DAIHATSU
CHARADE
Chassis

4

SECTION 4
AUTOMATIC TRANSMISSION

WR-04001

GENERAL INFORMATION

SECTIONAL VIEW

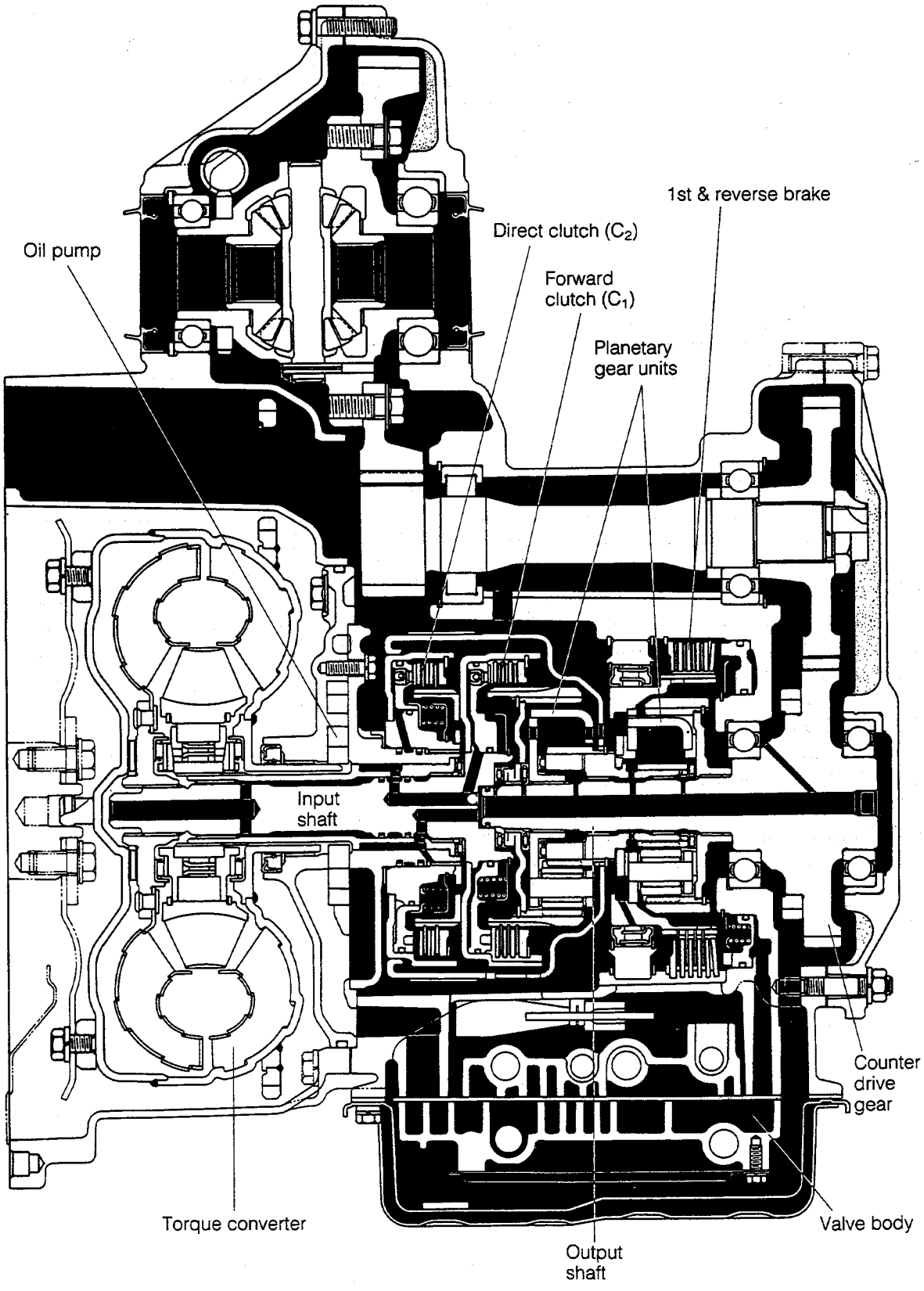


Fig. 4-1

WR-04002

SPECIFICATIONS

Item \ Engine type		CB-23
Torque converter	Type	Three-element, one-stage, two-phase type
	Stall torque ratio	2.26
	One-way clutch type	Sprag type
Transmission type	Type	Spiral gear type planetary gear (two-row)
	Control element	Wet type multiple clutch — 2 sets
		Band type brake — 1 set
		Wet type multiple brake — 1 set
		One-way clutch — 1 piece
	Gear ratio	1st gear: 2.810; 2nd gear: 1.549; 3rd gear: 1.000 reverse gear: 2.296
	Reduction gear ratio	Reduction gear ratio: 0.980; final gear ratio: 3.872
	Speedometer	Number of drive gear teeth: 27, Number of driven gear teeth: 24
	Oil pump	Internal gear type
	Fluid to be used	Automatic fluid Dexron-II
	Fluid capacity liter (Imp. qts, US qts)	Approx. 5 (4.4, 5.3)
	Cooling method	Water-cooled (radiator built-in type)
Control system	Gear shift control method	Electronic hydraulic pressure control method
	Automatic gear shift	Three forward speeds, full automatic shift
	Manual control pattern	P—R—N—D—2—L

WR-04003

OPERATING INSTRUCTIONS ON VEHICLE EQUIPPED WITH 3-SPEED AUTOMATIC TRANSMISSION

1. When the transmission is downshifted from the [D] or [2] range to the [L] range during running, as a precautionary measure perform the downshift at a vehicle speed below 50 km/h. The transmission has such function that, even if the transmission is downshifted to the [L] range, no downshift to the first gear will take place at a vehicle speed above 56 km/h.
2. When the automatic transmission-equipped vehicle is towed, set the change lever to the [N] position and tow the vehicle at a speed below 30 km/h. Towing distance is to be limited to 80 km.
   If troubles seem to exist inside the transmission, move the vehicle with front wheels raised by a wrecker. If the engine is not running, no oil circulates in the transmission. Hence, there is a possibility that the gear, clutch and so forth may get seized.

WR-04004

3. If the electronic control system, such as the computer, should be encountered with abnormality, resulting in malfunctioning gear shift, and yet you must perform emergency running, you may operate the vehicle, following the procedure given below.
   1) Disconnect the 2-pole connector (elliptical and white) leading to the solenoid of the transmission.
      Secure the disconnected harness leading to the solenoid so that it may not be caught by the drive shaft.
   2) When the shift lever is selected to the [L], [2] and [D] ranges progressively in this order, upshift occurs as follows: the 1st gear in the [L] range, the 2nd gear in the [2] range and the 3rd gear in the [D] range.

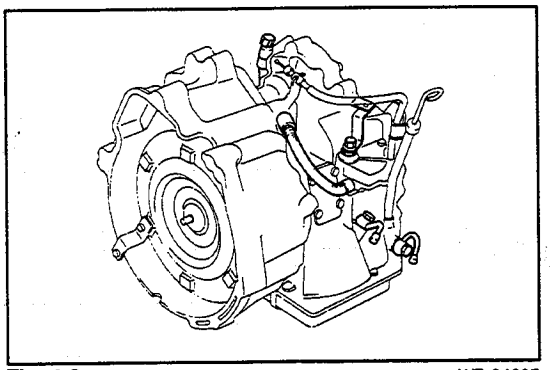
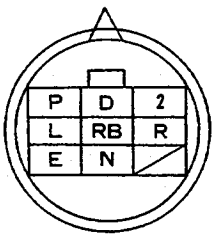
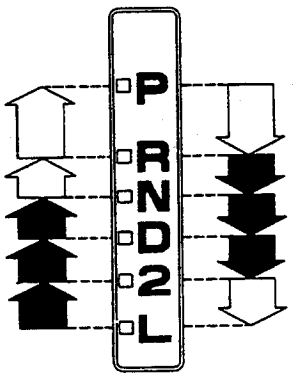
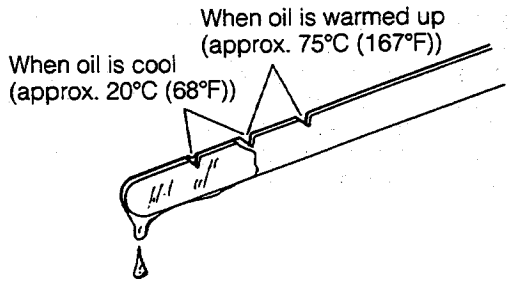


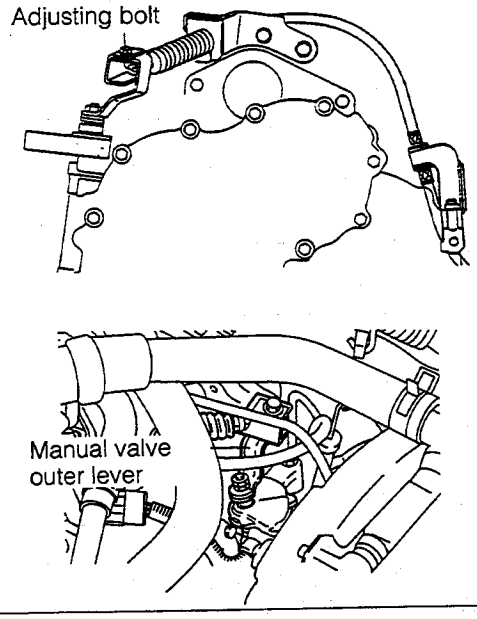
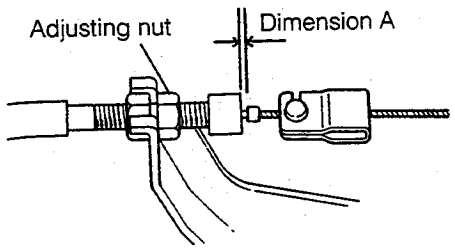
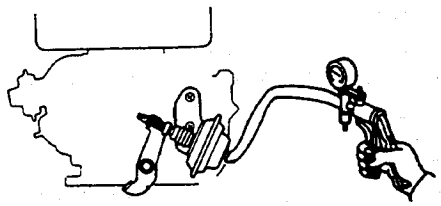
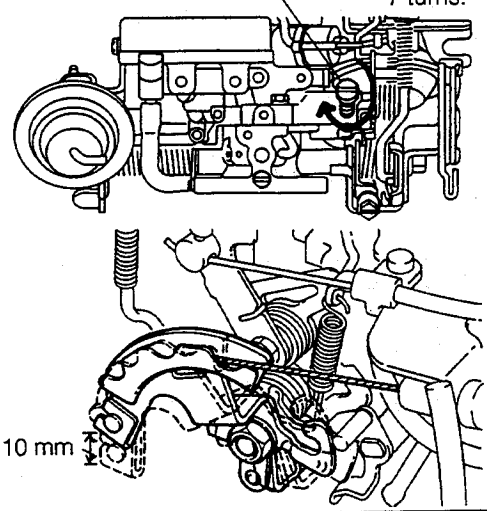
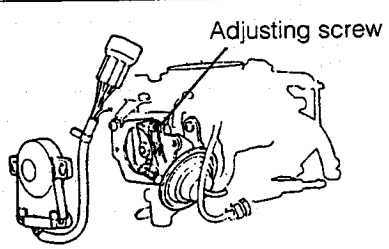
Fig. 4-2 WR-04005

BASIC CHECKS

Item	Procedure
Preparation of check	1. Park the vehicle on a flat road. 2. Ensure the safety at the forward and rear areas of the vehicle. Perform the following checks.
Neutral Start Switch Check 	1. Apply the parking brake. 2. Ensure that the engine can start when the shift lever is set to the [N] or [P] range. Also ensure that the engine will not start when other ranges are selected. 3. Check each continuity specified in the connection table, using a circuit tester. Connection Table Terminal / Range: E (WB: white/black), N (BY: black/yellow), P (BR: black/red) N: E–N P: E–P Others: E, N, P
Shift Lever Position Check  ➡ means "Move shift lever without pushing shift lever button." ⇨ means "Move shift lever with shift lever button pushed."	1. Start the engine. Release the parking brake. Ensure that the vehicle moves forward when the shift lever is shifted from the [N] range to the [D], [2] or [L] ranges. Also, ensure that the vehicle moves backward when the shift lever is shifted to the [R] range. 2. Stop the engine, and apply the parking brake. 3. Set the shift lever from the [N] range to each of the [D], [2] and [L] ranges. Make sure that the shift lever can be operated smoothly and shifted to each range with a good detent feeling. Also ensure that the position indicator functions properly. Moreover set the engine key switch to the [ON] position. Ensure that the position indicator in the combination meter functions properly. 4. Set the engine key switch to the [ON] position. Switch the shift lever from the [P] or [N] range to the [R] range. Ensure that the backup lamp goes on.
Engine Idling Speed Check **Specified Value: 800 - 850 rpm**	1. Apply the parking brake. 2. Attach an engine tachometer. 3. With the [N] range selected, warm up the engine. 4. Ensure that the engine idling speed complies with the specification.
Automatic Transmission Fluid Level Check  Total fluid capacity: Approx. 5.0 ℓ (including torque converter)	1. Apply the parking brake. 2. With the brake pedal depressed and the engine running at the idling speed, select the shift lever all through the ranges from the [P] to [L]. Finally, return the shift lever to the [P] range. 3. Take out the level gauge and wipe off the fluid with a cloth. Insert the level gauge and take it out again. Check to see if the fluid level is between the upper and lower limits. **NOTE:** **1. Perform the check when the fluid temperature is 70 - 80°C (158 - 176°F), which is the normal operating temperature.** **2. If the fluid level is low, check for fluid leakage.** **3. Care must be exercised as to a too-low fluid level, for it will cause various troubles.**
Solenoid Valve Connector Check Computer Connector Check	1. Check to see if any connector is disconnected.
Speedometer Check	1. Check to see if the speedometer pointer is moving. 2. Check to see if the vehicle speed indicator is normal. 3. Check to see if the vehicle speed sensor is producing an output.(See page 4–15.)

WR-04006

ADJUSTMENTS

Item	Procedure
Shift Lever Adjustment 	1. Check the joint section between the control rod and the manual valve outer lever for wear. Check other joint sections for wear and deformation. 2. Turn the manual valve outer lever to the left as far as it goes (P range). Then, back off two stages (N range). 3. Slacken the swivel bracket attaching bolt (adjusting bolt) located at the end section of the control cable. 4. Set the shift lever to the N range. With the shift lever lightly pushed to the R range side, tighten the attaching bolt in Step 3. (While drawing the control cable to the transmission side, securely tighten the control cable.) 5. After completion of the adjustment, check the shift lever operation. Ensure that the shift lever is operated with a good detent feeling and that the position indicator functions properly for each range. Also, make sure that the vehicle moves forward in the D, 2 and L ranges, whereas the vehicle backs up in the R range.
Throttle Cable Adjustment 	Adjust the adjusting nut in such a way that the dimension A complies with the specified value when the throttle is fully closed. **Specified Value: 0 - 0.5 mm (0 - 0.02 inch)** **Tightening Torque: 0.85 - 1.55 kg-m (6.15 - 11.2 ft-lb)**
Throttle Sensor Adjustment  Throttle Adjusting Screw Screw-in 7 turns. 	1. Using a MityVac (a hand vacuum pump), keep the dashpot in a contracted state. 2. Slacken the throttle adjusting screw so that it may be once cleared from the throttle shaft arm. 3. Screw-in the throttle adjusting screw until it comes in contact with the throttle shaft arm. Further screw-in the throttle adjusting screw 7 turns. (At this point, the periphery of the throttle lever travels 10 mm (0.39 inch).) 4. Adjust the throttle sensor so that the switch "S_4" – to –"earth" continuity of the throttle sensor may be changed from [OFF] to [ON] at this opening degree of the throttle valve. Perform this adjustment by turning the adjusting screw located at the back of the throttle sensor, using the SST. (See page 4–14.) 5. Remove the MityVac. Back off the throttle adjusting screw so that the idling speed may be adjusted to 800 - 850 rpm. 

TESTS

Prior to the following tests, be sure to perform basic checks and adjustments.

1. STALL TEST

This test checks the total performance of the transaxle and engine, by measuring the maximum engine revolution speed at each range.

NOTE:

1. Perform this test when the fluid temperature is 70 - 80°C (158 - 176°F), which is the normal operating temperature.
2. Never perform this test continuously for more than six seconds.

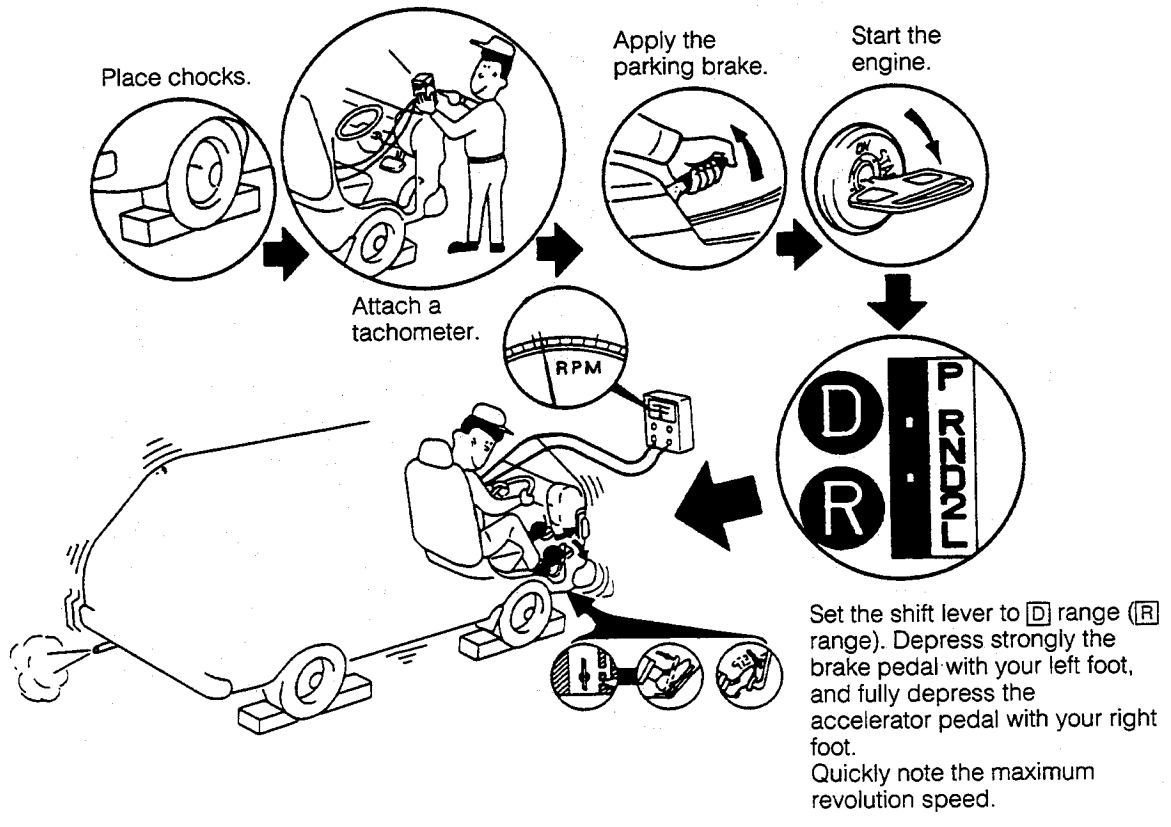


Fig. 4-3

WR-04008

Specified stall revolution speed:

2100 - 2300 rpm

Reference: If the measured value does not conform to the specification, the following are possible causes.

Case where stall revolution speeds for both ranges are the same, but lower than the specified value	1. Lack of engine output 2. Torque converter malfunctioning
Case where stall revolution speed for D range is greater than the specified value	1. Forward clutch slipping 2. One-way clutch of torque converter malfunctioning 3. Line pressure too low
Case where stall revolution speed for R range is greater than the specified value	1. Direct clutch slipping 2. 1st & reverse brake slipping 3. Line pressure too low

WR-04009

2. TIME LAG TEST

When the shift lever is shifted while the engine is idling, a certain time elapses before a shock is felt. This time is called the time lag. This time lag test evaluates the conditions of the clutch, brake and line pressure.

NOTE:

1. Perform this test when the fluid temperature is 70 - 80°C (158 - 176°F), which is the normal operating temperature.
2. If the time lag is to be measured consecutively, be sure to put an one-minute interval between the tests.

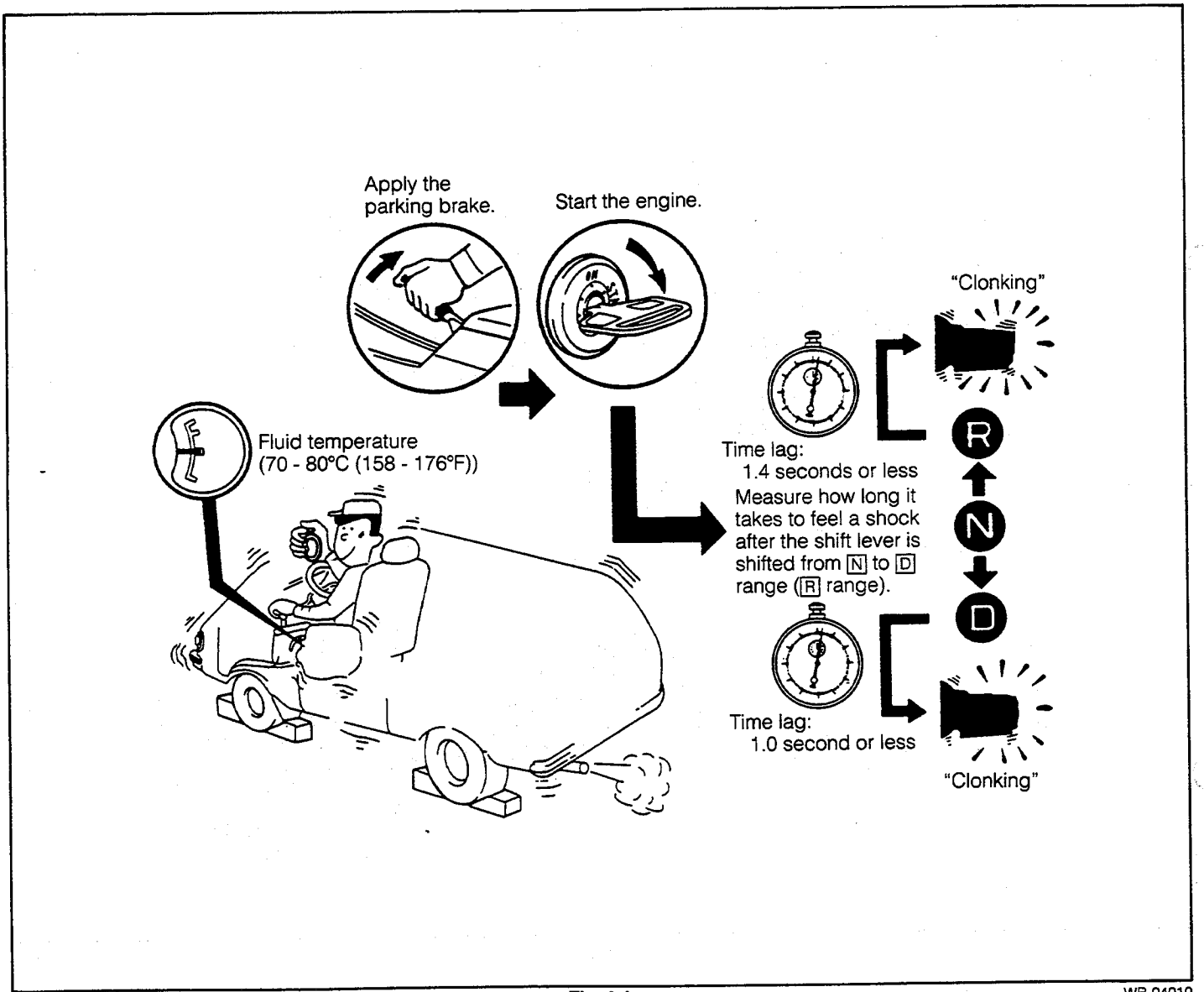


Fig. 4-4

WR-04010

Specified time lag

N → D Range: 1.0 Second or Less

N → R Range: 1.4 Seconds or Less

Reference: If the measured value does not conform to the specification, the following are possible causes.

Case where time lag for N to D shift is greater than the specified value	1. Forward clutch worn 2. Line pressure too low
Case where time lag for N to R shift is greater than the specified value	1. Direct clutch worn 2. First & reverse brake worn 3. Line pressure too low

WR-04011

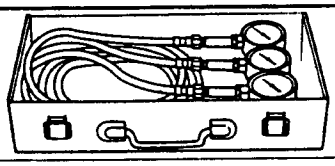
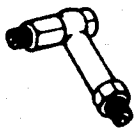
3. HYDRAULIC PRESSURE TEST

This test checks operating condition of each section by measuring the fluid line pressure.

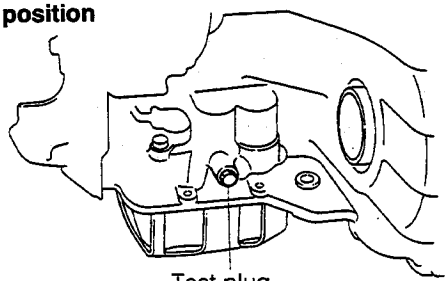
NOTE:

1. Perform this test when the fluid temperature is 70 - 80°C (158 - 176°F), which is the normal operating temperature.
2. Be sure to replace the test plug with a new one.

Articles to be prepared

Instruments		09992-00092-000 Oil pressure gauge for automatic transmission Tool handled by Banzai, Ltd. Type: OPG-100
		Oil pressure gauge adaptor (For A35 and A55) Tool handled by Banzai, Ltd. Type: OPG-41

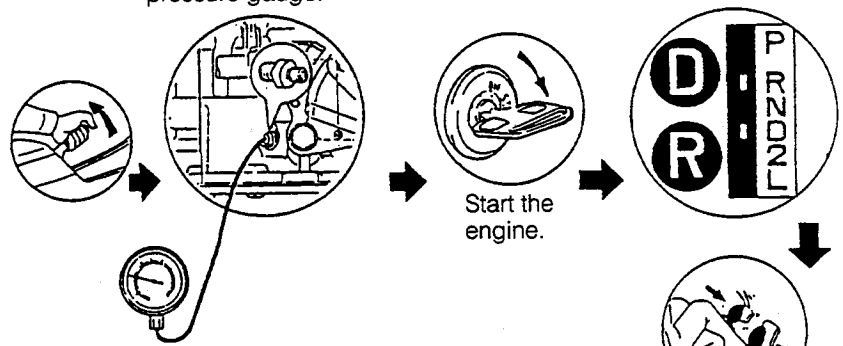
Test plug position



Test plug

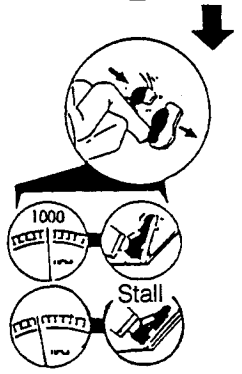
Remove the test plug.
Attach a hydraulic pressure gauge.

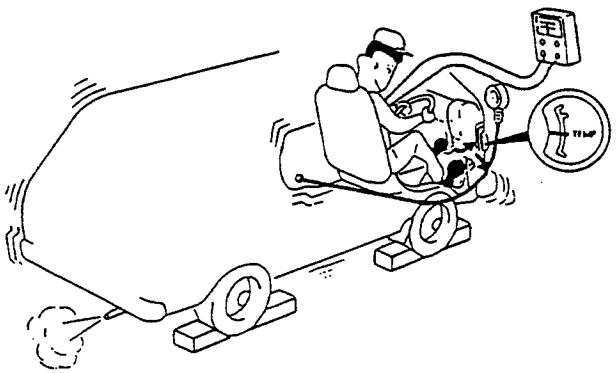
Shift to [R] range ([D] range).



Apply the parking brake.

Start the engine.





While depressing the brake pedal strongly with your left foot, manipulate the accelerator pedal with your right foot. Measure the hydraulic pressure.

Fig. 4-5

WR-04012

Specified hydraulic pressure

Engine running condition	Hydraulic pressure kg/cm^2 (psi)	
	[D] range	[R] range
Idling revolution	2 - 4 (28 - 57)	5 - 8 (71 - 114)
Stall revolution	4 - 6 (57 - 85)	8 - 12 (114 - 171)

Reference: If the measured value does not conform to the specification, the following are possible causes.

Case where hydraulic pressure for each range is greater than the specified value	1. Regulator valve malfunctioning 2. Throttle valve malfunctioning 3. Throttle cable improperly adjusted
Case where hydraulic pressure for each range is lower than the specified value	1. Oil pump faulty 2. Regulator valve malfunctioning 3. Throttle valve malfunctioning 4. Throttle cable improperly adjusted
Case where hydraulic pressure for [D] range is lower than the specified value	1. Forward clutch malfunctioning 2. Oil leakage at [D] range circuit
Case where hydraulic pressure for [R] range is lower than the specified value	1. Direct clutch malfunctioning 2. First & reverse brake malfunctioning 3. Oil leakage at [R] range circuit

WR-04013

4. SYSTEM CHECKS ON TEST VEHICLE

(1) Running test

Check the gear shift at each shift point in accordance with the shift point characteristics diagram. Determine whether or not the gear shift occurs by your body feeling.

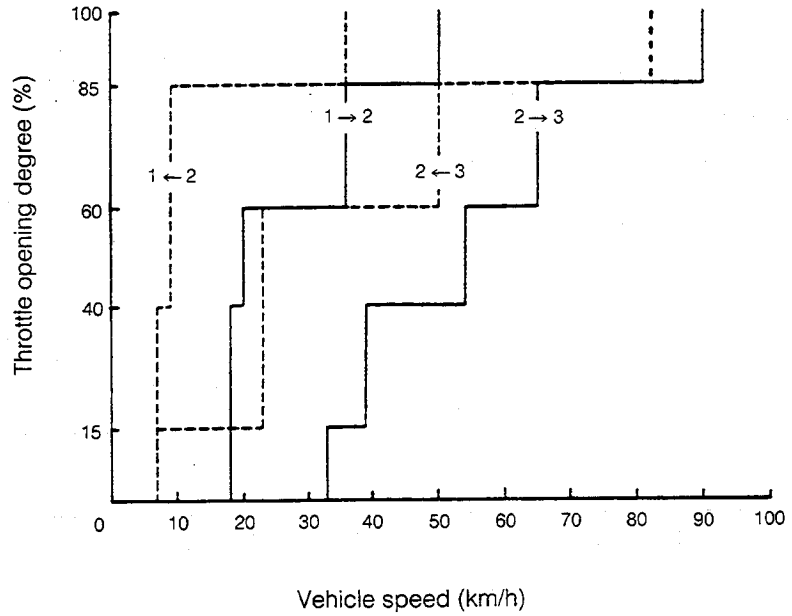


Fig. 4-6 WR-04014

D range test

1. From the standstill state, start the vehicle by fully depressing the accelerator pedal (in D range). Ensure that the upshift from 1st gear to 2nd gear occurs at a vehicle speed of approx. 50 km/h.

