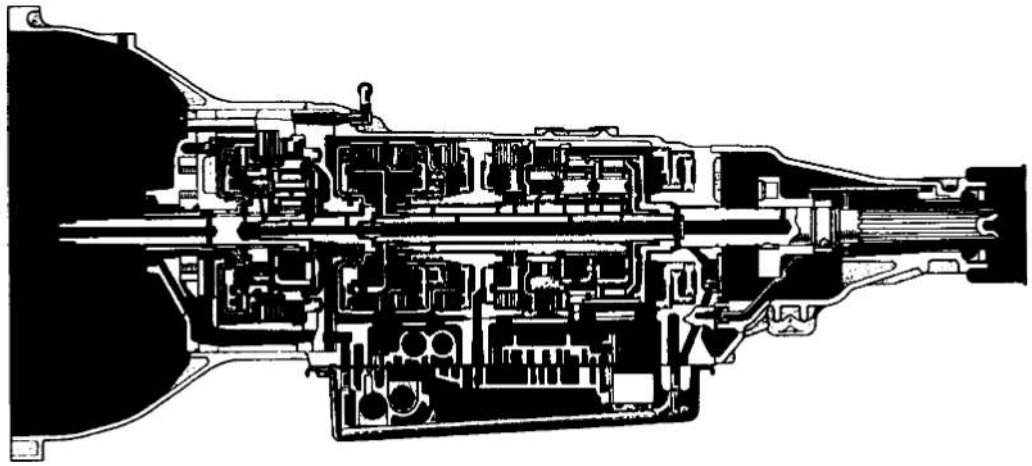
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DESCRIPTION

ENERAL

The A46DE is a 4-speed, Electronically Controlled Transmission with lock-up clutch mechanism developed exclusively for the PREVIA.
The A46DE automatic transmission is mainly composed of a torque converter clutch, an overdrive (hereafter called O/D) planetary gear unit, a 3-speed planetary gear unit, a hydraulic control system and an electronic control system.

Sectional View



Q00580

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ENERAL SPECIFICATIONS

Type of Transmission		A46DE
Type of Engine		2TZ-FE
Torque Converter Clutch Stall Torque Ratio		2.0 : 1
Lock-up Mechanism		Equipped
Gear Ratio	1st Gear	2.452
	2nd Gear	1.452
	3rd Gear	1.000
	O/D Gear	0.730
	Reverse Gear	2.212
Number of Discs and Plates	(Disc and Plate)	
	O/D Direct Clutch (C_0)	1/0
	Forward Clutch (C_1)	5/5
	Rear Clutch (C_2)	3/3
	No. 2 Brake (B_2)	3/3
	No. 3 Brake (B_3)	5/4
	O/D Brake (B_0)	3/3
	No. 1 Brake (B_1)	2/3
ATF Type		ATF DEXRON◆ II
Capacity (US qts, Imp. qts)	Total	5.7 (6.0, 5.0)
	Drain and Refill	2.4 (2.5, 2.1)

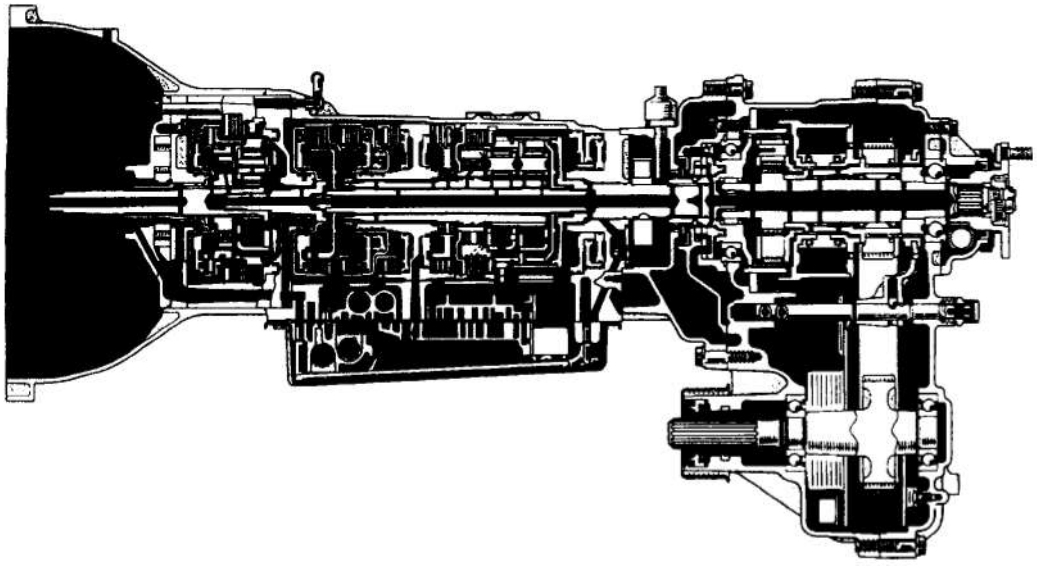
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DESCRIPTION

ENERAL

The A46DF is a 4-speed, Electronically Controlled Transmission with lock-up clutch mechanism developed exclusively for the PREVIA.
The A46DF automatic transmission is equipped with a full-time four-wheel drive transfer.
The A46DF automatic transmission is mainly composed of a torque converter clutch, an overdrive (hereafter called O/D) planetary gear unit, a 3-speed planetary gear unit, a hydraulic control system and an electronic control system.

Sectional View



Q00581

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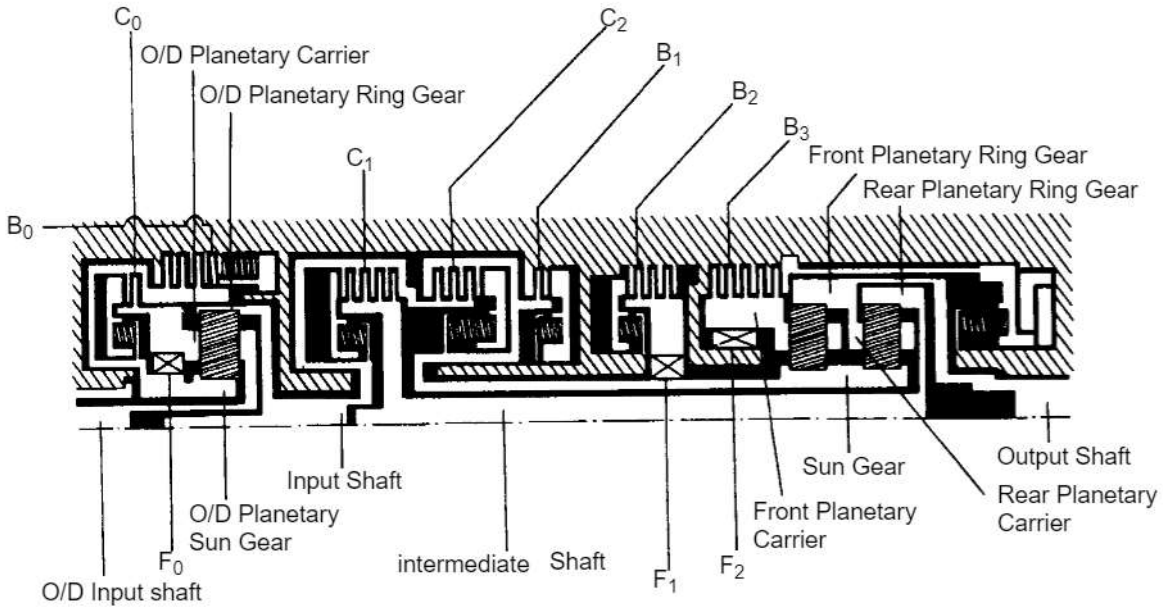
GENERAL SPECIFICATIONS

Type of Transmission		A46DF
Type of Engine		2TZ-FE
Torque Converter Clutch Stall Torque Ratio		2.0: 1
Lock-up Mechanism		Equipped
Gear Ratio	1st Gear	2.452
	2nd Gear	1.452
	3rd Gear	1.000
	O/D Gear	0.730
	Reverse Gear	2.212
Number of Discs and Plates	(Disc and Plate)	
	O/D Direct Clutch (C_0)	1 / 0
	Forward Clutch (C_1)	5/5
	Rear Clutch (C_2)	3/3
	No. 2 Brake (B_2)	3/3
	No. 3 Brake (B_2)	5/4
	O/D Brake (B_0)	3/3
	No. 1 Brake (B_1)	2/3
ATF Type		ATF DEXRON◆ II
Capacity (US qts, Imp. qts)	Total	5.7 (6.0, 5.0)
	Drain and Refill	2.4 (2.5, 2.1)

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OPERATION

. OPERATING CONDITIONS



AT3283

Ring (i.e., Shift Lever Position)	Gear	No. 1 Solenoid Valve	No. 2 Solenoid Valve	C_0	C_1	C_2		B_0	B_1	B_2	B_3		F_0	F_1	F_2
						I.P.	O.P.				I.P.	O.P.			
P	Parking	—	—	○							○	○	○		
R	Reverse	—	—	○		○	○				○	○	○		
N	Neutral	—	—	○									○		
D	1st	ON	OFF	○	○								○		○
	2nd	ON	ON	○	○					○			○	○	
	3rd	OFF	ON	○	○		○			○			○		
	O/D	OFF	OFF		○		○	○		○					
2	1st	ON	OFF	○	○								○		○
	2nd	ON	ON	○	○				○	○			○	○	
L	1st	ON	OFF	○	○						○	○	○		○

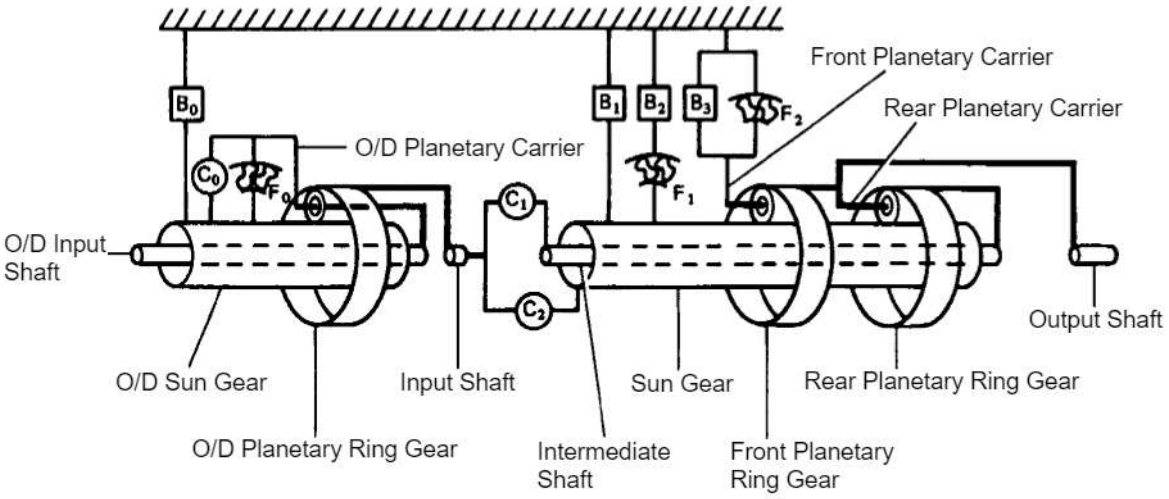
I.P.....Inner Piston
O.P. .....Outer Piston

V02873

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. FUNCTION OF COMPONENTS

COMPONENT	FUNCTION
O/D Direct Clutch (C_0)	Connects overdrive sun gear and overdrive carrier
O/D Brake (B_0)	Prevents overdrive sun gear from turning either clockwise or counterclockwise
O/D One-Way Clutch (F_0)	When transmission is being driven by engine, connects overdrive sun gear and overdrive carrier
Front Clutch (C_1)	Connects input shaft and intermediate shaft
Rear Clutch (C_2)	Connects input shaft and front & rear planetary sun gear
No. 1 Brake (B_1)	Prevents front & rear planetary sun gear from turning either clockwise or counterclockwise
No. 2 Brake (B_2)	Prevents outer race of F_1 from turning either clockwise or counterclockwise, thus preventing front & rear planetary sun gear from turning counterclockwise
No. 3 Brake (B_3)	Prevents front planetary carrier from turning either clockwise or counterclockwise
No. 1 One-Way Clutch (F_1)	When B_2 is operating, prevents front & rear planetary sun gear from turning counterclockwise
No. 2 One-Way Clutch (F_2)	Prevents front planetary carrier from turning counterclockwise



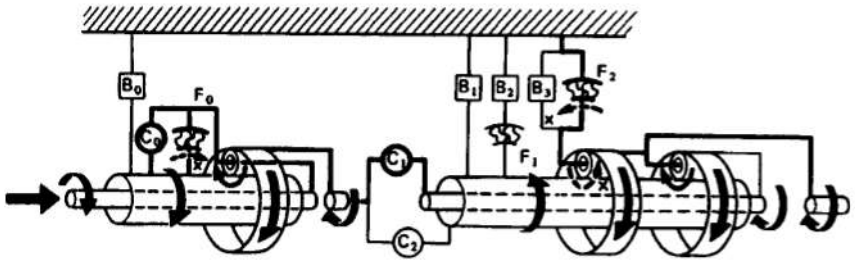
AT3282

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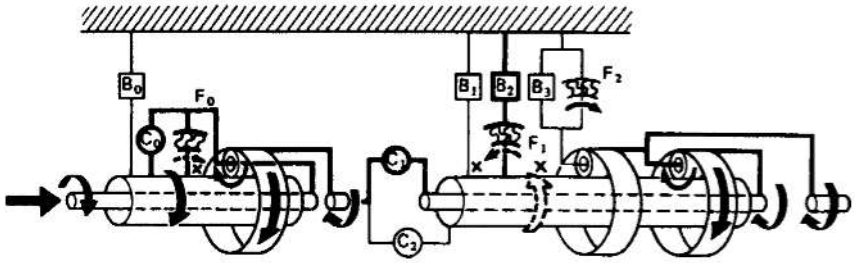
The conditions of operation for each gear position are shown in the following illustrations:

D or 2 Position 1st Gear



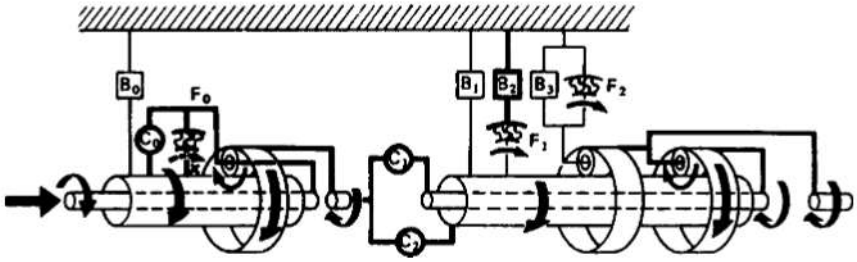
AT7802

D Position 2nd Gear



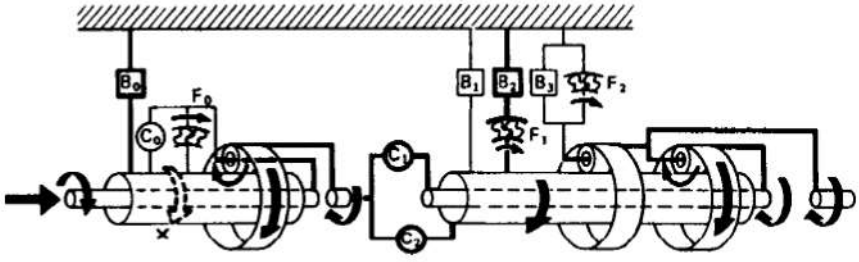
AT7803

D or 2 Position 3rd Gear



AT7804

D Position O/D

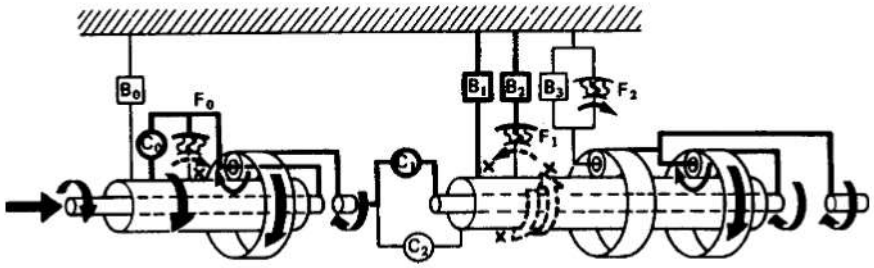


AT7805

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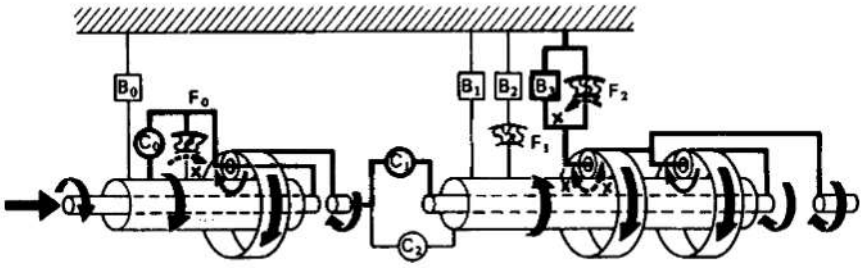
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2 or L Position 2nd Gear



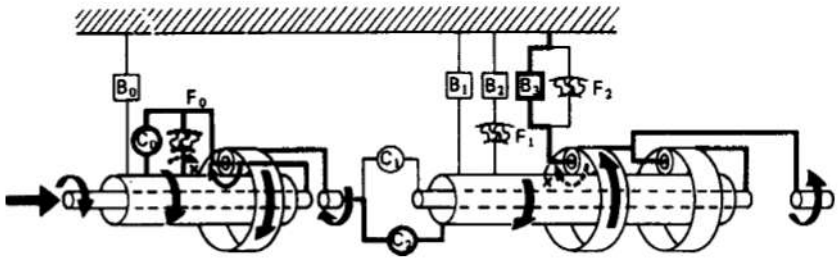
AT7806

L Position 1st Gear



AT7807

R Position Reverse Gear



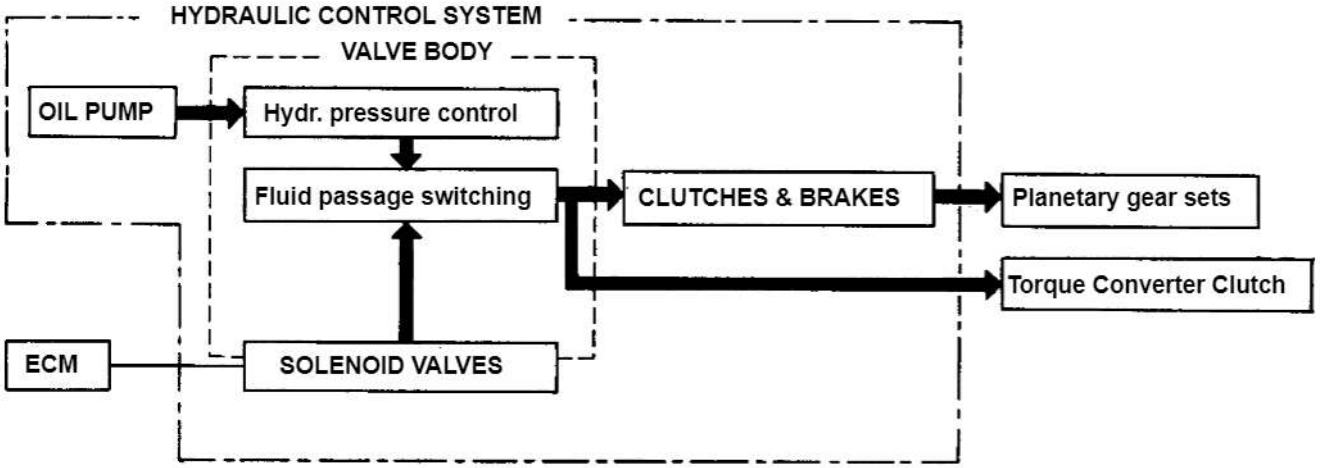
AT7808

V02759

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. HYDRAULIC CONTROL SYSTEM

The hydraulic control system is composed of the oil pump, the valve body, the governor body, the accumulators, the clutches and brakes as well as the fluid passage which connect all of these components. Based in the hydraulic pressure created by the oil pump, the hydraulic control system governs the hydraulic pressure acting on the torque converter clutch, clutches and brakes in accordance with the vehicle driving conditions.
There are three solenoid valves on the valve body.
The No. 1 and No. 2 solenoid valves are turned on and off by signals from the ECM to operate the shift valves and change the gear shift position.
The No. 3 solenoid valve is operated by signals from the ECM to engage or disengage the lockup clutch of the torque converter clutch.



V01537

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. ELECTRONIC CONTROL SYSTEM

The electronic control system, which controls the shift points and the operation of the lock-up clutch, is composed of the following three parts:

1. Sensors

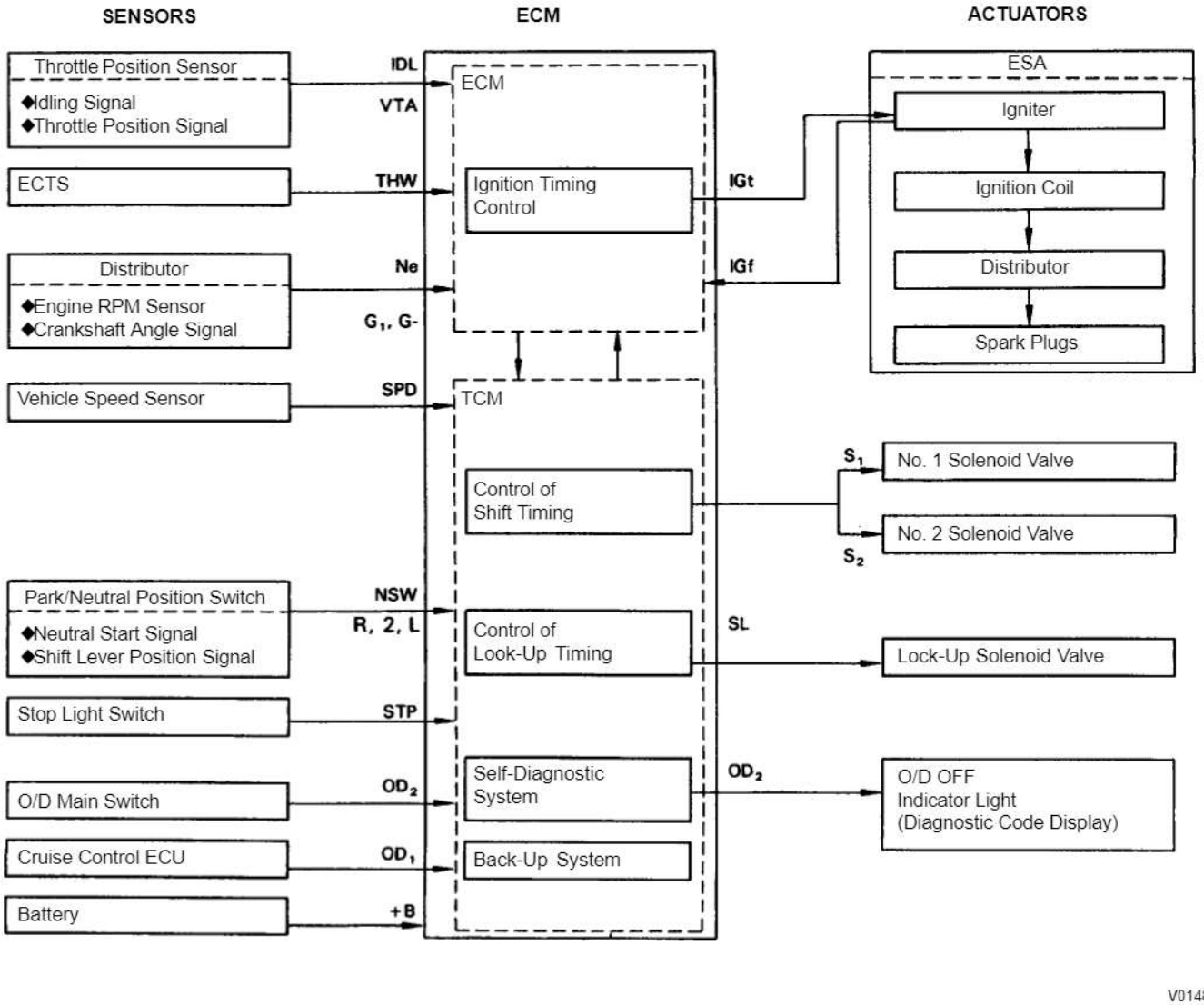
These sensors sense the vehicle speed, throttle opening and other conditions and send these data to the ECM in the form of electrical signals.

2. ECM

The ECM determines the shift and lock-up timing based upon the signals from sensors, and controls the solenoid valves of the hydraulic control unit accordingly.

3. Actuators

These are three solenoid valves that control hydraulic pressure acting on the hydraulic valves to control shifting and lock-up timing.

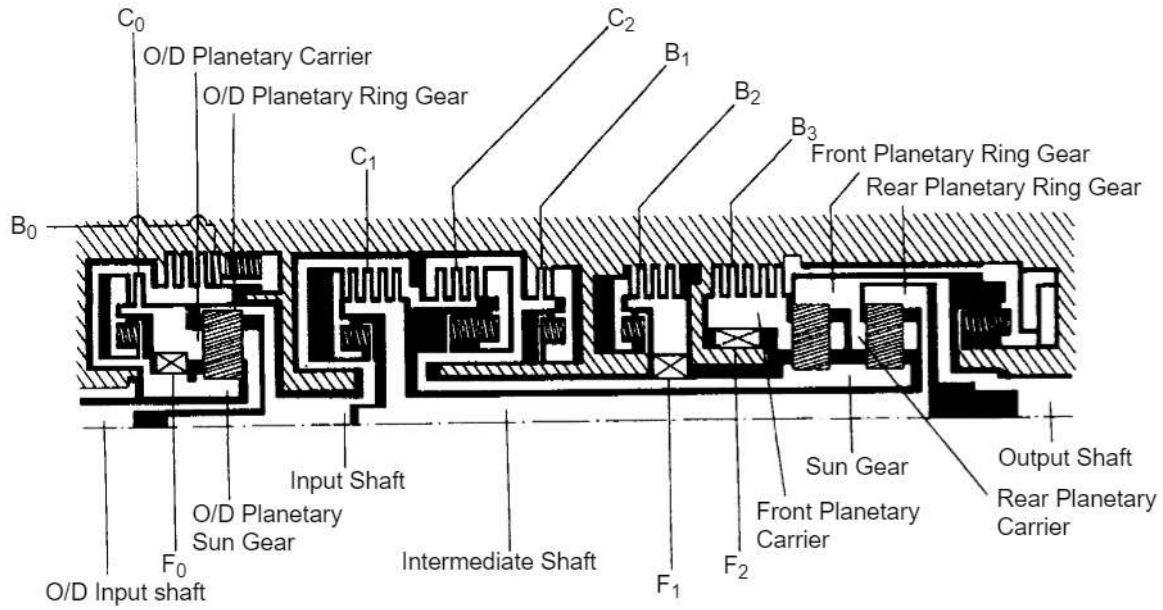


V01480

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OPERATION

. OPERATING CONDITIONS



AT3283

Ring (i.e., Shift Lever Position)	Gear	No. 1 Solenoid Valve	No. 2 Solenoid Valve	C_0	C_1	C_2		B_0	B_1	B_2	B_3		F_0	F_1	F_2
						I.P.	O.P.				I.P.	O.P.			
P	Parking	—	—	○							○	○	○		
R	Reverse	—	—	○		○	○				○	○	○		
N	Neutral	—	—	○									○		
D	1st	ON	OFF	○	○								○		○
	2nd	ON	ON	○	○					○			○	○	
	3rd	OFF	ON	○	○		○			○			○		
	O/D	OFF	OFF		○		○	○		○					
2	1st	ON	OFF	○	○								○		○
	2nd	ON	ON	○	○				○	○			○	○	
L	1st	ON	OFF	○	○						○	○	○		○

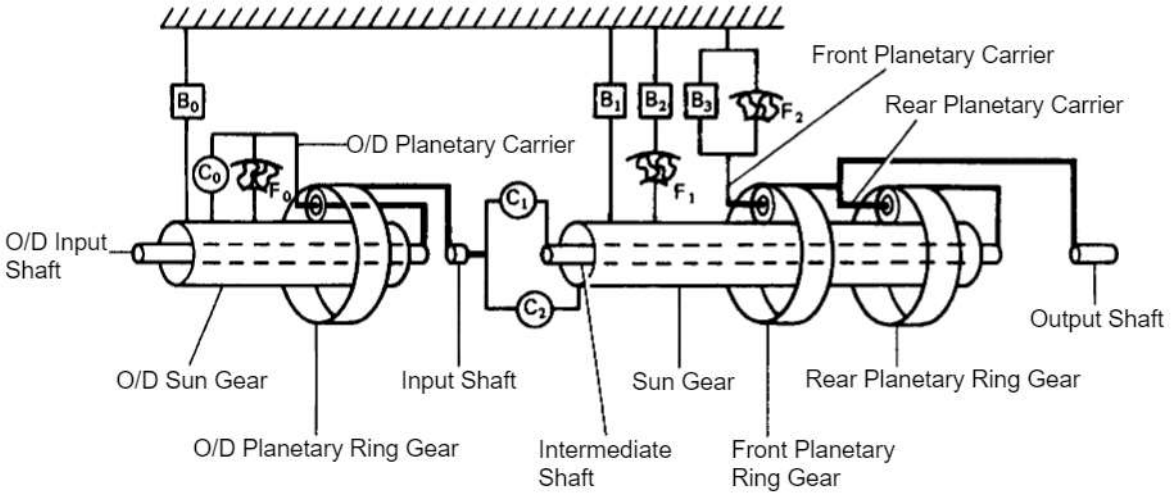
I.P.....Inner Piston
O.P. .....Outer Piston

V02873

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. FUNCTION OF COMPONENTS

COMPONENT	FUNCTION
O/D Direct Clutch (C_0)	Connects overdrive sun gear and overdrive carrier
O/D Brake (B_0)	Prevents overdrive sun gear from turning either clockwise or counterclockwise
O/D One-Way Clutch (F_0)	When transmission is being driven by engine, connects overdrive sun gear and overdrive carrier
Front Clutch (C_1)	Connects input shaft and intermediate shaft
Rear Clutch (C_2)	Connects input shaft and front & rear planetary sun gear
No. 1 Brake (B_1)	Prevents front & rear planetary sun gear from turning either clockwise or counterclockwise
No. 2 Brake (B_2)	Prevents outer race of F_1 from turning either clockwise or counterclockwise, thus preventing front & rear planetary sun gear from turning counterclockwise
No. 3 Brake (B_3)	Prevents front planetary carrier from turning either clockwise or counterclockwise
No. 1 One-Way Clutch (F_1)	When B_2 is operating, prevents front & rear planetary sun gear from turning counterclockwise
No. 2 One-Way Clutch (F_2)	Prevents front planetary carrier from turning counterclockwise



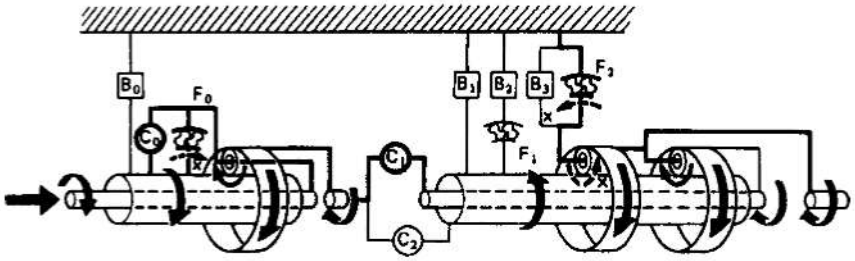
AT3282

V02760

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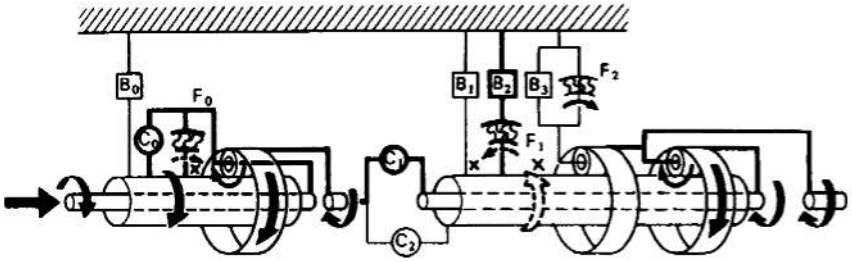
The conditions of operation for each gear position are shown in the following illustrations:

D or 2 Position 1st Gear



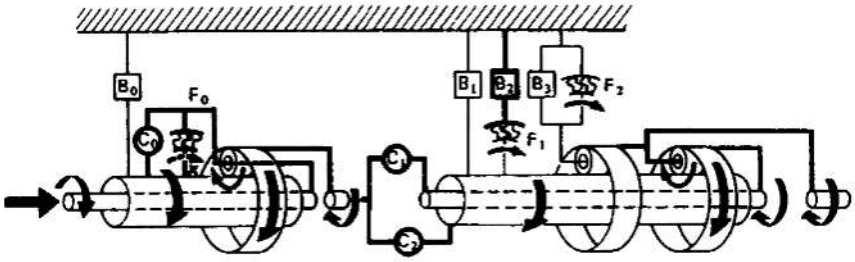
AT7802

D Position 2nd Gear



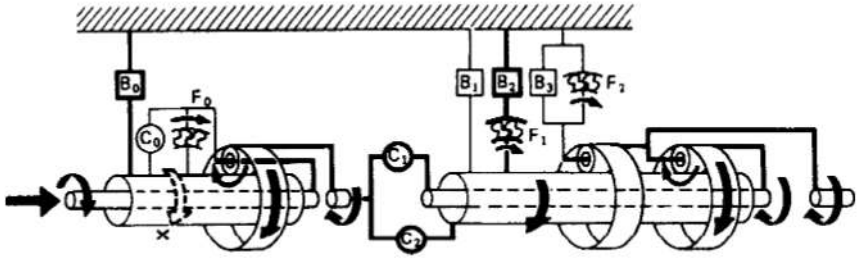
AT7803

D or 2 Position 3rd Gear



AT7804

D Position O/D

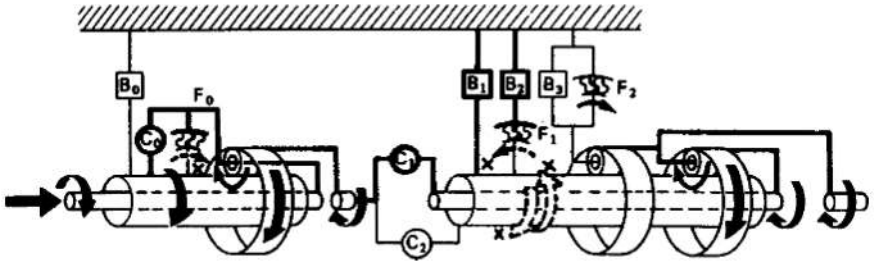


AT7805

V02761

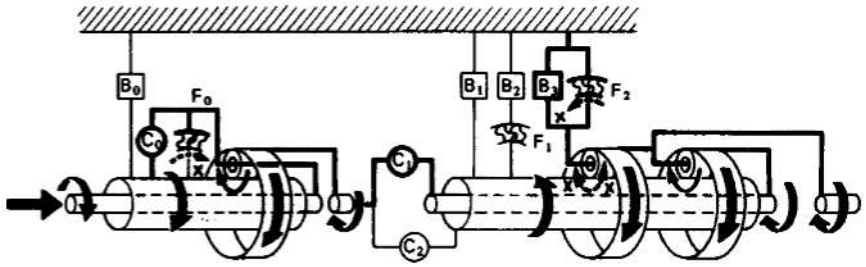
cardiagn.com

2 or L Position 2nd Gear



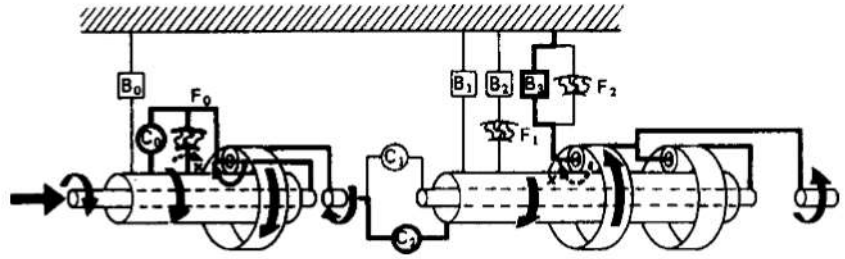
AT7806

L Position 1st Gear



AT7807

R Position Reverse Gear



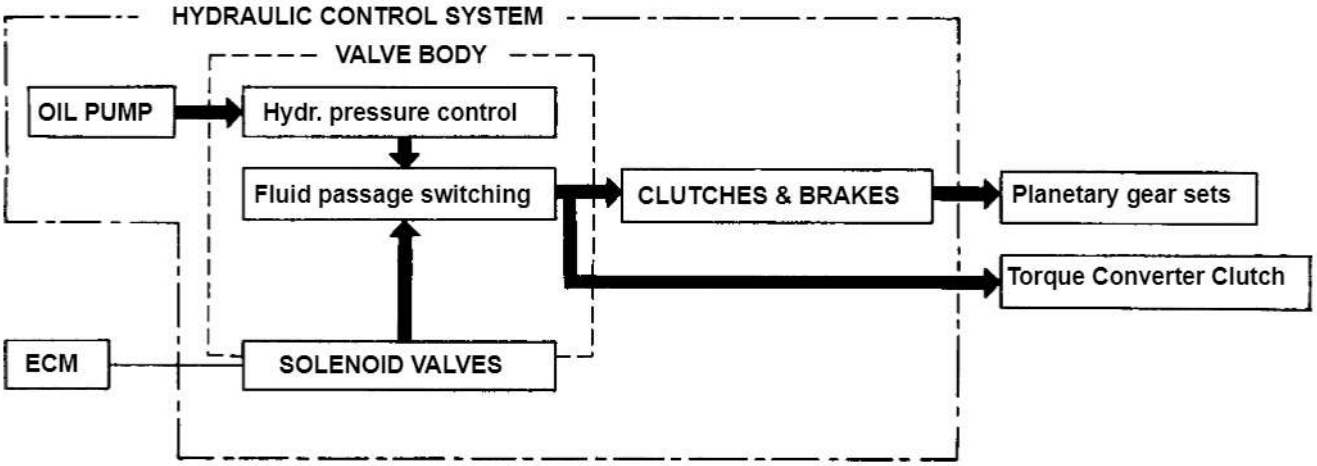
AT7808

V02759

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V01537

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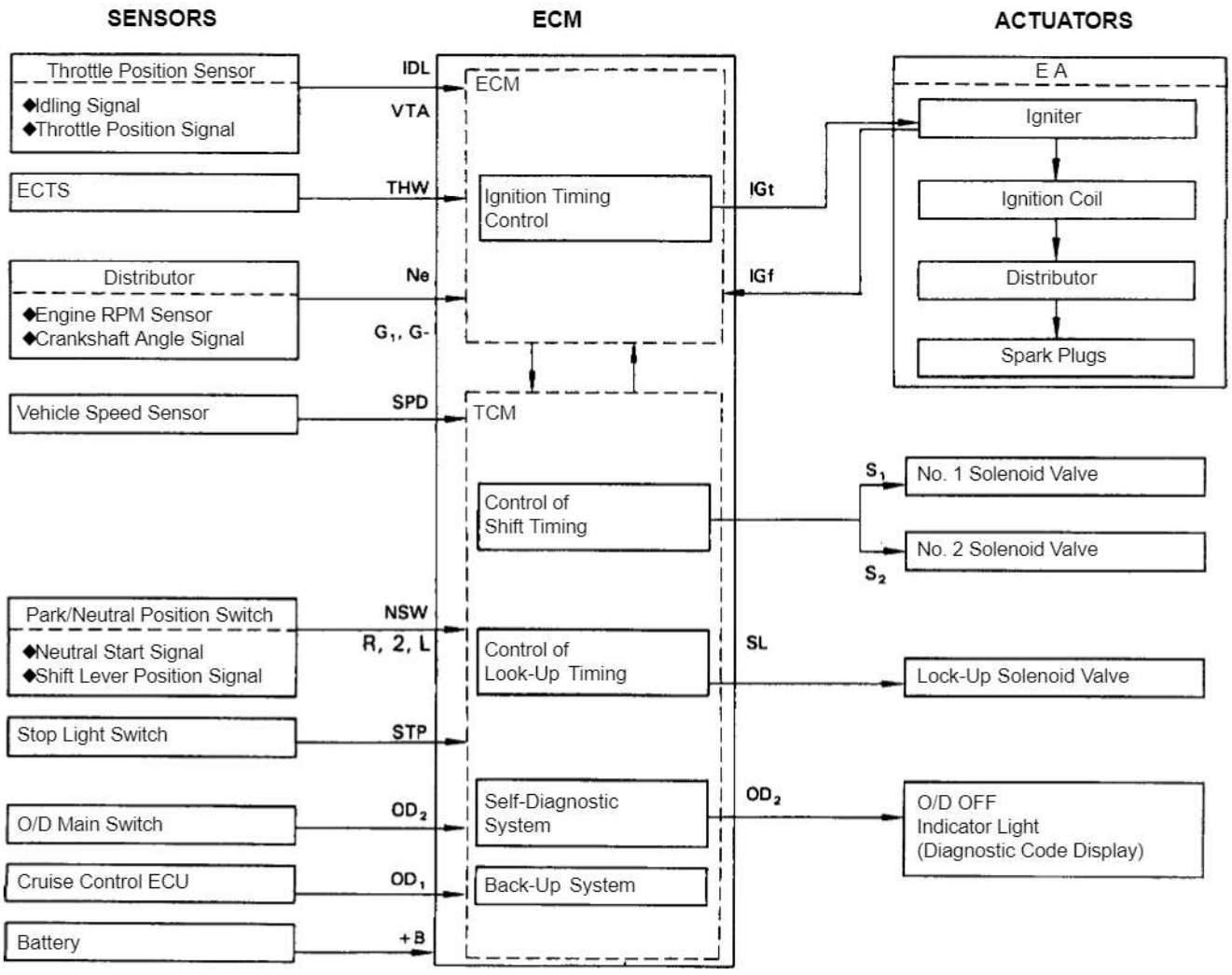
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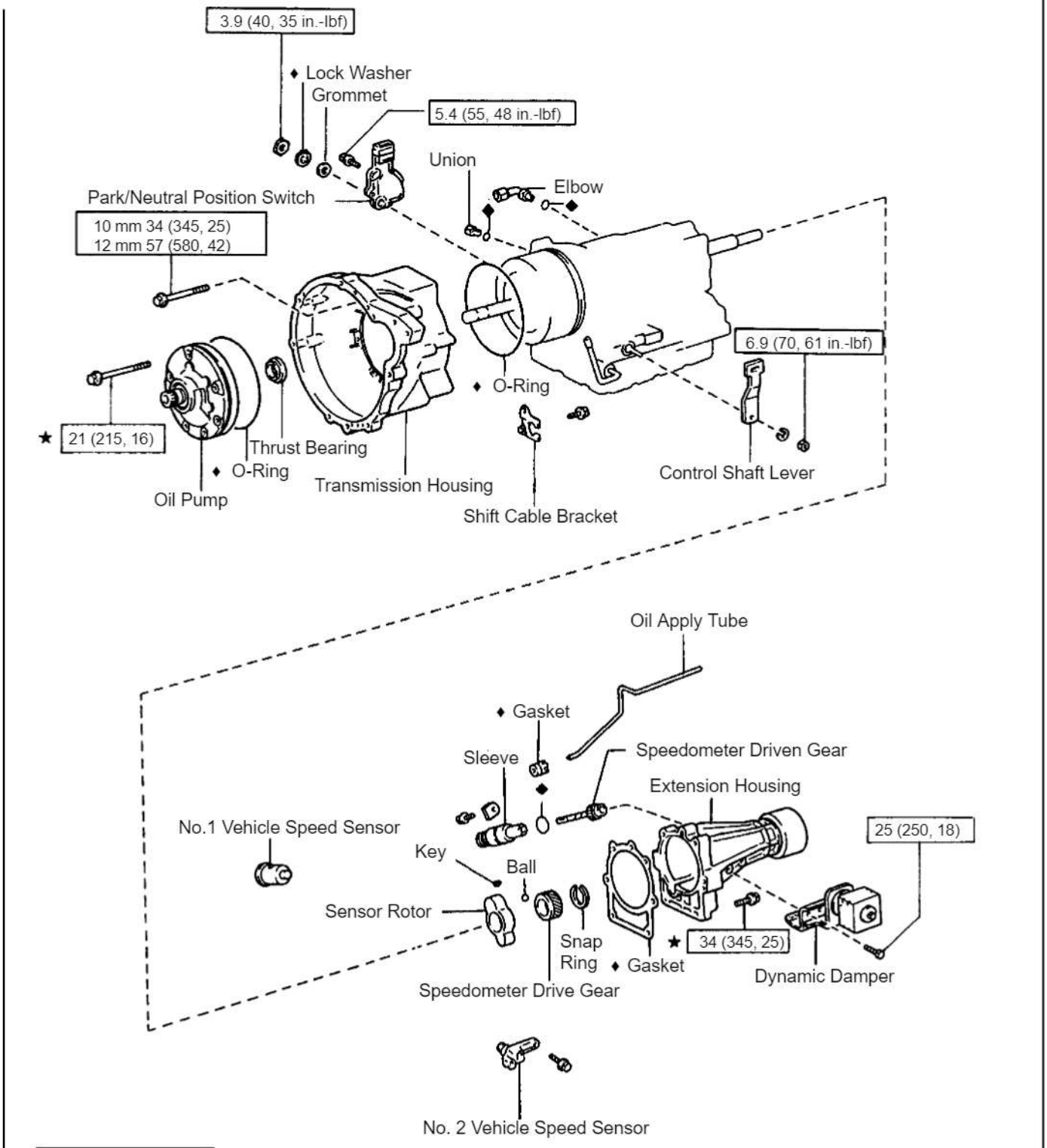


V01480

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COMPONENT PARTS REMOVAL

COMPONENTS



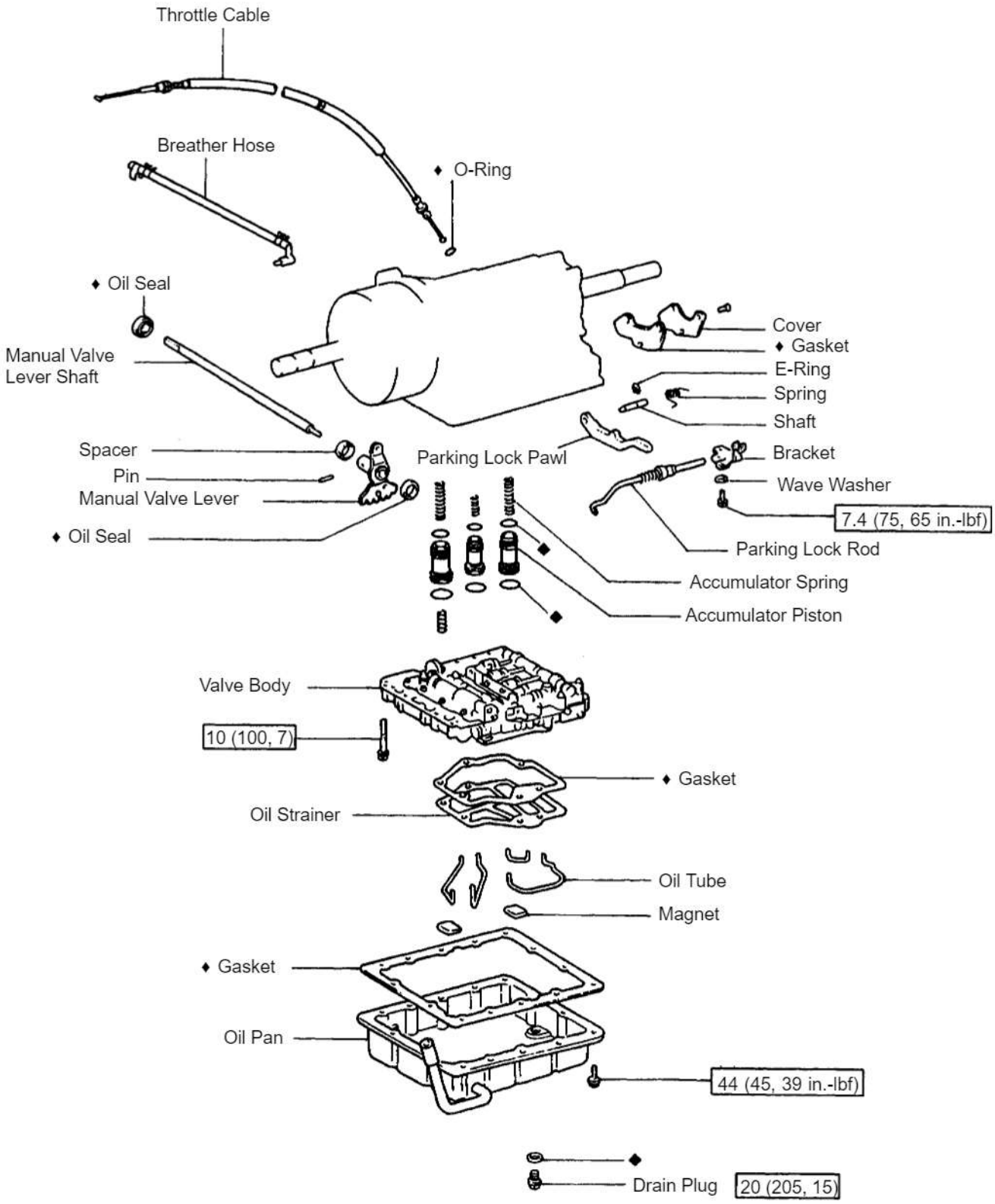
N-m (kgf-cm, ft-lbf) : Specified torque

♦ Non-reusable part

◆ Precoated part

AT6312

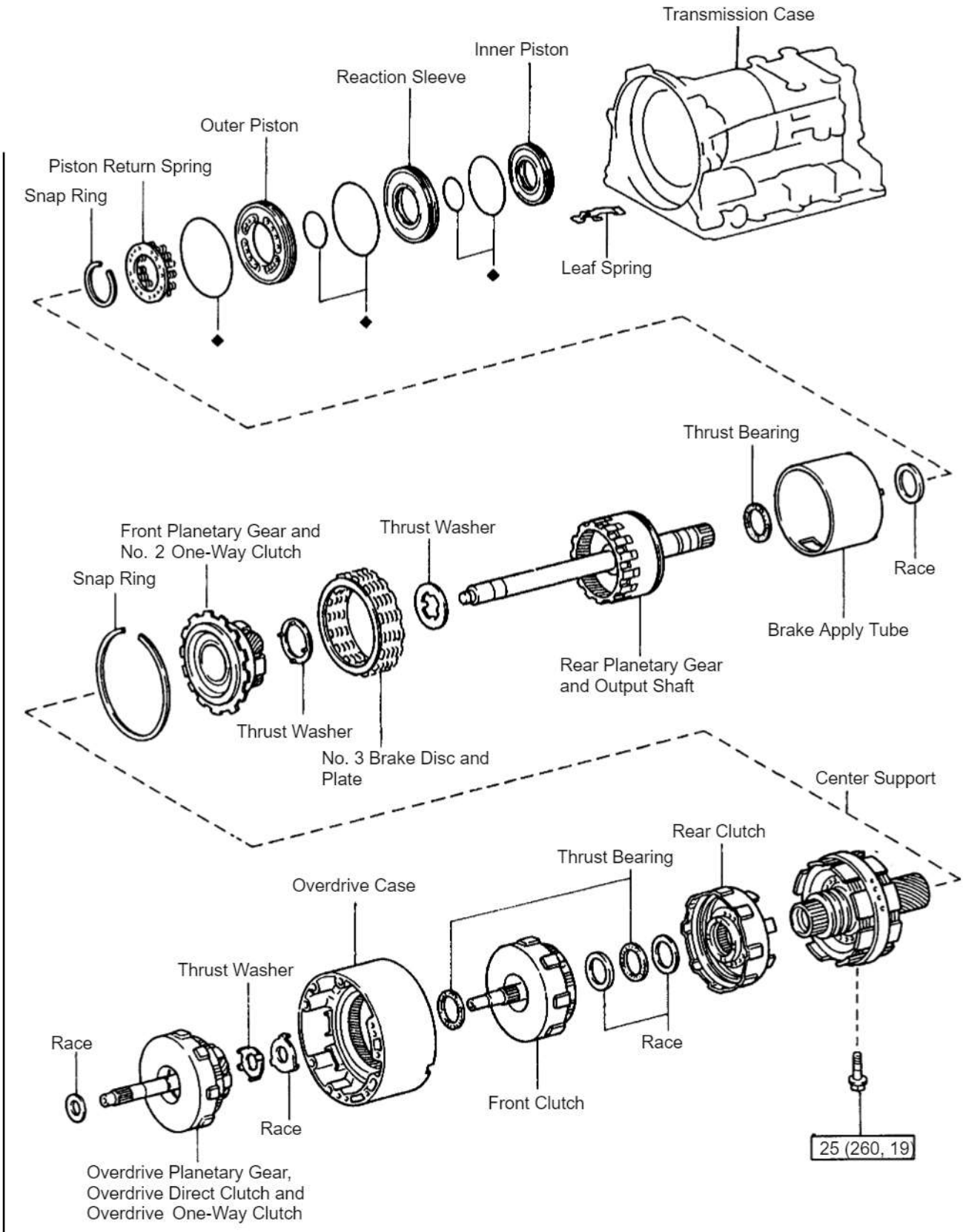
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N-m (kgf-cm, ft-lbf) : Specified torque
♦ Non-reusable part

AT6313

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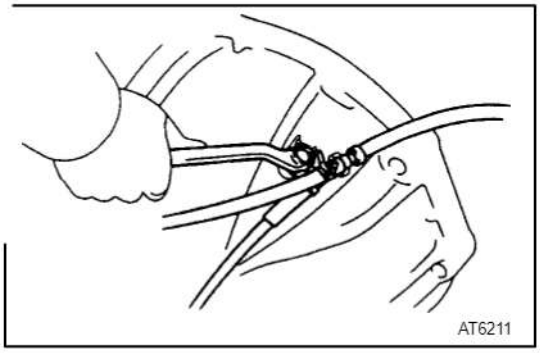
N-m (kgf-cm, ft-lbf) : Specified torque

♦ Non-reusable part

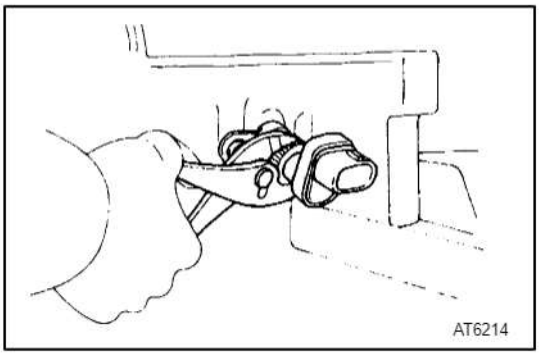
AT6314

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TRANSMISSION REMOVAL



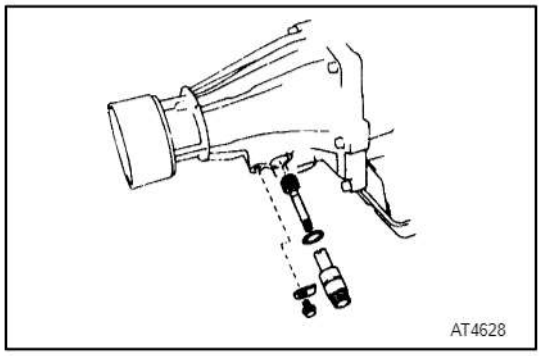
1. REMOVE THROTTLE CABLE CLAMP



2. REMOVE NO. 1 VEHICLE SPEED SENSOR

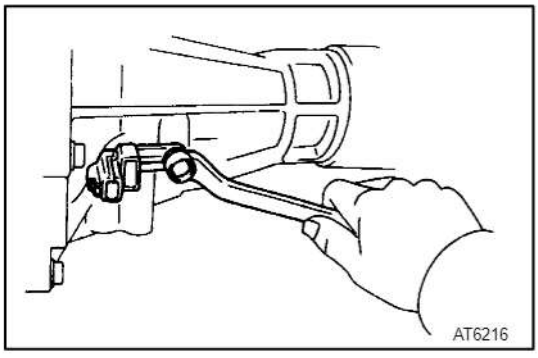
(a) Remove the bolt and the wire harness clamp.

(b) Using plies, remove the No. 1 vehicle speed sensor.



3. REMOVE SPEEDOMETER DRIVEN GEAR

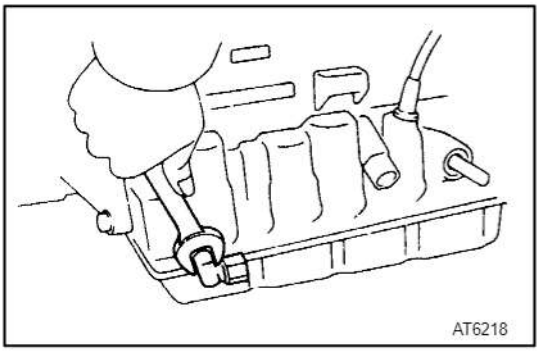
Remove the bolt and the driven gear.



4. REMOVE NO. 2 VEHICLE SPEED SENSOR

(a) Remove the four bolt and the dynamic damper.

(b) Remove the bolt and the No. 2 vehicle speed sensor.

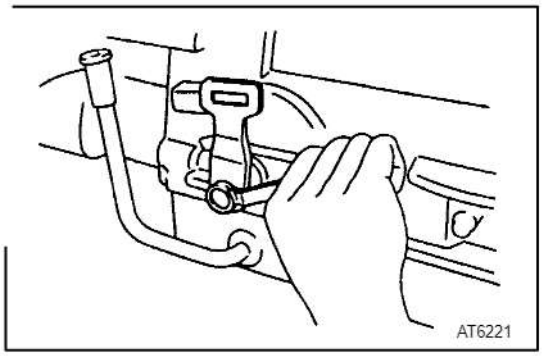


6. REMOVE UNION AND ELBOW

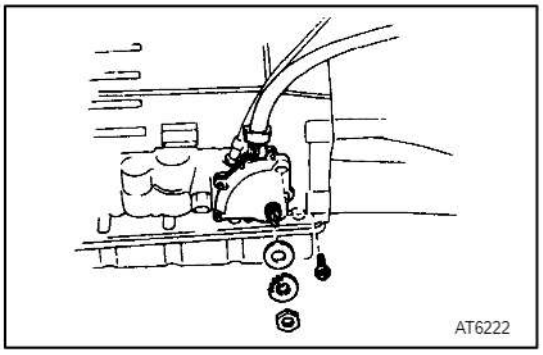
(a) Remove the union and elbow.

(b) Remove the O-ring from them.

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6. REMOVE TRANSMISSION CONTROL SHAFT LEVER

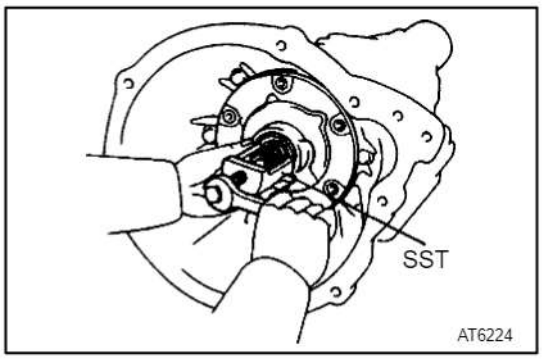


7. REMOVE PARK/NEUTRAL POSITION SWITCH

(a) Unstake the lock washer.

(b) Remove the nut and bolt, and then remove the park/neutral position switch.

(c) Remove the lock washer and grommet.



8. REMOVE OIL PUMP

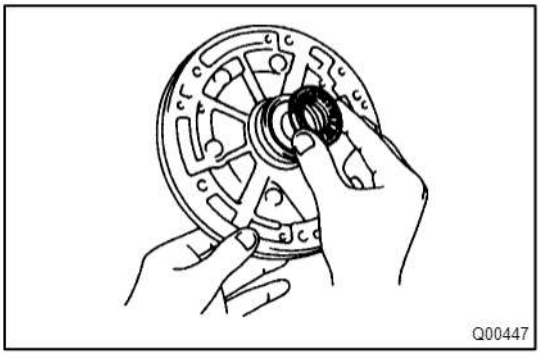
(a) Remove the seven bolts.

(b) Position SST on the shaft in back of the spline.

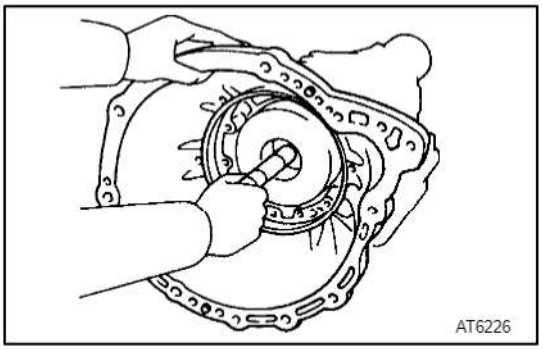
SST 09610-20012

NOTICE: Do not damage the shaft bushing surface. Turn the end bolt of SST to free the pump.

(c) Grasp the front pump stator shaft and pull the pump from the case.



9. WATCH FOR THRUST BEARING BEHIND OIL PUMP

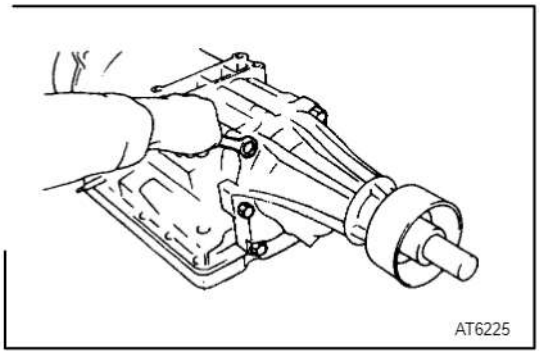


10. REMOVE TRANSMISSION HOUSING

(a) Remove the two 12 mm (0.472 in.) and four 10 mm (0.394 in.) bolts.

(b) Hold the input shaft while removing the transmission housing.

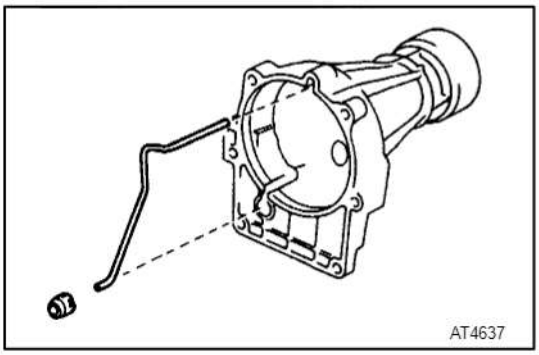
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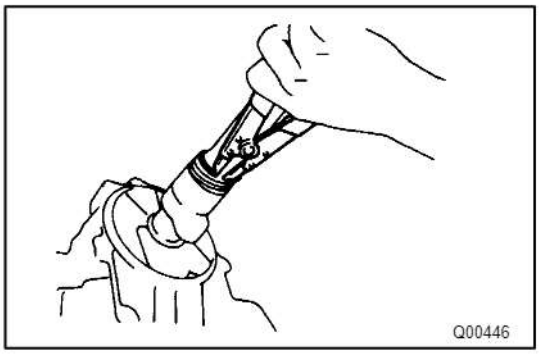
11. REMOVE EXTENSION HOUSING AND GASKET

(a) Remove the six bolts and the extension housing.

(b) Remove the gasket from the extension housing.



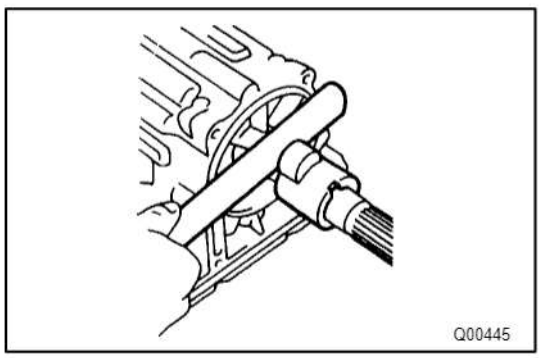
(c) Remove the oil apply tube from the extension housing.



12. REMOVE SPEEDOMETER DRIVE GEAR

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

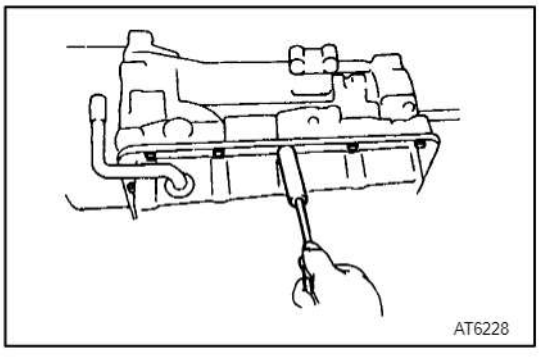
(b) Remove the drive gear and the steel ball.



13. REMOVE SENSOR ROTOR

(a) Using a snap ring plies, remove the snap ring from the output shaft.

(b) Remove the key and the sensor rotor.



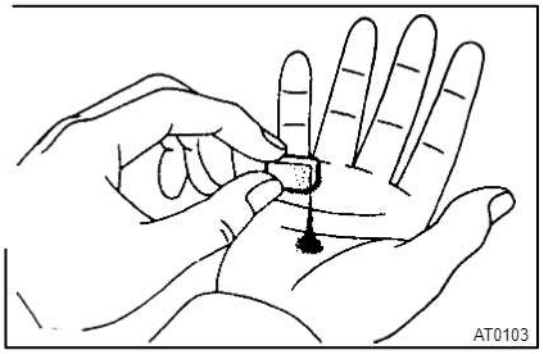
14. REMOVE OIL PAN

NOTICE: Do not turn the transmission over as this will contaminate the valve body with any foreign matter at the bottom on the pan.

(a) Remove the fourteen bolts.

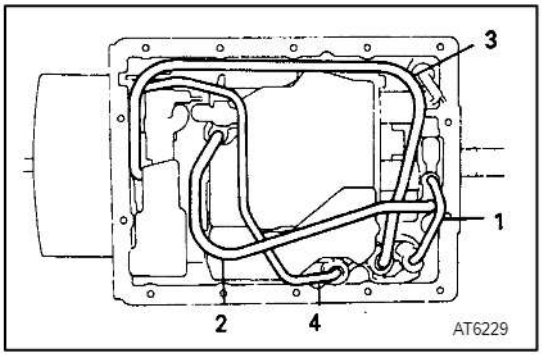
(b) Remove the pan by lifting the transmission case.

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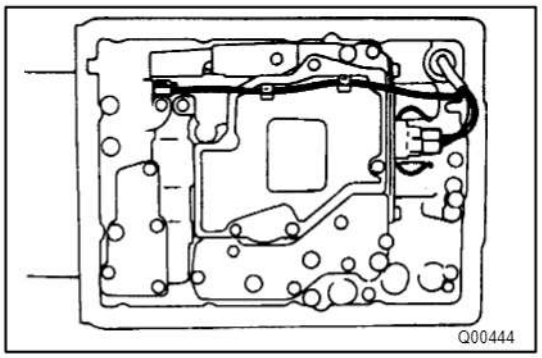
15. EXAMINE PARTICLES IN PAN

Remove the two magnets and use it to collect any steel chips. Look carefully at the chips and particles in the pan and on the magnet to anticipate what type of wear you will find in the transmission.
Steel (magnetic): bearing, gear and clutch plate
Brass (nonmagnetic): bushing wear



18. TURN TRANSMISSION OVER AND REMOVE OIL TUBES

Pry up both oil tube ends with a large screwdriver and remove the four oil tubes.

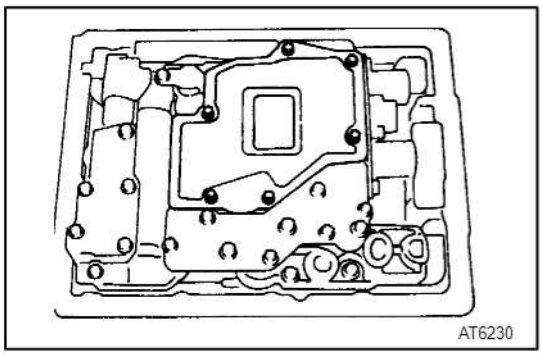


17. REMOVE SOLENOID WIRING

(a) Disconnect the connector from the No. 1 and No. 2 solenoid and the No. 3 solenoid.

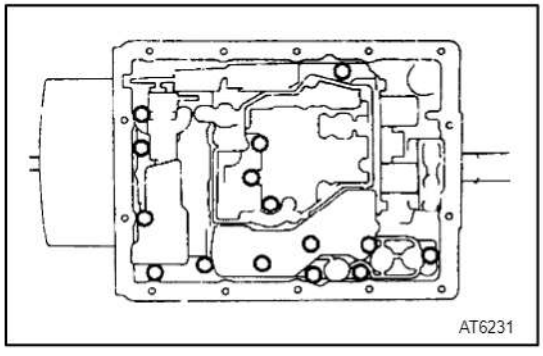
(b) Remove the bolt, lock plate and the grommet from the transmission case.

(c) Pull the wiring out of the transmission case.



18. REMOVE OIL STRAINER

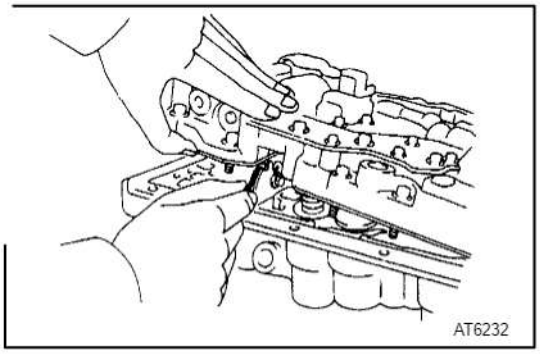
Remove the six bolts and the strainer.



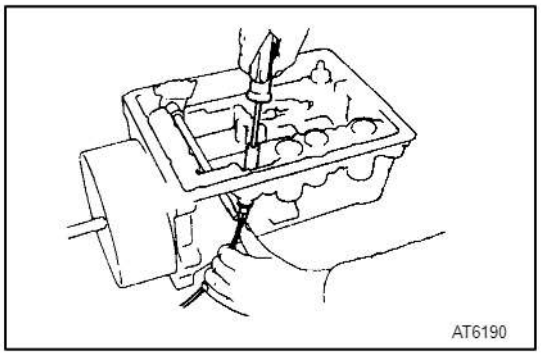
19. REMOVE VALVE BODY

(a) Remove the fifteen bolts.

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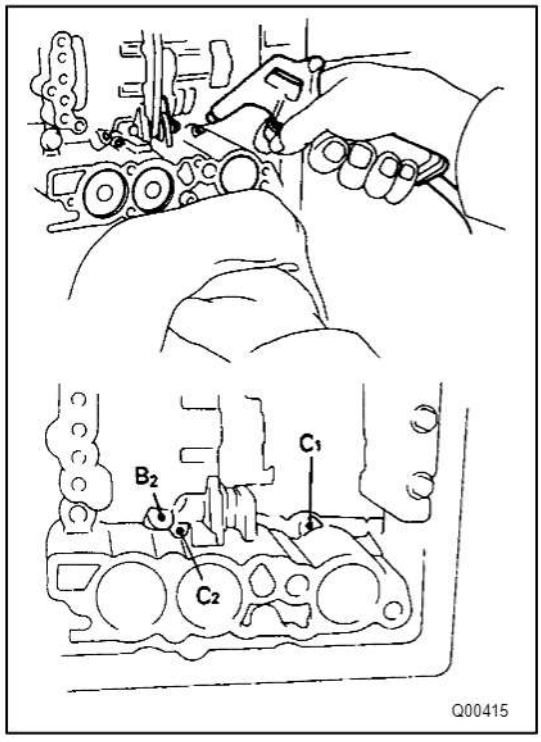


(b) Disconnect the throttle cable from the cam and remove the valve body.



20. REMOVE THROTTLE CABLE

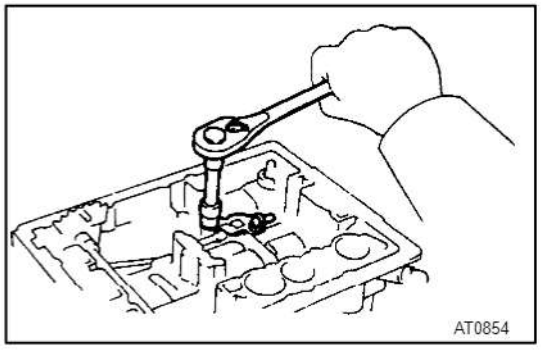
Using a 10 mm socket, push the throttle cable out of the transmission case.



21. COVER PISTON WITH A SHOP RAG AND REMOVE ACCUMULATOR PISTONS AND SPRINGS

CAUTION: Keep face away to avoid injury.

Position a shop rag to catch each position. Applying compressed air to the oil hole, pop each piston into the shop rag. Force air into the holes shown, and remove the accumulator pistons and springs.

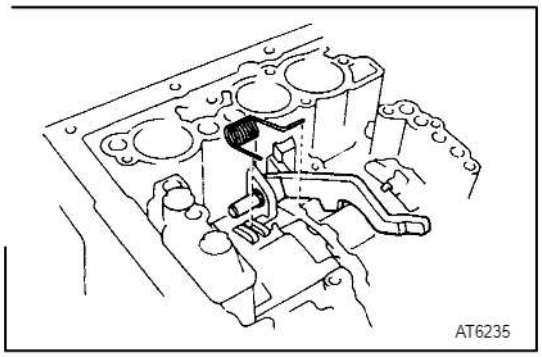


22. REMOVE PARKING LOCK ROD

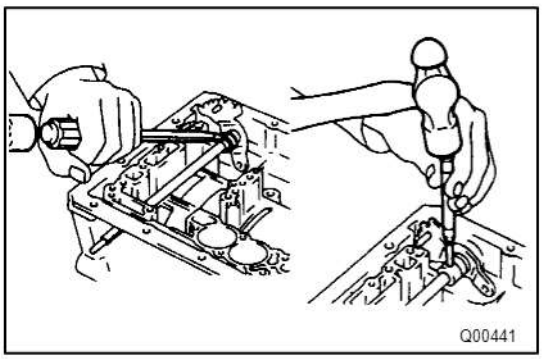
(a) Remove two bolts and the bracket.

(b) Remove the parking lock rod.

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23. REMOVE SPRING, PIVOT PIN AND PARKING LOCK PAWL

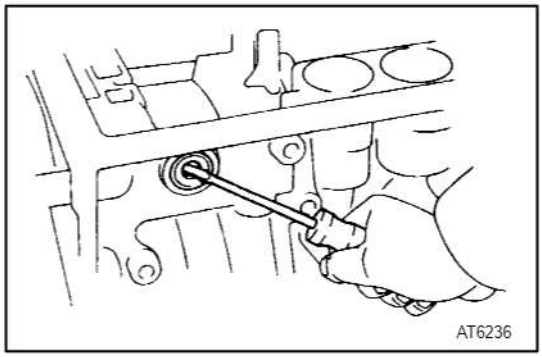


24. IF NECESSARY, REMOVE MANUAL LEVER SHAFT

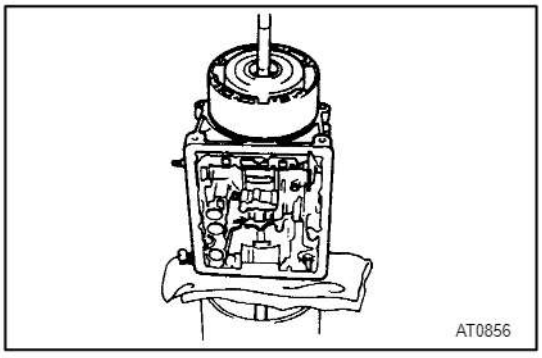
(a) Using a hammer and screwdriver, pry and shift the spacer.

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

(c) Slide the manual valve lever shaft out case and remove the manual valve lever and spacer.



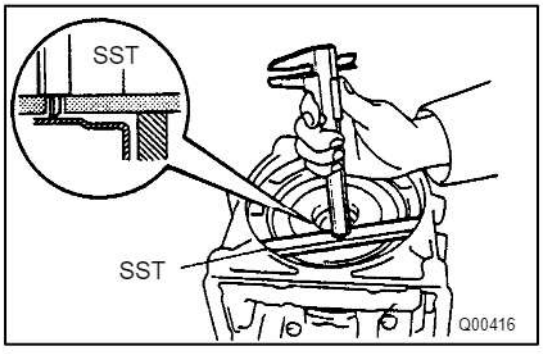
(d) Using a screwdriver, remove two oil seals.



25. PLACE TRANSMISSION CASE ON CYLINDER

Place the transmission on a cylinder stand for more efficient work.

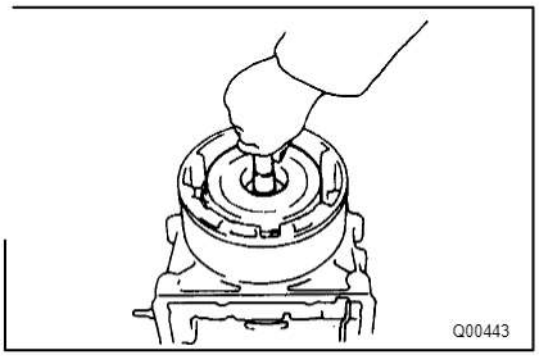
NOTICE: Place shop rags between the case and stand to avoid damaging the case.



28. MEASURE DISTANCE BETWEEN TOP OF CASE AND CLUTCH DRUM

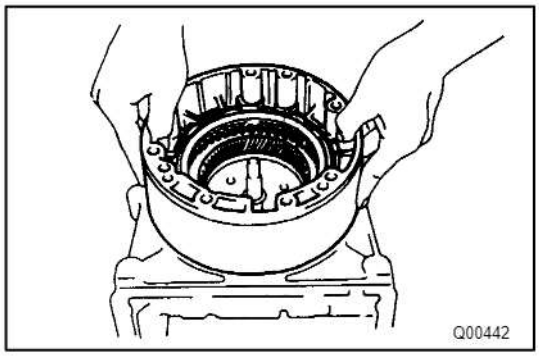
Set SST on the case, as shown in the illustration.
SST 09350-20015 (09370-12010)
Make a note of the finding for reassembly.

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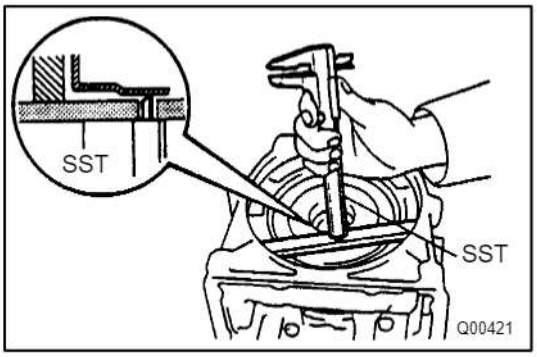
27. REMOVE OVERDRIVE CLUTCH

Remove the overdrive clutch assembly.
Watch for the thrust washer and races on both sides of the assembly.



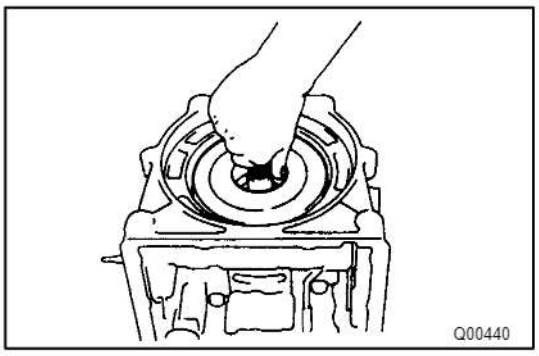
28. REMOVE OVERDRIVE CASE

Remove the overdrive case from the transmission case.
Watch for the bearings, thrust washer and races on both sides of the assembly.



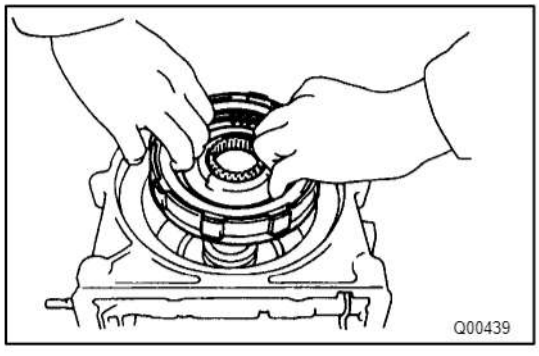
29. MEASURE DISTANCE BETWEEN TOP OF CASE AND CLUTCH DRUM

Set SST on the case, as shown.
SST 09350-20015 (09370-12010)
Make a note of the finding for reassembly.



30. REMOVE FRONT CLUTCH AND THRUST BEARINGS

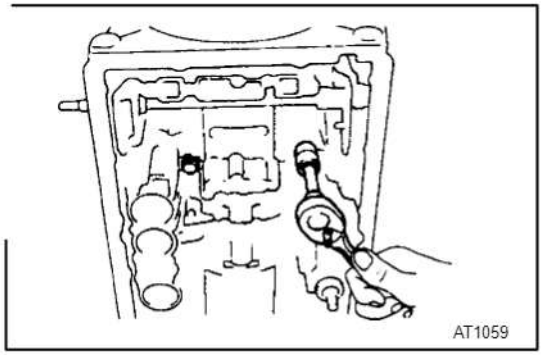
Remove the front clutch assembly.
Watch for the bearings and races on both sides of the assembly.



31. REMOVE REAR CLUTCH

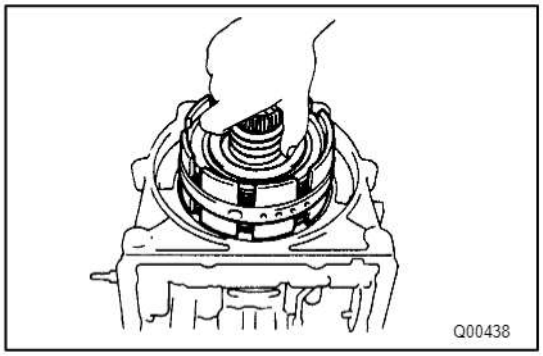
Remove the rear clutch hub and pull it out from the case.

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32. REMOVE CENTER SUPPORT BOLTS

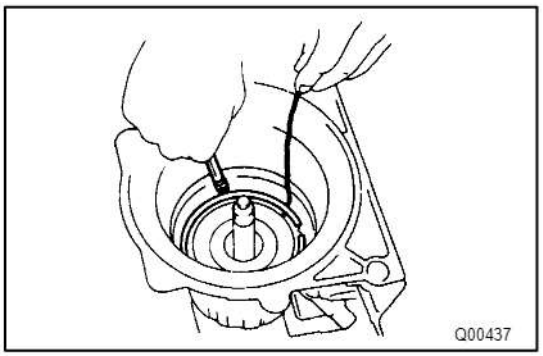
Remove the two center support bolts.
HINT: After removing one bolt, the other one will be loose.



33. REMOVE CENTER SUPPORT AND SUN GEAR ASSEMBLY

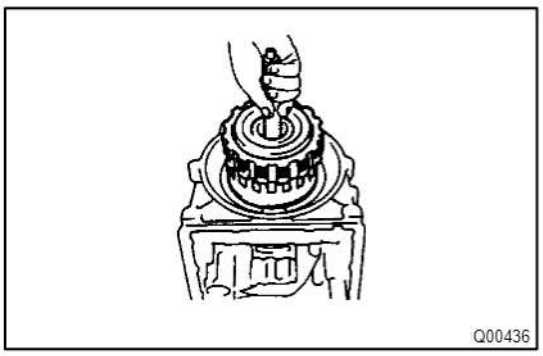
(a) Using snap ring plies, remove the snap ring.

(b) Remove the center support and sun gear assembly from the case front opening.
Watch for the bearing race on the end of the sun gear.



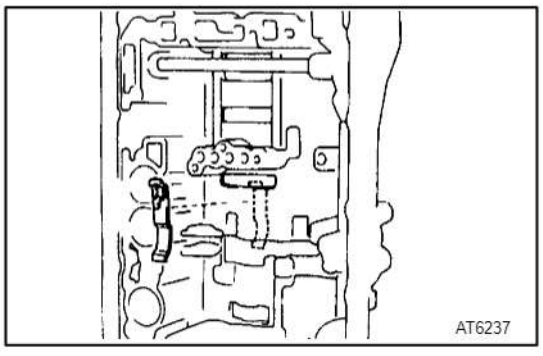
34. REMOVE REAR PLANETARY GEAR AND OUTPUT SHAFT ASSEMBLY

(a) Using a long screwdriver, compress the snap ring and lift it above the groove with a wire hook.



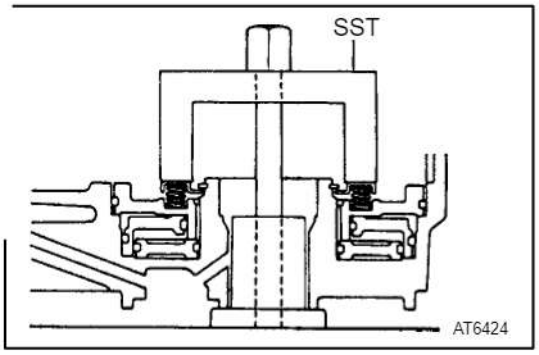
(b) Using snap ring pliers, remove the snap ring from the output shaft.

(c) Grasp the intermediate shaft and pull out the rear parts.
If the brake apply tube and rear thrust bearing and races do not come out with the assembly, remove them from the case.
Watch for the bearing and race in the transmission case.



35. REMOVE LEAF SPRING

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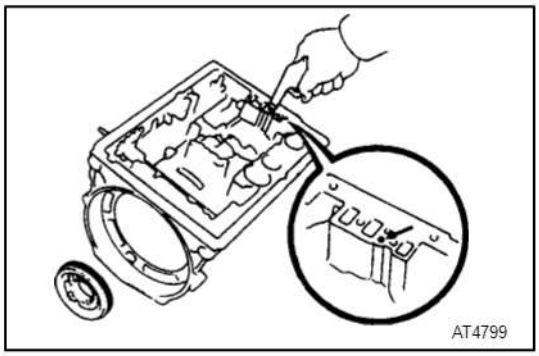
36. REMOVE COMPONENTS OF FIRST AND REVERSE BRAKE

(a) Set SST on the spring retainer, and compress the return spring.

SST 09350-20015 (09369-20040)

(b) Using snap ring pliers, remove the snap ring.

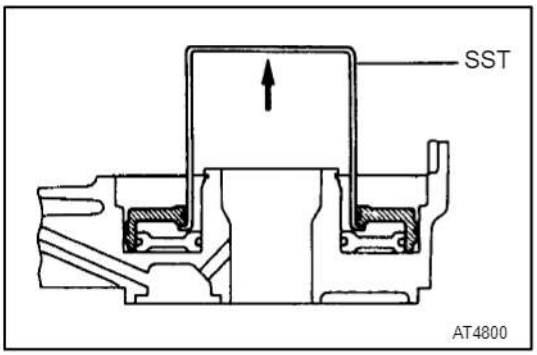
(c) Remove the piston return spring.



(d) Hold first and reverse brake outer piston with hand, apply compressed air to the transmission case to remove first and reverse brake outer piston.

(e) Remove first and reverse brake outer piston. If the piston does not pop out with compressed air, lift the piston out with needle-nose pliers.

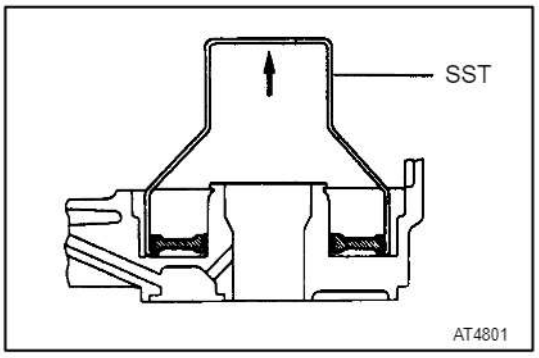
(f) Remove the O-ring from outer piston.



(g) Install SST behind the reaction sleeve and gradually lift it out of the transmission case.

SST 09350-30020 (09350-07080)

(h) Remove the two O-rings from the reaction sleeve.



(i) Install SST behind the inner piston and gradually lift it out of the transmission case.

SST 09350-30020 (09350-07090)

(j) Remove the two O-rings from the inner piston.

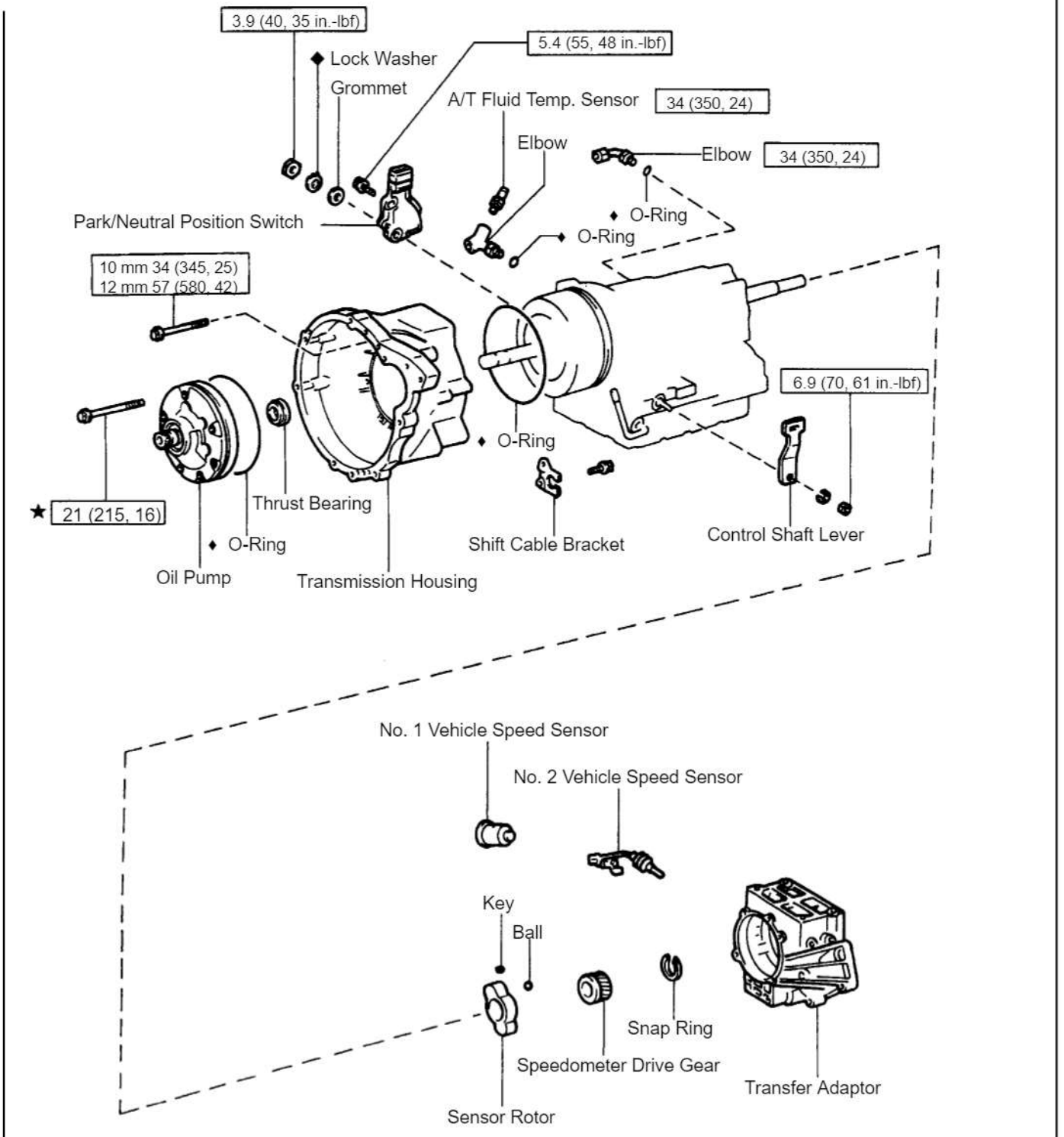
37. BASIC DISASSEMBLY IS COMPLETE

The transmission in now in basic component subassemblies. Next, disassemble, clean, inspect, repair and assemble each of these component parts.

