

SECTION 21

AUTOMATIC TRANSMISSION

NOTICE:

This SECTION contains description of the automatic transmission of this model and its maintenance service. It also provides information on those parts, structure and maintenance service of the vehicle equipped with an automatic transmission which are different from or additional to those of the vehicle equipped with a manual transmission.

For basic structure of automatic transmission, refer to "AUTOMATIC TRANSMISSION BASIC MANUAL".

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21-1. AUTOMATIC TRANSMISSION

DESCRIPTION

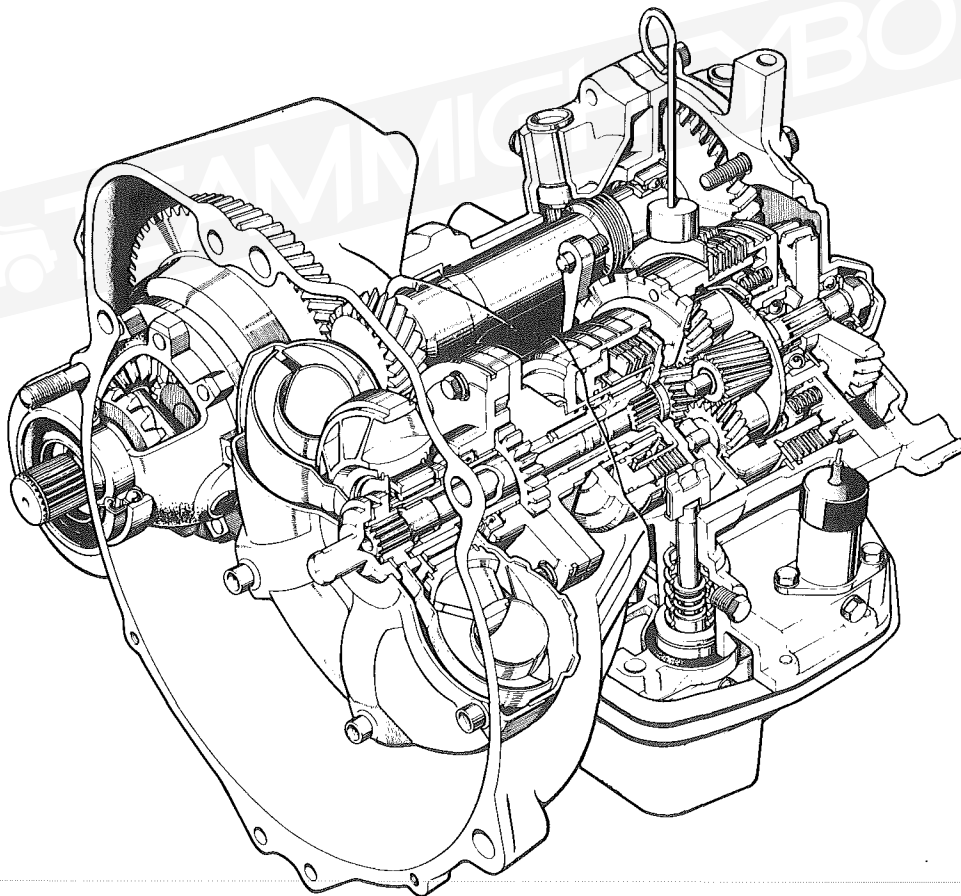
The automatic transmission used in this model consists of the following.

- Torque converter acts as a clutch by transmitting the engine torque by the use of a fluid (oil).
- Transmission effects a change in engine speed and torque transmitted through the torque converter, and further transmits it to the driving wheels.
- Valve control system consists of the electronic control system and hydraulic control system which automatically effect gear shifts in the transmission and the selector lever.

They automatically perform functions as a clutch and transmission to provide 2-forward speeds and 1-reverse.

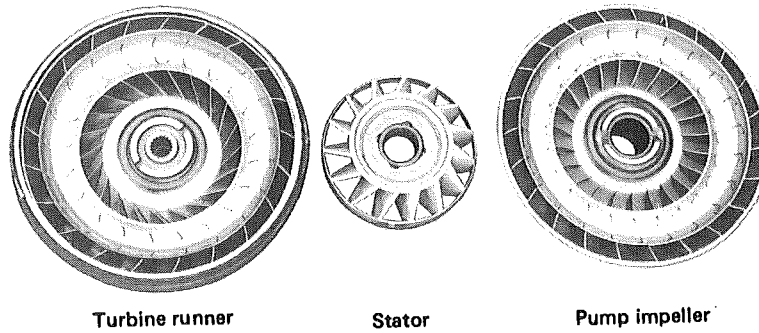
The automatic transmission has the following advantages in comparison with the manual transmission.

- It frees the driver from frequent operation of the clutch pedal and gear shift lever, thus making driving less tiring.
- The power train from the engine to the drive shaft (wheels) is not totally mechanical. Driving torque and engine brake are transmitted by means of the fluid in the torque converter. This means that each component is exposed to less shock and therefore smoother starting, acceleration and deceleration are provided.



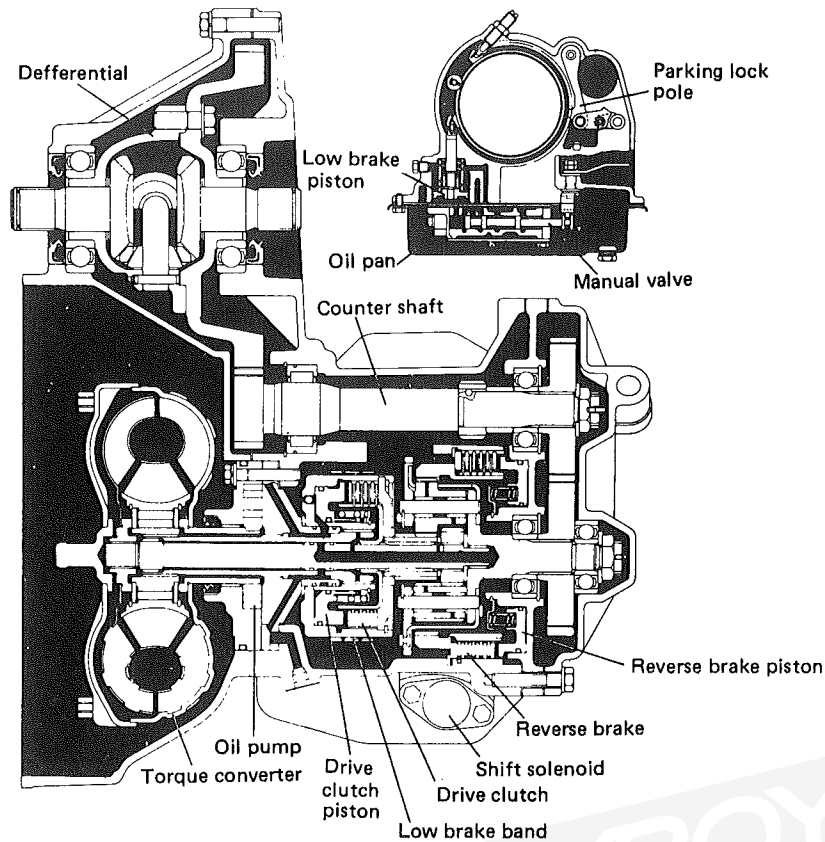
SPECIFICATIONS

Torque converter



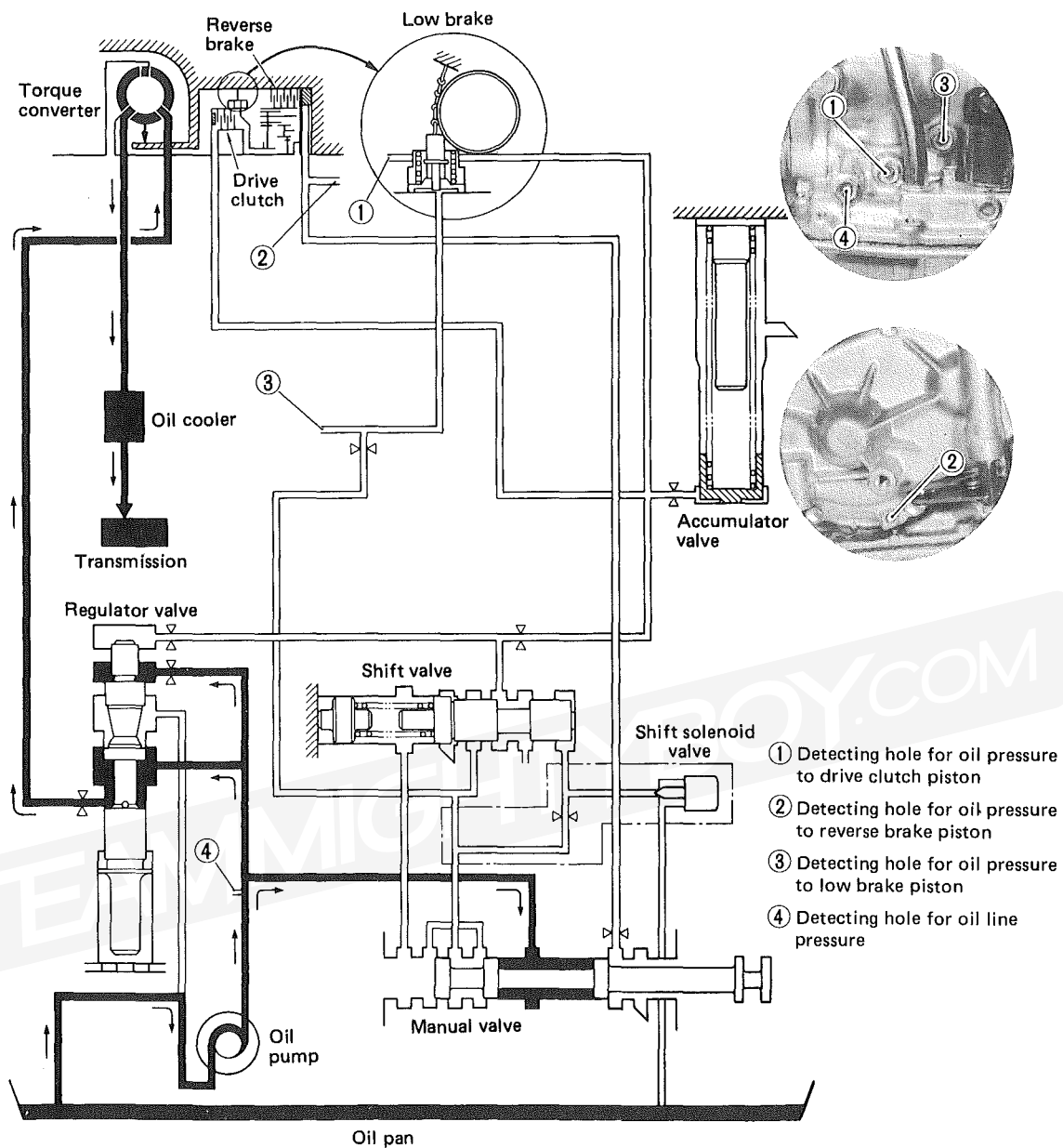
Type	3-element, 1-stage, 2-phase
Stall torque ratio	2.6
Stall point (engine speed)	2,800 – 3,100 r/min.
Nominal diameter	178 mm (7.01 in.)
One-way clutch type	Roller type

Transmission



Type			Planetary gear (2-forward speeds, 1-reverse)		
Elements of gear control system			Brake-band type brake 1 unit		
			Wet multi-plate type brake 1 unit		
			Wet multi-plate type clutch..... 1 unit		
Gear ratio & number of teeth	L		1.821	Input sun gear 28	
	D	Low	1.821	Low sun gear 23	
		High	1.000	Short pinion 28	
		R		1.821	Long pinion. 18
				Internal gear 79	
Primary gear ratio			42/37 = 1.135		
Final gear ratio			89/19 = 4.684		
Selector position	P (park)		Output shaft locked, transmission in neutral, engine start possible.		
	R (reverse)		Transmission in reverse for backing.		
	N (neutral)		Transmission in neutral, engine start possible.		
	D (drive)		For driving (automatic gear change LOW ⇄ HIGH).		
	L (low)		For uphill driving and engine braking during downhill driving on a steep slope.		

Hydraulic control system



Oil pump	Internal involute gear pump, engine drive.
Valve control system	Manual control & automatic electronic control.
Fluid	Automatic Transmission Fluid Dexron- II
Fluid capacity	3.3 ℓ (6.97/5.81 US/Imp pt)
Lubricating system	Forced feed lubrication with oil pump.
Fluid cooling system	Water cooling by circulating type auxiliary cooler built in the radiator lower tank.

SERVICE DATA

Item		Standard
Idling speed		850 – 950 r/min
Line pressure at idling speed	L range	5.5 – 7.5 kg/cm ² (78 – 107 psi)
	Low of D range	5.5 – 7.5 kg/cm ² (78 – 107 psi)
	High of D range	4.5 – 5.5 kg/cm ² (64 – 78 psi)
	R range	6.0 – 8.0 kg/cm ² (85 – 114 psi)
Stall point (engine speed)		2,800 -- 3,100 r/min
Lag time	From N range to R	Less than 1.4 second
	From N range to D	Less than 0.6 second
Brake band adjusting screw		Tighten the anchor bolt to the torque of 3.5 ~ 4.5 N·m (0.35 ~ 0.45 kg-m, 2.6 ~ 3.0 lb-ft) and then loosen it by 4 1/2 turns.
Shift solenoid		10 – 16 Ω
Drive plate deflection		Less than 0.25 mm (0.01 in.)

Item	Standard	Service Limit
Oil pump side clearance	0.04 – 0.07 mm (0.0016 – 0.0027 in.)	0.09 mm (0.0035 in.)
Outer gear periphery clearance in pump case	0.10 – 0.18 mm (0.0039 – 0.0071 in.)	0.3 mm (0.0118 in.)
Outer gear tooth clearance in pump case	0.05 – 0.10 mm (0.0020 – 0.0039 in.)	0.5 mm (0.0197 in.)
Side clearance of oil pump cover seal ring	0.05 – 0.13 mm (0.0020 – 0.0051 in.)	0.35 mm (0.0138 in.)
Primary reduction gear backlash	0.05 – 0.20 mm (0.0020 – 0.0079 in.)	0.3 mm (0.0118 in.)
Reverse brake piston height	13.7 – 14.2 mm (0.54 – 0.56 in.)	—
Reverse brake clearance	2.26 – 3.38 mm (0.089 – 0.133 in.)	3.9 mm (0.153 in.)

Item	Standard	Service Limit
Drive clutch clearance	1.85 – 2.80 mm (0.073 – 0.110 in.)	3.5 mm (0.138 in.)
Free end gap of low brake piston ring	0.1 – 0.3 mm (0.0039 – 0.0118 in.)	—
Free length of low brake piston return spring	40.2 mm (1.58 in.)	—
Preload of low brake piston return spring	6.9 – 8.5 kg (15.2 – 18.7 lb) for fitting length 34 mm (1.34 in.)	—
Side clearance of planetary gear short pinion	0.23 – 0.62 mm (0.009 – 0.024 in.)	0.8 mm (0.031 in.)
Side clearance of input shaft seal ring	0.05 – 0.13 mm (0.0020 – 0.0051 in.)	0.35 mm (0.0138 in.)

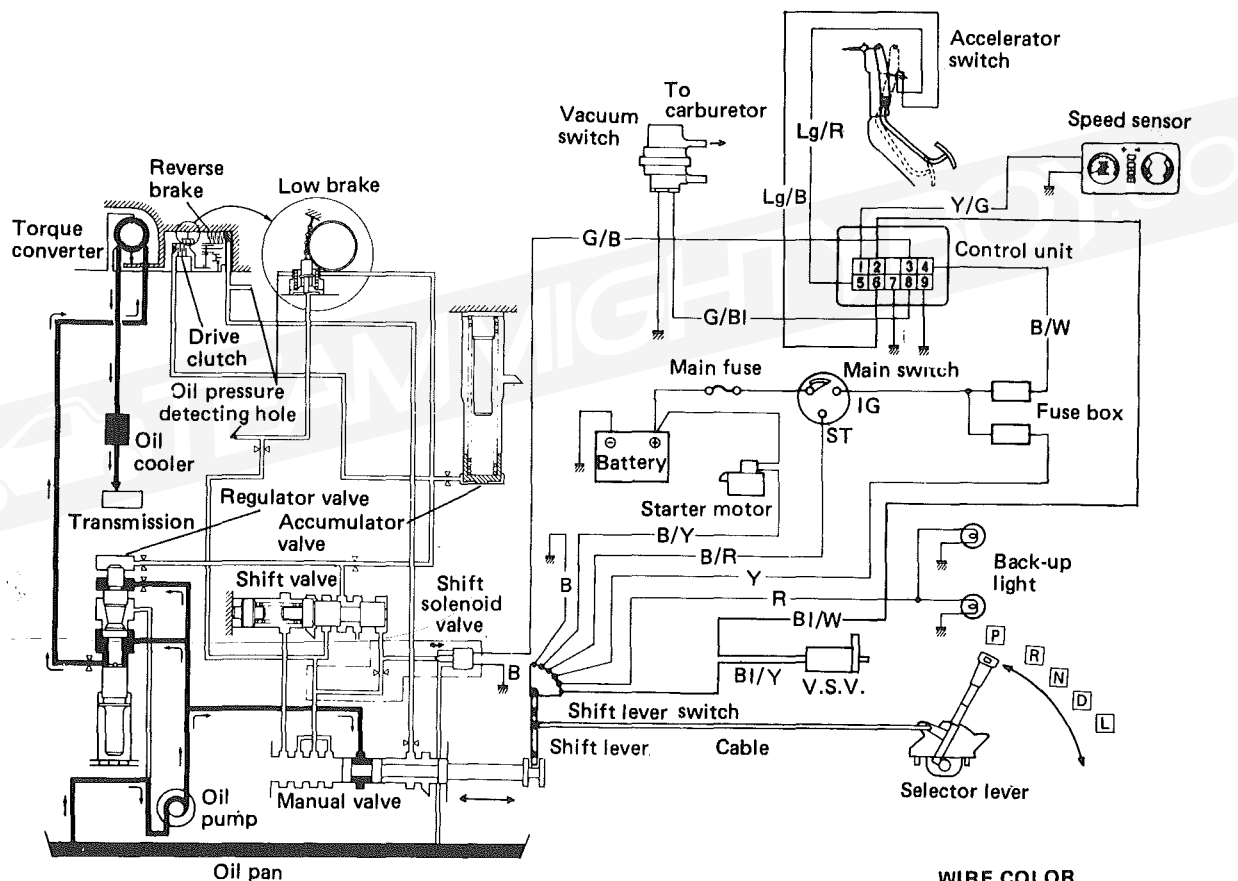


OPERATION

Operation of the automatic transmission in outline is as follows.

As the engine starts, the pump impeller of the torque converter which is connected to the crankshaft rotates, and so does the oil pump where oil pressure is produced. The torque converter transmits the engine revolution to the transmission. Also in the valve control system, with the selector lever shifted to a desired position (from **P** or **N** range to **R**, **D** or **L**), the manual valve in the hydraulic control system is actuated to control opening or closing of each oil pressure line to the clutch piston and the brake pistons in the transmission. Each piston then acts on the clutch, brake and brake band to provide gear shift for the selected lever position. In addition, with the selector lever in **D** range, the gear is shifted automatically from LOW to HIGH and vice versa. This is done by the solenoid valve in the hydraulic control system under the control of the electronic control system.

The structure and operation of the torque converter and transmission are described in the BASIC MANUAL. This section discusses the selector lever control system and the automatic gear shift system in **D** range.

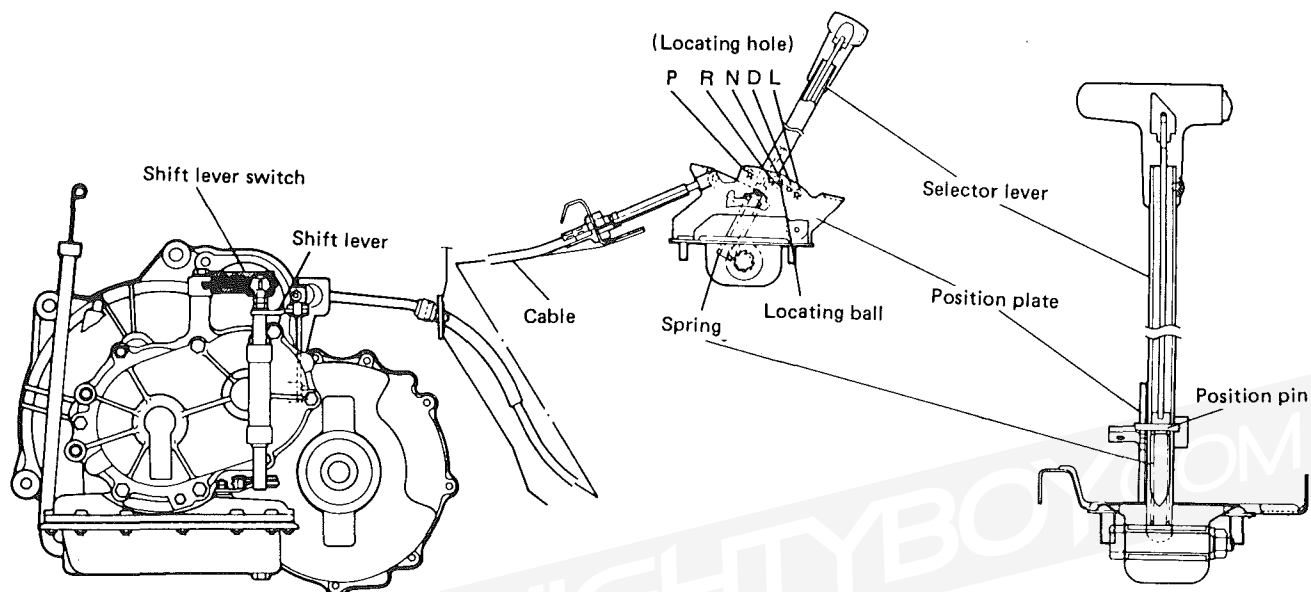


WIRE COLOR

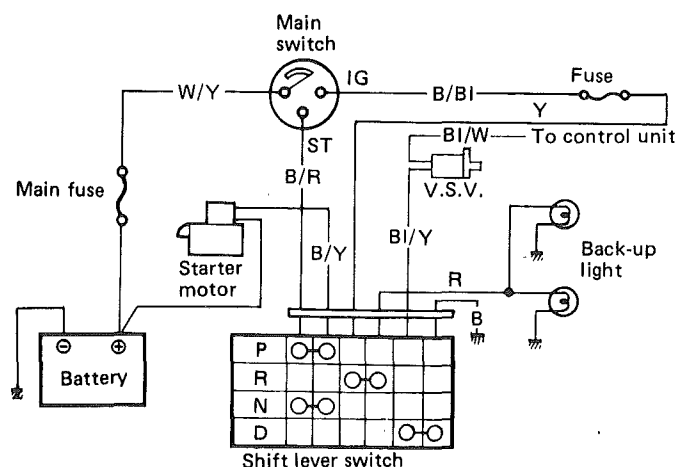
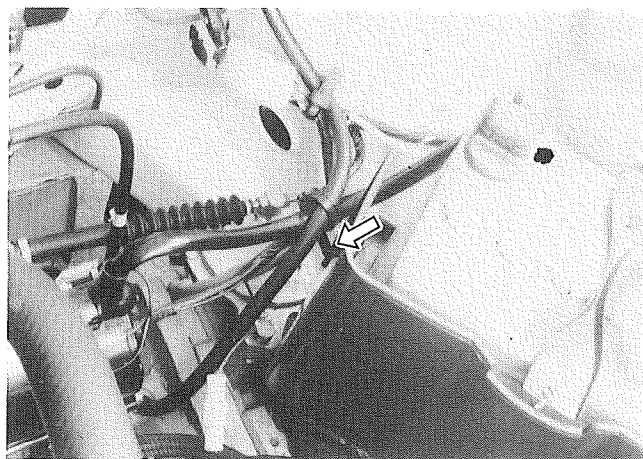
B	Black
B/R . . .	Black with Red
B/W . . .	Black with White
BI/Y . .	Blue with Yellow
BI/W . .	Blue with White
B/Y . . .	Black with Yellow
G/B . . .	Green with Black
G/BI . .	Green with Blue
Lg/B . .	Light green with Black
Lg/R . .	Light green with Red
R	Red
Y/G . . .	Yellow with Green

Selector lever control system

The selector lever is installed in the center of the front floor. It is linked by the cable to the shift lever of the transmission (which actuates the manual valve in the hydraulic control system and the parking lock pole). The shift lever switch is mounted on the shift lever shaft and operated by it. When the selector lever is shifted to **P** or **N** range, the electrical circuit to the starter is produced, and when shifted to **R**, the circuit to the back up light is produced, and when shifted to **D**, the circuit to V.S.V. is produced.



[Shift lever switch]



WIRE COLOR

B . . . Black
B/R . . Black with Red
B/BI . . Black with Blue
B/Y . . Black with Yellow

BI/Y . . Blue with Yellow
BI/W . . Blue with White
R . . . Red
W/Y . . White with Yellow
Y . . . Yellow

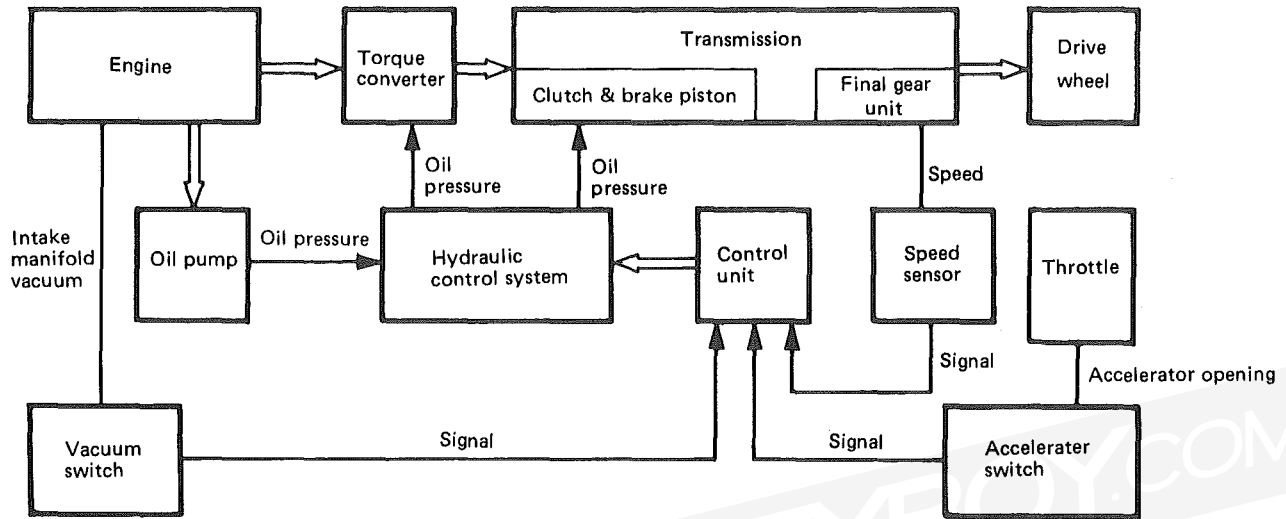
Automatic gear shift system in **D** range

[Description]

This system operates in **D** range as follows.

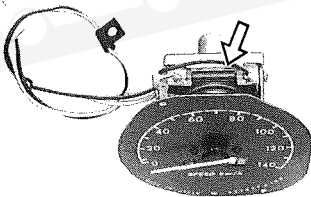
When the control unit receives signals from those sensors of car speed, intake manifold vacuum and accelerator opening, it actuates the shift solenoid which directs oil under pressure in the hydraulic control system so as to effect gear shift in the transmission.

Gear shift system diagram

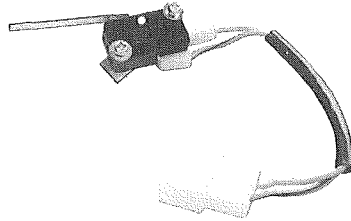


[Components]

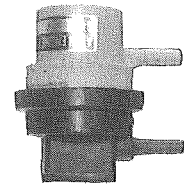
Speed sensor



Accelerator switch



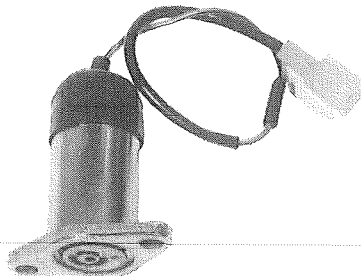
Vacuum switch



Control unit



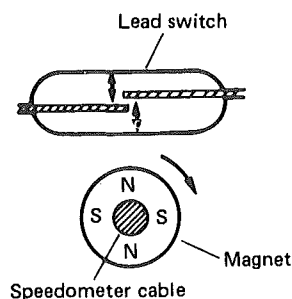
Shift solenoid



[Operation]

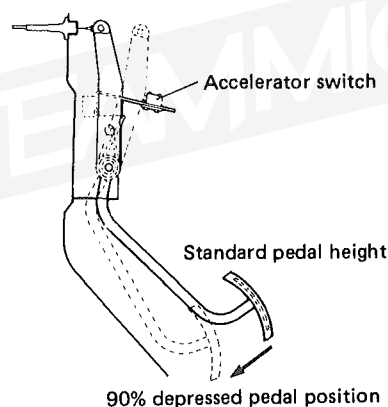
Speed sensor

The speed sensor consisting of the lead switch and magnet is built in the speedometer. As the magnet rotates with the speedometer cable, its magnet force causes the lead switch to turn ON and OFF. ON and OFF of the lead switch are sent to the control unit as pulse signals in proportion to car speed.



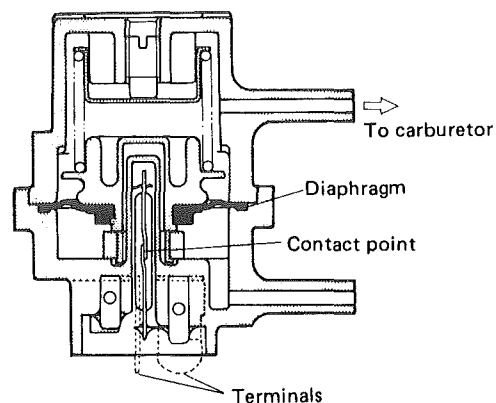
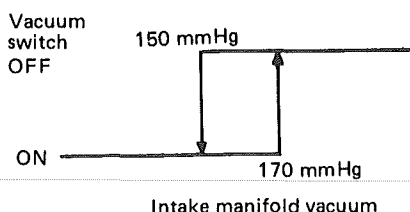
Accelerator switch

The accelerator switch is mounted on the accelerator pedal bracket. When the accelerator pedal is depressed more than 90% down, the switch turns ON and signals accelerator opening to the control unit.



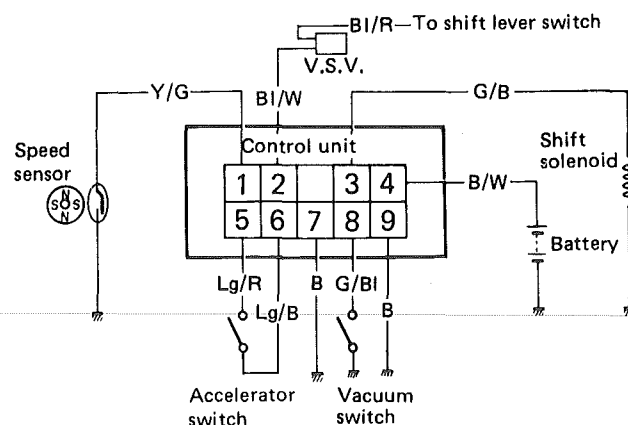
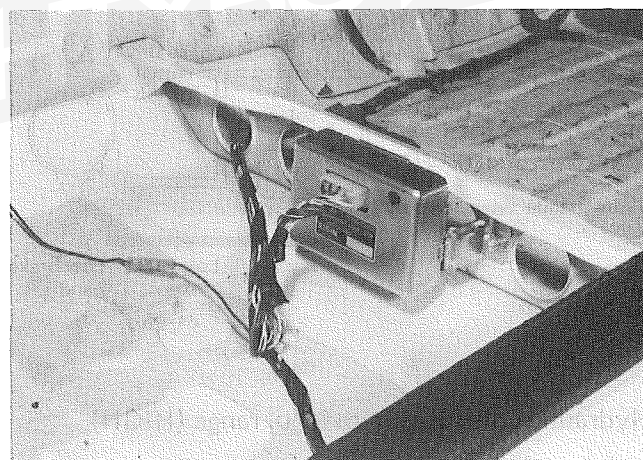
Vacuum switch

The vacuum switch turns ON or OFF by the intake manifold vacuum and signals the engine load to the control unit.



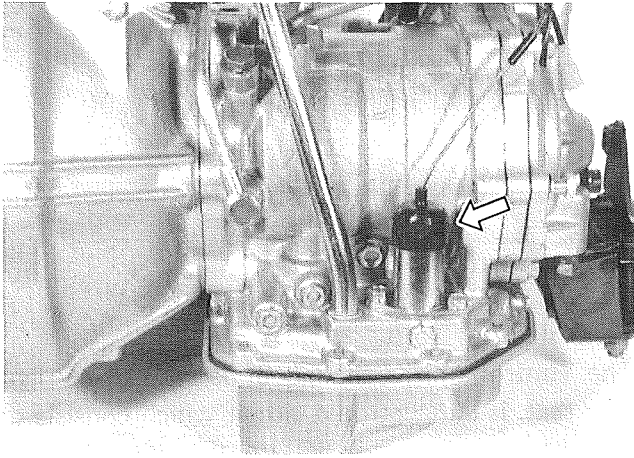
Control unit

The control unit, installed under the front right side seat, is an electronic circuit which consists of such semiconductors as IC, transistors and diodes. It receives signals from the speed sensor, accelerator switch and vacuum switch and send a signal to the shift solenoid so as to control gear shift in **D** range.