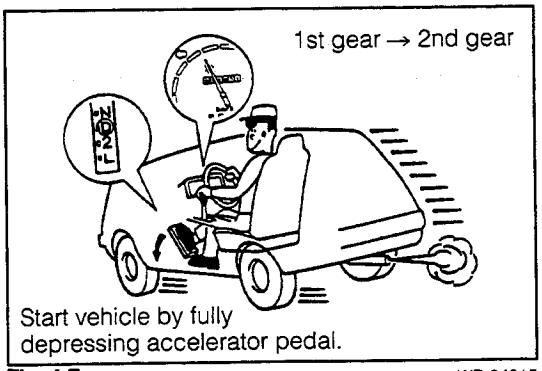


Fig. 4-7 WR-04015

2. From the standstill state, start the vehicle by depressing the accelerator pedal about halfway. Ensure that the upshift from the 2nd gear to the 3rd gear occurs at a vehicle speed of approx. 54 km/h.

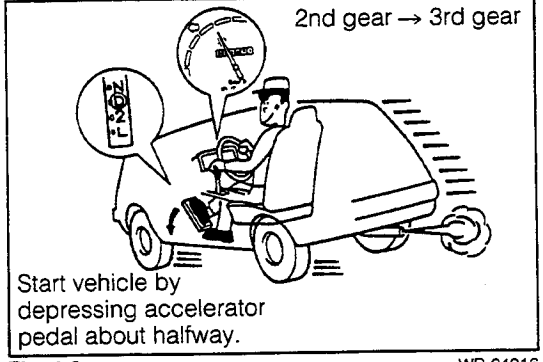


Fig. 4-8 WR-04016

3. While running in the 3rd gear of the [D] range at a vehicle speed of 80 km/h or less, depress the accelerator pedal fully. Ensure that the downshift from the 3rd gear to the 2nd gear occurs.

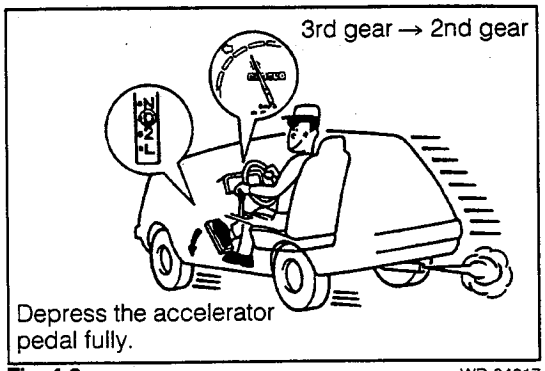


Fig. 4-9 WR-04017

4. While running in the 2nd gear of the [D] range at a vehicle speed of 36 km/h or less, depress the accelerator pedal fully. Ensure that the downshift from the 2nd gear to the 1st gear occurs.

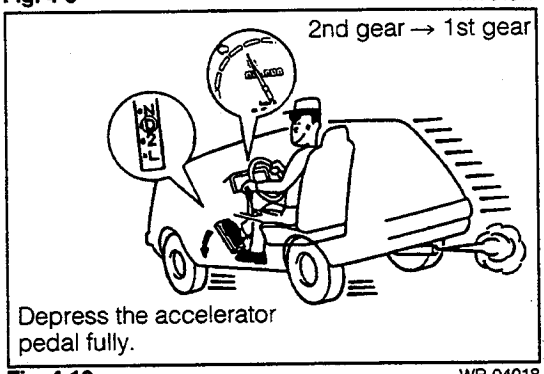


Fig. 4-10 WR-04018

Trouble symptom	Possible causes
No upshift from 1st gear to 2nd gear takes place.	1. 1 – 2 shift valve malfunctioning 2. Solenoid valve No. 2 malfunctioning 3. Shift control system malfunctioning
No upshift from 2nd gear to 3rd gear takes place.	1. 2 – 3 shift valve malfunctioning 2. Solenoid valve No. 1 malfunctioning 3. Shift control system malfunctioning
Incorrect shift points	1. 1 – 2 and 2 – 3 shift valves malfunctioning 2. Shift control system malfunctioning
Excessive shocks	1. Idling speed too high 2. Line pressure too high 3. Accumulator malfunctioning

WR-04019

(2) Engine brake test

While running in the 3rd gear of the [D] range, shift to the [2] or [L] range. Check the engine brake operation in each range.

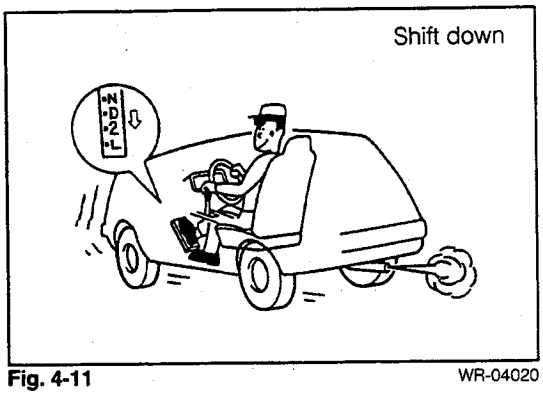


Fig. 4-11 WR-04020

Reference: If the engine brake does not work effectively, the following are possible causes.

Case where engine brake will not work in [2] range	2nd brake malfunctioning
Case where engine brake will not work in [L] range	First & reverse brake malfunctioning

(3) Manual running test

Remove the harness of the solenoid valves No. 1 and No. 2 at its connector section (white, 2-pole). Run the vehicle by manually shifting the shift lever to each range. Check to see if the gear shifts occur in accordance with each range.

NOTE:

Secure the disconnected harness, using vinyl tape or the like, so that it may not be caught by the rotating sections.

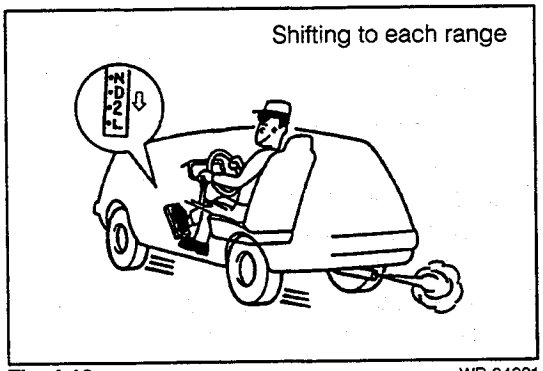


Fig. 4-12 WR-04021

Specifications

Shift lever position	D	2	L
Gear position	3rd	2nd	1st

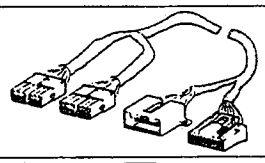
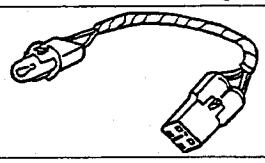
(4) [P] range test

1. Place the vehicle on a grade (about 5 degrees or more) with the vehicle in an uphill state. Set the lever to the [P] range and release the parking brake lever.
   Ensure that the vehicle will not move by the operation of the parking lock mechanism.
2. Repeat this test in the same procedure for the vehicle facing downhill.
3. Check to see if the vehicle moves when the shift lever is changed from the [P] range to other ranges.

WR-04022

5. ELECTRICAL SYSTEM CHECK

Articles to be prepared

	Shape	Number and nomenclature of parts	Use
SST		09842-87702-000 Transmission control computer check subharness	For checking computer input/output voltages
		09843-87702-000 ATX computer check lamp	Diagnosis display
Instrument	Digital tester		

WR-04023

How to use SST

Connect the transmission control computer check subharness between the computer and the connector of the harness at the vehicle side. This subharness is used for checking input/output voltages of each terminal.

When measuring the connector terminal voltage, use a circuit tester with adequate internal resistance of more than 40 kΩ. If a circuit tester with small internal resistance is used, no correct voltage is indicated.

After completion of the connection, confirm the following items and perform the check.

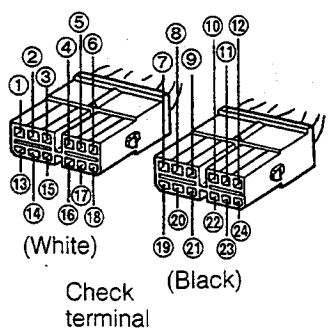
1. Continuity exists between the body earth and each of the earth terminals ⑨ and ㉑.
2. Regardless of the key switch position, the battery voltage is applied across ㉒ and ⑨ (earth).
3. When the key switch is set to the [LOCK] and [ACC] position, no voltage is applied across ⑫ and ⑨ (earth); when set to the [ON] position, the battery voltage is applied.

Computer terminals

⑫	⑪	⑩	⑨	⑧	⑦	⑥	⑤	④	③	②	①
IG	L1	L2	E01	S3	T1	SPD1	P	D	2	L	BR
ST	FP	+B	E1	S4	S1	Ne	S2	SPD2	TV	N	R
㉔	㉓	㉒	㉑	⑳	⑲	⑱	⑰	⑯	⑮	⑭	⑬

WR-04024

SST terminal



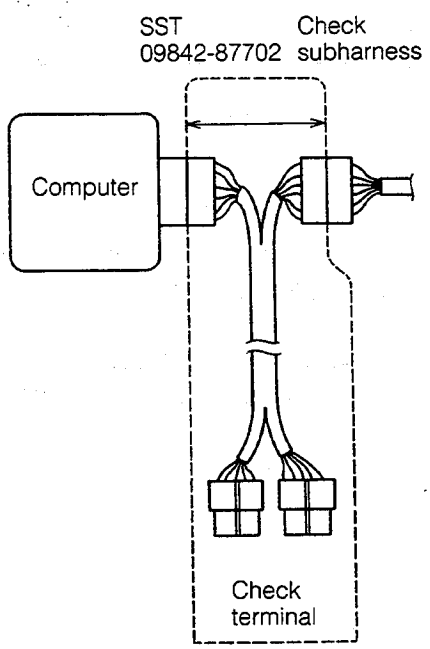


Fig. 4-13

Diagnosis display

This system is provided with a diagnosis function. Therefore, if the vehicle is encountered with any abnormality, first check to see if any abnormality code indication is present. If any abnormality code is displayed, check the corresponding item according to the table below. (For display method, see page 3–50 of the Technical Information No. 9331-GE.)

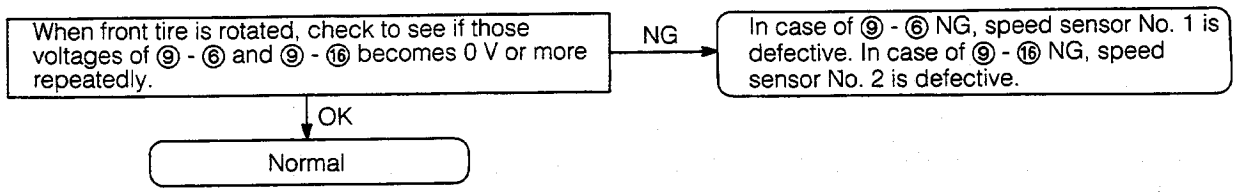
Code No.	Lamp flashing number	Diagnosis item	Page to be referred to
1	1	Normal	—
2	2	Abnormality in pulse signal of vehicle speed sensor No. 1	P 4–15
3	3	Open wire or short in solenoid valve No. 1	P 4–17
4	4	Open wire or short in solenoid valve No. 2	P 4–17
5	5	Abnormality in signal input of throttle sensor	P 4–17
6	6	Abnormality in shift position signal	P 4–16
7	7	Abnormality in pulse signal of vehicle speed sensor No. 2	P 4–15

WR-04025

UNIT INSPECTION

1. VEHICLE SPEED SENSOR CHECK (Refer to page 3–47 of the Technical Information No. 9331-GE)

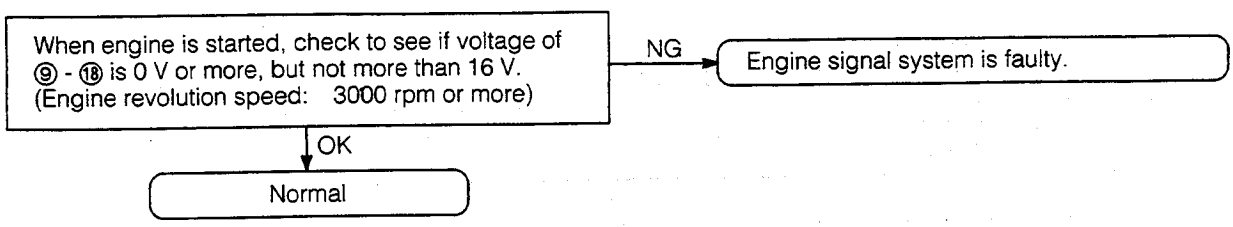
Perform this check with the key switch set to the [ON] position, but without starting the engine.



WR-04026

2. IG PULSE CHECK

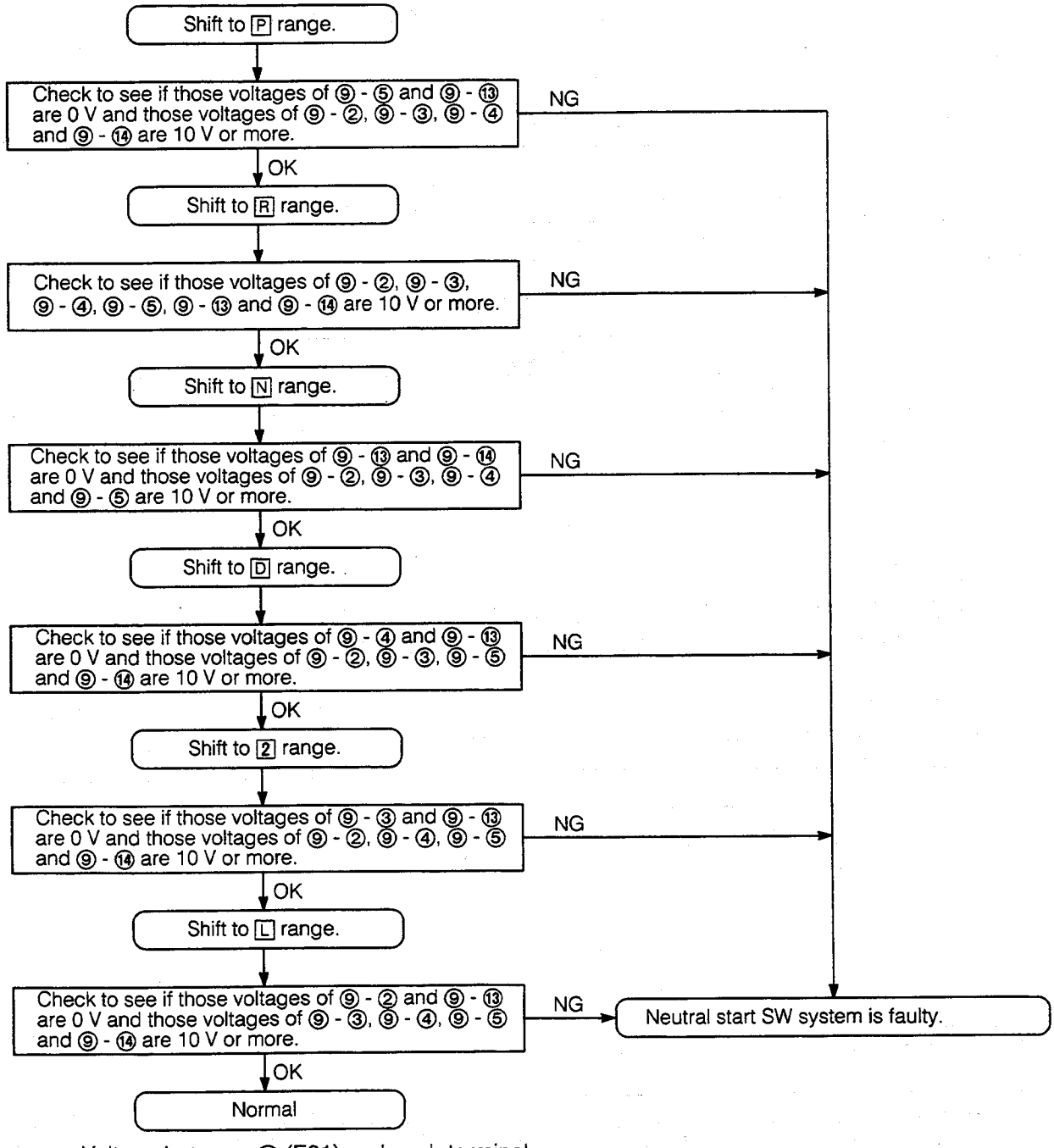
Perform this check after starting the engine.



WR-04027

3. NEUTRAL START SW CHECK (Refer to page 3–47 of the Technical Information No. 9331-GE)

Perform this check with the key switch set to the [ON] position, but without starting the engine.



WR-04028

Voltage between ⑨ (E01) and each terminal

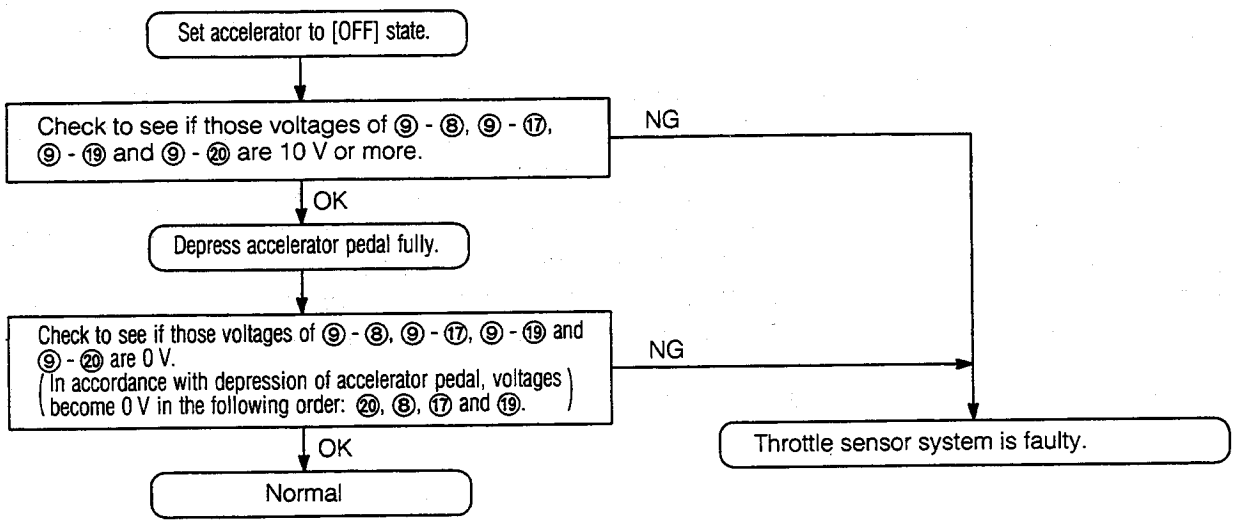
Shift position \ Terminal No.	⑤P	⑬R	⑭N	④D	③2	②L
P	L	L	H	H	H	H
R	H	H	H	H	H	H
N	H	L	L	H	H	H
D	H	L	H	L	H	H
2	H	L	H	H	L	H
L	H	L	H	H	H	L

L: 0V H: 10V or more

WR-04029

4. THROTTLE SENSOR CHECK (Refer to page 3–46 of the Technical Information No. 9331-GE)

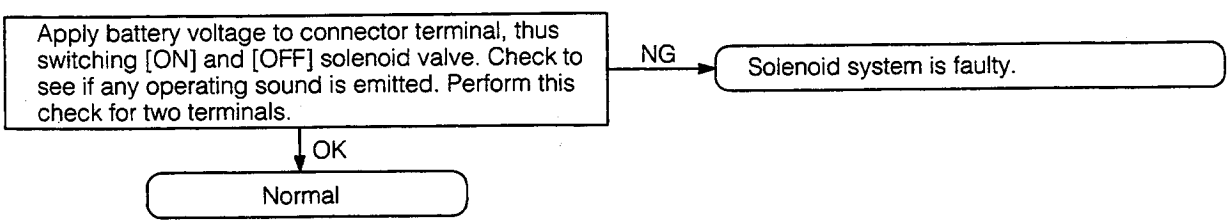
Perform this check with the key switch set to the [ON] position, but without starting the engine.



WR-04030

5. SOLENOID VALVE CHECK (2 POINTS) (Refer to page 3–48 of the Technical Information No. 9331-GE)

With the connector of the solenoid harness disconnected, apply the battery voltage to the connector at the transaxle side. Check to see if any operating sound occurs.



WR-04031

6. TRANSMISSION CONTROL COMPUTER

The computer itself can not be checked.

(1) Be very careful not to apply impacts (e.g. dropping) to the transmission control computer.
(2) The connector should be connected, while paying attention to the locking direction. Furthermore, the connector should be disconnected with the lock button being depressed, making sure that the connector is not twisted.
(3) Be certain to turn OFF the engine switch before the connector is connected or disconnected.
(4) When the computer is mounted onto the body, be sure to tighten the two attaching bolts evenly and alternately in order that the bracket may not be distorted.
(5) Never open the sealing of the computer proper. Also, be sure not to modify the computer.
(6) Prior to the removal/installation of the battery terminals, make sure to turn OFF the engine switch.
(7) Under no circumstances should the battery be connected reversely.
(8) Care must be exercised to ensure that no water or dust gets to the computer proper. If the computer proper should be soaked by water or the like, do not reuse the computer proper.

NOTE:
The computer is installed on the upper side of the glove compartment box.

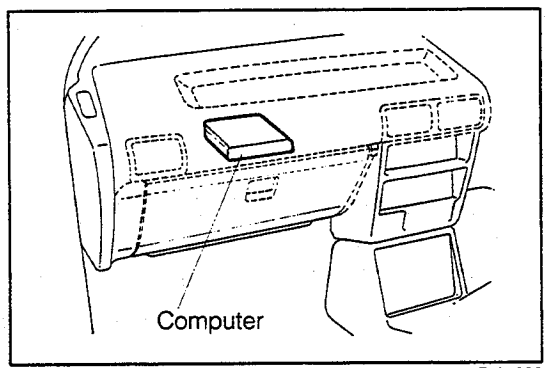


Fig. 4-14 WR-04032

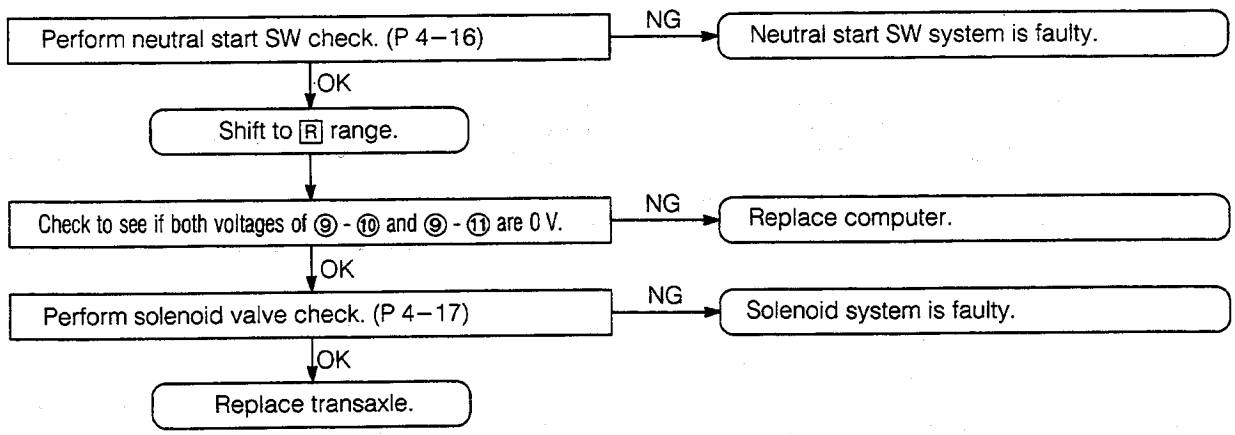
TROUBLE SHOOTING

When checks and repairs have been made on abnormal codes, set the key switch to the [OFF] position. Remove the fuse (tail) or battery negative ⊖ terminal, thus canceling the memory.

Vehicle will not move forward at all.	Replace transaxle Ay. (P 4−24)
Vehicle will not move backward at all.	Perform check A. (P 4−19)
No shift will occur at all.	Perform check B. (P 4−20)
Shifts occur, but they are not normal.	Perform check C. (P 4−20)
No diagnosis output is present.	Perform check D. (P 4−21)
Engine will not start even when key switch is set to [ST] position.	Perform check E. (P 4−21)
Engine stops when key switch is returned to ON position.	Perform check F. (4−22)

WR-04033

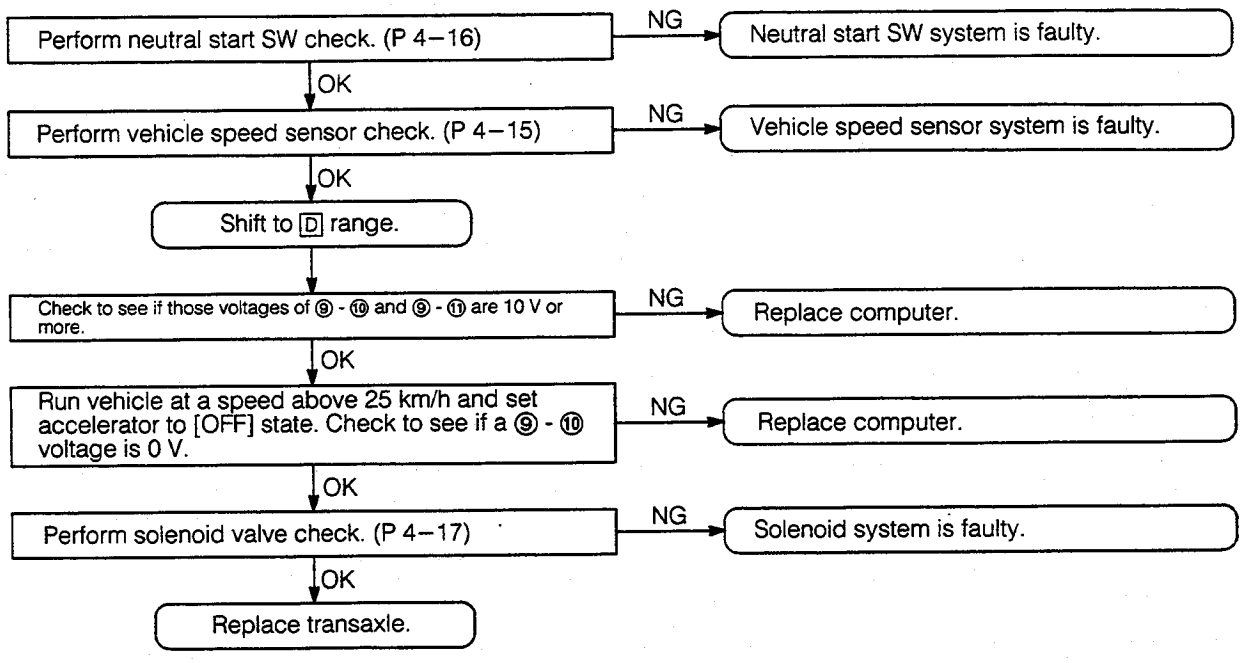
1. CHECK A



NOTE:
Here, "So-and-so system is faulty" means not only that sensors are faulty but also that there are disconnected connector, open wire, short and so forth at the vehicle side, as viewed from the computer side.

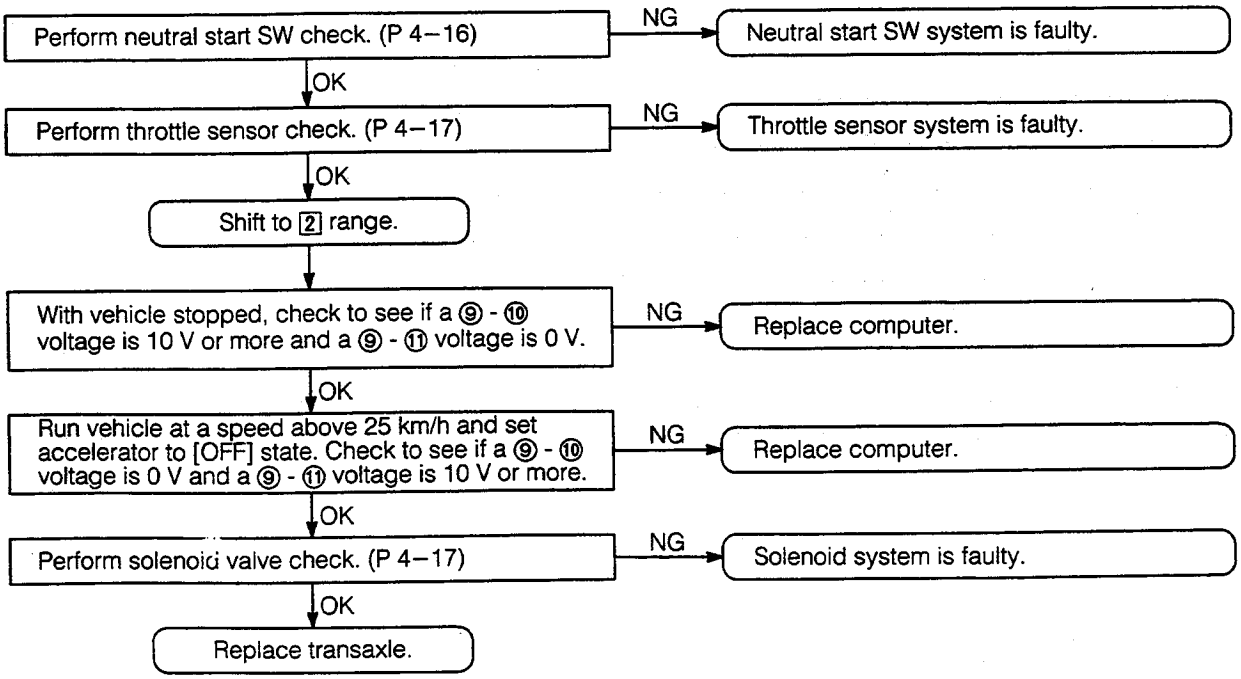
WR-04034

2. CHECK B



WR-04035

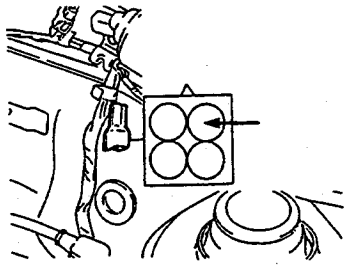
3. CHECK C

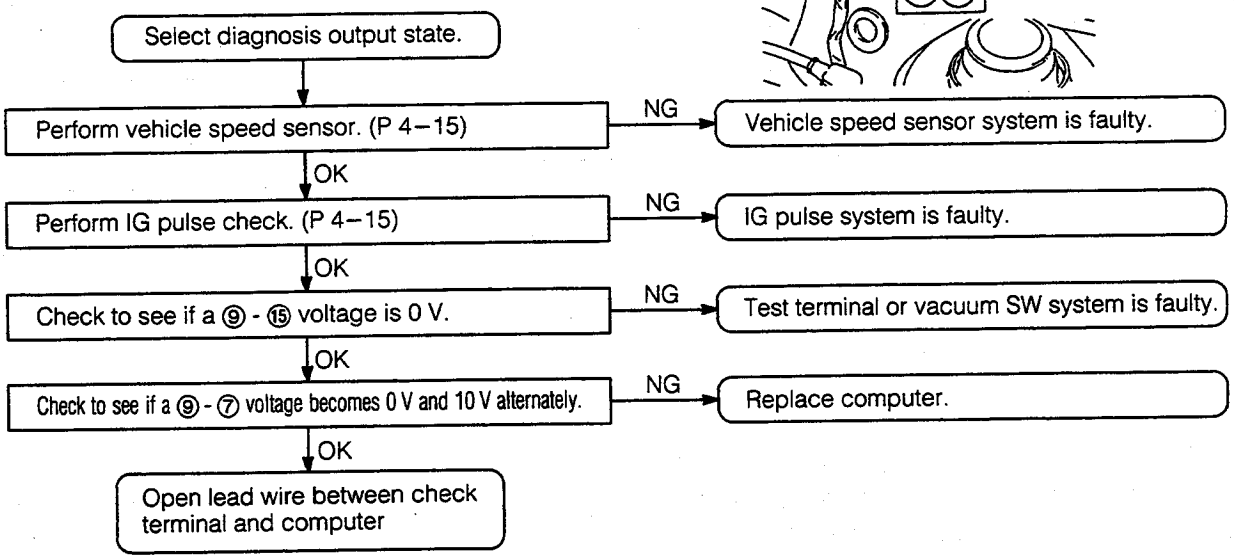


WR-04036

4. CHECK D

Prior to this check, ensure that the battery voltage is applied to the terminal shown in the figure.