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COMPONENT PARTS REMOVAL

COMPONENTS



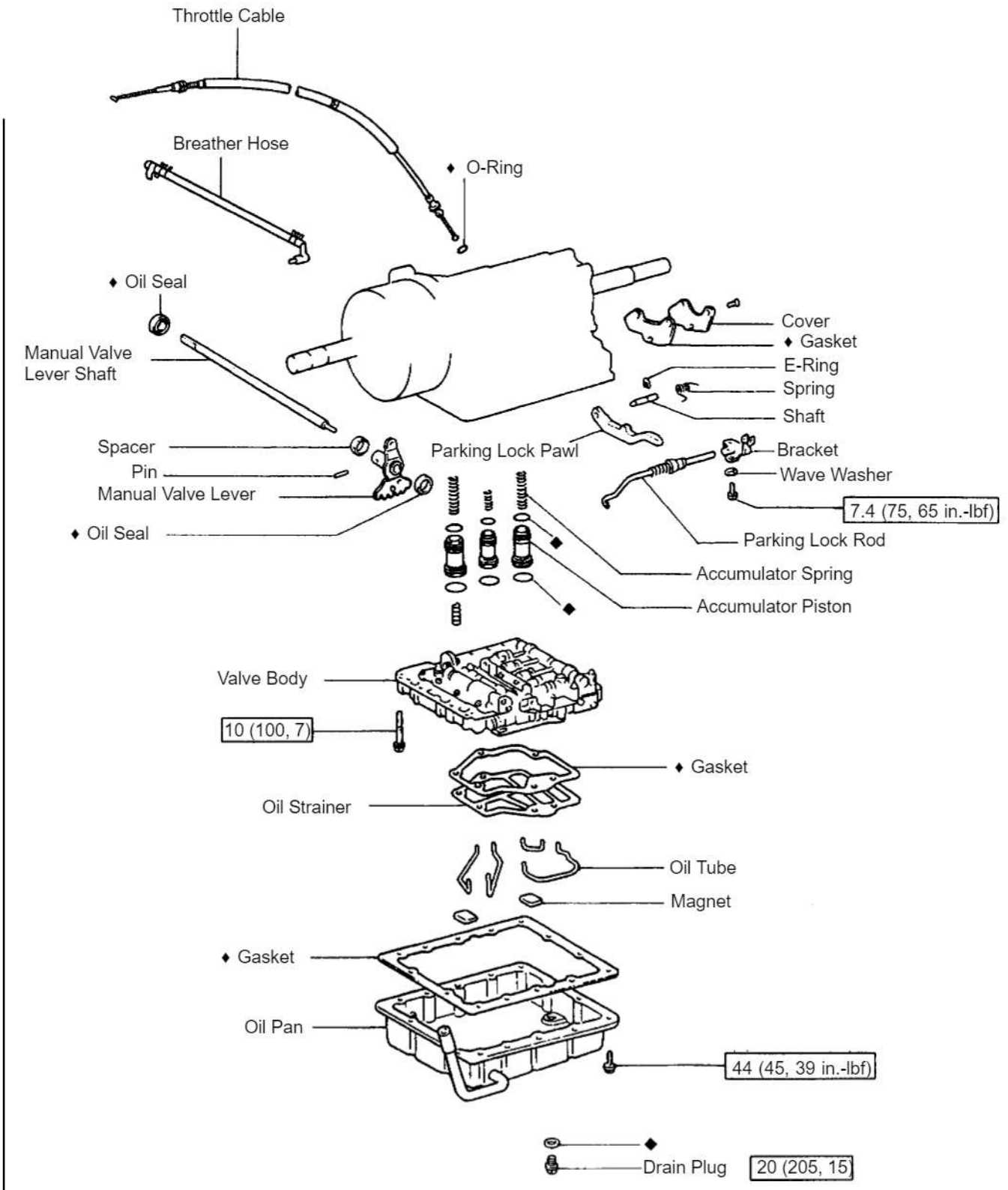
N-m (kgf-cm, ft-lbf) : Specified torque

♦ Non-reusable part

Q03428

Z07120

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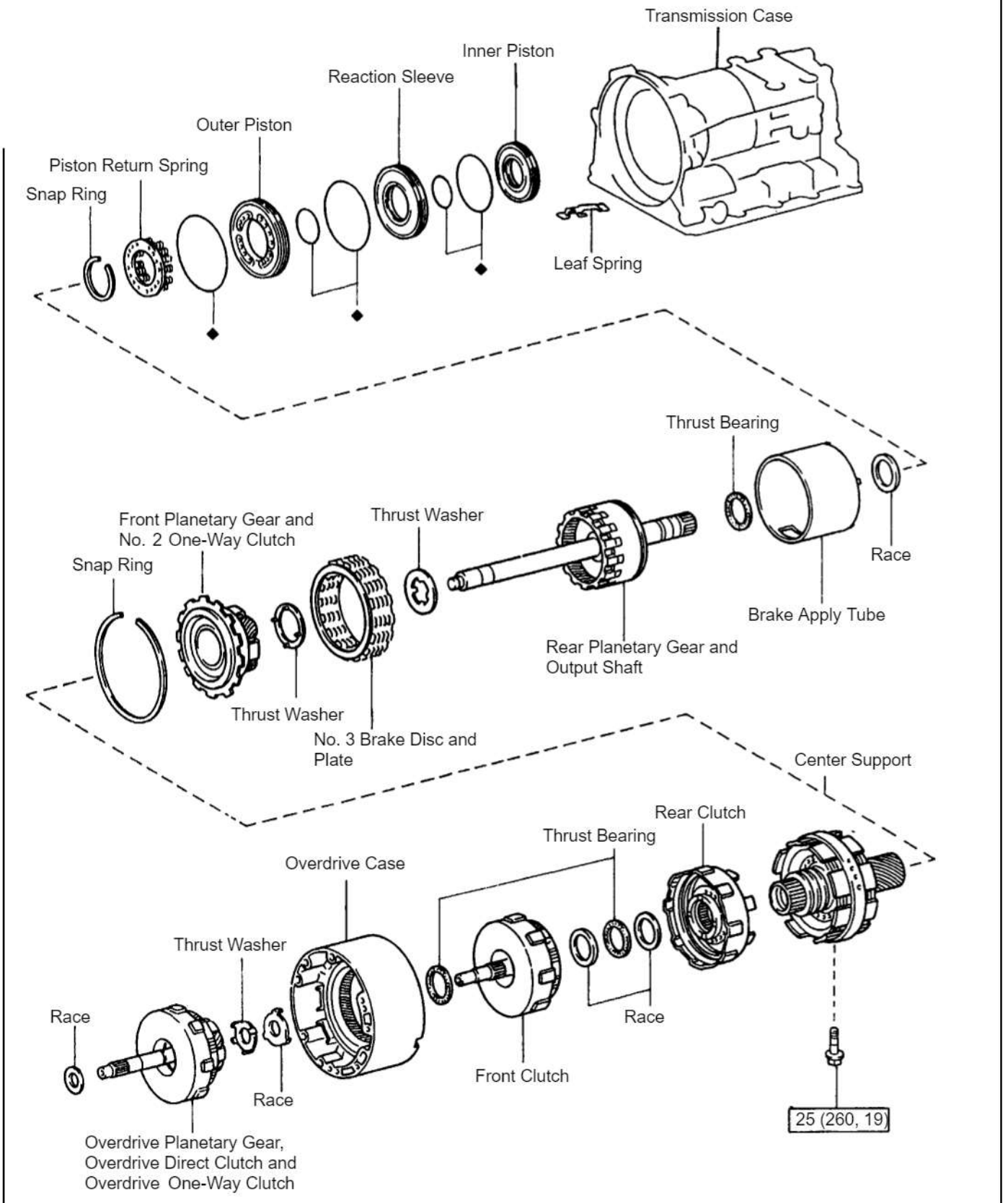


N-m (kgf-cm, ft-lbf) : Specified torque

♦ Non-reusable part

AT6313

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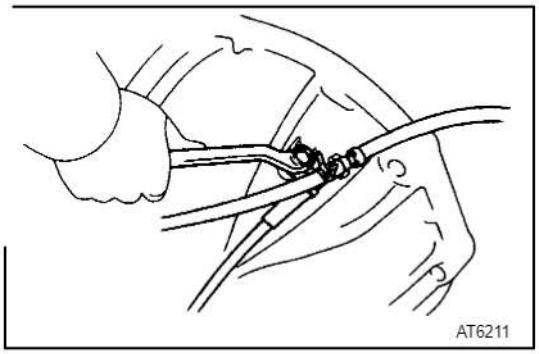


N-m (kgf-cm, ft-lbf) : Specified torque

♦ Non-reusable part

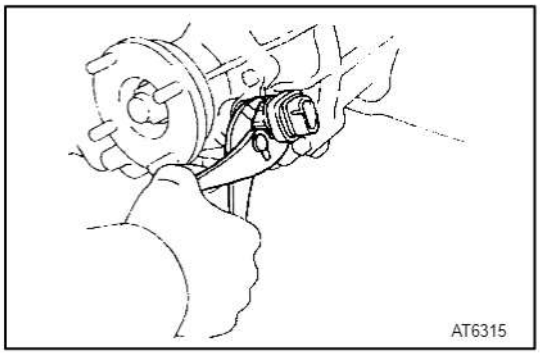
AT6314

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TRANSMISSION REMOVAL

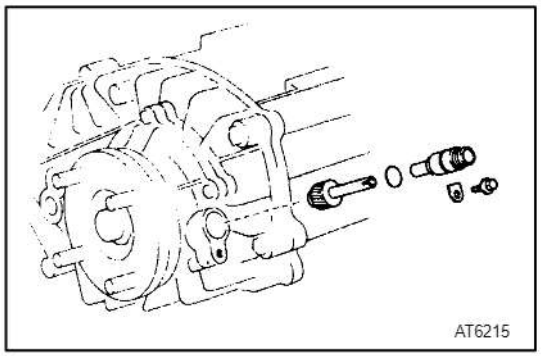
1. REMOVE THROTTLE CABLE CLAMP



2. REMOVE NO. 1 VEHICLE SPEED SENSOR

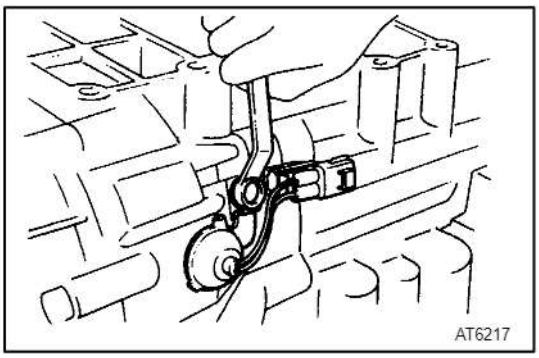
(a) Remove the bolt and the wire harness clamp.

(b) Using pliers, remove the No. 1 vehicle speed sensor.



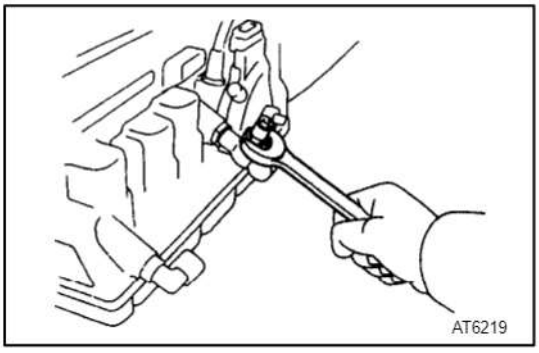
3. REMOVE SPEEDOMETER DRIVEN GEAR

Remove the bolt and the driven gear.



4. REMOVE NO. 2 VEHICLE SPEED SENSOR

Remove the bolt and the No. 2 vehicle speed sensor.

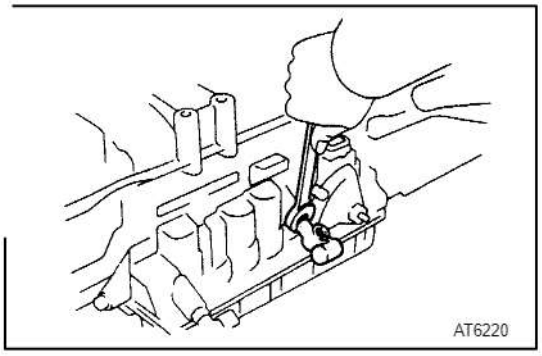


5. REMOVE TWO ELBOWS

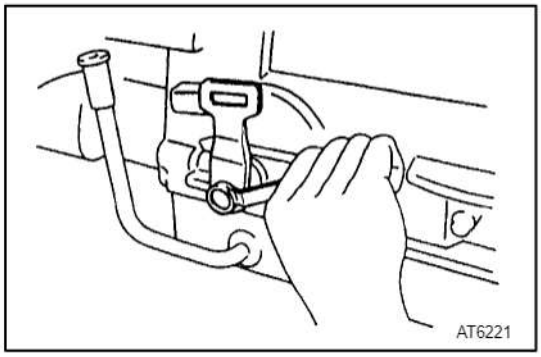
(a) Remove the A/T fluid temperature sensor.

(b) Remove the O-ring from it.

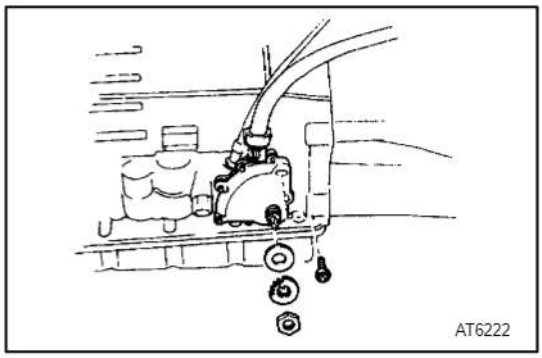
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(c) Remove two elbows.
(d) Remove the O-ring from them.

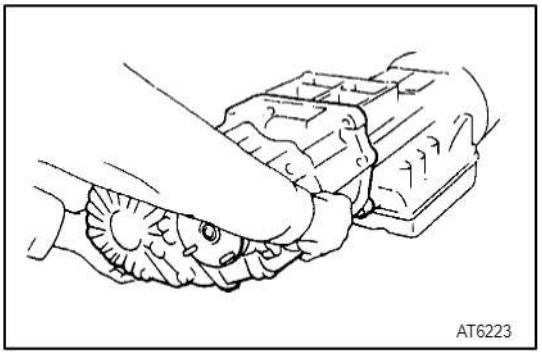


6. REMOVE TRANSMISSION CONTROL SHAFT LEVER



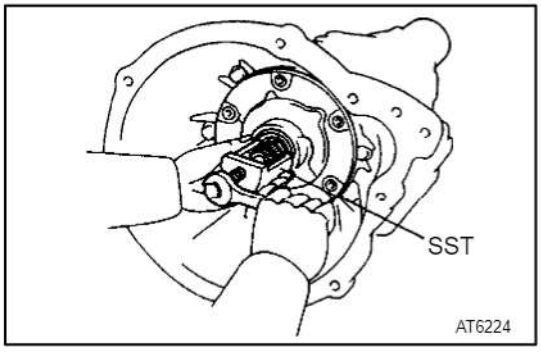
7. REMOVE PARK/NEUTRAL POSITION SWITCH

(a) Unstake the lock washer.
(b) Remove the nut and bolt, and then remove the park/ neutral position switch.
(c) Remove the lock washer and grommet.



8. REMOVE TRANSFER

(a) Remove the bolt and speedometer cable bracket.
(b) Remove the seven bolts and the transfer.



9. REMOVE OIL PUMP

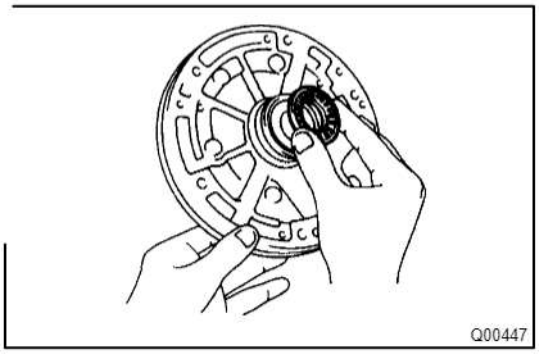
(a) Remove the seven bolts.
(b) Position SST on the shaft in back of the spline.

SST 09610-20012

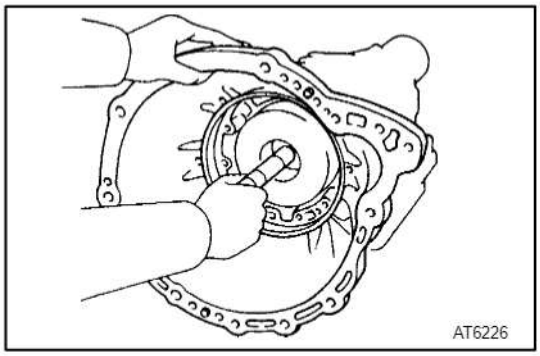
NOTICE: Do not damage the shaft bushing surface. Turn the end bolt of SST to free the pump.

(c) Grasp the front pump stator shaft and pull the pump from the case.

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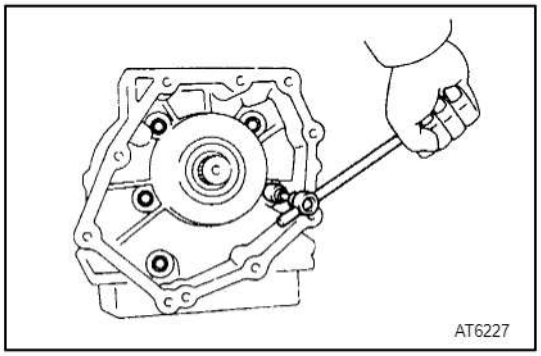
10. WATCH FOR THRUST BEARING BEHIND OIL PUMP



11. REMOVE TRANSMISSION HOUSING

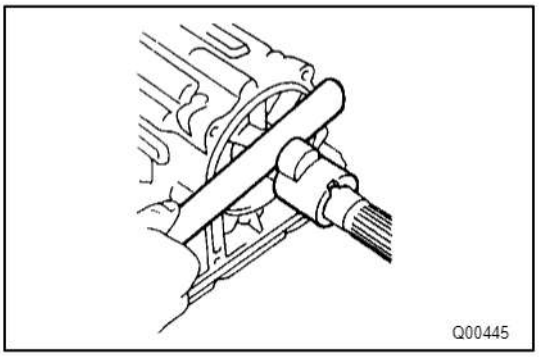
(a) Remove the two 12 mm (0.472 in.) and four 10 mm (0.394 in.) bolts.

(b) Hold the input shaft while removing the transmission housing.



12. REMOVE TRANSFER ADAPTOR

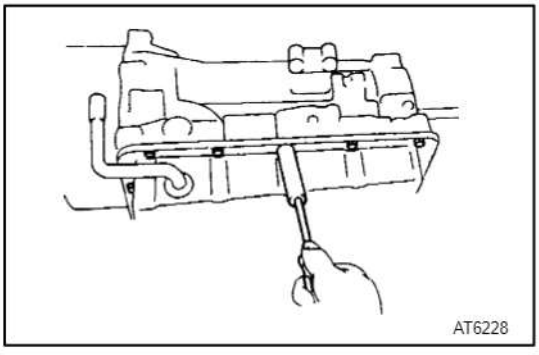
Remove the six bolts and the adaptor. If necessary, tap the transfer adaptor with a plastic hammer or equivalent to loosen it.



13. REMOVE SENSOR ROTOR

(a) Using a snap ring pliers, remove the snap ring from the output shaft.

(b) Remove the key and the sensor rotor.



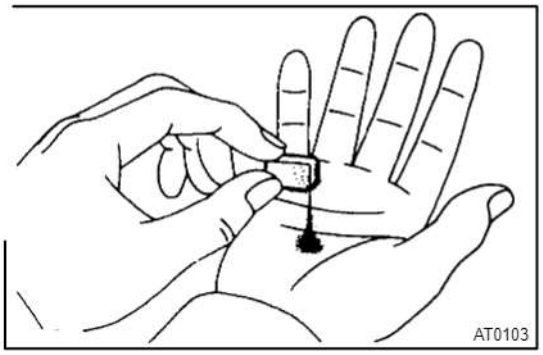
14. REMOVE OIL PAN

NOTICE: Do not turn the transmission over as this will contaminate the valve body with any foreign matter at the bottom on the pan.

(a) Remove the fourteen bolts.

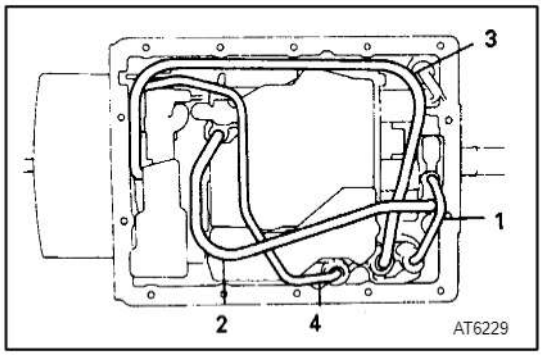
(b) Remove the pan by lifting the transmission case.

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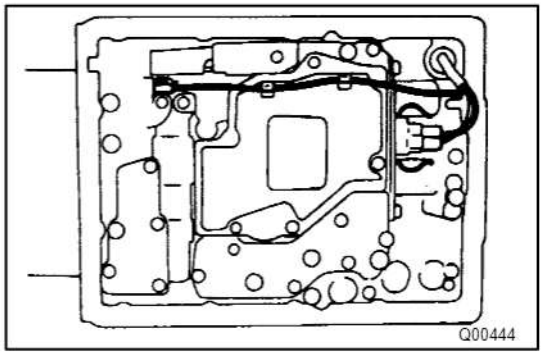
15. EXAMINE PARTICLES IN PAN

Remove the two magnets and use it to collect any steel chips. Look carefully at the chips and particles in the pan and on the magnet to anticipate what type of wear you will find in the transmission.
Steel (magnetic): bearing, gear and clutch plate
Brass (nonmagnetic): bushing wear



16. TURN TRANSMISSION OVER AND REMOVE OIL TUBES

Pry up both oil tube ends with a large screwdriver and remove the four oil tubes.

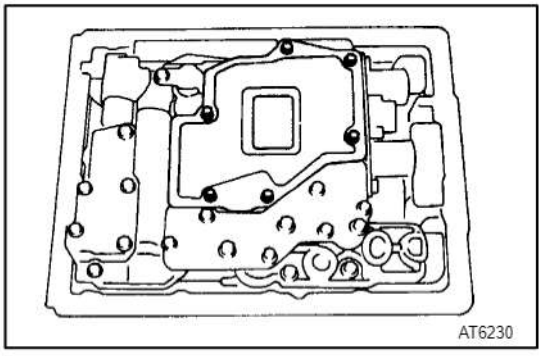


17. REMOVE SOLENOID WIRING

(a) Disconnect the connector from the No. 1 and No. 2 solenoid and the No. 3 solenoid.

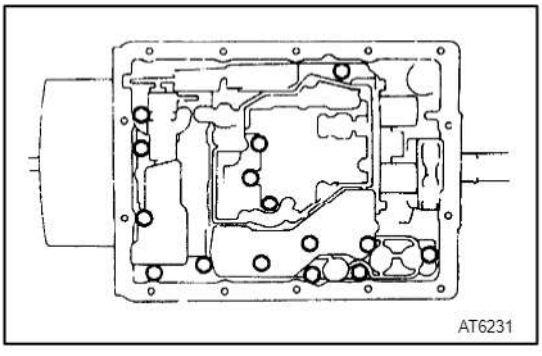
(b) Remove the bolt, lock plate and the grommet from the transmission case.

(c) Pull the wiring out of the transmission case.



18. REMOVE OIL STRAINER

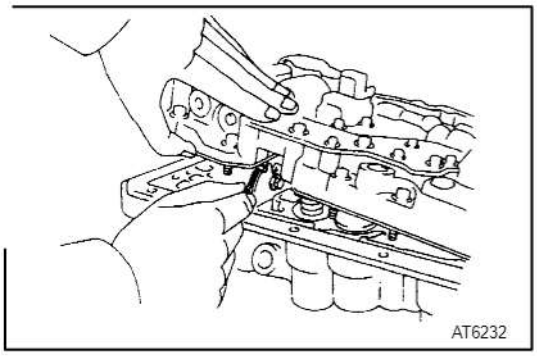
Remove the six bolts and the strainer.



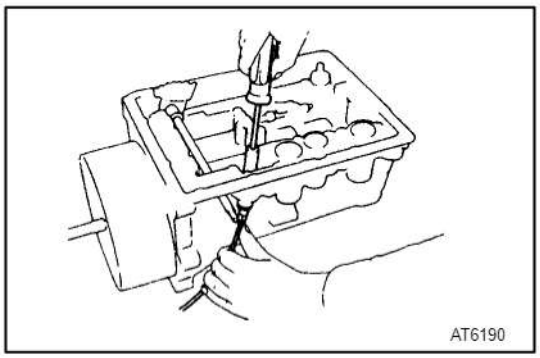
19. REMOVE VALVE BODY

(a) Remove the fifteen bolts.

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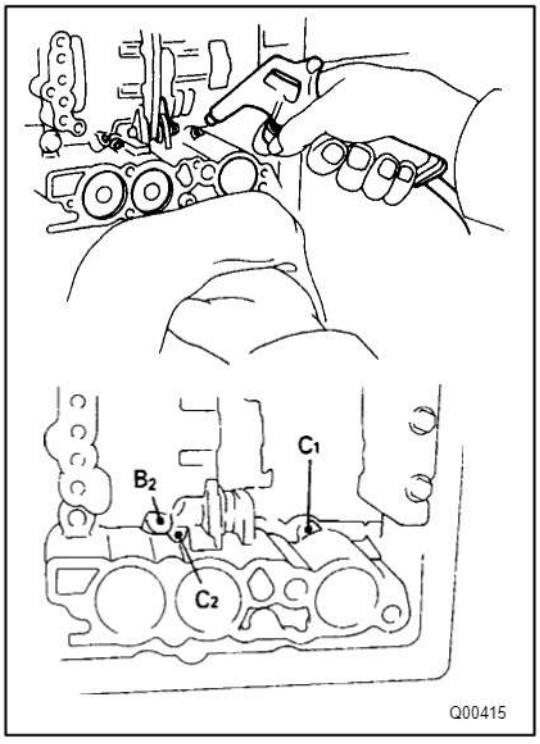


(b) Disconnect the throttle cable from the cam and remove the valve body.



20. REMOVE THROTTLE CABLE

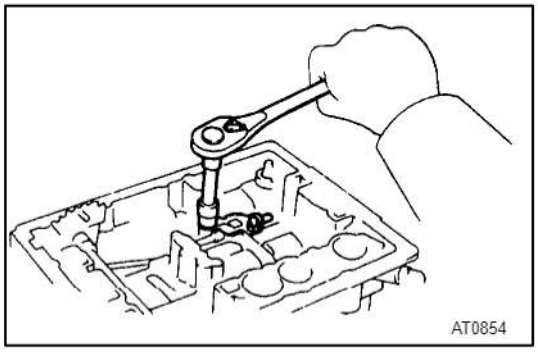
Using a 10 mm socket, push the throttle cable out of the transmission case.



21. COVER PISTON WITH A SHOP RAG AND REMOVE ACCUMULATOR PISTONS AND SPRINGS

CAUTION: Keep face away to avoid injury.

Position a shop rag to catch each position. Applying compressed air to the oil hole, pop each piston into the shop rag. Force air into the holes shown, and remove the accumulator pistons and springs.

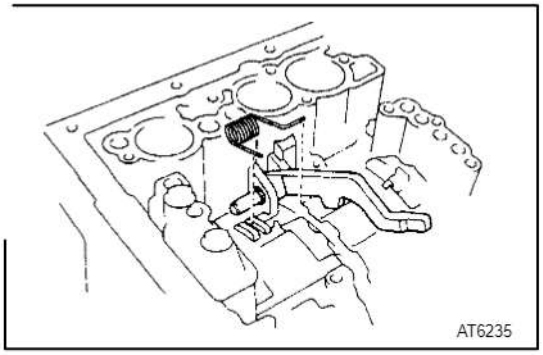


22. REMOVE PARKING LOCK ROD

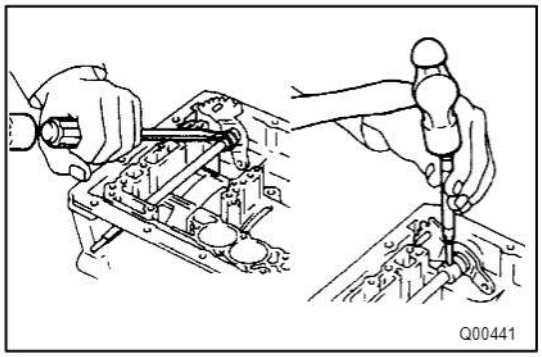
(a) Remove two bolts and the bracket.

(b) Remove the parking lock rod.

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23. REMOVE SPRING, PIVOT PIN AND PARKING LOCK PAWL

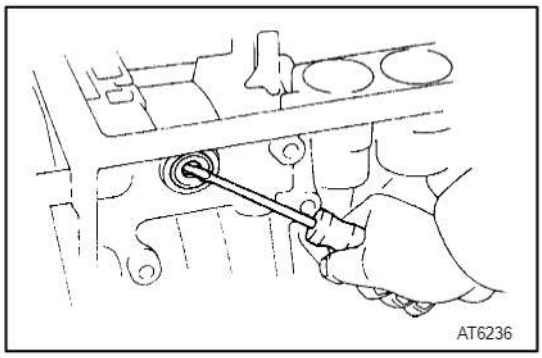


24. IF NECESSARY, REMOVE MANUAL LEVER SHAFT

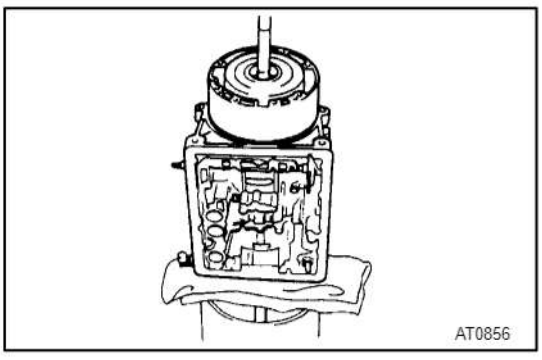
(a) Using a hammer and screwdriver, pry and shift the spacer.

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

(c) Slide the manual valve lever shaft out case and remove the manual valve lever and spacer.



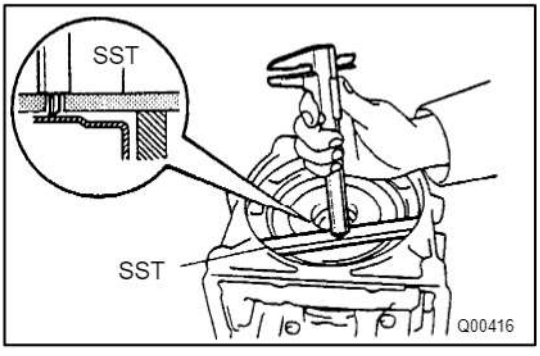
(d) Using a screwdriver, remove two oil seals.



25. PLACE TRANSMISSION CASE ON CYLINDER

Place the transmission on a cylinder stand for more efficient work.

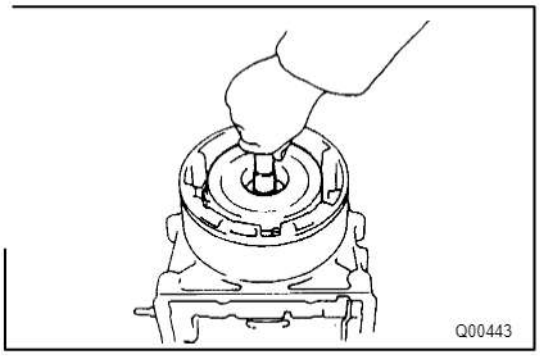
NOTICE: Place shop rags between the case and stand to avoid damaging the case.



26. MEASURE DISTANCE BETWEEN TOP OF CASE AND CLUTCH DRUM

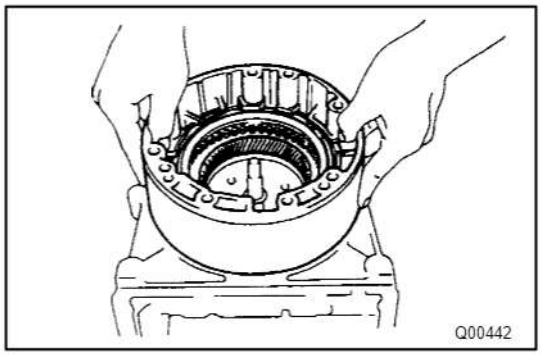
Set SST on the case, as shown in the illustration.
SST 09350-20015 (09370-12010)
Make a note of the finding for reassembly.

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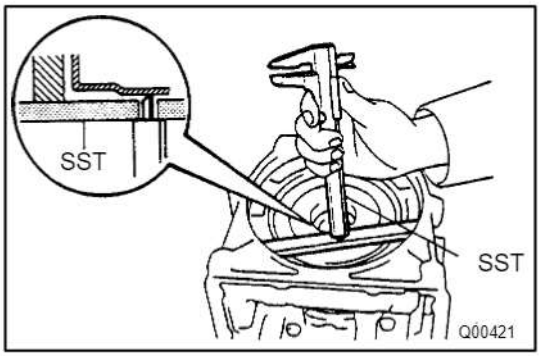
27. REMOVE OVERDRIVE CLUTCH

Remove the overdrive clutch assembly.
Watch for the thrust washer and races on both sides of the assembly.



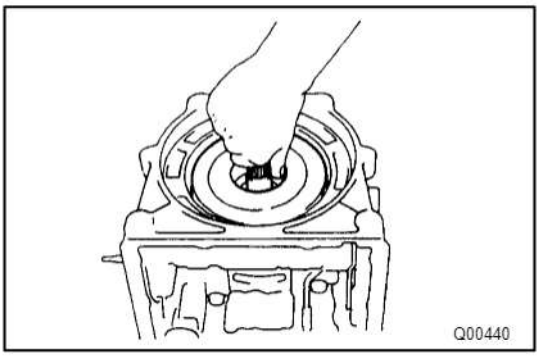
28. REMOVE OVERDRIVE CASE

Remove the overdrive case from the transmission case.
Watch for the bearings, thrust washer and races on both sides of the assembly.



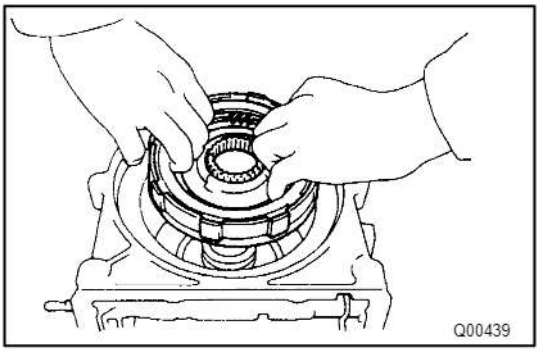
29. MEASURE DISTANCE BETWEEN TOP OF CASE AND CLUTCH DRUM

Set SST on the case, as shown.
SST 09350-20015 (09370-12010)
Make a note of the finding for reassembly.



30. REMOVE FRONT CLUTCH AND THRUST BEARINGS

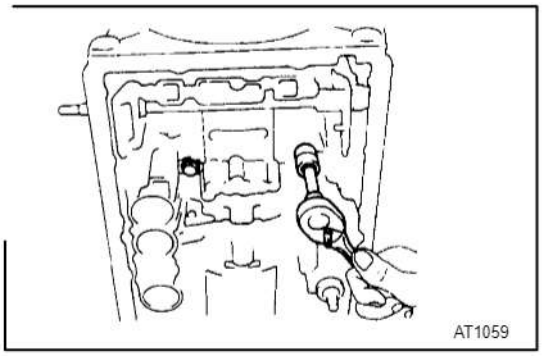
Remove the front clutch assembly.
Watch for the bearings and races on both sides of the assembly.



31. REMOVE REAR CLUTCH

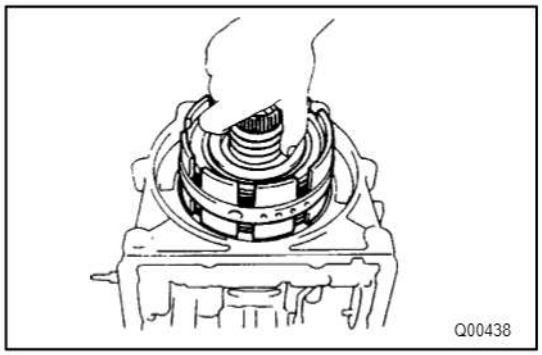
Remove the rear clutch hub and pull it out from the case.

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32. REMOVE CENTER SUPPORT BOLTS

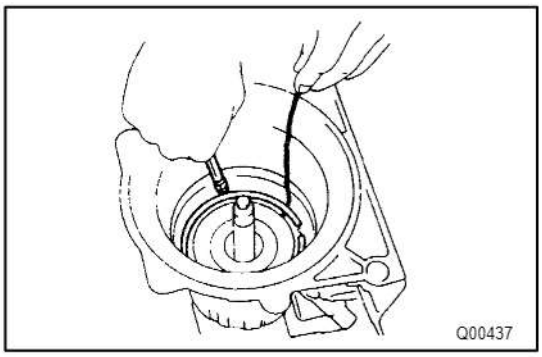
Remove the two center support bolts.
HINT: After removing one bolt, the other one will be loose.



33. REMOVE CENTER SUPPORT AND SUN GEAR ASSEMBLY

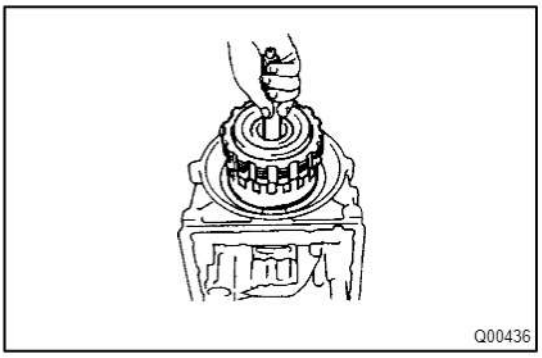
(a) Using snap ring pliers, remove the snap ring.

(b) Remove the center support and sun gear assembly from the case front opening.
Watch for the bearing race on the end of the sun gear.



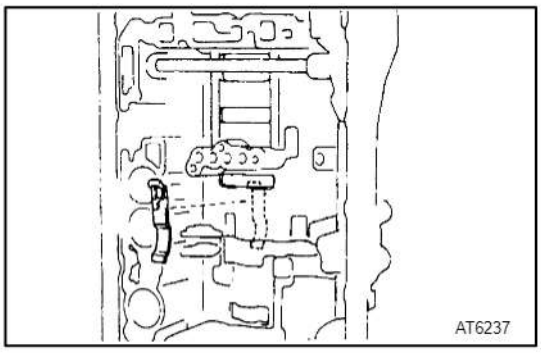
34. REMOVE REAR PLANETARY GEAR AND OUTPUT SHAFT ASSEMBLY

(a) Using a long screwdriver, compress the snap ring and lift it above the groove with a wire hook.



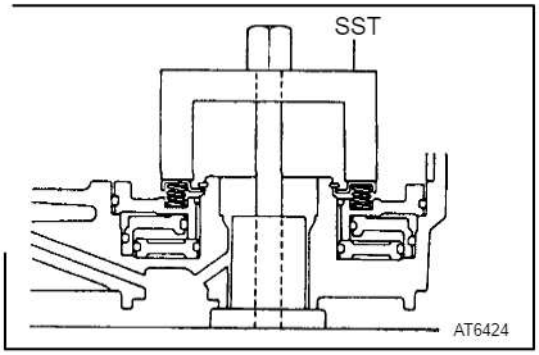
(b) Using snap ring pliers, remove the snap ring from the output shaft.

(c) Grasp the intermediate shaft and pull out the rear parts.
If the brake apply tube and rear thrust bearing and races do not come out with the assembly, remove them from the case.
Watch for the bearing and race in the transmission case.



35. REMOVE LEAF SPRING

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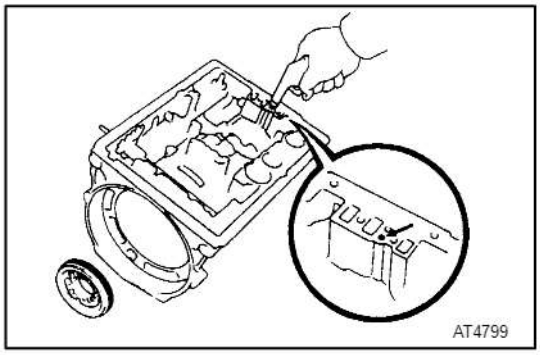
36. REMOVE COMPONENTS OF FIRST AND REVERSE BRAKE

(a) Set SST on the spring retainer, and compress the return spring.

SST 09350-20015 (09369-20040)

(b) Using snap ring plies, remove the snap ring.

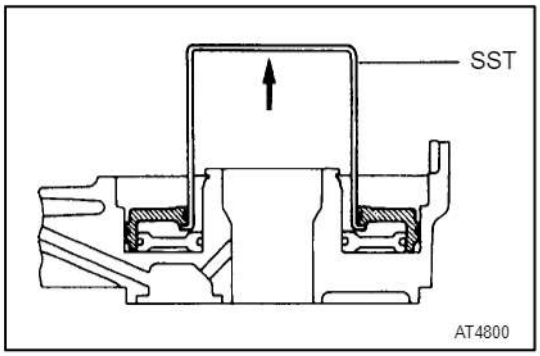
(c) Remove the piston return spring.



(d) Hold first and reverse brake outer piston with hand, apply compressed air to the transmission case to remove first and reverse brake outer piston.

(e) Remove first and reverse brake outer piston.
If the piston does not pop out with compressed air, lift the piston out with needle-nose pliers.

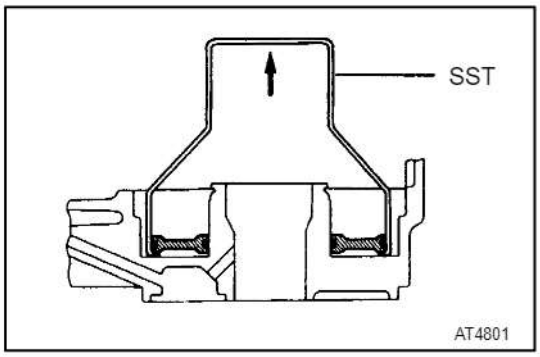
(f) Remove the O-ring from outer piston.



(g) Install SST behind the reaction sleeve and gradually lift it out of the transmission case.

SST 09350-30020 (09350-07080)

(h) Remove the two O-rings from the reaction sleeve.



(i) Install SST behind the inner piston and gradually lift it out of the transmission case.

SST 09350-30020 (09350-07090)

(j) Remove the two O-rings from the inner piston.

37. BASIC DISASSEMBLY IS COMPLETE

The transmission in now in basic component subassemblies. Next, disassemble, clean, inspect, repair and assemble each of these component parts.

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COMPONENT PARTS

GENERAL NOTES

The instructions here are organized so that you work on only one component group at a time. This will help avoid confusion from similar-looking parts of different subassemblies being on your workbench at the same time.
The component groups are inspected and repaired from the converter housing side.
As much as possible, complete the inspection, repair and assembly before proceeding to the next component group. If a component group can not be assembled because parts are being ordered, be sure to keep all parts of that group in a separate container while proceeding with disassembly, inspection, repair and assembly of other component groups.
Recommended ATF:
DEXRON◆ II

GENERAL CLEANING NOTES:

1. All disassembled parts should be washed clean and any fluid passages and holes blown through with compressed air.
2. When using compressed air to dry parts, always aim away from yourself to prevent accidentally spraying automatic transmission fluid or kerosene on your face.
3. The recommended automatic transmission fluid or kerosene should be used for cleaning.

PARTS ARRANGEMENT:

1. After cleaning, the parts should be arranged in correct order to allow efficient inspection, repairs, and reassembly.
2. When disassembling a valve body, be sure to keep each valve together with the corresponding spring.
3. New discs for the brakes and clutches that are to be used for replacement must be soaked in transmission fluid for at least fifteen minutes before assembly.

GENERAL ASSEMBLY:

1. All oil seal rings, clutch discs, clutch plates, rotating parts, and sliding surfaces should be coated with transmission fluid prior to reassembly.
2. All gaskets and rubber O-rings should be replaced.
3. Make sure that the ends of a snap ring are not aligned with one of the cutouts and are installed in the groove correctly.
4. If a worn bushing is to be replaced, the subassembly containing that bushing must also be replaced.
5. Check thrust bearings and races for wear or damage. Replace if necessary.
6. Use petroleum jelly to keep parts in place.

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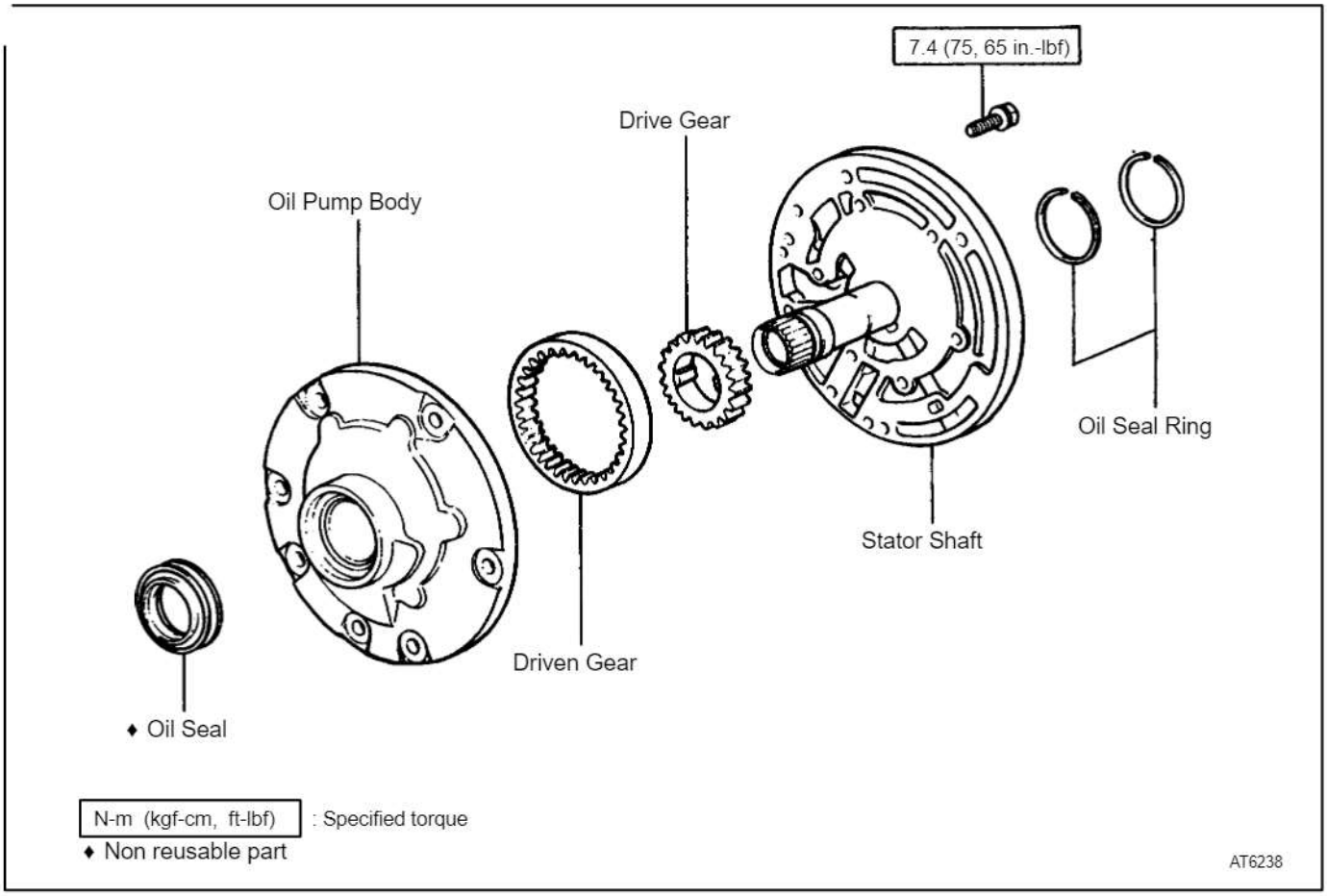
GENERAL ASSEMBLY:

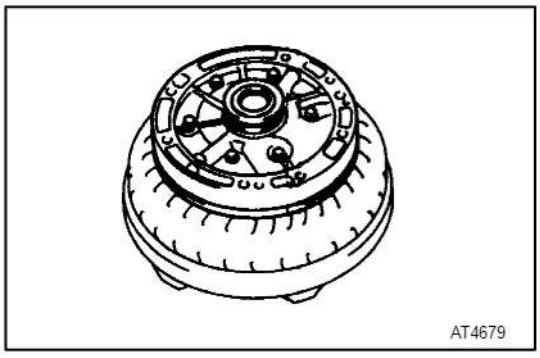
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OIL PUMP

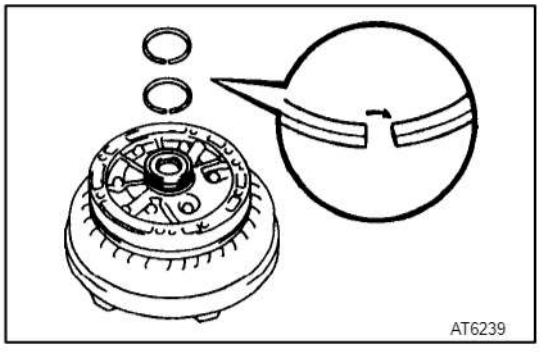
COMPONENTS





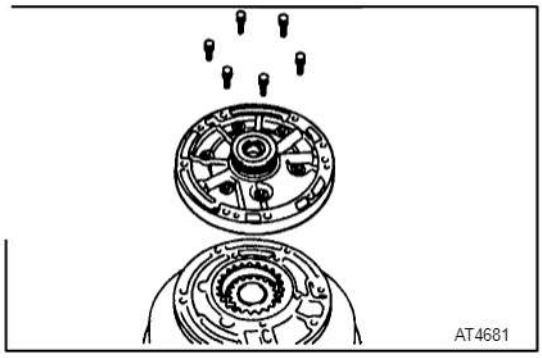
OIL PUMP DISASSEMBLY

1. **USE TORQUE CONVERTER CLUTCH AS WORK STAND**



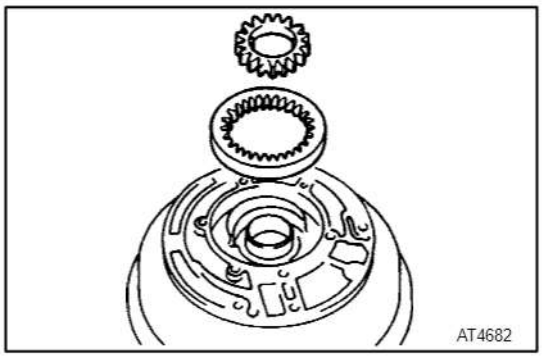
2. **REMOVE OIL SEAL RINGS**
   Remove the two oil seal rings.

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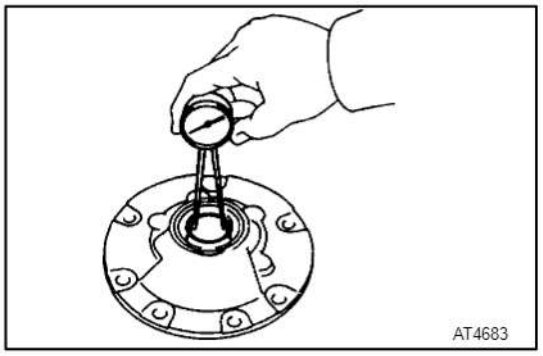
3. REMOVE STATOR SHAFT

Remove the six bolts, and then remove the stator shaft from the oil pump body.



4. REMOVE OIL PUMP DRIVE GEAR AND DRIVEN GEAR

OIL PUMP INSPECTION



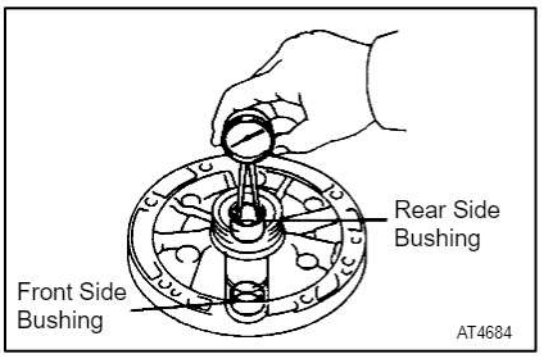
1. CHECK OIL PUMP BODY BUSHING

Using a dial indicator, measure the inside diameter of the oil pump body bushing.

Maximum inside diameter:

38.19 mm (1.5035 in.)

If the inside diameter is greater than the maximum, replace the oil pump body.



2. CHECK STATOR SHAFT BUSHING

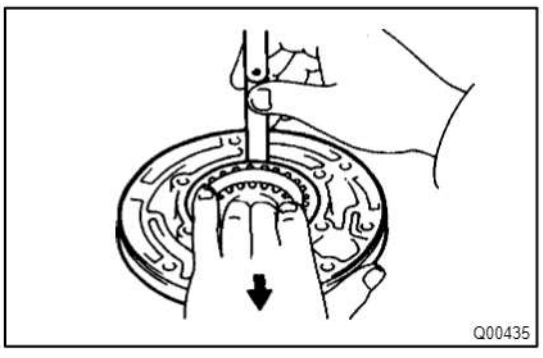
Using a dial indicator, measure the inside diameter of the stator shaft bushings.

Maximum inside diameter:

Front side 21.58 mm (0.8496 in.)

Rear side 23.10 mm (0.9094 in.)

If the inside diameter is greater than the maximum, replace the stator shaft.



3. CHECK BODY CLEARANCE OF DRIVEN GEAR

Push the driven gear to one side of the body.
Using a feeler gauge, measure the clearance.

Standard body clearance:

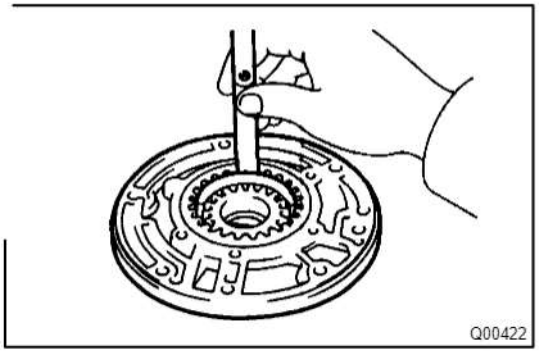
0.07 - 0.15 mm (0.0028 - 0.0059 in.)

Maximum body clearance:

0.3 mm (0.012 in.)

If the body clearance is greater than the maximum, replace the drive gear, driven gear or pump body.

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Q00422

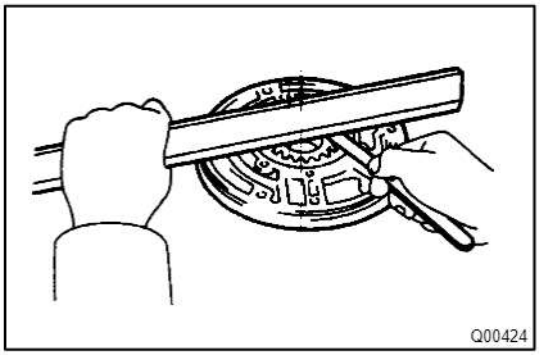
4. CHECK TIP CLEARANCE OF DRIVEN GEAR

Measure between the driven gear teeth and the crescent-shaped part of the pump body.

Standard tip clearance:
0.11 - 0.14 mm (0.0043 - 0.0055 in.)

Maximum tip clearance:
0.3 mm (0.012 in.)

If the tip clearance is greater than the maximum, replace the drive gear, driven gear or pump body.


Q00424

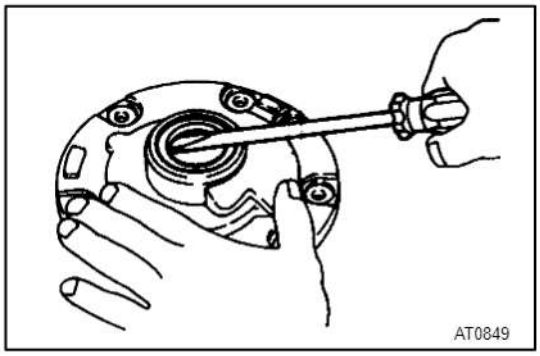
5. CHECK SIDE CLEARANCE OF BOTH GEARS

Using a steel straight edge and a feeler gauge, measure the side clearance of both gears.

Standard side clearance:
0.02 - 0.05 mm (0.0008 - 0.0020 in.)

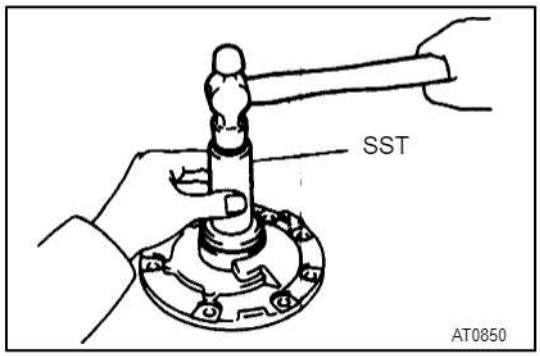
Maximum side clearance:
0.1 mm (0.004 in.)

If the side clearance is greater than the maximum, replace the drive gear, driven gear or pump body.


AT0849

6. IF NECESSARY, REPLACE OIL SEAL

(a) Pry off the oil seal with a screwdriver.

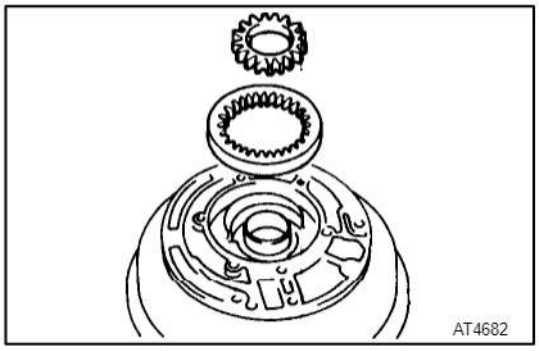


AT0850

(b) Using SST, install a new oil seal.
The oil seal end should be flushed with the outer edge of the pump body.

SST 09350-20015 (09388-20010)

(c) Coat the oil seal lip with MP grease.


AT4682

OIL PUMP ASSEMBLY

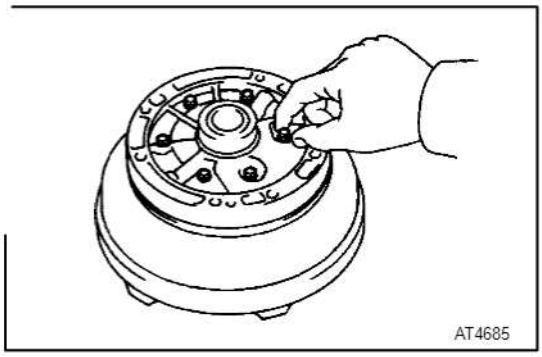
1. INSTALL DRIVEN GEAR AND DRIVE GEAR TO OIL PUMP BODY

(a) Place the oil pump body on the torque converter clutch.

(b) Coat the driven gear and drive gear with ATF.

(c) Install the driven gear and drive gear.

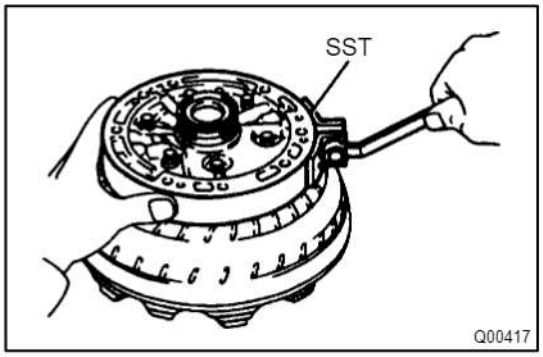
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2. INSTALL STATOR SHAFT TO OIL PUMP BODY

(a) Align the stator shaft with each bolt hole.

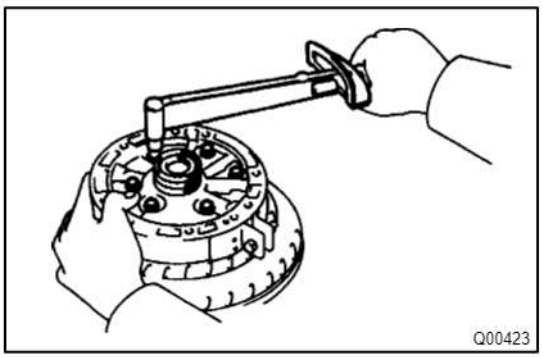
(b) Temporarily install the six bolts.



(c) Install SST around the pump body and stator shaft.

SST 09350-20015 (09363-20010)

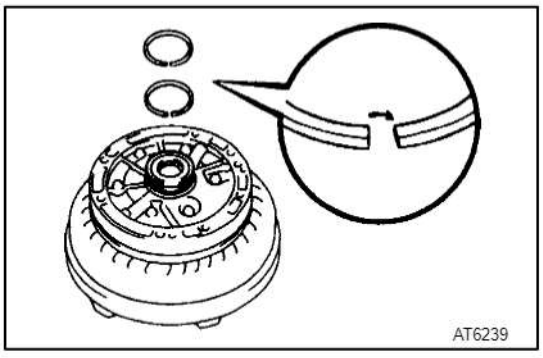
(d) Tighten SST to align the pump body and stator shaft.



(e) Tighten the six bolts.

Torque: 7.4 N-m (75 kgf-cm, 65 in.-lbf)

(f) Remove SST.



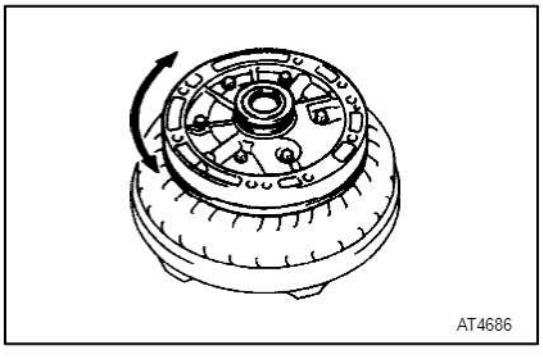
3. INSTALL OIL SEAL RINGS

(a) Coat the two oil seal rings with ATF.

(b) Contract the oil seal rings and install them onto the stator shaft.

NOTICE: Do not spread the ring ends too much.

HINT: After installing the oil seal rings, check that they rotate smoothly.



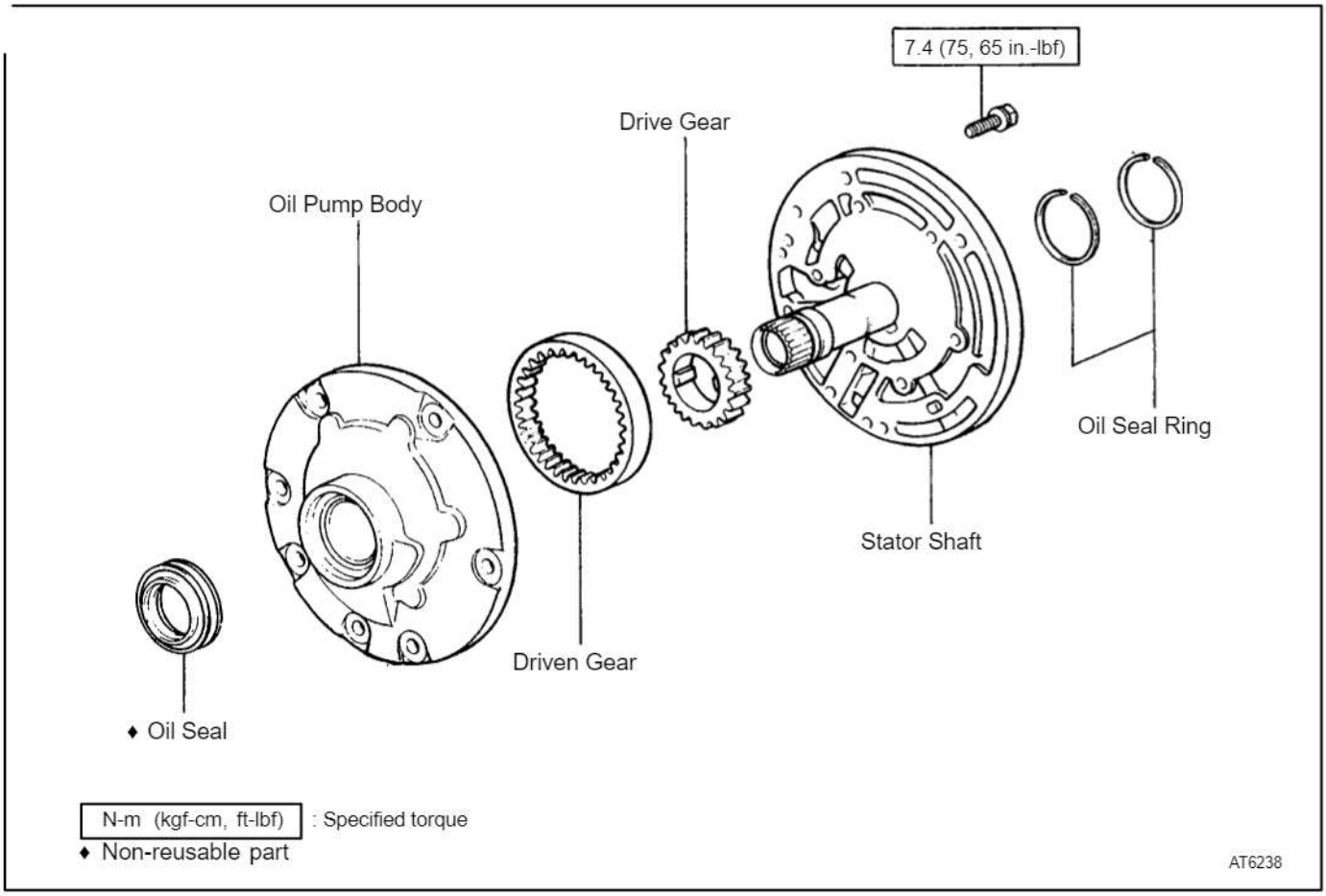
4. CHECK OIL PUMP DRIVE GEAR ROTATION

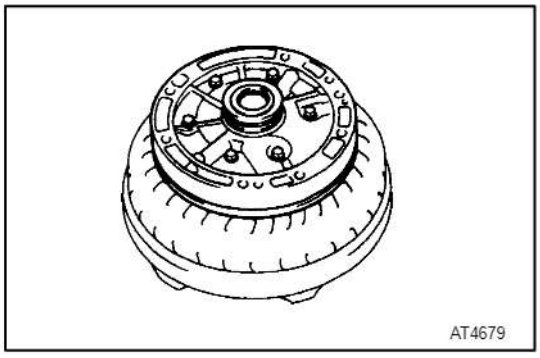
Make sure the drive gear rotates smoothly.

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OIL PUMP

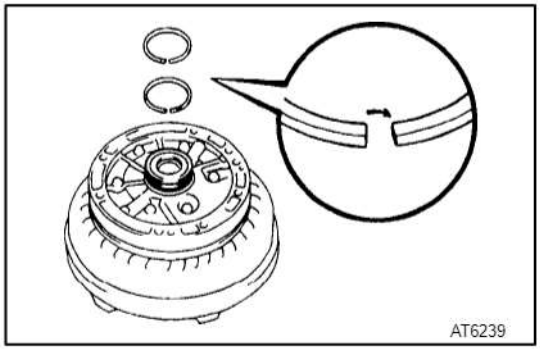
COMPONENTS





OIL PUMP DISASSEMBLY

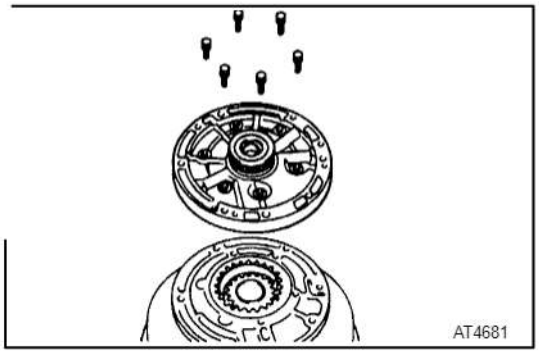
1. USE TORQUE CONVERTER CLUTCH AS WORK STAND



2. REMOVE OIL SEAL RINGS

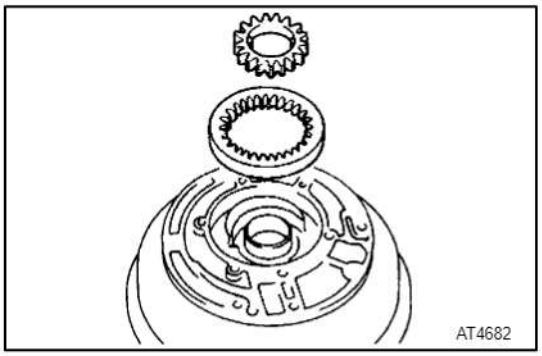
Remove the two oil seal rings.

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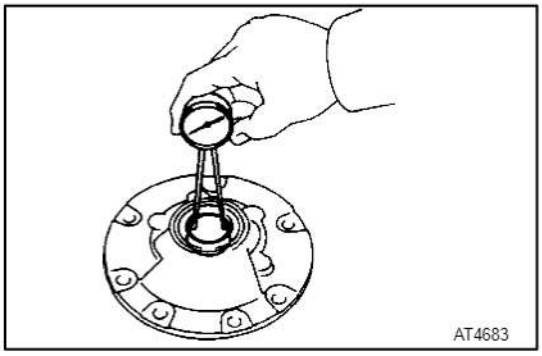
3. REMOVE STATOR SHAFT

Remove the six bolts, and then remove the stator shaft from the oil pump body.



4. REMOVE OIL PUMP DRIVE GEAR AND DRIVEN GEAR

OIL PUMP INSPECTION



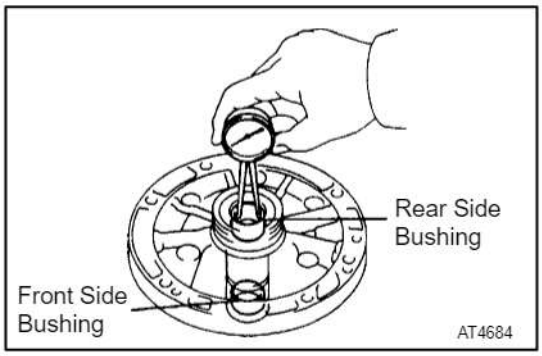
1. CHECK OIL PUMP BODY BUSHING

Using a dial indicator, measure the inside diameter of the oil pump body bushing.

Maximum inside diameter:

38.19 mm (1.5035 in.)

If the inside diameter is greater than the maximum, replace the oil pump body.



2. CHECK STATOR SHAFT BUSHING

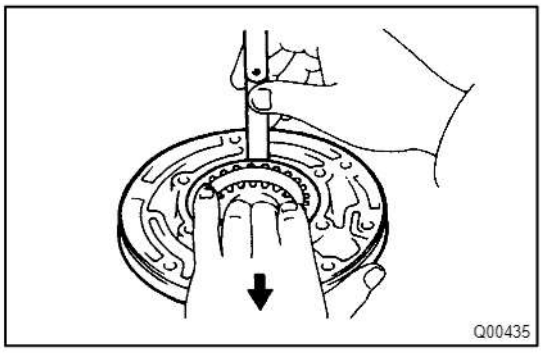
Using a dial indicator, measure the inside diameter of the stator shaft bushings.

Maximum inside diameter:

Front side 21.58 mm (0.8496 in.)

Rear side 23.10 mm (0.9094 in.)

If the inside diameter is greater than the maximum, replace the stator shaft.



3. CHECK BODY CLEARANCE OF DRIVEN GEAR

Push the driven gear to one side of the body.
Using a feeler gauge, measure the clearance.

Standard body clearance:

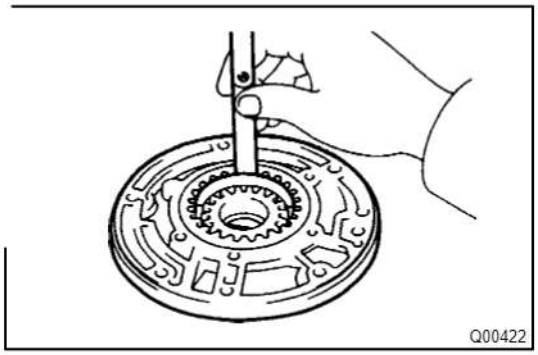
0.07 - 0.15 mm (0.0028 - 0.0059 in.)

Maximum body clearance:

0.3 mm (0.012 in.)

If the body clearance is greater than the maximum, replace the drive gear, driven gear or pump body.

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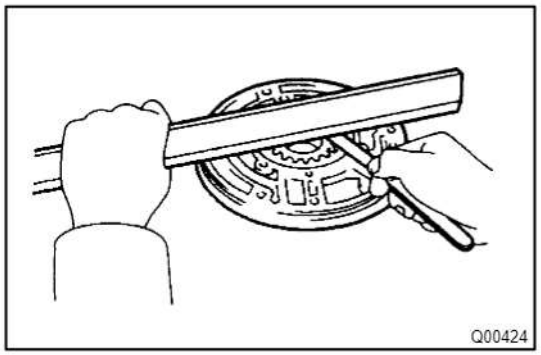
4. CHECK TIP CLEARANCE OF DRIVEN GEAR

Measure between the driven gear teeth and the crescent-shaped part of the pump body.

Standard tip clearance:
0.11 - 0.14 mm (0.0043 - 0.0055 in.)

Maximum tip clearance:
0.3 mm (0.012 in.)

If the tip clearance is greater than the maximum, replace the drive gear, driven gear or pump body.



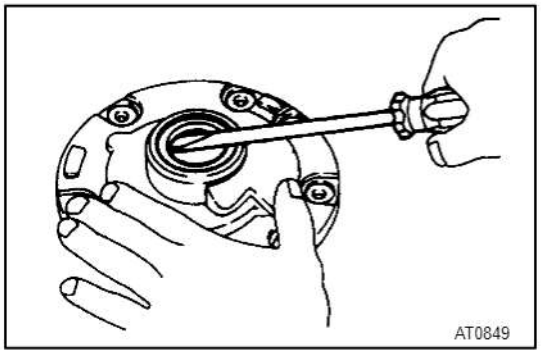
5. CHECK SIDE CLEARANCE OF BOTH GEARS

Using a steel straight edge and a feeler gauge, measure the side clearance of both gears.

Standard side clearance:
0.02 - 0.05 mm (0.0008 - 0.0020 in.)

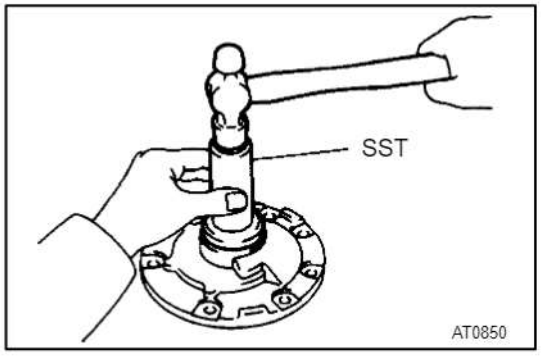
Maximum side clearance:
0.1 mm (0.004 in.)

If the side clearance is greater than the maximum, replace the drive gear, driven gear or pump body.



6. IF NECESSARY, REPLACE OIL SEAL

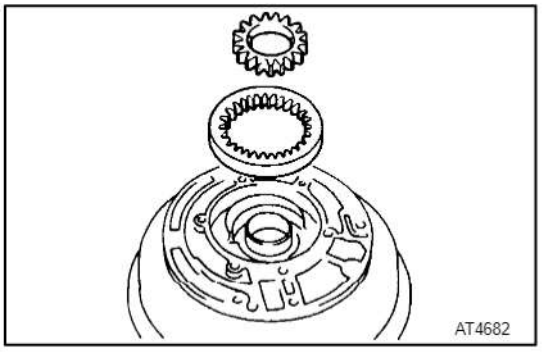
(a) Pry off the oil seal with a screwdriver.



(b) Using SST, install a new oil seal.
The oil seal end should be flushed with the outer edge of the pump body.

SST 09350-20015 (09388-20010)

(c) Coat the oil seal lip with MP grease.



OIL PUMP ASSEMBLY

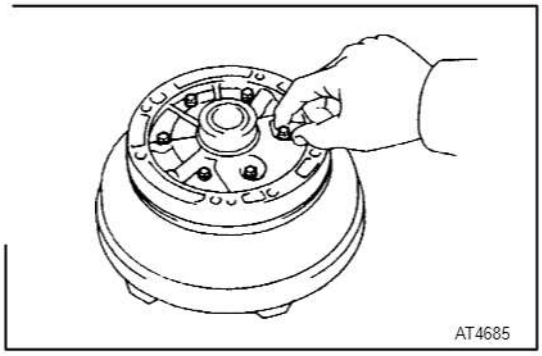
1. INSTALL DRIVEN GEAR AND DRIVE GEAR TO OIL PUMP BODY

(a) Place the oil pump body on the torque converter clutch.

(b) Coat the driven gear and drive gear with ATF.

(c) Install the driven gear and drive gear.

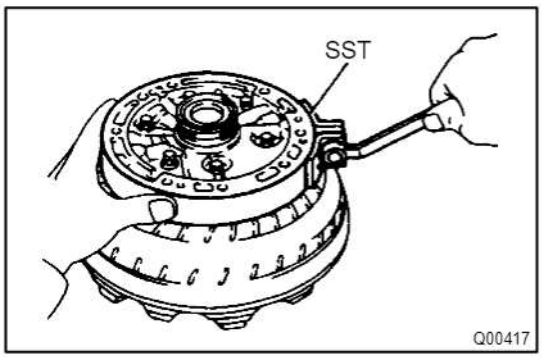
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2. INSTALL STATOR SHAFT TO OIL PUMP BODY

(a) Align the stator shaft with each bolt bole.

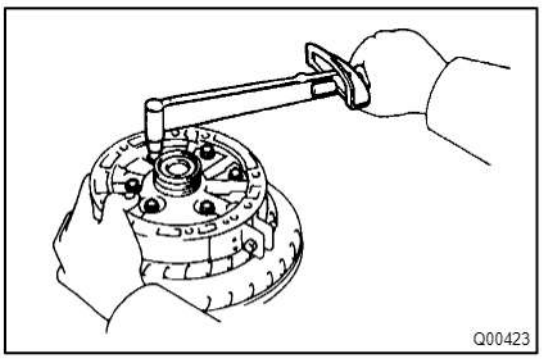
(b) Temporarily install the six bolts.



(c) Install SST around the pump body and stator shaft.

SST 09350-20015 (09363-20010)

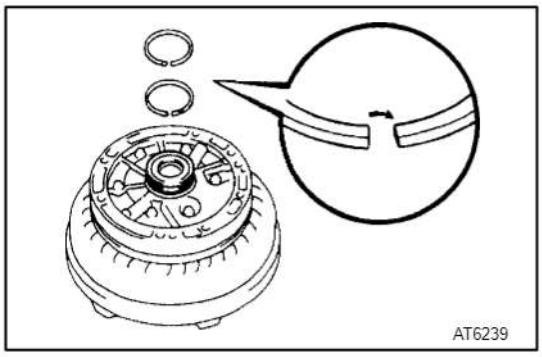
(d) Tighten SST to align the pump body and stator shaft.



(e) Tighten the six bolts.

Torque: 7.4 N-m (75 kgf-cm, 65 in.-lbf)

(f) Remove SST.



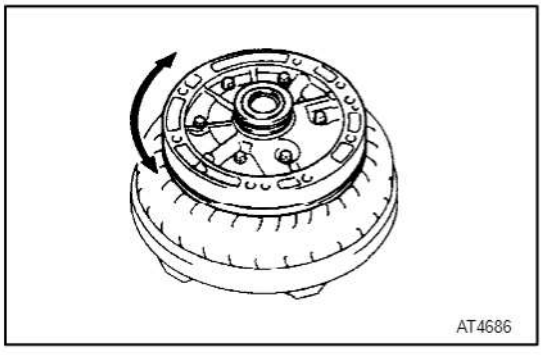
3. INSTALL OIL SEAL RINGS

(a) Coat the two oil seal rings with ATF.

(b) Contract the oil seal rings and install them onto the stator shaft.

NOTICE: Do not spread the ring ends too much.

HINT: After installing the oil seal rings, check that they rotate smoothly.



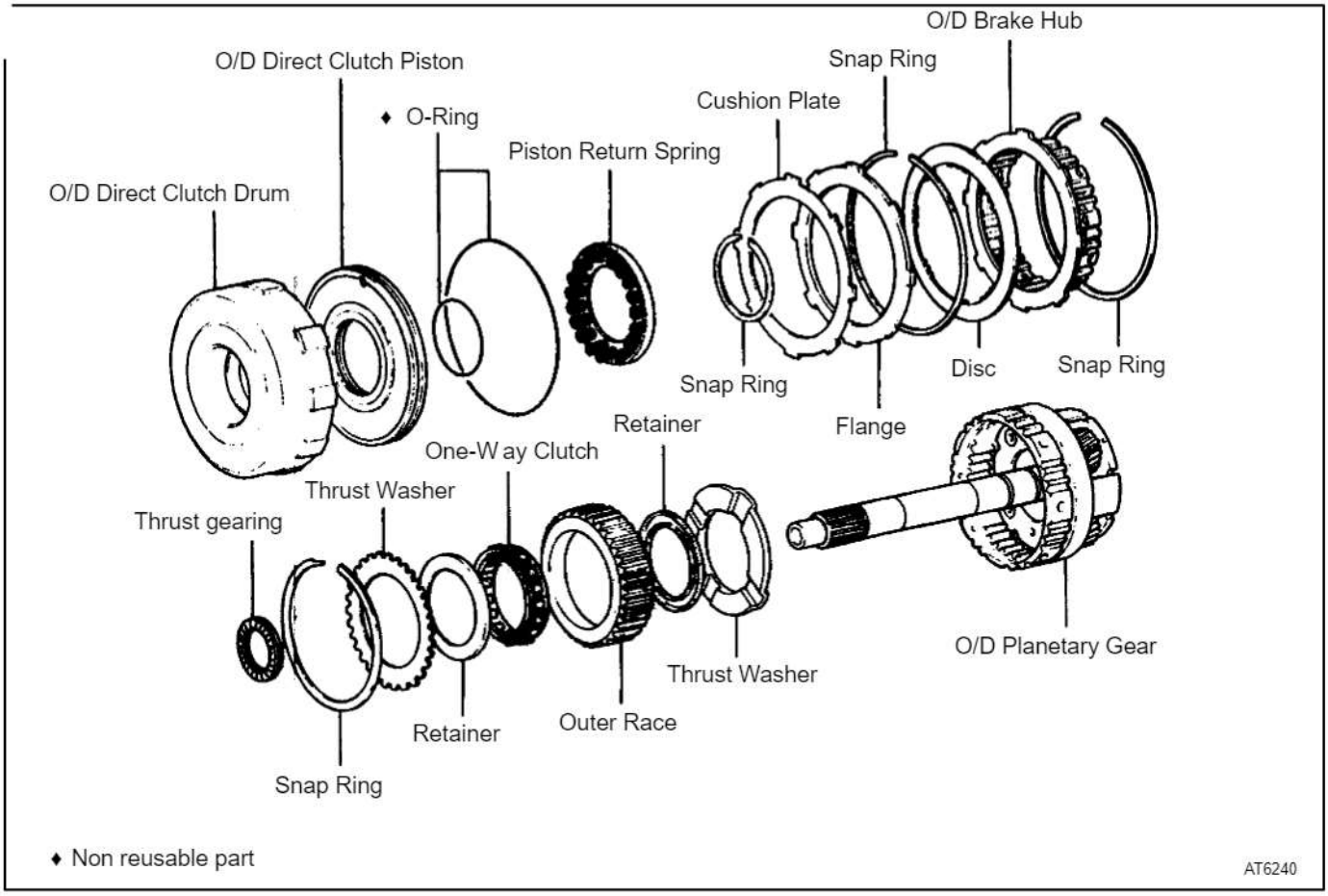
4. CHECK OIL PUMP DRIVE GEAR ROTATION

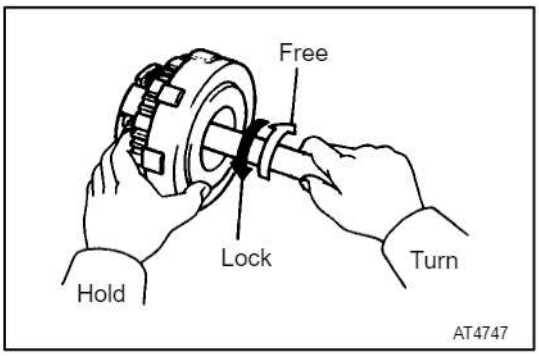
Make sure the drive gear rotates smoothly.

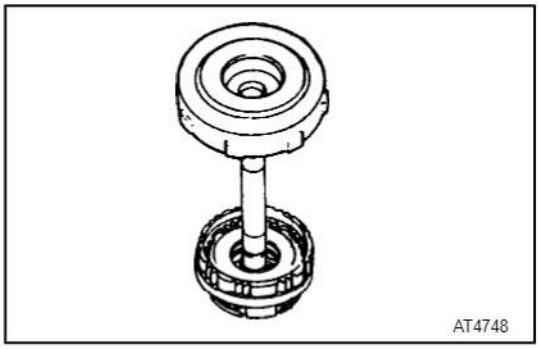
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OVERDRIVE DIRECT CLUTCH

COMPONENTS



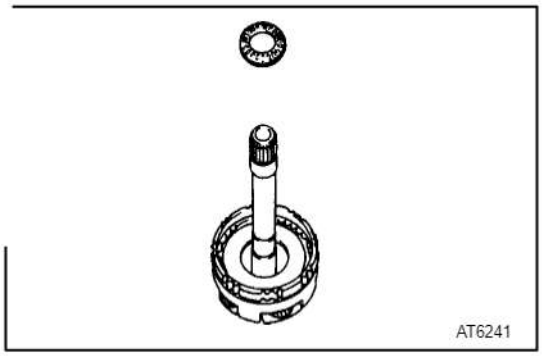




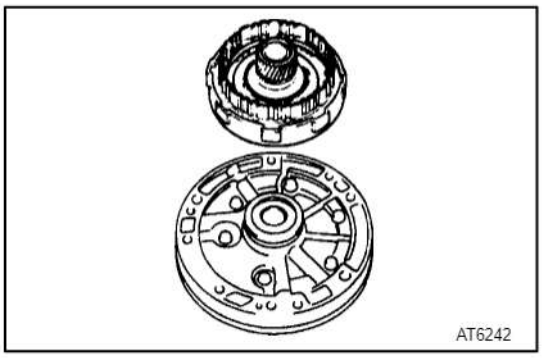
OVERDRIVE PLANETARY GEAR, OVERDRIVE DIRECT CLUTCH AND OVERDRIVE ONE-WAY CLUTCH DISASSEMBLY

1. **CHECK OPERATION OF ONE-WAY CLUTCH**
   Hold the O/D direct clutch drum and turn the input shaft.
   The input shaft turns freely clockwise and locks counterclockwise,
2. **REMOVE OVERDRIVE DIRECT CLUTCH ASSEMBLY FROM OVERDRIVE PLANETARY GEAR**
   (a) Remove the overdrive direct clutch from the overdrive planetary gear.

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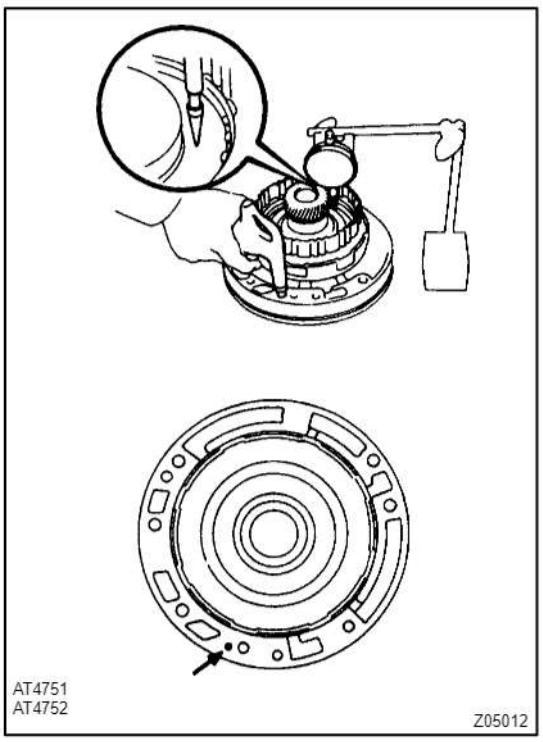

AT6241

(b) Remove the assembled bearing and race from the planetary carrier.


AT6242

3. CHECK PISTON STROKE OF OVERDRIVE DIRECT CLUTCH

(a) Place the O/D direct clutch assembly onto the oil pump.


AT4751
AT4752
Z05012

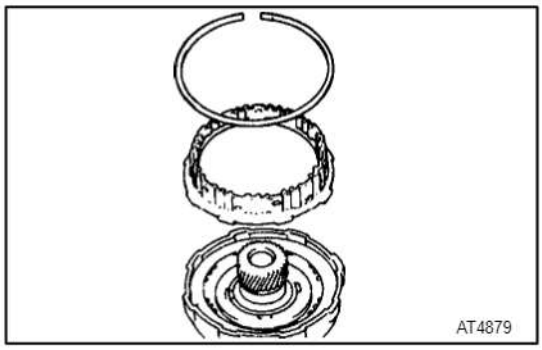
(b) Using a dial indicator, measure the O/D direct clutch piston stroke applying and releasing the compressed air 392 - 785 kPa (4 - 8 kgf/cm^2, 57 - 114 psi) , as shown.

Piston stroke:

1.77 - 2.58 mm (0.0697 - 0.1016 in.)

If the values are nonstandard, inspect the discs.

(c) Remove the O/D direct clutch assembly from the oil pump.

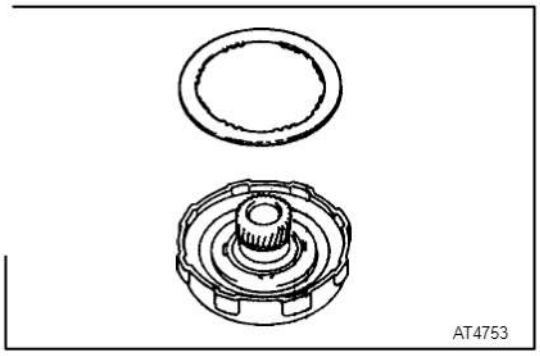

AT4879

4. REMOVE OVERDRIVE BRAKE HUB

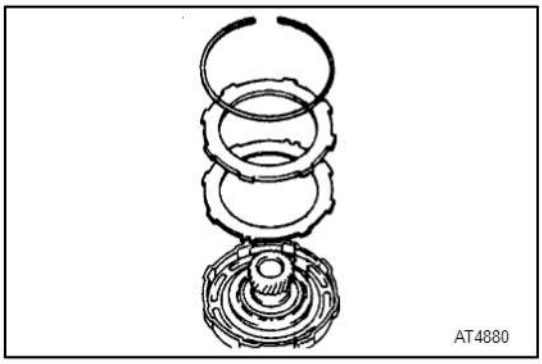
(a) Using a screwdriver, remove the snap ring.

(b) Remove the O/D brake hub.

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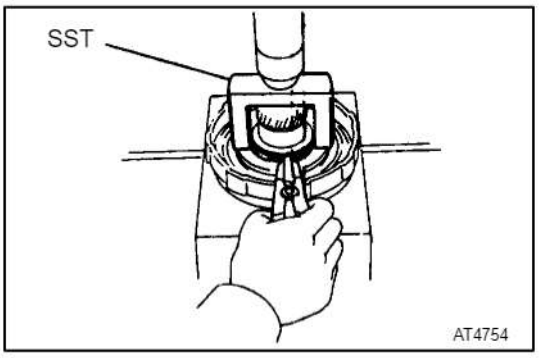
5. REMOVE DISC



8. REMOVE FLANGE AND CUSHION PLATE

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

(b) Remove the flange and cushion plate.

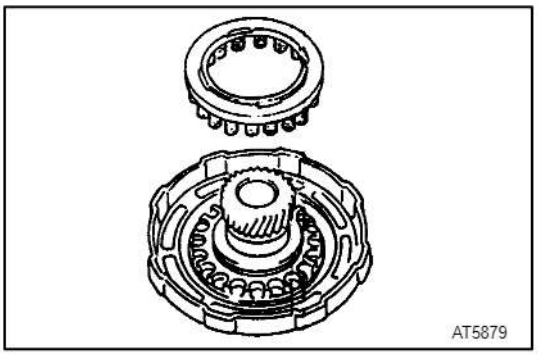


7. REMOVE PISTON RETURN SPRINGS

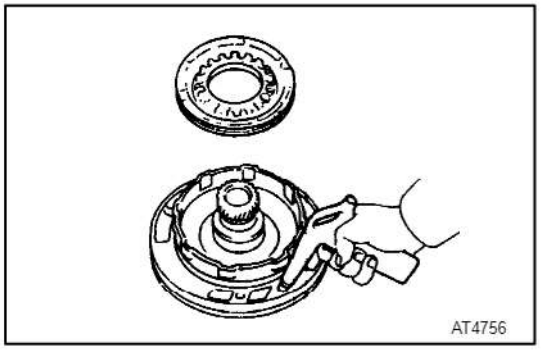
(a) Place SST on the spring seat and compress the return springs with a shop press.

SST 09350-20015 (09369-20040)

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



(c) Remove the spring seat and eighteen springs.



8. REMOVE OVERDRIVE DIRECT CLUTCH PISTON

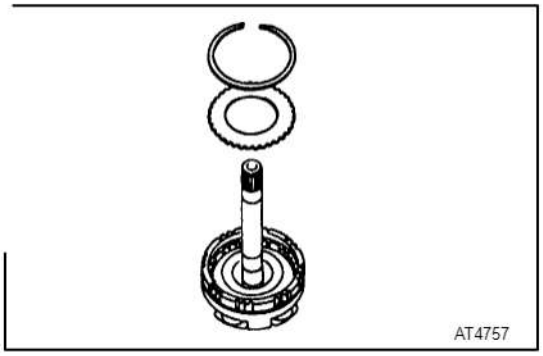
(a) Place the O/D direct clutch onto the oil pump.

(b) Hold the O/D direct clutch piston and apply compressed air to the oil pump to remove the O/D direct clutch piston.

HINT: Make sure the direct clutch piston square in the drum before applying compressed air.

(c) Remove the two O-rings from the piston.

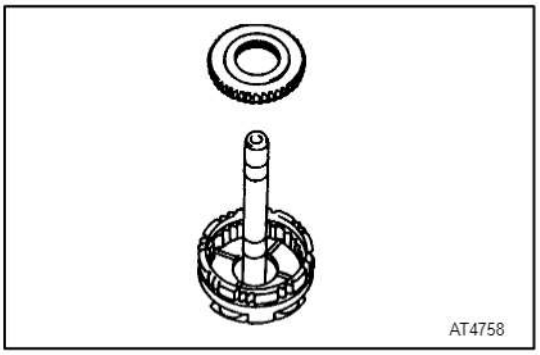
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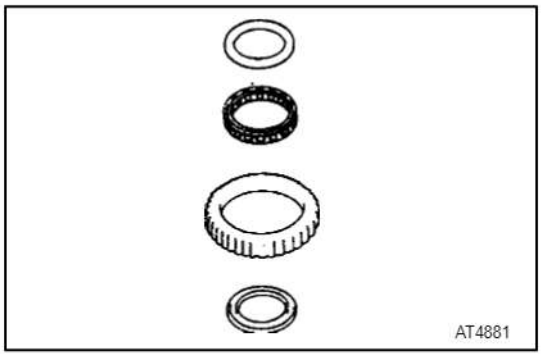
9. REMOVE THRUST WASHER

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

(b) Remove the thrust washer.



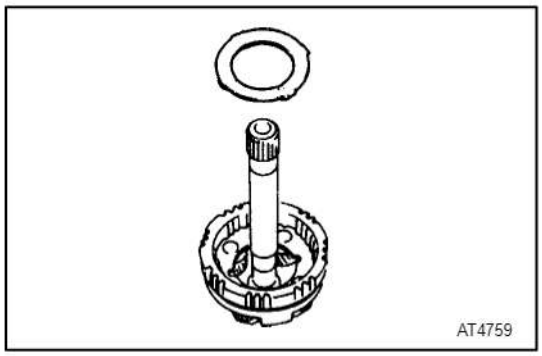
10. REMOVE ONE-WAY CLUTCH ASSEMBLY



11. DISASSEMBLE ONE-WAY CLUTCH

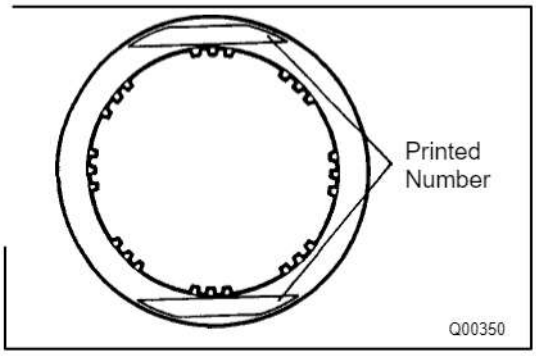
(a) Remove the two retainers from both sides.

(b) Remove the one-way clutch from the outer race.



12. REMOVE THRUST WASHER

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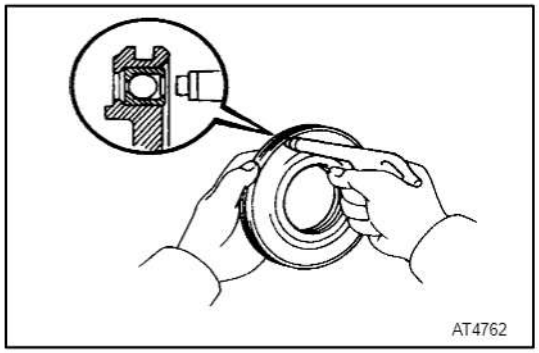


OVERDRIVE PLANETARY GEAR AND OVERDRIVE DIRECT CLUTCH INSPECTION

1. INSPECT DISC AND FLANGE

Check to see if the sliding surface of the disc and flange are worn or burnt. If necessary, replace them.
HINT:

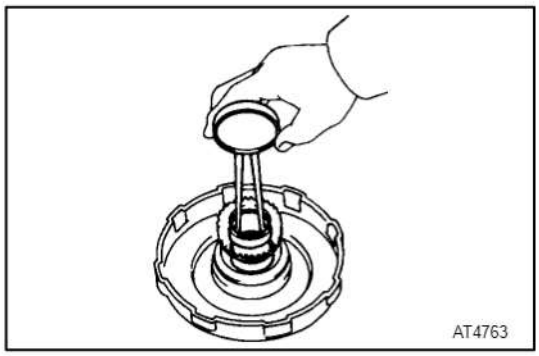
- © If the lining of the disc is peeling off or discolored, or even if parts of the printed numbers are defaced, replace disc.
- © Before assembling new disc, soak it in ATF for at least fifteen minutes.



2. CHECK OVERDRIVE DIRECT CLUTCH PISTON

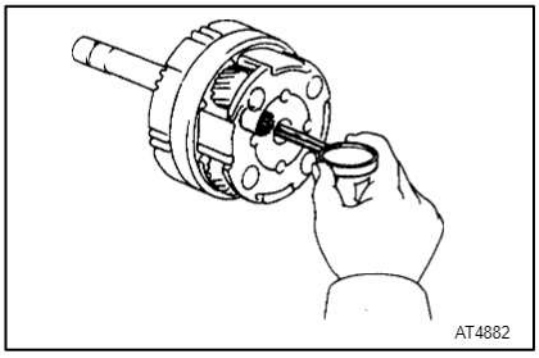
(a) Check that check ball is free by shaking the piston.

(b) Check that the valve does not leak by applying low-pressure compressed air.



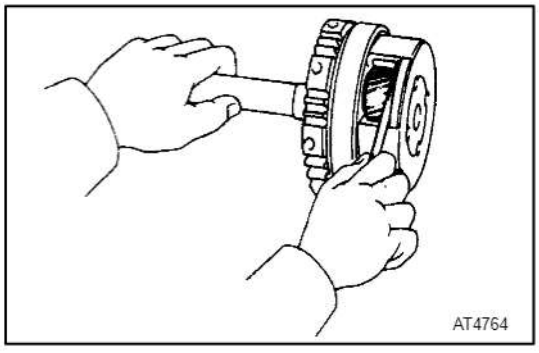
3. CHECK OVERDRIVE DIRECT CLUTCH DRUM BUSHINGS

Using a dial indicator, measure the inside diameter of the clutch drum bushings.
Maximum inside diameter:
23.14 mm (0.9110 in.)
If the inside diameter is greater than the maximum, replace the clutch drum.



4. CHECK OVERDRIVE PLANETARY GEAR BUSHING

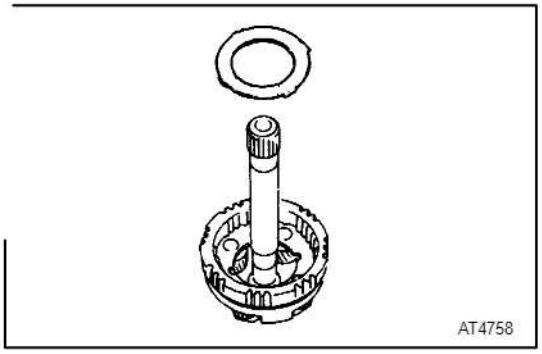
Using a dial indicator, measure the inside diameter of the planetary gear bushing.
Maximum inside diameter:
11.27 mm (0.4437 in.)
If the inside diameter is greater than the maximum, replace the planetary gear.