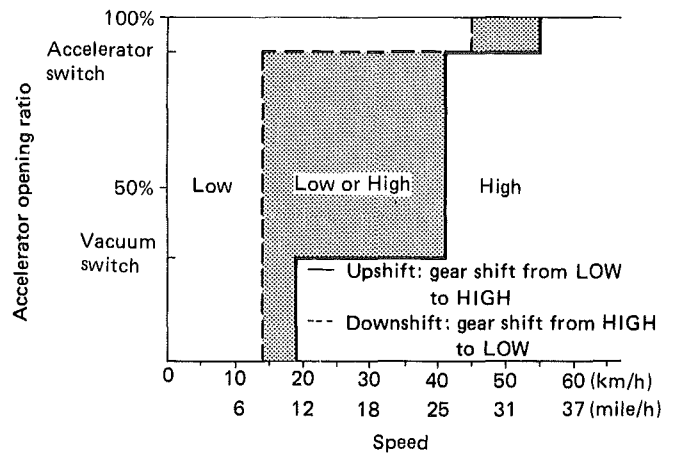
Shift solenoid

The shift solenoid is mounted in the transmission hydraulic control system. Being actuated by the signal from the control unit, it directs the flow of oil under pressure.

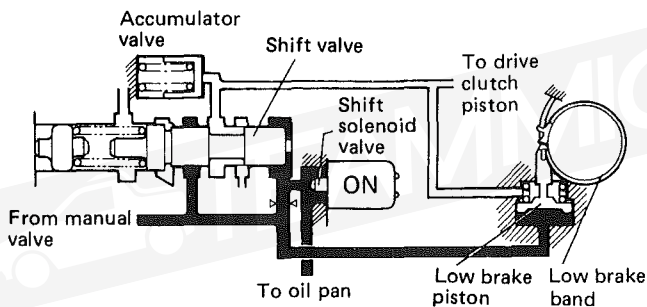


Gear shift pattern in **D** range

The gear shift in **D** range is determined by signals from the speed sensor, accelerator switch and vacuum switch as shown in the diagram below.



Hydraulic control system in **D** range (LOW)

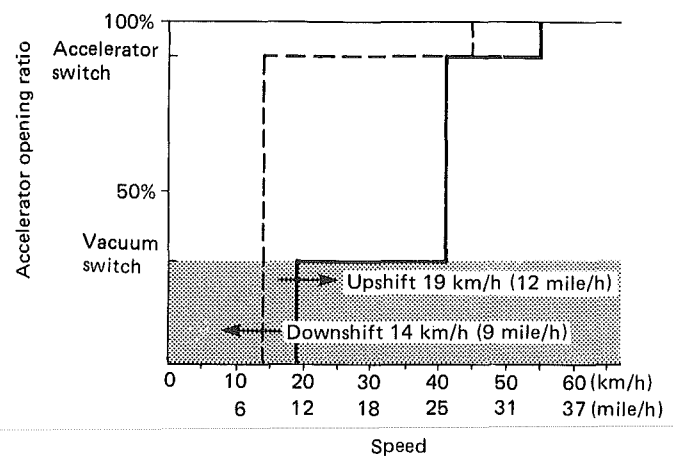
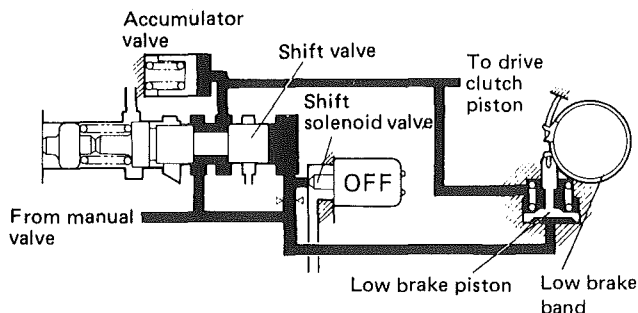


Gear shift points (both downshift and upshift) vary with driving conditions, but they fall into the following four patterns.

- (1) When the car is driven with the accelerator pedal depressed approximately 1/4 way down (The engine is under low load and the vacuum switch is OFF) as shown by the shaded area in the diagram, gear shift points are as follows.

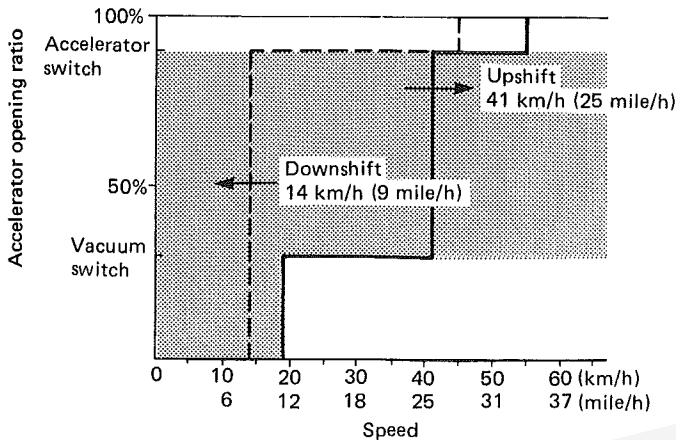
	Speed
Upshift	16 – 22 km/h (10 – 14 miles/h)
Downshift	9 – 19 km/h (6 – 12 miles/h)

Hydraulic control system in **D** range (HIGH)



- (2) When the car is driven with the accelerator pedal depressed approximately 1/2 way down (the engine is under medium load, the vacuum switch is ON and the accelerator switch is OFF) as shown by the shaded area in the diagram, gear shift points are as follows.

	Speed
Upshift	38 – 44 km/h (23 – 27 miles/h)
Downshift	9 – 19 km/h (6 – 12 miles/h)

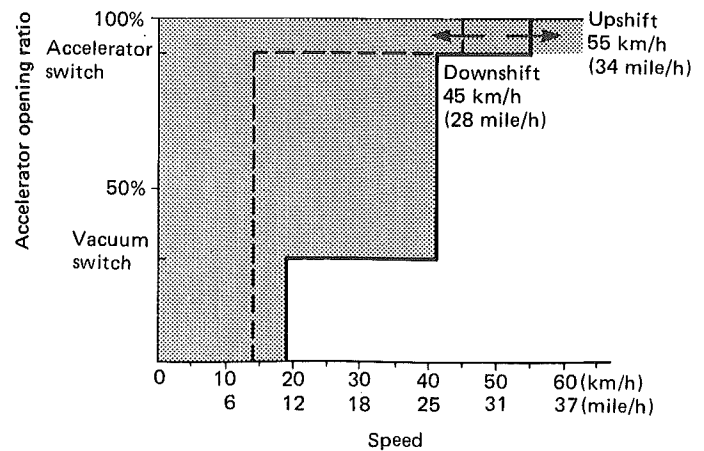


NOTE:

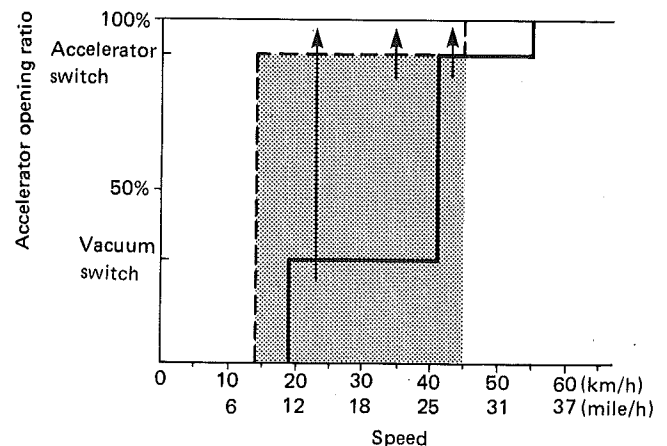
The vacuum switch operating point varies with driving conditions, for engine vacuum itself varies with them.

- (3) When the car is driven with the accelerator pedal depressed more than 90% of its full stroke down (the engine is under high load and the accelerator switch is ON) as shown by the shaded area in the diagram, gear shift points are as follows.

	Speed
Upshift	52 – 58 km/h (32 – 36 miles/h)
Downshift	40 – 50 km/h (25 – 31 miles/h)

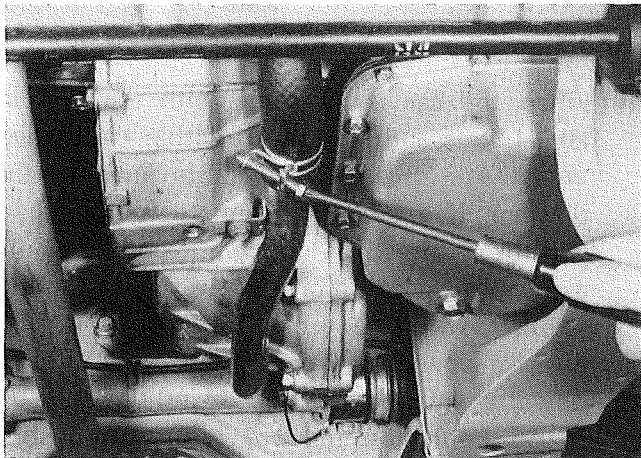


- (4) When the car is travelling with the gear in HIGH state and at a speed within the shaded area (14 – 45 km/h, 9 – 28 miles/h) in the diagram, if a quick acceleration is needed, it will be achieved as follows. Depressing the accelerator pedal more than 90% of its full stroke down (the accelerator switch is ON) effect a downshift from HIGH to LOW (kick-down) and accelerates the car in LOW state up to 55 km/h (34 miles/h) where an upshift occurs.

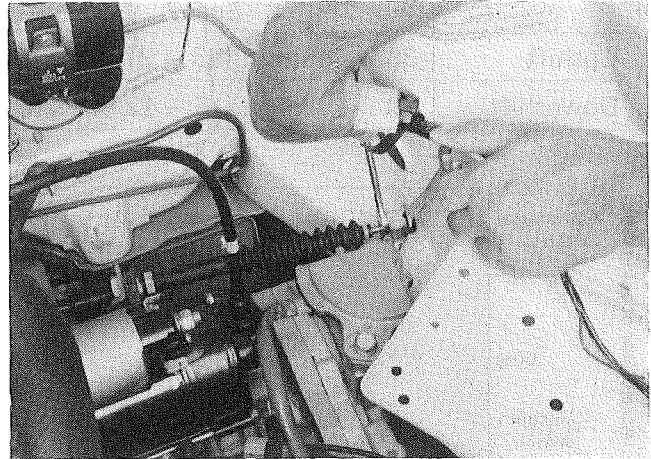


DISMOUNTING

1. Disconnect negative (—) and positive (+) cords from the battery terminals, and remove the battery and its tray.
2. Remove engine hood.
3. Remove the front grille and upper member.
4. Disconnect the radiator fan thermo switch and radiator fan lead wires at the coupler.
5. Disconnect the radiator outlet hose from the outlet pipe and drain the cooling water.



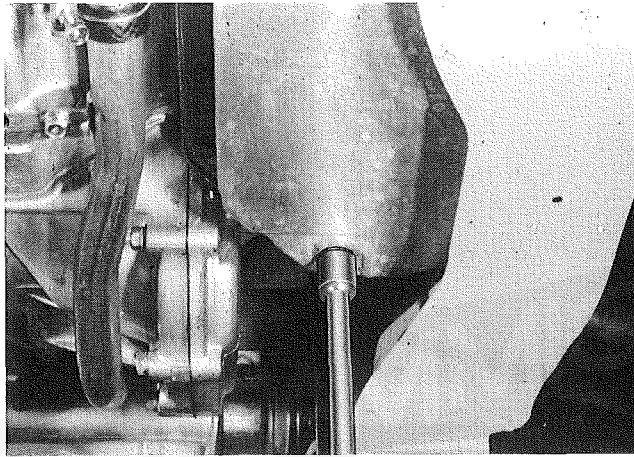
13. Disconnect shift switch and shift solenoid lead wires at the coupler.
14. Disconnect the selector lever control cable from the shift switch lever and its bracket.



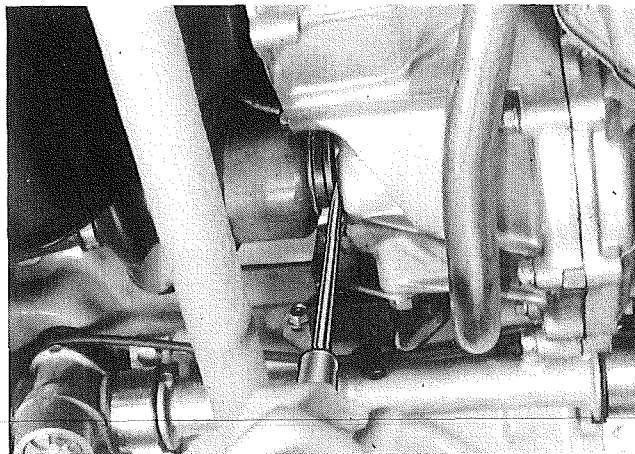
6. Disconnect the radiator inlet hose from the thermostat cap.
7. Disconnect the transmission oil cooler outlet and inlet hoses from the oil cooler pipes.
8. Remove the radiator and reserve tank from the body.
9. Pull off ignition coil high-tension cord from the distributor.
10. Disconnect the lead wire from distributor terminal.
11. Release wire harness and breather hose from its clamp, and disconnect the lead wires and positive (+) battery cord from the starter motor.
12. Disconnect the lead wire and negative (—) battery cord from transmission case.

15. Disconnect the speedometer cable from the transmission case.
16. Disconnect the coupler and lead wire from the alternator terminals.
17. Remove the air cleaner case.
18. Disconnect the choke and accelerator wires from the carburetor body.
19. Disconnect the carburetor solenoid lead wire at the coupler.
20. Disconnect canister vacuum hose from intake manifold (if equipped).
21. To release the pressure in fuel tank, remove fuel filler cap and then, reinstall it.
Disconnect the fuel return hose from the carburetor body.
22. Disconnect the fuel inlet (feed) hose from the fuel pump.

23. Disconnect the lead wire from the water TEMP. gauge.
24. Disconnect the lead wire from the oil pressure gauge.
25. Disconnect the vacuum switch and VSV lead wires at the coupler.
26. Disconnect the heater outlet and inlet hoses from water inlet pipe and heater valve.
27. Remove the torque rod from its brackets.
28. Lift the front end of the machine by jacking, and support it on safety stands.
29. Disconnect the exhaust center pipe from the exhaust manifold and remove exhaust center pipe mounting bolt.
30. Drain the transmission fluid.



31. Disconnect the drive shaft differential side joints (left & right) from differential side gear.

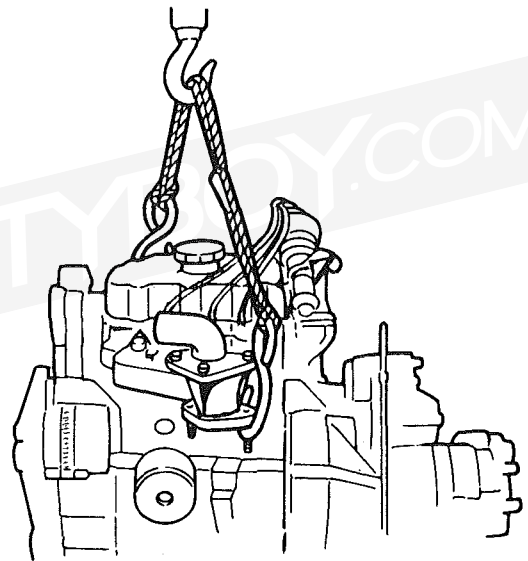


32. Set a piece of wire across the hook on the inlet manifold and another safe place such as the exhaust manifold so that the engine can be lifted by using a chain block.
33. Remove the nuts securing the engine and transmission mountings to make the engine ready for removal.

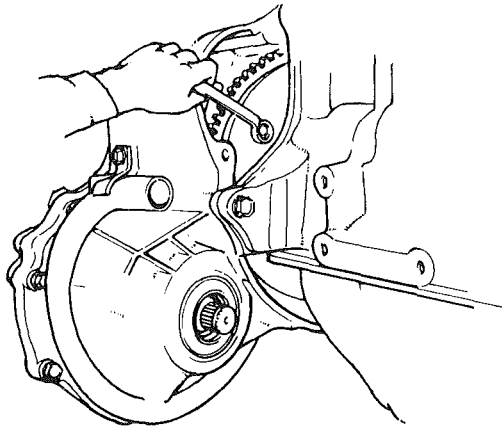
CAUTION:

Before finally lifting engine, recheck to ascertain all items are disconnected and free.

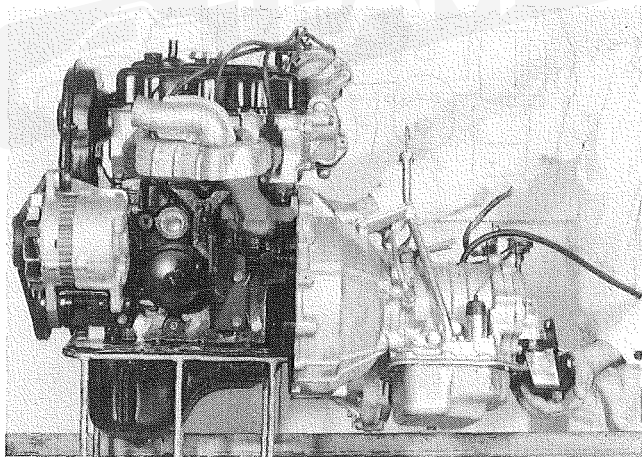
34. Lift the engine a little and pull the drive shafts (right & left) out of the spline of the differential side gear.
35. Take down the engine with transmission.



36. Disconnect the vacuum hose from the vacuum switch.
37. Disconnect the hose from the radiator outlet pipe.
38. Remove the starter motor.
39. Remove the clutch housing lower plate.
40. Loosen the bolts securing the torque converter and drive plate.



41. Remove the transmission together with torque converter.



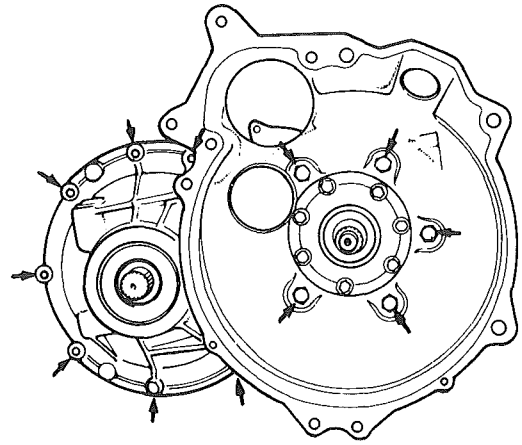
DISASSEMBLING, INSPECTION AND REASSEMBLING

1. Disassembling

When disassembling the automatic transmission, observe the following precautions.

NOTE:

1. Carry out the work in a clean dust-free conventional workshop.
2. Wash off thoroughly sand, dirt and whatever on the outside of the transmission.
3. Don't use gloves during the work.
4. When separating the transmission case which is made of aluminum alloy, use a plastic hammer and tap lightly. Never force it apart with a driver inserted between the mating surfaces, for damage to the mating surface will cause oil leakage.
5. Use care to prevent dust and foreign matters from getting inside the disassembled parts.
6. Keep the disassembled parts in order so as not to lose them.
7. Try to investigate the cause of the trouble while disassembling.

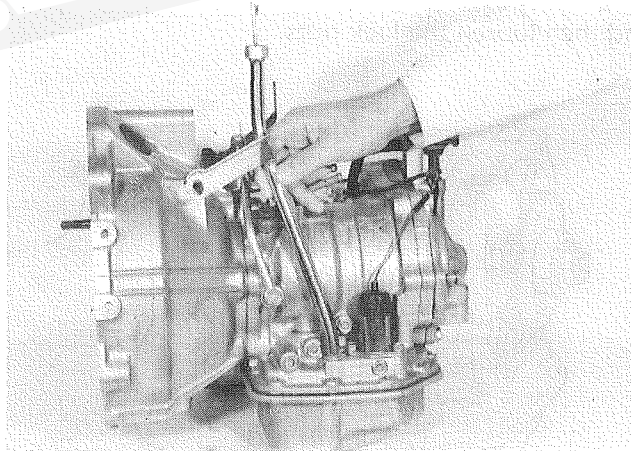


Remove the torque converter housing and differential by tapping the torque converter housing and the differential side gear shaft lightly with a plastic hammer.

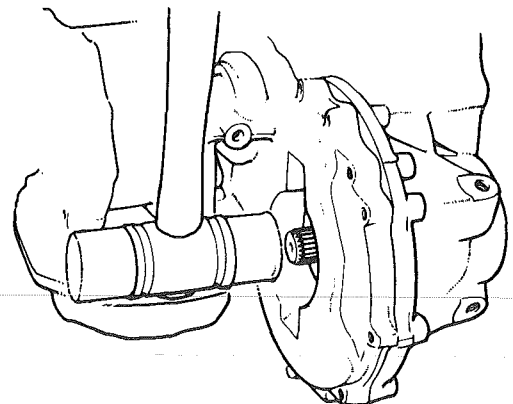
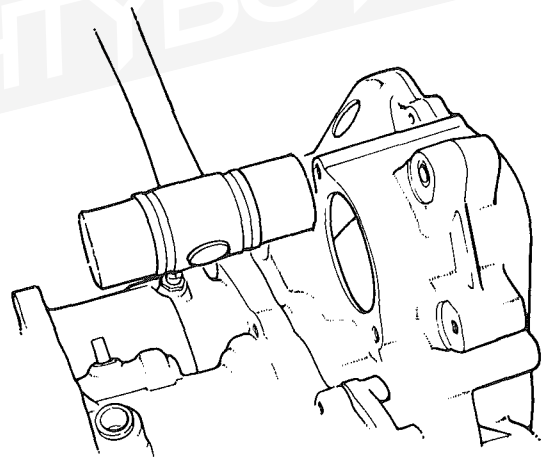
NOTE:

- Use care to prevent damage to the oil pump oil seal.

Remove the filler tube after loosening its stay bolt.



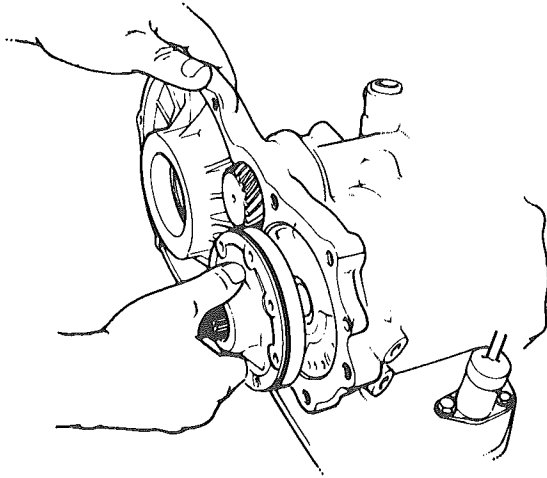
Loosen the bolts fastening the torque converter housing.



Remove the oil pump by loosening its fixing bolts.

NOTE:

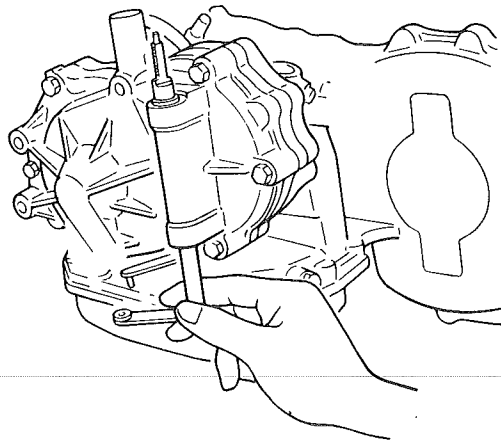
- Use care not to let the oil pump inner gear drop off.



Remove the shift lever switch, and then remove the shift lever and boot by loosening the shift lever fastening nuts. Remove the snap ring from the joint section of the shift lever shaft and manual lever. Remove the snap ring from the shift lever shaft and pull out the shift lever shaft from the rear cover.

NOTE:

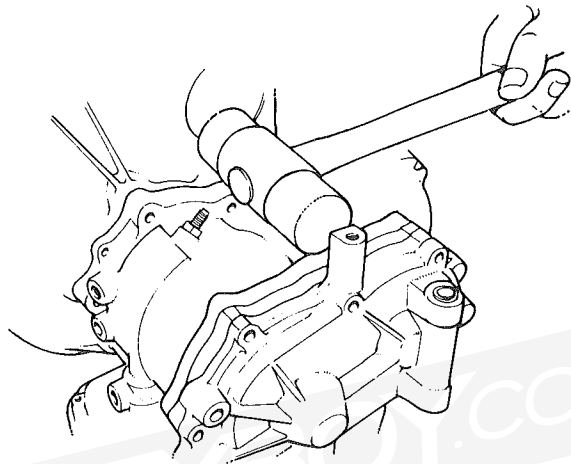
- Use care not to lose the thrust washer on the shift lever shaft and the bush of the joint section.



Loosen the bolts fastening the transmission rear cover and remove the cover by tapping it with a plastic hammer.

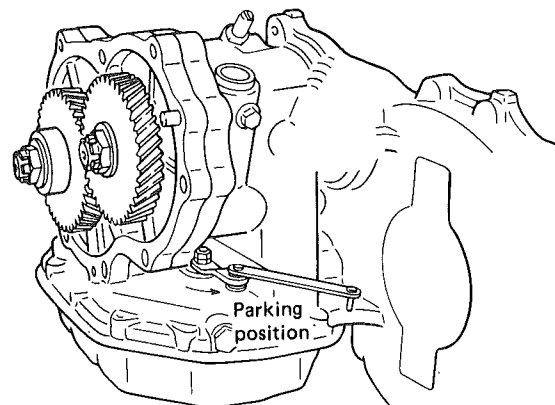
NOTE:

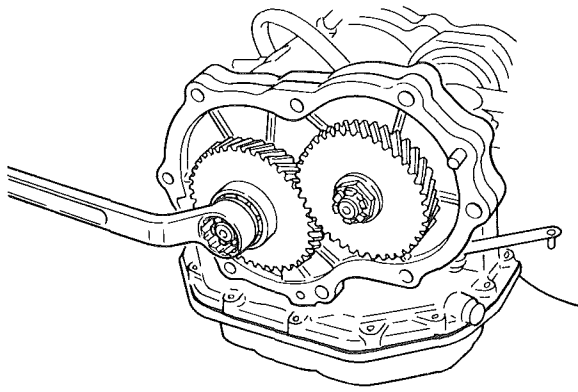
- Make sure not to force off the cover by inserting the driver between the mating surfaces.
- Draw the cover straight out.



Remove the cotter pins from the lock nuts of the output shaft and counter shaft.

Shift the manual lever to the parking position so that the output shaft is locked and cannot turn, and then loosen the lock nuts.

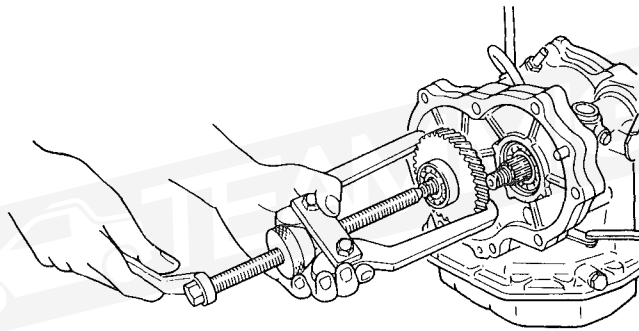




Remove the reduction driven gear and then remove the reduction drive gear together with bearing by using the bearing puller.

NOTE:

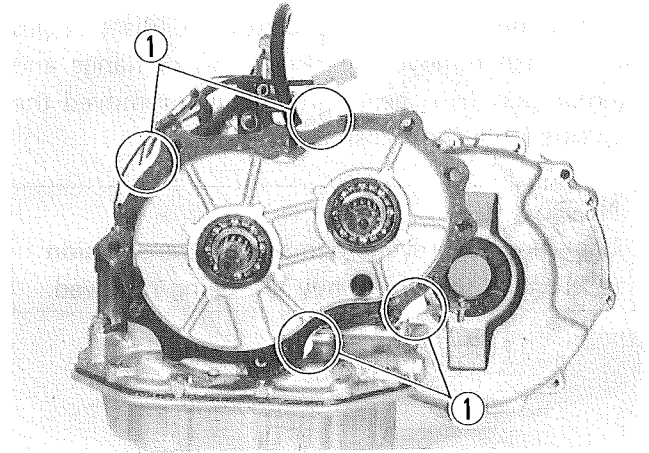
Be very careful to prevent damage to the tooth surface of the gear.



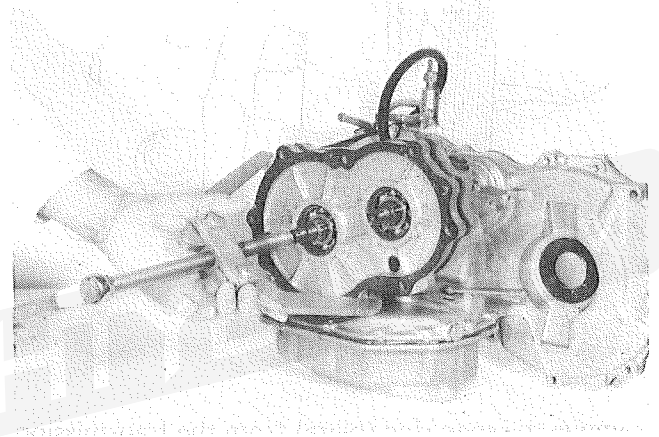
Using the bearing puller, remove the reverse brake drum by catching the projecting parts of the reverse brake drum with the puller claws.

NOTE:

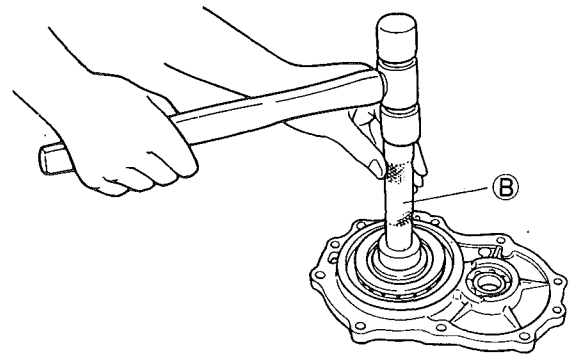
- Use care to prevent damage to the mating surfaces of the reverse brake drum and transmission case.
- Draw the reverse brake drum straight out.
- Be careful not to lose knock-pins (2 pcs).



1. Projecting parts



When removing the output shaft bearing or the counter shaft bearing from the reverse brake drum, accomplish the work with the special tool ② after the snap ring was removed.

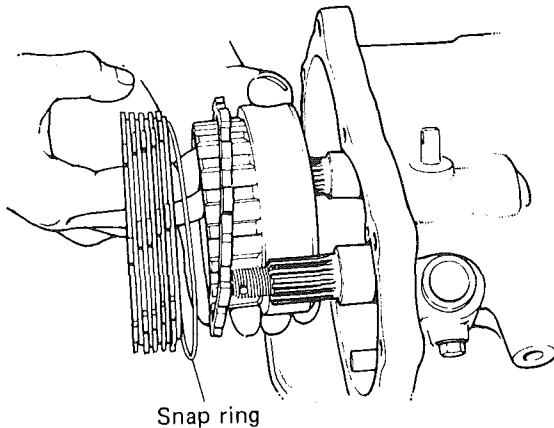


② : Bearing installer (09922-55131)

Remove the reverse brake plates and discs (4 pcs each). Then remove the reverse brake flange and internal gear (ring gear) after having removed the snap ring from the transmission case.

NOTE:

Use care to prevent damage to transmission case and discs while they are being removed.

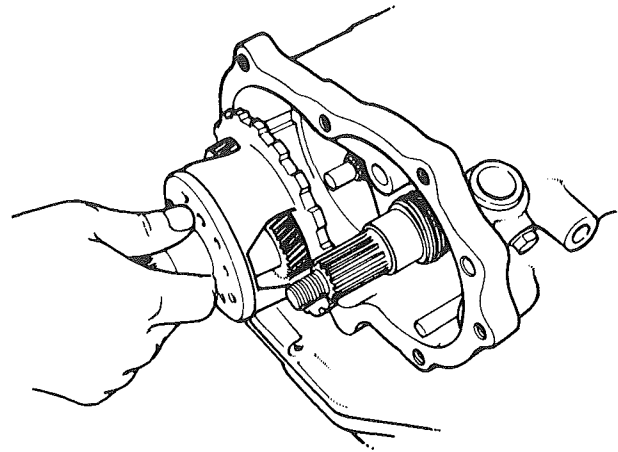
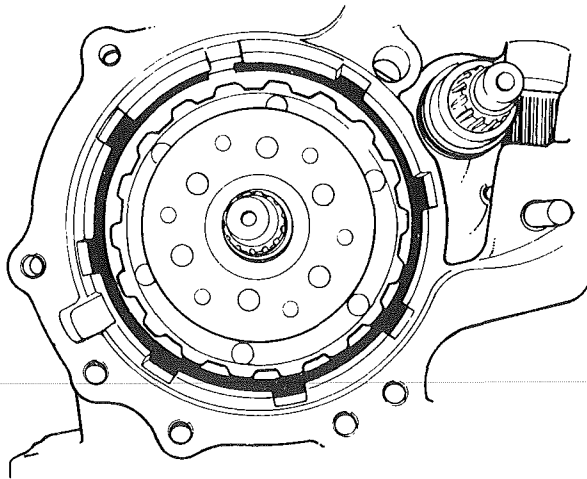


Snap ring

Remove the snap ring (plate) from the transmission case with a driver or the like and then remove the planetary gear unit.