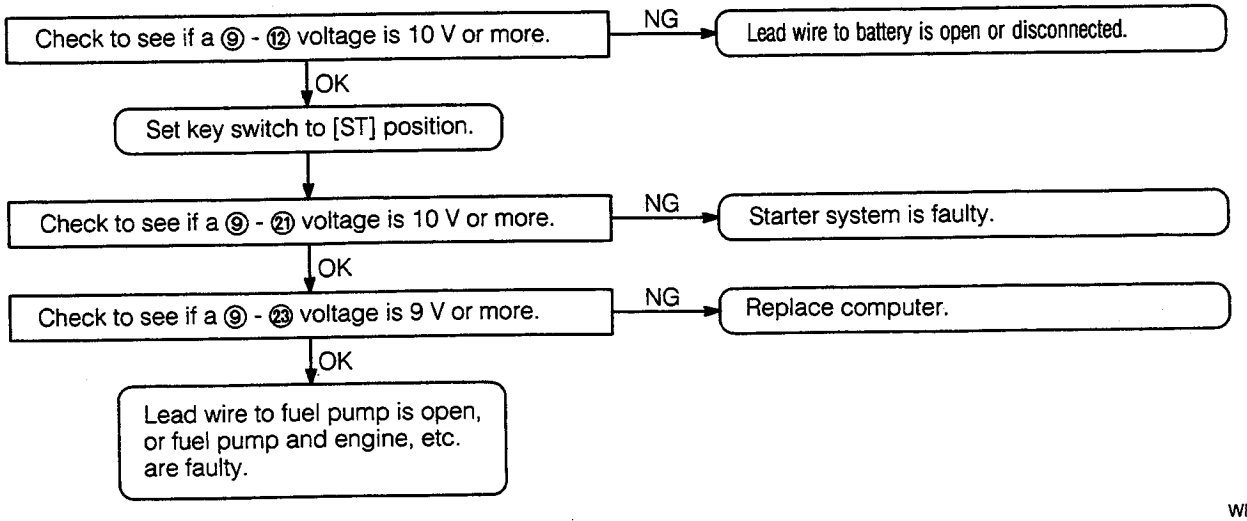




WR-04037

5. CHECK E

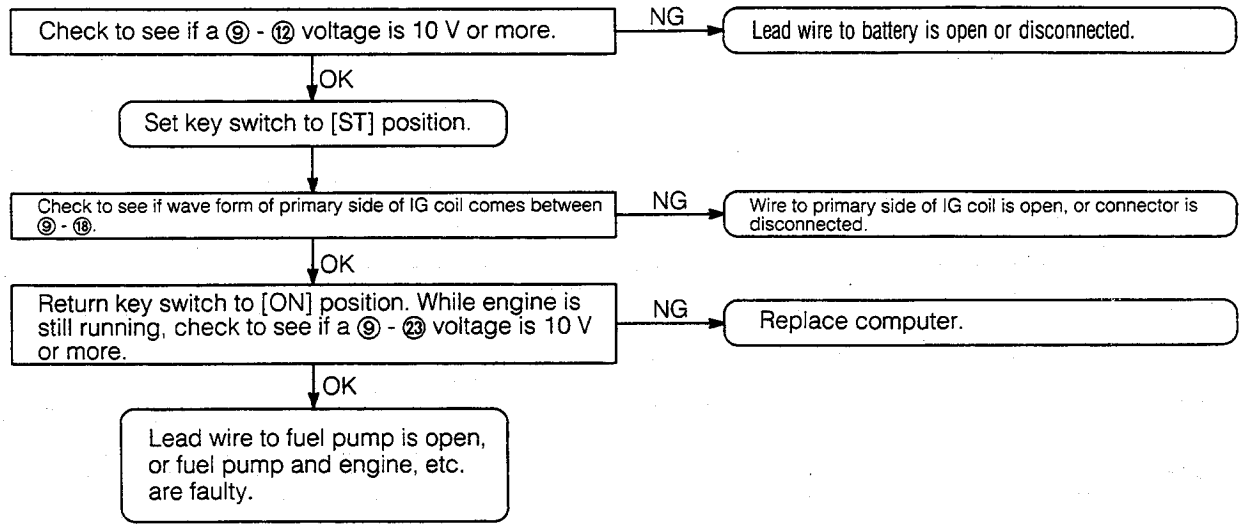
Perform this check with the key switch set to the [ON] position, but without starting the engine.



WR-04038

6. CHECK F

Perform this check with the key switch set to the [ON] position, but without starting the engine.



WR-04039

7. MEMORY ELIMINATION OF DIAGNOSIS CODE

After repairing abnormal part, remove the fuse (tail) or battery negative ⊖ terminal for more than 10 seconds in order to cancel the memory.

FLUID CHANGE

1. Jack up the vehicle.
2. Allow the transmission to cool. Remove the drain plug and drain out the automatic fluid.

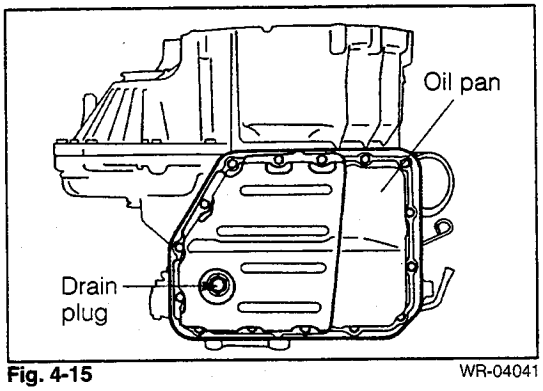


Fig. 4-15 WR-04041

3. Install the drain plug gasket and drain plug. Tighten the plug to the specified torque.
   Tightening Torque: 1.8 - 2.3 kg-m (13 - 17 ft-lb)
4. While the vehicle is still in a raised state, check the transmission and adjacent areas (including oil hose and oil cooler) for oil leakage, loose connecting sections or damage.
5. Pull out the oil level gauge from the oil filler tube. Add 1.5 ℓ (2.64 Imp.pt) of new fluid through the oil filler tube.
   NOTE 1:
   When the automatic transmissionhas been overhauled and the torque converter is to be reused, add 3.5 ℓ (6.2 Imp.pt) of new automatic fluid.

   NOTE 2:
   As for the torque converter and automatic transmission which contain no fluid at all, add 5 ℓ (8.8 Imp.pt) of new automatic fluid.

WR-04042

6. Check the fluid level only after the vehicle has reached the running state (70 - 80°C, 158 - 176°F).

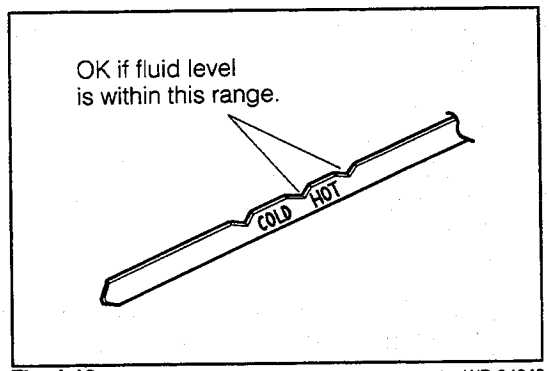


Fig. 4-16 WR-04043

TRANSMISSION REMOVAL AND INSTALLATION

REMOVAL

1. Remove the air suction guide from the air cleaner.
2. Disconnect the negative ⊖ terminal of the battery.
3. Disconnect the positive ⊕ terminal of the battery.
4. Remove the battery and battery tray.
5. Disconnect the earth terminal from the transmission.
6. Disconnect the solenoid wire coupler and neutral start switch wire coupler.
7. Disconnect the wire harness from the transmission.
8. Disconnect the speedometer cable from the transmission.
9. Disconnect the oil pressure control cable from the accelerator cable. Remove the accelerator cable from the transmission.
10. Remove the control cable from the transmission. (See APPENDIX.)
11. Remove the starter motor.
12. Drain out the automatic fluid from the transmission.
13. Disconnect the fluid inlet/outlet pipes. Then, hang them by means of wire so that no fluid may flow out from the oil cooler and hose.
14. Jack up or lift up the vehicle.
15. Remove the exhaust front pipe.
16. Remove the clutch housing undercover.
17. Remove the six bolts at the drive plate.
    NOTE:
    It is advisable to lock the drive plate by inserting a common screwdriver to the drive plate gear through the clutch housing cut-out section.
18. Remove the right and left drive shafts in accordance with the "DRIVE SHAFT DISASSEMBLY" of the SECTION 5 (FRONT AXLE).
19. In order to remove the transmission, securely support the engine and transmission separately, using jacks or the like.
20. Remove the engine lower/left mounting.
21. Remove the bolt connecting the engine and transmission.
22. Remove the transmission from the engine. Carefully lower the transmission.
    NOTE 1:
    When removing the transmission from the engine, be very careful not to apply excessive forces to the drive plate or the torque converter.

    NOTE 2:
    After the transmission has been removed, keep the transmission in such a way that the oil pan may come at the bottom so that no fluid may flow out.

WR-04046

INSTALLATION

Reverse the removal procedure to install the transmission, following the operating instructions given below.

NOTE 1:
Prior to the installation, apply grease around the cup located at the center of the torque converter.

NOTE 2:
Prior to the installation, measure the dimension A indicated in the right figure.
Specified Value: 27.2 mm (1.07 inch) or more
If the measured value does not conform to the specifications, rework the installation.

NOTE 3:
Tighten the six bolts on the drive plate and the torque converter to the following torque.
Tightening Torque: 1.5 - 2.2 kg-m (11 - 16 ft-lb)

NOTE 4:
Tighten the bolts attaching the transmission to the engine to the following torque.
Tightening Torque: 5.0 - 7.0 kg-m (36 - 51 ft-lb)

NOTE 5:
Tighten the lower/left mounting bracket to the following torque.
Tightening Torque: 3.0 - 4.5 kg-m (22 - 33 ft-lb)

NOTE 6:
Install the right and left drive shafts in accordance with the "ASSEMBLY OF DRIVE SHAFT" of the SECTION 5 (FRONT AXLE).

NOTE 7:
After completion of the installation, check the automatic fluid level with the vehicle placed on a level place.

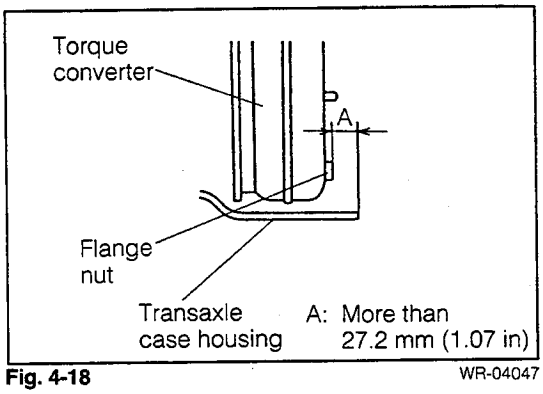


Fig. 4-18 WR-04047

DISASSEMBLY OF TRANSMISSION

INSTRUCTIONS ON DISASSEMBLY

1. In order to prevent dirt or dust from getting into the transmission case, observe the following instructions.
   (1) Prior to the disassembly, thoroughly wash off any sand or mud adhering to the outside of the transmission case.
   (2) Perform the disassembly at a clean place.
   (3) Do not wear gloves or use cloth.
2. Prior to the disassembly, check to see if any fluid leakage exists.
3. To prevent the removed parts from being lost or mixed with each other, place those parts removed from the transmission case in order.
4. Perform the disassembly, while paying attention to the trouble shooting, too.
5. Do not remove any parts unnecessarily.
6. Completely peel off any trace of the gaskets from the parts, making sure that no damage is made to the gasket mate surfaces.
7. When removing the snap rings, care must be exercised not to damage other parts.
8. When removing the bearings, be very careful not to apply forces to the balls and rollers.
9. When disassembling the transmission case, rear cover, oil pump, housing, valve body and so forth, never pry them off by a common screwdriver. Instead, disassemble them by lightly tapping them using a plastic hammer.

WR-04048

1. Remove the torque converter.
   NOTE:
   Be sure to receive fluid which may leak with a pan or the like.

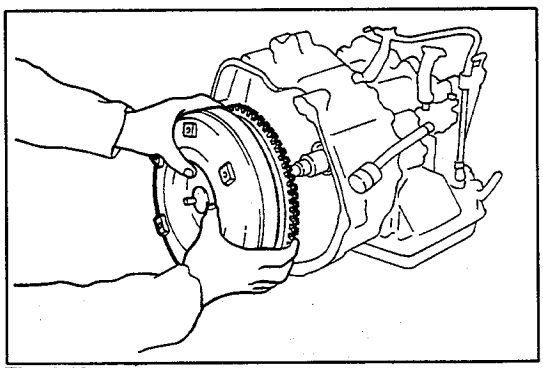


Fig. 4-19 WR-04049

2. Remove the oil filler tube and oil level gauge.

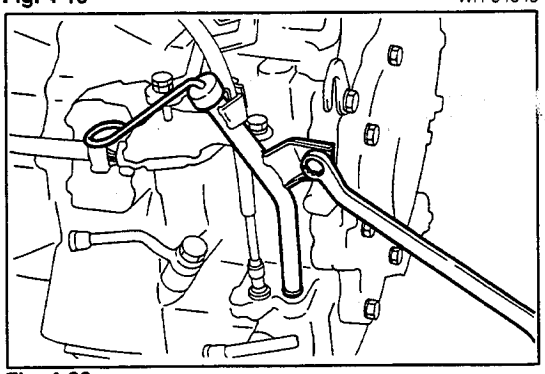


Fig. 4-20 WR-04050

3. Remove the drain plug and drain out the transmission fluid.
   NOTE:
   Completely drain out the fluid remaining inside the differential case by tilting it in various directions.

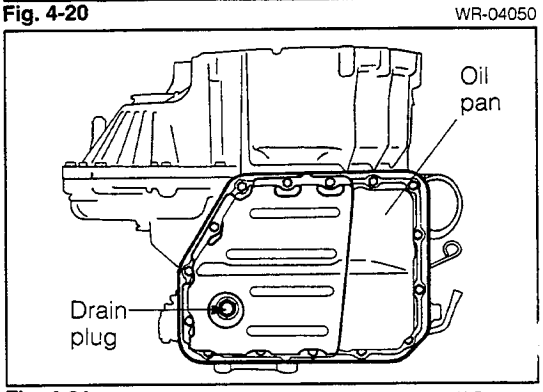


Fig. 4-21 WR-04051

4. Remove the oil pan and oil pan gasket.
   NOTE:
   (1) Do not raise the oil pan side higher than the transmission case during the removal. Failure to observe this note will cause foreign matters at the bottom of the oil pan to contaminate the valve body.
   (2) Remove the oil pan by lightly tapping the entire periphery of the oil pan using a plastic hammer. Never pry off the oil pan, using a common screwdriver.

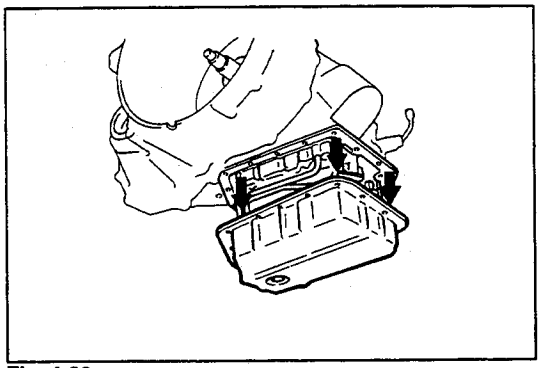


Fig. 4-22 WR-04052

5. Disconnect the solenoid connector. (Two points)

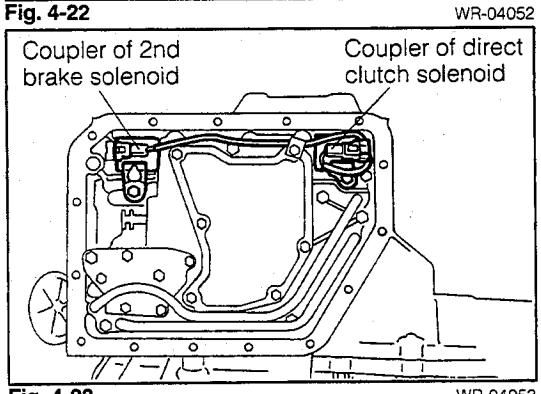


Fig. 4-23 WR-04053

6. Remove the oil tube.
   NOTE:
   Raise the end of the tube, using a common screwdriver.

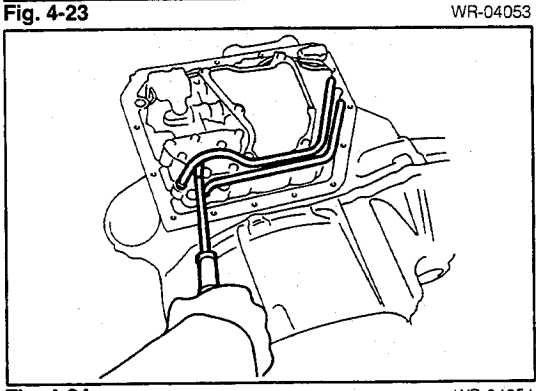


Fig. 4-24 WR-04054

7. Remove the throttle cable from the throttle valve cam.

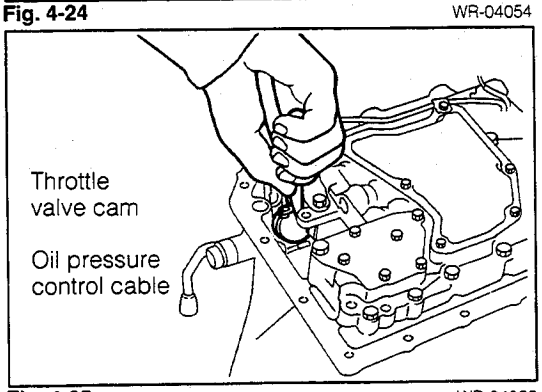


Fig. 4-25 WR-04055

8. Remove the valve body and oil strainer.
   NOTE:
   Remove the 11 bolts indicated in the figure.

9. Remove the throttle cable from the transmission case.

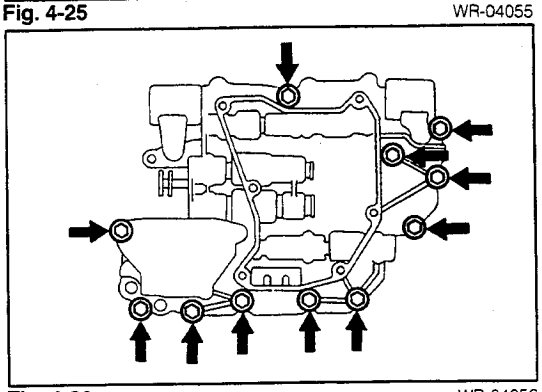


Fig. 4-26 WR-04056

9. Removal of the accumulator piston
   (1) Cover with a cloth so as to prevent the piston from jumping out or the fluid from splashing.
   (2) To remove the piston, gently applying compressed air with a low pressure (1 kg/cm^2, 15 psi at the maximum) into the oil hole indicated in the figure.

   NOTE:
   Care must be exercised as to jumping out of the piston or fluid splashing.

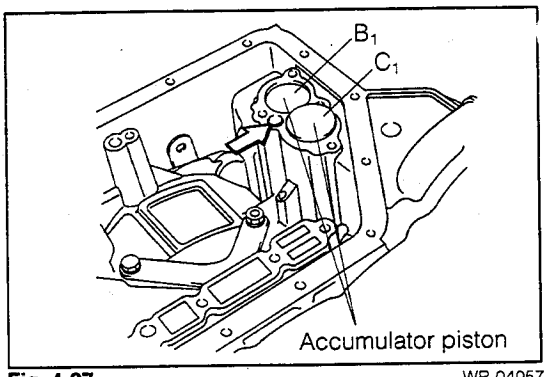


Fig. 4-27 WR-04057

10. Removal of the neutral start switch and the case side cover
    (1) Prior to the removal, shift to [N] range and scribe marks between the manual valve control lever and the neutral start switch and between the switch and the switch attaching position of the case in order to be easy to install.
    (2) Remove the manual valve control lever and the neutral start switch.
    (3) Remove the case side cover and the gasket.

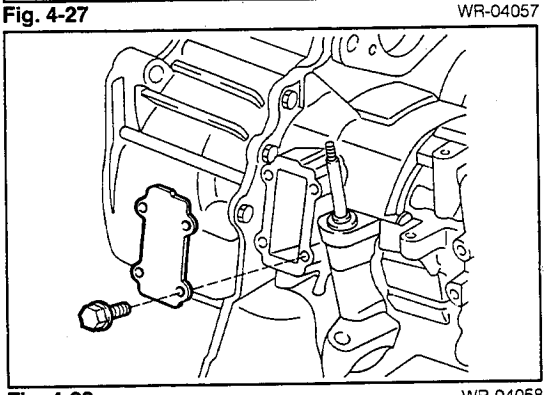


Fig. 4-28 WR-04058

11. Check of the 2nd brake piston rod stroke
    (1) Scribe a mark on the piston rod.
    (2) Apply compressed air into the oil hole indicated in the right figure and measure the rod stroke.
    Specified Value: 1.5 - 3.0 mm (0.059 - 0.118 inch)
    (The length of difference (A) represents the rod stroke.)

    (3) If the measured value does not comply with the specification, select a rod from the table below and replace it. Or replace the brake band.

Evaluation	Piston rod length	Identification mark
Too short	121.3 mm (4.77 inches)	Not provided
Too long	122.7 mm (4.83 inches)	Provided (See figure below.)

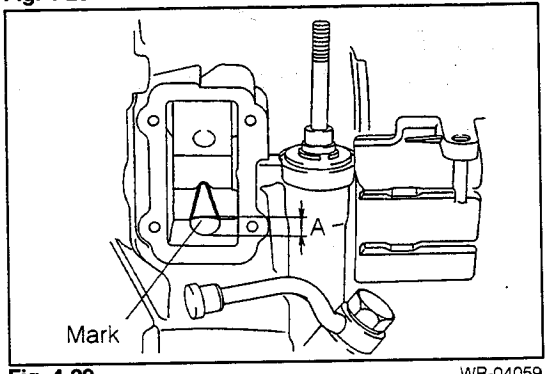


Fig. 4-29 WR-04059

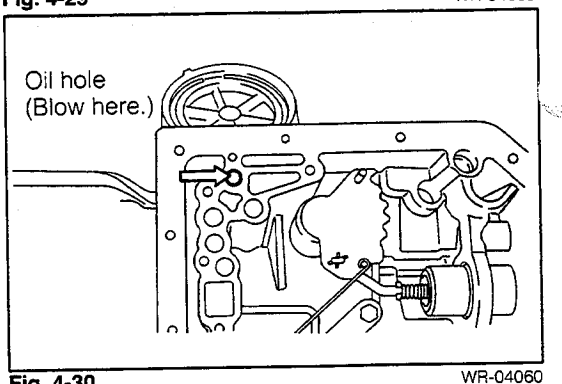


Fig. 4-30 WR-04060

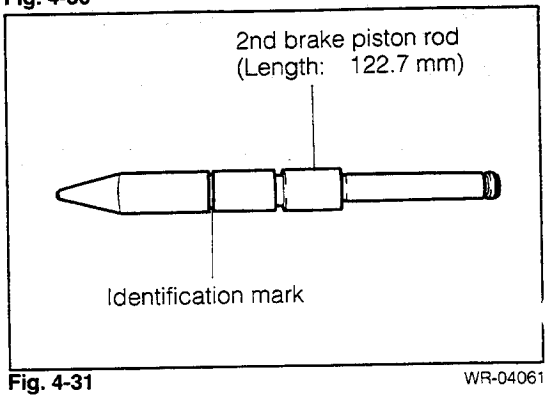


Fig. 4-31 WR-04061

12. Removal of the 2nd brake piston
    (1) Detach the snap ring, using a common screwdriver or the like. Remove the cover and piston.

    NOTE 1:
    If the 2nd brake piston and rod are encountered with no trouble, this removal is not required.

    NOTE 2:
    When removing the 2nd brake piston by applying compressed air, care must be exercised as to jumping out of the piston or fluid splashing.

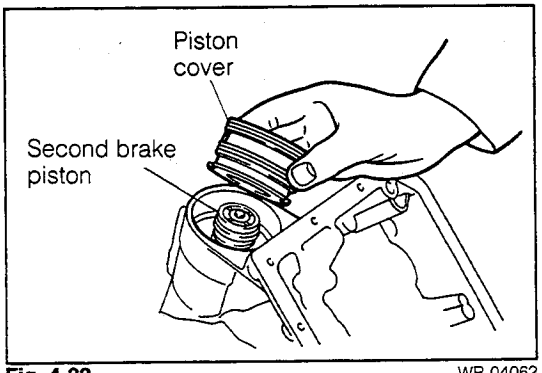


Fig. 4-32 WR-04062

13. Removal of the solenoid wire harness
    (1) Remove the nut retaining the lock plate. Remove the wire.
    (2) Remove the wire clamps (2 points) of the rear cover.

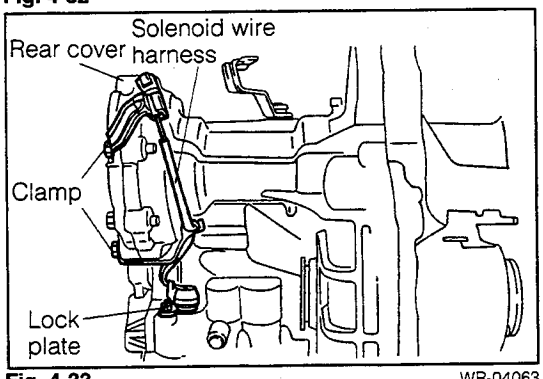


Fig. 4-33 WR-04063

14. Removal of the oil pump
    (1) Remove the oil pump attaching bolts (6 pieces).
    (2) Remove the oil pump, using the following SST.
        SST: **09350-87702-000**

    09350-87702-000

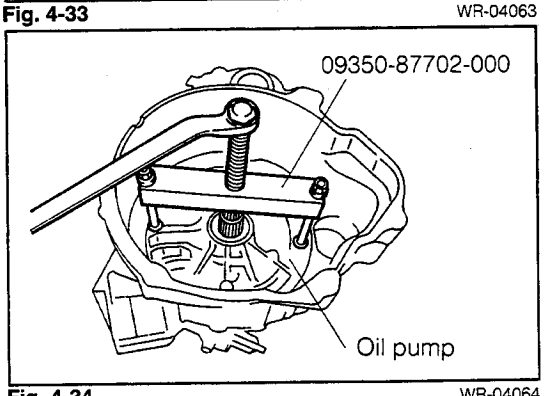


Fig. 4-34 WR-04064

15. Removal of the torque converter housing
    (1) Remove the bolts at both inside and outside of the housing.
    (2) Remove the housing by lightly tapping the periphery of the housing, using a plastic hammer.

    NOTE:
    Before removing the housing, detach the speedometer driven gear.

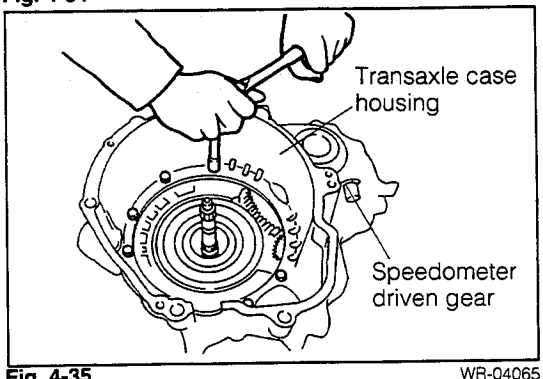


Fig. 4-35 WR-04065

16. Draw out the straight pin, using pliers.

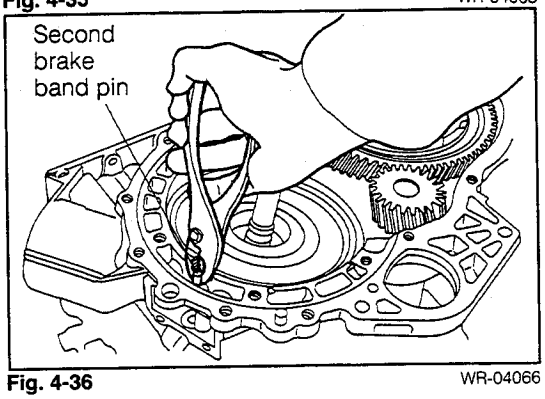


Fig. 4-36 WR-04066

17. Removal of the direct clutch and forward clutch
    (1) While holding the input shaft, remove the direct clutch and forward clutch at the same time.