5. MEASURE PLANETARY PINION GEAR THRUST CLEARANCE

Using a feeler gauge, measure the planetary pinion gear thrust clearance.
Standard clearance:
0.20 - 0.50 mm (0.0079 - 0.0197 in.)
If the clearance is nonstandard, inspect the planetary gear thrust washer.
If necessary, replace the planetary gear assembly.

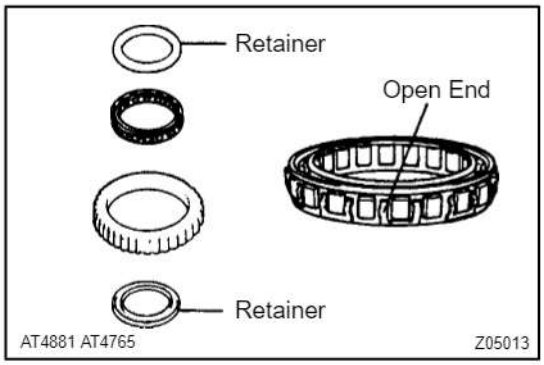
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AT4758

OVERDRIVE PLANETARY GEAR, OVERDRIVE DIRECT CLUTCH AND OVERDRIVE ONE-WAY CLUTCH ASSEMBLY

1. INSTALL THRUST WASHER

Install the thrust washer to the overdrive planetary gear, the grooved side facing upward.

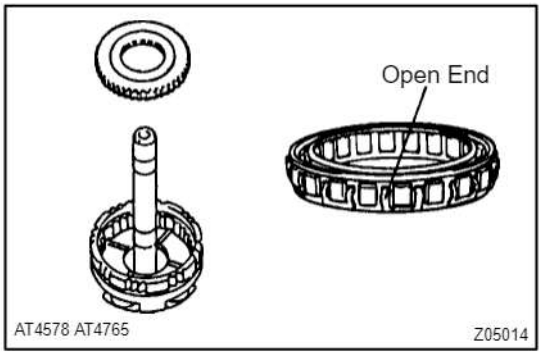


AT4881 AT4765 Z05013

2. ASSEMBLE ONE-WAY CLUTCH

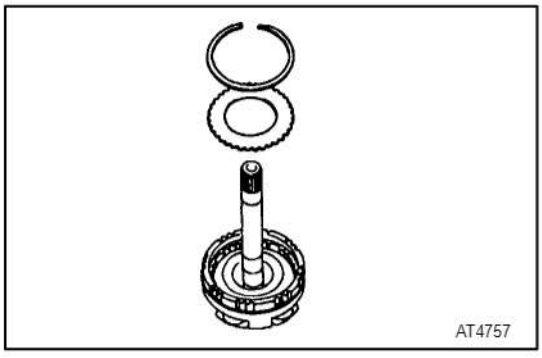
(a) Install the one-way clutch into the outer race, the open end of the retainers facing upward.

(b) Install the two retainers to both sides.



AT4578 AT4765 Z05014

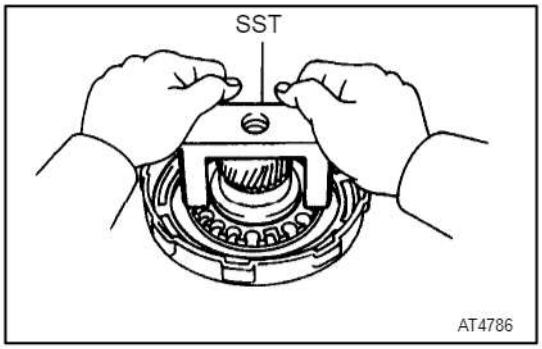
3. INSTALL ONE-WAY CLUTCH ASSEMBLY


AT4757

4. INSTALL THRUST WASHER

(a) Install the thrust washer.

(b) Using a screwdriver, install the snap ring.



AT4786

5. INSTALL OVERDRIVE DIRECT CLUTCH PISTON

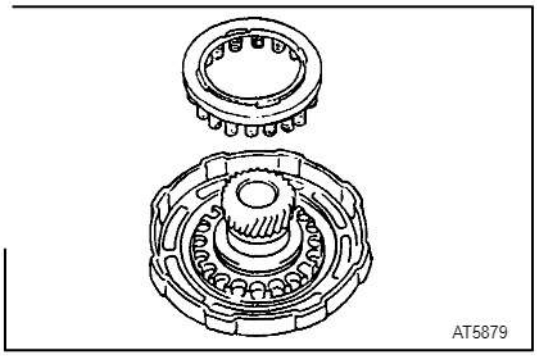
(a) Coat new O-rings with ATF and install them on the O/D direct clutch piston.

(b) Place SST on the direct clutch piston.

SST 09350-20015 (09369-20040)

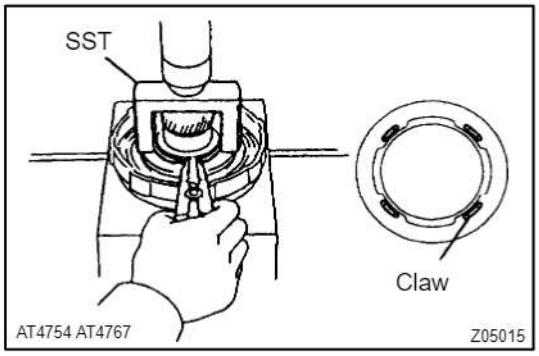
(c) Being careful not to damage the O-rings, press in the direct clutch piston into the clutch drum with both hands.

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6. INSTALL PISTON RETURN SPRINGS

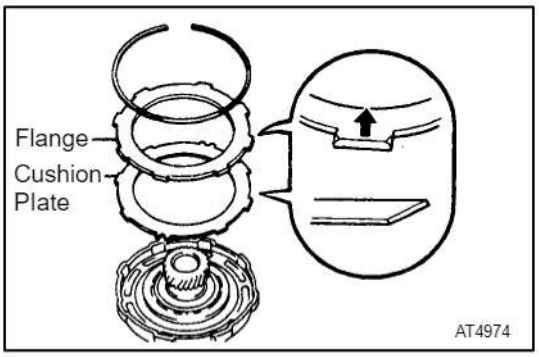
(a) Install the eighteen springs and spring seat.



(b) Place SST on the spring seat, and compress the return springs with a shop press.

SST 09350-20015 (09369-20040)

(c) Install the snap ring with a snap ring expander. Be sure the end gap of the snap ring is not aligned with the spring seat claw.

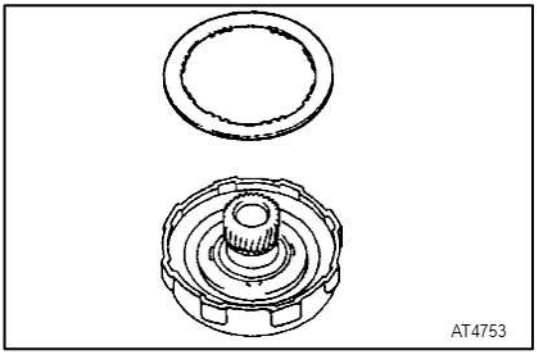


7. INSTALL CUSHION PLATE AND FLANGE

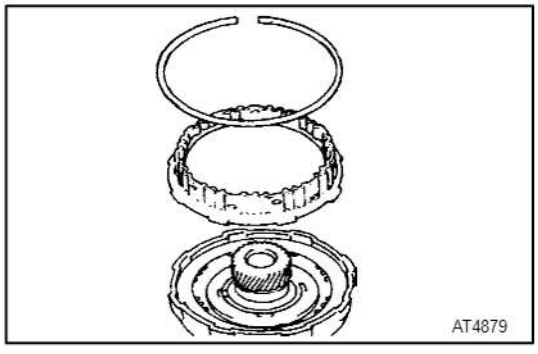
(a) Install the cushion plate.

(b) Install flange, the rounded edge facing upward.

(c) Install the snap ring. Be sure the end gap of the snap ring is not aligned with the cutout portion of the drum.



8. INSTALL DISC

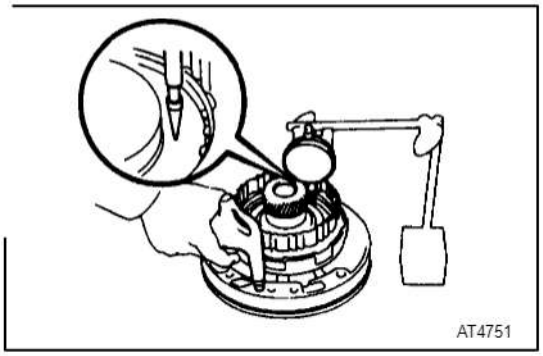


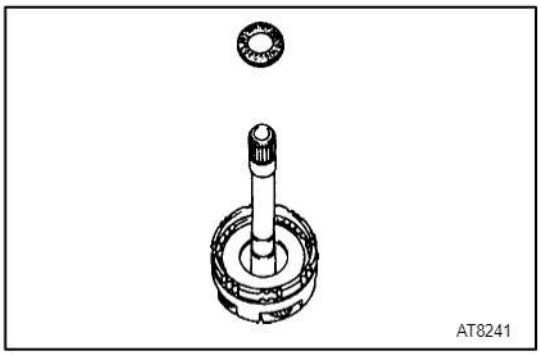
9. INSTALL OVERDRIVE BRAKE HUB

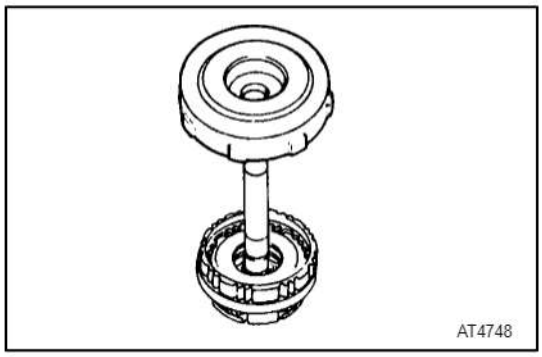
(a) Install the O/D brake hub.

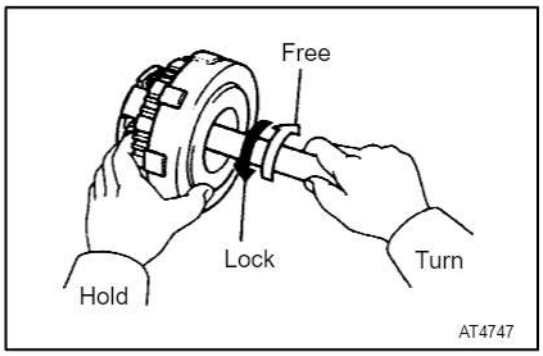
(b) Using a screwdriver, install the snap ring. Be sure the end gap of the snap ring is not aligned with the cutout portion of the drum.

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AT4751


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AT4748



AT4747

10. CHECK PISTON STROKE OF OVERDRIVE DIRECT CLUTCH

(a) Place the O/D direct clutch assembly onto the oil pump.

(b) Using dial indicator, measure the overdrive direct clutch piston stroke applying and releasing the compressed air 392 - 785 kPa (4 - 8 kgf/cm^2, 57 - 114 psi), as shown.

Piston stroke:

1.77 - 2.58 mm (0.0697 - 0.1016 in.)

If the piston stroke is less than the limit, parts may have been assembled incorrectly, check and reassemble again.

11. INSTALL OVERDRIVE DIRECT CLUTCH ASSEMBLY

(a) Coat the race and bearing with petroleum jelly and install them onto the O/D planetary gear.

Assembled bearing and race diameter:

	Inside mm (in.)	Outside mm (in.)
Assembled bearing and race	37.3 (1.469)	52.5 (2.067)

(b) Install the direct clutch assembly onto the O/D planetary gear.

HINT: Mesh the splines of the O/D planetary gear with the flukes of the disc by rotating and pushing the O/D planetary gear.

12. CHECK OPERATION OF ONE-WAY CLUTCH

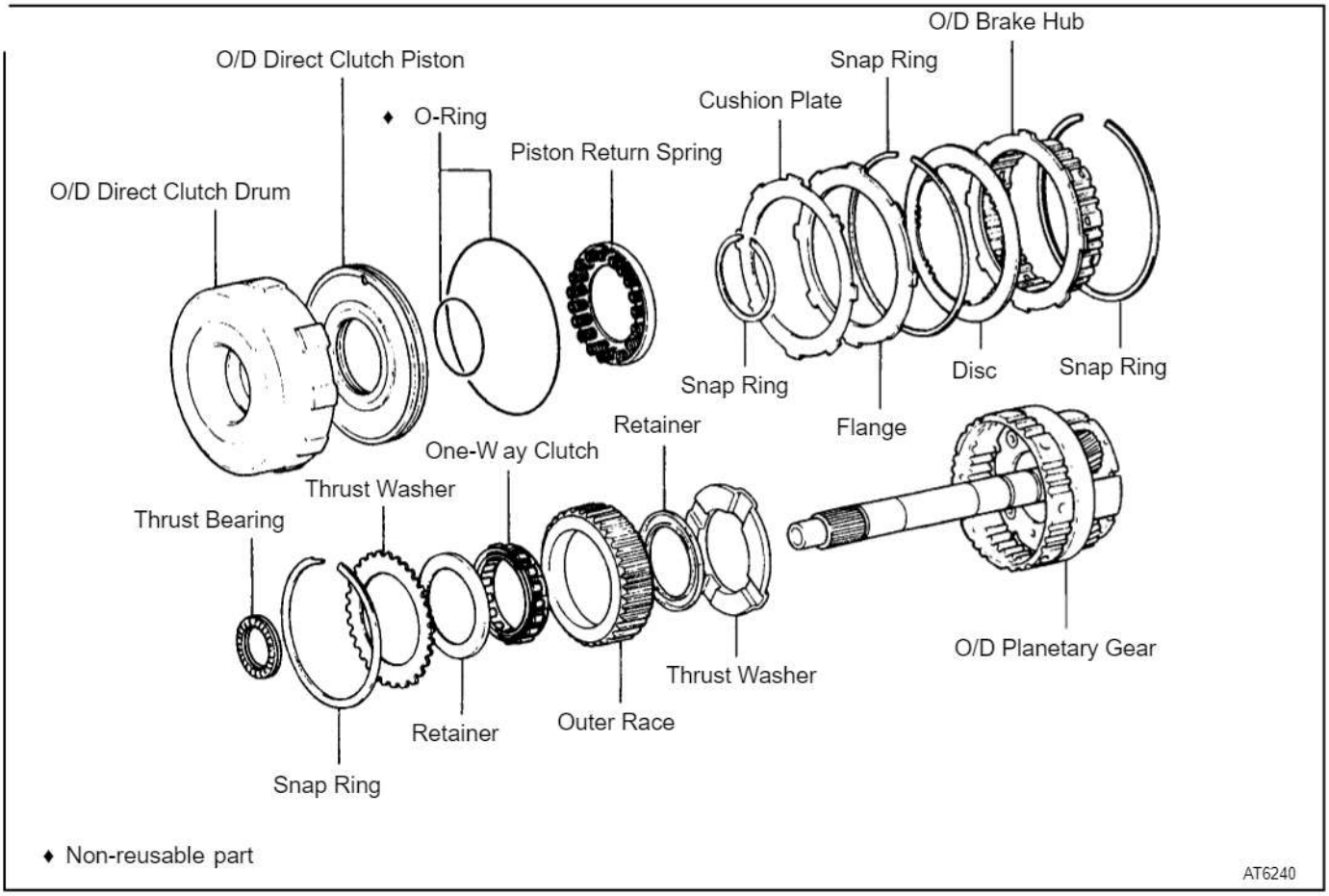
Hold the O/D direct clutch drum and turn the input shaft.

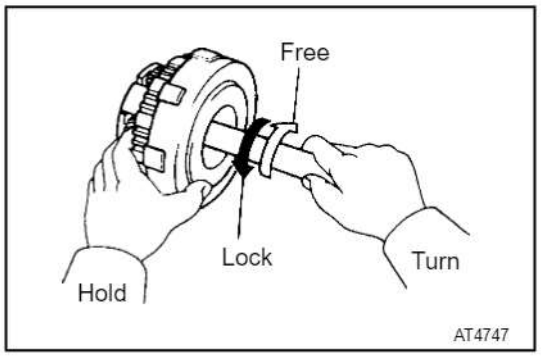
The input shaft turns freely clockwise and locks counterclockwise.

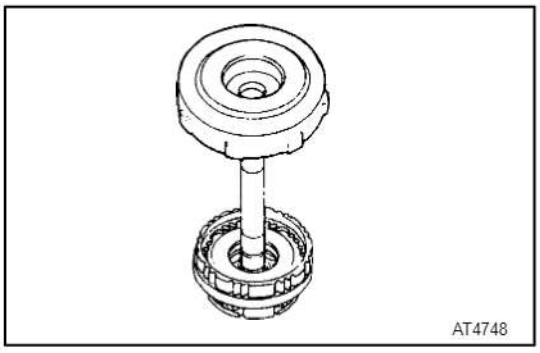
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OVERDRIVE DIRECT CLUTCH

COMPONENTS







OVERDRIVE PLANETARY GEAR, OVERDRIVE DIRECT CLUTCH AND OVERDRIVE ONE-WAY CLUTCH DISASSEMBLY

1. CHECK OPERATION OF ONE-WAY CLUTCH

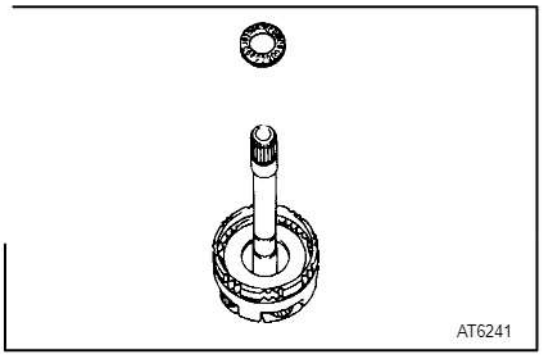
Hold the O/D direct clutch drum and turn the input shaft.

The input shaft turns freely clockwise and locks counterclockwise.

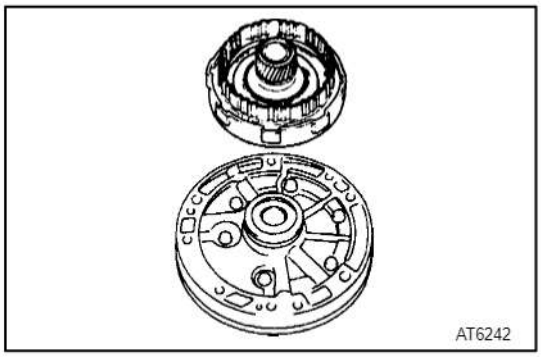
2. REMOVE OVERDRIVE DIRECT CLUTCH ASSEMBLY FROM OVERDRIVE PLANETARY GEAR

(a) Remove the overdrive direct clutch from the overdrive planetary gear.

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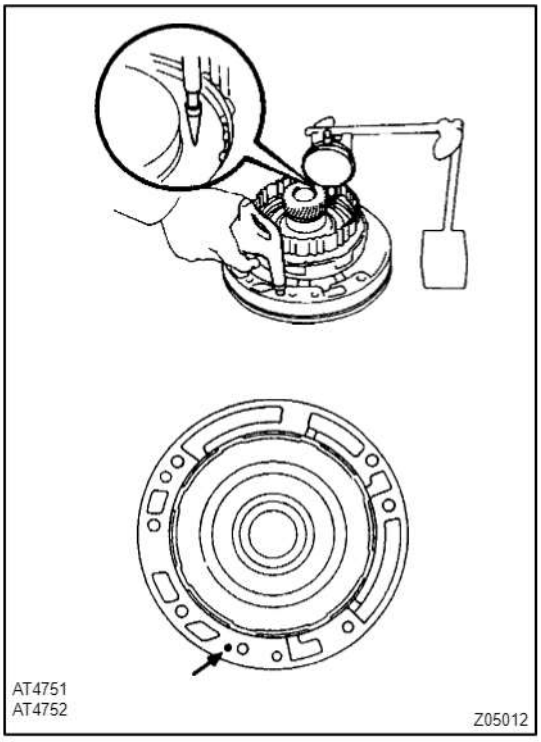


(b) Remove the assembled bearing and race from the planetary carrier.



3. CHECK PISTON STROKE OF OVERDRIVE DIRECT CLUTCH

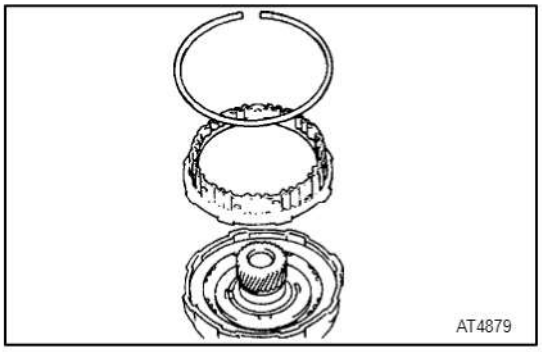
(a) Place the O/D direct clutch assembly onto the oil pump.



(b) Using a dial indicator, measure the O/D direct clutch piston stroke applying and releasing the compressed air 392 - 785 kPa (4 - 8 kgf/cm^2, 57 - 114 psi), as shown.

Piston stroke:
1.77 - 2.58 mm (0.0697 - 0.1016 in.)
If the values are nonstandard, inspect the discs.

(c) Remove the O/D direct clutch assembly from the oil pump.

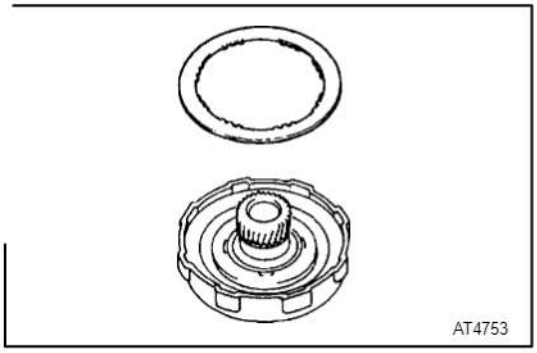


4. REMOVE OVERDRIVE BRAKE HUB

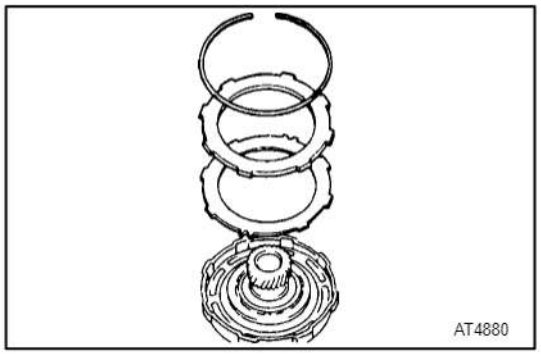
(a) Using a screwdriver, remove the snap ring.

(b) Remove the O/D brake hub.

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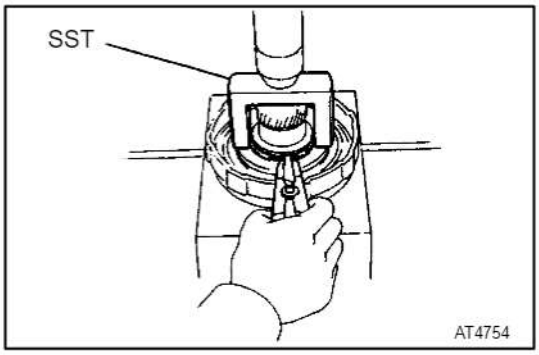
5. REMOVE DISC



6. REMOVE FLANGE AND CUSHION PLATE

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

(b) Remove the flange and cushion plate.

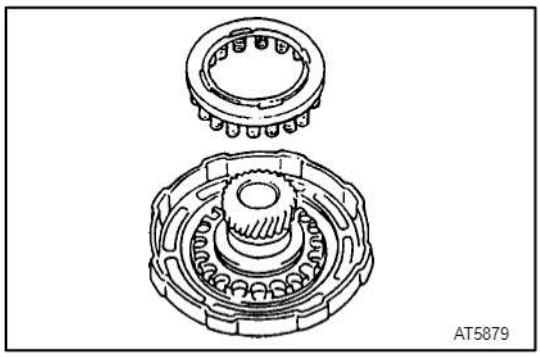


7. REMOVE PISTON RETURN SPRINGS

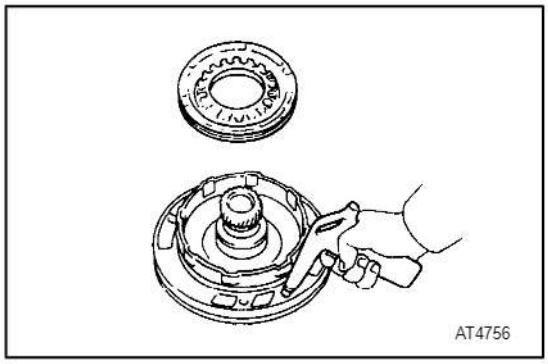
(a) Place SST on the spring seat and compress the return springs with a shop press.

SST 09350-20015 (09369-20040)

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



(c) Remove the spring seat and eighteen springs.



8. REMOVE OVERDRIVE DIRECT CLUTCH PISTON

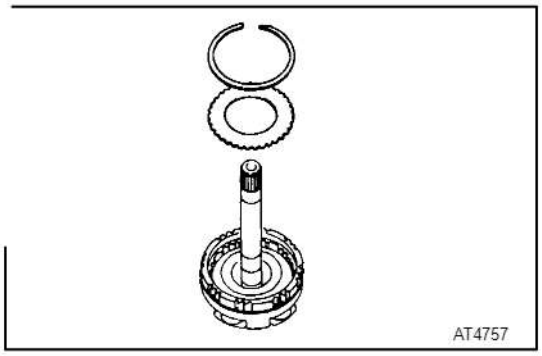
(a) Place the O/D direct clutch onto the oil pump.

(b) Hold the O/D direct clutch piston and apply compressed air to the oil pump to remove the O/D direct clutch piston.

HINT: Make sure the direct clutch piston square in the drum before applying compressed air.

(c) Remove the two O-rings from the piston.

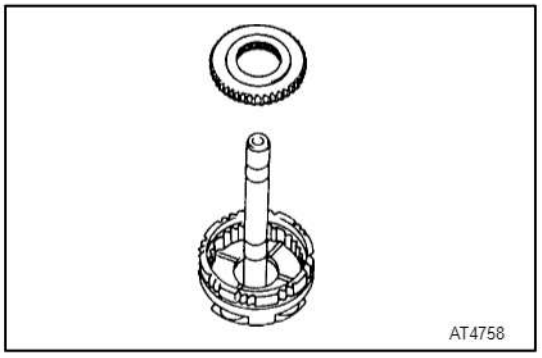
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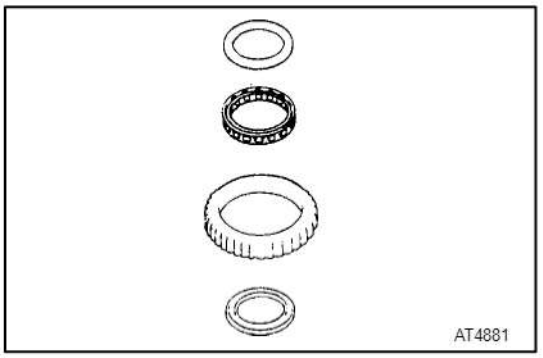
9. REMOVE THRUST WASHER

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

(b) Remove the thrust washer.



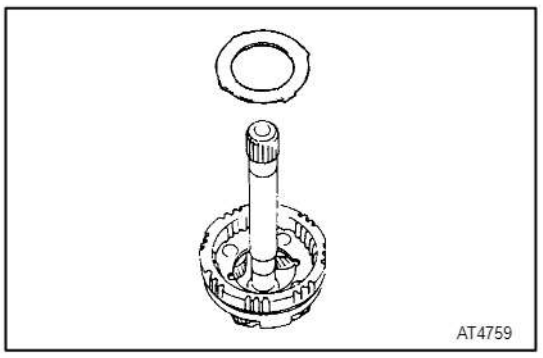
10. REMOVE ONE-WAY CLUTCH ASSEMBLY



11. DISASSEMBLE ONE-WAY CLUTCH

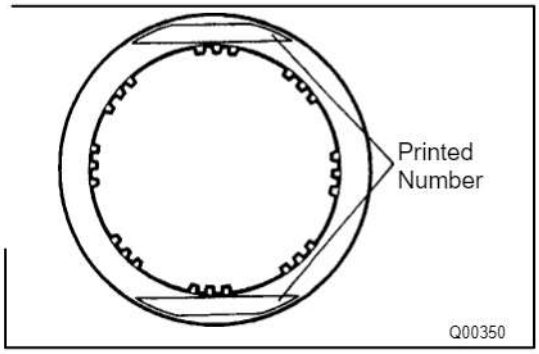
(a) Remove the two retainers from both sides.

(b) Remove the one-way clutch from the outer race.



12. REMOVE THRUST WASHER

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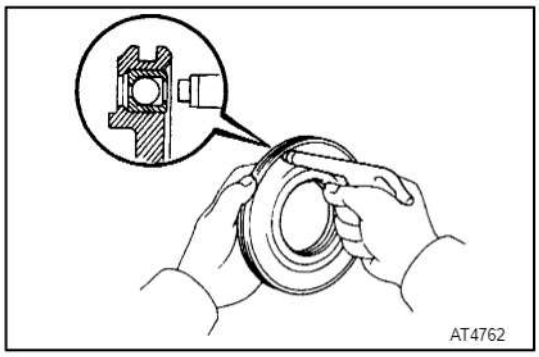


OVERDRIVE PLANETARY GEAR AND OVERDRIVE DIRECT CLUTCH INSPECTION

1. INSPECT DISC AND FLANGE

Check to see if the sliding surface of the disc and flange are worn or burnt. If necessary, replace them.
HINT:

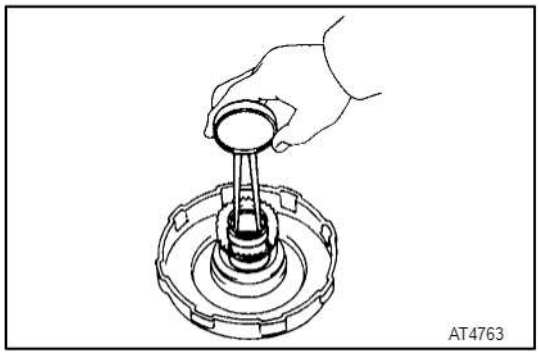
- © If the lining of the disc is peeling off or discolored, or even if parts of the printed numbers are defaced, replace disc.
- © Before assembling new disc, soak it in ATF for at least fifteen minutes.



2. CHECK OVERDRIVE DIRECT CLUTCH PISTON

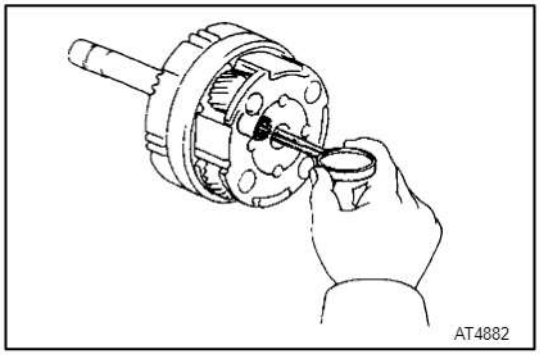
(a) Check that check ball is free by shaking the piston.

(b) Check that the valve does not leak by applying low-pressure compressed air.



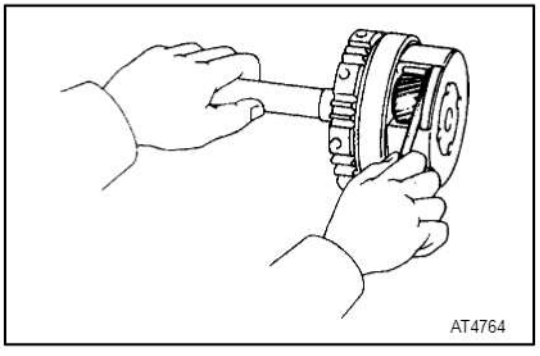
3. CHECK OVERDRIVE DIRECT CLUTCH DRUM BUSHINGS

Using a dial indicator, measure the inside diameter of the clutch drum bushings.
Maximum inside diameter:
23.14 mm (0.9110 in.)
If the inside diameter is greater than the maximum, replace the clutch drum.



4. CHECK OVERDRIVE PLANETARY GEAR BUSHING

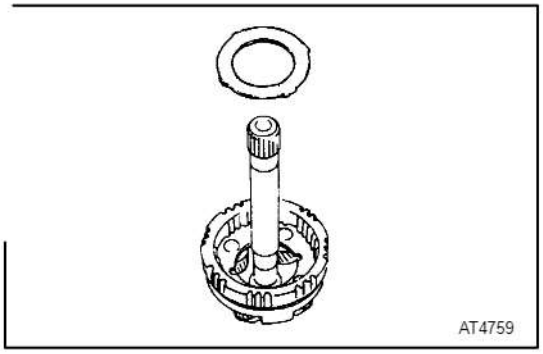
Using a dial indicator, measure the inside diameter of the planetary gear bushing.
Maximum inside diameter:
11.27 mm (0.4437 in.)
If the inside diameter is greater than the maximum, replace the planetary gear.



5. MEASURE PLANETARY PINION GEAR THRUST CLEARANCE

Using a feeler gauge, measure the planetary pinion gear thrust clearance.
Standard clearance:
0.20 - 0.50 mm (0.0079 - 0.0197 in.)
If the clearance is nonstandard, inspect the planetary gear thrust washer.
If necessary, replace the planetary gear assembly.

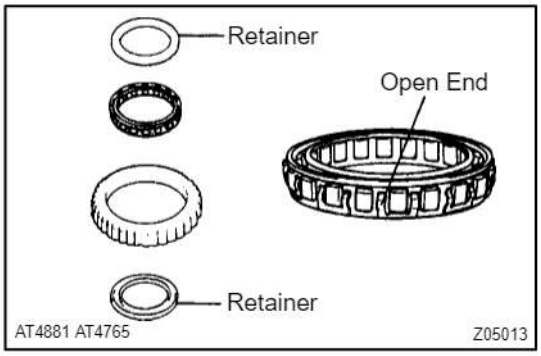
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OVERDRIVE PLANETARY GEAR, OVERDRIVE DIRECT CLUTCH AND OVERDRIVE ONE-WAY CLUTCH ASSEMBLY

1. INSTALL THRUST WASHER

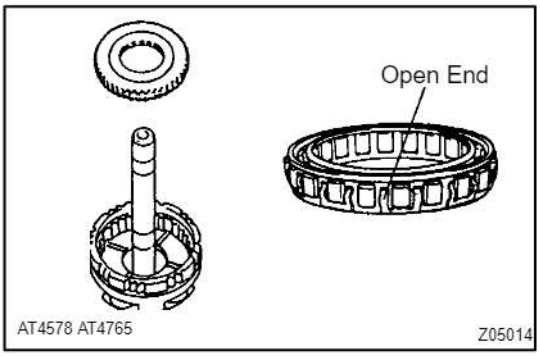
Install the thrust washer to the overdrive planetary gear, the grooved side facing upward.



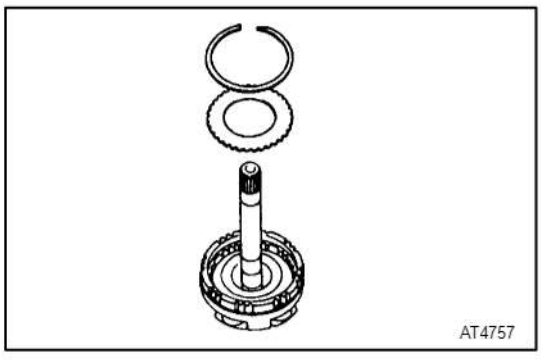
2. ASSEMBLE ONE-WAY CLUTCH

(a) Install the one-way clutch into the outer race, the open end of the retainers facing upward.

(b) Install the two retainers to both sides.



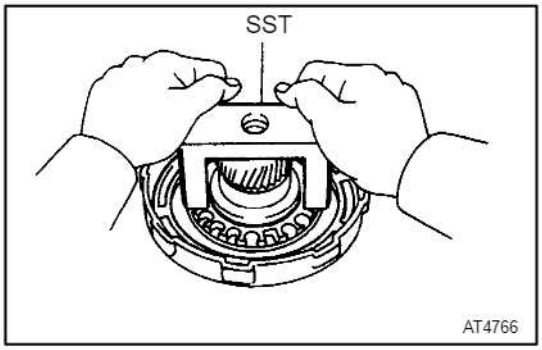
3. INSTALL ONE-WAY CLUTCH ASSEMBLY



4. INSTALL THRUST WASHER

(a) Install the thrust washer.

(b) Using a screwdriver, install the snap ring.



5. INSTALL OVERDRIVE DIRECT CLUTCH PISTON

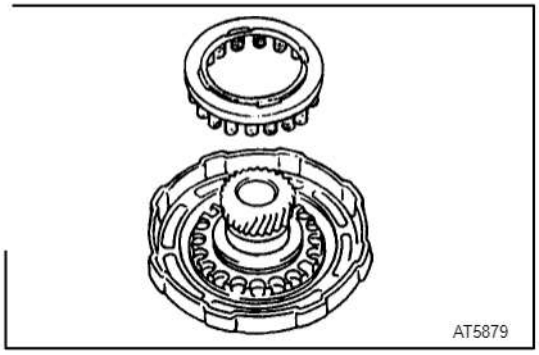
(a) Coat new O-rings with ATF and install them on the O/D direct clutch piston.

(b) Place SST on the direct clutch piston.

SST 09350-20015 (09369-20040)

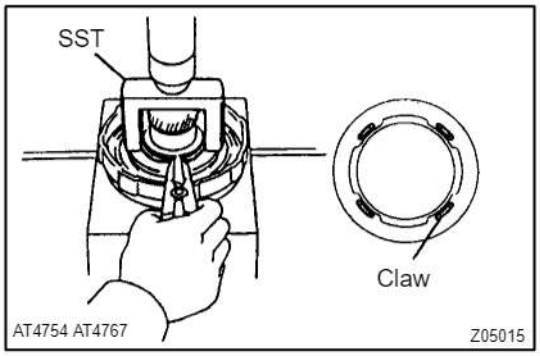
(c) Being careful not to damage the O-rings, press in the direct clutch piston into the clutch drum with both hands.

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6. INSTALL PISTON RETURN SPRINGS

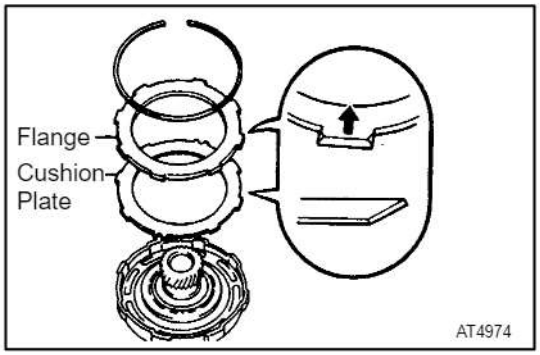
(a) Install the eighteen springs and spring seat.



(b) Place SST on the spring seat, and compress the return springs with a shop press.

SST 09350-20015 (09369-20040)

(c) Install the snap ring with a snap ring expander. Be sure the end gap of the snap ring is not aligned with the spring seat claw.

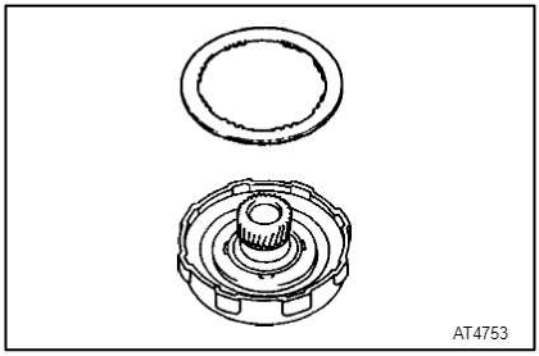


7. INSTALL CUSHION PLATE AND FLANGE

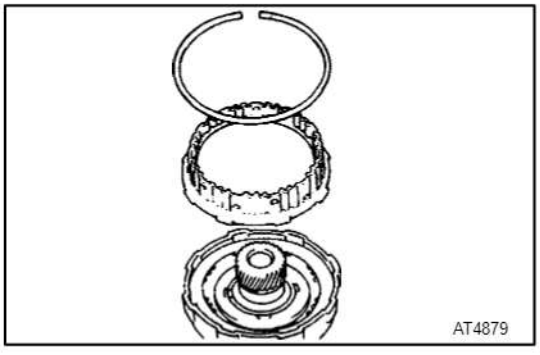
(a) Install the cushion plate.

(b) Install flange, the rounded edge facing upward.

(c) Install the snap ring. Be sure the end gap of the snap ring is not aligned with the cutout portion of the drum.



8. INSTALL DISC

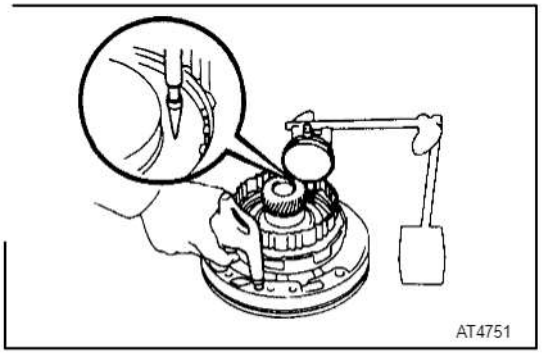


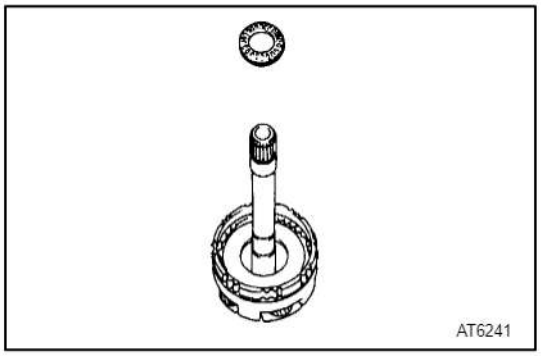
9. INSTALL OVERDRIVE BRAKE HUB

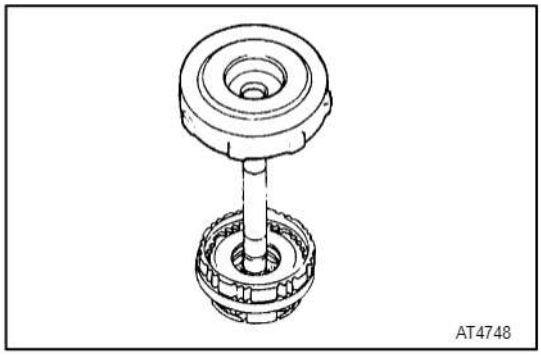
(a) Install the O/D brake hub.

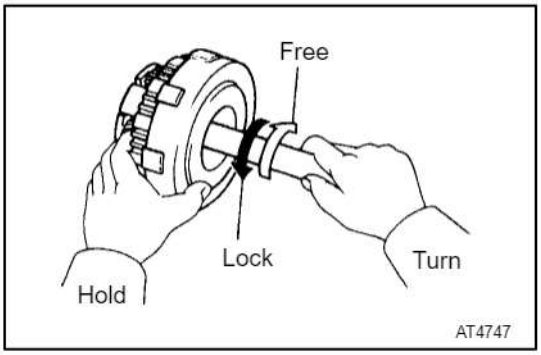
(b) Using a screwdriver, install the snap ring. Be sure the end gap of the snap ring is not aligned with the cutout portion of the drum.

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AT4751


AT6241


AT4748



AT4747

10. CHECK PISTON STROKE OF OVERDRIVE DIRECT CLUTCH

(a) Place the O/D direct clutch assembly onto the oil pump.

(b) Using dial indicator, measure the overdrive direct clutch piston stroke applying and releasing the compressed air 392 - 785 kPa (4 - 8 kgf/cm^2, 57 - 114 psi), as shown.

Piston stroke:

1.77 - 2.58 mm (0.0697 - 0.1016 in.)

If the piston stroke is less than the limit, parts may have been assembled incorrectly, check and reassemble again.

11. INSTALL OVERDRIVE DIRECT CLUTCH ASSEMBLY

(a) Coat the race and bearing with petroleum jelly and install them onto the O/D planetary gear.

Assembled bearing and race diameter:

	Inside mm (in.)	Outside mm (in.)
Assembled bearing and race	37.3 (1.469)	52.5 (2.067)

(b) Install the direct clutch assembly onto the O/D planetary gear.

HINT: Mesh the splines of the O/D planetary gear with the flukes of the disc by rotating and pushing the O/D planetary gear.

12. CHECK OPERATION OF ONE-WAY CLUTCH

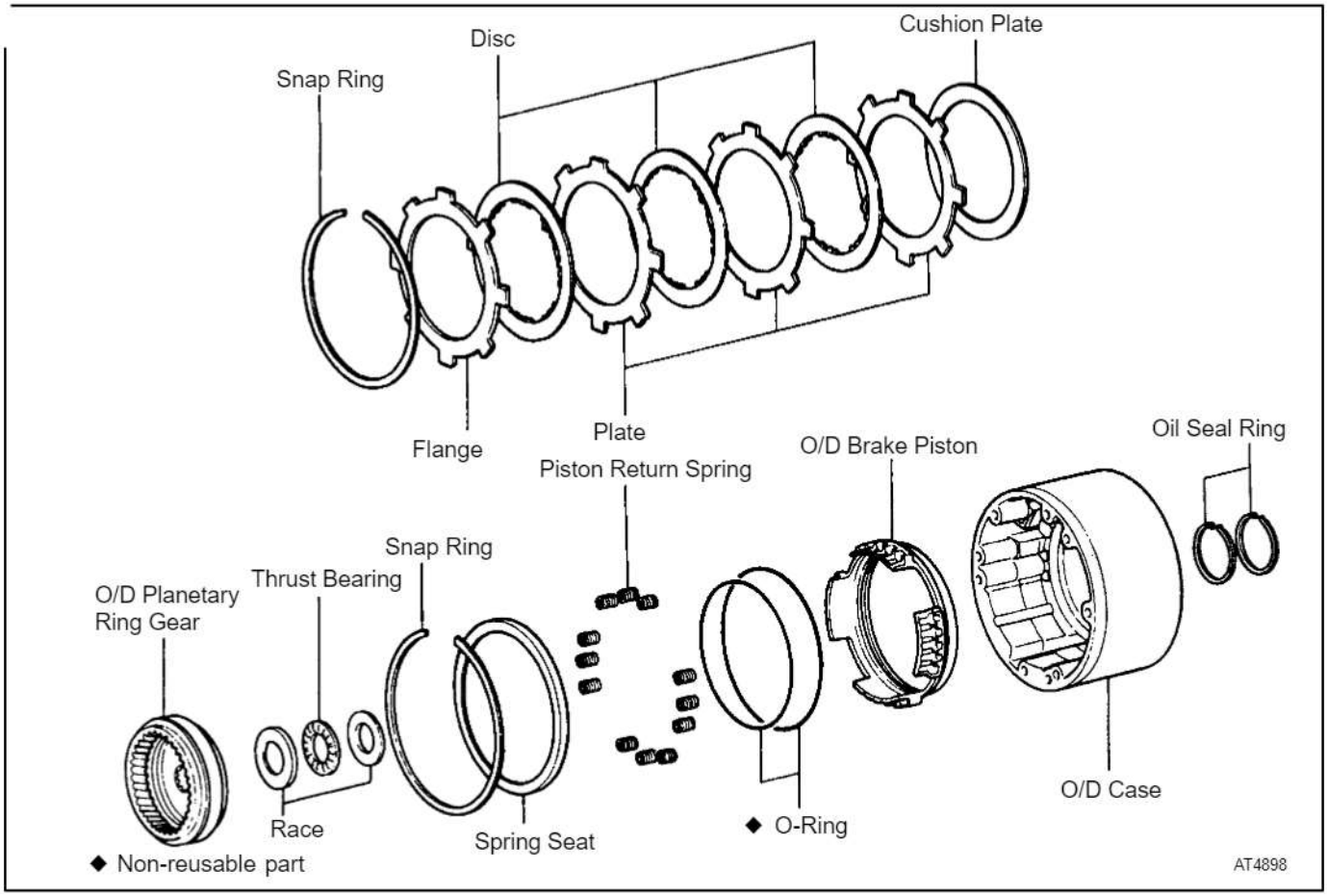
Hold the O/D direct clutch drum and turn the input shaft.

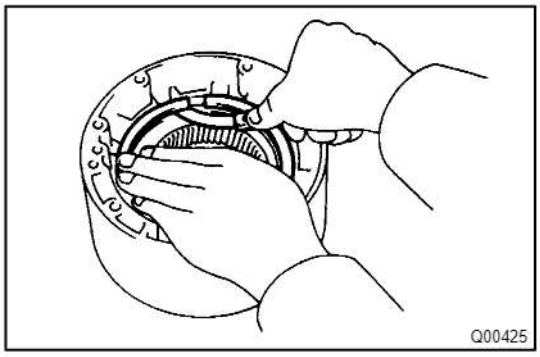
The input shaft turns freely clockwise and locks counterclockwise.

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OVERDRIVE BRAKE

COMPONENTS





OVERDRIVE BRAKE DISASSEMBLY

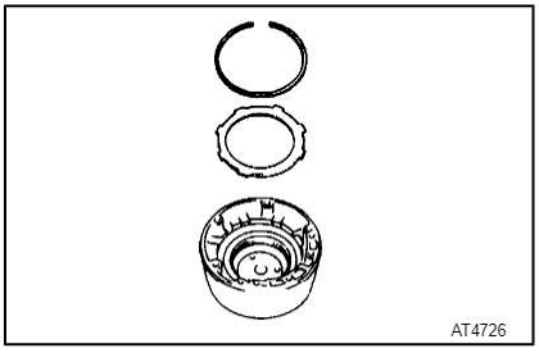
1. CHECK PACK CLEARANCE OF OVERDRIVE BRAKE

Using a thickness gauge, measure the pack clearance between the snap ring and brake flange.

Pack clearance:

0.35 - 1.91 mm (0.0138 - 0.0752 in.)

If the values are nonstandard, inspect the discs.

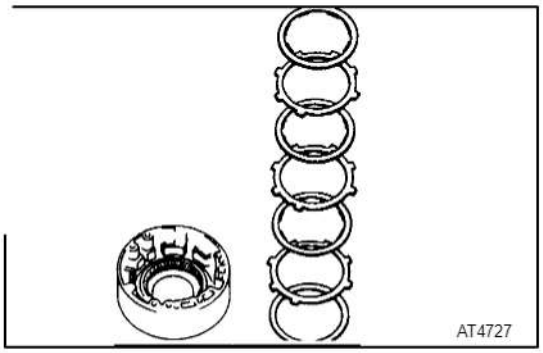


2. REMOVE FLANGE, DISCS, PLATES AND CUSHION PLATE

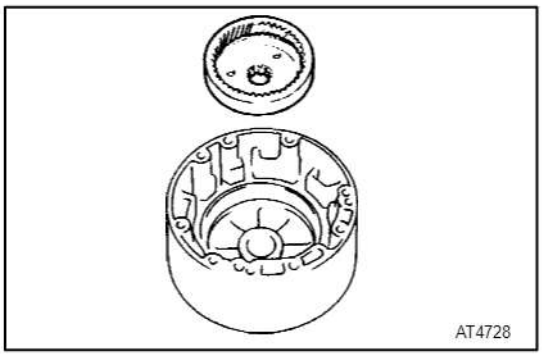
(a) Using a screwdriver, remove the snap ring.

(b) Remove the flange.

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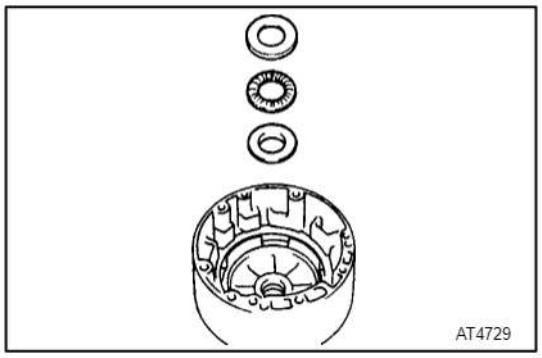


(c) Remove the three discs and three plates.
(d) Remove the cushion plate.

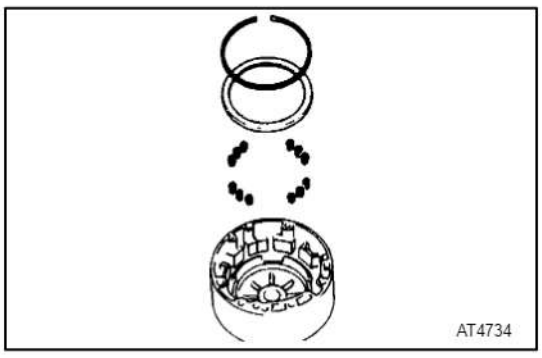


3. REMOVE OVERDRIVE PLANETARY RING GEAR

(a) Remove the O/D planetary ring gear.

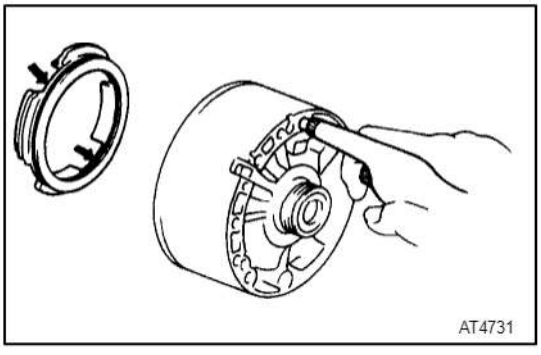


(b) Remove the bearing and two races.



4. REMOVE PISTON RETURN SPRINGS

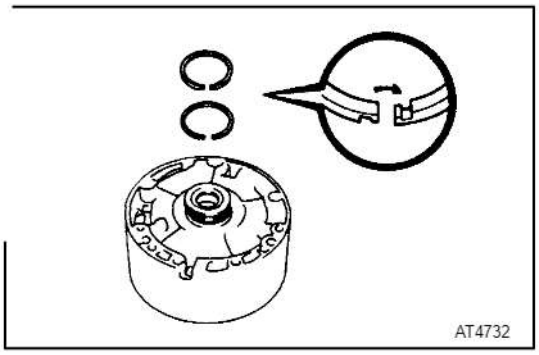
(a) Using a screwdriver, remove the snap ring.
(b) Remove the spring seat and twelve springs.



5. REMOVE OVERDRIVE BRAKE PISTON

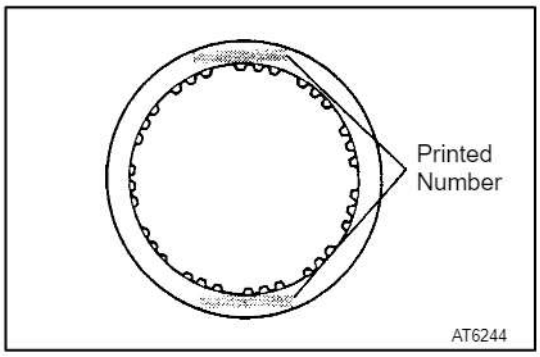
(a) Hold the O/D brake piston with hand, apply compressed air into the passage to remove the O/D brake piston.
(c) Remove the two O-rings from the piston.

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6. REMOVE OIL SEAL RINGS

Remove the two oil seal rings.



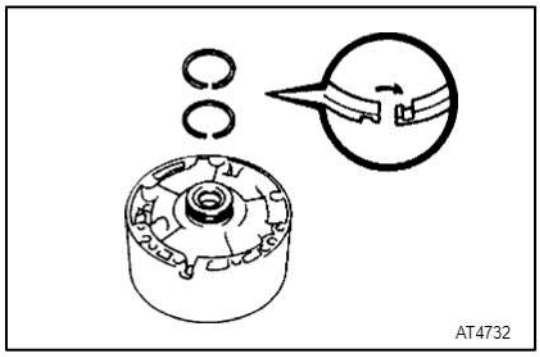
OVERDRIVE BRAKE INSPECTION

INSPECT DISC, PLATE AND FLANGE

Check to see if the sliding surface of the disc, plate and flange are worn or burnt. If necessary, replace them.

HINT:

- © If the lining of the disc is peeling off or discolored, or even if parts of the printed numbers are defaced, replace all discs.
- © Before assembling new discs, soak them in ATF for at least fifteen minutes.



OVERDRIVE BRAKE ASSEMBLY

1. INSTALL OIL SEAL RINGS

(a) Coat the two oil seal rings with ATF.

(b) Contact the oil seal rings and install them onto the O/D case.

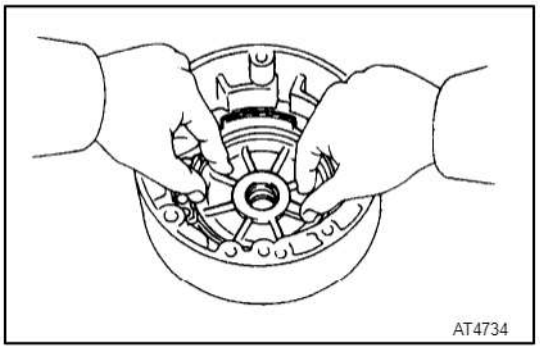
NOTICE: Do not spread the ring ends more than necessary.

HINT: After installing the oil seal rings, check that they rotate smoothly.

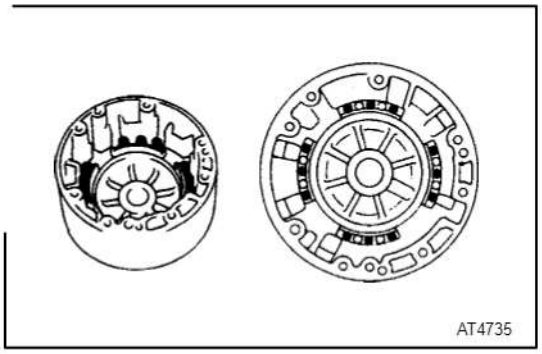
2. INSTALL OVERDRIVE BRAKE PISTON

(a) Coat two new O-rings with ATF and install them on the O/D brake piston.

(b) Being careful not to damage the O-rings, press in the brake piston into the O/D case with both hands.

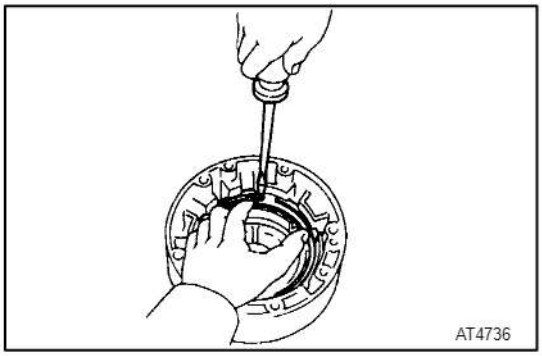


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AT4735

3. INSTALL PISTON RETURN SPRINGS

(a) Install the twelve piston return springs, as shown.


AT4736

(b) Install the spring seat.

(c) Pushing the spring seat, install the snap ring. Be sure the end gap of the snap ring is not aligned with the cutout portion of the O/D case.

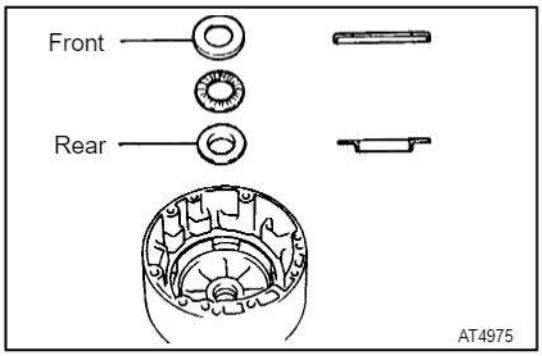
HINT: Make sure that the snap ring is inserted its groove.

4. INSTALL OVERDRIVE PLANETARY RING GEAR

(a) Coat the bearing and races with petroleum jelly and install them onto the overdrive case.

Bearing and races diameter:

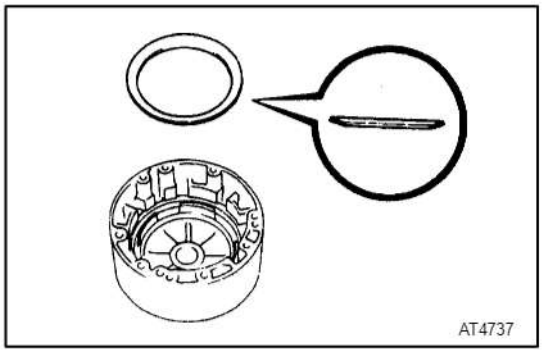
	Inside mm (in.)	Outside mm (in.)
Race (Front)	30.1 (1.185)	48.5 (1.909)
Bearing	28.4 (1.118)	46.3 (1.823)
Race (Rear)	27.6 (1.087)	44.5 (1.752)



AT4975

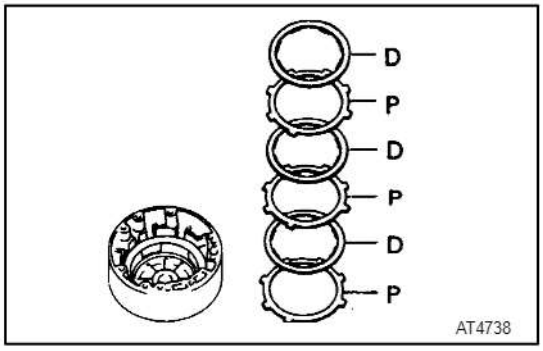
(b) Install the O/D planetary ring gear.

5. INSTALL CUSHION PLATE


AT4737

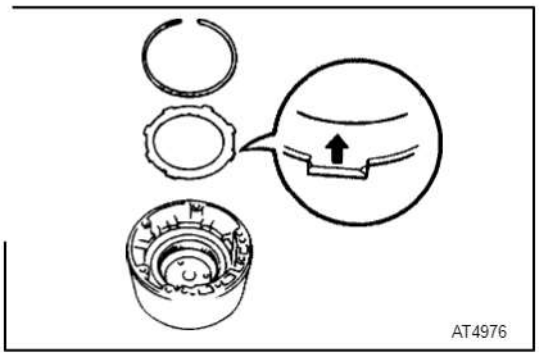
6. INSTALL PLATES AND DISCS

Install the three plates and three discs.
Install in order: P =Plate D =Disc
P-D-P-D-P-D



AT4738

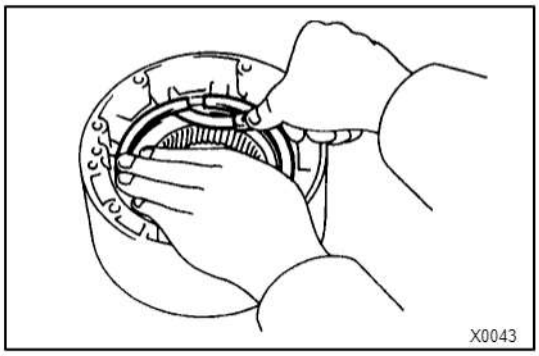
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7. INSTALL FLANGE

(a) Install the flange, the rounded edge facing upward.

(b) Using a screwdriver, install the snap ring. Be sure the end gap of the snap ring is not aligned with the cutout portion of the O/D case.



8. CHECK PACK CLEARANCE OF OVERDRIVE BRAKE

Using a thickness gauge, measure the pack clearance between the snap ring and brake flange.

Pack clearance:

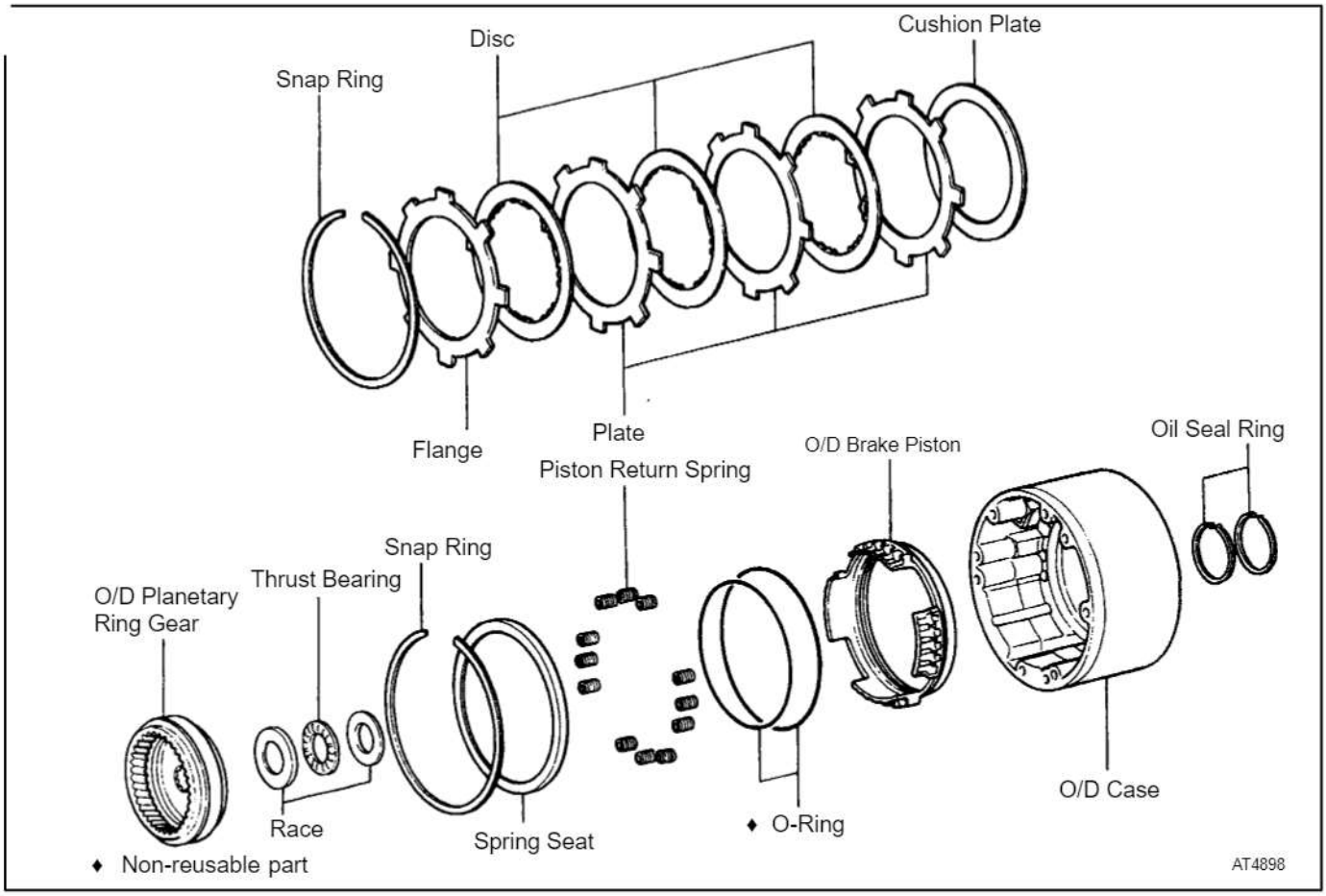
0.35 - 1.91 mm (0.0138 - 0.0752 in.)

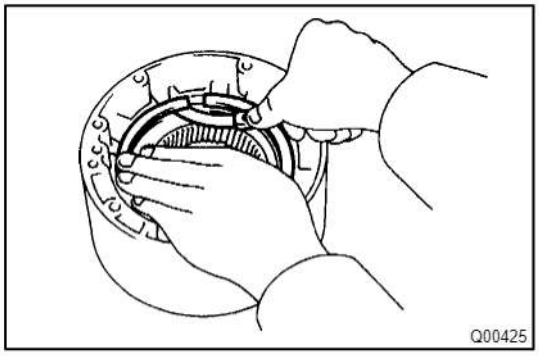
If the pack clearance is less than the limit, parts may have been assembled incorrectly, check and reassemble again.

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OVERDRIVE BRAKE

COMPONENTS





OVERDRIVE BRAKE DISASSEMBLY

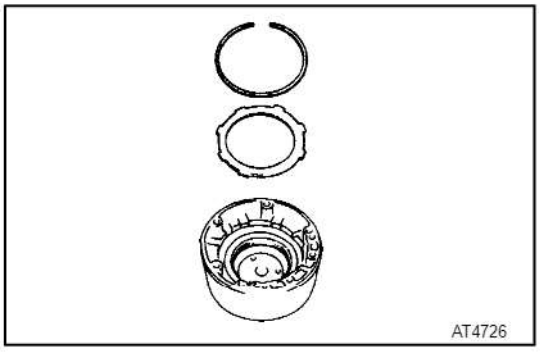
1. CHECK PACK CLEARANCE OF OVERDRIVE BRAKE

Using a thickness gauge, measure the pack clearance between the snap ring and brake flange.

Pack clearance:

0.35 - 1.91 mm (0.0138 - 0.0752 in.)

If the values are nonstandard, inspect the discs.

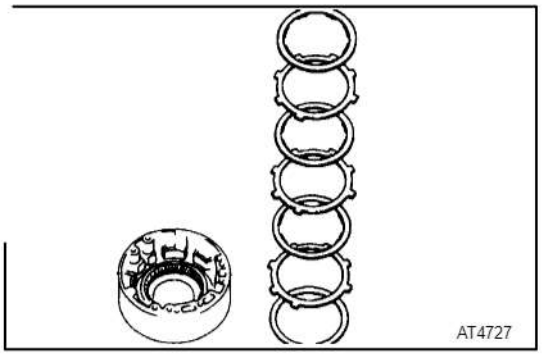


2. REMOVE FLANGE, DISCS, PLATES AND CUSHION PLATE

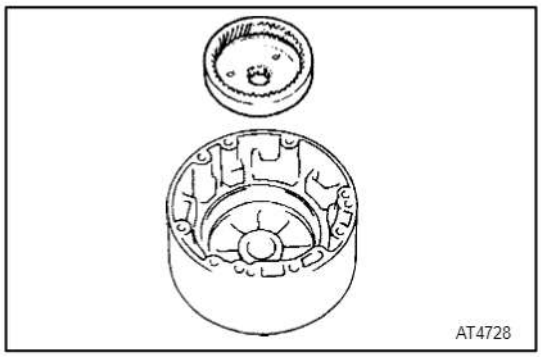
(a) Using a screwdriver, remove the snap ring.

(b) Remove the flange.

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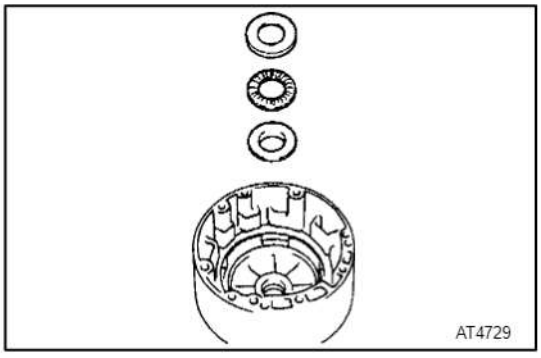


(c) Remove the three discs and three plates.
(d) Remove the cushion plate.

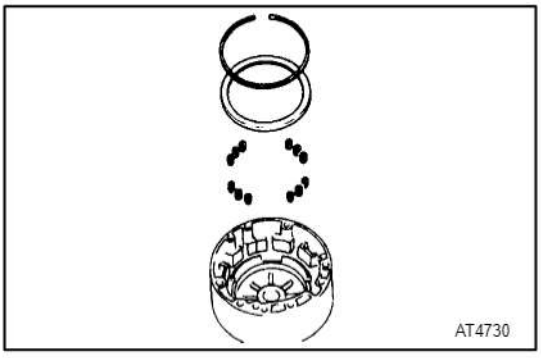


3. REMOVE OVERDRIVE PLANETARY RING GEAR

(a) Remove the O/D planetary ring gear.

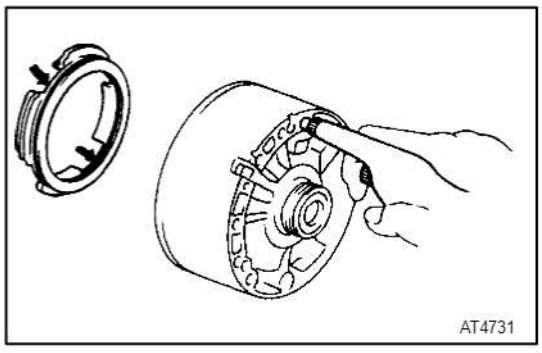


(b) Remove the bearing and two races.



4. REMOVE PISTON RETURN SPRINGS

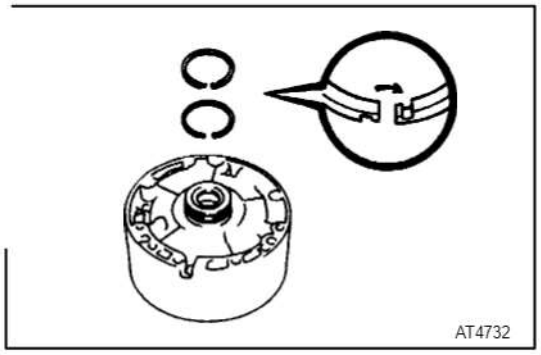
(a) Using a screwdriver, remove the snap ring.
(b) Remove the spring seat and twelve springs.



5. REMOVE OVERDRIVE BRAKE PISTON

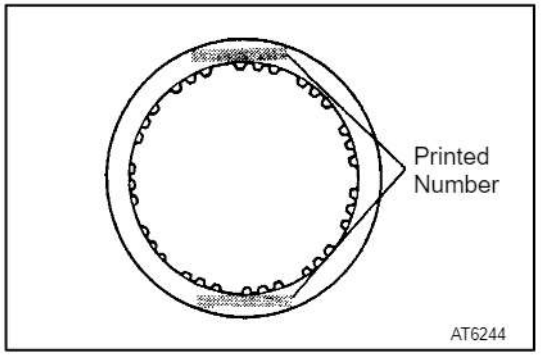
(a) Hold the O/D brake piston with hand, apply compressed air into the passage to remove the O/D brake piston.
(b) Remove the two O-rings from the piston.

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6. REMOVE OIL SEAL RINGS

Remove the two oil seal rings.



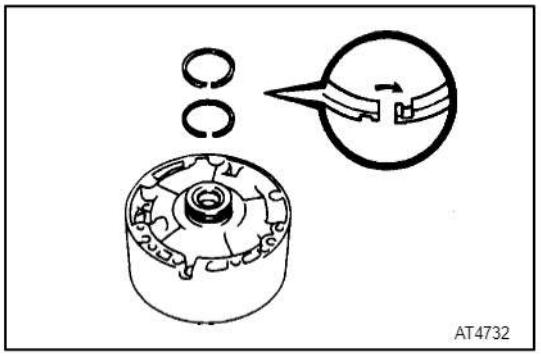
OVERDRIVE BRAKE INSPECTION

INSPECT DISC, PLATE AND FLANGE

Check to see if the sliding surface of the disc, plate and flange are worn or burnt. If necessary, replace them.

HINT:

- © If the lining of the disc is peeling off or discolored, or even if parts of the printed numbers are defaced, replace all discs.
- © Before assembling new discs, soak them in ATF for at least fifteen minutes.



OVERDRIVE BRAKE ASSEMBLY

1. INSTALL OIL SEAL RINGS

(a) Coat the two oil seal rings with ATF.

(b) Contact the oil seal rings and install them onto the O/D case.

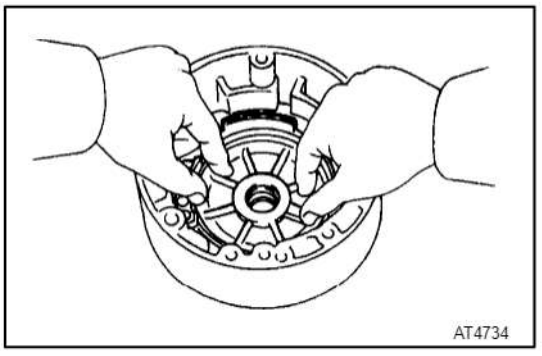
NOTICE: Do not spread the ring ends more than necessary.

HINT: After installing the oil seal rings, check that they rotate smoothly.

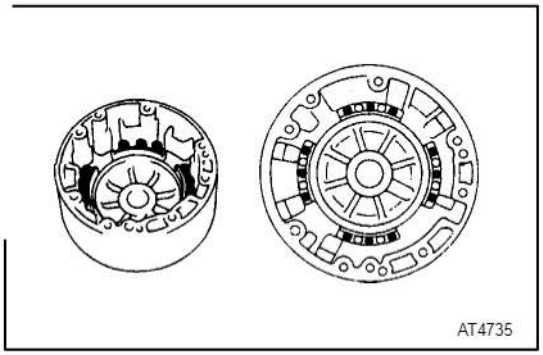
2. INSTALL OVERDRIVE BRAKE PISTON

(a) Coat two new O-rings with ATF and install them on the O/D brake piston.

(b) Being careful not to damage the O-rings, press in the brake piston into the O/D case with both hands.

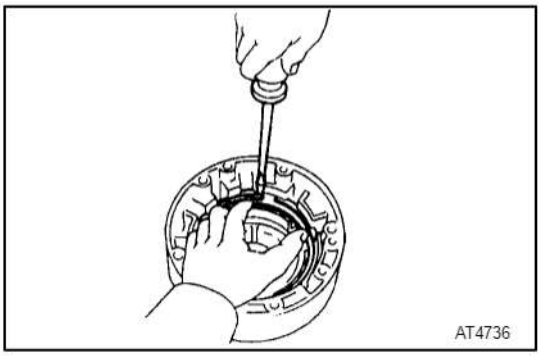


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3. INSTALL PISTON RETURN SPRINGS

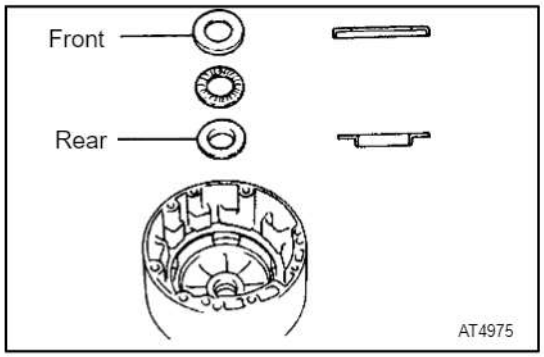
(a) Install the twelve piston return springs, as shown.



(b) Install the spring seat.

(c) Pushing the spring seat, install the snap ring. Be sure the end gap of the snap ring is not aligned with the cutout portion of the O/D case.

HINT: Make sure that the snap ring is inserted its groove.



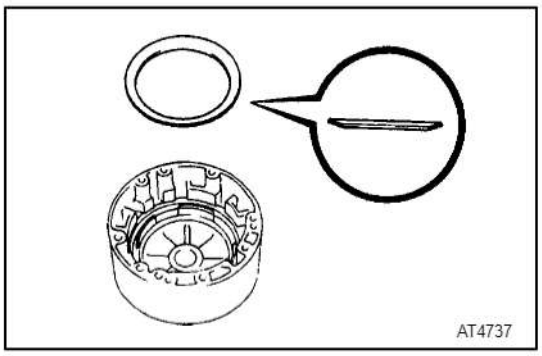
4. INSTALL OVERDRIVE PLANETARY RING GEAR

(a) Coat the bearing and races with petroleum jelly and install them onto the overdrive case.

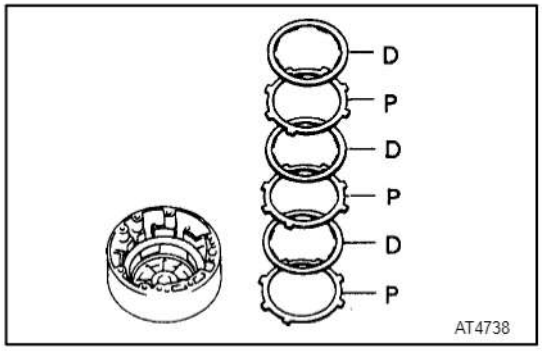
Bearing and races diameter:

	Inside mm (in.)	Outside mm (in.)
Race (Front)	30.1 (1.185)	48.5 (1.909)
Bearing	28.4 (1.118)	46.3 (1.823)
Race (Rear)	27.6 (1.087)	44.5 (1.752)

(b) Install the O/D planetary ring gear.



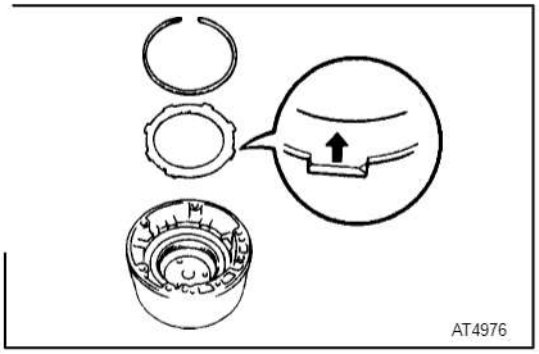
5. INSTALL CUSHION PLATE



6. INSTALL PLATES AND DISCS

Install the three plates and three discs.
Install in order: P =Plate D =Disc
P-D-P-D-P-D

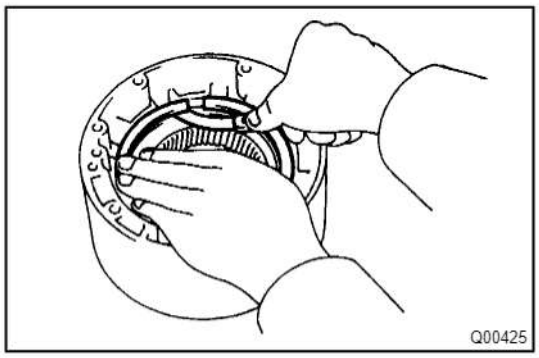
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7. INSTALL FLANGE

(a) Install the flange, the rounded edge facing upward.

(b) Using a screwdriver, install the snap ring. Be sure the end gap of the snap ring is not aligned with the cutout portion of the O/D case.



8. CHECK PACK CLEARANCE OF OVERDRIVE BRAKE

Using a thickness gauge, measure the pack clearance between the snap ring and brake flange.

Pack clearance:

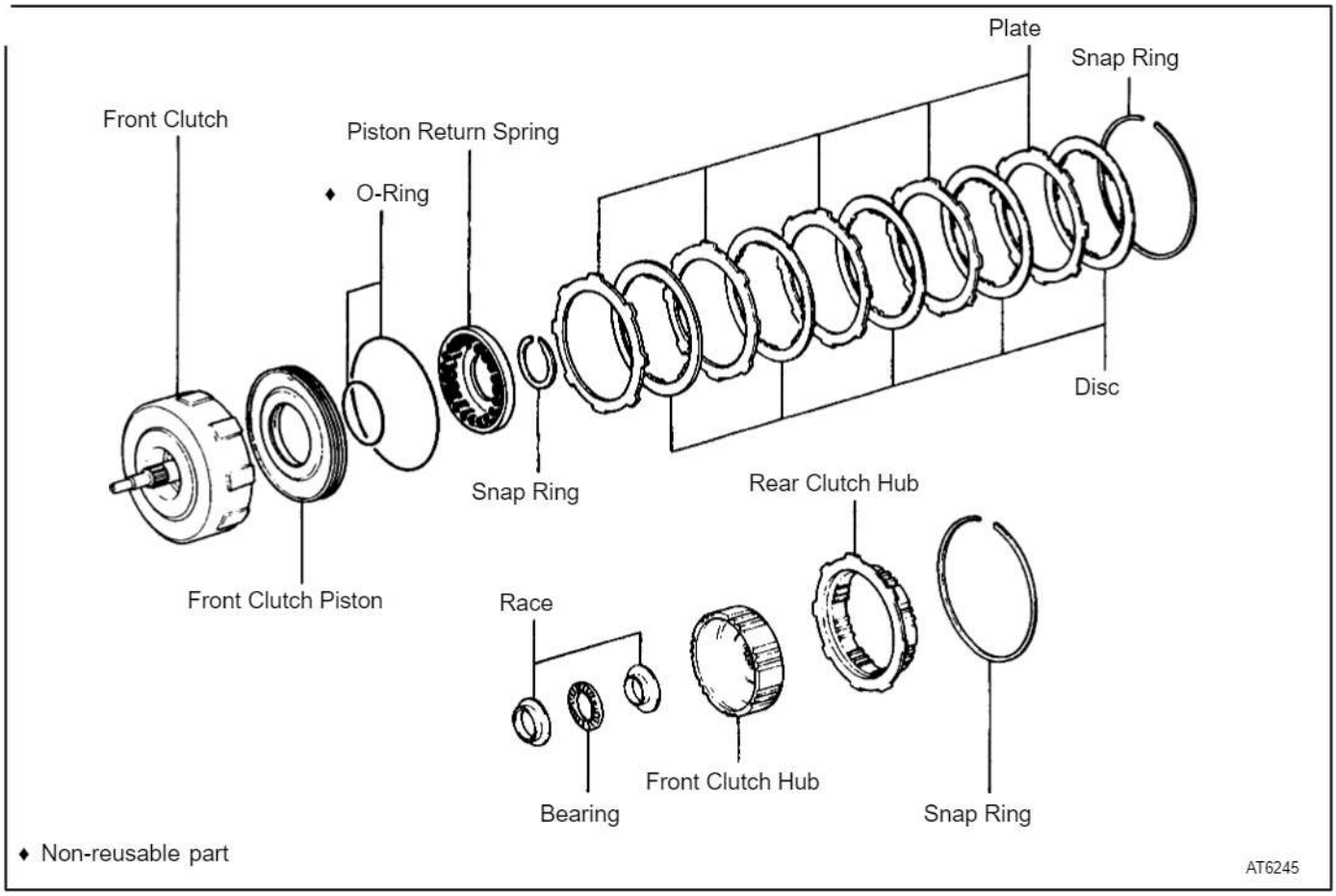
0.35 - 1.91 mm (0.0138 - 0.0752 in.)

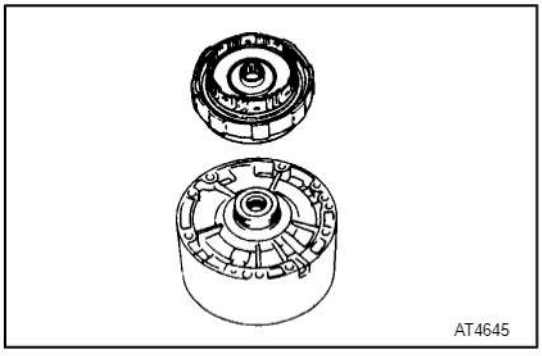
If the pack clearance is less than the limit, parts may have been assembled incorrectly, check and reassemble again.

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FRONT CLUTCH

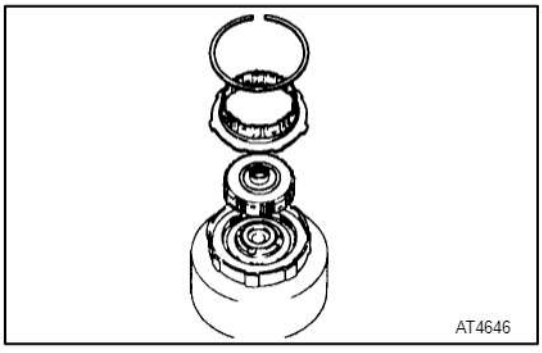
COMPONENTS





FRONT CLUTCH DISASSEMBLY

1. INSTALL FRONT CLUTCH ASSEMBLY TO OVER-DRIVE CASE

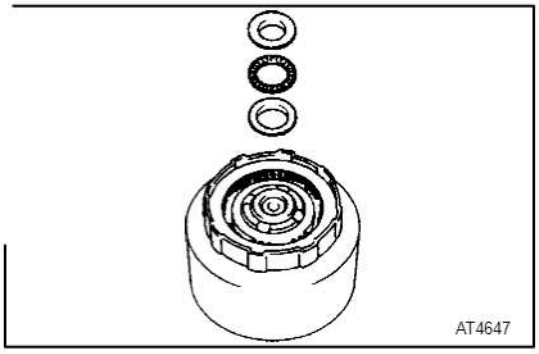


2. REMOVE REAR CLUTCH HUB AND FRONT CLUTCH HUB

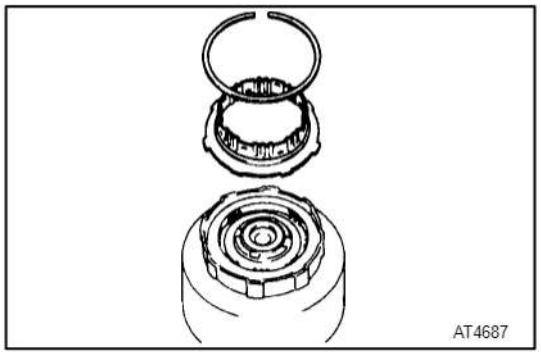
(a) Using a screwdriver, remove the snap ring.

(b) Remove the rear clutch hub and front clutch hub.

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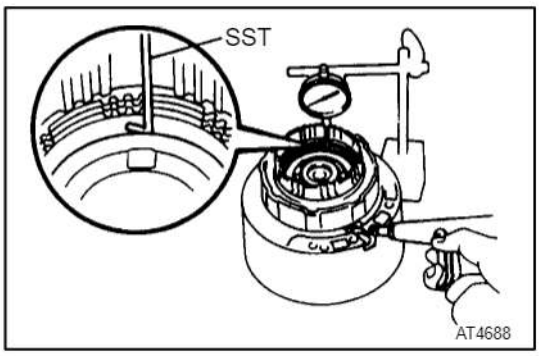
(c) Remove the bearing and two races.



3. CHECK PISTON STROKE OF FRONT CLUTCH

(a) For check of piston stroke, install the rear clutch hub.

(b) Install the snap ring.



(c) Using SST and a dial indicator, measure the front clutch piston stroke applying and releasing the compressed air 392 - 785 kPa (4 - 8 kgf/cm^2, 57 - 114 psi), as shown.

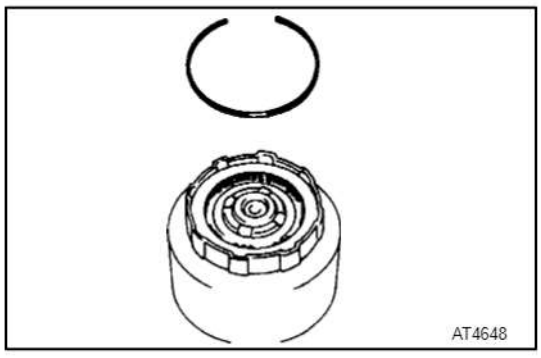
SST 09350-20015 (09350-06120)

Piston stroke:

1.40 - 2.48 mm (0.0551 - 0.0976 in.)

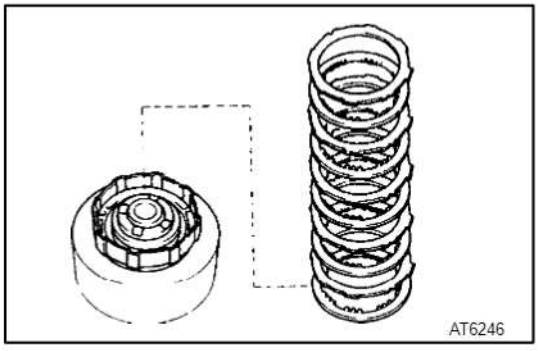
If the values are nonstandard, inspect the discs.

(d) Remove the snap ring and rear clutch hub.



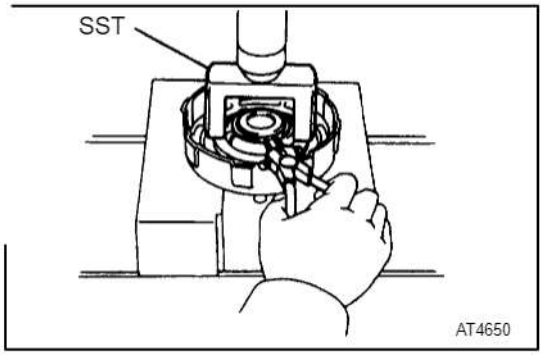
4. REMOVE DISCS AND PLATES

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



(b) Remove the five discs and five plates.

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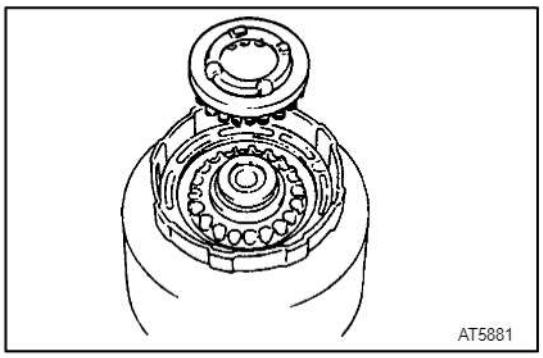


6. REMOVE PISTON RETURN SPRINGS

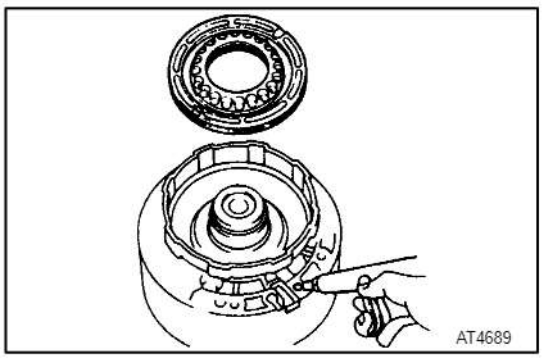
(a) Place SST on the spring seat and compress the return springs with a shop press.

SST 09350-20015 (09369-20040)

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



(c) Remove the spring seat and twenty springs.

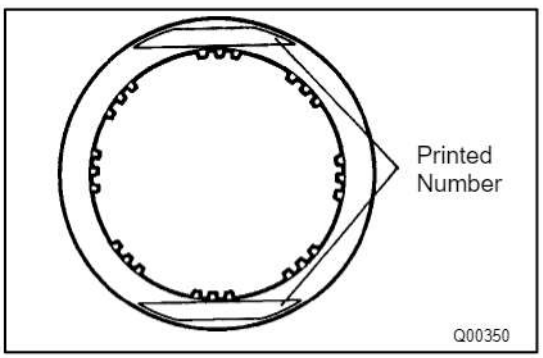


6. REMOVE FRONT CLUTCH PISTON

(a) Place the front clutch drum onto the O/D case.

(d) Hold the front clutch piston with hand, apply compressed air to the O/D case to remove the front clutch piston.

(c) Remove the two O-rings from the piston.



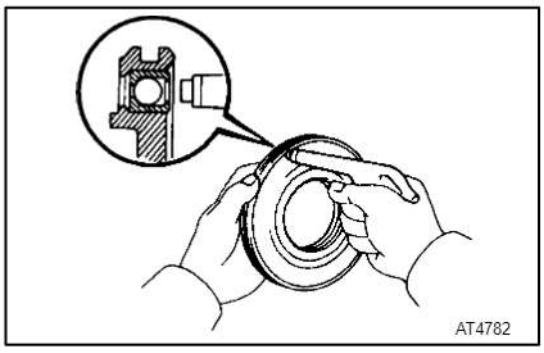
FRONT CLUTCH INSPECTION

1. INSPECT DISC AND PLATE

Check to see if the sliding surface of the disc and plate are worn or burnt. If necessary, replace them.

HINT:

- If the lining of the disc is peeling off or discolored, or even if parts of the printed numbers are defaced, replace all discs.
- Before assembling new discs, soak them in ATF for at least fifteen minutes.

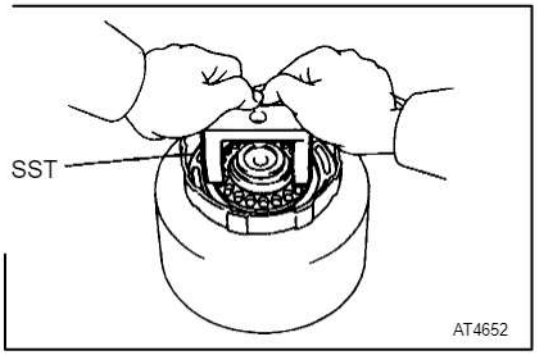


2. CHECK FRONT CLUTCH PISTON

(a) Check that check ball is free by shaking the piston.

(b) Check that the valve does not leak by applying low pressure compressed air.

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FRONT CLUTCH ASSEMBLY

1. INSTALL FRONT CLUTCH PISTON

(a) Coat new O-rings with ATF and install them on the front clutch piston.

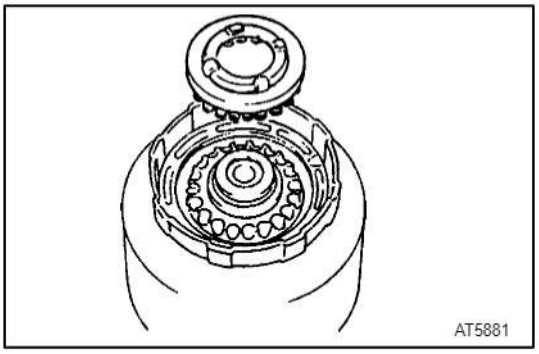
(b) Place SST on the front clutch piston.