NOTE:

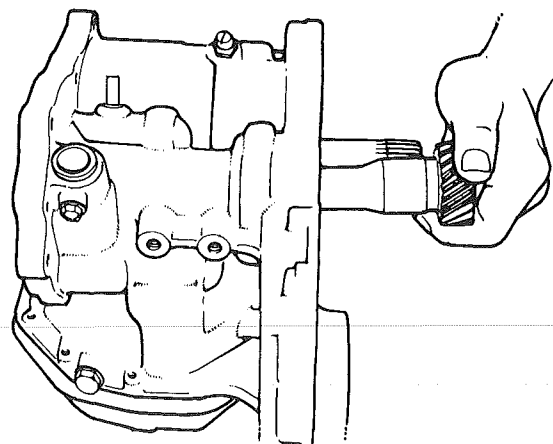
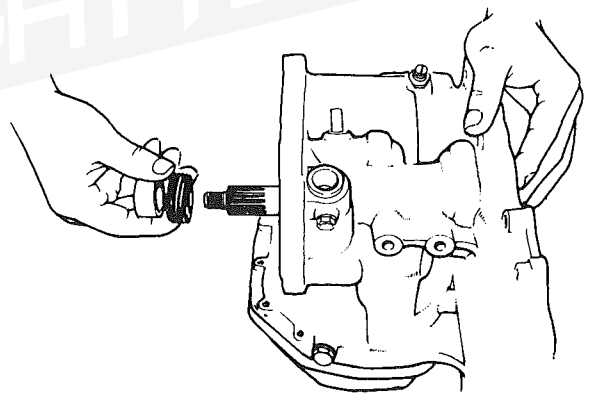
Use care to prevent damage to the transmission case when removing the snap ring.



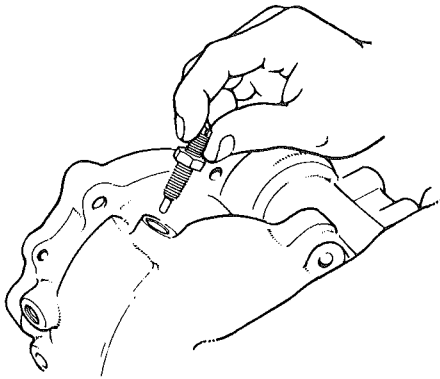
Draw out the spacer and speedometer drive gear from the counter shaft and then pull out the counter shaft from the transmission case.

NOTE:

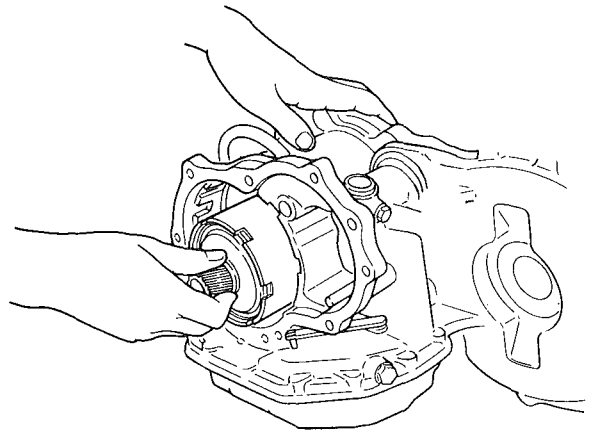
Make sure to keep the speedometer drive gear lock ball.



Remove the low brake band adjusting bolt (anchor bolt) by loosening its lock nut.



Remove the clutch drum ass'y, low brake band, low brake band struts and clutch drum thrust washer.

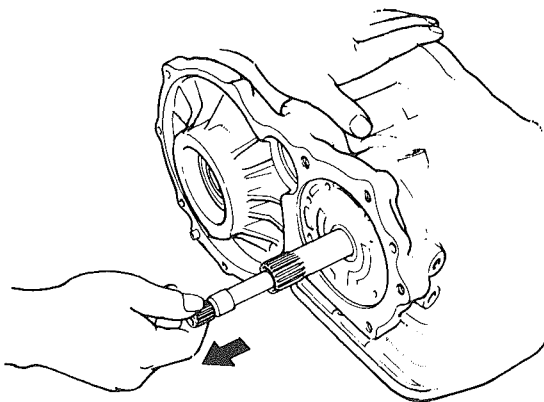


Remove the low sun gear thrust washer from the input shaft.

NOTE:

The low sun gear thrust washer may be attached to the planetary gear unit in some cases.

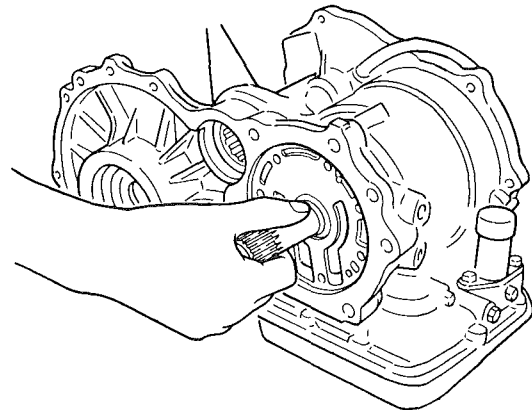
Pull out the input shaft slowly toward the torque converter side, using care to avoid damage to the seal ring on the shaft.



Remove the oil pump cover from the transmission case. If it can't be removed by hand, put the transmission case in the used ATF, heat it to 50 ~ 60°C (122 ~ 140°F) and then remove the cover.

NOTE:

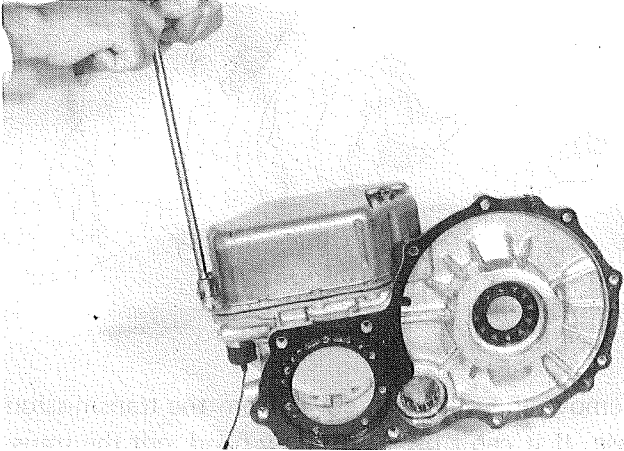
- Draw the oil pump cover straight out.
- Never force it off with a hammer.



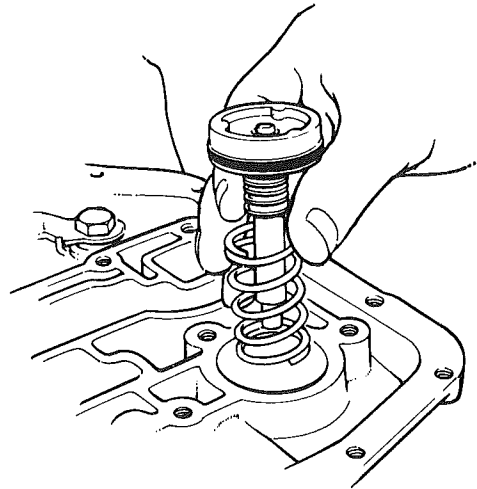
Remove the oil pan by loosening its fixing bolts.

NOTE:

- Don't try to force off the oil pan by inserting the driver between the mating surfaces.

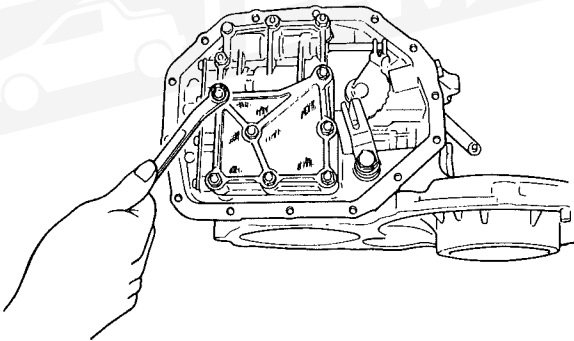


Remove the low brake piston and return spring from the transmission case.



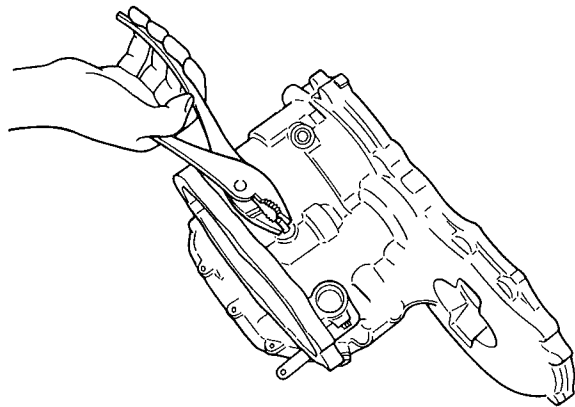
Remove the oil breather hose from the breather plug, and using pliers or a driver and a hammer, remove the oil breather plug from the transmission case.

Loosen the bolts and nuts fastening the valve body and remove the oil strainer and valve body.

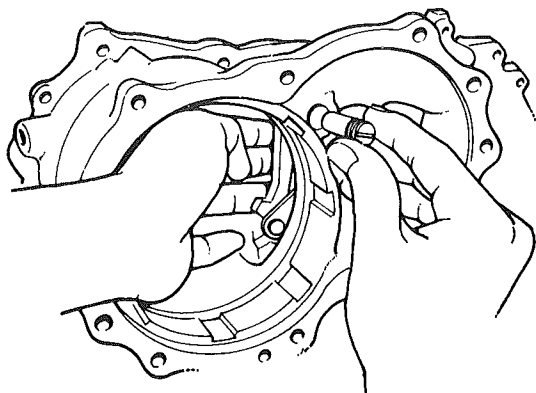


NOTE:

Use care to prevent damage to the transmission case.



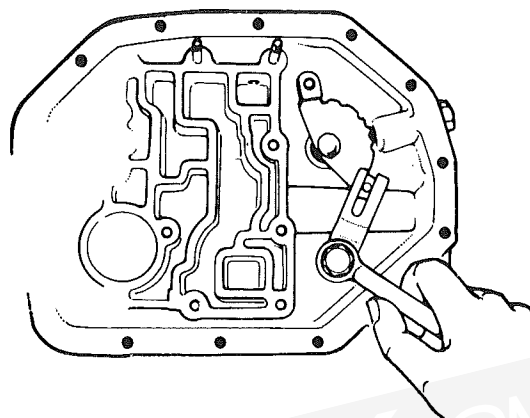
Loosen the upper pin of the parking lock pole with a driver and pull it out of the case.



Loosen the bolt fastening the parking idler lever. And then remove the parking idler lever, return spring and toggle operating lever all together.

NOTE:

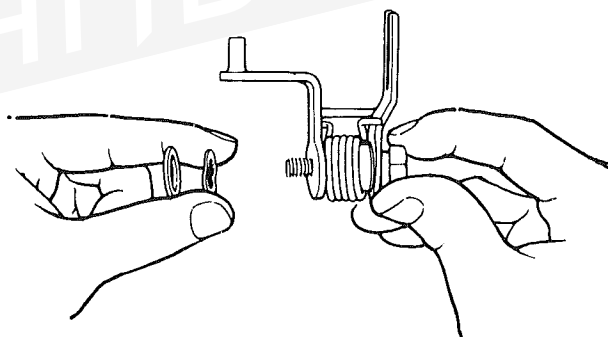
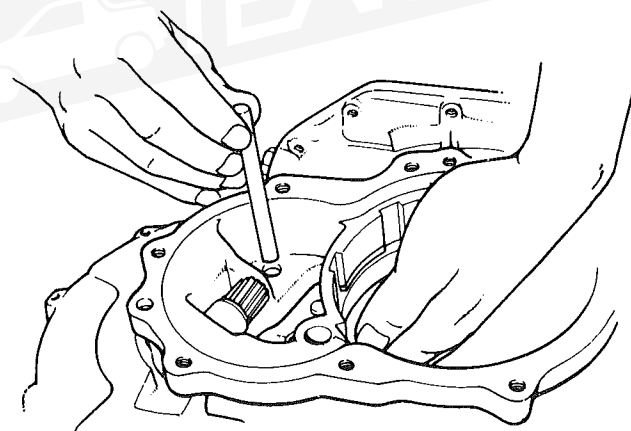
Use care not to lose the wave washer and plain washer.



Pull out the lower pin of the parking lock pole and remove the parking lock pole ass'y.

NOTE:

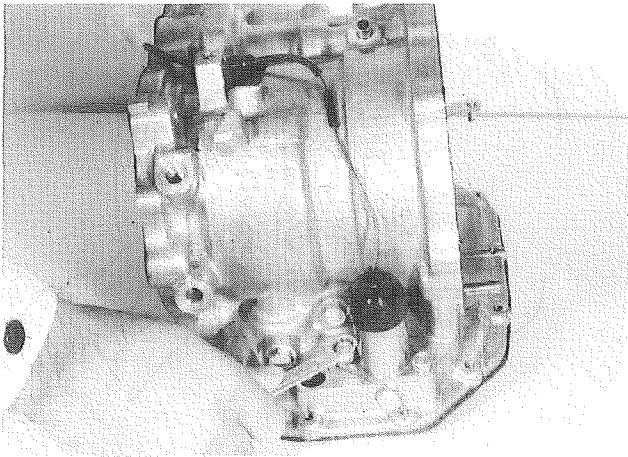
Make sure to keep the spacer fitted to the lower pin.



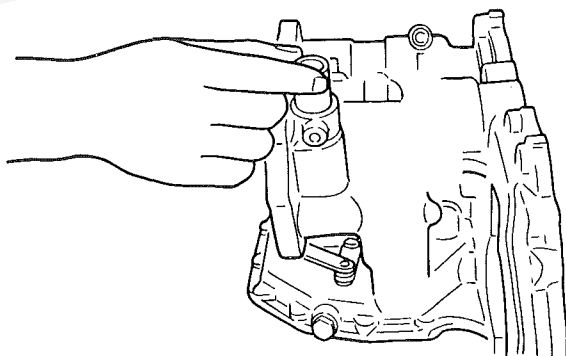
Remove the shift solenoid by loosening its fastening bolts.

NOTE:

- Don't pull the lead wire when removing the shift solenoid.
- O-rings may be attached to the case. Be sure to keep them.



Remove the stopper bolt of the speedometer cable and then remove the speedometer driven gear and sleeve from the transmission.



2. Inspection (during disassembly)

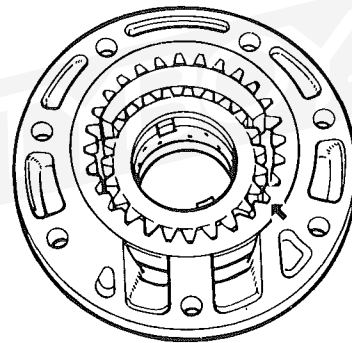
If any part is found defective in any of the following steps or its test result exceeds the specified limit, make sure to replace that part or its related parts as necessary.

Torque converter

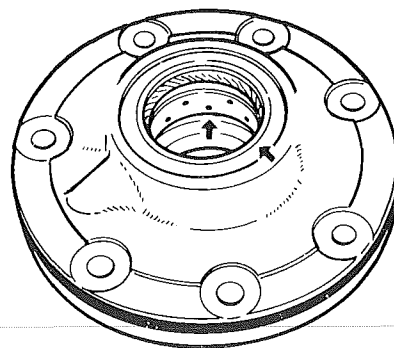
- Visually inspect the torque converter for damage and dent.
- Check the outside surface of the torque converter and its welded section for oil leakage.

Oil pump

- Visually inspect the tooth surfaces of both the inner and outer gears for damage and wear.

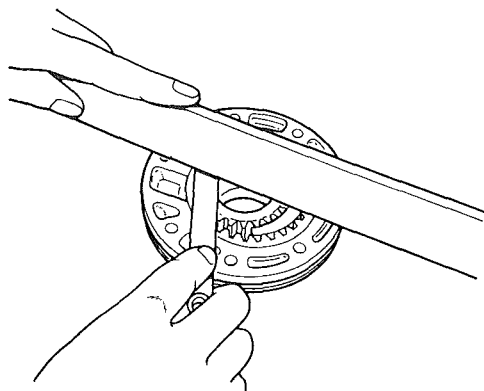


- Check the bush and oil seal in the oil pump case for damage and wear.



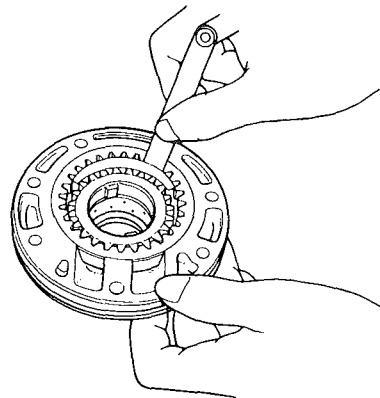
- Using a straightedge and a thickness gauge, check the (side) clearance between the outer gear/inner gear and pump case.

Side clearance	Standard	Limit
	0.04 – 0.07 mm (0.0016 – 0.0027 in.)	0.09 mm (0.0035 in.)



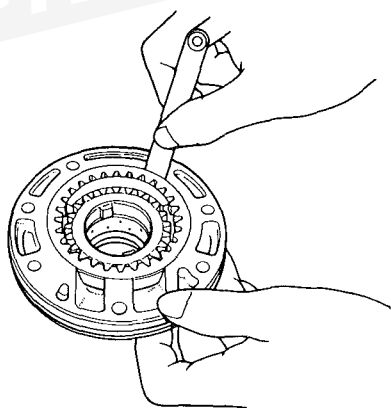
- Check the (radial) clearance between the outer gear and crescent.

Radial clearance	Standard	Limit
	0.05 – 0.10 mm (0.0020 – 0.0039 in.)	0.5 mm (0.0197 in.)



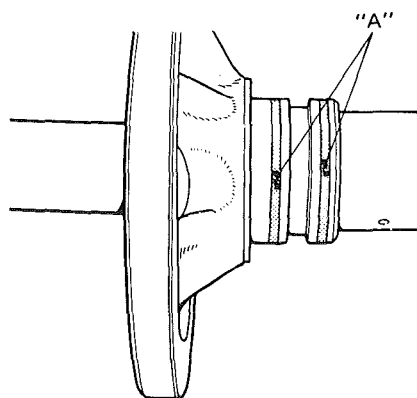
- Check the (radial) clearance between the outer gear and pump case.

Radial clearance	Standard	Limit
	0.10 – 0.18 mm (0.0039 – 0.0071 in.)	0.3 mm (0.0118 in.)



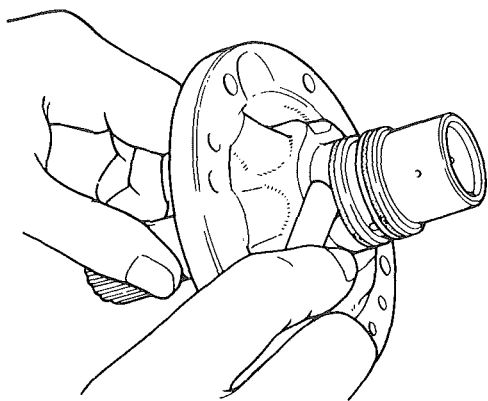
- Check to ensure that the seal rings fitted on the oil pump cover is not stuck, damaged, worn or weakened.

If any clearance is found at the stopper "A" of the seal ring, it is weakened and must be replaced.



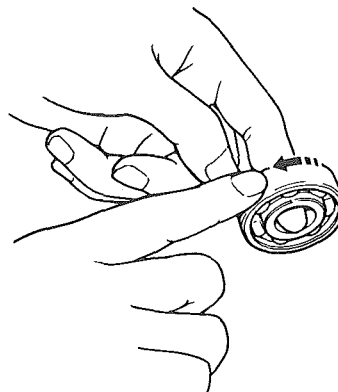
- Using a thickness gauge, check the seal ring in its groove for its side clearance as shown below.

Clearance	Standard	Limit
	0.05 – 0.13 mm (0.0020 – 0.0051 in.)	0.35 mm (0.0138 in.)



Bearing

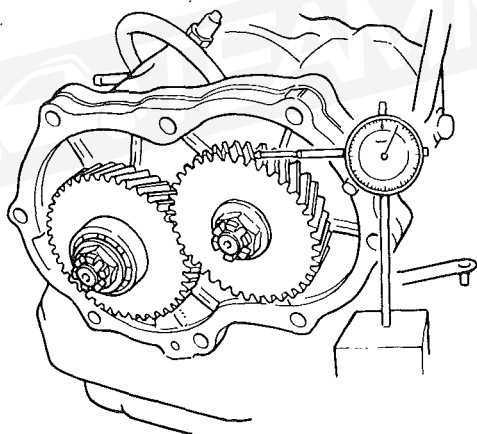
Check each bearing by spinning its inner or outer race by hand to "feel" the smoothness of rotation. Replace the bearing if noted to exhibit sticking, resistance or abnormal noise when spun or rotated by hand.



Primary reduction gear

Check both the primary reduction drive and driven gears for damage and wear. Also, check for their backlash as shown below.

Backlash	Standard	Limit
	0.05 – 0.20 mm (0.0020 – 0.0079 in.)	0.3 mm (0.0118 in.)



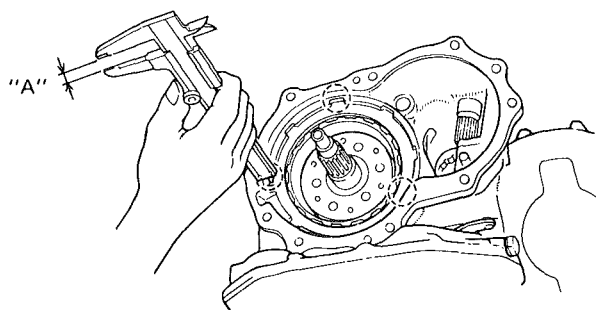
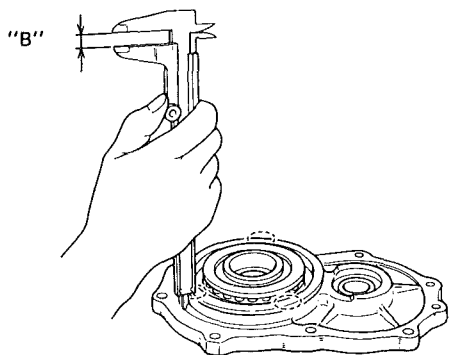
Reverse brake

- Check the reverse brake disc and plate for discoloration, any damage, or excessive wear. Also check for flatness.
- Check the reverse brake clearance as follows. With the reverse brake discs and plates installed in the case, take measurement "A". Also take measurement "B" of the reverse brake drum. In both cases the gasket should not be included. If the clearance (obtained by subtracting "B" from "A") exceeds the limit, replace either the reverse brake drum or reverse brake disc so that the clearance becomes within the standard value.

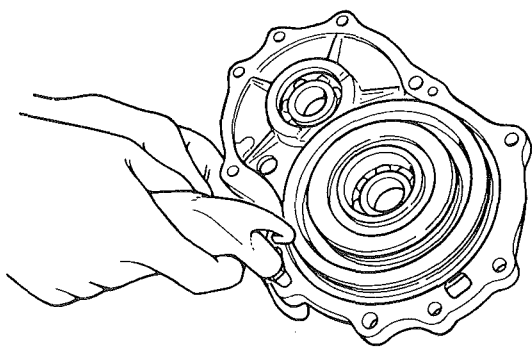
NOTE:

For measurements "A" and "B", use the average of three measurements obtained at three locations as shown below.

	Standard	Limit
Reverse brake piston height ("B")	13.7 – 14.2 mm (0.54 – 0.56 in.)	—
Reverse brake clearance ("A" – "B")	2.26 – 3.38 mm (0.089 – 0.133 in.)	3.9 mm (0.153 in.)



- Check the reverse brake piston and its return spring for proper operation without resistance by blowing the compressed air into the oil hole.



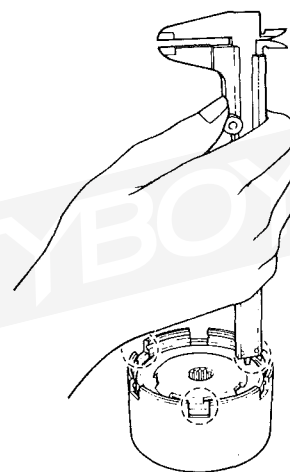
Drive clutch

- Check the clutch disc and plate for discoloration, any damage, or excessive wear. Also check for flatness.
- Check the drive clutch clearance as follows. Remove the snap ring and then the flange. And measure the clearance as shown below.

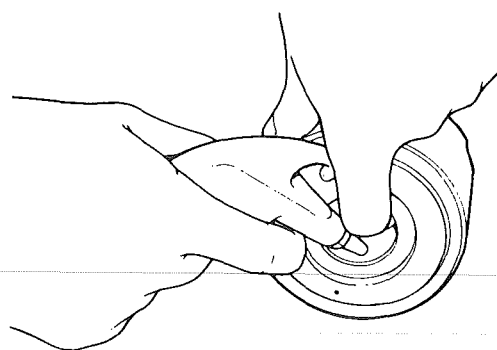
NOTE:

Use the average of three measurements of the clearance measured at three locations as shown below.

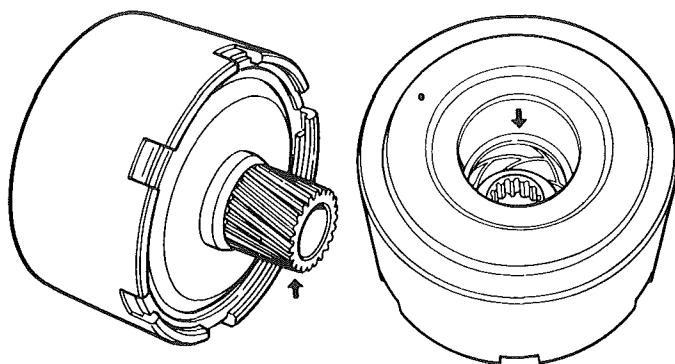
	Standard	Limit
Drive clutch clearance	1.85 – 2.80 mm (0.073 – 0.110 in.)	3.5 mm (0.138 in.)



- Check the drive clutch piston and its return spring for correct operation without resistance while closing one of the two oil holes found inside of the clutch drum with a finger and blowing the compressed air into the other hole.



- Check the low sun gear, clutch hub spline and clutch drum bush for damage and excessive wear.

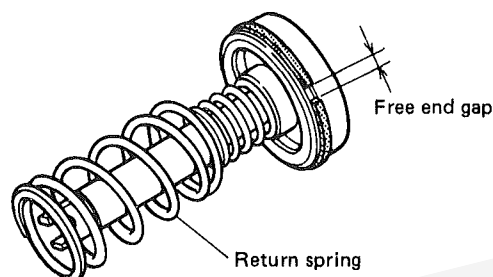
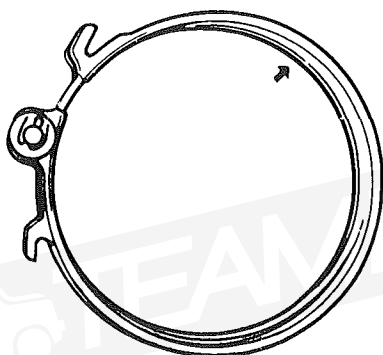


- Check the low brake piston ring and return spring for damage and weakening.

	Standard
Piston ring free end gap	0.1 – 0.3 mm (0.0039 – 0.0118 in.)
Return spring free length	40.2 mm (1.58 in.)
Return spring preload	6.9 – 8.5 kg (15.2 – 18.7 lb) for fitting length 34 mm (1.34 in.)

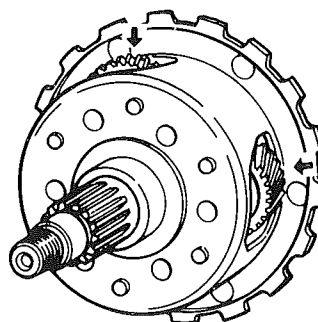
Low brake

- Check the low brake band and clutch drum for damage, discoloration and excessive wear.

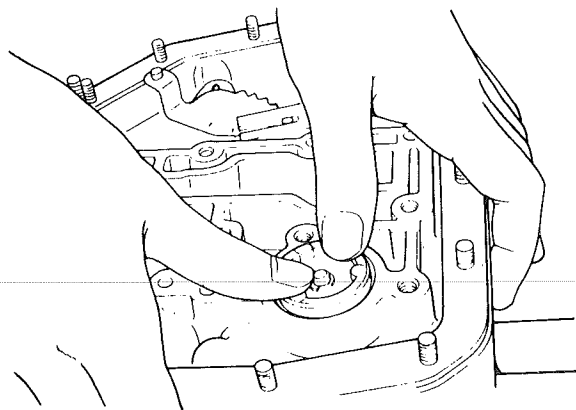


Planetary gear unit

- Check the tooth surface of each gear for damage and discoloration, and also check each gear for smooth rotation without abnormal noise.

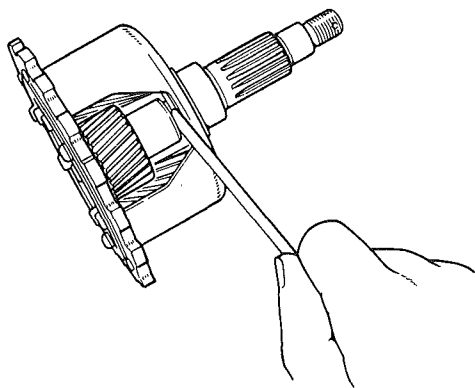


- Pushing the low brake piston with a finger, check the piston and return spring for correct operation without resistance. Also, check inside of the cylinder of the transmission case for damage and stepped wear.

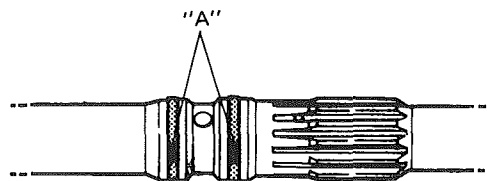


- Check the clearance between the short pinion and thrust washer. Also, check the planetary carrier lock plate for bend or damage.

	Standard	Limit
Clearance	0.23 – 0.62 mm (0.009 – 0.024 in.)	0.8 mm (0.031 in.)

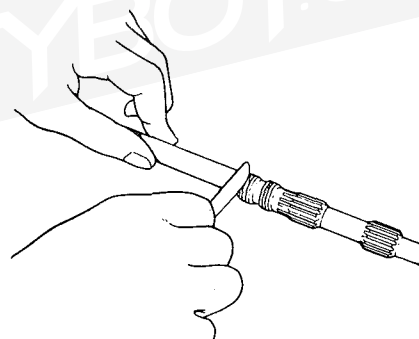


- Check to ensure that the seal ring on the input shaft is not stuck, damaged, worn or weakened. If any clearance is noted at the stopper "A" of the seal ring, it is weakened and must be replaced.



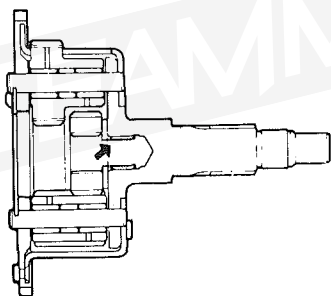
- Using a thickness gauge, check the seal ring in its groove for side clearance as shown below.

	Standard	Limit
Clearance	0.05 – 0.13 mm (0.0020 – 0.0051 in.)	0.35 mm (0.0138 in.)



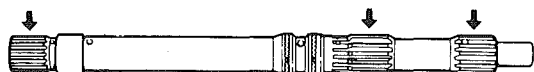
Output shaft

Look inside of the output shaft and visually inspect the bush for damage or wear.



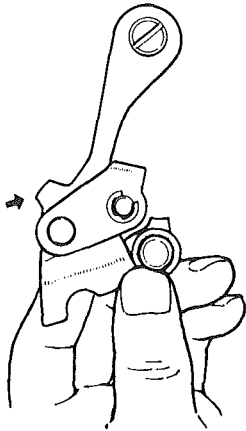
Input shaft

- Check the spline of the input shaft for damage and wear.