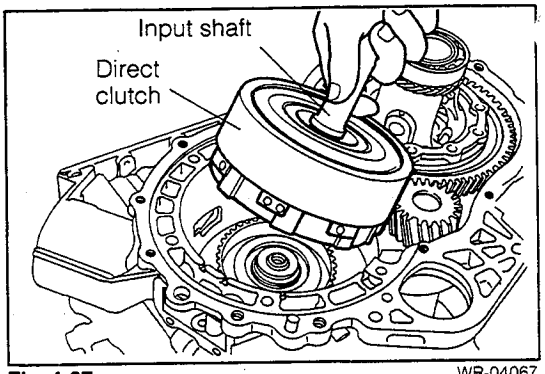


Fig. 4-37 WR-04067

    (2) Remove the direct clutch from the input shaft.

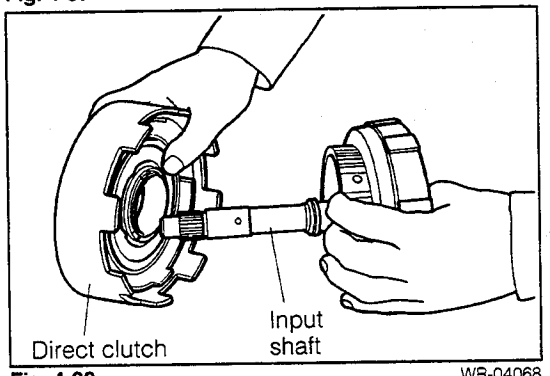


Fig. 4-38 WR-04068

18. Remove the 2nd brake band.

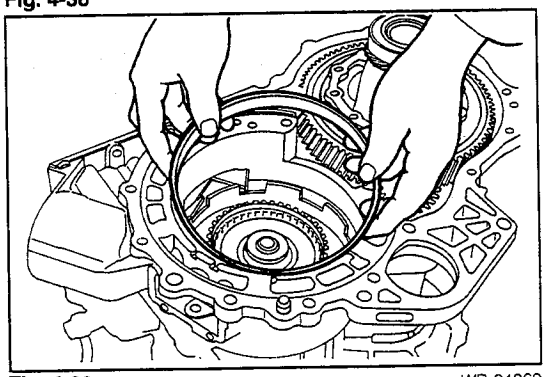


Fig. 4-39 WR-04069

19. Remove the front planetary ring gear.
    NOTE:
    Check the thrust needle roller bearing.

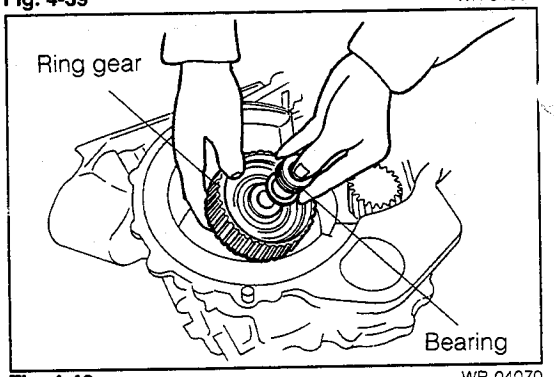


Fig. 4-40 WR-04070

20. Remove the front planetary ring gear assembly.
    NOTE:
    Check the thrust needle roller bearing.

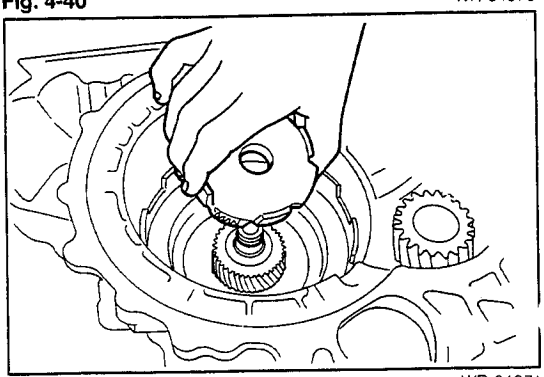


Fig. 4-41 WR-04071

21. Remove the thrust needle bearing from the planetary sun gear.
NOTE:
Check the thrust needle roller bearing.

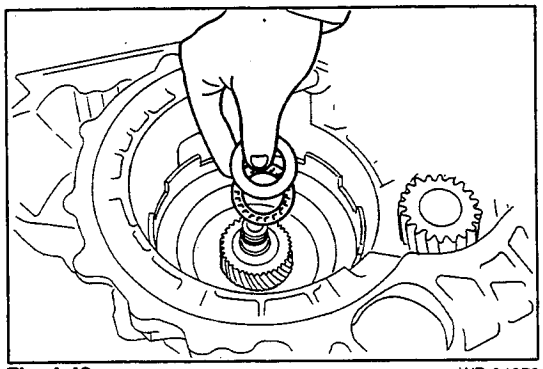


Fig. 4-42 WR-04072

22. Remove the planetary sun gear assembly
NOTE:
Check the thrustwasher.

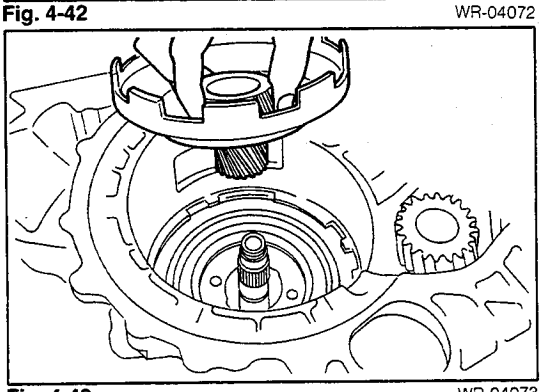


Fig. 4-43 WR-04073

23. Detach the one-way clutch snap ring.
NOTE:
Be very careful not to scratch other parts.

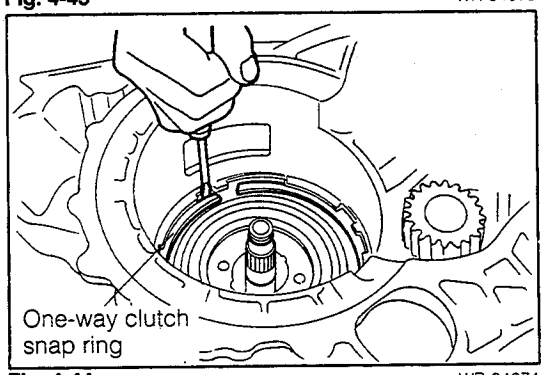


Fig. 4-44 WR-04074

24. Remove the one-way clutch and rear planetary gear.
NOTE:
Check the thrust washer.

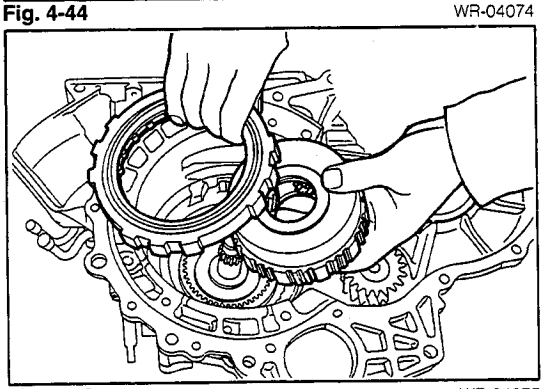


Fig. 4-45 WR-04075

25. Remove the rear planetary ring gear and thrust bearing.
NOTE:
Check the thrust needle roller bearing.

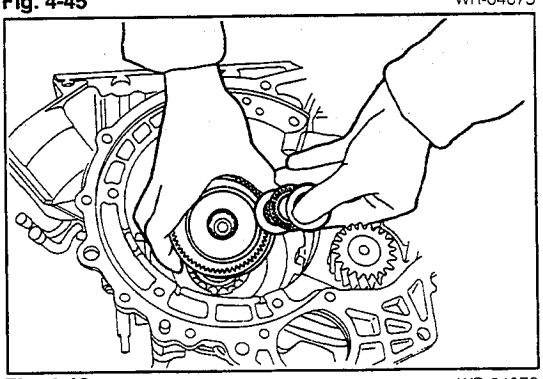


Fig. 4-46 WR-04076

26. Check of the 1st & reverse brake clearance
    (1) Measure the clearance indicated in the right figure, using a thickness gauge.
    Specified Value: 0.58 - 1.92 mm (0.023 - 0.075 inch)

    (2) If the measure value does not comply with the specification, replace the clutch disc or the plate.

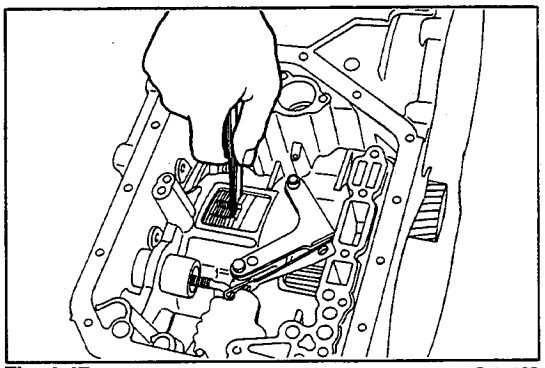


Fig. 4-47 WR-04077

27. Detach the snap rings (2 pieces), using a common screwdriver.
    NOTE:
    Be very careful not to scratch other parts.

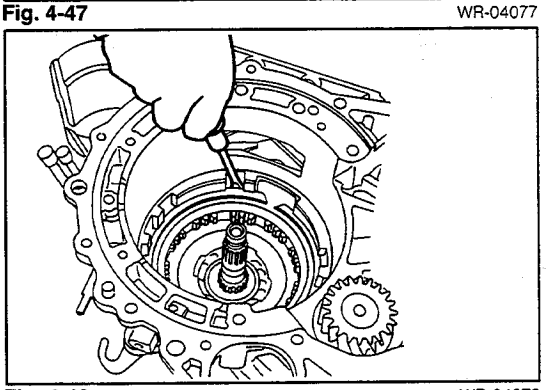


Fig. 4-48 WR-04078

28. Remove the 1st & reverse brake flange, disc, plate and damper plate.

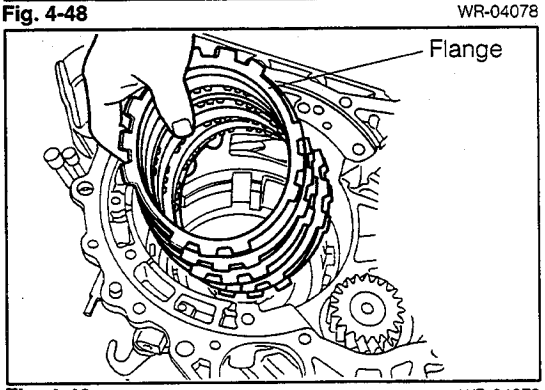


Fig. 4-49 WR-04079

29. Remove the differential gear assembly.

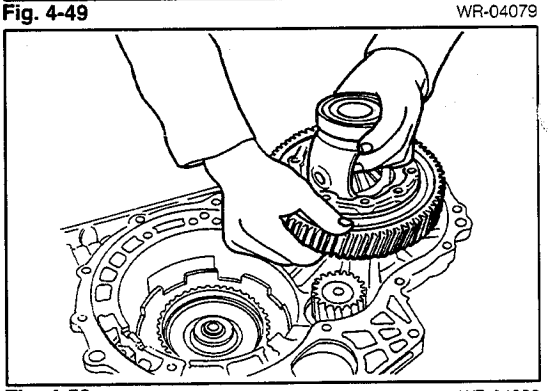


Fig. 4-50 WR-04080

30. Removal of the rear cover
    (1) Remove the bolts (7 pieces) and nuts (2 pieces).
    (2) Remove the rear cover by lightly tapping the position indicated in the figure, using a plastic hammer.

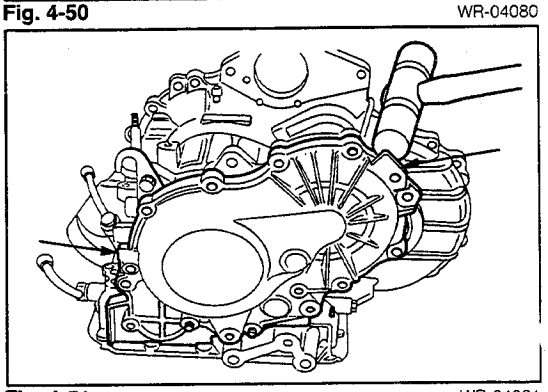


Fig. 4-51 WR-04081

1. Removal of the counter shaft lock nut
   (1) Release the staked state of the lock nut by means of a chisel.
   (2) Shift to the P range so that the gear may not turn.
   (3) Loosen the lock nut.
   NOTE:
   Carefully loosen the lock nut so that no shocks may be given to the parking lock pawl and output shaft.

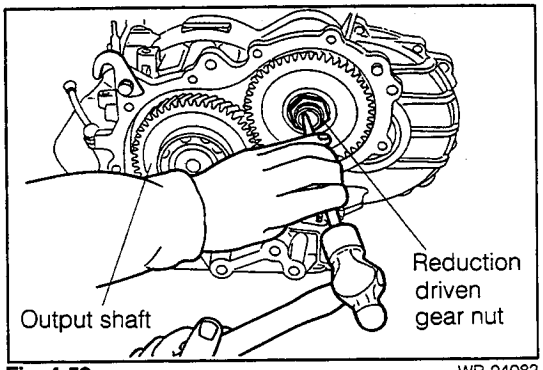


Fig. 4-52 WR-04082

32. Draw out the reduction driven gear.

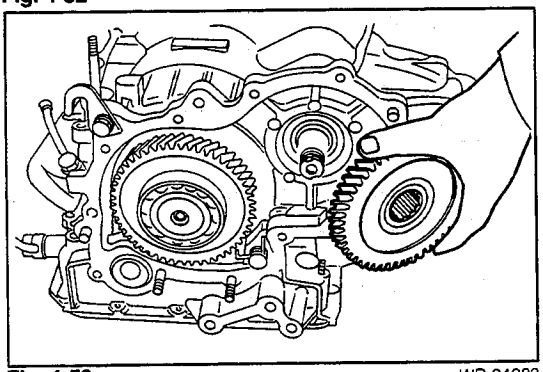


Fig. 4-53 WR-04083

33. Remove the drive counter shaft by lightly tapping it, using a plastic hammer.

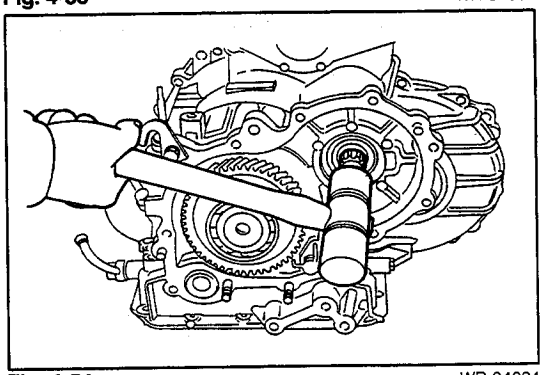


Fig. 4-54 WR-04084

34. Removal of the counter drive gear
   (1) Remove the output shaft by pushing the bearing outer race of the inner output shaft. During this operation, use the following SST as shown in the figure.
   NOTE:
   Never tap the output shaft.
   SST: 09350-87702-000

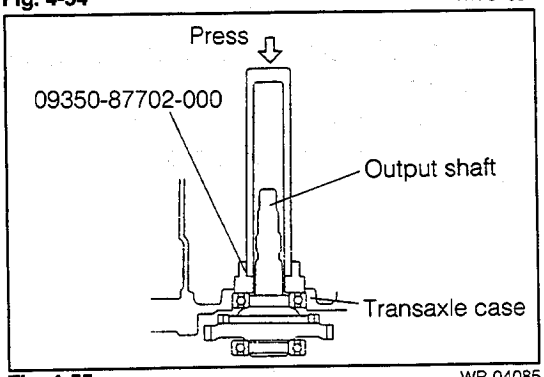


Fig. 4-55 WR-04085

35. Removal of the parking lock pawl
   (1) Draw out the parking lock pawl shaft and spring.
   (2) Remove the parking lock pawl.

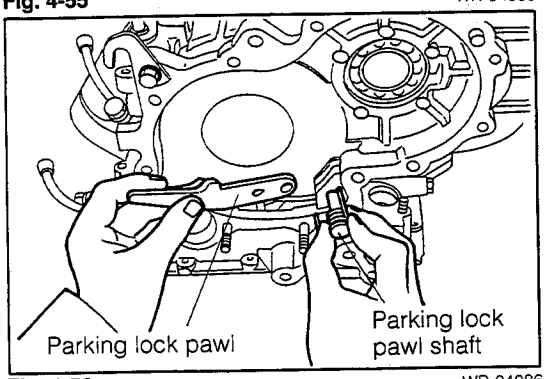


Fig. 4-56 WR-04086

(3) Remove the parking lock pawl sleeve.

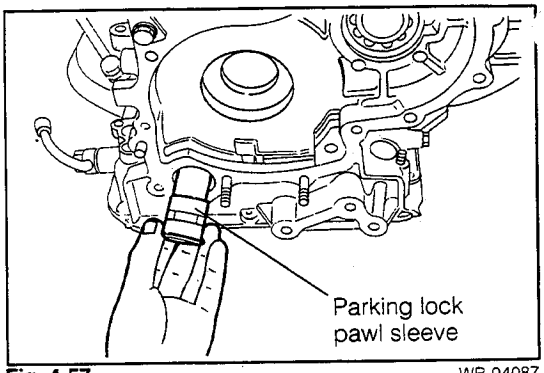


Fig. 4-57 WR-04087

36. Removal of the 1st & reverse brake piston

(1) Compress the return spring, using the SST indicated in the figure.
SST: 09350-87702-000

NOTE:
Do not compress the return spring beyond its compression allowance (deflection allowance).

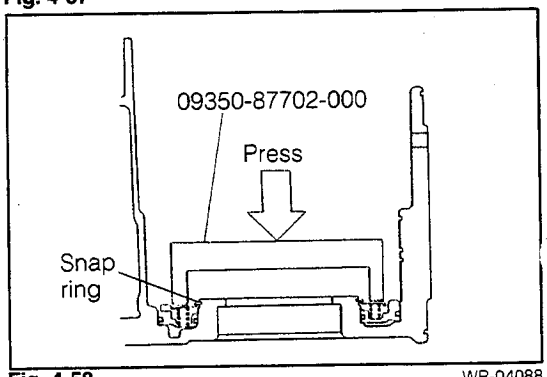


Fig. 4-58 WR-04088

(2) Detach the snap ring.

(3) Remove the return spring subassembly.

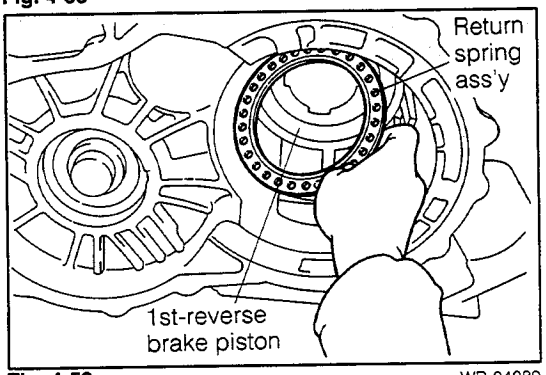


Fig. 4-59 WR-04089

(4) Remove the piston by applying compressed air into the oil hole indicated in the figure.

NOTE:
Slowly apply compressed air with a low pressure (1 kg/cm^2, 15 psi) so that the piston may not tilt.

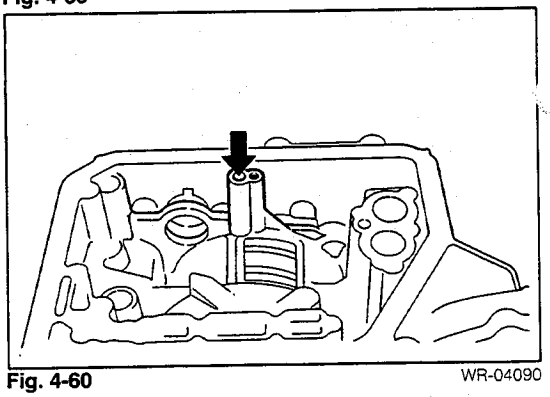


Fig. 4-60 WR-04090

(5) Remove the "O" ring from the piston.

WR-04091

INSPECTION AND REPAIRS OF EACH PART

OIL PUMP

COMPONENTS

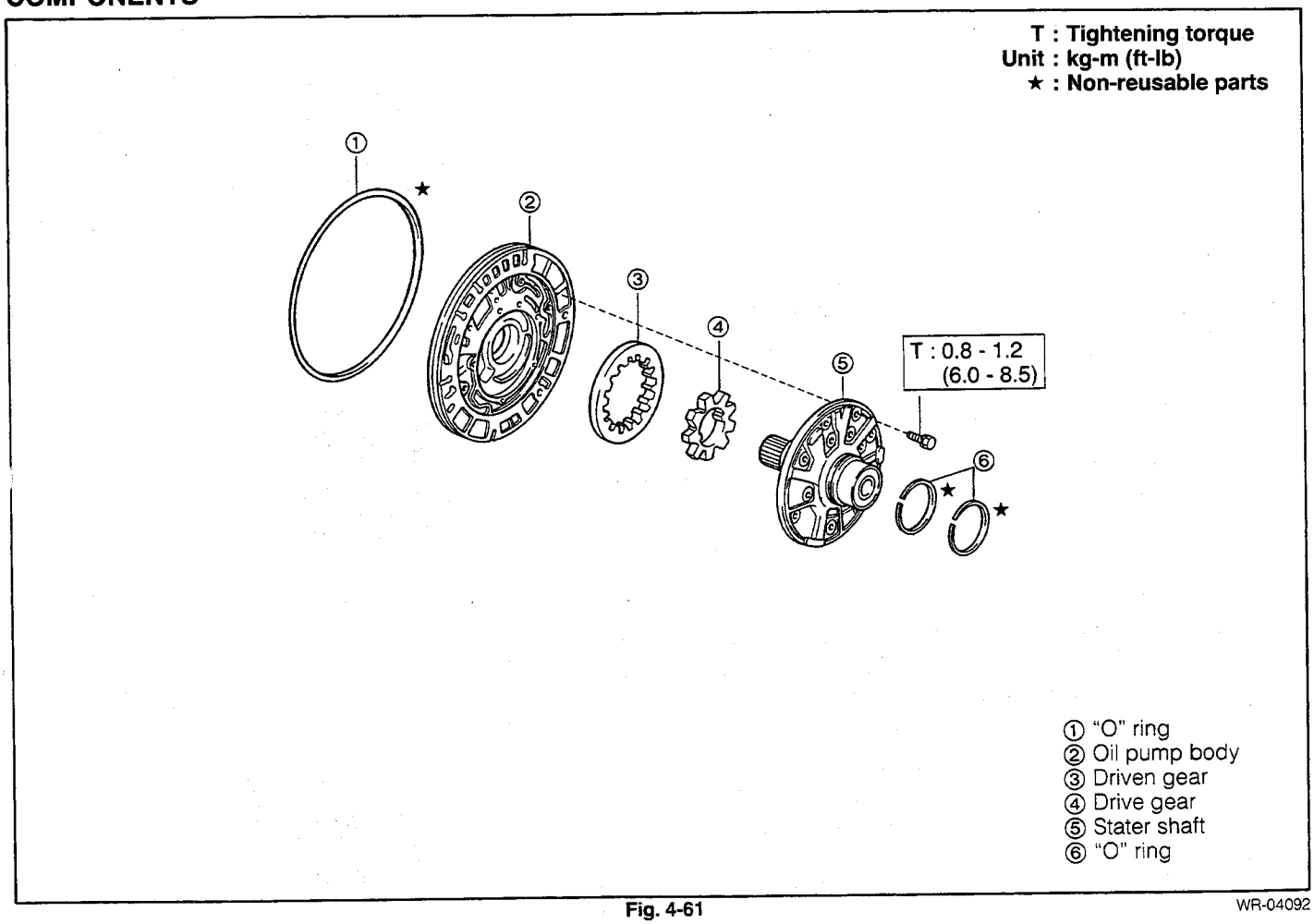


Fig. 4-61 WR-04092

DISASSEMBLY

1. Remove the following parts from the oil pump body.
   (1) "O" ring
   (2) Bolts (11 pieces)
   (3) Stater shaft

WR-04093

INSPECTION

1. Check the pump body oil seal for wear, damage and cracks.
   NOTE:
   Replace any parts that exhibit defects.

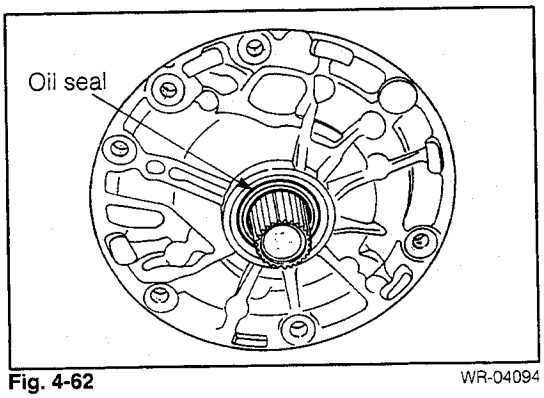


Fig. 4-62 WR-04094

2. Body clearance check
   (1) Push the driven gear against the one side of the body.
   (2) Measure the clearance between the driven gear and the body, using a thickness gauge.
   Specified Value: 0.07 - 0.15 mm (0.0028 - 0.0059 inch)
   Allowable Limit: 0.30 mm (0.011 inch)
   NOTE:
   If the clearance exceeds the allowable limit, replace the driven gear.

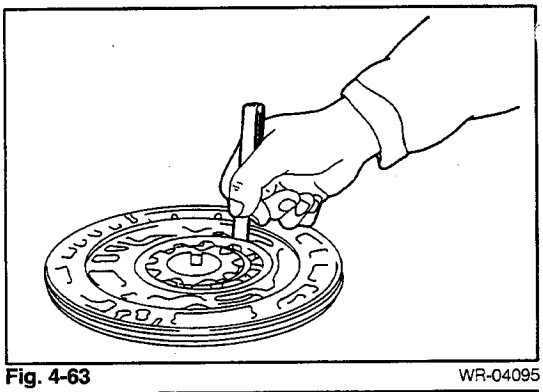


Fig. 4-63 WR-04095

3. Tip clearance check
   (1) Measure the clearance between the driven gear tooth and the crescent, using a thickness gauge.
   Specified Value: 0.11 - 0.14 mm (0.0043 - 0.0055 inch)
   Allowable Limit: 0.30 mm (0.011 inch)
   NOTE:
   If the clearance exceeds the allowable limit, replace the driven gear.

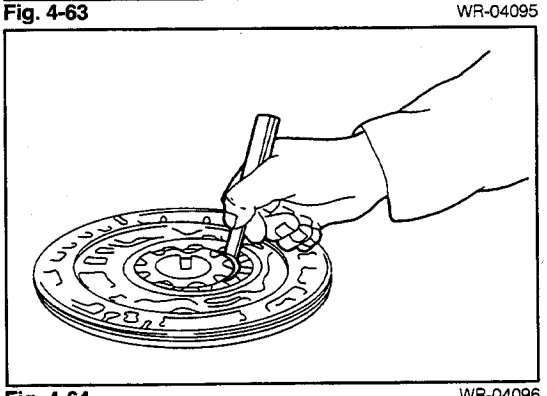


Fig. 4-64 WR-04096

4. Side clearance check
   (1) Measure the side clearance between the gear and the installation surface of the stator shaft over the entire periphery, using a straight edge (square) in combination with a thickness gauge.
   Specified Value: 0.02 - 0.05 mm (0.0008 - 0.0019 inch)
   Allowable Limit: 0.1 mm (0.0039 inch)
   NOTE:
   If the side clearance exceeds the allowable limit, replace the part.

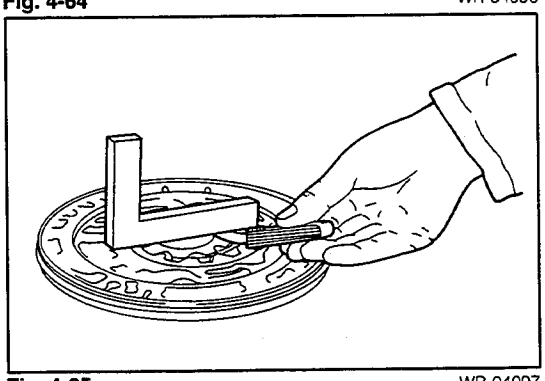


Fig. 4-65 WR-04097

ASSEMBLY

NOTE:
Be sure to replace the "O" rings with new ones.

1. Install the driven gear and drive gear into the pump body.
   NOTE:
   Prior to the installation, apply the automatic fluid to the parts.

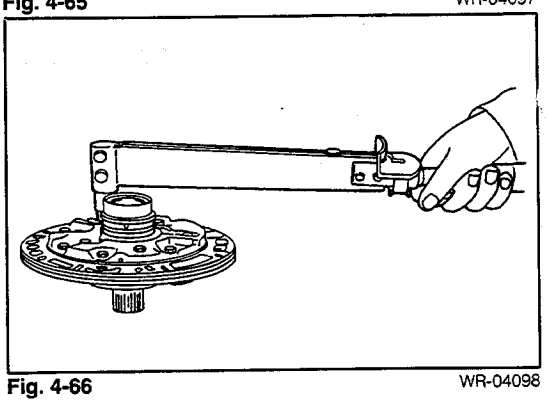


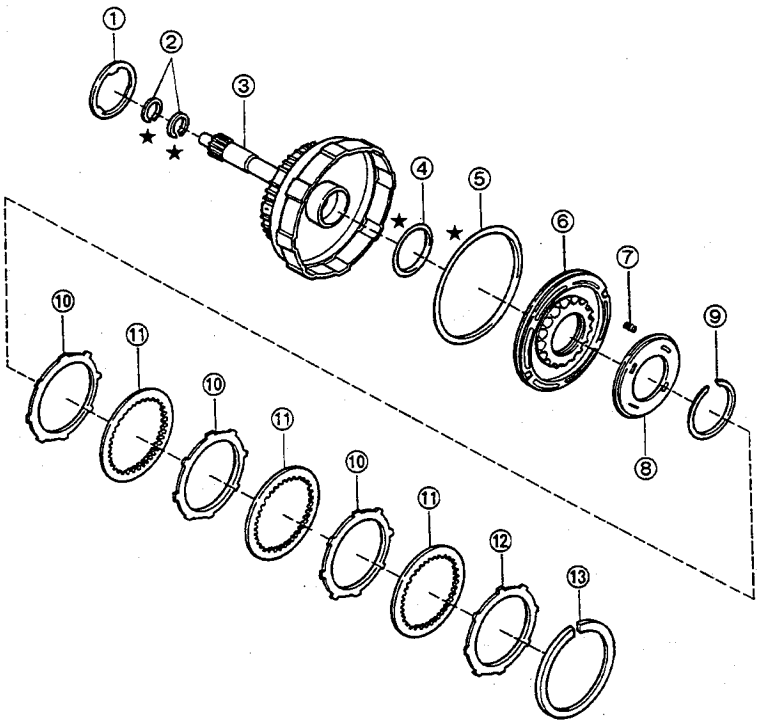
Fig. 4-66 WR-04098

2. Install the stator shaft to the pump body. Tighten the bolts (11 pieces).
   Tightening Torque: 0.8 - 1.2 kg-m (6.0 - 8.5 ft-lb)
3. Install the cover seal rings (2 pieces).
4. Apply the automatic fluid to the oil pump bush and "O" ring.
5. Install the "O" ring.
   NOTE:
   Ensure that the seal is not corrugated and that it is fitted properly in the groove.
6. Ensure that the drive gear rotates smoothly.