SST 09350-20015 (09369-20040)

(c) Being careful not to damage the O-rings, press the clutch piston into the front clutch drum with both hands.

2. INSTALL PISTON RETURN SPRINGS

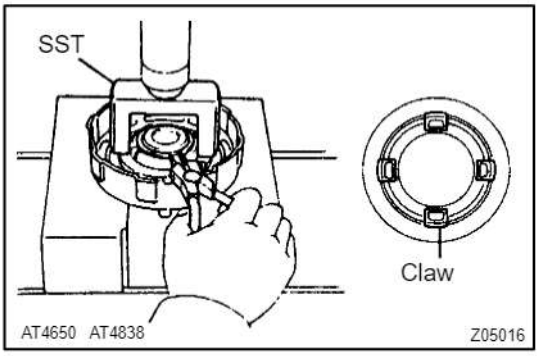
(a) Install the twenty springs and spring seat.



(b) Place SST on the spring seat, and compress the return springs with a shop press.

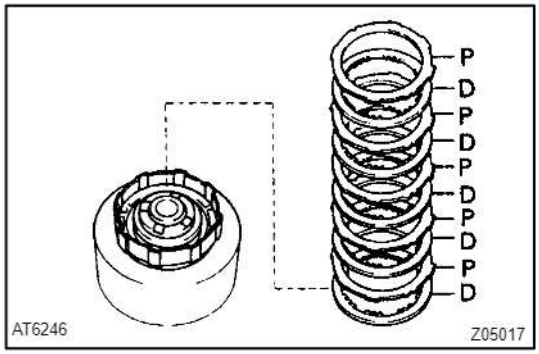
SST 09350-20015 (09369-20040)

(c) Install the snap ring with a snap ring expander. Be sure the end gap of the snap ring is not aligned with the spring seat claw.



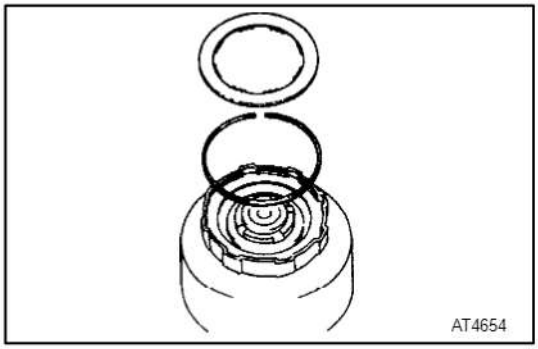
3. INSTALL PLATES AND DISCS

(a) Install the five plates and five discs.
Install in order: P =Plate D = Disc
D-P-D-P-D-P-D-P-D-P

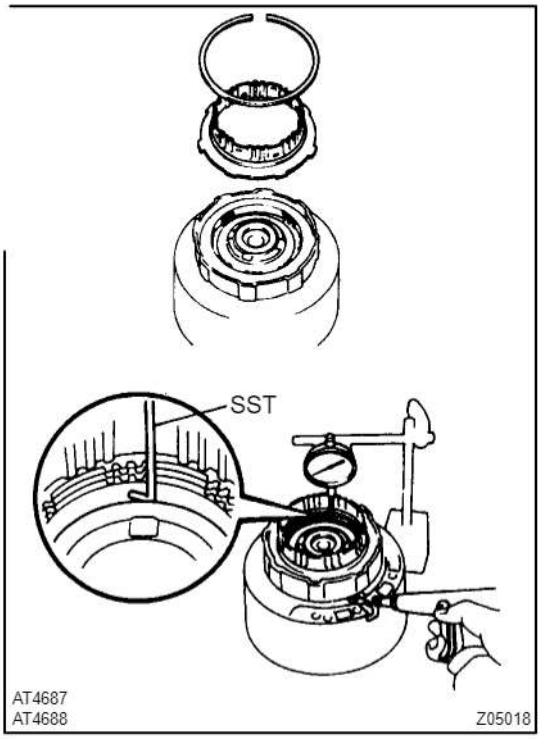


(b) Install the snap ring. Be sure the end gap of the snap ring is not aligned with the cutout portion of the front clutch drum.

(c) Install the disc.



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4. CHECK PISTON STROKE OF FRONT CLUTCH

(a) For check of piston stroke, install the rear clutch hub.

(b) Install the snap ring.

(c) Using SST and a dial indicator, measure the front clutch piston stroke applying and releasing the compressed air 392 - 785 kPa (4 - 8 kgf/cm^2, 57 - 114 psi) , as shown.

SST 09350-20015 (09350-06120)

Piston stroke:

1.40 - 2.48 mm (0.0551 - 0.0976 in.)

If the piston stroke is less than the limit, parts may have been assembled incorrectly, check and reassemble again.

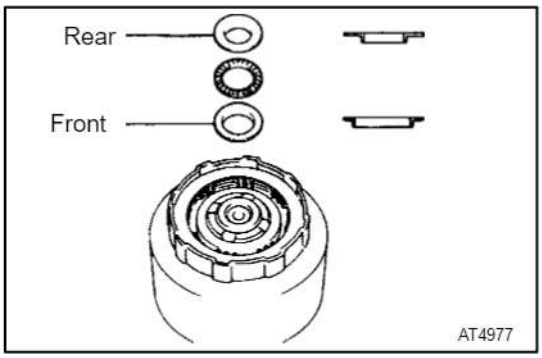
If the piston stroke is nonstandard, select another plate.

HINT: There are two different thicknesses for the plate.

Plate thickness:

1.8 mm (0.071 in.)	2.0 mm (0.079 in.)

(d) Remove the snap ring and rear clutch hub.

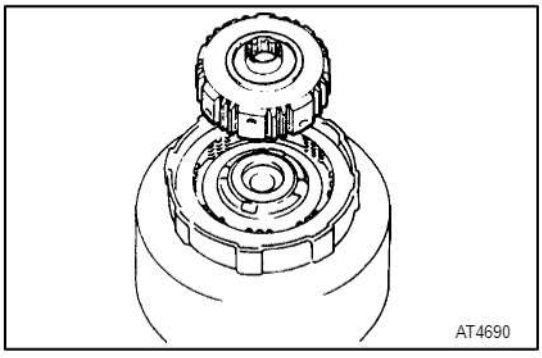


5. INSTALL FRONT CLUTCH HUB

(a) Coat the bearing and races with petroleum jelly and install them onto the front clutch drum.

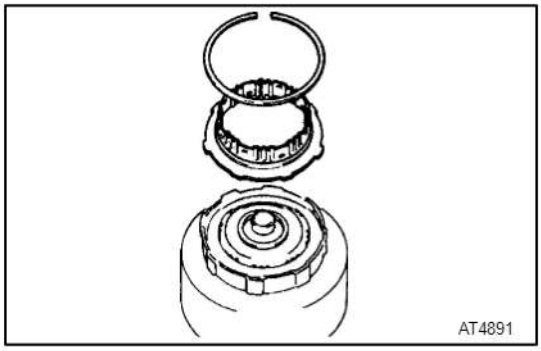
Bearing and races diameter:

	Inside mm (in.)	Outside mm (in.)
Race (Rear)	21.4 (0.843)	37.3 (1.469)
Bearing	23.4 (0.921)	37.5 (1.476)
Race (Front)	24.1 (0.949)	37.3 (1.469)



(b) Install the front clutch hub into the front clutch drum.

HINT: Mesh the splines of the front clutch hub with the flukes of the discs by rotating and pushing the front clutch hub.



6. INSTALL REAR CLUTCH HUB

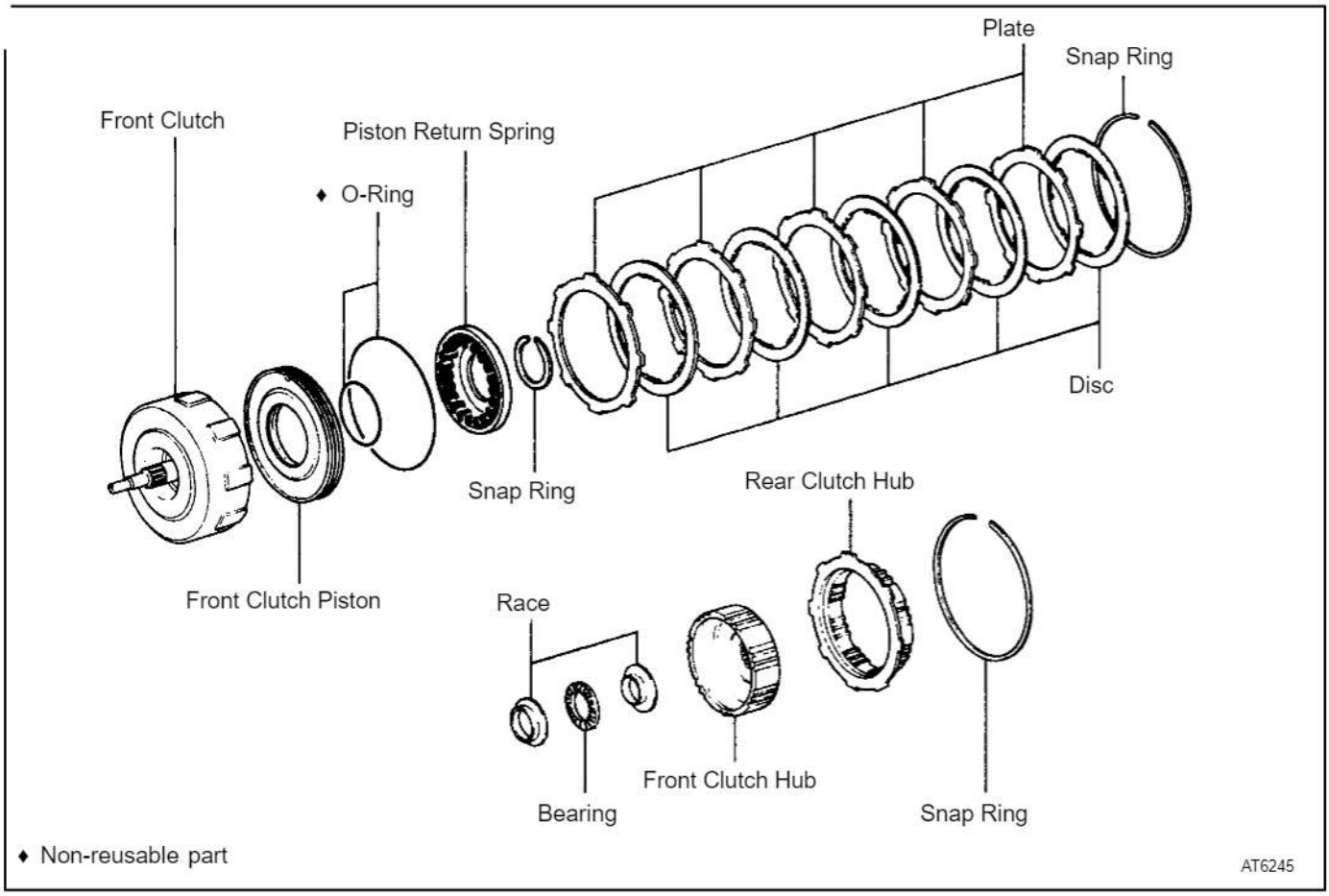
(a) Install the rear clutch hub.

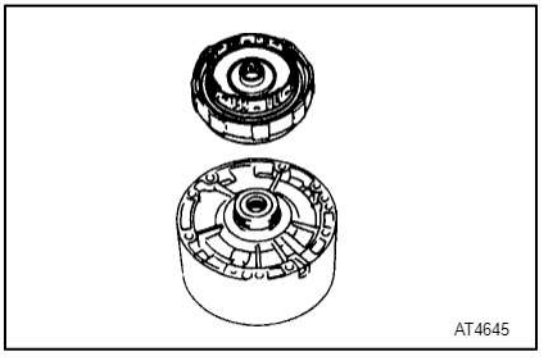
(b) Install the snap ring. Be sure the end gap of the snap ring is not aligned with the cutout portion of the front clutch drum.

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FRONT CLUTCH

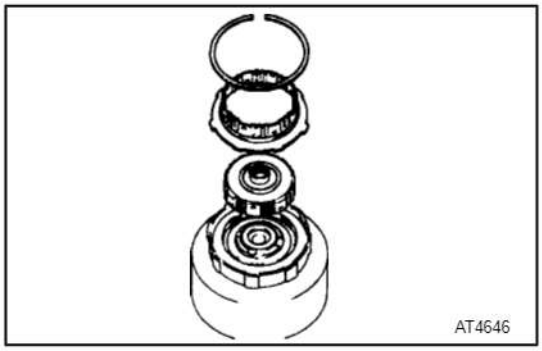
COMPONENTS





FRONT CLUTCH DISASSEMBLY

1. INSTALL FRONT CLUTCH ASSEMBLY TO OVER-DRIVE CASE

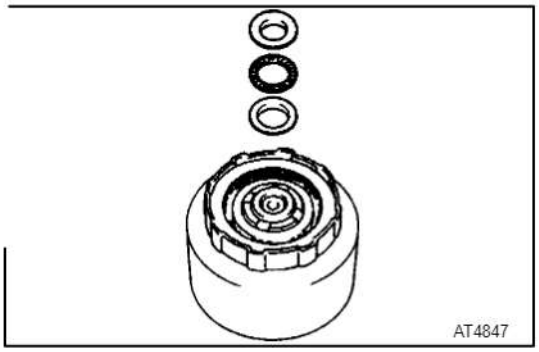


2. REMOVE REAR CLUTCH HUB AND FRONT CLUTCH HUB

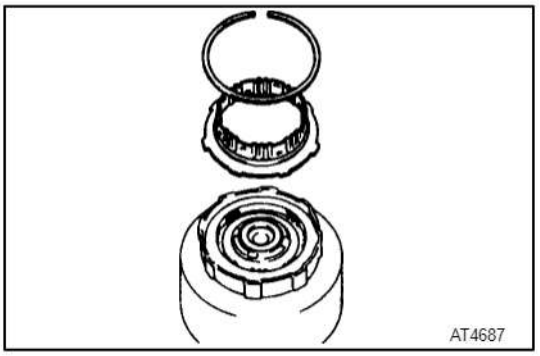
(a) Using a screwdriver, remove the snap ring.

(b) Remove the rear clutch hub and front clutch hub.

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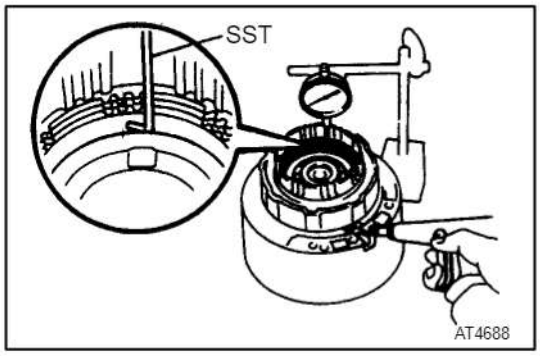
(c) Remove the bearing and two races.



3. CHECK PISTON STROKE OF FRONT CLUTCH

(a) For check of piston stroke, install the rear clutch hub.

(b) Install the snap ring.



(c) Using SST and a dial indicator, measure the front clutch piston stroke applying and releasing the compressed air 392 - 785 kPa (4 - 8 kgf/cm^2, 57 - 114 psi), as shown.

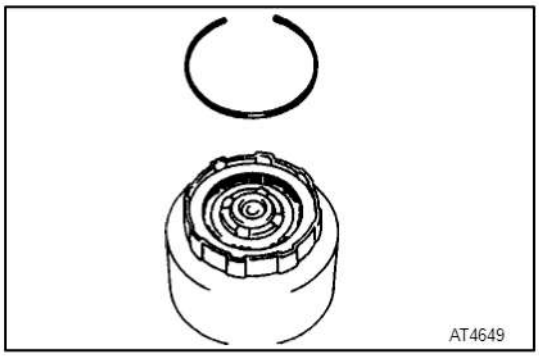
SST 09350-20015 (09350-06120)

Piste stroke:

1.40 - 2.48 mm (0.0551 - 0.0976 in.)

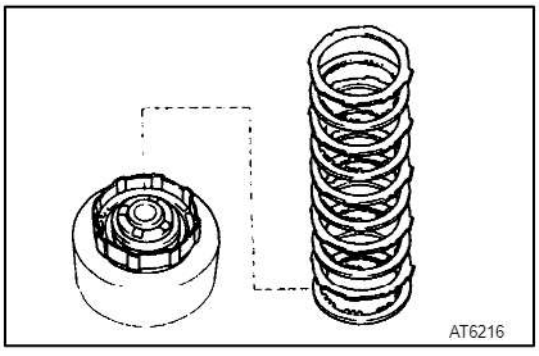
If the values are nonstandard, inspect the discs.

(d) Remove the snap ring and rear clutch hub.



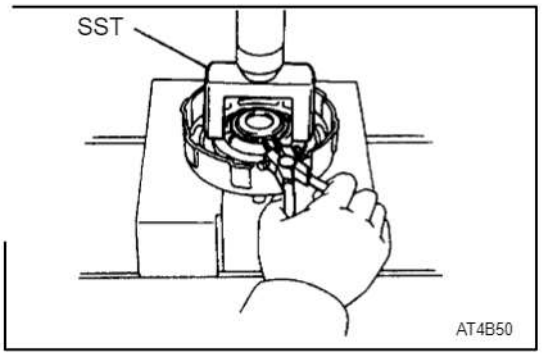
4. REMOVE DISCS AND PLATES

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



(b) Remove the five discs and five plates.

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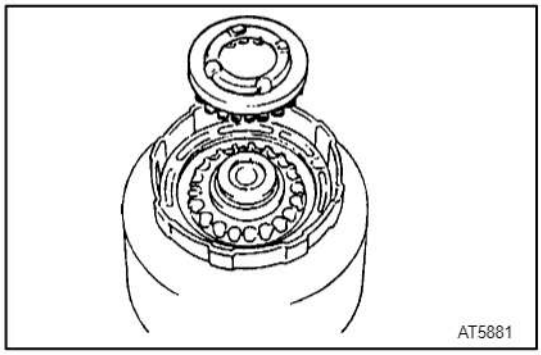


5. REMOVE PISTON RETURN SPRINGS

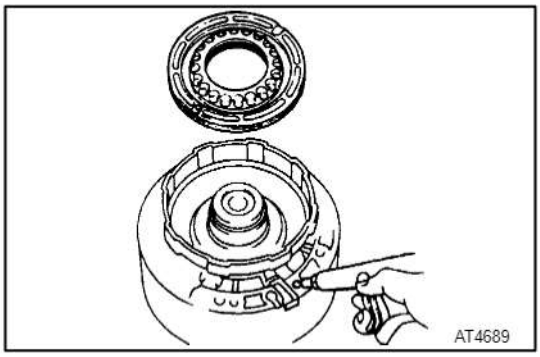
(a) Place SST on the spring seat and compress the return springs with a shop press.

SST 09350-20015 (09369-20040)

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



(c) Remove the spring seat and twenty springs.



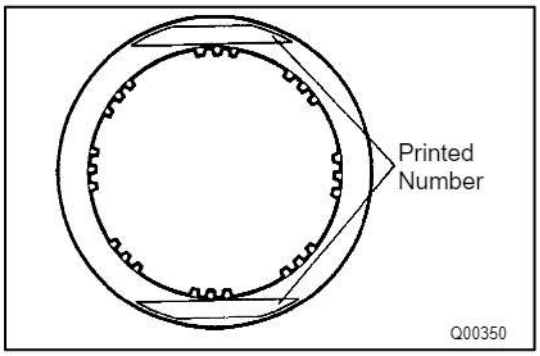
6. REMOVE FRONT CLUTCH PISTON

(a) Place the front clutch drum onto the O/D case.

(d) Hold the front clutch piston with hand, apply compressed air to the O/D case to remove the front clutch piston.

(c) Remove the two O-rings from the piston.

FRONT CLUTCH INSPECTION

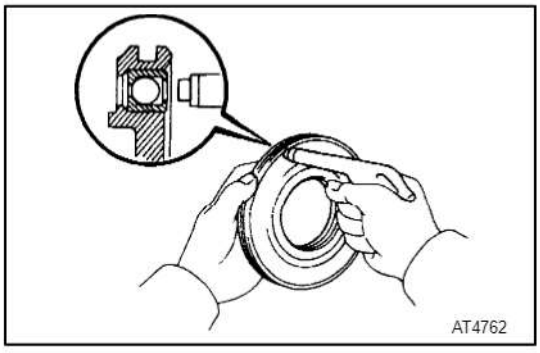


1. INSPECT DISC AND PLATE

Check to see if the sliding surface of the disc and plate are worn or burnt. If necessary, replace them.

HINT:

- If the lining of the disc is peeling off or discolored, or even if parts of the printed numbers are defaced, replace all discs.
- Before assembling new discs, soak them in ATF for at least fifteen minutes.

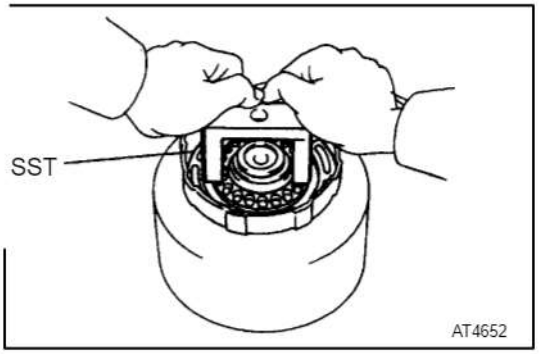


2. CHECK FRONT CLUTCH PISTON

(a) Check that check ball is free by shaking the piston.

(b) Check that the valve does not leak by applying low pressure compressed air.

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FRONT CLUTCH ASSEMBLY

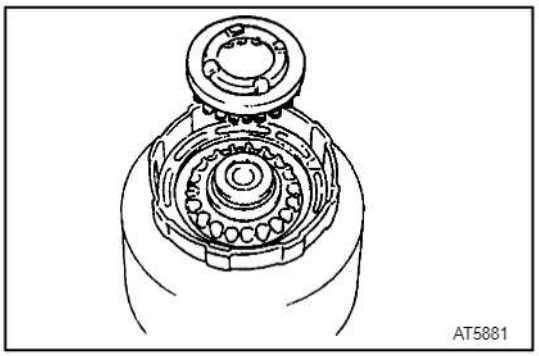
1. INSTALL FRONT CLUTCH PISTON

(a) Coat new O-rings with ATF and install them on the front clutch piston.

(b) Place SST on the front clutch piston.

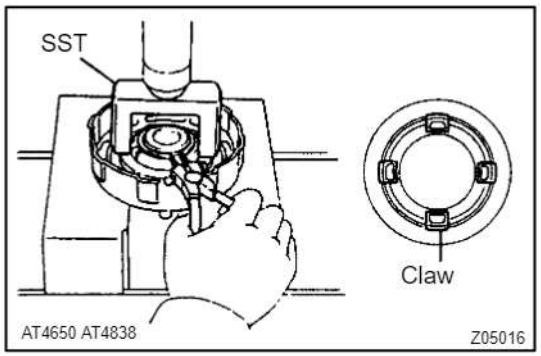
SST 09350-20015 (09369-20040)

(c) Being careful not to damage the O-rings, press the clutch piston into the front clutch drum with both hands.



2. INSTALL PISTON RETURN SPRINGS

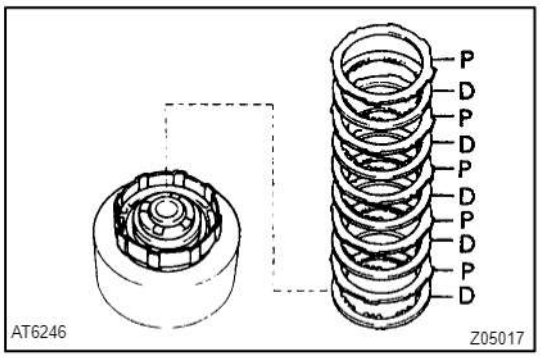
(a) Install the twenty springs and spring seat.



(b) Place SST on the spring seat, and compress the return springs with a shop press.

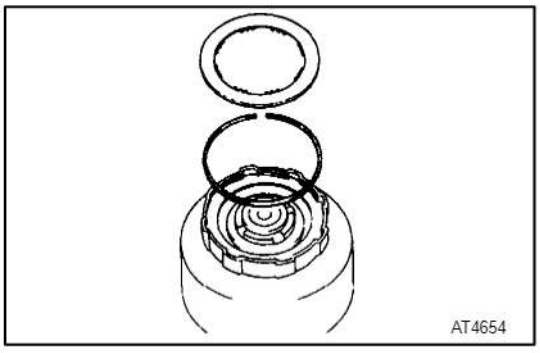
SST 09350-20015 (09369-20040)

(c) Install the snap ring with a snap ring expander. Be sure the end gap of the snap ring is not aligned with the spring seat claw.



3. INSTALL PLATES AND DISCS

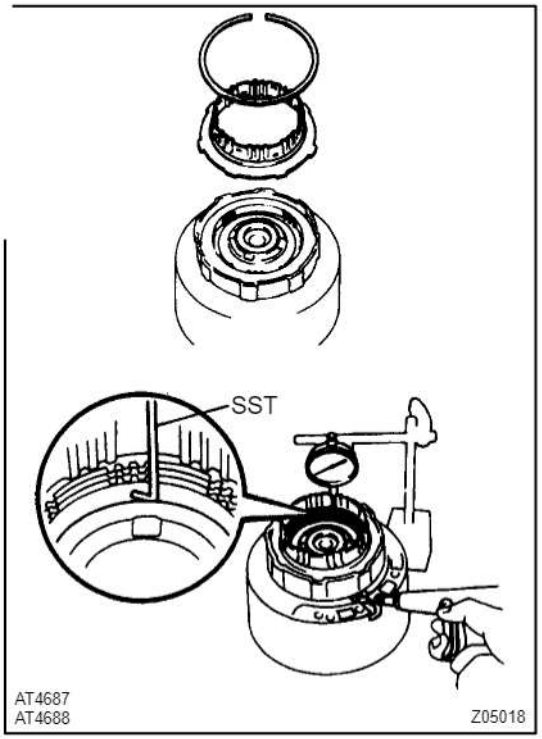
(a) Install the five plates and five discs.
Install in order: P =Plate D = Disc
D-P-D-P-D-P-D-P-D-P



(b) Install the snap ring. Be sure the end gap of the snap ring is not aligned with the cutout portion of the front clutch drum.

(c) Install the disc.

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4. CHECK PISTON STROKE OF FRONT CLUTCH

(a) For check of piston stroke, install the rear clutch hub.

(b) Install the snap ring.

(c) Using SST and a dial indicator, measure the front clutch piston stroke applying and releasing the compressed air 392 - 785 kPa (4 - 8 kgf/cm^2, 57 - 114 psi) , as shown.

SST 09350-20015 (09350-06120)

Piston stroke:

1.40 - 2.48 mm (0.0551 - 0.0976 in.)

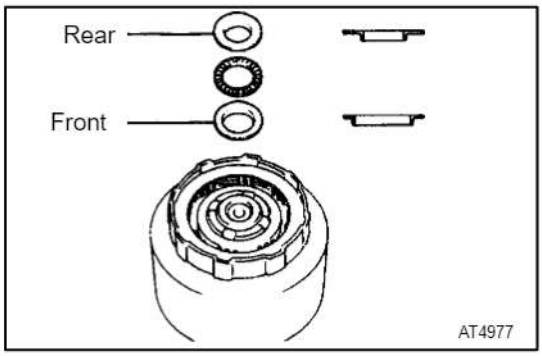
If the piston stroke is less than the limit, parts may have been assembled incorrectly, check and reassemble again.

If the piston stroke is nonstandard, select another plate.

HINT: There are two different thicknesses for the plate.

Plate thickness:

1.8 mm (0.071 in.)	2.0 mm (0.079 in.)



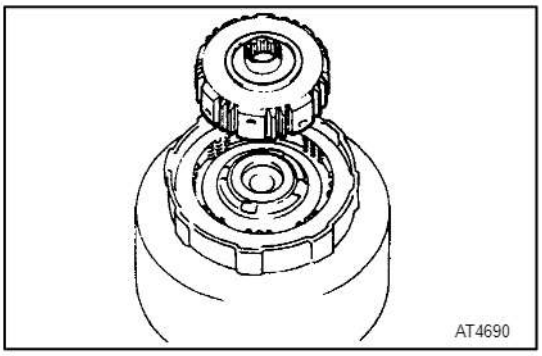
(d) Remove the snap ring and rear clutch hub.

5. INSTALL FRONT CLUTCH HUB

(a) Coat the bearing and races with petroleum jelly and install them onto the front clutch drum.

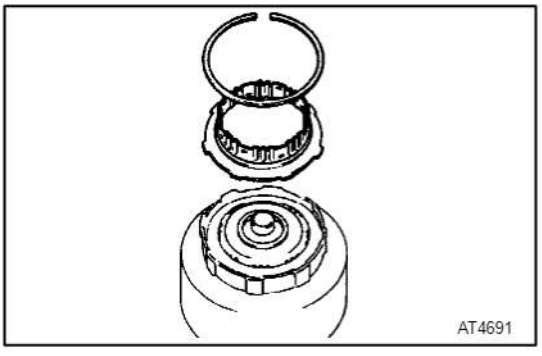
Bearning and races diameter:

	Inside mm (in.)	Outside mm (in.)
Race (Rear)	21.4 (0.843)	37.3 (1.469)
Bearing	23.4 (0.921)	37.5 (1.478)
Race (Front)	24.1 (0.949)	37.3 (1.469)



(b) Install the front clutch hub into the front clutch drum.

HINT: Mesh the splines of the front clutch hub with the flukes of the discs by rotating and pushing the front clutch hub.



6. INSTALL REAR CLUTCH HUB

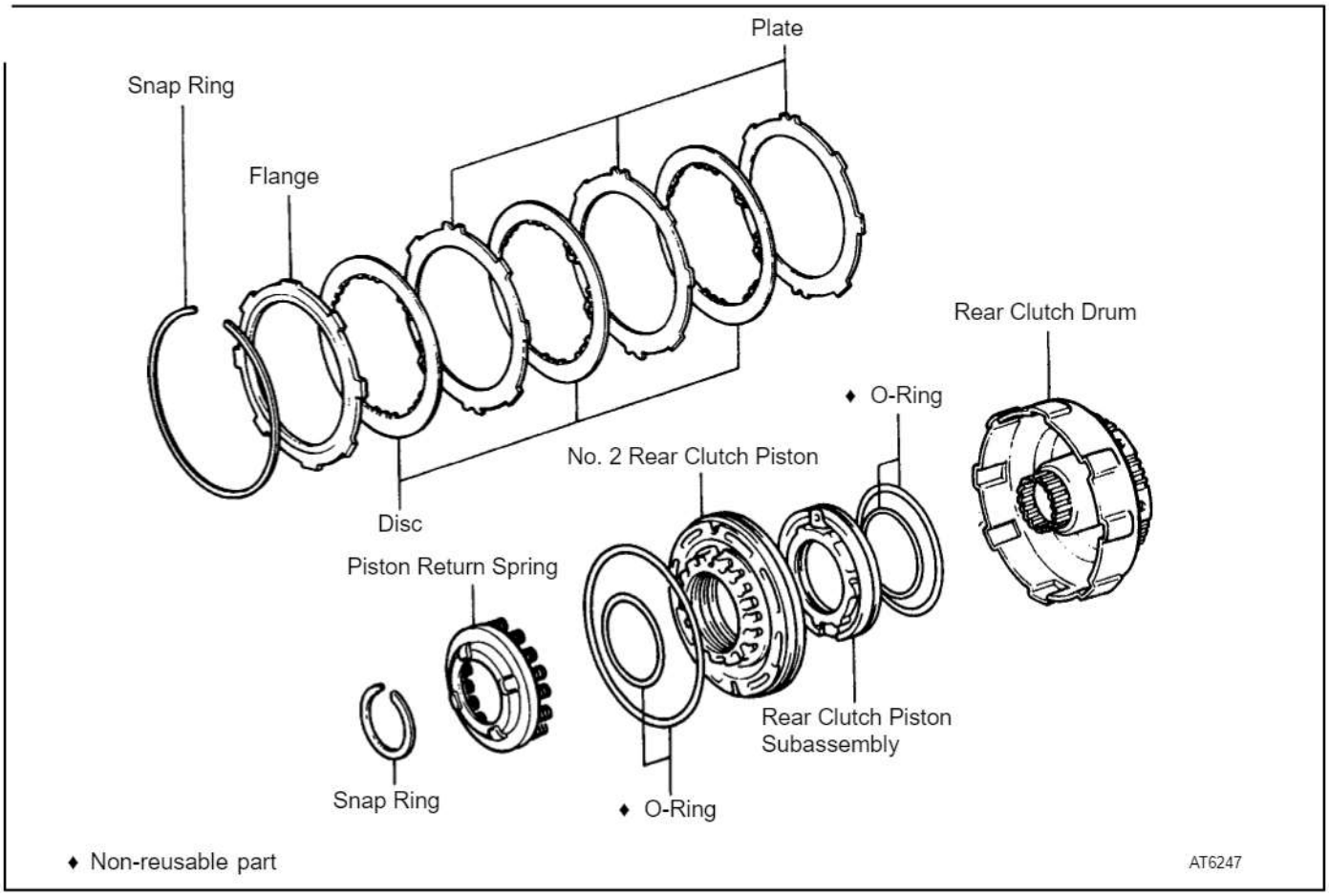
(a) Install the rear clutch hub.

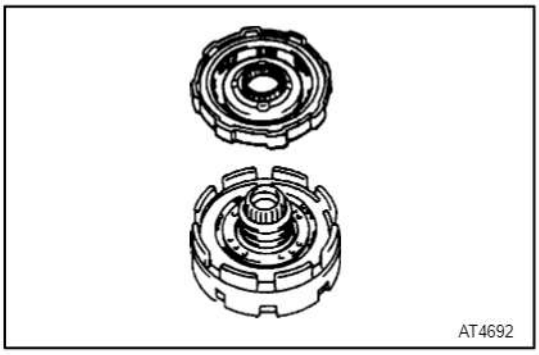
(b) Install the snap ring. Be sure the end gap of the snap ring is not aligned with the cutout portion of the front clutch drum.

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REAR CLUTCH

COMPONENTS

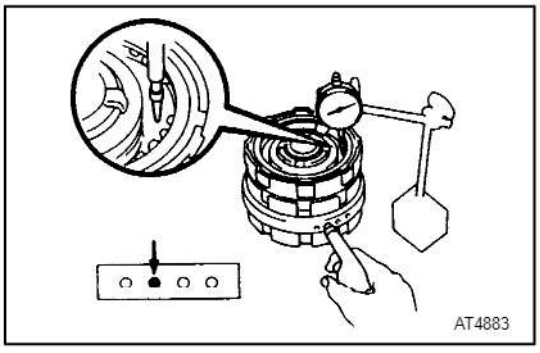




REAR CLUTCH DISASSEMBLY

1. CHECK PISTON STROKE OF REAR CLUTCH

(a) Place the rear clutch assembly onto the center support.



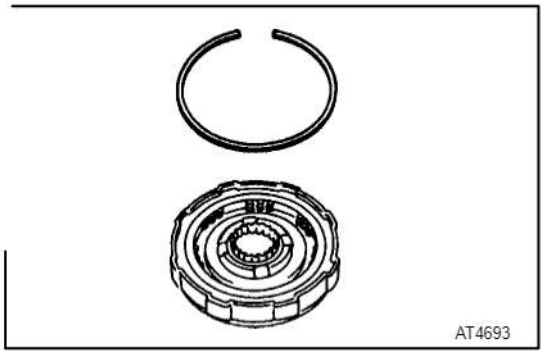
(b) Using a dial indicator, measure the rear clutch piston stroke applying and releasing the compressed air 392-785 kPa (4 - 8 kgf/cm^2, 57 - 114 psi), as shown.

Piston stroke:

0.90 - 1.75 mm (0.0354 - 0.0689 in.)

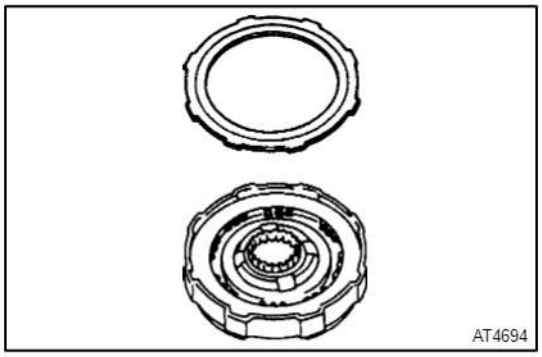
If the values are nonstandard, inspect the discs.

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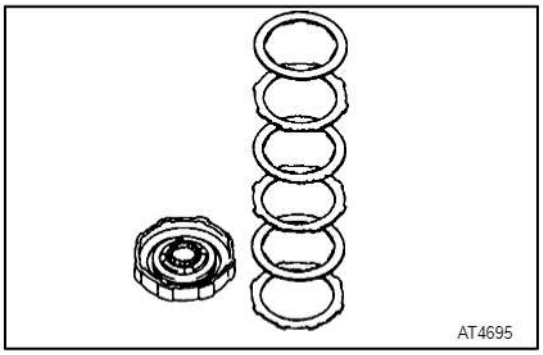


2. REMOVE FLANGE

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

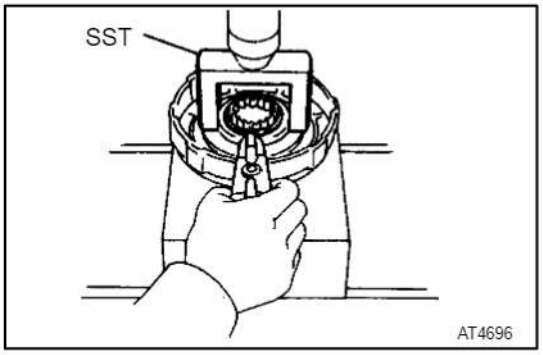


(b) Remove the flange.



3. REMOVE DISCS AND PLATES

Remove the three discs and three plates.

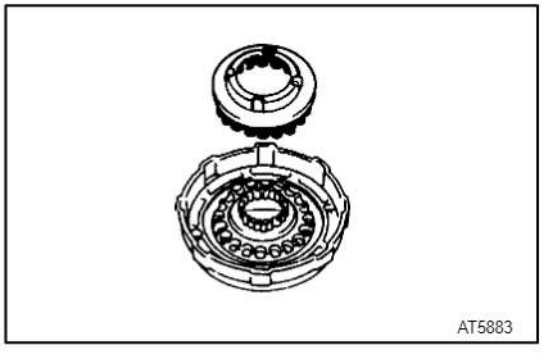


4. REMOVE PISTON RETURN SPRINGS

(a) Place SST on the spring seat and compress the return springs with a shop press.

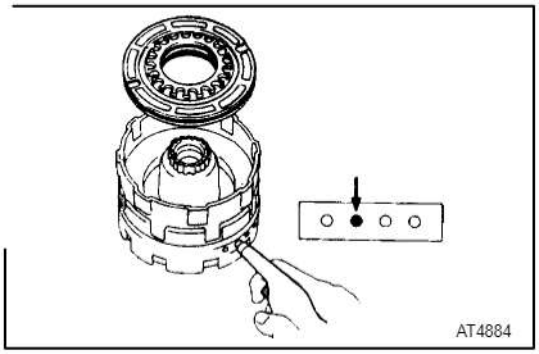
SST 09350-20015 (09369-20040)

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



(c) Remove the piston return spring.

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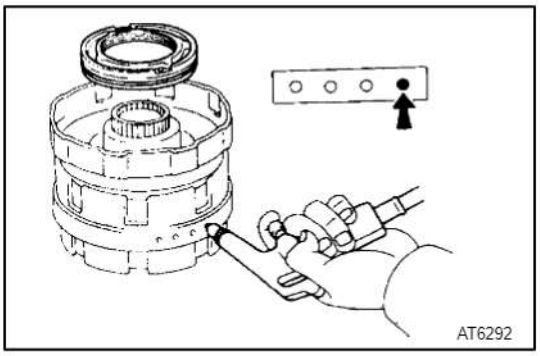


5. REMOVE REAR CLUTCH PISTON

(a) Place the rear clutch drum onto the center support.

(b) Hold the No. 2 rear clutch piston with hand, apply compressed air to the center support to remove the rear clutch piston.

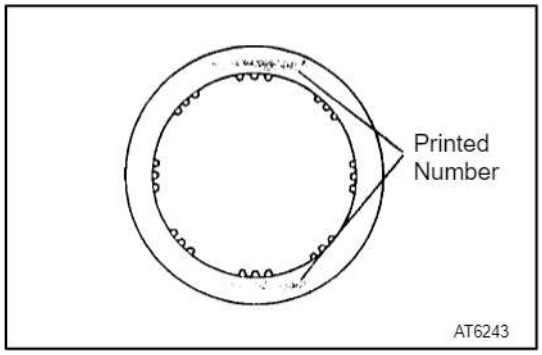
(c) Remove the two O-rings from the piston.



(d) Hold the rear clutch piston subassembly with hand, apply compressed air to the center support to remove the rear clutch piston subassembly.

(e) Remove the two O-rings from the piston.

REAR CLUTCH INSPECTION



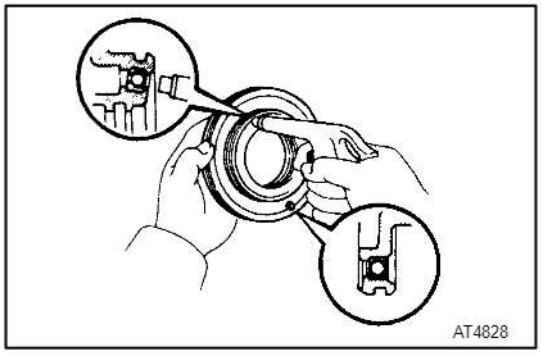
1. INSPECT DISC, PLATE AND FLANGE

Check to see if the sliding surface of the disc, plate and flange are worn or burnt. If necessary, replace them.

HINT:

© If the lining of the disc is peeling off or discolored, or even if parts of the printed numbers are defaced, replace all discs.

© Before assembling new discs, soak them in ATF for at least fifteen minutes.

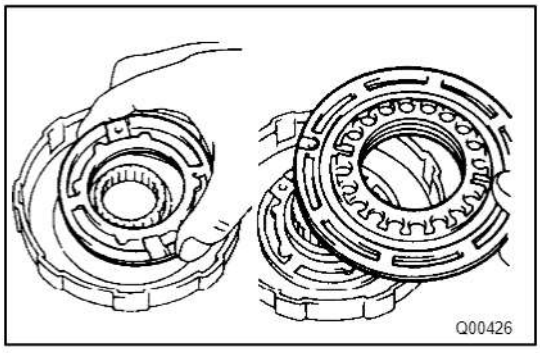


2. CHECK REAR CLUTCH PISTON

(a) Check that check balls are free by shaking the piston.

(b) Check that the valves do no leak by applying low-pressure compressed air.

REAR CLUTCH ASSEMBLY

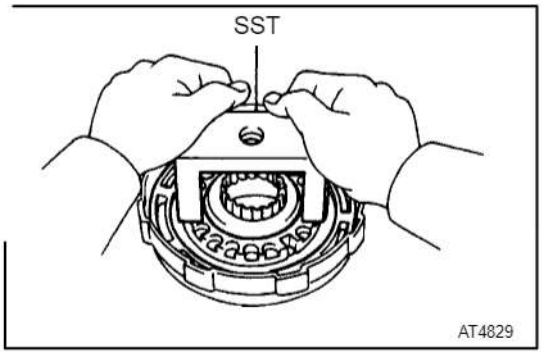


1. INSTALL REAR CLUTCH PISTON SUBASSEMBLY

(a) Coat new O-rings with ATF and install them onto the piston subassembly.

(b) Install piston subassembly into the No. 2 rear clutch piston.

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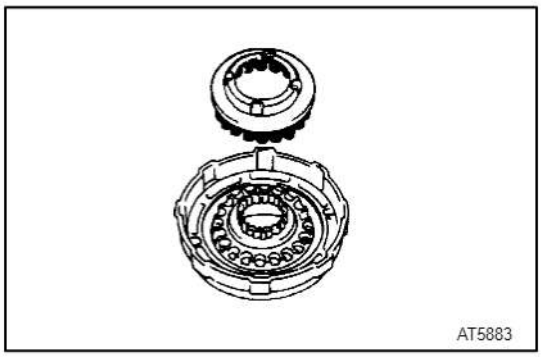
2. INSTALL NO. 2 REAR CLUTCH PISTON

(a) Coat new O-rings with ATF and install them on the rear clutch piston.

(b) Place SST on the rear clutch piston.

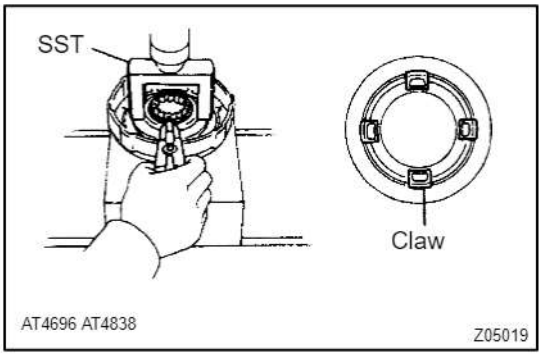
SST 09350-20015 (09369-20040)

(c) Being careful not to damage the O-rings, press in the rear clutch piston into the clutch drum with both hands.



3. INSTALL PISTON RETURN SPRINGS

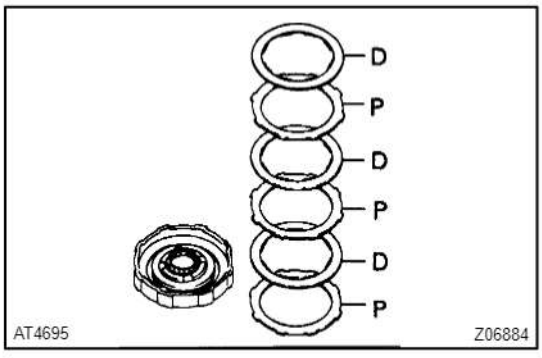
(a) Install the piston return spring.



(b) Place SST on the spring seat, and compress the return springs with a shop press.

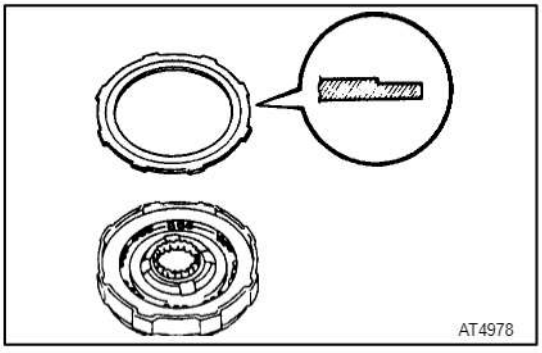
SST 09350-20015 (09369-20040)

(c) Install the snap ring with a snap ring expander. Be sure the end gap of the snap ring is not aligned with the spring seat claw.



4. INSTALL PLATES AND DISCS

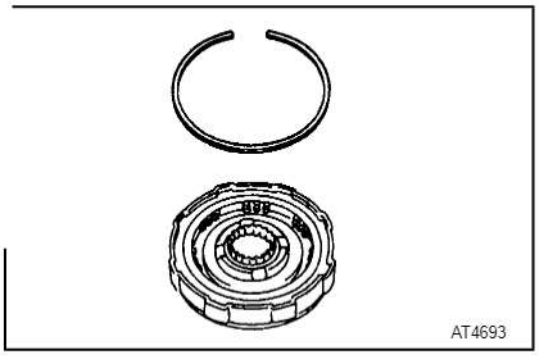
Install the three plates and three discs.
Install in order: P = Plate D = Disc
P-D-P-D-P-D



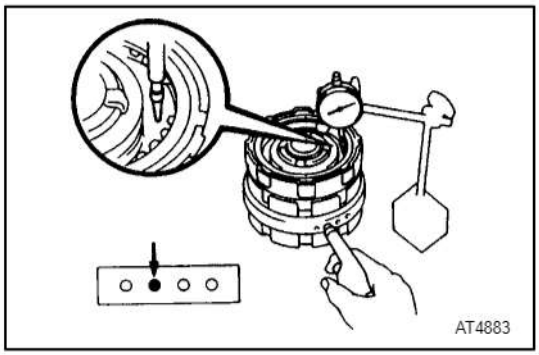
5. INSTALL FLANGE

(a) Install the flange, the flat end facing downward.

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(b) Using a screwdriver, install the snap ring. Be sure the end gap of the snap ring is not aligned with the cutout portion of the rear clutch drum.



6. CHECK PISTON STROKE OF REAR CLUTCH

(a) Plate the rear clutch assembly onto the center support.

(b) Using a dial indicator, measure the rear clutch piston stroke applying and releasing the compressed air 392-785 kPa (4 - 8 kgf/cm^2, 57 - 114 psi), as shown.

Piston stroke:

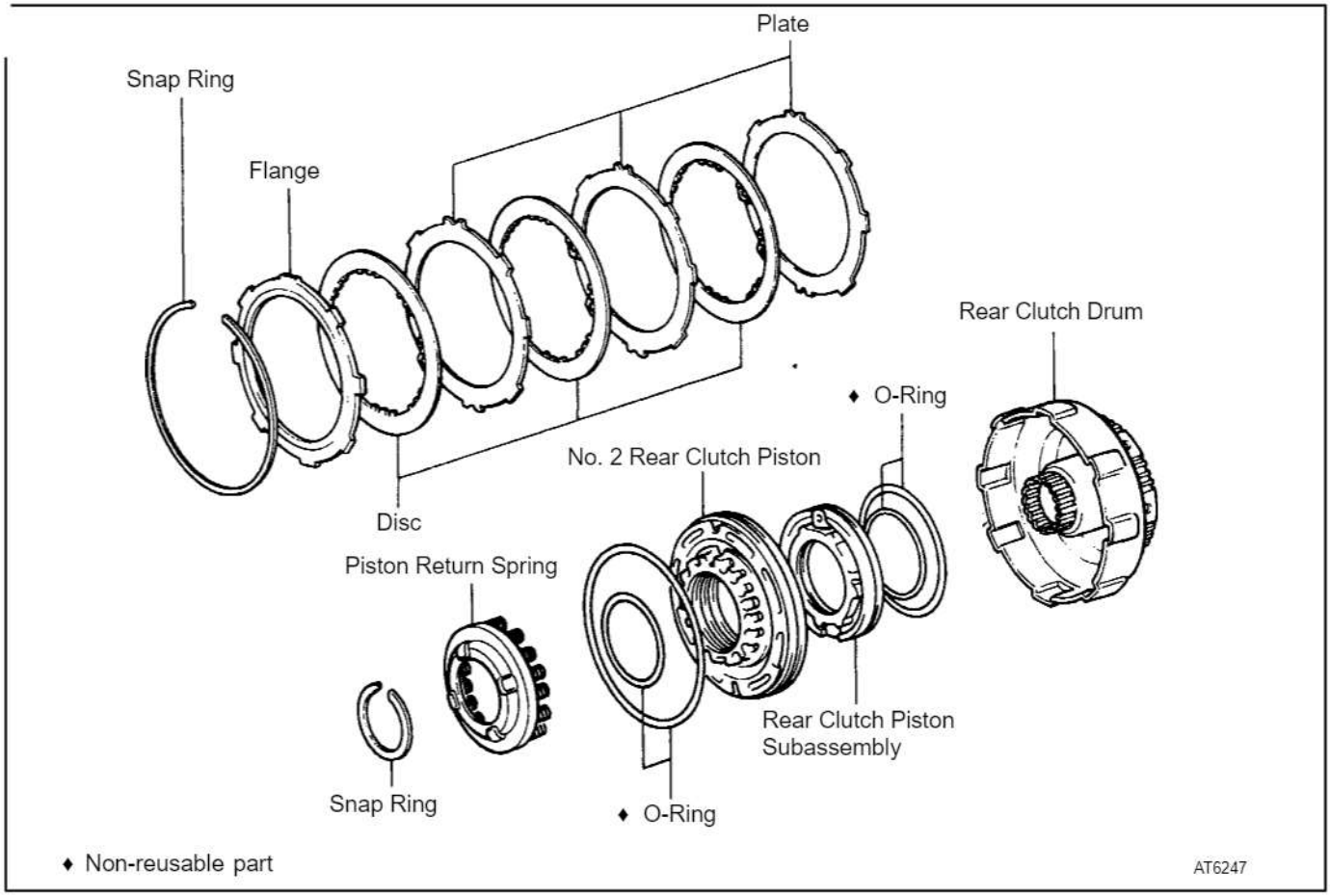
0.90 - 1.75 mm (0.0354 - 0.0689 in.)

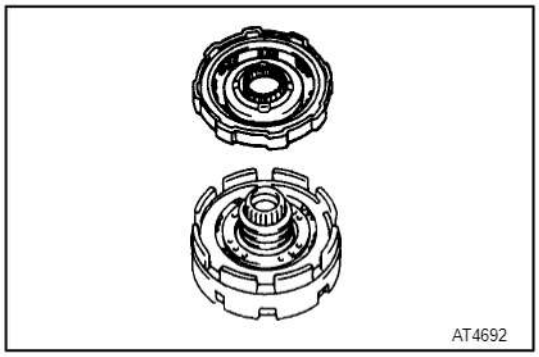
If the piston stroke is less than the limit, parts may have been assembled incorrectly, check and reassemble again.

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REAR CLUTCH

COMPONENTS

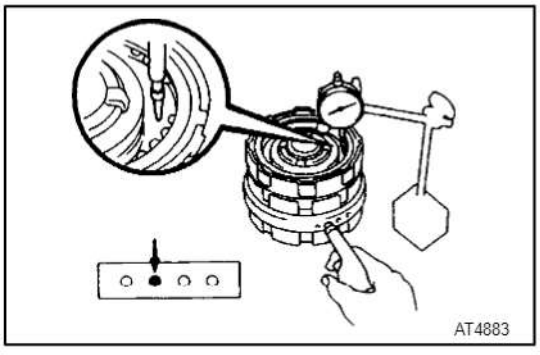




REAR CLUTCH DISASSEMBLY

1. CHECK PISTON STROKE OF REAR CLUTCH

(a) Place the rear clutch assembly onto the center support.



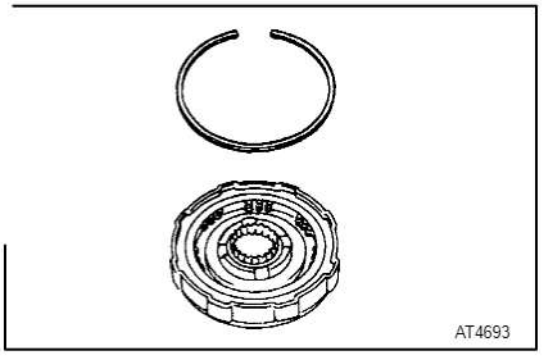
(b) Using a dial indicator, measure the rear clutch piston stroke applying and releasing the compressed air 392-785 kPa (4 - 8 kgf/cm^2, 57 - 114 psi), as shown.

Piston stroke:

0.90 - 1.75 mm (0.0354 - 0.0689 in.)

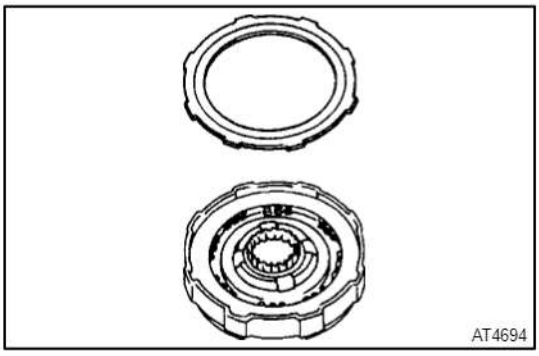
If the values are nonstandard, inspect the discs.

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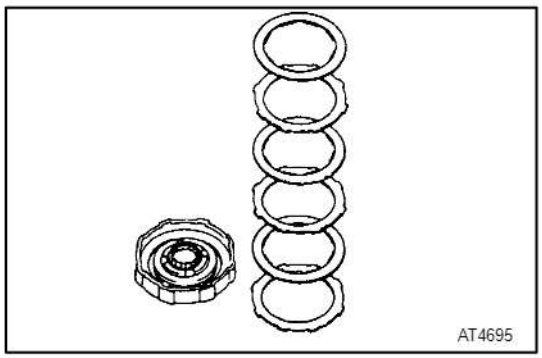


2. REMOVE FLANGE

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

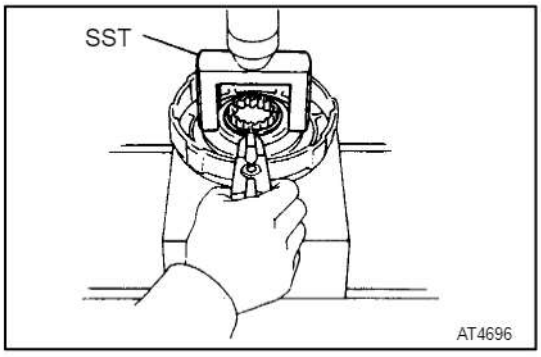


(b) Remove the flange.



3. REMOVE DISCS AND PLATES

Remove the three discs and three plates.

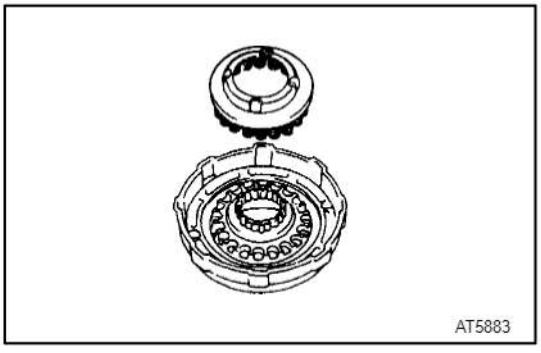


4. REMOVE PISTON RETURN SPRINGS

(a) Place SST on the spring seat and compress the return springs with a shop press.

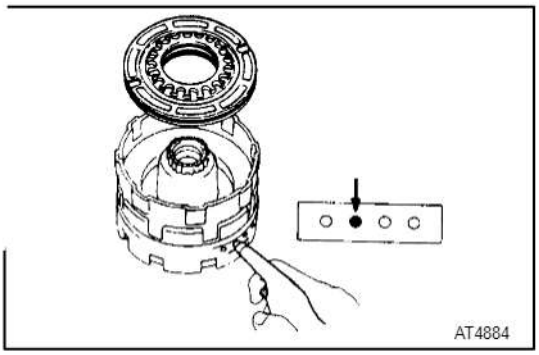
SST 09350-20015 (09369-20040)

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



(c) Remove the piston return spring.

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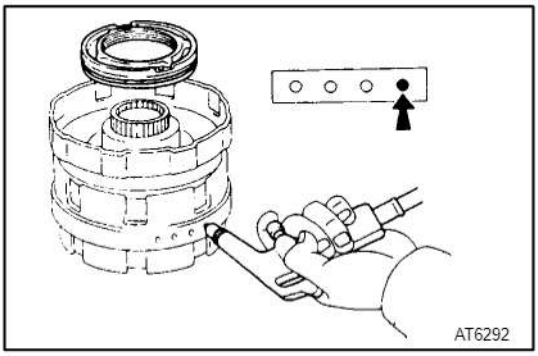


5. REMOVE REAR CLUTCH PISTON

(a) Place the rear clutch drum onto the center support.

(b) Hold the No. 2 rear clutch piston with hand, apply compressed air to the center support to remove the rear clutch piston.

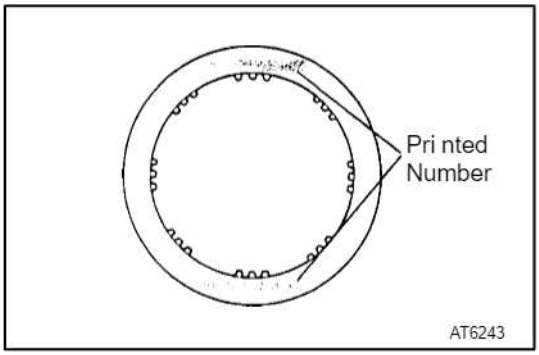
(c) Remove the two O-rings from the piston.



(d) Hold the rear clutch piston subassembly with hand, apply compressed air to the center support to remove the rear clutch piston subassembly.

(e) Remove the two O-rings from the piston.

REAR CLUTCH INSPECTION



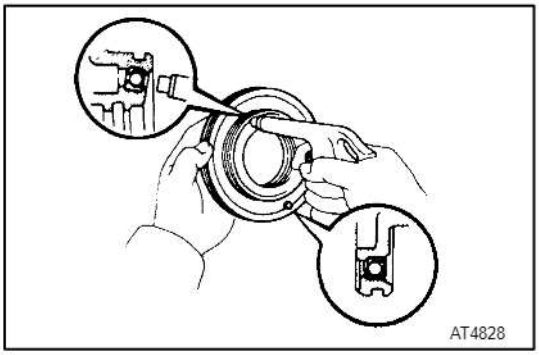
1. INSPECT DISC, PLATE AND FLANGE

Check to see if the sliding surface of the disc, plate and flange are worn or burnt. If necessary, replace them.

HINT:

© If the lining of the disc is peeling off or discolored, or even if parts of the printed numbers are de-faced, replace all discs.

© Before assembling new discs, soak them in ATF for at least fifteen minutes.

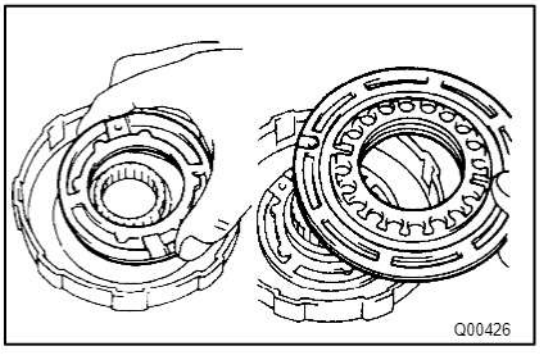


2. CHECK REAR CLUTCH PISTON

(a) Check that check balls are free by shaking the piston.

(b) Check that the valves do no leak by applying low-pressure compressed air.

REAR CLUTCH ASSEMBLY

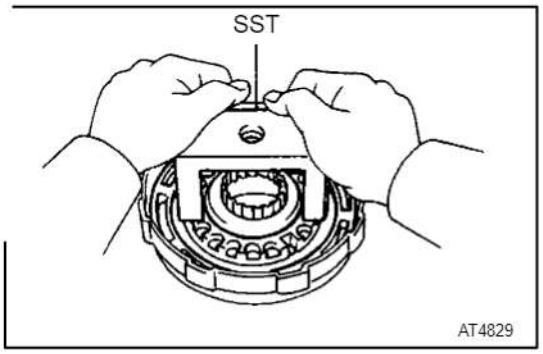


1. INSTALL REAR CLUTCH PISTON SUBASSEMBLY

(a) Coat new O-rings with ATF and install them onto the piston subassembly.

(b) Install piston subassembly into the No. 2 rear clutch piston.

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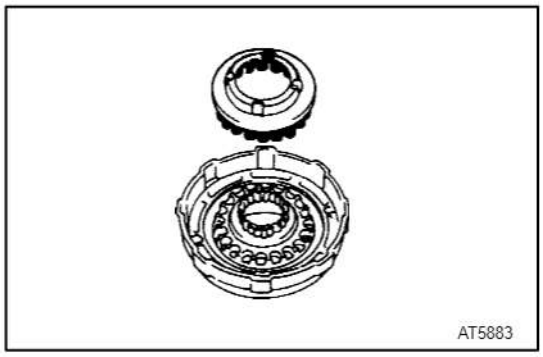
2. INSTALL NO. 2 REAR CLUTCH PISTON

(a) Coat new O-rings with ATF and install them on the rear clutch piston.

(b) Place SST on the rear clutch piston.

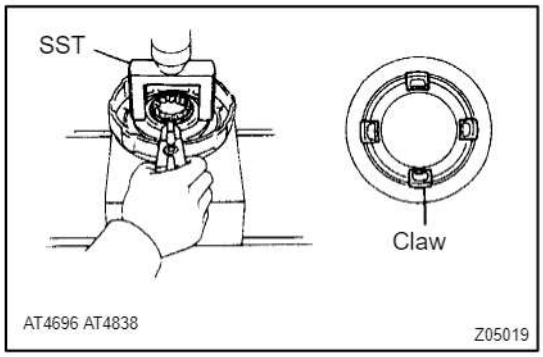
SST 09350-20015 (09369-20040)

(c) Being careful not to damage the O-rings, press in the rear clutch piston into the clutch drum with both hands.



3. INSTALL PISTON RETURN SPRINGS

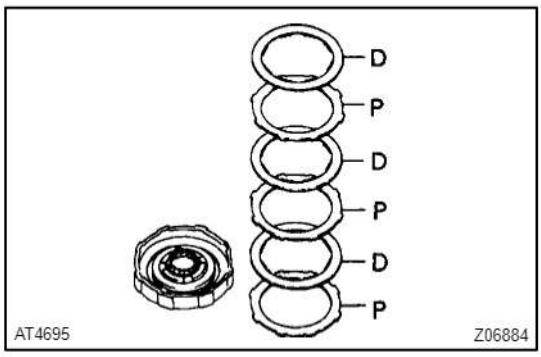
(a) Install the piston return spring.



(b) Place SST on the spring seat, and compress the return springs with a shop press.

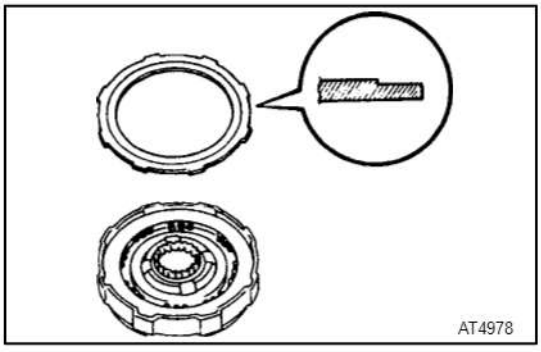
SST 09350-20015 (09369-20040)

(c) Install the snap ring with a snap ring expander. Be sure the end gap of the snap ring is not aligned with the spring seat claw.



4. INSTALL PLATES AND DISCS

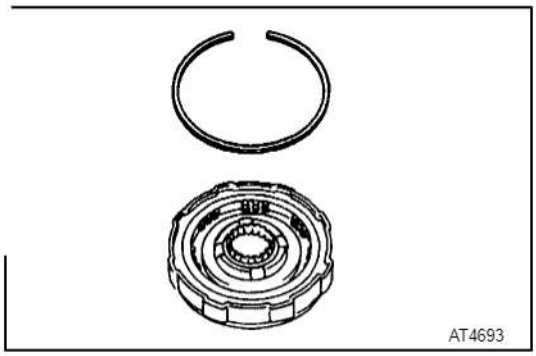
Install the three plates and three discs.
Install in order: P = Plate D = Disc
P-D-P-D-P-D



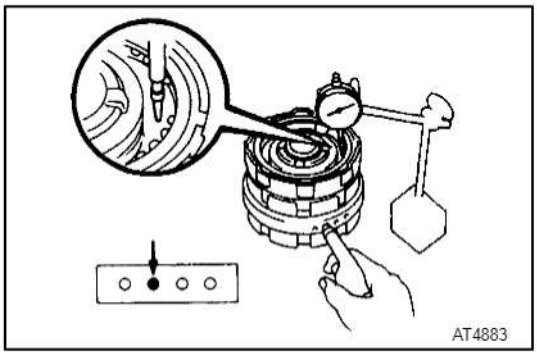
5. INSTALL FLANGE

(a) Install the flange, the flat end facing downward.

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(b) Using a screwdriver, install the snap ring. Be sure the end gap of the snap ring is not aligned with the cutout portion of the rear clutch drum.



6. CHECK PISTON STROKE OF REAR CLUTCH

(a) Plate the rear clutch assembly onto the center support.

(b) Using a dial indicator, measure the rear clutch piston stroke applying and releasing the compressed air 392-785 kPa (4 - 8 kgf/cm^2, 57 - 114 psi), as shown.

Piston stroke:

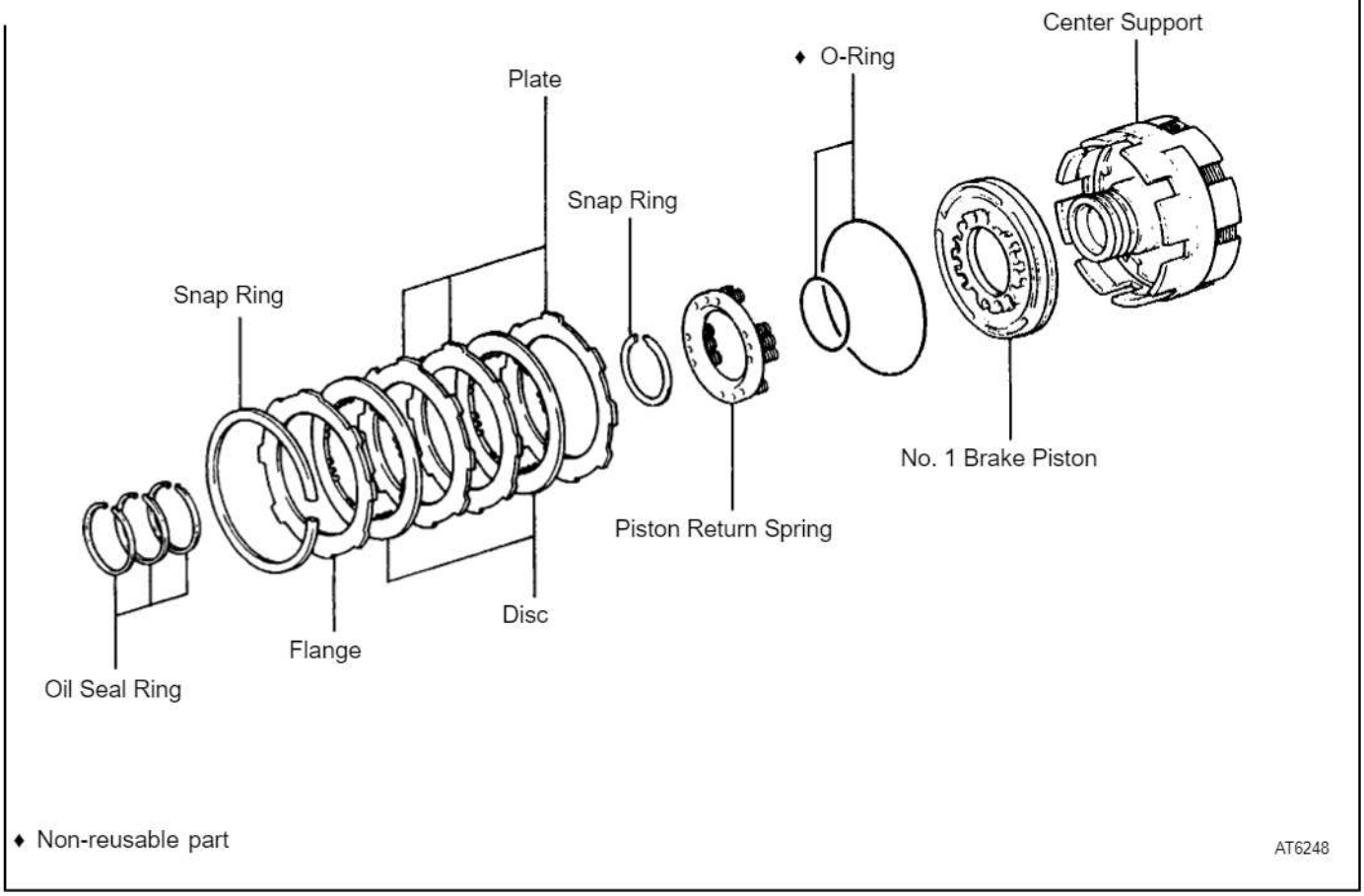
0.90 - 1.75 mm (0.0354 - 0.0689 in.)

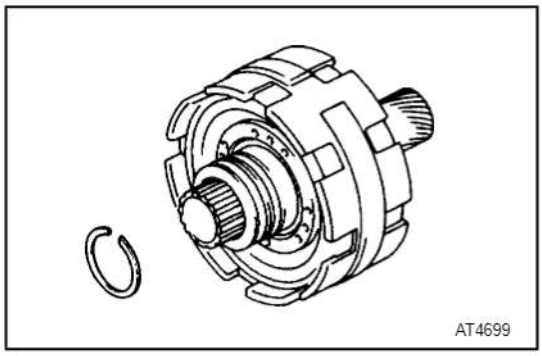
If the piston stroke is less than the limit, parts may have been assembled incorrectly, check and reassemble again.

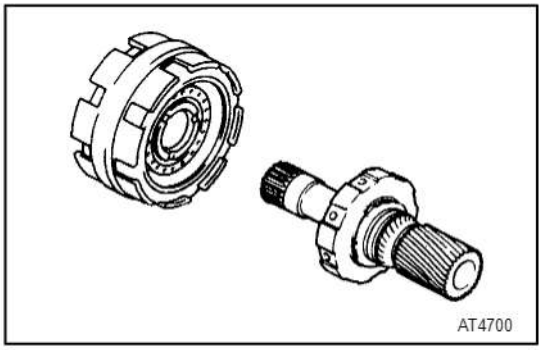
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NO. 1 BRAKE

COMPONENTS







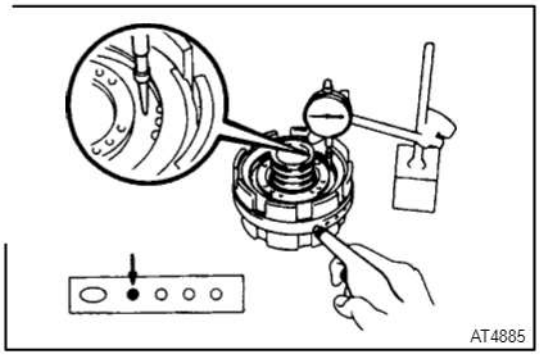
NO. 1 BRAKE DISASSEMBLY

1. REMOVE PLANETARY SUN GEAR AND NO. 1 ONE-WAY CLUTCH

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

(b) Remove the planetary sun gear with No. 1 one-way clutch.

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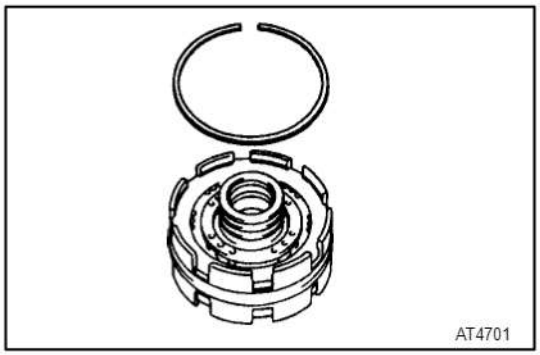
2. CHECK PISTON STROKE OF NO. 1 BRAKE

Using a dial indicator, measure the No. 1 brake piston stroke applying and releasing the compressed air 392 -785 kPa (4 - 8 kgf/cm^2, 57 - 114 psi), as shown.

Piston stroke:

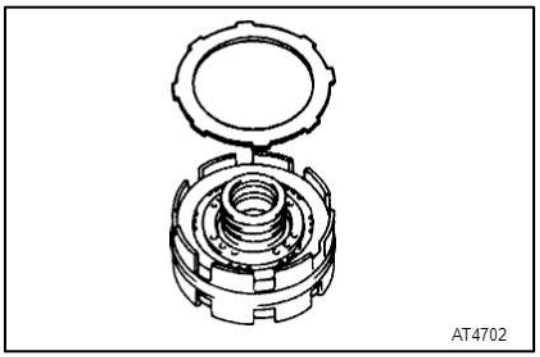
0.80 - 1.73 mm (0.0315 - 0.0681 in.)

If the values are nonstandard, inspect the disc.

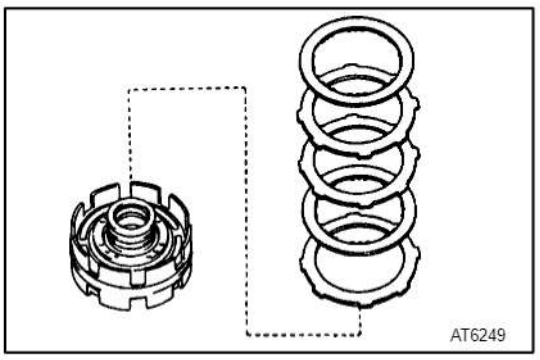


3. REMOVE FLANGE

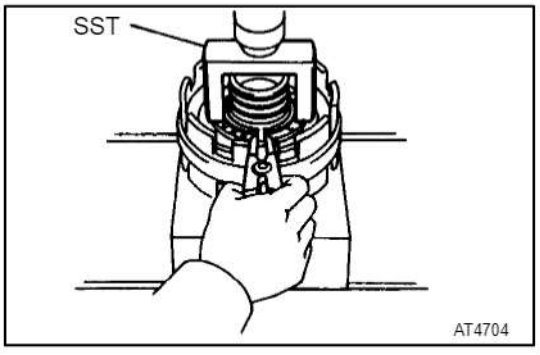
(a) Using a screwdriver, remove the snap ring.



(b) Remove the flange.



4. REMOVE DISCS AND PLATES



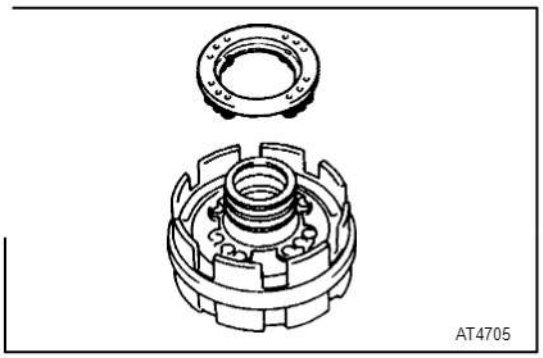
6. REMOVE PISTON RETURN SPRING

(a) Place SST on the spring seat and compress the return springs with a shop press.

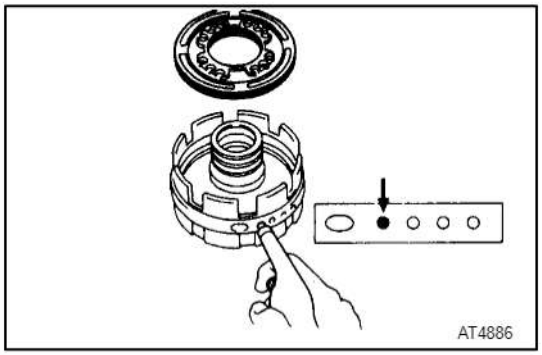
SST 09350-20015 (09369-20040)

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

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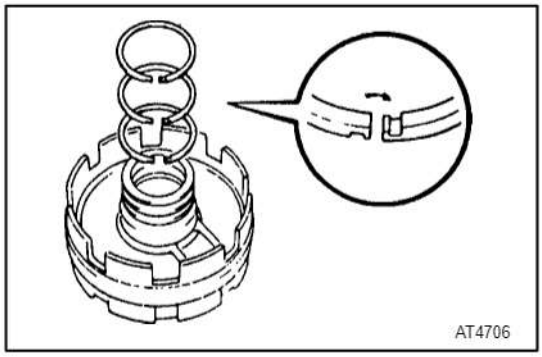
(c) Remove the piston return spring.



6. REMOVE NO. 1 BRAKE PISTON

(a) Hold the No. 1 brake piston with hand, apply compressed air to the center support to remove the No. 1 brake piston.

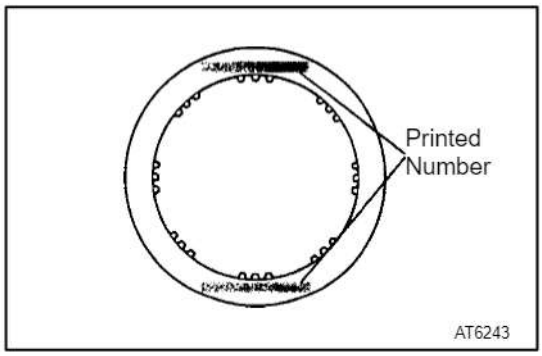
(b) Remove the two O-rings from the piston.



7. REMOVE OIL SEAL RINGS

Remove the three oil seal rings.

NO. 1 BRAKE INSPECTION

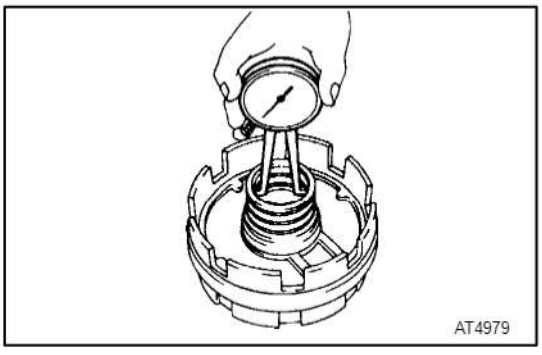


1. INSPECT DISC, PLATE AND FLANGE

Check to see if the sliding surface of the disc, plate and flange are worn or burnt. If necessary, replace them.

HINT:

- If the lining of the disc is peeling off or discolored, or even if parts of the printed numbers are defaced, replace disc.
- Before assembling new disc, soak it in ATF for at least fifteen minutes.



2. CHECK CENTER SUPPORT BUSHING

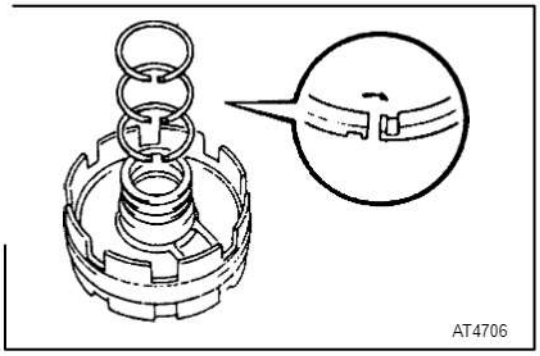
Using a dial indicator, measure the inside diameter of the center support bushing.

Maximum inside diameter:

36.46 mm (1.4354 in.)

If the inside diameter is greater than the maximum, replace the center support.

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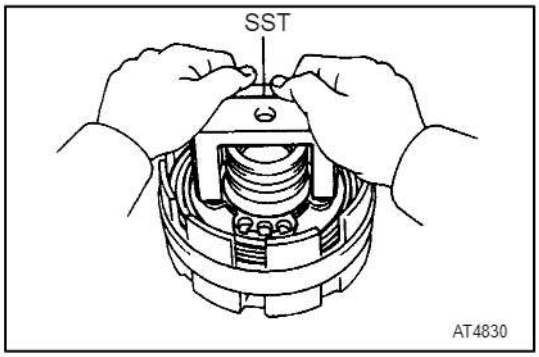
NO. 1 BRAKE ASSEMBLY

1. INSTALL OIL SEAL RINGS

(a) Coat the three oil seal rings with ATF.

(b) Contract the oil seal rings and install them onto the center support.

NOTICE: Do not spread the ring ends too much.
HINT: After installing the oil seal rings, check that they rotate smoothly.



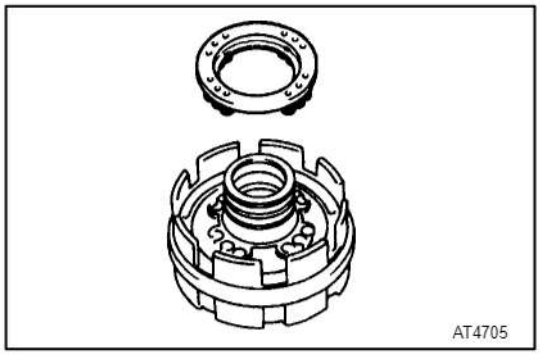
2. INSTALL NO. 1 BRAKE PISTON

(a) Coat new O-rings with ATF and install them on the No. 1 brake piston.

(b) Place SST on the No. 1 brake piston.

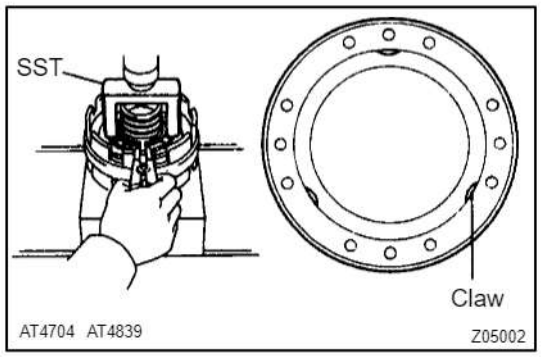
SST 09350-20015 (09369-20040)

(c) Being careful not to damage the O-rings, press in the No. 1 brake piston into the center support with both hands.



3. INSTALL PISTON RETURN SPRING

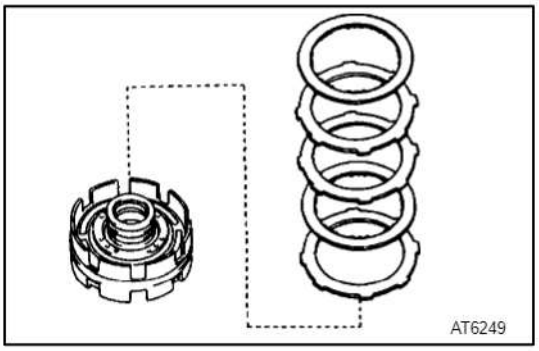
(a) Install the piston return spring.



(b) Place SST on the spring seat, and compress the return springs with a shop press.

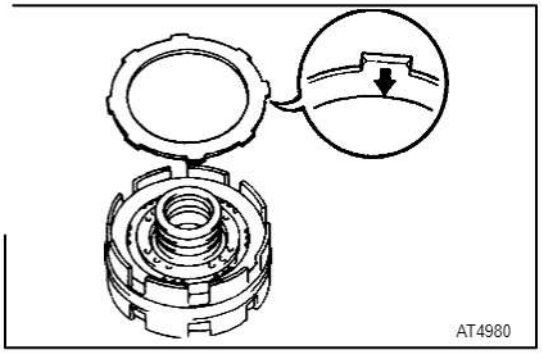
SST 09350-20015 (09369-20040)

(c) Install the snap ring with a snap ring expander. Be sure the end gap of the snap ring is not aligned with the spring seat claw.



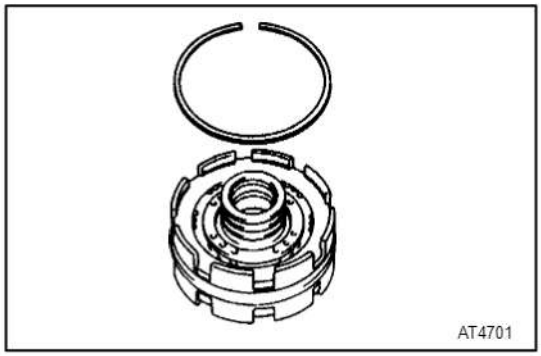
4. INSTALL PLATES AND DISCS

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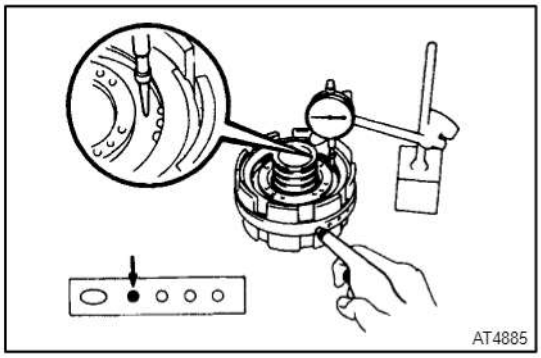


6. INSTALL FLANGE

(a) Install the flange, the rounded edge facing downward.



(b) Using a screwdriver, install the snap ring. Be sure the end gap of the snap ring is not aligned with the cutout portion of the center support.



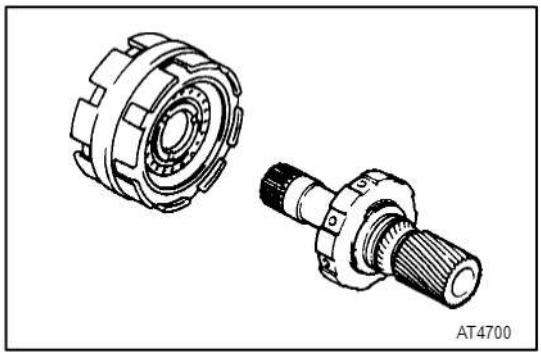
6. CHECK PISTON STROKE OF NO. 1 BRAKE

Using a dial indicator, measure the No. 1 brake piston stroke applying and releasing the compressed air 392-785 kPa (4 - 8 kgf/cm^2, 57 - 114 psi), as shown.

Piston stroke:

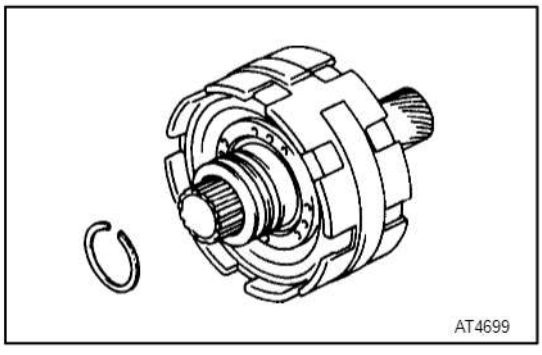
0.80 - 1.73 mm (0.0315 - 0.0681 in.)

If the piston stroke is less than the limit, parts may have been assembled incorrectly, check and reassemble again.



7. INSTALL PLANETARY SUN GEAR AND NO. 1 ONE-WAY CLUTCH

(a) While turning the one-way clutch, install the planetary sun gear.

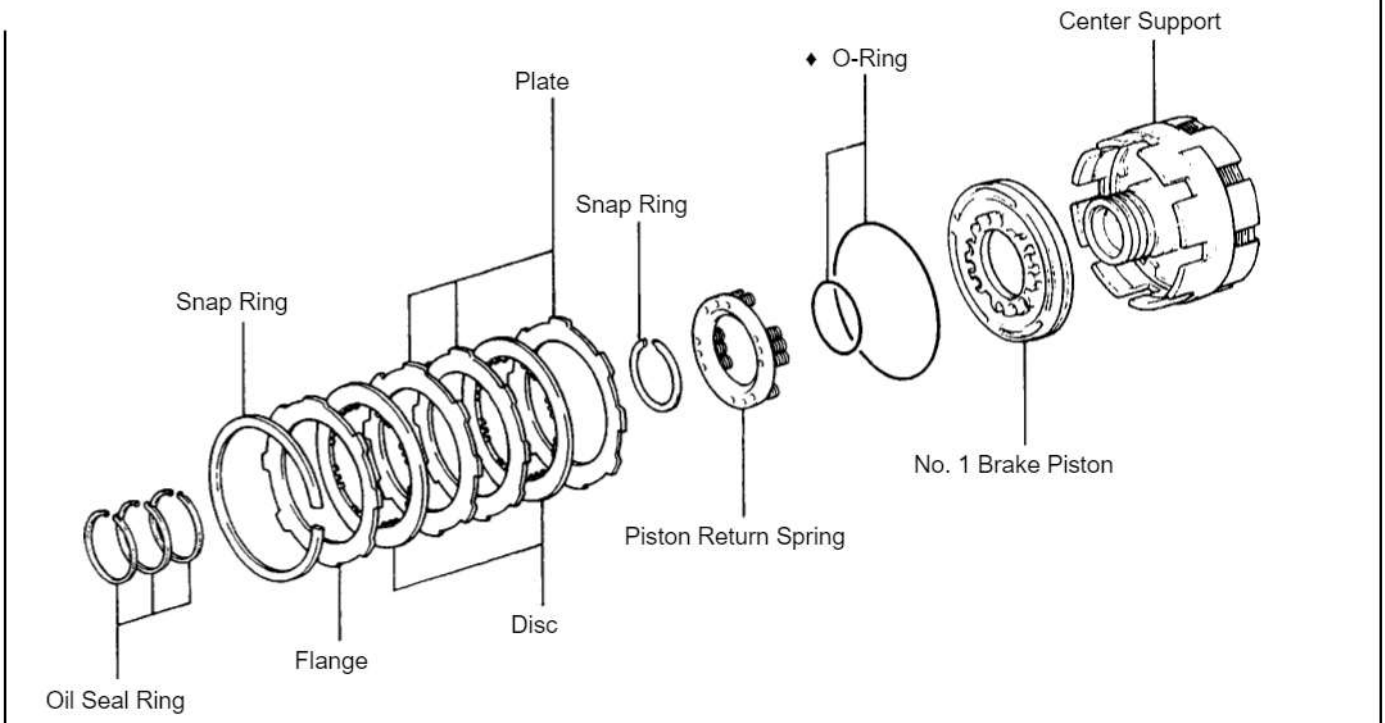


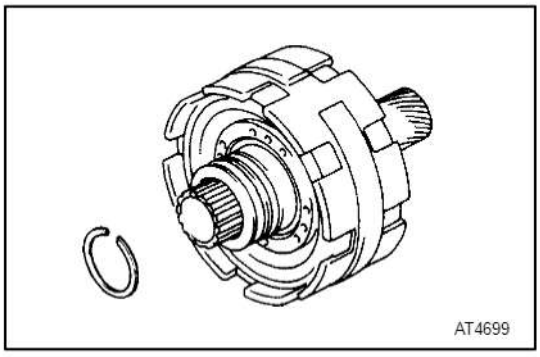
(b) Using a snap ring expander, install the snap ring.

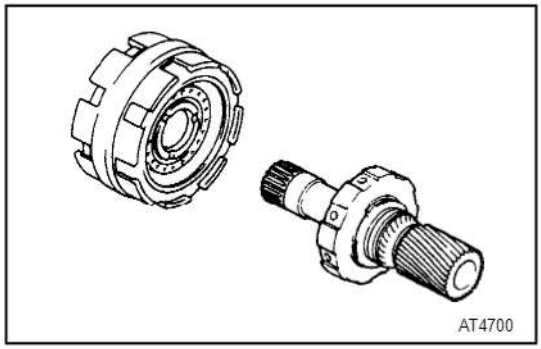
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NO. 1 BRAKE

COMPONENTS







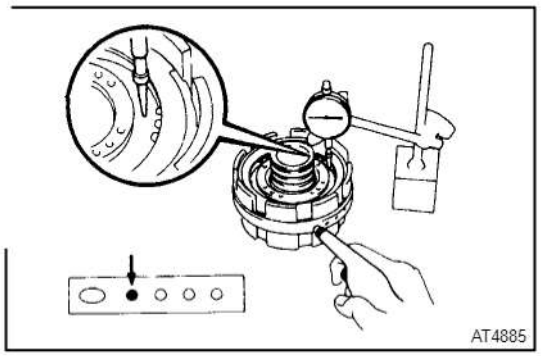
NO. 1 BRAKE DISASSEMBLY

1. REMOVE PLANETARY SUN GEAR AND NO. 1 ONE-WAY CLUTCH

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

(b) Remove the planetary sun gear with No. 1 one-way clutch.

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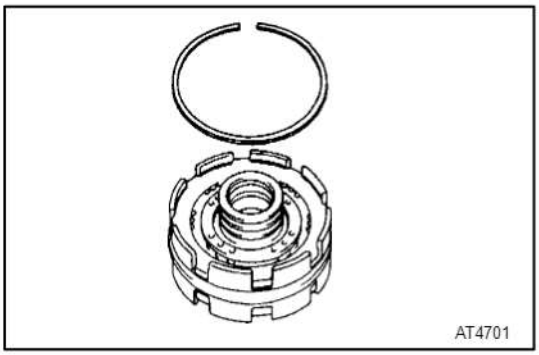
2. CHECK PISTON STROKE OF NO. 1 BRAKE

Using a dial indicator, measure the No. 1 brake piston stroke applying and releasing the compressed air 392 -785 kPa (4 - 8 kgf/cm^2, 57 - 114 psi), as shown.

Piston stroke:

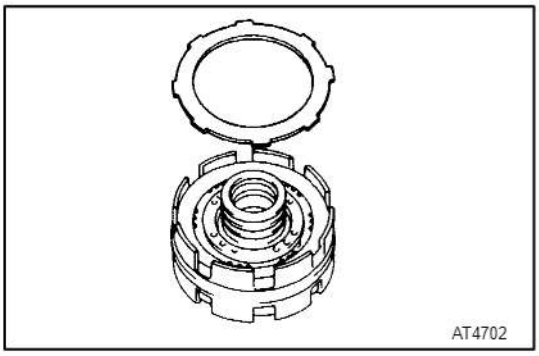
0.80 - 1.73 mm (0.0315 - 0.0681 in.)

If the values are nonstandard, inspect the disc.

