TRANSMISSION
MANUAL AND AUTOMATIC

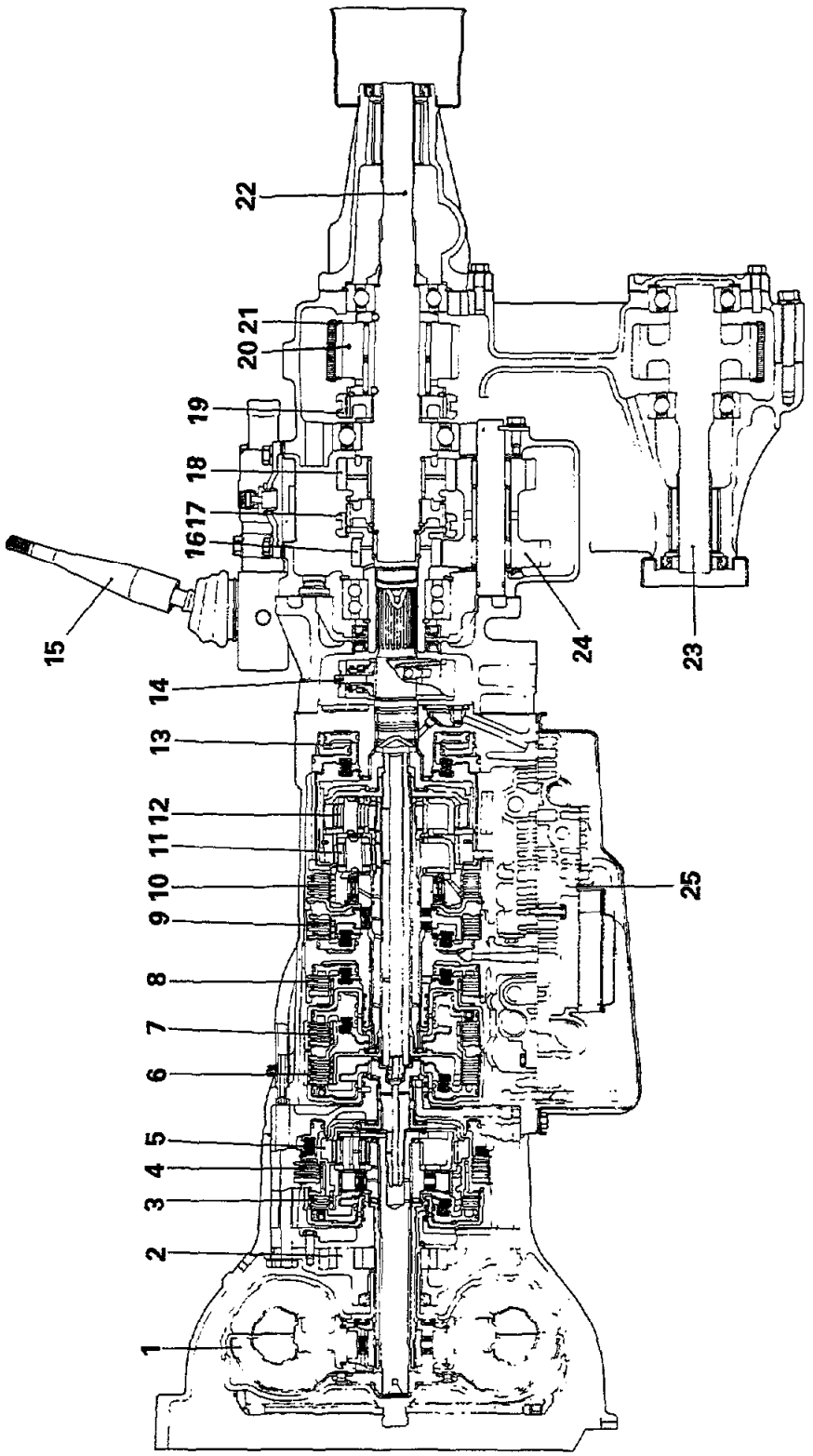
CONTENTS

N21AA--

AUTOMATIC TRANSMISSION

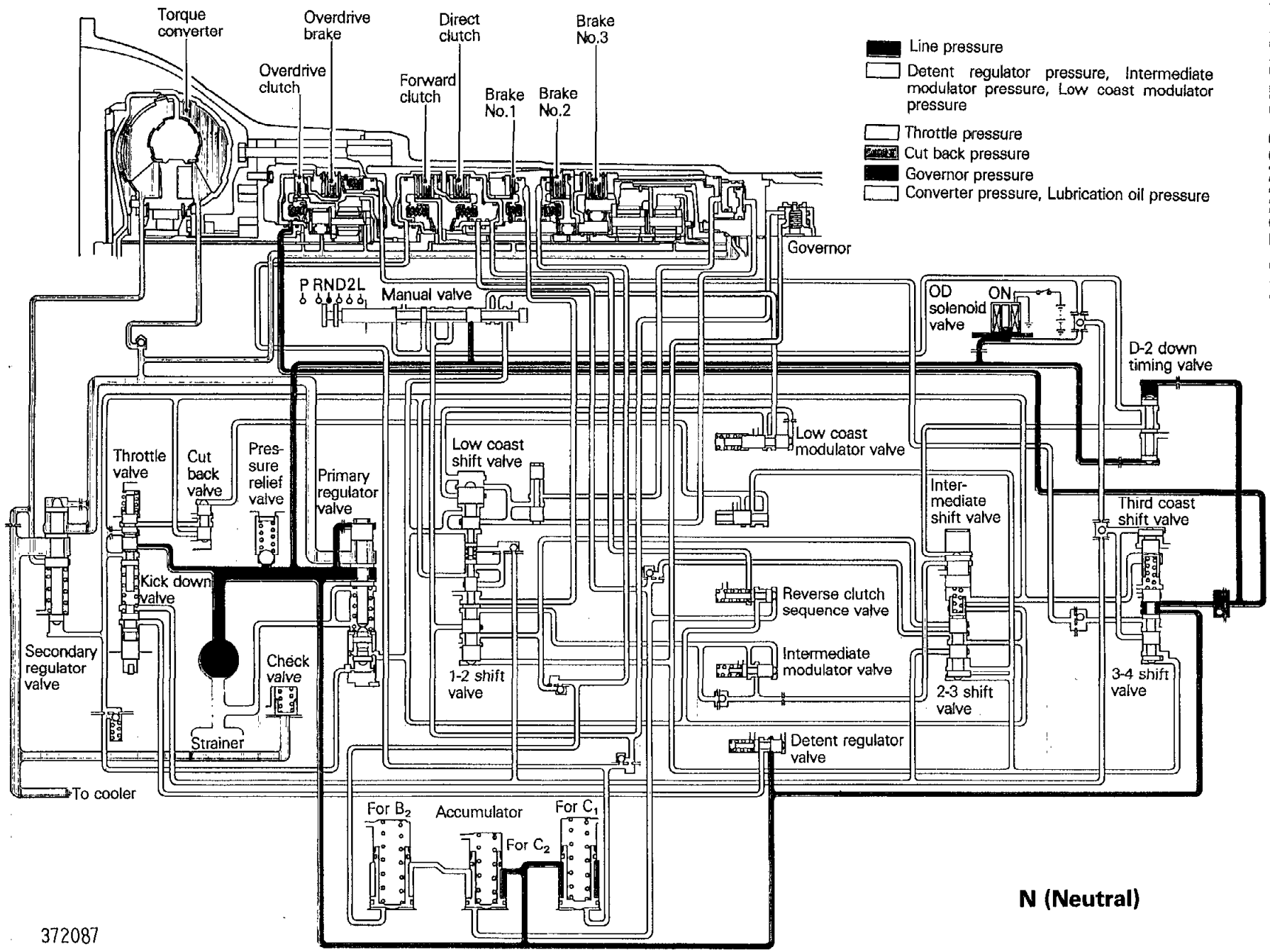
GENERAL INFORMATION

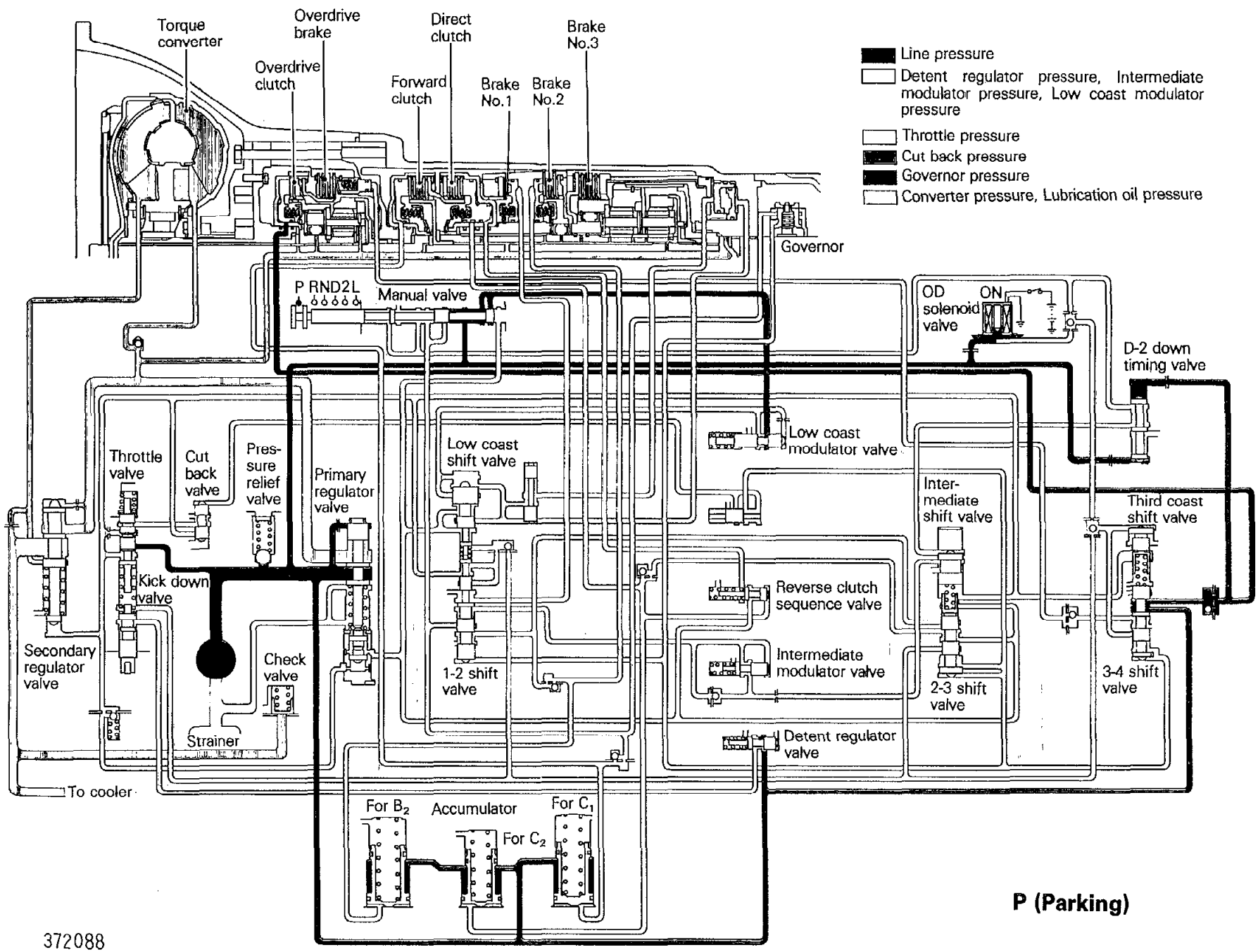
N21BABQ



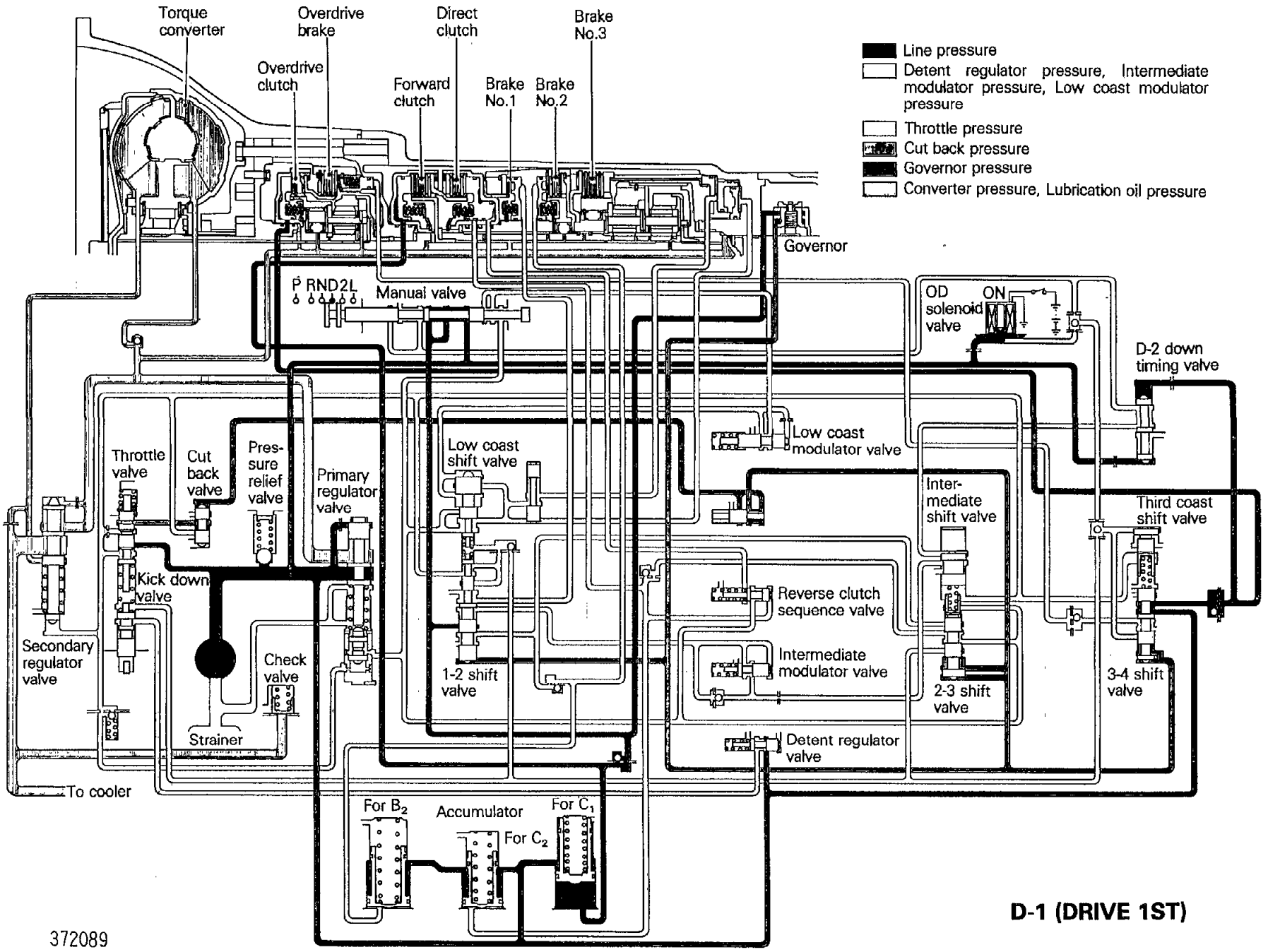
1. Torque converter
2. Oil pump
3. Over drive clutch
4. Over drive brake
5. Over drive planetary gear
6. Forward clutch
7. Direct clutch
8. Brake No.1
9. Brake No.2
10. Brake No.3
11. Front planetary gear
12. Rear planetary gear
13. Brake No.3 piston
14. Governor
15. Transfer control lever
16. Input gear
17. High-low clutch
18. Low speed gear
19. 2WD-4WD clutch
20. Drive sprocket
21. Chain
22. Rear output shaft
23. Front output shaft
24. Counter gear
25. Valve body

MODEL KM148

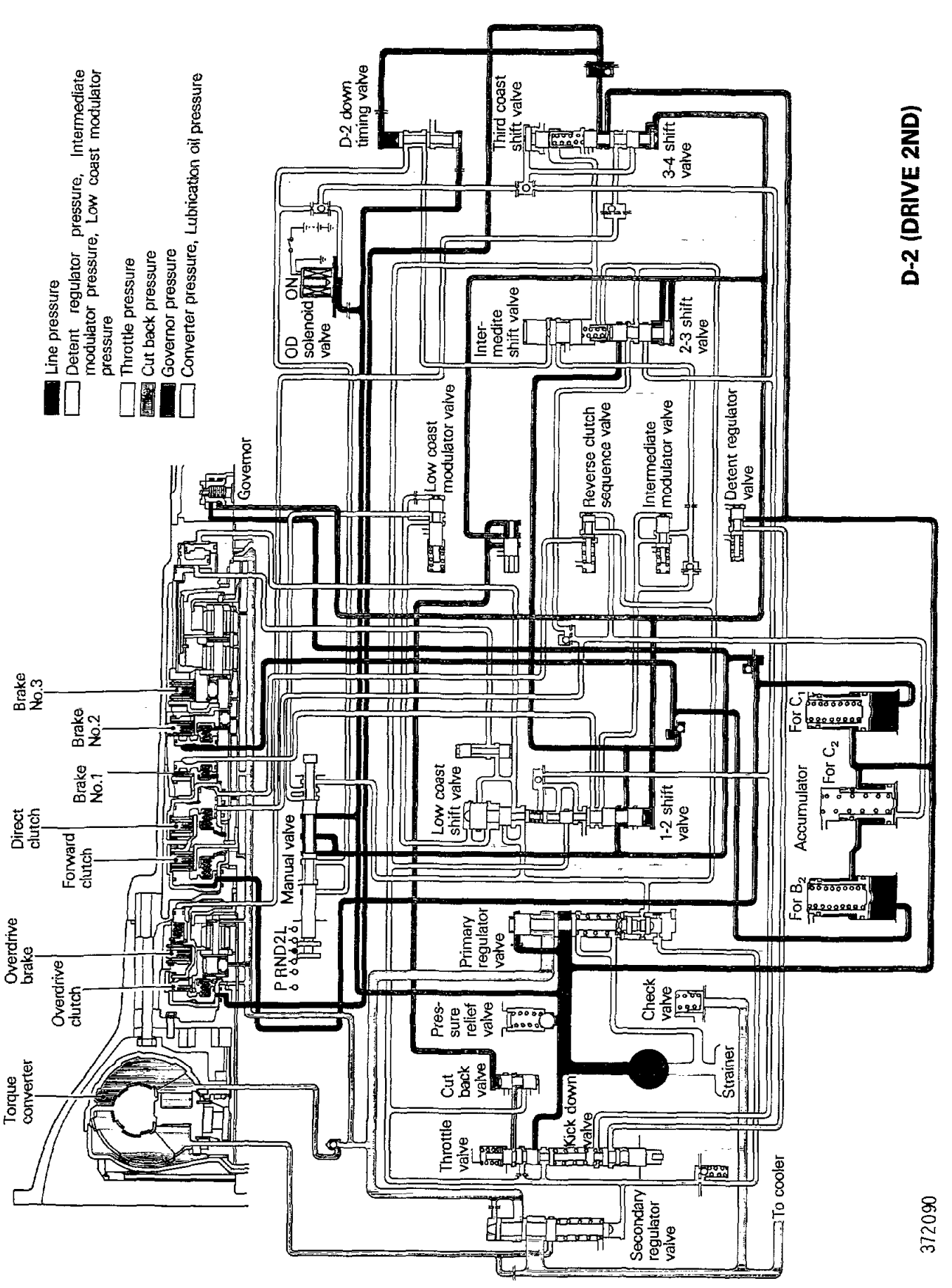

Torque converter
Overdrive brake
Direct clutch
Brake No.3
Overdrive clutch
Forward clutch
Brake No.1
Brake No.2
Line pressure
Detent regulator pressure, Intermediate modulator pressure, Low coast modulator pressure
Throttle pressure
Cut back pressure
Governor pressure
Converter pressure, Lubrication oil pressure
Governor
P R N D 2 L
Manual valve
OD solenoid valve
ON
D-2 down timing valve
Low coast modulator valve
Throttle valve
Cut back valve
Pressure relief valve
Primary regulator valve
Low coast shift valve
Inter-mediate shift valve
Third coast shift valve
Kick down valve
Reverse clutch sequence valve
Intermediate modulator valve
Secondary regulator valve
Check valve
1-2 shift valve
2-3 shift valve
3-4 shift valve
Detent regulator valve
Strainer
To cooler
For B2
Accumulator
For C1
For C2
N (Neutral)
372087

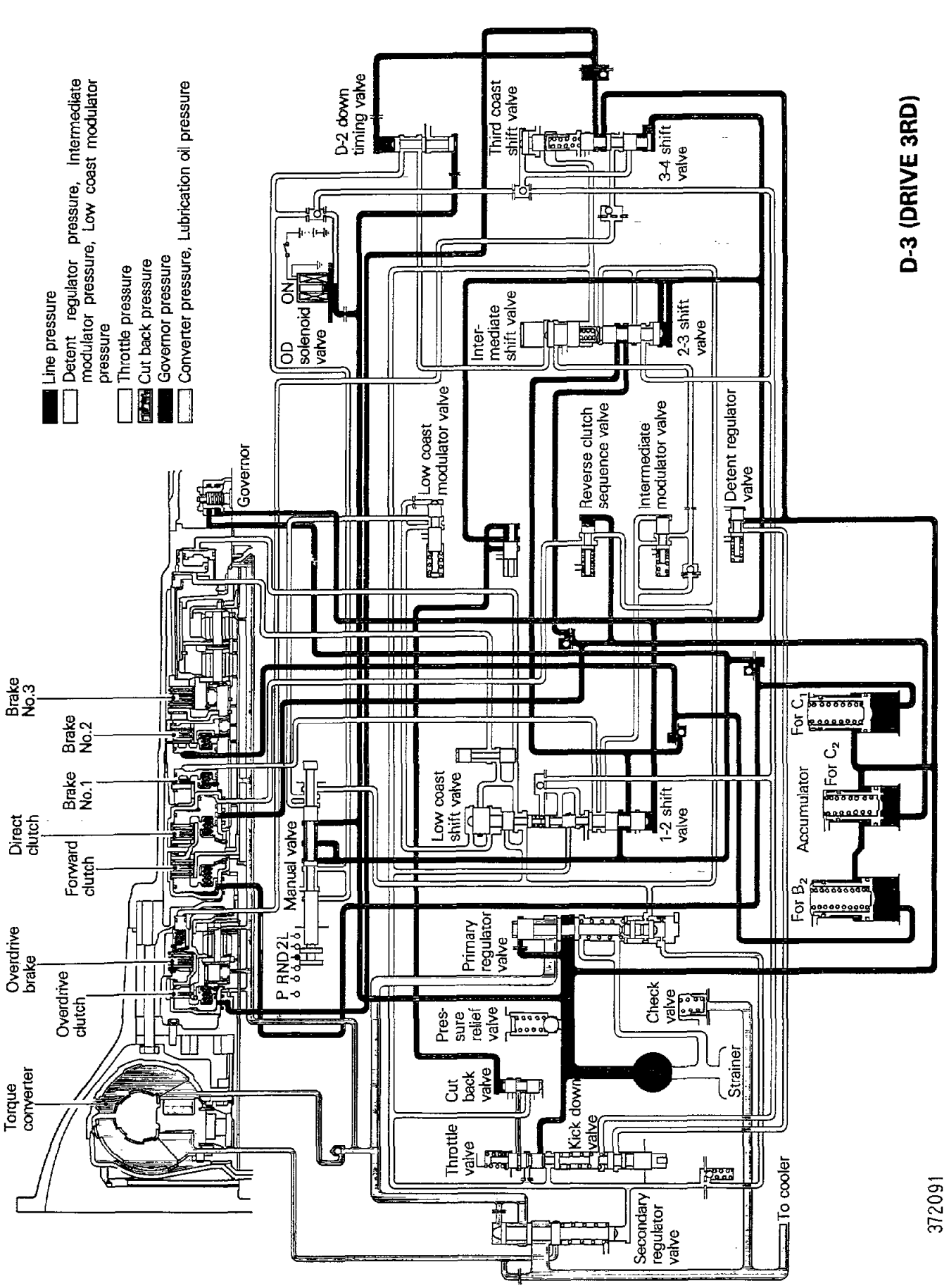

Torque converter
Overdrive brake
Direct clutch
Brake No.3
Overdrive clutch
Forward clutch
Brake No.1
Brake No.2
Line pressure
Detent regulator pressure, Intermediate modulator pressure, Low coast modulator pressure
Throttle pressure
Cut back pressure
Governor pressure
Converter pressure, Lubrication oil pressure
Governor
P RND2L
Manual valve
OD solenoid valve
ON
D-2 down timing valve
Low coast modulator valve
Throttle valve
Cut back valve
Pres-sure relief valve
Primary regulator valve
Low coast shift valve
Inter-mediate shift valve
Third coast shift valve
Kick down valve
Reverse clutch sequence valve
Secondary regulator valve
Check valve
Intermediate modulator valve
1-2 shift valve
2-3 shift valve
3-4 shift valve
Strainer
Detent regulator valve
To cooler
For B_2
Accumulator
For C_1
For C_2
372088

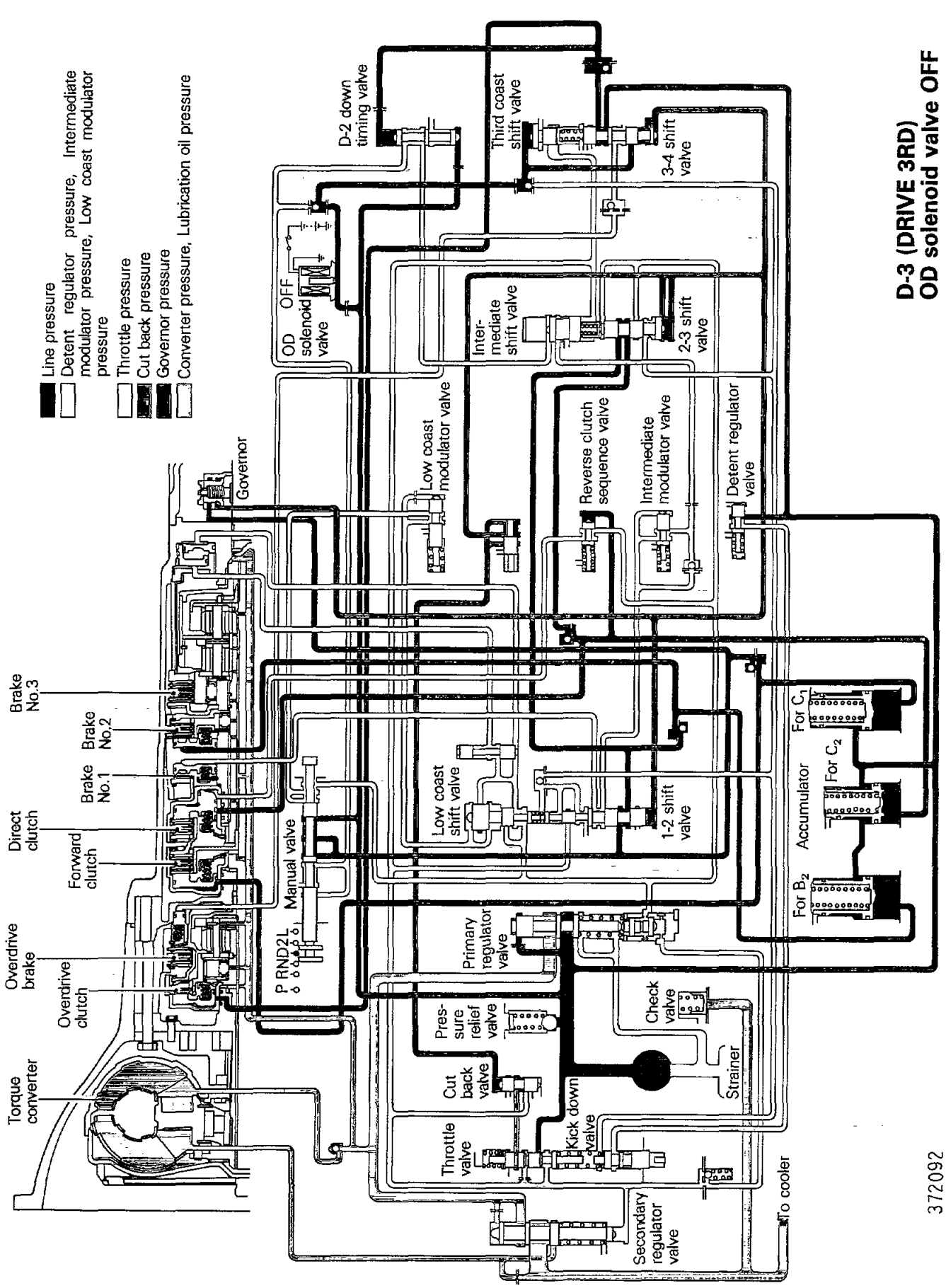
P (Parking)

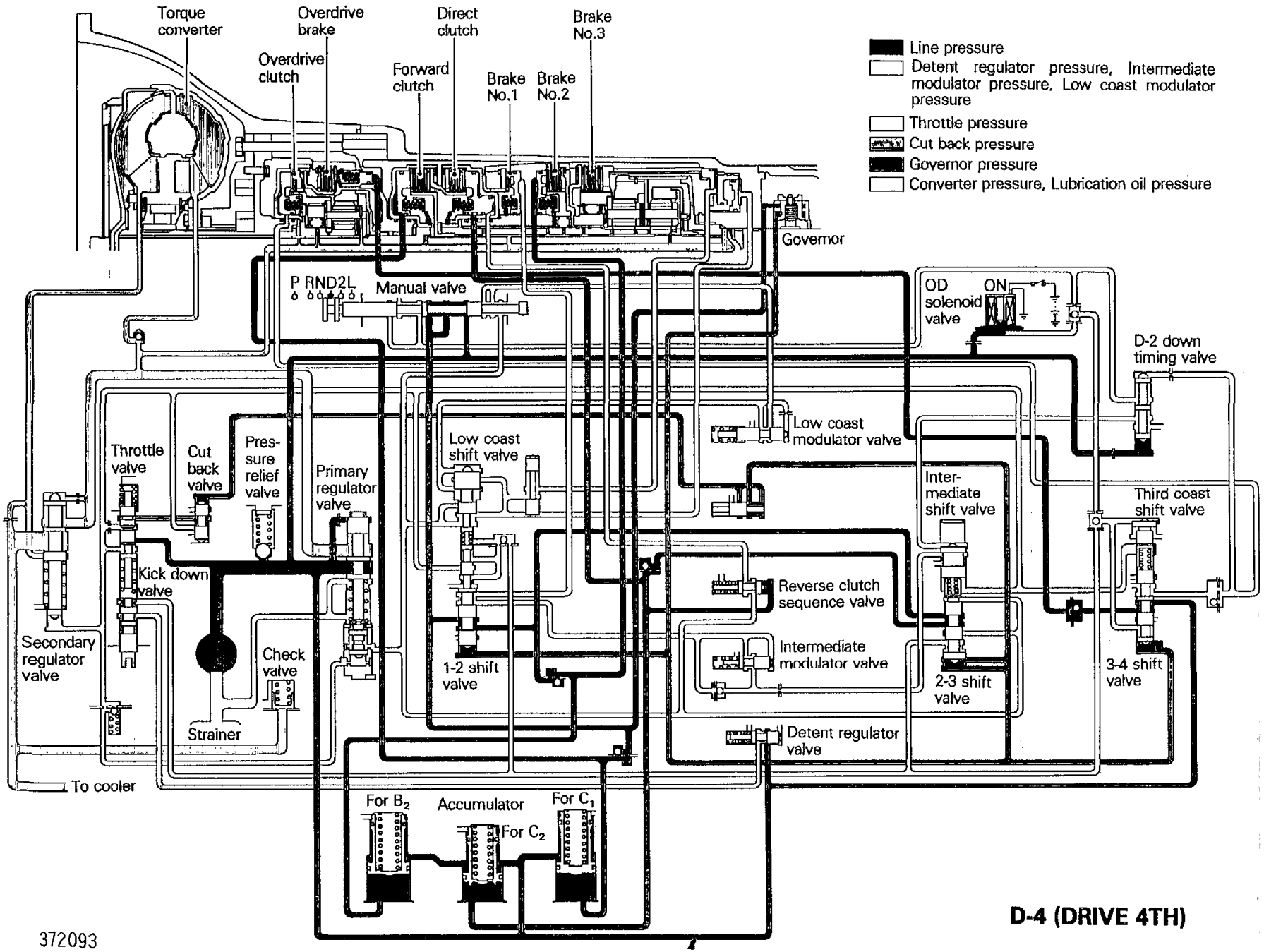

Torque converter
Overdrive brake
Direct clutch
Brake No.3
Overdrive clutch
Forward clutch
Brake No.1
Brake No.2
Line pressure
Detent regulator pressure, Intermediate modulator pressure, Low coast modulator pressure
Throttle pressure
Cut back pressure
Governor pressure
Converter pressure, Lubrication oil pressure
Governor
P RND2L
Manual valve
OD solenoid valve
OD ON
D-2 down timing valve
Low coast modulator valve
Throttle valve
Cut back valve
Pres-sure relief valve
Primary regulator valve
Low coast shift valve
Inter-mediate shift valve
Third coast shift valve
Kick down valve
Reverse clutch sequence valve
Secondary regulator valve
Check valve
Intermediate modulator valve
1-2 shift valve
2-3 shift valve
3-4 shift valve
Strainer
Detent regulator valve
To cooler
For B2
Accumulator
For C1
For C2
372089

D-1 (DRIVE 1ST)

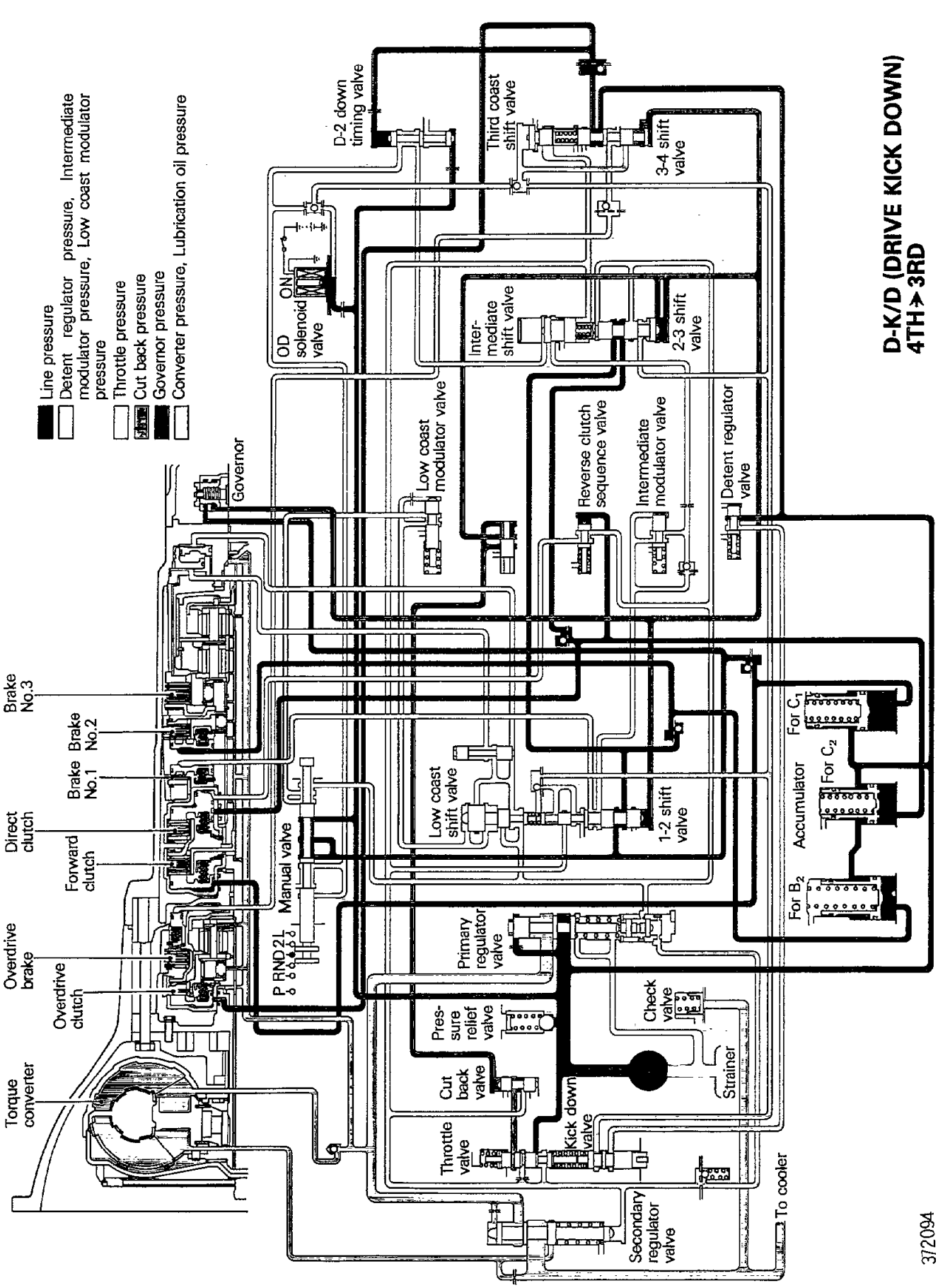

Line pressure
Detent regulator pressure, Intermediate modulator pressure, Low coast modulator pressure
Throttle pressure
Cut back pressure
Governor pressure
Converter pressure, Lubrication oil pressure
D-2 (DRIVE 2ND)
Torque converter
Overdrive clutch
Overdrive brake
Forward clutch
Direct clutch
Brake No.1
Brake No.2
Brake No.3
Governor
D-2 down timing valve
Third coast shift valve
3-4 shift valve
OD solenoid valve
ON
OFF
Inter-medite shift valve
2-3 shift valve
Low coast modulator valve
Reverse clutch sequence valve
Intermediate modulator valve
Detent regulator valve
Manual valve
P RND2L
Low coast shift valve
1-2 shift valve
For C_1
For C_2
Accumulator
For B_2
Primary regulator valve
Check valve
Pres-sure relief valve
Strainer
Cut back valve
Kick down valve
Throttle valve
Secondary regulator valve
To cooler
372090

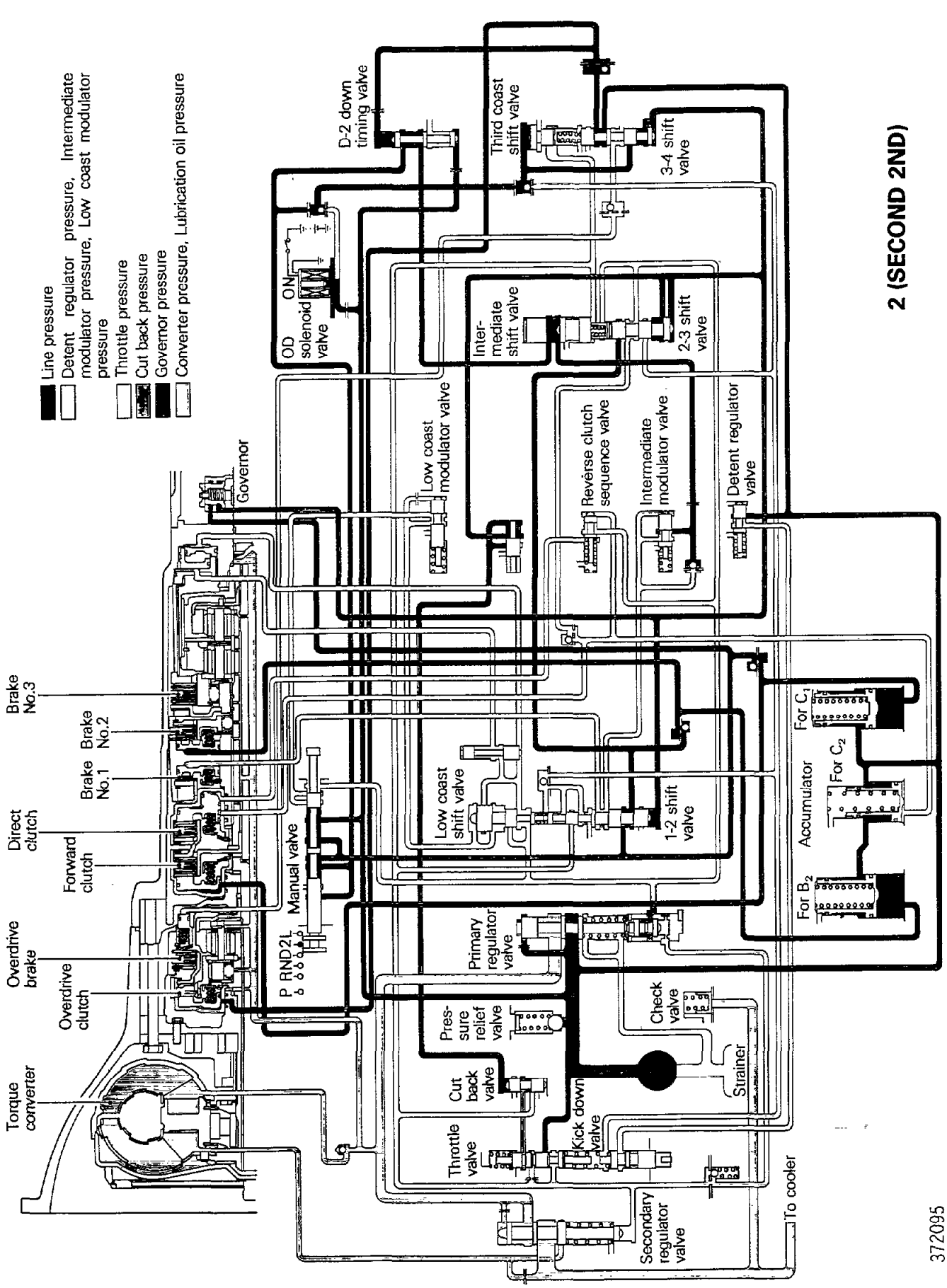

D-3 (DRIVE 3RD)
Line pressure
Detent regulator pressure, Intermediate modulator pressure, Low coast modulator pressure
Throttle pressure
Cut back pressure
Governor pressure
Converter pressure, Lubrication oil pressure
Torque converter
Overdrive clutch
Overdrive brake
Forward clutch
Direct clutch
Brake No.1
Brake No.2
Brake No.3
P RND2L
Manual valve
Governor
D-2 down timing valve
OD solenoid valve
ON
Third coast shift valve
3-4 shift valve
Inter-mediate shift valve
2-3 shift valve
Low coast modulator valve
Reverse clutch sequence valve
Intermediate modulator valve
Detent regulator valve
Low coast shift valve
1-2 shift valve
Primary regulator valve
Pres-sure relief valve
Check valve
Cut back valve
Strainer
Throttle valve
Kick down valve
Secondary regulator valve
To cooler
For C_1
For C_2
Accumulator
For B_2
372091

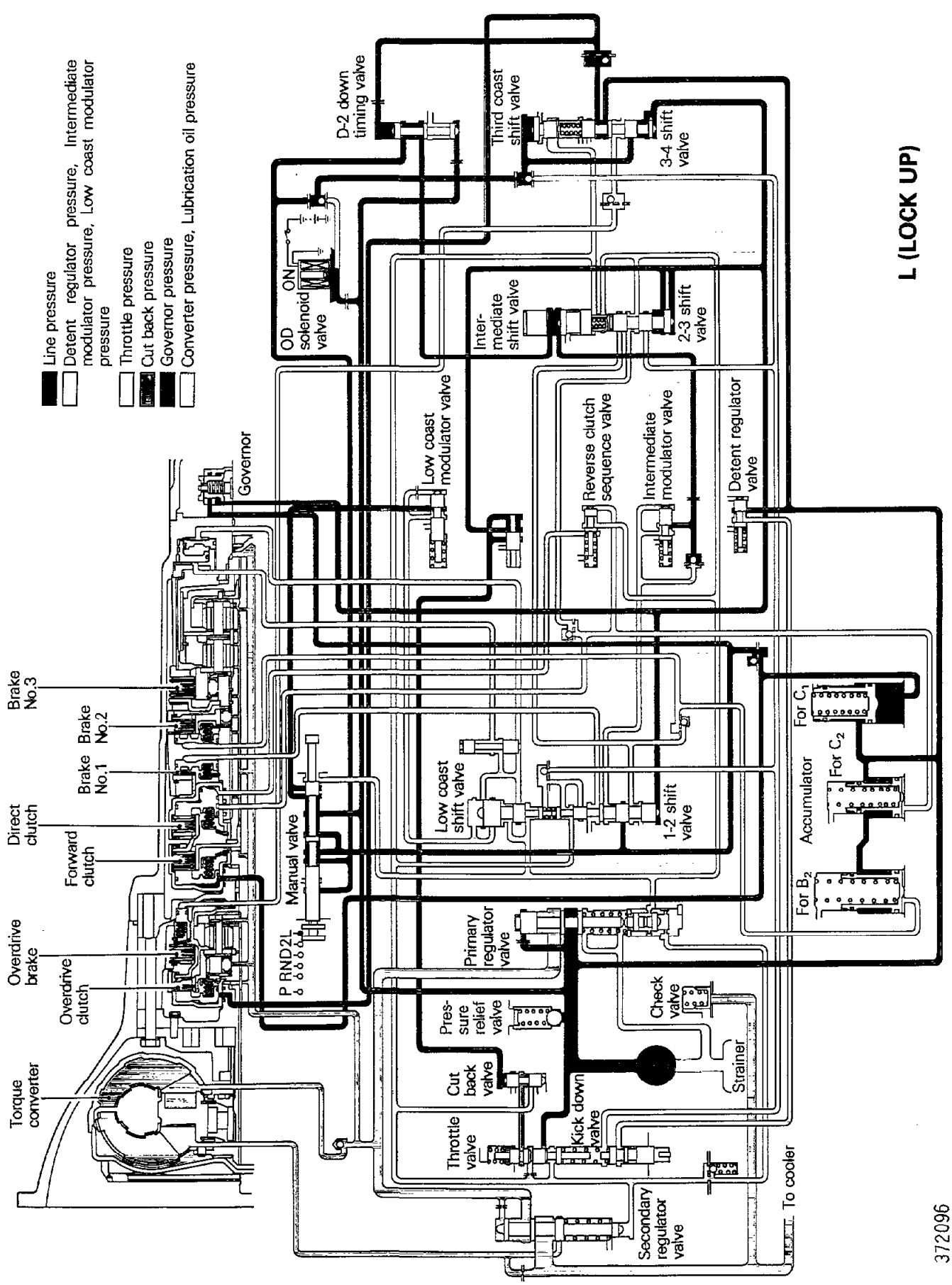

Line pressure
Detent regulator pressure, Intermediate modulator pressure, Low coast modulator pressure
Throttle pressure
Cut back pressure
Governor pressure
Converter pressure, Lubrication oil pressure
D-3 (DRIVE 3RD)
OD solenoid valve OFF
D-2 down timing valve
Third coast shift valve
3-4 shift valve
OD solenoid valve
OFF
Inter-mediate shift valve
2-3 shift valve
Low coast modulator valve
Reverse clutch sequence valve
Intermediate modulator valve
Detent regulator valve
Governor
Brake No.3
Brake No.2
Brake No.1
Direct clutch
Forward clutch
Overdrive brake
Overdrive clutch
Torque converter
Manual valve
P RND2L
Low coast shift valve
1-2 shift valve
For C_1
For C_2
Accumulator
For B_2
Primary regulator valve
Pres-sure relief valve
Check valve
Strainer
Cut back valve
Kick down valve
Throttle valve
Secondary regulator valve
To cooler
372092

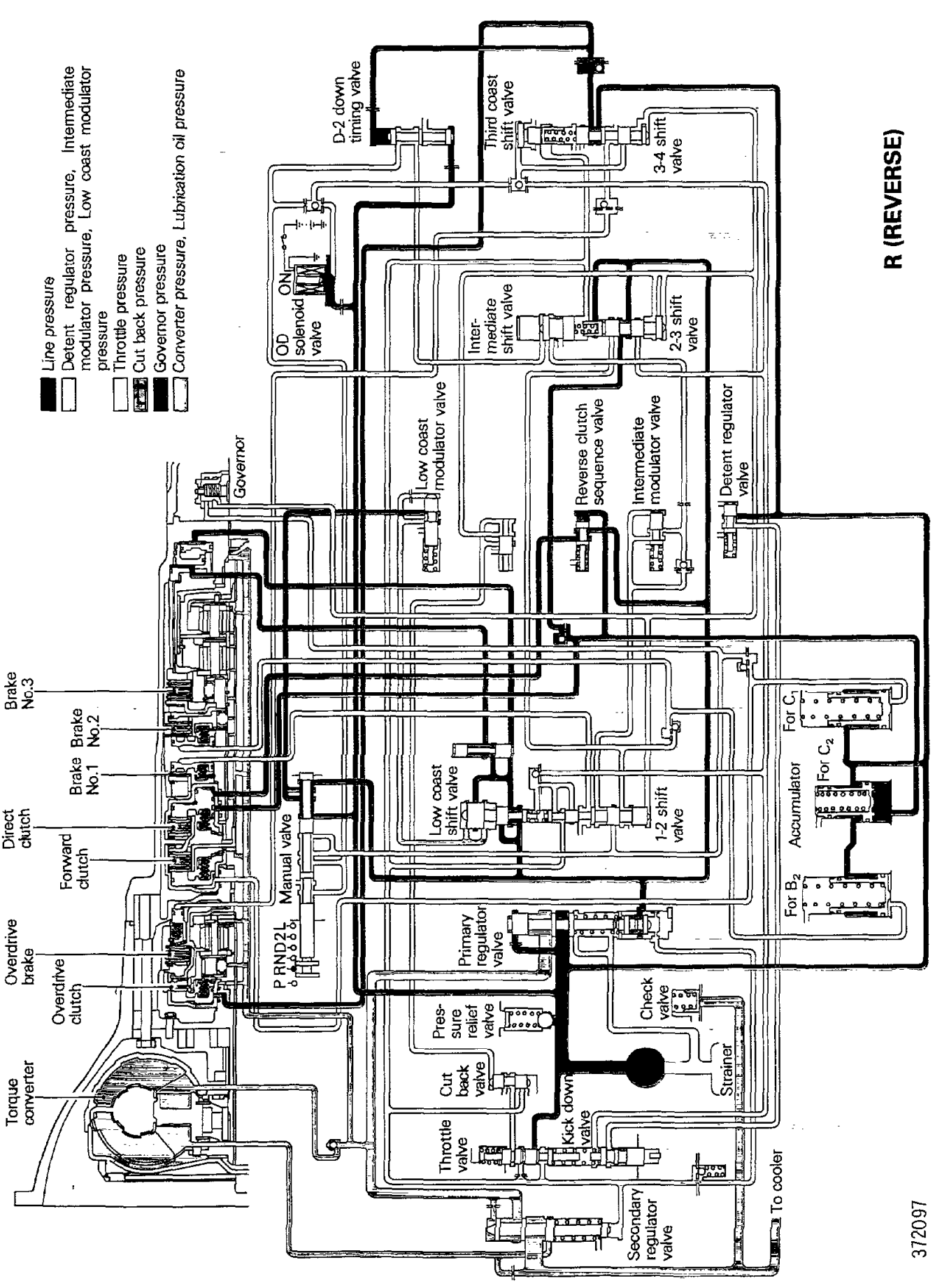

Torque converter
Overdrive brake
Direct clutch
Brake No.3
Overdrive clutch
Forward clutch
Brake No.1
Brake No.2
Line pressure
Detent regulator pressure, Intermediate modulator pressure, Low coast modulator pressure
Throttle pressure
Cut back pressure
Governor pressure
Converter pressure, Lubrication oil pressure
Governor
P RND2L
Manual valve
OD solenoid valve
ON
D-2 down timing valve
Low coast modulator valve
Throttle valve
Cut back valve
Pres-sure relief valve
Primary regulator valve
Low coast shift valve
Inter-mediate shift valve
Third coast shift valve
Kick down valve
Reverse clutch sequence valve
Secondary regulator valve
Check valve
1-2 shift valve
Intermediate modulator valve
2-3 shift valve
3-4 shift valve
Strainer
Detent regulator valve
To cooler
For B_2
Accumulator
For C_1
For C_2
372093