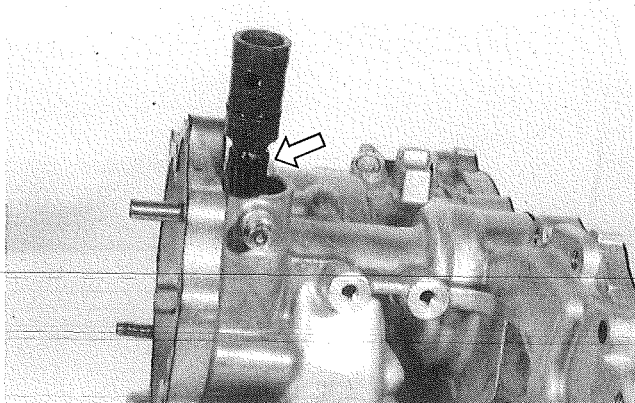
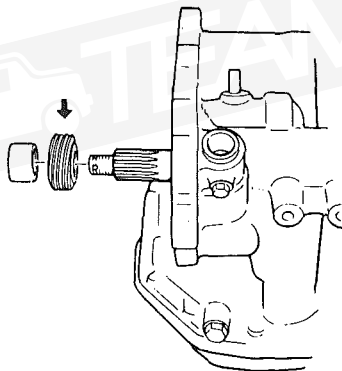
Parking

- Check the parking lock pole and the teeth with which the pole is to be engaged for damage and excessive wear. Also, check to ensure that the lock pole return spring is free from any damage or weakening.



Speedometer gear

Check the speedometer drive and driven gears for damage and excessive wear.



3. Reassembling

CAUTION:

New drive clutch disc, low brake band and reverse brake disc must be soaked in specified ATF for more than two hours before installation.

NOTE:

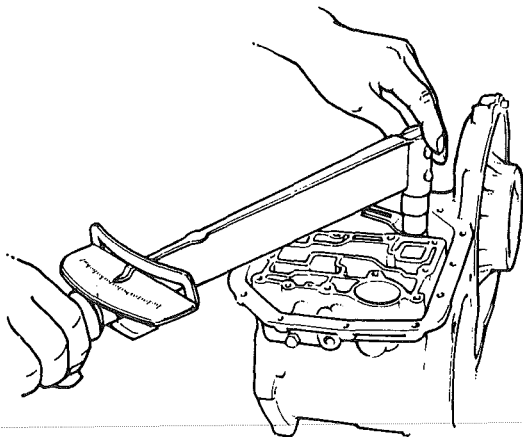
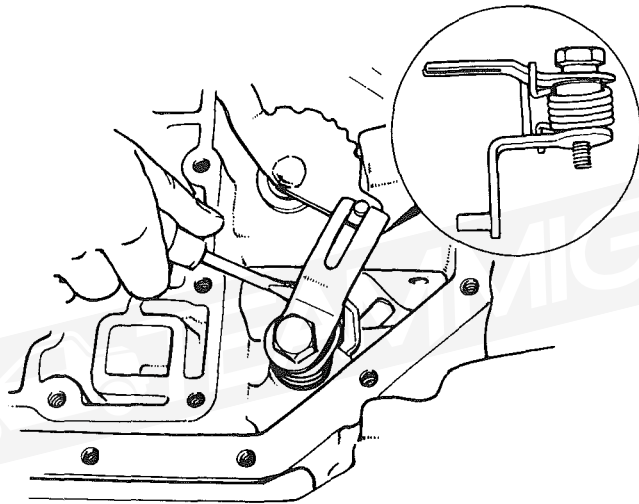
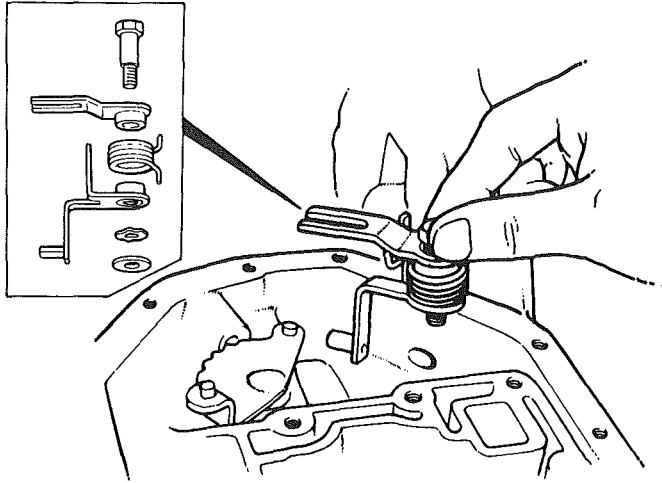
- Before reassembly, clean every mating surface of each case and make sure that it is free from old gasket, dust and dirt.
- As to the gasket, O-ring, cotter pin and seal washer, make sure to use new one for reassembly.
- Don't apply any adhesive or liquid packing to the gaskets.
- Before installing any sliding part or rotating part, be sure to apply it with either specified AUTOMATIC TRANSMISSION FLUID or SUZUKI SUPER GREASE C (99000-25030).
- Wash every part to be installed with kerosene and air-dry it. Don't wipe it with rags.
- The components of the automatic transmission is finished with precision. Any damage or entry of foreign matters can cause fluid leakage or some other trouble in its performance. Therefore, be sure to carry out reassembly work with utmost care, while inspecting each part closely.
- Be sure to tighten each bolt and nut to the specified torque, for their over-tightness or under-tightness can cause oil leakage.

Put the parking idler lever, return spring, toggle operating lever, wave washer and plain washer all together and install them in the transmission case, and catch the return spring on the parking idler lever and toggle operating lever.

NOTE:

- Grease the wave washer and plain washer with SUZUKI SUPER GREASE C, and they are kept from falling off and installation will be easier.
- Fit the manual lever pin into the groove of the parking idler lever securely.
- After installation, check to ensure that the toggle operating lever operates properly by moving the manual lever.

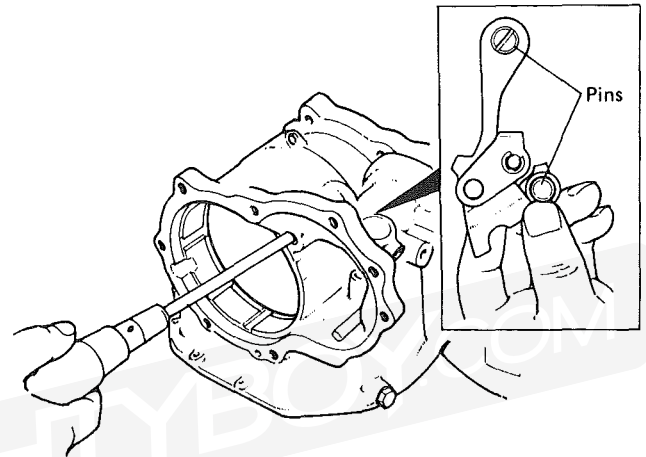
	N·m	kg·m	lb·ft
Toggle lever bolt tightening torque	10 – 16	1.0 – 1.6	7.5 – 11.5



Shift the toggle operating lever into a range position other than **P** and **R** and then install the parking lock pole to the transmission case with 2 pins.

NOTE:

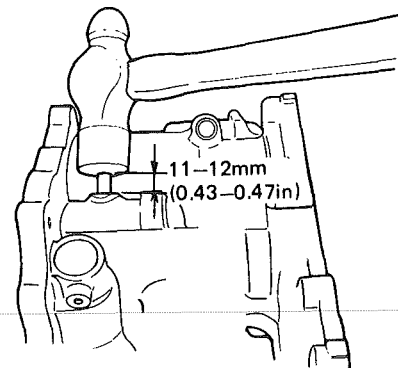
- With the lower pin, make sure to fit the spacer.
- After installation, shift the manual lever into the parking position and check the parking lock pole for operation.



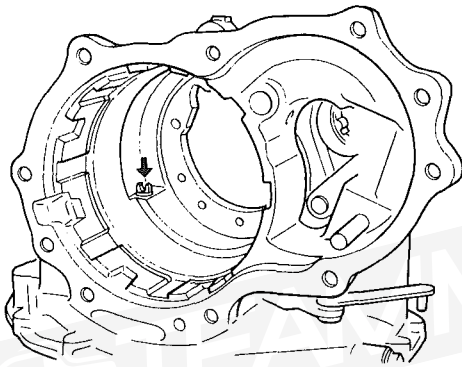
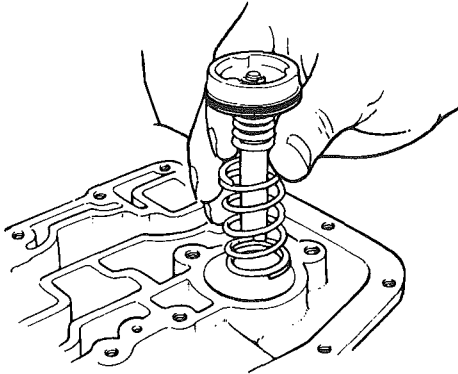
Drive the breather plug into the transmission case until the plug head is 11 – 12 mm (0.43 – 0.47 in) above the case surface.

NOTE:

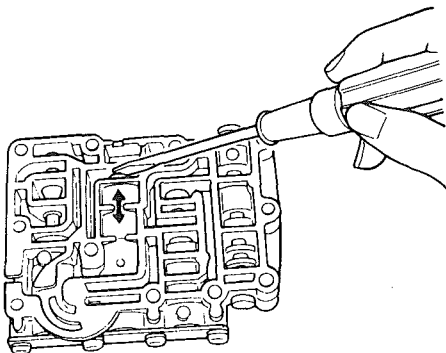
- Apply SUZUKI BOND No. 1215 (99000-31110) to the plug before driving it in.
- Don't drive it in obliquely.



Grease the ring of the low brake piston with SUZUKI SUPER GREASE C. Install the low brake piston and return spring in the case, with the groove at the piston rod end directed parallel with the input shaft. Use care to avoid damage to the ring.



Before installing the valve body to the transmission case, check to ensure that the manual valve, regulator valve, shift valve and accumulator valve operates smoothly and that no foreign matters are caught in them.



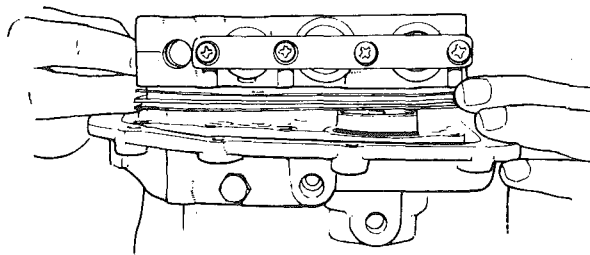
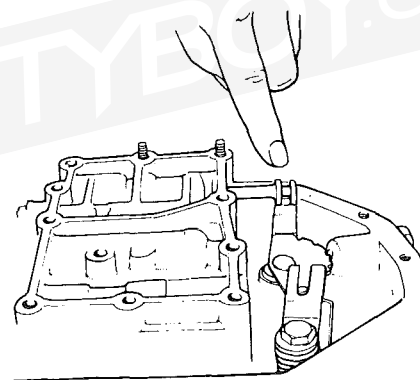
Apply ATF to each valve and install the gasket, valve body and oil strainer, observing the following precautions.

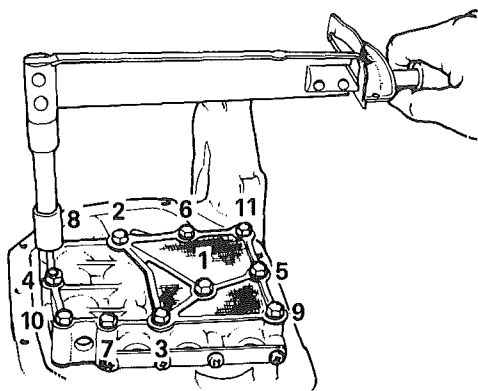
NOTE:

- Fit the groove of the manual valve and the manual lever pin to each other securely.
- Use care to avoid damage to the low brake piston ring.
- First, position the bolts on the opposite side of the stud bolt side so as to prevent the gasket from slipping out of place. And tighten the bolts and nuts gradually according to the numbers given in the figure.
- After installation, check the manual valve for operation by moving the manual lever.

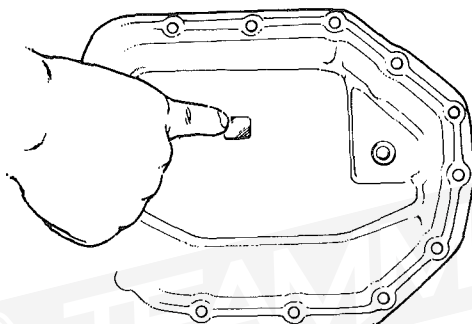
Tightening torque
for valve body bolt
and nut

6 – 9 N·m
(0.6 – 0.9 kg·m)
4.5 – 6.5 lb·ft





Attach the magnet onto the oil pan in a location directly under the oil strainer.



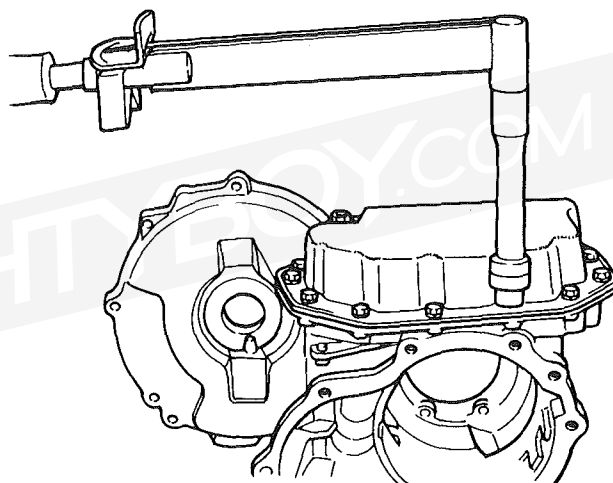
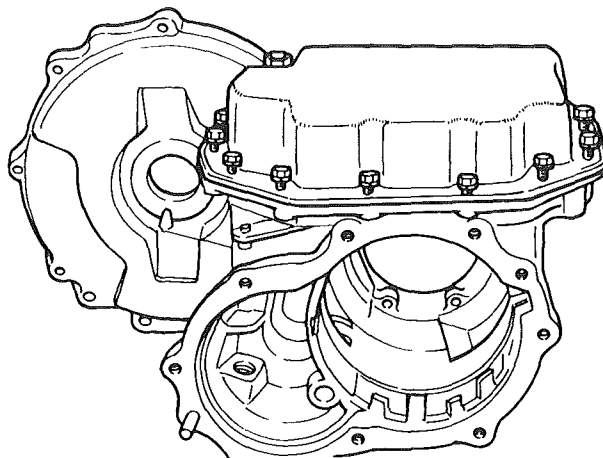
Install the oil pan and gasket in the transmission case and tighten the fixing bolts to the specified torque.

NOTE:

- Make sure that the mating surfaces of the oil pan and the case are free from dust and dirt.
- First, tighten each bolt hand-tight only, position the gasket correctly and then re-tighten all the bolts gradually to the specified torque one after another diagonally.

Tightening torque
for oil pan bolt

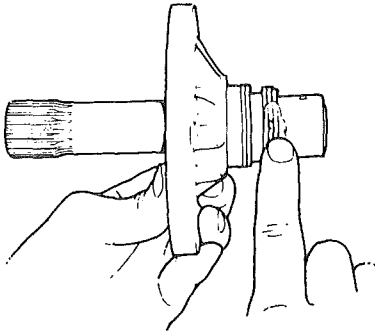
5 – 6 N·m
(0.5 – 0.6 kg-m)
4.0 – 4.3 lb-ft



Install the oil pump cover gasket in the transmission case, making sure that the holes in the gasket and the case are aligned. Before installation, grease either the case or gasket with SUZUKI SUPER GREASE C so as to prevent the gasket from getting out of place. Then install the oil pump cover in the transmission case. For this work, use two of the oil pump securing bolts as a guide to keep all the oil ports in the case, gasket and cover aligned.

NOTE:

- Apply ATF to the seal ring on the oil pump cover shaft.
- Make sure to prevent damage to the oil pump cover.
- After installation check to ensure again that all oil ports are aligned.



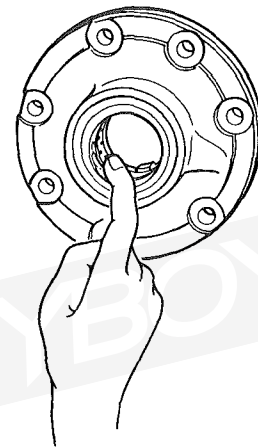
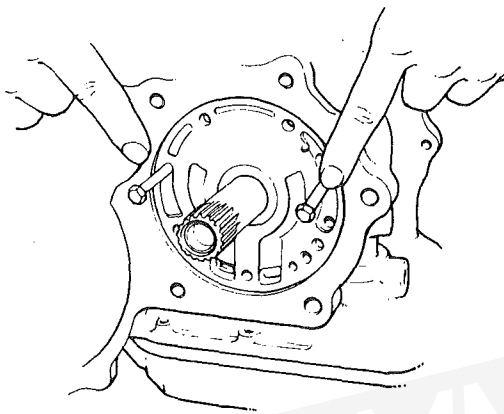
Apply SUZUKI SUPER GREASE C to the inner surface of the alloy bush which is inside of the oil pump and the oil seal lip, and install the oil pump. Make sure to use a new seal washer for the oil pump securing bolt.

NOTE:

Make sure to align the oil holes of the oil pump cover and the pump.

Tightening torque
for oil pump bolt

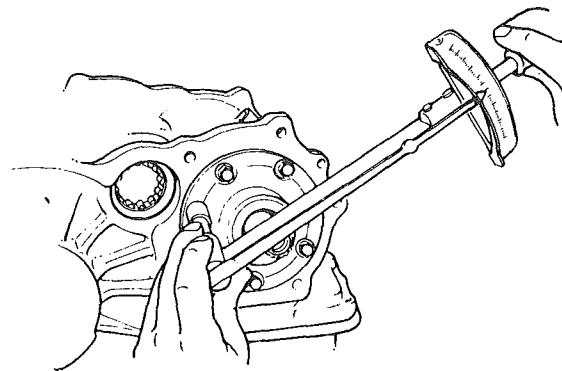
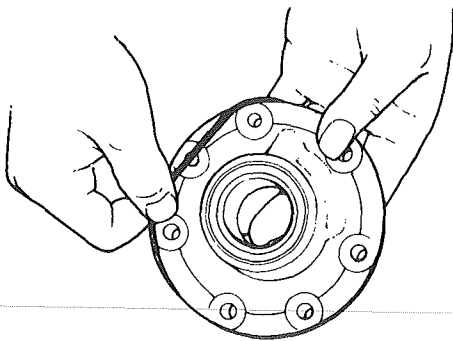
6 – 9 N·m
(0.6 – 0.9 kg-m)
4.5 – 6.5 lb-ft



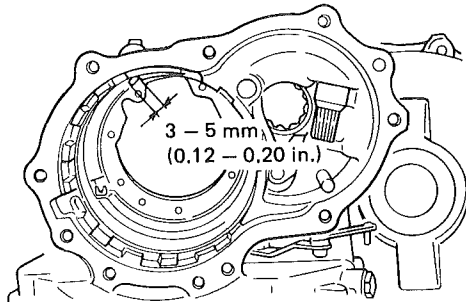
Fit a new O-ring to the oil pump.

NOTE:

Grease the O-ring with SUZUKI SUPER GREASE C before fitting. And don't apply excessive force.



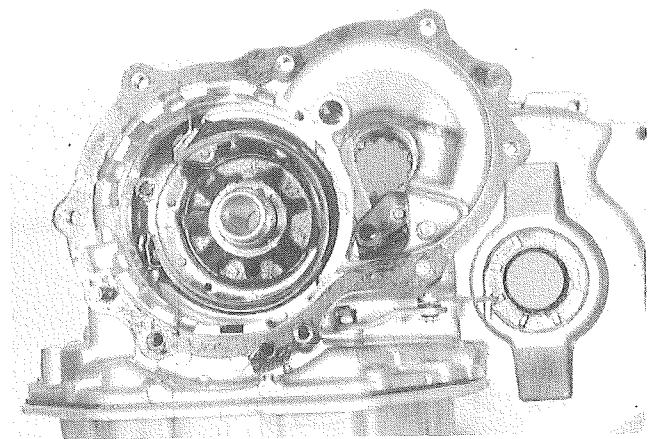
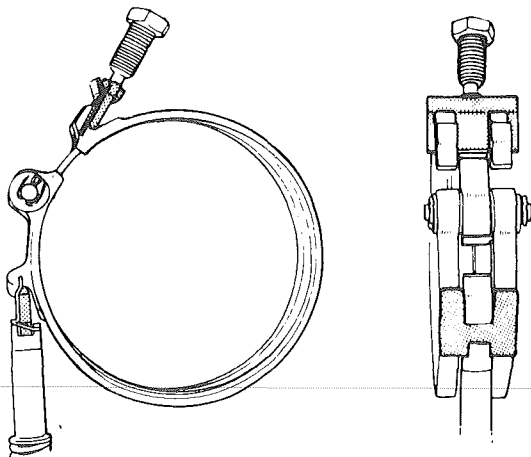
Screw the low brake band adjusting bolt (anchor bolt) through the transmission case to the extent that the bolt comes out of the inner surface of the case by 3 – 5 mm (0.12 – 0.20 in) as shown below.



Install the low brake band and struts.

NOTE:

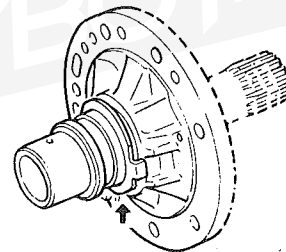
- When reusing the low brake band, be sure to apply ATF to its inner surface. When using a new low brake band, soak it in ATF for more than two hours before installation.
- Pay special attention to the correct direction of each strut as to face and back as well as top and bottom.
- After installation, make sure that the struts are fitted securely in the grooves of the piston rod and adjusting bolt.



Fit the clutch drum thrust washer on the oil pump cover shaft.

Grease the washer with SUZUKI SUPER GREASE C so as to prevent it from falling off.

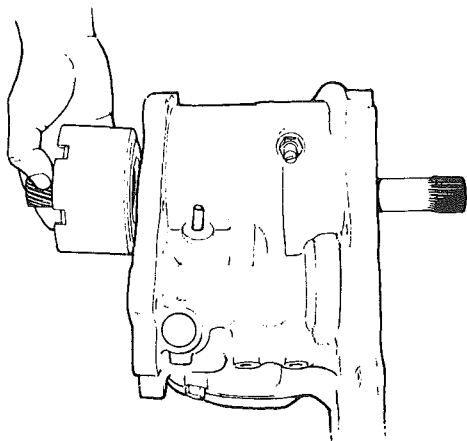
Make sure that the bent part of the washer is fitted in the groove of the oil pump cover.



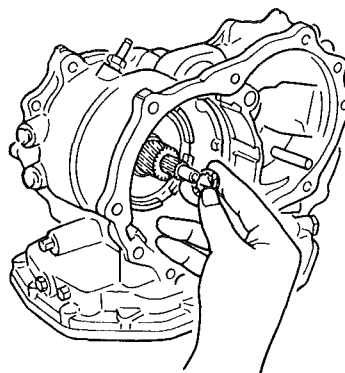
Install the clutch drum ass'y on the oil pump cover shaft after applying SUZUKI SUPER GREASE C to the inner surface of the alloy bush which is inside of the ass'y.

NOTE:

- Use care to prevent damage to the low brake band.
- After installation, check the drum for smooth rotation.
- When using a new clutch, soak it in ATF for more than two hours before installation.



Apply SUZUKI SUPER GREASE C to the low sun gear thrust washer and fit it on the input shaft, directing its grooved surface toward the low sun gear.



Insert the input shaft from the oil pump side gradually straight into the oil pump cover, avoiding damage to the seal rings on the input shaft.

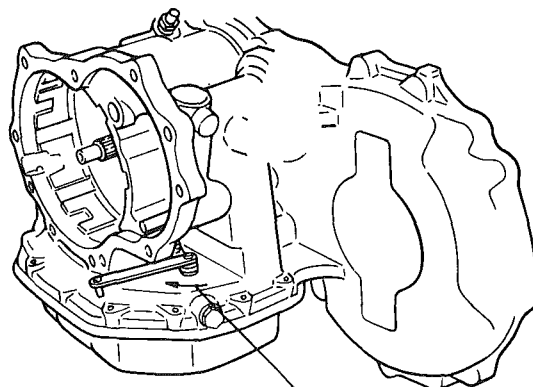
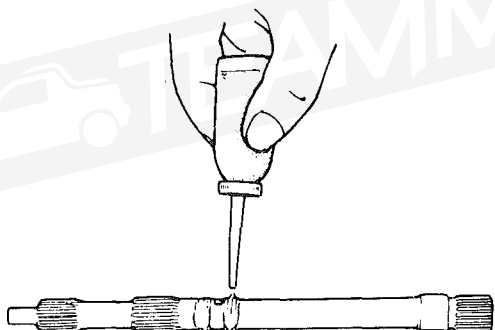
NOTE:

- Make sure to insert the shaft end without spline into the case.
- Apply ATF to the seal rings on the input shaft.

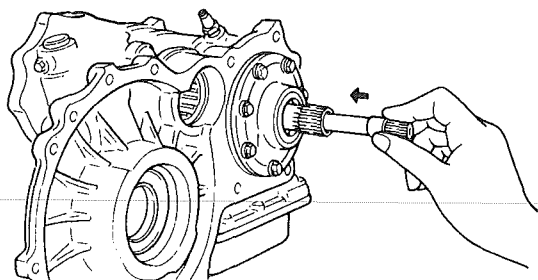
Shift the manual lever in a position other than the parking position and install the planetary gear ass'y while holding the input shaft on the oil pump side.

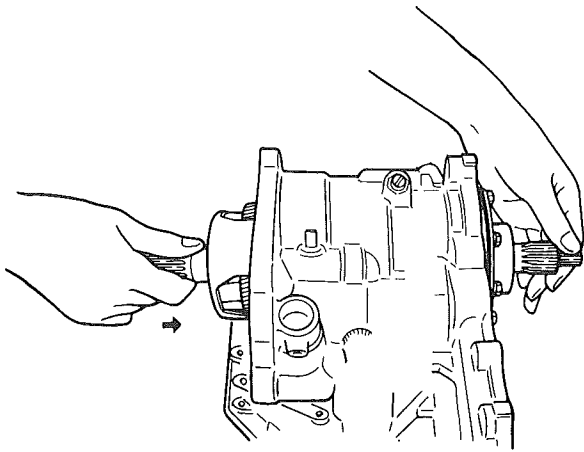
NOTE:

Before installation, be sure to grease the alloy bush in the planetary gear ass'y with SUZUKI SUPER GREASE C.



Position other than the parking

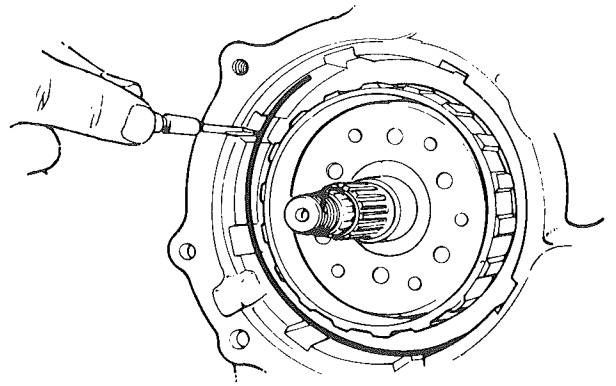




Install the snap ring (plate) in the interior groove of the case by fitting one end of the ring into the groove first and pushing the rest in with a driver, using care to avoid damage to the case.

NOTE:

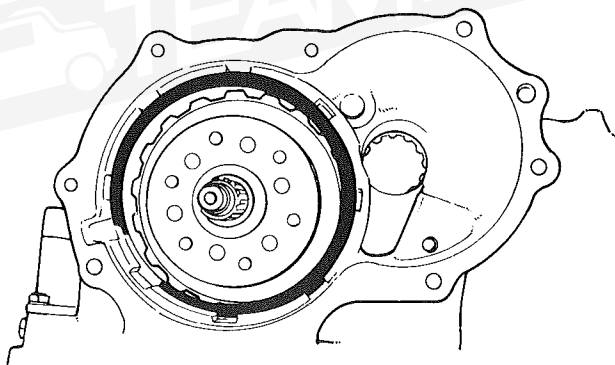
- Use utmost care to avoid damage to the transmission case.
- Should the case be damaged to produce metal powder, clean the case thoroughly.



Install the reverse brake discs and plates (4 pcs each) alternately.

NOTE:

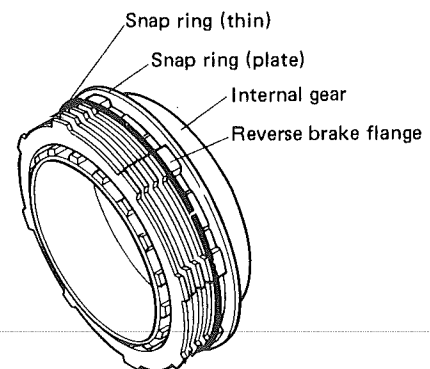
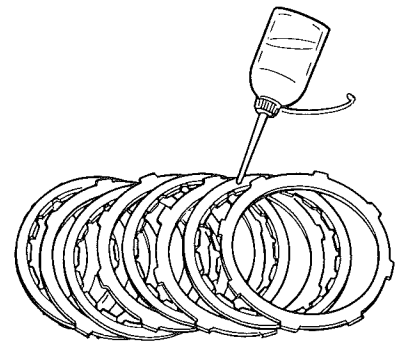
- Apply ATF to each reverse brake disc before installation.
- Make sure to install them in the correct order.
- When using new reverse brake discs, soak them in ATF for more than two hours before installation.



Install the internal gear (ring gear) to the planetary gear and the reverse brake flange to the internal gear. In this installation, the chamfer of the flange outer circumference should face the disc. And then install the snap ring (thin) in the groove of the case.

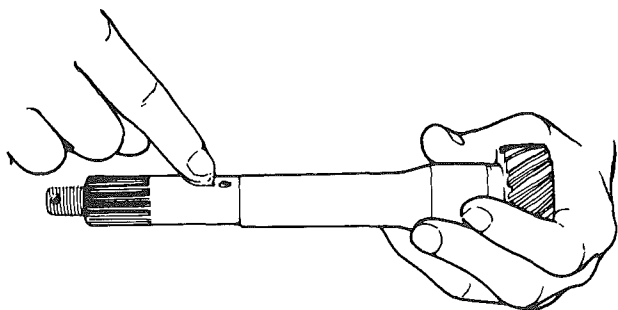
NOTE:

After installation, check to ensure that the snap ring is securely fitted in the groove.



After installing reverse brake disc, check the reverse brake clearance referring page 21-26 in this section.

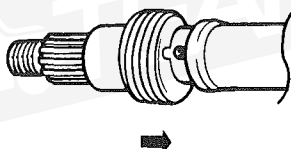
Fit the speedometer drive gear lock ball on the counter shaft. Grease the ball with SUZUKI SUPER GREASE C so as to prevent it from falling off.



Insert the counter shaft into the transmission case and then install the speedometer drive gear and spacer on the counter shaft.

NOTE:

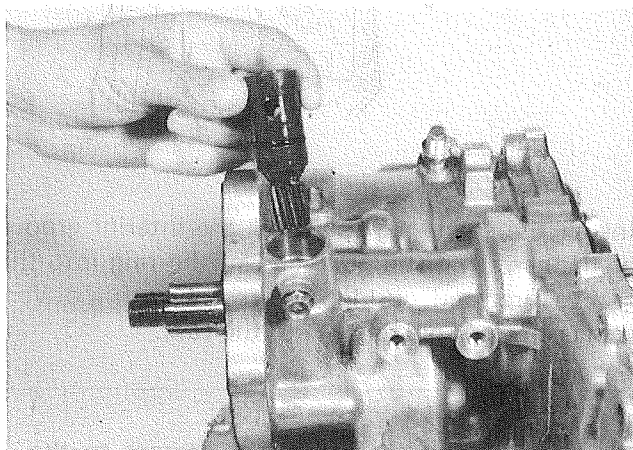
Make sure that the lock ball is fitted in the groove of the speedometer drive gear.



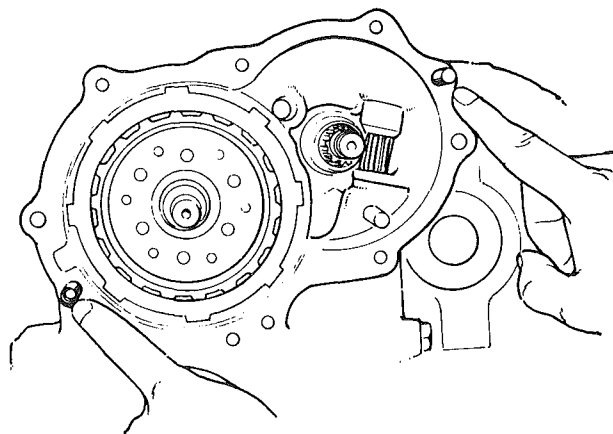
Apply SUZUKI SUPER GREASE C to the O-ring on the sleeve and install the speedometer driven gear, sleeve and the speedometer cable stopper bolt in the transmission case.

NOTE:

Make sure to align the holes of the sleeve and the case.



Drive the knock pins (2 pcs) into the transmission case, using care not to tilt them.



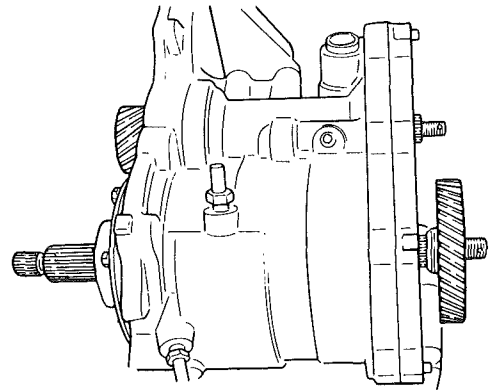
Place the transmission case in such a way that the side for the reverse brake drum to be installed faces upward so that the reverse brake discs and plates are kept in place.