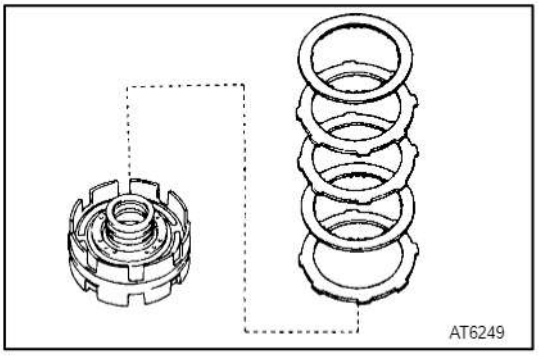


3. REMOVE FLANGE

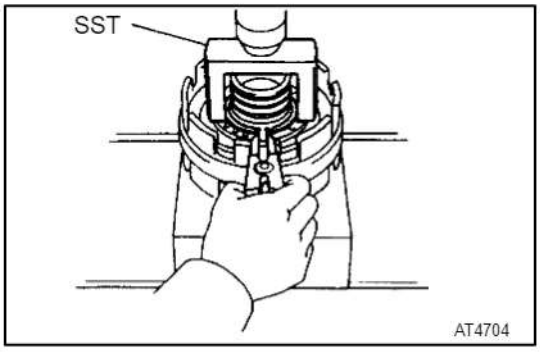
(a) Using a screwdriver, remove the snap ring.



(b) Remove the flange.



4. REMOVE DISCS AND PLATES



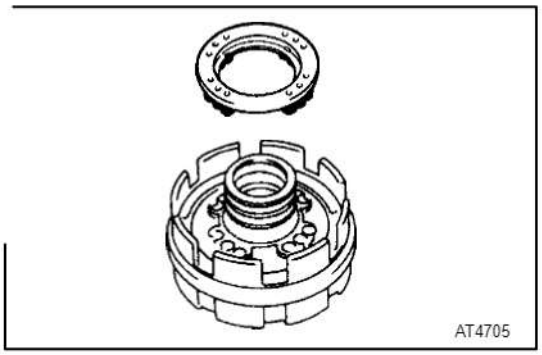
5. REMOVE PISTON RETURN SPRING

(a) Place SST on the spring seat and compress the return springs with a shop press.

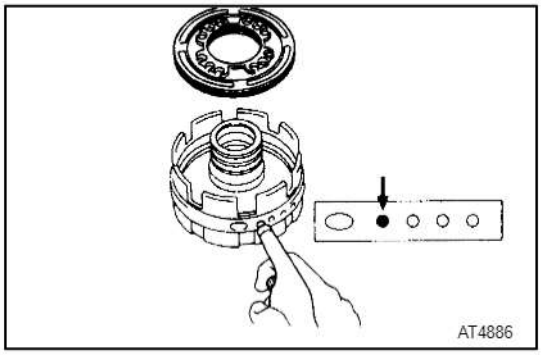
SST 09350-20015 (09369-20040)

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

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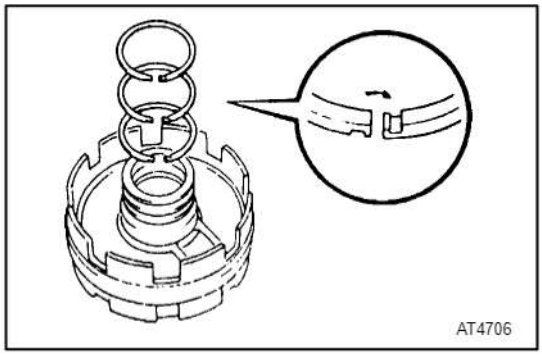
(c) Remove the piston return spring.



6. REMOVE NO. 1 BRAKE PISTON

(a) Hold the No. 1 brake piston with hand, apply compressed air to the center support to remove the No. 1 brake piston.

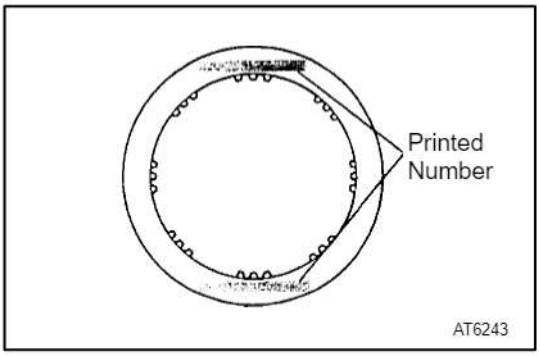
(b) Remove the two O-rings from the piston.



7. REMOVE OIL SEAL RINGS

Remove the three oil seal rings.

NO. 1 BRAKE INSPECTION

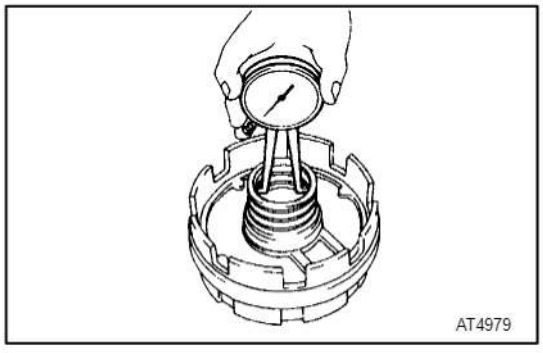


1. INSPECT DISC, PLATE AND FLANGE

Check to see if the sliding surface of the disc, plate and flange are worn or burnt. If necessary, replace them.

HINT:

- If the lining of the disc is peeling off or discolored, or even if parts of the printed numbers are defaced, replace disc.
- Before assembling new disc, soak it in ATF for at least fifteen minutes.



2. CHECK CENTER SUPPORT BUSHING

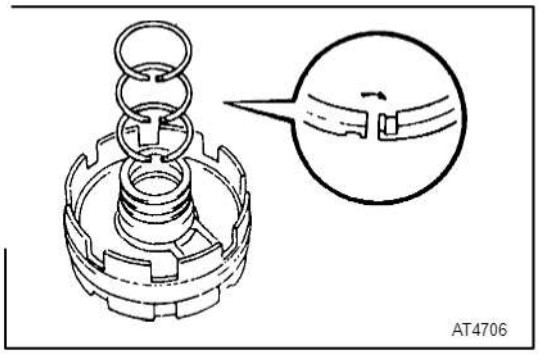
Using a dial indicator, measure the inside diameter of the center support bushing.

Maximum inside diameter:

36.46 mm (1.4354 in.)

If the inside diameter is greater than the maximum, replace the center support.

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NO. 1 BRAKE ASSEMBLY

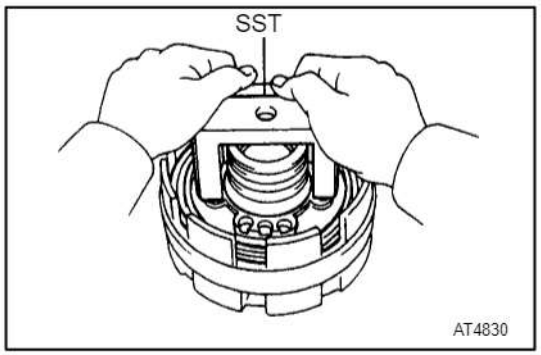
1. INSTALL OIL SEAL RINGS

(a) Coat the three oil seal rings with ATF.

(b) Contract the oil seal rings and install them onto the center support.

NOTICE: Do not spread the ring ends too much.

HINT: After installing the oil seal rings, check that they rotate smoothly.



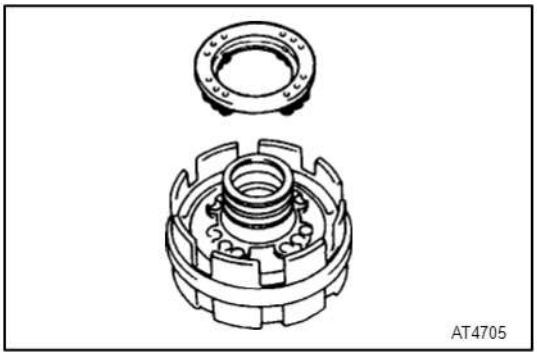
2. INSTALL NO. 1 BRAKE PISTON

(a) Coat new O-rings with ATF and install them on the No. 1 brake piston.

(b) Place SST on the No. 1 brake piston.

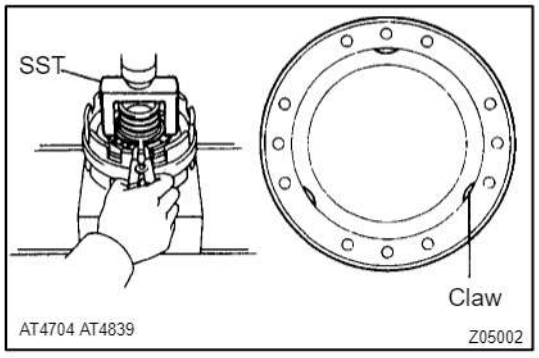
SST 09350-20015 (09369-20040)

(c) Being careful not to damage the O-rings, press in the No. 1 brake piston into the center support with both hands.



3. INSTALL PISTON RETURN SPRING

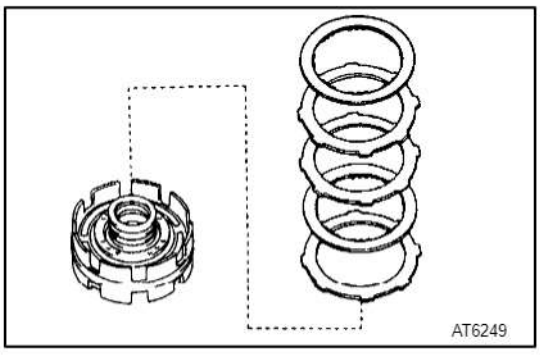
(a) Install the piston return spring.



(b) Place SST on the spring seat, and compress the return springs with a shop press.

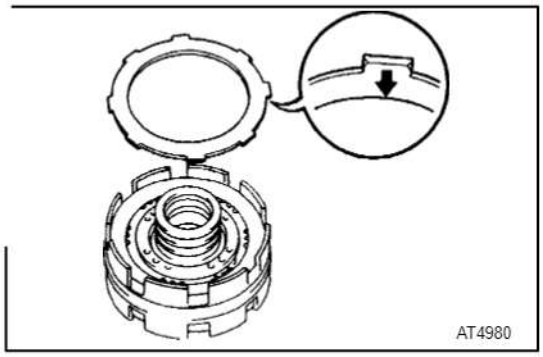
SST 09350-20015 (09369-20040)

(c) Install the snap ring with a snap ring expander. Be sure the end gap of the snap ring is not aligned with the spring seat claw.



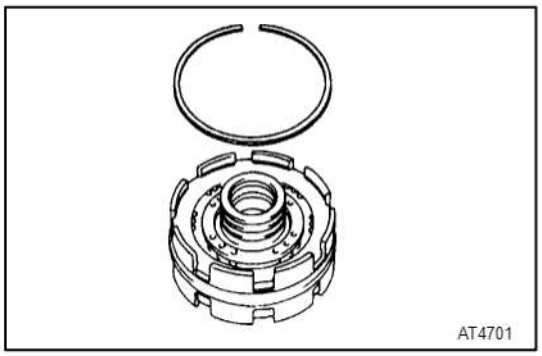
4. INSTALL PLATES AND DISCS

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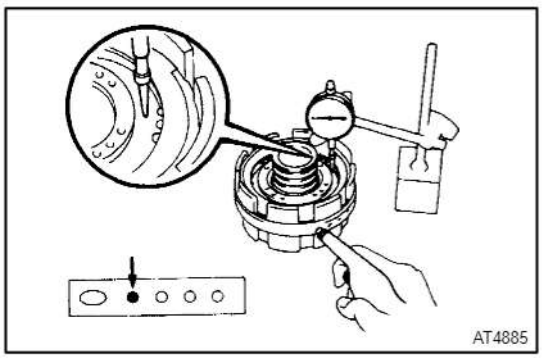


5. INSTALL FLANGE

(a) Install the flange, the rounded edge facing downward.



(b) Using a screwdriver, install the snap ring. Be sure the end gap of the snap ring is not aligned with the cutout portion of the center support.



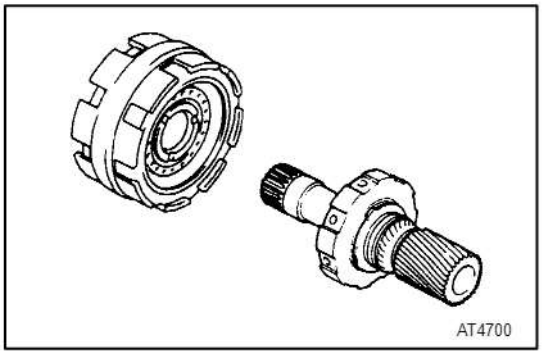
6. CHECK PISTON STROKE OF NO. 1 BRAKE

Using a dial indicator, measure the No. 1 brake piston stroke applying and releasing the compressed air 392 -785 kPa (4 - 8 kgf/cm^2, 57 - 114 psi), as shown.

Piston stroke:

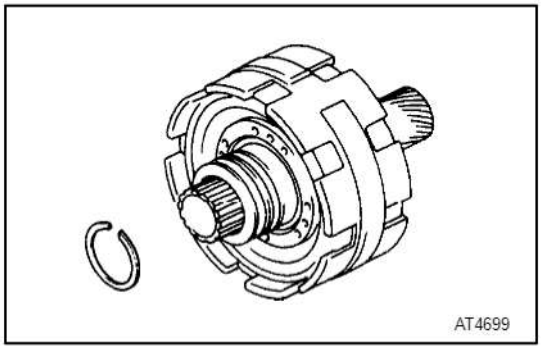
0.80 - 1.73 mm (0.0315 - 0.0681 in.)

If the piston stroke is less than the limit, parts may have been assembled incorrectly, check and reassemble again.



7. INSTALL PLANETARY SUN GEAR AND NO. 1 ONE-WAY CLUTCH

(a) While turning the one-way clutch, install the planetary sun gear.

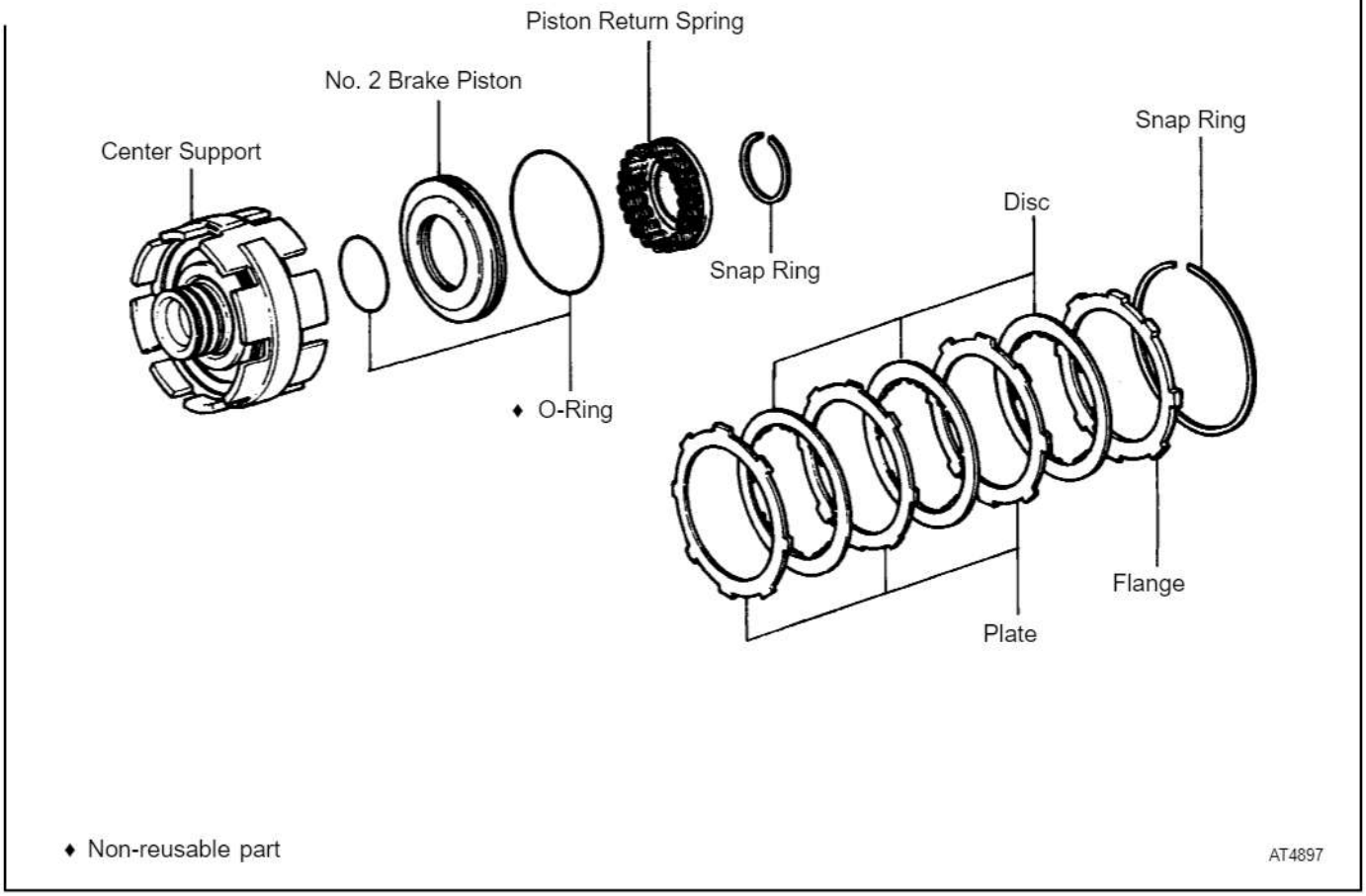


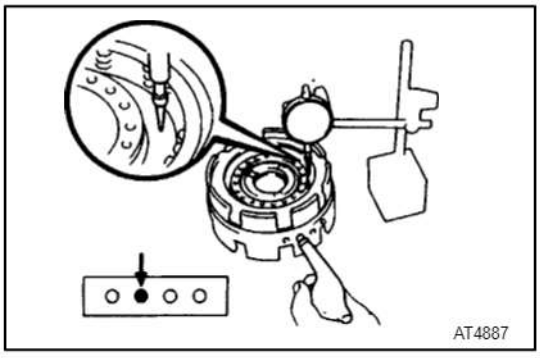
(b) Using a snap ring expander, install the snap ring.

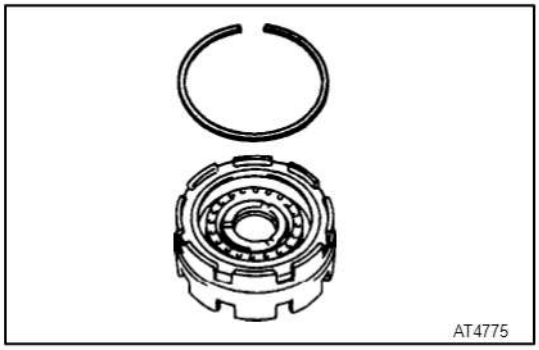
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NO. 2 BRAKE

COMPONENTS







NO. 2 BRAKE DISASSEMBLY

1. **REMOVE PLANETARY SUN GEAR AND NO. 1 ONE-WAY CLUTCH**
2. **CHECK PISTON STROKE OF NO. 2 BRAKE**

   Using a dial indicator, measure the No. 2 brake piston stroke applying and releasing the compressed air 392 -785 kPa (4 - 8 kgf/cm^2, 57 - 114 psi), as shown.

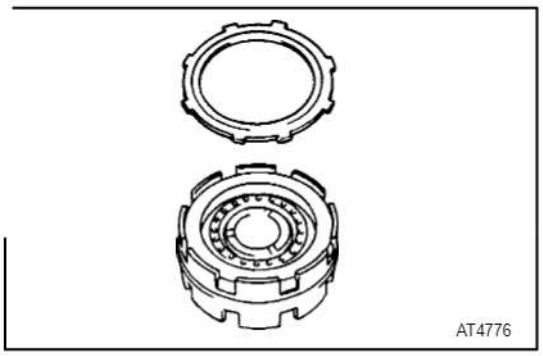
   Piston stroke:

   1.01 - 2.25 mm (0.0398 - 0.0886 in.)

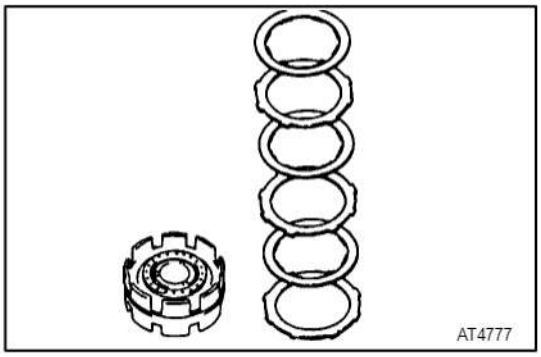
   If the values are nonstandard, inspect the discs.
3. **REMOVE FLANGE**

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

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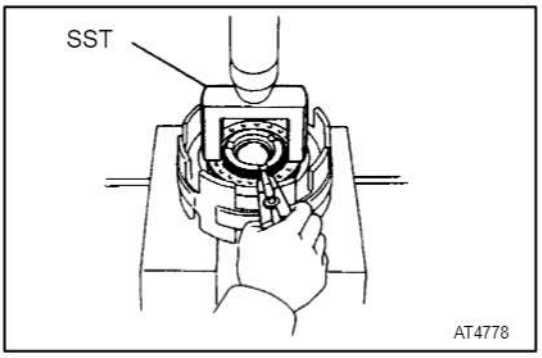


(b) Remove the flange.



4. REMOVE DISCS AND PLATES

Remove the three discs and three plates.

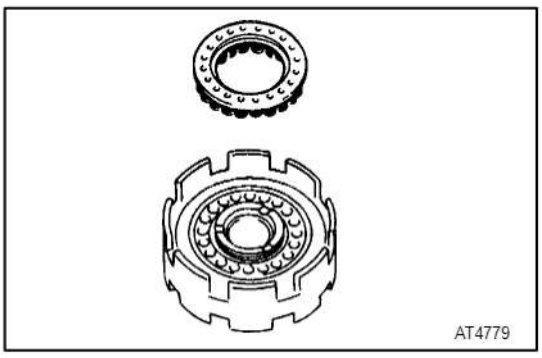


5. REMOVE PISTON RETURN SPRING

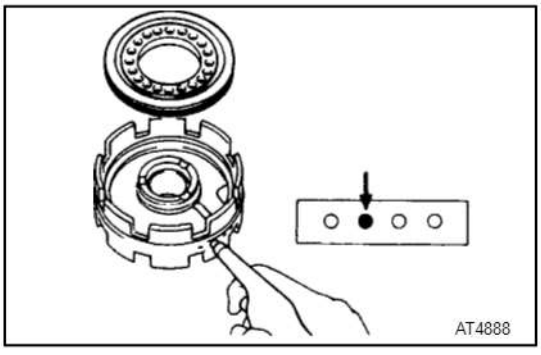
(a) Place SST on the spring seat and compress the return springs with a shop press.

SST 09350-20015 (09369-20040)

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



(c) Remove the piston return spring.

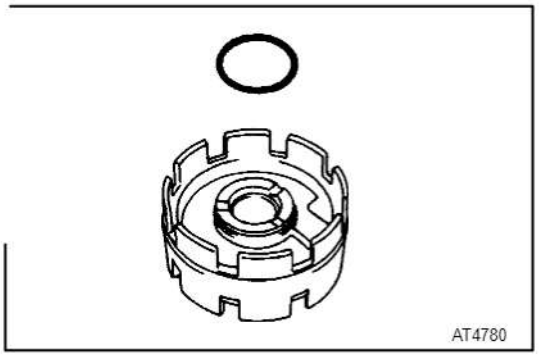


6. REMOVE NO. 2 BRAKE PISTON

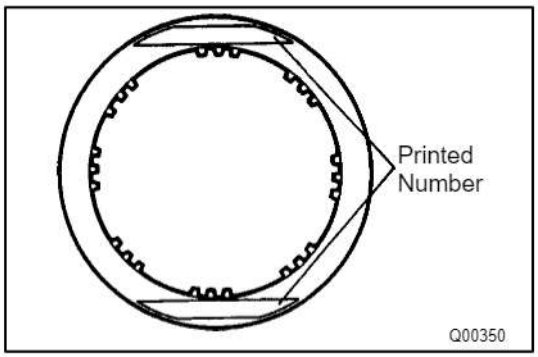
(a) Hold the No. 2 brake piston with hand, apply compressed air to the center support to remove the No. 2 brake piston.

(b) Remove the O-ring from the piston.

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(c) Remove the O-ring from the center support.

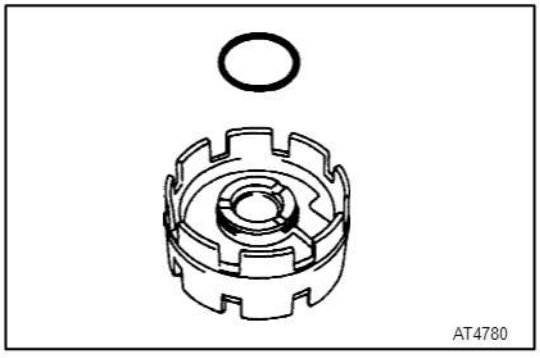


NO. 2 BRAKE INSPECTION

INSPECT DISC, PLATE AND FLANGE

Check to see if the sliding surface of the disc, plate and flange are worn or burnt. If necessary, replace them.
HINT:

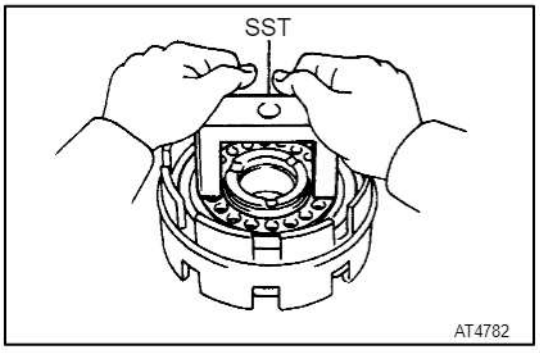
- If the lining of the disc is peeling off or discolored, or even if parts of the printed numbers are defaced, replace all discs.
- Before assembling new discs, soak them in ATF for at least fifteen minutes.



NO. 2 BRAKE ASSEMBLY

1. INSTALL NO. 2 BRAKE PISTON

(a) Coat a new O-ring with ATF and install it on the center support.



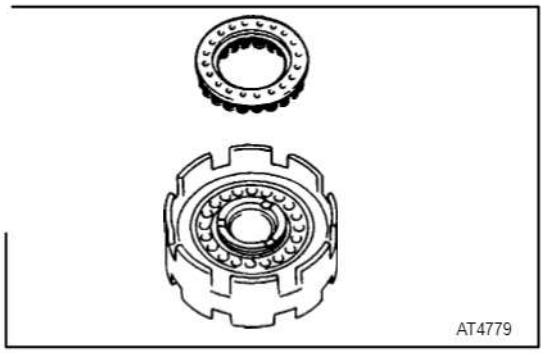
(b) Coat a new O-ring with ATF and install it on the No. 2 brake piston.

(c) Place SST on the No. 2 brake piston.

SST 09350-20015 (09369-20040)

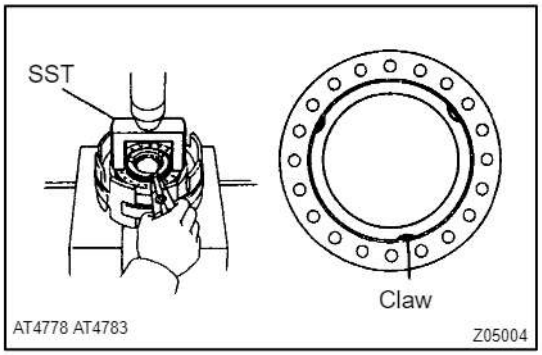
(d) Being careful not to damage the O-rings, press in the No. 2 brake piston into the center support with both hands.

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2. INSTALL PISTON RETURN SPRING

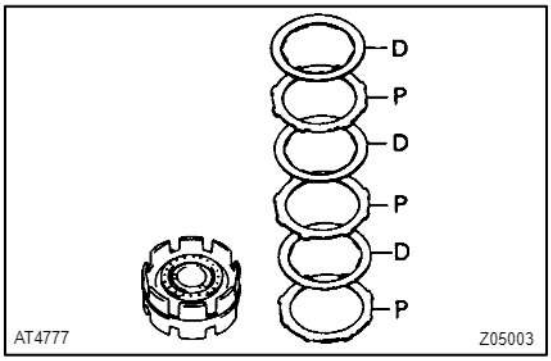
(a) Install the piston return spring.



(b) Place SST on the spring seat, and compress the return springs with a shop press.

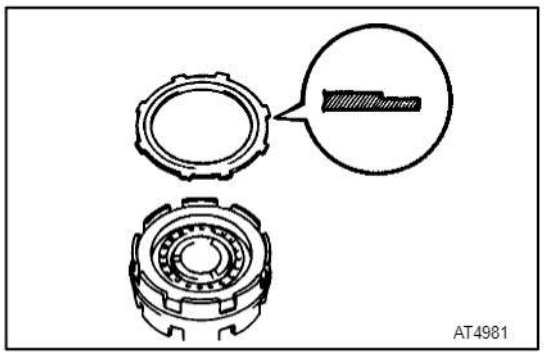
SST 09350-20015 (09369-20040)

(c) Install the snap ring with a snap ring expander. Be sure the end gap of the snap ring is not aligned with the spring seat claw.



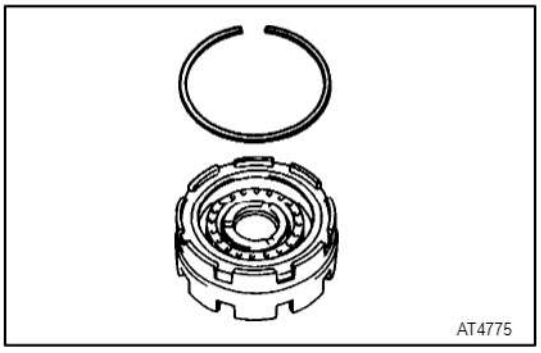
3. INSTALL PLATES AND DISCS

Install the three plates and three discs.
Install in order: P = Plate D = Disc
P-D-P-D-P-D



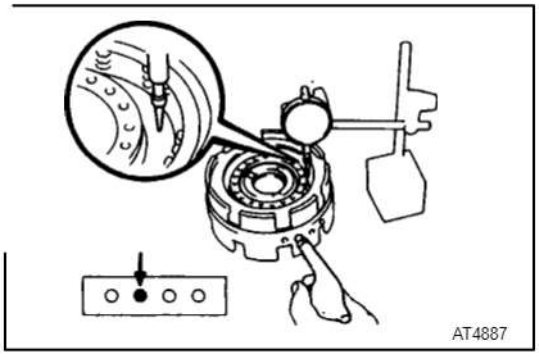
4. INSTALL FLANGE

(a) Install the flange, the flat end facing downward.



(b) Using a screwdriver, install the snap ring. Be sure the end gap of the snap ring is not aligned with the cutout portion of the center support.

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5. CHECK PISTON STROKE OF NO. 2 BRAKE

Using a dial indicator, measure the No. 2 brake piston stroke applying and releasing the compressed air 392-785 kPa (4 - 8 kgf/cm^2, 57 - 114 psi), as shown.

Piston stroke:

1.01 - 2.25 mm (0.0398 - 0.0886 in.)

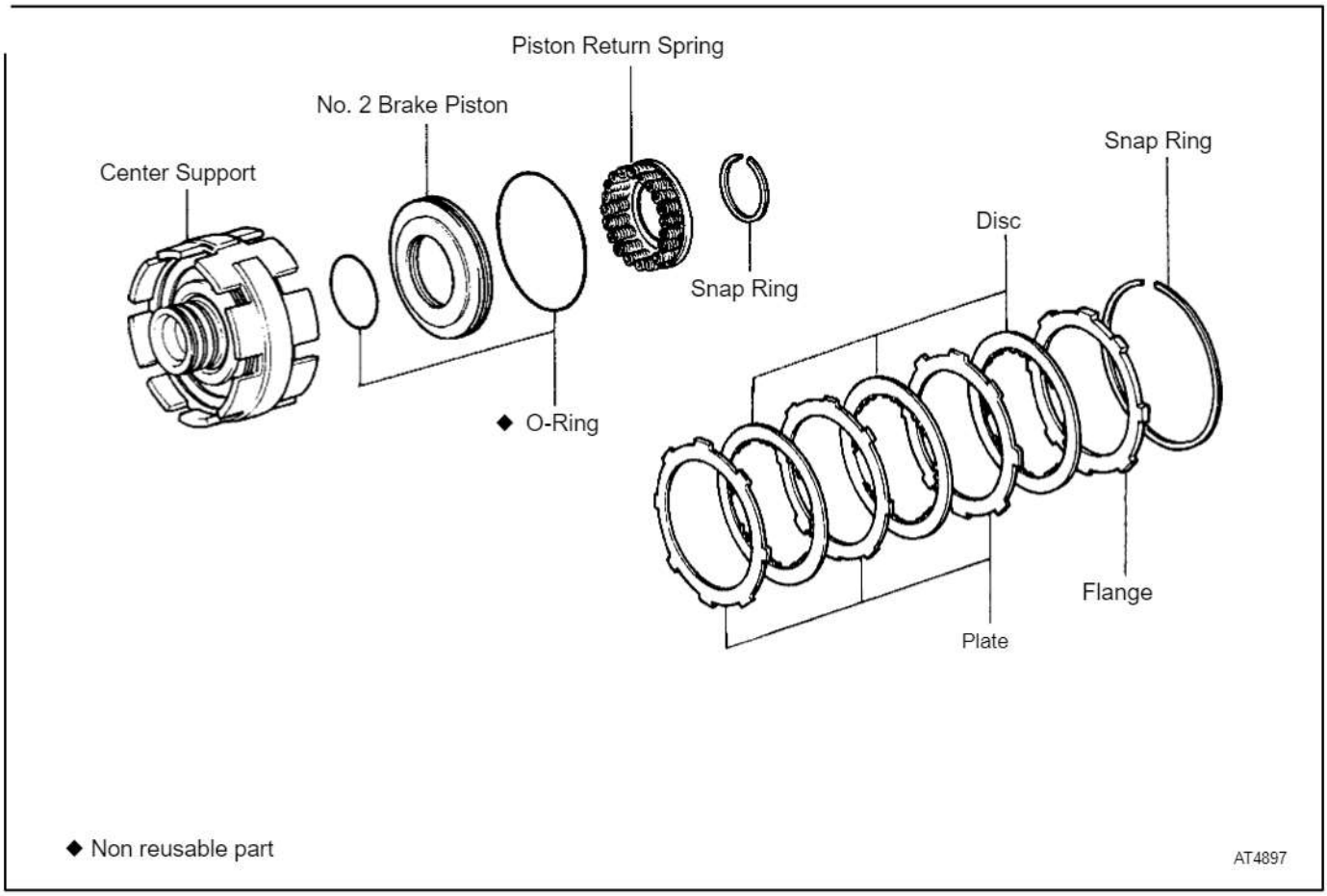
If the piston stroke is less than the limit, parts may have been assembled incorrectly, check and reassemble again.

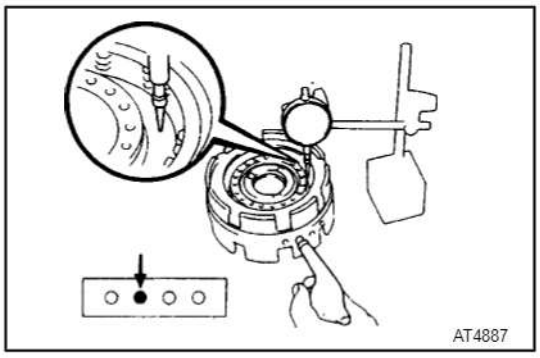
6. INSTALL PLANETARY SUN GEAR AND NO. 1 ONE-WAY CLUTCH

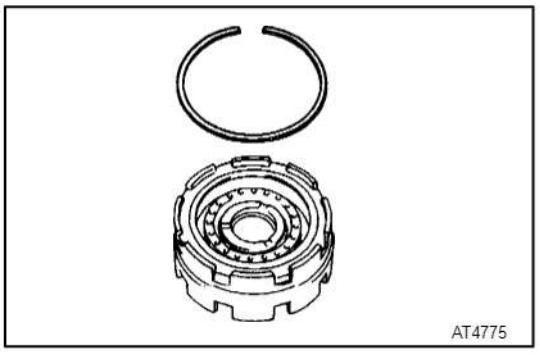
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NO. 2 BRAKE

COMPONENTS







NO. 2 BRAKE DISASSEMBLY

1. **REMOVE PLANETARY SUN GEAR AND NO. 1 ONE-WAY CLUTCH**
2. **CHECK PISTON STROKE OF NO. 2 BRAKE**

   Using a dial indicator, measure the No. 2 brake piston stroke applying and releasing the compressed air 392-785 kPa (4 - 8 kgf/cm^2, 57 - 114 psi), as shown.

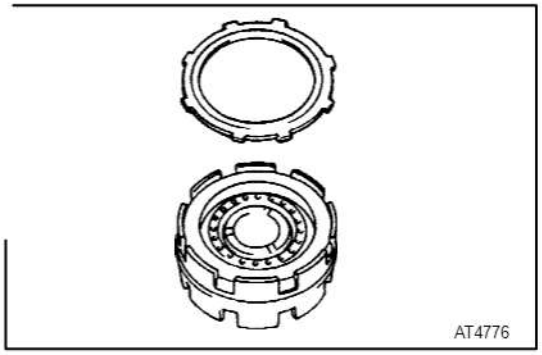
   Piston stroke:

   1.01 - 2.25 mm (0.0398 - 0.0886 in.)

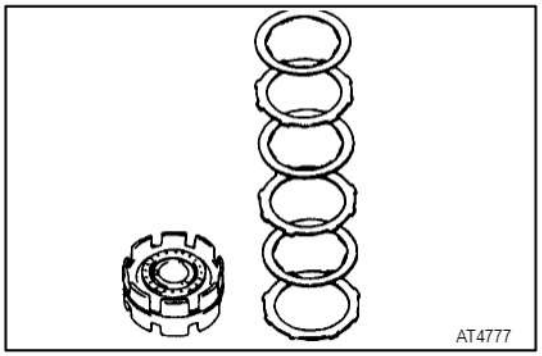
   If the values are nonstandard, inspect the discs.
3. **REMOVE FLANGE**

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

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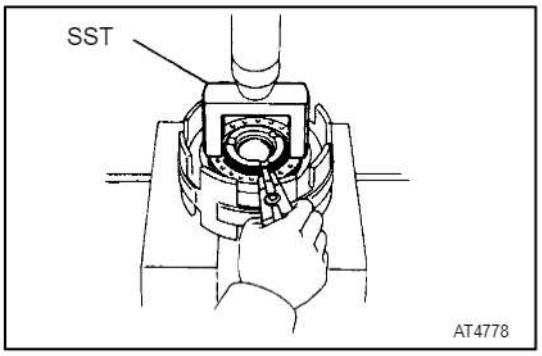


(b) Remove the flange.



4. REMOVE DISCS AND PLATES

Remove the three discs and three plates.

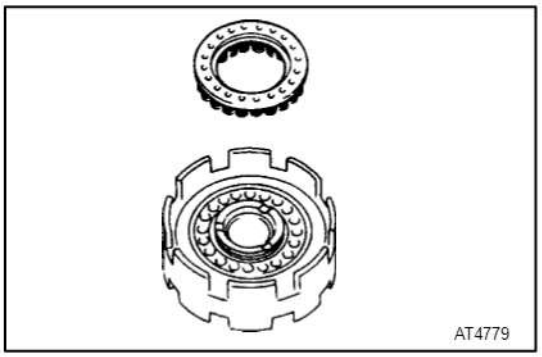


5. REMOVE PISTON RETURN SPRING

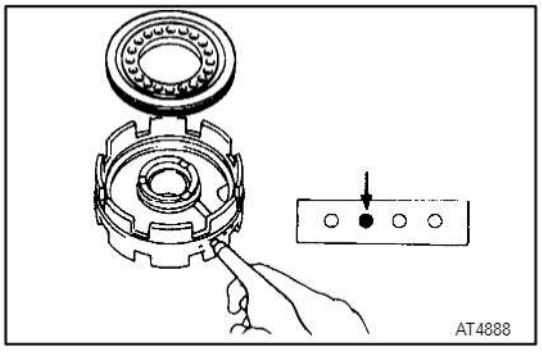
(a) Place SST on the spring seat and compress the return springs with a shop press.

SST 09350-20015 (09369-20040)

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



(c) Remove the piston return spring.

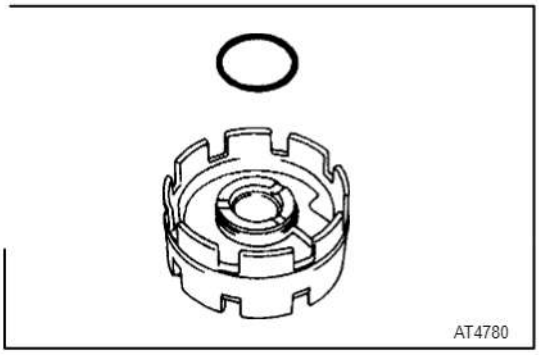


6. REMOVE NO. 2 BRAKE PISTON

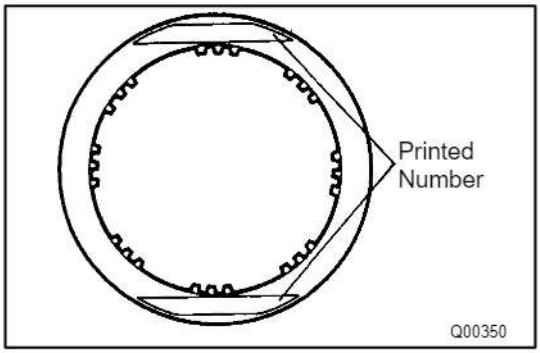
(a) Hold the No. 2 brake piston with hand, apply compressed air to the center support to remove the No. 2 brake piston.

(b) Remove the O-ring from the piston.

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(c) Remove the O-ring from the center support.



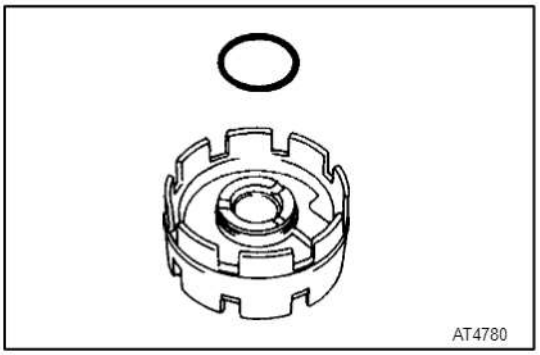
NO. 2 BRAKE INSPECTION

INSPECT DISC, PLATE AND FLANGE

Check to see if the sliding surface of the disc, plate and flange are worn or burnt. If necessary, replace them.
HINT:

- © If the lining of the disc is peeling off or discolored, or even if parts of the printed numbers are defaced, replace all discs.
- © Before assembling new discs, soak them in ATF for at least fifteen minutes.

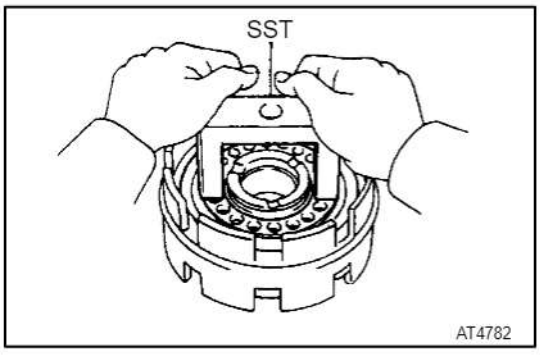
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NO. 2 BRAKE ASSEMBLY

1. INSTALL NO. 2 BRAKE PISTON

(a) Coat a new O-ring with ATF and install it on the center support.

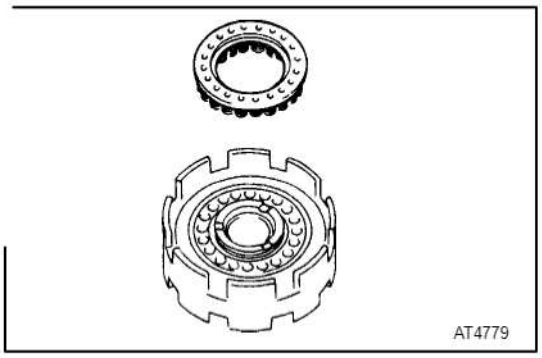


(b) Coat a new O-ring with ATF and install it on the No. 2 brake piston.

(c) Place SST on the No. 2 brake piston.

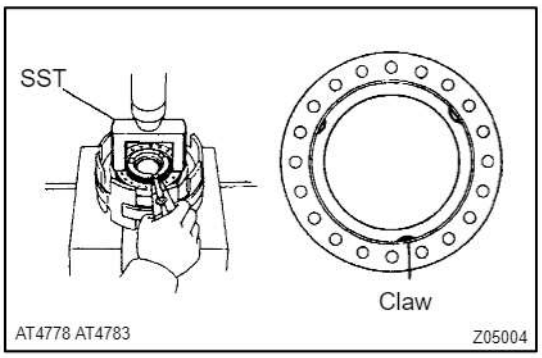
SST 09350-20015 (09369-20040)

(d) Being careful not to damage the O-rings, press in the No. 2 brake piston into the center support with both hands.



2. INSTALL PISTON RETURN SPRING

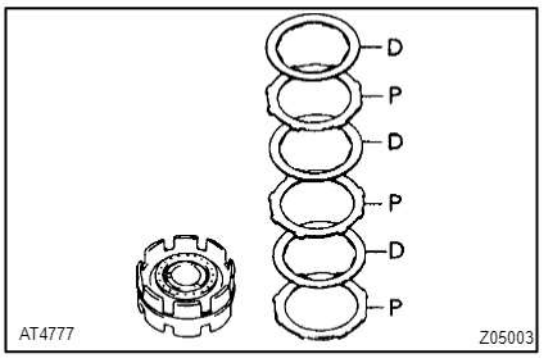
(a) Install the piston return spring.



(b) Place SST on the spring seat, and compress the return springs with a shop press.

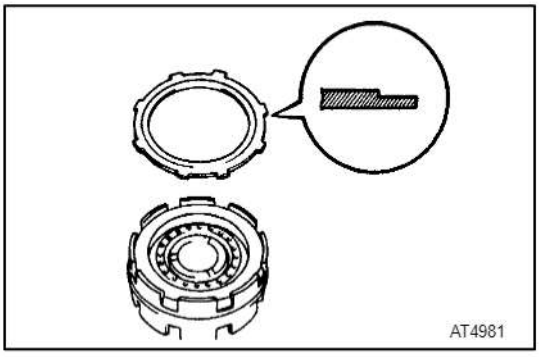
SST 09350-20015 (09369-20040)

(c) Install the snap ring with a snap ring expander. Be sure the end gap of the snap ring is not aligned with the spring seat claw.



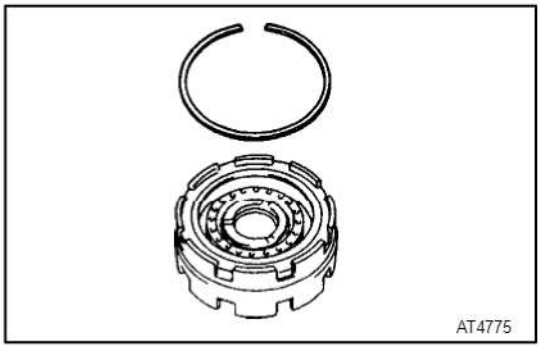
3. INSTALL PLATES AND DISCS

Install the three plates and three discs.
Install in order: P = Plate D = Disc
P-D-P-D-P-D



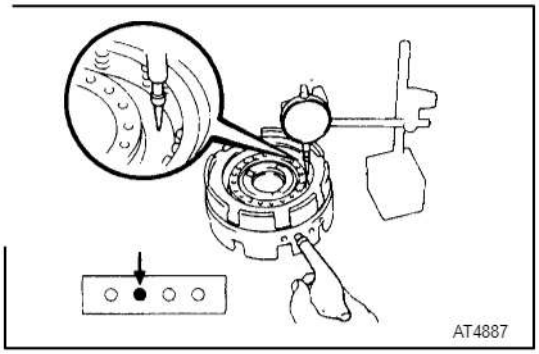
4. INSTALL FLANGE

(a) Install the flange, the flat end facing downward.



(b) Using a screwdriver, install the snap ring. Be sure the end gap of the snap ring is not aligned with the cutout portion of the center support.

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5. CHECK PISTON STROKE OF NO. 2 BRAKE

Using a dial indicator, measure the No. 2 brake piston stroke applying and releasing the compressed air 392-785 kPa (4 - 8 kgf/cm^2, 57 - 114 psi), as shown.

Piston stroke:

1.01 - 2.25 mm (0.0398 - 0.0886 in.)

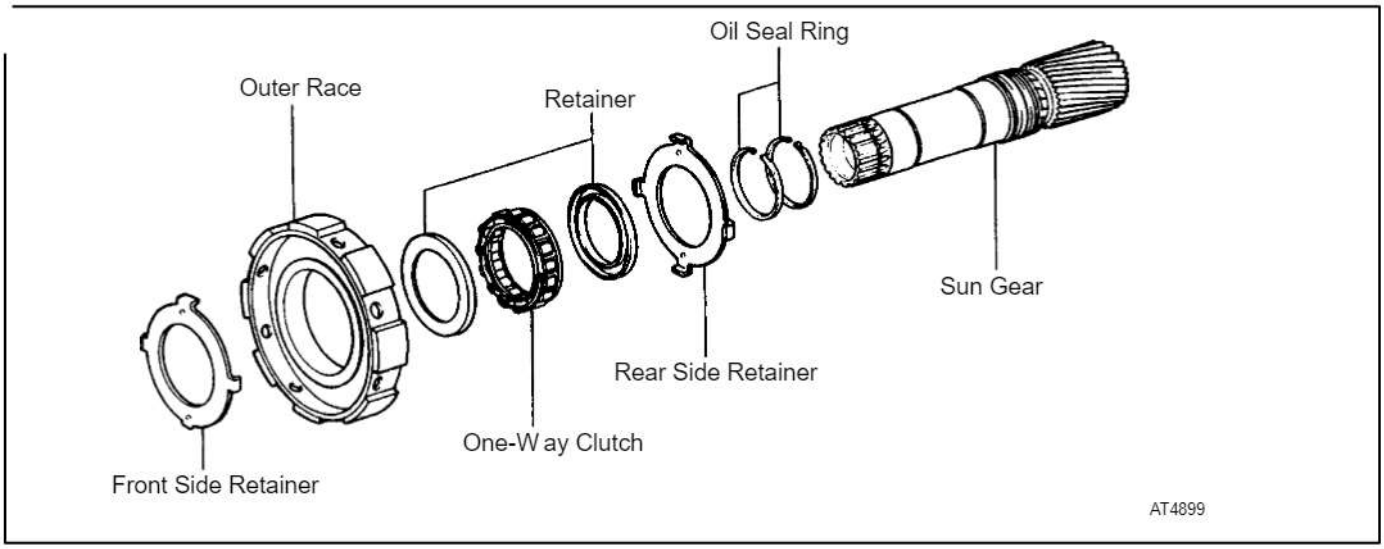
If the piston stroke is less than the limit, parts may have been assembled incorrectly, check and reassemble again.

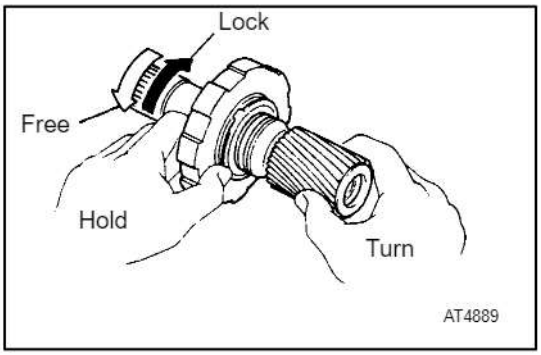
6. INSTALL PLANETARY SUN GEAR AND NO. 1 ONE-WAY CLUTCH

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PLANETARY SUN GEAR

COMPONENTS

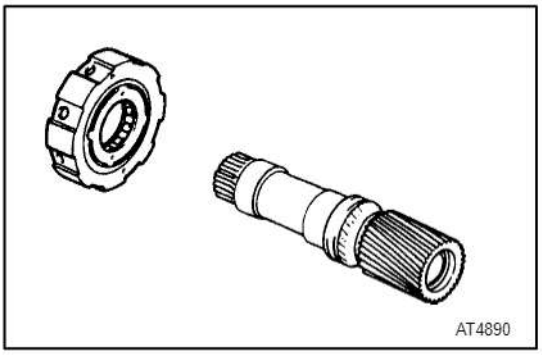




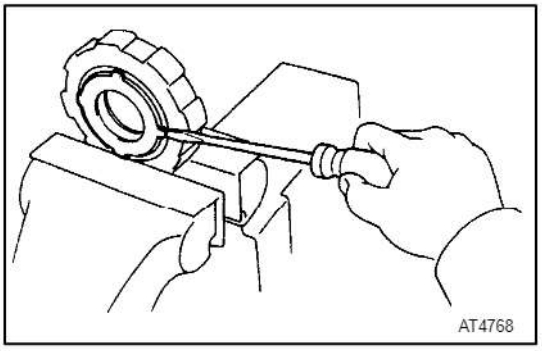
PLANETARY SUN GEAR AND NO. 1 ONE-WAY CLUTCH DIASSEMBLY

1. **REMOVE PLANETARY SUN GEAR AND NO. 1 ONE-WAY CLUTCH**
2. **CHECK OPERATION OF NO. 1 ONE-WAY CLUTCH**

   Hold No. 1 one-way clutch and turn the planetary sun gear. The planetary sun gear turns freely counterclockwise and locks clockwise.

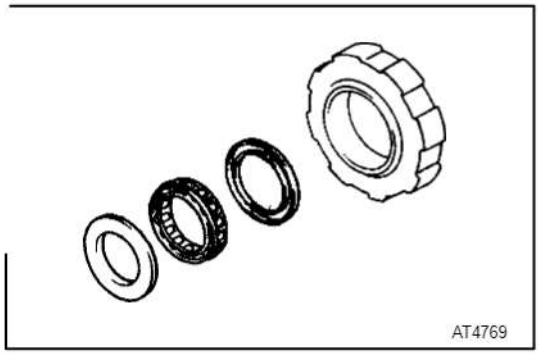


3. **REMOVE NO. 1 ONE-WAY CLUTCH FROM PLANETARY SUN GEAR**

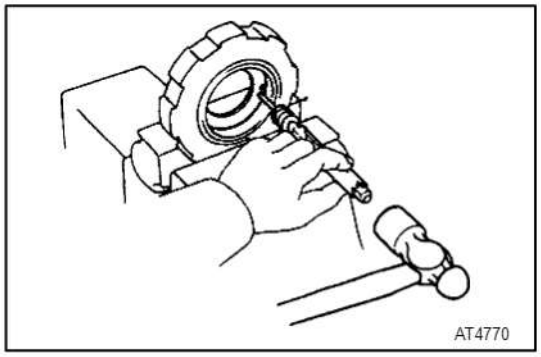


4. **DISASSEMBLE NO. 1 ONE-WAY CLUTCH**
   (a) Using a screwdriver, loosen the staked parts of the rear side retainer.
   (b) Remove the retainer.

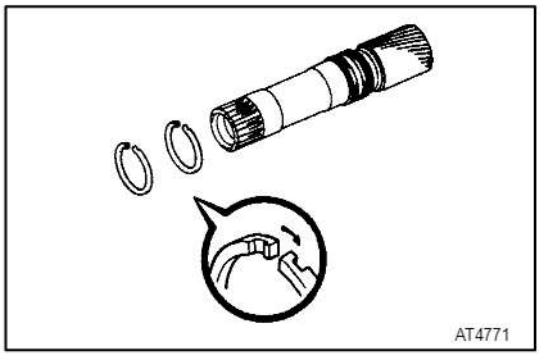
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(c) Remove the one-way clutch and two retainers from the outer race.

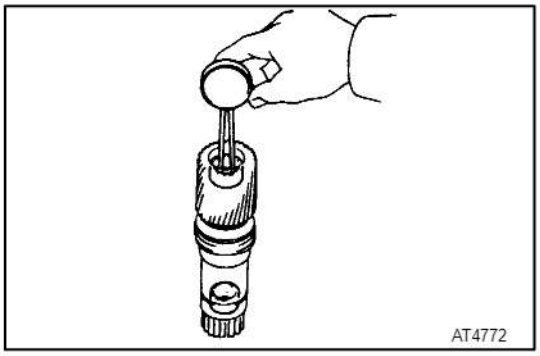


(d) Using a pin punch and hammer, remove the front side retainer.



5. REMOVE OIL SEAL RINGS

Remove the two oil seal rings.



PLANETARY SUN GEAR INSPECTION

CHECK PLANETARY SUN GEAR BUSHINGS

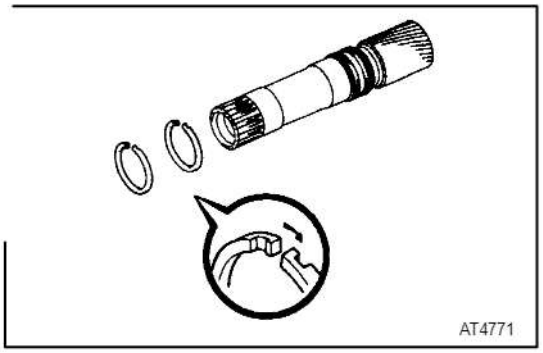
Using a dial indicator, measure the inside diameter of the planetary sun gear bushings.

Maximum inside diameter:

21.58 mm (0.8496 in.)

If the inside diameter is greater than the maximum, replace the planetary sun gear.

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PLANETARY SUN GEAR AND NO. 1 ONE-WAY CLUTCH ASSEMBLY

1. INSTALL OIL SEAL RINGS

(a) Coat the two oil seal rings with ATF.

(b) Contract the oil seal rings, and install them into the planetary sung gear.

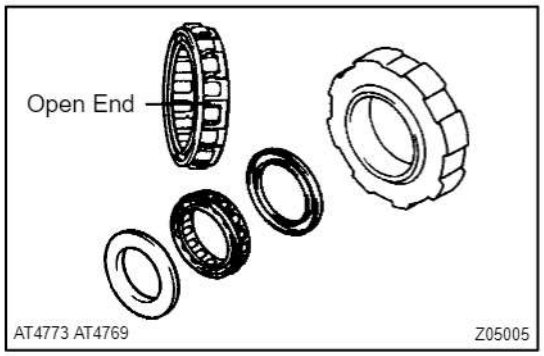
NOTICE: Do not spread the ring ends too much.

HINT: After installing the oil seal rings, check that they rotate smoothly.

2. ASSEMBLE NO. 1 ONE-WAY CLUTCH

(a) Install the one-way clutch into the outer race, the open end of the retainers facing rearward.

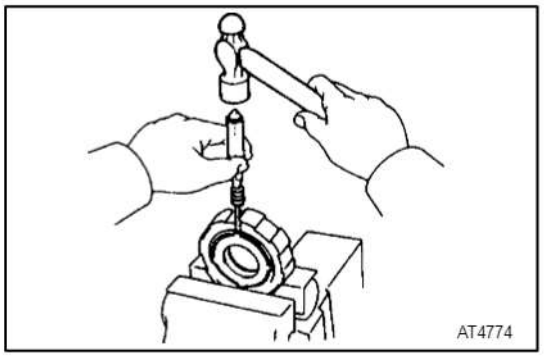
(b) Install the two retainers into both sides.



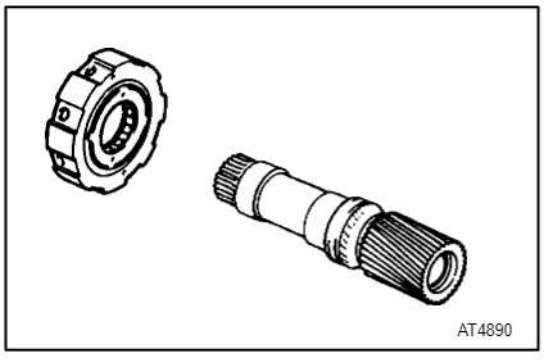
AT4773 AT4769 Z05005

(c) Install two new retainers to the outer race.

(d) Using a pin punch and hammer, stake the claws.


AT4774

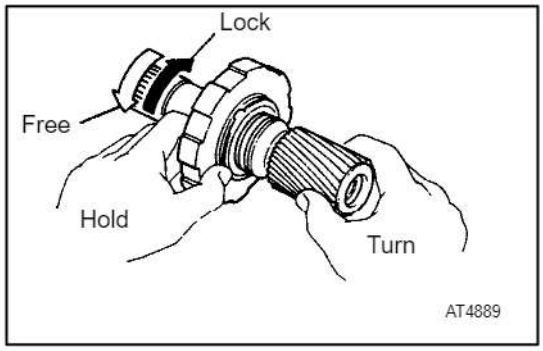
3. INSTALL NO. 1 ONE-WAY CLUTCH TO PLANETARY SUN GEAR


AT4890

4. CHECK OPERATION OF NO. 1 ONE-WAY CLUTCH

Hold No. 1 one-way clutch and turn the planetary sun gear. The planetary sun gear turns freely counter-clockwise and locks clockwise.

5. INSTALL PLANETARY SUN GEAR AND NO. 1 ONE-W AY CLUTCH

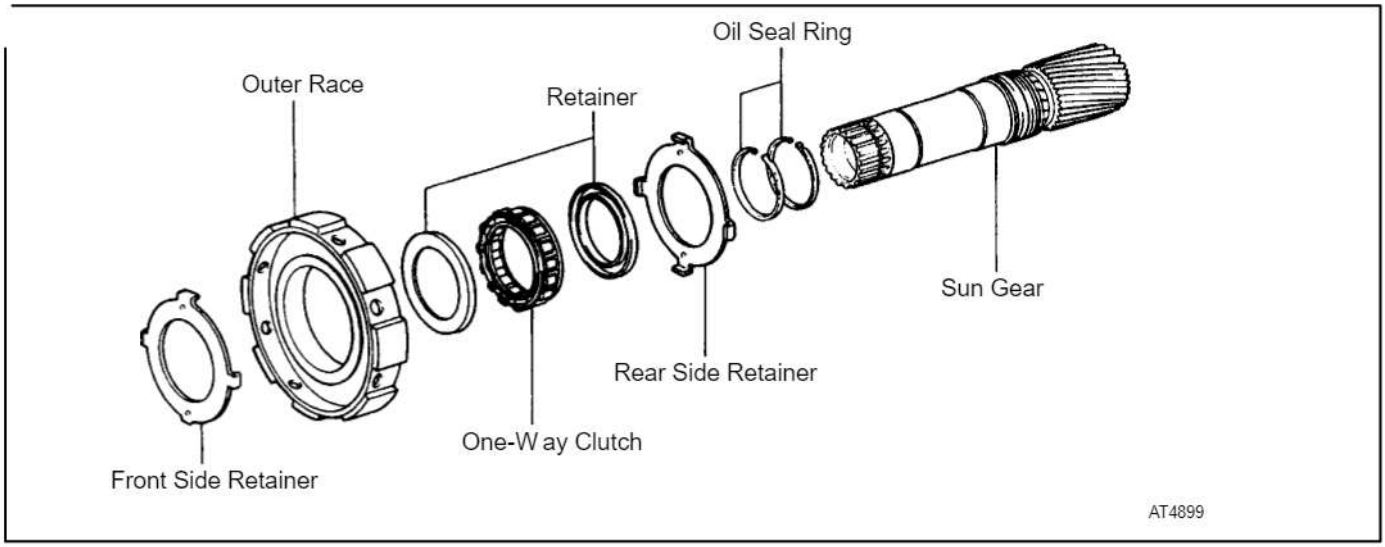


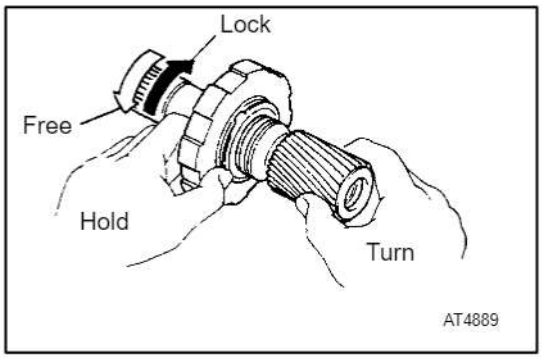
AT4889

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PLANETARY SUN GEAR

COMPONENTS

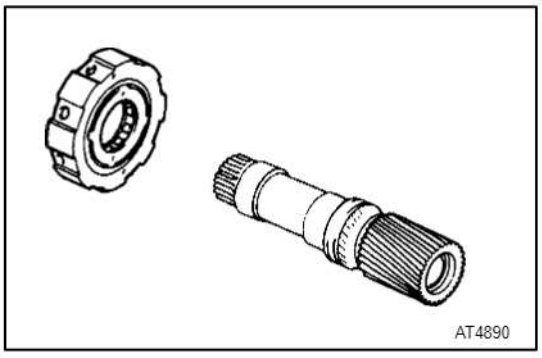




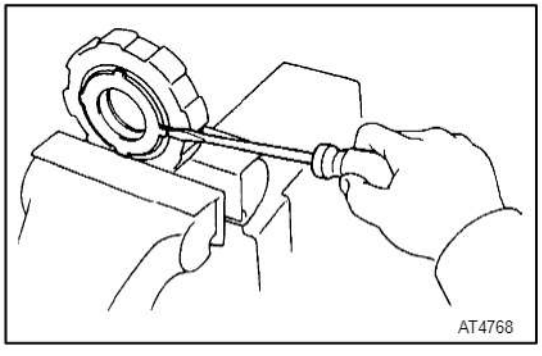
PLANETARY SUN GEAR AND NO. 1 ONE-WAY CLUTCH DISASSEMBLY

1. **REMOVE PLANETARY SUN GEAR AND NO. 1 ONE-WAY CLUTCH**
2. **CHECK OPERATION OF NO. 1 ONE-WAY CLUTCH**

   Hold No. 1 one-way clutch and turn the planetary sun gear. The planetary sun gear turns freely counterclockwise and locks clockwise.

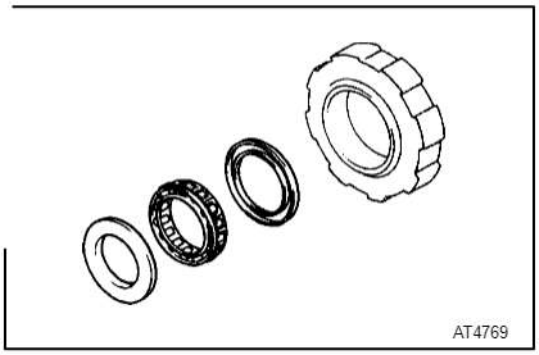


3. **REMOVE NO. 1 ONE-WAY CLUTCH FROM PLANETARY SUN GEAR**

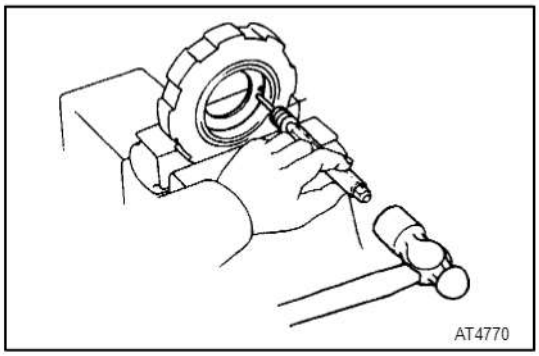


4. **DISASSEMBLE NO. 1 ONE-WAY CLUTCH**
   (a) Using a screwdriver, loosen the staked parts of the rear side retainer.
   (b) Remove the retainer.

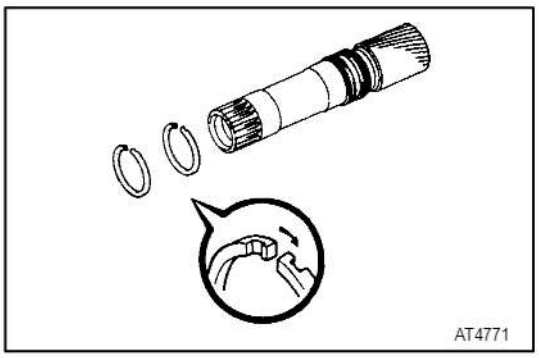
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(c) Remove the one-way clutch and two retainers from the outer race.

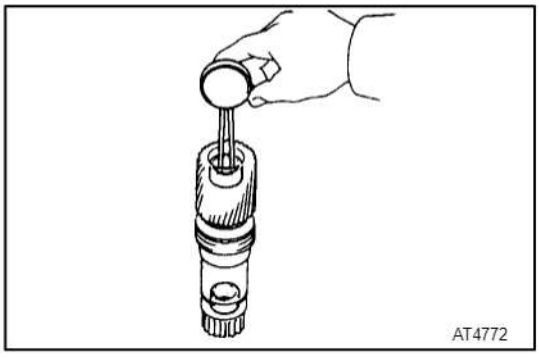


(d) Using a pin punch and hammer, remove the front side retainer.



5. REMOVE OIL SEAL RINGS

Remove the two oil seal rings.



PLANETARY SUN GEAR INSPECTION

CHECK PLANETARY SUN GEAR BUSHINGS

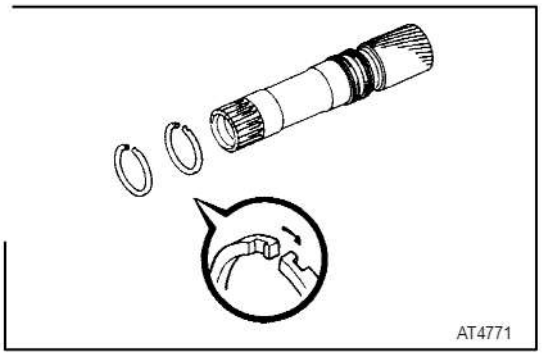
Using a dial indicator, measure the inside diameter of the planetary sun gear bushings.

Maximum inside diameter:

21.58 mm (0.8496 in.)

If the inside diameter is greater than the maximum, replace the planetary sun gear.

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PLANETARY SUN GEAR AND NO. 1 ONE-WAY CLUTCH ASSEMBLY

1. INSTALL OIL SEAL RINGS

(a) Coat the two oil seal rings with ATF.

(b) Contract the oil seal rings, and install them into the planetary sung gear.

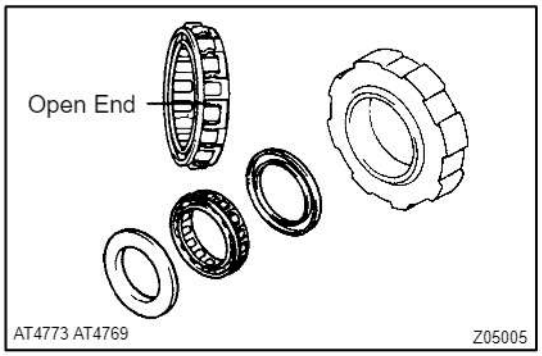
NOTICE: Do not spread the ring ends too much.

HINT: After installing the oil seal rings, check that they rotate smoothly.

2. ASSEMBLE NO. 1 ONE-WAY CLUTCH

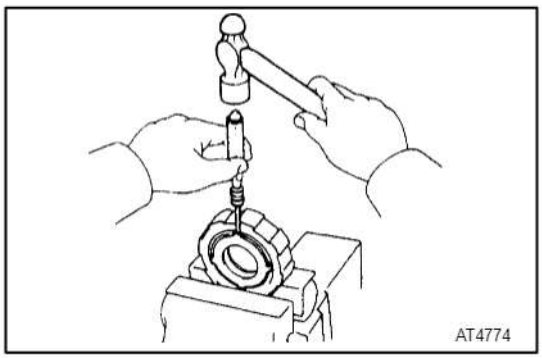
(a) Install the one-way clutch into the outer race, the open end of the retainers facing rearward.

(b) Install the two retainers into both sides.

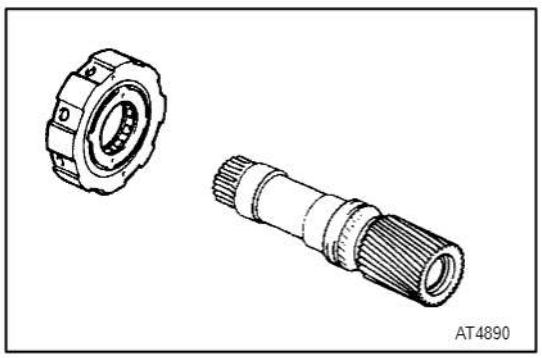


(c) Install two new retainers to the outer race.

(d) Using a pin punch and hammer, stake the claws.



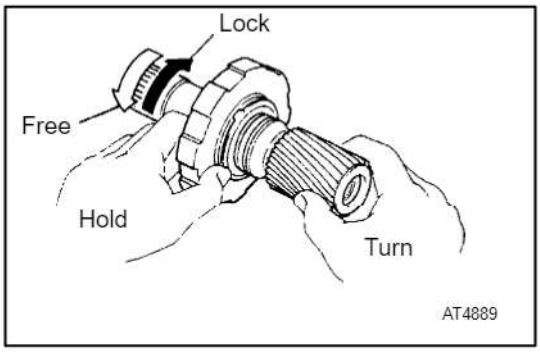
3. INSTALL NO. 1 ONE-WAY CLUTCH TO PLANETARY SUN GEAR



4. CHECK OPERATION OF NO. 1 ONE-WAY CLUTCH

Hold No. 1 one-way clutch and turn the planetary sun gear. The planetary sun gear turns freely counterclockwise and locks clockwise.

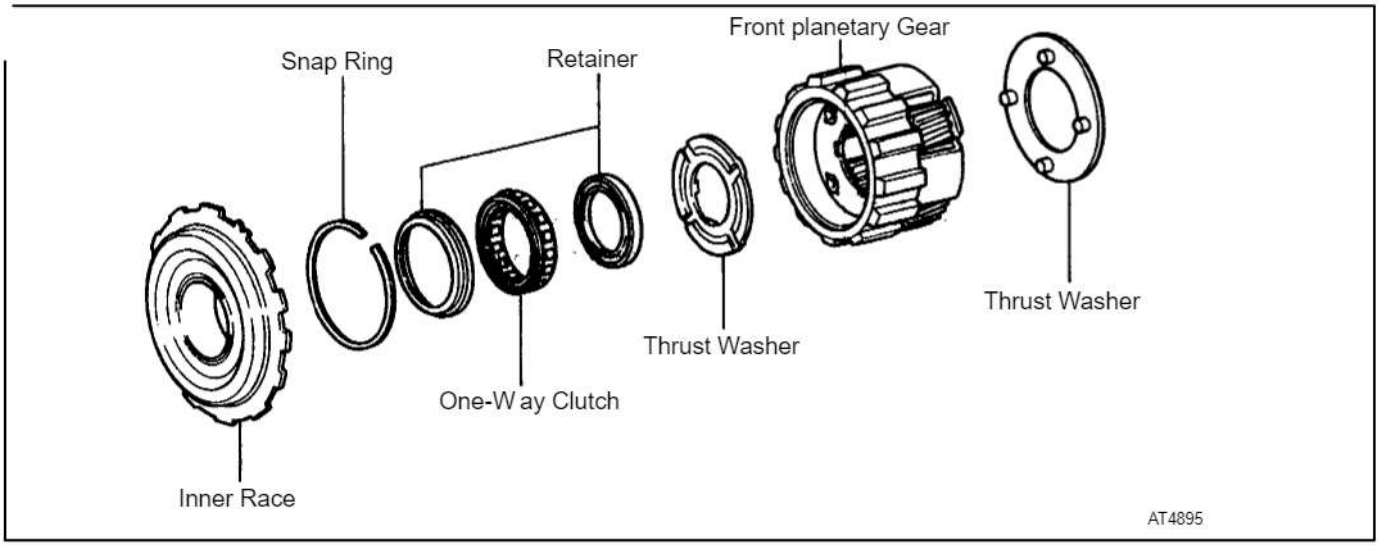
5. INSTALL PLANETARY SUN GEAR AND NO. 1 ONE-WAY CLUTCH

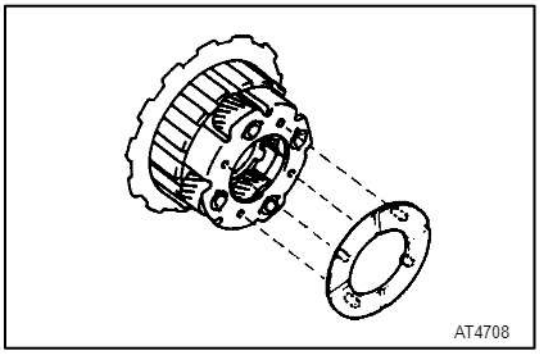


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FRONT PLANETARY GEAR

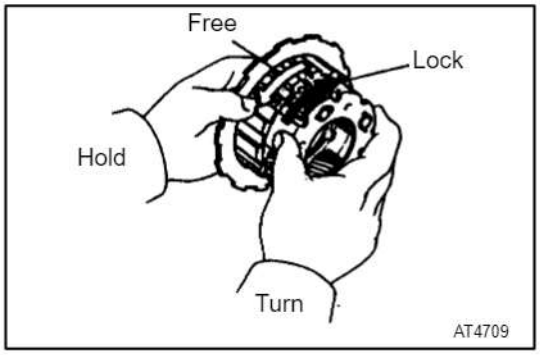
COMPONENTS



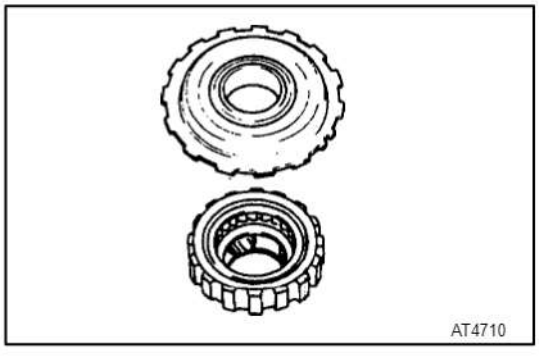


FRONT PLANETARY GEAR AND NO. 2 ONE-WAY CLUTCH DISASSEMBLY

1. **REMOVE THRUST WASHER FROM FRONT PLANETARY CARRIER**

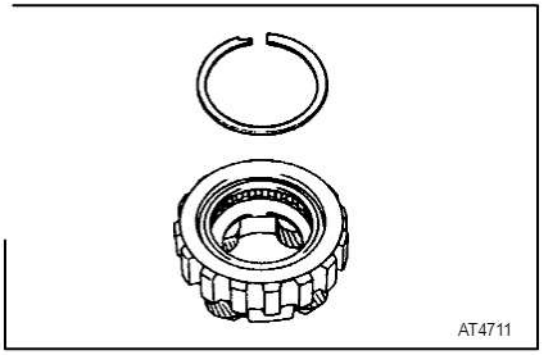


2. **CHECK OPERATION OF NO. 2 ONE-WAY CLUTCH**
   Hold the one-way clutch inner race and turn the planetary gear. The planetary gear turns freely counterclockwise and locks clockwise.



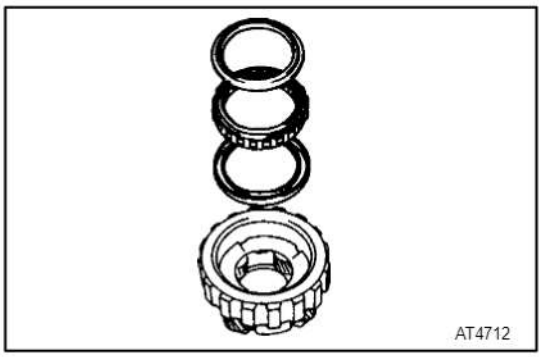
3. **REMOVE ONE-WAY CLUTCH INNER RACE**

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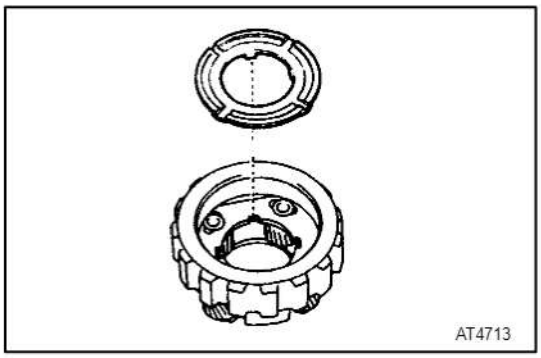


4. REMOVE NO. 2 ONE-WAY CLUTCH

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

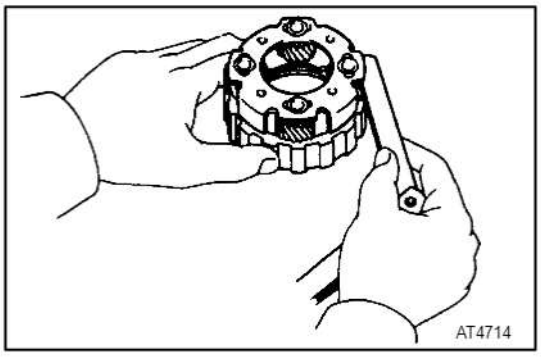


(b) Remove the one-way clutch and two retainers from the planetary gear.



5. REMOVE THRUST WASHER

FRONT PLANETARY GEAR INSPECTION



MEASURE PLANETARY PINION GEAR THRUST CLEARANCE

Using a feeler gauge, measure the planetary pinion gear thrust clearance.

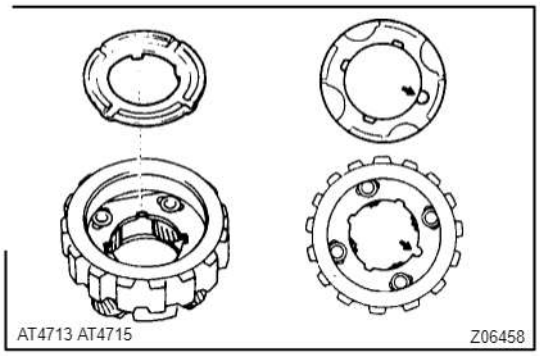
Standard clearance:

0.20 - 0.50 mm (0.0079 - 0.0197 in.)

If the clearance is nonstandard, inspect the planetary gear thrust washer.

If necessary, replace the planetary gear assembly.

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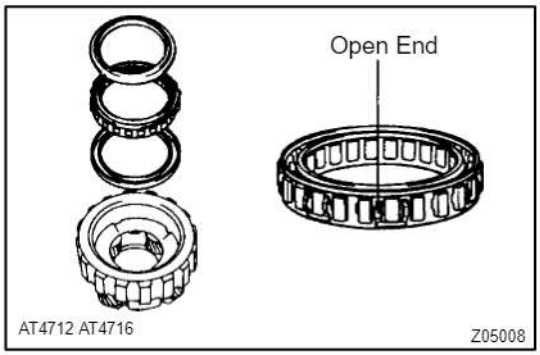
FRONT PLANETARY GEAR AND NO. 2 ONE-WAY CLUTCH ASSEMBLY

1. INSTALL THRUST WASHER

(a) Coat the thrust washer with petroleum jelly.

(b) Install the thrust washer into the front planetary gear.

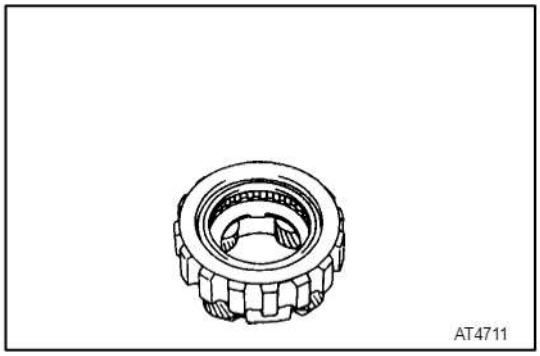
HINT: Make sure that the lug shapes match the cutout portions on the front planetary gear.



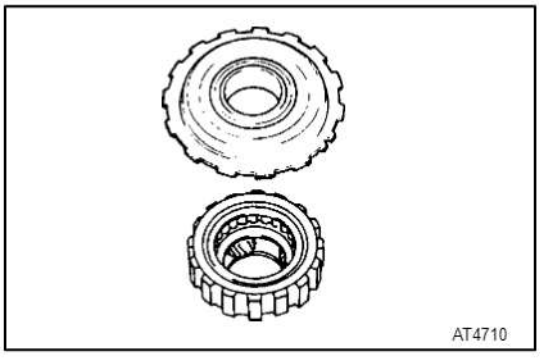
2. INSTALL NO. 2 ONE-WAY CLUTCH

(a) Install the one-way clutch and two retainers into the front planetary gear, as shown.

HINT: Make sure that the open end of the retainers on the one-way clutch are faced upward.

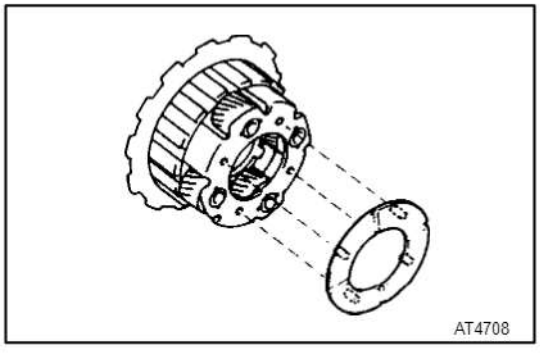


(b) Using a screwdriver, install the snap ring.



3. INSTALL ONE-WAY CLUTCH INNER RACE

Install the inner race while turning it counterclockwise.



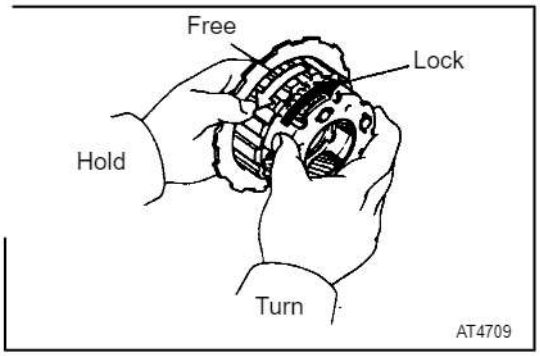
4. INSTALL THRUST WASHER

(a) Coat the thrust washer with petroleum jelly.

(b) Install the thrust washer onto the front planetary gear.

HINT: Make sure that the lug shapes match the holes on the front planetary gear.

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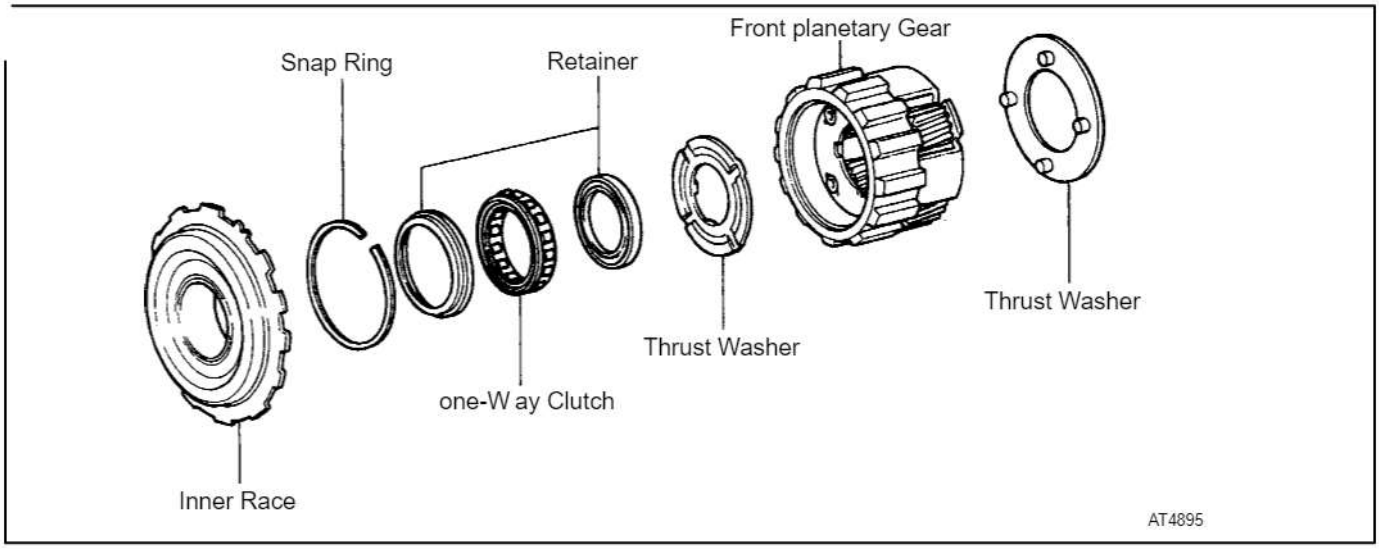
5. CHECK OPERATION OF NO. 2 ONE-WAY CLUTCH

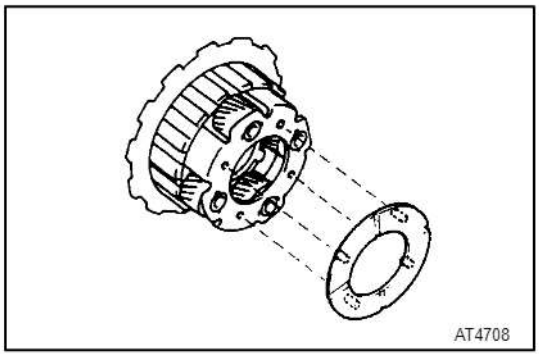
Hold the one-way clutch inner race and turn the planetary gear. The planetary gear turns freely counterclockwise and locks clockwise.

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FRONT PLANETARY GEAR

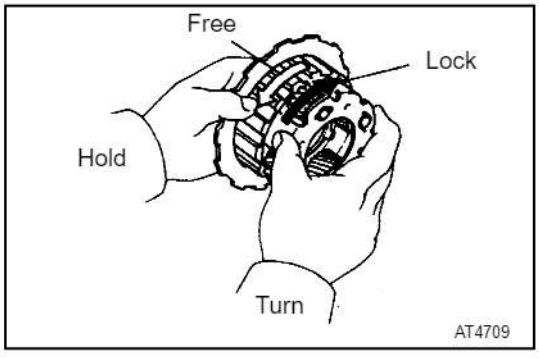
COMPONENTS



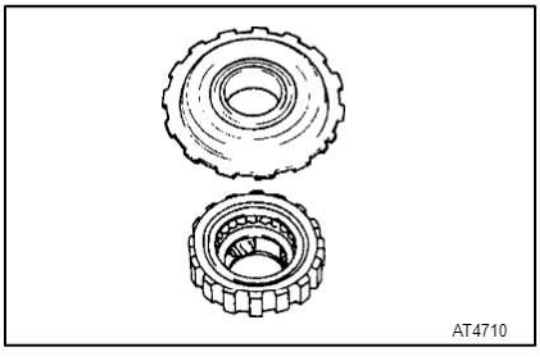


FRONT PLANETARY GEAR AND NO. 2 ONE-WAY CLUTCH DISASSEMBLY

1. **REMOVE THRUST WASHER FROM FRONT PLANETARY CARRIER**

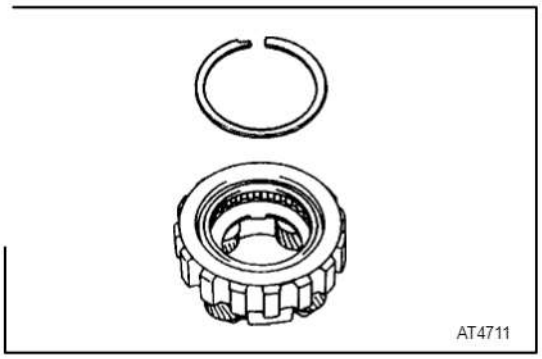


2. **CHECK OPERATION OF NO. 2 ONE-WAY CLUTCH**
   Hold the one-way clutch inner race and turn the planetary gear. The planetary gear turns freely counterclockwise and locks clockwise.



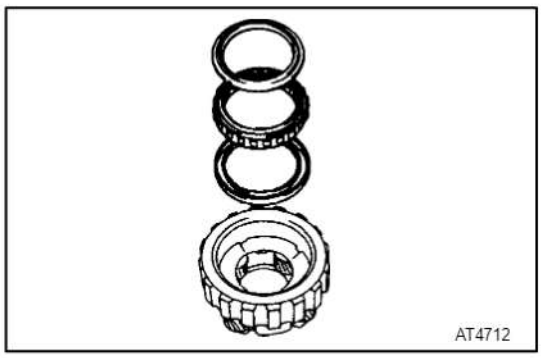
3. **REMOVE ONE-WAY CLUTCH INNER RACE**

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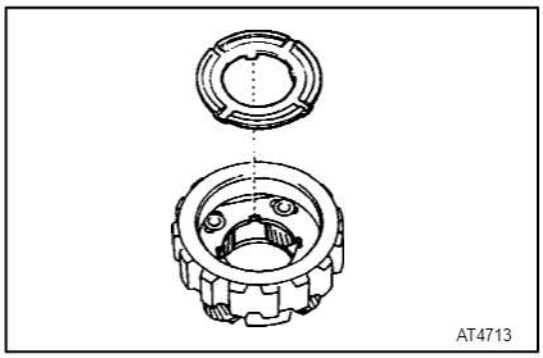


4. REMOVE NO. 2 ONE-WAY CLUTCH

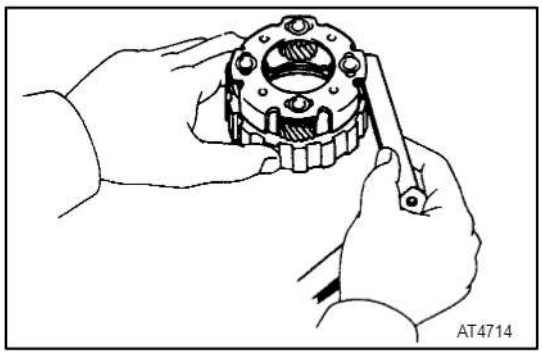
(a) Using a screwdriver, remove the snap ring.



(b) Remove the one-way clutch and two retainers from the planetary gear.



5. REMOVE THRUST WASHER



FRONT PLANETARY GEAR INSPECTION

MEASURE PLANETARY PINION GEAR THRUST CLEARANCE

Using a feeler gauge, measure the planetary pinion gear thrust clearance.

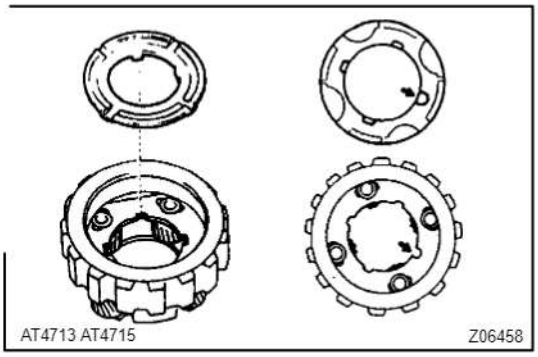
Standard clearance:

0.20 - 0.50 mm (0.0079 - 0.0197 in.)

If the clearance is nonstandard, inspect the planetary gear thrust washer.

If necessary, replace the planetary gear assembly.

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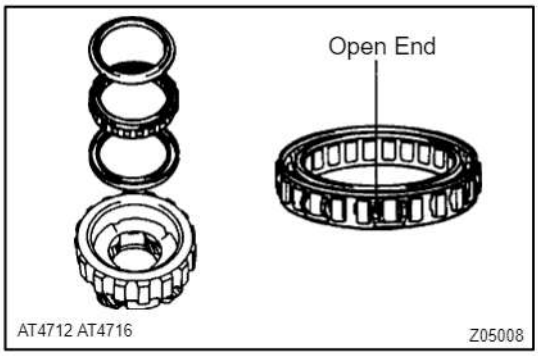
FRONT PLANETARY GEAR AND NO. 2 ONE - WAY CLUTCH ASSEMBLY

1. INSTALL THRUST WASHER

(a) Coat the thrust washer with petroleum jelly.

(b) Install the thrust washer into the front planetary gear.

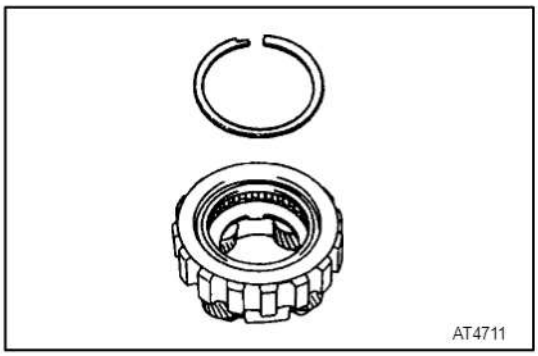
HINT: Make sure that the lug shapes match the cutout portions on the front planetary gear.



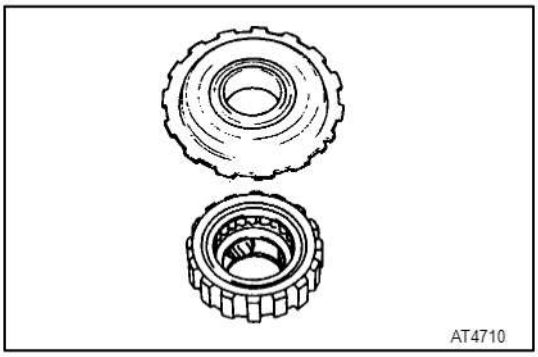
2. INSTALL NO. 2 ONE-WAY CLUTCH

(a) Install the one-way clutch and two retainers into the front planetary gear, as shown.