D-4 (DRIVE 4TH)


D-K/D (DRIVE KICK DOWN)
4TH → 3RD
Line pressure
Detent regulator pressure, Intermediate modulator pressure, Low coast modulator pressure
Throttle pressure
Cut back pressure
Governor pressure
Converter pressure, Lubrication oil pressure
Torque converter
Overdrive clutch
Overdrive brake
Forward clutch
Direct clutch
Brake No.1
Brake No.2
Brake No.3
P RND2L
Manual valve
Governor
D-2 down timing valve
OD solenoid valve
OFF
ON
Third coast shift valve
3-4 shift valve
Inter-mediate shift valve
2-3 shift valve
Low coast modulator valve
Reverse clutch sequence valve
Intermediate modulator valve
Detent regulator valve
Low coast shift valve
1-2 shift valve
For C1
For C2
Accumulator
For B2
Primary regulator valve
Pres-sure relief valve
Check valve
Strainer
Cut back valve
Throttle valve
Kick down valve
Secondary regulator valve
To cooler
372094


Line pressure
Detent regulator pressure, Intermediate modulator pressure, Low coast modulator pressure
Throttle pressure
Cut back pressure
Governor pressure
Converter pressure, Lubrication oil pressure
2 (SECOND 2ND)
Brake No.3
Brake No.2
Brake No.1
Direct clutch
Forward clutch
Overdrive brake
Overdrive clutch
Torque converter
Governor
D-2 down timing valve
Third coast shift valve
3-4 shift valve
OD solenoid valve
ON
Inter-mediate shift valve
2-3 shift valve
Low coast modulator valve
Reverse clutch sequence valve
Intermediate modulator valve
Detent regulator valve
Manual valve
P RND2L
Low coast shift valve
1-2 shift valve
For C_1
For C_2
Accumulator
For B_2
Primary regulator valve
Check valve
Pres-sure relief valve
Strainer
Cut back valve
Kick down valve
Throttle valve
Secondary regulator valve
To cooler
372095


Line pressure
Detent regulator pressure, Intermediate modulator pressure, Low coast modulator pressure
Throttle pressure
Cut back pressure
Governor pressure
Converter pressure, Lubrication oil pressure
L (LOCK UP)
Torque converter
Overdrive clutch
Overdrive brake
Direct clutch
Forward clutch
Brake No.1
Brake No.2
Brake No.3
P RND2L
Manual valve
Governor
OD solenoid valve
ON
D-2 down timing valve
Third coast shift valve
3-4 shift valve
Inter-mediate shift valve
2-3 shift valve
Low coast modulator valve
Reverse clutch sequence valve
Intermediate modulator valve
Detent regulator valve
Low coast shift valve
1-2 shift valve
For C_1
For C_2
Accumulator
For B_2
Primary regulator valve
Pres-sure relief valve
Check valve
Strainer
Cut back valve
Throttle valve
Kick down valve
Secondary regulator valve
To cooler
372096


Line pressure
Detent regulator pressure, Intermediate modulator pressure, Low coast modulator pressure
Throttle pressure
Cut back pressure
Governor pressure
Converter pressure, Lubrication oil pressure
R (REVERSE)
D-2 down timing valve
Third coast shift valve
3-4 shift valve
OD solenoid valve
ON
Inter-mediate shift valve
2-3 shift valve
Governor
Low coast modulator valve
Reverse clutch sequence valve
Intermediate modulator valve
Detent regulator valve
Brake No.3
Brake No.2
Brake No.1
Direct clutch
Forward clutch
Overdrive brake
Overdrive clutch
Torque converter
Manual valve
P RND2L
Low coast shift valve
1-2 shift valve
Primary regulator valve
Pres-sure relief valve
Cut back valve
Throttle valve
Kick down valve
Check valve
Strainer
Secondary regulator valve
To cooler
For C_1
For C_2
Accumulator
For B_2
372097

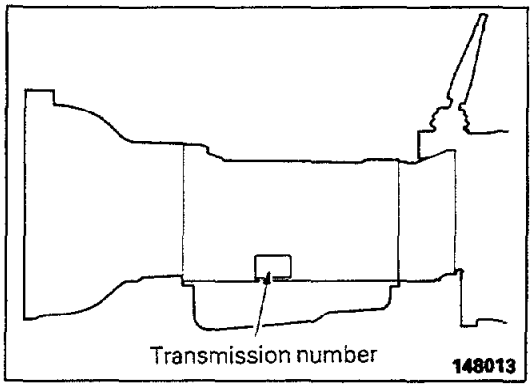
SPECIFICATIONS

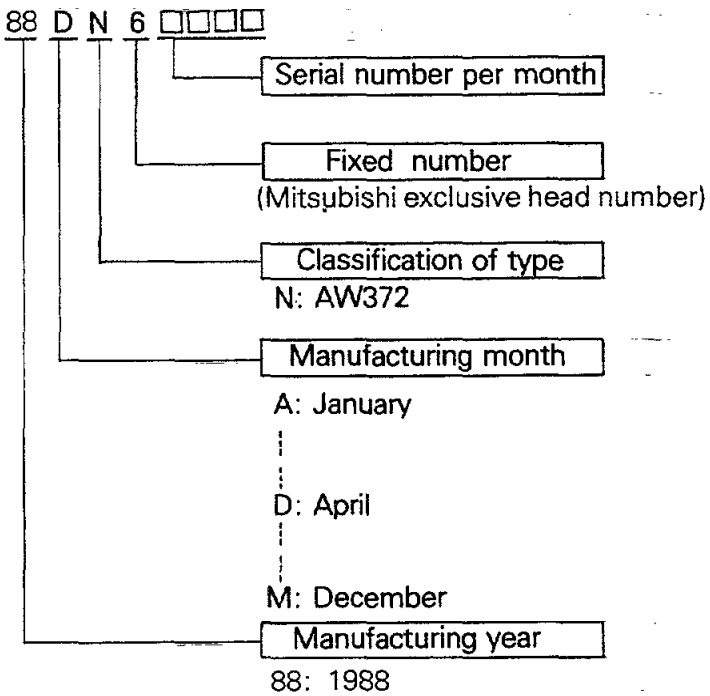
GENERAL SPECIFICATIONS

N21CA–1

Items	Specifications
Automatic transmission and transfer case model	KM148-6-FSI
Torque converter	
Type	3 elements, 1-step 2-phase system
Stall torque ratio	2.02
One-way clutch	Sprag type
Transmission	
Type	Forward 4 gears, reverse 1 gear, single-line planetary gear and Simpson planetary gear
Control elements	
Clutch	Multiple disc type 3 pairs
Brake	Multiple disc tyep 4 pairs
One-way clutch	Sprag type 3 pairs
Gear ratios	
1st gear	2.826
2nd gear	1.493
3rd gear	1.000
4th gear	0.688
Reverse	2.703
Shift control method	Floor shift type
Select pattern	P-R-N-D-2-L and overdrive switch
Oil pump	
Type	Gear type
Drive system	Directly coupled to engine via torque converter
Hydraulic control system	Throttle opening and vehicle speed detection
Oil-cooling system	Air-cooled system + water-cooled system oil cooler (secondary cooling method)
Transfer	
Type	Always-engaged type
Shift control method	Single-lever floor-shift type
Shift ratios	
LOW	1.944
HIGH	1.000
Speedometer gear ratio	26/8

Transmission number marking position and designation





SERVICE SPECIFICATIONS

N21CB--1

Items	Standard	Limit
Stall speed (rpm)	2100–2400	
Governor pressure kPa (psi)		
1000 rpm	133–163 (19.4–23.6)	
2000 rpm	251–281 (36.4–40.6)	
3000 rpm	400–430 (58–62.2)	
Line Pressure kPa (psi)		
"D" range		
When idling	510–590 (74–85)	
During stall	1080–1280 (156–185)	
"R" range		
When idling	770–890 (112–130)	
During stall	1570–1960 (227–285)	

Items	Standard	Limit
Input shaft end play mm (in.)	0.3–0.9 (.012–.035)	
Oil pump		
Side clearance mm (in.)	0.02–0.65 (.0008–.0020)	(.004)
Body clearance mm (in.)	0.07–0.15 (.0028–.0059)	0.3 (.012)
Tip clearance (driven gear) mm (in.)	0.11–0.14 (.0043–.0055)	0.3 (.012)
Clutch and brake piston stroke mm (in.)		
Overdrive clutch(C^0)	1.56–2.53 (.0614–.0996)	
Forward clutch (C^1)	1.43–2.93 (.0563–.1154)	
Direct clutch (C^2)	0.91–1.99 (.0358–.0783)	
No. 1 brake (B^1)	0.80–1.73 (.0315–.0681)	
No. 2 brake (B^2)	1.01–2.25 (.0398–.0886)	
Brake clearance mm (in.)		
Overdrive brake (B^0)	0.65–2.21 (.0256–.0870)	
No. 3 brake (B^3)	0.61–2.64 (.0240–.1039)	
Transfer		
H-L clutch hub end play mm (in.)	0–0.08 (0–.003)	
Input gear bearing end play mm (in.)	0–0.06 (0–.002)	
Input gear end play mm (in.)	0–0.06 (0–.002)	
Transmission control		
Sleeve and selector lever clearance mm (in.)	15.2–15.9 (.60–.62)	

Spring identification

mm (in.)

Spring		Free height	Outside diameter	Number of loops	Wire diameter	Identification color
Valve body springs						
Lower valve body	1-2 shift valve spring	34.62	7.56	13.0	0.56	–
	Pressure relief valve spring	32.14	13.14	9.0	2.03	–
	Primary regulator valve spring	65.56	17.2	13.0	1.8	LIGHT BLUE
	3-4 shift valve spring	35.18	10.6	14.5	1.1	GREEN
	Oil cooler bypass valve spring	28.9	13.8	6.5	1.6	ORANGE
	Damping check valve spring	20.0	4.97	16.0	0.40	–
Rear upper valve body	2-3 shift timing valve spring	35.10	8.96	12.5	0.76	WHITE
	Reverse clutch sequence valve spring	37.55	9.2	14.0	1.2	RED
	low-coast modulator valve spring	42.35	9.24	15.0	0.84	–
	Detent regulator valve	31.39	8.85	13.5	0.90	ORANGE
	Intermediate modulator valve spring	35.43	8.8	14.4	0.90	RED
Front upper valve body	Throttle valve spring	21.94	8.58	8.0	0.71	–
	Down shift plug spring	39.76	10.83	11.5	1.2	PURPLE
	Secondary regulator valve spring	71.27	17.43	15.0	1.93	GREEN
Clutch and brake return springs						
Overdrive and forward clutches		15.10	8.0	5.5	1.1	RED
Direct clutch		15.10	8.0	5.5	1.1	RED
Brake		16.12	8.0	6.0	1.0	–

mm (in.)

Spring		Free height	Outside diameter	Number of loops	Wire diameter	Identification color
Accumulator springs						
C_1	No. 1	64.68	17.5	18.5 4.0	2.0	–
C_2	No. 1	32.2	14.7	6.5	1.6	ORANGE
	No. 2	43.56	14.3	9.45	1.8	BLUE
B_2		66.68	20.4	12.0	3.2	LIGHT GREEN

Identification of clutches, brakes and accumulators

Number of discs		
Clutch	C_0	2
	C_1	5
	C_2	3 (single piston)
Brake	B_0	3
	B_1	2
	B_2	3
	B_3	5
Accumulator piston OD × Length		
B_2		34.8 × 48.5 mm (1.370 × 1.909 in.)
C_2		31.8 × 45.0 mm (1.252 × 1.772 in.)
C_1		31.8 × 49.5 mm (1.252 × 1.949 in.)
Accumulator piston spring		
B_2		Single
C_2		Double
C_1		Single

TORQUE SPECIFICATIONS

N21CC–1

Items	Nm	ft.lbs.
Transmission control lever		
Transmission control rod (B) to pin	13	9
Cross shaft bracket (A) to body	10–13	7–9
Selector handle mounting screw	2	0.4
Transmission control arm to bracket	18–24	13–17
Transmission		
Oil filler tube to transmission	10–12	7–9
No. 2 crossmember to frame	55–75	40–54
Rear engine support member to frame	10–13	7–9
No. 2 crossmember to transmission	18–25	13–18
Transmission to engine (A)	65–85	47–61
Transmission to engine (B)	80–100	58–72
Transmission to engine (D)	30–42	22–30
Transmission to starter motor	27–34	20–25
Torque converter to drive plate	35–42	25–30
Converter housing installation bolt		
10 mm (.39 in.) dia. bolt	27–42	20–30
12 mm (.47 in.) dia. bolt	48–68	35–49
Oil pump assembly installation bolt	18–25	13–18
Oil pump body and cover-tightening bolt	6–9	4.3–6.5
Center support installation bolt	24–28	17–20
Adapter installation bolt	27–42	20–30
Cover plate installation screw	6–9	4.3–6.5
All bolts of valve body	5–6	3.6–4.3
Throttle cam installation bolt	6–9	4.3–6.5
Valve body assembly installation bolt	8–12	5.8–9
Oil screen installation bolt	5–6	3.6–4.3
Parking cam plate installation bolt	6–9	4.3–6.5
Oil pan installation bolt	4–5	2.9–3.6
Union	30–40	22–29
Elbow connector	30–40	22–29
Plug (for hydraulic test)	6–9	4.3–6.5
Oil pan drain plug	18–23	13–17
Overdrive solenoid valve installation bolt	10–16	7–12
Plug	10–16	7–12
Manual lever installation nut	14–18	10–13
Transmission oil cooler		
Transmission oil cooler eye bolts	30–35	22–25
Transmission oil cooler tube flare nut	40–50	29–36
Transfer		
Transfer case installation bolt	30–42	22–30
Transfer case installation nut	30–42	22–30
Chain cover bolt	31–42	22–30
Side cover bolt	8–10	5–7
Rear cover bolt	15–22	11–15
Cover bolt	15–22	11–15
Control housing bolt	15–22	11–15

TSB Revision

Items	Nm	ft.lbs.
Oil filler plug	30–35	22–25
Drain plug	30–35	22–25
Select plug	30–35	22–25
Locking plate bolt	15–22	11–15
Rear output shaft lock nut	100–130	72–94
Speedometer sleeve clamp bolt	1.5–2.2	1.1–1.6
Seal plug	30–42	22–30
4WD switch	30	22
Control shaft set screw	8–10	5–7
Control lever assembly to control housing	8–10	5–7
Transfer mounting bracket to transfer	18–25	13–18
Transfer mounting bracket to pipe	30–42	22–29

LUBRICANTS

N21CD–1

Items	Specified lubricants	Quantity
Automatic transmission fluid	Automatic Transmission Fluid "DEXRON" type	Approx. 7.2 lit. (15.2 pints)
Transfer oil	Hypoid gear oil API classification GL-4 or higher SAE viscosity No. 80W or 75W-85W	Approx. 2.2 lit. (4.7 pints)
Transfer control lever assembly O-ring	Hypoid gear oil API classification GL-4 or higher SAE viscosity No. 80W or 75W-85W	Small quantity

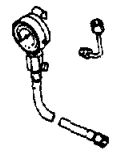
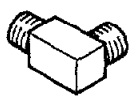
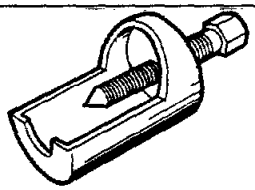
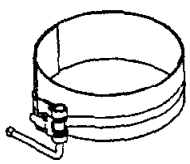
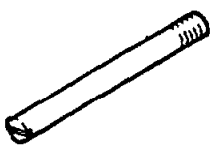
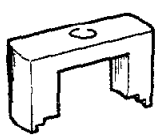
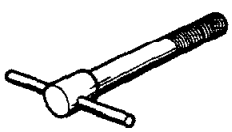
SEALANTS AND ADHESIVES

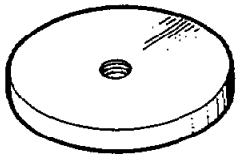
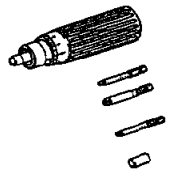
N21CE–1

Items	Specified sealants and adhesives	Quantity
Oil pump installation bolt (threads)	3M ART Part No. 8660 or equivalent	As required
Adaptor gasket (both sides)	3M ART Part No. 8660 or equivalent	As required
Air breather (press-in circumference)	3M ART Part No. 8660 or equivalent	As required
Chain cover gasket (both sides)	3M ART Part No. 8660 or equivalent	As required
Rear cover gasket (both sides)	3M ART Part No. 8660 or equivalent	As required
Cover gasket (both sides)	3M ART Part No. 8660 or equivalent	As required
Control housing gasket (cover side surface only)	3M ART Part No. 8660 or equivalent	As required
Bolt (threads)	3M Adhesive Nut Locking 4171 or equivalent	As required

SPECIAL TOOLS

N21DA--1

Tool	Number	Name	Use
	MD998330 (includes MD998331)	Oil pressure gauge (3000 kPa · 427 psi)	Measurement of oil pressure
	MD999563 (includes MD998331)	Oil Pressure gauge (1000 kPa · 142 psi)	Measurement of oil pressure
	MD998206	Adapter	Connection of oil pressure gage
	MD998212	Oil pump puller	Removal of oil pump
	MD998335	Oil pump band	Assembly of oil pump
	MD998412	Guide	Installation of oil pump
	MD998217	Gauge	Check of quality of assembly condition
	MB998903	Spring compressor	Disassembly and assembly of clutch and brake
	MD998904	Bolt	Disassembly and assembly of No. 3 brake spring

Tool	Number	Name	Use
	MD998211	Retainer	Disassembly and assembly of No. 3 brake spring
	MD998353	Torque driver set	Tightening of valve body screw

TROUBLESHOOTING N21EBAP

GENERAL

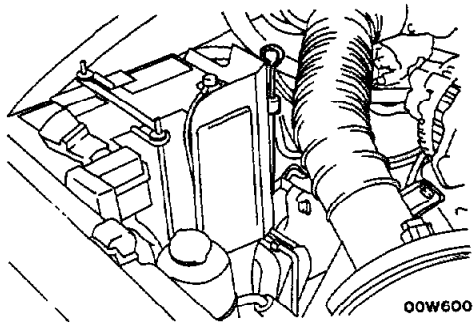
Automatic transmission malfunctions may be caused by the following conditions:

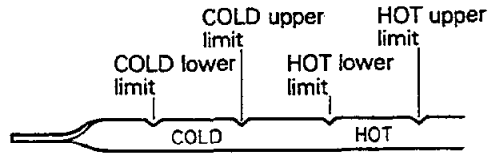
(1) Improper maintenance and adjustment
(2) Mechanical malfunctions
(3) Hydraulic malfunctions
(4) Poor engine performance

Troubleshooting in the event of any such malfunctions should begin by checking fluid level, ATF condition, manual linkage adjustment, throttle control cable adjustment and other conditions whose deviation from standards can be readily known.
Then, road test shall be performed to determine whether or not the problem has been corrected or more diagnosis is necessary. If the problem still persists after these tests and corrections, hydraulic tests should be performed for further troubleshooting.

FLUID LEVEL AND ATF CONDITION

(1) Place the vehicle on a level surface.
(2) Before removing the dipstick, wipe all dirt from area around the dipstick.
(3) With the selector lever in the "P" position and the parking brake applied, start the engine.
(4) The engine should be running at idle and the transmission should be warmed up sufficiently.
(5) Move the selector lever through all positions to fill the torque converter and hydraulic circuit with fluid. Then, place the lever in the "N" or "P" position.
(6) Check to see that the fluid level is within the range between "COLD" upper limit and the "HOT" lower limit on the dipstick.:NL
If the fluid level is low, top up until the level rises to within the range between the "HOT" lower and upper limits.





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Low fluid level can allow the oil pump to take in air together with fluid, leading to various troubles. Air trapped in hydraulic circuit forms bubbles which make the fluid spongy. This loweres pressure and slows down pressure buildup.
If the transmission has too much fluid, gears churn up foam and cause same conditions as when the fluid level is low, resulting in premature deterioration of ATF. In either case, air bubbles can cause overheating and fluid oxidation and varnishing, which can interfere with normal valve, clutch and servo operation. Foaming can also result in fluid escaping from the transmission vent where it may be mistaken for a fluid leak.
Along with the fluid level, it is equally important to check condition of fluid. When fluid smells burned, it is contaminated with metal bushing or friction material particles and hence a complete overhaul of the transmission is needed. Be sure to examine fluid on the dipstick closely.
After fluid has been checked, insert the dipstick until it is seated fully to seal out water and dirt.

MANUAL LINKAGE

The inhibitor switch is installed on the selector lever. After checking normal operation of this switch, place the selector lever in the "N" position. If the notch of the selector lever on the transmission side faces directly down, the linkage has been adjusted correctly.

THROTTLE CONTROL CABLE

Throttle control cable adjustment is very important to assure normal operation of the transmission. Shift speed control, shift feeling and transmission slip depend greatly on this adjustment.

If the throttle outer cable is set too long (namely, the inner cable is too tight), the throttle valve is already in operating state and consequently, presense of hydraulic pressure higher than specified is suspected. The throttle pressure acts on each shift valve and when upshifting, the governor pressure that counteracts against the throttle pressure is higher than normal. Namely, if the outer cable is set too long, upshift takes place at vehicle speed higher than normal.

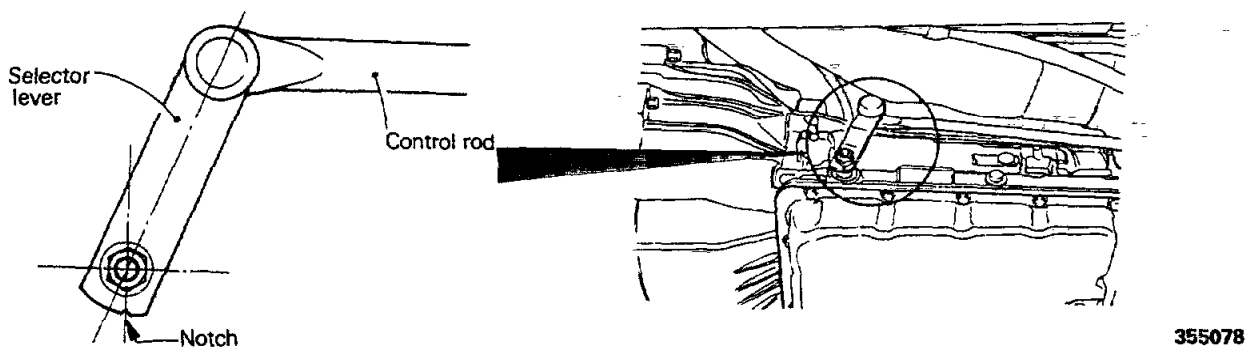
On the other hand, if the outer cable is set too short (the inner cable is slack), upshift takes at vehicle speed lower than normal.

INHIBITOR SWITCH

Check to see that the engine starts only when the selector lever is in the "N" or "P" position and that it does not start when the selector lever is in other positions.

SELECTOR LEVER

(1) Check to see that the vehicle moves forward when the selector lever is shifted from the "N" position to the "D" range and that the vehicle reverses when the lever is shifted to the "R" range.
(2) Stop the engine.
(3) Shift the selector lever from the "N" position to the "D" range and then to the "2" position to check that the lever can be operated smoothly and engage at each position with reasonable firmness.
(4) Check to see that shifting to each of the "P", "R", "2" and "L" positions can take place only when the selector lever is pushed in.



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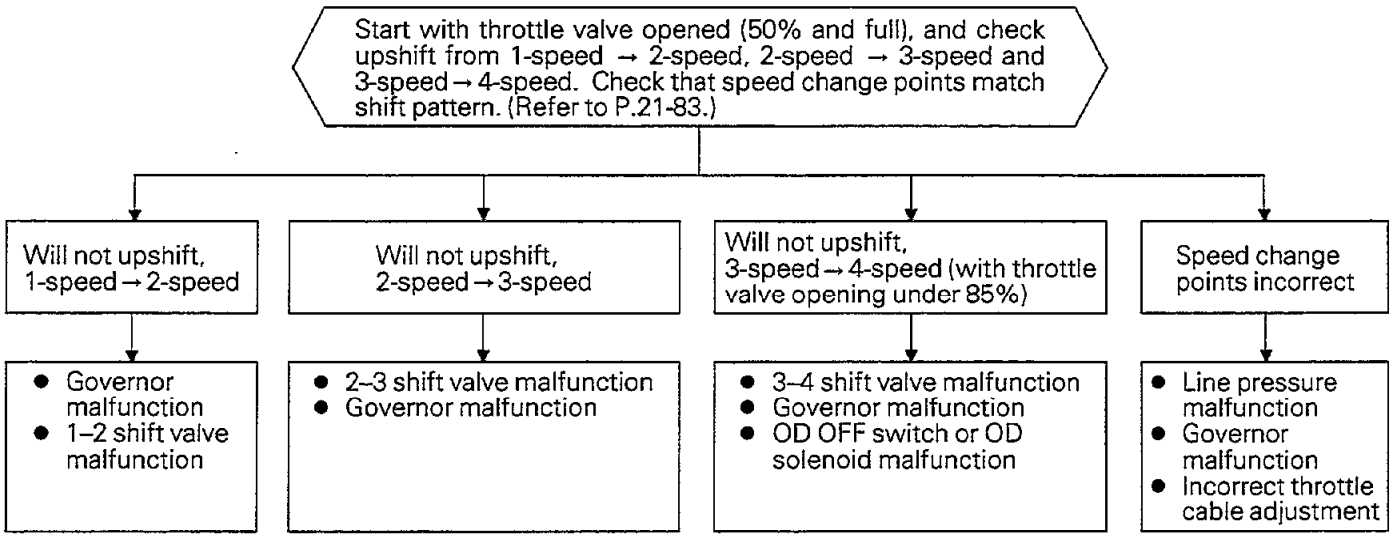
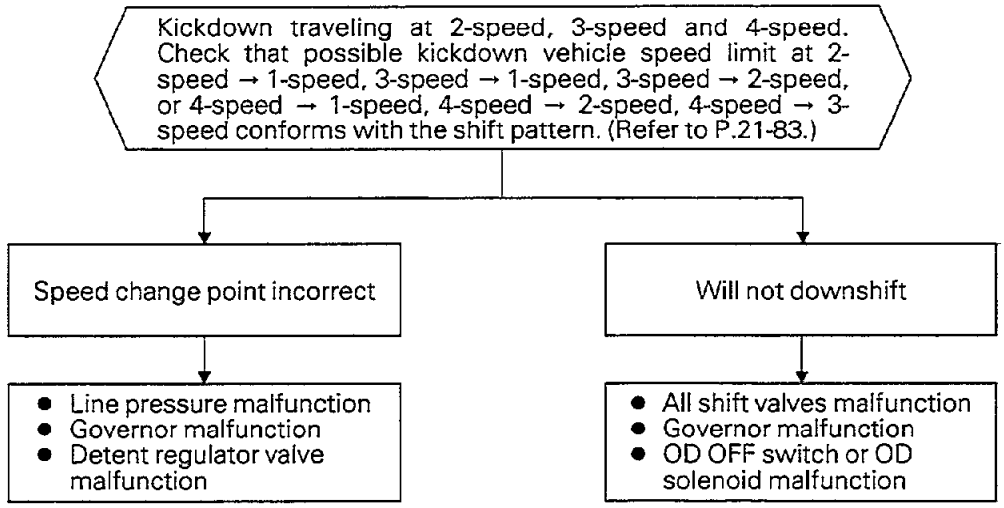
ROAD TEST

Prior to performing road test, be sure to make basic checks including check and adjustment of fluid level and condition and adjustment of the throttle cable. For road test, the transfer must be placed in the 2H (2WD-high) position.
In road test, various changes such as slips in transmission and shifting conditions are checked and hence the transmission operation at each shift position must have been checked.

D RANGE TEST





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When traveling in 3-speed or 4-speed, release accelerator and shift to L. Check that 3-speed → 2-speed or 4-speed → 3-speed takes place immediately and 2-speed → 1-speed dowsnshift conforms with shift pattern. (Refer to P.21-83.)

- Speed change point incorrect
  - Incorrect throttle cable adjustment
  - Governor malfunction
  - Line pressure malfunction
  - Low coast modulator valve malfunction
- Will not downshift, 2-speed → 1-speed
  - 1–2 shift valve malfunction
  - Governor malfunction

When traveling in 3-speed or 4-speed, shift to 2 and L and check engine brake function in each range.

- Engine brake will not function in 2.
  - Brake No. 1 malfunction
- Engine brake will not function in L.
  - Brake No. 3 malfunction

Check for abnormal noise(s) during acceleration and deceleration. Check for shocks when slipping and changing speed.

- Strong shock
  - High line pressure
  - Accumulator malfunction
  - Check ball malfunction

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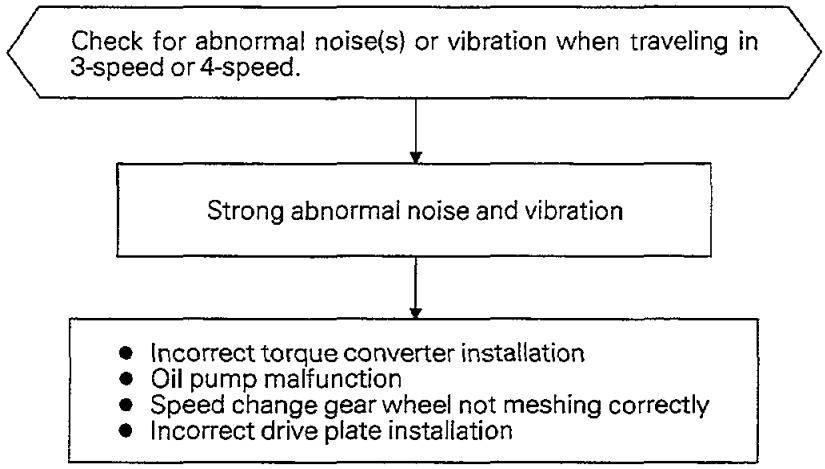
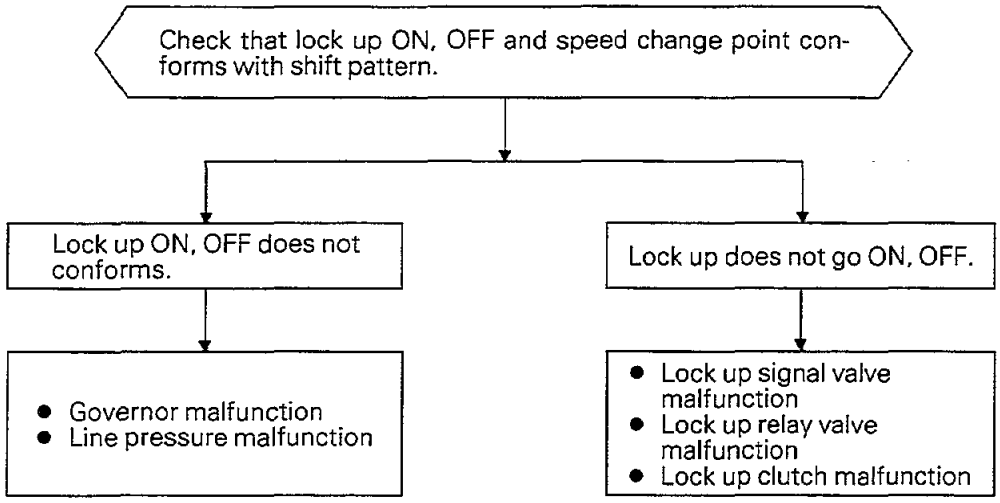


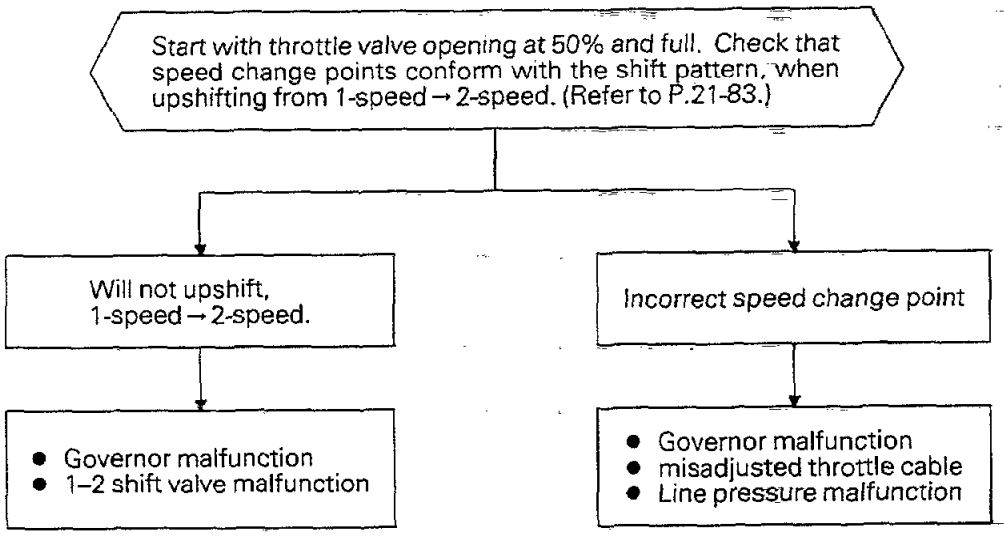
NOTE
Abnormal noises and vibrations are often caused by an unbalanced propeller shaft, differential, tire, torque converter, engine etc. Extremely thorough inspection is therefore required.

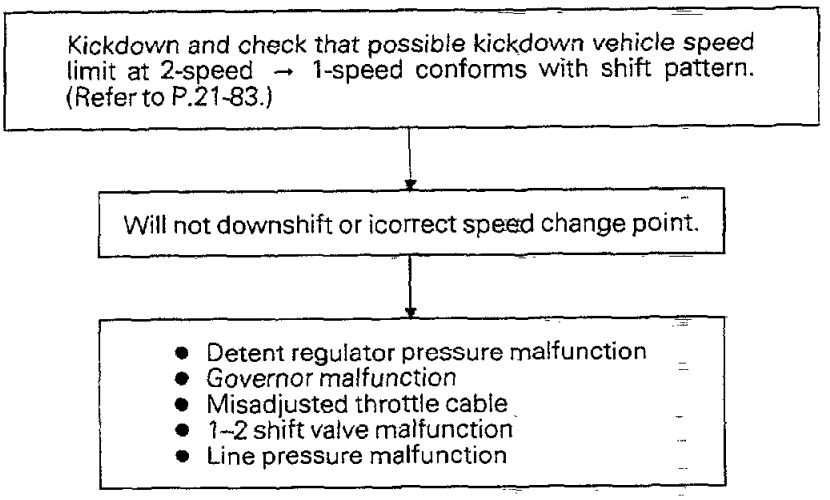


NOTE
(1) Determine the moment when lock up turns ON by decreased engine rpm or by a slight shock back and forth.
(2) Determine the moment when lock up turns OFF by increased engine rpm.
(3) Check lock up condition by pumping the accelerator slightly. If engine rpm rises in accordance with throttle valve opening size, determine that the lock up is OFF, if not, determine it ON.

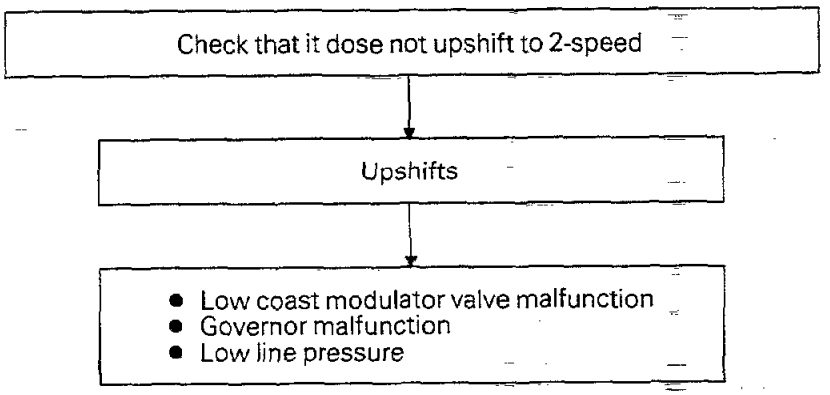
When lock up is OFF, drive power is transferred through the fluid in the torque converter and therefore, when the accelerator pedal is depressed, slipping occurs inside the torque converter with a resulting large increase in engine rpm.

2 RANGE TEST

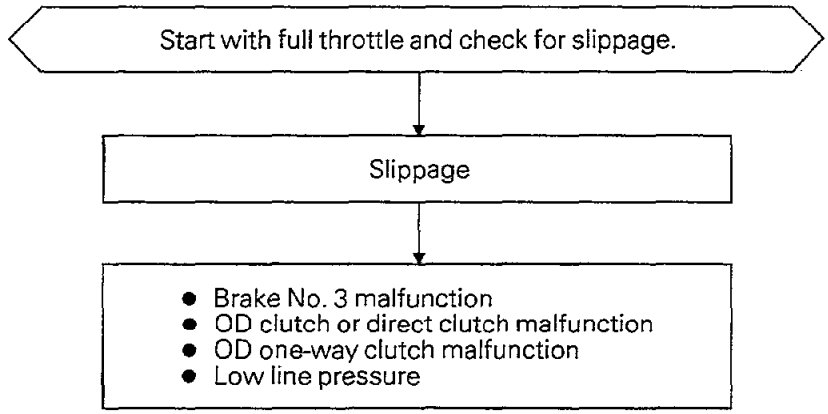




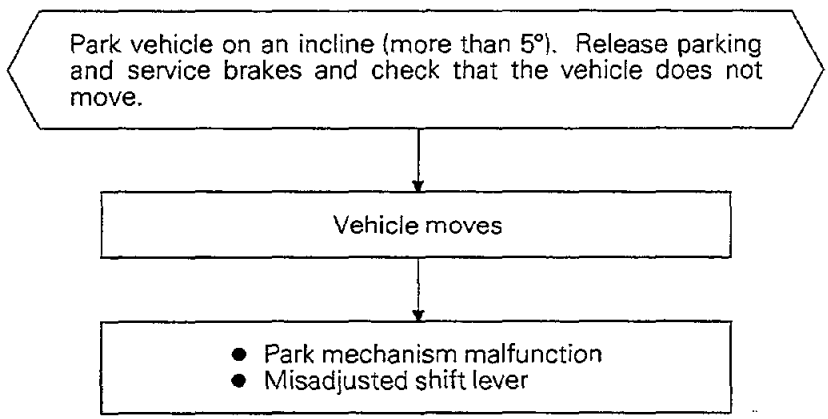
L RANGE TEST

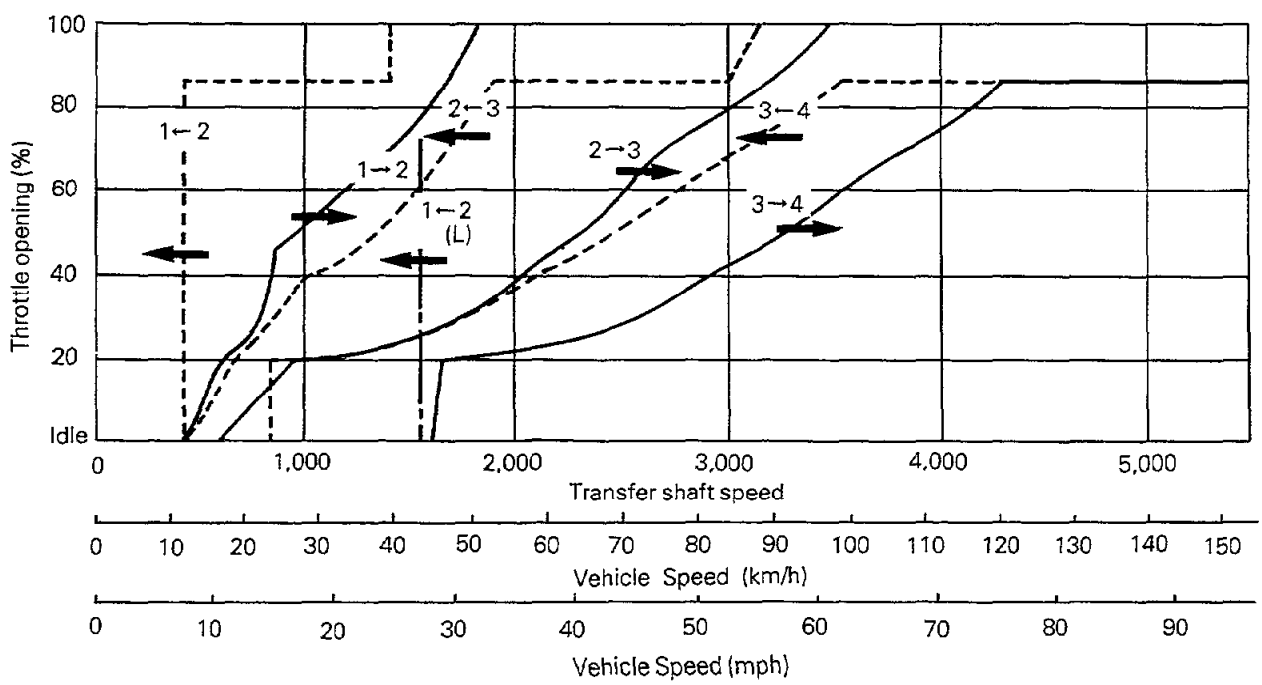


R RANGE TEST



P RANGE TEST





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TSB Revision

CONVERTER STALL TEST

In this test, the engine maximum speed when the torque con verter stalls with the shift lever in the "D" or "R" range is measured to check operation of the torque converter, stator and oneway clutch and check holding performance of the transmission clutch (including brake).

Caution
do not stand in front or at rear of the vehicle during this test.

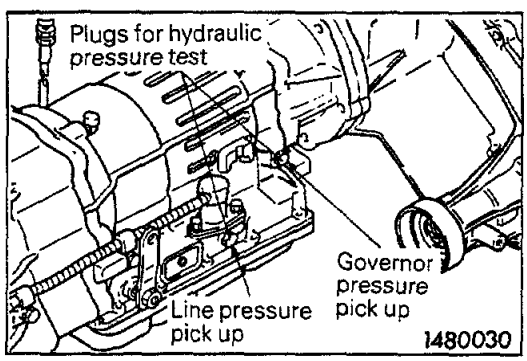
1. Check the transmission fluid level. The fluid temperature should be at the level after normal operation [50 – 80°C (122 – 176°F)]. The engine coolant temperature should also be at the level after normal operation [80 – 90° (176 – 194°F)].
2. Apply chocks to the rear wheels (right and left).
3. Mount an engine tachometer.
4. Apply fully the parking and service brakes.
5. Start the engine.
6. With the selector lever in the "D" range, fully depress the accelerator pedal and read off the engine maximum speed.

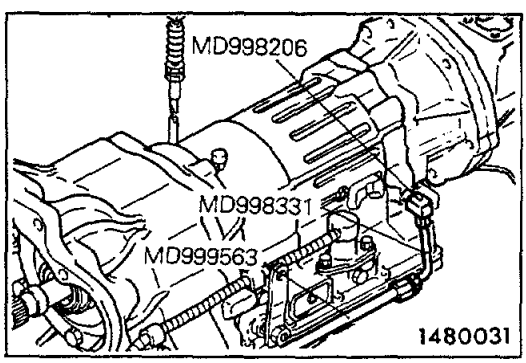
   Standard value: 2100–2400 rpm

   NOTE
   When doing so, do not keep the engine running with throttle full open for more than necessary duration (5 seconds or more). If two or more stall tests are needed, place the selector lever in the "N" position and run the engine at about 1,000 rpm to allow the transmission fluid to cool before another stall test.
7. Place the selector lever in the "R" range and perform the test as above.

JUDEGEMENT OF STALL TEST RESULTS

Stall speed in "D" and "R" range is equal to each other but lower than the nominal value.	(1) Engine output is low (2) Stator one-way clutch is faulty. (Faulty torque converter is suspected if it is lower than nominal by more than 600 rpm.)
Stall speed in "D" range is higher than nominal.	(1) O.D. clutch slipping. (2) O.D. one-way clutch faulty (3) Forward clutch slipping (4) One-way clutch No. 2 faulty (5) Low line pressure
Stall speed in "R" range is higher than nominal.	(1) O.D. clutch slipping. (2) O.D. one-way clutch faulty (3) Direct clutch slipping (4) Brake No. 3 slipping (5) Low line pressure





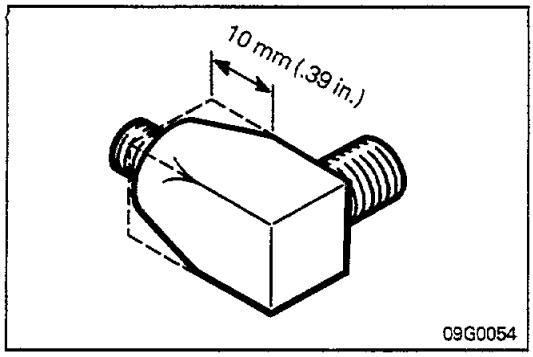
HYDRAULIC PRESSURE TEST

The hydraulic pressure tests (governor pressure and line pressure tests) are important in determining the causes of transmission failures.
Before conducting these tests, fluid level and condition and throttle cable adjustment etc. must be checked for defects or abnormalities. When conducting the tests, the engine and transmission should be at correct operating temperatures, [engine cooling water 80 – 90°C (176 – 194°F), transmission fluid 50 – 80°C (122 – 176°F)].

GOVERNOR PRESSURE TEST

1. Place vehicle on a chassis dynamometer.
2. Remove plug from governor pressure takeoff port.
3. Install special tool as shown in figure and place the meter inside vehicles.

   NOTE
   When the adapter interferes with teh extension housing, repair the tool as shown in figure.
4. Apply parking brake.
5. Start engine.
6. Release parking brakes.



7. Shift to D and measure governor pressure at each output shaft rpm.

Standard value:

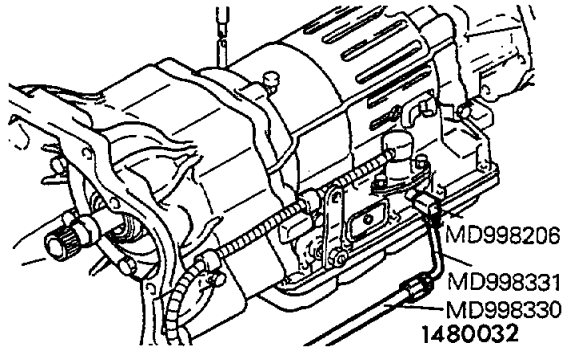
Output shaft speed (rpm)	Vehicle speed km/h (mph)	Governor pressure kPa (psi)
1,000	28 (17)	133–163 (19.4–23.6)
2,000	56 (35)	251–281 (36.4–40.6)
3,200	90 (56)	400–430 (58–62.2)

JUDGEMENT BY GOVERNOR PRESSURE

Governor pressure is not within the standard value	• Line pressure malfunction • Oil leak in governor circuit • Governor malfunction

LINE PRESSURE TEST

1. Place the vehicle on a chassis dynamometer.
2. Remove the plug from the line pressure takeoff port.
3. Install special tool as shown in the figure and place the meter inside vehicle.
4. Apply the parking brake.
5. Start the engine.
6. Place the selector lever in the "D" range.
7. Depress the brake pedal firmly by the left foot and operates the accelerator pedal by the right foot to measure the line pressure at each engine rpm. If the measured pressure is not nominal, check adjustment of the throttle cable and readjust if necessary before conducting the test again.
8. Place the selector lever in the "R" range and test as above.



Standard value:

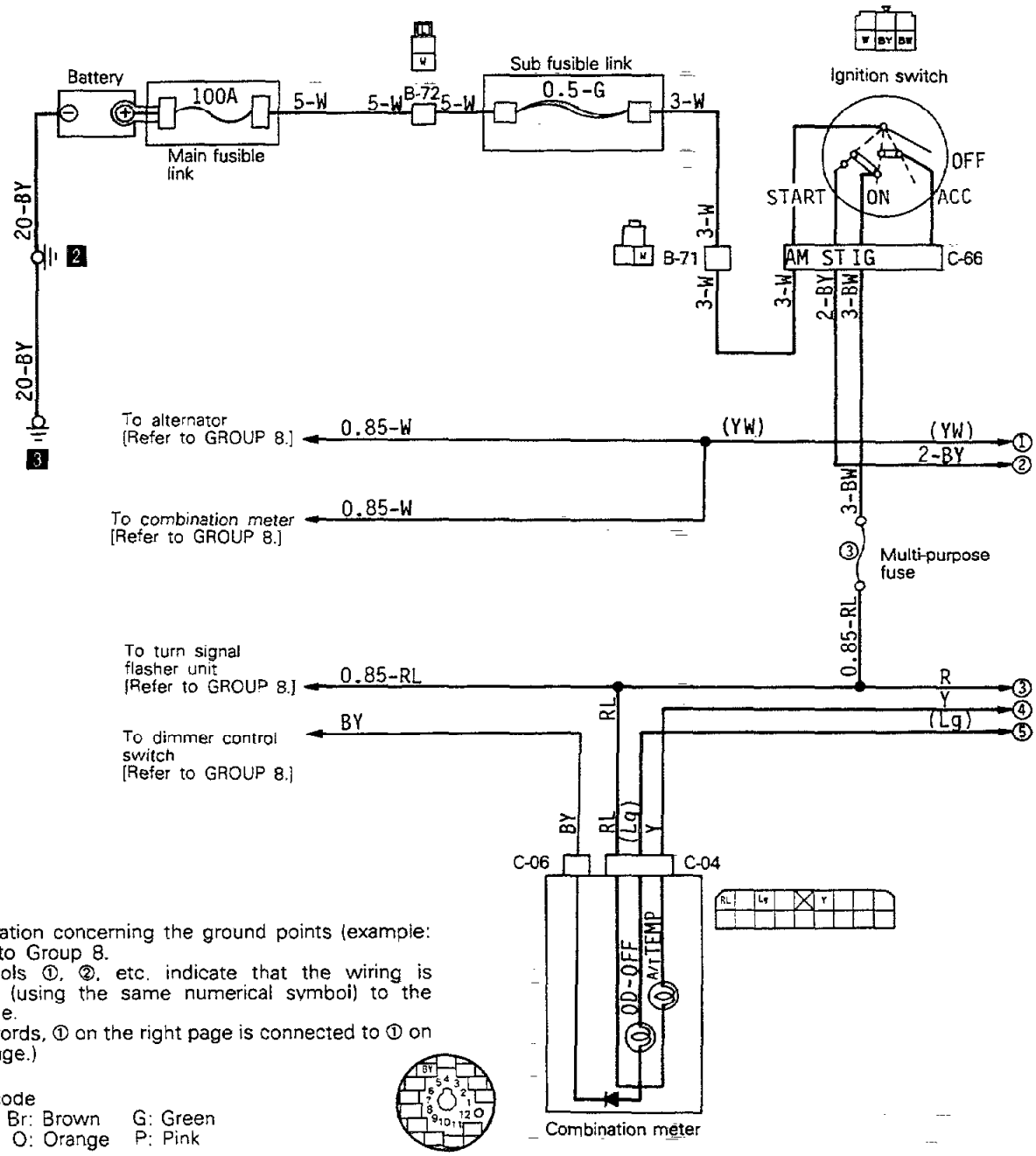
	Line pressure kPa (psi)	
	"D" range	"R" range
At idle	510–590 (74–85)	770–890 (112–130)
At stall	1080–1280 (156–185)	1570–1960 (227–285)

JODGEMENT BY LINE PRESSURE

Hydraulic pressure higher than nominal in all ranges	(1)Regulator valve faulty (2)Throttle valve faulty (3)Throttle control cable incorrectly adjusted
Hydraulic pressure lower than nominal in all ranges	(1)Oil pump faulty (2)Regulator valve faulty (3)Throttle valve faulty (4)Throttle control cable incorrectly adjusted (5)O.D. clutch faulty
Hydraulic pressure lower than nominal in "D" range	(1)Large fluid leaks in "D" range hydraulic circuit (2)Forward clutch faulty (3)O.D. clutch faulty
Hydraulic pressure lower than nominal in "R" range	(1)Large fluid leaks in "R" range hydraulic circuit (2)Brake No. 3 faulty (3)Direct clutch faulty (4)O.D. clutch faulty

TSB Revision

OVERDRIVE CONTROL SYSTEM CIRCUIT



Remarks
(1) For information concerning the ground points (example: 1), refer to Group 8.
(2) The symbols ①, ②, etc. indicate that the wiring is connected (using the same numerical symbol) to the facing page.
(In other words, ① on the right page is connected to ① on the left page.)