FORWARD CLUTCH

COMPONENTS

★ : Non-reusable parts



① Direct clutch washer
② Input shaft "O" ring
③ Input shaft sub-assy
④ "O" ring (inner)
⑤ "O" ring (outer)
⑥ Forward clutch piston
⑦ Return spring
⑧ Return spring seat
⑨ Spring seat snap ring
⑩ Clutch plate
⑪ Clutch disc
⑫ Clutch flange
⑬ Clutch plate snap ring

Fig. 4-67 WR-04099

DISASSEMBLY

1. Compress the return spring, using the following SST. Remove the spring seat snap ring.
   SST: 09350-87702-000
   NOTE:
   Do not compress the return spring beyond its compression allowance (deflection allowance).

2. Remove the spring seat and return spring.

3. Detach the clutch plate snap ring. Remove the flange, disc and plate.

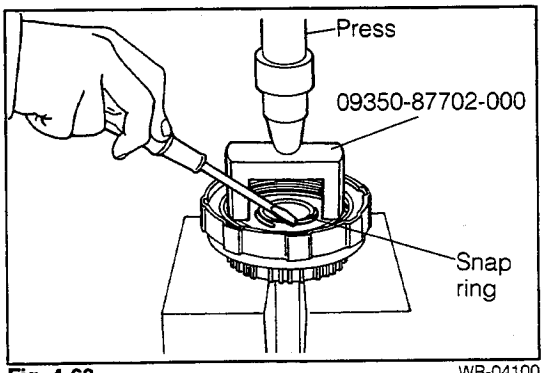


Fig. 4-68 WR-04100

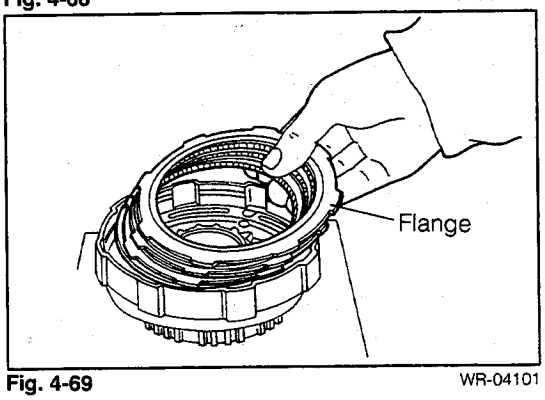


Fig. 4-69 WR-04101

4. Remove the forward clutch piston by applying compressed air into the the input shaft oilhole indicated in the figure.
5. Remove the outer and inner "O" rings from the forward clutch piston.

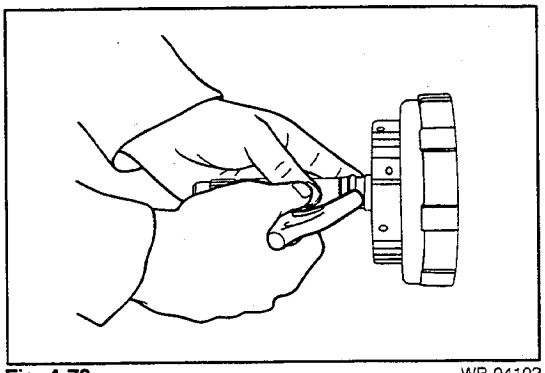


Fig. 4-70 WR-04102

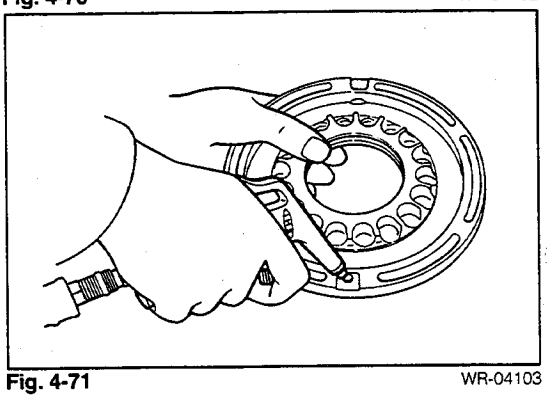


Fig. 4-71 WR-04103

INSPECTION

1. Ensure that the valve (ball) moves freely in the clutch piston.
2. Check the valve for leakage by applying compressed air with a low pressure.
   NOTE:
   If any valve seizure or air leakage exists, replace the forward clutch piston.

ASSEMBLY

NOTE:
Be sure to replace the "O" rings and the seal rings with new ones.

1. Apply the automatic fluid to "O" rings (both inner and outer). Proceed to install the "O" rings to the forward clutch piston.

2. Insert the forward clutch piston to the input shaft drum.
   NOTE:
   Be careful not to twist the "O" rings or not to have them caught by other parts. WR-04104

3. Install the return springs (18 pieces) and spring seats.

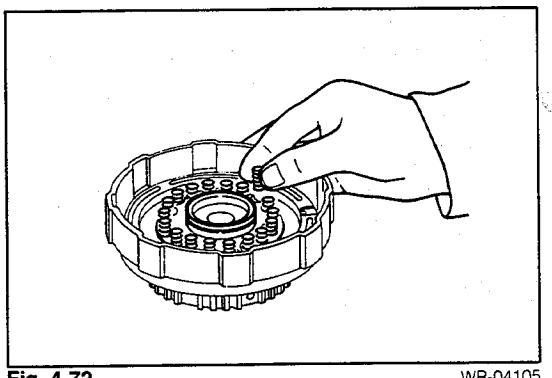


Fig. 4-72 WR-04105

4. Compress the return spring and attach the spring seat snap ring, using the following SST.
   SST: 09350-87702-000
   NOTE 1:
   Check to see if the spring seat snap ring is fitted properly on the spring seat.

   NOTE 2:
   Do not compress the return spring beyond its compression allowance (deflection allowance).

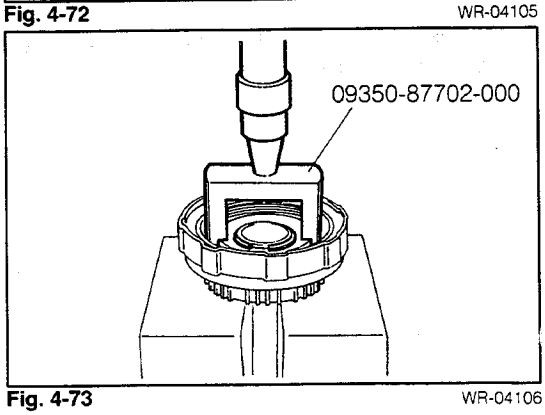


Fig. 4-73 WR-04106

5. Install the following parts in this order.
   (1) Plate
   (2) Clutch disc
   (3) Plate
   (4) Clutch disc
   (5) Plate
   (6) Clutch disc
   (7) Flange
6. Attach the clutch plate snap ring.

WR-04107

7. Clutch clearance measurement
   (1) Measure the clearance indicated in the figure, using a thickness gauge.
   Specified Value: 0.41 - 1.08 mm (0.016 - 0.043 inch)
   NOTE 1:
   If the measured clearance does not comply with the specification, replace the clutch disc or plate.

   NOTE 2:
   If the measured clearance does not comply with the specification although a new clutch disc or plate has been used, select a proper one from the following two flanges having different thicknesses.

Evaluation	Flange thickness
Too small	3.00 mm (0.118 inch)
Too large	3.37 mm (0.132 inch)

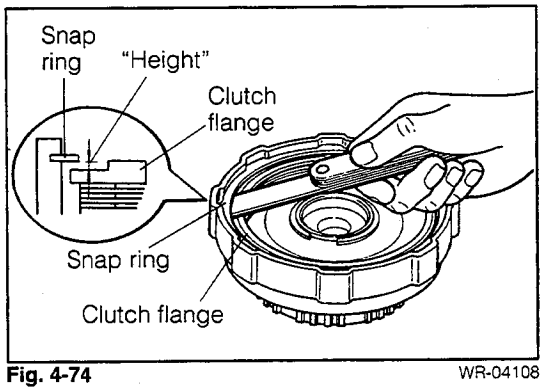


Fig. 4-74 WR-04108

8. Apply compressed air into the oil hole of the input shaft indicated in the figure and check to see if the clutch piston moves freely.

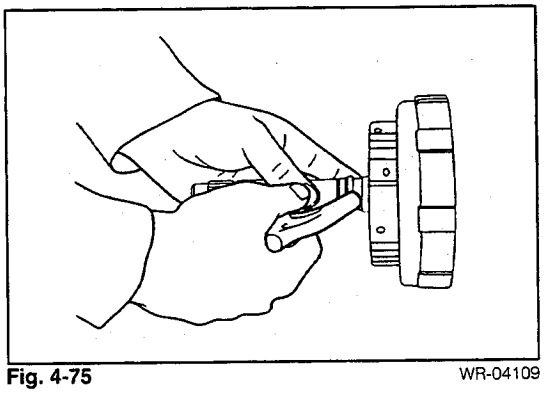
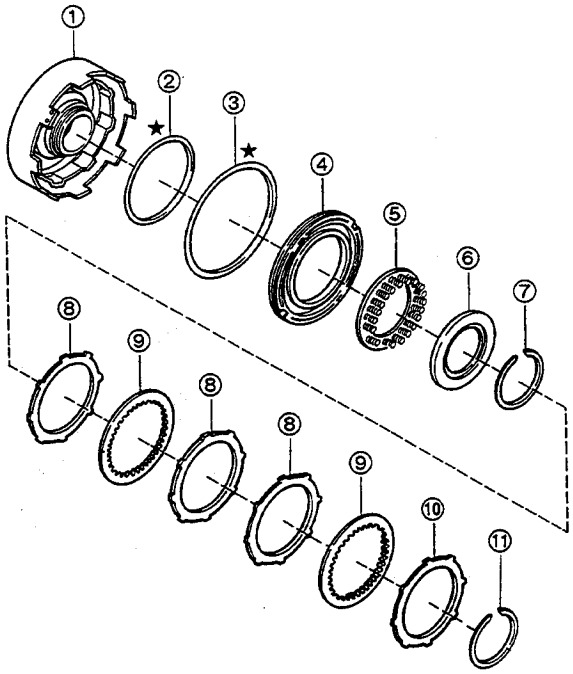


Fig. 4-75 WR-04109

DIRECT CLUTCH

COMPONENTS

★ : Non-reusable parts



① Direct clutch drum
② "O" ring (inner)
③ "O" ring (outer)
④ Direct clutch piston
⑤ Return spring S/A
⑥ Return spring seat
⑦ Spring seat snap ring
⑧ Clutch plate
⑨ Clutch disc
⑩ Clutch flange
⑪ Clutch plate snap ring

Fig. 4-76 WR-04110

DISASSEMBLY

1. Compress the return spring and detach the spring seat snap ring, using the following SST.
   SST: 09350-87702-000
   NOTE:
   Do not compress the return spring beyond its compression allowance (deflection allowance).

2. Remove the return spring seat and return spring sub-assembly.

3. Detach the clutch plate snap ring. Remove the flange, disc and plate.

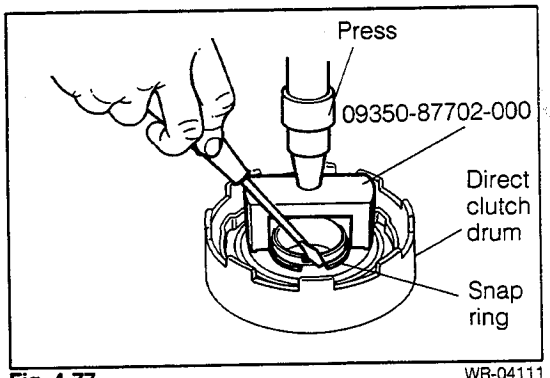


Fig. 4-77 WR-04111

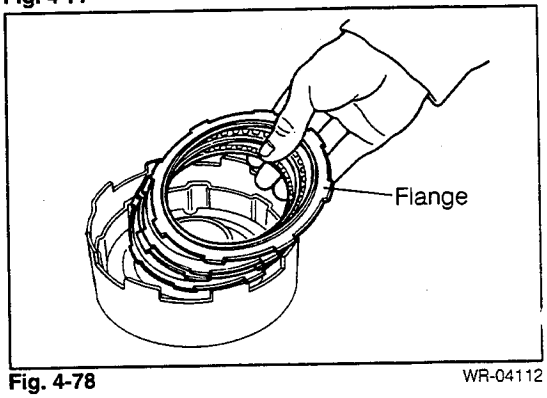


Fig. 4-78 WR-04112

4. Remove the direct clutch piston by applying compressed air into the oil hole indicated in the figure.

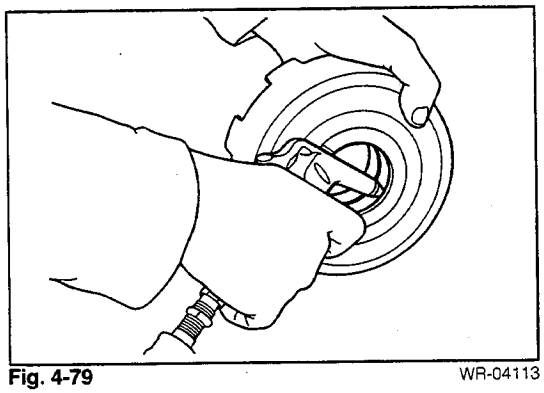


Fig. 4-79 WR-04113

5. Remove the "O" ring from the direct clutch drum.
6. Remove the "O" ring from the direct clutch piston. WR-04114

INSPECTION

1. Check to see if the check valve (ball) moves freely in the clutch piston.
2. Check the valve for leakage by applying compressed air with a low pressure.
   NOTE:
   If any valve seizure or air leakage exists, replace the direct clutch piston.

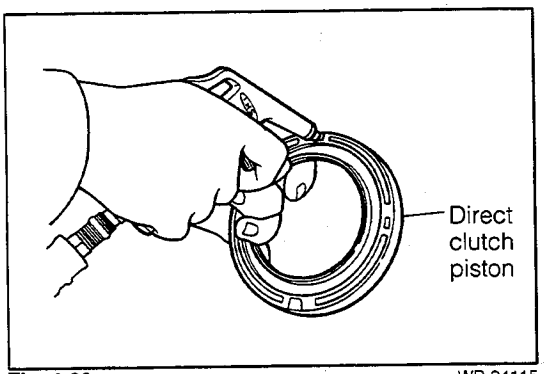


Fig. 4-80 WR-04115

ASSEMBLY

NOTE:
Be sure to replace the "O" rings with new ones.

1. Apply the automatic fluid to the "O" ring. Proceed to install the "O" ring to the direct clutch drum.
2. Apply the automatic fluid to the "O" ring. Proceed to install the "O" ring to the direct clutch piston.
3. Insert the direct clutch piston to the direct clutch drum.
   NOTE:
   Be careful not to twist the "O" ring or not to have it caught by other parts.

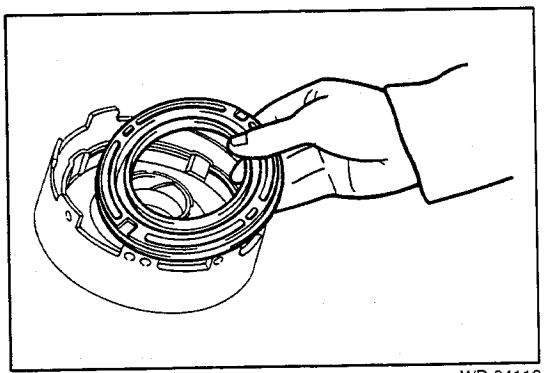


Fig. 4-81 WR-04116

4. Install the spring seat subassembly.
5. Install the spring seat.

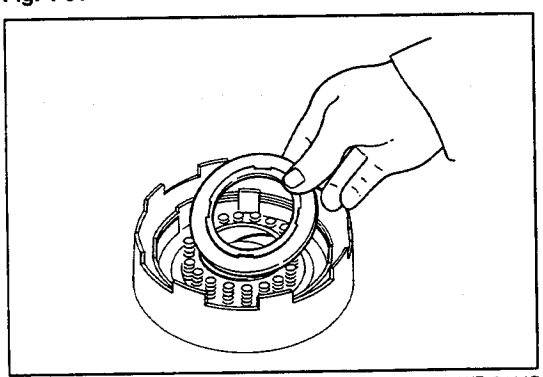


Fig. 4-82 WR-04117

6. Compress the return spring and attach the spring seat snap ring, using the following SST.
   SST: 09350-87702-000
   NOTE 1:
   Check to see if the spring seat snap ring is fitted properly on the spring seat.

   NOTE 2:
   Do not compress the return spring beyond the compression allowance (deflection allowance).

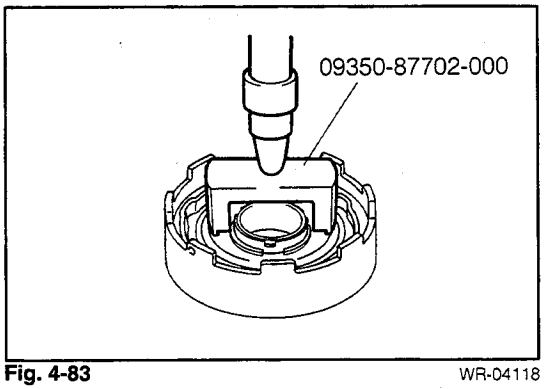


Fig. 4-83 WR-04118

7. Install the following parts in this order.
   (1) Plate
   (2) Clutch disc
   (3) Plate
   (4) Plate
   (5) Clutch disc
   (6) Flange
   NOTE:
   Prior to the installation, immerse the clutch discs in the automatic fluid for at least two hours.

WR-04119

8. Attach the clutch plate snap ring.

9. Measurement of the clutch (C_2) clearance
   (1) Measure the clearance indicated in the figure, using a thickness gauge.
   Specified Value: 0.89 - 1.46 mm (0.035 - 0.057 inch)
   NOTE 1:
   If the measured clearance does not comply with the specification, replace the clutch disc or plate.

   NOTE 2:
   If the measured clearance does not comply with the specification although a new clutch disc or plate has been used, select a proper one from the following two flanges having different thicknesses.

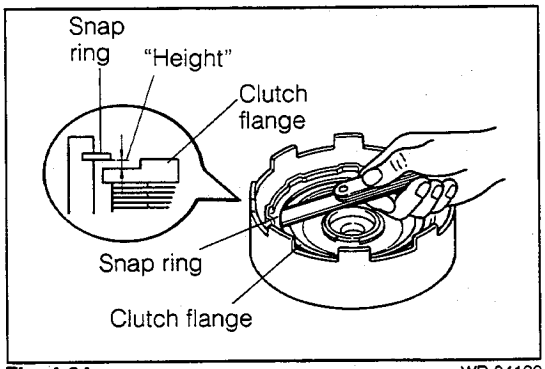


Fig. 4-84 WR-04120

Evaluation	Flange thickness
Too large	3.37 mm (0.132 inch)
Too small	3.00 mm (0.118 inch)

10. Apply compressed air into the oil hole indicated in the figure and check to see if the direct clutch moves.

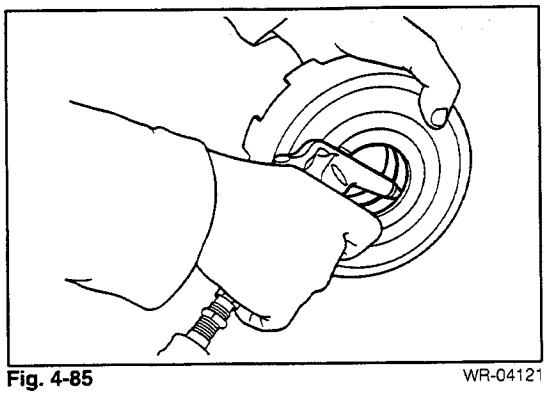


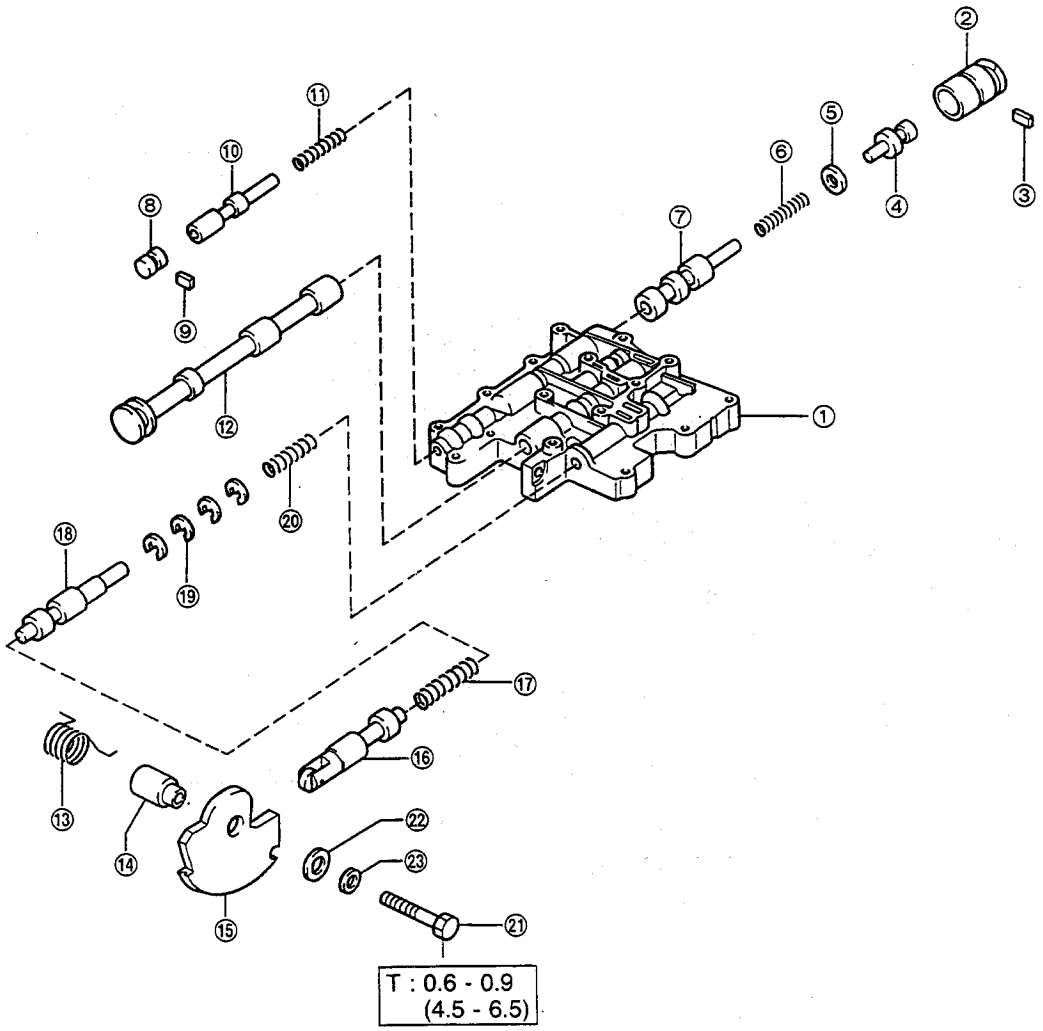
Fig. 4-85 WR-04121

VALVE BODY

COMPONENTS

Upper valve body

T : Tightening torque
Unit : kg-m (ft-lb)



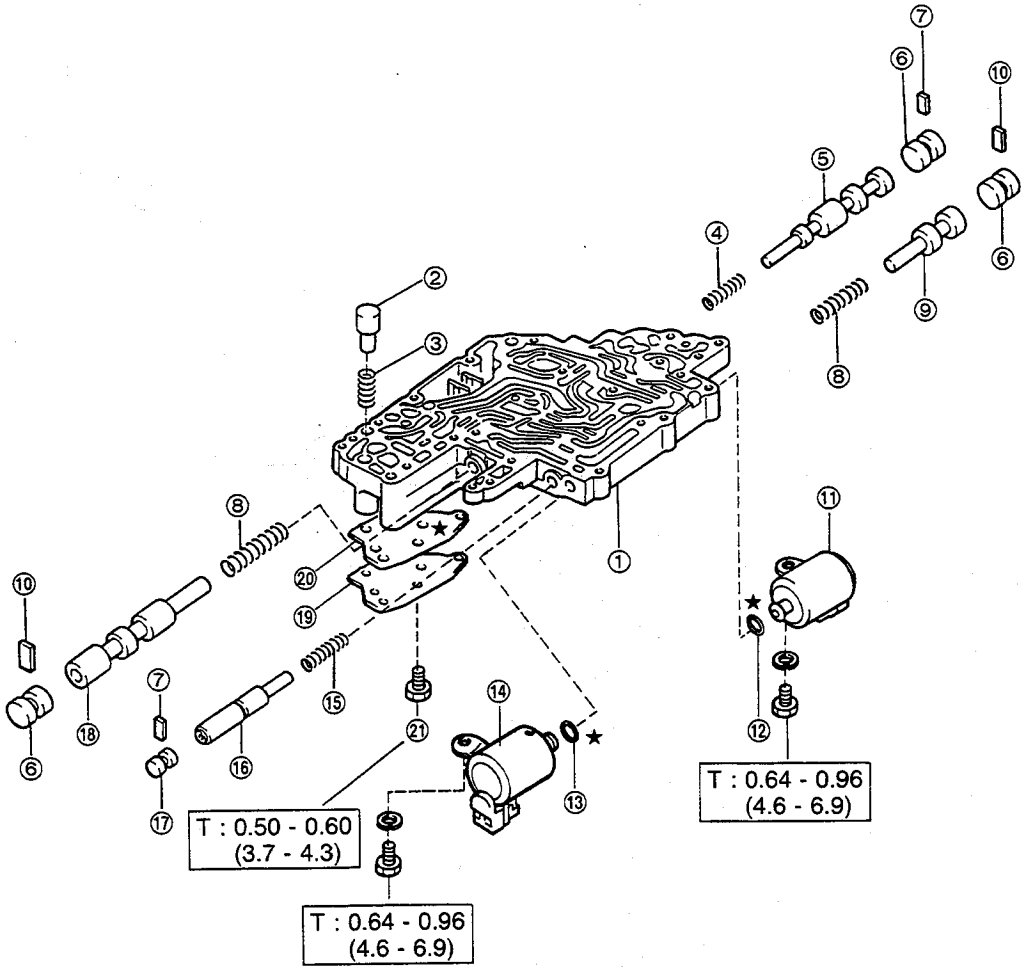
① Upper valve body
② Pressure regulator valve sleeve
③ No. 1 key (ℓ = 9.2 mm, 0.36 inch)
④ Primary regulator valve plunger
⑤ Plate washer
⑥ Primary regulator valve spring
(Red. Length: 52.5 mm)
⑦ Primary regulator valve
⑧ Plug
⑨ No. 3 key (ℓ = 11 mm, 0.43 inch)
⑩ B_1 control valve
⑪ B_1 control valve spring
(Yellow-green. Length: 34.1 mm)
⑫ Manual valve
⑬ Throttle valve spring
⑭ Throttle valve cam pin
⑮ Throttle valve cam
⑯ Downshift plug
⑰ Throttle valve No. 2 spring
(Purple. Length: 31.5 mm)
⑱ Throttle valve
⑲ Throttle valve ring(s)
⑳ Throttle valve No. 1 spring
(White. Length: 22.2 mm)
㉑ Throttle valve cam bolt
㉒ Washer plate
㉓ Spring washer

Fig. 4-86

WR-04122

Lower valve body

T : Tightening torque
Unit : kg-m (ft-lb)
★ : Non-reusable parts



① Lower valve body
② Cooler by-pass valve
③ Spring
(Orange. Length: 19.9 mm)
④ Secondary regulator valve spring
(Yellow. Length: 31.4 mm)
⑤ Secondary regulator valve
⑥ Plug
⑦ No. 3 key (ℓ = 11 mm, 0.43 inch)
⑧ Shift valve spring
(Pink. Length: 39.6 mm)
⑨ 2 - 3 shift valve
⑩ No. 2 key (ℓ = 15 mm, 0.59 inch)
⑪ Direct clutch solenoid
⑫ "O" ring
⑬ "O" ring
⑭ 2nd brake solenoid
⑮ B_2 control valve spring
(Blue. Length: 28.1 mm)
⑯ B_2 control valve
⑰ B_2 control valve plug
⑱ 1 - 2 shift valve
⑲ Lower valve body cover
⑳ Gasket
㉑ Lower valve body cover bolt

Fig. 4-87

WR-04123

DISASSEMBLY

Instructions on disassembly

(1) The automatic transmission employs many valves, springs, plugs and so forth which are similar in their shapes. It is, therefore, advisable to arrange disassembled parts by putting a mark showing the item No. on each part.
(2) The "E" rings on the throttle valve are used to adjust the hydraulic pressure. Hence, when disassembling the "E" rings, record the number of the "E" rings.
(3) Thoroughly wash the valve body and components.
(4) Store the gasket in a vinyl bag. Do not leave the gasket in the atmosphere for more than three hours.
(5) Before disassembling, draw out the manual valve for fear of fall itself.

1. Separation of the upper valve body and lower valve body
   (1) Remove the bolts (16 pieces) indicated in the figure. (Upper valve body side)
   NOTE:
   Prior to the disassembly, take out the manual valve, for it drops by its own weight.

WR-04124

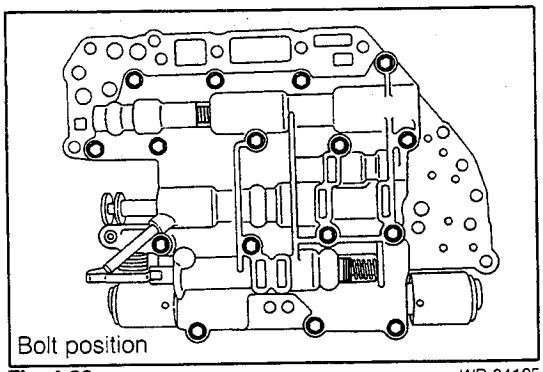


Fig. 4-88 WR-04125

   (2) With the upper valve body held at the lower side, separate the lower valve body.
   NOTE 1:
   If this separation is made with the upper valve body held at the upper side, there is a possibility that the steel balls drop and will be lost.