Install the reverse brake drum gasket and reverse brake drum in the case. And press-fit the bearings with the special tool ©. After that, fit the snap rings into the grooves of the reverse brake drum.

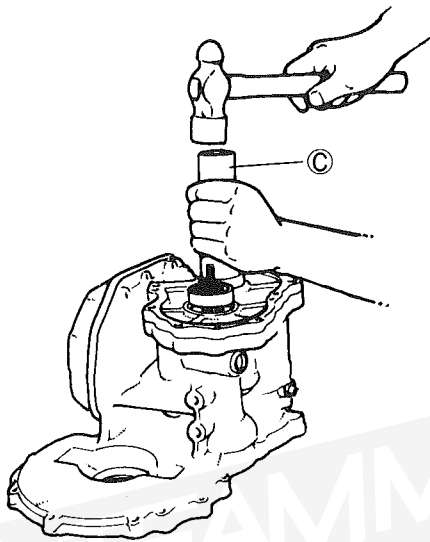
NOTE:

Be careful not to allow the counter shaft to come out of the case.

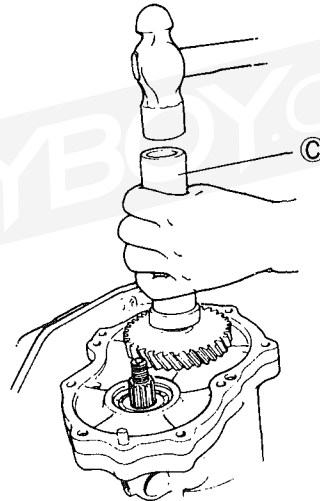
Install the reduction drive gear (smaller one) on the output shaft, directing the side with the longer boss toward the reverse brake drum.



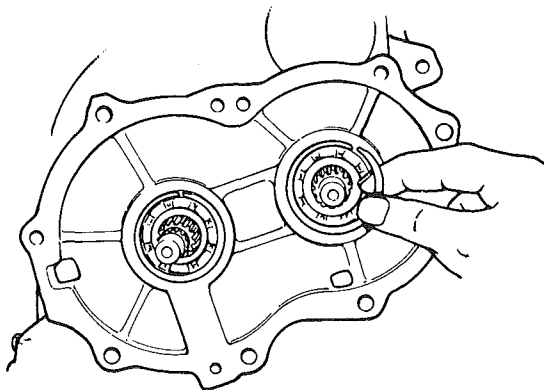
Using the special tool ©, press-fit the bearing into the output shaft.



© : Bearing installer (09913-76010)

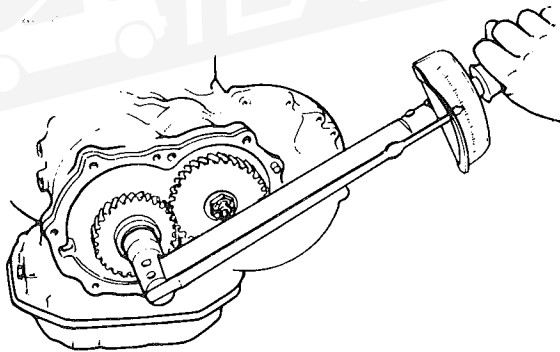
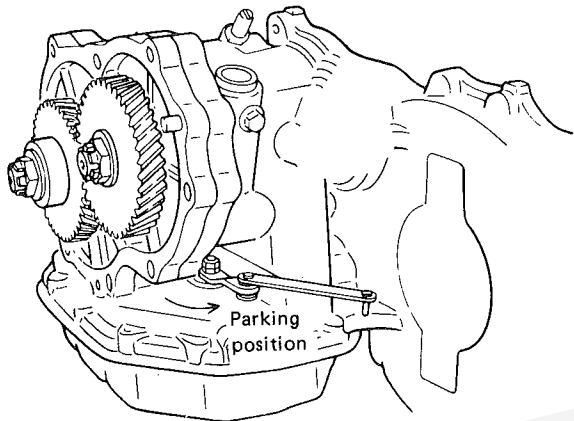


© : Bearing installer (09913-76010)

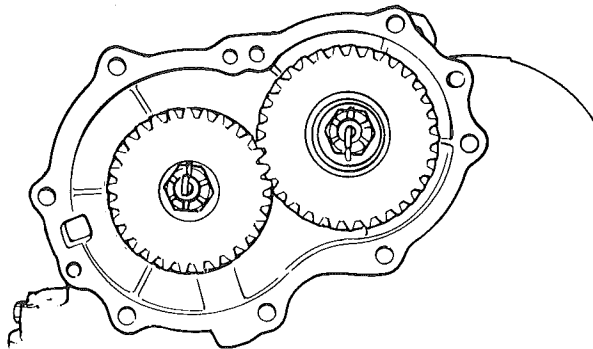


Install the reduction driven gear (bigger one) on the counter shaft in the same direction as the reduction drive gear.
Fit the washer and castle nut on each shaft, shift the manual lever to the parking position and then tighten the castle nut to the specified tightening torque.

Tightening torque for output and counter shaft lock nuts	50 – 80 N·m (5.0 – 8.0 kg-m) 36.5 – 57.5 lb-ft
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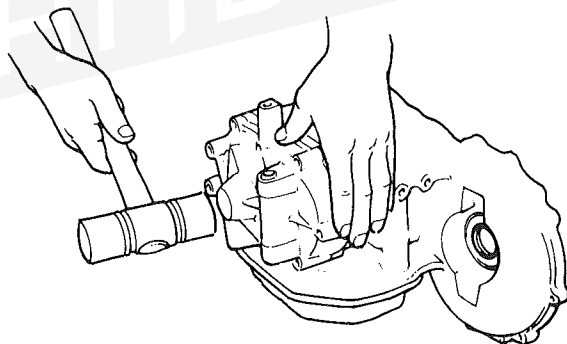


Fit the cotter pin into each nut and shaft, and secure it by bending it.



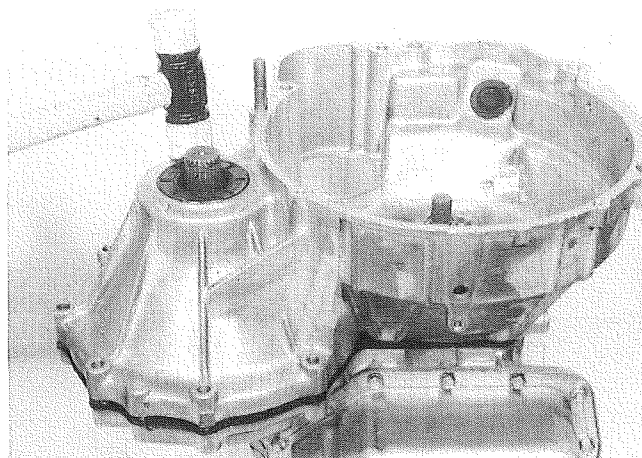
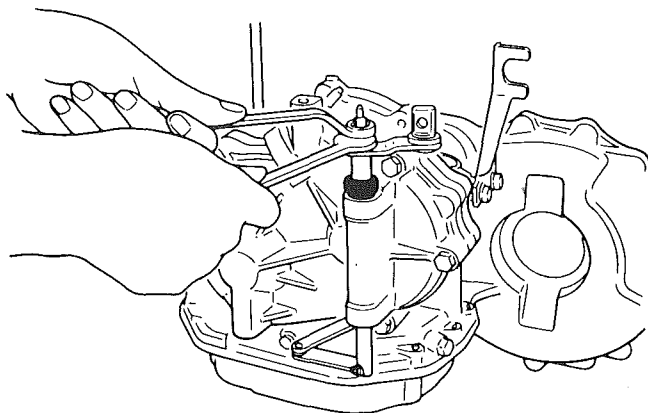
Install the rear cover to the reverse brake drum.

Tightening torque for rear cover bolt	15 – 22 N·m (1.5 – 2.2 kg-m) 11.0 – 15.5 lb-ft
---------------------------------------	--



Apply SUZUKI SUPER GREASE C to the surface of the shift lever shaft which slides with the rear cover and install the shift lever shaft to the rear cover and the link of manual lever.
Install the snap ring, boot and shift lever.

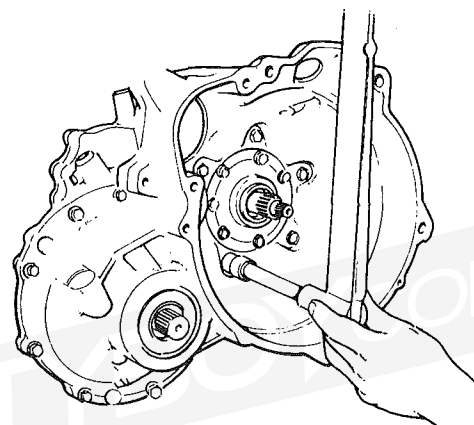
NOTE: After installation, check the manual lever for correct operation by operating the shift lever.
--



Place the transmission case with its oil pump side facing upward. Drive the knock pin into the transmission case, using care not to tilt it. Grease the differential oil seal lip of the torque converter housing with SUZUKI SUPER GREASE C and install the torque converter housing in the transmission case.

NOTE:

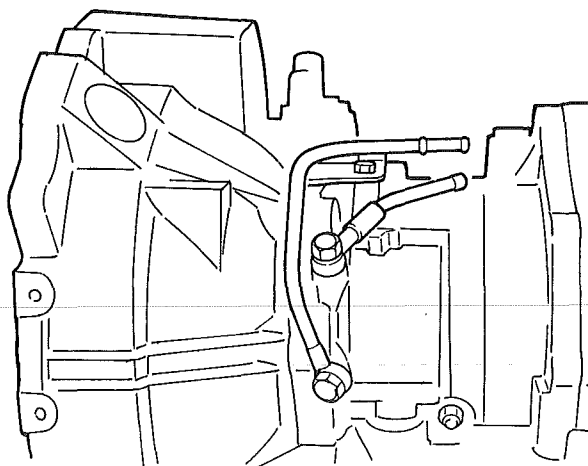
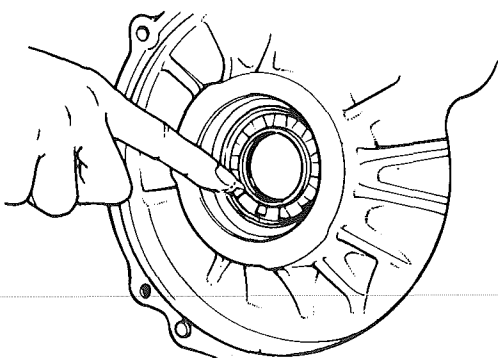
- Make sure to install the torque converter housing straight into its place, using care to avoid damage to the oil pump O-ring.
- Be careful that the gasket stays in place.



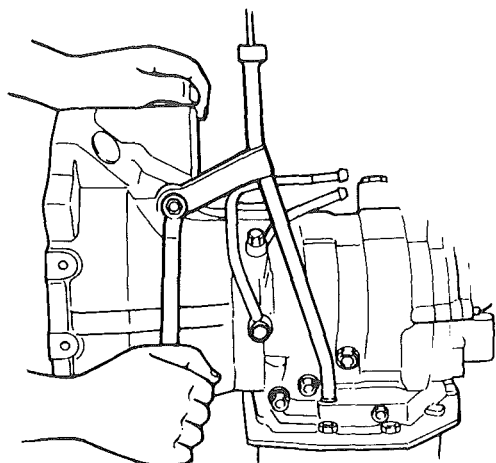
Install the oil pipes on the transmission case as shown in below figure.

Tightening torque for torque converter housing (oil pump side)	30 – 45 N·m (3.0 – 4.5 kg-m) 22.0 – 32.5 lb-ft
Tightening torque for torque converter housing (differential side)	15 – 22 N·m (1.5 – 2.2 kg-m) 11.0 – 15.5 lb-ft

Tightening torque for oil pipe union bolt	11 – 13 N·m (1.1 – 1.3 kg-m) 8.0 – 9.0 lb-ft
Tightening torque for oil pipe mounting bolt	4 – 6 N·m (0.4 – 0.6 kg-m) 3.0 – 4.0 lb-ft



Install the oil filler tube.



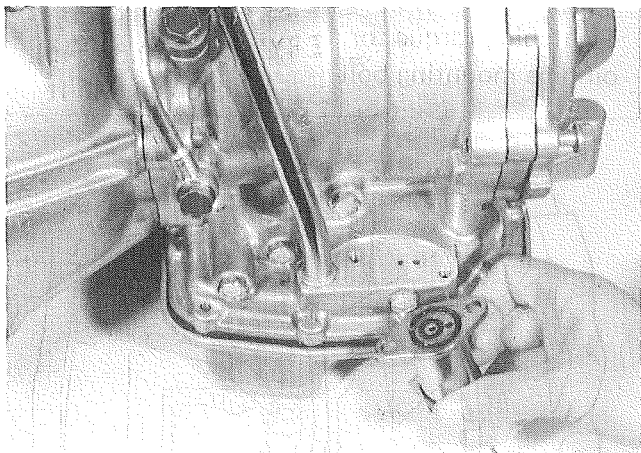
Grease the O-rings of the shift solenoid with SUZUKI SUPER GREASE C to prevent them from falling off and install them to the shift solenoid. And then install the shift solenoid in the case, aligning the oil passages of the case and the solenoid.

NOTE:

Be very careful to keep the mating surfaces of the shift solenoid and the case free from dust and dirt.

Tightening torque for
shift solenoid bolt

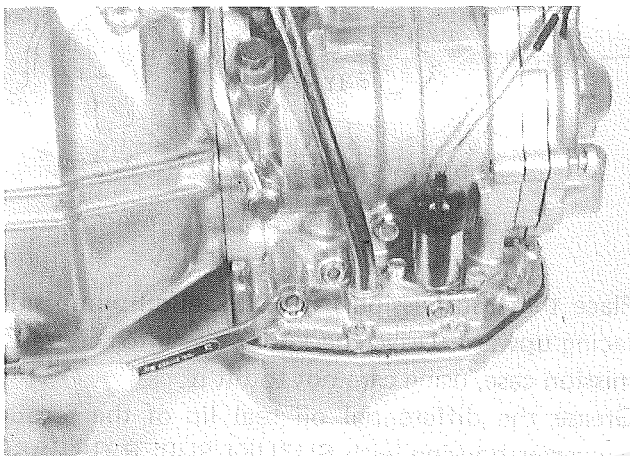
4 – 7 N·m
(0.4 – 0.7 kg-m)
3.0 – 5.0 lb-ft



Install the blind plugs with O-ring into the oil pressure detecting holes.

Tightening torque
for blind plug

6 – 8 N·m
(0.6 – 0.8 kg-m)
4.5 – 5.5 lb-ft

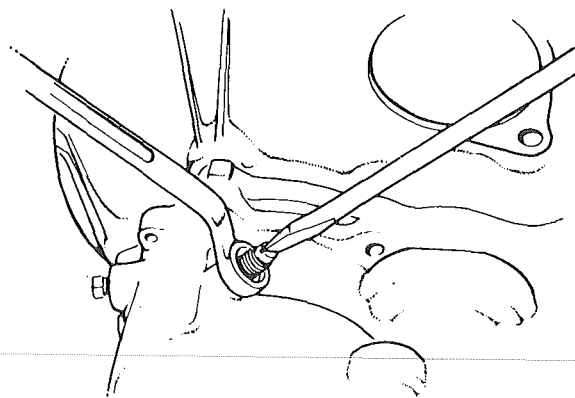


[Adjustment of low brake band]

Tighten the low brake band adjusting bolt (anchor bolt) to the torque of 3.5 – 4.5 N·m (0.35 – 0.45 kg-m, 2.6 – 3.0 lb-ft) and back out 4 1/2 turns. Lock it there with a lock nut and paint the bolt thread with white paint to prevent it from getting loose.

Tightening torque
for adjusting bolt
lock nut

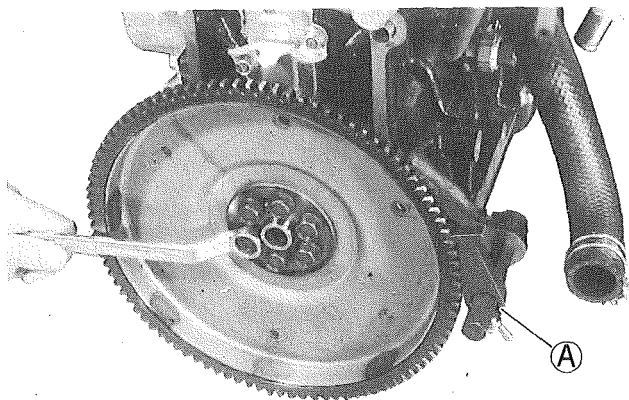
23 – 31 N·m
(2.3 – 3.1 kg-m)
17.0 – 22.0 lb-ft



Drive plate

When installing the drive left plate, be very careful for its installing direction. The side with the bend outer edge must face the transmission as shown below.

Whenever removing or installing the drive plate, use the special tool ①.



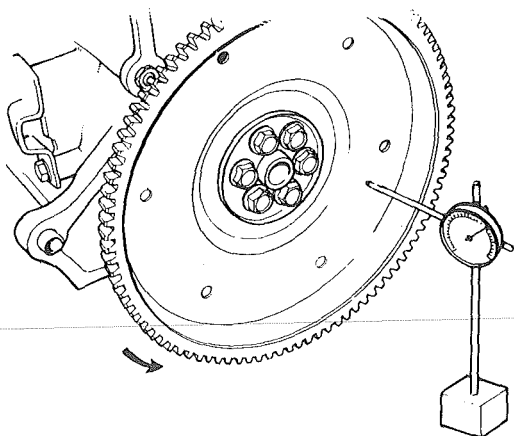
① Drive plate stopper (Flywheel holder)
(Part No. 09924-17810)

After installing the drive plate on the crankshaft, check it for deflection at the position as shown in the figure below.

Its deflection should be less than the following specification.

This check must be carried out rigidly because an excessive deflection will cause oil leakage from the oil pump oil seal and result in rapid wear of the bush.

Deflection of drive plate	Less than 0.25 mm (0.01 in)
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Torque converter

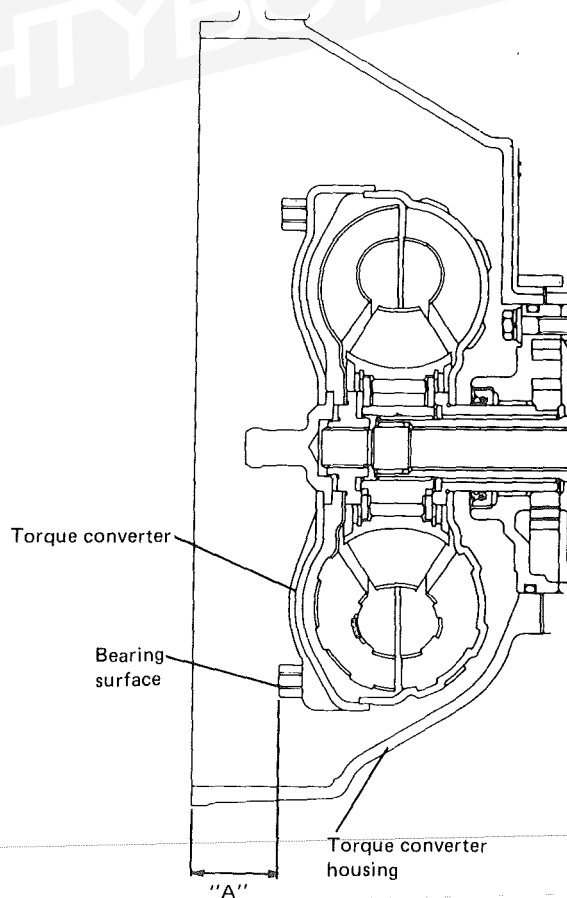
Make sure that the outer surface of the boss of the torque converter is clean and then fit the torque converter into the transmission.

To ensure that the torque converter is securely fitted, measure "A" as shown in the figure below (from the bearing surface of the torque converter to the end surface of the torque converter housing). The measurement should be the below specified value.

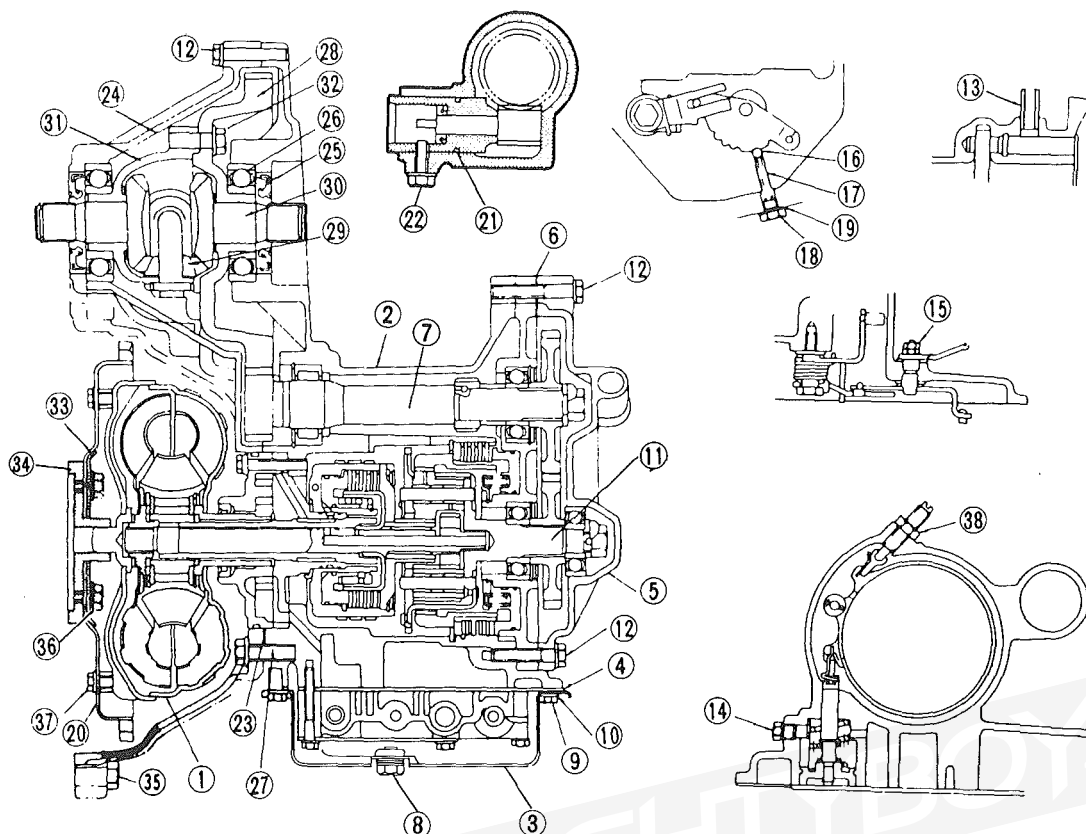
NOTE:

When installing the torque converter, turn it while pushing it lightly until the pawl on the oil pump gear fits securely into the groove in the torque converter. Never try to raise the transmission and drop the torque converter into it or apply an impact force.

Dimension "A"	Approx. 31 mm (1.22 in.)
---------------	--------------------------



Tightening torque



- | | | |
|---------------------------------|----------------------------------|---------------------------------|
| 1. Torque converter assembly | 13. Breather hose union | 25. Differential side oil seal |
| 2. Transmission assembly | 14. Plug | 26. Differential side bearing |
| 3. Transmission oil pan | 15. Nut | 27. Housing bolt |
| 4. Oil pan gasket | 16. Ball | 28. Differential ring gear |
| 5. Transmission case left cover | 17. Spring | 29. Differential pinion |
| 6. Left cover gasket | 18. Bolt | 30. Differential side gear |
| 7. Counter shaft | 19. Gasket | 31. Differential case |
| 8. Oil drain plug | 20. Torque converter drive plate | 32. Differential case bolt |
| 9. Oil pan bolt | 21. O ring | 33. Torque converter left plate |
| 10. Spring washer | 22. Bolt | 34. Drive plate flange |
| 11. Output shaft | 23. Transmission case gasket | |
| 12. Case bolt | 24. Torque converter housing | |

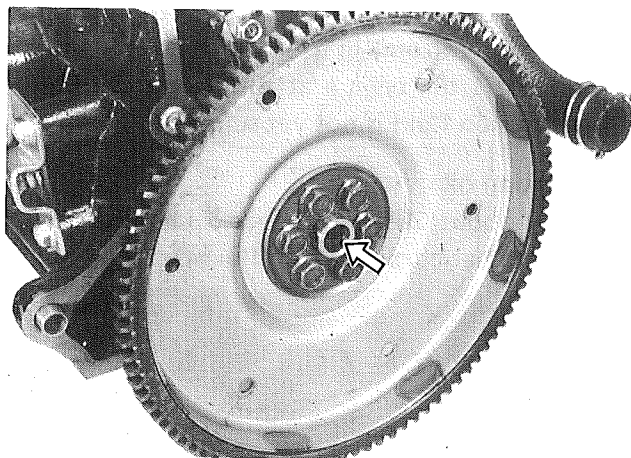
Fastening parts	N·m	kg·m	lb·ft
⑧ Oil drain plug	18 – 23	1.8 – 2.3	13.5 – 16.5
⑪ Oil pan bolt	5 – 6	0.5 – 0.6	4.0 – 4.3
⑫ Transmission rear cover bolt and torque converter housing differential side bolt	15 – 22	1.5 – 2.2	11.0 – 15.5
⑭ Oil pressure detecting hole plug	6 – 8	0.6 – 0.8	4.5 – 5.5
⑮ Shift lever nut	4 – 5	0.4 – 0.5	3.0 – 3.5
⑰ Shift lever locating bolt	19 – 31	1.9 – 3.1	14.0 – 22.0
⑳ Speedometer cable lock bolt	4 – 7	0.4 – 0.7	3.0 – 5.0
㉑ Torque converter housing bolt	30 – 45	3.0 – 4.5	22.0 – 32.5
㉒ Differential case bolt	80 – 100	8.0 – 10.0	58.0 – 72.0
㉓ Transmission bolt & nut	25 – 35	2.5 – 3.5	18.5 – 25.0
㉔ Drive plate bolt	40 – 45	4.0 – 4.5	29.0 – 32.5
㉕ Torque converter mounting bolt	6 – 10	0.6 – 1.0	4.5 – 7.0
㉖ Low brake anchor bolt lock nut	23 – 31	2.3 – 3.1	17.0 – 22.0

REMOUNTING

Reverse the dismounting procedure. The important steps in remounting are as follows.

Transmission

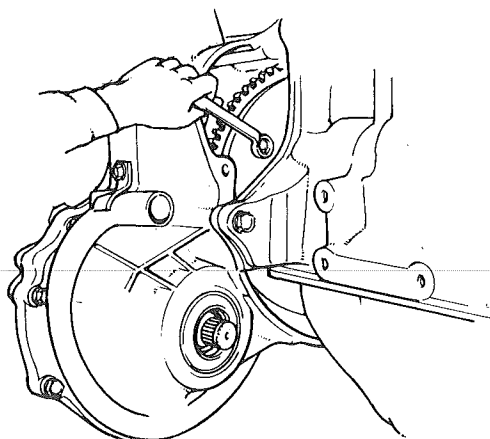
- 1) Apply SUZUKI SUPER GREASE A (99000-25010) to the drive plate flange where the piece of the torque converter fits.



- 2) Install the transmission together with the torque converter to the engine. Tighten the transmission securing bolts and nuts and then torque converter mounting bolts, each to its specified torque.

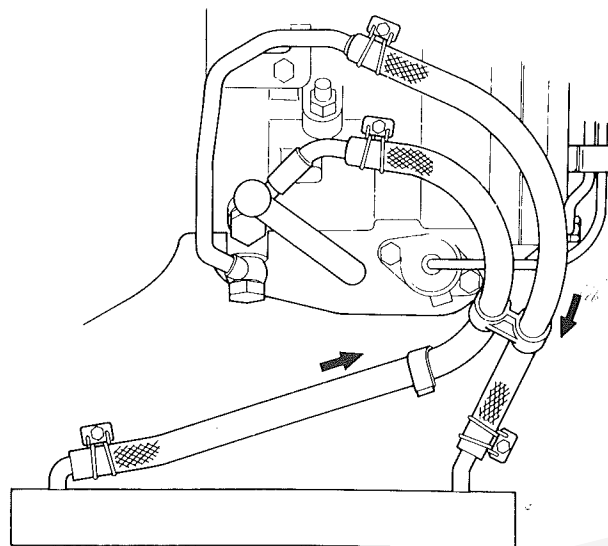
Tightening torque

Transmission securing bolt & nut	25 – 35 N·m (2.5 – 3.5 kg-m) 18.5 – 25.0 lb-ft
Torque converter mounting bolt	6 – 10 N·m (0.6 – 1.0 kg-m) 4.5 – 7.0 lb-ft



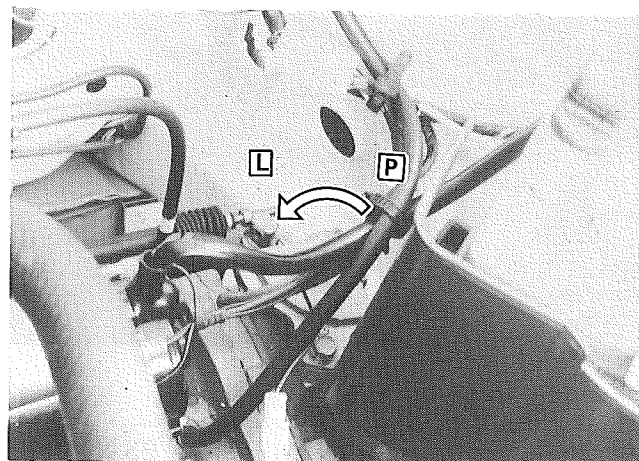
Oil cooler hoses

Connect the oil cooler hoses as shown below and secure each connection with a clamp.

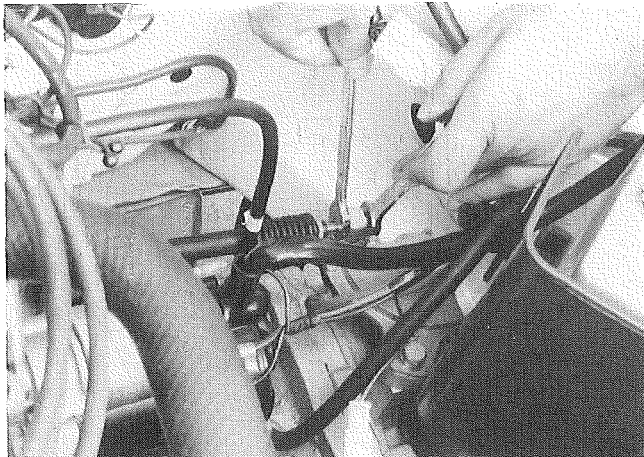


Selector lever control cable

- 1) Shift the selector lever next to the driver's seat to the **L** range position.
- 2) Shift the shift lever on the transmission to the **L** range position, too. (Turn the lever counter-clockwise facing the car's straightforward direction. The extreme end is its **L** range position.)

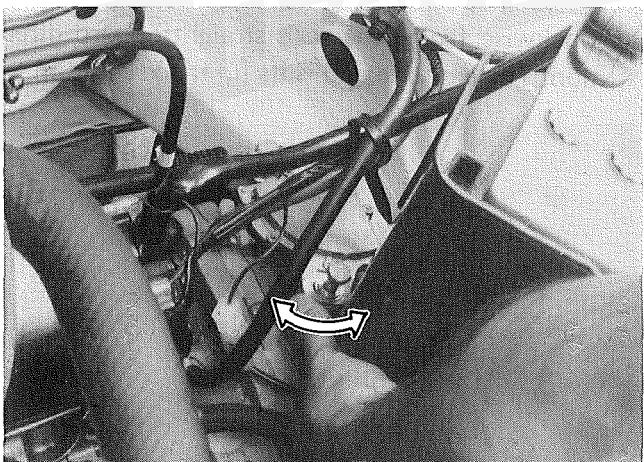


- 3) Now connect the control cable to the transmission and shift lever and adjust it with nut so that it is free from any play, and be sure to tighten lock nut.



Shift lever switch

- 1) Shift the selector lever to the **[L]** range position.
- 2) Move shift lever switch by hand in arrow direction as shown in figure. Stop at the position where a "click" from joint is heard or felt by hand and then secure it by tightening bolt to specified torque.



Tightening torque for shift
lever switch mounting
bolt

13 – 23 N·m
(1.3 – 2.3 kg-m)
9.5 – 16.5 lb-ft

- 3) Check the starter motor for operation only in the **[P]** and **[N]** ranges and not in the others by shifting the selector lever in each range and turning the main switch to the start position each time. Also, check to ensure that the back up light lights in the **[R]** range.

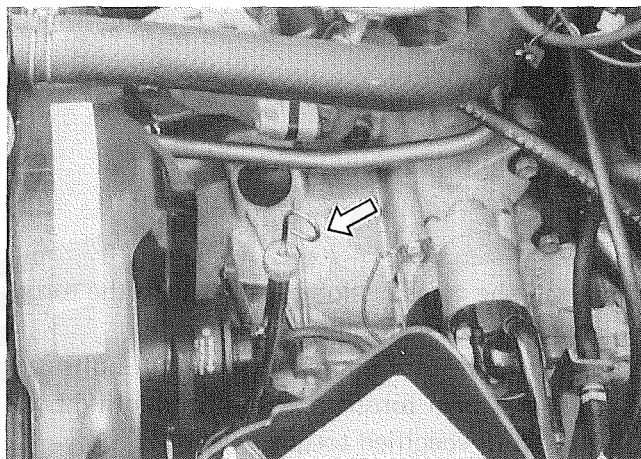
NOTE:

Perform the above check while shifting the selector lever to each range in the orders from **[P]** to **[L]** and from **[L]** to **[P]**.