Wiring color code
B: Black Br: Brown G: Green
Ll: Light blue O: Orange P: Pink
Gr: Gray L: Blue Lg: Light green
R: Red Y: Yellow W: White

OPERATION

Automatic transmission oil temperature warning light

- When the ignition switch is placed in the "ON" position without starting the engine, current will flow to fuse No. 3, the automatic transmission oil temperature warning light, diode alternator, and the ground, and the warning lights will light. This is a circuit for the purpose of checking for bulb circuit breakage, and the lights will go out when the engine is started.
- When the engine is started, current flows to the ignition switch, fuse No. 3, and the automatic transmission oil temperature warning light, the battery voltage will go to the oil temperature switch.
- When ATF temperature rises above 50°C (122°F), the oil temperature switch will go on.
- When the oil temperature switch goes on, current will flow to the ignition switch, fuse No. 3, the automatic oil temperature warning light, oil temperature switch and the ground and the warning lights will go on.

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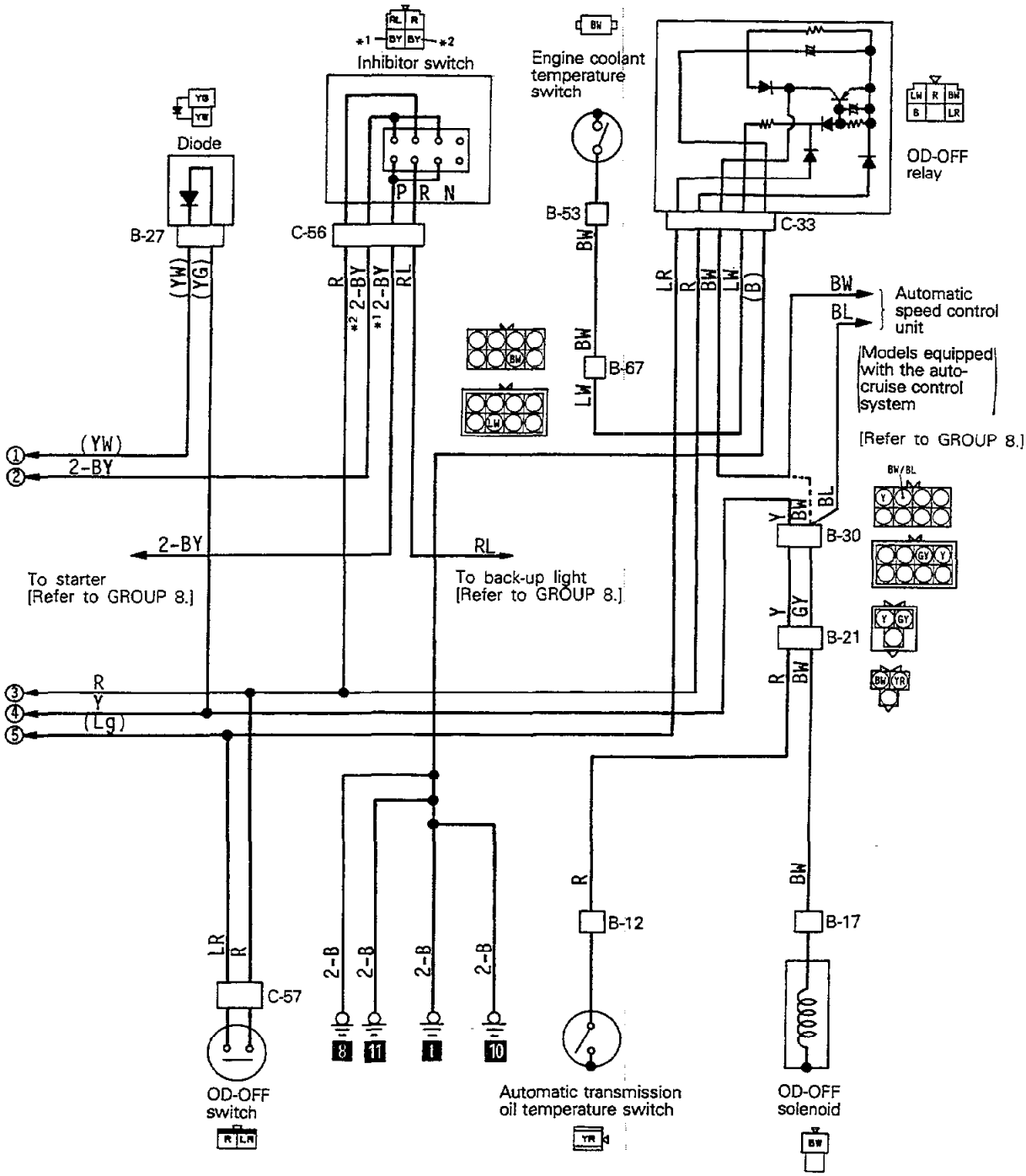
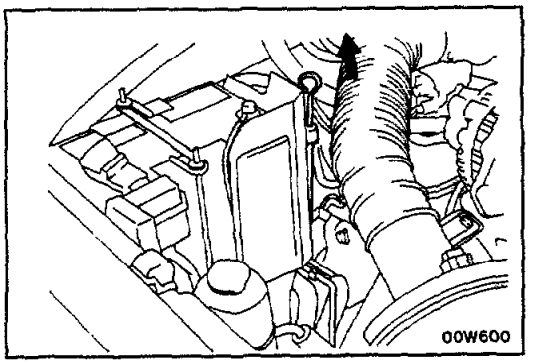
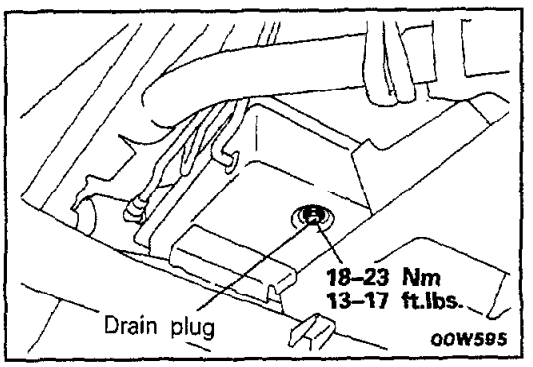


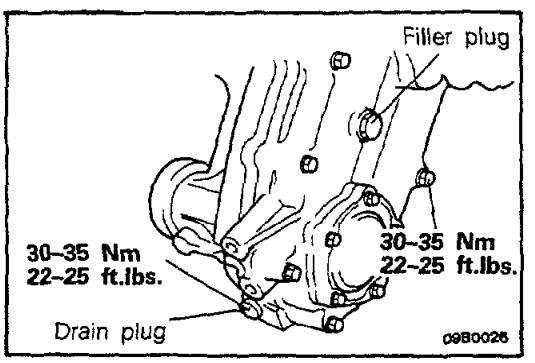
Overdrive-off solenoid valve

- When the overdrive-OFFswitch is switched ON (with the ignition switch at the ON position), battery voltage is applied, through fuse No. 3 and the overdrive-OFF relay, to the engine coolant temperature switch.
- When the coolant temperature becomes 80°C (176°F) or higher, the engine coolant temperature switch is switched ON.
- When the engine coolant temperature switch is switched ON, current flows to the ignition switch, fuse No. 3, the overdrive-OFF switch, the overdrive-OFF relay, the engine coolant temperature switch, and ground, and the relay is switched ON.
- When the overdrive-OFF relay is switched ON, current flows to the ignition switch, fuse No. 3, the overdrive-OFF switch, the overdrive-OFF relay, the overdtive-OFF solenoid, and ground, and the solenoid valve is activated.
- When the overdrive-OFF switch is switched ON, current flows to the ignition switch, fuse No. 3, the overdrive-OFF switch, the overdrive-OFF indicator, and ground, and the indicator illuminates.

TSB Revision







SERVICE ADJUSTMENT PROCEDURES

N21FC8E

TRANSMISSION FLUID CHANGING AND INSPECTION

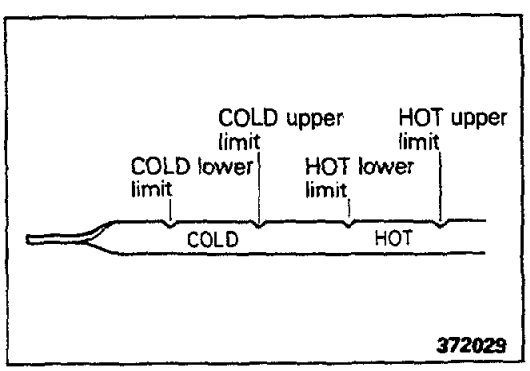
(1) Check the fluid level (automatic transmission and transfer case).
(2) For the checking procedures of automatic transmission fluid (ATF), see P.21-77.

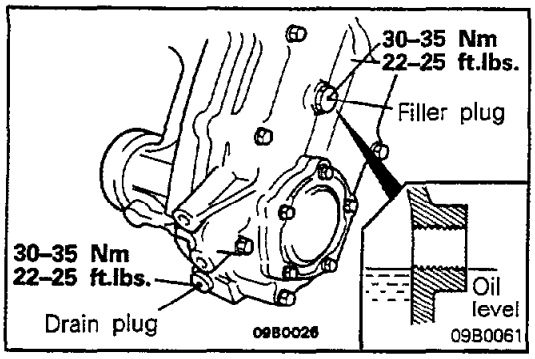
(3) Check the transfer case oil level with the filler plug removed.
(4) The fluid level is okay if it is at the same level as the lowest point of the filler plug hole.
(5) Install the filler plug and gasket, and tighten to 30–35 Nm (22–25 ft.lbs.).

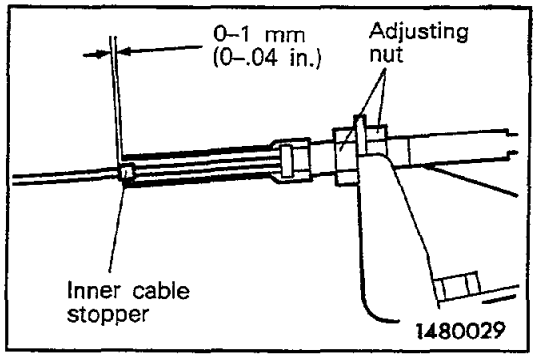
ATF CHANGING PROCEDURES

Caution
If ATF change is required due to damage to the transmission, be sure to clean the cooler system.

(1) Raise the vehicle on hoist. Place a drain container with large openig under the drain plug (located in bottom of the oil pan).
(2) Remove the drain plug to let ATF drain
(3) Install the drain plug and new gasket and tighten to 18–23 Nm (13–17 ft.lbs.).
(4) Refill ATF through the oil level gauge hole until its level reaches the COLD lower limit of the level gauge.
(5) Start the engine and allow to idle for at least two minutes. Then, with the parking brake and service brake applied, move the selector lever through all positions and finally place in the "N" or "P" position.
(6) After the transmission is warmed up to the normal operating temperature, recheck the fluid level, which must be between the HOT upper limit and HOT lower limit marks.
(7) Insert the dipstick fully to prevent dirt from entering the transmission.







TRANSFER CASE OIL CHANGING PROCEDURES

(1) Remove the filler plug.
(2) Place a drain container with large opening under the drain plug.
(3) Remove the drain plug to let oil drain.
(4) Install the drain plug and new gasket and tighten to 30–35 Nm (22–25 ft.lbs.).
(5) Refill specified transfer case oil up to specified level.
(6) Install the filler plug and gasket and tighten to 30–35 Nm (22–25 ft.lbs.).

THROTTLE CABLE CHECK AND ADJUSTMENT N21FHAA

(1) Check for defective or bent throttle lever or throttle cable bracket.
(2) Check that the distance between the inner cable stopper and dust cover surface is within the standard value.

Standard value : 0–1 mm (0–.04 in.)

(3) If outside the standard value, adjust with adjusting nut.

PROPELLER SHAFT OIL SEALS REPLACEMENT N21FGAC

Refer to P.21-11.

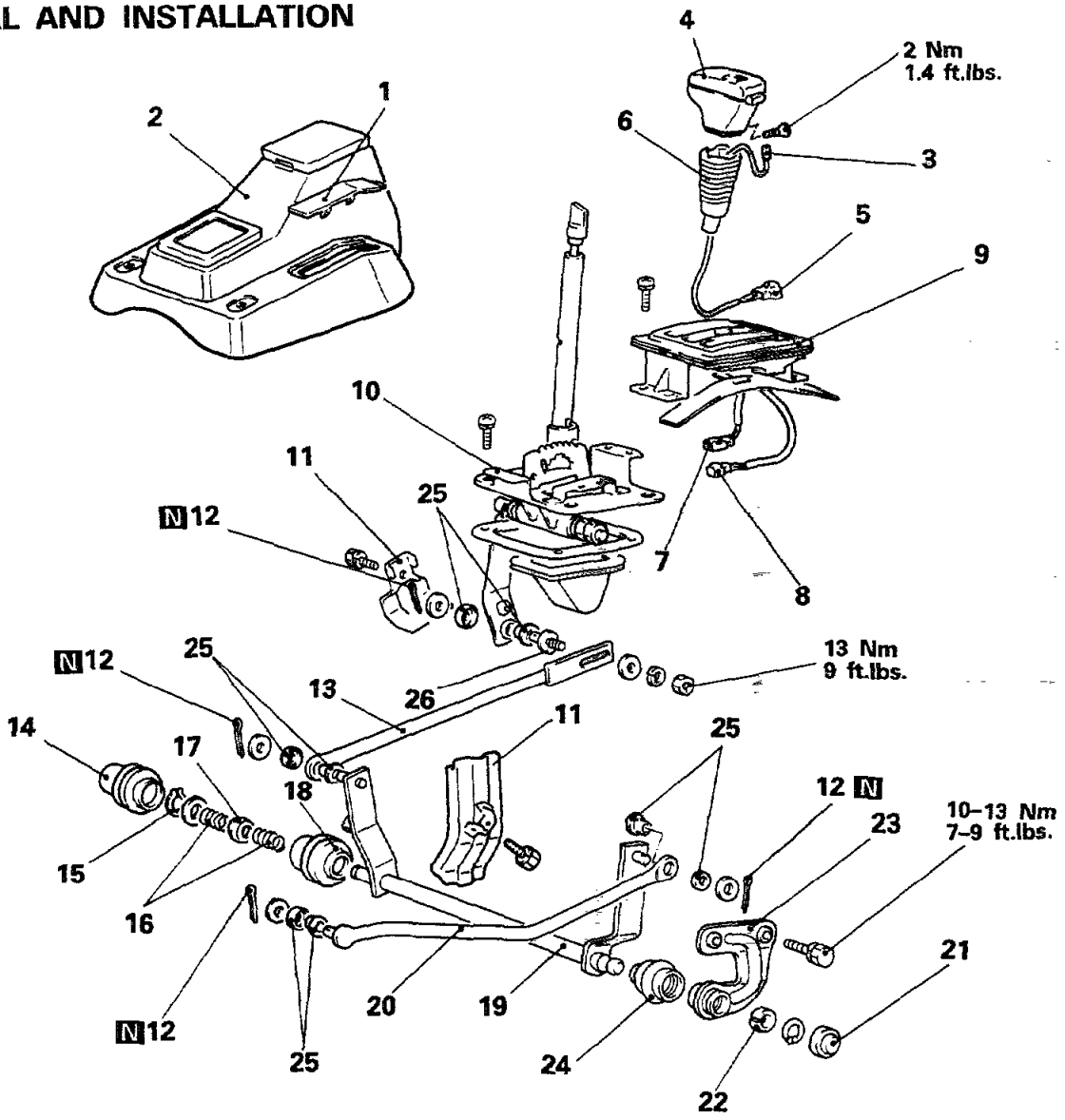
SPEEDOMETER CABLE REPLACEMENT N21FEAH

Refer to P.21-11.

TRANSMISSION CONTROL

REMOVAL AND INSTALLATION

N21IA–



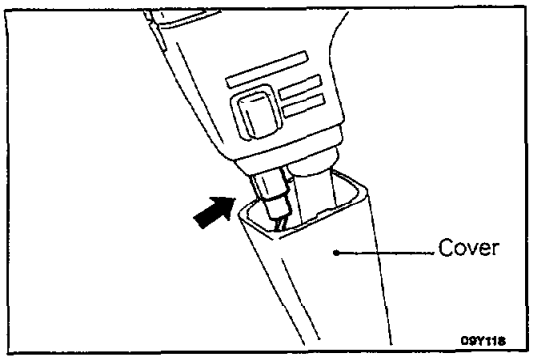
09W542

Removal steps

1. Plate B
2. Floor console
3. Overdrive switch connection
4. ◆◆ Selector handle
5. Overdrive switch harness and front wiring harness connection
6. Cover
7. Inhibitor switch and front wiring harness connection
8. Position indicator light and front wiring harness connection
9. Indicator panel
10. Bracket assembly
11. Heat protector
12. Cotter pin
13. ◆◆ ◆◆ Transmission control rod (B)
14. Dust cover
15. Snap ring
16. ◆◆ Spring
17. ◆◆ Cross shaft bushing
18. ◆◆ Cross shaft boot (B)
19. ◆◆ ◆◆ Select cross shaft
20. ◆◆ ◆◆ Transmission control rod (A)
21. Cap
22. ◆◆ Bushing
23. ◆◆ Cross shaft bracket (A)
24. ◆◆ Cross shaft boot
25. ◆◆ Bushing
26. ◆◆ Pin

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Removal".
(3) ◆◆ : Refer to "Service Points of Installation".
(4) N : Non-reusable parts

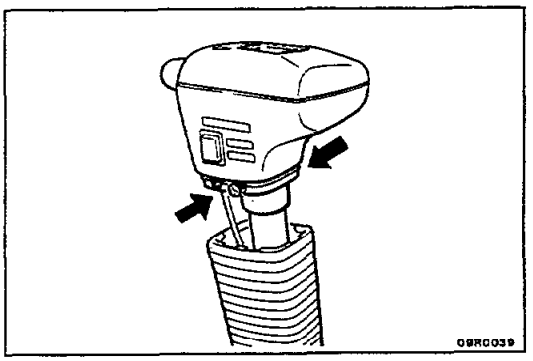
TSB Revision



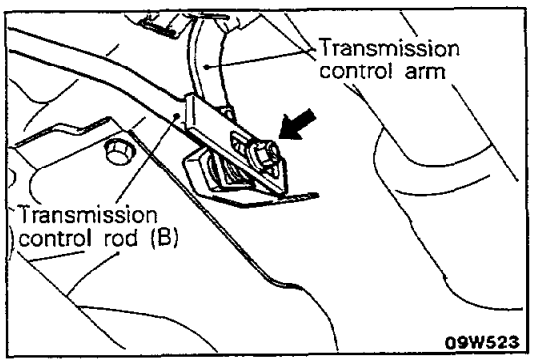
SERVICE POINTS OF REMOVAL N21IBAF

4. REMOVAL OF SELECTOR HANDLE

(1) Press the cover downward.
(2) Disconnect the overdrive switch connector from the selector handle.

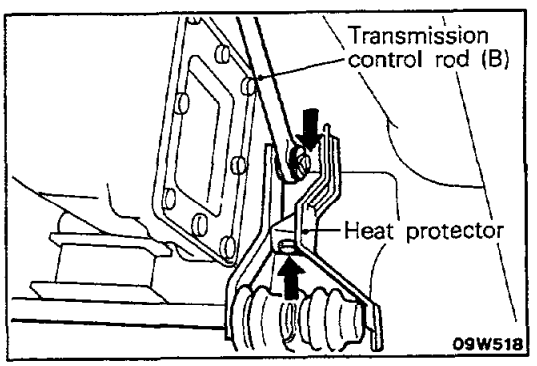


(3) Remove the selector handle from the shift lever.

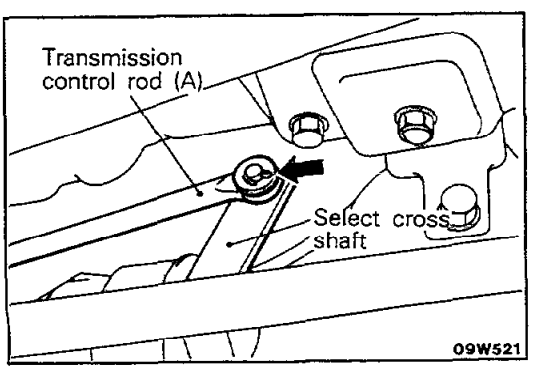


13. DISCONNECTION OF TRANSMISSION CONTROL ROD (B)

(1) Disconnect the transmission control rod (B) from the transmission control arm by lossening the nut from under the floor.



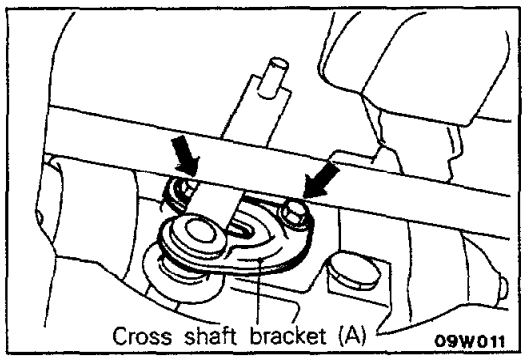
(2) Disconnect the select cross shaft from the heat protector.
(3) Disconnect the select cross shaft from transmission control rod B.



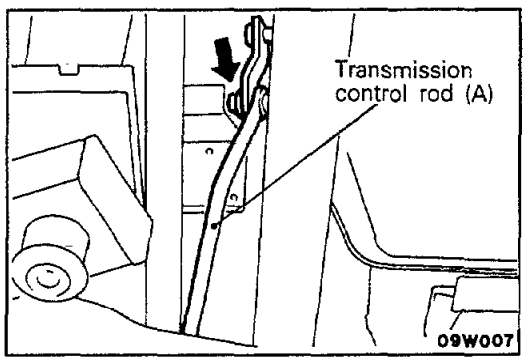
19. REMOVAL OF SELECT CROSS SHAFT/20. TRANSMISSION CONTROL ROD (A)

(1) Disconnect the select cross shaft from transmission control rod A.

TSB Revision

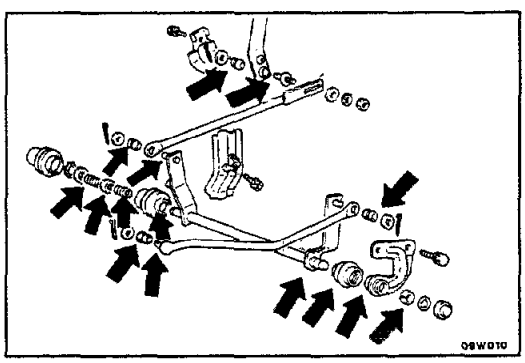


(2) Remove the dust cover, and then remove the snap ring that holds the spring.
(3) Remove the cross shaft bracket mounting bolts from the transfer assembly.
(4) Detach the cross shaft bracket from the bracket on the No. 1 crossmember side.



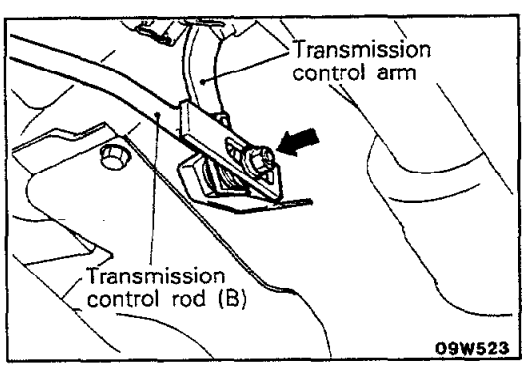
(5) Remove transmission control rod A from the transmission.

SERVICE POINTS OF INSTALLATION N21IDAH



26. APPLICATION OF GREASE TO PIN/25. BUSHING/24. CROSS SHAFT BOOT/23. CROSS SHAFT BRACKET (A)/22. BUSHING/20. TRANSMISSION CONTROL ROD (A)/19. SELECT CROSS SHAFT/18. CROSS SHAFT BOOT (B)/17. CROSS SHAFT BUSHING/16. SPRING

Apply a coating of the multipurpose grease to the bushing inner surface and the sliding parts shown in the figure.

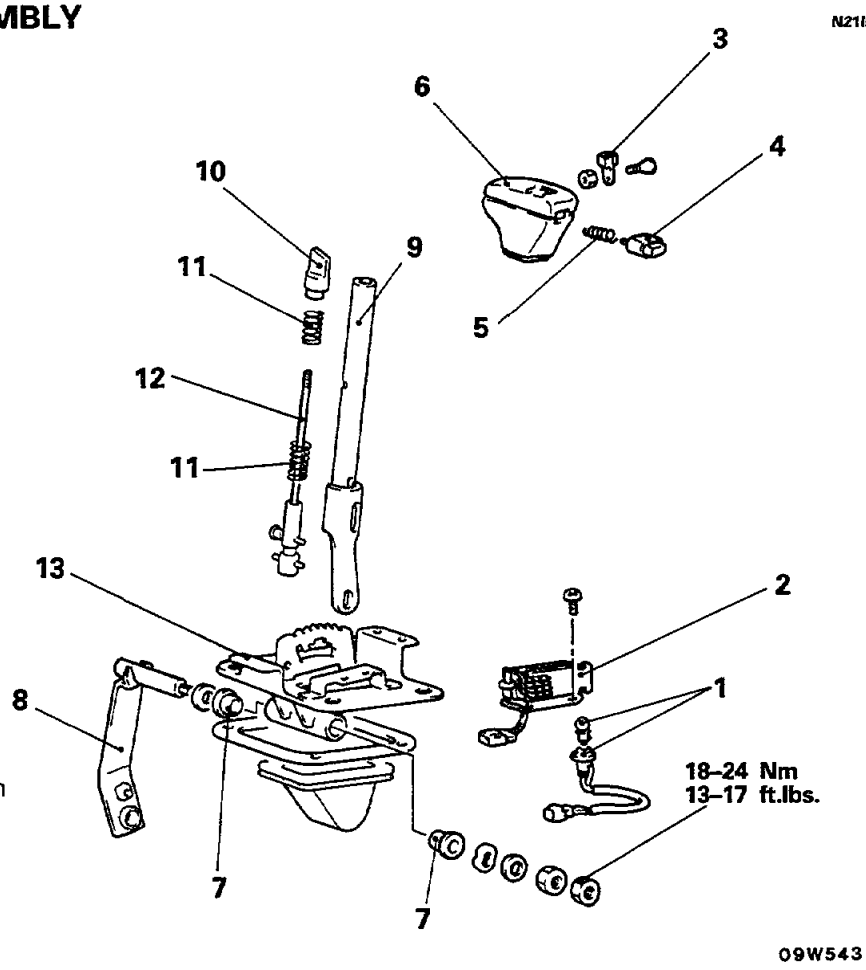


13. INSTALLATION OF TRANSMISSION CONTROL ROD (B)

(1) Move the transmission and shift lever to the "N" position, and then install the transmission control arm and transmission control rod (B) as shown in the figure.
(2) Check, while driving, to be sure that the transmission is set to each range when the selector lever is shifted to each position.
(3) Check, while driving, to be sure that the overdrive is activated and cancelled correctly when the overdrive switch is used.

DISASSEMBLY AND REASSEMBLY

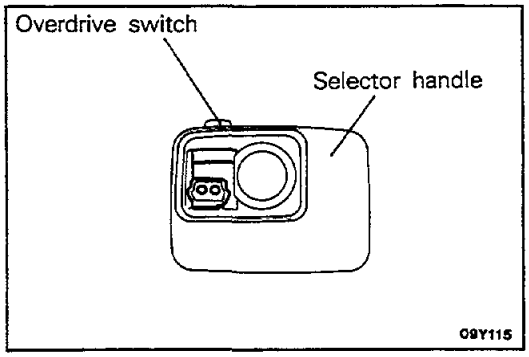
N21IE–

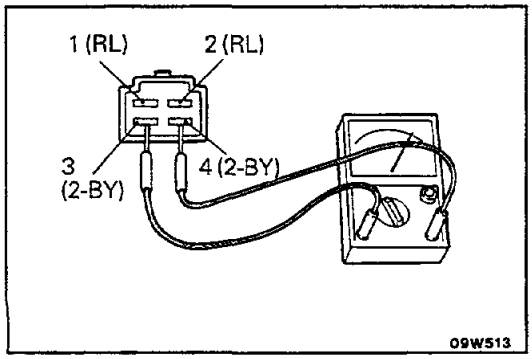


Removal steps

1. Position indicator light
2. ◆◆ Inhibitor switch
3. Overdrive switch
4. ◆◆ Pushbutton
5. Spring
6. Selector handle
7. ◆◆ Bushings
8. ◆◆ Transmission control arm
9. Shift lever
10. ◆◆ Sleeve
11. ◆◆ Spring
12. ◆◆ Rod assembly
13. Bracket

NOTE
(1) Reverse the disassembly procedures to reassemble.
(2) ◆◆ : Refer to "Service Points of Reassembly".





INSPECTION

N21IGAC

- Check for unusual wear of the bracket's detent plate part, rod end pin, each bushing, pushbutton and sleeve contact surface.
- Check for weakness of the spring.
- Check the operation of the overdrive switch. (Check the continuity.)

When the overdrive switch is OFF: continuity
When the overdrive switch is ON: non-continuity

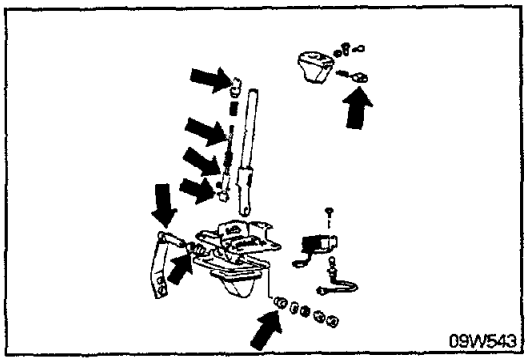
Inhibitor switch

Check the continuity with the select lever at each position.

Select lever position \ Terminals	1	2	3	4
P			○—○	
R	○—○			
N			○—○	

NOTE
○—○ indicates that there is continuity between the terminals.

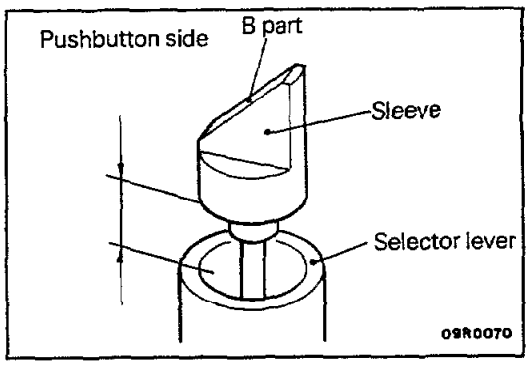
TSB Revision



SERVICE POINTS OF REASSEMBLY N21IHABe

12. APPLICATION OF GREASE TO ROD ASSEMBLY/11. SPRING/10. SLEEVE/8. TRANSMISSION CONTROL ARM/7. BUSHINGS/4. PUSHBUTTON

Apply the multipurpose grease to each sliding part of the lever.

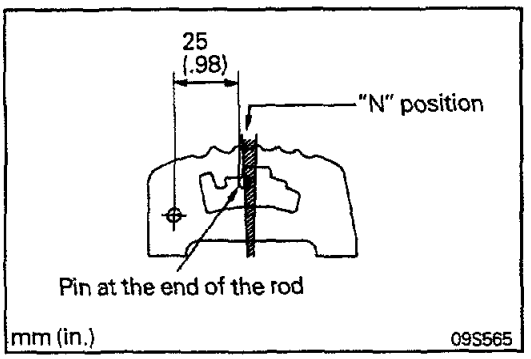


10. INSTALLATION OF SLEEVE

Move the selector lever to the "N" position, and turn the sleeve so that the angled surface of the sleeve is at the pushbutton side. At this time, adjust the clearance between the sleeve and the selector lever so that it is the standard value.

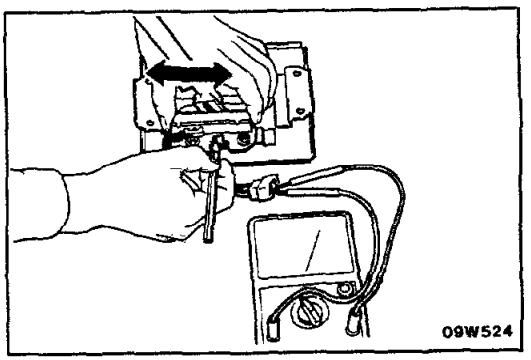
Standard value : 15.2–15.9 mm (.60–.62 in.)

NOTE
Move the B part of the sleeve to the pushbutton side (driver's seat side).

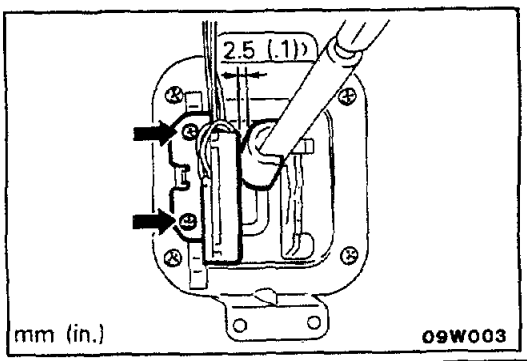


2. INSTALLATION OF INHIBITOR SWITCH

(1) Temporarily install the inhibitor switch.
(2) Set the shift lever so that the pin at the end of the rod is at the position shown in the figure.



(3) Using a circuit tester between 2-BY and 2-BY of the inhibitor switch connector, check the continuity when the inhibitor switch is moved back and forth, and mark the bracket.



(4) Tighten the inhibitor switch mounting screws at the position where the clearance between the inhibitor switch and the selector lever is the specified distance.

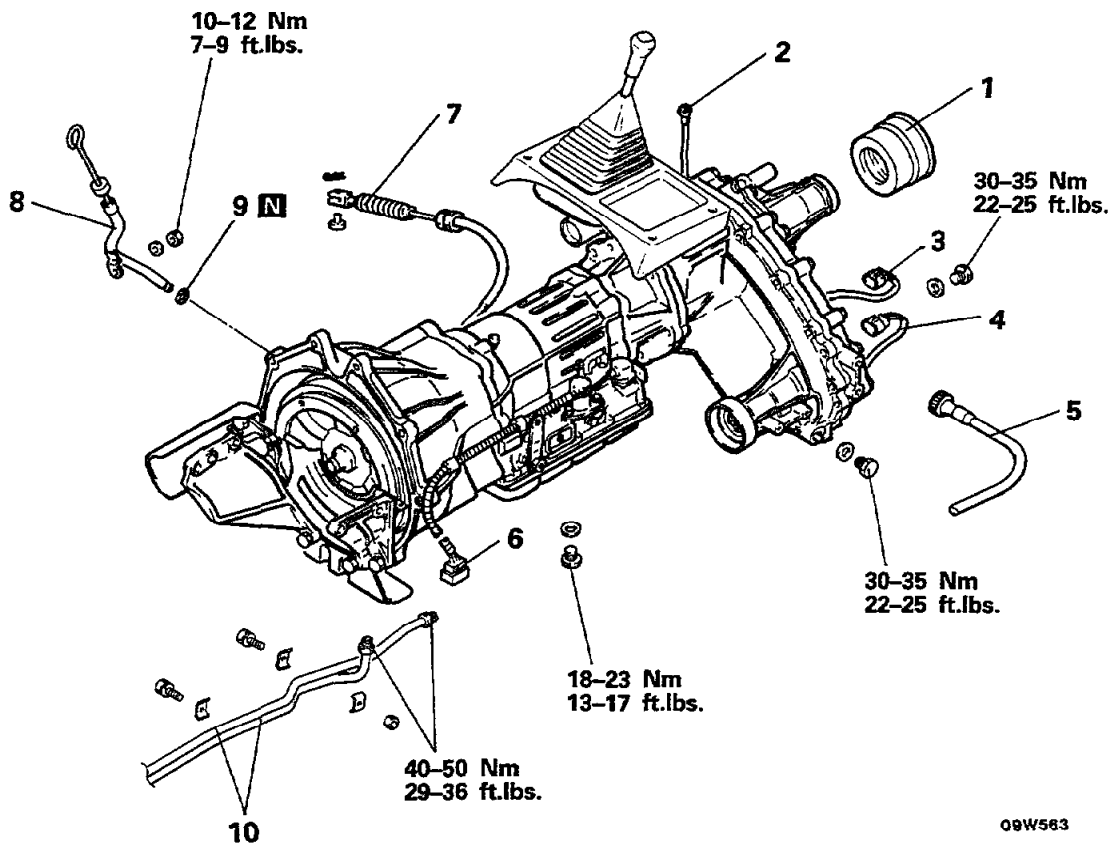
TRANSMISSION AND TRANSFER ASSEMBLY

REMOVAL AND INSTALLATION

N21LA–

Pre-removal Operation
- Removal of Cross Shaft Protector
- Removal of Front Exhaust Pipe
- Removal of Transfer Case Protector
- Draining of Automatic Transmission Fluid and Transfer Oil (Refer to GROUP 0-Maintenance Service)
- Removal of Front and Rear Propeller shaft (Refer to GROUP 16-Propeller shaft)

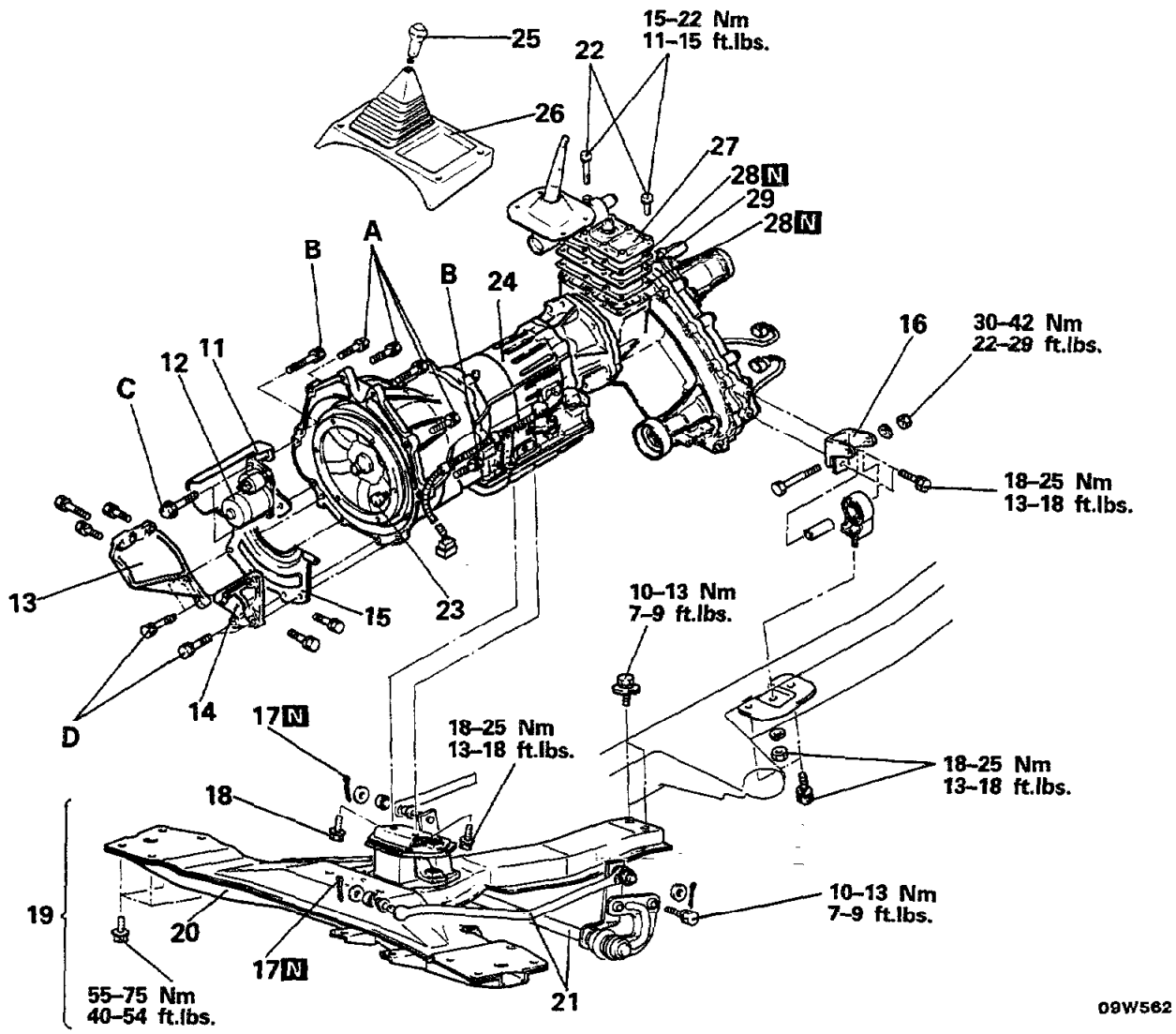
Post-installation Operation
- Supplying of Automatic Transmission Fluid and Transfer Oil (Refer to GROUP 0-Maintenance Service)
- Installation of Front Exhaust Pipe (Refer to GROUP 11-Exhaust Pipe)
- Installation of Front and Rear Propeller shaft (Refer to GROUP 16-Propeller shaft)
- Installation of Cross Shaft Protector
- Installation of Transfer Case Protector
- Checking of Selector Lever Activation



Removal steps

1. Dust seal guard
2. Ground cable
3. Oxygen sensor connector
4. 4WD indicator light switch connector
5. Speedometer cable
6. Overdrive solenoid valve connector
7. ◆◆ Throttle control cable
8. Oil filler tube
9. ◆◆ O-ring
10. Automatic transmission cooler tube

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Installation".
(3) N : Non reusable parts



11. Stator cover
◀▶ 12. Stator motor
▶◀ 13. Transmission stay (R.H.)
▶◀ 14. Transmission stay (L.H.)
15. Bell housing cover
◀▶ 16. Transfer mounting bracket
17. Cotter pin
18. Bolts.
19. No. 2 crossmember and rear engine support member with transfer control rod
20. No. 2 crossmember
▶◀ 21. Transmission control rod assembly
◀▶ 22. Transfer control lever mounting bolts
23. Special bolts (six)
◀▶ ▶◀ 24. Transmission and transfer assembly
25. Transfer shift lever knob
26. Front floor console
27. Control lever assembly
▶◀ 28. Control housing gasket
29. Contorl housing cover

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◀▶ : Refer to "Service Points of Removal".
(3) ▶◀ : Refer to "Service Points of Installation".
(4) N : Non reusable parts

	Nm	ft.lbs.	O.D. x Length mm (in.)	Bolt identification
A	65–85	47–61	⑦ 12×40 (.5×1.6)	⑦ D×L
B	80–100	58–72	⑦ 12×55 (.5×2.2)	D
C	27–34	20–25	⑦ 10×55 (.4×2.2)	
D	30–42	22–30	⑦ 10×40 (.4×1.6)	L Y09512

SERVICE POINTS OF REMOVAL N21LBAN

12. REMOVAL OF STARTER MOTOR

Refer to P.21-13.

16. REMOVAL OF TRANSFER MOUNTING BRACKET

Refer to P.21-13.

22. REMOVAL OF TRANSFER CONTROL LEVER ASSEMBLY MOUNTING BOLTS

Move the transfer control lever to the "2H" position and remove the control lever assembly mounting bolts.

24. REMOVAL OF TRANSMISSION AND TRANSFER ASSEMBLY

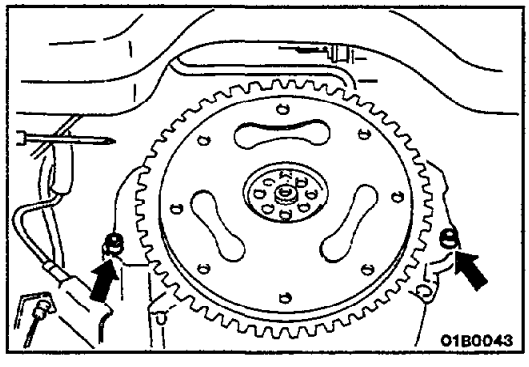
(1) Disconnect the transmission and transfer assembly from the engine by pulling it slowly toward the rear of the vehicle.

(2) When lowering the transmission and transfer assembly, tilt the front of the transmission downward and slowly lower forward, while using care to make sure that the rear of the transmission does not hit the No. 4 crossmember.

NOTE
Detach so that the torque converter does not remain at the engine side.

SERVICE POINTS OF INSTALLATION N21LDAS

28. APPLICATION OF SEALANT TO CONTROL HOUSING GASKET



Apply semi-drying sealant to both surfaces of the control housing gasket.

24. INSTALLATION OF TRANSMISSION AND TRANSFER ASSEMBLY

On the engine side, there are two centering locations. Make sure that the transmission mounting bolt holes are aligned with them before mounting the transmission and transfer assembly to the engine.

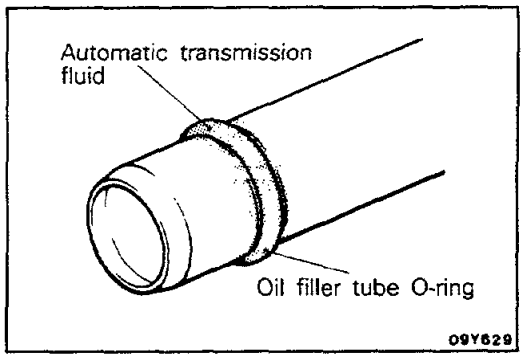
21. INSTALLATION OF TRANSMISSION CONTROL ROD ASSEMBLY

(1) Apply a coating of multipurpose grease to the sliding parts.

(2) Confirm the position of the selector lever. (Refer to P.21-78.)

14. INSTALLATION OF TRANSMISSION STAY (L.H.)/13. TRANSMISSION STAY (R.H.)

Refer to P.21-30.



9. APPLICATION OF LUBRICANT TO O-RING

Apply a small amount of the specified automatic transmission fluid to the O-ring and then install.

Specified transmission fluid: Automatic Transmission Fluid "DEXRON" type

7. CONNECTION OF THROTTLE CONTROL CABLE

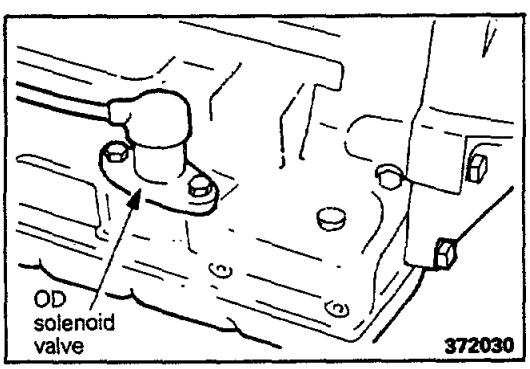
Refer to P.21-89.

DISASSEMBLY

N21LEAF

Caution

1. **When removing the transmission assembly from the vehicle, use care so that the oil pan is not hit by the transmission jack.**
2. **The automatic transmission is built of accurately machined parts which should be handled during disassembly with utmost care to prevent damage.**
3. **When separating light alloy metal parts such as the case, do not pry with a screwdriver but tap lightly with a soft headed hammer (plastic hammer).**
4. **Place rubber mat on the work bench and keep it clean.**
5. **During disassembly, do not wear cloth gloves or use rags.**
   If necessary, use nylon cloth or paper towel.
6. **Clean all parts that have been disassembled. Ordinary detergent may be used for cleaning metallic parts but after washing, be sure to dry with air.**
7. **Wash the clutch disc, brake disc, resin and rubber parts in ATF (automatic transmission fluid) and keep them free from dust.**
8. **If the transmission itself is damaged, disassemble and clean the cooler system.**



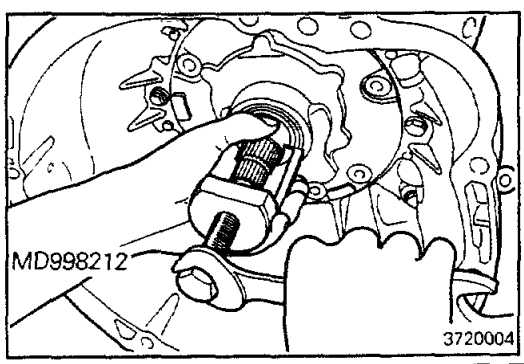
(1) Remove sand and dirt from the outside of the transmission.
(2) Remove the transfer (P.21-154).
(3) Place the transmission assembly on a bench with the oil pan down.

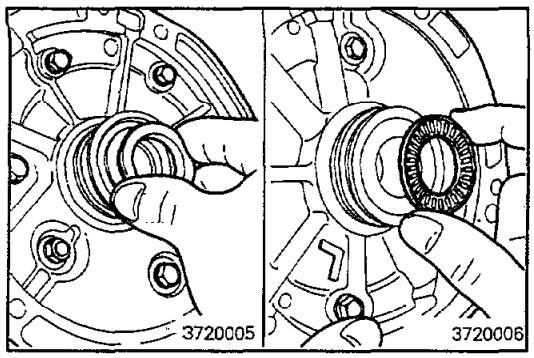
Caution
Do not place the assembly with the oil pan up before the oil pan is removed. This is necessary to prevent foreign matter in the oil pan from entering the valve body.

(4) Remove the torque converter.
(5) Remove the O.D. solenoid valve.
(6) Remove the oil pump:
   (a) Remove the seven bolts.
   (b) Position the special tool on the shaft in back of the spline.
   (c) Turn bolt of the special tool to free the pump.

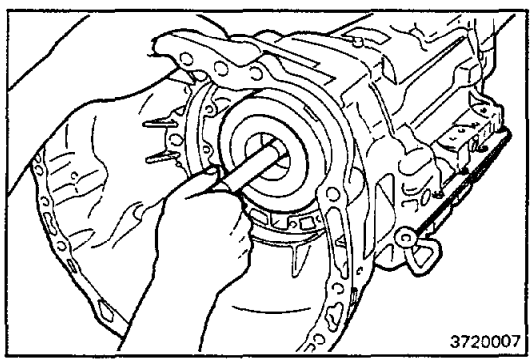
Caution
- **Do not damage the shaft bushing surface.**

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

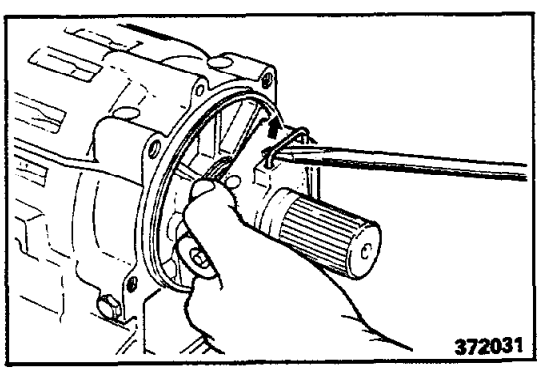




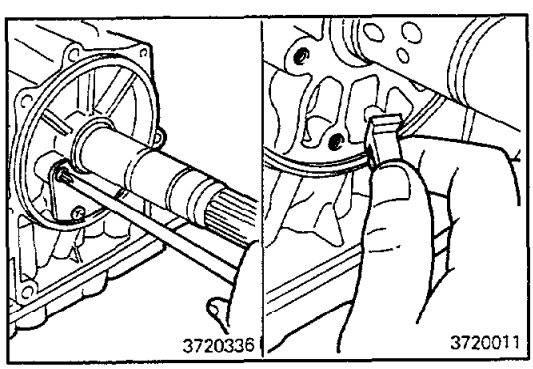
(7) Watch for the bearing and race behind the oil pump.



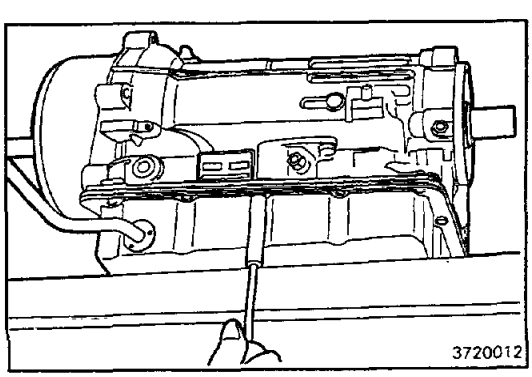
(8) Remove the torque converter housing:
  (a) Remove the two 12-mm bolts and four 10-mm bolts.
  (b) While holding the input shaft, remove the converter housing.



(9) Remove the adapter and gasket.
(10) Remove the governor mounting bolt.
(11) Lift up the governor retaining ring lightly by a screwdriver and remove the governor assembly from the output shaft.