HINT: Make sure that the open end of the retainers on the one-way clutch are faced upward.

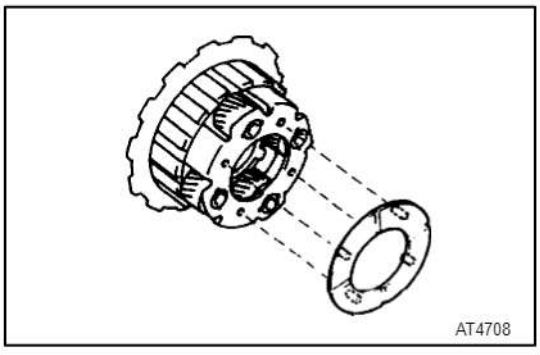


(b) Using a screwdriver, install the snap ring.



3. INSTALL ONE-WAY CLUTCH INNER RACE

Install the inner race while turning it counterclockwise.



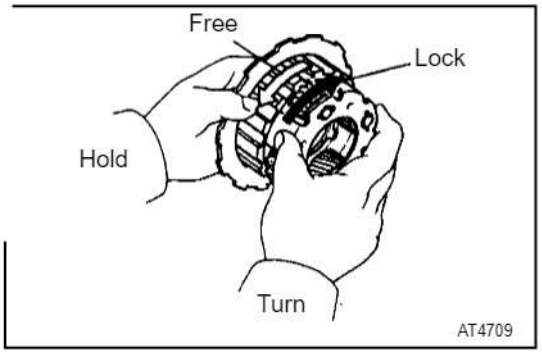
4. INSTALL THRUST WASHER

(a) Coat the thrust washer with petroleum jelly.

(b) Install the thrust washer onto the front planetary gear.

HINT: Make sure that the lug shapes match the holes on the front planetary gear.

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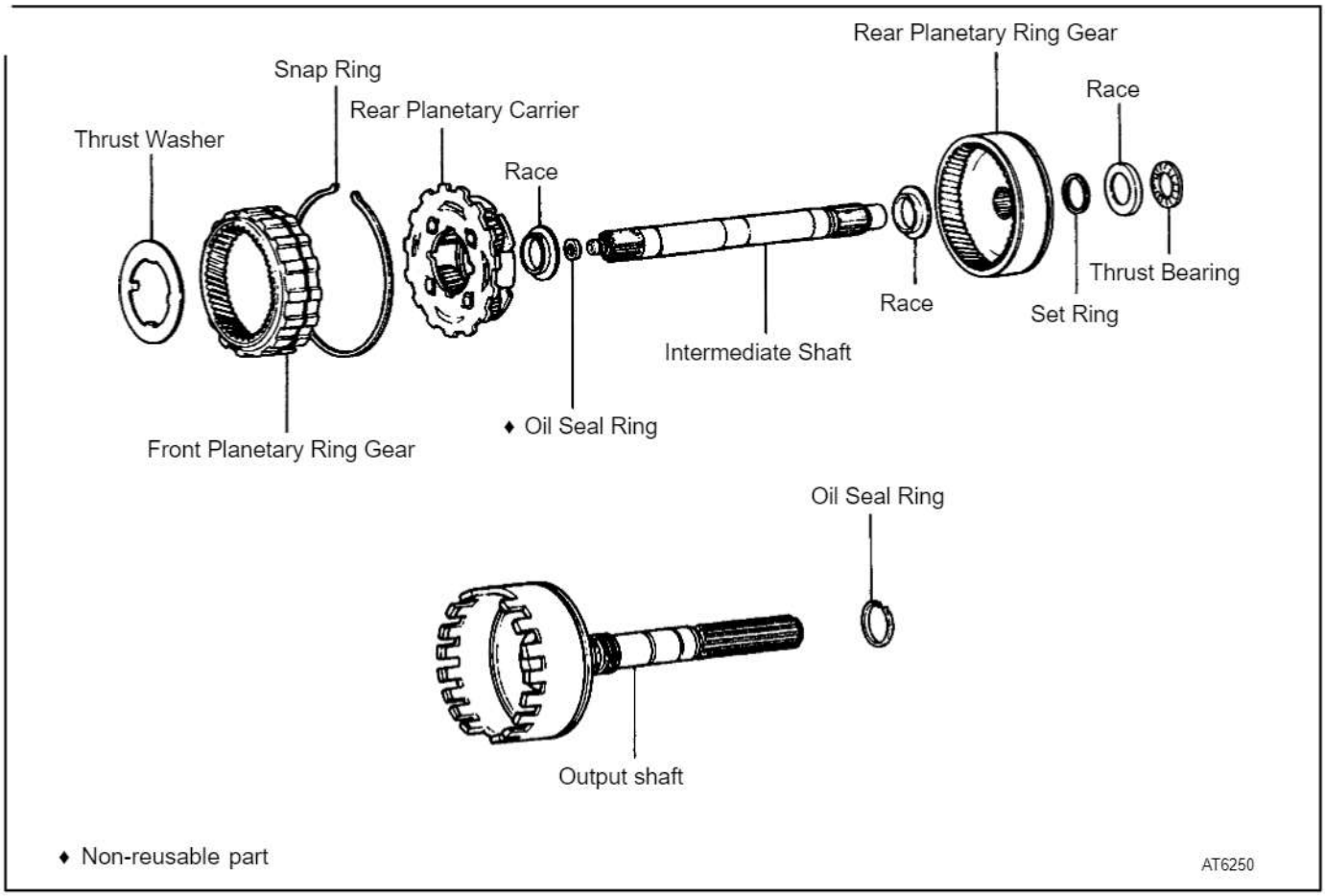
5. CHECK OPERATION OF NO. 2 ONE-WAY CLUTCH

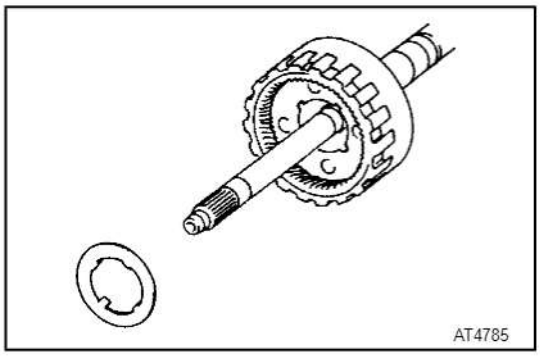
Hold the one-way clutch inner race and turn the planetary gear. The planetary gear turns freely counterclockwise and locks clockwise.

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REAR PLANETARY GEAR

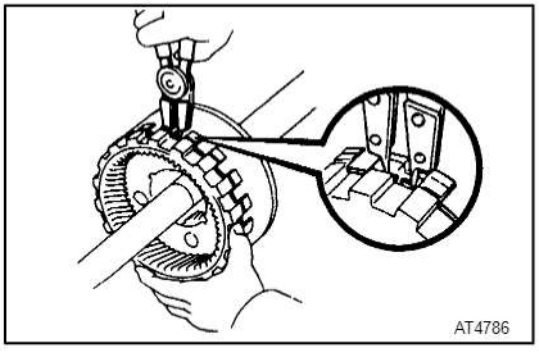
COMPONENTS





REAR PLANETARY GEAR AND OUTPUT SHAFT DISASSEMBLY

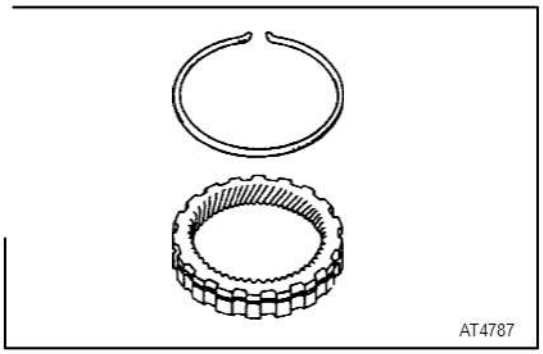
1. REMOVE THRUST WASHER FROM FRONT PLANETARY RING GEAR



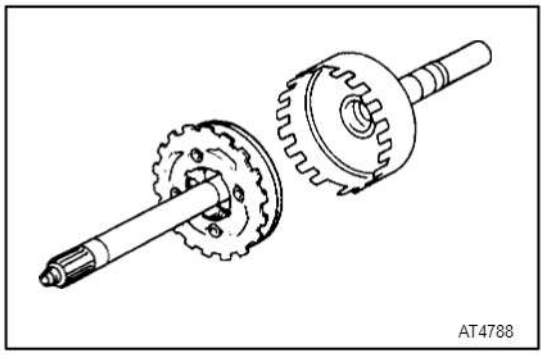
2. REMOVE FRONT PLANETARY RING GEAR

(a) Using a snap ring expander, pull out the ring gear while compressing the snap ring.

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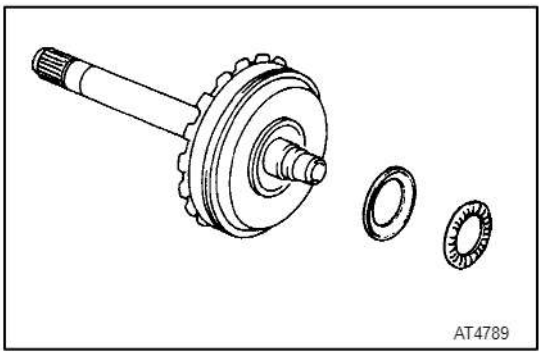

AT4787

(b) Using a screwdriver, remove the snap ring from the ring gear.

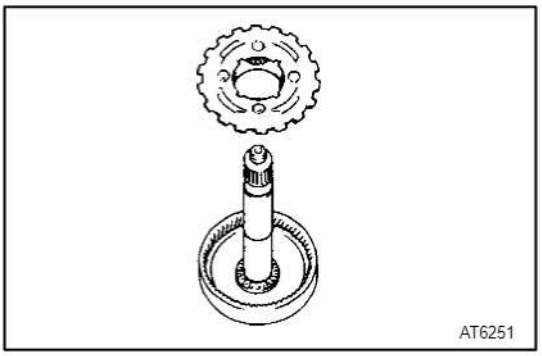

AT4788

3. REMOVE REAR PLANETARY GEAR ASSEMBLY FROM OUTPUT SHAFT

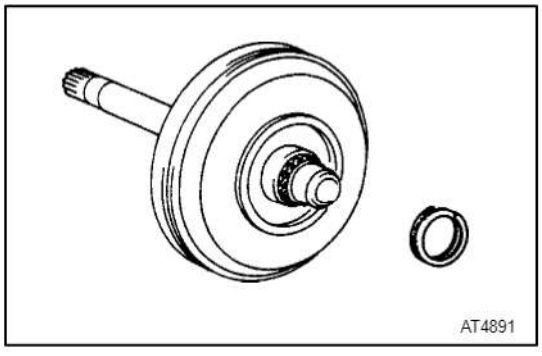
(a) Pull out the rear planetary gear assembly.


AT4789

(b) Remove the bearing and race.


AT6251

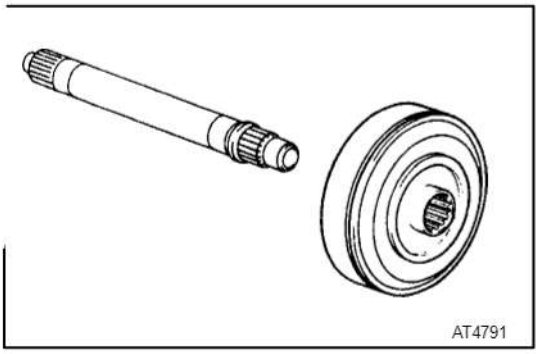
4. REMOVE REAR PLANETARY CARRIER AND ASSEMBLED BEARING AND RACE FROM PLANETARY RING GEAR


AT4891

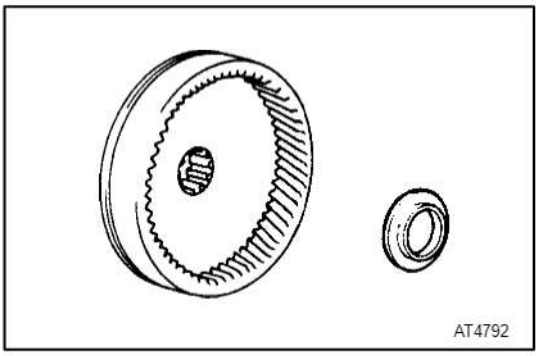
5. REMOVE PLANETARY RING GEAR

(a) Using a screwdriver, remove the set ring.

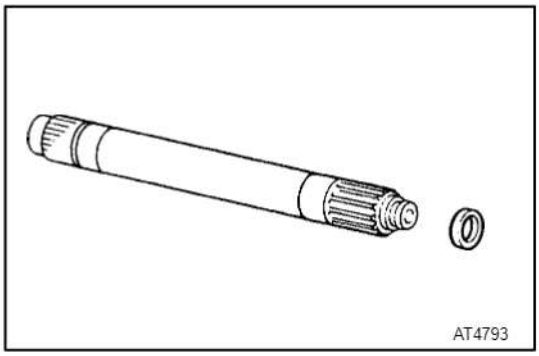
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(b) Remove the planetary ring gear.

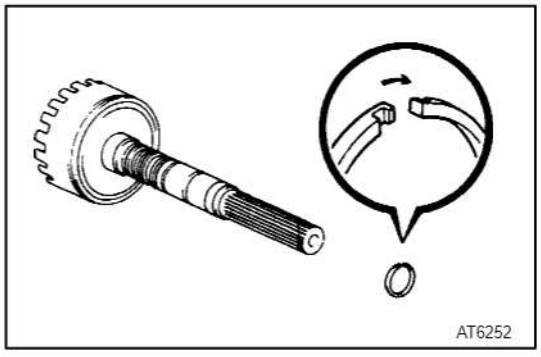


(c) Remove the race from the ring gear.



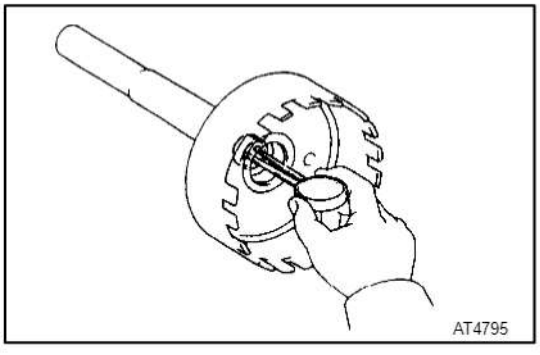
6. REMOVE OIL SEAL RING FROM INTERMEDIATE SHAFT

Using a screwdriver, remove the oil seal ring.



7. REMOVE OIL SEAL RINGS FROM OUTPUT SHAFT

Remove the three oil seal rings.



REAR PLANETARY GEAR AND OUTPUT SHAFT INSPECTION

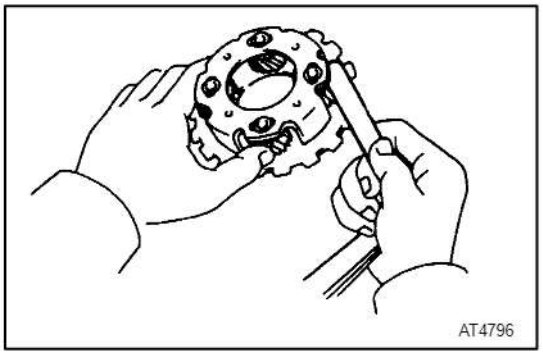
1. CHECK OUTPUT SHAFT BUSHING

Using a dial indicator, measure the inside diameter of the output shaft bushing.

Maximum inside diameter:
18.08 mm (0.7118 in.)

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If the inside diameter is greater than the maximum, replace the output shaft.



2. MEASURE PLANETARY PINION GEAR THRUST CLEARANCE

Using a feeler gauge, measure the planetary pinion gear thrust clearance.

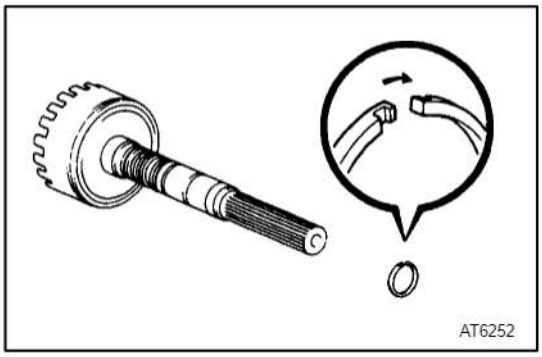
Standard clearance:

0.20 - 0.50 mm (0.0079 - 0.0197 in.)

If the clearance is nonstandard, inspect the planetary gear thrust washer.

If necessary, replace the planetary gear assembly.

REAR PLANETARY GEAR AND OUTPUT SHAFT ASSEMBLY



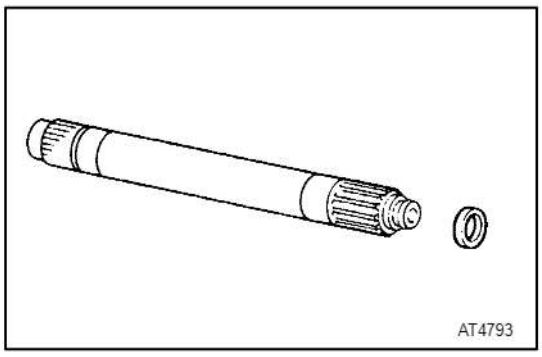
1. INSTALL OIL SEAL RINGS

(a) Coat the three oil seal rings with ATF.

(b) Contract the oil seal rings, and install them onto the output shaft.

NOTICE: Do not spread the ring ends too much.

HINT: After installing the oil seal rings, check that they rotate smoothly.

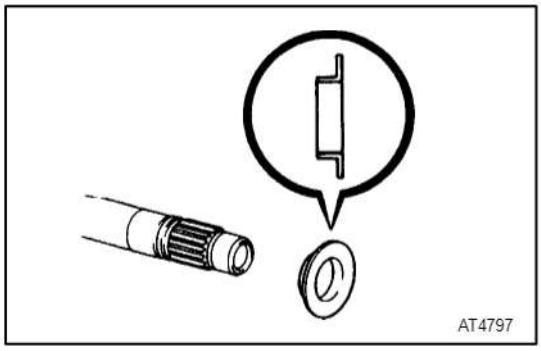


2. INSTALL NEW OIL SEAL RING

Coat a new oil seal ring with ATF and install it to the intermediate shaft.

NOTICE: Do not spread the ring too much.

HINT: After installing the oil seal ring, check that it rotates smoothly.



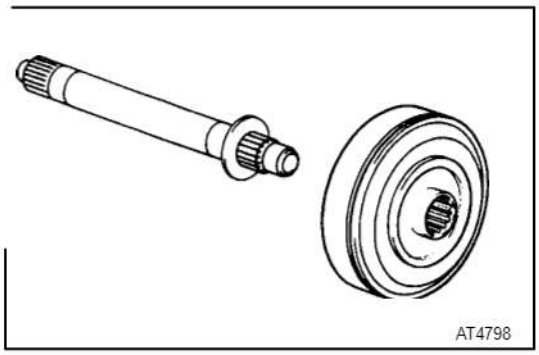
3. INSTALL PLANETARY RING GEAR

(a) Coat the race with petroleum jelly and install it onto the intermediate shaft.

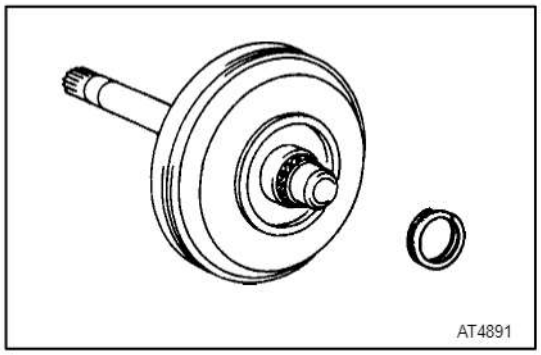
Race diameter:

	Inside mm (in.)	Outside mm (in.)
Race	21.6 (0.850)	41.4 (1.630)

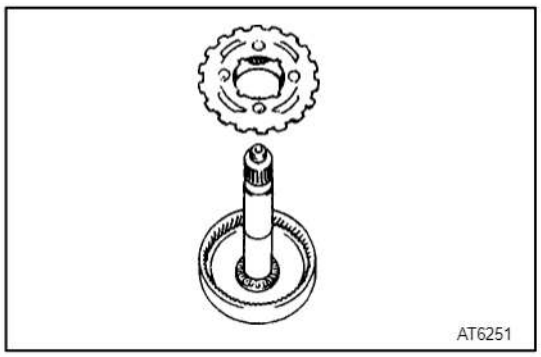
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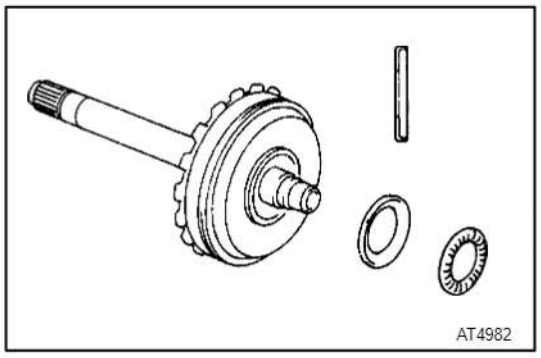
(b) Install the ring gear to the intermediate shaft.



(c) Install the set ring.



4. INSTALL ASSEMBLED BEARING AND RACE AND REAR PLANETARY CARRIER TO PLANETARY RING GEAR

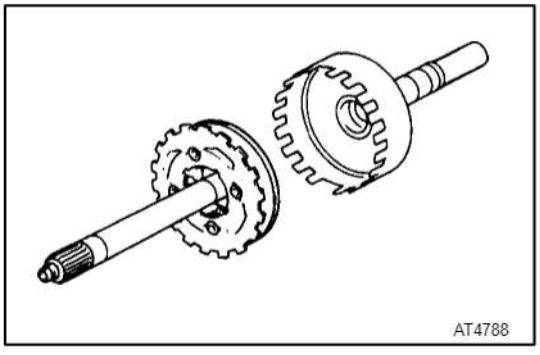


5. INSTALL REAR PLANETARY GEAR ASSEMBLY TO OUTPUT SHAFT

(a) Coat the bearing and race with petroleum jelly and install them onto the ring gear.

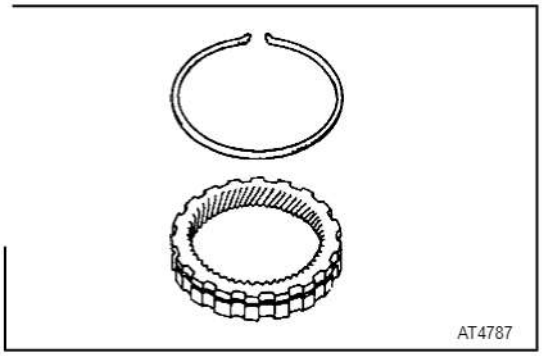
Bearing and race diameter:

	Inside mm (in.)	Outside mm (in.)
Race	30.1 (1.185)	48.5 (1.909)
Bearing	28.4 (1.118)	46.4 (1.827)



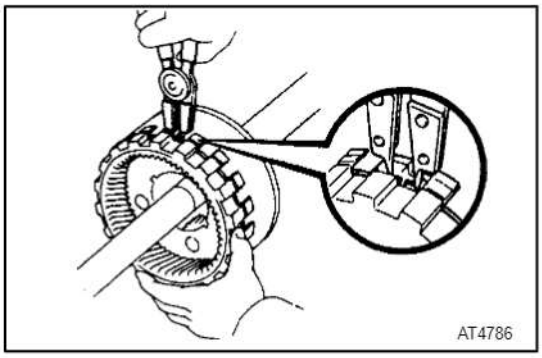
(b) Install the rear planetary gear assembly to the output shaft.

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AT4787

6. INSTALL FRONT PLANETARY RING GEAR

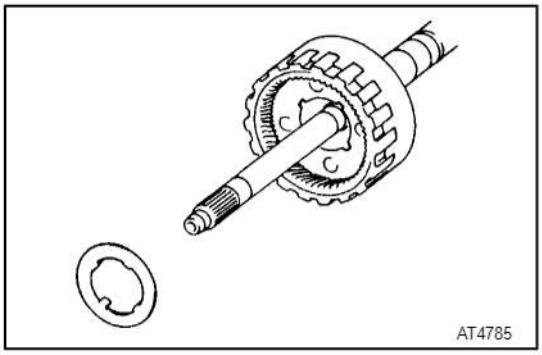
(a) Install the snap ring.


AT4786

(b) Align the snap ring end with the wide cutout portion of the output shaft.

(c) Using a snap ring expander, install the ring gear while compressing the snap ring.

(d) Check that the snap ring is installed into the groove of the output shaft.


AT4785

7. INSTALL THRUST WASHER

(a) Coat the thrust washer with petroleum jelly.

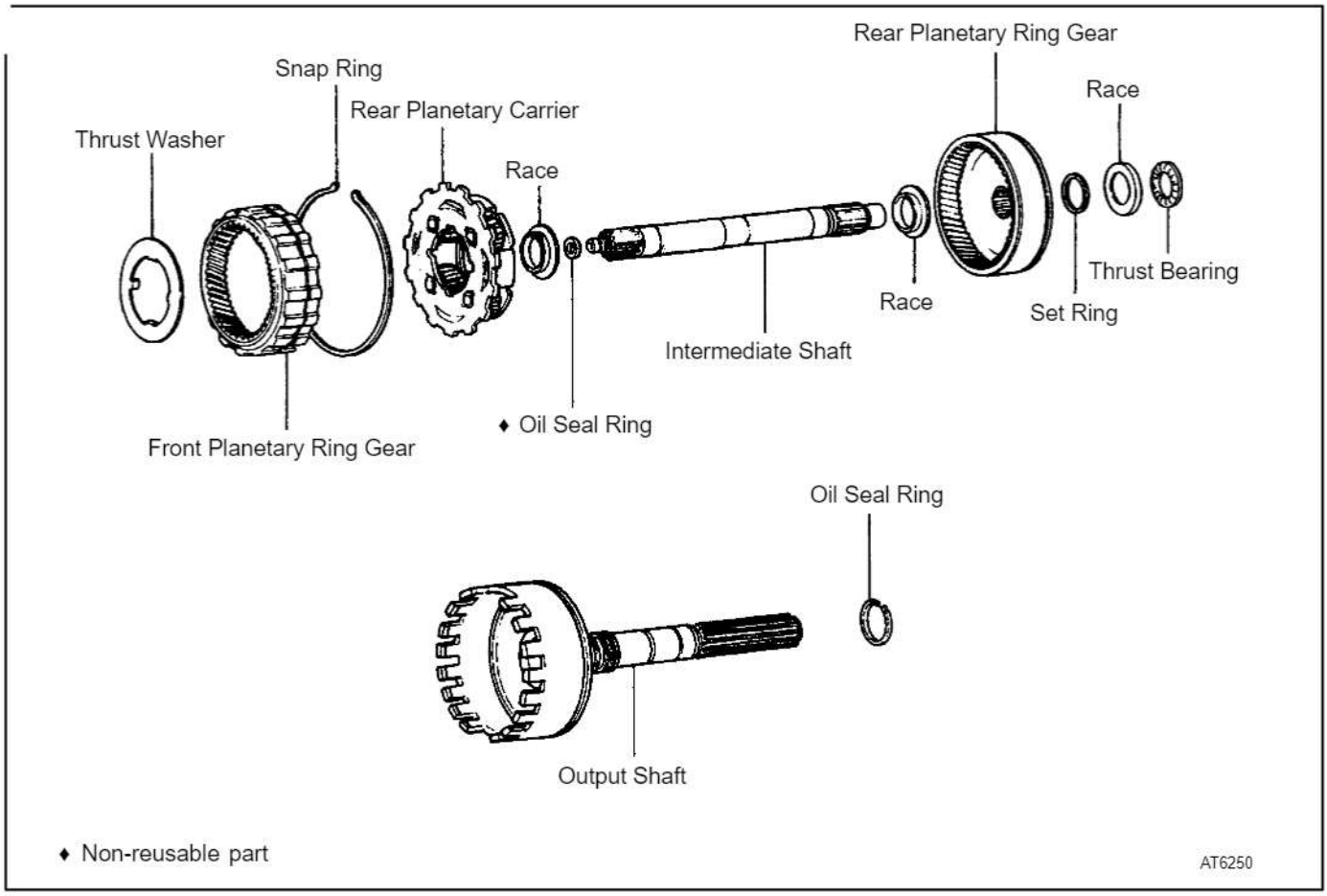
(b) Install the thrust washer onto the rear planetary carrier.

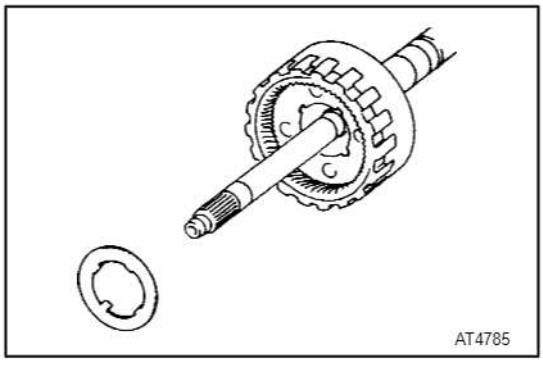
HINT: Make sure that the lug shapes match the cutout portions on the rear planetary carrier.

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REAR PLANETARY GEAR

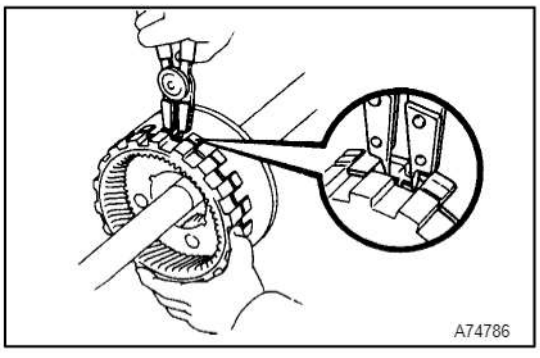
COMPONENTS





REAR PLANETARY GEAR AND OUTPUT SHAFT DISASSEMBLY

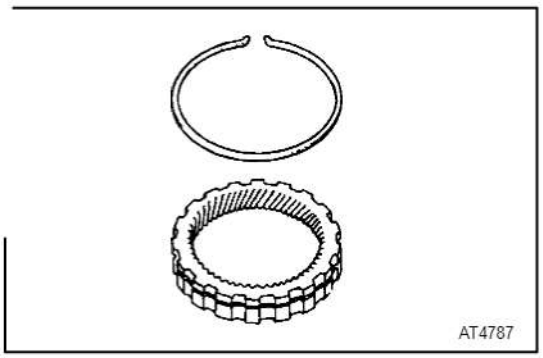
1. REMOVE THRUST WASHER FROM FRONT PLANETARY RING GEAR



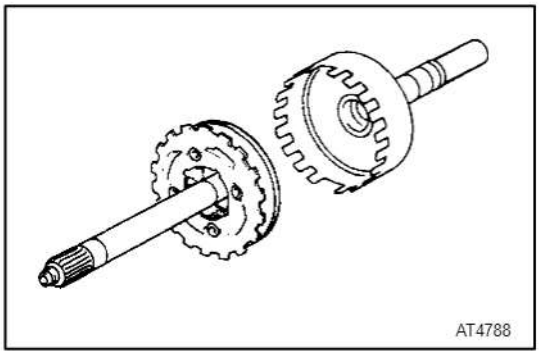
2. REMOVE FRONT PLANETARY RING GEAR

(a) Using a snap ring expander, pull out the ring gear while compressing the snap ring.

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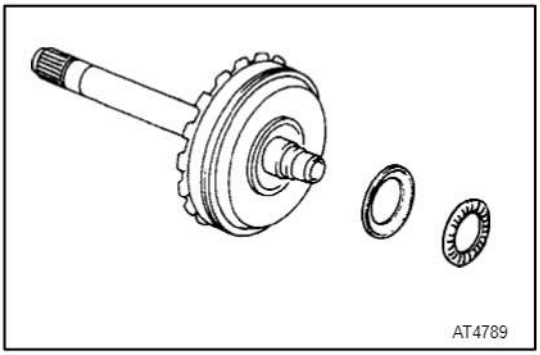


(b) Using a screwdriver, remove the snap ring from the ring gear.

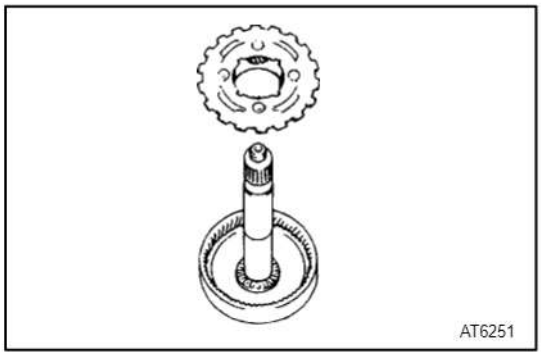


3. REMOVE REAR PLANETARY GEAR ASSEMBLY FROM OUTPUT SHAFT

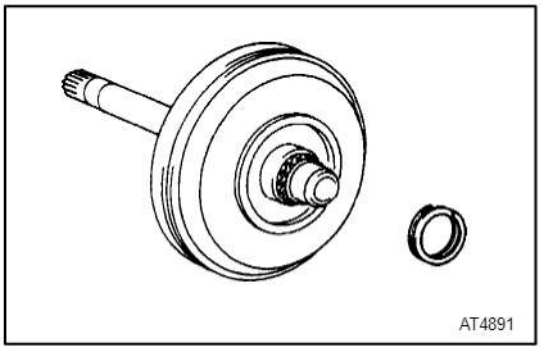
(a) Pull out the rear planetary gear assembly.



(b) Remove the bearing and race.



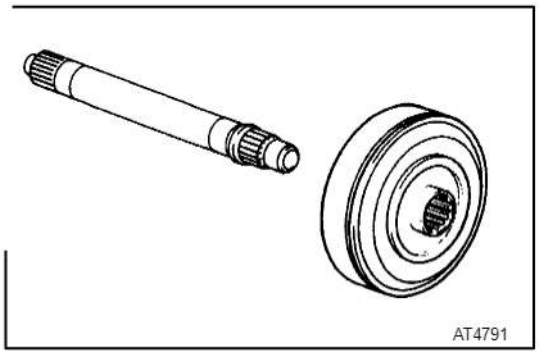
4. REMOVE REAR PLANETARY CARRIER AND ASSEMBLED BEARING AND RACE FROM PLANETARY RING GEAR



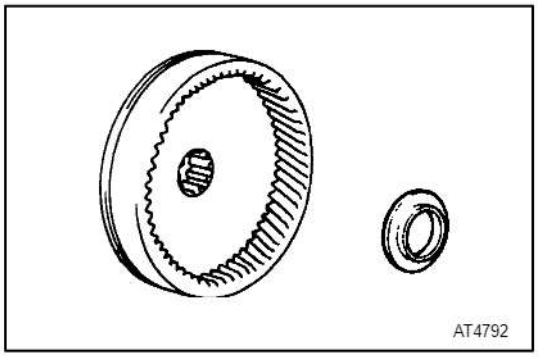
5. REMOVE PLANETARY RING GEAR

(a) Using a screwdriver, remove the set ring.

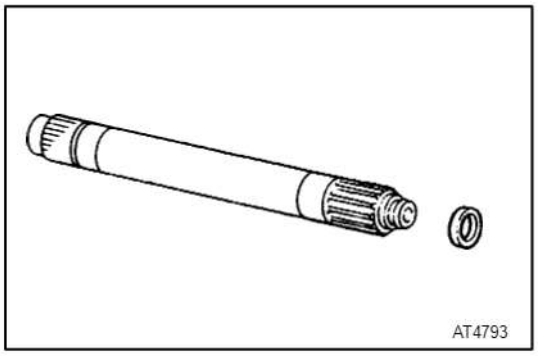
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(b) Remove the planetary ring gear.

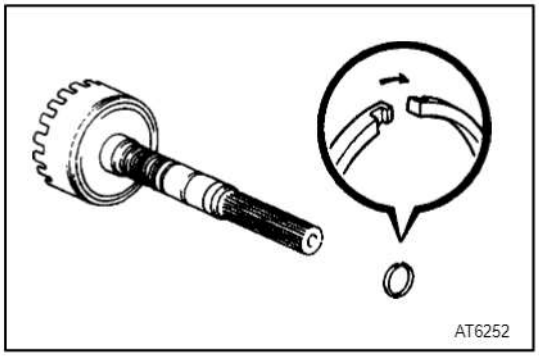


(c) Remove the race from the ring gear.



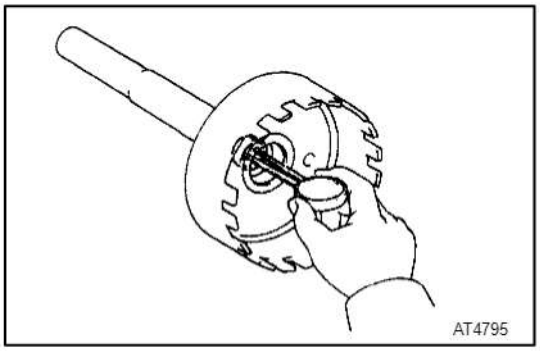
6. REMOVE OIL SEAL RING FROM INTERMEDIATE SHAFT

Using a screwdriver, remove the oil seal ring.



7. REMOVE OIL SEAL RINGS FROM OUTPUT SHAFT

Remove the three oil seal rings.



REAR PLANETARY GEAR AND OUTPUT SHAFT INSPECTION

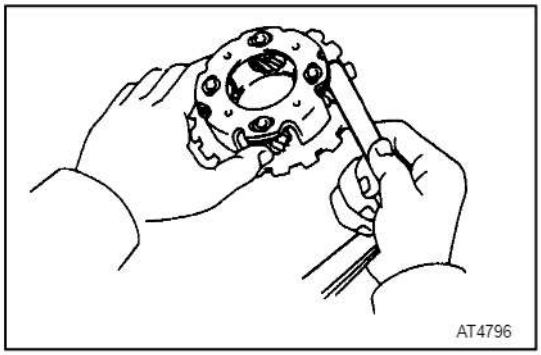
1. CHECK OUTPUT SHAFT BUSHING

Using a dial indicator, measure the inside diameter of the output shaft bushing.

Maximum inside diameter:
18.08 mm (0.7118 in.)

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If the inside diameter is greater than the maximum, replace the output shaft.



2. MEASURE PLANETARY PINION GEAR THRUST CLEARANCE

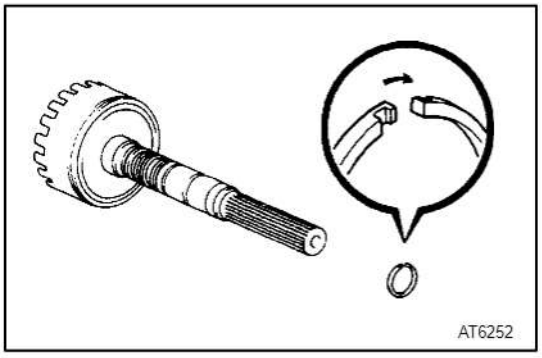
Using a feeler gauge, measure the planetary pinion gear thrust clearance.

Standard clearance:

0.20 - 0.50 mm (0.0079 - 0.0197 in.)

If the clearance is nonstandard, inspect the planetary gear thrust washer.

If necessary, replace the planetary gear assembly.



REAR PLANETARY GEAR AND OUTPUT SHAFT ASSEMBLY

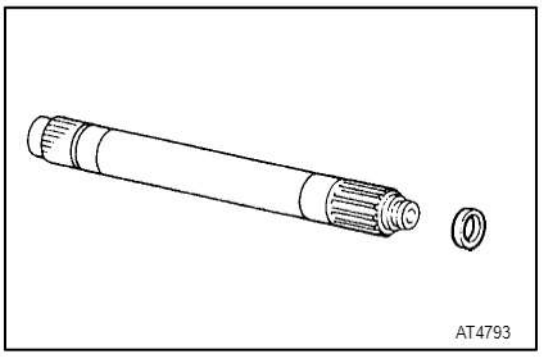
1. INSTALL OIL SEAL RINGS

(a) Coat the three oil seal rings with ATF.

(b) Contract the oil seal rings, and install them onto the output shaft.

NOTICE: Do not spread the ring ends too much.

HINT: After installing the oil seal rings, check that they rotate smoothly.

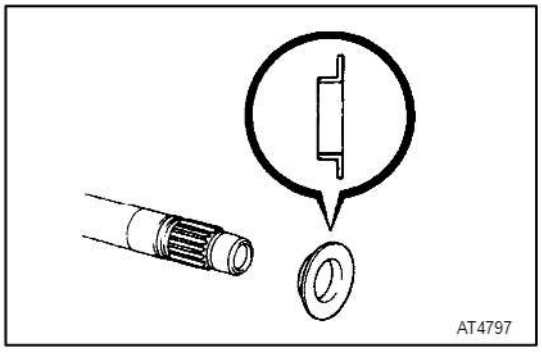


2. INSTALL NEW OIL SEAL RING

Coat a new oil seal ring with ATF and install it to the intermediate shaft.

NOTICE: Do not spread the ring too much.

HINT: After installing the oil seal ring, check that it rotates smoothly.



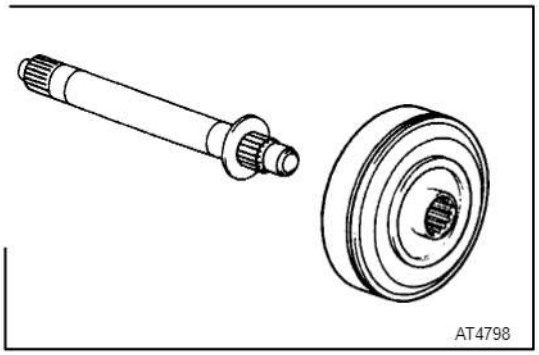
3. INSTALL PLANETARY RING GEAR

(a) Coat the race with petroleum jelly and install it onto the intermediate shaft.

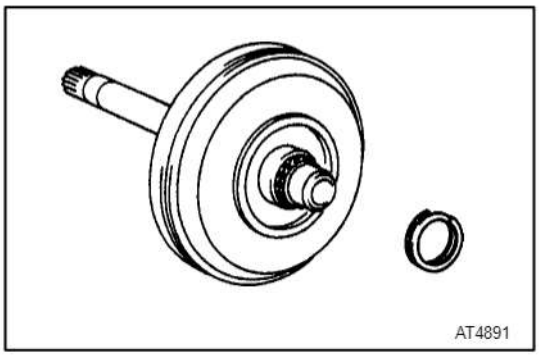
Race diameter:

	Inside mm (in.)	Outside mm (in.)
Race	21.6 (0.850)	41.4 (1.630)

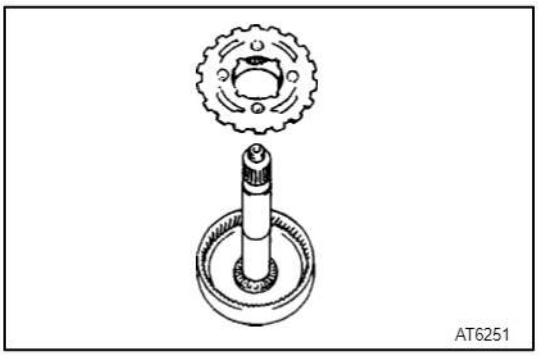
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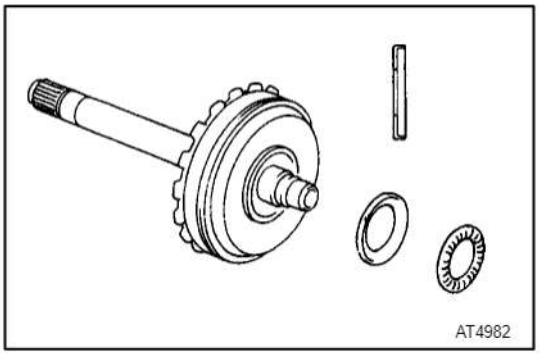
(b) Install the ring gear to the intermediate shaft.



(c) Install the set ring.



4. INSTALL ASSEMBLED BEARING AND RACE AND REAR PLANETARY CARRIER TO PLANETARY RING GEAR

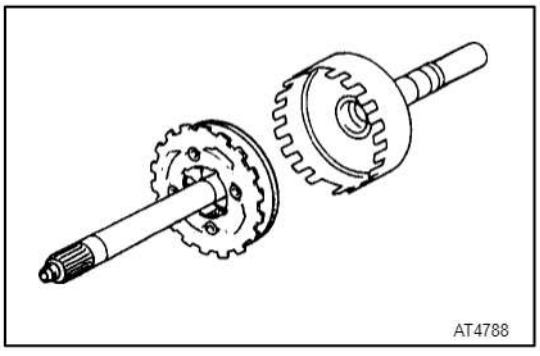


5. INSTALL REAR PLANETARY GEAR ASSEMBLY TO OUTPUT SHAFT

(a) Coat the bearing and race with petroleum jelly and install them onto the ring gear.

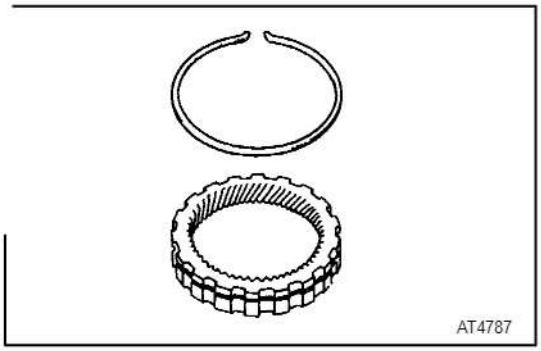
Bearing and race diameter:

	Inside mm (in.)	Outside mm (in.)
Race	30.1 (1.185)	48.5 (1.909)
Bearing	28.4 (1.118)	46.4 (1.827)



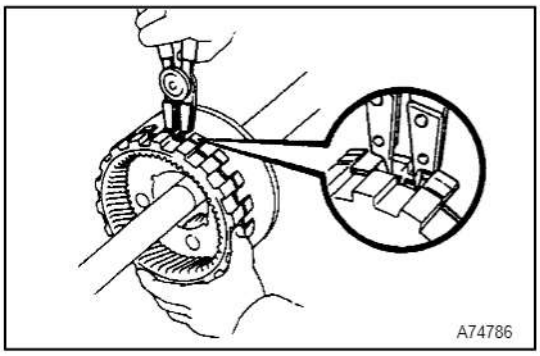
(b) Install the rear planetary gear assembly to the output shaft.

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6. INSTALL FRONT PLANETARY RING GEAR

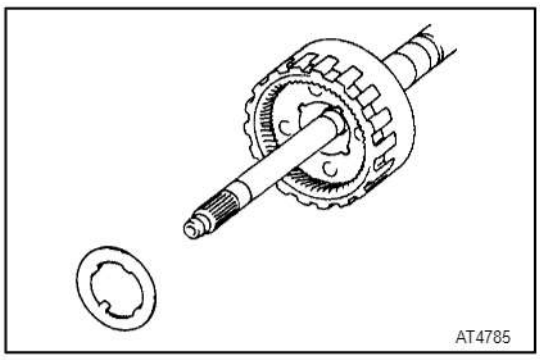
(a) Install the snap ring.


A74786

(b) Align the snap ring end with the wide cutout portion of the output shaft.

(c) Using a snap ring expander, install the ring gear while compressing the snap ring.

(d) Check that the snap ring is installed into the groove of the output shaft.


AT4785

7. INSTALL THRUST WASHER

(a) Coat the thrust washer with petroleum jelly.

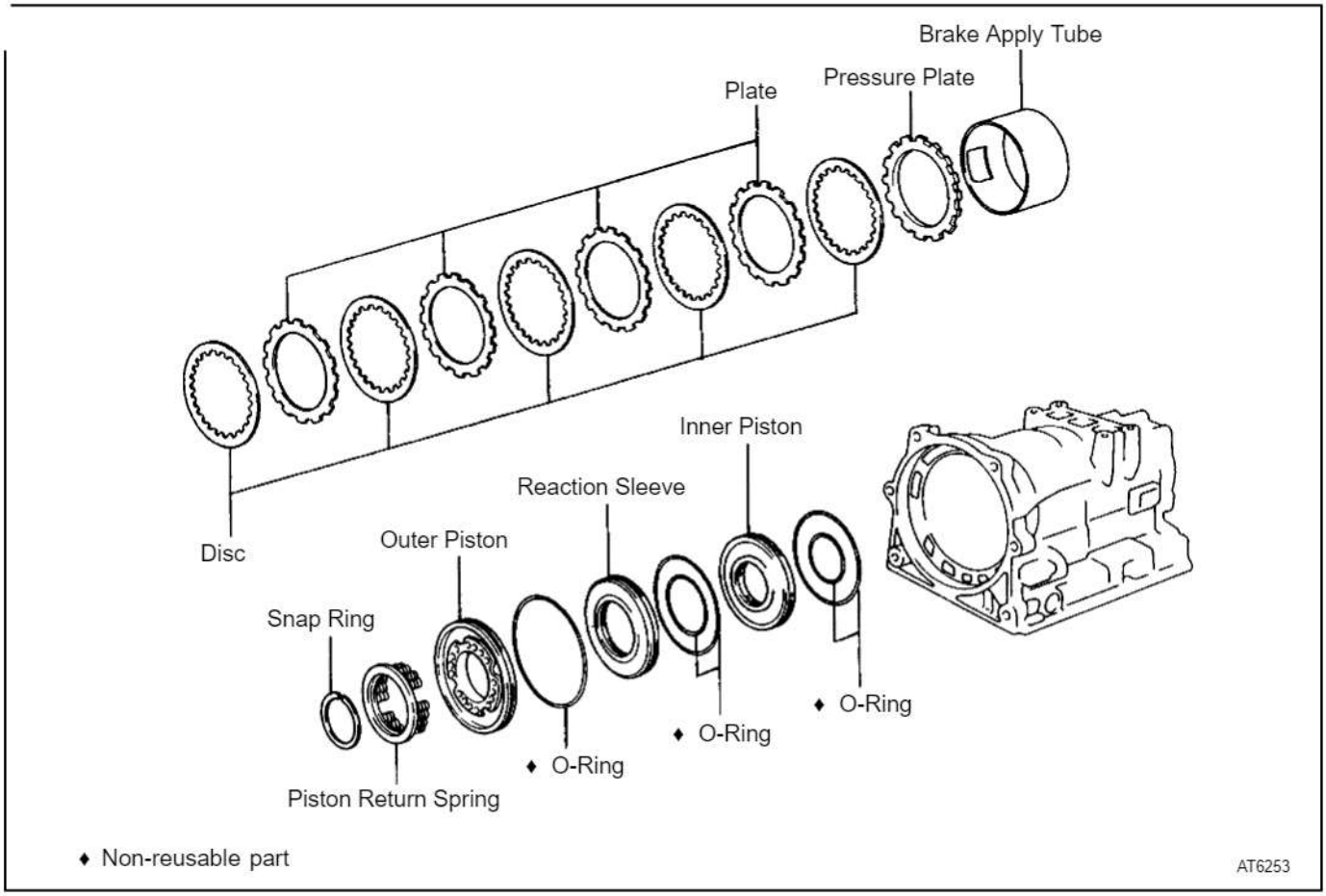
(b) Install the thrust washer onto the rear planetary carrier.

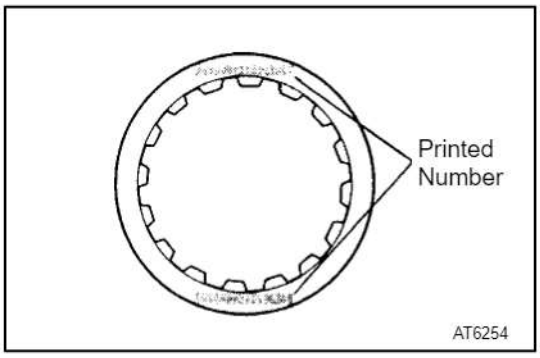
HINT: Make sure that the lug shapes match the cutout portions on the rear planetary carrier.

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NO. 3 BRAKE

COMPONENTS





NO. 3 BRAKE INSPECTION

INSPECT DISC AND PLATE

Check to see if the sliding surface of the disc and plate are worn or burnt. If necessary, replace them.

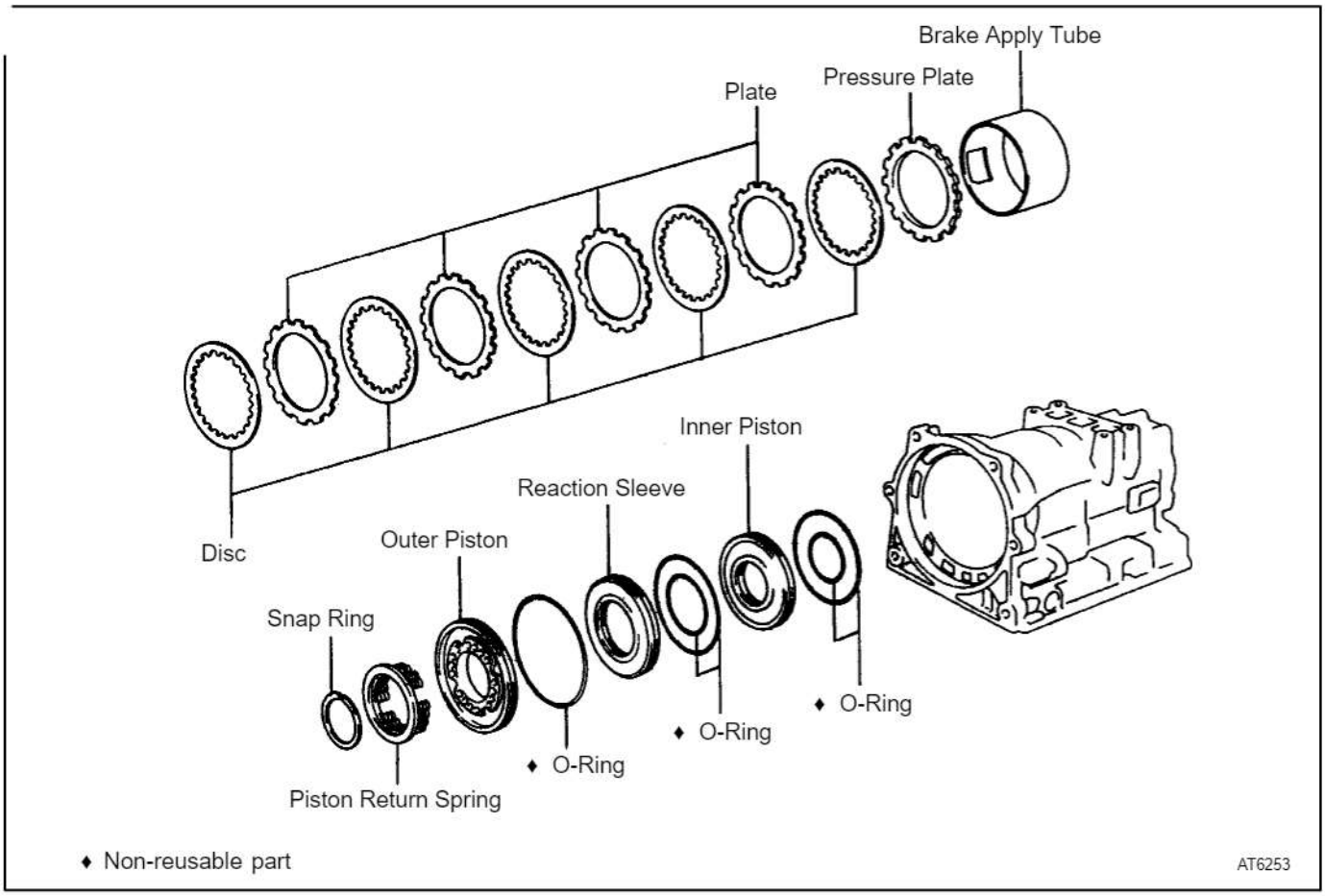
HINT:

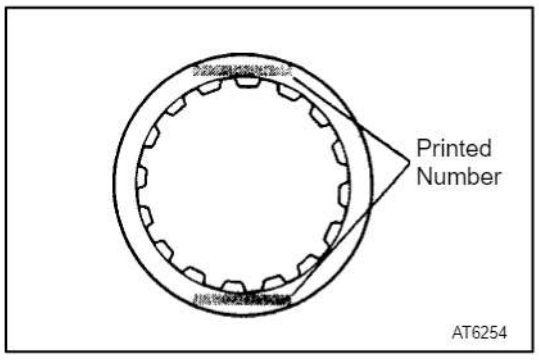
- © If the lining of the disc is peeling off or discolored, or even if parts of the printed numbers are defaced, replace all discs.
- © Before assembling new discs, soak them in ATF for at least fifteen minutes.

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NO. 3 BRAKE

COMPONENTS





NO. 3 BRAKE INSPECTION

INSPECT DISC AND PLATE

Check to see if the sliding surface of the disc and plate are worn or burnt. If necessary, replace them.

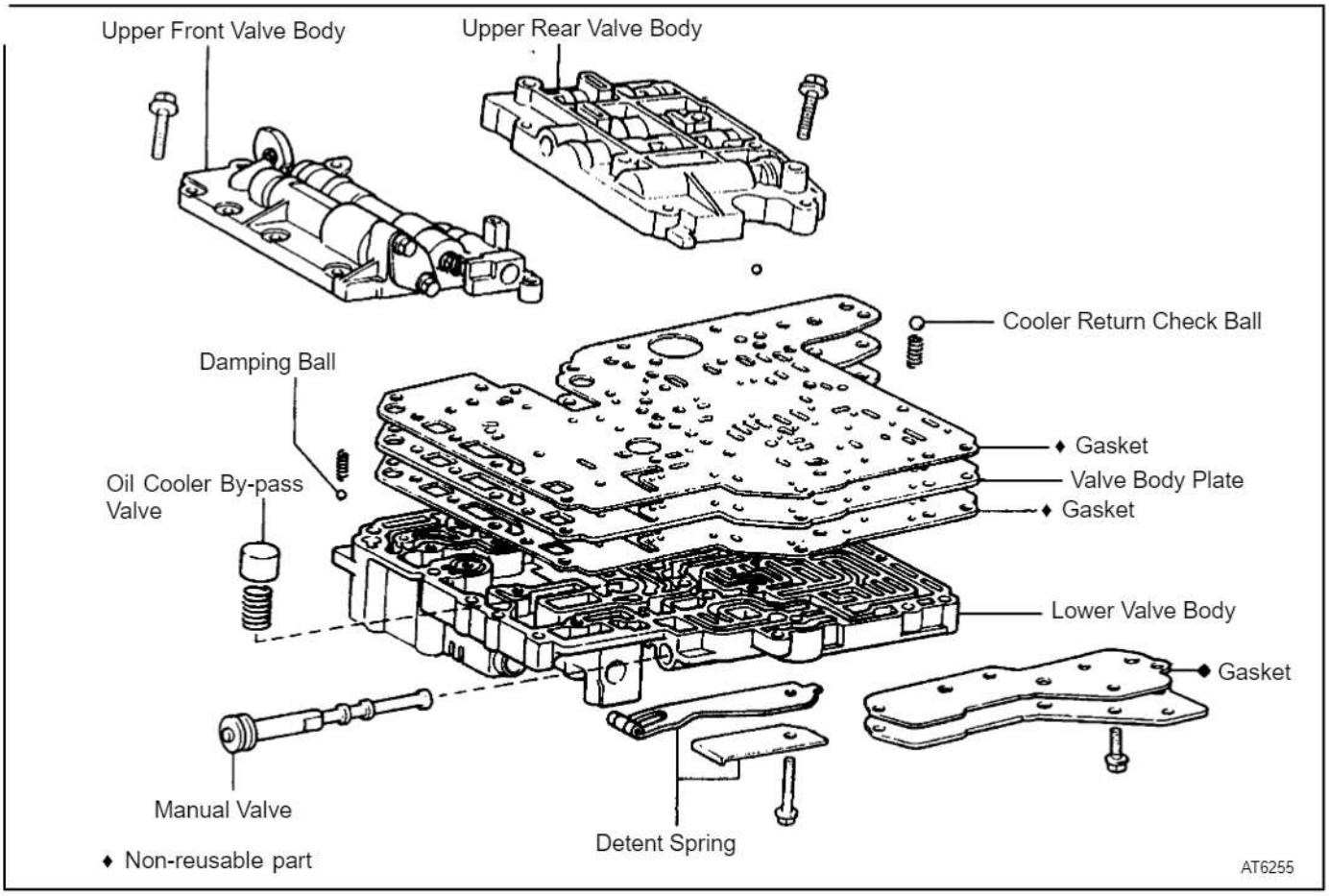
HINT:

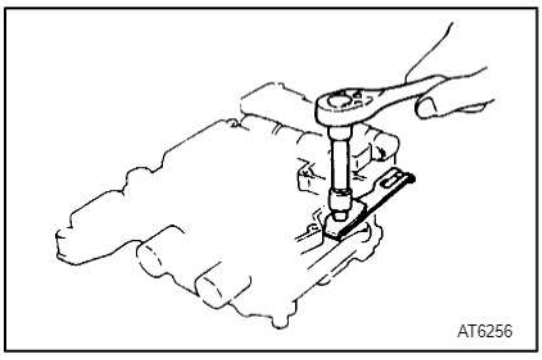
- © If the lining of the disc is peeling off or discolored, or even if parts of the printed numbers are defaced, replace all discs.
- © Before assembling new discs, soak them in ATF for at least fifteen minutes.

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VALVE BODY

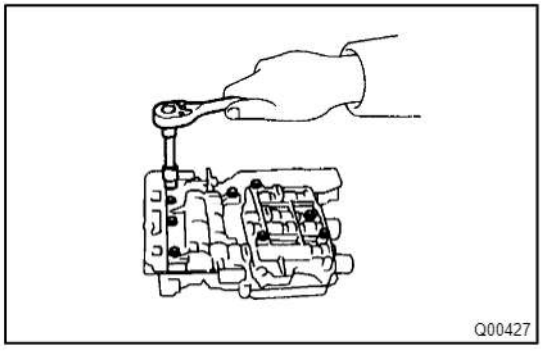
COMPONENTS





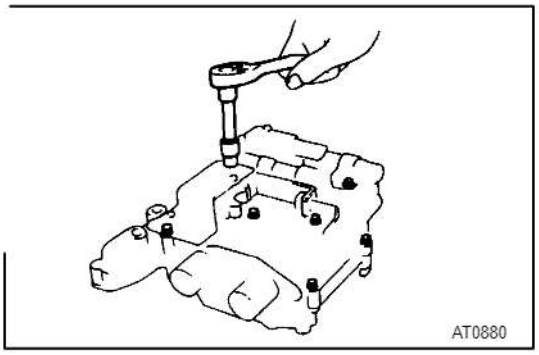
VALVE BODY DISASSEMBLY

1. **REMOVE DETENT SPRING**
2. **REMOVE MANUAL VALVE**

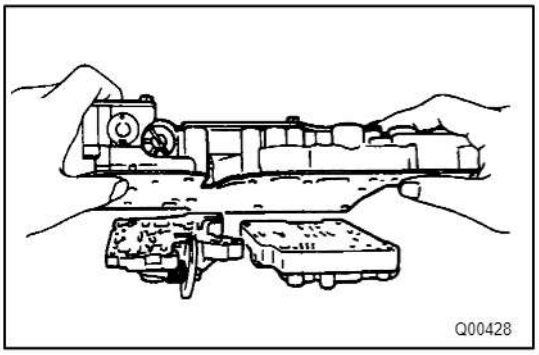


3. **TURN ASSEMBLY OVER AND REMOVE NINE BOLTS FROM UPPER FRONT VALVE BODY AND UPPER REAR VALVE BODY**

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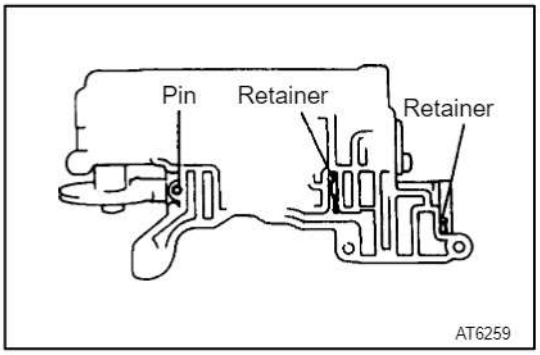


4. TURN ASSEMBLY OVER AND REMOVE SET BOLTS FROM LOWER VALVE BODY

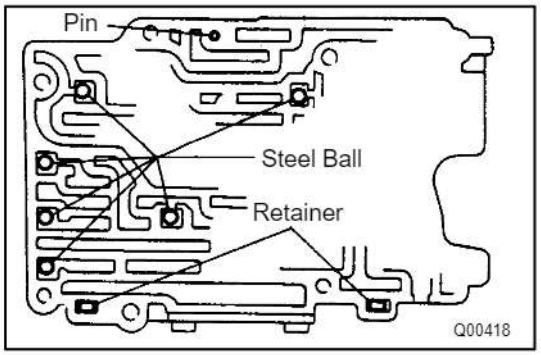


5. LIFT OFF LOWER VALVE BODY AND PLATE AS SINGLE UNIT

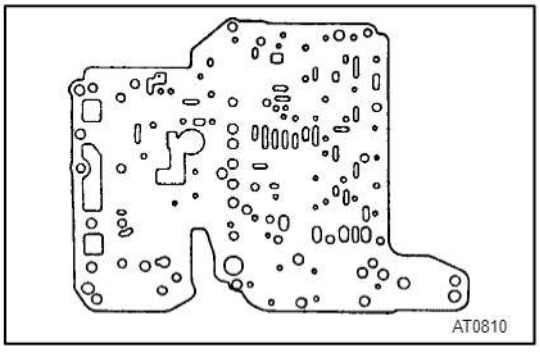
Hold valve body plate to lower valve body.
HINT: Be careful that the check valve and balls do not fall out.



8. WATCH FOR STEEL BALLS, RETAINERS AND PINS IN VALVE BODY



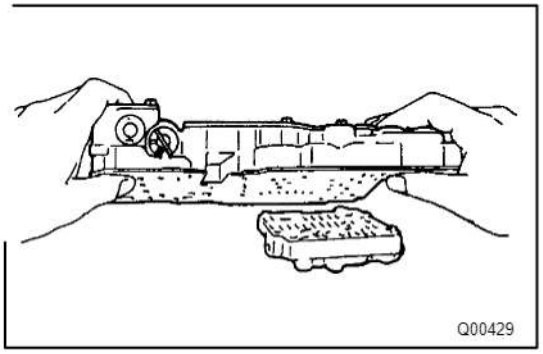
VALVE BODY ASSEMBLY



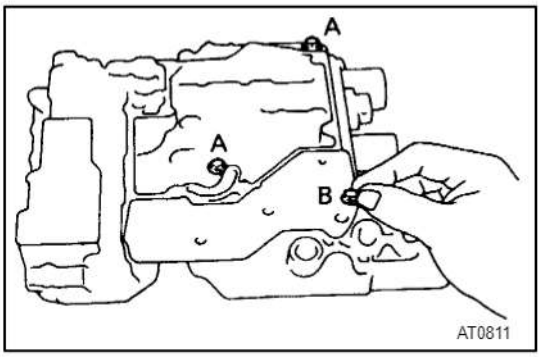
1. POSITION NEW GASKET ON UPPER REAR VALVE BODY

Align a new gasket at each bolt hole.

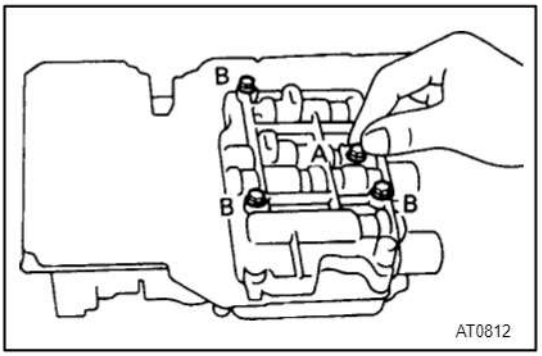
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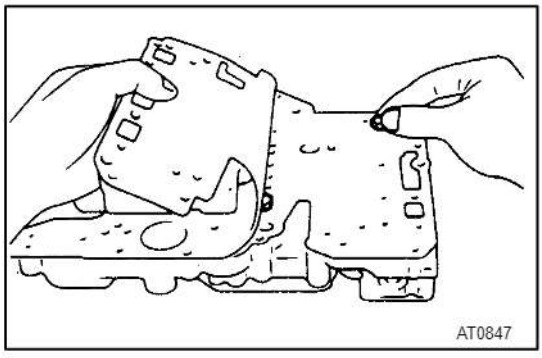
2. **PLACE LOWER VALVE BODY WITH PLATE AND GASKETS ON TOP OF UPPER REAR VALVE BODY**
Align each bolt hole in the valve body and gasket.



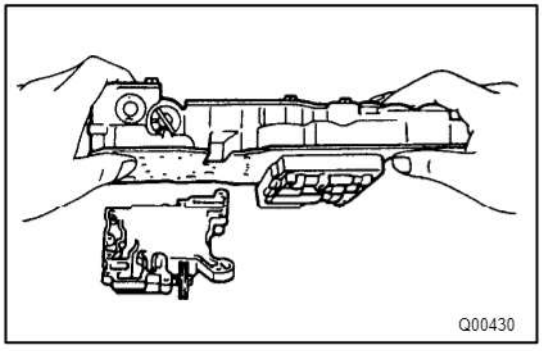
3. **INSTALL AND FINGER TIGHTEN THREE BOLTS IN LOWER VALVE BODY TO SECURE UPPER REAR VALVE BODY**
Bolt length:
A bolt 28 mm (1.102 in.)
B bolt 45 mm (1.772 in.)



4. **TURN ASSEMBLY OVER, CHECK GASKET ALIGNMENT AND FINGER TIGHTEN FOUR BOLTS IN UPPER VALVE BODY**
Bolt length:
A bolt 28 mm (1.102 in.)
B bolt 35 mm (1.378 in.)

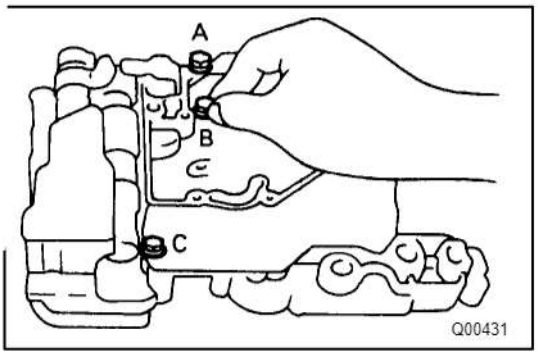


5. **REMOVE TEMPORARY BOLTS FROM PLATE**



6. **PLACE LOWER AND UPPER REAR VALVE BODY ASSEMBLY ON TOP OF UPPER FRONT VALVE BODY**

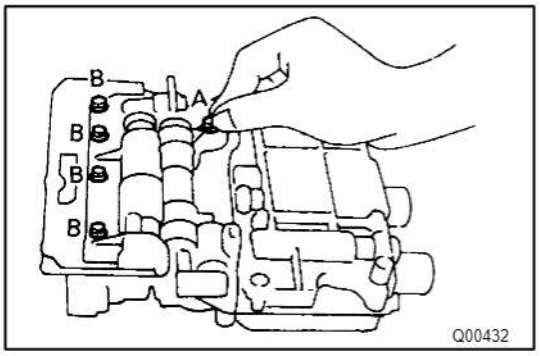
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7. INSTALL AND FINGER TIGHTEN SET BOLTS IN LOWER VALVE BODY TO SECURE UPPER FRONT VALVE BODY

Bolt length:

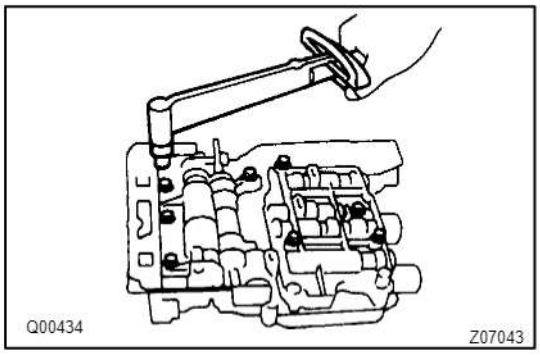
A bolt 20 mm (0.787 in.)
B bolt 28 mm (1.102 in.)
C bolt 45 mm (1.772 in.)



8. TURN ASSEMBLY OVER AND FINGER TIGHTEN FIVE BOLTS IN UPPER FRONT VALVE BODY

Bolt length:

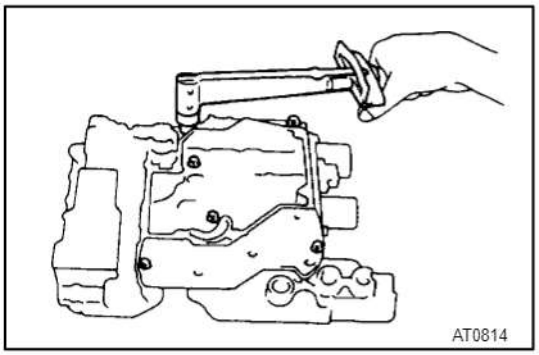
A bolt 20 mm (0.787 in.)
B bolt 18 mm (0.709 in.)



9. TIGHTEN BOLTS IN UPPER FRONT AND REAR VALVE BODIES

Recheck the alignment of the gasket. Tighten the bolts.

Torque: 5.4 N-m (55 kgf-cm, 48 in.-lbf)



10. TURN ASSEMBLY OVER AND TIGHTEN BOLTS IN LOWER VALVE BODY

Tighten the bolts.

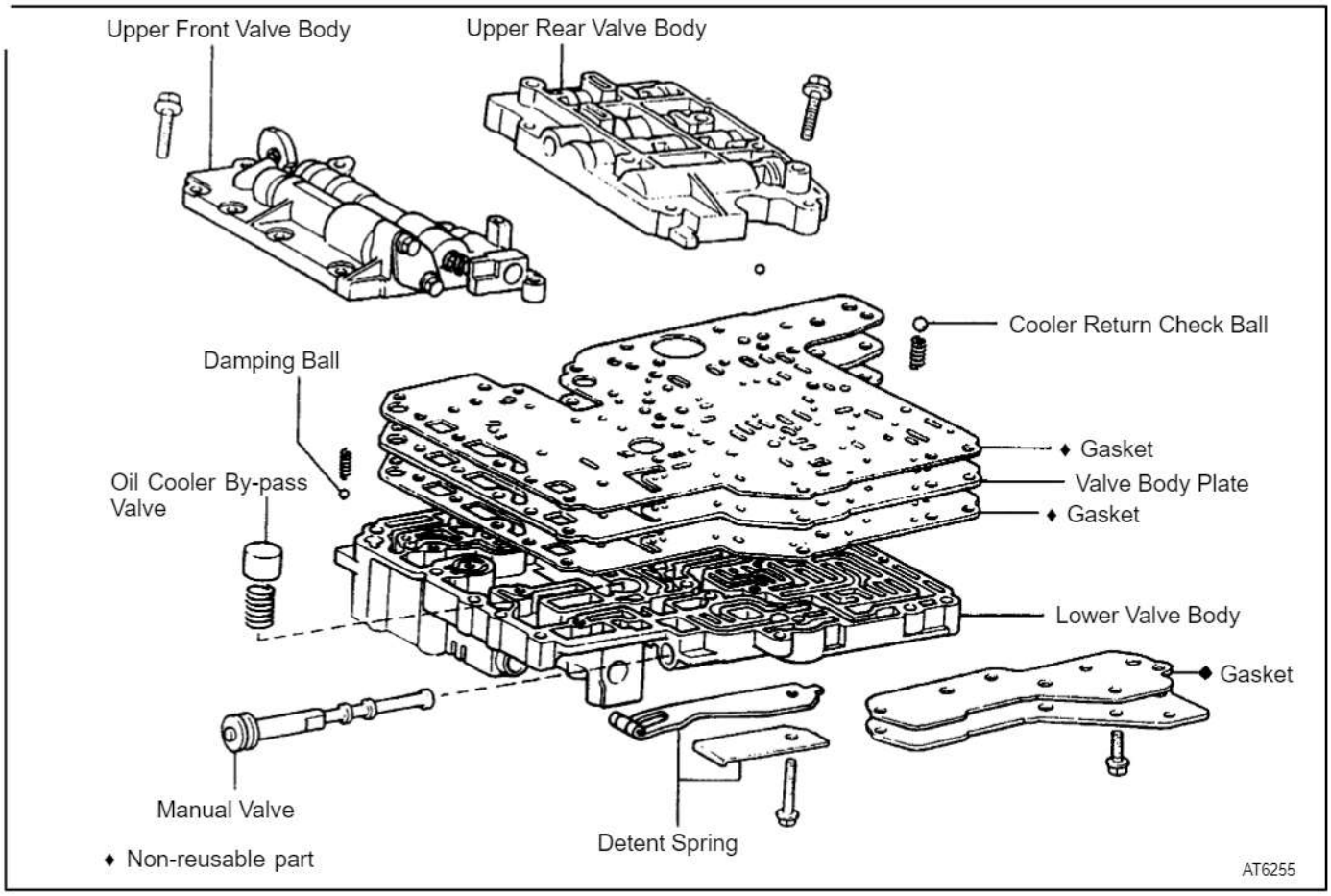
Torque: 5.4 N-m (55 kgf-cm, 48 in.-lbf)

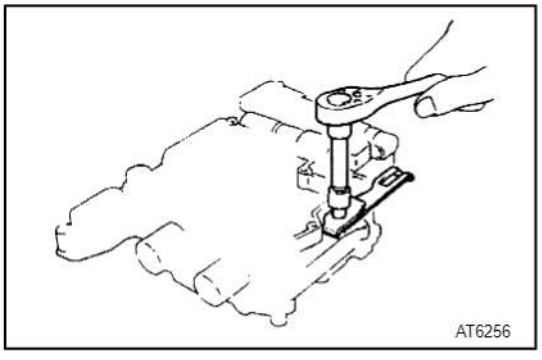
11. INSTALL MANUAL VALVE INTO LOWER VALVE BODY

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VALVE BODY

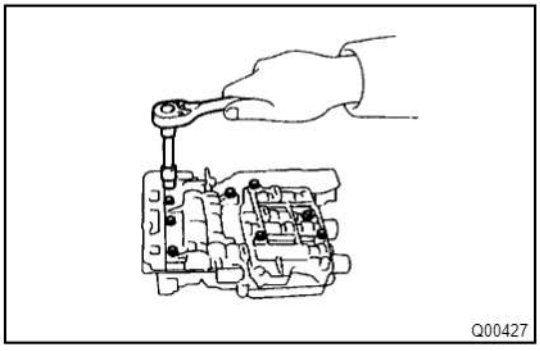
COMPONENTS





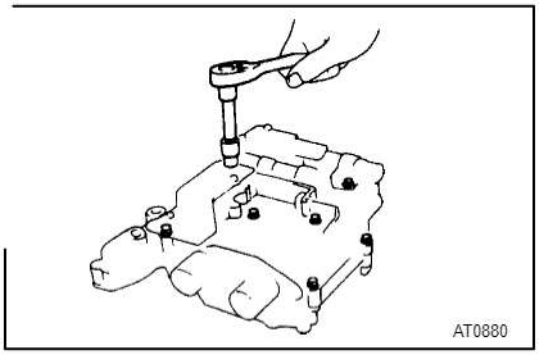
VALVE BODY DISASSEMBLY

1. **REMOVE DETENT SPRING**
2. **REMOVE MANUAL VALVE**

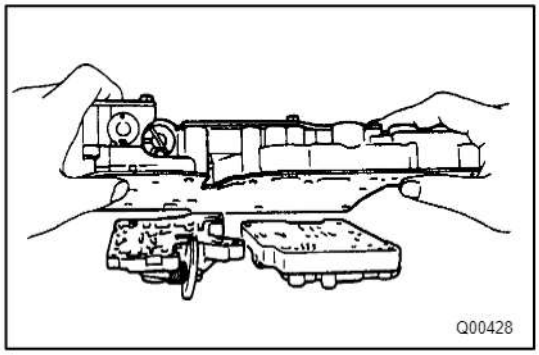


3. **TURN ASSEMBLY OVER AND REMOVE NINE BOLTS FROM UPPER FRONT VALVE BODY AND UPPER REAR VALVE BODY**

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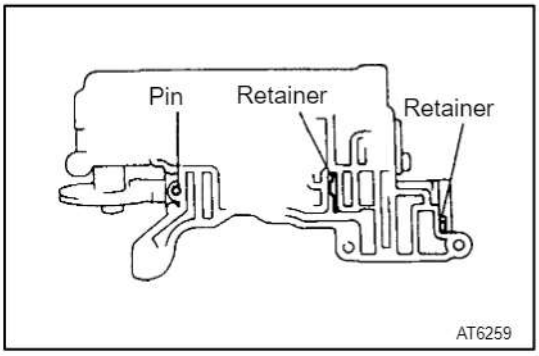


4. TURN ASSEMBLY OVER AND REMOVE SET BOLTS FROM LOWER VALVE BODY

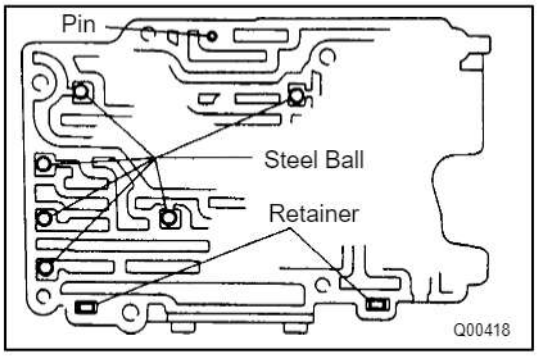


5. LIFT OFF LOWER VALVE BODY AND PLATE AS SINGLE UNIT

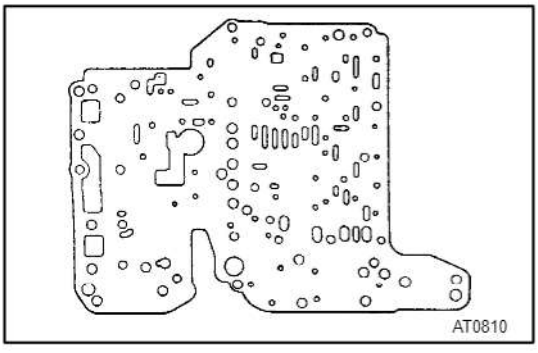
Hold valve body plate to lower valve body.
HINT: Be careful that the check valve and balls do not fall out.



6. WATCH FOR STEEL BALLS, RETAINERS AND PINS IN VALVE BODY



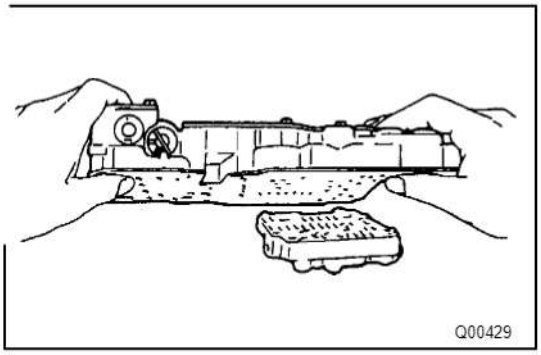
VALVE BODY ASSEMBLY



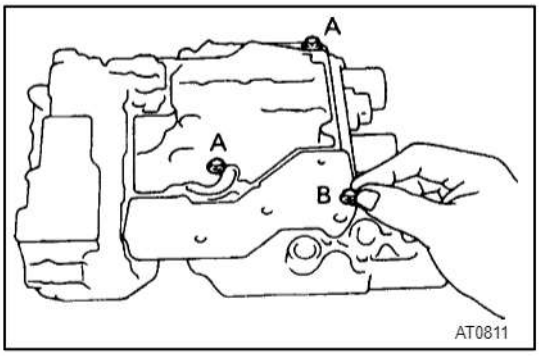
1. POSITION NEW GASKET ON UPPER REAR VALVE BODY

Align a new gasket at each bolt hole.

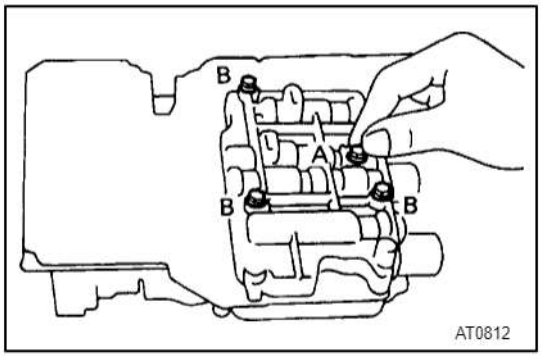
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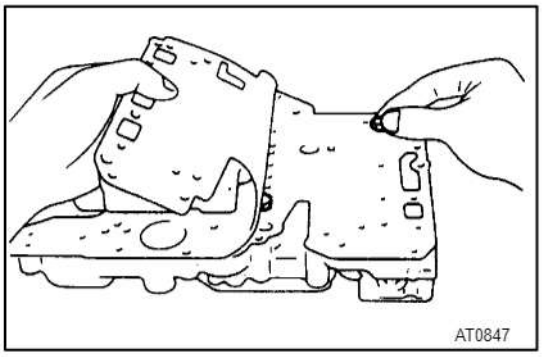
2. **PLACE LOWER VALVE BODY WITH PLATE AND GASKETS ON TOP OF UPPER REAR VALVE BODY**
Align each bolt hole in the valve body and gasket.



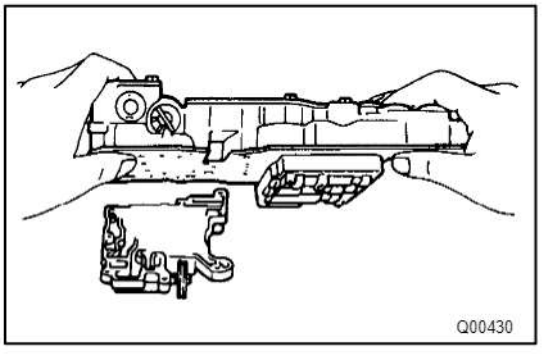
3. **INSTALL AND FINGER TIGHTEN THREE BOLTS IN LOWER VALVE BODY TO SECURE UPPER REAR VALVE BODY**
Bolt length:
A bolt 28 mm (1.102 in.)
B bolt 45 mm (1.772 in.)



4. **TURN ASSEMBLY OVER, CHECK GASKET ALIGNMENT AND FINGER TIGHTEN FOUR BOLTS IN UPPER VALVE BODY**
Bolt length:
A bolt 28 mm (1.102 in.)
B bolt 35 mm (1.378 in.)

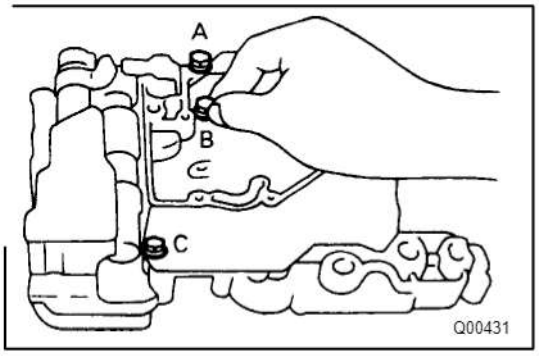


5. **REMOVE TEMPORARY BOLTS FROM PLATE**



6. **PLACE LOWER AND UPPER REAR VALVE BODY ASSEMBLY ON TOP OF UPPER FRONT VALVE BODY**

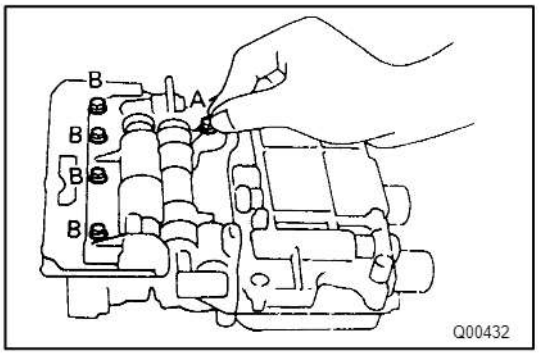
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7. INSTALL AND FINGER TIGHTEN SET BOLTS IN LOWER VALVE BODY TO SECURE UPPER FRONT VALVE BODY

Bolt length:

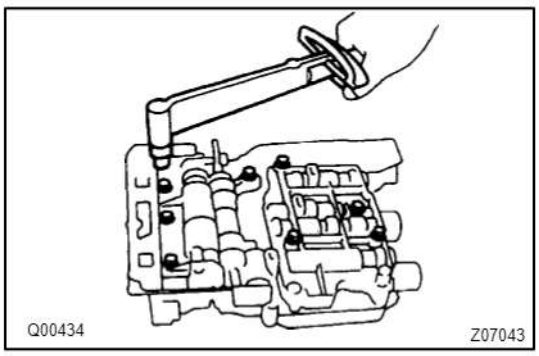
A bolt 20 mm (0.787 in.)
B bolt 28 mm (1.102 in.)
C bolt 45 mm (1.772 in.)



8. TURN ASSEMBLY OVER AND FINGER TIGHTEN FIVE BOLTS IN UPPER FRONT VALVE BODY

Bolt length:

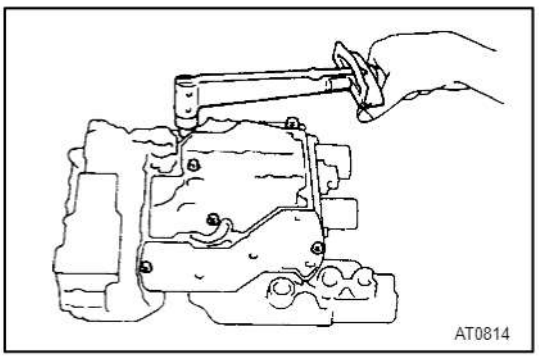
A bolt 20 mm (0.787 in.)
B bolt 18 mm (0.709 in.)



9. TIGHTEN BOLTS IN UPPER FRONT AND REAR VALVE BODIES

Recheck the alignment of the gasket. Tighten the bolts.

Torque: 5.4 N-m (55 kgf-cm, 48 in.-lbf)



10. TURN ASSEMBLY OVER AND TIGHTEN BOLTS IN LOWER VALVE BODY

Tighten the bolts.

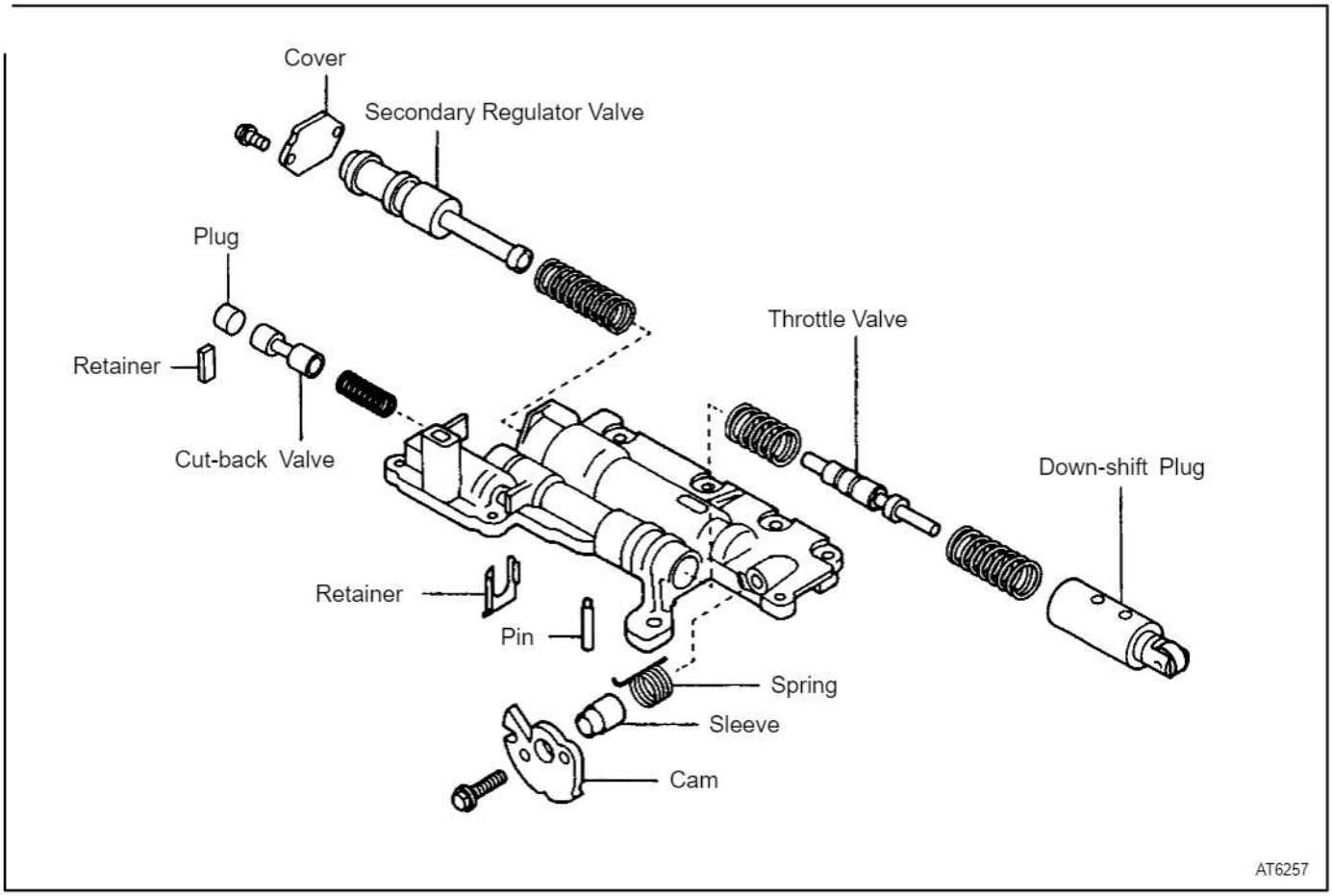
Torque: 5.4 N-m (55 kgf-cm, 48 in.-lbf)

11. INSTALL MANUAL VALVE INTO LOWER VALVE BODY

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FRONT UPPER VALVE BODY

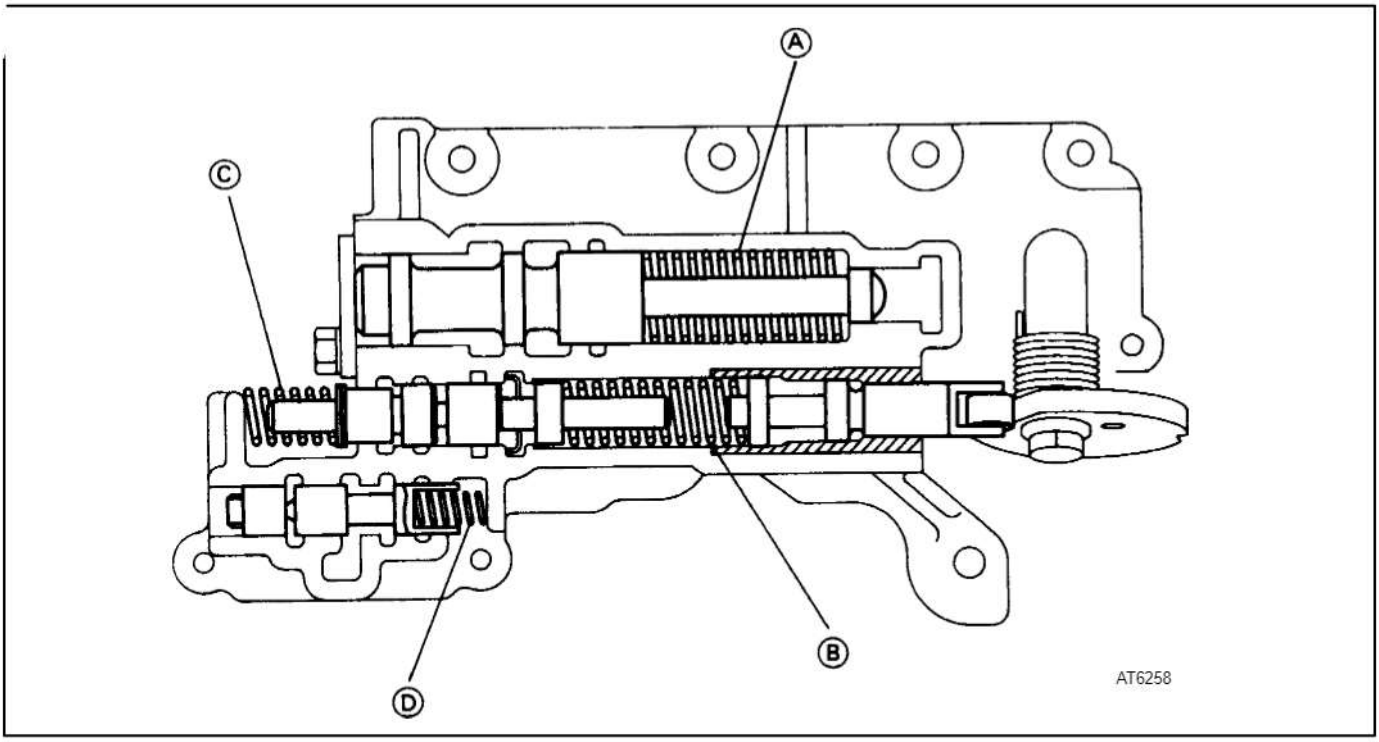
COMPONENTS



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ALVE BODY SPRINGS SPECIFICATIONS

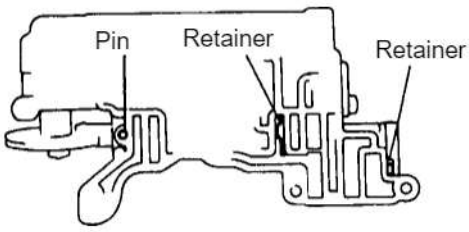
HINT: During reassembly, please refer to the spring specifications below to help you to differentiate the different springs.