   NOTE 2:
   After completion of the separation, remove the steel balls from the upper valve body.

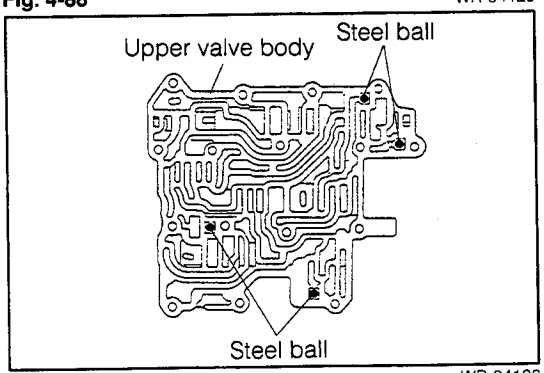


Fig. 4-89 WR-04126

2. Disassembly of the upper valve body assembly
   (1) Remove the throttle valve cam attaching bolt. Remove the cam, spring and pin.
   (2) Remove the downshift plug and spring.

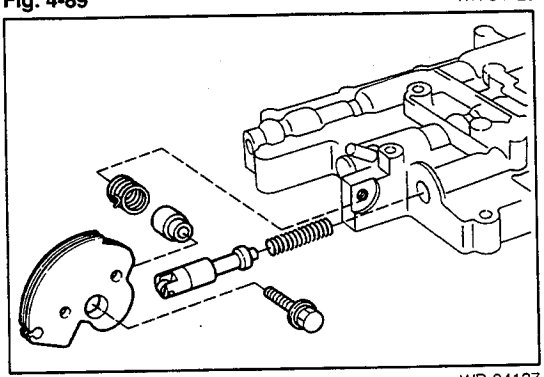


Fig. 4-90 WR-04127

   (3) Remove the throttle valve after the "E" rings have been removed from the outside of the valve body.
   NOTE:
   Record the number of the "E" rings used.

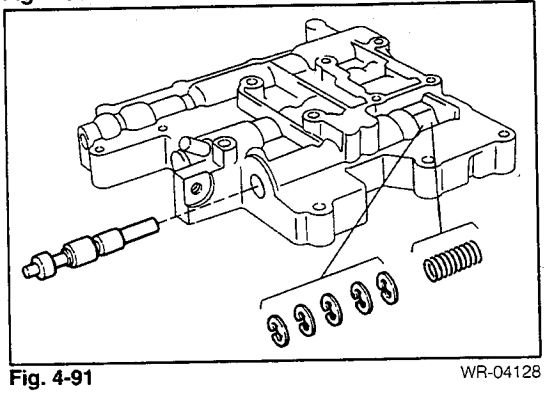


Fig. 4-91 WR-04128

(4) While lightly pushing the plug at the valve inserting hole, remove the straight key. Remove the plug, B_1 control valve and spring.

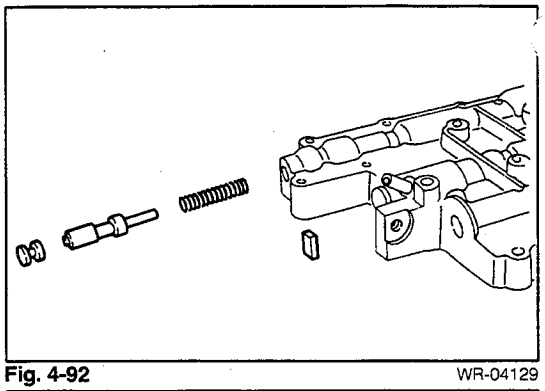


Fig. 4-92 WR-04129

(5) While lightly pushing the sleeve at the valve inserting hole, remove the straight key. Remove the sleeve, plunger, washer, spring and primary regulator valve.

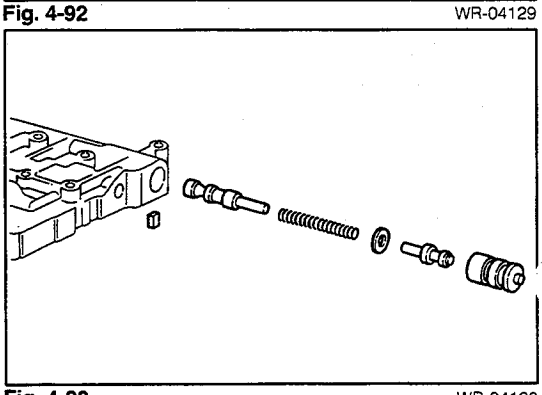


Fig. 4-93 WR-04130

3. Disassembly of the lower valve body assembly
   (1) Remove the direct clutch solenoid assembly and second brake solenoid assembly.
   (2) Remove the gasket and lower valve body cover.

   NOTE:
   Care must be exercised as to the jumping out of the cooler bypass valve during this operation.

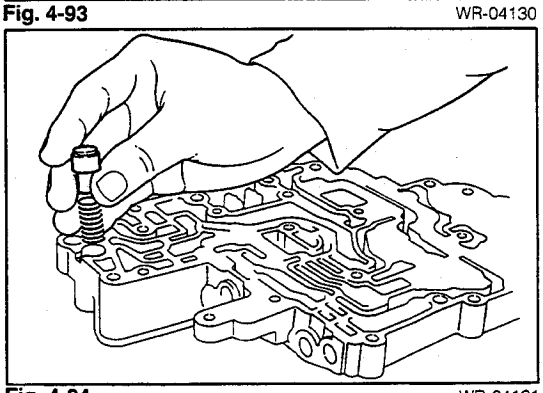


Fig. 4-94 WR-04131

(3) Remove the straight key. Remove the plug, secondary regulator valve and spring.
(4) Remove the straight key. Remove the plug, 2 - 3 shift valve and spring.

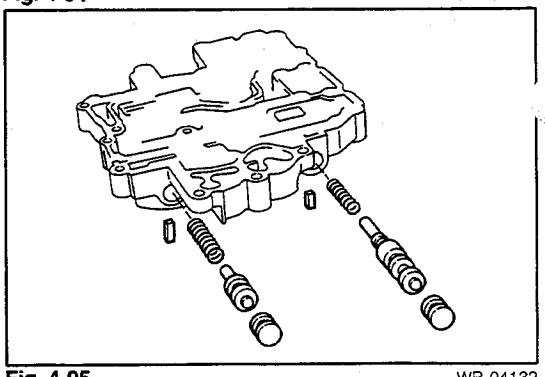


Fig. 4-95 WR-04132

(5) Remove the straight key. Remove the plug, B_2 control valve and spring.
(6) Remove the straight key. Remove the plug, 1 - 2 shift valve and spring.

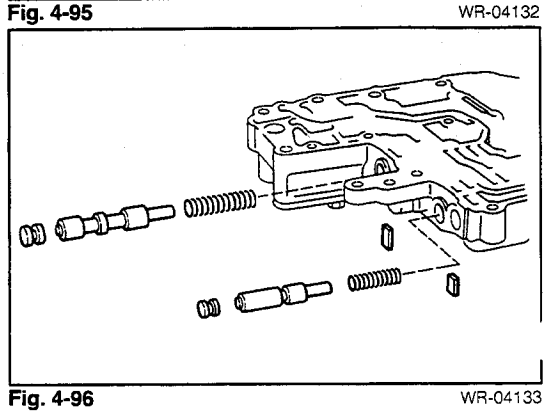


Fig. 4-96 WR-04133

INSPECTION

1. Check the oil passage of the valve body for restriction.
2. Check to see if scratches are present at the valve body hole and valve sliding surface.
3. Check the spring for a flattened condition.
   (See "LIST OF SPRINGS" of the APPENDIX at page 4−73.)

ASSEMBLY

NOTE:
Be sure to replace the "O" rings and gaskets with new ones.

Instructions on assembly

(1) Prior to the installation, apply the automatic fluid to the valve, spring, plug, straight key and so forth.
(2) Correctly insert the valve to the spring.
(3) Be very careful to insert the components, such as the valves and springs, to their correct positions.
NOTE 1:
Install these parts in accordance with the marks showing the item numbers which were put during the disassembly.

NOTE 2:
See "LIST OF SPRINGS" at page 4−73 during the assembly.

(4) Care must be exercised to ensure that the valves are inserted in their correct directions.
(5) When inserting the valve, spring, plug and straight key, be careful not to damage the valve body.
(6) Check to see if the valve moves smoothly.
NOTE 1:
Make sure that each part (particularly plunger and sleeve) goes in by its own weight during the insertion.

WR-04135

1. Assembly of the upper valve body
   (1) Installation of primary regulator valve
      ①Hold the valve body horizontally. Insert the primary regulator valve approx. 80 % of its overall length. Then, push the spring (red) so as to insert the primary regulator valve.
      ②Put the plunger into the sleeve. Install the washer plate. Then, insert it into position.
      ③Insert the straight key (ℓ = 9.2 mm, 0.36 inch) so as to secure the sleeve.
   (2) Installation of B_1 control valve
      ①Install the spring to the valve. Insert them together into position.
      ②Insert the plug. Secure it by means of the straight key (ℓ = 11 mm, 0.43 inch).
   (3) Installation of throttle valve and downshift plug
      ①Push the spring (purple) so as to insert the throttle valve.
      ②Working from the outside of the valve body, install the "E" rings to the throttle valve.
   NOTE:
   Install the "E" rings in the same number as that prior to the disassembly.

      ③Install the spring (white).
      ④Install the downshift plug.
   (4) Installation of throttle valve cam
      ①Install the pin and spring to the cam.
   NOTE:
   Attach the hook of the spring to the cam hole.

②Tighten the throttle valve cam, together with the spring washer and washer plate, to the valve body.
M6 bolt Nominal length: 28 mm (1.1inch)
Tightening Torque: 0.6 - 0.9 kg-m (4.3 - 6.5 ft-lb)

NOTE 1:
Attach the other end of the spring to the outside of the valve body.

NOTE 2:
While pushing the cam against the roller section of the downshift plug, screw-in the cam.

NOTE 3:
Make sure that the roller of the downshift plug is located at the center of the throttle valve cam.

NOTE 4:
Insert the manual valve after the upper body and lower body have been assembled.

WR-04136

2. Assembly of the lower valve body
(1) Installation of secondary regulator valve
①Insert the spring (yellow), secondary regulator valve and plug.
②Insert the straight key (ℓ = 11 mm, 0.43 inch). Secure it by means of the plug.
(2) Installation of 1 - 2 shift valve
①Insert the spring (pink), 1 - 2 shift valve and plug.
②Insert the straight key (ℓ = 11 mm, 0.43 inch). Secure it by means of the plug.
(3) Installation of B_2 control valve
①Insert the spring (blue), B_2 control valve and plug.
②Insert the straight key (ℓ = 15 mm, 0.59 inch). Secure it by means of the plug.
(4) Installation of 2 - 3 shift valve
①Insert the spring (pink), 2 - 3 shift valve and plug.
②Insert the straight key (ℓ = 15 mm, 0.59 inch). Secure it by means of the plug.
(5) Installation of direct clutch solenoid assembly and second brake solenoid assembly
①Prior to the insertion, apply the automatic fluid to the new "O" ring.
②Care must be exercised as to the tightening bolt holes. When tightening the bolts, be sure not to mistake the right and left holes.
M6 bolt Nominal length: 10 mm (0.39 inch) × 2 pieces
Tightening Torque: 0.64 - 0.96 kg-m (4.6 - 6.9 lb-ft)

WR-0413

(6) Installation of lower valve body cover
①Install the cover, using a new gasket.
M5 bolt Nominal length:
14 mm (0.55 inch) × 10 pieces
Tightening Torque: 0.50 - 0.60 kg-m (3.6 - 4.3 ft-lb)

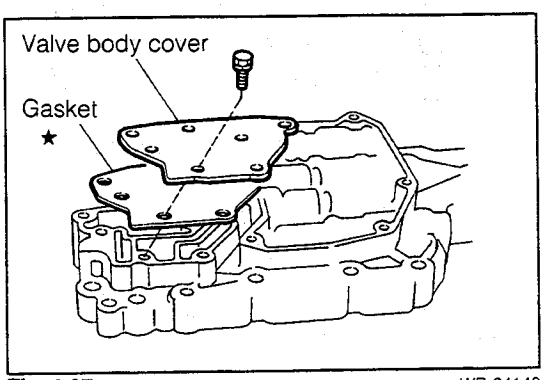


Fig. 4-97 WR-04140

3. Assembly of the valve body assembly
   (1) Insert the spring (orange) and cooler bypass valve to the lower valve body.
   (2) Install the steel balls (4 pieces) to the upper valve body.

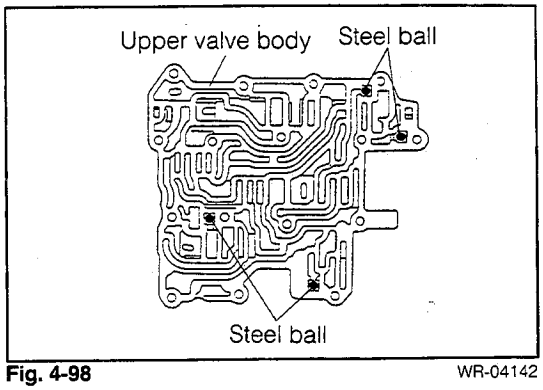


Fig. 4-98 WR-04142

   (3) Install new gaskets on both surfaces of the valve body plate. Place the valve body plate on the upper valve body.
   (4) Turn over the upper valve body, while making sure that the plate may not separate from the upper valve body. Then, place the upper valve body on the lower valve body.

NOTE 1:
When the upper valve body is being turned over, be very careful not to allow the steel balls to drop.

NOTE 2:
Do not pry the cooler bypass valve.

NOTE 3:
Ensure that the plate or gasket may not be displaced from its installation position. WR-04143

4. Installation of the bolts
   (1) List of bolts used

Stand-ard	Nominal length	Shape of head	Number	Installation position
M5	29.5 mm (1.16 inch) Length of threaded portion: 22.0 mm	Deep recess	6	A
M5	38.0 mm (1.50 inch)	Deep recess	6	B
M5	44.0 mm (1.73 inch)	Deep recess	2	C
M5	29.5 mm (1.16 inch) Length of threaded portion: 19.5 mm	Normal recess	2	D

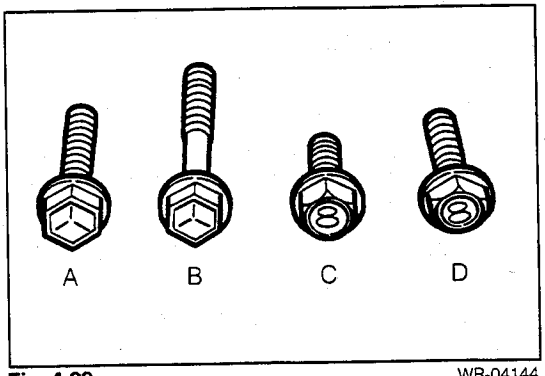


Fig. 4-99 WR-04144

(2) Tightening sequence of bolts
Lightly tighten two bolts marked with ①.
Securely tighten four bolts marked with ②.
Securely tighten eight bolts marked with ③.
Securely tighten four bolts marked with ④.

NOTE:
At the same time, securely tighten the bolts which were temporarily tightened in step ①.

Tightening Torque: 0.5 - 0.6 kg-m (3.6 - 4.3 ft-lb)

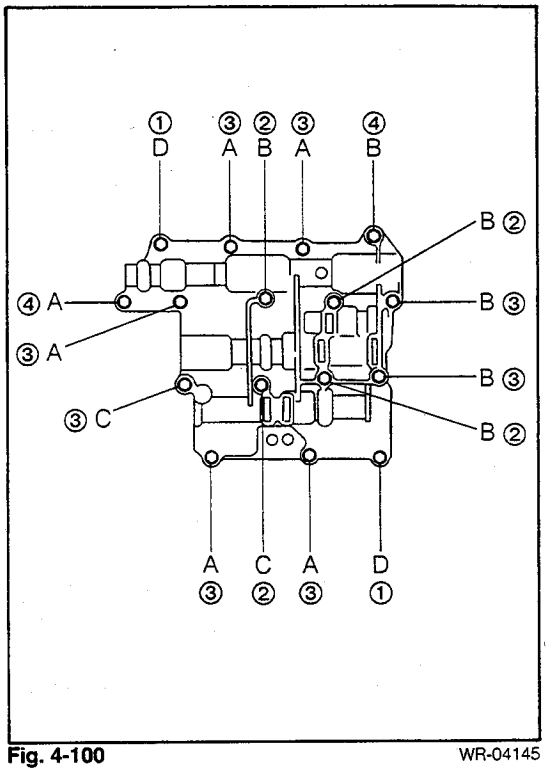


Fig. 4-100 WR-04145

5. Insert the manual valve into the upper valve body.

WR-04146

ASSEMBLY OF TRANSMISSION

INSTRUCTIONS ON ASSEMBLY

1. Be sure to replace the following parts with new ones: gaskets, lock nut, "O" rings, oil seals, seal rings of each piston, seal washers of the oil pump set bolts, oil deflector and test plug.
2. When replacing the low brake band and clutch disc with new ones, immerse the new parts in the automatic fluid for at least two hours preceding the assembly.
3. Be sure to apply the automatic fluid to the sliding sections of the parts.
4. Thoroughly clean the bolts or threaded holes, to which a sealing agent has been applied.
5. Prior to the assembly, ensure that air continuity exists in each oil passage by applying compressed air into each oil passage.
6. Be careful not to damage each gasket surface of the transmission case, rear cover, oil pump, valve body and housing.
7. Tighten the bolts and nuts to the specified torque.
8. Install the bearing and race in their correct positions and directions.
9. In order to prevent foreign matters, such as dust or dirt, from getting into the transmission case, clean each part by applying compressed air prior to the installation.
10. When applying grease, use the specified MP (multipurpose) type.

WR-04147

1. Installation of the manual shift shaft and parking lock pawl
(1) Install the lower washer and parking rod to the manual shift shaft.
(2) Insert the manual shift shaft into the transmission case.

NOTE:
When the manual shift shaft passes through the oil seal, be careful not to damage the lip section of the oil seal.

(3) Lock the shift shaft by the washer and the "E" ring.

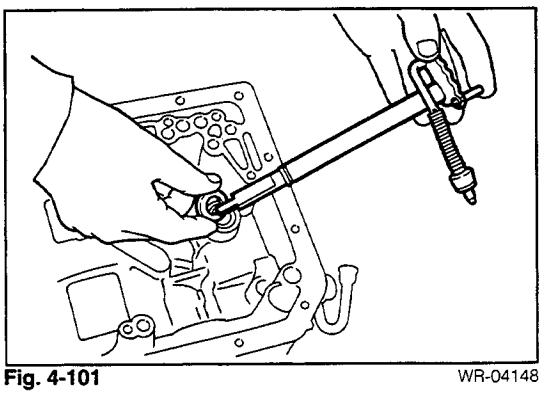


Fig. 4-101 WR-04148

(3) Install the manual detent spring subassembly.

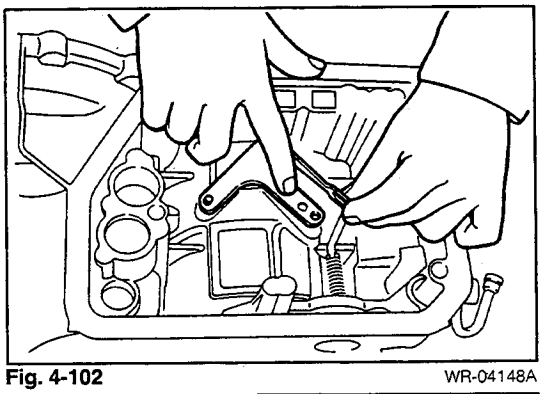


Fig. 4-102 WR-04148A

(4) Install the pin and snap ring to the parking lock pawl sleeve. Install the sleeve in the transmission case in such a way that the rod may get into the sleeve.

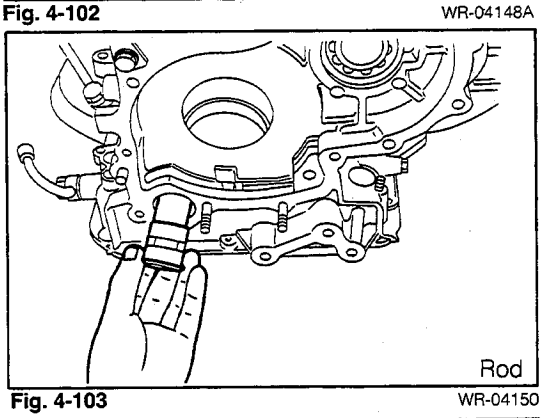


Fig. 4-103 WR-04150

(5) Installation of parking lock pawl and parking lock pawl shaft
① Install the pawl in the correct position.
② Pass the shaft through the spring. Install them to the pawl, as shown in the right figure.
③ Shift the manual shift lever to the [P] range. Ensure that the parking lock pawl moves smoothly.

WR-04151

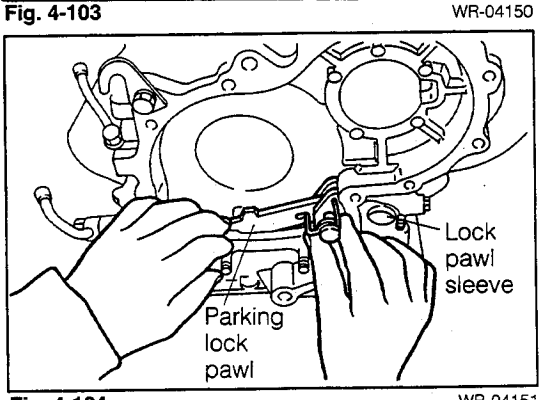


Fig. 4-104 WR-04151

2. Installation of the 1st & reverse brake piston
(1) Apply the automatic fluid to the "O" rings (both inner and outer). Then, install them to the piston.
(2) Insert the piston into the transmission case in the direction indicated in the right figure.

NOTE:
Be careful not to twist the "O" rings or not to have them caught by other parts.

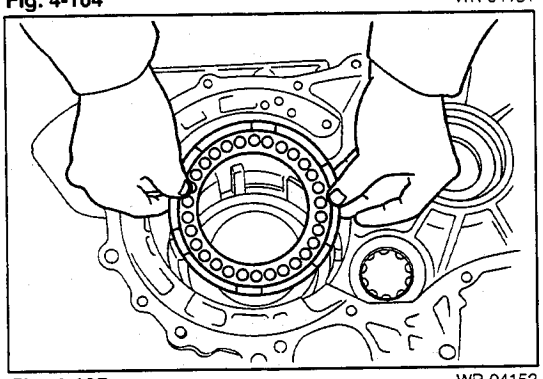


Fig. 4-105 WR-04152

(3) Install the return spring subassembly in such a way that it is fitted into the round groove of the piston. Compress the spring as shown in the right figure, using the following SST. Then, attach the return spring snap ring.
SST: 09350-87702-000

NOTE 1:
Ensure that the snap ring is attached to four grooves of the spring seat.

NOTE 2:
Do not compress the return spring beyond its compression allowance (deflection allowance).

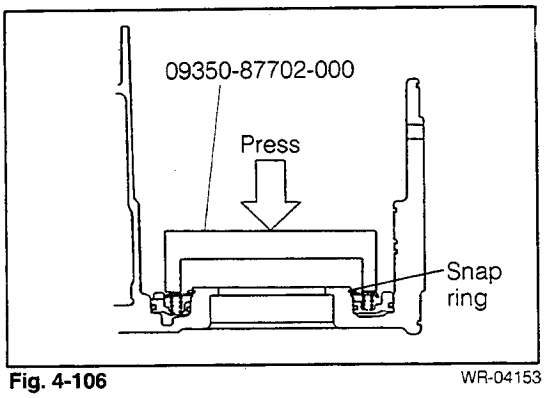


Fig. 4-106 WR-04153

(4) Install the following parts in this order.
①Cushion plate
②Plate
③Disc
④Plate Total number of plates: 4
⑤Disc Total number of discs: 4
⑥Plate
⑦Disc
⑧Plate
⑨Disc
⑩Flange

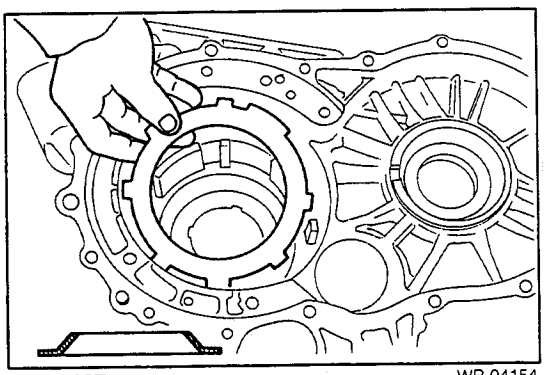


Fig. 4-107 WR-04154

NOTE 1:
Make sure that the cushion plate is installed in the correct installing direction.
(Install it in such a way that, as viewed from above, the floated side may come to the center, whereas the recessed side may come to the outside.)

NOTE 2:
Immerse the discs in the automatic fluid for at least two hours preceding the installation.

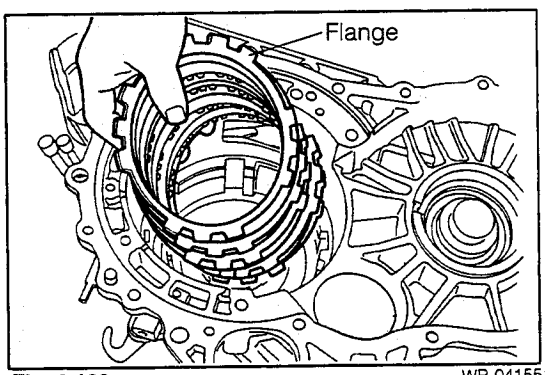


Fig. 4-108 WR-04155

NOTE 3:
Care must be exercised as to the assembling sequence and the number of the discs and plates.

(5) Install the snap ling.
(6) Measure the clearance indicated in the right figure, using a thickness gauge
Specified Value: 0.58 - 1.92 mm (0.023 - 0.075 inch)

NOTE:
If the measure value does not comply with the specification, check the installing condition of the clutch discs and the plates.

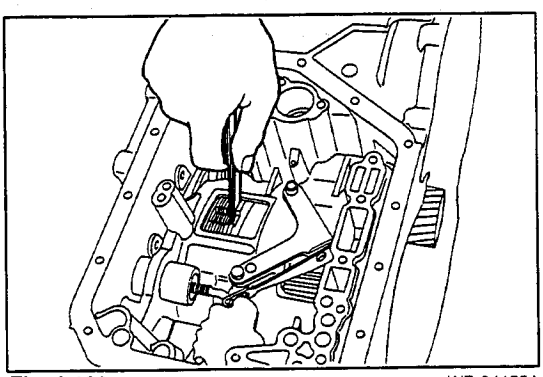


Fig. 4-109 WR-04155A

(7) Apply compressed air into the oil hole indicated in the right figure and check to see if the piston moves freely.

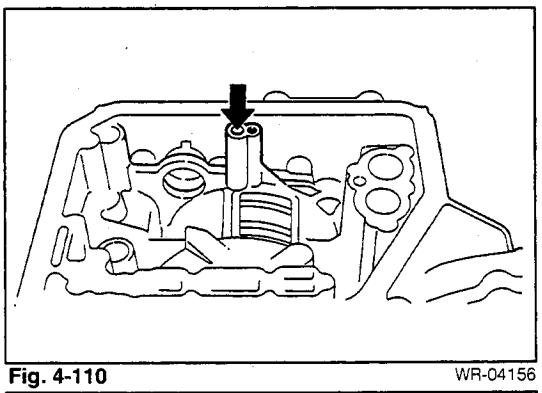


Fig. 4-110 WR-04156

3. Installation of the counter shaft, reduction gear and rear cover

(1) Press the ball bearing into the output shaft, using the following SST.
SST: 09350-87702-000

NOTE:
Prior to the press-fitting, apply the automatic fluid to the inner race and outer race.

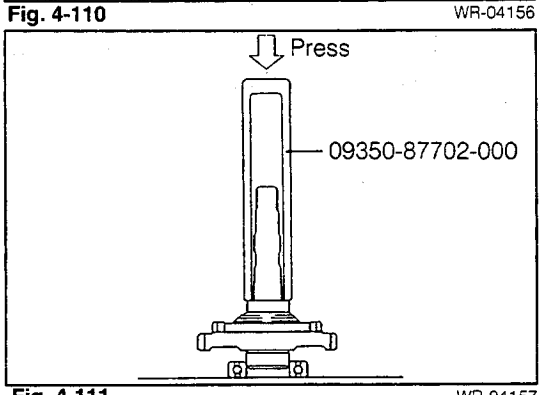


Fig. 4-111 WR-04157

(2) Drive the ball bearing into the transmission case, using a hammer in combination with the following SST.
SST: 09608-30011-000

NOTE:
Prior to the press-fitting, apply the automatic fluid to the inner race and outer race.

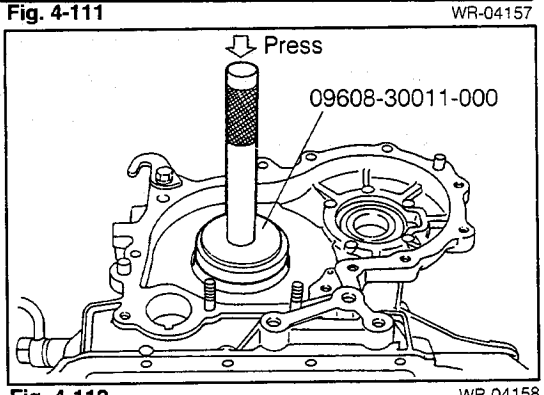


Fig. 4-112 WR-04158

(3) Press the output shaft into the transmission case using the following SST, as indicated in the figure.
SST: 09350-87702-000

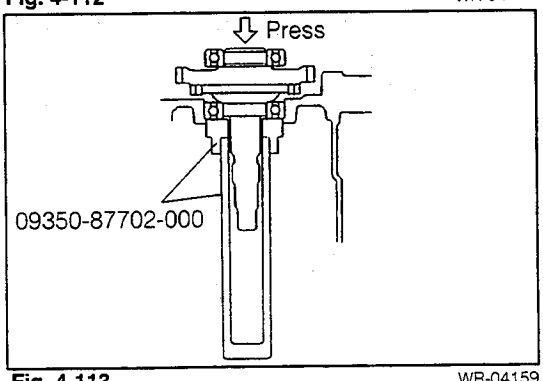


Fig. 4-113 WR-04159

(4) Press the roller bearing from the differential gear side of the counter shaft case, using the following SST. Then, attach the snap ring.
SST: 09608-30011-000

NOTE:
Prior to the press-fitting of the bearing, apply the automatic fluid to the inner race and outer race.