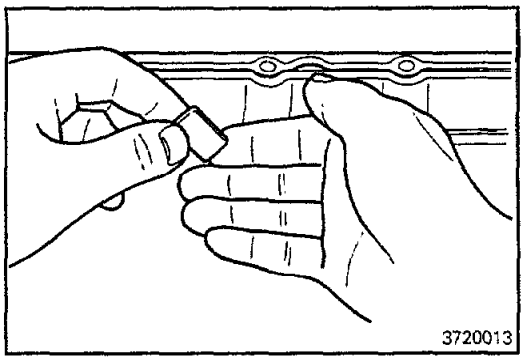


(12) Remove the governor strainer:
  (a) Remove the four screws and plate.
  (b) Remove the strainer from the case.



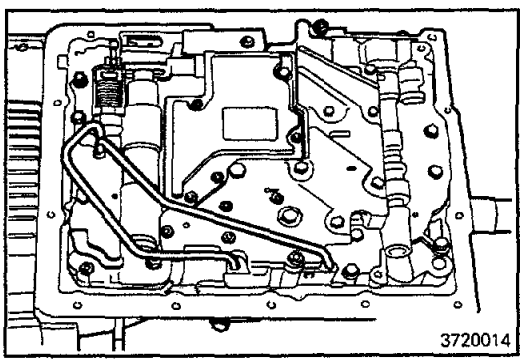
(13) Remove the oil pan and gasket:
  (a) Remove the fourteen bolts.
  (b) Remove the oil pan with the transmission case lifted.

Caution
- **Do not turn the transmission over as this will contaminate the valve body by foreign materials collected in the bottom of oil pan.**

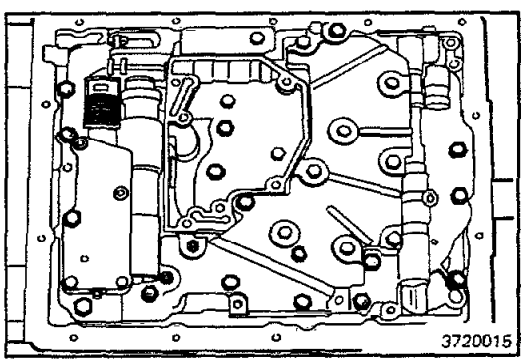


(14) Examine metallic particles in the oil pan as follows:
Remove the magnet and use it to collect any steel chips. Look carefully at the chips and particles in the oil pan and on the magnet to guess where the wear occurs in the transmission:

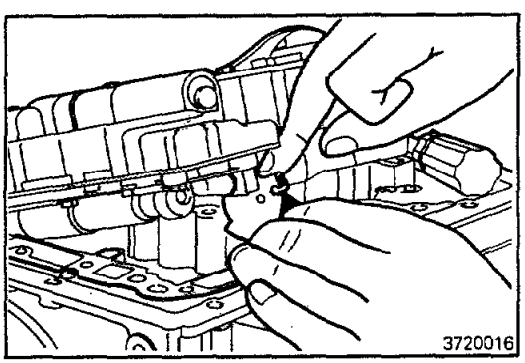
Steel (magnetic) = bearing, gear and clutch plate wear.
Brass (nonmagnetic) = bushing wear.



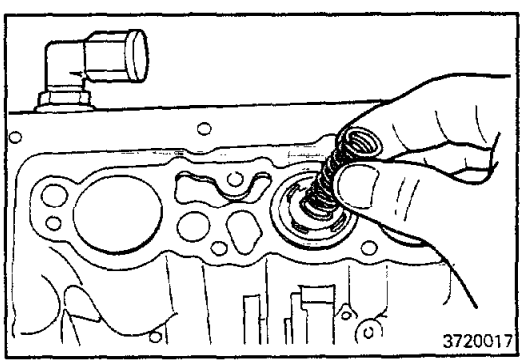
(15) Turn the transmission over and remove the tubes by prying up both ends of each tube with a large screwdriver.
(16) Remove the strainer.



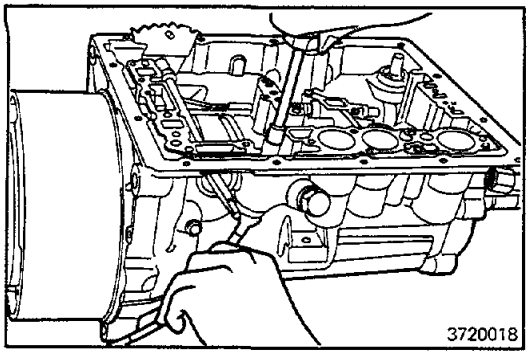
(17) Remove the seventeen valve body fixing bolts.



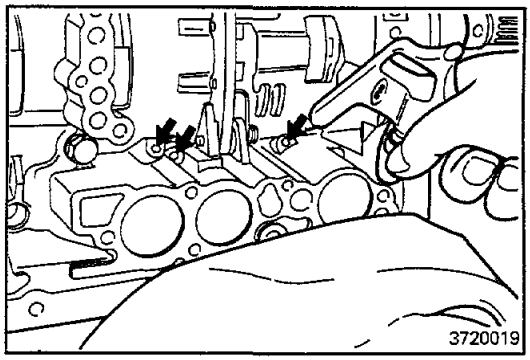
(18) Lift slightly the valve body and disconnect the throttle cable from the cam, then remove the valve body.



(19) Remove the C_2 accumulator piston spring.

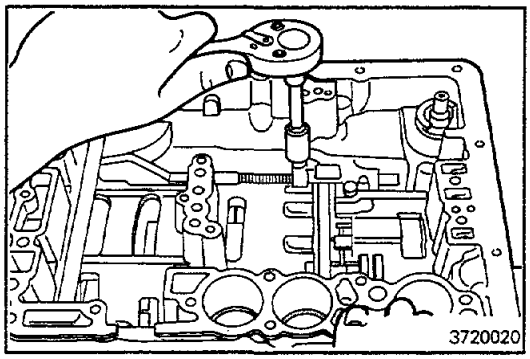


(20) Using a 10 mm (.39 in.) socket, push the plastic throttle cable retainer out of the transmission case to remove the cable with retainer.

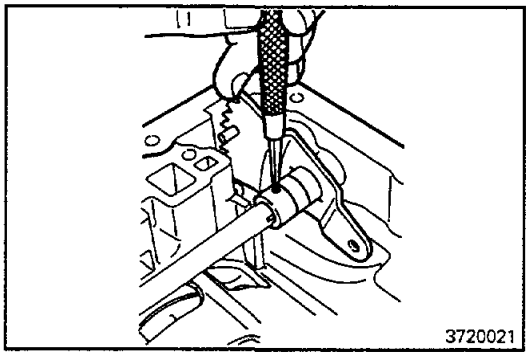


(21) Position a rag to catch each piston. Blow low-pressure compressed air (100 kPa, 14.5 psi) into each of the holes shown to let the piston into the rag.
Remove the pistons and springs.

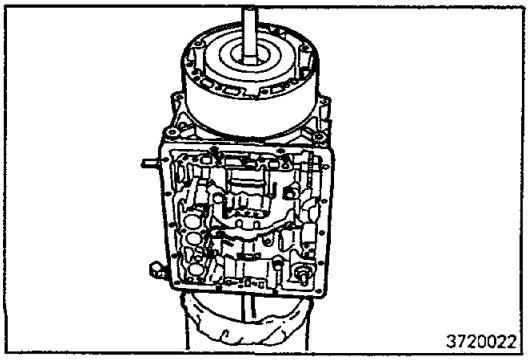
Caution
- **Keep face away to avoid injury.**
- **Do not use high-pressure air.**



(22) Remove the parking lock linkage:
(a) Remove the cam plate.
(b) Remove the parking lock rod.
(c) Remove the spring, pivot pin and parking lock pawl.

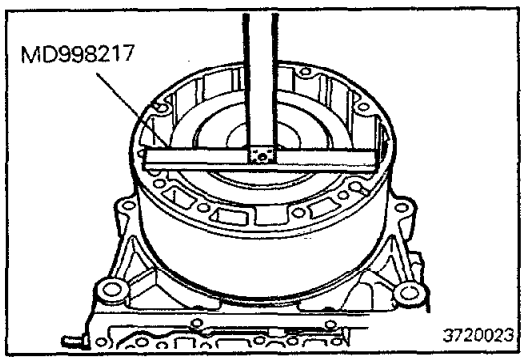


(23) Remove the manual lever and shaft:
(a) Using a hammer and punch, drive out the pin.
(b) Slide the shaft out the case and remove the detent plate.

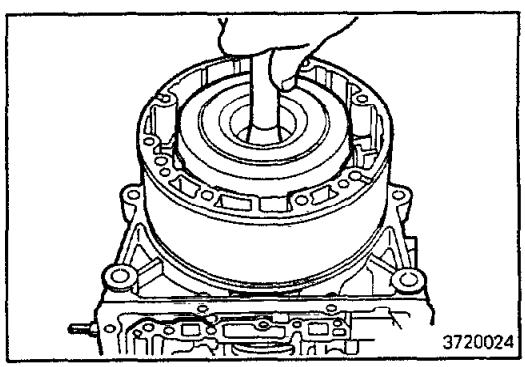


(24) Place the transmission on a cylindrical stand for more efficient work.

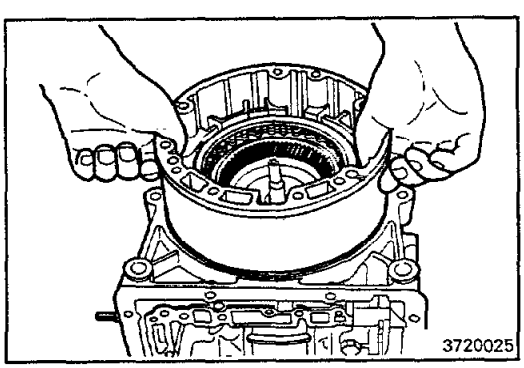
Caution
- **Place shop rags between the case and stand to avoid damaging the case.**



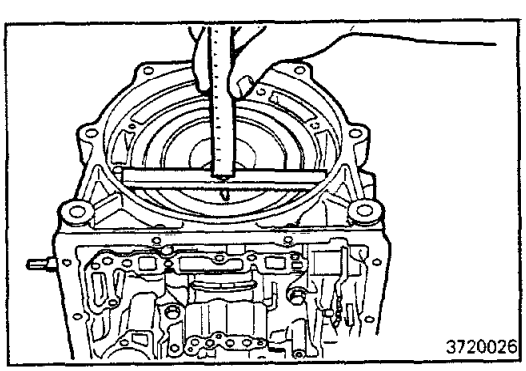
(25) Set the special tool on the overdrive case and measure the distance between the top of overdrive case and clutch cylinder.
Make a note of the distance for reassembly.



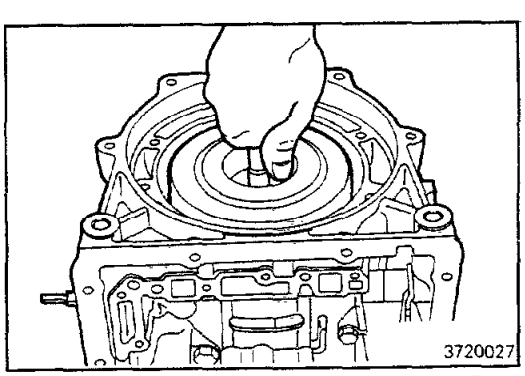
(26) Grasp the shaft and pull out the overdrive clutch assembly. Watch for bearings and races on both sides of the assembly.



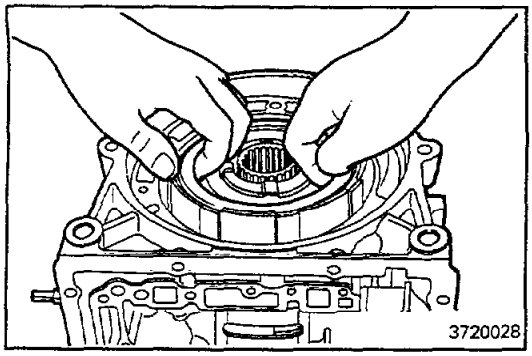
(27) Remove the overdrive case and brake as follows:
Hold both sides of the overdrive case and pull it out from the transmission case. Watch for bearings and races on both sides of the assembly.



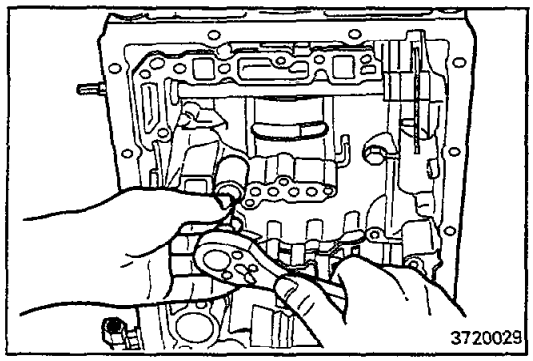
(28) Set the special tool in the case. Measure the distance between the top of case flange and the clutch drum.
Make a note of the finding for reassembly.



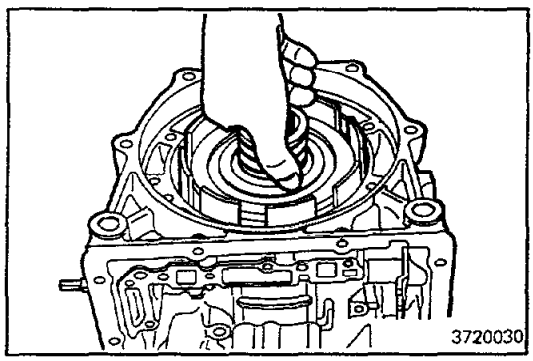
(29) Grasp the shaft and pull out the forward clutch assembly. Watch for bearings and races on both sides of the assembly.



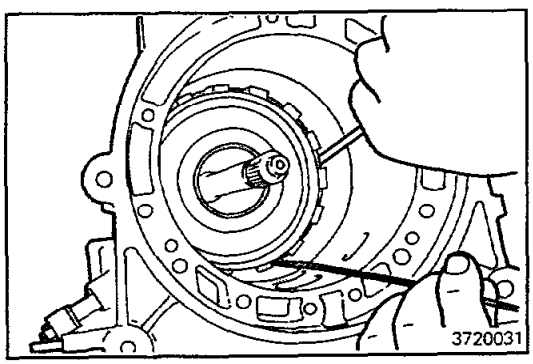
(30) Remove the direct clutch by grasping the clutch hub and pulling it out from the case.



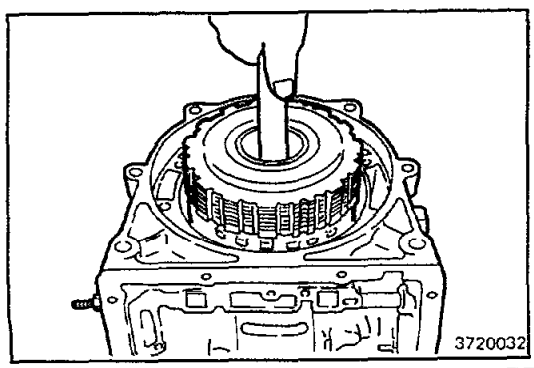
(31) Remove the center support and sun gear:
(a) Remove the two center support bolts.



(b) Grasp the center support assembly and pull out the center support with sun gear.



(32) Remove the reaction plate retaining ring using a long-shank screwdriver.



(33) Remove the No. 3 brake and planetary carrier assembly by pulling out the intermediate shaft.
If the brake apply tube and rear thrust bearing and races do not come out with the assembly, remove them from the case.

REASSEMBLY

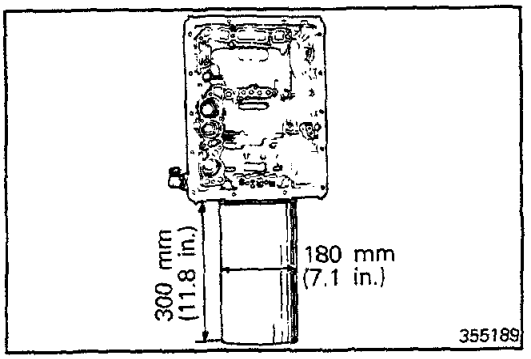
N21FAF

Caution

- **Before assembly, make sure that all component assemblies are assembled correctly.**
- **If something wrong is found in a certain component assembly while assembly, inspect and repair this assembly immediately.**

GENERAL ASSEMBLY NOTES

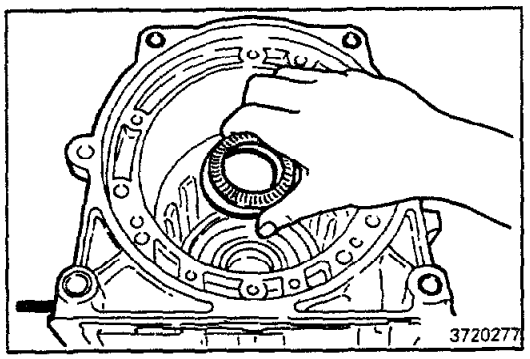
① The automatic transmission is composed of highly precision-finished parts, necessitating careful inspection before assembly because even a small nick could cause fluid leakage or affect performance.
② Before assembling new clutch discs, soak them in ATF for at least two hours.
③ Apply ATF on sliding or rotating surfaces of the parts before assembly.
④ Use petroleum jelly to keep the small parts in their places.
⑤ Do not use sealant or 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 by blowing with compressed air. Never use shop rags.
⑧ Be sure to install the thrust bearings and races in the correct direction and position.



(1) Place the transmission on a cylindrical stand for more efficient work.

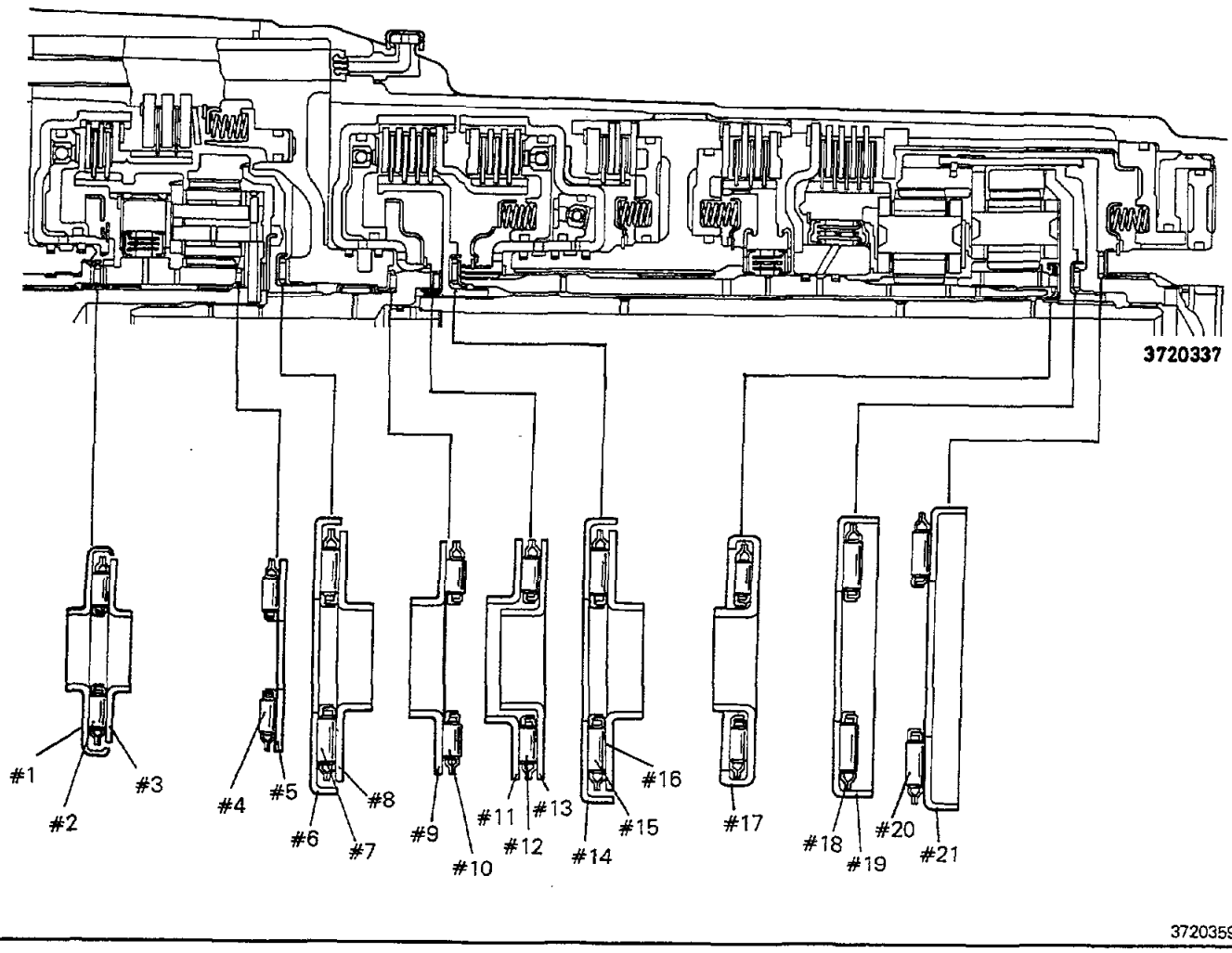
Caution

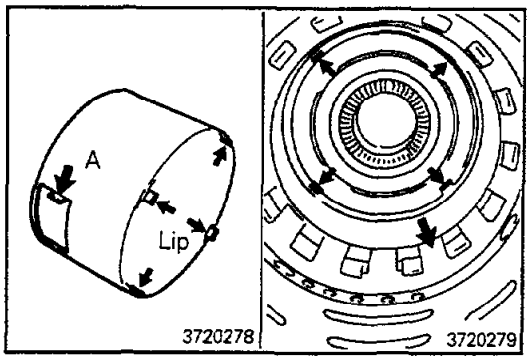
- **Place shop rags between the case and stand to avoid damaging the case.**



(2) Install the thrust bearing #20 and then the race #21 facing the cup side downward.

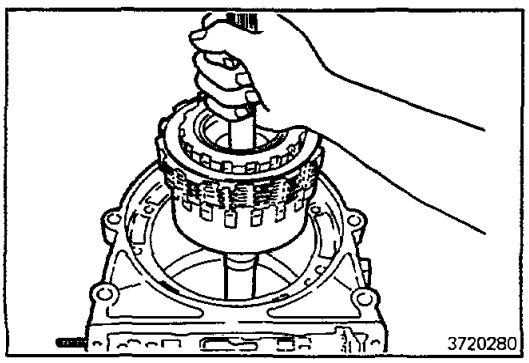
THRUST BEARING AND RACE POSITIONS





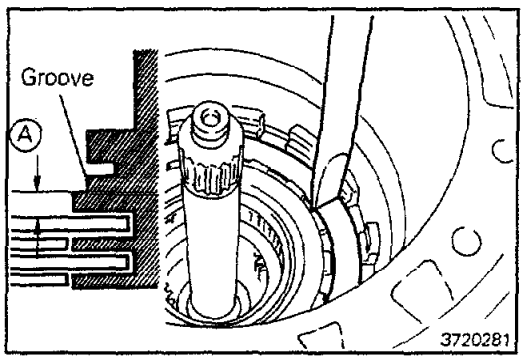
(3) Install the brake apply tube onto the case, aligning the tube's locking tab (part A) with part B of the case.

NOTE
Make sure that the tab of the tube is completely fitted in the case.



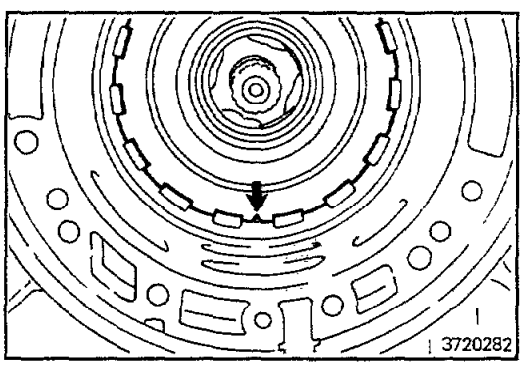
(4) Insert the output shaft assembly into the case.

TSB Revision



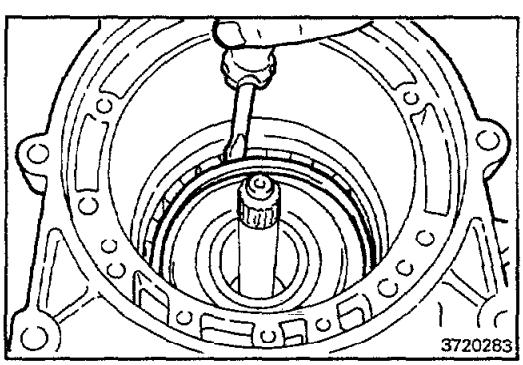
(5) With the case in upright position, make sure that the No. 3 brake is lower than the ledge below the retaining snap ring groove.
If the No. 3 brake is not lower than the ledge, components may be misassembled or there may be excess ATF between the disc and plate.

Standard value:
Dimension A: 0.61 – 2.64 mm (.024–.104 in.)

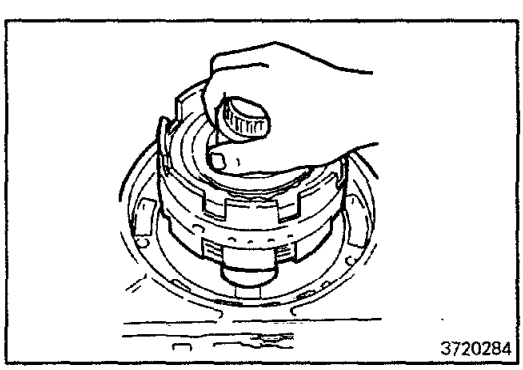


(6) Install the reaction plate as follows:
Position the notched tooth of the reaction plate toward the valve body side of the case. Push it into place.

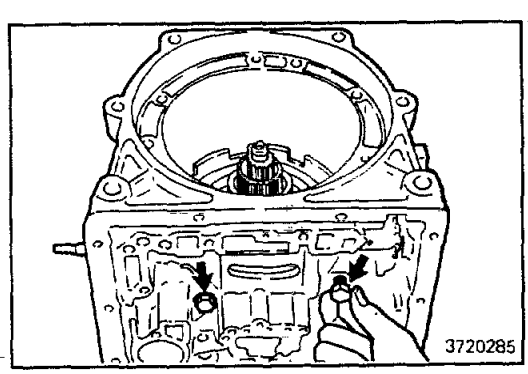
NOTE
The reaction plate is correctly installed if the retaining snap ring groove is fully visible.



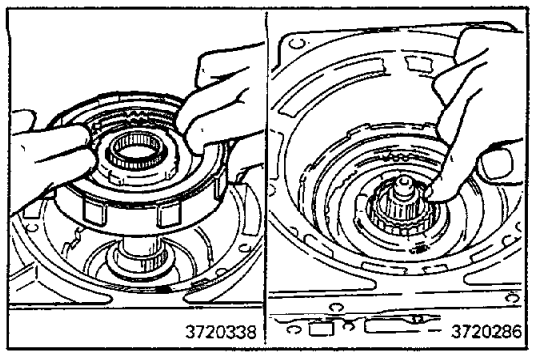
(7) Install the retaining snap ring as follows:
Use a large screwdriver to compress the snap ring. Push the snap ring into place by hand. Work around the case. Visually check to make sure that the ring is fully seated. Make sure that the ends of the snap ring are between the lugs.



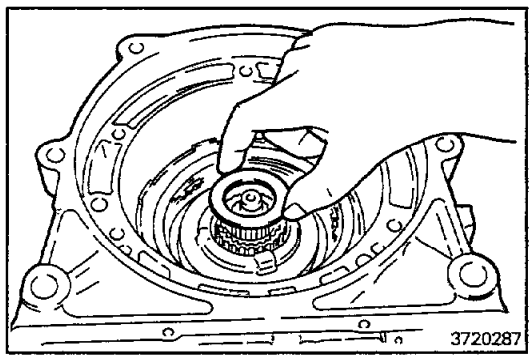
(8) Push the center support assembly into the case while aligning the oil hole and bolt hole of the center support with those of the body side.



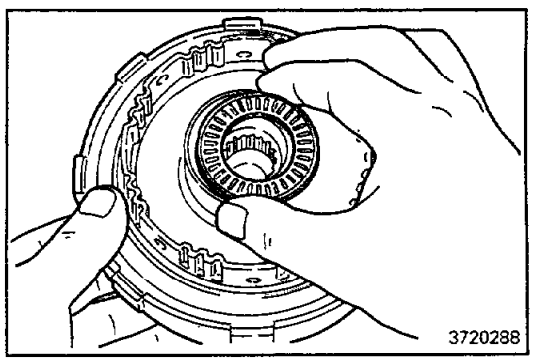
(9) Install the two center support bolts with wave washers. Finger tighten the bolts.



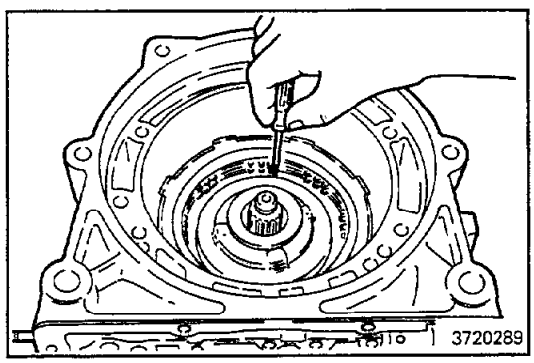
(10)Install the direct clutch in the case while turning the clutch to mesh its hub with the center support.
(11)Check for correct installation of the direct clutch.
If the direct clutch is fully meshed with the center support, the splined center of the clutch will be flush with the end of the planetary sun gear shaft.



(12)After being coated with petroleum jelly, install the thrust bearing race #16 over the splined end of the direct clutch in case with its lip toward the direct clutch.

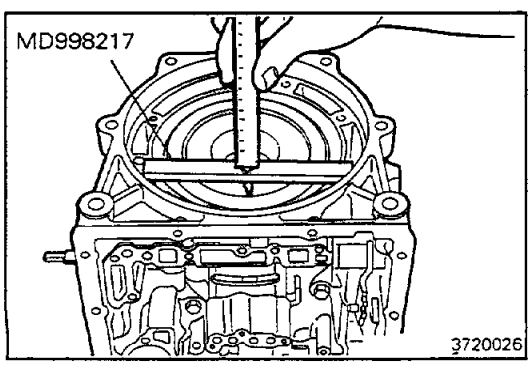


(13)After being coated with petroleum jelly, install the thrust bearing #15 and race #14 on the forward clutch, with the race's lip outward.

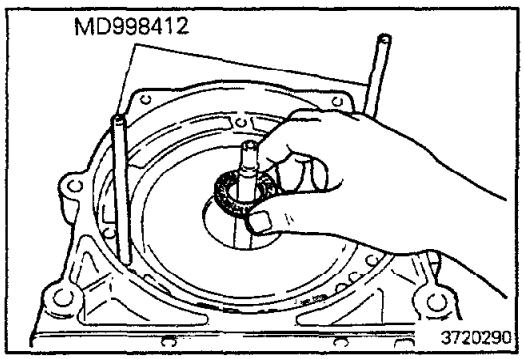


(14)Install the forward clutch assembly in the case:
(a) Align flukes of the direct clutch discs and mesh them with the forward clutch hub.
(b) Push the forward clutch assembly into the case.

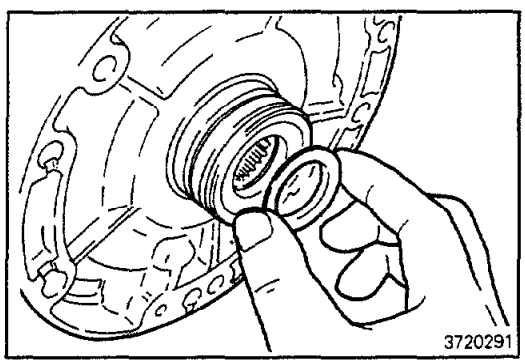
Caution
- **Be careful not to let the thrust bearing drop.**



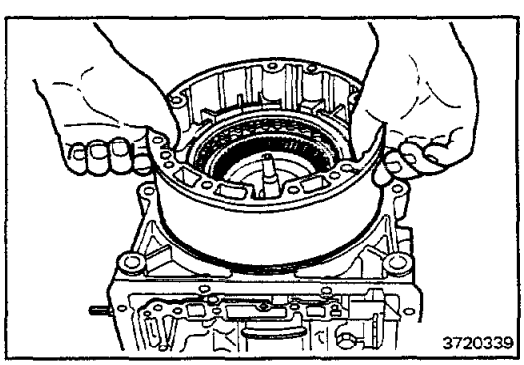
(15)Check for correct installation of the forward clutch as follows:
Set the special tool on the transmission case as shown in the figure.
Measure the distance between the top surface of the tool and forward clutch assembly. If the distance corresponds to that during disassembly, the forward clutch is installed correctly.



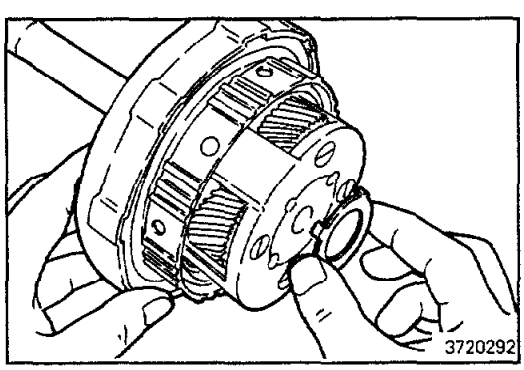
(16)Install the special tool on the case.
(17)After being coated with petroleum jelly, install the thrust bearing #10 on the forward clutch.



(18)After being coated with petroleum jelly, install the thrust race #9 on the overdrive case end with its lip toward the overdrive case.

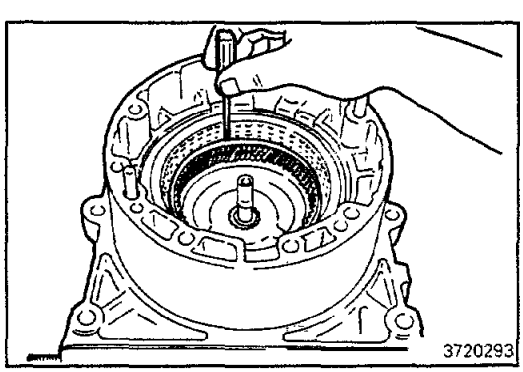


(19)Insert the overdrive case gently into the transmission case through the two guide pins with the part indicated by arrow facing in the direction shown.



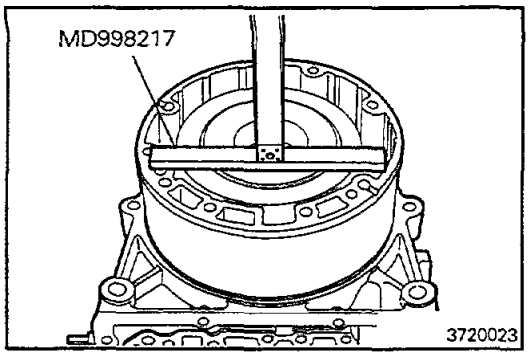
(20)Coat the thrust washers with petroleum jelly. Install the washers on the overdrive planetary gear.

NOTE
The washer lugs should be inserted in the holes.

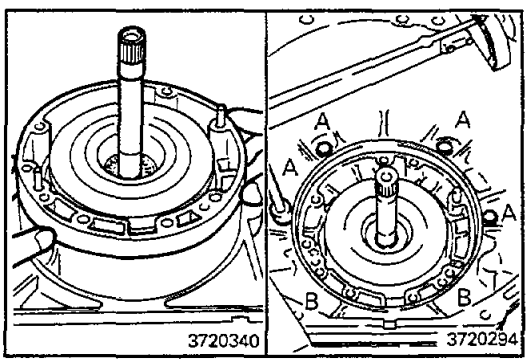


(21)Install the overdrive clutch in the case as follows:
Align the disc flukes in the overdrive case. Align the flukes with the slots of the overdrive clutch and press the overdrive clutch into the overdrive case.

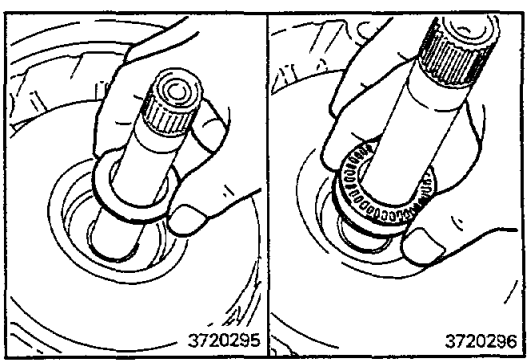
Caution
- **Be careful not to let the thrust washer drop.**



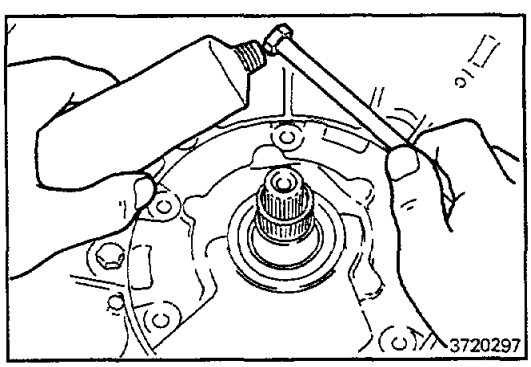
(22)Check for correct installation of the overdrive clutch as follows:
Set the special tool on the overdrive case as shown in the figure.
Measure the distance between the top surface of the tool and the overdrive clutch. If the distance corresponds to that during disassembly, the overdrive clutch is installed correctly.



(23)Install the O-ring on the overdrive case.
(24)Install the torque converter housing by using the two 12-mm bolts (B) and four 10-mm bolts (A).
Tighten the bolts to specification.



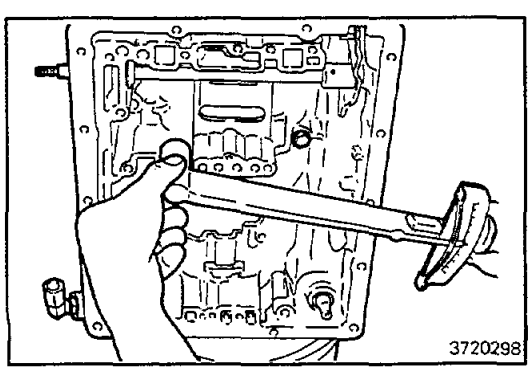
(25)Coat the thrust bearing race #3 with petroleum jelly and install it on the overdrive clutch.
(26)Coat the thrust bearing #2 and race #1 combination with petroleum jelly and install it on the oil pump.



(27)Install the oil pump:
(a) Install the oil pump gently through the two guide bolts, being careful that the thrust washer does not fall out.
(b) Coat the five set bolts with sealant, and finger tighten them.
(c) Using a screwdriver, remove the special tool. In the place of it, install the two set bolts coated with sealant.

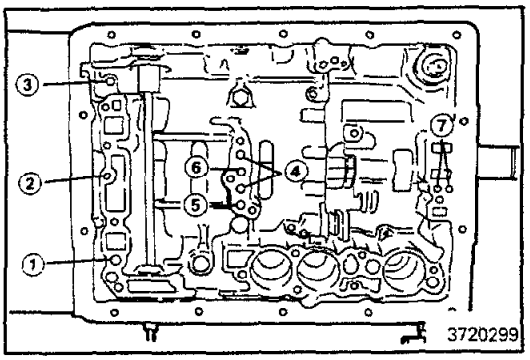
Specified sealant: 3M ART Part No. 8660 or equivalent

(d) Tighten the set bolts gradually and evenly to the specified torque.

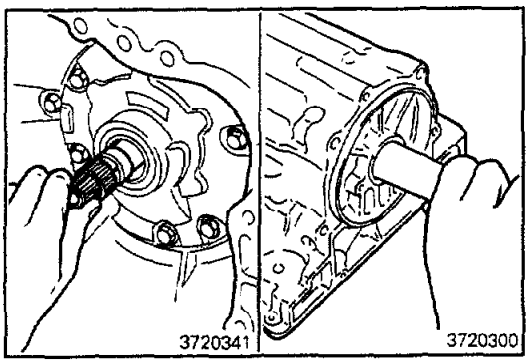


(28)Tighten the two center support bolts alternately in 7 Nm (5.16 ft.lbs.) increments until the specified torque is reached.

NOTE
Firest tighten the accumulator side bolt.

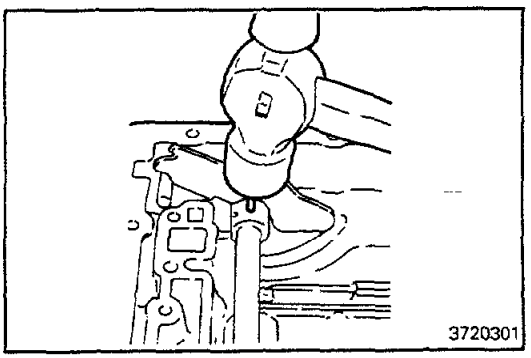


(29)Check the operation of pistons as follows:
Blow low-pressure compressed air into the passages indicated in the figure and listen for noise from piston movement.
① Overdrive clutch
② Overdrive brake
③ Forward clutch
④ Direct clutch
⑤ Brake No. 1
⑥ Brake No. 2
⑦ Brake No. 3
If the pistons do not move, disassemble and inspect them.

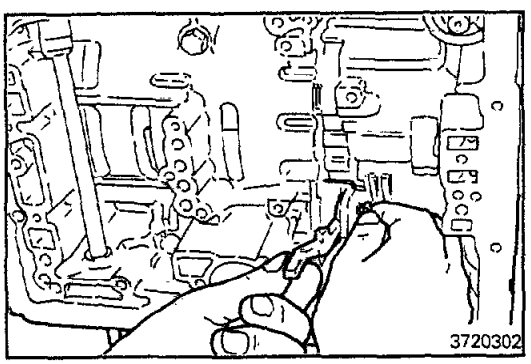


(30)Check the input shaft and output shaft:
(a) Make sure that the input shaft has play in axial direction and that it turns.
(b) Make sure that the output shaft has an appropriate end pay.

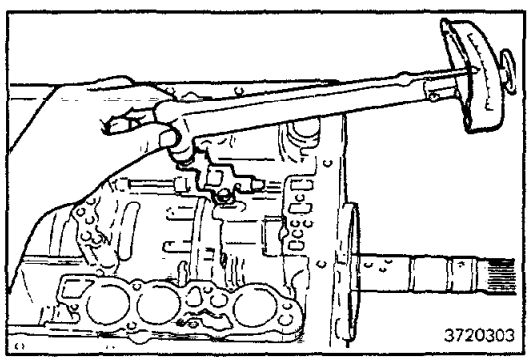
End play: 0.3 – 0.9 mm (.012–.035 in.)



(31)Install the manual valve lever and shaft into the case:
(a) Install the manual valve lever shaft to the transmission case through the manual valve lever.
(b) Drive in a new slotted spring pin with the slot at a right angle to the shaft.

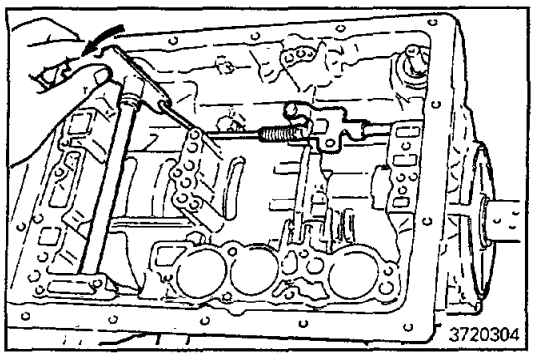


(32)Install the parking pawl, pivot pin and spring in the case.

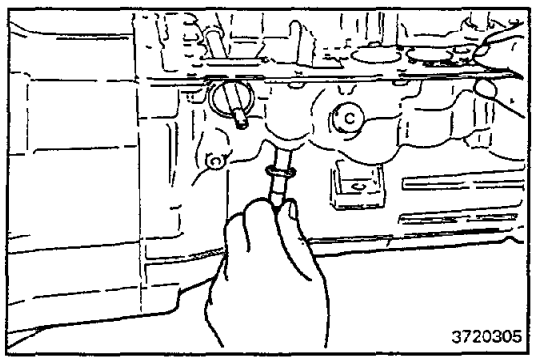


(33)Install the cam plate on the case with the two bolts. Tighten the bolts to the specified torque. Make sure the pawl moves freely.

NOTE
Be careful, as it is possible for the cam plate to be installed too far forward, where it will bind the pawl.

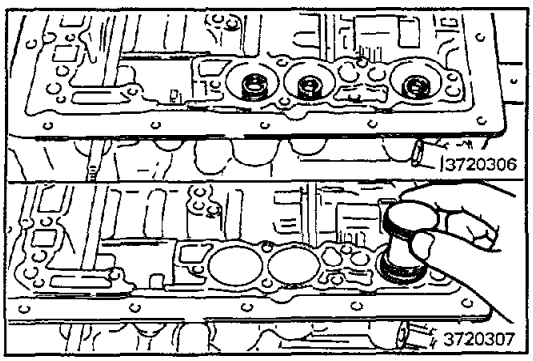


(34)Check the operation of the parking lock pawl.
The planetary gear output shaft must be locked when the manual valve lever is in the "P" range.

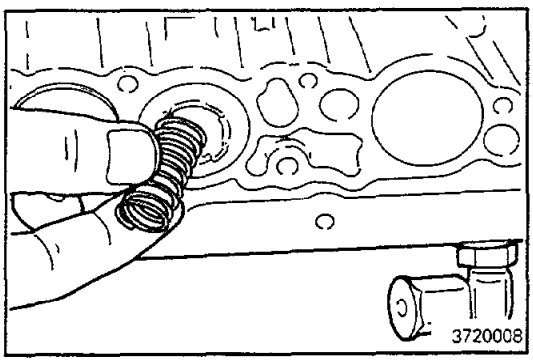


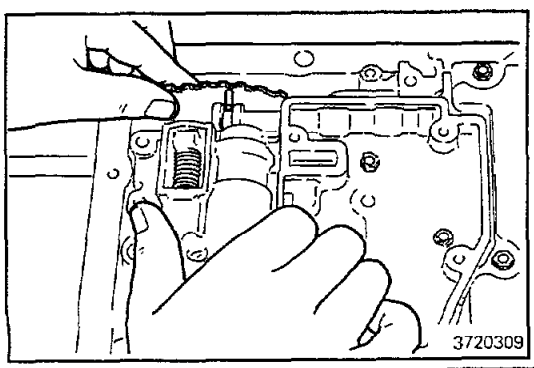
(35)Install a new O-ring on the throttle cable fitting.
(36)Install the throttle cable in the case by pushing the cable through the case, being careful not to damage the O-ring. Check for full seating.

Caution
- **In subsequent work, do not roll the case over the cable and break the cable fitting.**

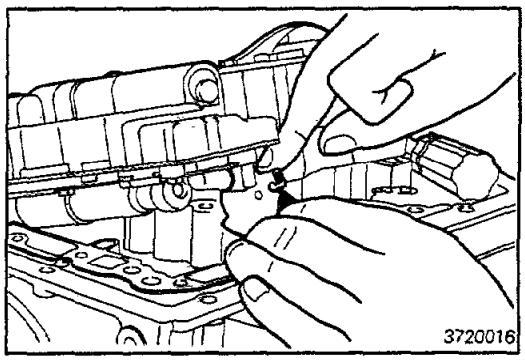


(37)Install the accumulator piston and springs.
Refer to the tables "Spring Identification" (page 21-72) and "Identification of Clutches, Brakes and Accumulators" (page 21-72, 73) for installation of correct springs and accumulator.

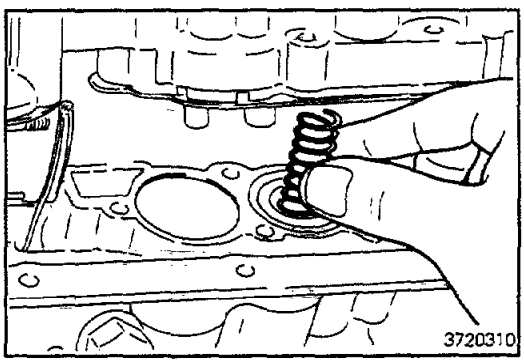




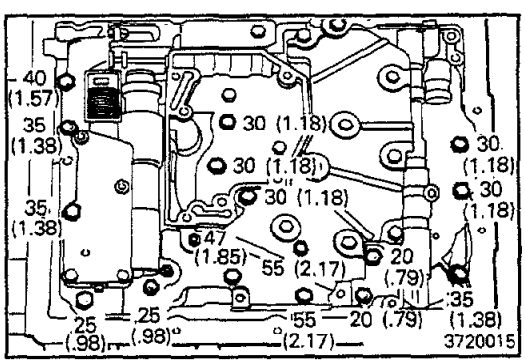
(38)Place the valve body on the transmission as follows:
Make sure the accumulator pistons are pressed fully into the bore. Align the manual valve with the pin on the manual valve lever, and lower valve body into place.



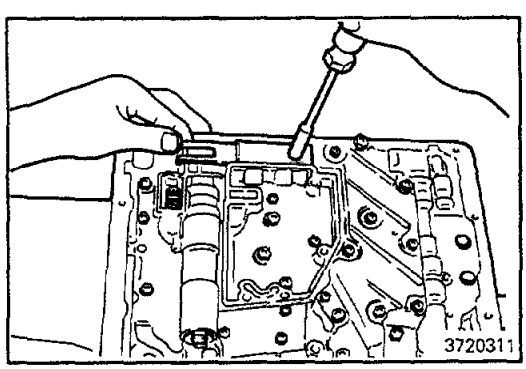
(39)Lift a side of the valve body and attach the throttle cable.



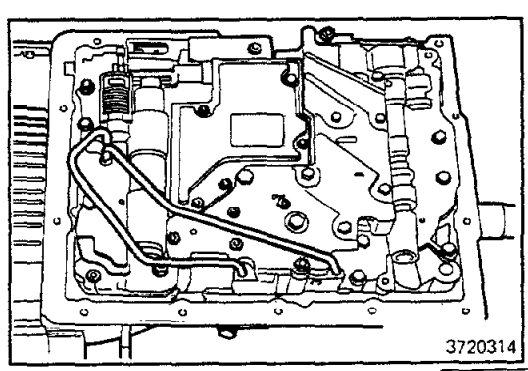
(40)Make sure that the lower spring is installed on the B_2 or C_2 piston.



(41)Install the bolts in the valve body and tighten the bolts to specified torque.
The length of each bolt is as shown in the figure <unit: mm (in.)>



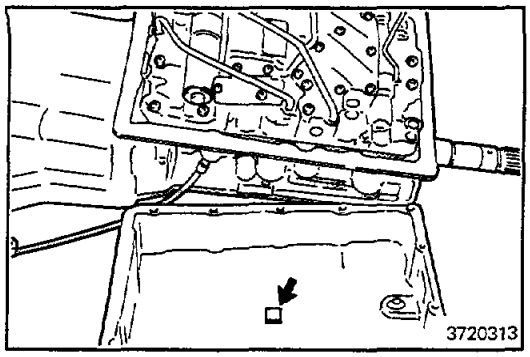
(42)Install the detent spring.
(43)Install the oil strainer and tighten the bolts to specified torque.



(44)Using a soft hammer, install the oil pipes into the position indicated in the figure.

Caution

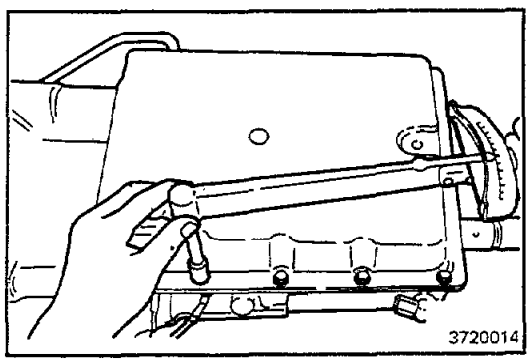
- **Be careful not to bend or damage the pipes.**

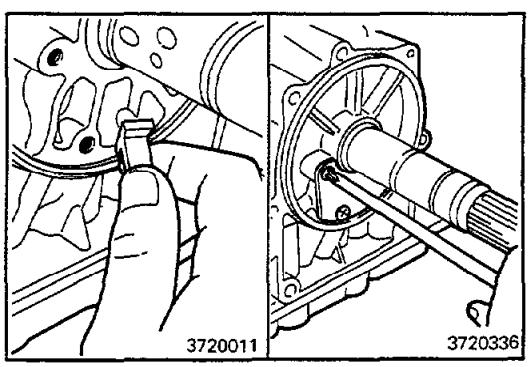


(45)Install the magnet in the oil pan and install the oil pan with a new gasket.