Mark	Name (Color)	Free length / Outer diameter mm (in.)	Total No. of coils
Ⓐ	Secondary regulator valve (Green)	71.27 (2.8059) / 17.43 (0.6862)	17.0
Ⓑ	Down-shift plug (Green)	39.55 (1.5571) / 10.9 (0.429)	11.4
Ⓒ	Throttle valve (None)	21.94 (0.8638) / 8.58 (0.3378)	10.0
Ⓓ	Cut-back valve (Green)	23.00 (0.9055) / 6.85 (0.2697)	12.5

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ETAINERS AND PIN LOCATION



AT6259

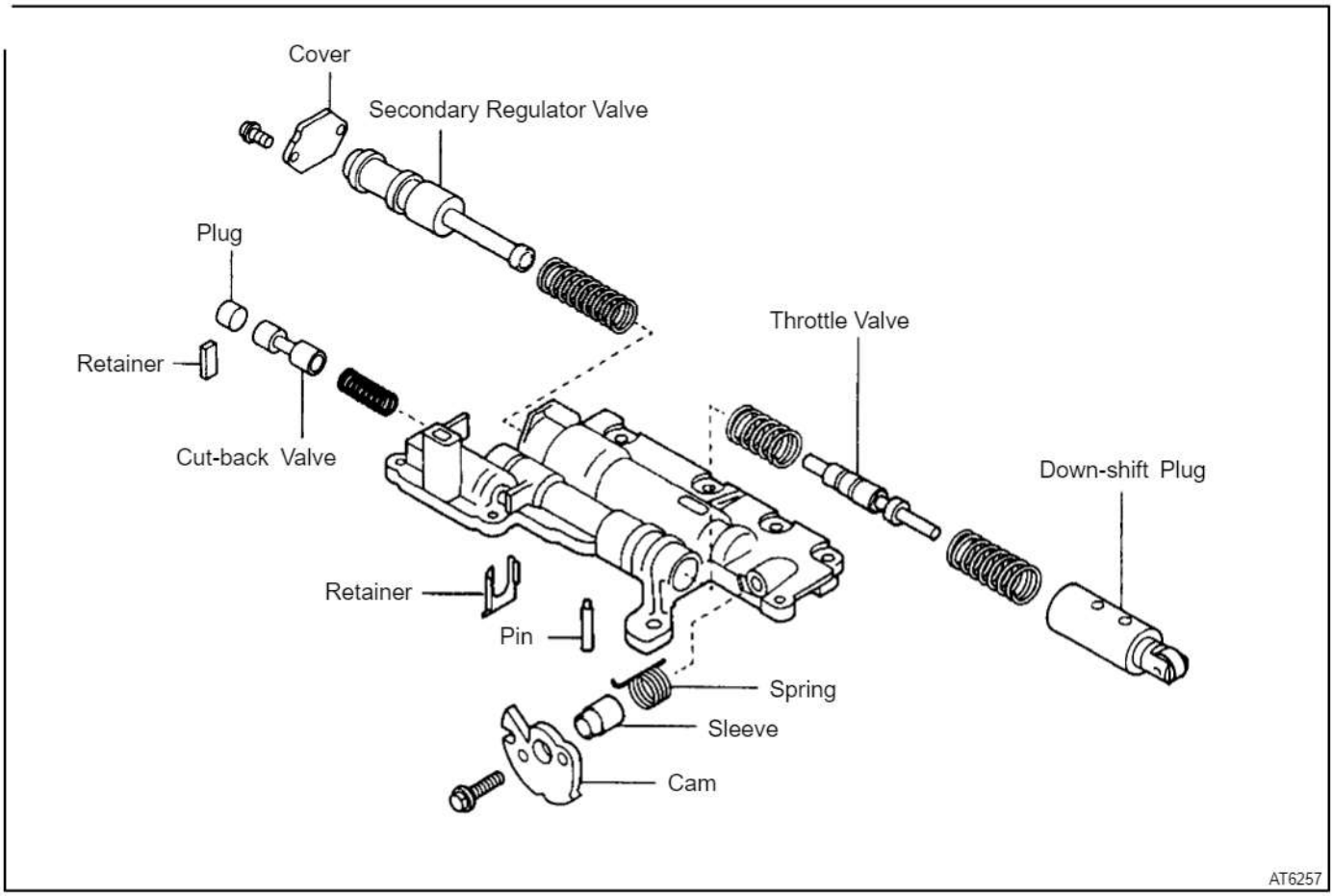
Z06979

Retainer	Height / Width / Thickness mm (in.)
Cut-back valve	19.0 (0.748) / 5.0 (0.197) / 3.2 (0.126)

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FRONT UPPER VALVE BODY

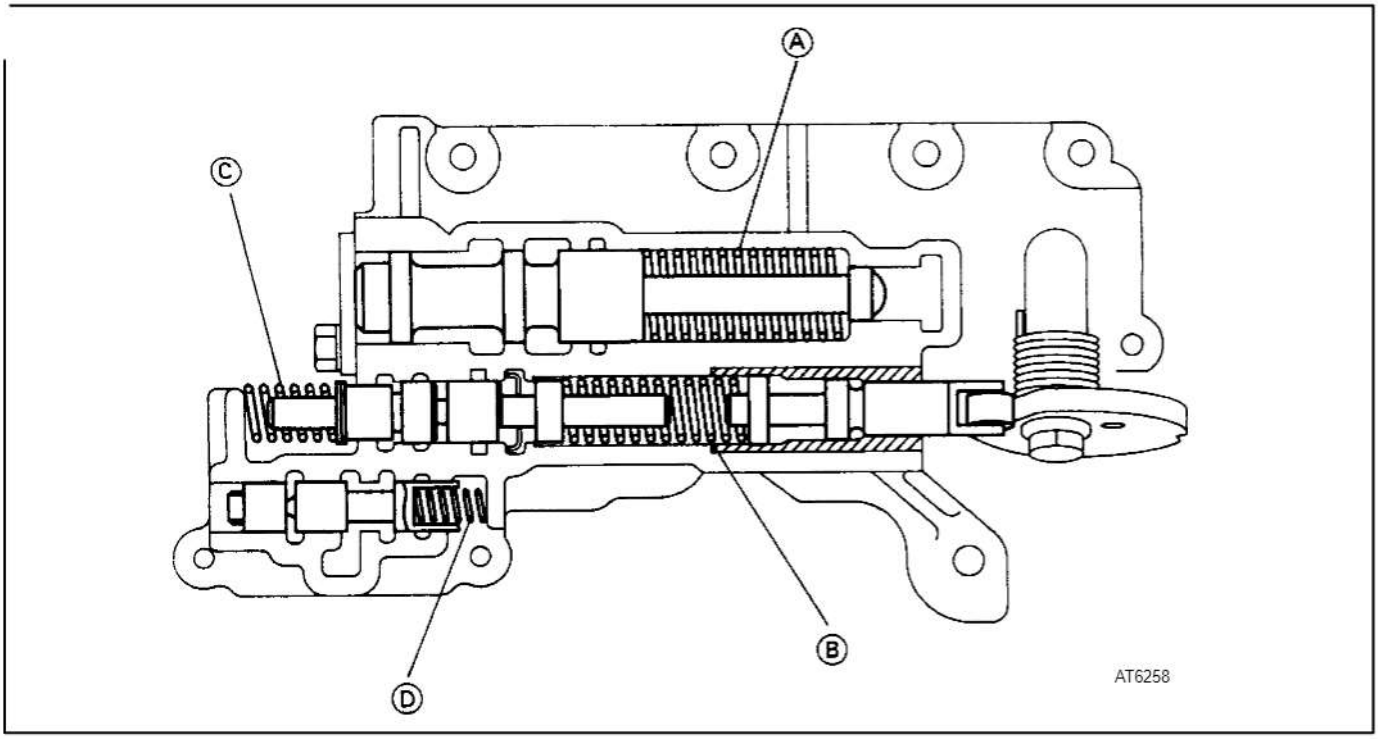
COMPONENTS



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ALVE BODY SPRINGS SPECIFICATIONS

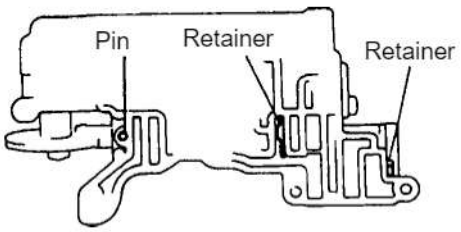
HINT: During reassembly, please refer to the spring specifications below to help you to differentiate the different springs.



Mark	Name (Color)	Free length / Outer diameter mm (in.)	Total No. of coils
Ⓐ	Secondary regulator valve (Green)	71.27 (2.8059) / 17.43 (0.6862)	17.0
Ⓑ	Down-shift plug (Green)	39.55 (1.5571) / 10.9 (0.429)	11.4
Ⓒ	Throttle valve (None)	21.94 (0.8638) / 8.58 (0.3378)	10.0
Ⓓ	Cut-back valve (Green)	23.00 (0.9055) / 6.85 (0.2697)	12.5

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ETAINERS AND PIN LOCATION



AT6259

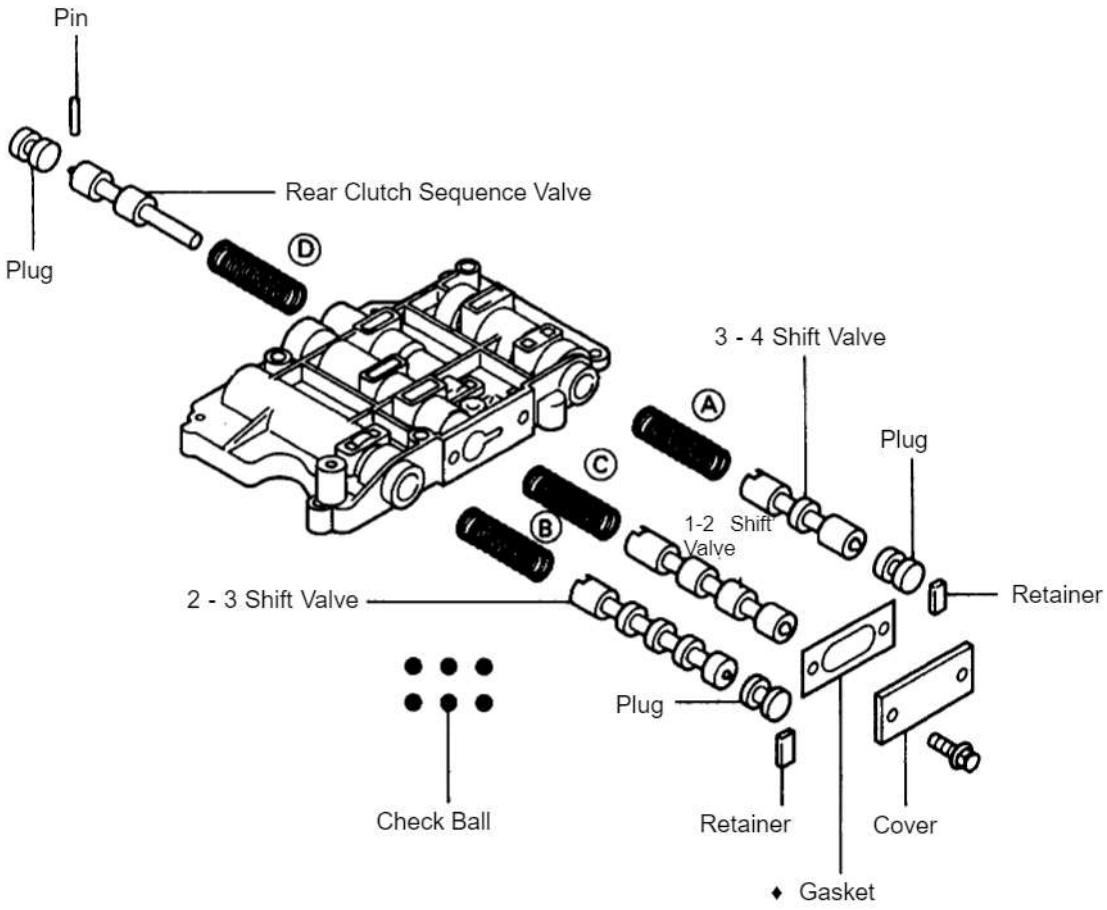
Z06979

Retainer	Height / Width / Thickness mm (in.)
Cut-back valve	19.0 (0.748) / 5.0 (0.197) / 3.2 (0.126)

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REAR UPPER VALVE BODY

COMPONENTS



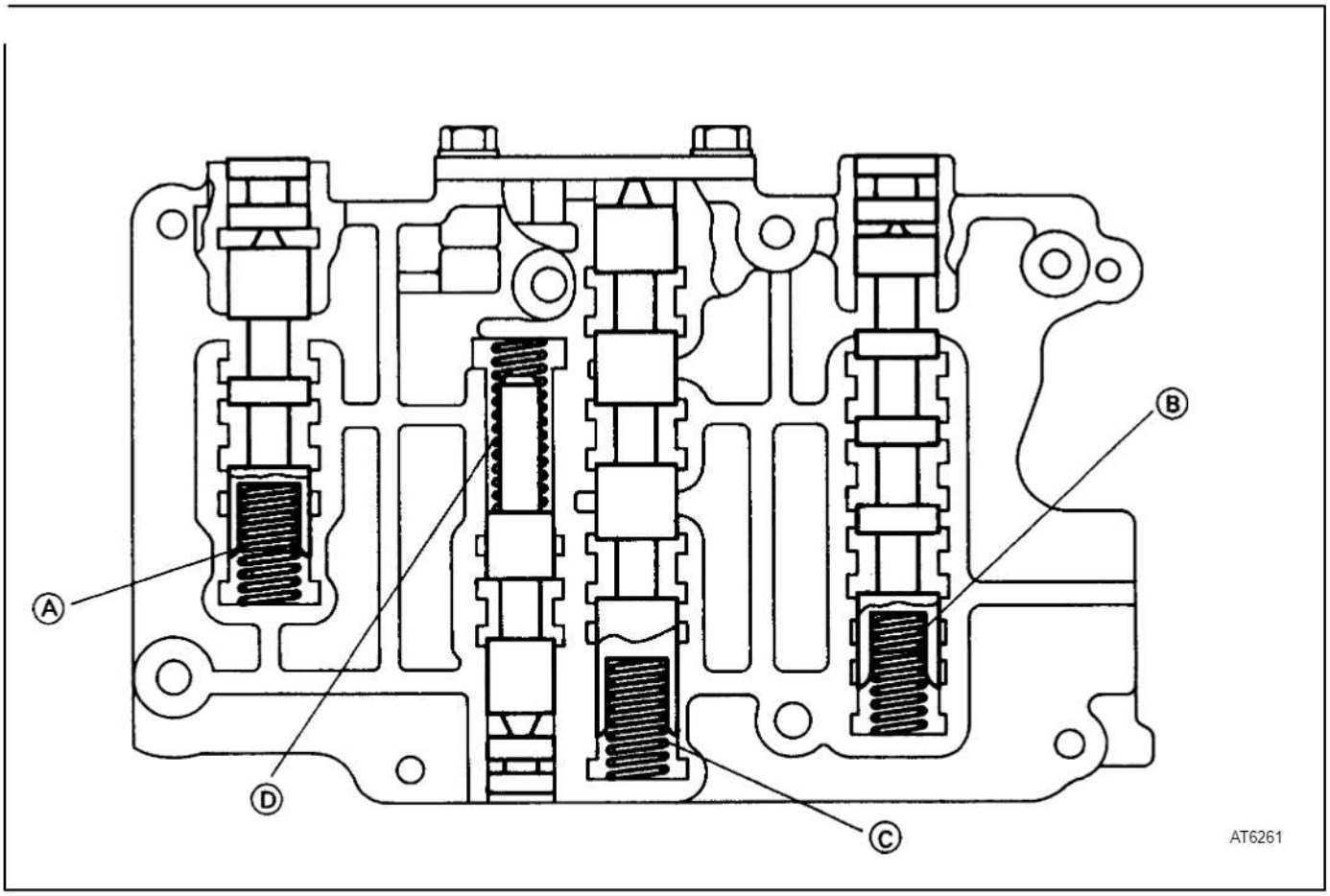
♦ Non-reusable part

AT6260

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ALVE BODY SPRINGS SPECIFICATIONS

HINT: During reassembly, please refer to the spring specifications below to help you to differentiate the different springs.

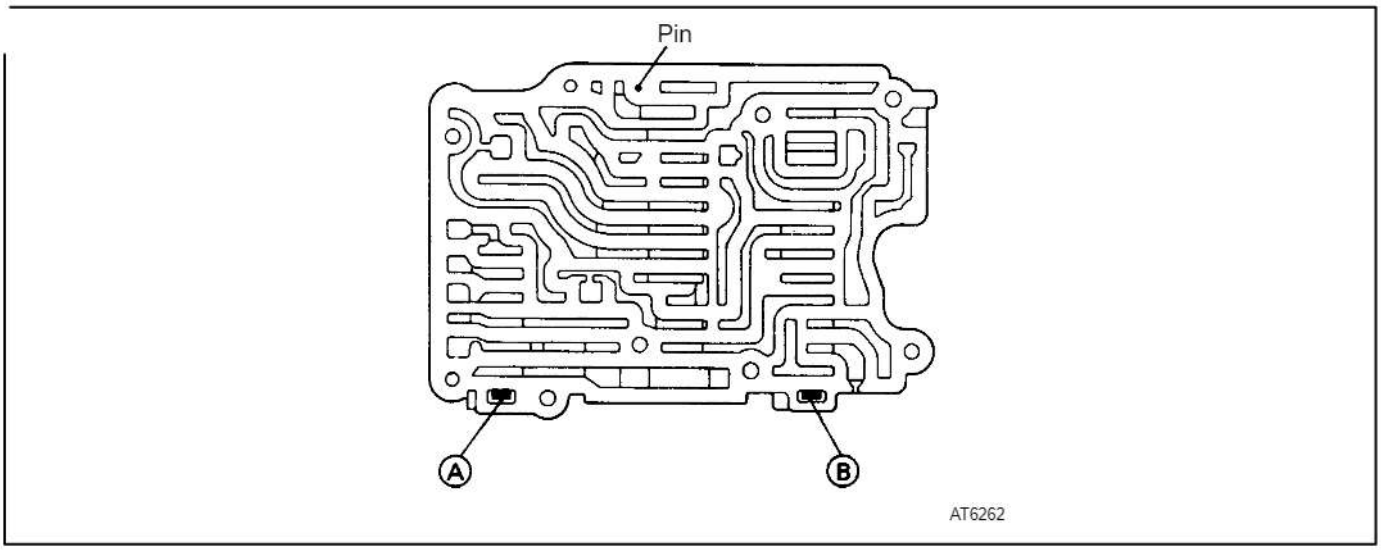


Mark	Name (Color)	Free length / Outer diameter mm (in.)	Total No. of coils
Ⓐ	3 - 4 shift valve (Blue)	29.15 (1.1476) / 8.9 (0.350)	12.0
Ⓑ	2 - 3 shift valve (Blue)	29.15 (1.1476) / 8.9 (0.350)	12.0
Ⓒ	1 - 2 shift valve (Blue)	29.15 (1.1476) / 8.9 (0.350)	12.0
Ⓓ	Reverse clutch sequence valve (None)	37.55 (1.4783) / 9.2 (0.362)	16.5

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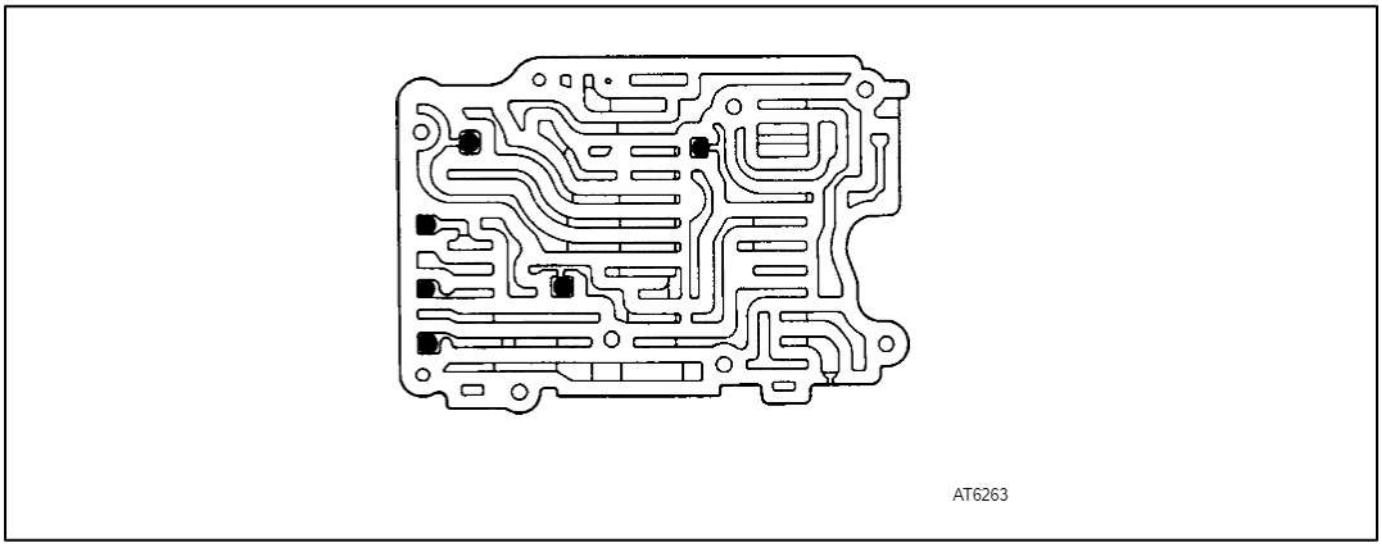
ETAINERS, PIN AND CHECK BALLS LOCATION

. RETAINERS AND PIN



Mark	Retainer	Height / Width / Thickness mm (in.)
Ⓐ	3 - 4 shift valve	10.0 (0.394) / 5.0 (0.197) / 3.2 (0.126)
Ⓑ	2 - 3 shift valve	10.0 (0.394) / 5.0 (0.197) / 3.2 (0.126)

2. CHECK BALLS

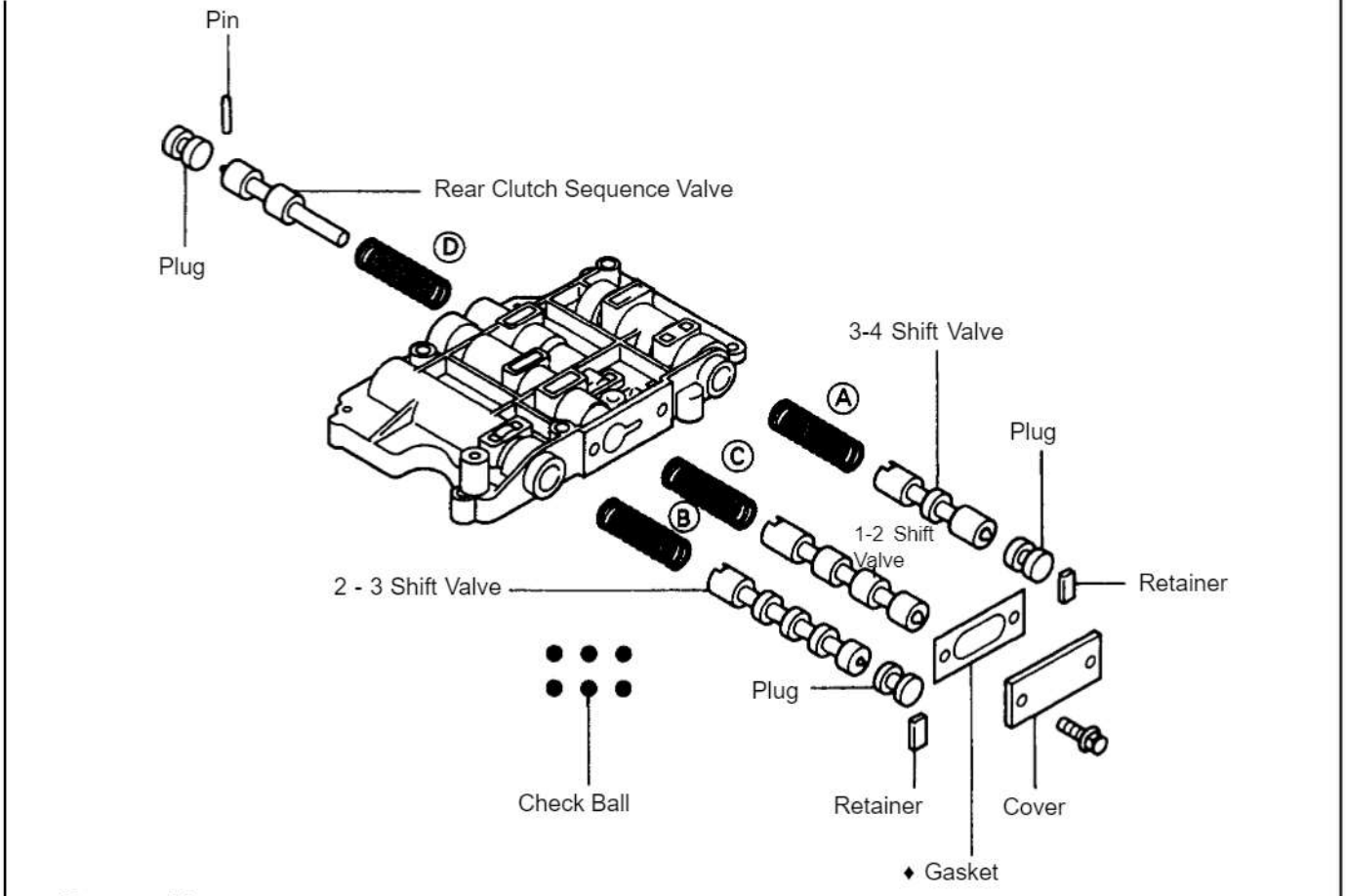


Check ball	Diameter mm (in.)
Steel ball	5.57 (0.2193)

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REAR UPPER VALVE BODY

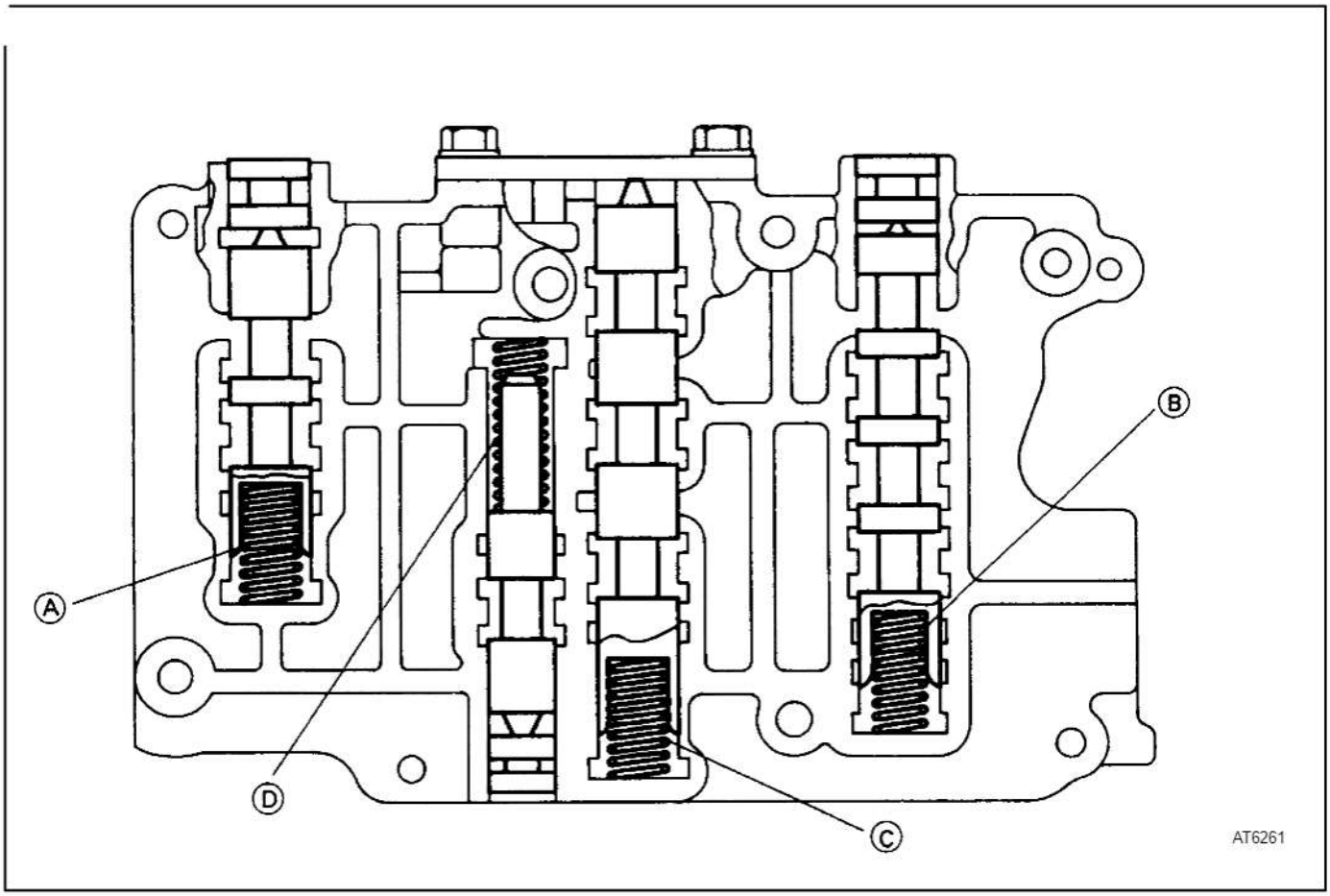
COMPONENTS



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ALVE BODY SPRINGS SPECIFICATIONS

HINT: During reassembly, please refer to the spring specifications below to help you to differentiate the different springs.

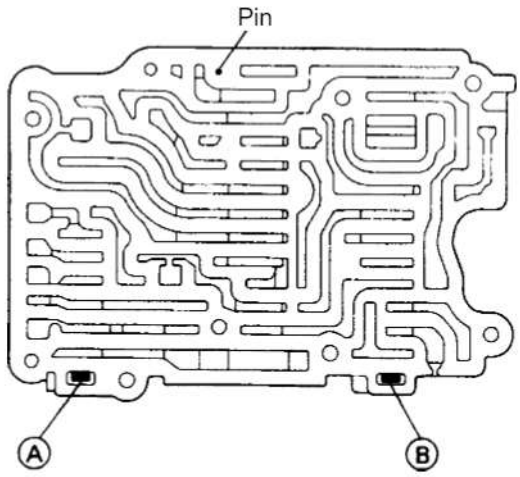


Mark	Name (Color)	Free length / Outer diameter mm (in.)	Total No. of coils
Ⓐ	3 - 4 shift valve (Blue)	29.15 (1.1476) / 8.9 (0.350)	12.0
Ⓑ	2 - 3 shift valve (Blue)	29.15 (1.1476) / 8.9 (0.350)	12.0
Ⓒ	1 - 2 shift valve (Blue)	29.15 (1.1476) / 8.9 (0.350)	12.0
Ⓓ	Reverse clutch sequence valve (None)	37.55 (1.4783) / 9.2 (0.362)	16.5

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RETAINERS, PIN AND CHECK BALLS LOCATION

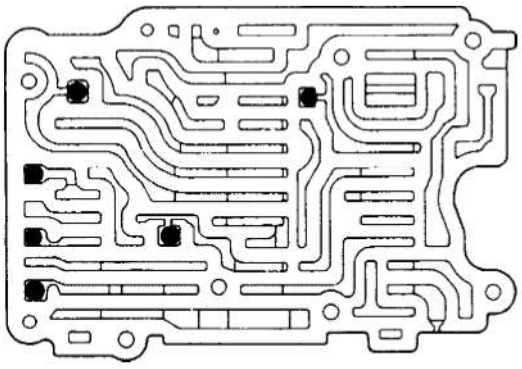
1. RETAINERS AND PIN



AT6262

Mark	Retainer	Height / Width / Thickness mm (in.)
Ⓐ	3 - 4 shift valve	10.0 (0.394) / 5.0 (0.197) / 3.2 (0.126)
Ⓑ	2 - 3 shift valve	10.0 (0.394) / 5.0 (0.197) / 3.2 (0.126)

2. CHECK BALLS



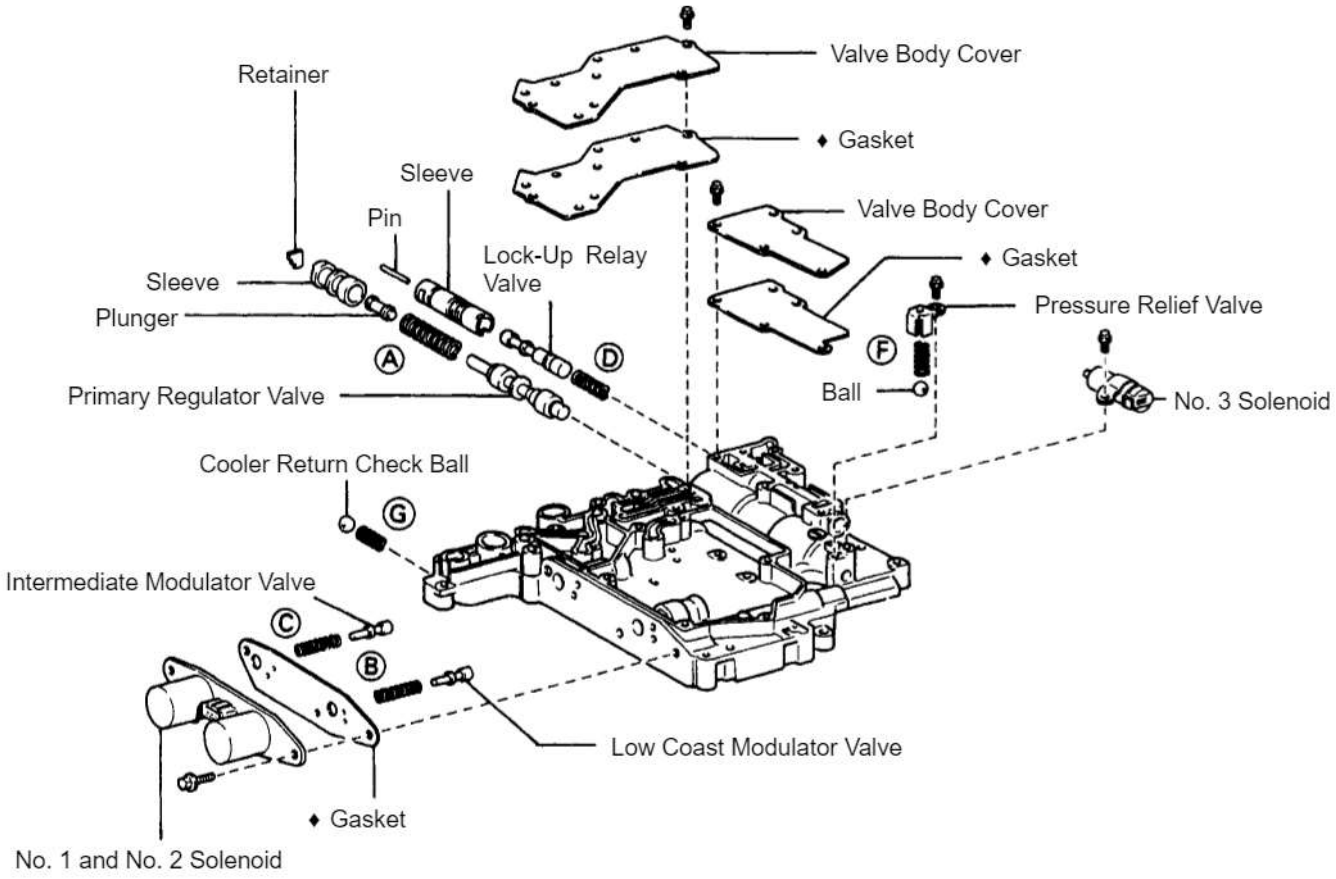
AT6263

Check ball	Diameter mm (in.)
Steel ball	5.57 (0.2193)

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LOWER VALVE BODY

COMPONENTS



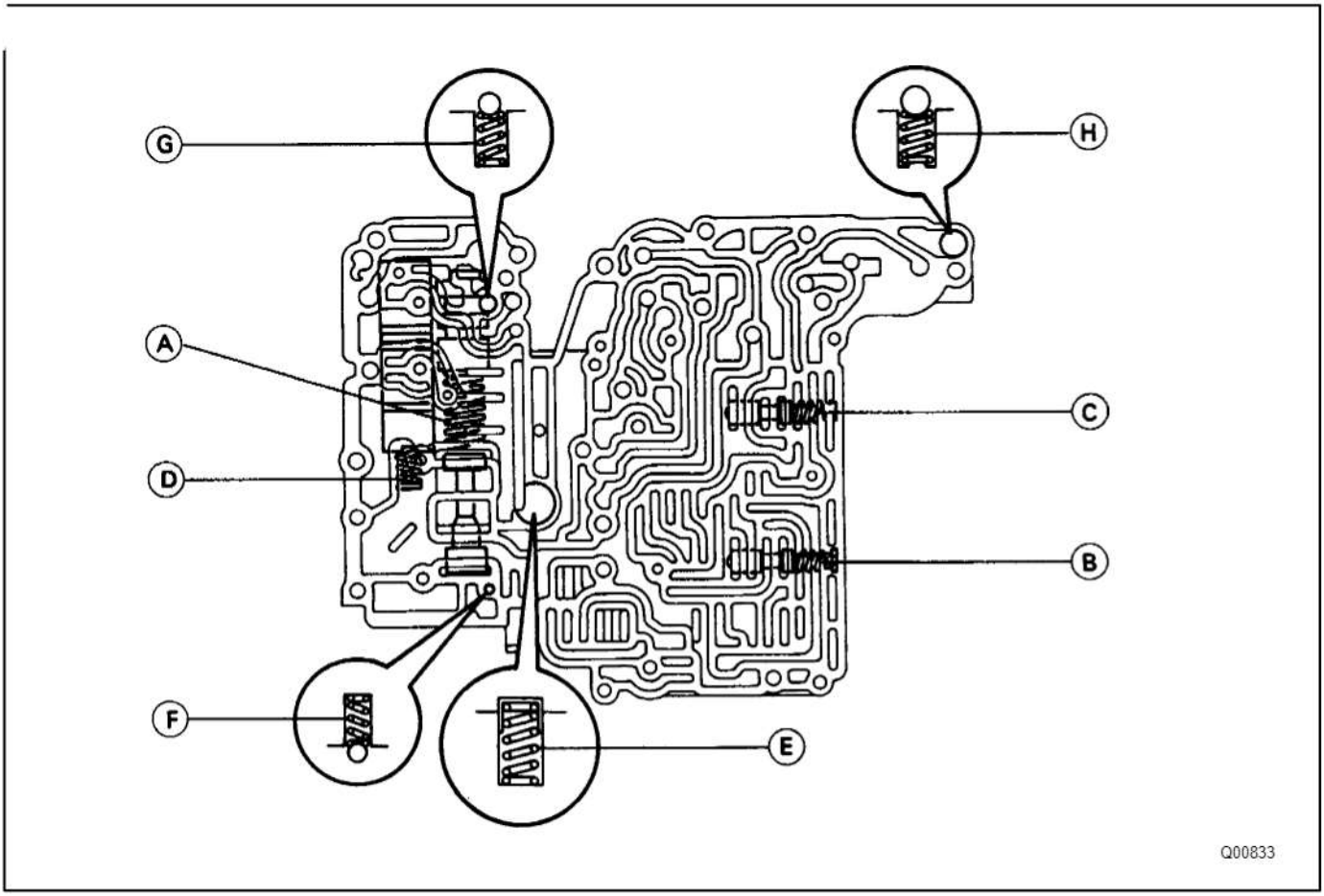
♦ Non-reusable part

AT6264

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ALVE BODY SPRINGS SPECIFICATIONS

HINT: During reassembly, please refer to the spring specifications below to help you to differentiate the different springs.

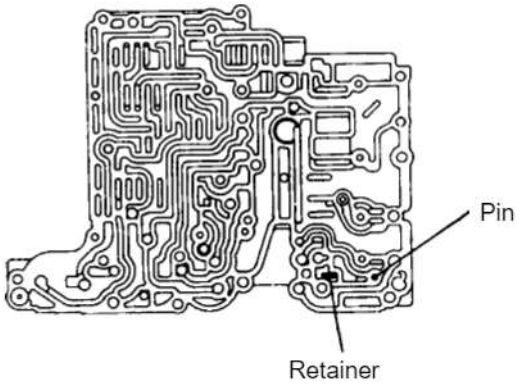


Mark	Name (Color)	Free length / Outer diameter mm (in.)	Total No. of coils
Ⓐ	Primary regulator valve (Blue)	50.28 (1.9795) / 17.02 (0.6701)	12.5
Ⓑ	Low coast modulator valve (None)	42.35 (1.6673) / 9.2 (0.362)	17.0
Ⓒ	Intermediate modulator valve (Red)	35.43 (1.3949) / 8.8 (0.348)	16.4
Ⓓ	Lock-up relay valve (Green)	32.60 (1.2835) / 11.4 (0.449)	10.25
Ⓔ	Oil cooler by-pass valve (Blue)	28.00 (1.1024) / 13.6 (0.535)	8.0
Ⓕ	Pressure relief valve (None)	32.14 (1.2654) / 13.14 (0.5173)	11.0
Ⓖ	Damping check valve (None)	20.00 (0.7874) / 4.97 (0.196)	18.0
Ⓗ	Cooler return check ball (None)	13.7 (0.539) / 10.5 (0.413)	10.0

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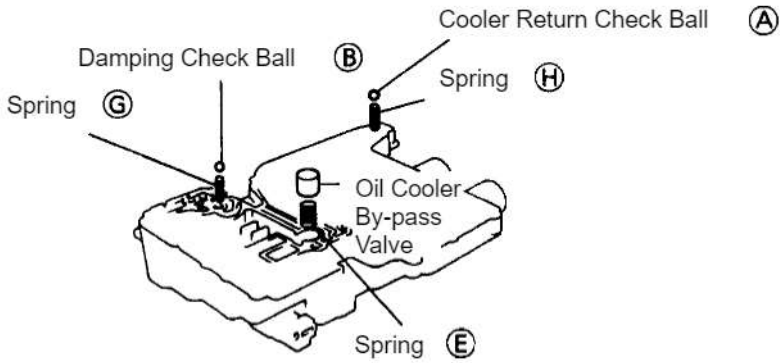
RETAINERS, CHECK BALLS AND SPRINGS LOCATION

. RETAINERS AND PIN



Retainer	Height / Width / Thickness mm (in.)
Primary regulator valve	17.5 (0.689) / 14.0 (0.551) / 3.2 (0.126)

2. CHECK BALL, SPRINGS AND VALVE

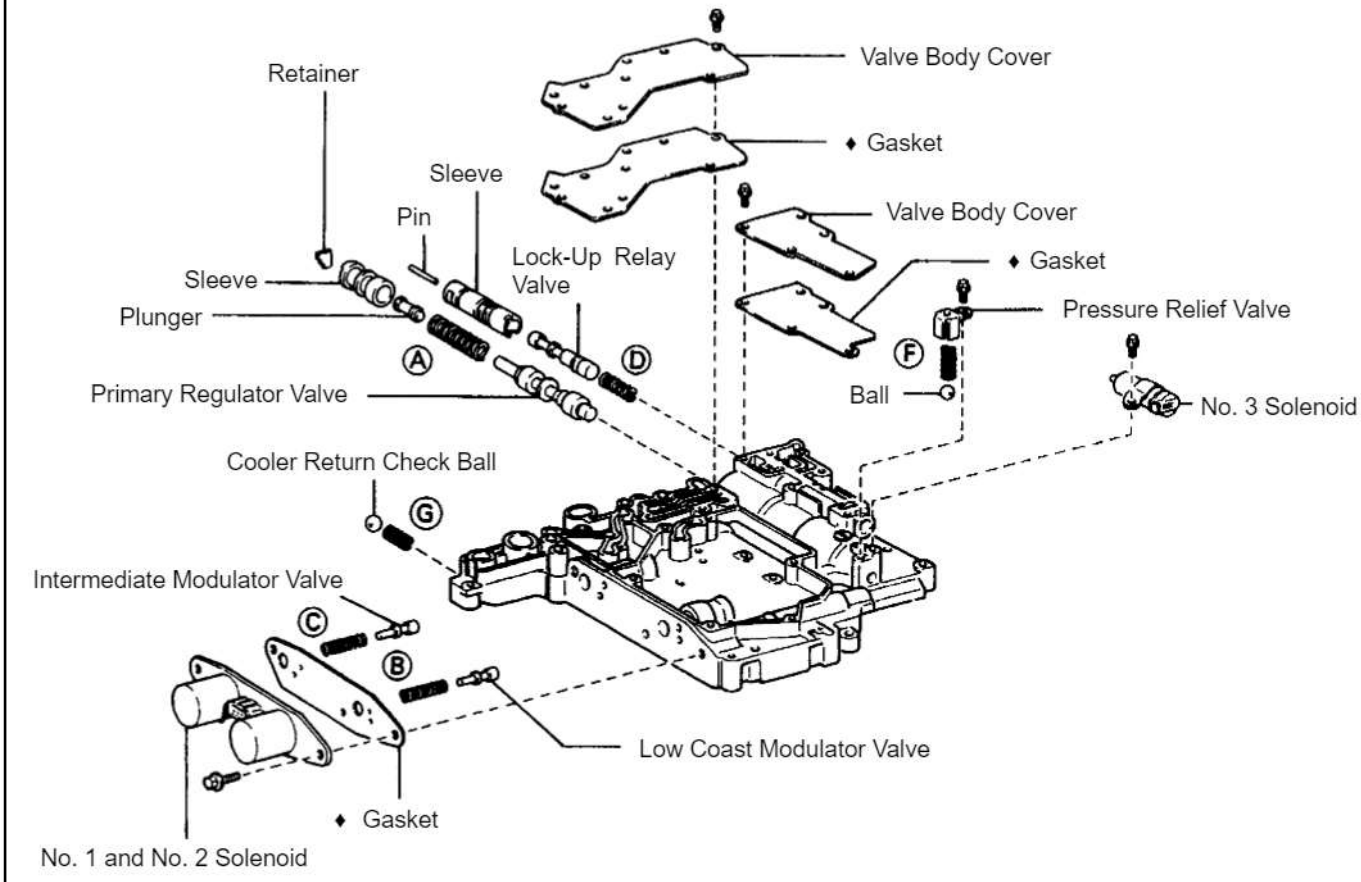


Mark	Check ball (Color)	Diameter mm (in.)
Ⓐ	Rubber ball (Yellow Ocher)	9.53 (0.3752)
Ⓑ	Rubber ball (Navy Blue)	6.35 (0.2500)

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LOWER VALVE BODY

COMPONENTS



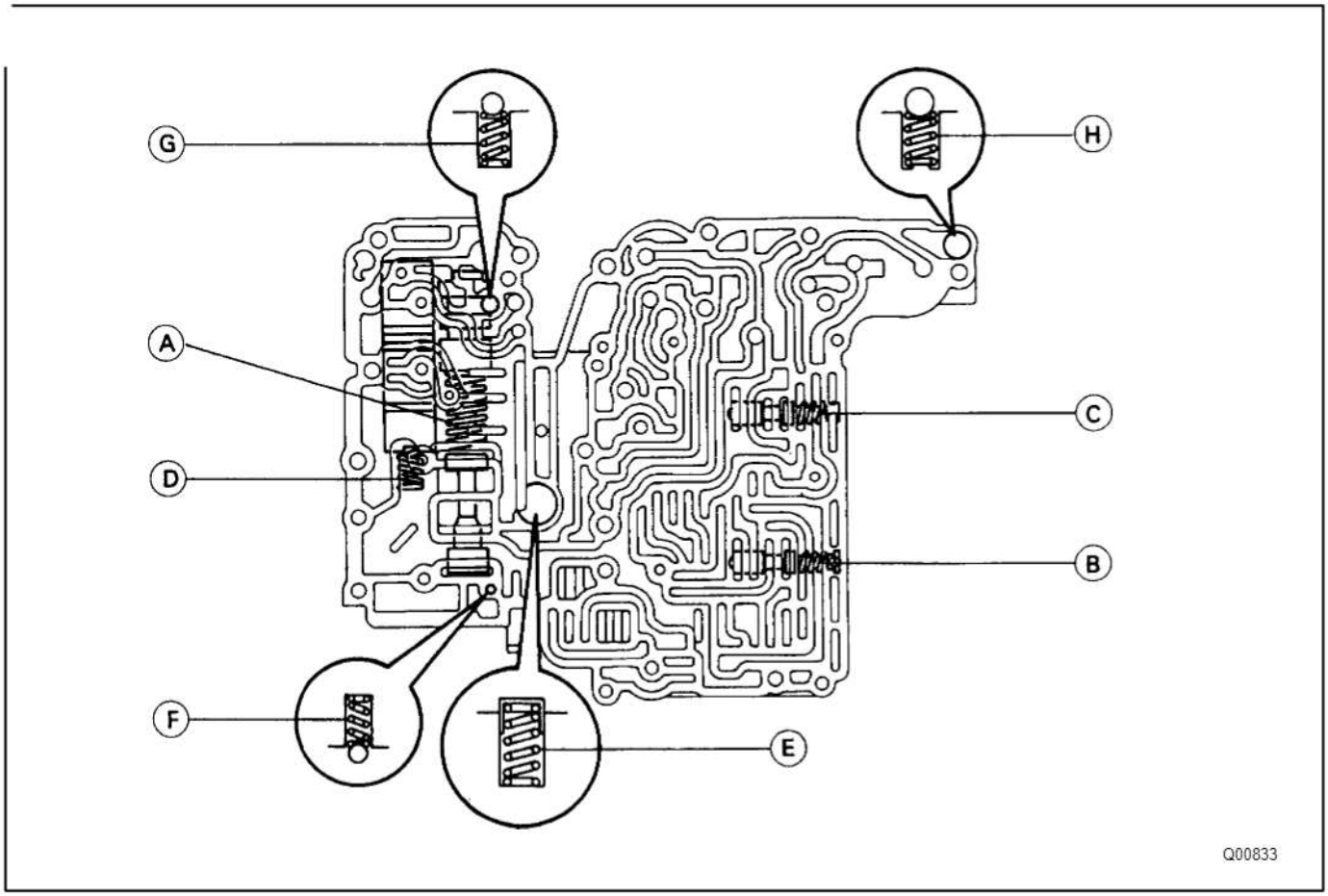
♦ Non-reusable part

AT6264

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ALVE BODY SPRINGS SPECIFICATIONS

HINT: During reassembly, please refer to the spring specifications below to help you to differentiate the different springs.

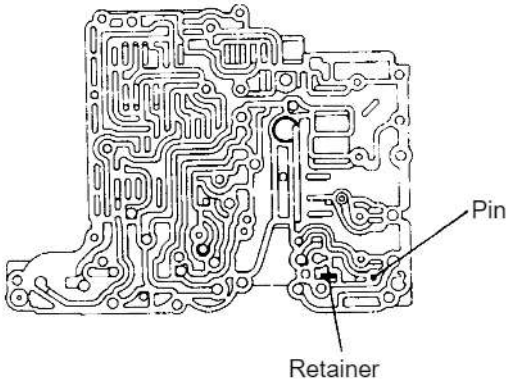


Mark	Name (Color)	Free length / Outer diameter mm (in.)	Total No. of coils
Ⓐ	Primary regulator valve (Blue)	50.28 (1.9795) / 17.02 (0.6701)	12.5
Ⓑ	Low coast modulator valve (None)	42.35 (1.6673) / 9.2 (0.362)	17.0
Ⓒ	Intermediate modulator valve (Red)	35.43 (1.3949) / 8.8 (0.346)	16.4
Ⓓ	Lock-up relay valve (Green)	32.60 (1.2835) / 11.4 (0.449)	10.25
Ⓔ	Oil cooler by-pass valve (Blue)	28.00 (1.1024) / 13.6 (0.535)	8.0
Ⓕ	Pressure relief valve (None)	32.14 (1.2654) / 13.14 (0.5173)	11.0
Ⓖ	Damping check valve (None)	20.00 (0.7874) / 4.97 (0.196)	18.0
Ⓗ	Cooler return check ball (None)	13.7 (0.539) / 10.5 (0.413)	10.0

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ETAINERS, CHECK BALLS AND SPRINGS LOCATION

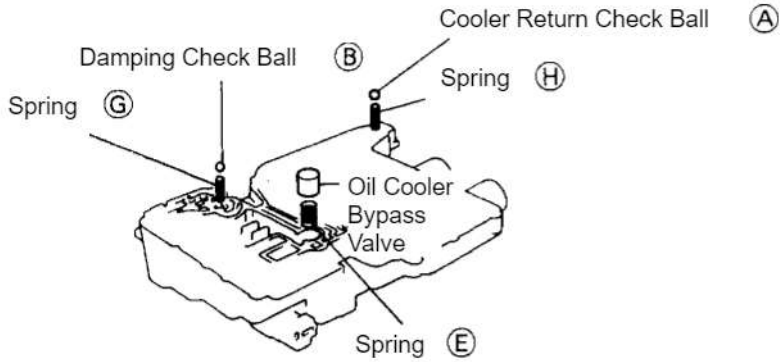
. RETAINERS AND PIN



AT6266

Retainer	Height / Width / Thickness mm (in.)
Primary regulator valve	17.5 (0.689) / 14.0 (0.551) / 3.2 (0.126)

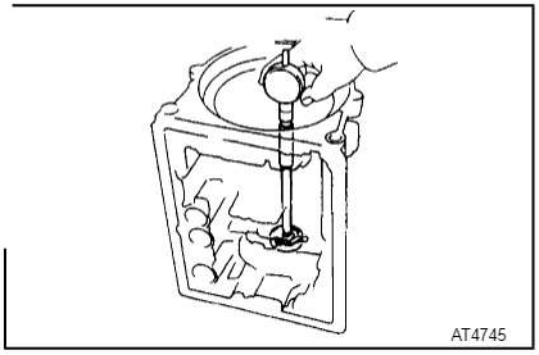
2. CHECK BALL, SPRINGS AND VALVE



AT1842

Mark	Check ball (Color)	Diameter mm (in.)
Ⓐ	Rubber ball (Yellow Ocher)	9.53 (0.3752)
Ⓑ	Rubber ball (Navy Blue)	6.35 (0.2500)

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TRANSMISSION CASE

TRANSMISSION CASE INSPECTION

INSPECT TRANSMISSION CASE BUSHING

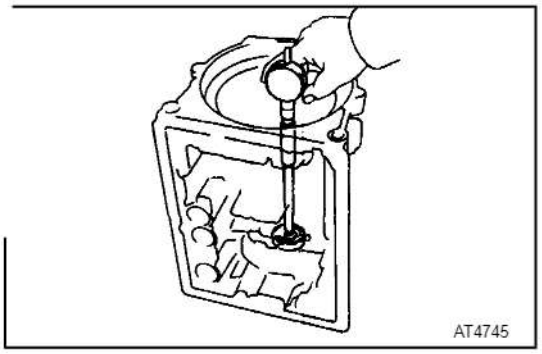
Using a cylinder gauge, measure the inside diameter of the transmission case rear bushing.

Maximum inside diameter:

38.19 mm (1.5035 in.)

If the inside diameter is greater than the maximum, replace the transmission case.

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TRANSMISSION CASE

TRANSMISSION CASE INSPECTION

INSPECT TRANSMISSION CASE BUSHING

Using a cylinder gauge, measure the inside diameter of the transmission case rear bushing.

Maximum inside diameter:

38.19 mm (1.5035 in.)

If the inside diameter is greater than the maximum, replace the transmission case.

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COMPONENT PARTS INSTALLATION

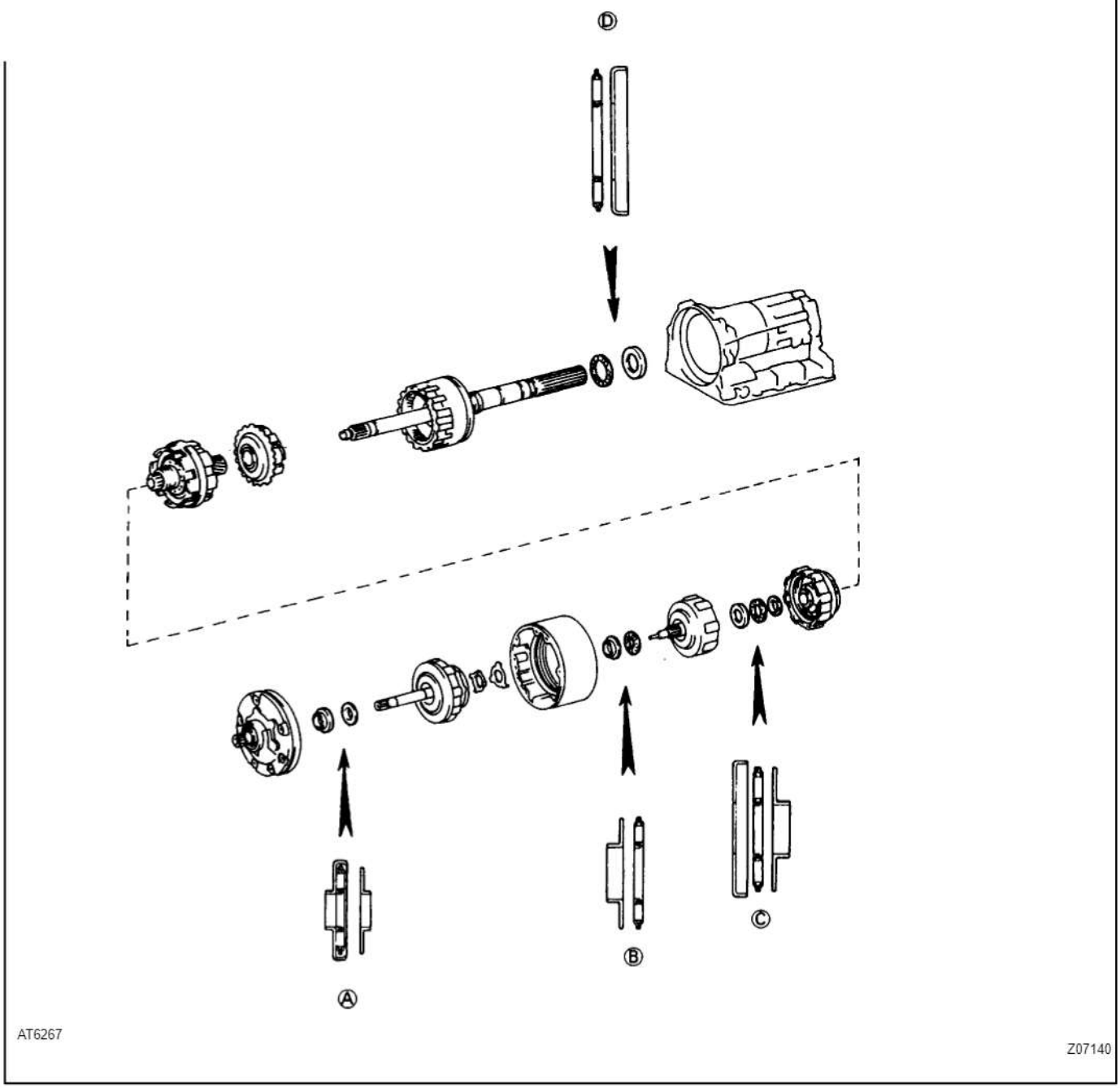
Disassembly, inspection and assembly of each component group have been indicated in the preceding chapter. Before assembly, make sure again that all component groups are assembled correctly.
If something wrong is found in a certain component group during assembly, inspect and repair this group immediately.
Recommended ATF:
DEXRON© II

GENERAL INSTALLATION NOTES

1. The automatic transmission is composed of highly precision-finished parts, necessitating careful inspection before assembly because even a small nick could cause fluid leakage of affect performance.
2. Before assembling new clutch discs, soak them in automatic transmission fluid for at least fifteen minutes.
3. Apply automatic transmission fluid on sliding or rotating surfaces of parts before assembly.
4. Use petroleum jelly to keep small parts in their places.
5. Do not use adhesive cements on gaskets and similar parts.
6. When assembling the transmission, be sure to use new gaskets and O-rings.
7. Dry all parts with compressed air, never use shop rags.

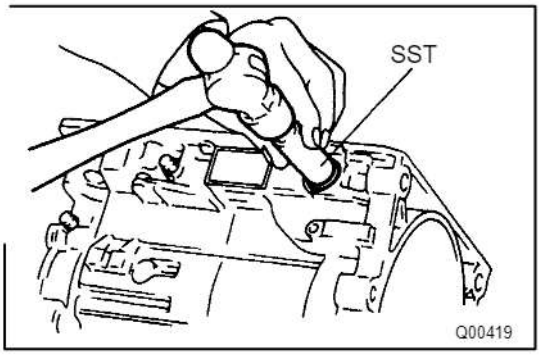
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BEARINGS AND RACES LOCATION



Mark	Front Race Diameter Inside / Outside mm (in.)	Thrust Bearing Diameter Inside / Outside mm (in.)	Rear Race Diameter Inside / Outside mm (in.)
Ⓐ	—	24.3 (0.957) / 43.2 (1.701)	24.3 (0.957) / 39.1 (1.539)
Ⓑ	24.1 (0.949) / 37.3 (1.469)	23.4 (0.921) / 37.5 (1.476)	—
Ⓒ	30.1 (1.185) / 48.5 (1.909)	28.4 (1.118) / 46.4 (1.827)	27.6 (1.087) / 44.5 (1.752)
Ⓓ	—	38.2 (1.504) / 55.2 (2.173)	39.2 (1.543) / 57.5 (2.264)

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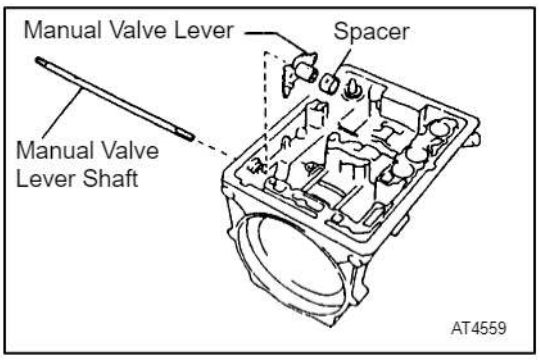
TRANSMISSION INSTALLATION

1. INSTALL MANUAL VALVE LEVER, SHAFT AND OIL SEALS

(a) Using SST, drive in two new oil seals as far as they will go.

SST 09350-20015 (09361-30011)

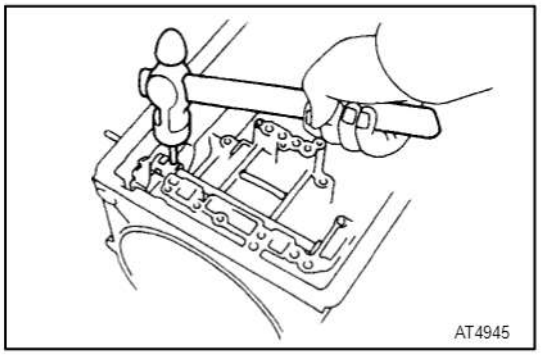
(b) Coat the oil seal lips with MP grease.



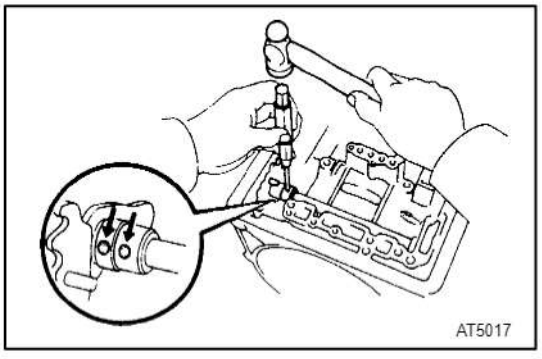
(c) Assembly a new spacer to the manual valve lever.

(d) Install the manual valve lever shaft to the transmission case through the manual valve lever.

NOTICE: Be careful not to damage the oil seal.



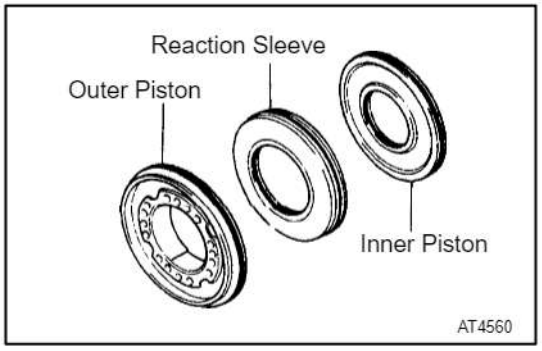
(e) Drive in the pin to the shaft.



(f) Match the spacer hole to the lever calking hollow and calk the spacer to the lever.

(g) Make sure the manual valve lever shaft turns smoothly.

2. INSTALL COMPONENTS OF NO. 3 BRAKE PISTON



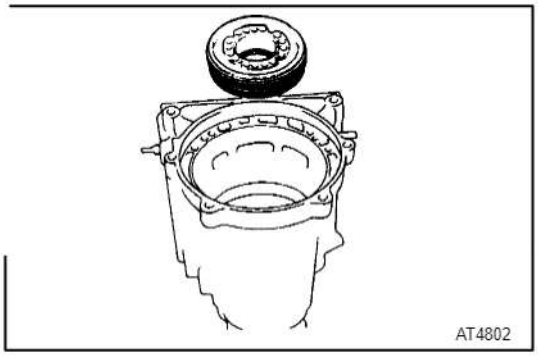
(a) Coat five new O-rings with ATF.

(b) Install the O-rings to the inner piston, reaction sleeve and outer piston.

NOTICE: The thinner O-ring goes on the outside of the reaction sleeve.

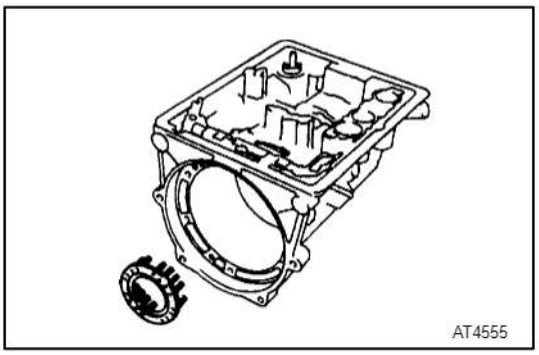
(c) Assembly the inner piston, reaction sleeve and outer piston.

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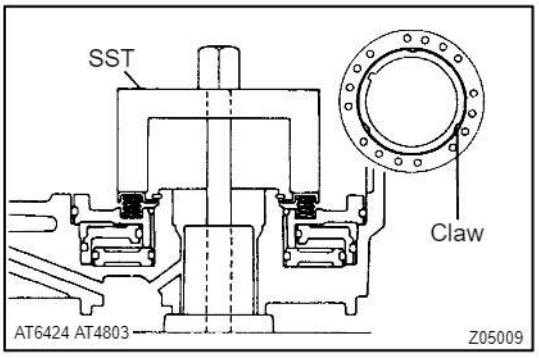


(d) Stand up the transmission case.

(e) Being careful not to damage the O-rings, press in the assembled pistons into the transmission case with hand.



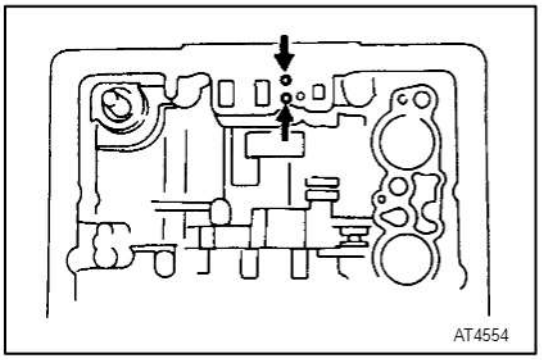
(f) Place the piston return spring onto the outer piston.



(g) Set SST and compress the return springs with SST.

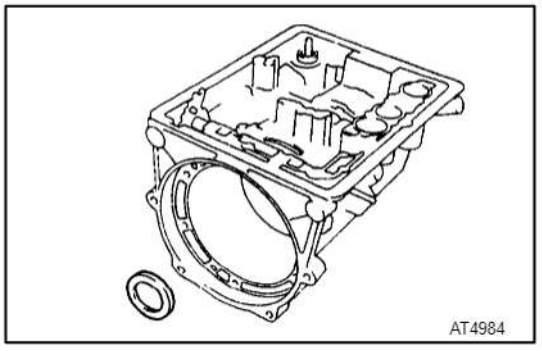
SST 09350-20015 (09369-20040)

(h) Install the snap ring with snap ring pliers. Be sure the end gap of the snap ring is not aligned with the spring seat claw.



3. CHECK NO. 3 BRAKE PISTONS MOVING

Make sure the No. 3 brake pistons move smoothly when applying and releasing the compressed air into the transmission case.



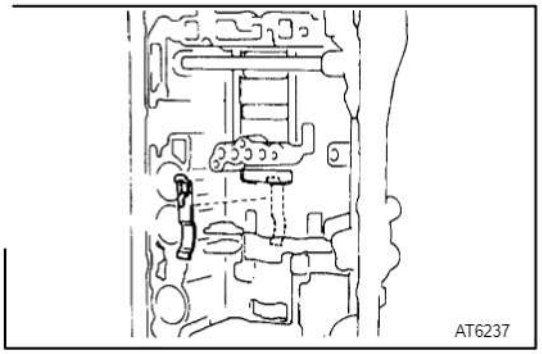
4. INSTALL RACE

Coat the race with petroleum jelly and install it onto the transmission case.

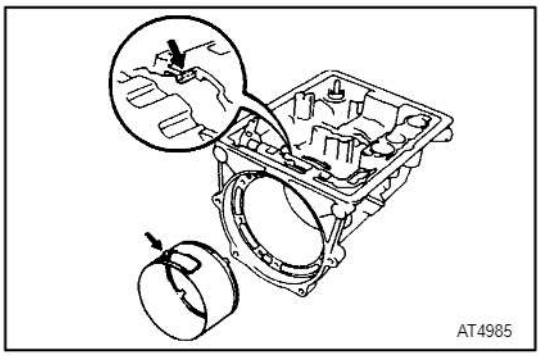
Race diameter:

	Inside mm (in.)	Outside mm (in.)
Race	39.2 (1.543)	57.5 (2.264)

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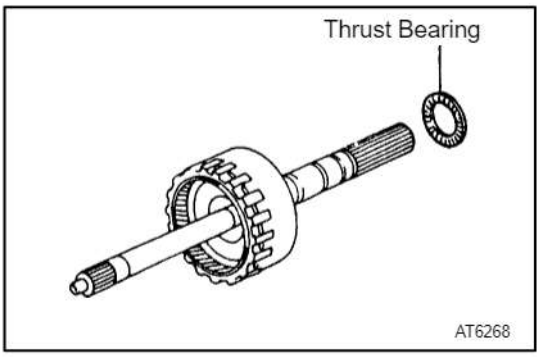


5. INSTALL LEAF SPRING



6. INSTALL BRAKE APPLY TUBE

Install the tube, aligning its locking tab with the cutout of the case.
HINT: Make sure that the lips of the tube end are completely inserted onto the outer piston.

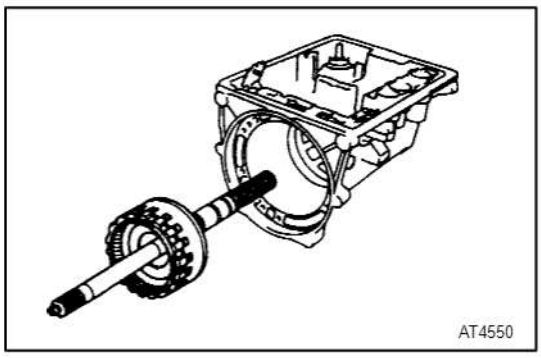


7. INSTALL REAR PLANETARY GEAR UNIT AND OUTPUT SHAFT

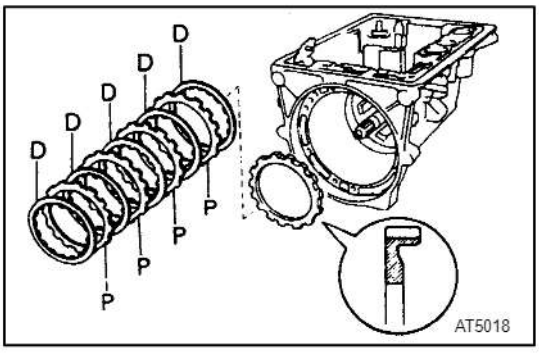
(a) Coat the two bearings with petroleum jelly and install them onto the rear planetary gear unit.

Bearing diameter:

	Inside mm (in.)	Outside mm (in.)
Thrust bearing	38.2 (1.504)	55.2 (2.173)



(b) Install the rear planetary gear unit to the transmission case.

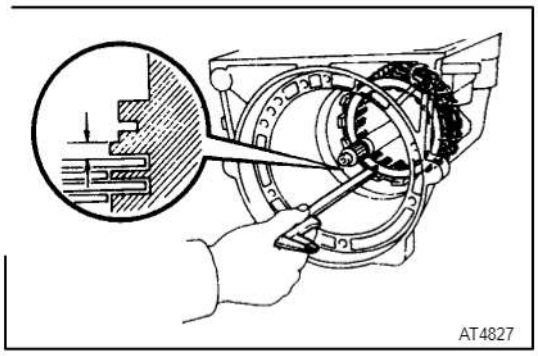


8. INSTALL PRESSURE PLATE, DISCS AND PLATES

(a) Install the pressure plate, the flat surface facing forward.

(b) Install the five discs and four plates.
Install in order: P = Plate D = Disc
D-P-D-P-D-P-D-P-D

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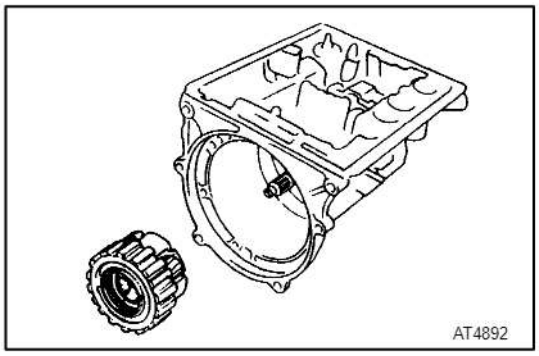
9. CHECK PACK CLEARANCE OF NO. 3 BRAKE

Using calipers, measure the clearance between the disc and transmission case, as shown.

Clearance:

0.61 - 2.64 mm (0.0240 - 0.1039 in.)

If the values are nonstandard, check for an improper installation.

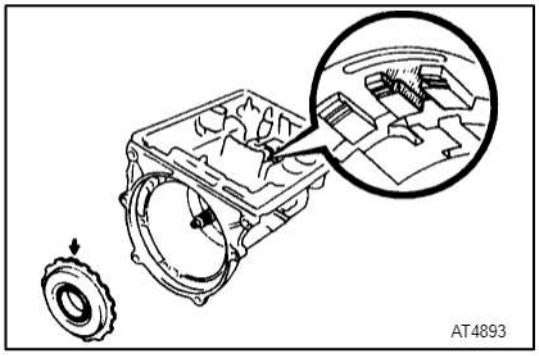


10. INSTALL FRONT PLANETARY GEAR UNIT

(a) Remove the one-way clutch inner race from the planetary gear unit.

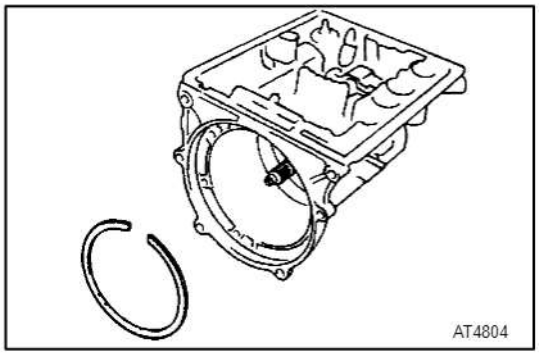
(b) Install the front planetary gear unit.

HINT: Mesh the splines of the planetary gear with the flukes of the discs by rotating and pushing the planetary gear.

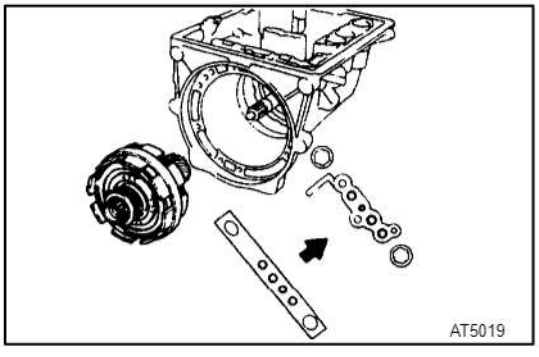


(c) Position the notched tooth of the inner race toward the valve body side of the case. Push it into place.

HINT: The inner race is correctly installed if the snap ring groove is fully visible.



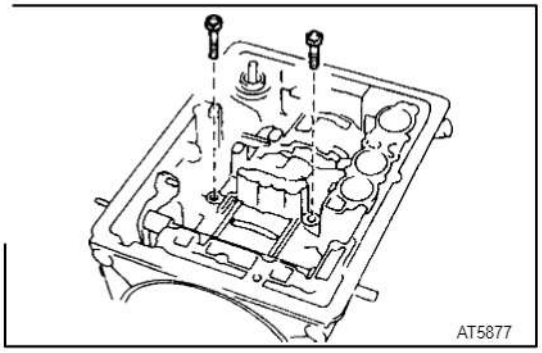
(d) Using a screwdriver, install the snap ring.



11. INSTALL CENTER SUPPORT

(a) Aim the bolt and oil holes of the center support toward the valve body side, and align them with the bolt and oil holes of the transmission case and insert.

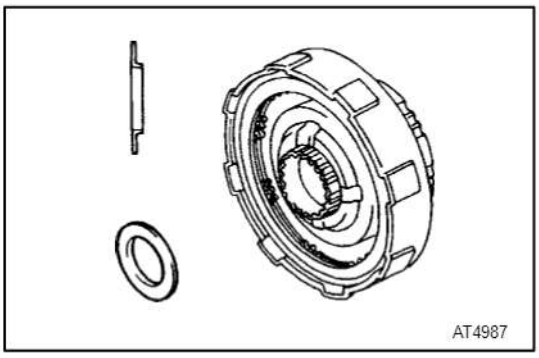
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(b) Install the two bolts and tighten the bolts.

HINT: First tighten the accumulator piston side.

Torque: 25 N-m (260 kgf-cm, 19 ft-lbf)

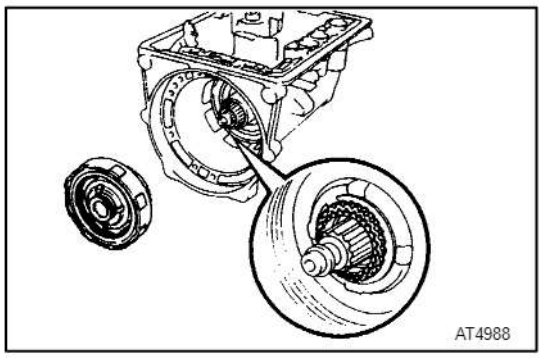


12. INSTALL REAR CLUTCH

(a) Coat the race with petroleum jelly and install it onto the rear clutch.

Race diameter:

	Inside mm (in.)	Outside mm (in.)
Race	27.6 (1.087)	44.5 (1.752)

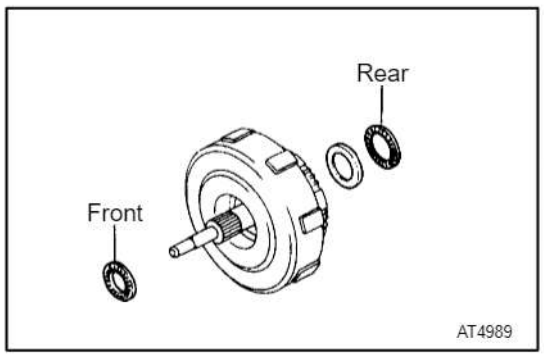


(b) Install the rear clutch.

HINT:

Mesh the splines of the rear clutch with the flukes of the disc by rotating and pushing the rear clutch.

If the rear clutch is fully meshed with the center support, the splined center of the clutch will be flush with the end of the sun gear shaft.

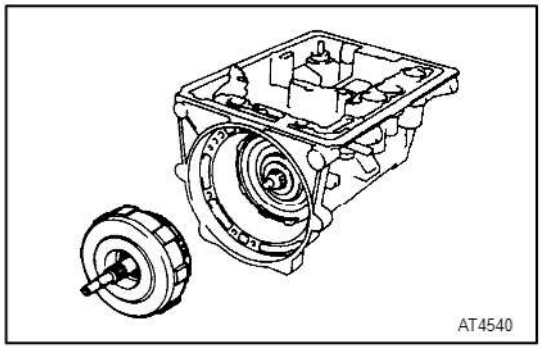


13. INSTALL FRONT CLUTCH

(a) Coat the bearing and race with petroleum jelly and install them onto the front clutch.

Bearing and race diameter:

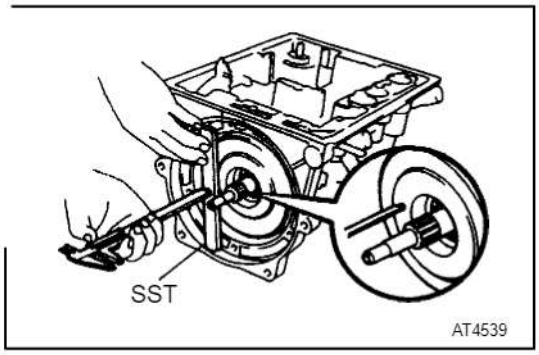
	Inside mm (in.)	Outside mm (in.)
Bearing (Front)	23.4 (0.921)	37.5 (1.476)
Race	30.1 (1.185)	48.5 (1.909)
Bearing (Rear)	28.4 (1.118)	46.4 (1.827)



(b) Install the front clutch.

HINT: Mesh the splines of the front clutch with the flukes of the discs by rotating and pushing the front clutch.

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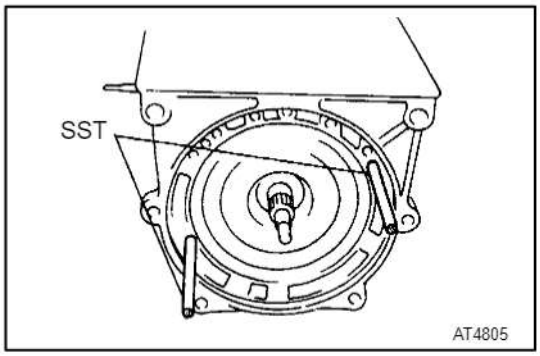


14. MEASURE INSTALLATION DISTANCE OF FRONT CLUTCH

(a) Place SST on the transmission case.

SST 09350-20015 (09370-12010)

(b) Using calipers, measure the distance between the tops of SST and the clutch drum.
If the distance corresponds to that during disassembly, the front clutch is installed correctly.

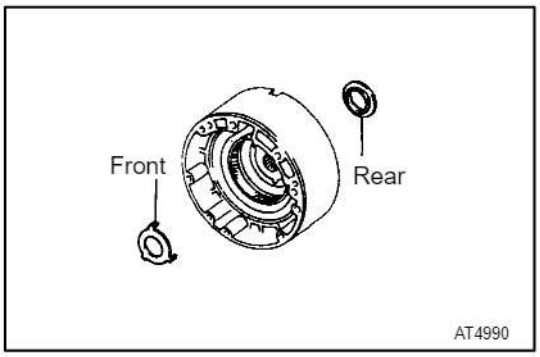


15. INSTALL OVERDRIVE CASE

(a) Finger tighten two SST on the transmission case.

HINT: Remove the SST after installation of the oil pump.

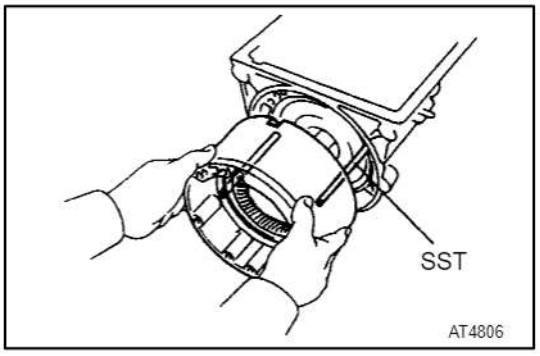
SST 09350-20015 (09362-30011)



(b) Coat the race and thrust washer with petroleum jelly and install them onto the overdrive case.

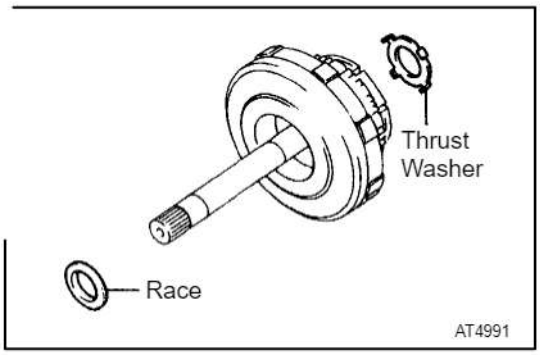
Races diameter:

	Inside mm (in.)	Outside mm (in.)
Race	24.1 (0.949)	37.3 (1.469)



(c) Insert the overdrive case gently through the two guide bolts (SST) with cutout portion of the case facing the valve body side.

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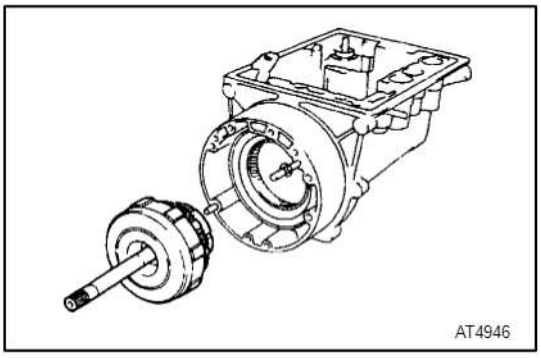
16. INSTALL OVERDRIVE PLANETARY GEAR UNIT WITH OVERDRIVE DIRECT CLUTCH AND ONE-WAY CLUTCH

(a) Coat the thrust washer with petroleum jelly and install it onto the overdrive planetary gear.

(b) Coat the race with petroleum jelly and install it onto the overdrive planetary gear.

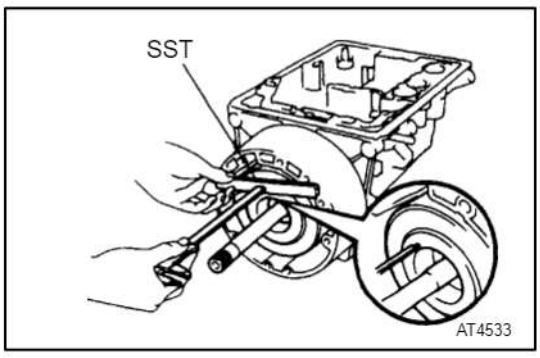
Race diameter:

	Inside mm (in.)	Outside mm (in.)
Race	24.3 (0.957)	39.2 (1.543)



(c) Install the overdrive planetary gear with the overdrive direct clutch and one-way clutch.

HINT: Mesh the splines of the overdrive planetary gear with the flukes of the discs by rotating and pushing the overdrive planetary gear.

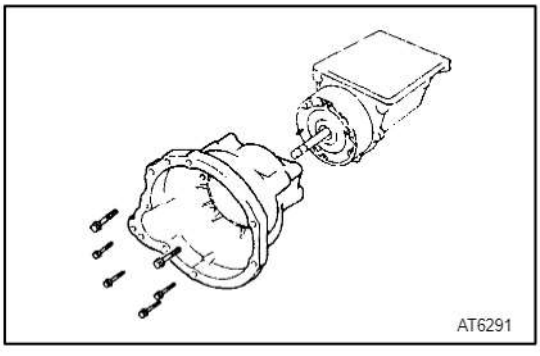


17. MEASURE INSTALLATION DISTANCE OF OVERDRIVE DIRECT CLUTCH

(a) Place SST on the overdrive case.

SST 09350-20015 (09370-12010)

(b) Using calipers, measure distance between the tops of SST and the clutch drum.
If the distance corresponds to that during disassembly, the overdrive direct clutch is installed correctly.



18. INSTALL TRANSMISSION HOUSING

(a) Coat a new O-ring with ATF and install it around the overdrive case.

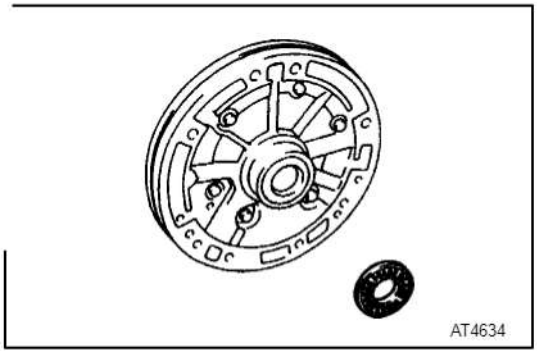
(b) Install the transmission housing and six bolts.

(c) Tighten the bolts.

Torque:

10 mm bolt 34 N-m (345 kgf-cm, 25 ft-lbf)
12 mm bolt 57 N-m (580 kgf-cm, 42 ft-lbf)

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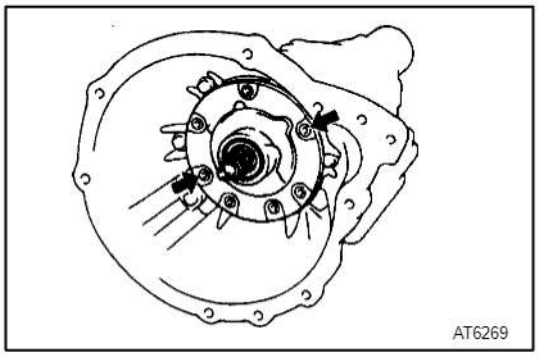

AT4634

19. INSTALL OIL PUMP

(a) Coat the assembled bearing and race with petroleum jelly and install it onto the oil pump.

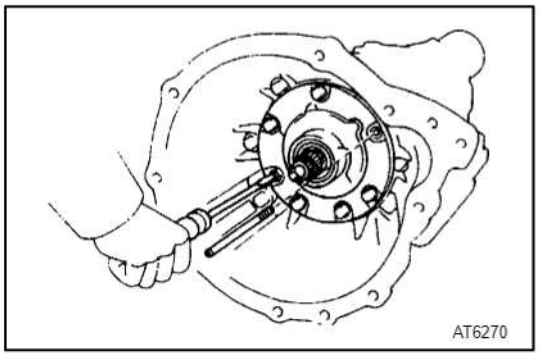
Assembled bearing and race:

	Inside mm (in.)	Outside mm (in.)
Assembled bearing and race	24.3 (0.957)	43.2 (1.701)


AT6269

(b) Coat a new O-ring with ATF and install it around the pump body.

(c) Install the oil pump gently through the two guide bolts (SST).


AT6270

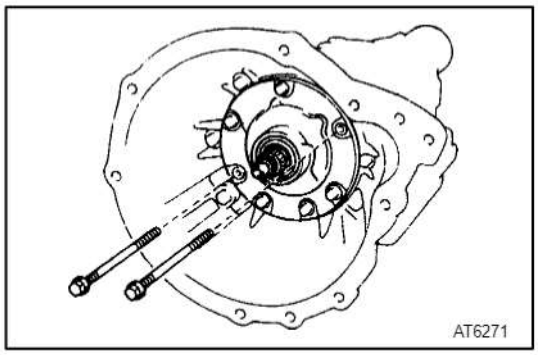
(d) Apply sealant to the bolt heads.

Sealant:

Part No. 08833 - 00080 THREE BOND 1344, LOCTITE 242 or equivalent

(e) Finger tighten the five bolts.

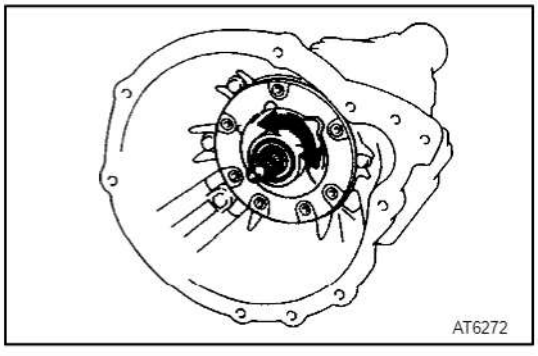
(f) Using a screwdriver, remove the two SST.


AT6271

(g) Finger tighten the two bolts.

(h) Tighten all bolts.

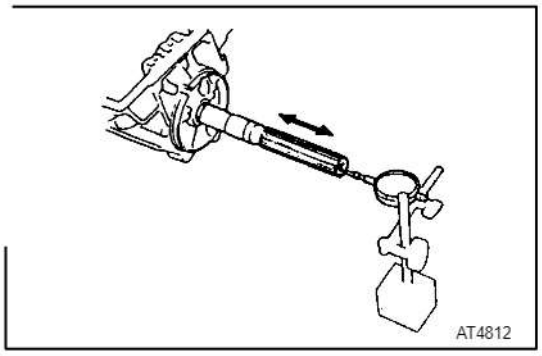
Torque: 21 N-m (215 kgf-cm, 16 ft-lbf)


AT6272

20. CHECK INPUT SHAFT ROTATION

Make sure the input shaft rotates smoothly.

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21. CHECK OUTPUT SHAFT

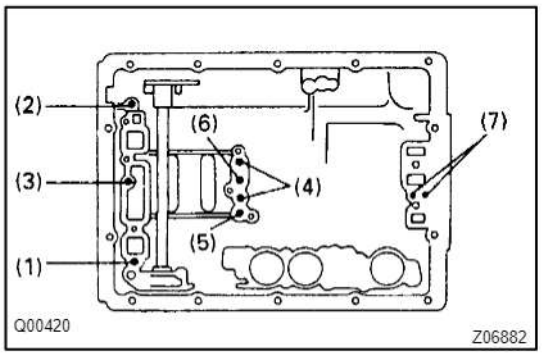
(a) Using a dial indicator, measure the end play of the output shaft with hand.

End play:

0.3 - 0.9 mm (0.012 - 0.035 in.)

If the values are nonstandard, check for an improper installation.

(b) Check to see that output shaft rotates smoothly.



22. INDIVIDUAL PISTON OPERATION INSPECTION

Check for the sound of operation while applying compressed air into the oil hole indicated in the illustration.

(1) O/D direct clutch

(2) O/D brake

(3) Rear clutch

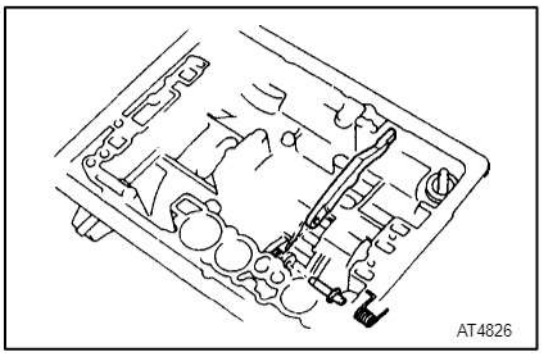
(4) Front clutch

(5) No. 1 brake

(6) No. 2 brake

(7) No. 3 brake

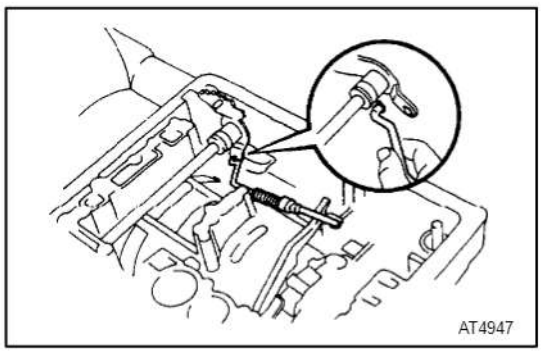
If there is no noise, disassemble and check the installation condition of the parts.



23. INSTALL PARKING LOCK PAWL AND ROD

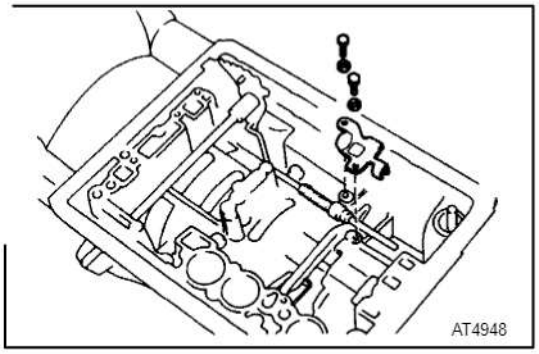
(a) Install the E-ring to the shaft.