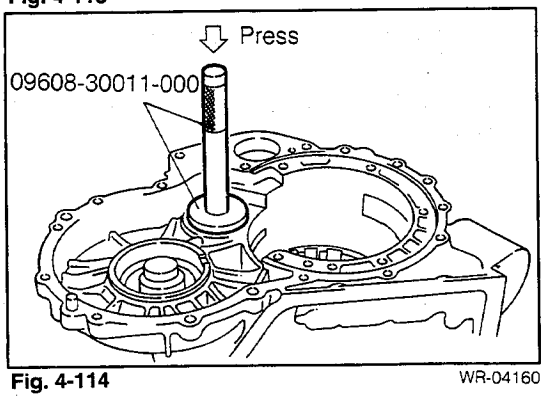


Fig. 4-114 WR-04160

(5) In advance, put the spacer on the counter shaft case.
(6) Press the ball bearing from the reduction gear side of the counter shaft case, using the following SST.
SST: 09608-30011-000

NOTE:
Prior to the press-fitting of the bearing, apply the automatic fluid to the inner race and outer race.

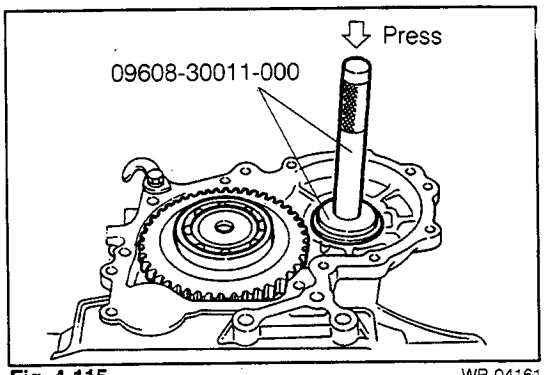


Fig. 4-115 WR-04161

(7) Install the bearing packing plate along the groove. Attach the snap ring.

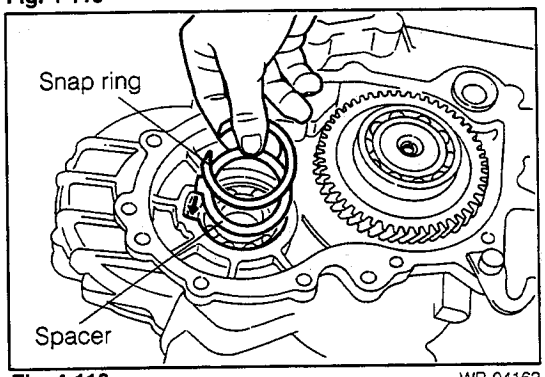


Fig. 4-116 WR-04162

(8) While the inner race of the ball bearing is being sustained, pass the spacer through the counter shaft and press the counter shaft into position.
SST: 09350-87702-000

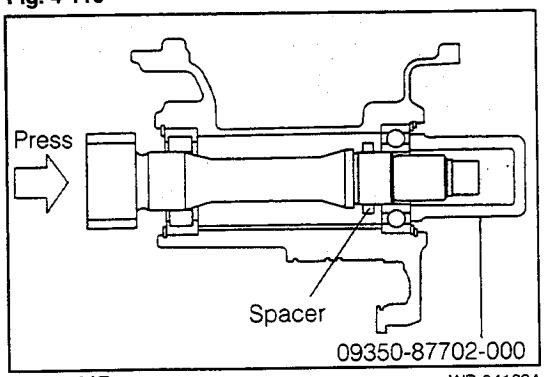


Fig. 4-117 WR-04162A

(9) Install the reduction driven gear to the counter shaft. Tighten the lock nut.
Tighten Torque: 11 - 15 kg-m (80 - 108 ft-lb)

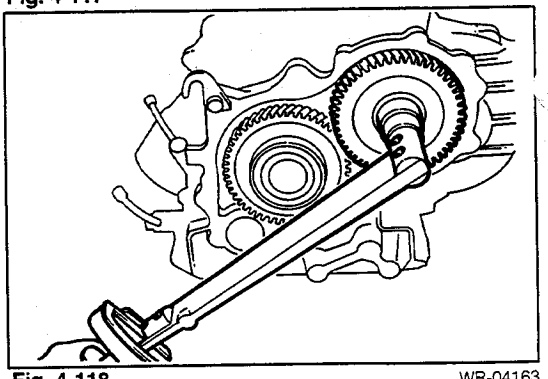


Fig. 4-118 WR-04163

(10) Stake the lock nut, using a chisel.
NOTE:
Be careful not to apply excessive forces to the counter shaft.

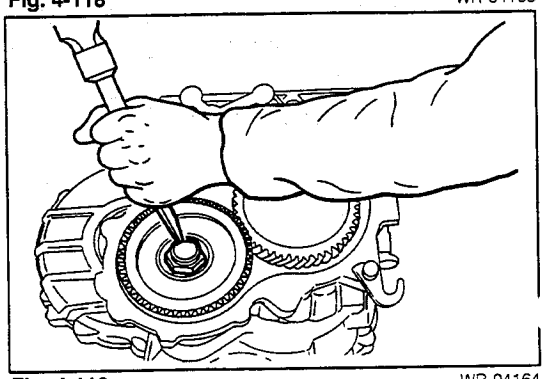


Fig. 4-119 WR-04164

(11) Install the gasket, making sure that it is aligned with the straight pin of the case. Install the rear cover.

NOTE 1:
Be sure that the bearing smoothly gets into the bearing hole of the rear cover.

NOTE 2:
Check to see if the shaft emits any abnormal gear sound, while rotating the shaft. WR-04165

(12) Secure the rear cover by tightening the ten bolts and two nuts.
Tightening Torque: Bolt 1.6 - 2.3 kg-m (12 - 16 ft-lb)
Nut 1.1 - 1.5 kg-m (8.0 - 10 ft-lb)

NOTE:
As for the arrow-headed bolt in the right figure, use this bolt to secure the solenoid wire harness in common.

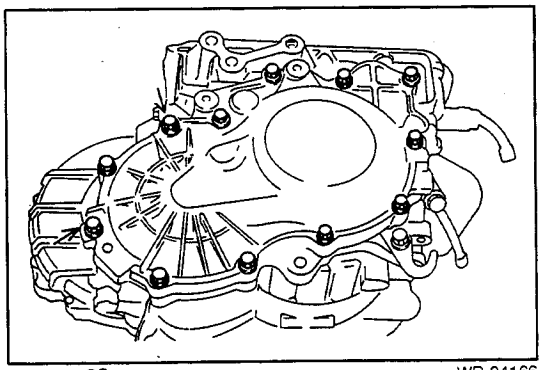


Fig. 4-120 WR-04166

(13) Working from the inside of the case, push the bearing outer race against the rear cover side, using the following SST.
SST: 09350-87702-000

NOTE 1:
For this operation, use the four cut-out sections of the transmission case.
Pushing Force: 500 kg (1100 lb)

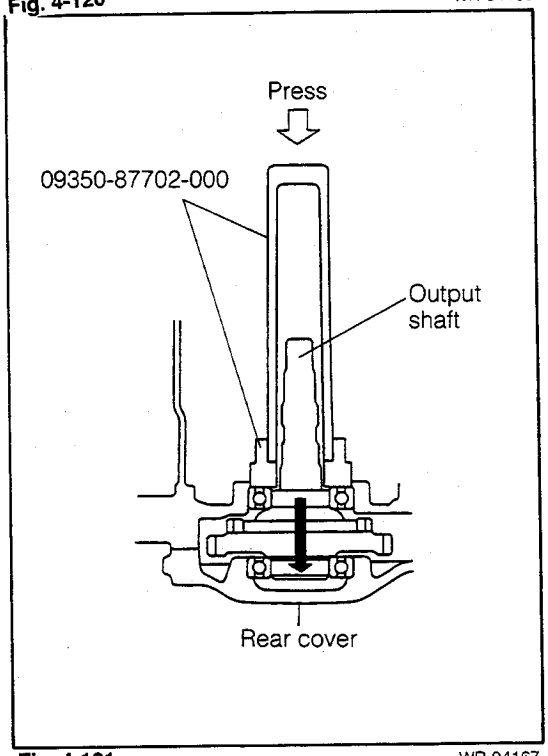


Fig. 4-121 WR-04167

4. Installation of the rear planetary gear and one-way clutch
(1) Install the rear planetary ring gear, making sure that it is aligned with the spline of the output shaft.

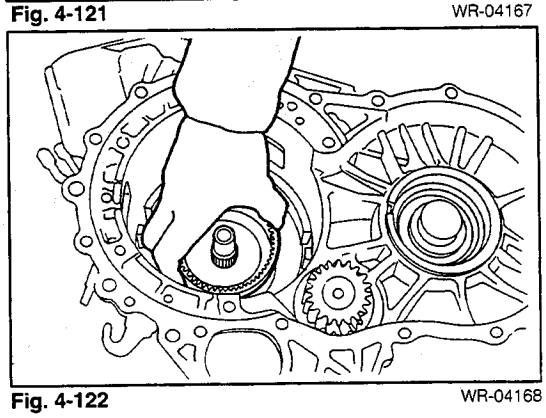


Fig. 4-122 WR-04168

(2) Install the bearing races (both sides) and thrust needle roller bearing.

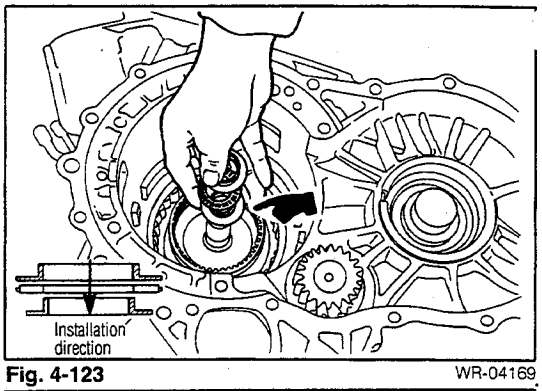


Fig. 4-123 WR-04169

(3) Fit the one-way clutch race snap ring to the groove at the 1st reverse brake side of the transmission case.

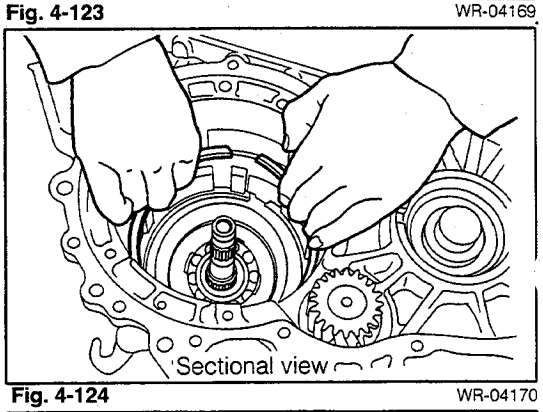


Fig. 4-124 WR-04170

(4) Install the thrust washers on each of the front and rear sections of the planetary gear assembly.

NOTE 1:
Apply grease to the washers.

NOTE 2:
Fit the recessed sections of the gear assembly with the two protruding sections correctly.

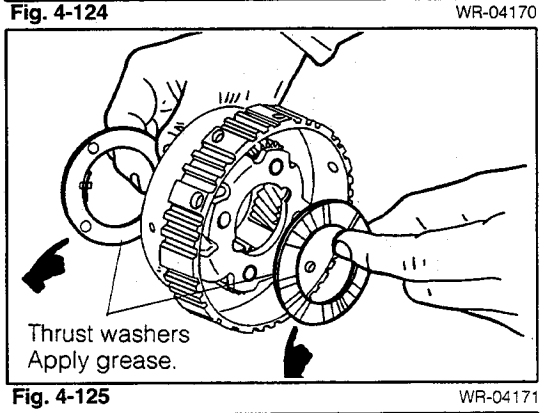


Fig. 4-125 WR-04171

(5) While turning the one-way clutch assembly counter-clockwise, install it to the planetary gear assembly.

NOTE:
After completion of the installation, be sure that the planetary gear assembly freely rotates clockwise when the one-way clutch outer race is secured.

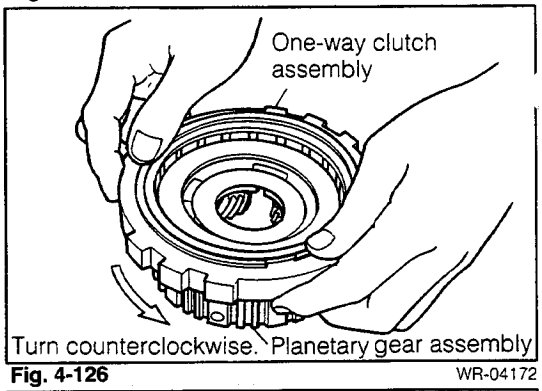


Fig. 4-126 WR-04172

(6) Insert the planetary gear assembly fitted with the one-way clutch assembly into the transmission case, while rotating the planetary gear assembly.

NOTE 1:
For easier insertion, align the pawls of the brake disc in advance.

NOTE 2:
If the shift lever is shifted to the [P] range, the shaft is locked, thus making it easier to align the cut-out sections with each other.

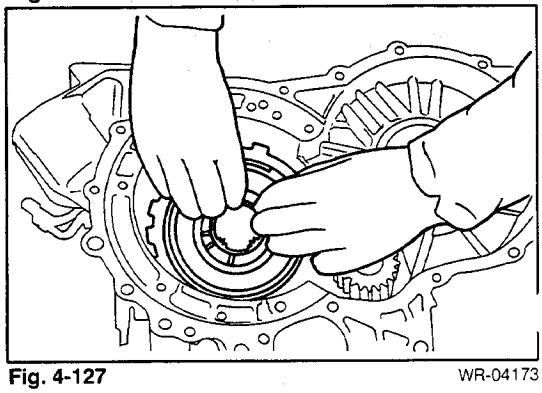


Fig. 4-127 WR-04173

NOTE 3:
After completion of the insertion, check the one-way clutch operation.
Clockwise rotation: Free
Counterclockwise rotation: Locked

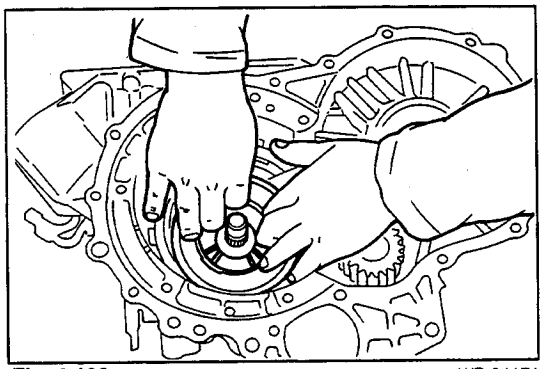


Fig. 4-128 WR-04174

(7) Attach the one-way clutch race snap ring to secure the one-way clutch assembly.

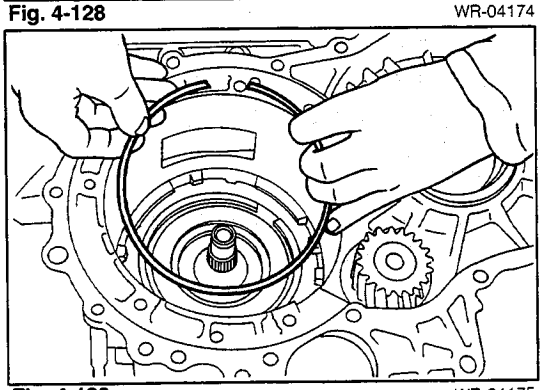


Fig. 4-129 WR-04175

5. Installation of the planetary sun gear assembly
(1) Install the cushion plate and the snap ling (sheet type) to the sun gear.
NOTE:
Be sure to install the cushion plate in the correct direction.

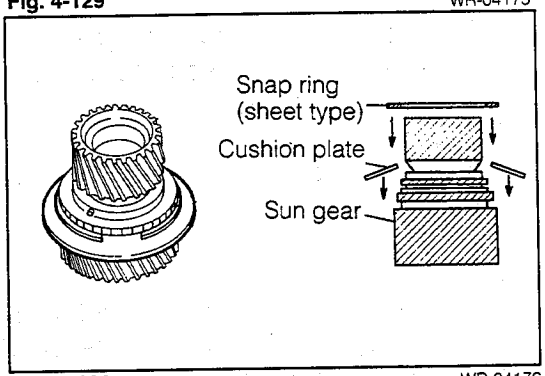


Fig. 4-130 WR-04176

(2) Insert the sun gear into the sun gear input drum.

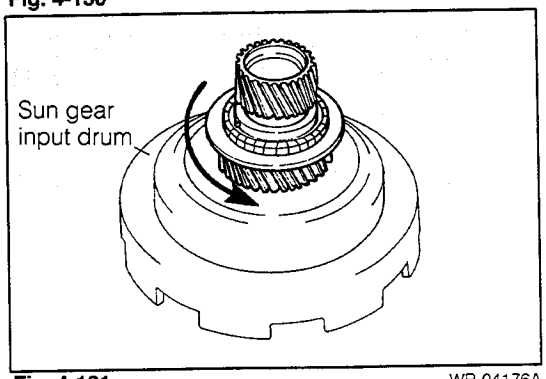


Fig. 4-131 WR-04176A

(3) Temporarily lock the sun gear input drum with another snap ring (wire type).

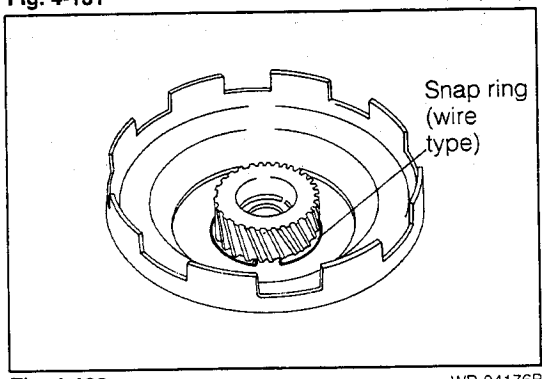


Fig. 4-132 WR-04176B

(4) Install the snap ring (wire type) in the correct position by pressing the cushion plate.

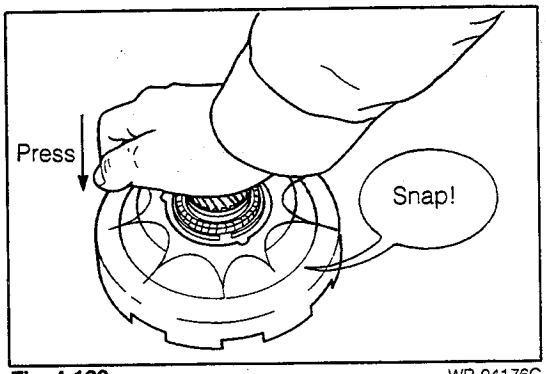


Fig. 4-133 WR-04176C

(5) Insert the straight pin into the sun gear.
(6) Install the washer in such a way that the straight pin gets into the cut-out section of the planetary thrust washer.

NOTE:
Prior to the installation, apply grease to the washer to prevent it from dropping.

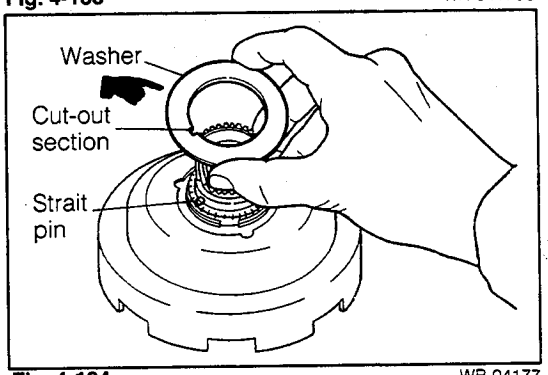


Fig. 4-134 WR-04177

(7) While meshing the sun gear assembly with the rear planetary gear, insert the sun gear assembly into the transmission case.

NOTE 1:
Be careful not to damage the bush provided inside of the sun gear.

NOTE 2:
Be certain that the flange section of the thrust bearing race, which was installed in the previous step, has been installed positively into the sun gear bore.

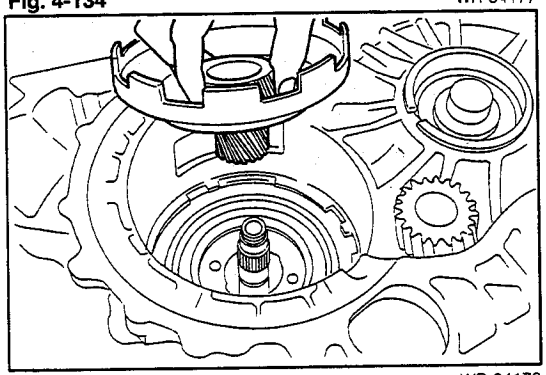


Fig. 4-135 WR-04178

6. Installation of the front planetary gear
(1) Place the thrust needle roller bearing and bearing race on the sun gear.

NOTE:
Be sure to place the bearing race in the correct direction on the sun gear.

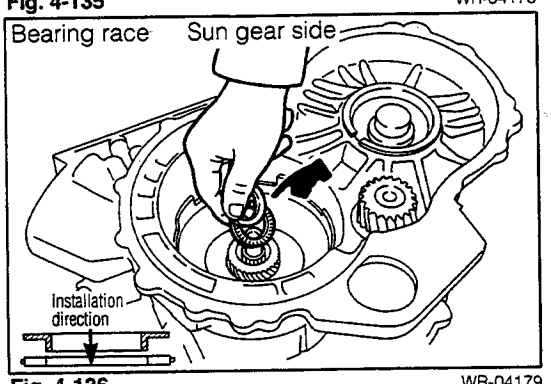


Fig. 4-136 WR-04179

(2) While rotating the front planetary gear assembly, fit the pinion gear in the sun gear.

NOTE:
Care must be exercised to ensure that the thrust bearing or the race may not be displaced from the correct position.

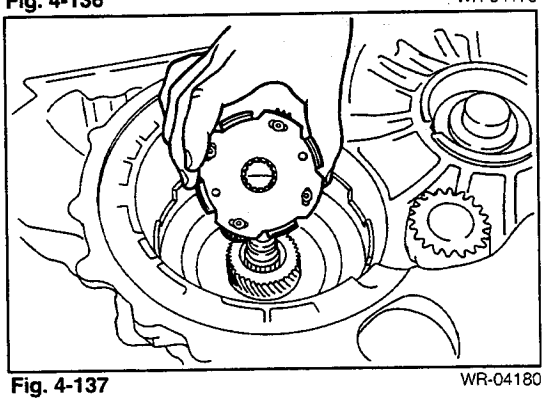


Fig. 4-137 WR-04180

(3) Place the following parts on the front planetary gear assembly in this order.
①Bearing race
②Thrust needle roller bearing
③Bearing race

NOTE:
Be sure to place the bearing races in the correct direction on the front planetary gear assembly.

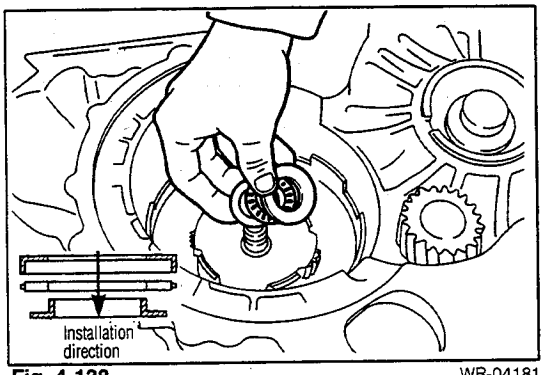


Fig. 4-138 WR-04181

(4) Install the front planetary ring gear to the thrust bearing which was installed in the preceding step.

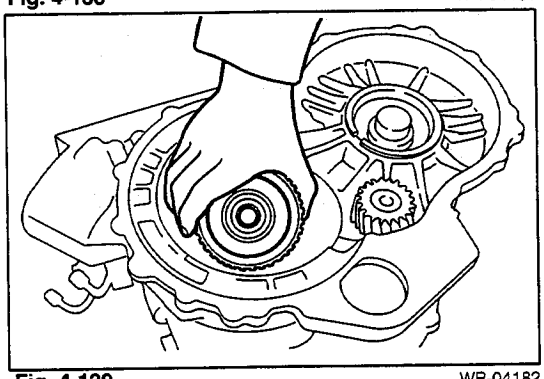


Fig. 4-139 WR-04182

(5) Install the "O" ring at the forward end of the output shaft.

NOTE:
Do not expand the "O" ring excessively during the installation.

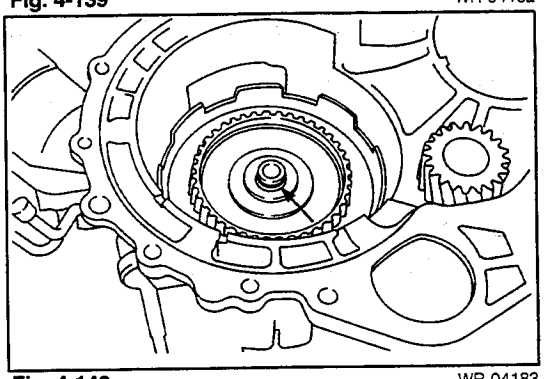


Fig. 4-140 WR-04183

7. Installation of the 2nd brake band
(1) Install the brake 2nd band in the transmission case.

NOTE:
Be sure to install the brake band in the correct direction.

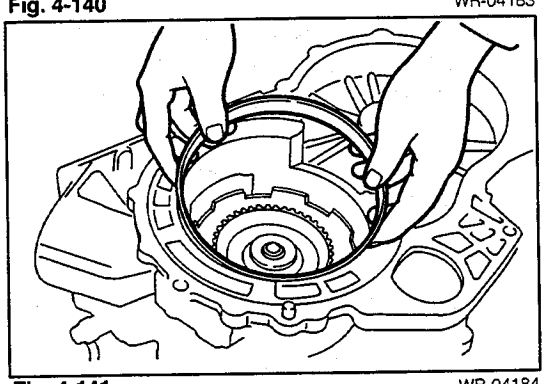


Fig. 4-141 WR-04184

8. Installation of the forward clutch and direct clutch
(1) When the "O" ring of the input shaft is replaced, apply grease to the input shaft side before installing the new "O" ring.

NOTE 1:
Be sure to install the "O" ring to the correct groove.

NOTE 2:
Do not expand the "O" ring excessively during the installation.

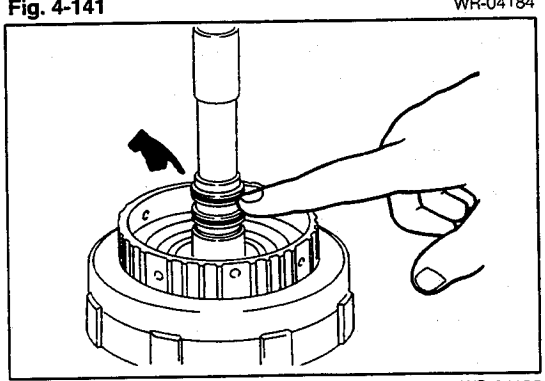


Fig. 4-142 WR-04185

(2) Apply grease to the thrust bearing race and thrust needle roller bearing as well as to their installing sections at the forward clutch. Then, install these parts into positions.

NOTE:
Be certain to install the bearing race in the correct direction.

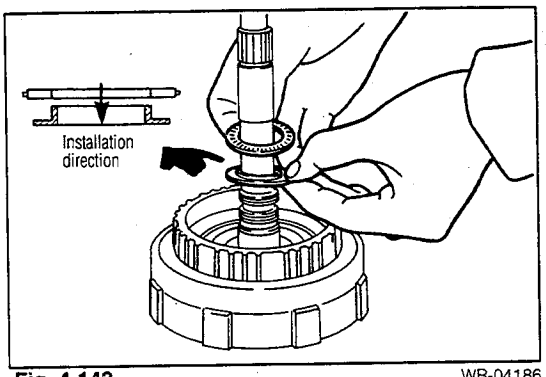


Fig. 4-143 WR-04186

(3) Install the thrust washer, with the side having no groove facing toward the direct clutch. For easier installation, apply grease to the side of the direct clutch.

NOTE:
Be sure to install the thrust washer in the correct direction.

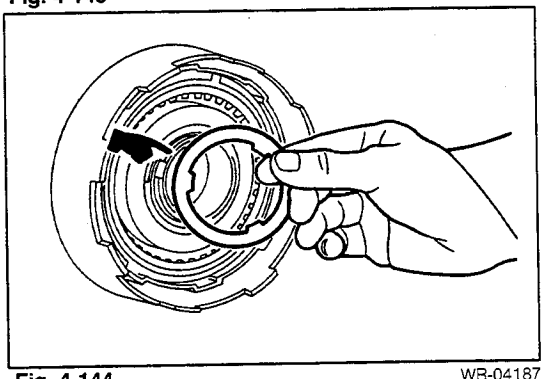


Fig. 4-144 WR-04187

(4) Install the direct clutch to the forward clutch.

NOTE 1:
For easier insertion, align the pawls of the clutch disc prior to the installation.

NOTE 2:
Be careful not to drop the thrust washer which was installed in the preceding step.

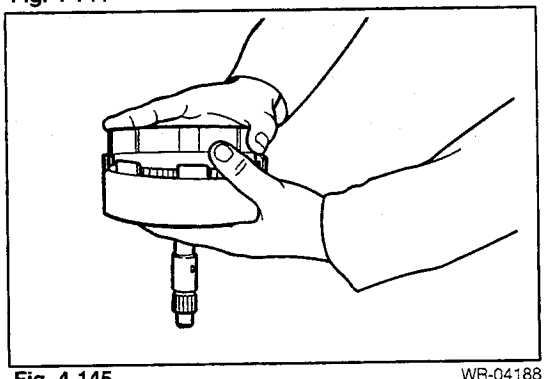


Fig. 4-145 WR-04188

(5) Apply grease on the front planetary ring gear in the transmission case. Install the thrust bearing race and thrust needle roller bearing in position.

NOTE:
Care must be exercised as to the installing direction and sequence.

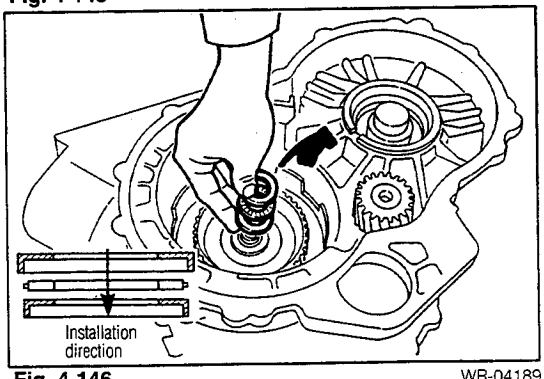


Fig. 4-146 WR-04189

(6) While holding the input shaft of the forward clutch, install the forward clutch fitted with the direct clutch to the transmission.

NOTE 1:
For easier insertion, align the pawls of the forward clutch disc prior to the installation.

NOTE 2:
Be careful not to drop the thrust bearing which was installed in the preceding step.