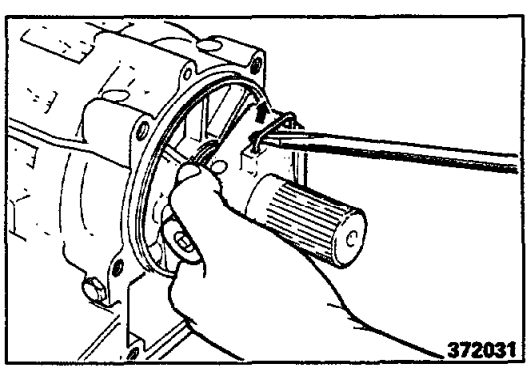
Caution
- **Make sure that the magnet does not interfere with the oil pipes.**

(46)Install the drain plug with a new gasket.

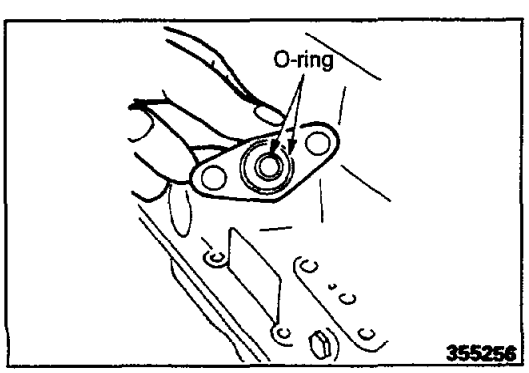




(47)Install the governor line strainer on the transmission case and then install the plate.



(48)Insert a slot screwdriver between the governor retaining ring and governor body and install the governor to the output shaft.
(49)Install the adapter and gasket.



(50)Install the O.D. solenoid.

Caution
Be sure to use two O-rings.

(51)Install torque converter to transmission.
(52)Install the transfer assembly (P.21-162).

GENERAL NOTES ON DISASSEMBLY AND ASSEMBLY OF COMPONENT ASSEMBLIES

N21NEAA

GENERAL CLEANING NOTES:

(1) All disassembled parts should be washed clean and the fluid passages and hole blown through with compressed air to make sure that they are not clogged.
(2) The cleaning solvent used should be the recommended ATF or kerosene.
(3) When using compressed air to dry parts, avoid spraying ATF or kerosene in your face.

PARTS HANDLING NOTES:

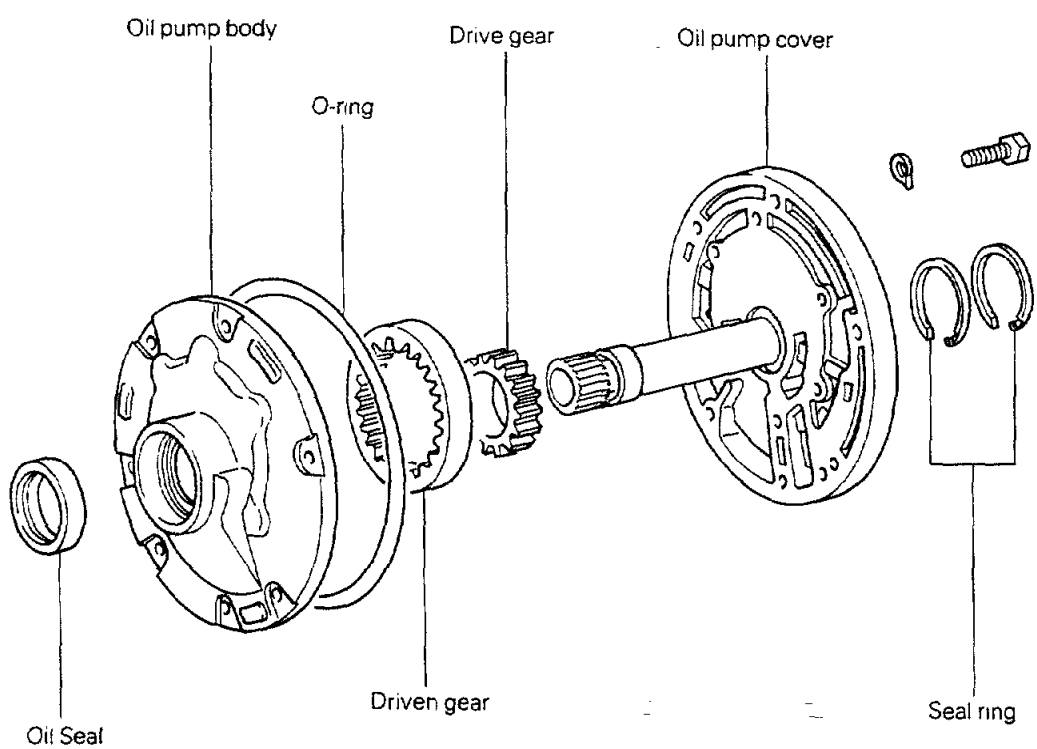
(1) After cleaning, the parts should be arranged in proper order to allow performing the inspection, repairs, and reassembly with efficiency.
(2) When disassembling the valve body, be sure to keep each valve together with its own spring.
(3) New brake and clutch discs that are to be used for replacement must be soaked in ATF for at least two hours before assembly.

GENERAL ASSEMBLY NOTES:

(1) All oil seal rings, clutch discs, clutch plates, rotating parts, and sliding surfaces should be coated with ATF prior to reassembly.
(2) All gaskets and 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 replacement must be made with the component assembly containing that bushing.
(5) Check thrust bearings and races for wear or damage. Replace if necessary.
(6) Use petroleum jelly to keep parts in their places.

OIL PUMP

N21LGAA



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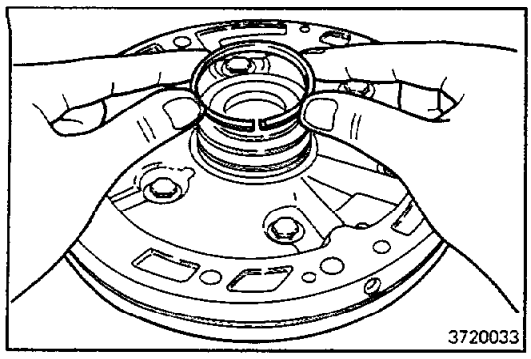
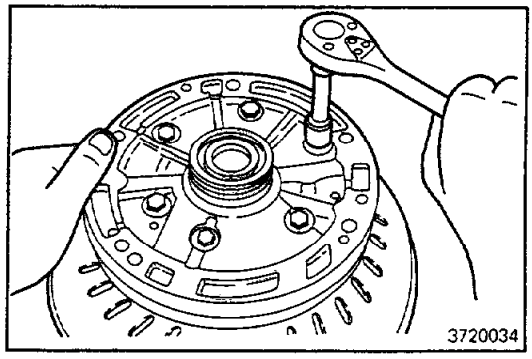
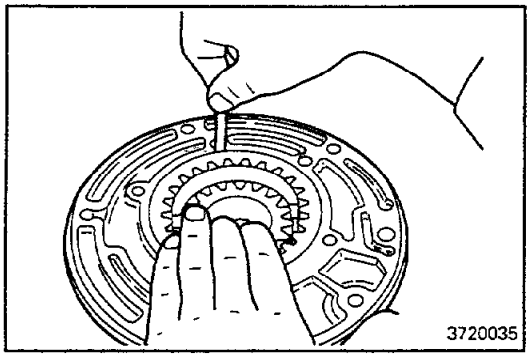


DISASSEMBLY

(1) Use the torque converter as a work stand.
(2) Remove the two seal rings from the oil pump cover.



(3) Remove the six bolts.
(4) Remove the oil pump cover.
(5) Remove the O-ring from the oil pump body.
(6) Remove the oil pump drive gear and driven gear. Identify their top and bottom by appropriate marking for proper reassembly.

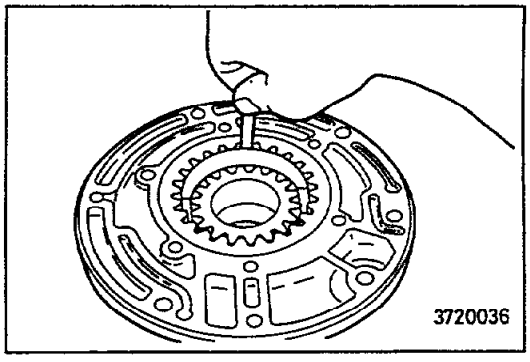


INSPECTION

BODY CLEARANCE CHECK

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

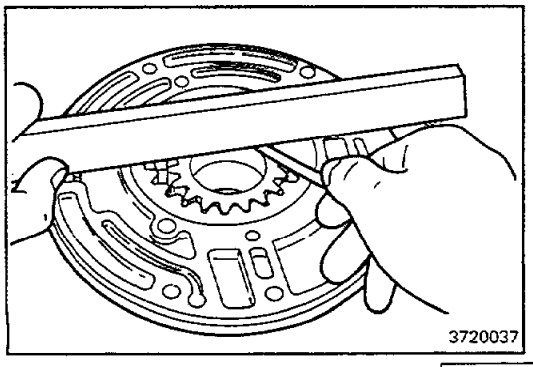
Standard value: 0.07–0.15 mm (.0028–.0059 in.)
Limit: 0.3 mm (.012 in.)



TIP CLEARANCE CHECK

(1) Measure the gap between the drive and driven gear teeth and the cresent-shaped part of pump body.

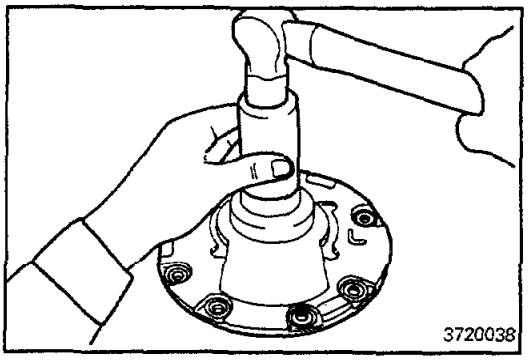
Standard value: 0.11–0.14 mm (.0043–.0055 in.)
Limit: 0.3 mm (.012 in.)



SIDE CLEARANCE CHECK

(1) Using a steel straightedge and a feeler gauge, measure the side clearance of drive and driven gears.

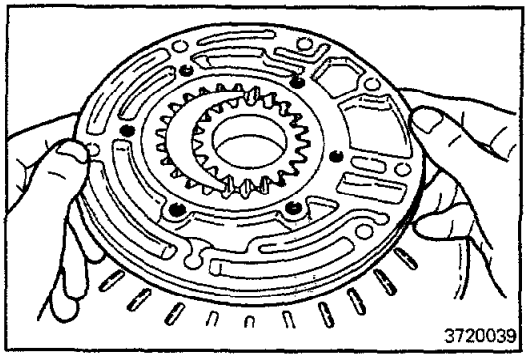
Standard value: 0.02–0.05 mm (.0008–.0020 in.)
Limit: 0.1 mm (.004 in.)



FRONT OIL SEAL CHECK

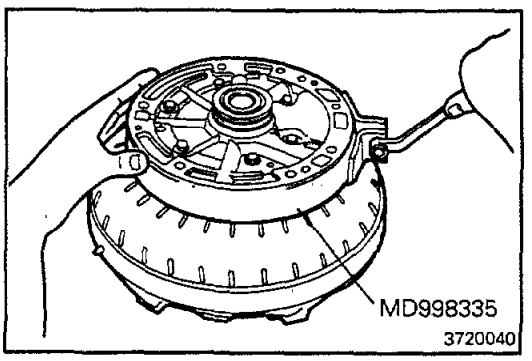
(1) Check for wear, damage or cracks.
If necessary, replace the oil seal by the following steps.
(2) Pry off the oil seal with a screwdriver.
(3) Install a new oil seal.

NOTE
The seal end should be flush with outer edge of pump body.

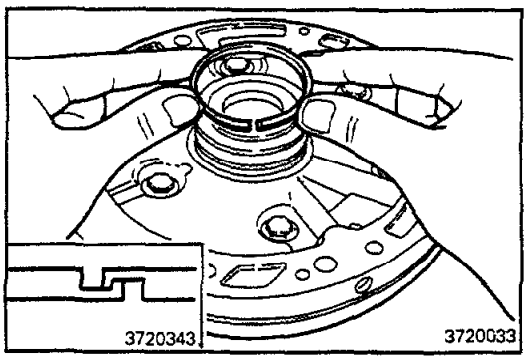


REASSEMBLY

(1) Set the oil pump body on the torque converter.
(2) Install the driven and drive gears on the oil pump body in correct directions according to the marks put during disassembly.
(3) Install the oil pump cover on the body.



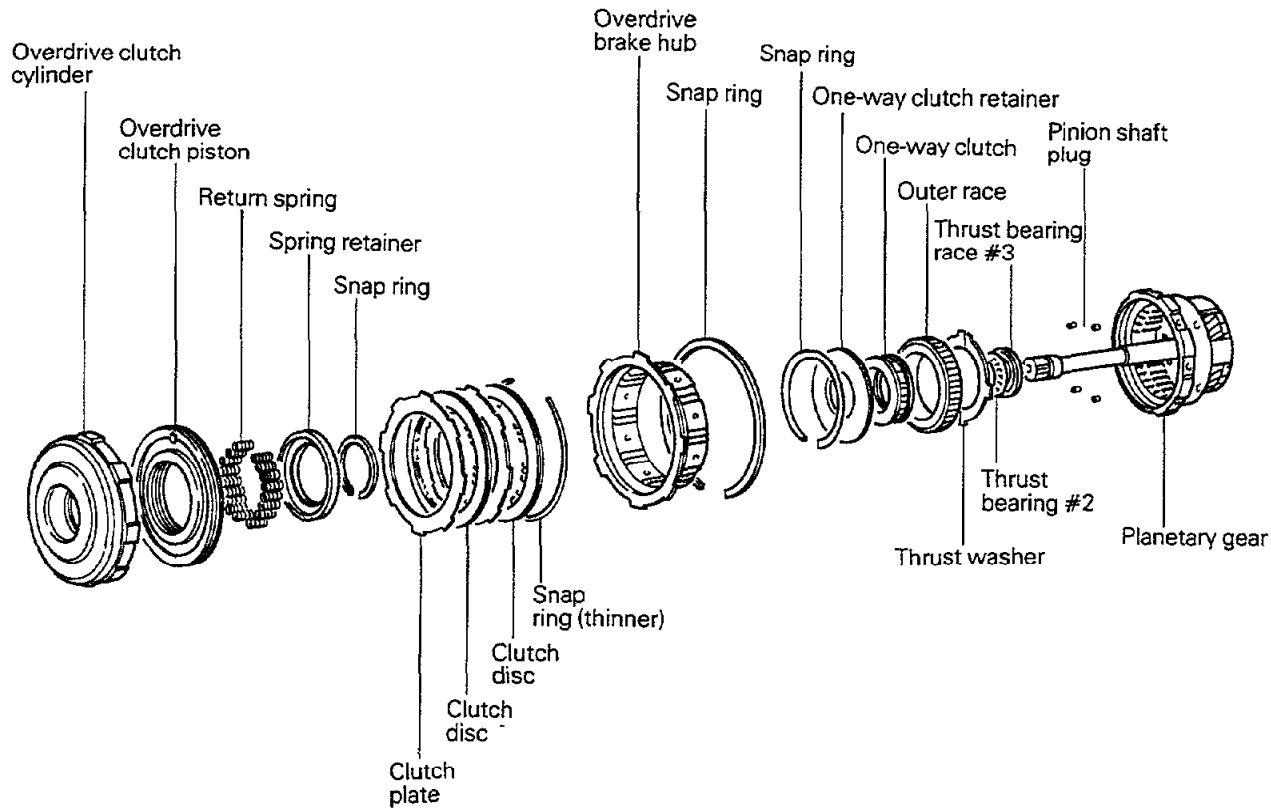
(4) Align the bolt holes in cover with those in body.
Install the six bolts with wave washers finger tight.
(5) Install the special tool around the oil pump body and cover.
Tighten the special tool to align the body and cover.
(6) Tighten the six pump cover bolts to the specified torque.
(7) Remove the special tool.



(8) Install the two seal rings on the pump cover by spreading apart and sliding them into the groove.
Hook both ends by hand.
(9) Install a new O-ring on the pump.
Make sure the O-ring is not twisted and is fully seated in the groove.

OVERDRIVE INPUT SHAFT AND CLUTCH

N21LHEB



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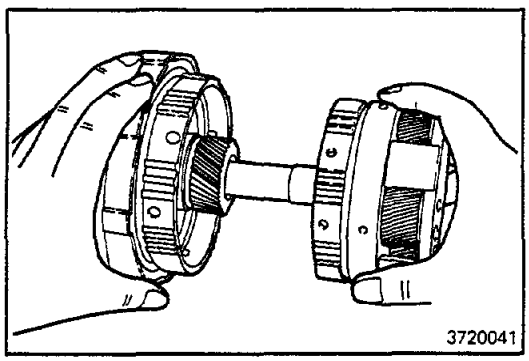
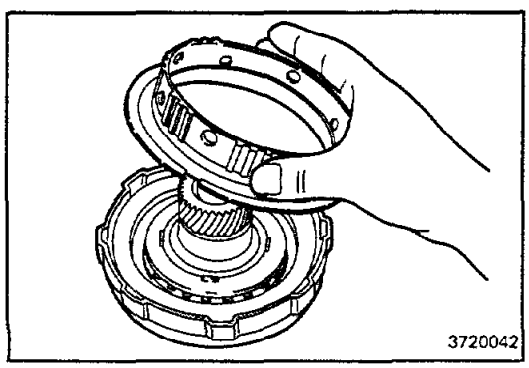


3720041

DISASSEMBLY

(1) Pull the overdrive clutch assembly from the input shaft.
(2) Remove the thrust bearing #4 and the race #5.

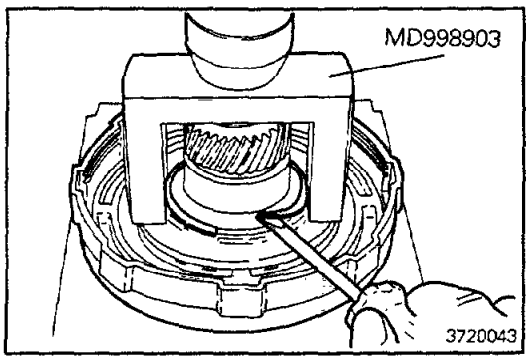


3720042

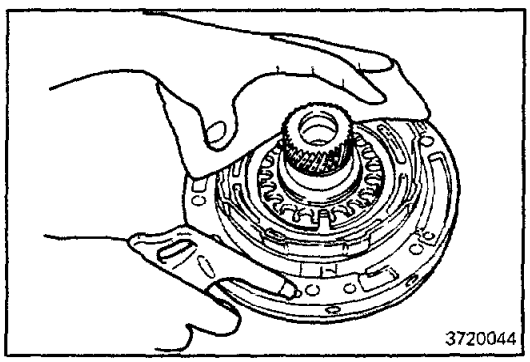
(3) Remove the snap ring and overdrive brake hub from the overdrive clutch assembly.
(4) Remove the snap ring, flange, clutch disc and plate.

NOTE
Do not allow the removed disc to dry out.

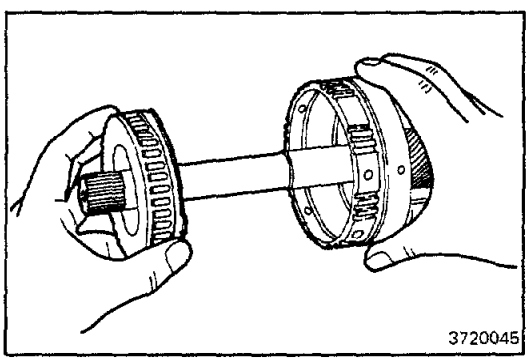
TSB Revision



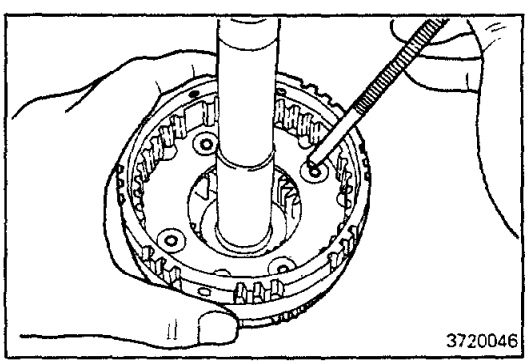
(5) Place the special tool on the spring retainer and compress the return springs with a shop press. Using a screwdriver, remove the snap ring.
(6) Remove the spring retainer and eighteen return springs.



(7) Assemble the overdrive clutch cylinder and piston set on the oil pump and blow out the piston:
  (a) Slide the overdrive clutch cylinder and piston set onto the oil pump.
  (b) Apply compressed air to the oil pump to remove the piston.
  (c) Remove the overdrive clutch cylinder from the oil pump.

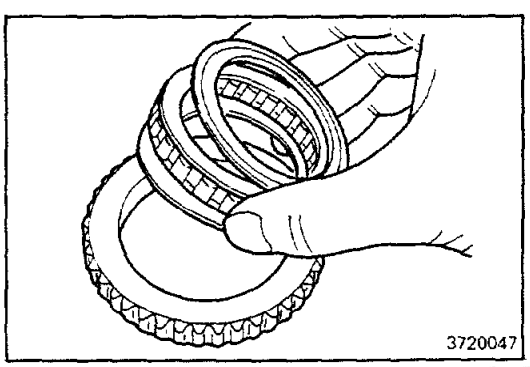


(8) Remove the O-rings from the overdrive clutch piston.
(9) Remove the snap ring from the overdrive planetary gear assembly.
(10) Remove the one-way clutch retainer, one-way clutch and outer race from the overdrive planetary gear assembly.

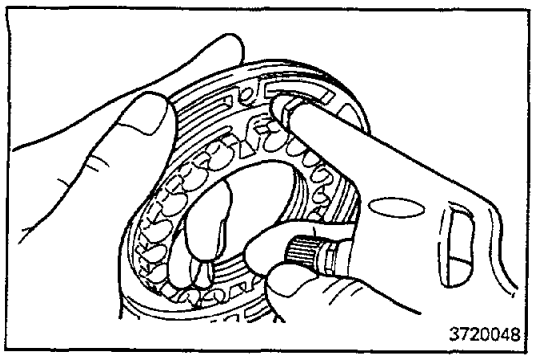


(11) Remove the four pinion shaft plugs by a magnet.

Caution
- **Keep the four plugs together to prevent losing them.**



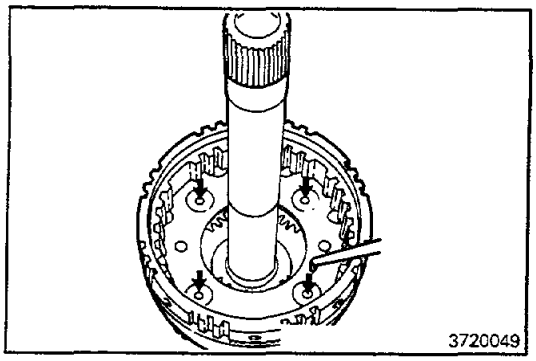
(12) Remove the one-way clutch from the outer race.



INSPECTION

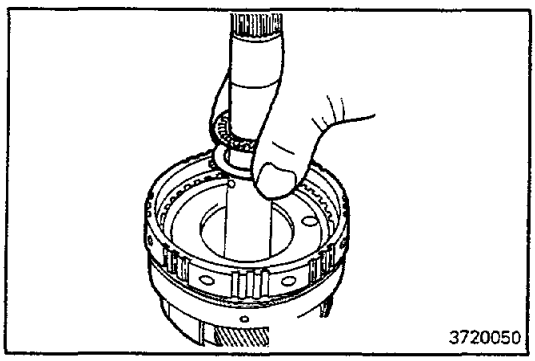
CLUTCH PISTON CHECK

(1) Check that the check ball is free by shaking the piston.
(2) Check that the valve does not leak by applying low-pressure compressed air.

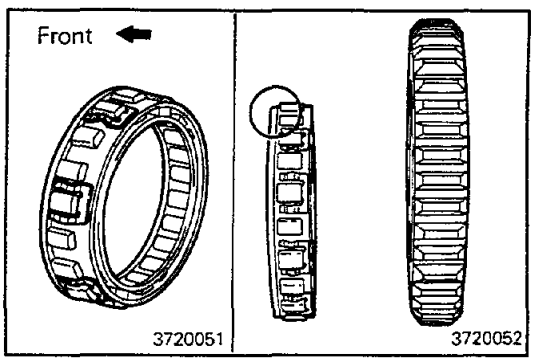


ASSEMBLY

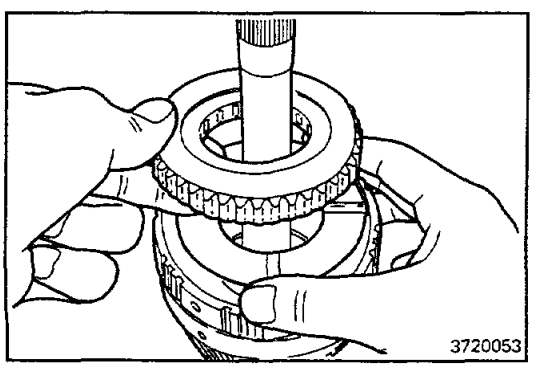
(1) Install the four pinion shaft plugs.



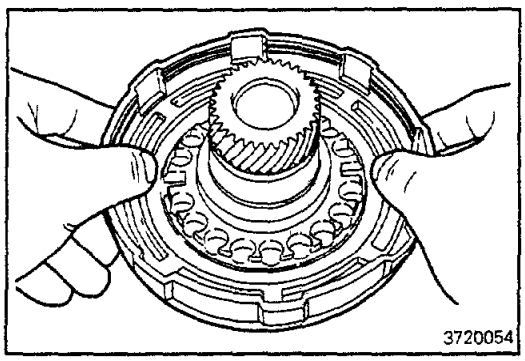
(2) Install the thrust bearing race #3 and thrust bearing #2 coated with petroleum jelly.



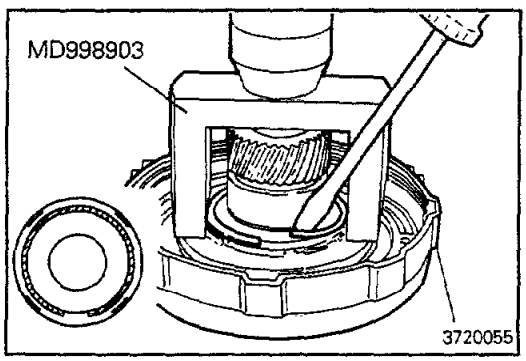
(3) Install the one-way clutch:
  (a) Install the one-way clutch into the outer race.
  (b) Install the one-way clutch retainers on both sides of the one-way clutch.



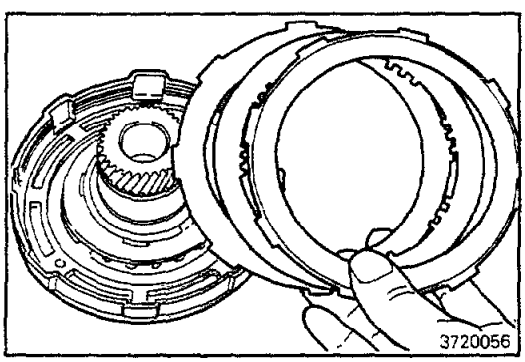
(4) Install the thrust washer and one-way clutch assembly:
  (a) Install the thrust washer, facing the grooves upward.
  (b) Install the one-way clutch assembly in correct direction.
  (c) Install the thrust washer.
  (d) Install the snap ring.



(5) Install the overdrive clutch piston in the overdrive clutch cylinder.
  (a) Install a new O-ring on the piston. Coat the O-ring with ATF.
  (b) Press piston into the drum with the cup side up.
(6) Install the eighteen return springs and set the spring retainer and snap ring in place.



(7) Compress the return springs and install the snap ring in the groove:
  (a) Place the special tool on the spring retainer, and compress the springs on shop press.
  (b) Install the snap ring with a screwdriver.
  Be sure the end gap of the snap ring is not aligned with the spring retainer claw.

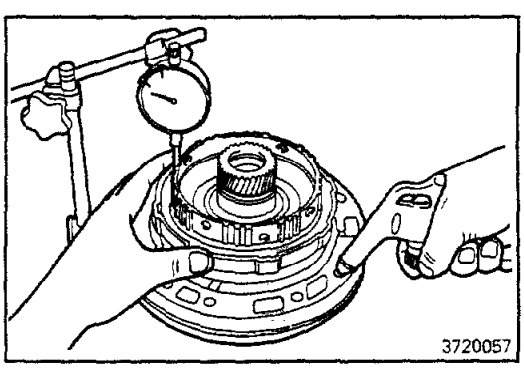


(8) Install the clutch plate and disc.
  (a) Using low-pressure compressed air, blow all excess ATF from the disc.

Caution
- **High-pressure air will damage the disc.**

  (b) Install the parts in the order shown below.
  Do not install the thinner snap ring yet.

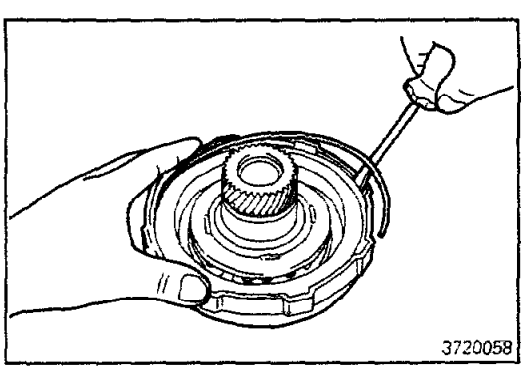
NOTE
A new clutch disc should be seaked in ATF for at least two hours before installation.



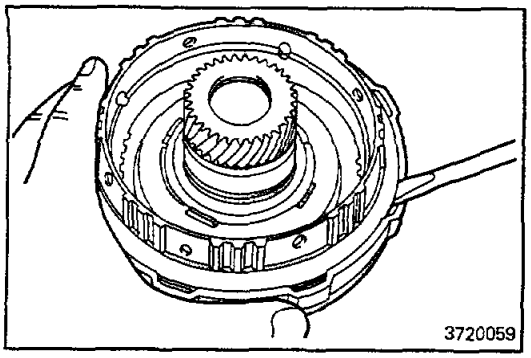
(9) Check the piston stroke of the overdrive clutch.
  (a) Install the overdrive clutch hub and snap ring.
  (b) Install the overdrive clutch cylinder onto the oil pump body.
  Using a dial indicator, measure the stroke applying and releasing the compressed air (400–800 kPa, 58–116 psi) as shown.

Standard value:
1.56–2.53 mm (.0614–.0996 in.)

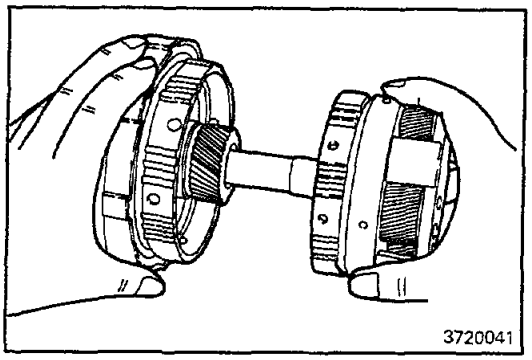
  If the stroke exceeds the limit, the disc and/or plate are probably worn. If the stroke is less than limit, parts may be misassembled or there may be excess ATF on the discs.
  (c) After the check, remove the snap ring and overdrive brake hub.



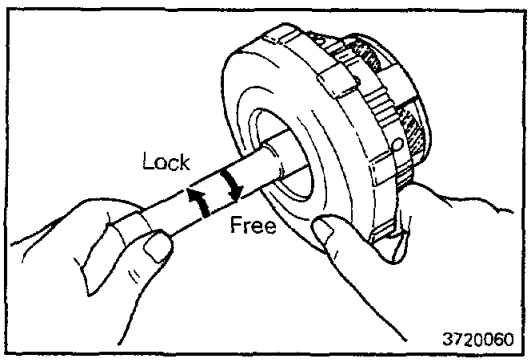
(10) Compress and lower the snap ring by hand into the groove in clutch cylinder. Check that the ends of the snap ring are not aligned with one of the cutouts.



(11)Install the *overdrive brake hub and snap ring.*
Check that the ends of the snap ring are not aligned with any of the cutouts.



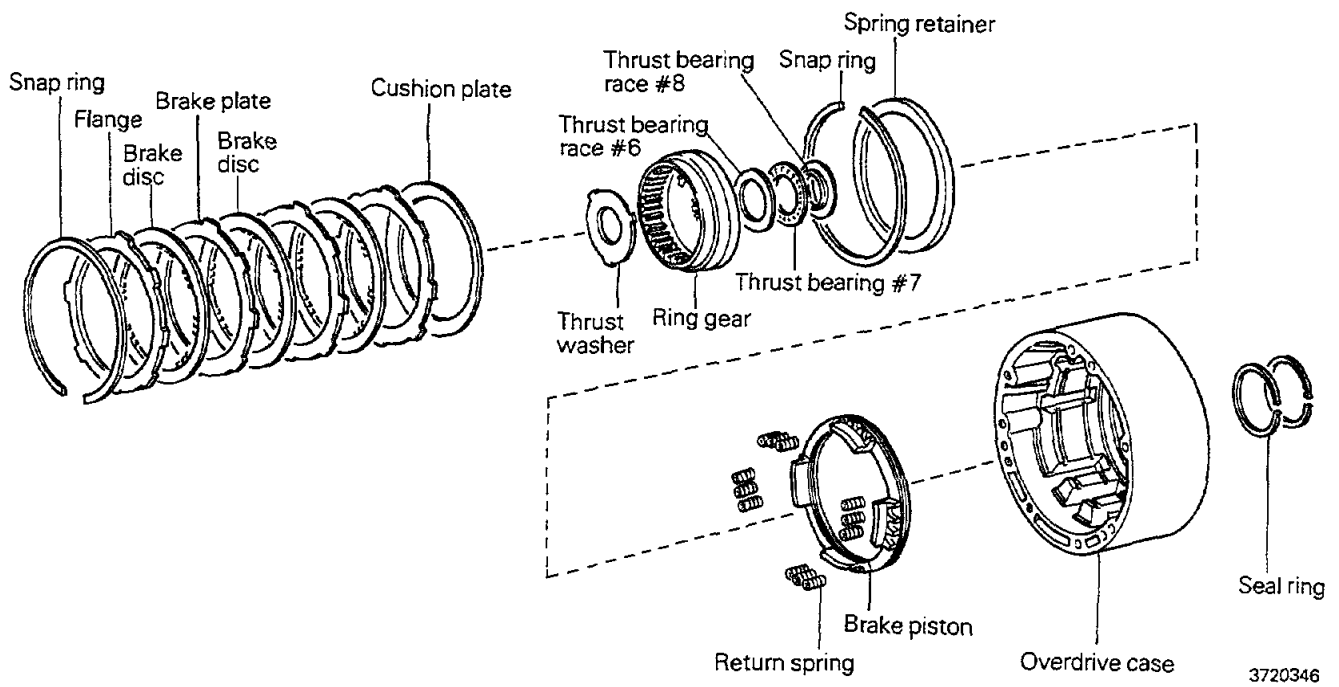
(12)Assemble the overdrive clutch assembly and overdrive planetary gear assembly while meshing the overdrive brake hub with the disc by twisting or jiggling the hub as required.

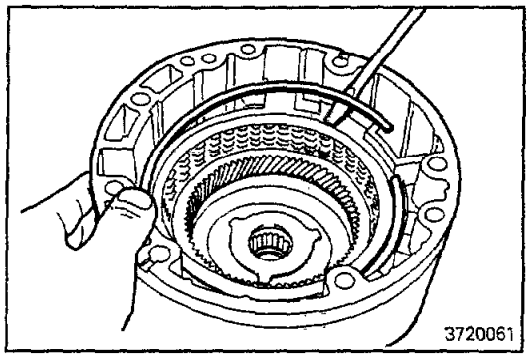


(13)Hold the overdrive clutch cylinder and turn the overdrive planetary gear shaft to check the operation of one-way clutch.
The shaft should turn freely clockwise and should lock counterclockwise.

OVERDRIVE CASE AND BRAKE

N21UAB

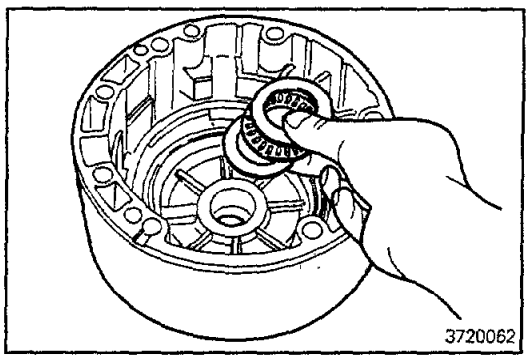




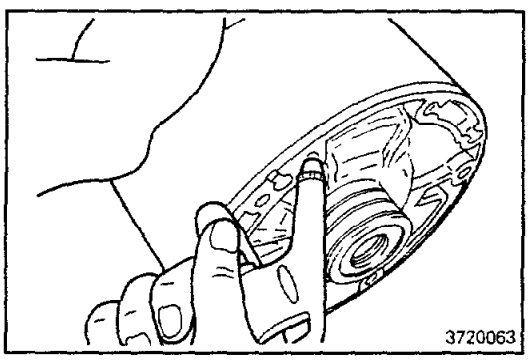
DISASSEMBLY

(1) Remove the snap ring from the overdrive case.
(2) Remove the flange, brake discs, brake plates and cushion plate.

NOTE
Do not allow the removed brake discs to dry out.



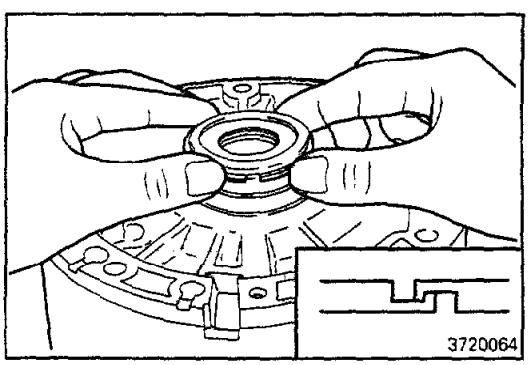
(3) Remove the planetary ring gear and thrust race #6.
(4) Remove the thrust bearing #7 and race #8 from the overdrive case.
Note position of the race.
(5) Remove the snap ring, spring retainer and return springs.
(6) Remove the brake piston.
Blow compressed air through the overdrive case hole indicated in the figure to force out the brake piston.
If the piston does not come out, lift it out with needle nose pliers.

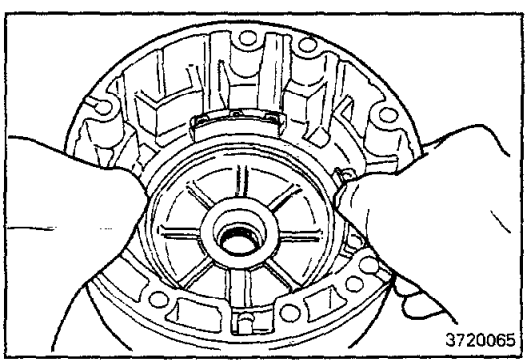


(7) Remove the two oil seal rings from the overdrive case.
(8) Remove the O-rings from the piston.

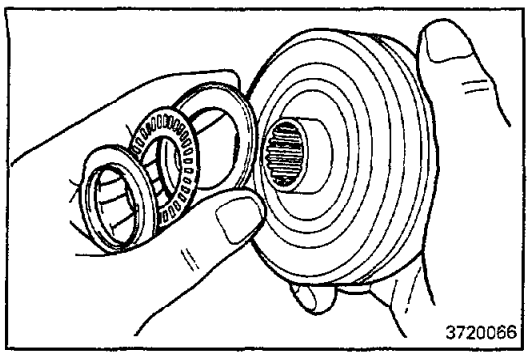
ASSEMBLY

(1) Install the two seal rings on the overdrive case by spreading apart and sliding them into the groove. Hook both ends by hand.



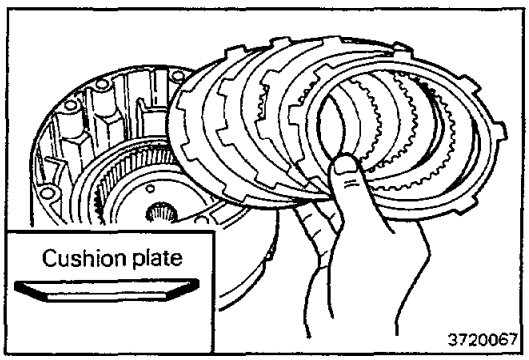


(2) Install new O-rings on piston. Coat the O-rings with ATF.
(3) Install the brake piston in the overdrive case with the cup side up, being careful not to damage the O-rings.
(4) Install the return springs and set the spring retainer and snap ring in place.
Check that the ends of the snap ring are not aligned with any of the cutouts.



(5) Install the thrust bearing #7 and races #6 and #8 to the planetary ring gear and set the ring gear in the overdrive case.

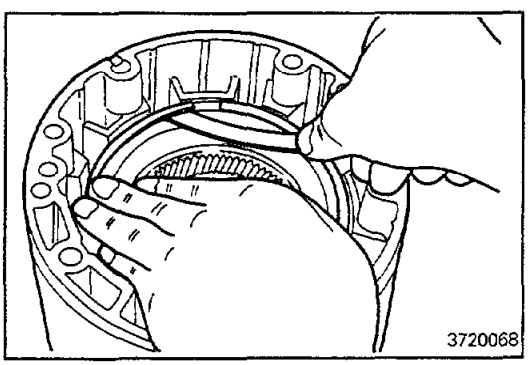
NOTE
Make sure that the thrust bearing races are installed in the correct direction.



(6) Install the cushion plate, brake discs, brake plates and flange:
(a) Using low-pressure compressed air, blow all excess ATF from the discs.
(b) Install the parts in the order shown below.

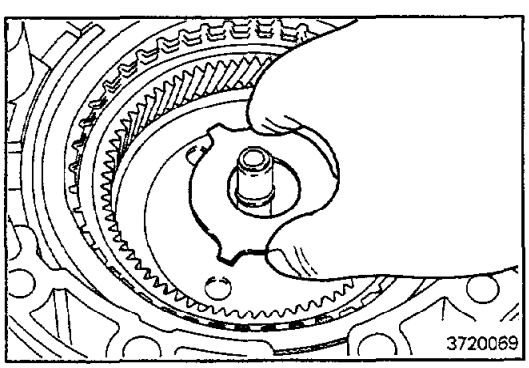
NOTE
New clutch discs should be soaked in ATF for at least two hours before installation.

Cushion plate (rounded end down) → Brake plate → Brake disc → Brake plate → Brake disc → Brake plate → Brake disc → Flange (flat end down)



(7) Install the snap ring.
Check that the ends of the snap ring are not aligned with one of the cutouts.
(8) Measure the distance between snap ring and flange with feeler gauge to check the brake clearance.

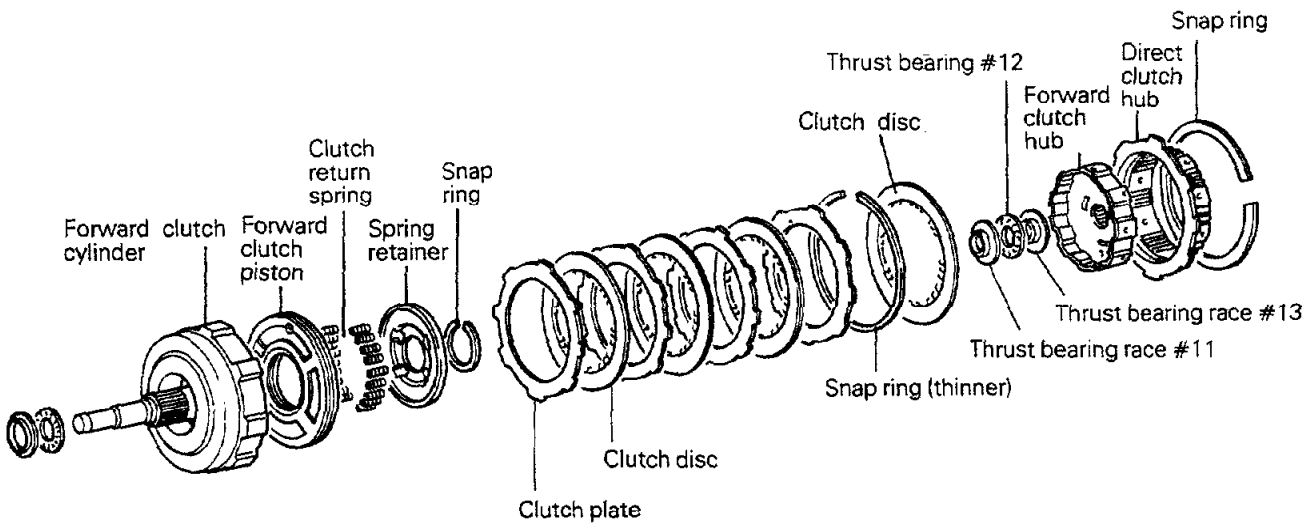
Standard value: 0.65–2.21 mm (.0256–.0870 in.)



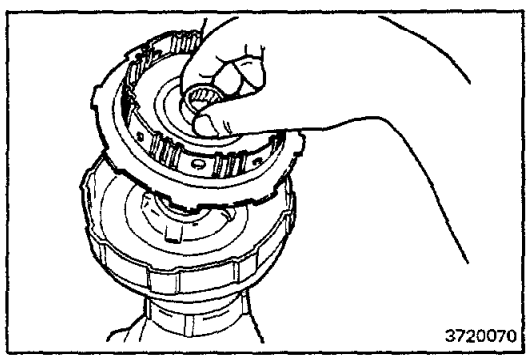
(9) Install the thrust washer onto the planetary ring gear.

FORWARD CLUTCH

N21LHDC



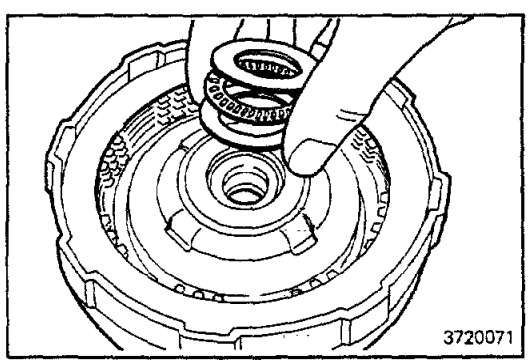
3720347



3720070

DISASSEMBLY

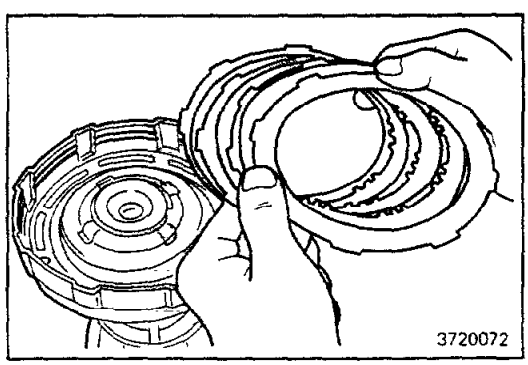
(1) Use the extension housing as a work stand.
(2) Remove the snap ring from the forward clutch cylinder.
(3) Remove the direct clutch hub and forward clutch hub.



3720071

(4) Remove the thrust bearing #12 and the races #11 and #13.
(5) Remove the clutch disc.

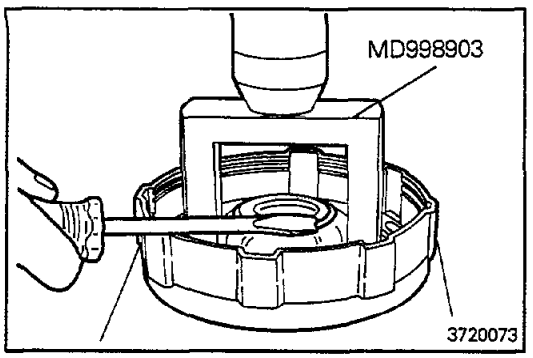
NOTE
Do not allow the removed disc to dry out.



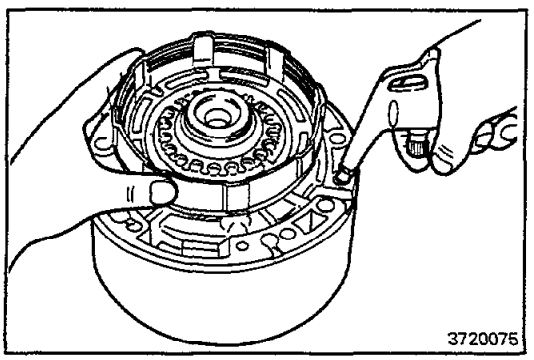
3720072

(6) Remove the snap ring.
(7) Remove the remaining clutch plates and discs.

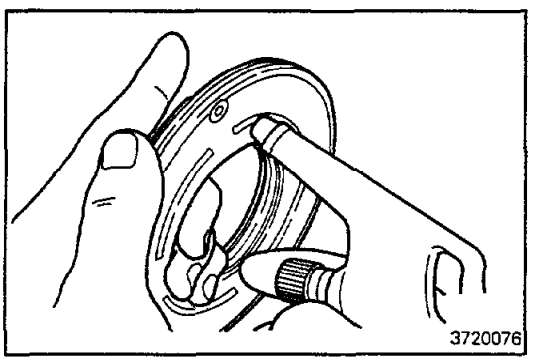
NOTE
Do not allow the removed discs to dry out.



(8) Set the special tool on the spring retainer and compress the clutch return springs with a shop press.
Using a screwdriver, remove the snap ring.
(9) Remove the special tool, then remove the spring retainer and eighteen clutch return springs.



(10)Assemble the forward clutch cylinder and piston on the overdrive case and force out the piston by compressed air:
(a) Slide the forward clutch cylinder and piston onto the overdrive case.
(b) Apply compressed air to the overdrive case to remove the piston.
(c) Remove the forward clutch cylinder from the overdrive case.
(11)Remove the O-rings from the forward clutch piston.

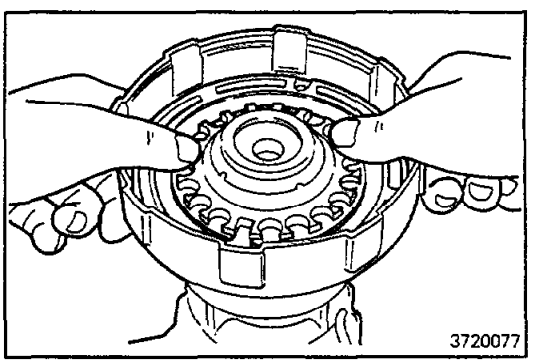


INSPECTION

FORWARD CLUTCH PISTON

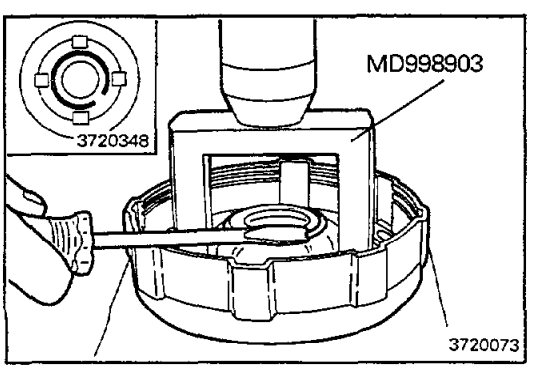
(1) Check that check ball is free by shaking the forward clutch piston.
(2) Check that the valve does not leak by applying low-pressure compressed air.

NOTE
Prepare new discs by soaking them at least two hours in ATF.

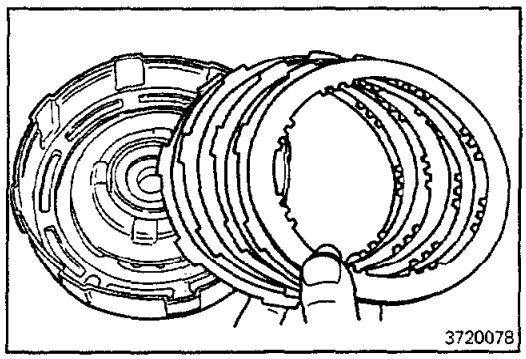


ASSEMBLY

(1) Install new O-rings on the forward clutch piston.
Coat the O-rings with ATF.
(2) Press the forward clutch piston into the forward clutch cylinder with the cup side up (check ball down).
Be careful not to damage the O-rings.