(b) Install the parking lock pawl, shaft and spring.



(c) Connect the parking lock rod to the manual valve lever.

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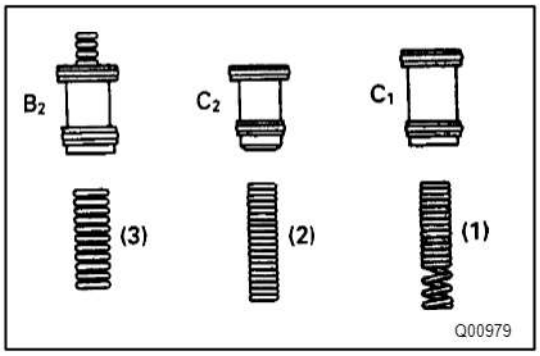


(d) Install the parking lock pawl bracket.

(e) Install and tighten the two bolts with the wave washers.

Torque: 7.4 N-m (75 kgf-cm, 65 in.-lbf)

(f) Shift the manual valve lever to P position, and confirm the planetary ring gear is correctly locked up by the lock pawl.



24. INSTALL ACCUMULATOR SPRINGS AND PISTONS

(a) Coat new O-rings with ATF and install them to the pistons.

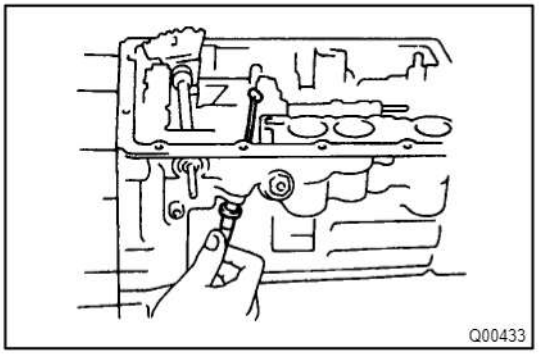
(b) Install the three springs and three accumulator pistons to the bore, as shown in the illustration.

◆Piston

Piston	Outer diameter mm (in.)
C_1	31.8 (1.252)
C_2	31.8 (1.252)
B_2	34.8 (1.370)

Spring

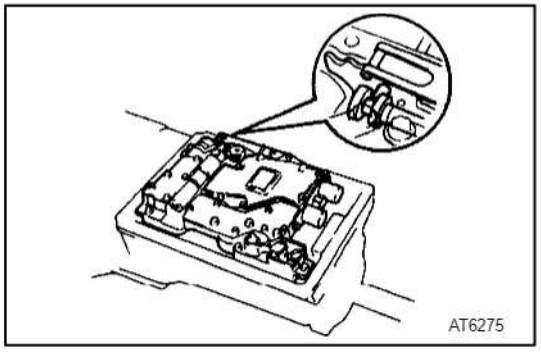
Piston (Color)		Free length mm (in.)	Outer diameter mm (in.)
(1) C_1	(None)	64.4 (2.535)	17.5 (0.689)
(2) C_2	(None)	57.4 (2.260)	15.9 (0.626)
(3) B_2	(Yellow)	32.0 (1.260)	15.4 (0.606)



25. INSTALL THROTTLE CABLE

(a) Coat a new O-ring with ATF and install it to the cable.

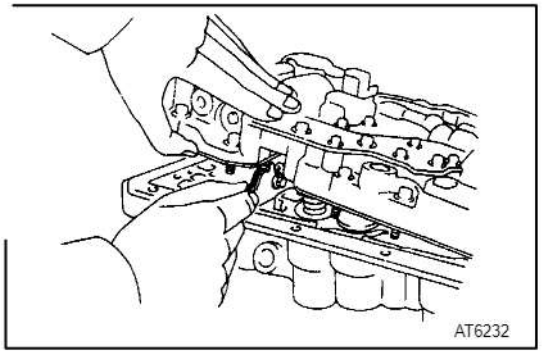
(b) Install the cable to the case.



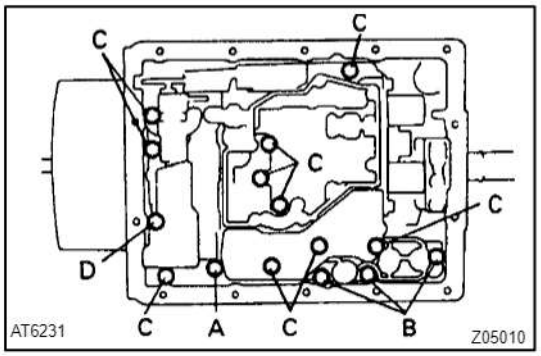
26. INSTALL VALVE BODY

(a) Align the groove of the manual valve to the pin of the lever.

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(b) Connect the throttle cable to the cam.



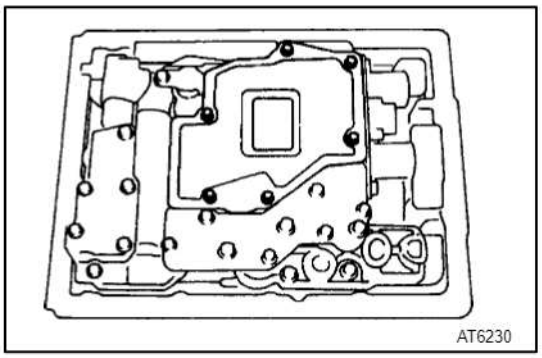
(c) Install the seventeen bolts.

HINT: Each bolt length (mm, in.) is indicated below.

Torque: 10 N-m (100 kgf-cm, 7 ft-lbf)

Bolt length:

A bolt 25 mm (0.98 in.)
B bolt 30 mm (1.18 in.)
C bolt 47 mm (1.85 in.)
D bolt 60 mm (2.36 in.)



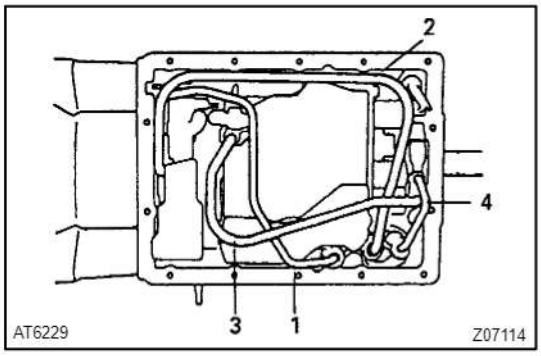
27. INSTALL OIL STRAINER

(a) Install a new gasket to the oil strainer.

(b) Install the oil strainer to the valve body.

(c) Install and tighten the six bolts.

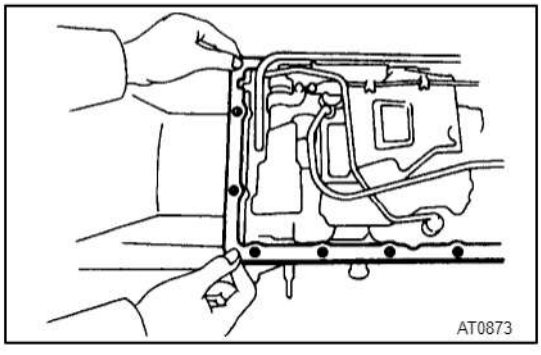
Torque: 5.4 N-m (55 kgf-cm, 48 in.-lbf)



28. INSTALL OIL TUBES

Using a plastic hammer, install the two tubes into position.

NOTICE: Be careful not to bend or damage the tubes.



29. INSTALL OIL PAN

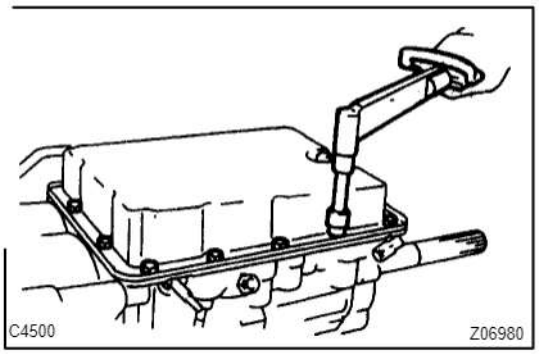
(a) Install the two magnets in the oil pan.

NOTICE: Make sure that the magnets do not interfere with the oil tubes.

(b) Install a new gasket to the transmission case.

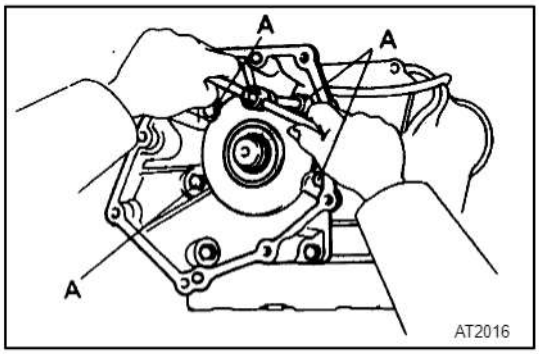
HINT: Align the cut part of the gasket and case.

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(c) Install and tighten the fourteen bolts.

Torque: 4.4 N-m (45 kgf-cm. 39 in.-lbf)



30. INSTALL TRANSFER ADAPTOR

(a) Install the transfer adaptor with a new gasket to the case.

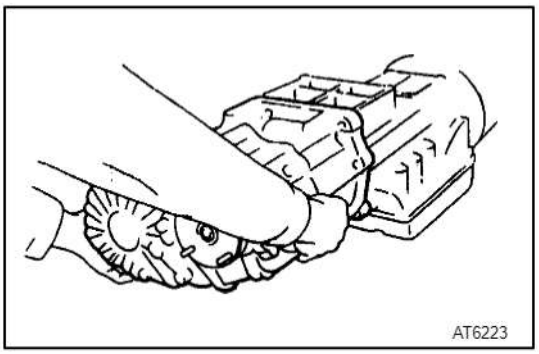
(b) Apply sealant to the bolt A.

Sealant:

Part No. 08833 - 00080, THREE BOND 1344, LOCTITE 242 or equivalent

(c) Install and tighten the six bolts.

Torque: 34 N-m (345 kgf-cm, 25 ft-lbf)



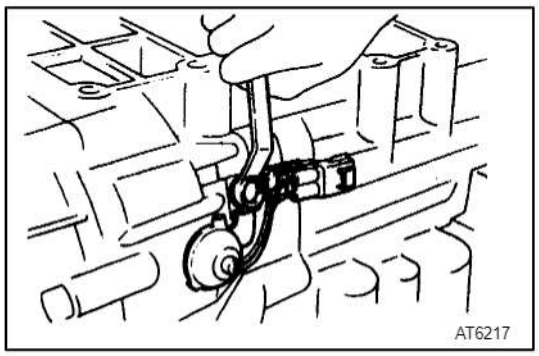
31. INSTALL TRANSFER

(a) Install the transfer with seven bolts.

(b) Install the speedometer cable bracket with the bolt.

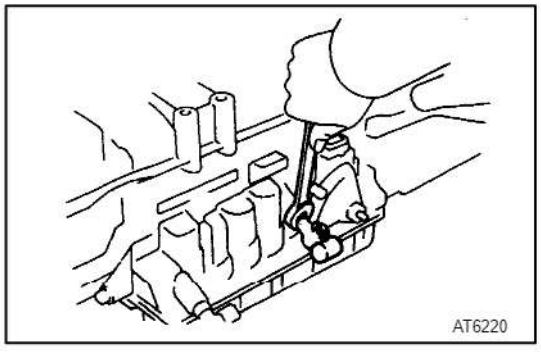
(c) Torque the eight bolts.

Torque: 45 N-m (455 kgf-cm, 33 ft-lbf)



32. INSTALL NO. 2 VEHICLE SPEED SENSOR

Install the No. 2 vehicle speed sensor with the bolt.



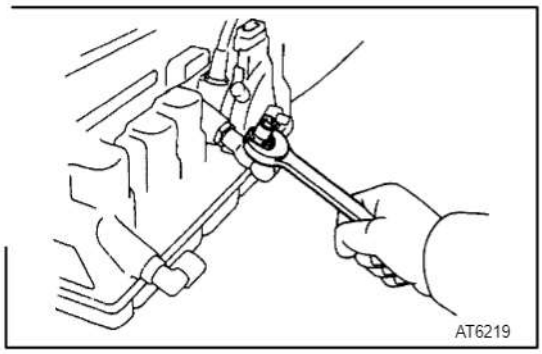
33. INSTALL TWO ELBOWS

(a) Coat new two O-rings with ATF and install them to each elbow.

(b) Install and tighten the elbows.

Torque: 34 N-m (350 kgf-cm, 25 ft-lbf)

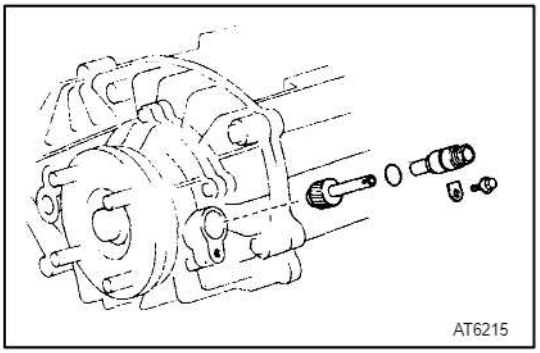
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(c) Coat a new O-ring with ATF and install it to the A/T fluid temperature sensor.

(d) Install and tighten the sensor to the front elbow.

Torque: 34 N-m (350 kgf-cm, 25 ft-lbf)

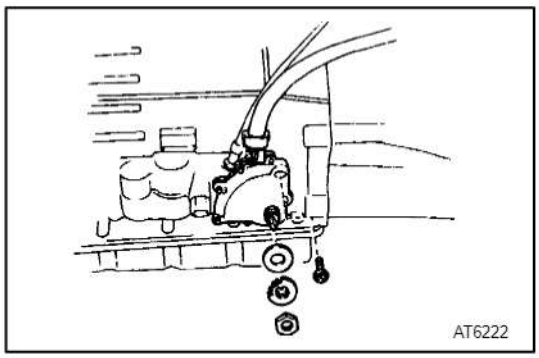


34. INSTALL SPEEDOMETER DRIVEN GEAR

(a) Coat a new O-ring with ATF and install it to the sleeve.

(b) Insert the driven gear into the sleeve.

(c) Install the lock plate with the bolt.

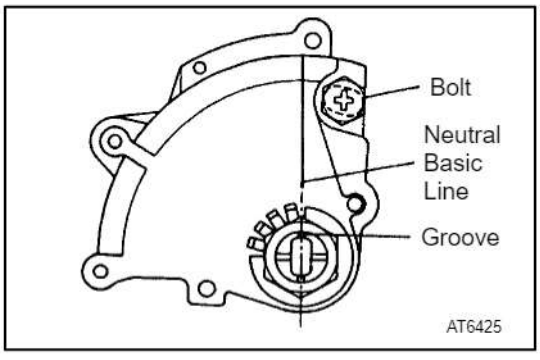


35. INSTALL PARK/NEUTRAL POSITION SWITCH

(a) Insert the park / neutral position switch onto the manual valve lever shaft and temporarily tighten the adjusting bolt.

(b) Install the grommet and a new lock washer, install and tighten the nut.

Torque: 3.9 N-m (40 kgf-cm, 35 in.-lbf)

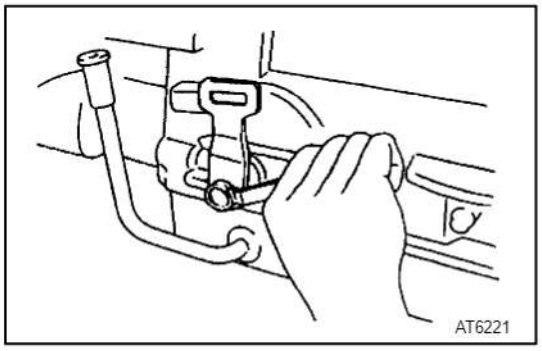


(c) Align the neutral basic line and the switch groove, and tighten the adjusting bolt.

Torque: 5.4 N-m (55 kgf-cm, 48 in.-lbf)

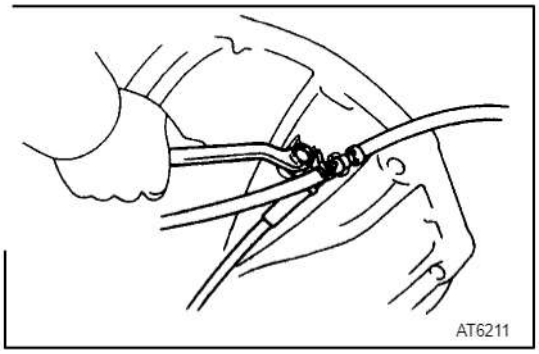
(d) Bend the tabs of the lock washer.

HINT: Bend at least two of the lock washer tabs.



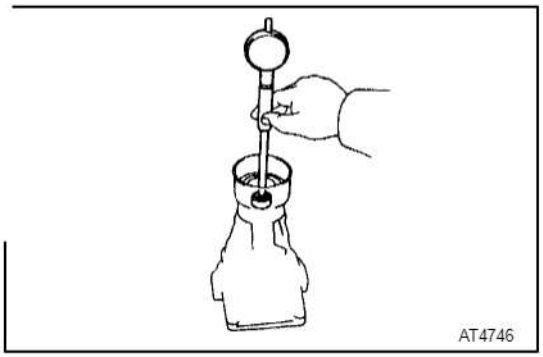
36. INSTALL TRANSMISSION CONTROL SHAFT LEVER

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AT6211

37. INSTALL WIRE HARNESS CLAMP AND THROTTLE CABLE CLAMP

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EXTENSION HOUSING

EXTENSION HOUSING INSPECTION

INSPECT EXTENSION HOUSING BUSHING

Using a cylinder gauge, measure the inside diameter of the extension housing bushing.

Maximum inside diameter:

38.09 mm (1.4996 in.)

If the inside diameter is greater than the maximum, replace the extension housing.

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COMPONENT PARTS INSTALLATION

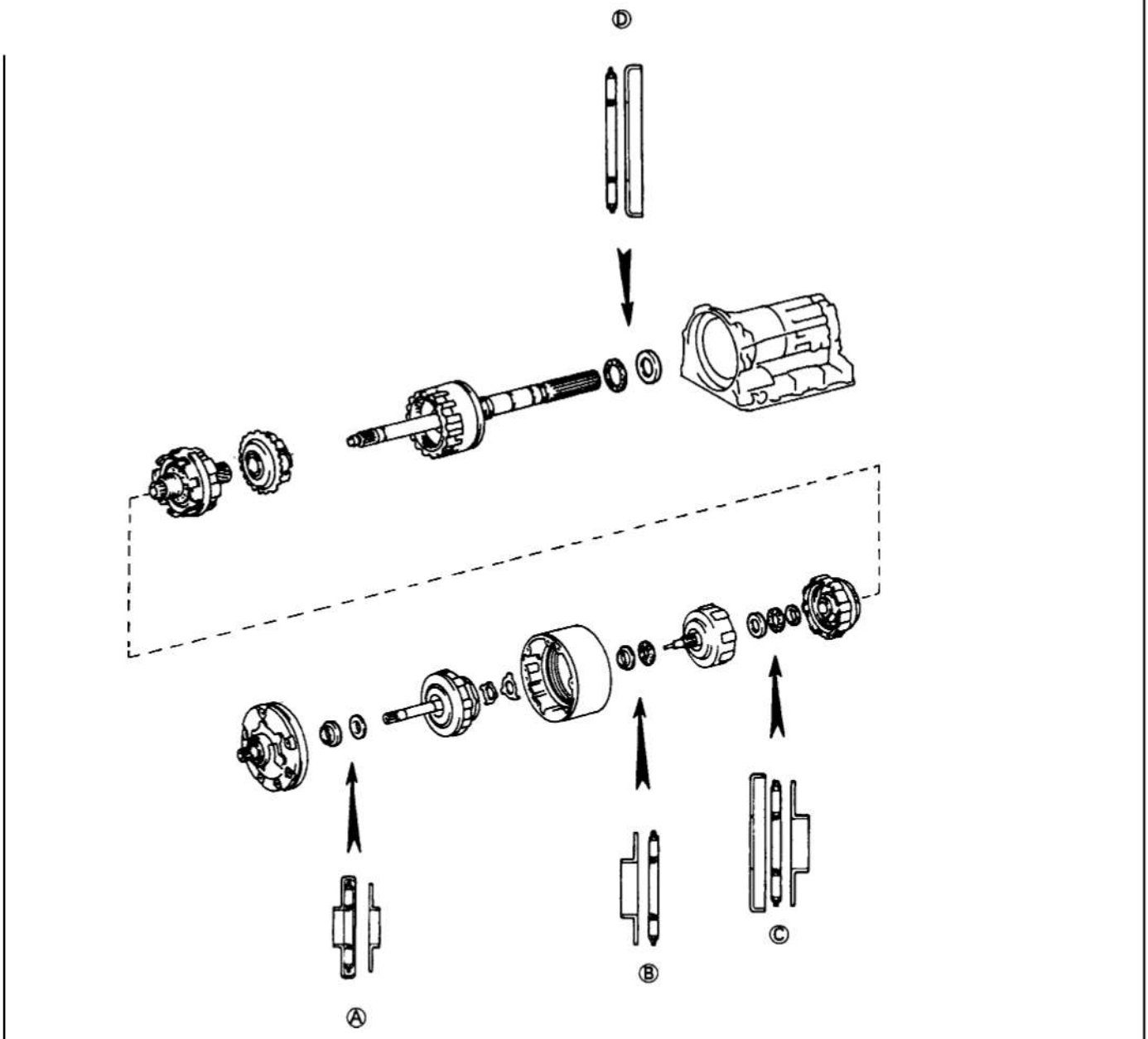
Disassembly, inspection and assembly of each component group have been indicated in the preceding chapter. Before assembly, make sure again that all component groups are assembled correctly.
If something wrong is found in a certain component group during assembly, inspect and repair this group immediately.
Recommended ATF:
DEXRON©II

GENERAL INSTALLATION NOTES

1. **The automatic transmission is composed of highly precision-finished parts, necessitating careful inspection before assembly because even a small nick could cause fluid leakage of affect performance.**
2. **Before assembling new clutch discs, soak them in automatic transmission fluid for at least fifteen minutes.**
3. **Apply automatic transmission fluid on sliding or rotating surfaces of parts before assembly.**
4. **Use petroleum jelly to keep small parts in their places.**
5. **Do not use adhesive cements on gaskets and similar parts.**
6. **When assembling the transmission, be sure to use new gaskets and O-rings.**
7. **Dry all parts with compressed air, never use shop rags.**

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BEARINGS AND RACES LOCATION

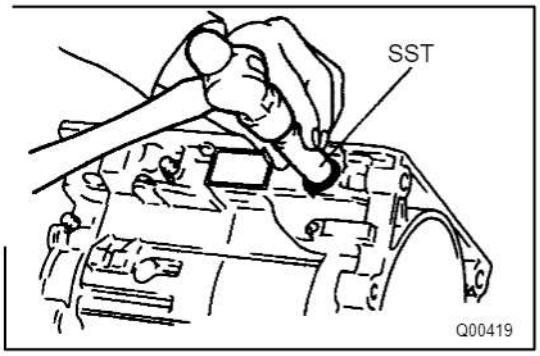


AT6267

Z07140

Mark	Front Race Diameter Inside / Outside mm (in.)	Thrust Bearing Diameter Inside / Outside mm (in.)	Rear Race Diameter Inside / Outside mm (in.)
Ⓐ	—	24.3 (0.957) / 43.2 (1.701)	24.3 (0.957) / 39.1 (1.539)
Ⓑ	24.1 (0.949) / 37.3 (1.469)	23.4 (0.921) / 37.5 (1.476)	—
Ⓒ	30.1 (1.185) / 48.5 (1.909)	28.4 (1.118) / 46.4 (1.827)	27.6 (1.087) / 44.5 (1.752)
Ⓓ	—	38.2 (1.504) / 55.2 (2.173)	39.2 (1.543) / 57.5 (2.264)

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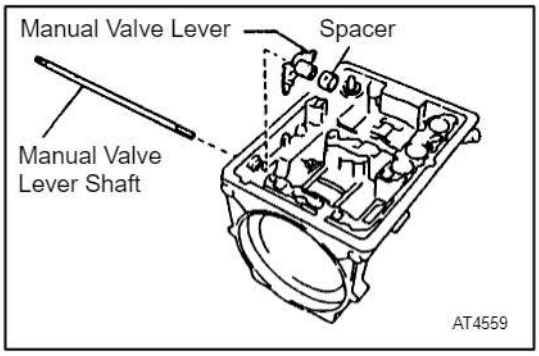
TRANSMISSION INSTALLATION

1. INSTALL MANUAL VALVE LEVER, SHAFT AND OIL SEALS

(a) Using SST, drive in two new oil seals as far as they will go.

SST 09350-20015 (09361-30011)

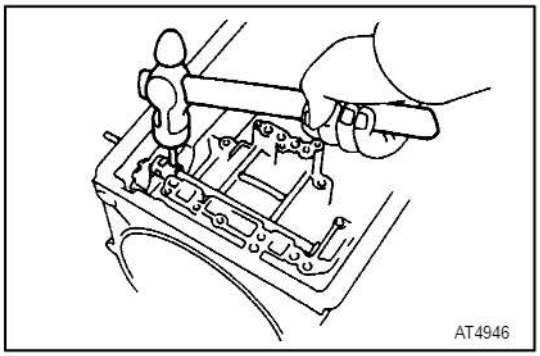
(b) Coat the oil seal lips with MP grease.



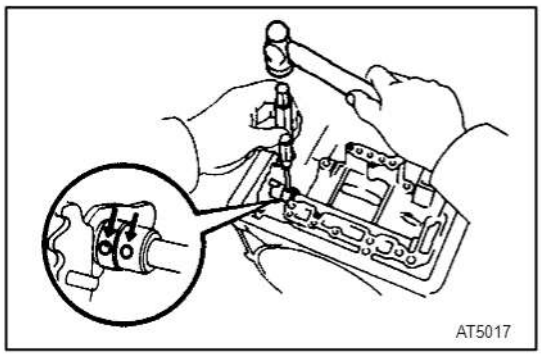
(c) Assembly a new spacer to the manual valve lever.

(d) Install the manual valve lever shaft to the transmission case through the manual valve lever.

NOTICE: Be careful not to damage the oil seal.



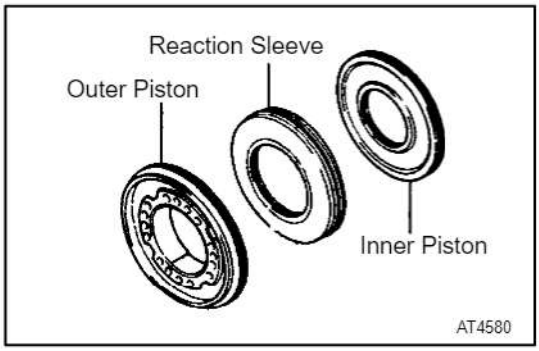
(e) Drive in the pin to the shaft.



(f) Match the spacer hole to the lever calking hollow and calk the spacer to the lever.

(g) Make sure the manual valve lever shaft turns smoothly.

2. INSTALL COMPONENTS OF NO. 3 BRAKE PISTON



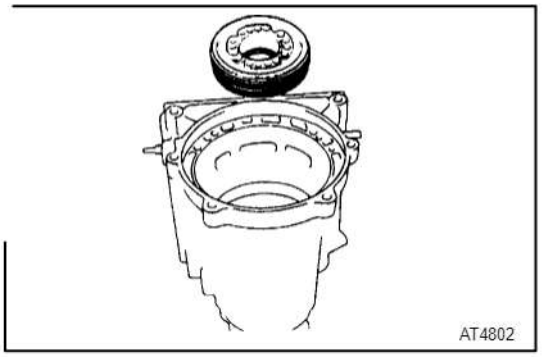
(a) Coat five new O-rings with ATF.

(b) Install the O-rings to the inner piston, reaction sleeve and outer piston.

NOTICE: The thinner O-ring goes on the outside of the reaction sleeve.

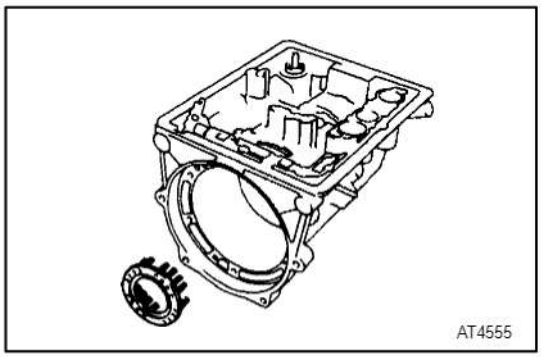
(c) Assembly the inner piston, reaction sleeve and outer piston.

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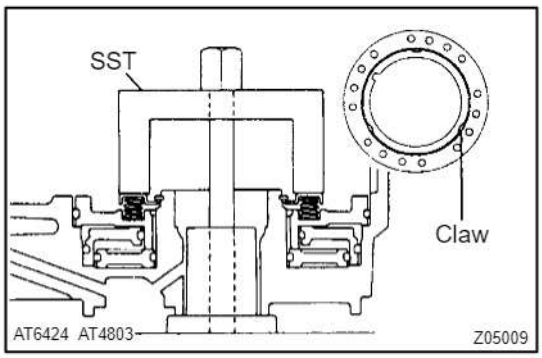


(d) Stand up the transmission case.

(e) Being careful not to damage the O-rings, press in the assembled pistons into the transmission case with hand.

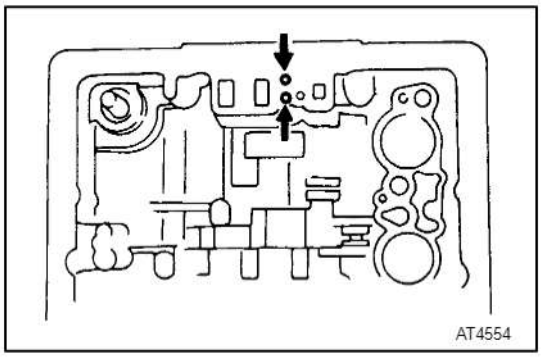


(f) Place the piston return spring onto the outer piston.



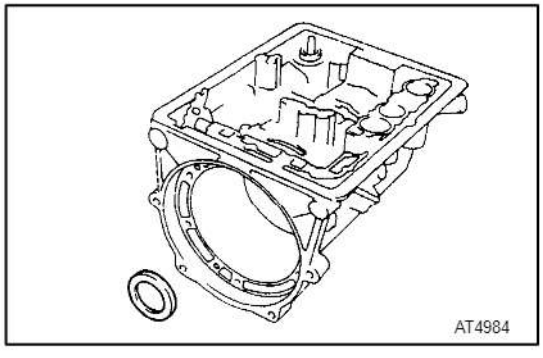
(g) Set SST and compress the return springs with SST.
SST 09350-20015 (09369-20040)

(h) Install the snap ring with snap ring plies. Be sure the end gap of the snap ring is not aligned with the spring seat claw.



3. CHECK NO. 3 BRAKE PISTONS MOVING

Make sure the No. 3 brake pistons move smoothly when applying and releasing the compressed air into the transmission case.



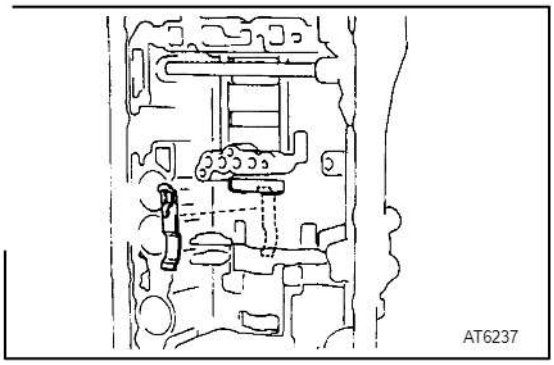
4. INSTALL RACE

Coat the race with petroleum jelly and install it onto the transmission case.

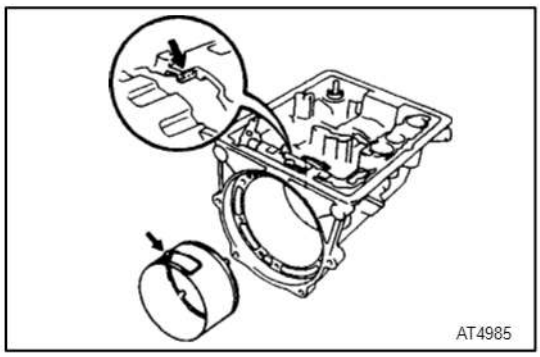
Race diameter:

	Inside mm (in.)	Outside mm (in.)
Race	39.2 (1.543)	57.5 (2.264)

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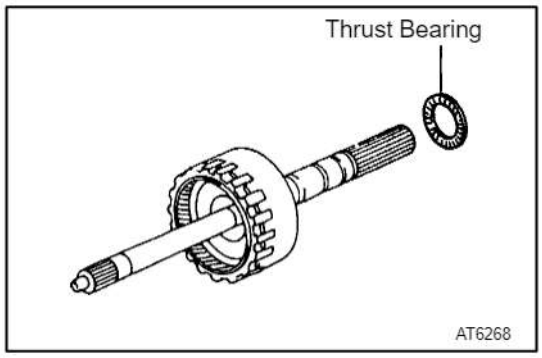
5. INSTALL LEAF SPRING



6. INSTALL BRAKE APPLY TUBE

Install the tube, aligning its locking tab with the cutout of the case.

HINT: Make sure that the lips of the tube end are completely inserted onto the outer piston.

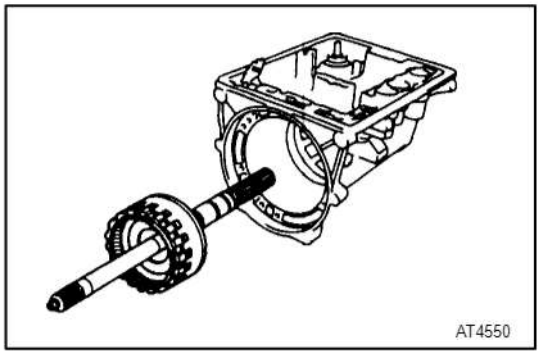


7. INSTALL REAR PLANETARY GEAR UNIT AND OUTPUT SHAFT

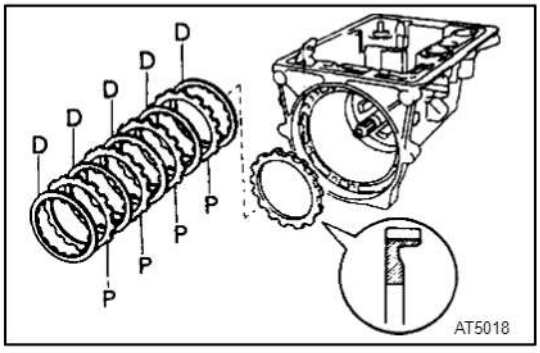
(a) Coat the two bearings with petroleum jelly and install them onto the rear planetary gear unit.

Bearing diameter:

	Inside mm (in.)	Outside mm (in.)
Thrust bearing	38.2 (1.504)	55.2 (2.173)



(b) Install the rear planetary gear unit to the transmission case.

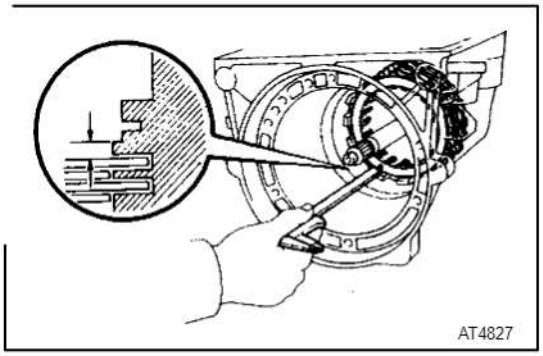


8. INSTALL PRESSURE PLATE, DISCS AND PLATES

(a) Install the pressure plate, the flat surface facing forward.

(b) Install the five discs and four plates.
Install in order: P = Plate D = Disc
D-P-D-P-D-P-D-P-D

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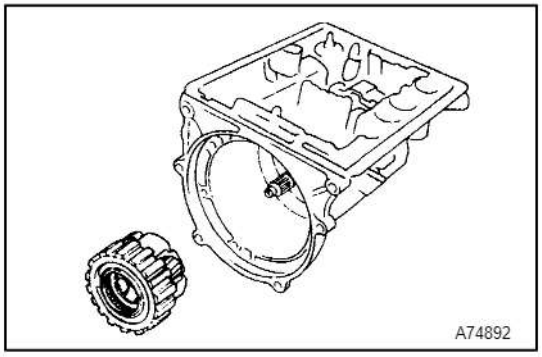
9. CHECK PACK CLEARANCE OF NO. 3 BRAKE

Using calipers, measure the clearance between the disc and transmission case, as shown.

Clearance:

0.61 - 2.64 mm (0.0240 - 0.1039 in.)

If the values are nonstandard, check for an improper installation.

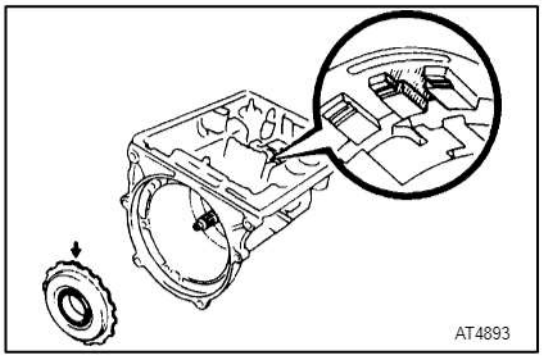


10. INSTALL FRONT PLANETARY GEAR UNIT

(a) Remove the one-way clutch inner race from the planetary gear unit.

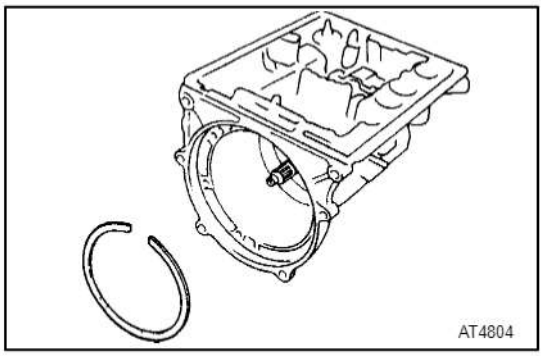
(b) Install the front planetary gear unit.

HINT: Mesh the splines of the planetary gear with the flukes of the discs by rotating and pushing the planetary gear.

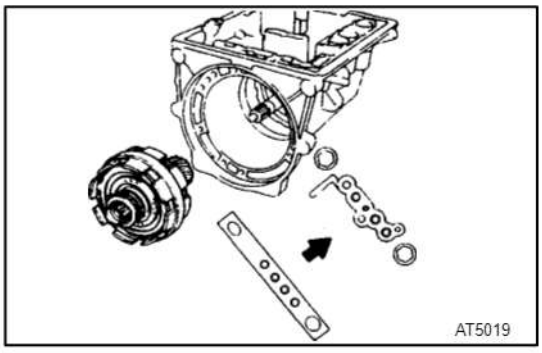


(c) Position the notched tooth of the inner race toward the valve body side of the case. Push it into place.

HINT: The inner race is correctly installed if the snap ring groove is fully visible.



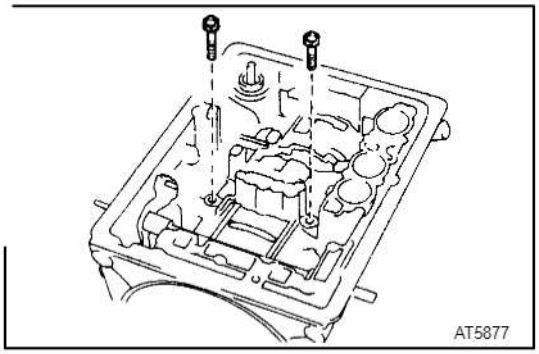
(d) Using a screwdriver, install the snap ring.



11. INSTALL CENTER SUPPORT

(a) Aim the bolt and oil holes of the center support toward the valve body side, and align them with the bolt and oil holes of he transmission case and insert.

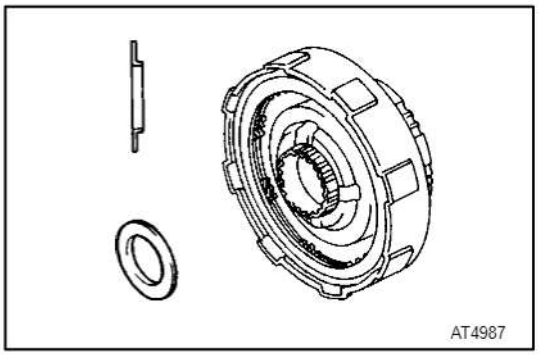
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(b) Install the two bolts and tighten the bolts.

HINT: First tighten the accumulator piston side.

Torque: 25 N-m (260 kgf-cm, 19 ft-lbf)

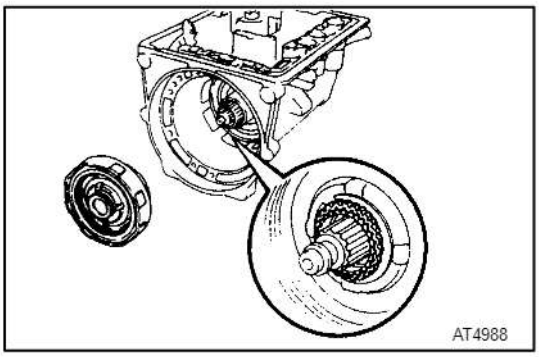


12. INSTALL REAR CLUTCH

(a) Coat the race with petroleum jelly and install it onto the rear clutch.

Race diameter:

	Inside mm (in.)	Outside mm (in.)
Race	27.6 (1.087)	44.5 (1.752)

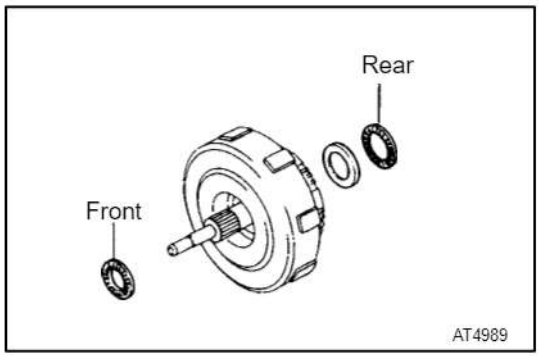


(b) Install the rear clutch.

HINT:

Mesh the splines of the rear clutch with the flukes of the disc by rotating and pushing the rear clutch.

If the rear clutch is fully meshed with the center support, the splined center of the clutch will be flush with the end of the sun gear shaft.

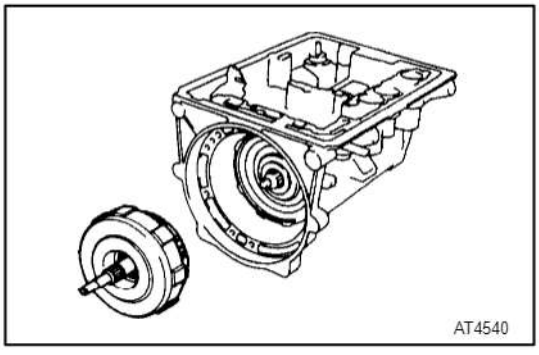


13. INSTALL FRONT CLUTCH

(a) Coat the bearing and race with petroleum jelly and install them onto the front clutch.

Bearing and race diameter:

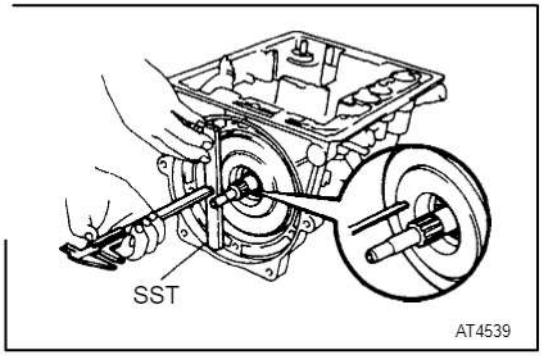
	Inside mm (in.)	Outside mm (in.)
Bearing (Front)	23.4 (0.921)	37.5 (1.476)
Race	30.1 (1.185)	48.5 (1.909)
Bearing (Rear)	28.4 (1.118)	46.4 (1.827)



(b) Install the front clutch.

HINT: Mesh the splines of the front clutch with the flukes of the discs by rotating and pushing the front clutch.

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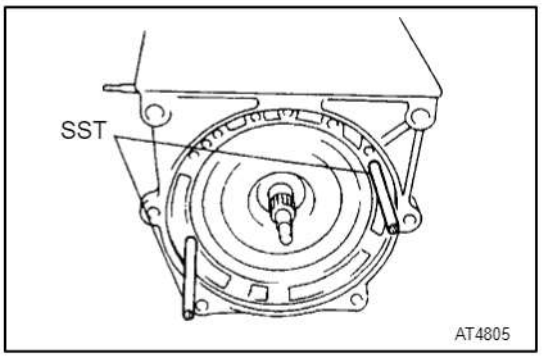


14. MEASURE INSTALLATION DISTANCE OF FRONT CLUTCH

(a) Place SST on the transmission case.

SST 09350-20015 (09370-12010)

(b) Using calipers, measure the distance between the tops of SST and the clutch drum.
If the distance corresponds to that during disassembly, the front clutch is installed correctly.

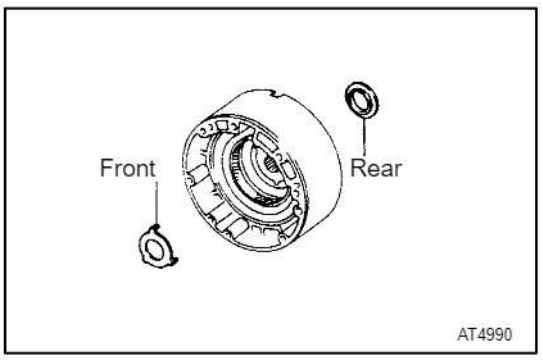


15. INSTALL OVERDRIVE CASE

(a) Finger tighten two SST on the transmission case.

HINT: Remove the SST after installation of the oil pump.

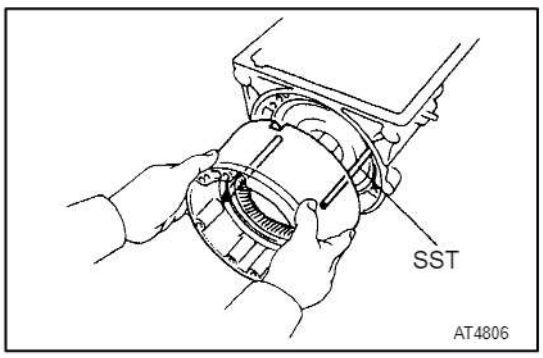
SST 09350-20015 (09362-30011)



(b) Coat the race and thrust washer with petroleum jelly and install them onto the overdrive case.

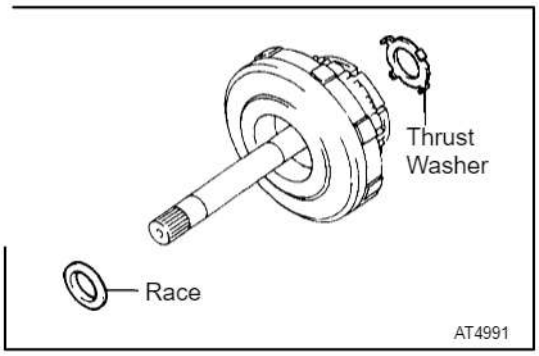
Races diameter:

	Inside mm (in.)	Outside mm (in.)
Race	24.1 (0.949)	37.3 (1.469)



(c) Insert the overdrive case gently through the two guide bolts (SST) with cutout portion of the case facing the valve body side.

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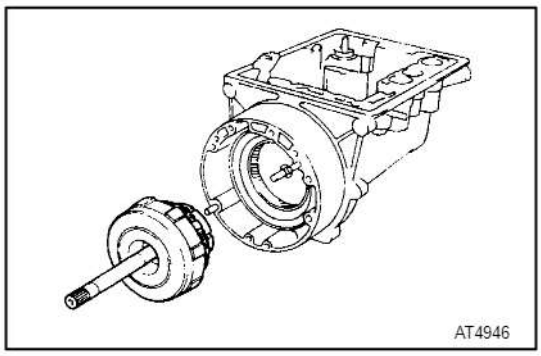
16. INSTALL OVERDRIVE PLANETARY GEAR UNIT WITH OVERDRIVE DIRECT CLUTCH AND ONE-WAY CLUTCH

(a) Coat the thrust washer with petroleum jelly and install it onto the overdrive planetary gear.

(b) Coat the race with petroleum jelly and install it onto the overdrive planetary gear.

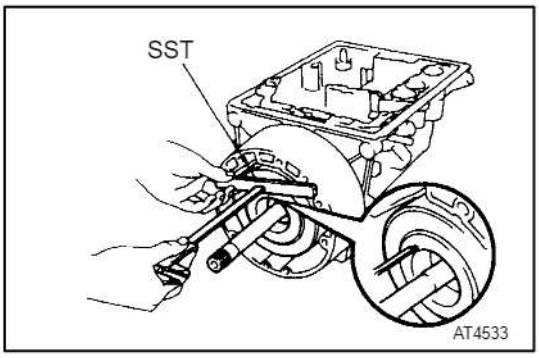
Race diameter:

	Inside mm (in.)	Outside mm (in.)
Race	24.3 (0.957)	39.2 (1.543)



(c) Install the overdrive planetary gear with the overdrive direct clutch and one-way clutch.

HINT: Mesh the splines of the overdrive planetary gear with the flukes of the discs by rotating and pushing the overdrive planetary gear.

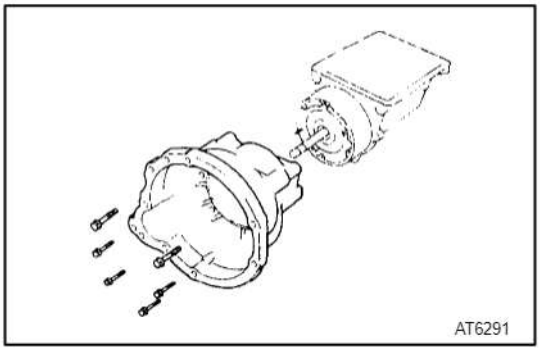


17. MEASURE INSTALLATION DISTANCE OF OVERDRIVE DIRECT CLUTCH

(a) Place SST on the overdrive case.

SST 09350-20015 (09370-12010)

(b) Using calipers, measure distance between the tops of SST and the clutch drum.
If the distance corresponds to that during disassembly, the overdrive direct clutch is installed correctly.



18. INSTALL TRANSMISSION HOUSING

(a) Coat a new O-ring with ATF and install it around the overdrive case.

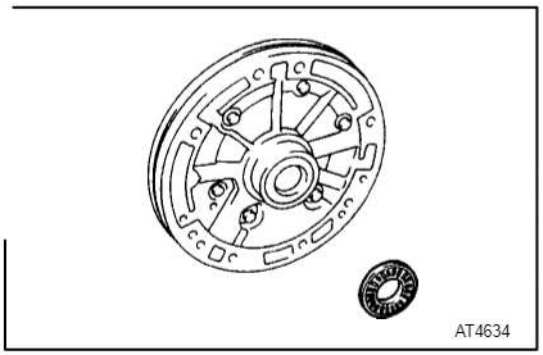
(b) Install the transmission housing and six bolts.

(c) Tighten the bolts.

Torque:

10 mm bolt 34 N-m (345 kgf-cm, 25 ft-lbf)
12 mm bolt 57 N-m (580 kgf-cm, 42 ft-lbf)

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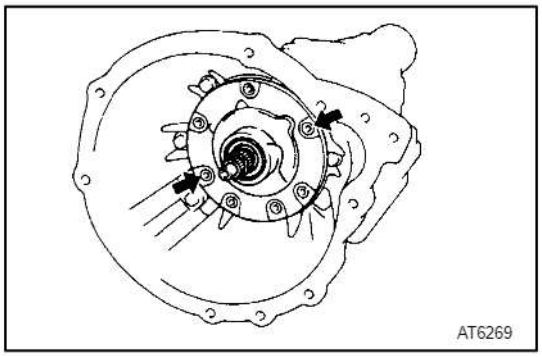

AT4634

19. INSTALL OIL PUMP

(a) Coat the assembled bearing and race with petroleum jelly and install it onto the oil pump.

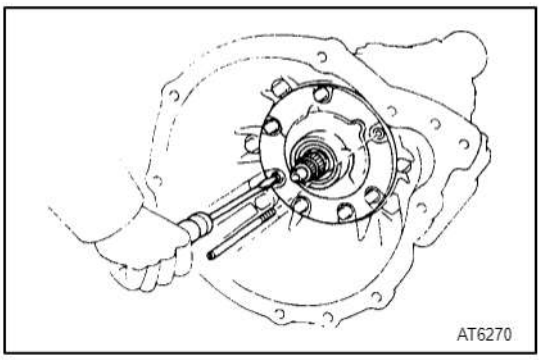
Assembled bearing and race:

	Inside mm (in.)	Outside mm (in.)
Assembled bearing and race	24.3 (0.957)	43.2 (1.701)


AT6269

(b) Coat a new O-ring with ATF and install it around the pump body.

(c) Install the oil pump gently through the two guide bolts (SST).

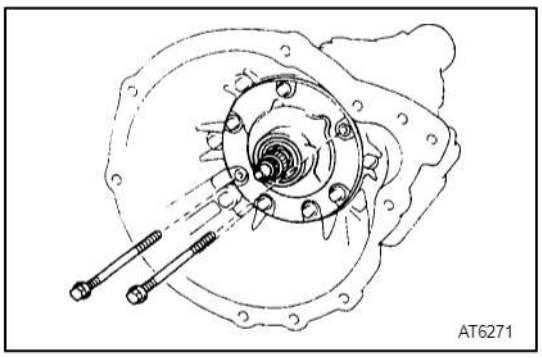

AT6270

(d) Apply sealant to the bolt heads.

Sealant:
Part No. 08833 - 00080 THREE BOND 1344, LOCTITE 242 or equivalent

(e) Finger tighten the five bolts.

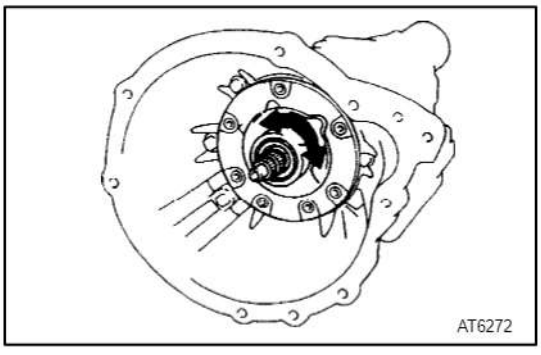
(f) Using a screwdriver, remove the two SST.


AT6271

(g) Finger tighten the two bolts.

(h) Tighten all bolts.

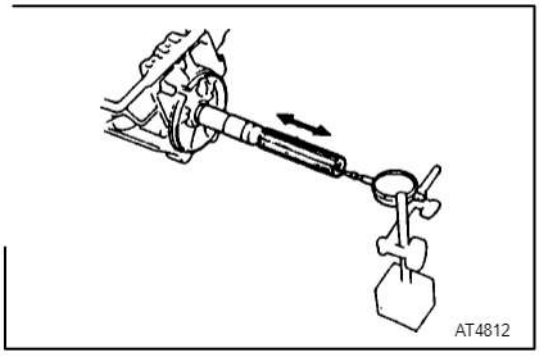
Torque: 21 N-m (215 kgf-cm, 16 ft-lbf)


AT6272

20. CHECK INPUT SHAFT ROTATION

Make sure the input shaft rotates smoothly.

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21. CHECK OUTPUT SHAFT

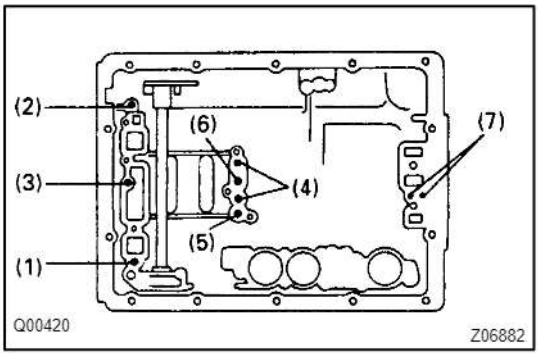
(a) Using a dial indicator, measure the end play of the output shaft with hand.

End play:

0.3 - 0.9 mm (0.012 - 0.035 in.)

If the values are nonstandard, check for an improper installation.

(b) Check to see that output shaft rotates smoothly.



22. INDIVIDUAL PISTON OPERATION INSPECTION

Check for the sound of operation while applying compressed air into the oil hole indicated in the illustration.

(1) O/D direct clutch

(2) O/D brake

(3) Rear clutch

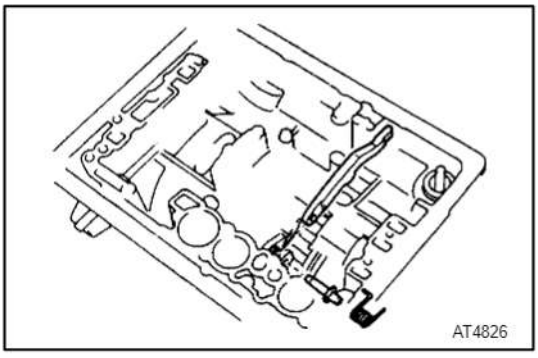
(4) Front clutch

(5) No. 1 brake

(6) No. 2 brake

(7) No. 3 brake

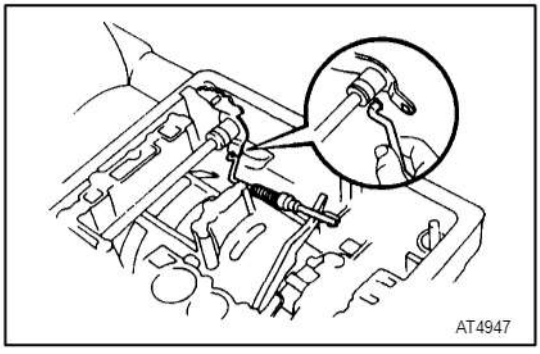
If there is no noise, disassemble and check the installation condition of the parts.



23. INSTALL PARKING LOCK PAWL AND ROD

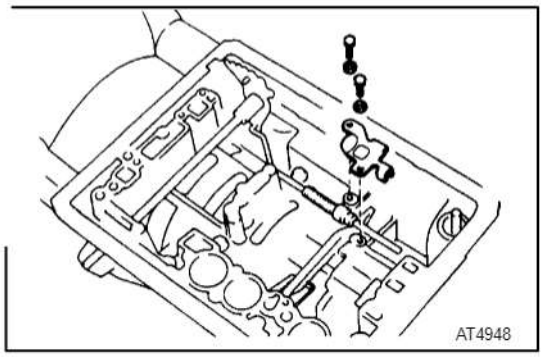
(a) Install the E-ring to the shaft.

(b) Install the parking lock pawl, shaft and spring.



(c) Connect the parking lock rod to the manual valve lever.

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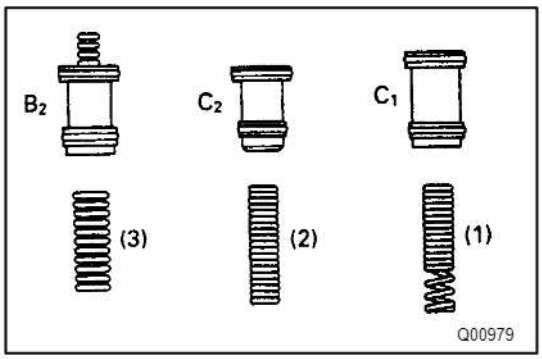


(d) Install the parking lock pawl bracket.

(e) Install and tighten the two bolts with the wave washers.

Torque: 7.4 N-m (75 kgf-cm, 65 in.-lbf)

(f) Shift the manual valve lever to P position, and confirm the planetary ring gear is correctly locked up by the lock pawl.



24. INSTALL ACCUMULATOR SPRINGS AND PISTONS

(a) Coat new O-rings with ATF and install them to the pistons.

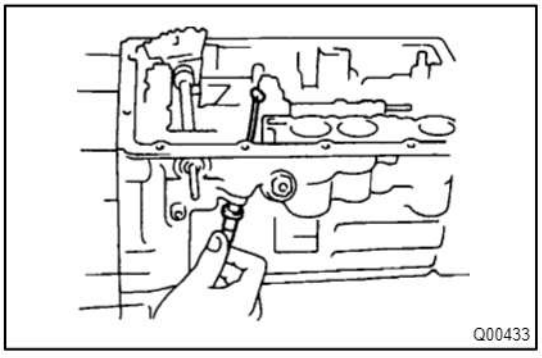
(b) Install the three springs and three accumulator pistons to the bore, as shown in the illustration.

◆Piston

Piston	Outer diameter mm (in.)
C_1	31.8 (1.252)
C_2	31.8 (1.252)
B_2	34.8 (1.370)

Spring

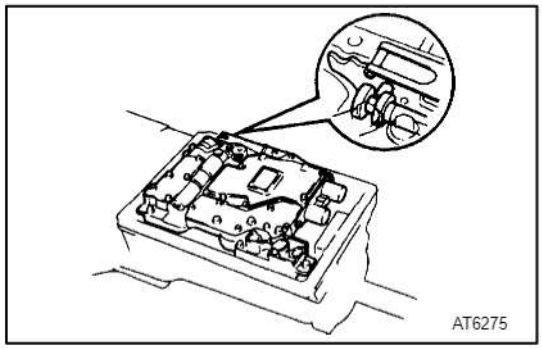
Piston (Color)		Free length mm (in.)	Outer diameter mm (in.)
(1) C_1	(None)	64.4 (2.535)	17.5 (0.689)
(2) C_2	(None)	57.4 (2.260)	15.9 (0.626)
(3) B_2	(Yellow)	32.0 (1.260)	15.4 (0.606)



25. INSTALL THROTTLE CABLE

(a) Coat a new O-ring with ATF and install it to the cable.

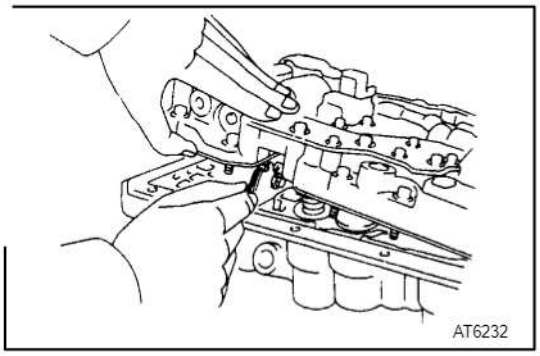
(b) Install the cable to the case.



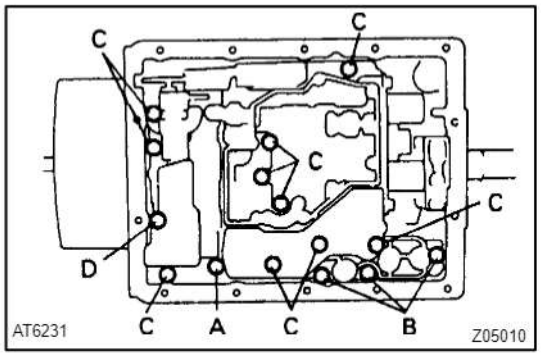
26. INSTALL VALVE BODY

(a) Align the groove of the manual valve to the pin of the lever.

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(b) Connect the throttle cable to the cam.



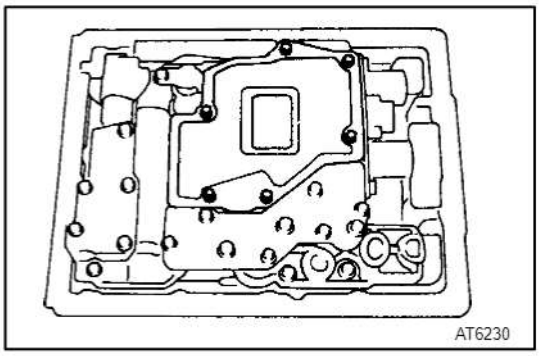
(c) Install the seventeen bolts.

HINT: Each bolt length (mm, in.) is indicated below.

Torque: 10 N-m (100 kgf-cm, 7 ft-lbf)

Bolt length:

A bolt 25 mm (0.98 in.)
B bolt 30 mm (1.18 in.)
C bolt 47 mm (1.85 in.)
D bolt 60 mm (2.36 in.)



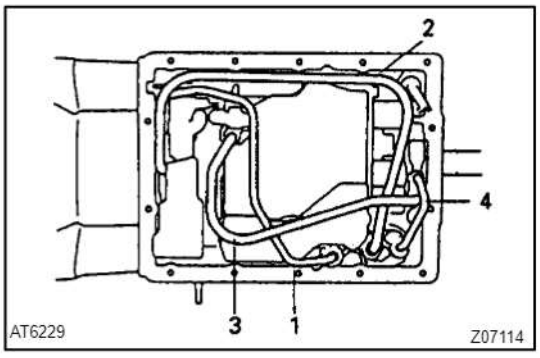
27. INSTALL OIL STRAINER

(a) Install a new gasket to the oil strainer.

(b) Install the oil strainer to the valve body.

(c) Install and tighten the six bolts.

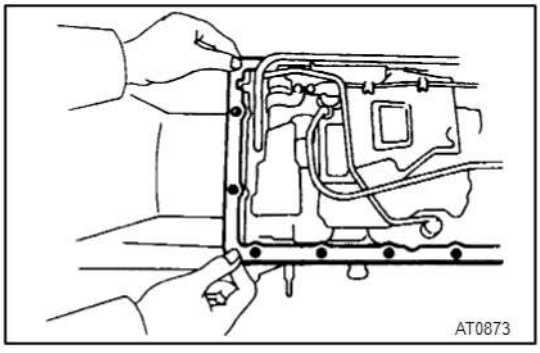
Torque: 5.4 N-m (55 kgf-cm, 48 in.-lbf)



28. INSTALL OIL TUBES

Using a plastic hammer, install the two tubes into position.

NOTICE: Be careful not to bend or damage the tubes.



29. INSTALL OIL PAN

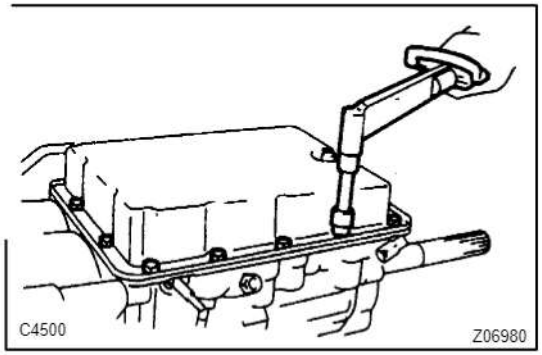
(a) Install the two magnets in the oil pan.

NOTICE: Make sure that the magnets do not interfere with the oil tubes.

(b) Install a new gasket to the transmission case.

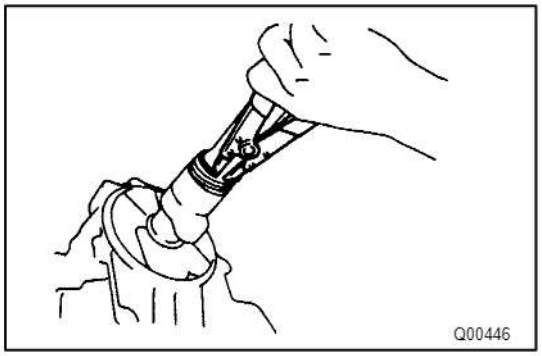
HINT: Align the cut part of the gasket and case.

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(c) Install and tighten the fourteen bolts.

Torque: 4.4 N-m (45 kgf-cm, 39 in.-lbf)



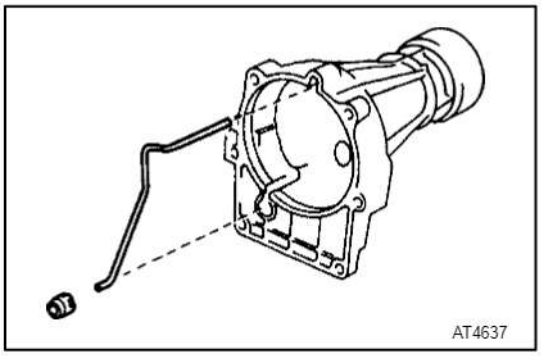
30. INSTALL SPEEDOMETER DRIVE GEAR AND BALL

(a) Using snap ring pliers, install the snap ring.

(b) Install the ball into the hole on the output shaft.

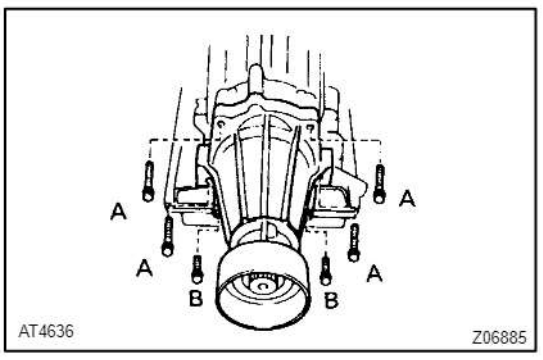
(c) Align the groove of the drive gear with the ball, install the drive gear.

(d) Using snap ring pliers, install the snap ring.



31. INSTALL EXTENSION HOUSING

(a) Install the oil apply tube and a new gasket to the extension housing.



(b) Install the extension housing with a new gasket to the case.

(c) Apply sealant to the bolt A.

Sealant:

Part No. 08833 - 00080, THREE BOND 1344, LOCTITE 242 or equivalent

(d) Install and tighten the six bolts.

HINT: The two lower bolts are shorter.

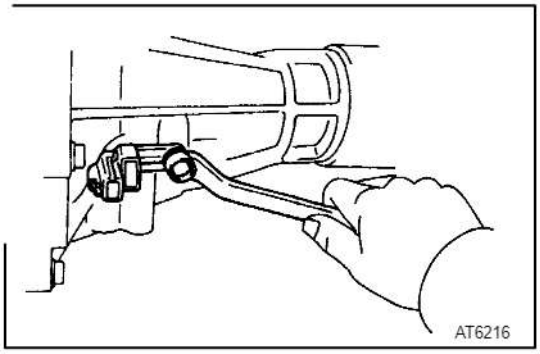
Torque: 34 N-m (345 kgf-cm, 25 ft-lbf)

HINT: Each bolt length in indicated below.

Bolt length:

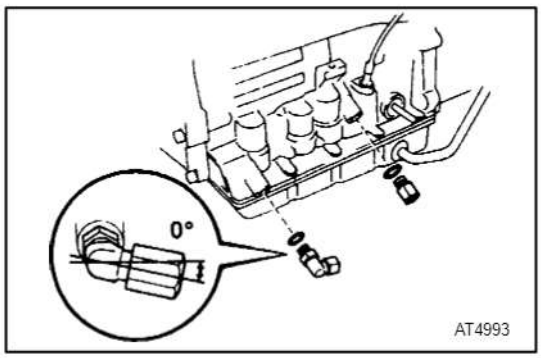
A bolt 45 mm (1.772 in.)
B bolt 35 mm (1.378 in.)

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32. INSTALL NO. 2 VEHICLE SPEED SENSOR

Install the No. 2 vehicle speed sensor with the bolt.

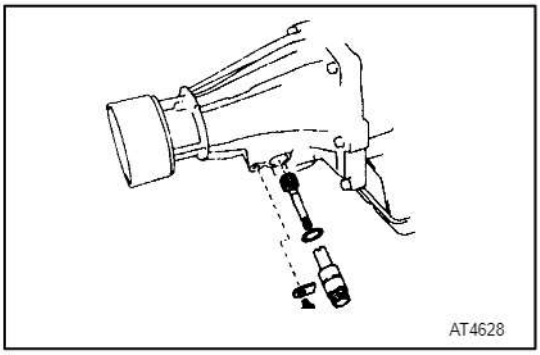


33. INSTALL UNION AND ELBOW

(a) Coat new two O-rings with ATF and install them to each union.

(b) Install and tighten the union and elbow.

Torque: 34 N-m (345 kgf-cm, 25 ft-lbf)

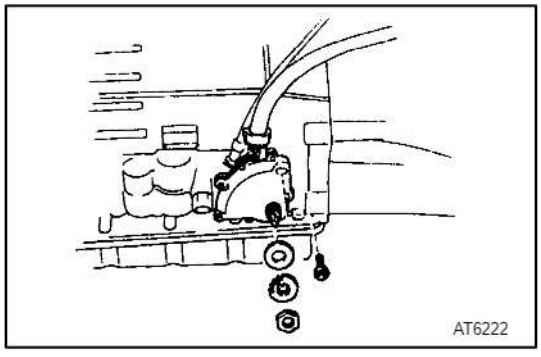


34. INSTALL SPEEDOMETER DRIVEN GEAR

(a) Coat a new O-ring with ATF and install it to the sleeve.

(b) Insert the driven gear into the sleeve.

(c) Install the lock plate with the bolt.

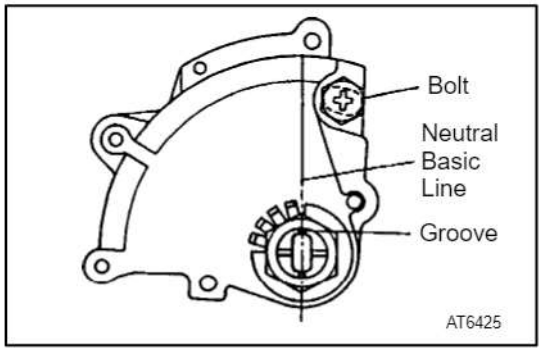


35. INSTALL PARK/NEUTRAL POSITION SWITCH

(a) Insert the park / neutral position switch onto the manual valve lever shaft and temporarily tighten the adjusting bolt.

(b) Install the grommet and a new lock washer, install and tighten the nut.

Torque: 3.9 N-m (40 kgf-cm, 35 in.-lbf)



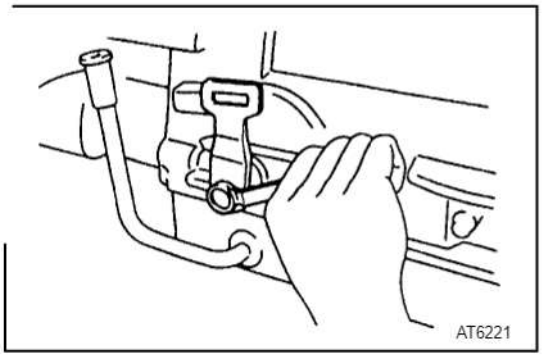
(c) Align the neutral basic line and the switch groove, and tighten the adjusting bolt.

Torque: 5.4 N-m (55 kgf-cm, 48 in.-lbf)

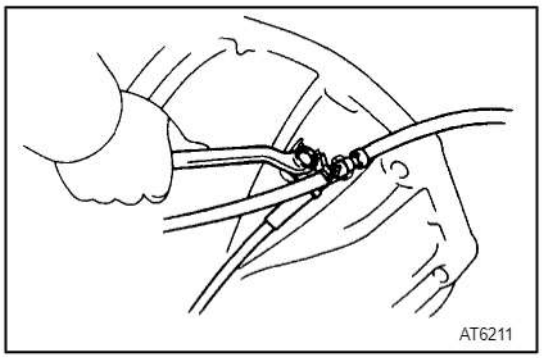
(d) Bend the tabs of the lock washer.

HINT: Bend at least two of the lock washer tabs.

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36. INSTALL TRANSMISSION CONTROL SHAFT LEVER



37. INSTALL WIRE HARNESS CLAMP AND THROTTLE CABLE CLAMP

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FOREWORD

This repair manual covers Disassembly, Inspection and Assembly procedures for the following Automatic Transmissions:

Automatic Transmission	Applicable Model
A46DE, A46DF	'93 Previa

For On-vehicle Servicing (Inspection, Adjustment, Troubleshooting, Removal and Installation) of Automatic Transmission, refer to the repair manual for the applicable vehicle model.

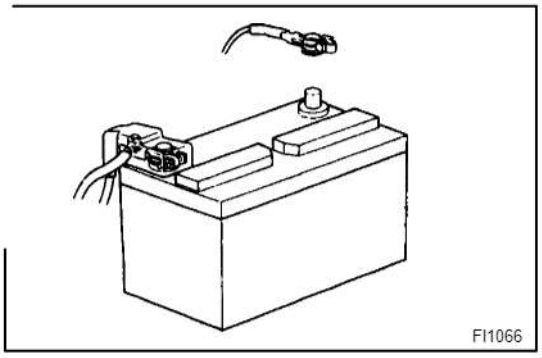
Pub. Name	Pub. No.
'93 Previa Repair Manual	RM318U

All information contained in this manual is the most up-to-date at the time of publication. However, specifications and procedures are subject to change without notice.

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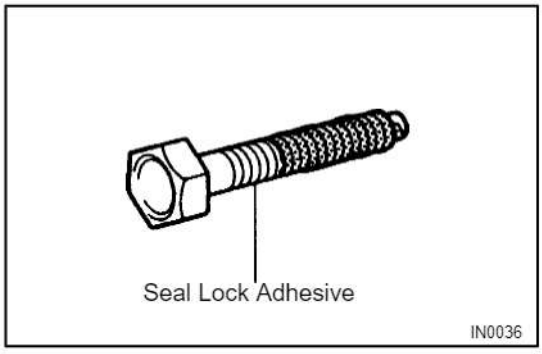
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FI1066

GENERAL REPAIR INSTRUCTIONS

1. **Use fender, seat and floor covers to keep the vehicle clean and prevent damage.**
2. **During disassembly, keep parts in the appropriate order to facilitate reassembly.**
3. **Observe the following:**
   (a) Before performing electrical work, disconnect the negative cable from the battery terminal.
   (b) If it is necessary to disconnect the battery for inspection or repair, always disconnect the cable from the negative (-) terminal which is grounded to the vehicle body.
   (c) To prevent damage to the battery terminal post, loosen the terminal nut and raise the cable straight up without twisting or prying it.
   (d) Clean the battery terminal posts and cable terminals with a clean shop rag. Do not scrape them with a file or other abrasive objects.
   (e) Install the cable terminal to the battery post with the nut loose, and tighten the nut after installation. Do not use a hammer to tap the terminal onto the post.
   (f) Be sure the cover for the positive (+) terminal is properly in place.
4. **Check hose and wiring connectors to make sure that they are secure and correct.**
5. **Non-reusable parts**
   (a) Always replace cotter pins, gaskets, O-rings and oil seals etc. with new ones.
   (b) Non-reusable parts are indicated in the component illustrations by the "♦ " symbol.



IN0036

6. **Precoated parts**
   Precoated parts are bolts and nuts, etc. that are coated with a seal lock adhesive at the factory.
   (a) If a precoated part is retightened, loosened or caused to move in any way, it must be recoated with the specified adhesive.

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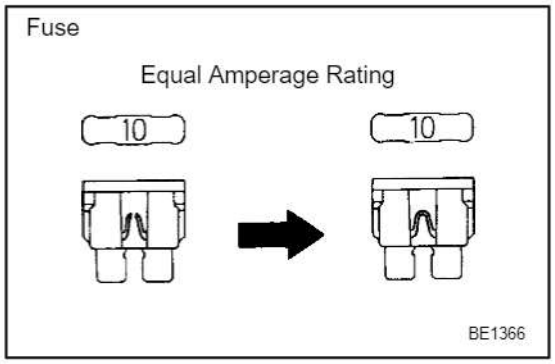
(b) When reusing precoated parts, clean off the old adhesive and dry with compressed air. Then apply the specified seal lock adhesive to the bolt, nut or threads.

(c) Precoated parts are indicated in the component illustrations by the "★" symbol.

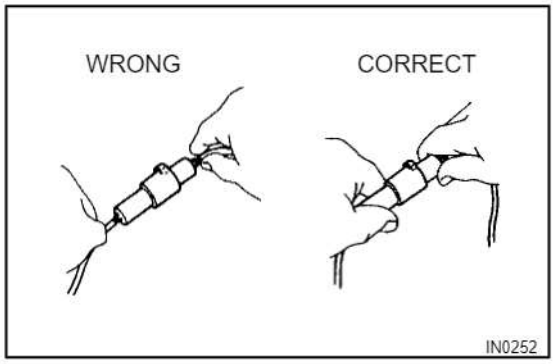
7. When necessary, use a sealer on gaskets to prevent leaks.

8. Carefully observe all specifications for bolt tightening torques. Always use a torque wrench.

9. Use of special service tools (SST) and special service materials (SSM) may be required, depending on the nature of the repair. Be sure to use SST and SSM where specified and follow the proper work procedure. A list of SST and SSM can be found at the preparation of AT section.



10. When replacing fuses, be sure the new fuse has the correct amperage rating. DO NOT exceed the rating or use one with a lower rating.



11. To pull apart electrical connectors, pull on the connector itself, not the wires.

12. Care must be taken when jacking up and supporting the vehicle. Be sure to lift and support the vehicle at the proper locations.

(a) If the vehicle is to be jacked up only at the front or rear end, be sure to block the wheels at the opposite end in order to ensure safety.

(b) After the vehicle is jacked up, be sure to support it on stands. It is extremely dangerous to do any work on a vehicle raised on a jack alone, even for a small job that can be finished quickly.

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GLOSSARY OF SAE AND TOYOTA TERMS

This glossary lists all SAE-J1930 terms and abbreviations used in this manual in compliance with SAE recommendations, as well as their Toyota equivalents.

SAE ABBRE-VIATIONS	SAE TERMS	TOYOTA TERMS ( )- -ABBREVIATIONS
A/C	Air Conditioning	Air Conditioner
ACL	Air Cleaner	Air Cleaner
AIR	Secondary Air Injection	Air Injection (AI)
AP	Accelerator Pedal	—
B+	Battery Positive Voltage	+B, Battery Voltage
BARO	Barometric Pressure	—
CAC	Charge Air Cooler	Intercooler
CARB	Carburetor	Carburetor
CFI	Continuous Fuel Injection	—
CKP	Crankshaft Position	Crank Angle
CL	Closed Loop	Closed Loop
CMP	Camshaft Position	Cam Angle
CPP	Clutch Pedal Position	—
CTOX	Continuous Trap Oxidizer	—
CTP	Closed Throttle Position	—
DFI	Direct Fuel Injection (Diesel)	Direct Injection (DI)
DI	Distributor Ignition	—
DLC1 DLC2 DLC3	Data Link Connector 1 Data Link Connector 2 Data Link Connector 3	1: Check Connector 2: Toyota Diagnosis Communication Link (TDCL) 3: OBD II Diagnostic Connector
DTC	Diagnostic Trouble Code	Diagnostic Code
DTM	Diagnostic Test Mode	—
ECL	Engine Control Level	—
ECM	Engine Control Module	Engine ECU (Electronic Control Unit)
ECT	Engine Coolant Temperature	Coolant Temperature, Water Temperature (THW)
EEPROM	Electrically Erasable Programmable Read Only Memory	Electrically Erasable Programmable Read Only Memory (EEPROM), Erasable Programmable Read Only Memory (EPROM)
EFE	Early Fuel Evaporation	Cold Mixture Heater (CMH), Heat Control Valve (HCV)
EGR	Exhaust Gas Recirculation	Exhaust Gas Recirculation (EGR)
EI	Electronic Ignition	Toyota Distributorless Ignition (TDI)
EM	Engine Modification	Engine Modification (EM)
EPROM	Erasable Programmable Read Only Memory	Programmable Read Only Memory (PROM)
EVAP	Evaporative Emission	Evaporative Emission Control (EVAP)
FC	Fan Control	—
FEEPROM	Flash Electrically Erasable Programmable Read Only Memory	—
FEPROM	Flash Erasable Programmable Read Only Memory	—
FF	Flexible Fuel	—
FP	Fuel Pump	Fuel Pump
GEN	Generator	Alternator
GND	Ground	Ground (GND)
HO2S	Heated Oxygen Sensor	Heated Oxygen Sensor (HO2S)

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IAC	Idle Air Control	Idle Speed Control (ISC)
IAT	Intake Air Temperature	Intake or Inlet Air Temperature
ICM	Ignition Control Module	—
IFI	Indirect Fuel Injection	Indirect Injection
IFS	Inertia Fuel-Shutoff	—
ISC	Idle Speed Control	—
KS	Knock Sensor	Knock Sensor
MAF	Mass Air Flow	Air Flow Meter
MAP	Manifold Absolute Pressure	Manifold Pressure Intake Vacuum
MC	Mixture Control	Electric Bleed Air Control Valve (EBCV) Mixture Control Valve (MCV) Electric Air Control Valve (EACV)
MDP	Manifold Differential Pressure	—
MFI	Multiport Fuel Injection	Electronic Fuel Injection (EFI)
MIL	Malfunction Indicator Lamp	Check Engine Light
MST	Manifold Surface Temperature	—
MVZ	Manifold Vacuum Zone	—
NVRAM	Non-Volatile Random Access Memory	—
O2S	Oxygen Sensor	Oxygen Sensor, O_2 Sensor (O_2S)
OBD	On-Board Diagnostic	On-Board Diagnostic (OBD)
OC	Oxidation Catalytic Converter	Oxidation Catalyst Converter (OC), CCo
OP	Open Loop	Open Loop
PAIR	Pulsed Secondary Air Injection	Air Suction (AS)
PCM	Powertrain Control Module	—
PNP	Park/Neutral Position	—
PROM	Programmable Read Only Memory	—
PSP	Power Steering Pressure	—
PTOX	Periodic Trap Oxidizer	Diesel Particulate Filter (DPF) Diesel Particulate Trap (DPT)
RAM	Random Access Memory	Random Access Memory (RAM)
RM	Relay Module	—
ROM	Read Only Memory	Read Only Memory (ROM)
RPM	Engine Speed	Engine Speed
SC	Supercharger	Supercharger
SCB	Supercharger Bypass	—
SFI	Sequential Multiport Fuel Injection	Electronic Fuel Injection (EFI), Sequential Injection
SPL	Smoke Puff Limiter	—
SRI	Service Reminder Indicator	—
SRT	System Readiness Test	—
ST	Scan Tool	—
TB	Throttle Body	Throttle Body
TBI	Throttle Body Fuel Injection	Single Point Injection Central Fuel Injection (Ci)
TC	Turbocharger	Turbocharger
TCC	Torque Converter Clutch	Torque Converter
TCM	Transmission Control Module	Transmission ECU (Electronic Control Unit)
TP	Throttle Position	Throttle Position
TR	Transmission Range	—

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TVV	Thermal Vacuum Valve	Bimetal Vacuum Switching Valve (BVSV) Thermostatic Vacuum Switching Valve (TVSV)
TWC	Three-Way Catalytic Converter	Three-Way Catalyst (TWC) CC_{RO}
TWC + OC	Three-Way + Oxidation Catalytic Converter	CC_R + CCo
VAF	Volume Air Flow	Air Flow Meter
VR	Voltage Regulator	Voltage Regulator
VSS	Vehicle Speed Sensor	Vehicle Speed Sensor (Read Switch Type)
WOT	Wide Open Throttle	Full Throttle
WU-OC	Warm Up Oxidation Catalytic Converter	—
WU-TWC	Warm Up Three-Way Catalytic Converter	Manifold Converter
3GR	Third Gear	—
4GR	Fourth Gear	—

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HOW TO USE THIS MANUAL

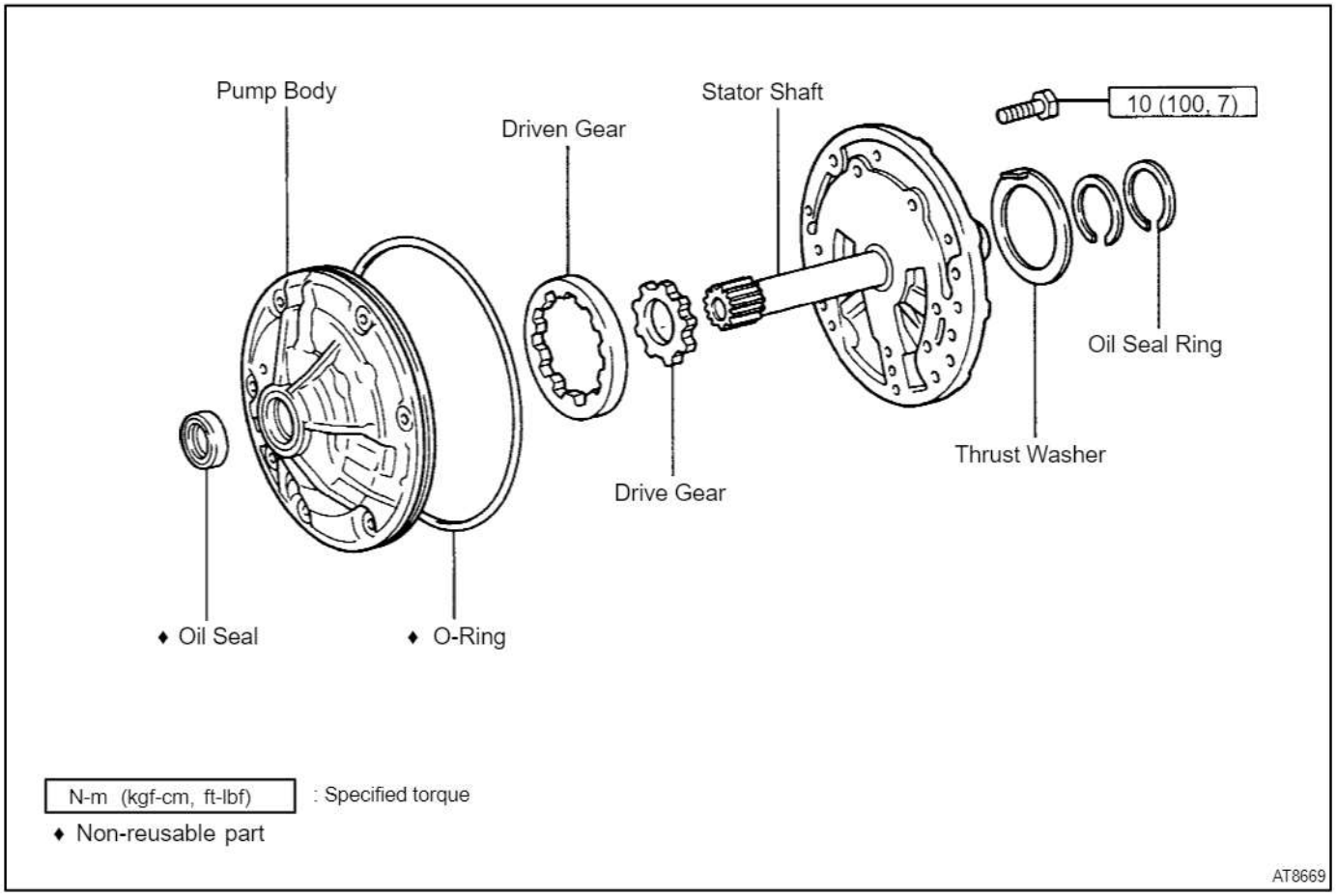
To assist you in finding your way through the manual, the Section Title and major heading are given at the top of every page.

PREPARATION

Preparation lists the SST (Special Service Tools), recommended tools, equipment, lubricant and SSM (Special Service Materials) which should be prepared before beginning the operation and explains the purpose of each one.

REPAIR PROCEDURES

Most repair operations begin with an overview illustration. It identifies the components and shows how the parts fit together.
Example:

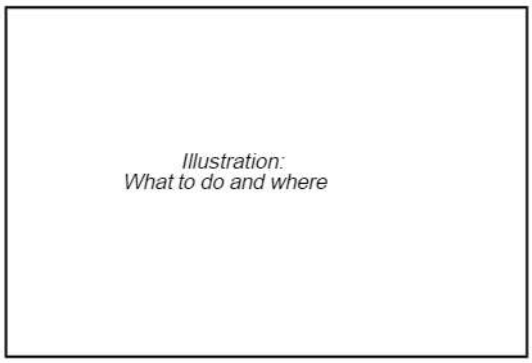


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The procedures are presented in a step-by-step format:

- © **The illustration shows what to do and where to do it.**
- © **The task heading tells what to do.**
- © **The detailed text tells how to perform the task and gives other information such as specifications and warnings.**

Example:



Task heading: what to do

21. CHECK PISTON STROKE OF OVERDRIVE BRAKE

(a) Place SST and a dial indicator onto the overdrive brake piston as shown in the illustration.

SST 09350-30020 (09350-06120)

Set part No. *Component part No.*

Detail text: how to do task

(b) Measure the stroke applying and releasing the compressed air (392 - 785 kPa, 4 - 8 kgf/cm^2 or 57 - 114 psi) as shown in the illustration.

Piston stroke: 1.40 - 1.70 mm (0.0551 - 0.0669 in.)

Specification

This format provides the experienced technician with a FAST TRACK to the information needed. The upper case task heading can be read at a glance when necessary, and the text below it provides detailed information. Important specifications and warnings always stand out in bold type.

REFERENCES

References have been kept to a minimum. However, when they are required you are given the page to refer to.

SPECIFICATIONS

Specifications are presented in bold type throughout the text where needed. You never have to leave the procedure to look up your specifications. They are also found at the back of AT section, for quick reference.

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AUTIONS, NOTICES, HINTS:

- © CAUTIONS are presented in bold type, and indicate there is a possibility of injury to you or other people.
- © NOTICES are also presented in bold type, and indicate the possibility of damage to the components being repaired.
- © HINTS are separated from the text but do not appear in bold. They provide additional information to help you perform the repair efficiently.

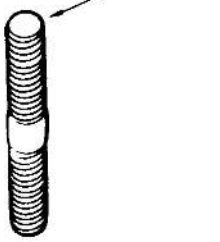
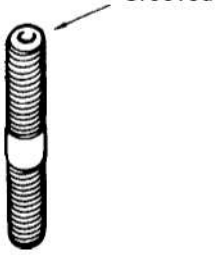
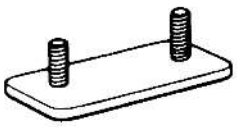
SI UNIT

The UNITS given in this manual are primarily expressed according to with the SI UNIT (International System of Unit), and alternately expressed in the metric system and in the English System.
Example:
Torque: 30 N-m (310 kgf-cm, 22 ft-lbf)

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STANDARD BOLT TORQUE SPECIFICATIONS

HOW TO DETERMINE BOLT STRENGTH

	Mark	Class		Mark	Class
Hexagon head bolt	 Bolt head No. 4- 5- 6- 7- 8- 9- 10- 11-	4T 5T 6T 7T 8T 9T 10T 11T	Stud bolt	 No mark	4T
	 No mark	4T		 Grooved	6T
Hexagon flange bolt w/ washer hexagon bolt	 No mark	4T			
Hexagon head bolt	 Two protruding lines	5T			
Hexagon flange bolt w/ washer hexagon bolt	 Two protruding lines	6T	Welded bolt		4T
Hexagon head bolt	 Three protruding lines	7T			
Hexagon head bolt	 Four protruding lines	8T			

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PECIFIED TORQUE FOR STANDARD BOLTS

Class	Diameter mm	Pitch mm	Specified torque					
			Hexagon head bolt			Hexagon flange bolt		
			N-m	kgf-cm	ft-lbf	N-m	kgf-cm	ft-lbf
4T	6	1	5	55	48 in.-lbf	6	60	52 in.-lbf
	8	1.25	12.5	130	9	14	145	10
	10	1.25	26	260	19	29	290	21
	12	1.25	47	480	35	53	540	39
	14	1.5	74	760	55	84	850	61
	16	1.5	115	1,150	83	-	-	-
5T	6	1	6.5	65	56 in.-lbf	7.5	75	65 in.-lbf
	8	1.25	15.5	160	12	17.5	175	13
	10	1.25	32	330	24	36	360	26
	12	1.25	59	600	43	65	670	48
	14	1.5	91	930	67	100	1,050	76
	16	1.5	140	1,400	101	-	-	-
6T	6	1	8	80	69 in.-lbf	9	90	78 in.-lbf
	8	1.25	19	195	14	21	210	15
	10	1.25	39	400	29	44	440	32
	12	1.25	71	730	53	80	810	59
	14	1.5	110	1,100	80	125	1,250	90
	16	1.5	170	1,750	127	-	-	-
7T	6	1	10.5	110	8	12	120	9
	8	1.25	25	260	19	28	290	21
	10	1.25	52	530	38	58	590	43
	12	1.25	95	970	70	105	1,050	76
	14	1.5	145	1,500	108	165	1,700	123
	16	1.5	230	2,300	166	-	-	-
8T	8	1.25	29	300	22	33	330	24
	10	1.25	61	620	45	68	690	50
	12	1.25	110	1,100	80	120	1,250	90
9T	8	1.25	34	340	25	37	380	27
	10	1.25	70	710	51	78	790	57
	12	1.25	125	1,300	94	140	1,450	105
10T	8	1.25	38	390	28	42	430	31
	10	1.25	78	800	58	88	890	64
	12	1.25	140	1,450	105	155	1,600	116
11T	8	1.25	42	430	31	47	480	35
	10	1.25	87	890	64	97	990	72
	12	1.25	155	1,600	116	175	1,800	130

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