Never start the engine at this point, for the transmission fluid is not yet supplied.

Transmission oil

- 1) Supply about 2.5 ℓ (5.28/4.40 US/Imp pt) of the Automatic transmission fluid Dexron-II.



- 2) Check the fluid level according to the procedure given in the following section and if it is not sufficient, replenish the fluid to the specified level.

CAUTION:

In this case, warm up the engine with idling speed. Make absolutely sure not to increase the engine speed.

INSPECTION AND ADJUSTMENT

1. Fluid level check and fluid change

The automatic transmission fluid does such important jobs as power transmission, cooling, lubrication and gear shift control. If the amount of fluid is not sufficient, fluid cannot be supplied to the torque converter, clutch and other members properly. It causes not only deteriorated performance of each member but also malfunction of the clutch and brake band because of their quick wear.

If the amount of fluid is excessive, the fluid is stirred by the rotating parts to produce foams. It can cause overheating of the transmission, resulting in fluid overflow from the fluid filler pipe. For the above reasons, it is essential to maintain the fluid level to the specified level.

1) Fluid level check

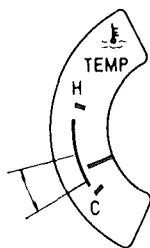
CAUTION:

During this check, the engine is kept idling. Use care not to allow any part of your body or clothing to contact such rotating parts as V-belt and cooling fan or very hot parts.

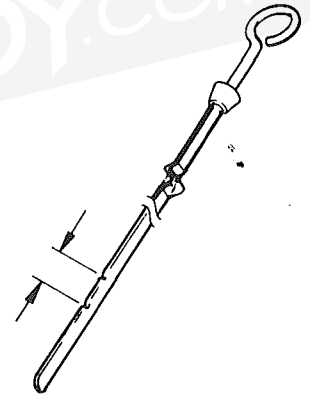
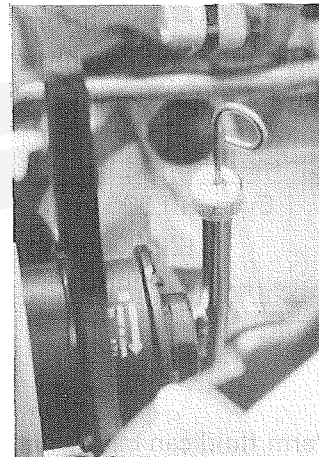
NOTES:

- Fluid level varies with the temperature of the transmission. As the fluid temperature gets higher, the fluid level rises further. Therefore, the fluid level check must be performed with the transmission warmed up.
- Before checking the fluid level, clean the area around the dipstick so that no dust gets in the transmission.

Carry out the following check with hot engine and transmission (the indicator of the water temperature meter around 80°C (176°F) after driving (normal cruise) some kilometers (Miles)).



- ③ With the engine idling, depress the foot brake and shift the selector lever to each range from **P** to **L** in that order and shift it back to **P**.
- ④ Pull out the dipstick and wipe off the fluid on it. Then insert the dipstick, pull it out again and check the fluid level. The fluid level should be within the range as marked on the dipstick.



If the fluid level is found low in these checks, check each part for leakage. After making sure that nothing is wrong, replenish the specified fluid.

- ① Park the car on the level ground.
- ② Shift the selector lever to **P** range and pull the parking brake.

2) Fluid to be used

Be sure to use Automatic Transmission Fluid DEXRON-II whenever replenishing or changing the fluid.

NOTE:

- It is absolutely essential to use a clean container for fluid replenishment to prevent dust and foreign matter from getting into the transmission. Contamination will occur by using containers previously used for other oils and or liquids such as anti-freeze, etc.
- Make sure to use the fluid of one and the same brand. Never mix the fluid of different brands.

3) Fluid change interval and procedure

As the fluid gets dirty and deteriorates, it is easy to produce foams which result in poor performance of the automatic transmission. To prevent this, it is necessary to change fluid at the intervals specified below.

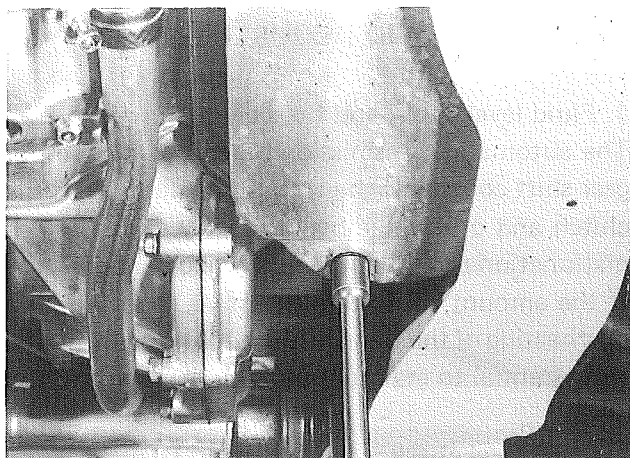
Automatic transmission fluid change interval	Every 40,000 km (24,000 miles) or 24 months
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[Fluid change procedure]

- ① Warm up the engine. (Warm fluid can be drained more quickly.)
- ② Shift the selector lever to each range from **P** to **L**, bring it back to **P** and stop the engine.
- ③ Remove the oil drain plug to let the fluid out. It is not possible, due to the structure of the transmission, to drain the entire fluid out of the transmission. Approximately 1.0 ℓ (2.11/1.76 US/Imp pt) can be changed.

WARNING:

Particular care must be taken when draining the automatic transmission fluid which has reached a high temperature.



- ④ Tighten the oil drain plug to the specified torque.

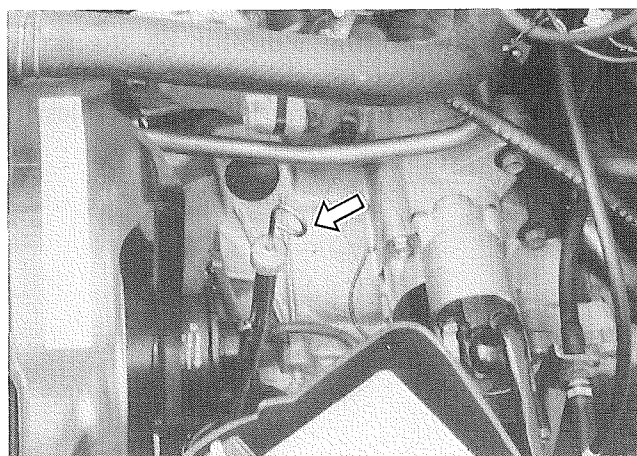
NOTE:

Remember that the drain plug gasket must be installed with the oil drain plug.

Oil drain plug tightening torque	N·m	kg·m	lb·ft
	18 – 23	1.8 – 2.3	13.5 – 16.5

- ⑤ Replenish the fluid

Fluid capacity	3.3 ℓ (6.97/5.81 US/Imp pt)
Amount of fluid change	Approx. 1.0 ℓ (2.11/1.76 US/Imp pt)



- ⑥ Check the fluid level according to the fluid level check procedure instructed previously.

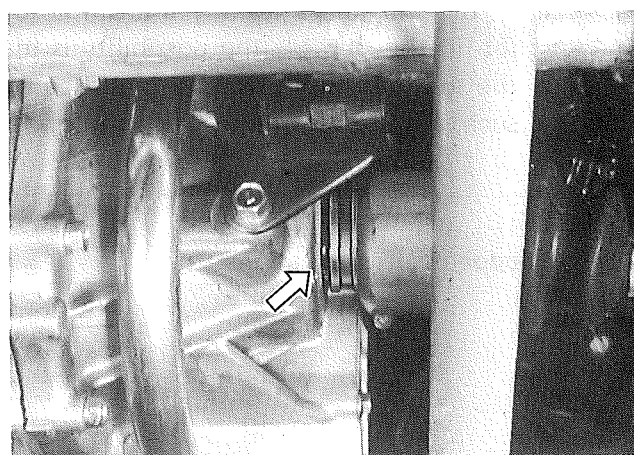
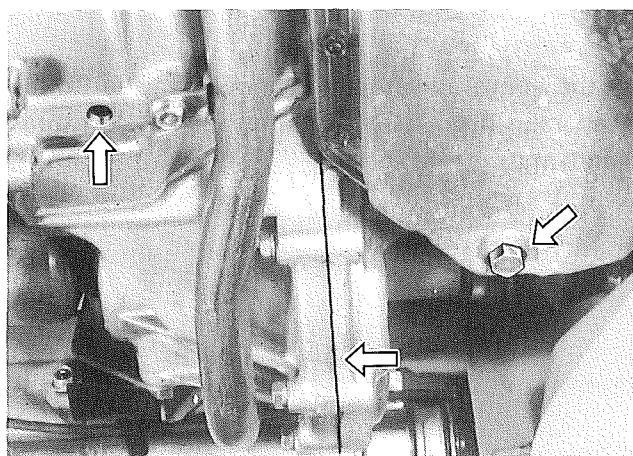
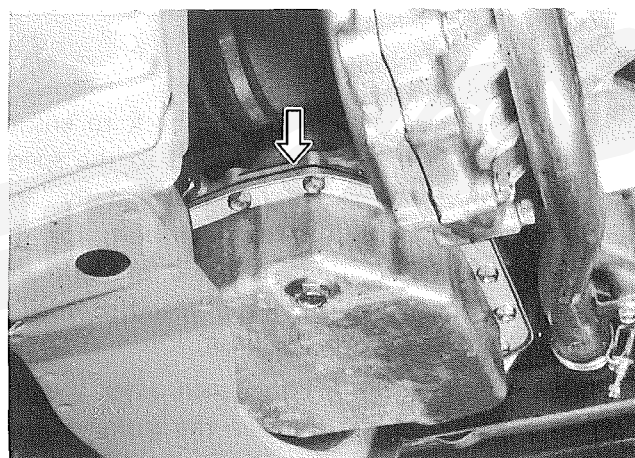
4) Diagnosis of troubles caused by fluid contamination

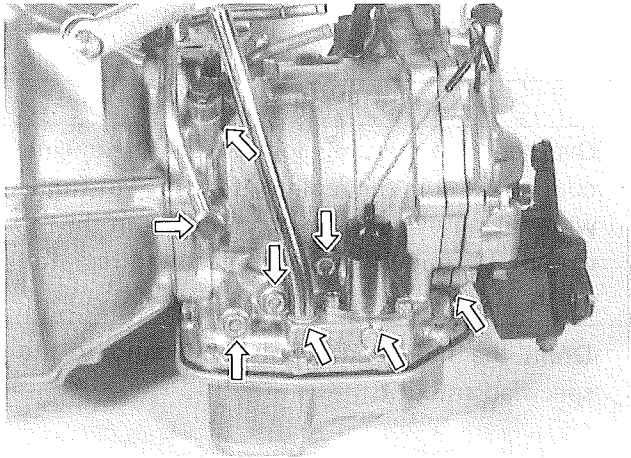
Fluid condition	Cause	Remedy
Gray or dull in color	Entry of water	Overhaul the transmission. Check the engine cooling water in the radiator for entry of fluid, which is an evidence of some defect in the oil cooler. If fluid is found, replace the radiator ass'y.
Milky in color (Abnormal buzz from the transmission.)	Cavitation caused by low fluid level.	Drain the fluid and supply new fluid to the specified amount.
Entry of metal powder	Trouble within the transmission	Repair or replace.

2. Inspection of oil leakage and repair

Low oil level caused by oil leakage will result in various trouble. Check the oil leakage and repair as necessary according to the following procedures.

- ① Jack up the front side and place the safety stands.
- ② Wipe off dirt so that leakage can be found easily.
- ③ Warm up the engine and shift the selector lever in each range from **P** to **L** in that order and shift it back to **P**. Stop the engine and check for oil leakage.





NOTE:

The oil cooler is in the radiator lower tank. Also, check the engine cooling water in the radiator for entry of oil.

④ Method of repair

- a) If oil leakage is found, check to ensure that each bolt is tightened to the specified torque. This is particularly important with the oil pan bolt, for the gasket used there is made of cork and tightness exceeding the specified torque will also cause oil leakage.
- b) If oil keeps leaking even after the job in the step a), replace the gasket with a new one.
- c) If oil still keeps leaking even after the job in the step b), the possibility is that the oil pan itself is out of shape. In such a case, replace it with a new one.

NOTE:

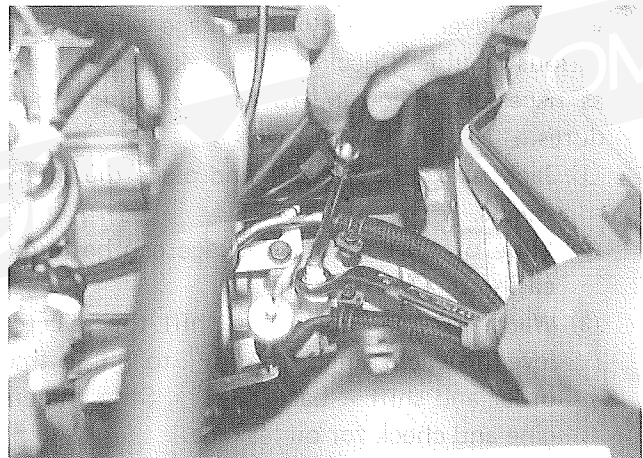
Don't apply sealant to gaskets.

3. Low brake band adjustment

Adjust the low band if the clutch drum slips when the car is started quickly or if engine speed is proved high only in **[L]** range or **LOW** of **[D]** range in the stall test. Its adjustment procedure is as follows.

- ① Loosen the lock nut.
- ② Tighten the anchor bolt to the torque of 3.5 ~ 4.5 N·m (0.35 ~ 0.45 kg-m, 2.6 ~ 3.0 lb-ft) once and then turn it back by 4 1/2 turns.
- ③ While holding the anchor bolt as it is in step ② with a screw driver, tighten the lock nut to the specified torque.

Lock nut	23 – 31 N·m
tightening torque	(2.3 – 3.1 kg-m)
	17.0 – 22.0 lb-ft

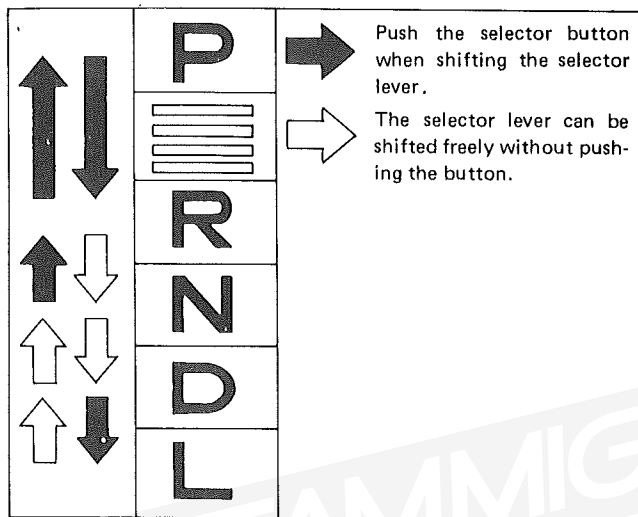


If the above adjustment cannot solve the trouble, the brake band itself is worn. Such a worn brake band must be replaced.

4. Inspection and adjustment of selector lever positions

Inspection

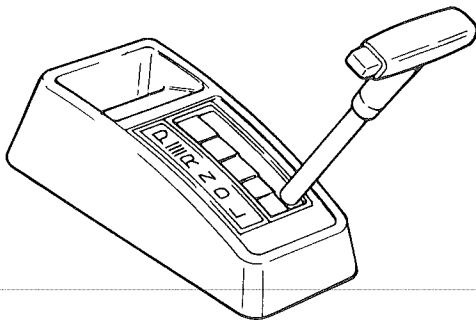
- ① Check if the automatic transmission operates according to the desired selector lever positions.
- ② Check to ensure that the selector lever can be shifted to each of **P** , **R** and **L** ranges only when the selector lever button is pressed, and its movement is smooth and articulate. Also, check the position indicator for correct indication of lever positions.



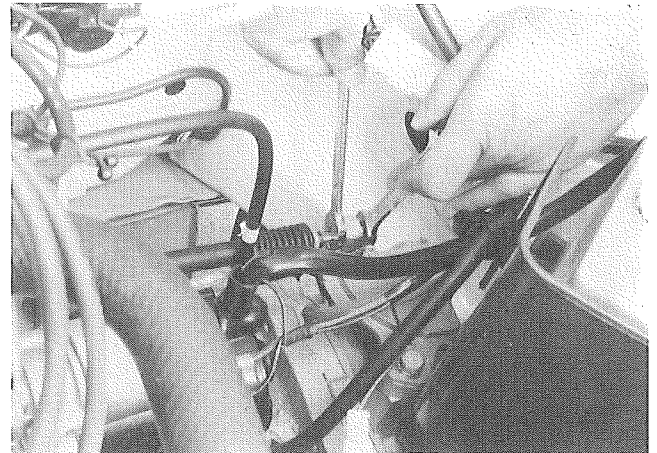
If any defect is found, replace defective parts or perform the following adjustment.

Adjustment

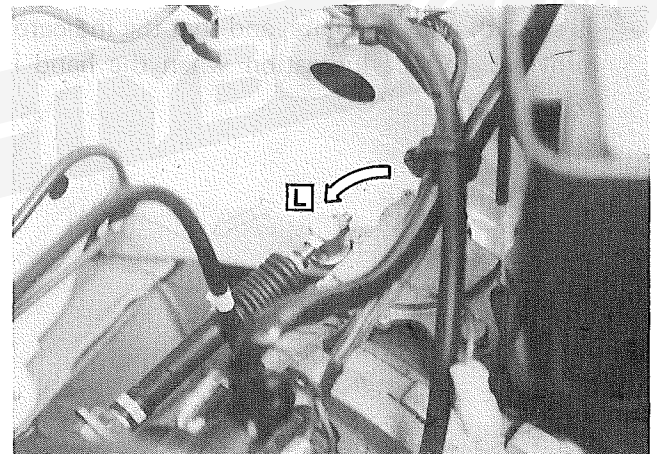
- ① Shift the selector lever to **L** range.



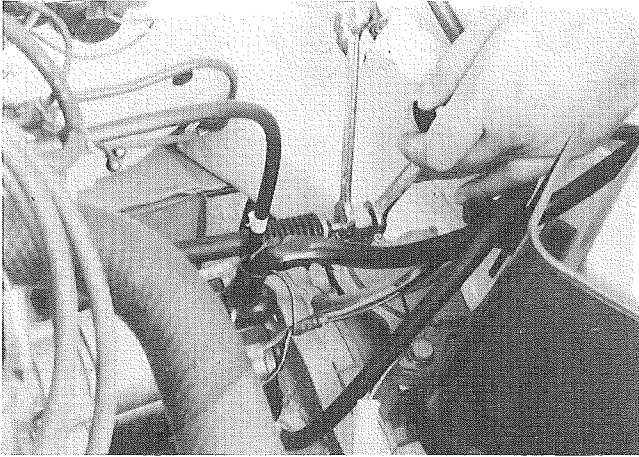
- ② Set the selector lever control cable free by loosening the lock nuts of the joint section of the selector lever control cable and shift lever.



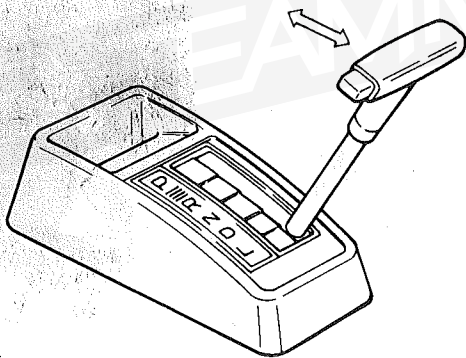
- ③ Bring the shift lever to the **L** range position.



- ④ With the lever kept as it is, tighten the lock nuts loosened in step ② so that the cable is free from play. At this time, be careful so that the cable does not get tense, either.



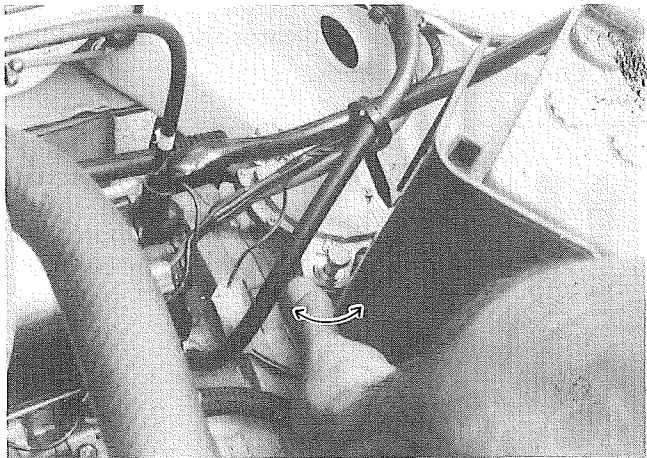
- ⑤ While shifting the selector lever in the order of **P** → **L** → **P**, check to ensure that each shift is smooth and articulate, and that the indicator provides correct indication when the hand is off the lever.



5. Inspection and adjustment of shift lever switch

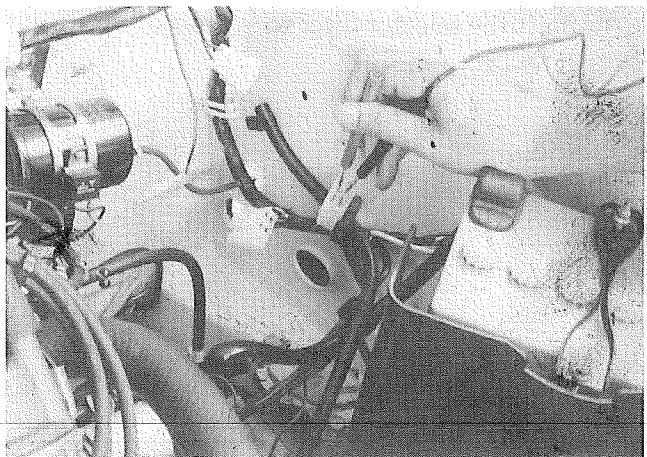
- ① Check if the starter turns on with the shift lever in **N** or **P** range but not with the lever in **D**, **L** or **R**.

Also, check if the back-up light comes ON when **R** range is selected. If the result is unsatisfactory, loosen the switch mounting bolt and adjust it within the range of the oblong mounting hole.



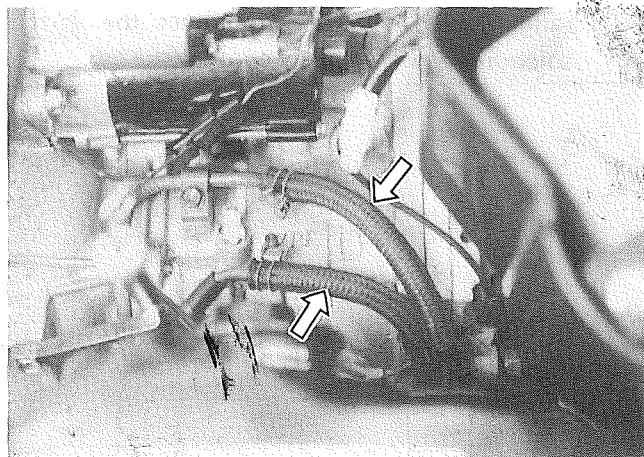
- ② If the above adjustment does not work, disconnect the shift lever switch lead wire at the coupler and check continuity as follows.

P or N range	Continuity across Black/Yellow and Black/Red terminals
R range	Continuity across Yellow and Red terminals
D range	Continuity across Blue/Red and Black terminals



6. Inspection of oil cooler hoses

Inspect the oil cooler hoses for deterioration and crack. Also, check each hose joint for evidence of oil leakage. If the hose is found defective, replace it with a new one.



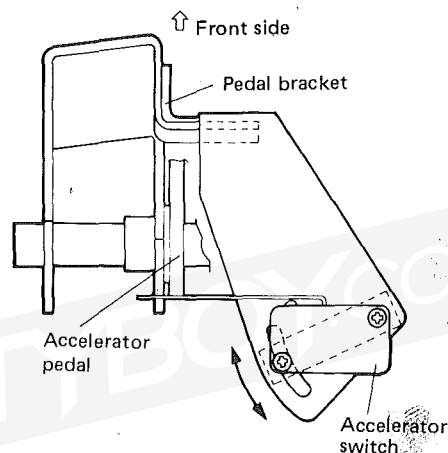
Replace the oil cooler hoses at the following intervals.

Replacement interval	Every 80,000 km (48,000 miles) or 48 months
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7. Adjustment of accelerator switch position

This adjustment is required when reinstalling the accelerator switch or when upshifting doesn't occur at the speed of about 52 – 58 km/h (32 – 36 miles/h) in **D** range.

Adjust the accelerator switch position so that the switch turns ON when the accelerator pedal is depressed 80 to 90% of its full stroke down. Generally speaking, positioning its mounting screw in the center of its adjusting hole sets the switch in the above said position.



TESTING METHODS

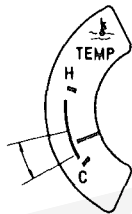
The operating conditions of each part of the automatic transmission can be checked in the following tests.

1. Oil pressure test

The purpose of this test is to check the operating conditions of each part of the transmission by measuring the oil pressure of the oil pressure lines.

NOTES:

- After fitting the oil pressure gauge, make sure that no oil leaks from where it is fitted or anywhere else.
- The oil pressure must be measured with the automatic transmission oil temperature at $70 - 80^{\circ}\text{C}$ ($158 - 176^{\circ}\text{F}$). So, before the test, warm up the engine till the water temperature meter indicates around 80°C (176°F).

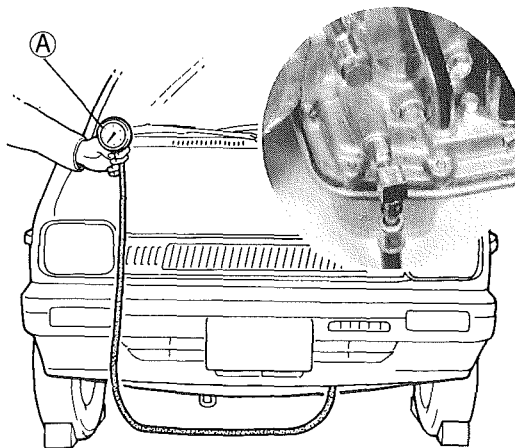


- Before testing oil pressure, check to be sure that transmission fluid level is within specification and transmission is free of oil leakage.

- ① Chock the front and rear wheels and pull the parking brake lever all the way up.
- ② Fit the oil pressure gauge at the position indicated in the below figure.
- ③ Start the engine and run it at specified idling speed.
- ④ Measure oil pressure in **[R]**, **[D]** and **[L]** ranges respectively.

NOTE:

- Be sure to keep the foot brake pedal depressed when shifting the selector lever and measuring oil pressure.
- In order to measure oil pressure of the **[D]** range HIGH circuit, disconnect the shift solenoid lead wire at its coupler.



Ⓐ : Oil pressure gauge
(Parts No. 09925-37810)

Oil pressure specified value

With the engine idling to the specification (900 ± 50 r/min), oil pressure in each range should be of the value given in the table.

Specified oil line pressure	
[R] range	6.0 – 8.0 kg/cm ² (85 – 114 psi)
[D] range LOW	5.5 – 7.5 kg/cm ² (78 – 107 psi)
[D] range HIGH	4.5 – 5.5 kg/cm ² (64 – 78 psi)
[L] range	5.5 – 7.5 kg/cm ² (78 – 107 psi)

Trouble-diagnosis

If the oil pressure is found out of specification, its possible cause is as listed in the chart.

Test result	Possible cause
Oil pressure in each range is higher than the specified value.	● Malfunction of regulator valve.
Oil pressure in each range is lower than the specified value.	● Defective oil pump. ● Malfunction of regulator valve.
Oil pressure in [L] range is low.	● Oil leakage from [L] range oil pressure circuit.
Oil pressure in [D] range LOW is low.	● Oil leakage from [D] range LOW oil pressure circuit.
Oil pressure in [D] range HIGH is low.	● Oil leakage from [D] range HIGH oil pressure circuit.
Oil pressure in [R] range is low.	● Oil leakage from [R] range oil pressure circuit.

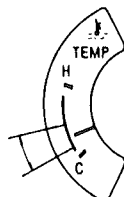
- ⑤ Reinstall the plug and tighten it to specified torque.
- ⑥ Upon completion of installation, check for oil leakage.

2. Stall test

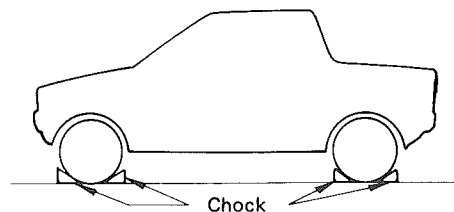
The purpose of this test is to check overall performance of the automatic transmission and engine by measuring the maximum engine speed in each range.

NOTES:

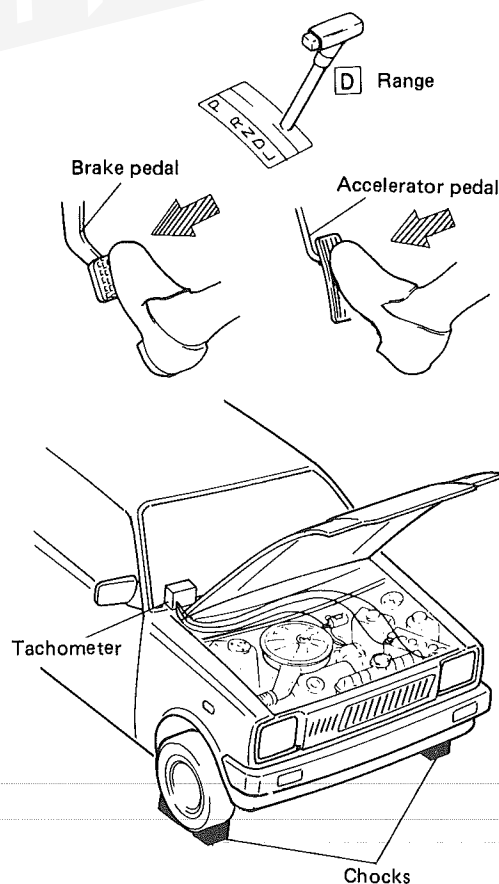
- As the test makes the oil temperature rise extremely high, it must not last more than 5 seconds.
- The oil temperature should be 70 – 80°C (158 – 176°F) for this test. So, before the test, warm up the engine till the water temperature meter indicates around 80°C (176°F) as shown in the figure.



- ① Chock the front and rear wheels as shown in the figure, pull the parking brake lever all the way up.



- ② Disconnect the shift solenoid lead wire at the coupler.
- ③ Connect the engine tachometer.
- ④ Start the engine.
- ⑤ Shift the selector lever to **[D]** range and slowly depress the accelerator pedal all the way down while looking at the tachometer. As the accelerator pedal is depressed down, the indicator of the tachometer reaches a certain point (stall point) where the engine speed becomes constant. At this point, read the engine speed on the tachometer.



NOTE:

In this case, the reading of the tachometer at the stall point is the engine speed of the **[D]** range HIGH since the shift solenoid lead wire has been disconnected at the coupler. In order to check the stall speed of **[D]** range LOW, connect the shift solenoid lead wire at its coupler.

- ⑥ Shift the selector lever to **[L]** range and repeat the same procedure as above.
- ⑦ Shift the selector lever to **[R]** range and repeat the same procedure as above.

Stall point (engine speed)	2,800 – 3,100 r/min (rpm)
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Trouble-diagnosis

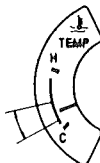
Test result	Possible cause
Engine speed in each range is lower than the specified speed.	<ul style="list-style-type: none">● Insufficient engine output.● Multifunction of stator one way clutch.
Engine speed in [D] range HIGH is higher than the specified speed.	<ul style="list-style-type: none">● Multi-plate clutch slipping.● Oil line pressure low.
Engine speed in [L] range ([D] range LOW) is higher than the specified speed.	<ul style="list-style-type: none">● Brake band slipping.● Oil line pressure low.
Engine speed in [R] range is higher than the specified speed.	<ul style="list-style-type: none">● Brake disc slipping.● Oil line pressure low.

3. Time lag test

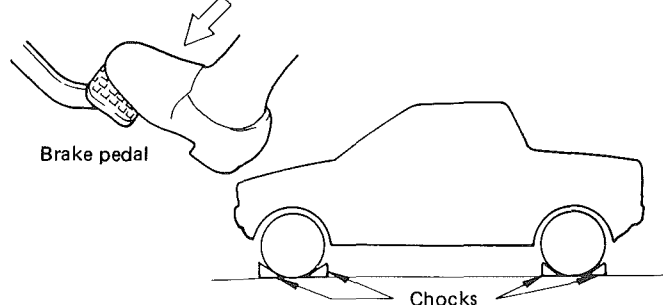
The purpose of this test is to check the conditions of the low brake, reverse brake and line pressure by measuring time lag which refers to the time elapsed since the selector lever was shifted till a shock is felt while the engine is idling.