(3) Install the eighteen clutch return springs, spring retainer and snap ring in place.
(4) Compress the clutch return springs and install snap ring in the groove:
(a) Set the special tool on the spring retainer, and compress the springs on a shop press.
(b) Install the snap ring using a screwdriver.
Be sure the end gap of snap ring is not aligned with the spring retainer claw.



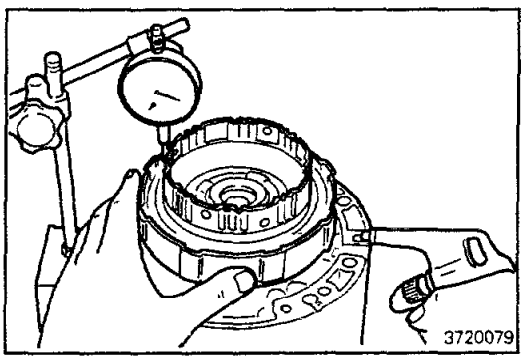
(5) Install the clutch discs and plates without assembling the snap ring.

NOTE
A new clutch disc should be soaked in ATF for at least two hours before installation.

(a) Using low-pressure compressed air, blow all excess ATF from discs.

Caution
- **High-pressure air will damage discs.**

(b) Install the clutch plates and discs alternately. Do not install the snap ring (thinner) yet.

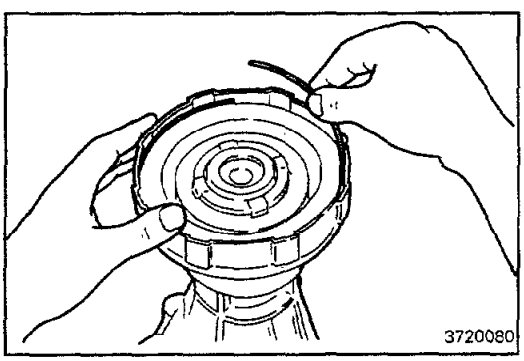


(6) Check the piston stroke of forward clutch:
(a) Install the direct clutch hub and snap ring.
(b) Install the forward clutch cylinder assembly onto the overdrive case.
Using a dial indicator, measure the stroke applying and releasing the compressed air (400–800 kPa, 58–116 psi).

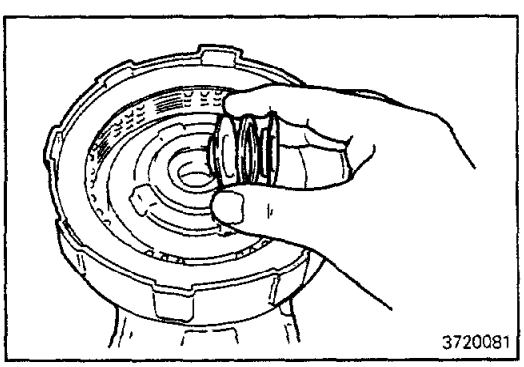
Standard stroke: 1.43–2.93 mm (.0563–.1154 in.)

If the stroke exceeds the limit, the clutch discs and/or plates are probably worn. If the stroke is less than the limit, parts may be misassembled or there may be excess ATF on the discs.

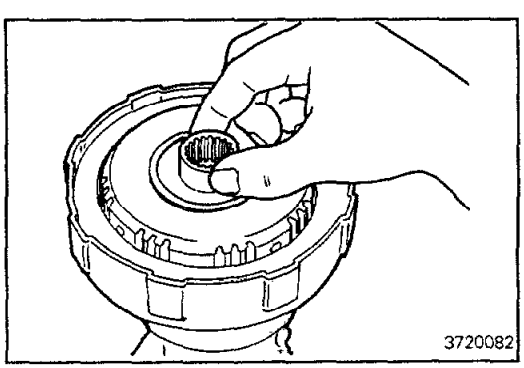
(c) After the check, remove the snap ring and direct clutch hub.



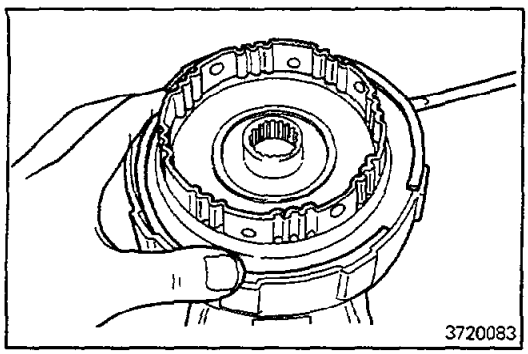
(7) Compress and lower the snap ring into the groove by hand. Check that the ends of the snap ring are not aligned with any of the cutouts.
(8) Install the clutch disc.



(9) Install the thrust bearing #12 and the races #11 and #13, all coated with petroleum jelly.



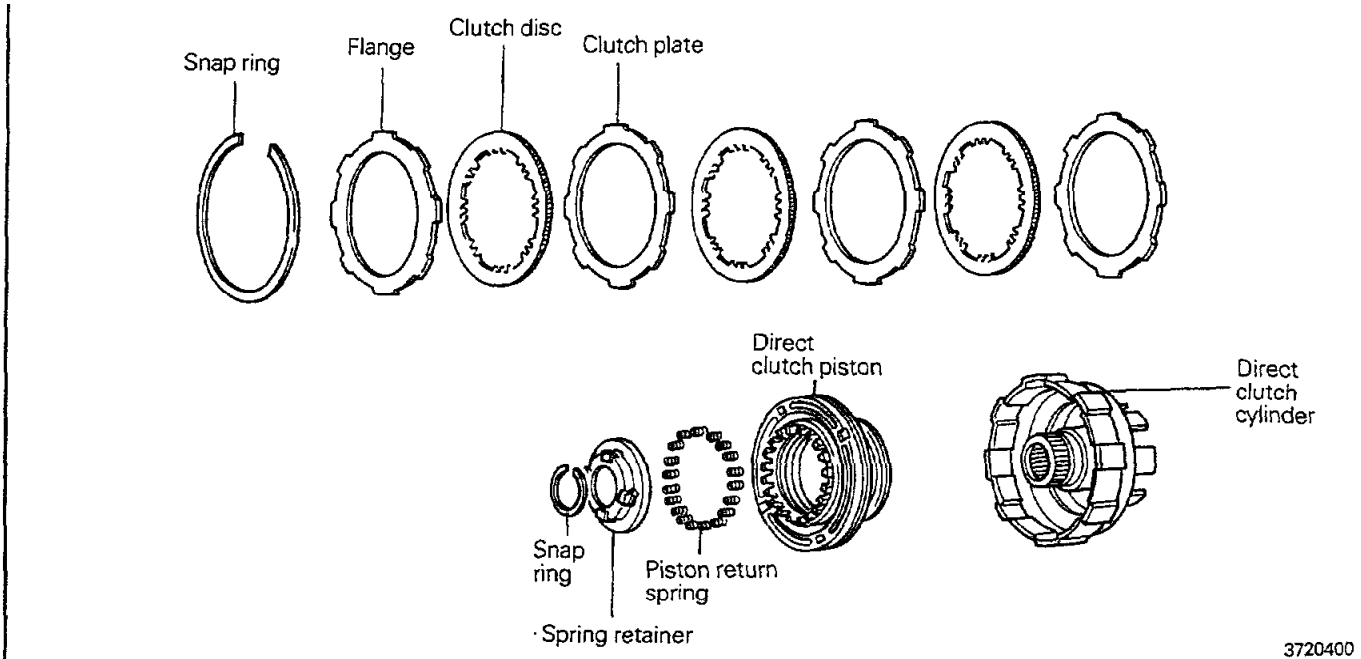
(10) Install the forward clutch hub while aligning the disc lugs with the hub teeth. Make sure the hub meshes with all the discs and is fully inserted.

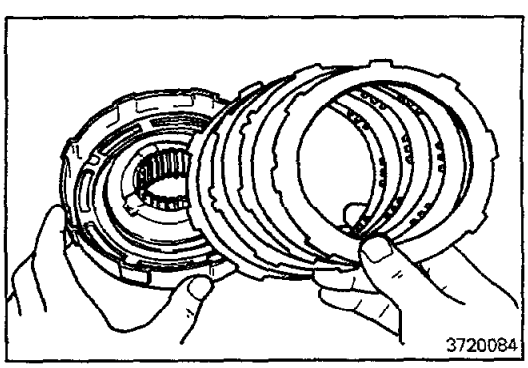


(11)Install the direct clutch hub and snap ring.
Check that the snap ring ends are not aligned with any of the cutouts.

DIRECT CLUTCH

N21LHCC

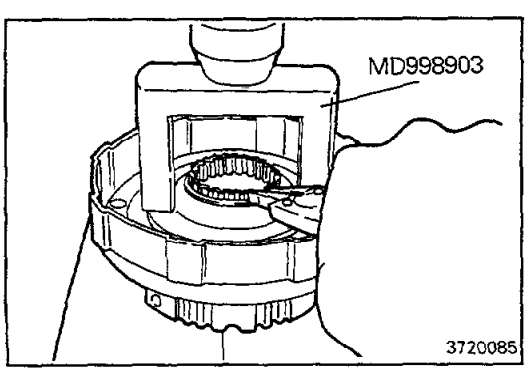




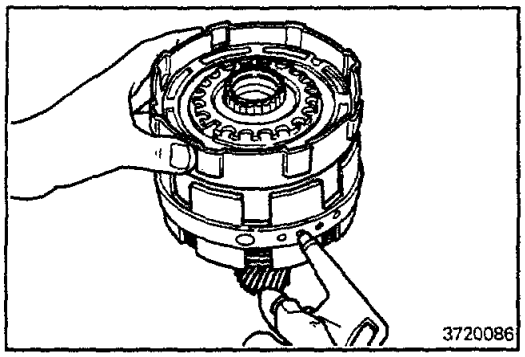
DISASSEMBLY

(1) Remove the snap ring from the direct clutch cylinder.
(2) Remove the flange, clutch discs and plates.

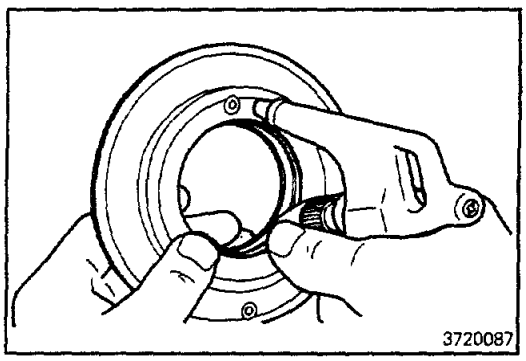
NOTE
Do not allow the clutch discs to dry out.



(3) Set the special tool on the spring retainer and compress the piston return springs with shop press.
Using snap ring pliers, remove the snap ring.
(4) Remove the spring retainer and eighteen piston return springs.



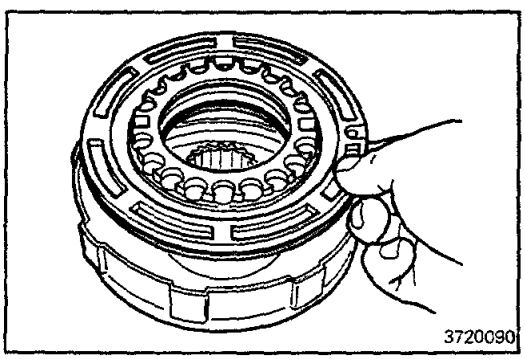
(5) Assemble the direct clutch cylinder and piston set on the center support and force out the piston by compressed air:
  (a) Slide the direct clutch cylinder and piston set onto the center support.
  (b) Apply compressed air to the center support to remove the piston.
  (c) Remove the direct clutch from the center support.
(6) Remove the O-rings from the direct clutch piston.



INSPECTION

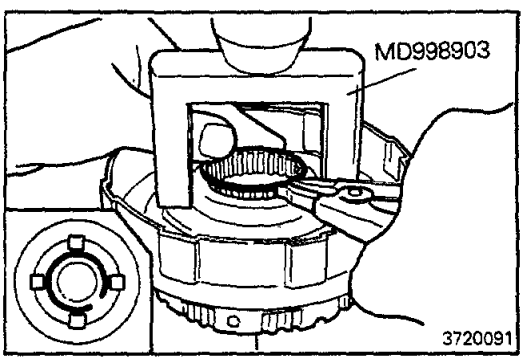
DIRECT CLUTCH PISTON

(1) Check that the check ball is free by shaking each piston.
(2) Check that the valve does not leak by applying low-pressure compressed air.

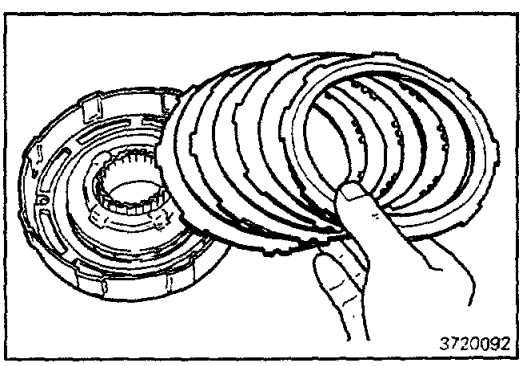


ASSEMBLY

(1) Install new O-rings on the direct clutch piston.
Coat the O-rings with ATF.
(2) Install the direct clutch piston in the direct clutch cylinder.
To install, press the direct clutch piston into the cylinder with the cup side up, being careful not to damage the O-rings.



(3) Install the eighteen piston return springs and set the retainer with snap ring in place.
(4) Compress the piston return springs and install the snap ring:
  (a) Set the special tool on the spring retainer, and compress the springs on a shop press.
  (b) With snap ring pliers, install the snap ring.
  Be sure the end gap of the snap ring is not aligned with the spring retainer claw.



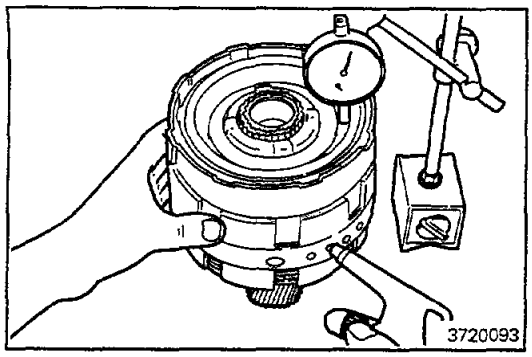
(5) Install the clutch discs, plates and flange:

NOTE
New clutch discs should be soaked in ATF for at least two hours before installation.

  (a) Using low-pressure compressed air, blow all excess ATF from the clutch discs.

Caution
- **High-pressure air will damage the discs.**

  (b) Install the parts in the following order:
  Clutch plate → Clutch disc → Clutch plate → Clutch disc → Clutch plate → Clutch disc → Flange (flat end down)



(6) Install the snap ring.
Check that the snap ring ends are not aligned with any of the cutouts.

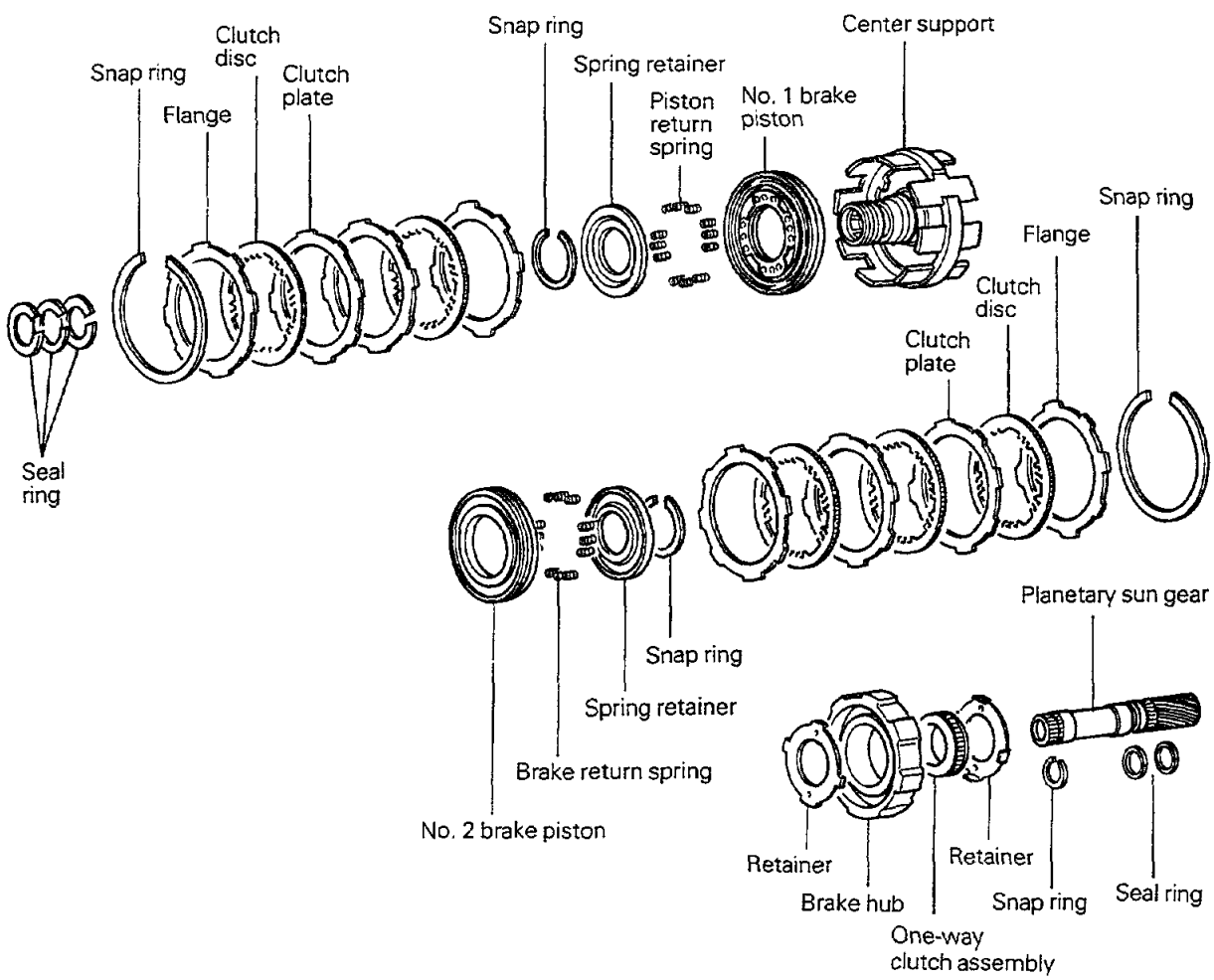
(7) Check the piston stroke of direct clutch as follows:
Install the direct clutch onto the center support. Using a dial indicator, measure the stroke applying and releasing the compressed air (400 – 800 kPa, 4 – 8 kg/cm², 58 – 116 psi) as shown.

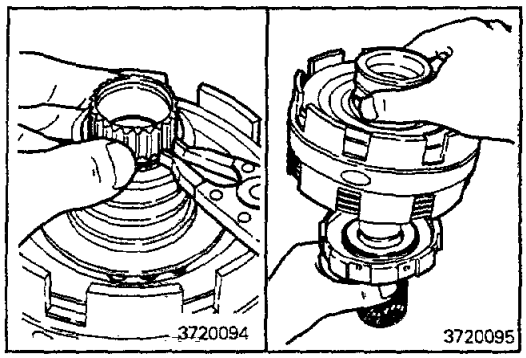
Standard piston stroke: 0.91–1.99 mm (.0358–.0783 in.)

If the stroke exceeds the limit, the clutch discs and/or plates are probably worn. If the stroke is less than the limit, parts may be misassembled or there may be excess ATF on the discs.

CENTER SUPPORT

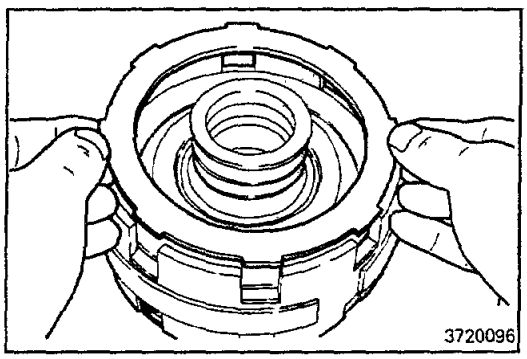
N21LUAA





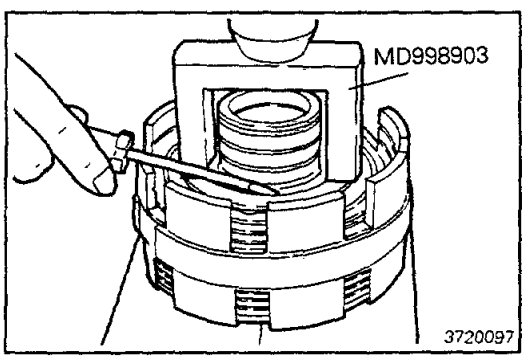
DISASSEMBLY

(1) Remove the snap ring from the end of planetary sun gear shaft.
(2) Pull the center support assembly from the planetary sun gear.

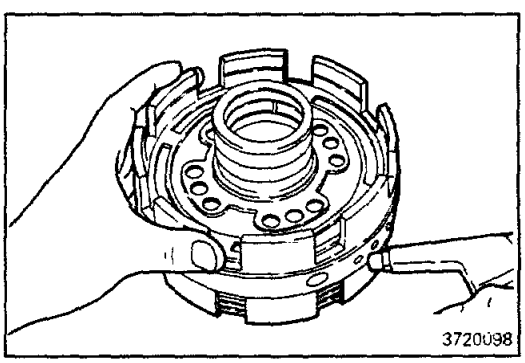


(3) Remove the snap ring from the front of center support assembly (No. 1 brake).
(4) Remove the flange, clutch disc and plate (No. 1 brake).

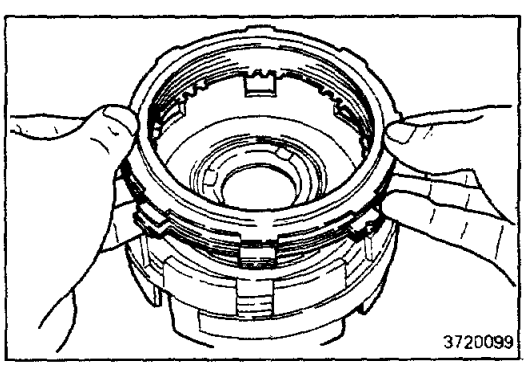
NOTE
Do not allow the removed clutch disc to dry out.



(5) Set the special tool on the spring retainer and compress the springs with a shop press.
Using a screwdriver, remove the snap ring.
(6) Remove the spring retainer and twelve brake return springs.

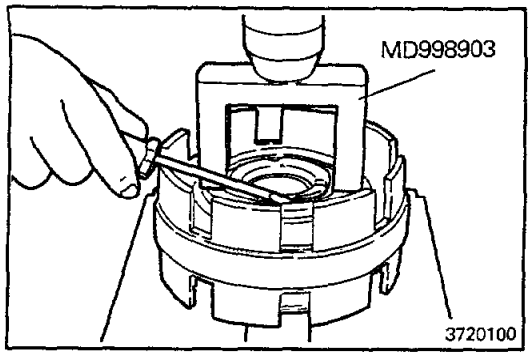


(7) Blow compressed air through the center support oil hole to remove the No. 1 brake piston.
(8) Remove the No. 1 brake piston O-rings.

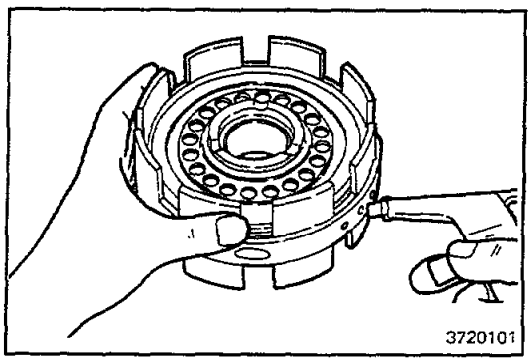


(9) Turn the center support assembly over and remove the rear snap ring (No. 2 brake).
(10) Remove the flange, clutch discs and plates (No. 2 brake).

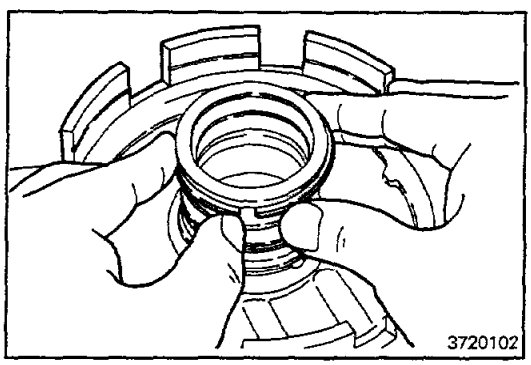
NOTE
Do not allow the removed clutch discs to dry out.



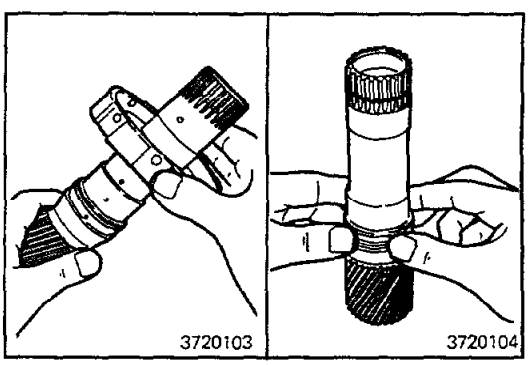
(11)Set the special tool on the spring retainer and compress the springs with a shop press.
Using a screwdriver, remove the snap ring.
(12)Remove the spring retainer and twenty brake return springs.



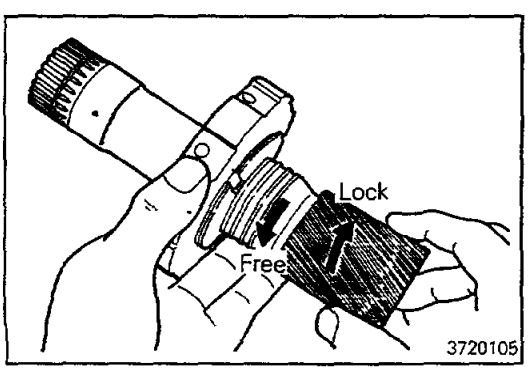
(13)Blow compressed air through the center support oil hole to remove the No. 2 brake piston.
(14)Remove the No. 2 brake piston O-rings.



(15)Remove the three oil seal rings from the center support.



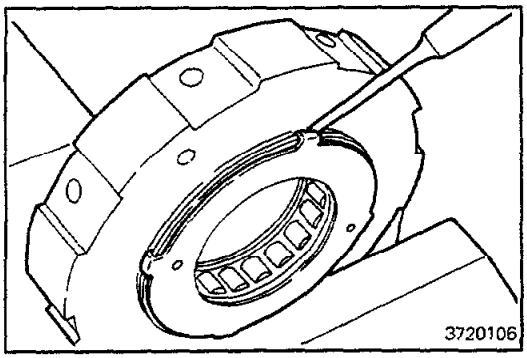
(16)Remove the one-way clutch assembly and oil seal rings from the planetary sun gear.



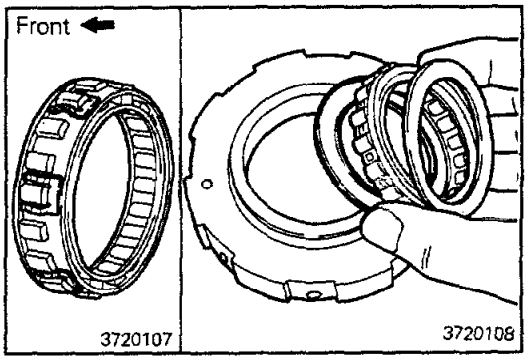
INSPECTION

ONE-WAY CLUTCH ASSEMBLY

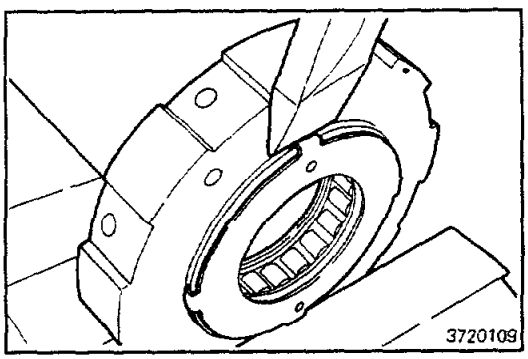
(1) Hold the No. 2 brake hub and turn the planetary sun gear. The sun gear should turn freely counterclockwise and should lock clockwise.
If the one-way clutch does not operate properly, replace it.



(2) If necessary, replace the one-way clutch:
(a) Bend the tabs back with a tapered punch.
(b) Pry off the retainer with a screwdriver. Leave the other retainer on the hub.
(c) Remove the one-way clutch.



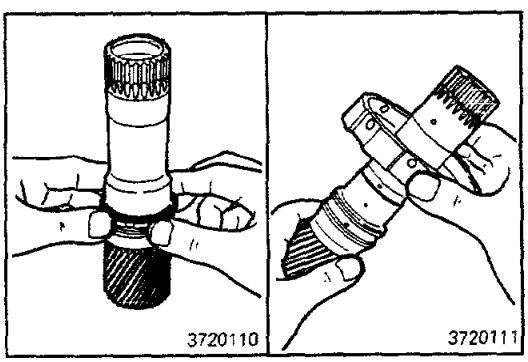
(d) Install the one-way clutch into the brake hub facing the spring cage toward the front.



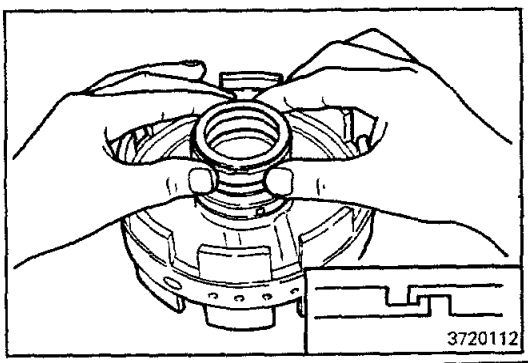
(e) Hold the brake hub in vise with soft jaws, and bend the tabs with a chisel.
(f) Check to make sure that the retainer is centered.

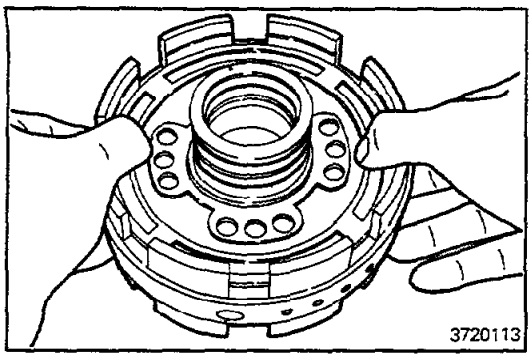
ASSEMBLY

(1) Install the two seal rings and one-way clutch assembly on the planetary sun gear.

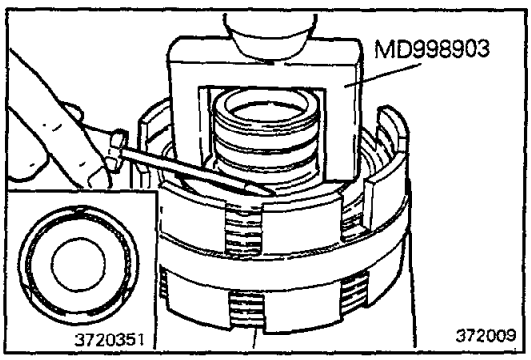


(2) Install the three seal rings in the groove of center support. Hook both ends of ring by hand as shown.

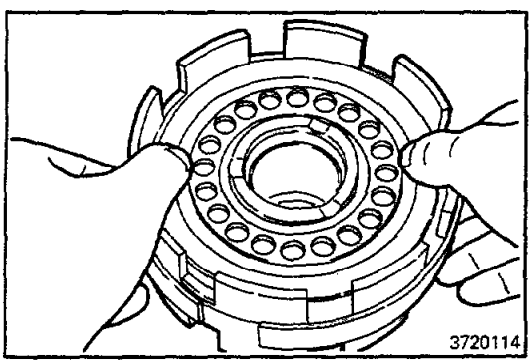




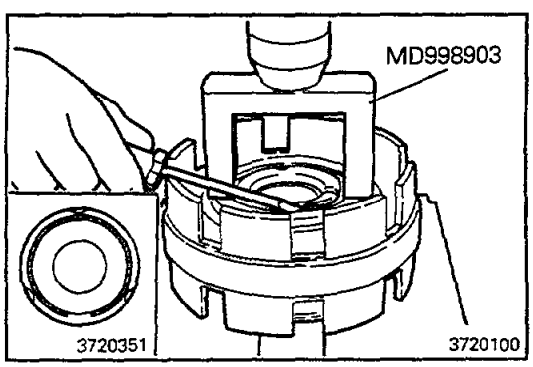
(3) Install new O-rings on piston. Coat the O-rings with ATF.
(4) Press the No. 1 brake piston into the center support with the cup side up, being careful not to damage the O-rings.



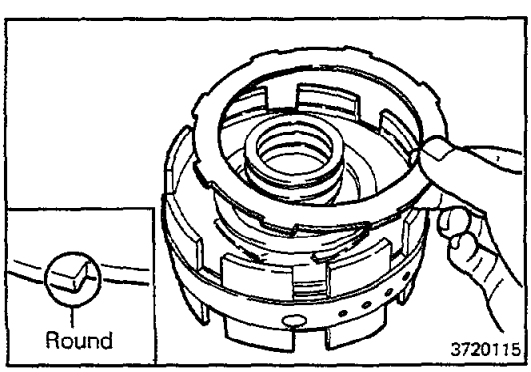
(5) Install the twelve piston return springs and set the retainer with snap ring in place.
(6) Set the special tool on the spring retainer, and compress the springs on a shop press.
Install the snap ring with a screwdriver.
Be sure the end gap of the snap ring is not aligned with the spring retainer claw.



(7) Install new O-rings on the piston and center support. Coat the O-rings with ATF.
(8) Turn the center support over, then press the No. 2 brake piston into the center support with the cup side up, being careful not to damage the O-rings.



(9) Install the twenty piston return springs and set retainer with snap ring in place.
(10) Set the special tool on the spring retainer, and compress the springs on a shop press.
Install the snap ring with a screwdriver.
Be sure the end gap of the snap ring is not aligned with the spring retainer claw.



(11) Turn the center support over and install the No. 1 brake piston, clutch plate, disc and flange:

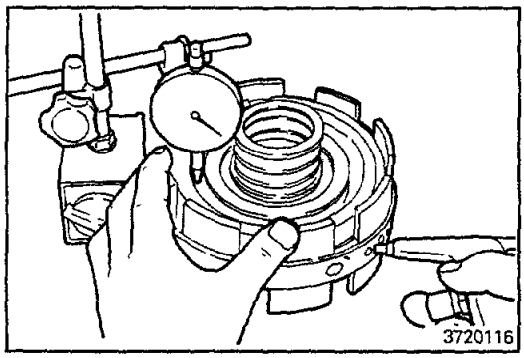
NOTE
New clutch discs should be soaked in ATF for at least two hours before installation.

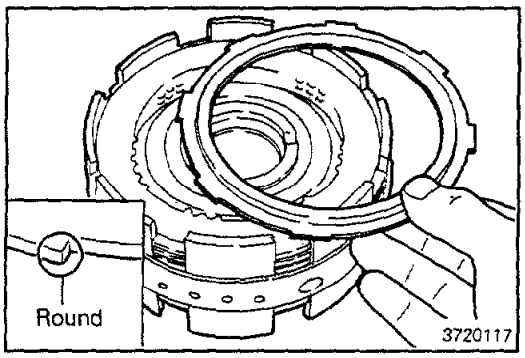
(a) Using low-pressure compressed air, blow all excess ATF from the disc.

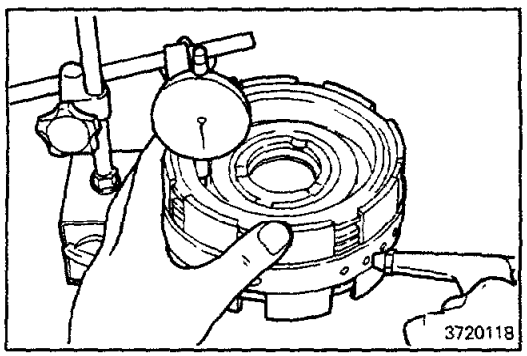
Caution
- **High-pressure air will damage the disc.**

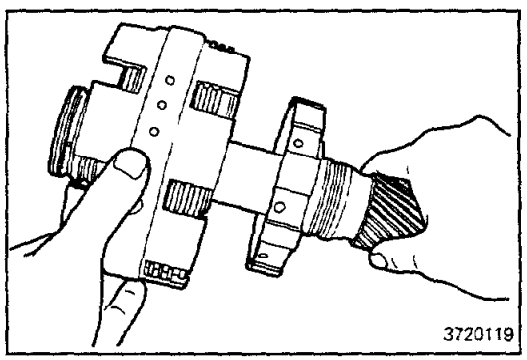
(b) Install the parts in the following order:

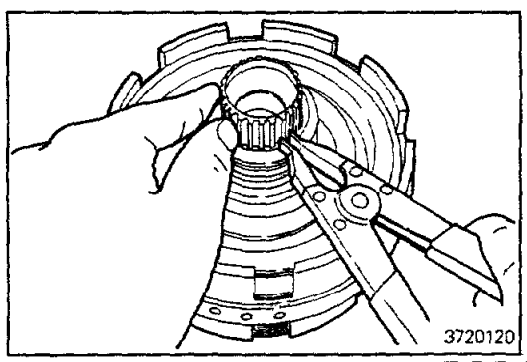
Clutch plate → Clutch disc → Clutch plates (2 pieces) → Clutch disc → Flange (rounded edge down)











(12)Install the snap ring in the center support.
Check that the snap ring ends are not aligned with any of the cutouts.

(13)Check the piston stroke of No. 1 brake as follows:
Using a dial indicator, measure the stroke applying and releasing the compressed air (400–800 kPa, 58–116 psi) as shown.

Standard piston stroke: 0.80–1.73 mm (.0315–.0681 in.)

If the stroke exceeds the limit, the clutch discs and/or plates are probably worn. If the stroke is less than the limit, parts may be misassembled or there may be excess ATF on the discs.

(14)Turn the center support over and install the No. 2 brake, clutch plates, discs and flange:

NOTE
New clutch discs should be soaked in ATF for at least two hours before installation.

(a) Using low-pressure compressed air, blow all excess ATF from the discs.

Caution
- **High-pressure air will damage the disc.**

(b) Install the parts in the following order.

Clutch plate → Clutch disc → Clutch plate → Clutch disc → Clutch plate → Clutch disc → Flange

(15)Install the snap ring in the center support.
Check that snap ring ends are not aligned with any of cutouts.

(16)Check the piston stroke of No. 2 brake as follows:
Using a dial indicator, measure the stroke applying and releasing the compressed air (400–800 kPa, 58–116 psi) as shown.

Standard piston stroke: 1.01–2.25 mm (.0398–.0886 in.)

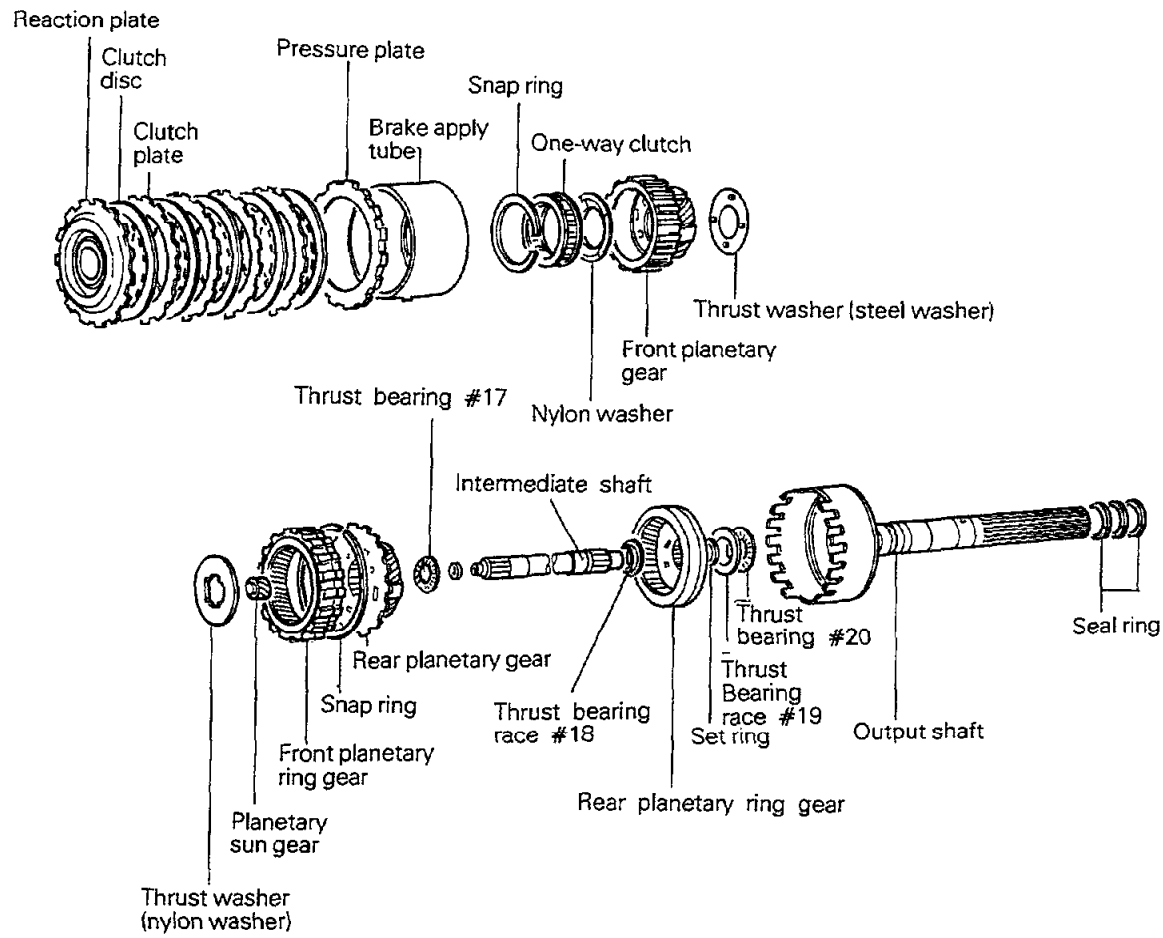
If the stroke exceeds the limit, the clutch discs and/or plates are probably worn. If the stroke is less than limit, parts may be misassembled or there may be excess ATF on the discs.

(17)Assemble the center support and planetary sun gear:
(a) Align the brake No. 2 clutch disc flukes.
(b) Mesh the brake hub with the discs, twisting and jiggling the hub as required.

(18)Install the snap ring on end of the planetary sun gear.

PLANETARY GEAR AND OUTPUT SHAFT

N21LKAF



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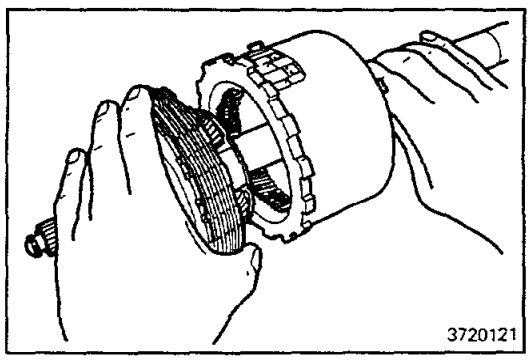

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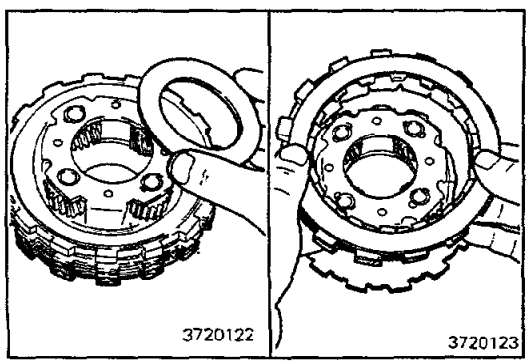
DISASSEMBLY

(1) Remove the No. 3 brake discs and plates and the front planetary gears.



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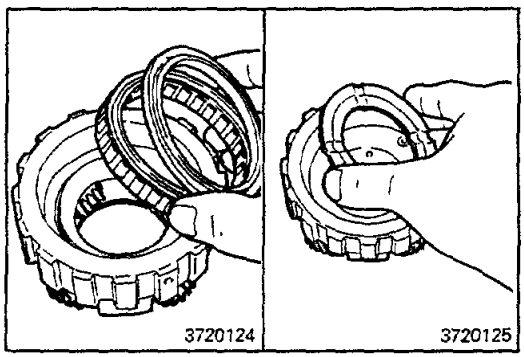
(2) Remove the steel thrust washer from the front planetary gears.

NOTE
The thrust washer may have stuck to the inside of the front planetary gear case.

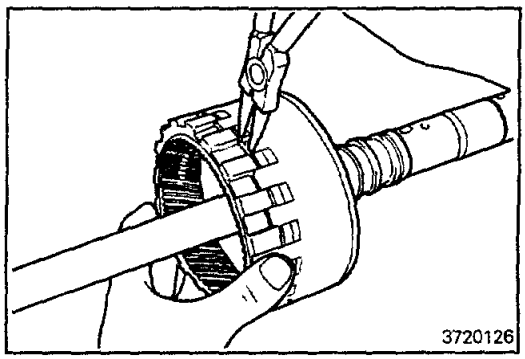
(3) Remove the clutch discs and plates from the front planetary gears.

(4) Remove the reaction plate from the front planetary gears.

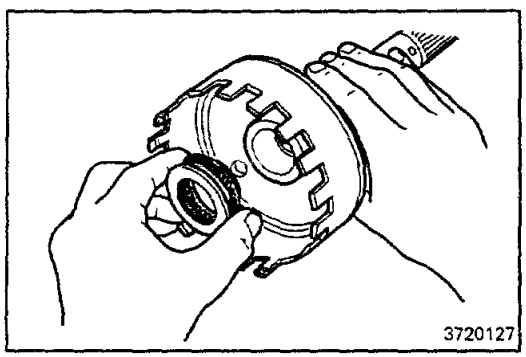
TSB Revision



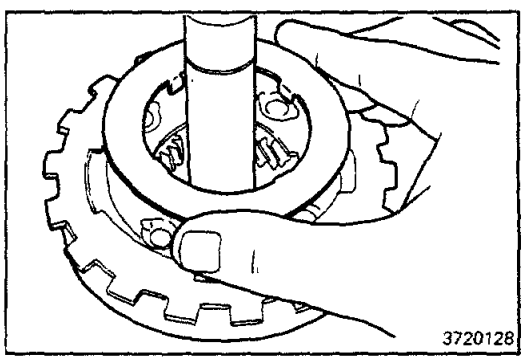
(5) Remove the snap ring and one-way clutch from the front planetary gears.
(6) Remove the nylon washer from the front planetary gears.



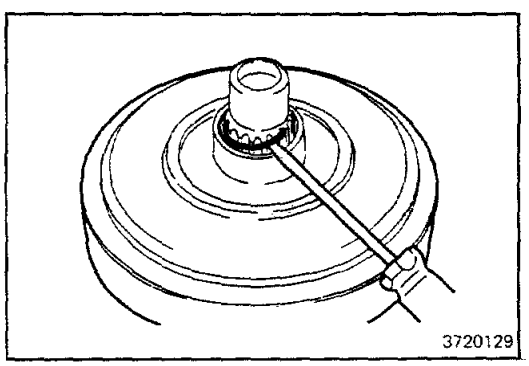
(7) Remove the brake apply tube and pressure plate.
(8) Compress the snap ring and remove the front planetary ring gear:
  (a) While pulling up the ring gear, compress the snap ring with needle-nose pliers and remove it from the groove.
  (b) Pull out the front planetary ring gear by hand.



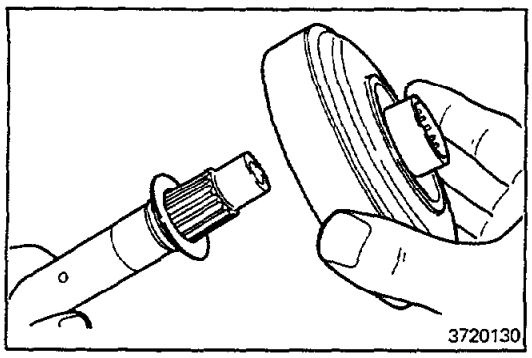
(9) Remove the intermediate shaft assembly from the output shaft.
(10)Remove the thrust bearing #20 and race #19 from the output shaft.
(11)Remove the three seal rings from the ouput shaft.



(12)Remove the nylon thrust washer from the rear planetary gear.
(13)Remove the planetary sun gear.
(14)Remove the rear planetary gear from the intermediate shaft assembly.
(15)Remove the thrust bearing #17 from the intermediate shaft.
Note the position of the races.

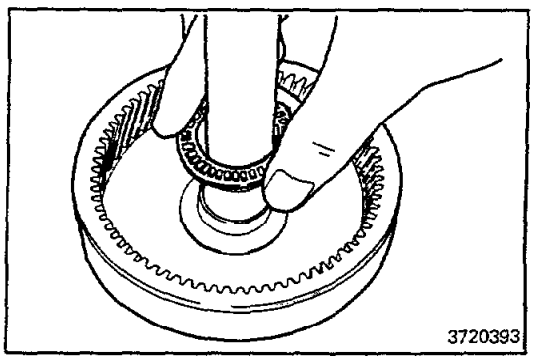


(16)Invert the intermediate shaft and remove the set ring.
(17)Remove the rear planetary ring gear and thrust bearing race #18 from the intermediate shaft.
Note the position of the race.

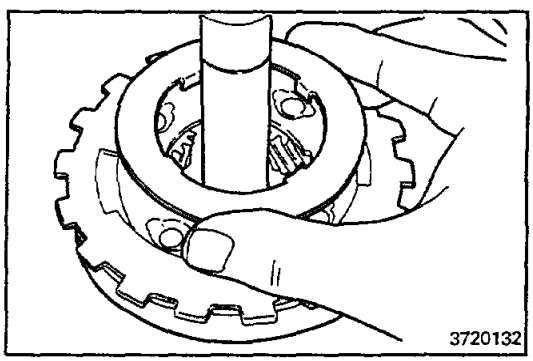


ASSEMBLY

(1) Install the thrust bearing race #18 and rear planetary ring gear on the intermediate shaft as follows:
Slip the thrust bearing race and ring gear onto the intermediate shaft with the exterior splines up, as shown.
(2) Install the set ring on the intermediate shaft.
Make sure the rear planetary ring gear is secure on the intermediate shaft.

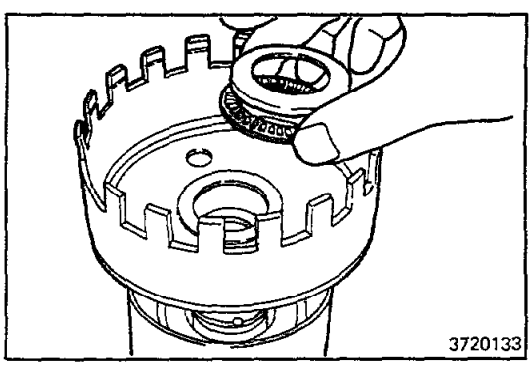


(3) Turn over the intermediate shaft and install thrust bearing #17.

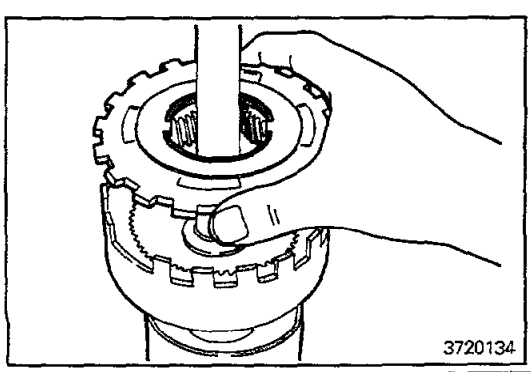


(4) Install the pinion gear assembly and nylon thrust washer on the rear planetary carrier.
Install the washer with the lugs down, fitting them into the rear planetary gear carrier.

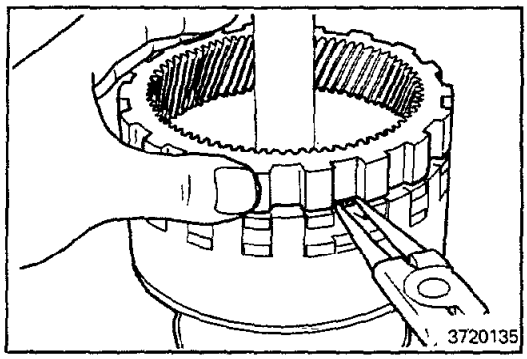
Caution
- **Make sure the different lug shapes match the openings on the plate.**



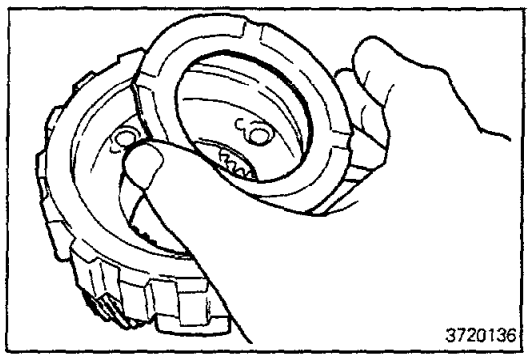
(5) Install the three oil seal rings on the output shaft by spreading apart and sliding them into the groove.
Hook both ends by hand.
(6) Use the extension housing as an assembly stand.
(7) Install the thrust bearing #20 and race #19 on the output shaft.



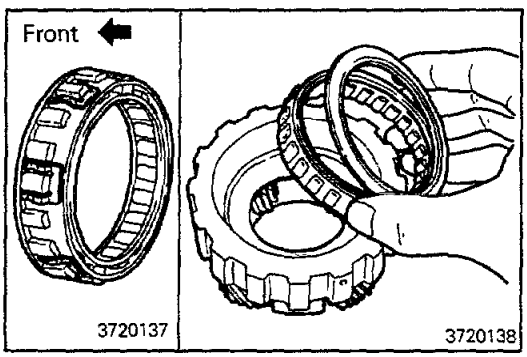
(8) Install the intermediate shaft assembly in the output shaft.
(9) Install the rear planetary gear in the output shaft.
(10)Install the planetary sun gear in the rear planetary gear.



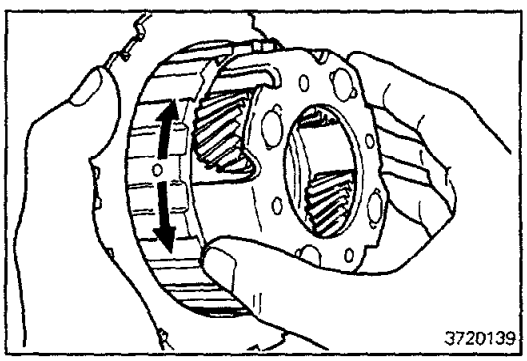
(11)Install the snap ring on the front planetary ring gear.
(12)Set the front planetary ring gear on the output shaft drum. Align the ends of the snap ring with the wide gap between the teeth.
(13)While pushing down the front planetary ring gear, squeeze the snap ring ends to install it into the groove.



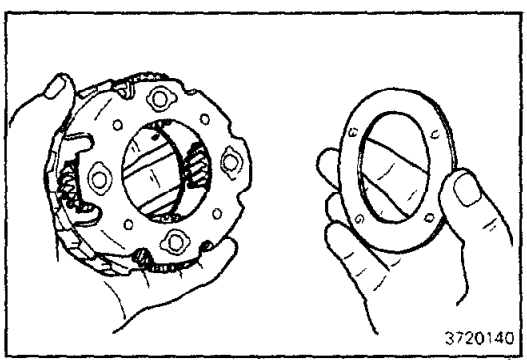
(14)Install the nylon washer in the front planetary gear, facing the lugs downward and aligning them with the slots in back of the planetary gear.



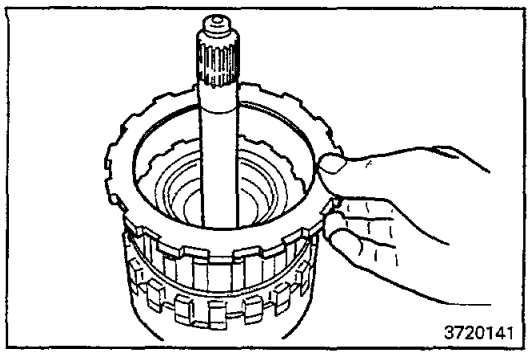
(15)Install the one-way clutch and snap ring into the front planetary gear, facing the spring cage toward the front.



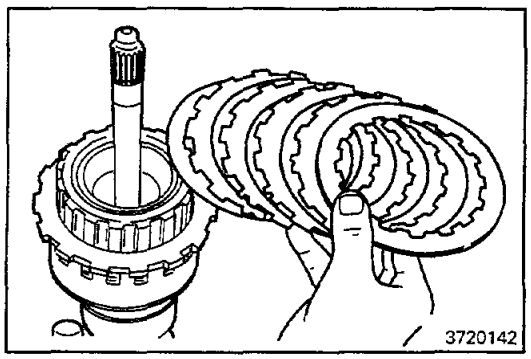
(16)Install the reaction plate on the planetary gear for testing purpose.
(17)Test the one-way clutch.
The planetary gear must rotate freely counterclockwise and lock clockwise.
If the clutch does not work correctly, it must be replaced.
(18)Remove the reaction plate.



(19)Install the thrust washer (steel washer) coated with petroleum jelly on the front planetary gear.



(20)Install the front planetary gear assembly to the intermediate shaft.
(21)Install the brake apply tube and the pressure plate facing the flat surface toward the intermediate shaft.



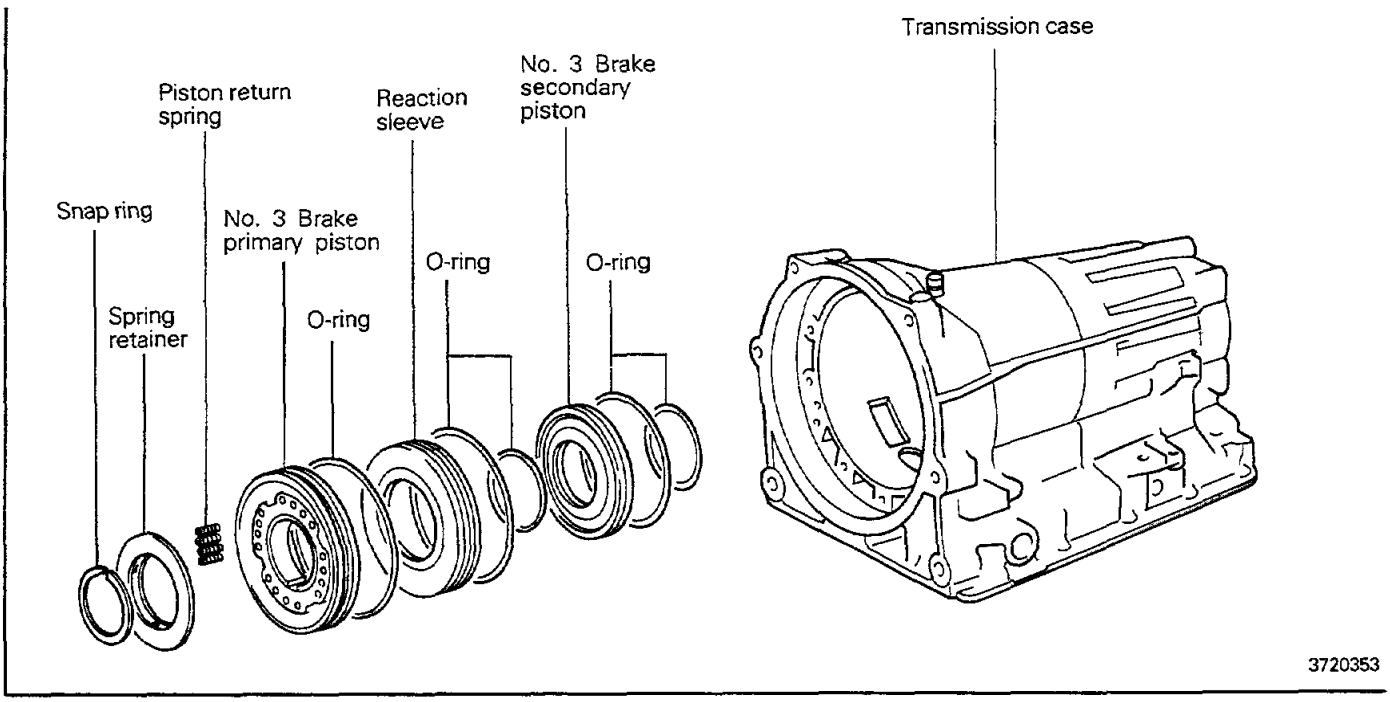
(22)Install the No. 3 brake discs and plates.
(a) Using low-pressure compressed air, blow all excess ATF from the discs.

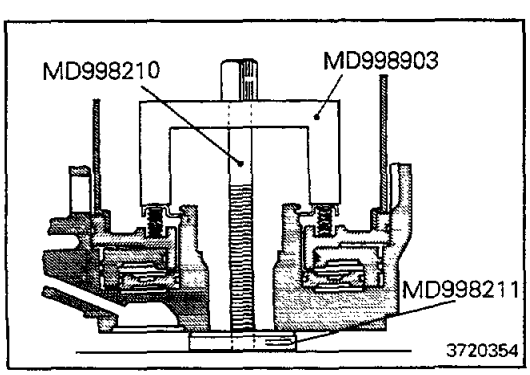
Caution
- **High-pressure air will damage the discs.**

(b) Install the parts in the following order:
Clutch disc → Clutch plate → Clutch disc → Clutch plate → Clutch disc → Clutch plate → Clutch disc → Clutch plate → Clutch disc

NO.3 BRAKE PISTON AND TRANSMISSION CASE

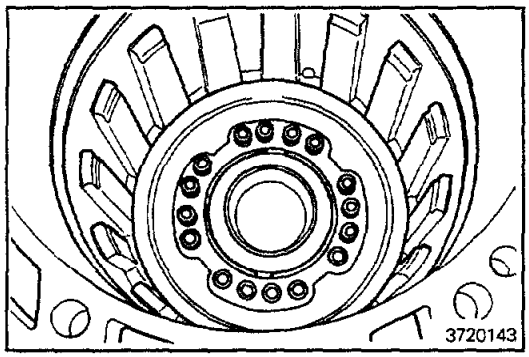
N21LIBC



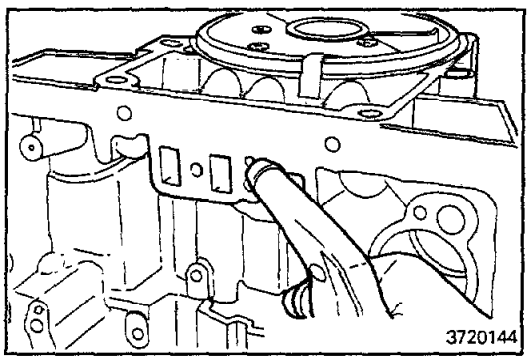


DISASSEMBLY

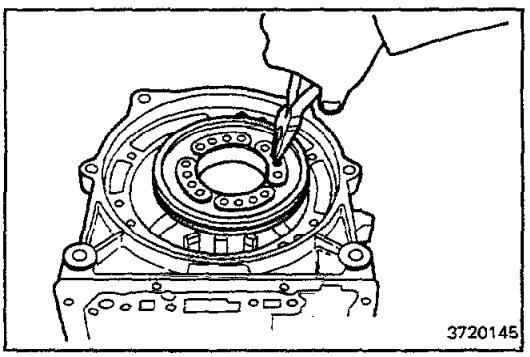
(1) Install the special tool. Gradually and evenly tighten the bolt to compress the springs, being careful not to damage the transmission case with the special tool.
(2) Using a screwdriver and a hook, remove the snap ring.



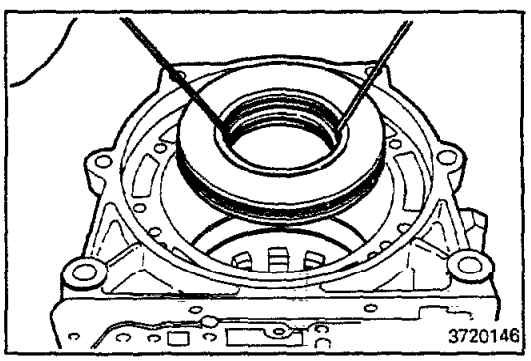
(3) Remove the spring retainer and sixteen piston return springs.



(4) With the front end down, place the transmission case on a workbench. Place several clean shop rags under the case to catch the piston and sleeve. Apply compressed air to the primary and secondary piston oil holes to force the piston and sleeve out.

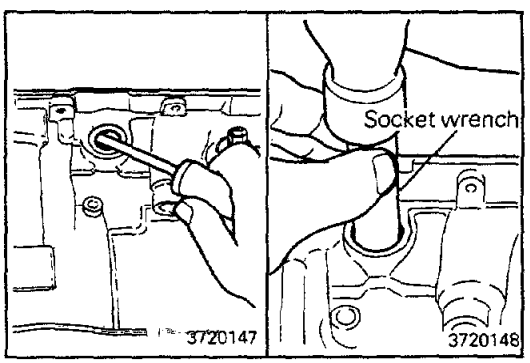


(5) If the piston and sleeve do not come out with the compressed air:
   (a) Using needle-nose pliers, lift the primary piston from the case.



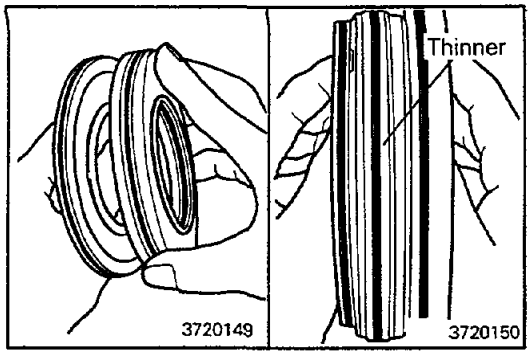
   (b) Insert two long hooks behind the reaction sleeve and gradually lift it out of the case.
   (c) Using hooks, lift the secondary piston out of case in the same manner.

(6) Remove the O-rings from the primary and secondary pistons and the reaction sleeve.



REPLACEMENT OF MANUAL SHAFT OIL SEALS

(1) Remove the manual shaft oil seals with a screwdriver.
(2) Drive in new left and right oil seals with a socket wrench.



ASSEMBLY

(1) Install new O-rings on the reaction sleeve and pistons.

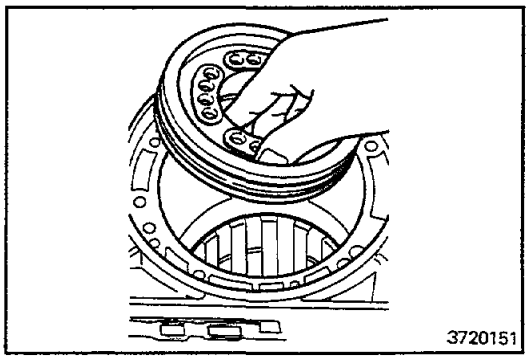
Caution
- **The thinner O-ring goes on the outside of the reaction sleeve.**

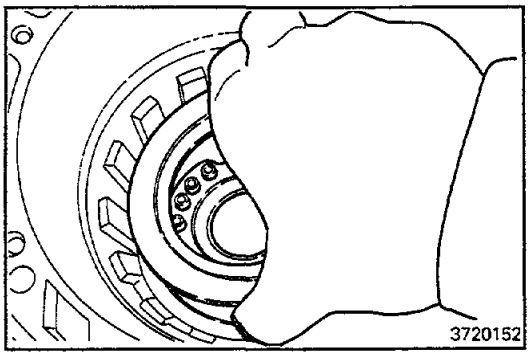
(2) Install the primary and secondary pistons in the reaction sleeve:
   (a) Push the secondary piston into the cupped side of the reaction sleeve.
   (b) Push the primary piston onto the other side of the reaction sleeve.

(3) Hold by hand the assembly with the primary piston up (spring seats visible), and push the assembly into its bore in the case.

Caution
- **Be careful not to damage the O-rings.**

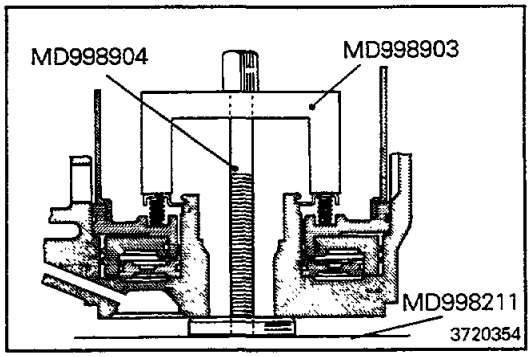
(4) Install the special tool (MD998211) under the transmission case.





(5) Install the sixteen piston return springs and set the spring retainer with snap ring in place.

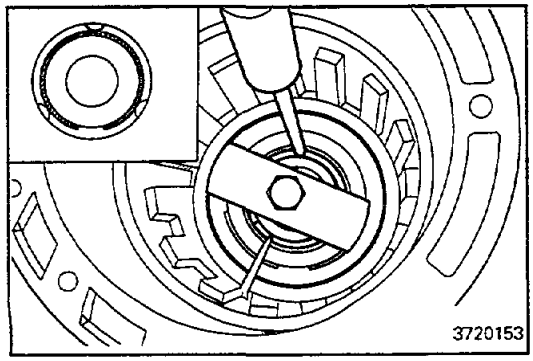
NOTE
The piston return springs are visible through the cutout in the case, which helps position them more easily.



(6) Carefully position the special tool (MD998903) on the spring retainer.

(7) Gradually and evenly tighten the special tool (MD99804) to compress the springs, being careful not to damage the transmission case with the special tool.

Caution
- **Avoid bending the spring retainer by overtightening the special tool.**

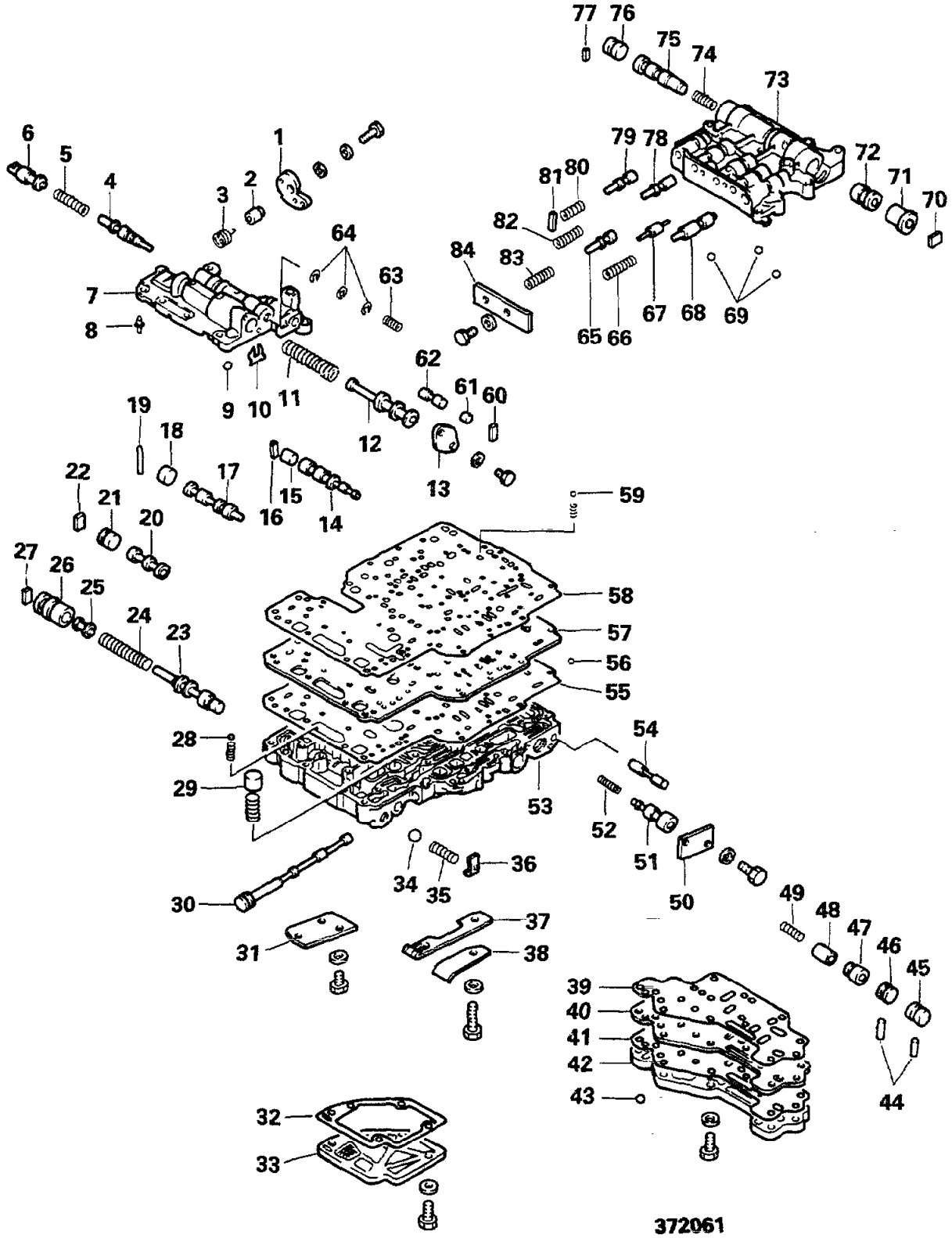


(8) Push the snap ring by hand into place. Visually check to make sure it is fully seated and centered by the three lugs on the spring retainer.

(9) Remove the special tool.

VALVE BODY

N21LO–



1. Throttle cam
2. Cam spacer
3. Return spring
4. Throttle valve
5. Throttle valve primary spring
6. Kickdown valve
7. Upper front valve body
8. Check valve
9. Check ball
10. Throttle valve keep plate
11. Secondary regulator valve spring
12. Secondary regulator valve
13. Front valve end cover
14. 1-2 shift valve
15. 1-2 shift valve plug
16. Valve retainer
17. 3-4 shift valve
18. 3-4 shift valve plug
19. Locating pin
20. D-2 down timing valve
21. D-2 down timing valve plug
22. Valve retainer
23. Primary regulator valve
24. Primary regulator valve spring
25. Primary regulator valve plunger
26. Primary regulator valve sleeve
27. Valve retainer
28. Check valve
29. Check valve
30. Manual valve
31. Plate
32. Oil screen gasket
33. Oil screen
34. Pressure relief valve
35. Pressure relief valve spring
36. Retainer
37. Detent spring
38. Detent spring plate
39. Lower valve body cover gasket (upper)
40. Lower valve body cover plate
41. Lower valve body cover gasket (lower)
42. Lower valve body cover
43. Check valve
44. Locating pin
45. Manual plug
46. Third coast shift valve plug
47. Third coast shift valve
48. 3-4 shift control valve
49. 3-4 shift control valve spring
50. Low coast shift valve cover
51. Low coast shift valve
52. 1-2 shift valve spring
53. Lower valve body
54. Plug
55. Lower valve body gasket
56. Check valve
57. Separate plate
58. Valve body gasket
59. Check valve
60. Valve retainer
61. Cut back plug
62. Cut back valve
63. Throttle valve secondary spring
64. E-ring
65. Reverse brake sequence valve
66. Low coast modulator valve spring
67. Plug
68. Low coast modulator valve
69. Check valve
70. Valve retainer
71. Intermediate coast shift valve plug
72. Intermediate coast shift valve
73. Upper rear valve body
74. 2-3 shift valve spring
75. 2-3 shift valve
76. 2-3 shift valve plug
77. Valve retainer
78. Intermediate coast modulator valve
79. Detent regulator valve
80. Detent regulator valve spring
81. Valve retainer
82. Intermediate coast modulator valve spring
83. Reverse clutch sequence valve spring
84. Rear valve cover

DISASSEMBLY

For disassembly, observe the precautions given below.

(1) Keep the disassembled parts orderly for efficient reassembly operation. Attach tags to springs for identification.
(2) When disassembling the valve, do not attempt to remove the valve with undue force. The valve and valve hole could be damaged or burred, leading to faulty valve operation.
(3) When removing the front upper and rear valve bodies from the lower valve body, use care not to lose check balls and springs.

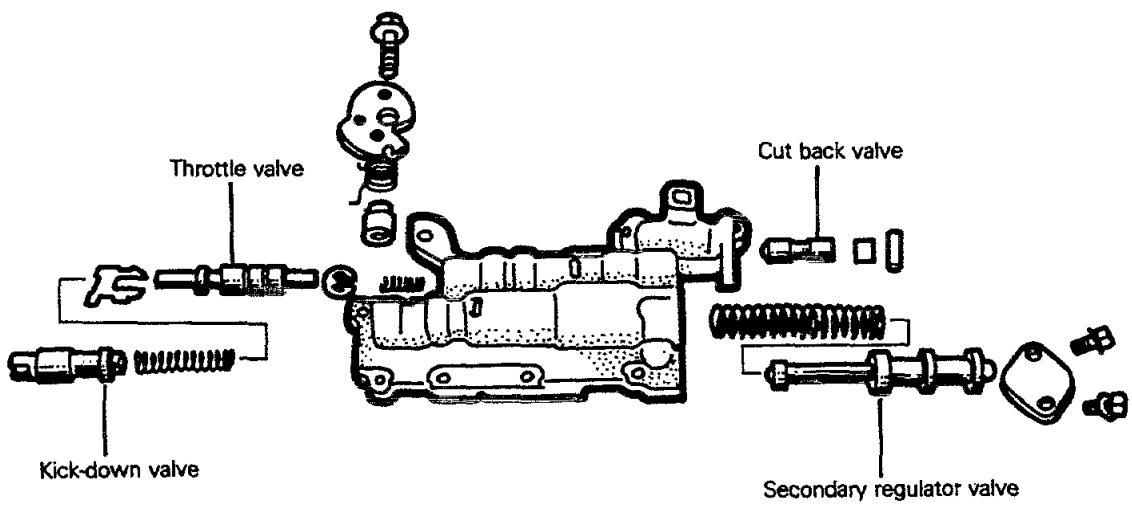
INSPECTION

Wash the removed parts and dry with air. Then, make the following checks.

Caution
When making checks, use care not to damage valve land outside and valve body holes.

(1) Check the valves for damage and wear.
(2) Insert the valves in the valve body and check smooth rotation and sliding.
(3) Check the valve body for damage and wear of valve hole bores and for clogging of oil holes and oil ways.
(4) Check for damage of the valve body plate wear and damage of check balls.
(5) Check for clogging of the oil strainer.

UPPER FRONT VALVE BODY



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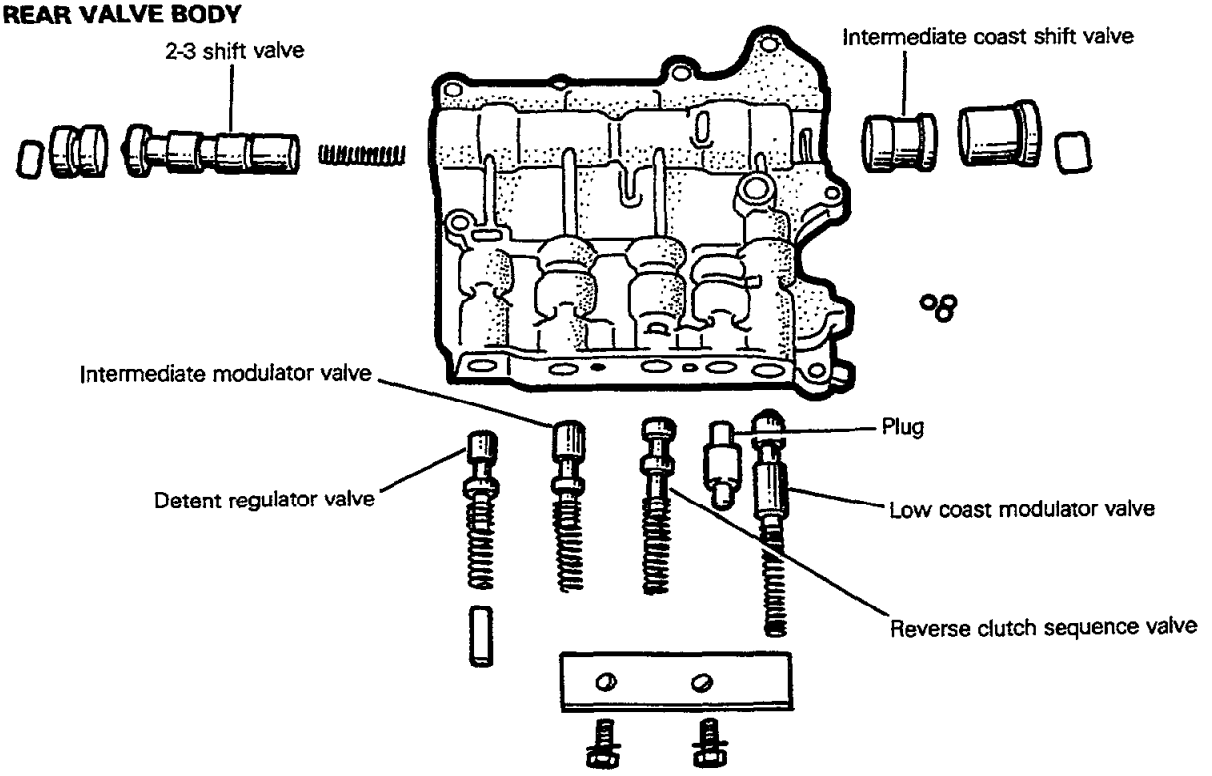
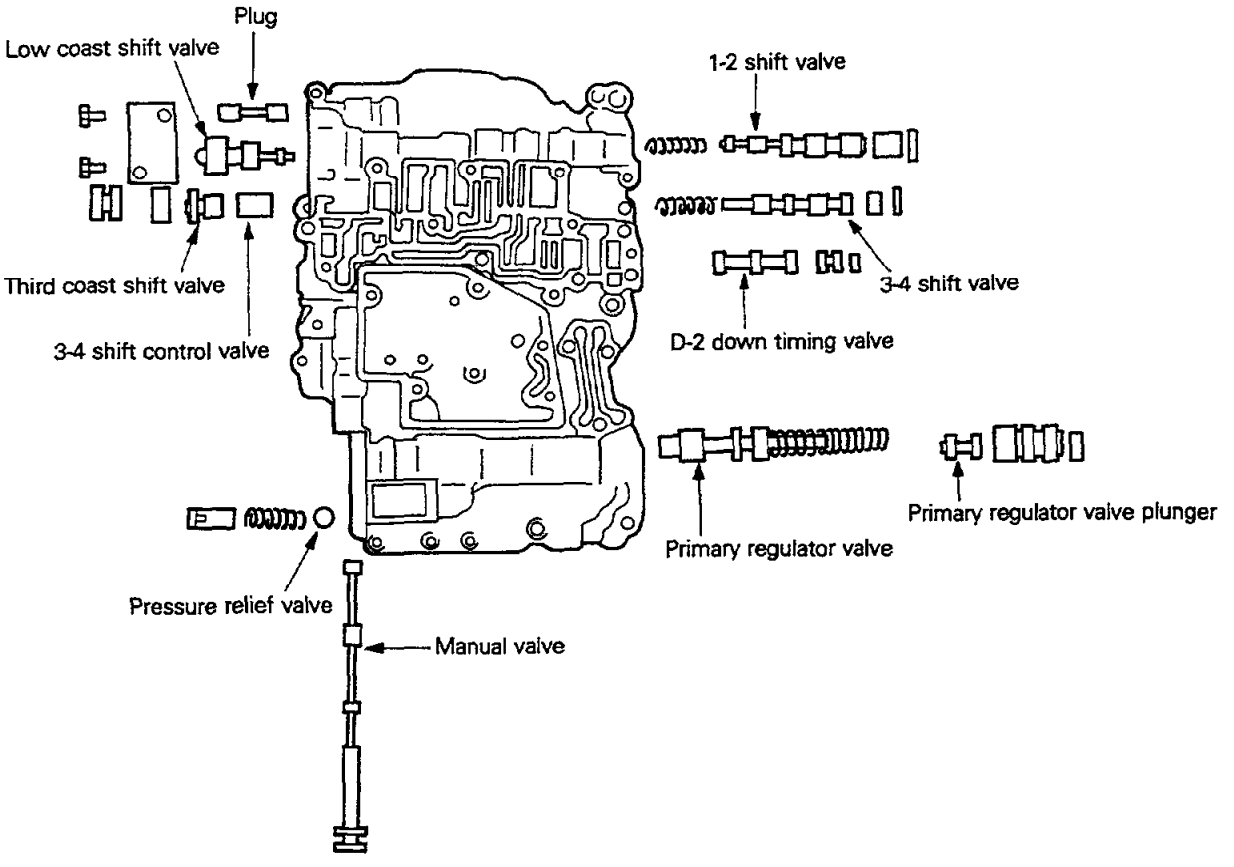
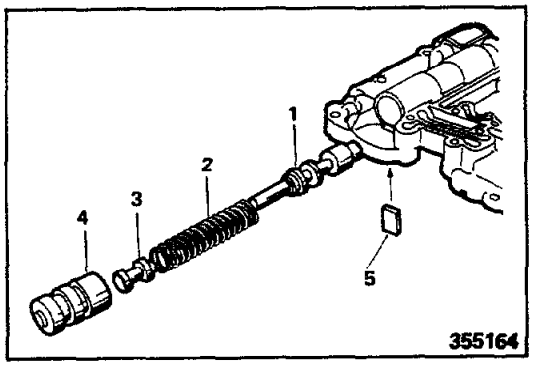
UPPER REAR VALVE BODY



(6) Check the springs and replace if broken or excessively deteriorated (See the table on page 21-72.)

LOWER VALVE BODY

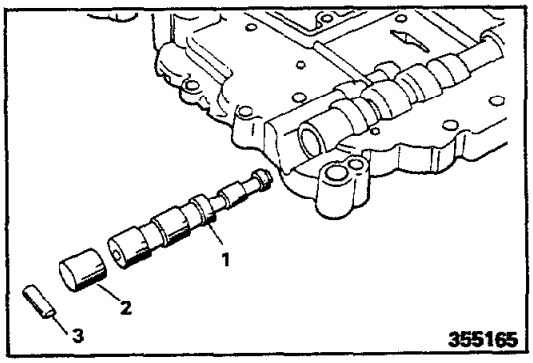




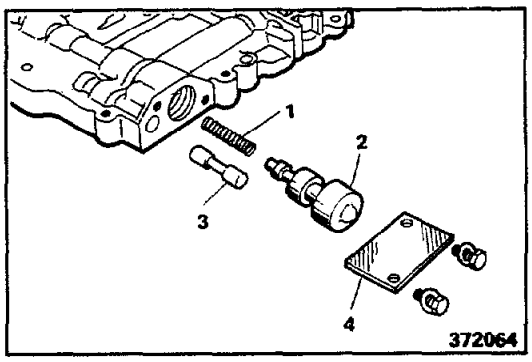
REASSEMBLY

Caution
Before reassembly, wash the parts in a clean detergent and dry with air. Do not wipe with rags for drying. Entry of dust could cause faulty valve operation.

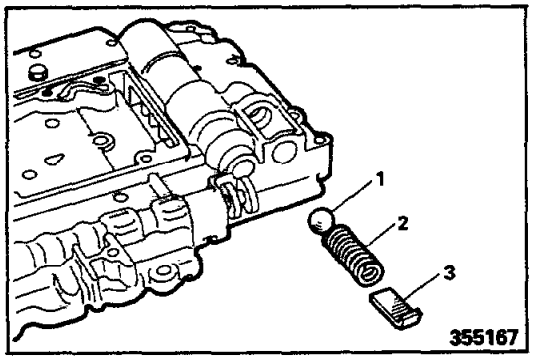
(1) Install primary regulator valve 1, spring 2, plunger 3 and sleeve 4 in the lower valve body in the order shown and insert retainer 5 to prevent the valve and other parts from coming loose.



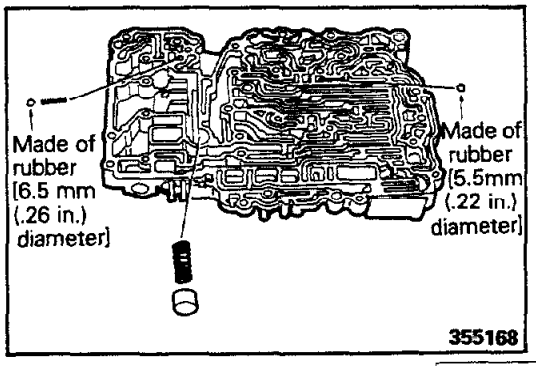
(2) Install 1-2 shift valve 1 and valve plug and insert retainer 3 to prevent the valve from coming loose.



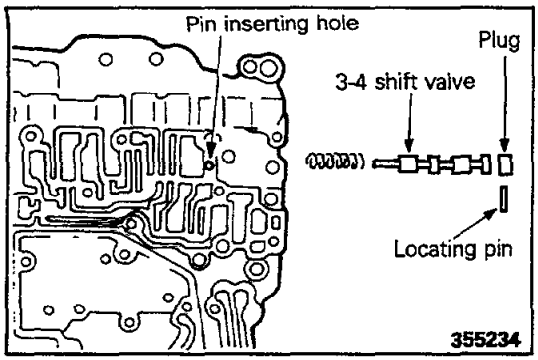
(3) Install 1-2 shift valve spring 1, low coast shift valve 2 and plug 3 and fit low coast shift valve cover 4.



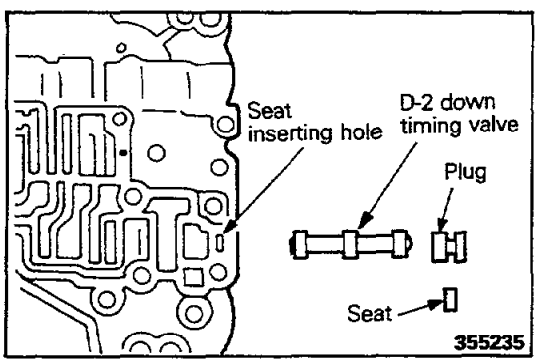
(4) Install pressure relief valve 1, spring 2 and retainer 3.



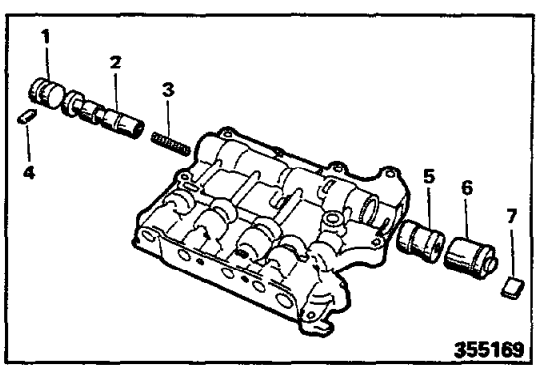
(5) Install spring, check valve and check valve spring at illustrated locations.



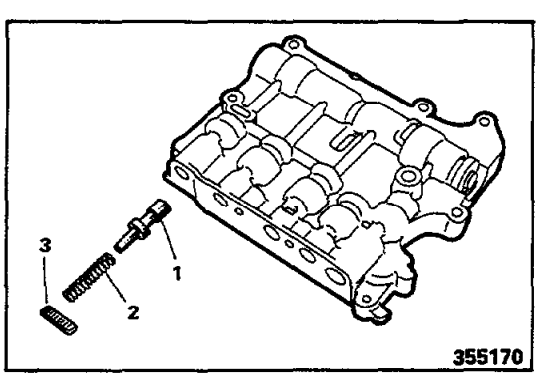
(6) Install the spring, 3-4 shift valve and plug and then insert the locating pin.



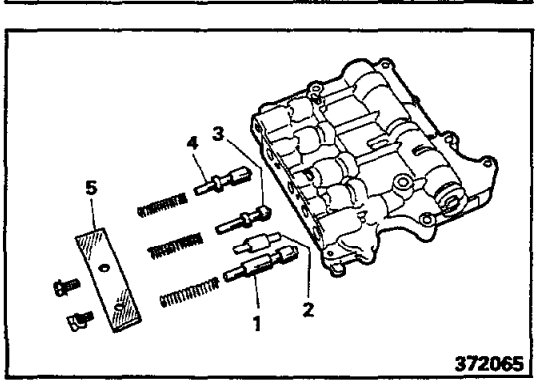
(7) Install the D-2 down timing valve and plug and insert the seat.



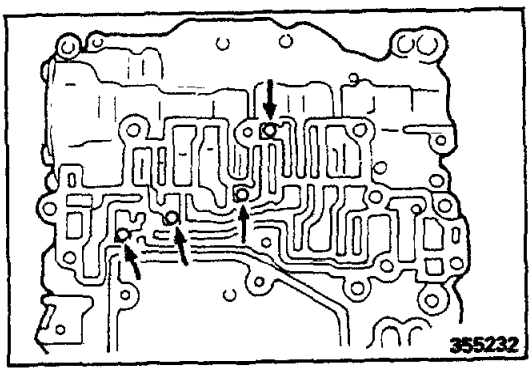
(8) Install 2-3 shift valve spring 1, 2-3 shift valve 2, 2-3 shift valve plug 3 and retainer 4 in the upper rear valve body.
(9) Install intermediate coast shift valve 5, plug 6 and retainer 7.



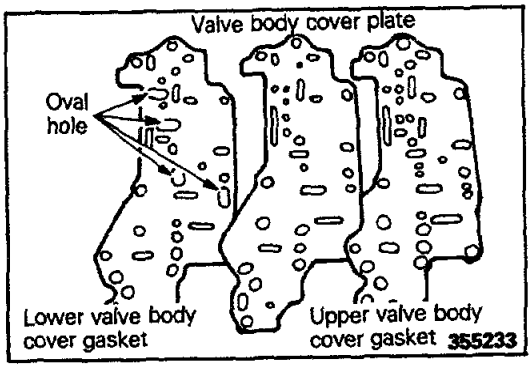
(10) Install detent regulator valve 1, spring 2 and retainer 3 in the order shown.



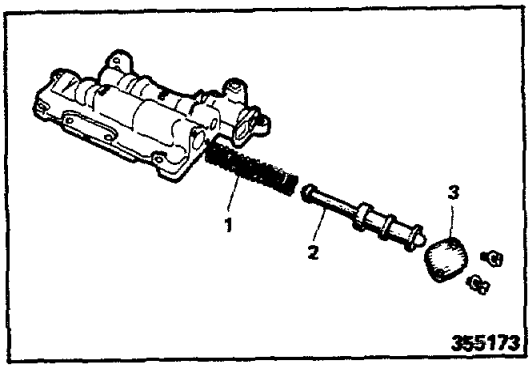
(11) Install low coast modulator valve 1, plug 2, reverse brake sequence valve 3 and intermediate coast modulator valve 4.
(12) Install valve springs.
(13) Install rear valve cover 5.



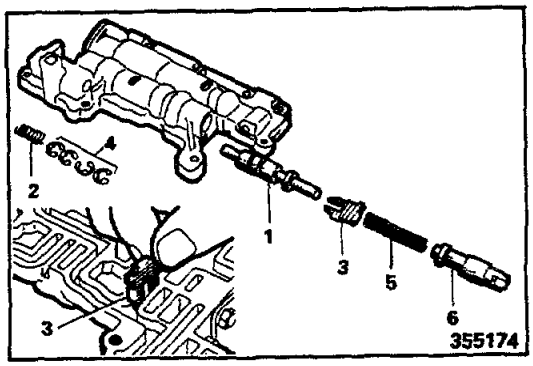
(14) Place check balls (rubber) at illustrated locations in oil ways in the bottom of the lower valve body.



(15) When installing the lower valve body cover, use the correct gasket. One with oval holes for check balls is for the lower valve body.

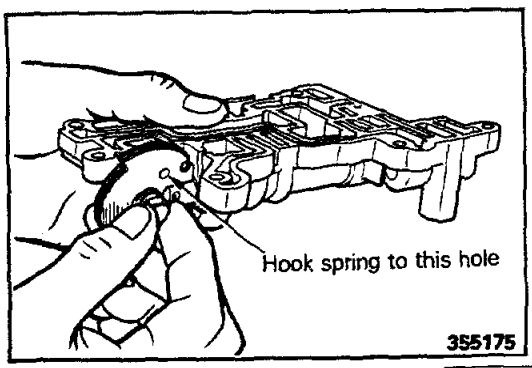


(16) Insert secondary regulator valve spring 1 and secondary regulator valve 2 in the front upper valve body and install front valve end cover 3.



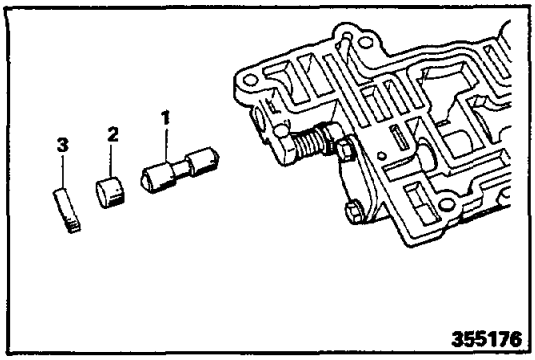
(17) Insert throttle valve 1, throttle valve secondary spring 2 and E rings 4 in the order shown and fit key plate 3 in the oil way at illustrated location. Then, install throttle valve primary spring 5 and kickdown valve 6.

Caution
1. **Install same number of E rings as before disassembly for not disturbing throttle valve adjustment.**
2. **Insertion of the throttle valve key plate at incorrect location could cause faulty valve operation.**

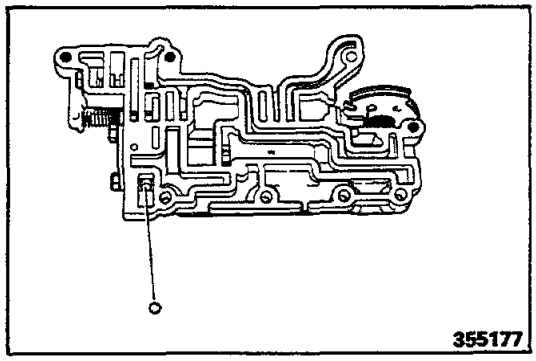


(18) Install the throttle cam and spring on the upper front valve body and tighten bolts temporarily. When installing, note the location of the spring end on the body side. Then, hook the other end of the spring to the cam and bolt the cam to the valve body. After installation, check that the throttle cam turns through full stroke smoothly.

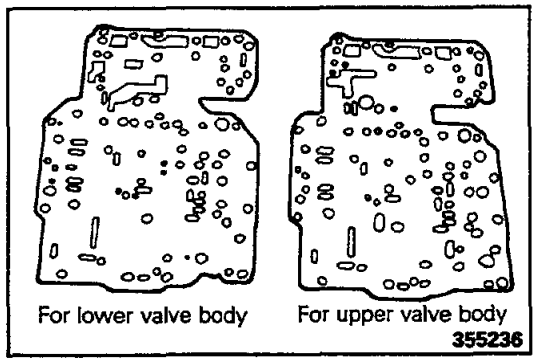
Caution
Hook the spring to the correct hole.



(19) Install cut back valve 1, valve plug 2 and retainer 3. Install the cut back plug with the larger land end facing out.

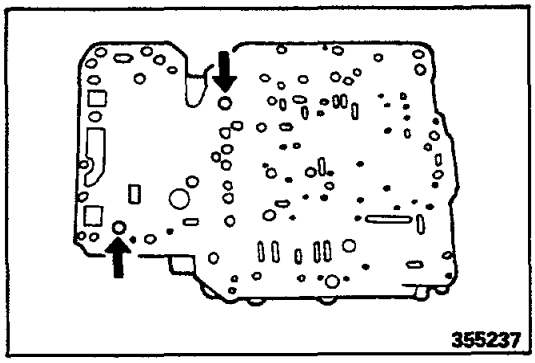


(20) Install the check ball (rubber) at the illustrated location.

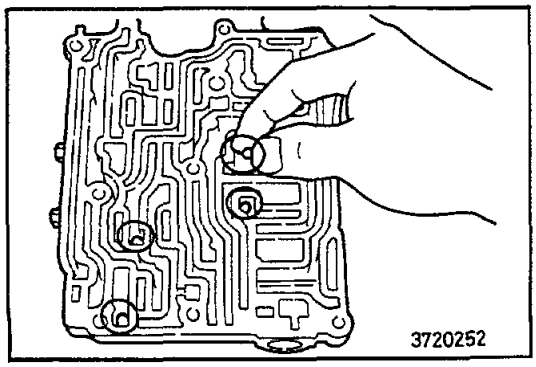


(21) Place a new lower valve body gasket on the lower valve body.

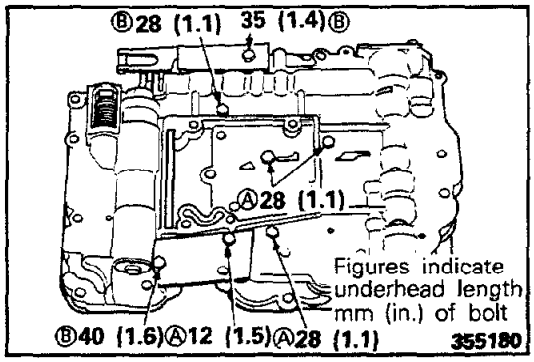
NOTE
Do not use gasket for the upper valve body.



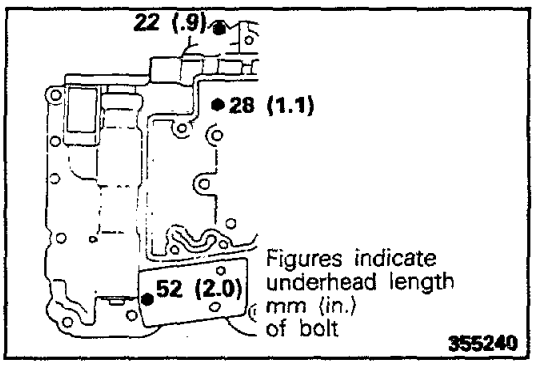
(22) Install the separator plate and tighten bolts at illustrated locations temporarily.



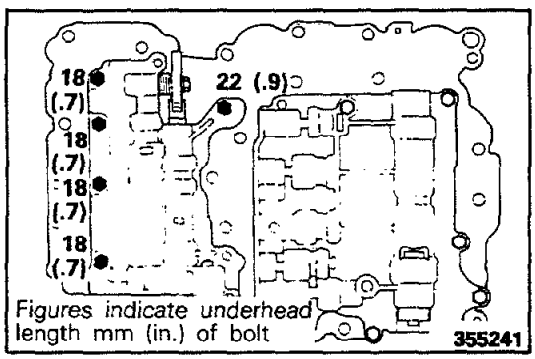
(23) Place a gasket for upper valve body, aligning with the separator plate.
(24) Install the check valve (steel) in the position shown in the figure.
The three check valves (rubber) are identical and may be installed in any other positions.



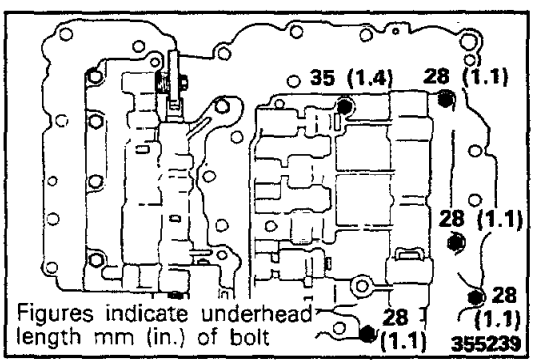
(25)Install the lower valve body onto the rear upper valve body and tighten the bolts (indicated by (A)) temporarily from the lower valve body side.
(26)Remove the two bolts tightened in step (22).
(27)Install the lower valve body onto the rear upper valve body and tighten the bolts (indicated by (B)) temporarily from the lower valve body side.
(28)Install the detent plate.



(29)Install the lower valve body onto the upper front valve body and temporarily tighten the bolts shown at left from the lower valve body side.