NOTES:

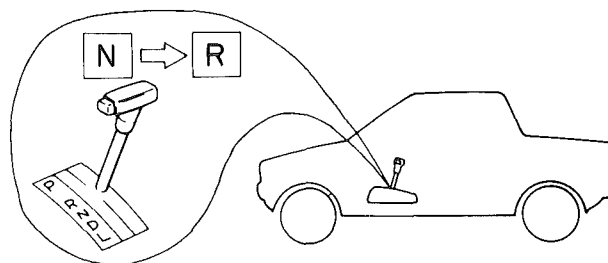
- Make measurements at the intervals of more than a minute (so as to residual pressure is regained in each pressure).
- The oil temperature should be 70 – 80°C (158 – 176°F) for this test. So, before the test, warm up the engine till the water temperature meter indicates around 80°C (176°F).



- ① Chock the front and rear wheels, pull the parking brake lever all the way up and depress the foot brake pedal.

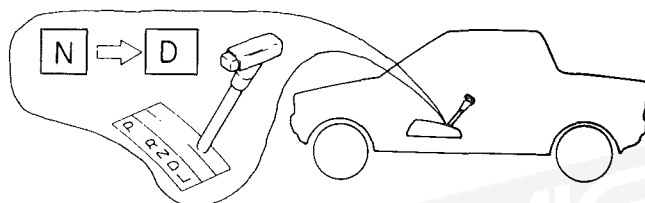


- ④ Repeat the same procedure as above with the selector lever shifted from **N** to **R**.



Time lag specification	N → D	less than 0.6 sec.
	N → R	less than 1.4 sec.

- ② Keep the engine idling.
- ③ Shift the selector lever from **N** to **D** range. Using a stop watch, find out how long it is between the time of the selector lever shift and a shock.



Trouble-diagnosis

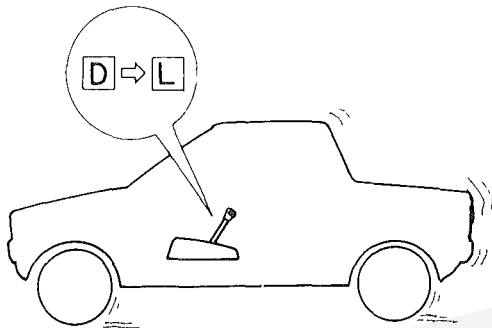
Test result		Possible cause
N → D	Time lag is larger than the specified value.	<ul style="list-style-type: none"> ● Oil line pressure low. ● Worn low brake band ● Low brake band out of adjustment
N → R	Time lag is larger than the specified value.	<ul style="list-style-type: none"> ● Oil line pressure low. ● Worn reverse brake.

4. Road test

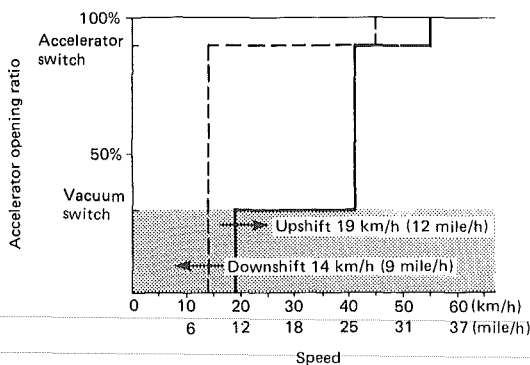
NOTE:

Perform this test in the flat and safe area with only one person in the car.

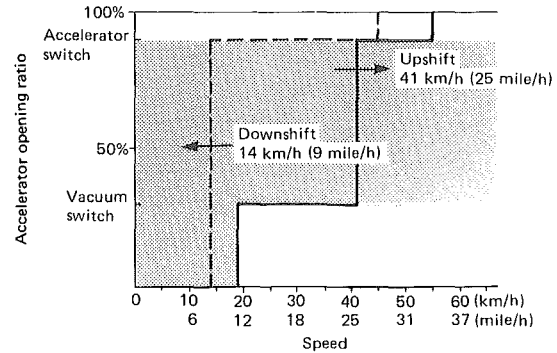
- 1) Check if acceleration is smooth in **[L]** range. But don't accelerate more than 55 km/h (34 miles/h).
- 2) Check if acceleration is smooth in **[D]** range.
- 3) Check if backing is smooth in **[R]** range.
- 4) Check if the transmission is downshifted when the selector lever is shifted to **[L]** range while the car is travelling at 14 – 55 km/h (9 – 34 miles/h) in **[D]** range HIGH.



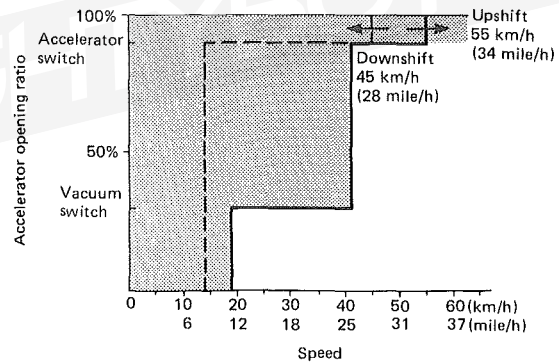
- 5) Check if the transmission is upshifted from LOW to HIGH when the accelerator pedal is depressed about 1/4 way down (so that the vacuum switch does not turn ON) in **[D]** range and the speedometer indicates around 19 km/h (12 miles/h). Then also check if the transmission is downshifted from HIGH to LOW at the speed of approximately 14 km/h (9 miles/h) during deceleration.



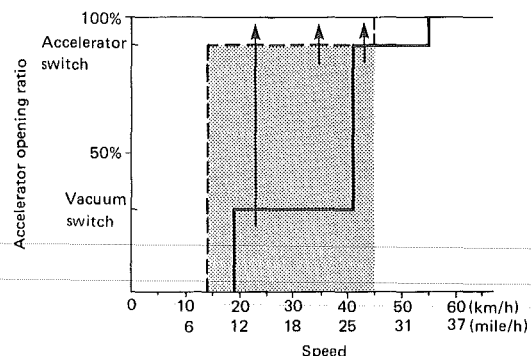
- 6) Check if the transmission is upshifted from LOW to HIGH when the accelerator pedal is depressed about 1/2 way down (so that the vacuum switch turns ON) in **[D]** range and the speedometer indicates around 41 km/h (25 miles/h).



- 7) Check if the transmission is upshifted from LOW to HIGH when the accelerator pedal is depressed all the way down (so that the accelerator switch turns ON) in **[D]** range and the speedometer indicates around 55 km/h (34 miles/h).



- 8) Check if the transmission is downshifted from HIGH to LOW (kickdown) when the accelerator pedal is depressed all the way down while the car is travelling at the speed of less than 45 km/h (28 miles/h) in **[D]** range HIGH.



Trouble-diagnosis

[Hydraulic control system]

Complaint	Possible cause
Car does not move or accelerate in L range or D range LOW.	<ol style="list-style-type: none">1. Malfunction of shift valve.2. Brake band out of adjustment.3. Worn brake band.4. Malfunction of brake piston.5. Insufficient oil pressure to brake band piston.
Car does not accelerate in D range HIGH.	<ol style="list-style-type: none">1. Malfunction of shift valve.2. Malfunction of clutch.3. Worn clutch disc.4. Malfunction of clutch piston.5. Insufficient oil pressure to clutch piston.
Car does not move or accelerate in R range.	<ol style="list-style-type: none">1. Malfunction of shift valve.2. Malfunction of reverse brake.3. Worn reverse brake disc.4. Malfunction of reverse brake piston.5. Insufficient oil pressure to reverse brake piston.
No upshifting (from L range or D range LOW to D range HIGH).	<ol style="list-style-type: none">1. Malfunction of shift valve.2. Incomplete sealing of shift solenoid valve (applicable only to D range LOW → HIGH).3. Malfunction of clutch.4. Insufficient oil pressure to clutch piston.5. Burnt or maladjusted brake band.6. Malfunction of clutch piston.
No downshifting (from D range HIGH to D range LOW or L range).	<ol style="list-style-type: none">1. Malfunction of shift valve.2. Brake band out of adjustment.3. Insufficient oil pressure to brake band piston.4. Burnt clutch disc.5. Malfunction of brake piston.

[Electronic control system]

When the transmission is not shifted automatically in **D** range, possible causes for each symptom are as listed in the below chart.

Complaint	Possible cause
No upshifting.	<ol style="list-style-type: none"> 1. Disconnected speedometer cable. 2. Defective speedometer cable. 3. Disconnected speed sensor coupler. 4. Defective speed sensor earth. 5. Break or short in wire harness between control unit and speed sensor. 6. Defective speed sensor. 7. Short in wire harness between control unit and shift solenoid. 8. Defective shift solenoid. 9. Defective control unit.
Upshift produced but not at speed of around 19 km/h (12 miles/h).	<ol style="list-style-type: none"> 1. Short in wire harness between control unit and vacuum switch. 2. Disconnected, clogged, or broken vacuum switch hose. 3. Defective vacuum switch. 4. Short in wire harness between control unit and accelerator switch. 5. Defective accelerator switch. 6. Defective control unit.
Upshift produced but not at speed of around 41 km/h (25 miles/h).	<ol style="list-style-type: none"> 1. Break or short in wire harness between control unit and vacuum switch. 2. Disconnected, clogged or broken vacuum switch hose. 3. Defective vacuum switch. 4. Short in wire harness between control unit and accelerator switch. 5. Defective accelerator switch. 6. Defective control unit.

Complaint	Possible cause
Upshift produced but not at speed of around 55 km/h (34 miles/h).	<ol style="list-style-type: none"> 1. Break or short in wire harness between control unit and accelerator switch. 2. Accelerator switch mounting position out of adjustment. 3. Defective accelerator switch. 4. Defective control unit.
No downshifting.	<ol style="list-style-type: none"> 1. Safety circuit operated. <div data-bbox="824 512 1442 743" style="border: 1px solid black; padding: 5px; margin: 10px 0;"> (When the speed signal to the control unit is discontinued while driving at the speed of more than 38 – 50 km/h (24 – 31 miles/h) in D range HIGH, this circuit serves to maintain the transmission in HIGH, preventing it from downshifting to LOW.) </div> <p>In such a case, stop the car and turn the ignition key to OFF once so as to turn off the safety circuit. Then drive the car again and check if the transmission upshifts. If it doesn't, foregoing possible causes for No upshifting are applicable to this case.</p> 2. Break in earth wire from control unit. 3. Break in wire harness between control unit and fuse box. 4. Disconnected shift solenoid coupler 5. Break in wire harness between control unit and shift solenoid. 6. Defective shift solenoid. 7. Defective control unit.

[Inspection of electronic control system]

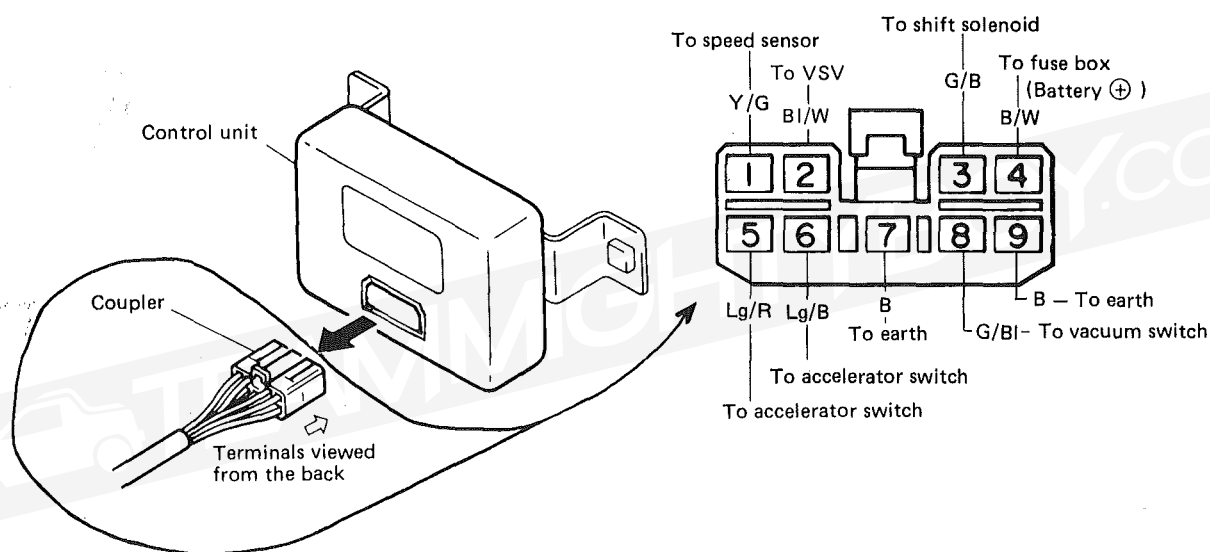
If the transmission is not shifted correctly in **D** range, perform the following inspections in accordance with the foregoing trouble-diagnosis.

There are two methods for this inspection: one by using a controller checker (Part No. 09937-81510) and the other by using a circuit tester. Use of a controller checker makes the inspection speedier and more assured. The method of inspection by using the controller checker is described in the instruction manual attached to itself. When using controller checker, refer to instruction manual for checking method and page 21 – 58 in this manual for speed change points. Here, the method of inspection by using a circuit tester will be dealt with.

[Inspection by using a circuit tester]

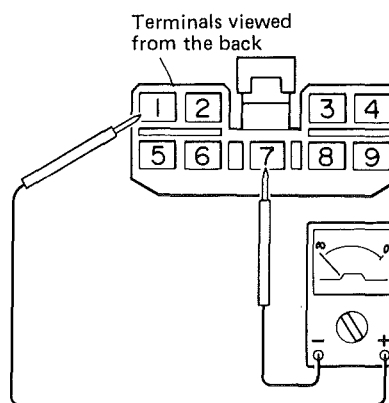
NOTE:

- Disconnect the wire harness coupler of the control unit which is installed under the right side front seat. Perform each inspection by connecting the tester to the coupler terminals from wire harness side of coupler disconnected.
- Be very careful not to connect the circuit tester between the terminals "1" and "4".



1. Speed sensor and its circuit

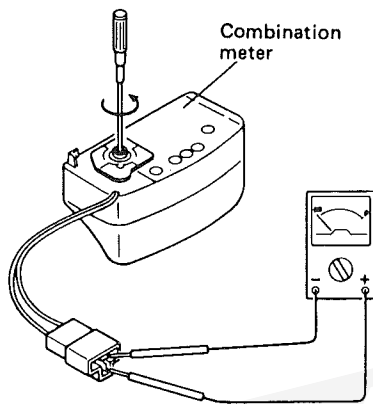
- 1) Jack up the front side of the car and place safety stands.
- 2) Shift the selector lever to **D** range.
- 3) After setting the selector switch of circuit tester to the Ω range, its probes between the coupler terminals "1" and "7", and then turn the front tire. If the pointer of the tester moves back and forth between 0 (zero) and ∞ (infinity), the speed sensor and its circuit are in good condition.



If it does not, move on to the next step to check the speed sensor itself removed from the circuit.

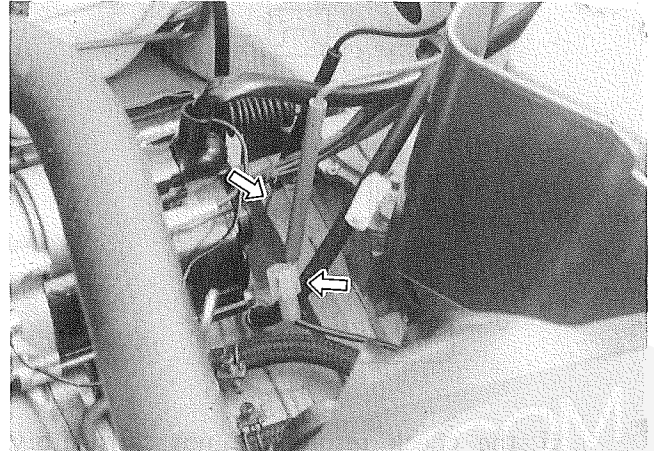
- 4) Remove the combination meter. Then check for continuity between terminals as shown below while turning the speedometer slowly with screw driver. At this time, the pointer of the tester should move back and forth between 0 (zero) and ∞ (infinity).

If it is found defective through the check in step 4), replace it with new one. If the speed sensor is proved free from fault, the possible cause of the trouble may be a break or a short in the wire harness between the control unit and the speed sensor.



If nothing is heard, check the shift solenoid itself removed from the circuit according to the following steps.

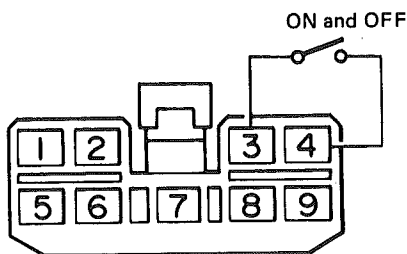
- 3) Disconnect the shift solenoid lead wire at the coupler.
- 4) Measure the resistance across the lead wire terminal and solenoid body or transmission case. The resistance should be 10 – 16 Ω .



If it is found defective through the check in step 4), replace it with a new one. If no fault is found, the possible cause of the trouble may be a break or a short in the circuit between the control unit and shift solenoid.

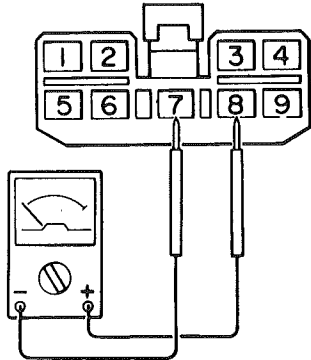
2. Shift solenoid and its circuit

- 1) Turn the ignition switch to ON.
- 2) Connect the coupler terminals "3" and "4" as shown in the figure and listen for operating sound of the shift solenoid.



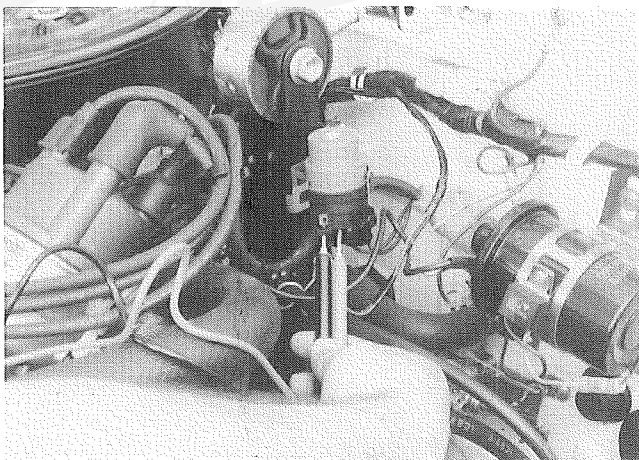
3. Vacuum switch and its circuit

- 1) Make sure that the selector lever is placed in **P** range.
- 2) Start the engine and keep it idling. Then check if there is continuity between the coupler terminals "7" and "8". There must not be continuity in this condition. On the other hand, there must be continuity in the same check but with the engine stopped.



If the check results are not satisfactory, move on to the next step to check the vacuum switch itself removed from the circuit.

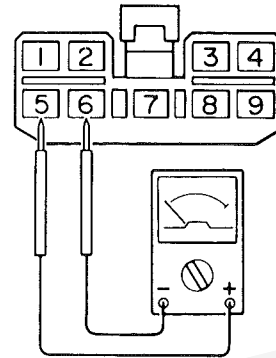
- 3) Disconnect the coupler from vacuum switch.
- 4) Connect the tester to the vacuum switch terminals and check for continuity as in step 2).



If the vacuum switch is found defective through the check in step 4), replace it with a new one. If no fault is found, the possible cause of the trouble may be a break or a short in the circuit between the control unit and vacuum switch.

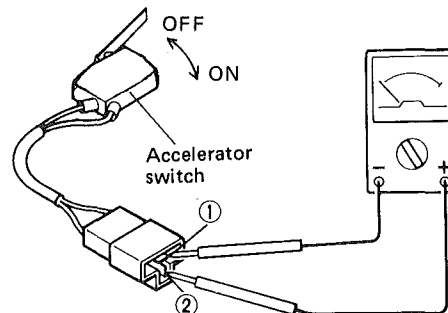
4. Accelerator switch and its circuit

- 1) With the accelerator pedal released, check if there is continuity between the coupler terminals "5" and "6". There should be no continuity in this condition.
- 2) With the accelerator pedal depressed all the way down (the accelerator switch turns ON), check for continuity between the coupler terminals "5" and "6". There should be continuity in this condition.



If not, move on to the next step to check the accelerator switch itself removed from the circuit.

- 3) Check for continuity between the accelerator switch lead wire terminals ① and ② while turning the accelerator switch to ON and OFF by hand. With the switch ON, there should be continuity, and with the switch OFF, there should be no continuity.



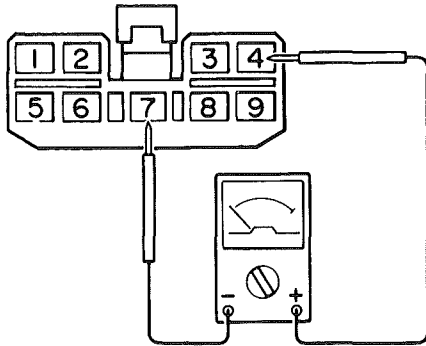
If the accelerator switch is found defective through the check in step 3), replace it with a new one.

If no fault is found, the possible cause of the trouble may be a break or a short in the circuit between the control unit and accelerator switch.

5. Battery Circuit

- 1) Turn the ignition switch "ON" position.
- 2) Check the voltage between terminals "4" and "7".

The voltage should be about 12V. If fault is found, repair or replace.

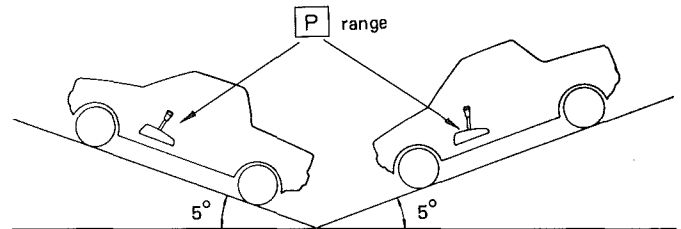


If each result of the above check 1 through 5 is satisfactory, the cause of the trouble is in the defective control unit.

5. **P** Range Test

Stop the car while driving up the slope (approx. 5°) and shift the selector lever to **P** range. Then check to ensure that the car is at a stop even without the parking lever pulled and that the selector lever can be shifted out of **P** range to others smoothly.

Carry out the same check while driving down the slope.



TROUBLE-DIAGNOSIS

Transmission

Complaint	Possible cause
Engine does not start in P or N range.	<ol style="list-style-type: none"> 1. Selector lever control cable out of adjustment 2. Loose connections between selector lever and shift lever 3. Break or short in shift lever switch circuit 4. Defective shift lever switch
Car backs up in R range but back-up light does not light.	<ol style="list-style-type: none"> 1. Break or short in back-up light circuit 2. Defective shift lever switch
Car does not move in D , L or R range.	<ol style="list-style-type: none"> 1. Disconnected or maladjusted connections between selector lever and manual valve 2. Burned transmission gear 3. Insufficient amount of fluid 4. Insufficient discharge pressure from oil pump 5. Clogged oil strainer 6. Malfunction of regulator valve
Car does not move or accelerate smoothly only in D range LOW or L range.	<ol style="list-style-type: none"> 1. Malfunction of shift valve 2. Malfunction of low brake piston 3. Insufficient oil pressure to low brake piston 4. Low brake band out of adjustment 5. Worn low brake band
Acceleration is not smooth in D range HIGH.	<ol style="list-style-type: none"> 1. Malfunction of shift valve 2. Malfunction of clutch piston 3. Insufficient oil pressure to clutch piston 4. Malfunction of check ball 5. Worn clutch disc 6. Incomplete sealing of shift solenoid valve
Car does not move or accelerate smoothly only in R range.	<ol style="list-style-type: none"> 1. Malfunction of reverse brake piston 2. Insufficient oil pressure to reverse brake piston 3. Worn reverse brake
No upshifting (from L range or D range LOW to D range HIGH)	<ol style="list-style-type: none"> 1. Malfunction of shift valve 2. Malfunction of clutch 3. Insufficient oil pressure to clutch piston 4. Burnt or maladjusted brake band 5. Incomplete sealing of shift solenoid valve (applicable only to D range LOW → HIGH)

Complaint	Possible cause
No downshifting (from D range HIGH to D range LOW or L range)	<ol style="list-style-type: none"> 1. Malfunction of shift valve 2. Brake band out of adjustment 3. Insufficient oil pressure to brake band piston 4. Burnt clutch disc
Creeping occurs N range. <div style="border: 1px solid black; padding: 5px;"> NOTE: When car is new, only a little creeping is expected because of friction at the clutch disc and others, but if creeping is excessive, the possible causes are as listed at the right. </div>	<ol style="list-style-type: none"> 1. Selector lever control cable out of adjustment 2. Low brake band out of adjustment 3. Malfunction of low brake, clutch or reverse brake piston 4. Malfunction of regulator valve 5. Burnt low brake band, clutch disc or reverse brake
Car moves in P range.	<ol style="list-style-type: none"> 1. Selector lever control cable out of adjustment 2. Malfunction of parking lock pole 3. Damaged parking lock pole or lock gear
Creeping is excessive in D , L and R range.	<ol style="list-style-type: none"> 1. Maladjusted engine idling speed
When selector lever is shifted from N range to R or D range, it takes longer than the specified time before shock is felt.	<ol style="list-style-type: none"> 1. Selector lever control cable out of adjustment 2. Loose connections between selector lever and manual valve 3. Insufficient discharge pressure from oil pump
Only when selector lever is shifted from N range to R range, it takes longer than the specified time before shock is felt.	<ol style="list-style-type: none"> 1. Malfunction of reverse brake piston 2. Insufficient oil pressure to reverse brake piston 3. Worn reverse brake
Only when selector lever is shifted from N range to D range, it takes longer than the specified time before shock is felt.	<ol style="list-style-type: none"> 1. Malfunction of low brake piston 2. Insufficient oil pressure to low brake piston 3. Worn low brake 4. Low brake band out of adjustment
When selector lever is shifted to R or D range, an excessive shock is felt.	<ol style="list-style-type: none"> 1. Maladjusted engine idling speed 2. Excessive oil pressure (malfunction of regulator valve)

Complaint	Possible cause
Only when up-shifted to D range HIGH, an excessive shock is felt.	<ol style="list-style-type: none"> 1. Malfunction of accumulator valve 2. Worn clutch disc 3. Malfunction of clutch piston
Only when selector lever is shifted to D range or L range, an excessive shock is felt.	<ol style="list-style-type: none"> 1. Worn low brake band 2. Low brake band out of adjustment 3. Malfunction of low brake piston
Only when selector lever is shifted to R range, an excessive shock is felt.	<ol style="list-style-type: none"> 1. Worn reverse brake disc 2. Malfunction of reverse brake piston
Car chatters when starting in D or L range.	<ol style="list-style-type: none"> 1. Low brake band out of adjustment 2. Faulty return stroke of clutch piston 3. Faulty return stroke of reverse brake piston 4. Malfunction of low brake piston 5. Worn low brake band.
Car chatters when starting in R range.	<ol style="list-style-type: none"> 1. Worn reverse brake disc 2. Low brake band out of adjustment 3. Faulty return stroke of low brake piston 4. Faulty return stroke of clutch piston
In R , D or L range, car does not move unless engine speed is increased.	<ol style="list-style-type: none"> 1. Defective oil pump
Abnormal noise is heard from transmission.	<ol style="list-style-type: none"> 1. Worn planetary gear, differential gear and primary gear, and improper tooth contact in their mesh 2. Insufficient amount of fluid
Excessive fuel consumption (provided that engine is in good condition)	<ol style="list-style-type: none"> 1. Defective stator one-way clutch 2. Dragging low brake, clutch disc and low brake

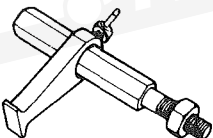
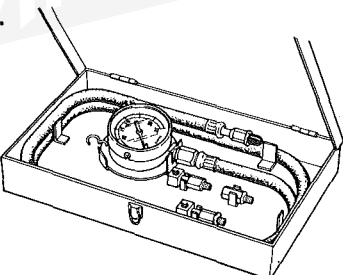
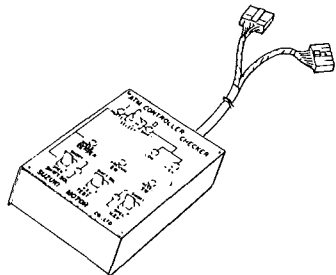
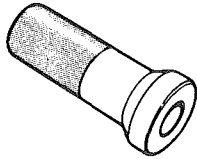
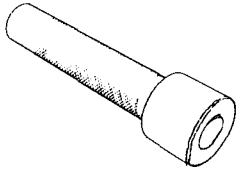
Electronic Control System

Complaint	Possible cause
No upshifting in D range	<ol style="list-style-type: none"> 1. Disconnected speedometer cable 2. Defective speedometer cable 3. Disconnected speed sensor coupler 4. Defective speed sensor earth 5. Break or short in wire harness between control unit and speed sensor 6. Defective speed sensor 7. Short in wire harness between control unit and shift solenoid 8. Defective shift solenoid 9. Defective control unit
In D range, upshift produced but not at speed of around 19 km/h (12 mile/h)	<ol style="list-style-type: none"> 1. Short in wire harness between control unit and vacuum switch 2. Disconnected, clogged or broken vacuum switch hose 3. Defective vacuum switch 4. Short in wire harness between control unit and accelerator switch 5. Defective accelerator switch 6. Defective control unit
In D range, upshift produced but not at speed of around 41 km/h (25 mile/h)	<ol style="list-style-type: none"> 1. Break or short in wire harness between control unit and vacuum switch 2. Disconnected, clogged or broken vacuum switch hose 3. Defective vacuum switch 4. Short in wire harness between control unit and accelerator switch 5. Defective accelerator switch 6. Defective control unit
In D range, upshift produced but not at speed of around 55 km/h (34 mile/h)	<ol style="list-style-type: none"> 1. Break or short in wire harness between control unit and accelerator switch 2. Accelerator switch mounting position out of adjustment 3. Defective accelerator switch 4. Defective control unit

Complaint	Possible cause
In <input type="checkbox"/> range, No downshifting	<ol style="list-style-type: none"> 1. Safety circuit operated <p>When the speed signal to the control unit is discontinued while driving at the speed of more than 38 ~ 50km/h (24 ~ 31 mile/h) in <input type="checkbox"/> range HIGH, this circuit serves to maintain the transmission in HIGH, preventing it from downshifting to LOW.</p> <p>In such a case, stop the car and turn the ignition key to OFF once so as to turn off the safety circuit. Then drive the car again and check if the transmission upshifts. If it doesn't, foregoing possible causes for No upshifting are applicable to this case.</p> 2. Break in earth wire from control unit 3. Break in wire harness between control unit and fuse box 4. Disconnected shift solenoid coupler 5. Break in wire harness between control unit and shift solenoid 6. Defective shift solenoid 7. Defective control unit

SPECIAL TOOLS

The following special tools assure safer, more accurate and speedier service work of the automatic transmission.

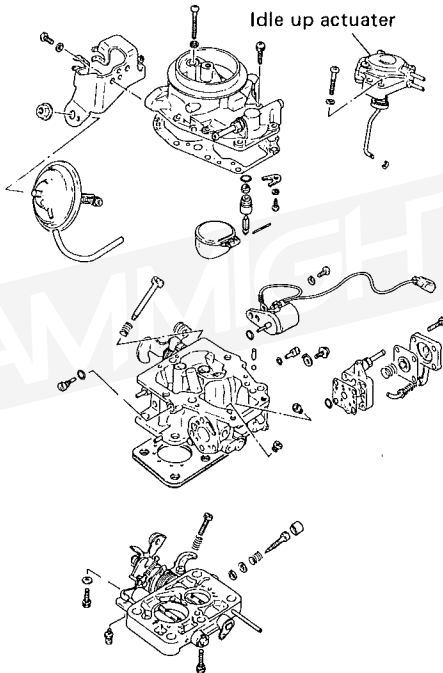
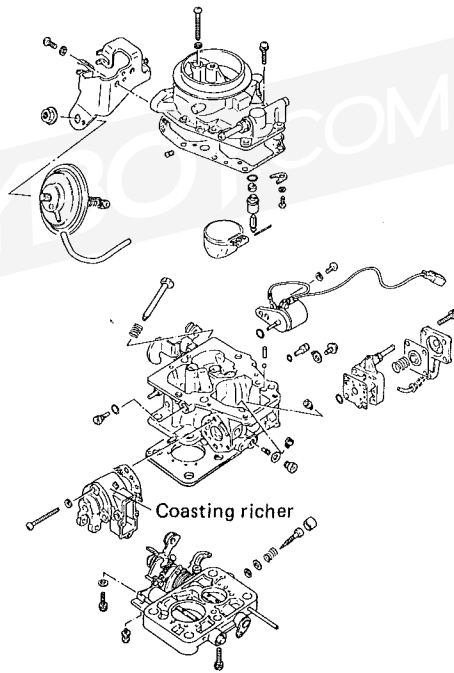
<p>1.</p>  <p>09924-17810 Drive plate stopper</p>	<p>2.</p>  <p>09925-37810 Oil pressure gauge set</p>	<p>3.</p>  <p>09937-81510 Controller checker</p>
<p>4.</p>  <p>09913-76010 Bearing installer</p>	<p>5.</p>  <p>09922-55131 Bearing installer</p>	

21-2. MODIFICATIONS

DESCRIPTION

Given in this section are descriptions on those parts in the car equipped with an automatic transmission (AT car) which are different from or additional to those in the car equipped with a manual transmission (MT car).