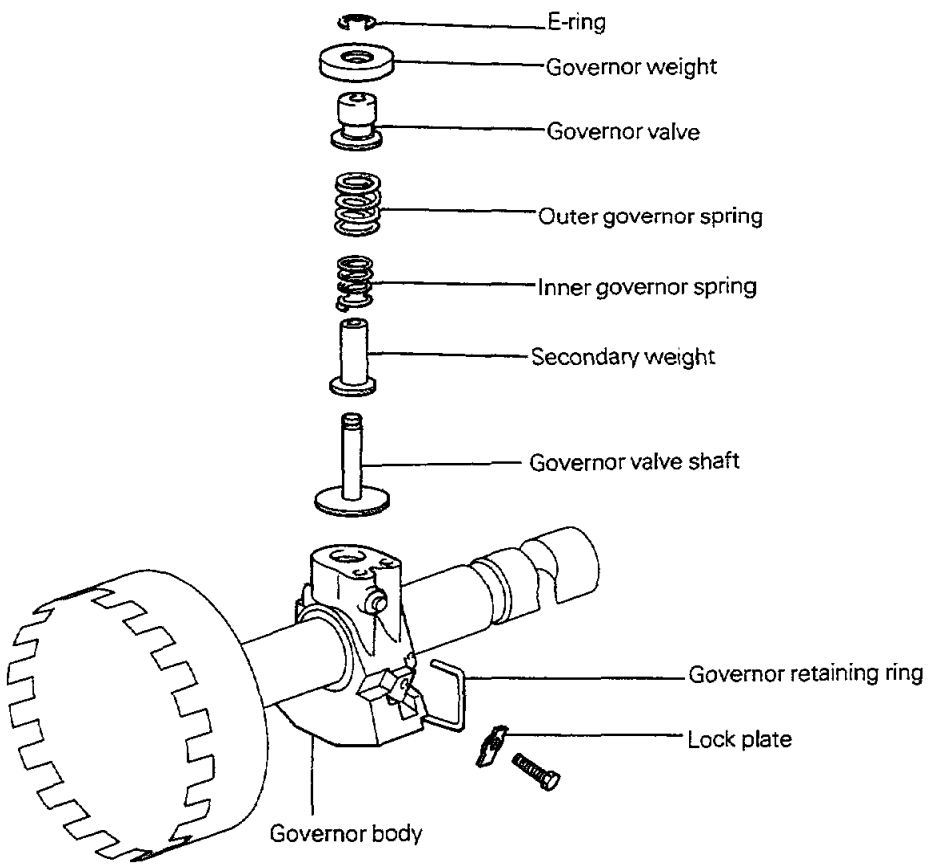
(30)Turn the valve body upside down and temporarily tighten the illustrated bolts from the upper valve body side.



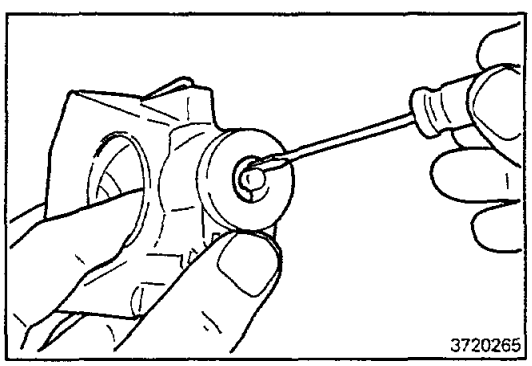
(31)Then, temporarily tighten the remaining valve body bolts as illustrated.
(32)Tighten all bolts of the valve body to specified torque.
(33)Install the manual valve.

GOVERNOR

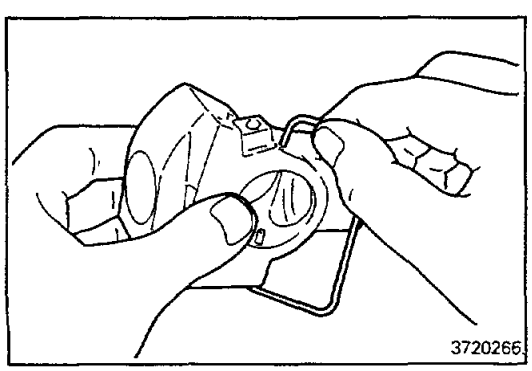
N21NAAB



3720361



3720265



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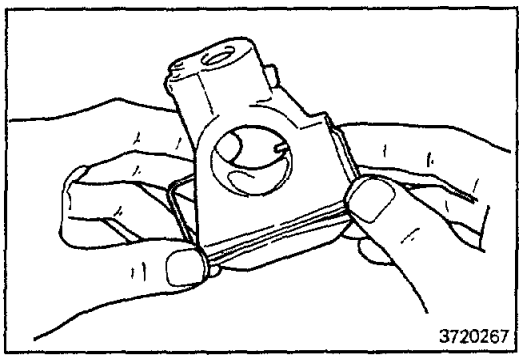
DISASSEMBLY

(1) Compress the spring by pushing up on the governor valve shaft and down on the governor weight. Remove the E-ring with a screwdriver. Lift off the governor weight.
(2) Remove the governor valve by letting it down through the bore.

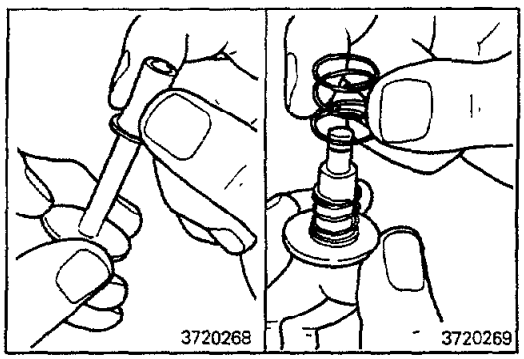
(3) Remove the governor retaining ring. To remove, disengage the end indicated by an arrow, being careful not to scratch the governor body.

TSB Revision

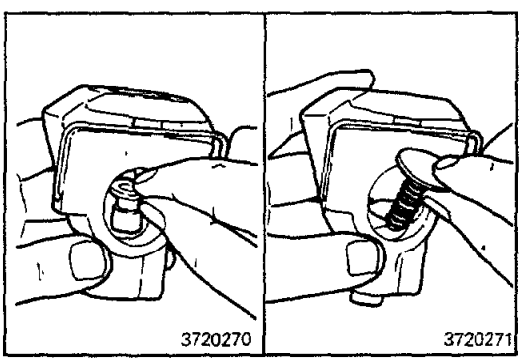


ASSEMBLY

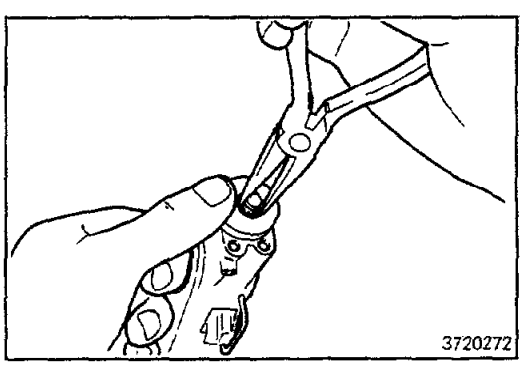
(1) Install the governor retaining ring by fitting the ring end indicated by an arrow in the hole. Be careful not to scratch the governor body.



(2) Install the governor valve, secondary weight, springs and governor valve shaft:
(a) Install the secondary weight to the governor valve shaft.
(b) Install the two springs.

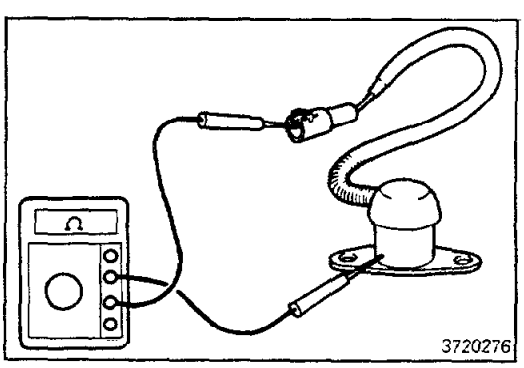


(c) Slide down the governor valve through the bore.
(d) Slide down the spring and shaft through the bore.



(3) Install the governor weight and E-ring on the governor valve shaft as follows:
Compress the spring, and install the E-ring on the shaft with needle-nose pliers. Make sure that it is fully seated in the groove.

NOTE
Make sure that the valve moves smoothly.



OVERDRIVE SOLENOID VALVE

N21NHAA

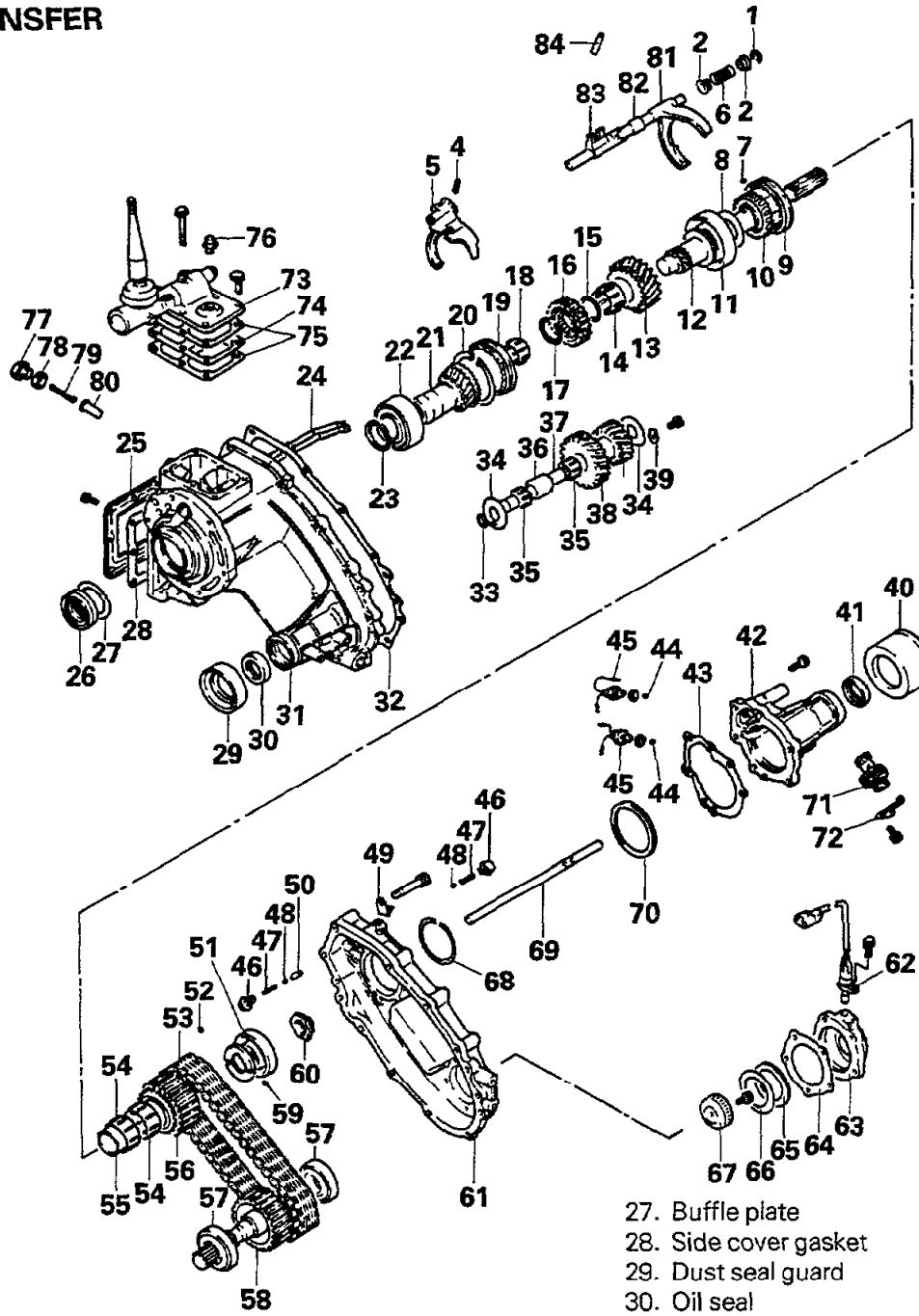
INSPECTION

(1) Inspect the overdrive solenoid by checking the resistance between the terminal and body.

Standard resistance: About 13 Ω

TRANSFER

N21NDAB



1. Snap ring
2. Spring retainer
3. Shift rail
4. Cotter pin
5. H-L shift fork
6. Spring
7. Steel ball
8. Stopper plate
9. Clutch sleeve
10. Clutch hub
11. Bearing
12. Rear output shaft
13. Low speed gear
14. Needle bearing
15. Bearing spacer
16. H-L clutch hub
17. Snap ring
18. Needle bearing
19. Clutch sleeve
20. Snap ring (optional)
21. Input gear
22. Bearing
23. Snap ring
24. Oil guide
25. Side cover
26. Oil seal
27. Buffle plate
28. Side cover gasket
29. Dust seal guard
30. Oil seal
31. Transfer case
32. Chain cover gasket
33. O-ring
34. Thrust washer
35. Needle bearing
36. Bearing spacer
37. Counter gear shaft
38. Counter gear
39. Lock plate
40. Dust seal guard
41. Dust seal
42. Rear cover
43. Rear cover gasket
44. Steel ball
45. 4WD lamp switch
46. Seal plug
47. Poppet spring
48. Seal ball
49. Cord fastener
50. Interlock plunger
51. Ball bearing
52. Steel ball
53. Chain
54. Needle bearing
55. Sprocket sleeve
56. Drive sprocket
57. Bearing
58. Front output shaft
59. Sprocket spacer
60. Lock nut
61. Chain cover
62. Pulse generator
63. Cover
64. Cover gasket
65. Spacer
66. Wave spring
67. Pulse rotor
68. Snap ring
69. H-L shift rail
70. Wave spring
71. Speedometer sleeve assembly
72. Sleeve clamp
73. Control lever assembly
74. Control housing cover
75. Gasket
76. Breather
77. Plug
78. Gasket
79. Select spring
80. Select plunger
81. 2-4WD shift fork
82. Distance piece
83. 2-4WD shift lug
84. Spring pin

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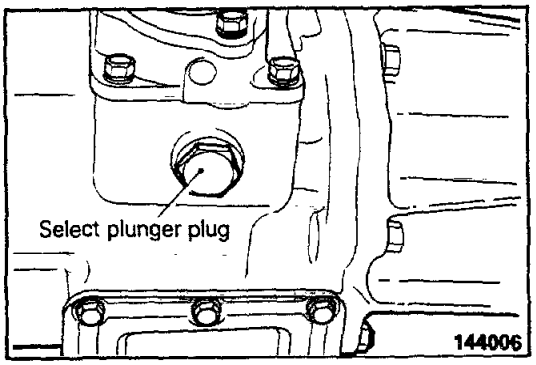
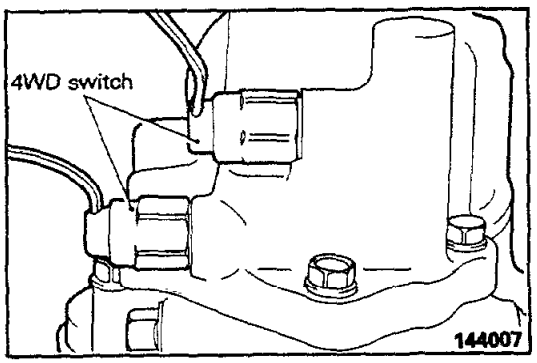


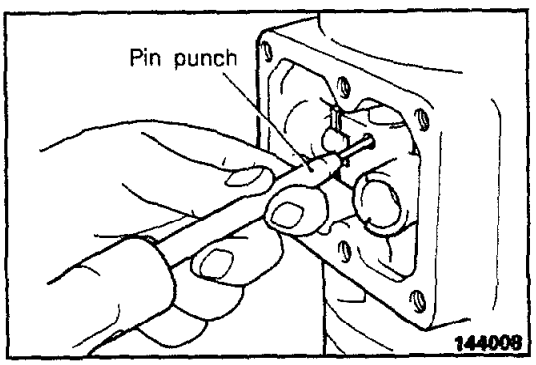
REMOVAL

(1) Remove the plug from the right side of the transfer case and take out the select spring and select plunger.
(2) Remove the control lever housing assembly, cover and gasket.
(3) Remove the transfer case to adapter attaching bolts and nuts.
(4) Pull the transfer case back to separate from the adapter.

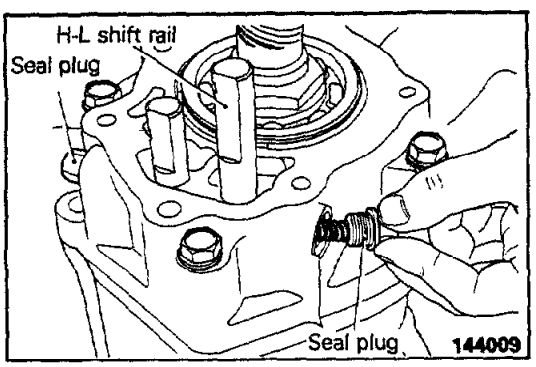


DISASSEMBLY

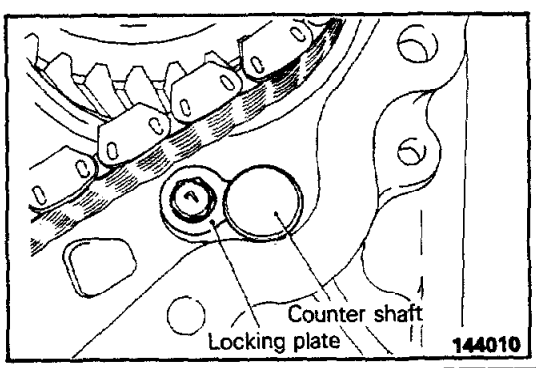
(1) Remove two 4WD light switches.Take out two steel balls.
(2) Remove the speedometer sleeve clamp and remove the speedometer sleeve assembly.
(3) Remove the rear cover attaching bolts and remove the spacer and gasket.
(4) Remove the cover (front output shaft portion) and take out the wave spring, spacer (if inserted) and gasket.
(5) Remove the side cover and gasket.



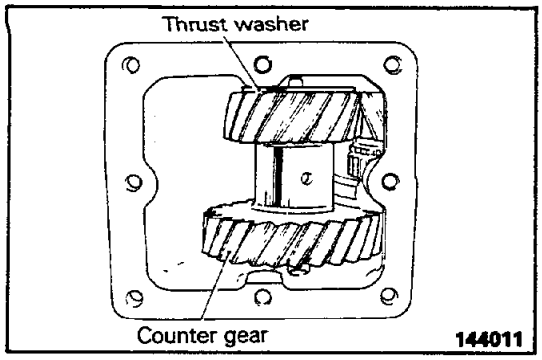
(6) Drive out the spring pin from the H-L shift fork by using the special tool or a pin punch (commercially available).



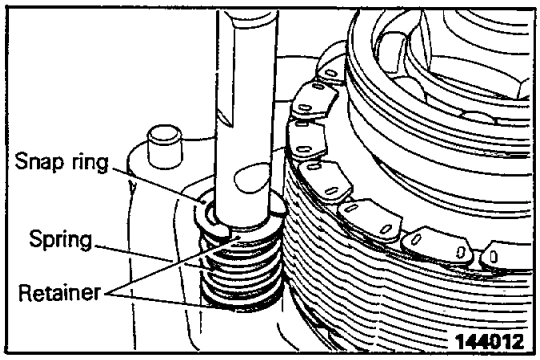
(7) Remove the two seal plugs and take out the two poppet springs and balls.
(8) Pull out the H-L shift rail rearward.
(9) Take out the interlock plunger.
(10) Remove the snap ring from the rear output shaft rear bearing.
(11) Remove the chain cover.
(12) Remove the oil guide.



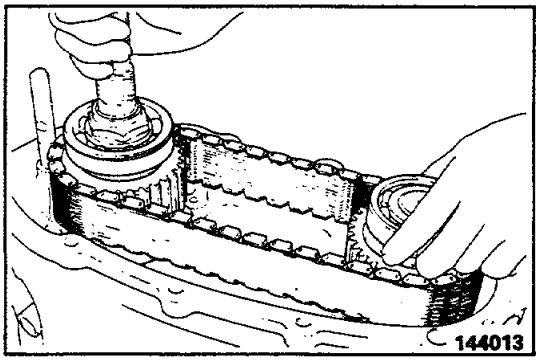
(13) Remove the countershaft locking plate and pull out the countershaft.



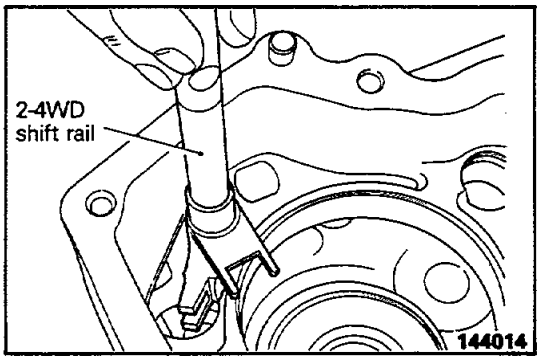
(14)Take out the counter gear, two thrust washers and needle bearings and spacer from the side cover hole.



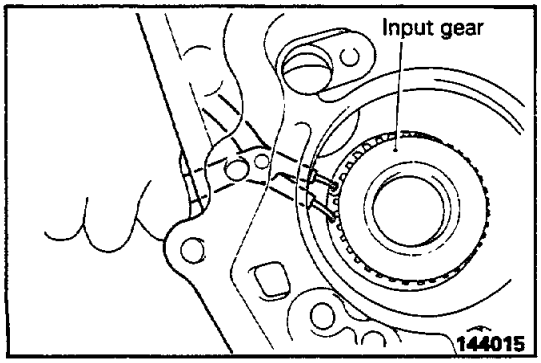
(15)Remove the snap ring from the 2-4WD shift rail and remove the two spring retainers and spring from the shift rail.



(16)Take out the front output shaft, rear output shaft, 2-4WD shift fork and chain together from the transfer case.



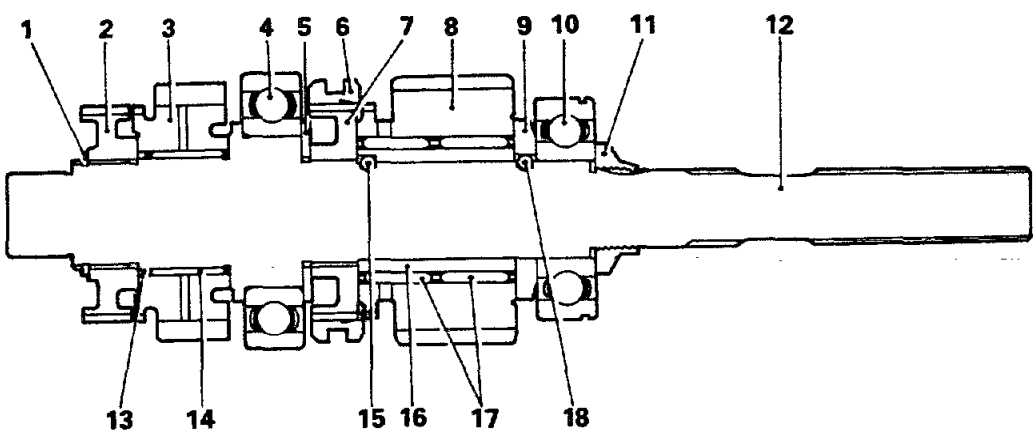
(17)Tap the spring pin out so that the 2-4WD shift rail, distance piece and 2-4WD shift lug can be removed.
(18)Remove the H-L shift fork and clutch sleeve.
(19)Remove the needle bearing from the input gear.



(20)Remove the snap ring and then remove the input gear assembly.

DISASSEMBLY OF REAR OUTPUT SHAFT

(1) Remove the snap ring from the rear output shaft front end and remove the H-L clutch hub, low speed gear, thrust washer and needle bearing.
(2) Pry up the staked portion of the rear output shaft lock nut and loosen and remove the lock nut.
(3) Remove the ball bearing from the rear end using a bearing puller (commercially available) or a press.
(4) Remove the sprocket spacer and steel ball.
(5) Remove the drive sprocket, two needle bearings, sprocket sleeve and steel ball.
(6) Remove the 2-4WD clutch sleeve, hub and stop plate and pull out the ball bearing using a puller or press.



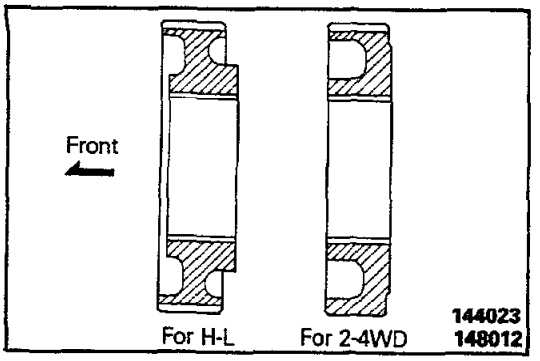
1. Snap ring
2. H-L clutch hub
3. Low speed gear
4. Ball bearing
5. Stop plate
6. 2-4WD clutch sleeve
7. 2-4WD clutch hub
8. Drive sprocket
9. Sprocket spacer
10. Ball bearing
11. Lock nut
12. Rear output shaft
13. Thrust washer
14. Needle bearing
15. Steel ball
16. Sprocket sleeve
17. Needle bearing
18. Steel ball

144016

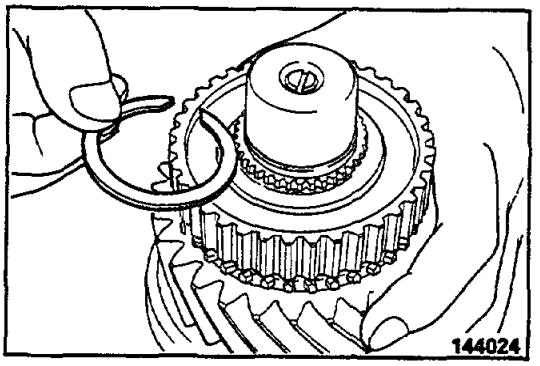
REASSEMBLY OF REAR OUTPUT SHAFT

For reassembly, follow the disassembly steps in reverse order, paying attention to the following.

(1) Prior to reassembly, wash parts and check sliding and rotating parts for damage. Replace parts if excessively worn or damaged.
(2) Apply transmission oil to rotating and sliding parts before reassembly.

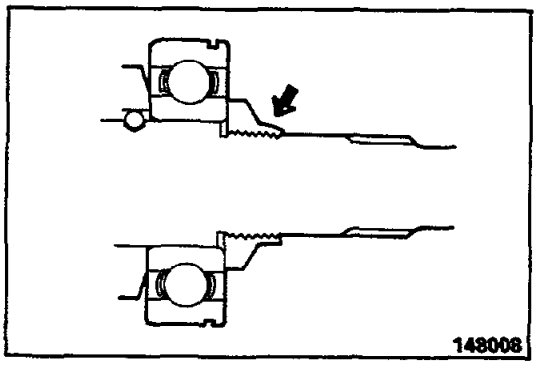


(3) When installing the clutch hub, note the direction. Also check that the sleeve slides smoothly when installed. The clutch sleeve may be installed in either direction.

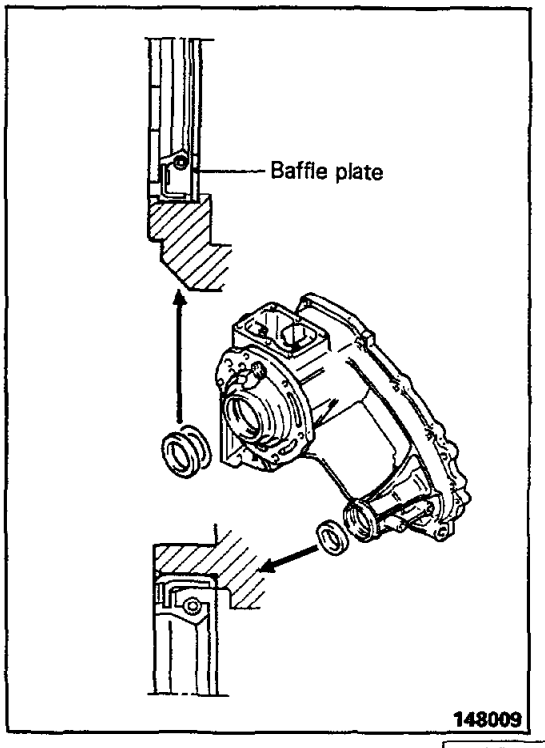


(4) Install a snap ring for H-L clutch hub on the front end of the rear output shaft. Use the thickest snap ring that fits in the groove.

H-L clutch hub end play
Standard value: 0—0.08 mm (0—.003 in.)



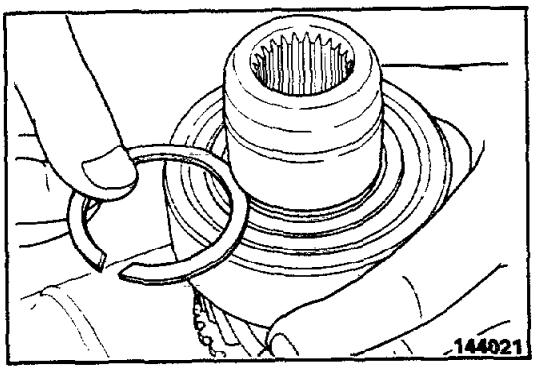
(5) Tighten the lock nut to specified torque and then stake at the illustrated location, aligning with the groove.
(6) Check that the low speed gear and drive sprocket ball bearing rotate smoothly.



REASSEMBLY

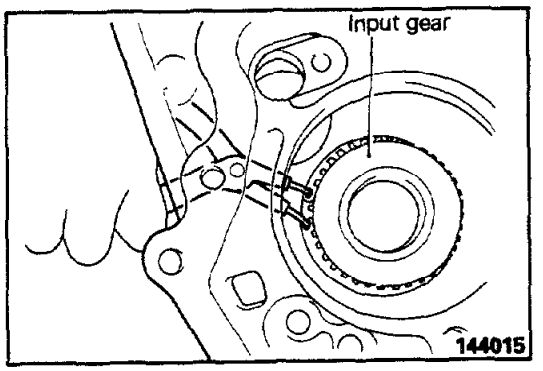
(1) Press fit new oil seals in the input gear portion and front output shaft portion of the transfer case. Fit the baffle plate on the input shaft side. Apply specified oil to the oil seal lips.

Specified oil: Hypoid gear oil API classification GL-4 or higher SAE viscosity No. 80W, 75W-85W



(2) Press fit the ball bearing to the input gear, pushing the inner race. Check that the bearing rotates smoothly.
(3) Fit a snap ring on the front end of the input gear. Use the thickest one that fits in the groove.

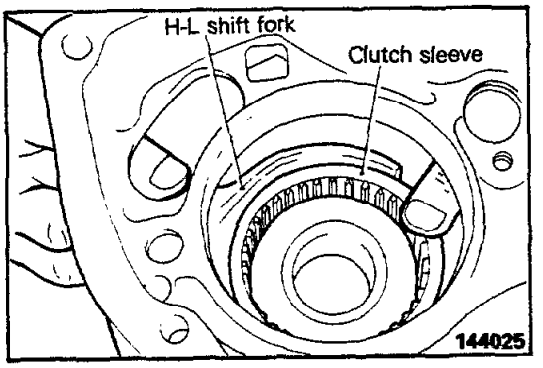
Standard value : 0 – 0.06 mm (0–.002 in.)



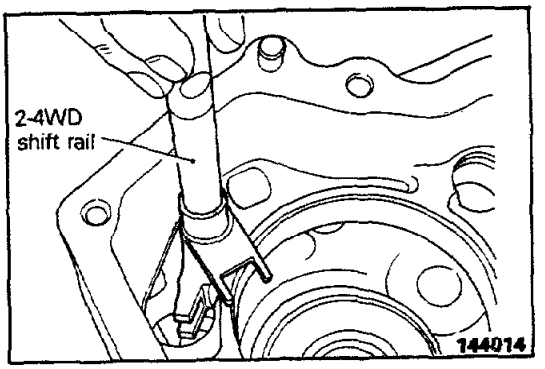
(4) Insert the input gear assembly in the transfer case and fit a snap ring. Use the thickest one that fits in the groove.

Standard value : 0 – 0.06 mm (0–.002 in.)

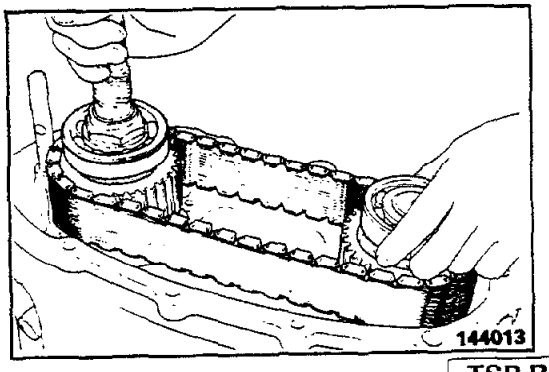
(5) Insert the needle bearing in the input gear.



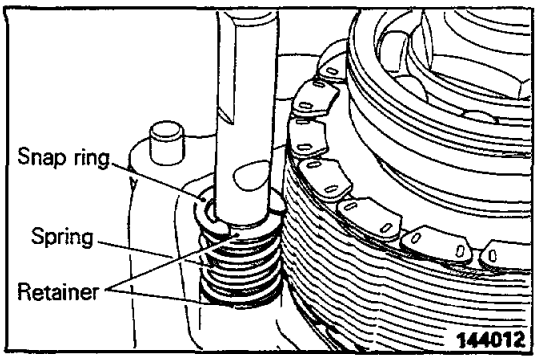
(6) Install the H-L clutch sleeve and shift fork.



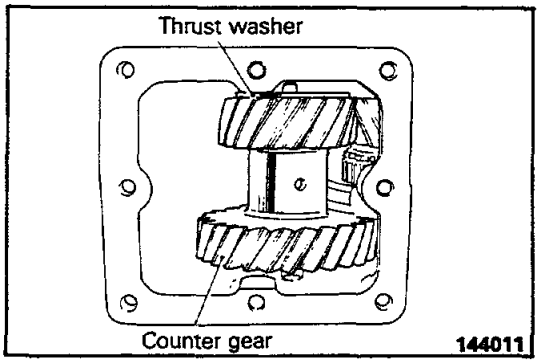
(7) Install the 2-4WD shift lug, distance piece and 2-4WD shift rail in this order, and then tap the spring pin in place.



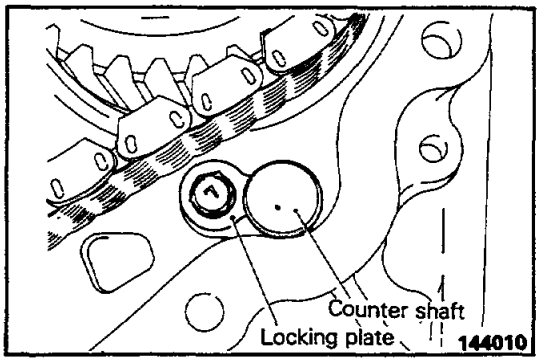
(8) Engage chain securely with the rear output shaft and front output shaft sprockets. Then, install the rear and front output shafts and chain together, while sliding the 2-4WD shift fork with the clutch sleeve attached over the 2-4WD shift rail.



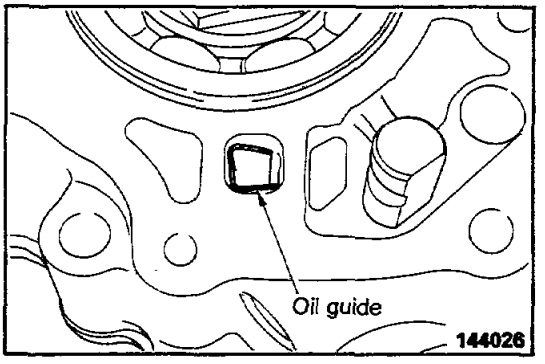
(9) Install two spring retainers and spring over the 2-4WD shift rail and fit a snap ring.



(10) Insert two needle bearings and spacer in the counter gear and install the assembly in the transfer case. Install a thrust washer on each of the counter gear.



(11) Insert the countershaft and fit the locking plate.



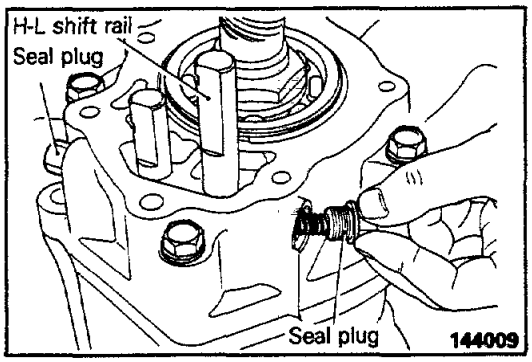
(12) Install the oil guide.
(13) Install the chain cover and gasket, making sure that the oil guide edge is in the chain cover window. Apply sealer to the gasket.

Specified sealant: 3M ART Part No. 8660 or equivalent

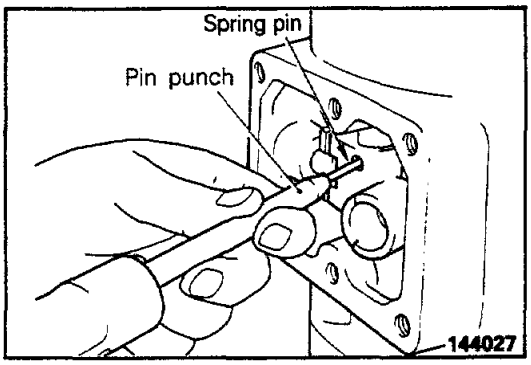
(14) Tighten the chain cover bolts to specified torque. Apply sealer to threads of bolts fitted in holes that go through the case.

Specified sealant: 3M Adhesive Nut Rocking 4171 or equivalent

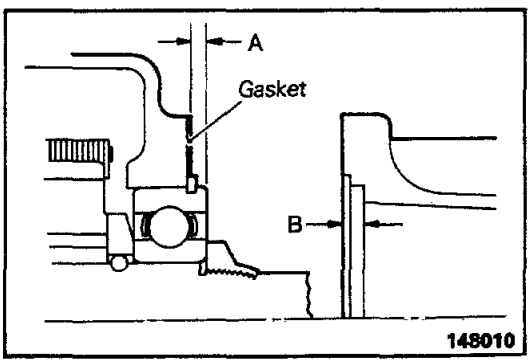
(15) Fit a snap ring in the groove of the bearing at the rear end of the rear output shaft.



(16) Insert the interlock plunger in the hole of the chain cover.
(17) Insert the H-L shift rail through the H-L shift fork. The H-L shift rail cannot be inserted unless the 2-4WD shift rail is shifted to the 4WD side.
(18) Install poppet balls and springs two each and fit the seal plugs. Face the smaller end of poppet springs toward the ball.

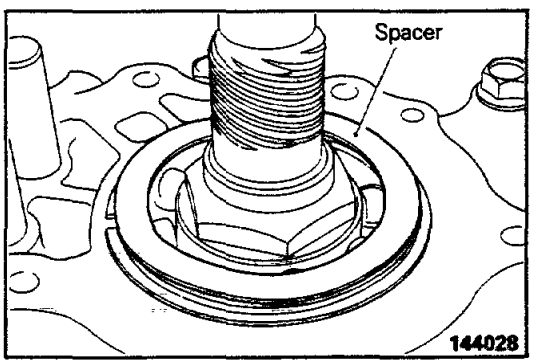


(19) Aligning the spring pin holes of the H-L shift fork and shift rail, drive in the spring pin by using the special tool or a pin punch (commercially available). When installing the spring pin, face its slit toward the shift rail center.



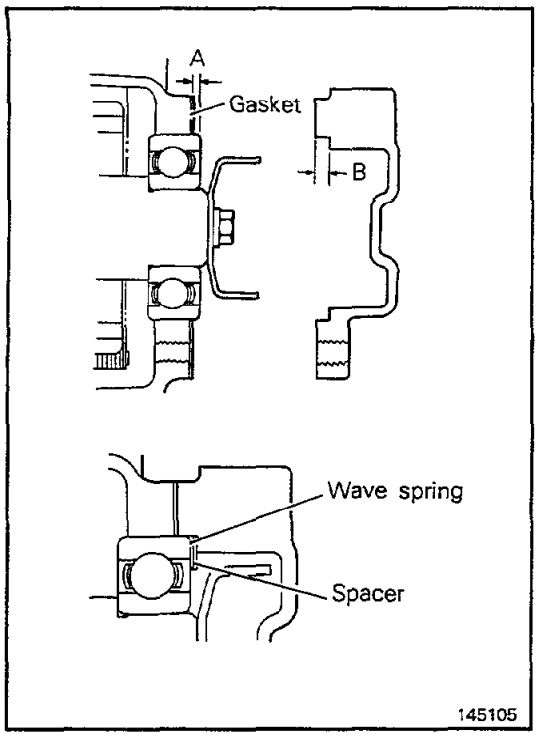
(20) Measure the output shaft rear bearing protrusion A and rear cover recess B to calculate the end play. Select the spacer that gives specified end play.
(21) Apply sealer to a new rear cover gasket and attach it to the chain cover side.

Specified sealant: 3M ART Part No. 8660 or equivalent



(22) Install the selected spacer on the rear of the output shaft rear bearing.
(23) Install the rear cover and tighten the bolts to specified torque. Apply sealant to threads of bolts fitted in holes that go through the case.

Specified sealant: 3M Adhesive Nut Rocking 4171 or equivalent



(24) Measure protrusion A of the front output shaft rear bearing and recess B of the cover and calculate the clearance. If it is more than nominal, place a spacer at illustrated location.

Standard value : 2 mm (.078 in.)

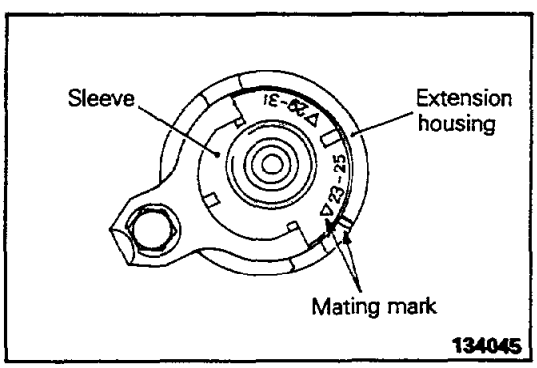
(25) Apply sealer to a new cover gasket and attach it to the chain cover.

Specified sealant: 3M ART Part No. 8660 or equivalent

(26) Install the wave spring spacer (if necessary) on the rear of the bearing.

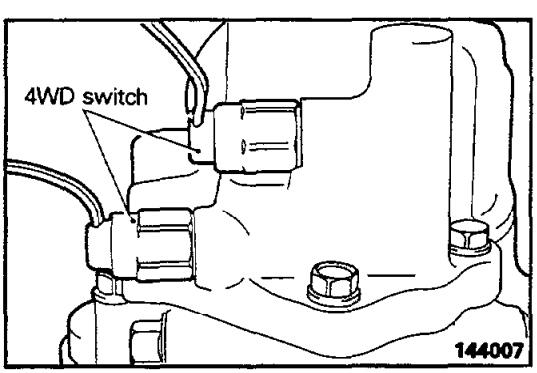
(27) Install the cover and tighten the bolts to specified torque. Apply sealer to threads of bolts.

Specified sealant: 3M Adhesive Nut Rocking 4171 or equivalent



(28) Insert the speedometer sleeve assembly in the rear cover. Line up the mating mark on the extension housing with the mark corresponding to the speedometer driven gear tooth number range put on the sleeve.

(29) Install the sleeve clamp and tighten the bolt.



(30) Install the two 4WD light switches, making sure that steel balls are fitted.

REASSEMBLY

For reassembly, follow the removal steps in reverse order, paying attention to the following.

1. Apply sealer to one side of the two control housing gaskets and attach them to both sides of the control housing cover.

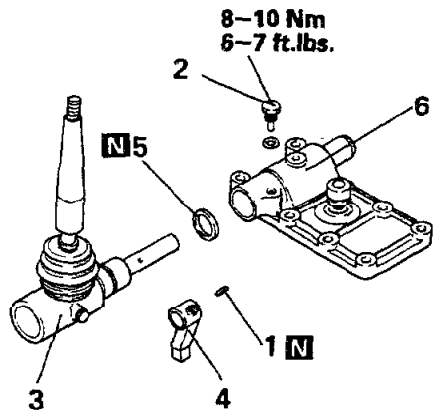
   Specified sealant: 3M ART Part No. 8660 or equivalent

2. Apply sealer to the adapter gasket.

   Specified sealant: 3M ART Part No. 8660 or equivalent

DISASSEMBLY AND REASSEMBLY (Transfer Control)

N21KE–



09W559

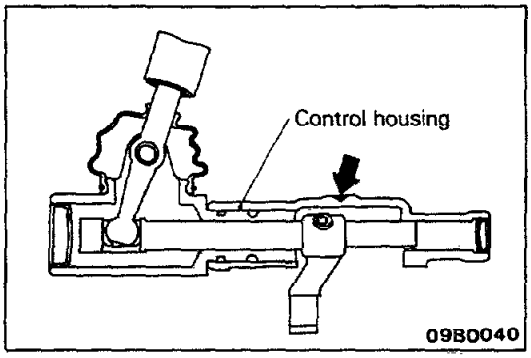
Disassembly steps

◆◆ 1. Spring pin
2. Set screw
3. Control lever assembly
4. Control finger
5. O-ring
6. Control housing

Reassembly steps

3. Control lever assembly
◆◆ 5. O-ring
6. Control housing
4. Control finger
◆◆ 1. Spring pin
2. Set screw

NOTE
(1) ◆◆ : Refer to "Service Points of Disassembly".
(2) ◆◆ : Refer to "Service Points of Reassembly".
(3) N : Non-reusable parts



09B0040

SERVICE POINTS OF DISASSEMBLY

N21KFAA

1. REMOVAL OF SPRING PIN

(1) Drill 12 mm (.47 in.) diameter hole in the center of the boss 16 mm (.63 in.) diameter on the control housing not to damage the control finger and control lever assembly.
(2) Draw out the spring pin using a punch.

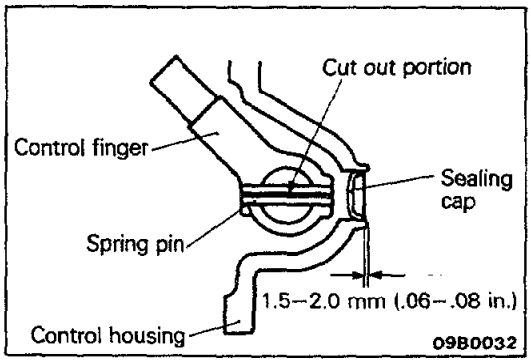
SERVICE POINTS OF REASSEMBLY

N21KHAB

5. APPLICATION OF LUBRICANT TO O-RING

Install the O-ring to the control lever assembly and apply a small amount of the specified oil on the O-ring.

Specified oil: Hypoid gear oil API classification GL-4 or higher SAE viscosity No. 80W, 75W-85W



09B0032

1. INSTALLATION OF SPRING PIN

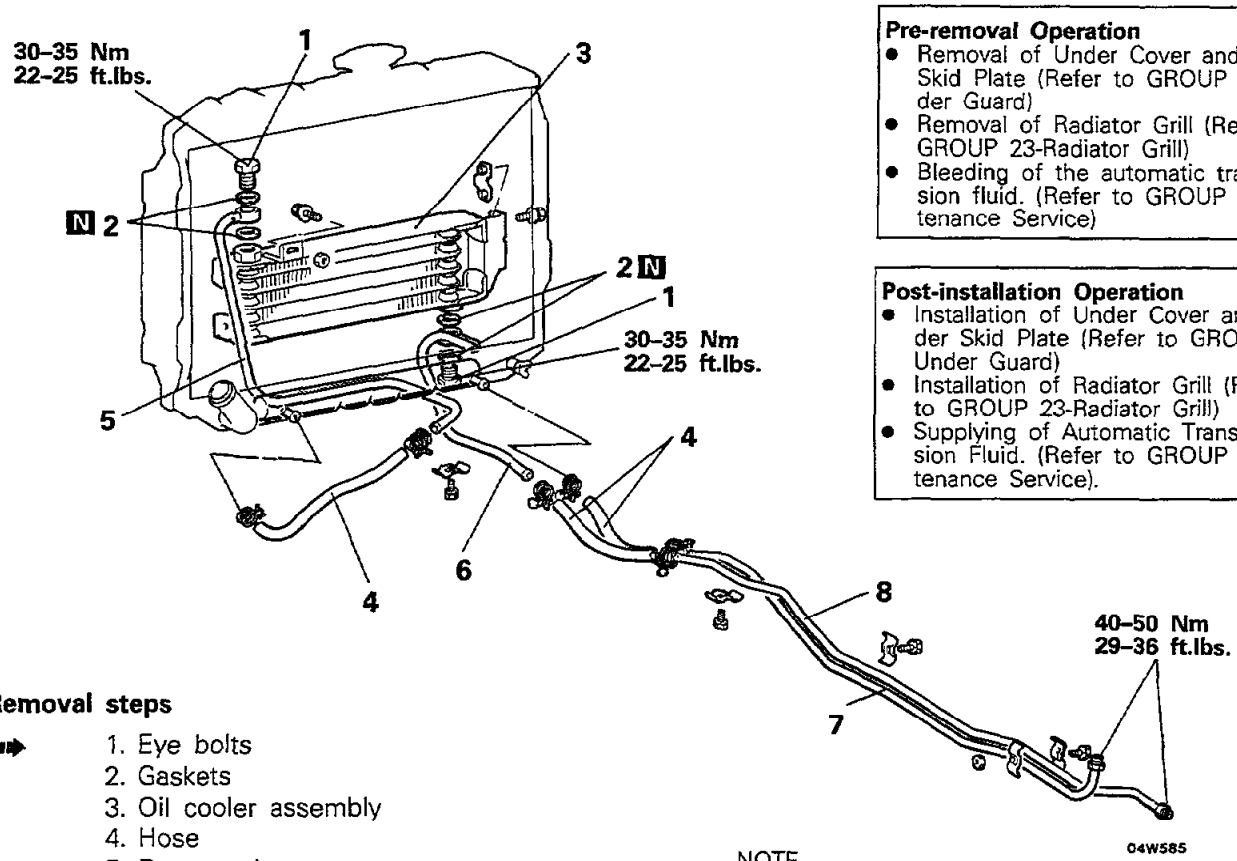
(1) Drive the spring pin using a punch so that the cut out portion of the spring pin is in the axial direction of the control lever assembly.
(2) Apply the sealant in the inner surface of the worked hole and drive the sealing cap up to the dimension shown in the figure.

TSB Revision

TRANSMISSION OIL COOLER

REMOVAL AND INSTALLATION

N21SA–



Pre-removal Operation
- Removal of Under Cover and Under Skid Plate (Refer to GROUP 23-Under Guard)
- Removal of Radiator Grill (Refer to GROUP 23-Radiator Grill)
- Bleeding of the automatic transmission fluid. (Refer to GROUP 0-Maintenance Service)

Post-installation Operation
- Installation of Under Cover and Under Skid Plate (Refer to GROUP 23-Under Guard)
- Installation of Radiator Grill (Refer to GROUP 23-Radiator Grill)
- Supplying of Automatic Transmission Fluid. (Refer to GROUP 0-Maintenance Service).

Removal steps

◆◆ 1. Eye bolts
2. Gaskets
3. Oil cooler assembly
4. Hose
5. Return tube
6. Feed tube
◆◆ 7. Feed tube
◆◆ 8. Return tube

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Removal".
(3) ◆◆ : Refer to "Service Points of Installation".
(4) N : Non-reusable parts

SERVICE POINTS OF REMOVAL

N21SBAE

1. REMOVAL OF EYE BOLTS

Caution
Loosen the eye bolts while tightening the weld nut of the oil cooler.

INSPECTION

N21SCAD

- Check the oil cooler fins for bend, damage and foreign matters caught between fins.
- Check the oil cooler tubes for crack, damage, clogging and deterioration.
- Check the gaskets for damage and deformation.
- Check the eye bolts for clogging and deformation.

SERVICE POINTS OF INSTALLATION

N21SDAA

8. INSTALLATION OF RETURN TUBE/7. FEED TUBE

For installation of the feed tube and return tube to the transmission, first loosely tighten each coupling and clamp, and then make the final tightening in sequence from the feed tube and return tube coupling.

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NOTE