1. ENGINE

ITEM	AT CAR	MT CAR												
Carburetor	<p>No deceleration control system is provided. Below idle up system is provided.</p> <p>Idle up system</p> <ul style="list-style-type: none">• This system makes the engine idling speed stable when the engine is cold or when the selector lever is shifted to the D range. 	<p>Deceleration control system (coasting richer) is provided.</p> 												
Radiator	<p>The oil cooler is provided in the lower tank of the radiator to cool off the automatic transmission fluid.</p> <p>Coolant capacity</p> <table><tr><td>Engine, radiator and heater</td><td>2.9 liters (6.1/5.1 US/Imp. pt.)</td></tr><tr><td>Reservoir tank</td><td>0.6 liters (1.3/1.1 US/Imp. pt.)</td></tr><tr><td>Total</td><td>3.5 liters (7.4/6.2 US/Imp. pt.)</td></tr></table>	Engine, radiator and heater	2.9 liters (6.1/5.1 US/Imp. pt.)	Reservoir tank	0.6 liters (1.3/1.1 US/Imp. pt.)	Total	3.5 liters (7.4/6.2 US/Imp. pt.)	<p>NO oil cooler is provided.</p> <table><tr><td>Engine, radiator and heater</td><td>2.4 liters (5.1/4.2 US/Imp. pt.)</td></tr><tr><td>Reservoir tank</td><td>0.6 liters (1.3/1.1 US/Imp. pt.)</td></tr><tr><td>Total</td><td>3.0 liters (6.3/5.3 US/Imp. pt.)</td></tr></table>	Engine, radiator and heater	2.4 liters (5.1/4.2 US/Imp. pt.)	Reservoir tank	0.6 liters (1.3/1.1 US/Imp. pt.)	Total	3.0 liters (6.3/5.3 US/Imp. pt.)
Engine, radiator and heater	2.9 liters (6.1/5.1 US/Imp. pt.)													
Reservoir tank	0.6 liters (1.3/1.1 US/Imp. pt.)													
Total	3.5 liters (7.4/6.2 US/Imp. pt.)													
Engine, radiator and heater	2.4 liters (5.1/4.2 US/Imp. pt.)													
Reservoir tank	0.6 liters (1.3/1.1 US/Imp. pt.)													
Total	3.0 liters (6.3/5.3 US/Imp. pt.)													

2. ELECTRICAL

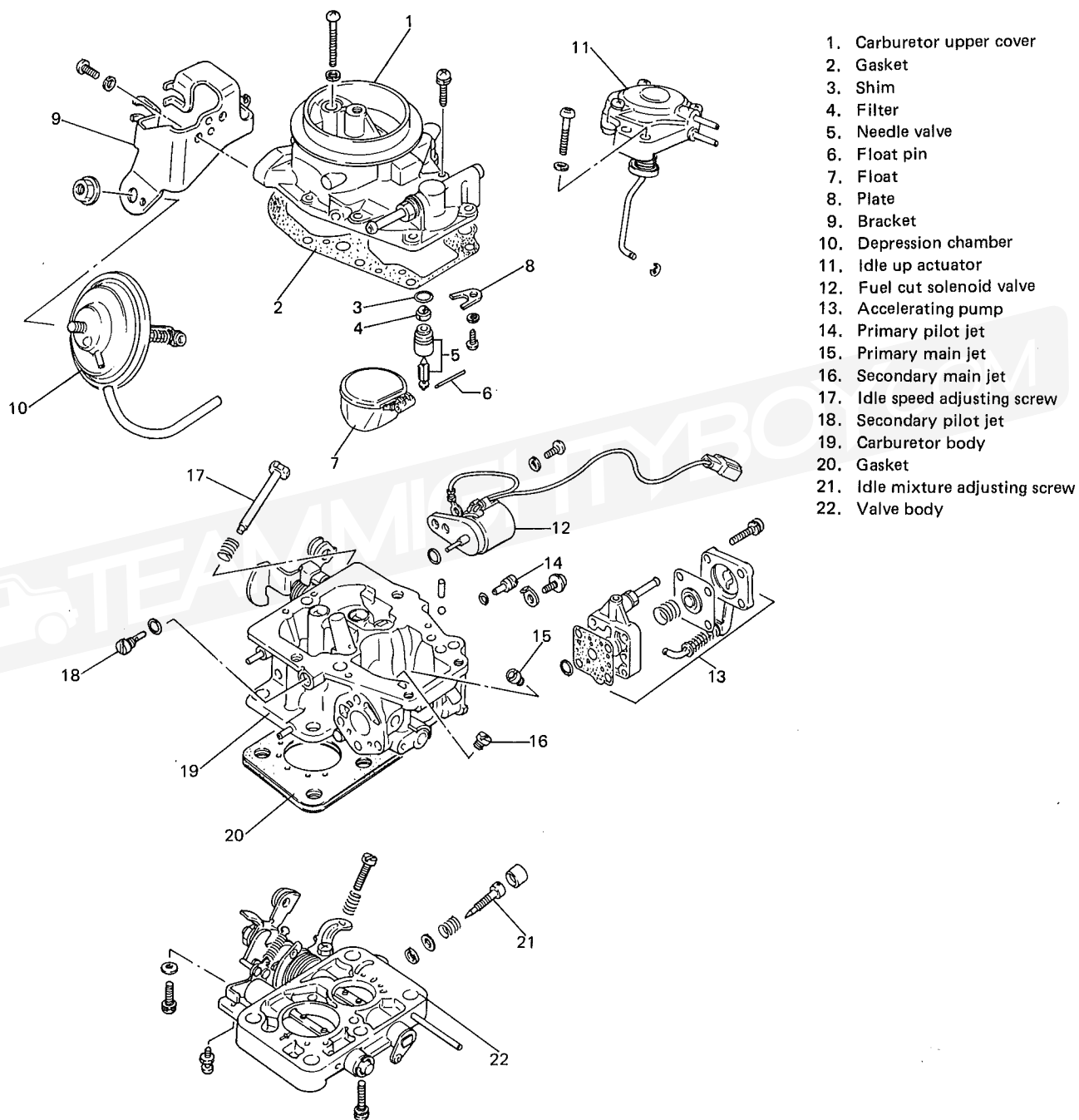
ITEM	AT CAR	MT CAR
Wiring	The automatic transmission control circuit is provided. The wiring diagram is attached at the end of this book.	



CARBURETOR

1. Description

The carburetor installed in this model is provided with two step type idle up system and not provided with deceleration control system as compared with carburetor installed in the manual transmission car.



1. Carburetor upper cover
2. Gasket
3. Shim
4. Filter
5. Needle valve
6. Float pin
7. Float
8. Plate
9. Bracket
10. Depression chamber
11. Idle up actuator
12. Fuel cut solenoid valve
13. Accelerating pump
14. Primary pilot jet
15. Primary main jet
16. Secondary main jet
17. Idle speed adjusting screw
18. Secondary pilot jet
19. Carburetor body
20. Gasket
21. Idle mixture adjusting screw
22. Valve body

2. Operation

Idle up system

This system serves to make the engine idling speed suitable for each condition when the engine is cold or when the selector lever is shifted to the range other than **P**, **R**, **N** and **L**. Its main components are T.V.S.V. (Thermal Vacuum Switching Valve), V.S.V. (Vacuum switching Valve), idle up actuator and idle up lever as shown below.

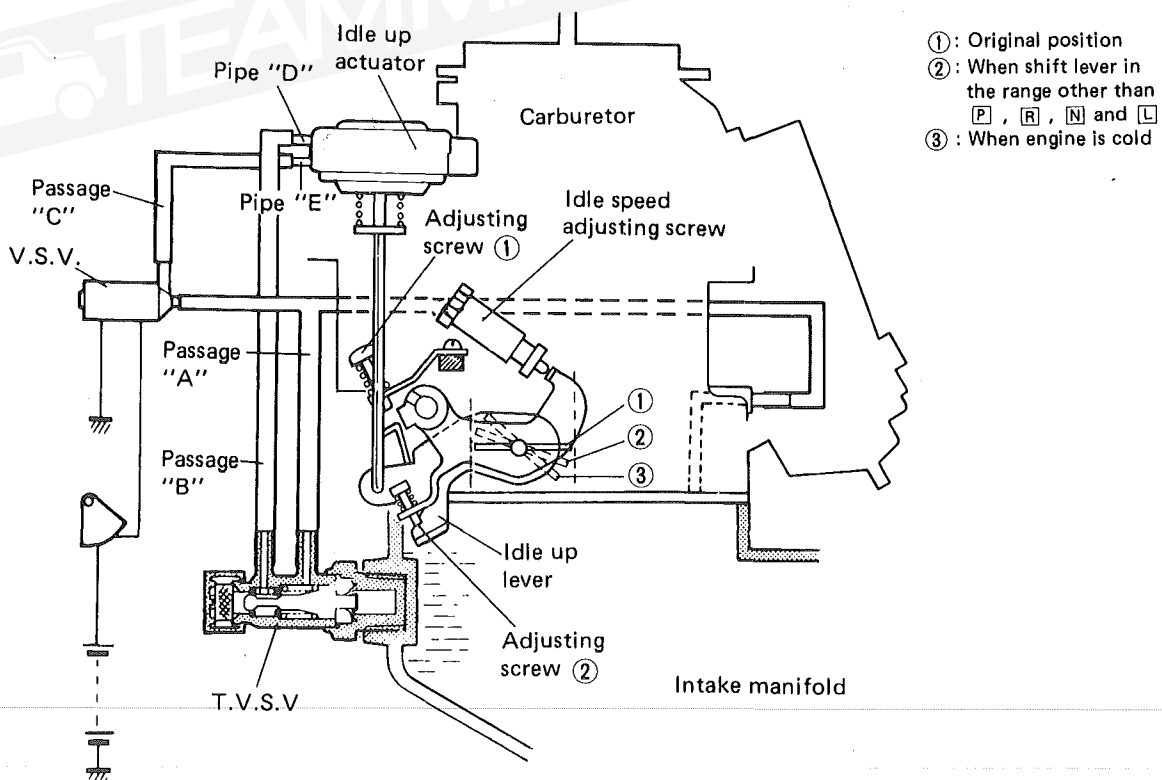
In one way it operates as follows.

When the engine cooling water temperature is low (less than 60°C or 140°F), the T.V.S.V. does not operate and the passages "A" and "B" are in continuity. In this state, as the vacuum (more than -200 mmHg) from the intake manifold is applied to the pipe "D" of the idle up actuator, the diaphragm in the actuator is pulled to cause the throttle valve to open to the point where the idle up lever contacts the adjusting screw ①. Thus a stable idling speed of the cold engine is obtained.

When the engine is warm (cooling water temperature is more than 60°C or 140°F), T.V.S.V. is actuated by the water temperature to shut off between the passages "A" and "B", whereby the passage "B" opens to the atmosphere. That is, as the vacuum from the intake manifold is shut off, the pressure in the idle up actuator becomes the atmospheric pressure and the throttle valve returns to its original position.

In another way, it operates as follows.

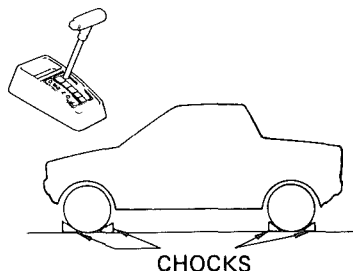
Even when the engine is warm, if the selector lever is shifted into the range other than **P**, **R**, **N** and **L**, the shift lever switch actuates the V.S.V. Then the passages "A" and "C" continue. In this state, as the vacuum (more than -300mmHg) from the intake manifold is applied to the pipe "E" of the idle up actuator, the throttle valve opens to the point where the stopper in the actuator contacts the actuator body. Thus the warm engine idling speed in the range other than **P**, **R**, **N** and **L** is maintained at the specified idling speed (900 ± 50r/min). If the selector lever is in **P**, **R**, **N** or **L** range, the passage "A" is shut off from the passage "C" which then opens to the atmosphere because the circuit to the V.S.V. is OFF. Consequently, the throttle valve returns to its original position.



3. Maintenance Service

CAUTION:

Before starting the engine for inspection or adjustment, be sure to set the selector lever to **P** range and pull the parking brake lever all the way up and chocks the wheels securely.



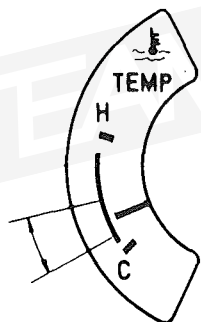
Idle speed and idle mixture

NOTE:

Requires external tachometer.

As preliminary steps, check to be sure that:

- Coolant temperature should be within the below indicated range.



- Choke valve is in full-open position.
- All accessories (wipers, heater, lights, etc.) are out of service.
- Ignition timing is within specification.
- Air cleaner has been properly installed and is in good condition.
- Engine valve clearance is within specification.
- Selector lever is in **P** range.

[Idle speed and idle mixture adjustment]

Adjust idle speed and idle mixture according to the following procedure.

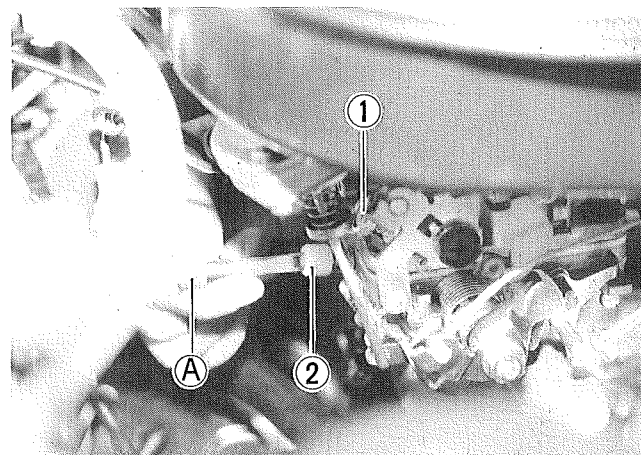
- 1) Adjust idle speed to 950 r/min (rpm) by repositioning (turning) idle speed adjusting screw ①.
- 2) With engine idling at 950 r/min (rpm), turn idle mixture adjusting screw ② to the right or left and set it where the highest engine speed is obtained. (This is the best idle position).
- 3) Perform above 1) and 2) once again, and then readjust idle speed to 950 r/min (rpm) with idle speed adjusting screw ①.
- 4) Upon completion of the work so far, readjust engine idle speed to the below specification by turning idle mixture adjusting screw ② slowly to the right (close).

All cars of this model now manufactured are delivered with their CO% factory adjusted as follows.

Engine idle mixture CO%	1.5 ± 0.5
Engine idle speed r/min (rpm)	900

In the country with the statutory requirements for the exhaust gas (CO%), be sure to adjust the idle mixture adjusting screw so that the CO% indicated on the exhaust gas tester will meet the above specification.

Special tool ① is necessary to turn the idle mixture adjusting screw ②.



1. Idle speed adjusting screw
2. Idle mixture adjusting screw

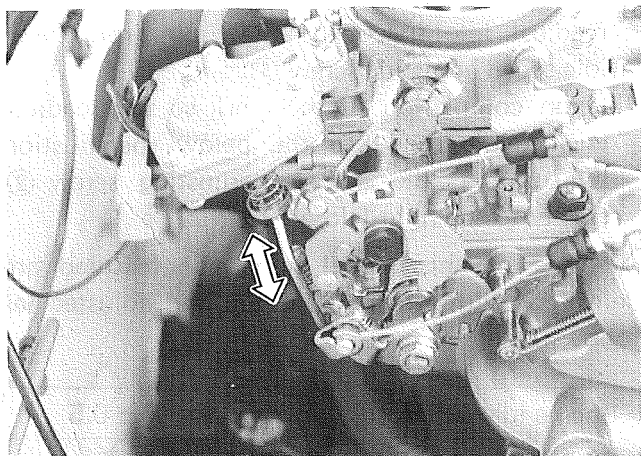
① : Special tool (Carburetor adjuster 09913-17310)

Idle up system when engine is cold.

[System inspection]

- 1) Be sure that engine coolant temperature is below 60°C (140°F).
- 2) Be sure that selector lever is in **P** range.
- 3) Start the engine.

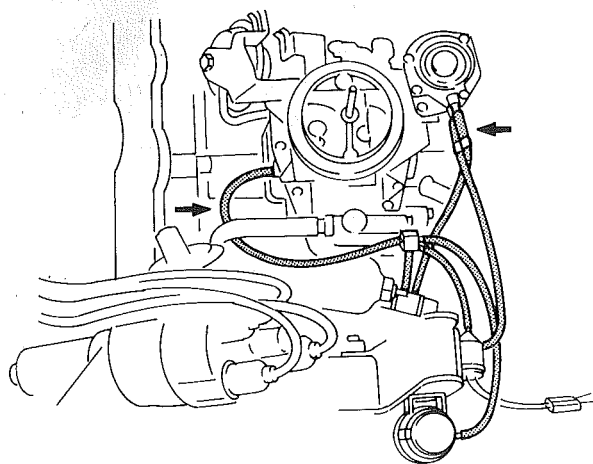
At this time, check that idle up actuator rod moves up. And it goes back to original position when engine stops.



If found faulty, check following parts individually according to each procedure.

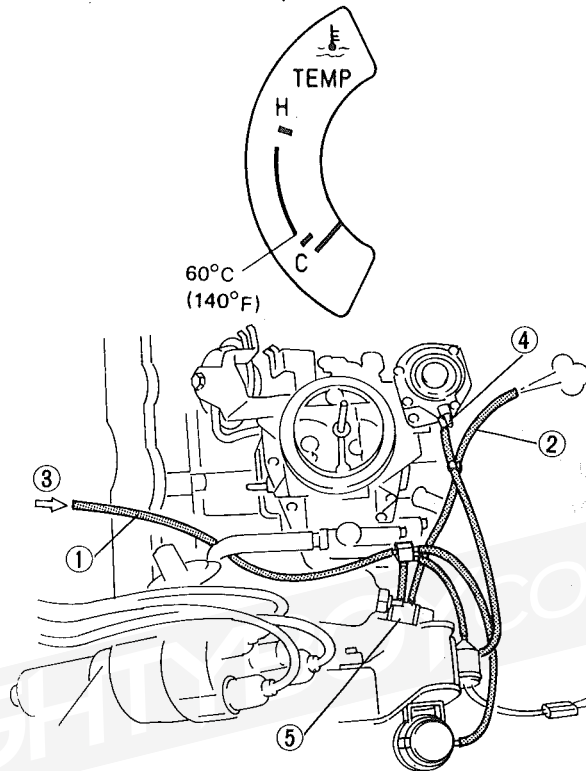
[Vacuum hose inspection]

Inspect each hose for pin holes, bends or damage. Also check to ensure that each joint is securely connected. Any part found defective must be corrected or replaced.



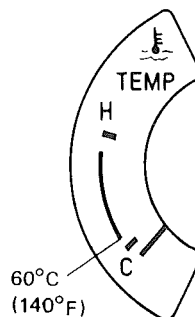
[TVSV inspection]

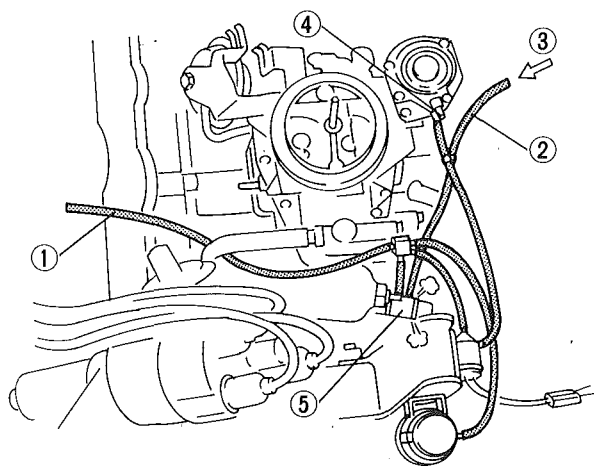
- 1) Make sure that the water temperature meter indicates below 60°C (140°F).
- 2) Disconnect hoses ① and ② from the carburetor and the pipe "D" of actuator respectively.
- 3) Blow air into the hose ①. Then the air must not come out of the filter, but out of the hose ②.



- | | | |
|---------|-------------|---------|
| 1. Hose | 3. Blow air | 5. TVSV |
| 2. Hose | 4. Pipe "D" | |

- 4) Reconnect the hose ① and ② back, and warm up the engine until the water temperature meter indicates above 60°C (140°F).
- 5) Stop the engine and disconnect the hose ① and ② from the carburetor and the pipe "D" of actuator respectively.
- 6) Blow air into the hose ②. Then the air must not come out of the hose ①, but out of the T.V.S.V. filter.



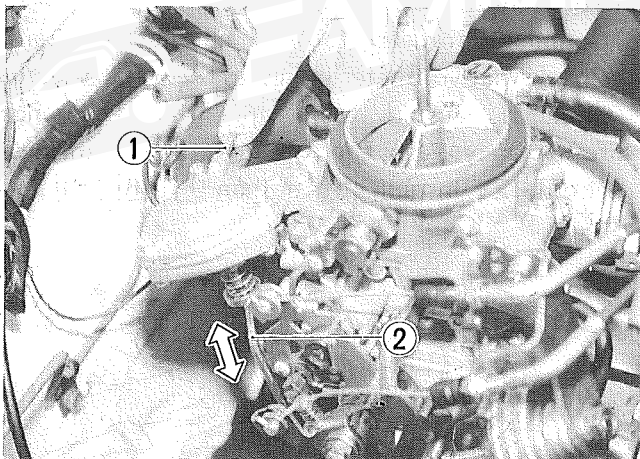


1. Hose
2. Hose
3. Blow air
4. Pipe "D"
5. TVSV

If the above inspection shows anything wrong, replace the T.V.S.V.

[Actuator inspection]

- 1) Disconnect hose from pipe "D" of actuator.
- 2) Pull actuator rod by finger all the way up and apply finger to the joint from which actuator hose has been disconnected.
- 3) In the state of 2), take finger off rod. If actuator rod stays up, it is normal. If defective, replace.



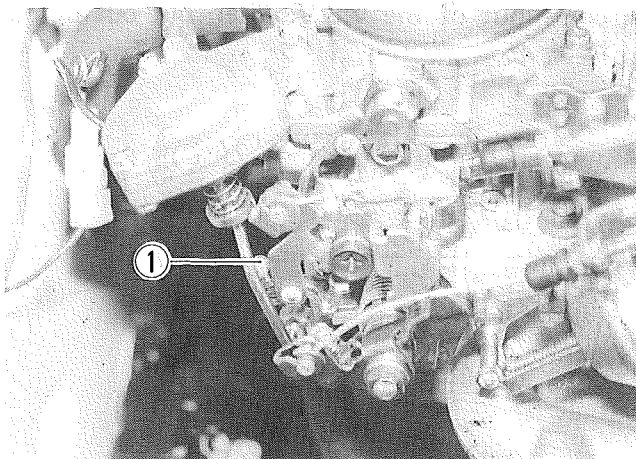
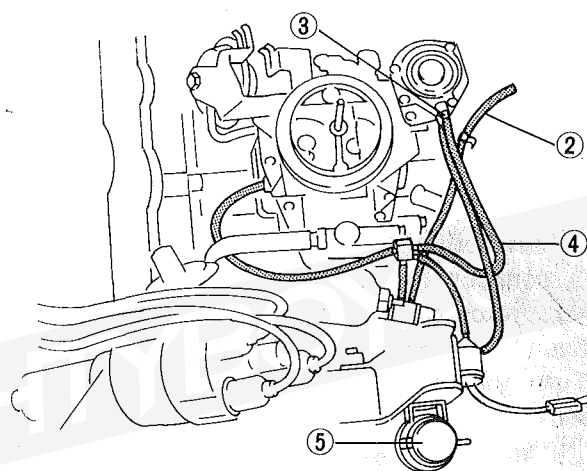
1. Pipe "D"
2. Actuator rod

[Adjustment]

- 1) Adjust idling speed to specification according to [Idle speed and idle mixture adjustment].
- 2) Disconnect the hose ② and hose ④ from the pipe "D" of the idle up actuator and the vacuum switch respectively and connect the hose ④ to the pipe "D" of the actuator. Adjust the adjusting screw ① so that the engine speed of the below specification is obtained.

Engine speed during
idle up when engine
coolant is normal
operating temperature

1,450 – 1,550 r/min



1. Adjusting screw for idle up
when engine is cold
2. Hose
3. Pipe "D"
4. Hose
5. Vacuum switch

Idle up system when selector lever is shifted into range other than **P** , **R** , **N** and **L** .

[System inspection]

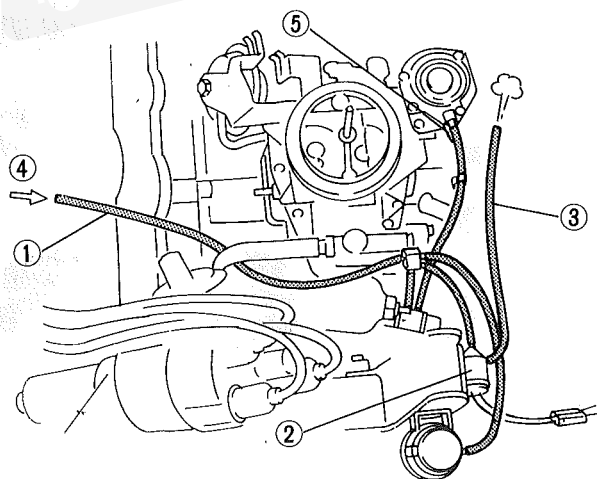
- 1) Adjust idle speed to specification by referring to item of [Idle speed and idle mixture adjustment] and maintain engine at that speed.
- 2) When selector lever is shifted to range other than **P** , **R** , **N** and **L** with depressing brake pedal, if engine speed keeps at below specified idle speed, that proves normal function of idle up.

Idle speed in the range other than P , R , N and L	850 – 950 r/min.
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If found faulty, check following parts individually according to each procedure.

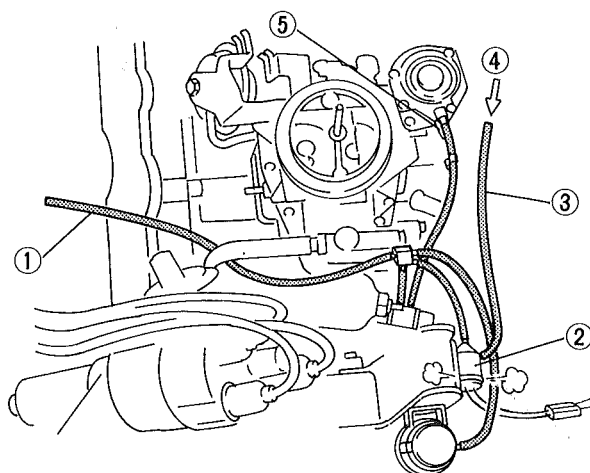
[VSV inspection]

- 1) Disconnect the hose ① and hose ③ from the carburetor and the pipe "E" of actuator respectively.
- 2) Turn the ignition switch to ON and shift the selector lever into the range other than **P** , **R** , **N** and **L** , making sure of the V.S.V. operation by its sound.
- 3) Blow air into the hose ①. Then the air must not come out of the V.S.V. filter, but out of the hose ③.



1. Hose
2. VSV
3. Hose
4. Blow air
5. Pipe "E"

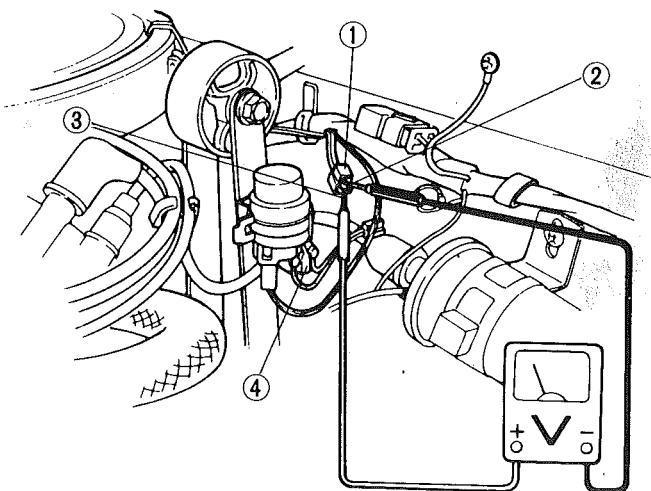
- 4) Shift the selector lever into **P** , **R** , **N** or **L** range.
- 5) Blow air into the hose ③. Then the air must not come out of the hose ①, but out of the V.S.V. filter.



1. Hose
2. VSV
3. Hose
4. Blow air
5. Pipe "E"

If found faulty in steps 3) and 5), proceed to the following checks.

- 6) With ignition switch at "OFF" position, disconnect lead wire coupler from VSV.
- 7) Turn ignition switch "ON" position.
- 8) Connect voltmeter to VSV coupler terminals. Check that voltmeter indicates 0V when selector lever is shifted to **P** , **R** , **N** and **L** range respectively. Also, check that voltmeter indicates about 12V in range other than **P** , **R** , **N** and **L** .

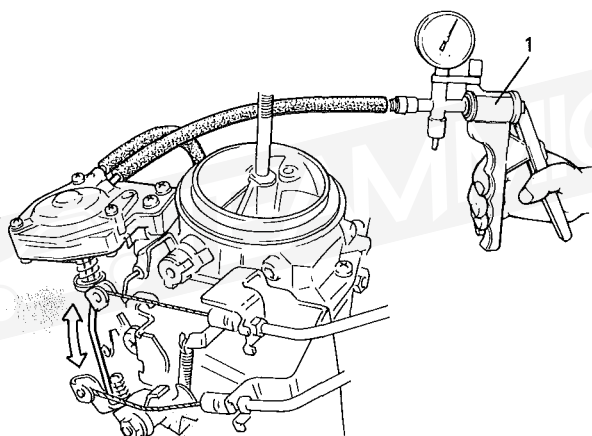


1. VSV coupler
2. Blue/Yellow wire (Connect negative probe)
3. Blue/White wire (Connect positive probe)
4. VSV

- 9) If found faulty in step 8), inspect shift lever switch and its circuit by referring to description of shift lever switch inspection of page 21-52 in this section.
- 10) If found faulty in step 8) and yet it is proved in step 9) that shift lever switch and wire harness are in good condition, replace AT control unit or wire harness.
- 11) If found faulty in steps 3) and 5) checks and yet it is proved in step 8) that VSV electric circuit is in good condition, replace VSV.
- 12) After checking, connect coupler and vacuum hoses disconnected.

[Actuator inspection]

- 1) Disconnect hose from VSV.
- 2) Connect vacuum pump gauge to its hose.
- 3) Check actuator rod moves smoothly and that it is held at the same position when about 40 cmHg vacuum is applied to actuator. If rod doesn't move smoothly, or it isn't held at the same position, replace actuator.



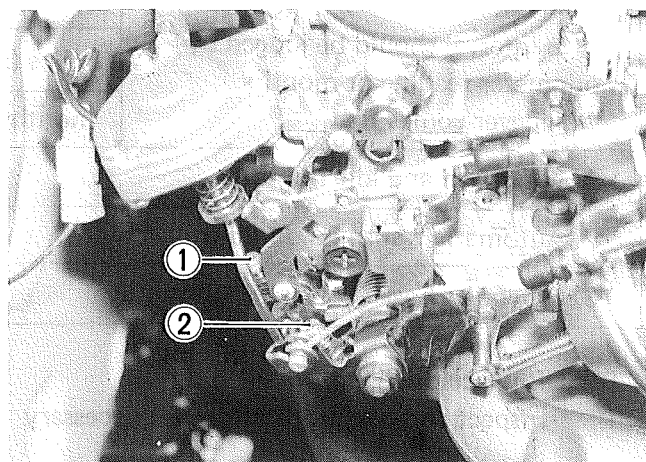
1. Vacuum pump gauge (09917-47910)

[Adjustment]

If idle up system is normal and yet idle up speed is not attained, adjust as follows.

- 1) Check to be sure that:
 - Engine idle speed is specification.
 - Parking brake is pulled fully and drive wheels are blocked.

- 2) The engine speed with selector lever shifted to range other than **P**, **R**, **N** and **L** should be within specification. If it is out of specification, adjust with adjusting screw ②.



1. Adjusting screw for idle up when engine is cold
2. Adjusting screw for idle up when selector lever is shifted into range other than **P**, **R**, **N** and **L**.

NOTE:

Adjusting the adjusting screw ② causes a change in the engine speed during idle up of the cold engine. Therefore, if the adjusting screw ② is adjusted, adjust the idle up speed of cold engine with adjusting screw ①, too.

21-3. PERIODIC INSPECTION SCHEDULE

The periodical inspection schedule for the AT car has following items additional to or modified from that for the MT car.

Interval: This interval should be judged by odometer reading or months, whichever comes first.	km (x 1,000)	1	10	20	30	40	50	60	70	80
	miles (x 1,000)	1	6	12	18	24	30	36	42	48
	months	1	6	12	18	24	30	36	42	48
1. Idle speed and idle mixture		I	I	I	I	I	I	I	I	I
2. Automatic transmission fluid		I	I	I	I	R	I	I	I	R
3. Oil cooler hose		I	I	I	I	I	I	I	I	R

"R" : Replace or change

"I" : Inspect and correct or replace if necessary