NOTE 3:
Be very careful not to damage the oil seal of the output shaft.

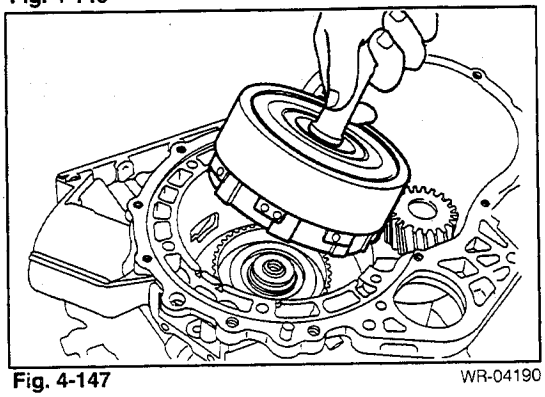


Fig. 4-147 WR-04190

(7) Secure the 2nd brake band by passing the straight pin through the transmission case and the hole of the 2nd brake band.

NOTE:
Prior to the installation, apply the automatic fluid to the pin.

9. Installation of the differential assembly
(1) Place the transmission case, with its rear cover side facing downward. While meshing the pinion gear of the counter shaft with the teeth of the differential ring gear, install the differential assembly.

NOTE 1:
Be careful not to damage the teeth of the gear during the installation.

NOTE 2:
The counter shaft pinion gear and the differential ring gear have been set as a pair. Hence, be careful not to mix these parts with other parts.

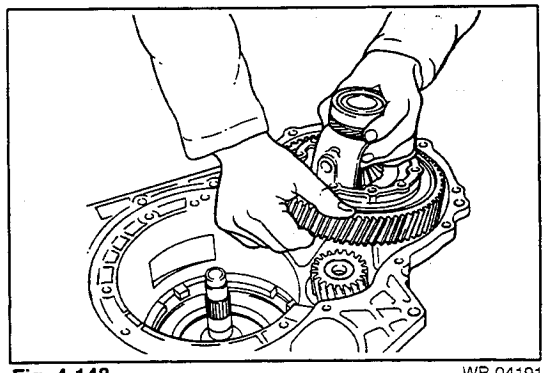


Fig. 4-148 WR-04191

10. Installation of the torque converter housing
(1) Install the gasket.

NOTE:
Make sure that the gasket is not protruding to the inside.

(2) While aligning the center of the differential gear bearing and the locating pin position, install the housing in the transmission case.

(3) Tighten the housing attaching bolts indicated in the right figure.
Tightening Torque: 1.6 - 2.3 kg-m (12 - 16 ft-lb)

NOTE:
Apply the sealant to the entire threaded portion of each bolt which bears a star mark (indicated by an arrow mark in the figure).

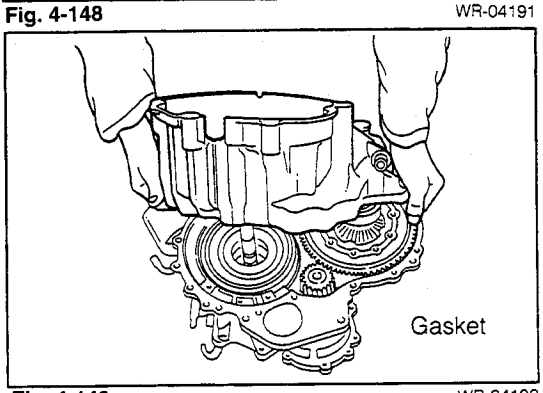


Fig. 4-149 WR-04192

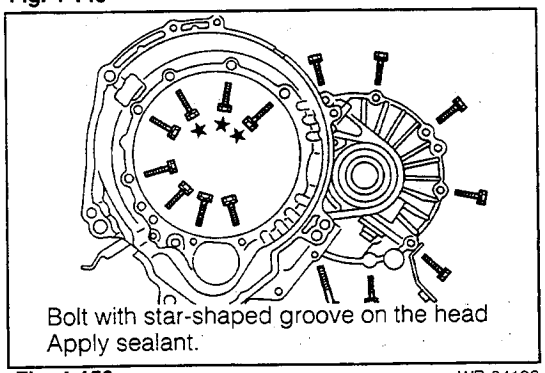


Fig. 4-150 WR-04193

11. Installation of the oil pump assembly
(1) Apply grease to the thrust bearing race and thrust needle roller bearing. Install them to the input shaft.

NOTE 1:
Be sure to install the bearing race in the correct direction.

NOTE 2:
Make sure that the bearing race and bearing are fitted positively.

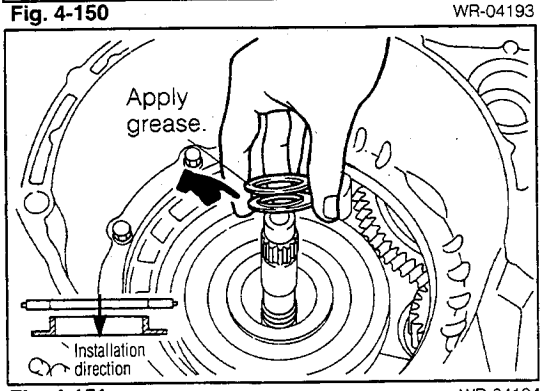


Fig. 4-151 WR-04194

(2) Install the thrust bearing race, after coating the oil pump side with grease.

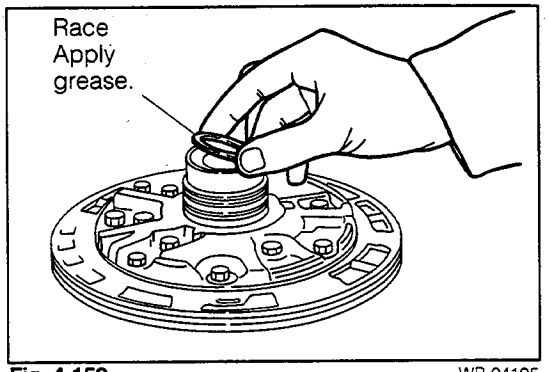


Fig. 4-152 WR-04195

(3) Attach the clutch drum thrust washer to the oil pump.
NOTE 1:
Align the flange of the washer with the cut-out section of the pump.

NOTE 2:
Prior to the installation, apply grease to retain the thrust washer.

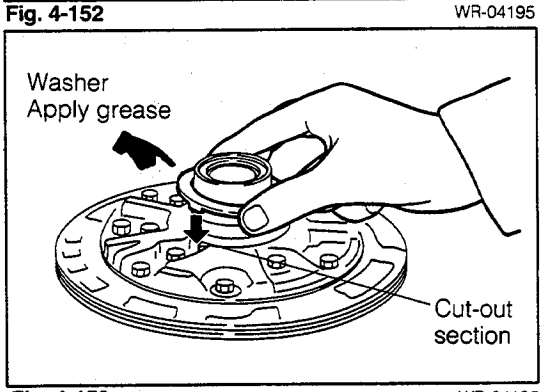


Fig. 4-153 WR-04196

(4) When the oil seal is replaced, apply grease to the oil seal prior to the installation.
NOTE 1:
Do not expand the oil seal excessively during the installation.

NOTE 2:
Be certain to install the oil seal to the correct groove.

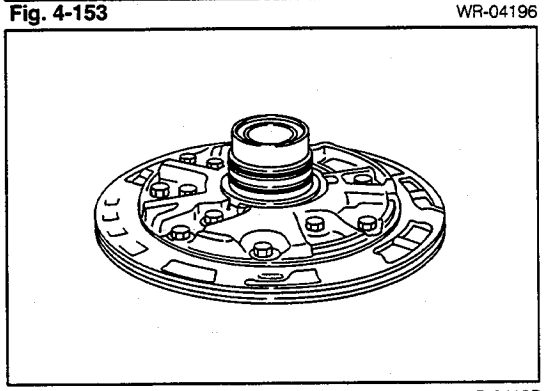


Fig. 4-154 WR-04197

(5) Install the "O" ring to the periphery of the oil pump.
NOTE 1:
Prior to the installation, apply grease to the "O" ring.

NOTE 2:
Use a new "O" ring.

NOTE 3:
Make sure that the "O" ring is not twisted or displaced from the groove on the periphery of the oil pump.

(6) Install the oil pump assembly in the transmission case.
NOTE:
Care must be exercised to ensure that the "O" ring of the input shaft and the "O" rings provided inside or outside of the pump may not be pinched or damaged. WR-04198

(7) Tighten the six flange bolts.
Tightening Torque: 1.8 - 2.7 kg-m (14 - 19 ft-lb)

NOTE:
Note that only the bolt indicated by the ⇩ mark in the figure is a M10 bolt.

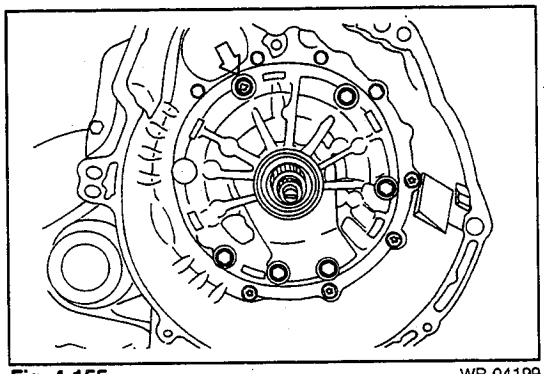


Fig. 4-155 WR-04199

12. Check of the input shaft end play
(1) Measure the play in the axial direction by applying the plunger of a dial gauge to the end surface of the input shaft.
Specified Value: 0.3 - 0.9 mm (0.012 - 0.035 inch)

(2) If the measured value does not comply with the specification, select a proper one from the following two thrust bearing races having different thicknesses. Then, replace the race which was installed in Step 12-(3) at page 00 with the newly-selected bearing race.
Thrust bearing race thickness
Too large end play → 1.4 mm (0.055 inch)
Too small end play → 0.8 mm (0.031 inch)

(3) After the reinstallation, ensure that the input shaft rotates smoothly.

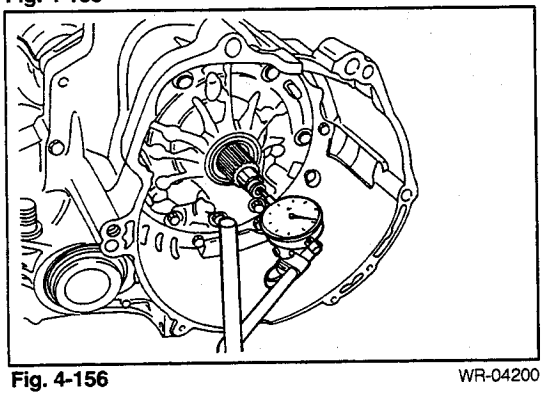


Fig. 4-156 WR-04200

13. Installation of the solenoid wire harness
(1) Fit the lock plate into the groove of the solenoid wire grommet. Install the solenoid wire to the stud bolt of the transmission case.
(2) Attach the washer to the stud bolt and tighten it with the nut.
(3) Clamp the wire harness at two points of the rear cover.

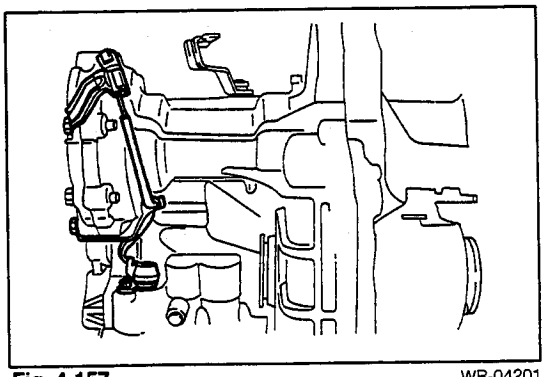


Fig. 4-157 WR-04201

14. Installation of the throttle cable
(1) Insert the throttle cable into the hole of the transmission case.

NOTE 1:
Apply the automatic fluid to the "O" ring.

NOTE 2:
Care must be exercised to ensure that the "O" ring may not be damaged or pinched.

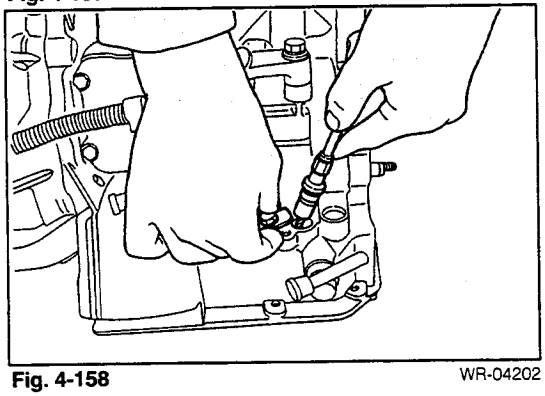


Fig. 4-158 WR-04202

15. Installation of the 2nd brake piston

(1) Install the "O" ring and washer to the piston rod.

NOTE:
Prior to the installation, apply grease to the "O" ring.

(2) Insert the spring and rod to the piston. Secure it with the "E" ring.

NOTE:
Prior to the installation, apply the automatic fluid to the inserting section of the rod.

(3) Install the two "O" rings to the piston.

NOTE 1:
Be careful not to damage the "O" rings.

NOTE 2:
Do not expand the "O" rings excessively.

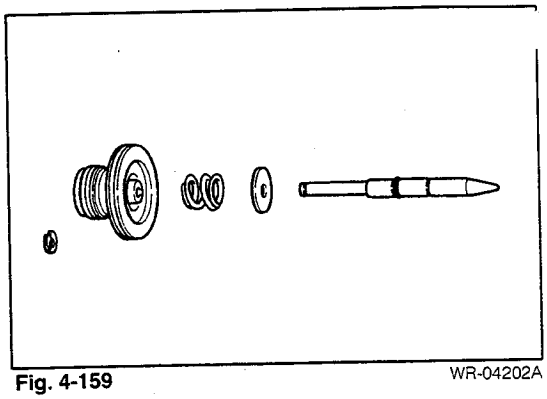


Fig. 4-159 WR-04202A

(4) Put the spring in the transmission case. Insert the piston assembly into the case.

NOTE 1:
Apply the automatic fluid to the inserting section of the piston rod.

NOTE 2:
Care must be exercised to ensure that the "O" ring may not be damaged or pinched.

NOTE 3:
Make sure that the forward end of the rod is aligned with the metal fitting of the brake band.

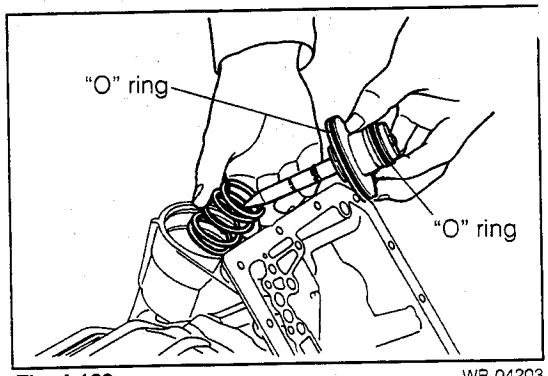


Fig. 4-160 WR-04203

(5) Install two "O" rings to the piston cover.

NOTE:
Prior to the installation, apply the automatic fluid to the "O" rings.

(6) Insert the piston cover into the transmission case.

NOTE:
Care must be exercised to ensure that the "O" ring may not be damaged or pinched.

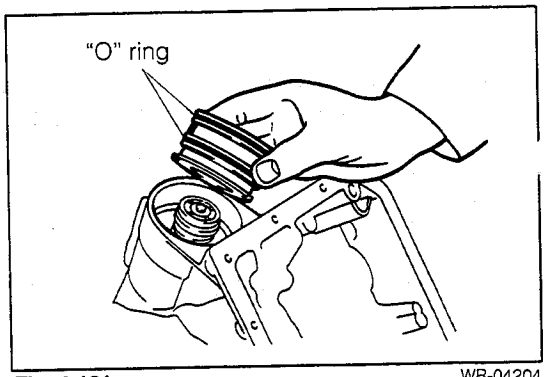


Fig. 4-161 WR-04204

(7) With the piston cover pushed to the inside, attach the snap ring in position.

(8) Through the side cover hole, check to see if the forward end of the rod is in contact with the metal fitting of the brake band at its specified position.

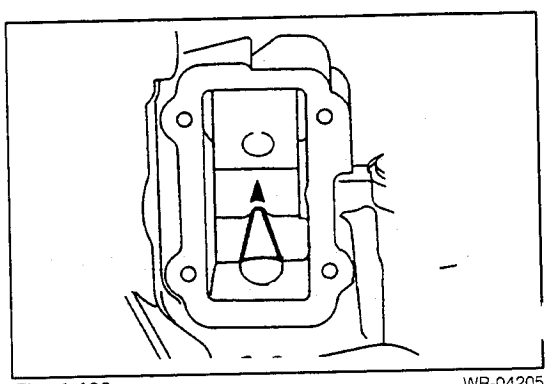


Fig. 4-162 WR-04205

(9) Perform the 2nd brake piston stroke check in the same way as with the disassembly. WR-04206

(10) Install the transmission case side cover and its gasket. Tighten them by means of the four bolts.
Tightening Torque: 0.7 - 0.9 kg-m (5.5 - 6.5 ft-lb)

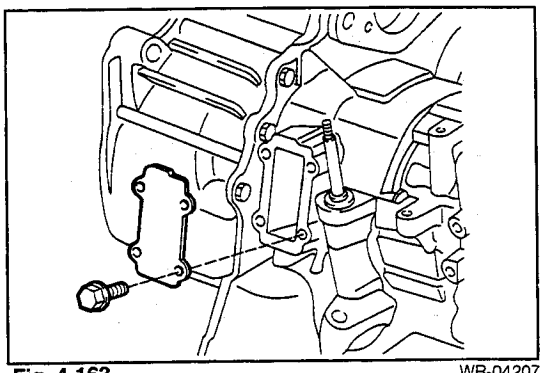


Fig. 4-163 WR-04207

16. Installation of the neutral start switch and the manual valve outer lever.
(1) Install the neutral start switch.
①Set the manual shaft to the "N" position.
②Insert the switch into the control shaft.
③Temporarily secure the switch bolt (nominal length: 35 mm).
④Align the scribe lines on the control rod and switch with each other.
⑤Securely tighten the bolt which has been secured temporarily in the step ③ above.
Tightening Torque: 1.6 - 2.3 kg-m (12 - 17 ft-lb)
⑥Ensure that the switch is functioning properly

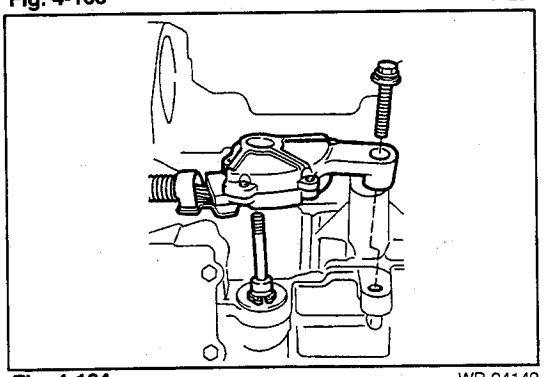


Fig. 4-164 WR-04149

(2) Pass the upper washer and then the shift lever through the manual shift shaft which protrudes above the transmission upper section. Then, secure them by means of double nuts.

NOTE:
The following shows the tightening sequence of double nuts.
①Tighten the lower nut.
Tightening Torque: 0.9 - 1.7 kg-m (6.5 - 12 ft-lb)
②Tighten the upper nut.
Tightening Torque: 0.9 - 1.7 kg-m (6.5 - 12 ft-lb)
③With the upper nut locked, tighten the lower nut in the reverse direction.
Tightening Torque: 0.9 - 1.7 kg-m (6.5 - 12 ft-lb)

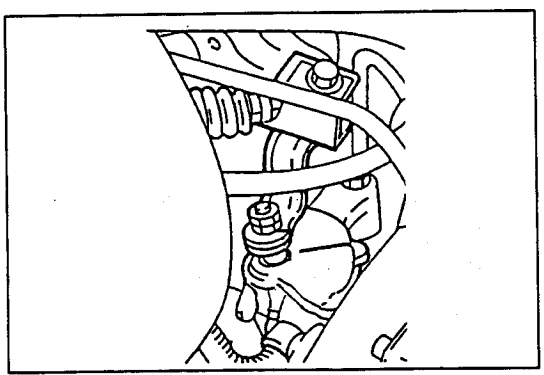


Fig. 4-165 WR-04149A

(3) Check to see if the shaft rotates smoothly.

17. Installation of the accumulator piston
    (1) Install the "O" ring on the piston.
    NOTE:
    Prior to the installation, apply the automatic fluid to the piston and "O" ring.

    (2) Insert the spring into the piston.
    (3) Insert the piston into the transmission case.
    NOTE 1:

	Number of "O" ring	Spring length mm (inch)	Spring outer diameter mm (inch)
B_1	2	52 (2.05)	10.0 (0.394)
C_1	1	64.1 (2.52)	15.0 (0.591)

    NOTE 2:
    Care must be exercised to ensure that the "O" ring may not be damaged or pinched.

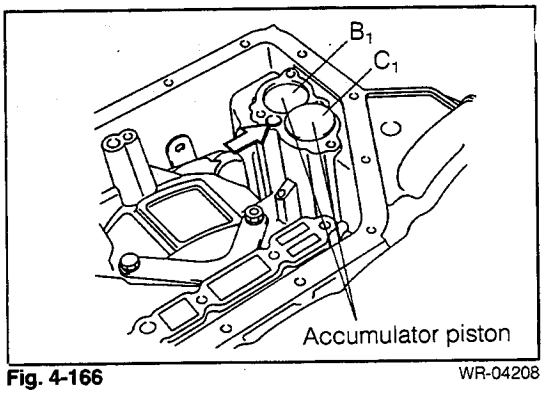


Fig. 4-166 WR-04208

18. Installation of the valve body assembly
    (1) Place the valve body assembly on the transmission case.
    (2) Install the pin of the manual lever in the manual valve.
    (3) Temporarily tighten the two bolts indicated in the figure.

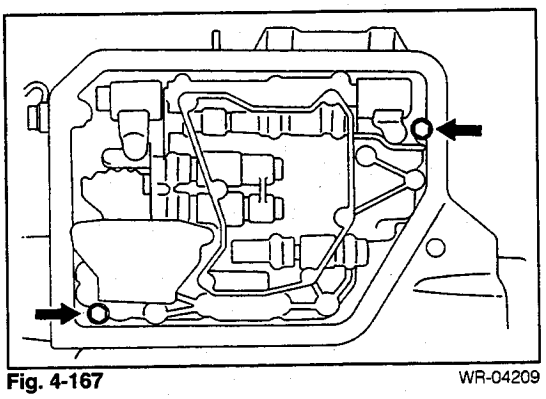


Fig. 4-167 WR-04209

    (4) Install the throttle cable to the throttle cam.
    NOTE:
    Do not pull the cable more than 40 mm (1.57 inches).

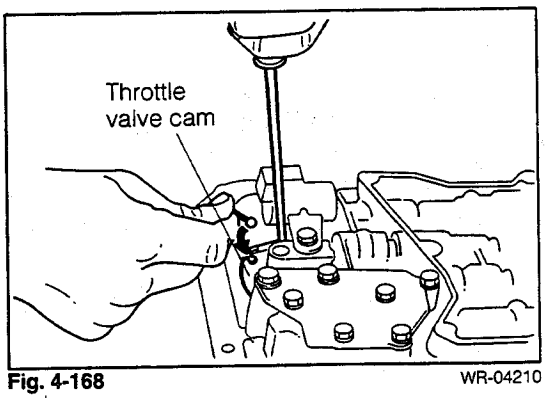


Fig. 4-168 WR-04210

(5) Tighten all bolts.

No.	Stand-ard	Nominal length mm (inch)	Tightening torque kg-m (ft-lb)	Number	Shape of head
①	M6	36 (1.417)	0.80 - 1.20 (6.0 - 8.5)	7	Deep recess
②	M6	47 (1.850)	0.80 - 1.20 (6.0 - 8.5)	1	Deep recess
③-1, ③-2	M6	25 (0.984)	0.80 - 1.20 (6.0 - 8.5)	2	Normal recess
④	M6	32 (1.260)	0.80 - 1.20 (6.0 - 8.5)	1	Normal recess

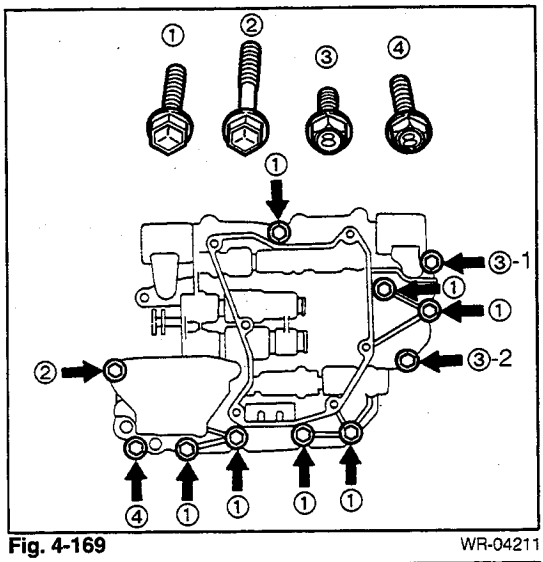


Fig. 4-169 WR-04211

(6) Install the oil tubes.

NOTE 1:
First insert the oil tube's end having no stopper (1 in the right figure) about 2 mm (0.079 inch). Then, insert the end having a stopper (2 in the right figure).

NOTE 2:
To prevent the tube from being deformed, lightly tap the tube using a plastic hammer.

NOTE 3:
Positively insert the tube, until the stopper of the tube comes into contact with the case.

NOTE 4:
Install the tubes in parallel with the valve body.

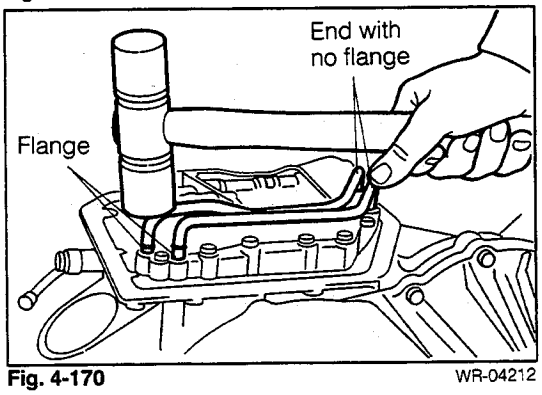


Fig. 4-170 WR-04212

(7) Connect the solenoid connector.

NOTE:
The wire harness differs in length to prevent wrong connections. Therefore, do not pull it forcibly.

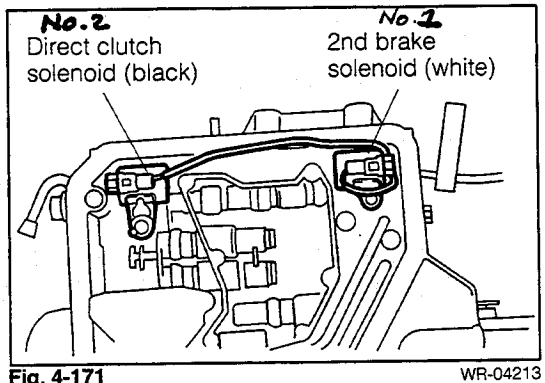


Fig. 4-171 WR-04213

(8) Install the oil strainer. At the same time, clamp the two solenoid connectors. Tighten them all together.
Tightening Torque: 0.4 - 0.6 kg-m (3.0 - 4.0 ft-lb)

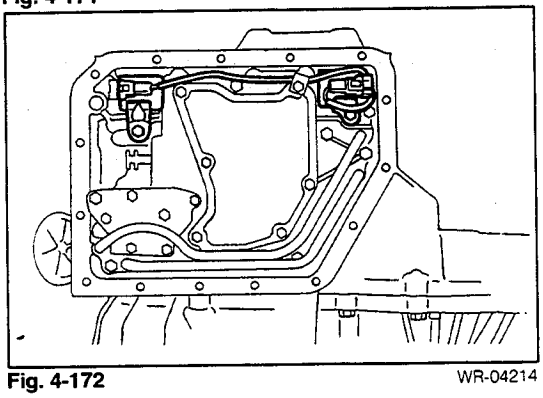


Fig. 4-172 WR-04214

19. Installation of the oil pan
(1) Set the gasket on the transmission case.
NOTE:
Make sure that the bolt holes of the gasket are aligned with those in the transmission case.

(2) Place the magnet on the oil pan.
NOTE:
It is advisable to place the magnet at the position indicated in the figure.

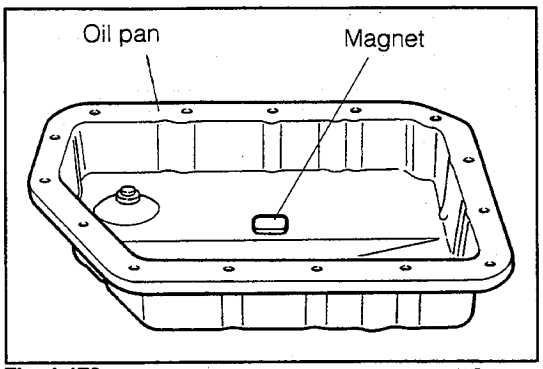


Fig. 4-173 WR-04215

(3) Tighten the oil pan by means of the bolts (13 pieces) and screws (two pieces).
Tightening Torque: 0.4 - 0.6 kg-m (3.0 - 4.0 ft-lb)
NOTE 1:
Apply the sealant to the two screws indicated in the figure.

NOTE 2:
Make sure that the tube and oil pan do not interfere with each other.

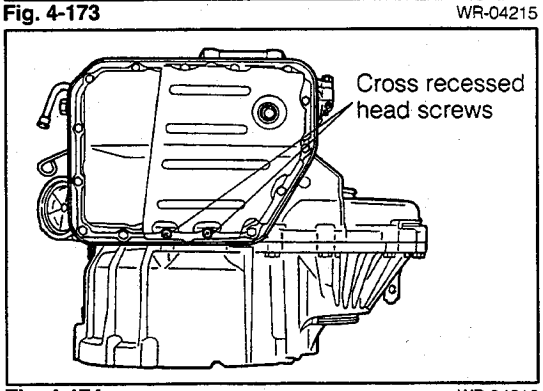


Fig. 4-174 WR-04216

(4) Tighten the drain plug.
Tightening Torque: 1.8 - 2.3 kg-m (13.5 - 16.5 ft-lb)
WR-04217

20. Installation of the oil filler tube
(1) Install the "O" ring to the oil filler tube. Insert the oil filler tube into the transmission case.
NOTE 1:
Apply the automatic fluid to the "O" ring.

NOTE 2:
Insert the oil filler tube up to the flange position.

(2) Secure the oil filler tube by means of the bolt.
Tightening Torque: 0.3 - 0.7 kg-m (2.4 - 5.6 ft-lb)

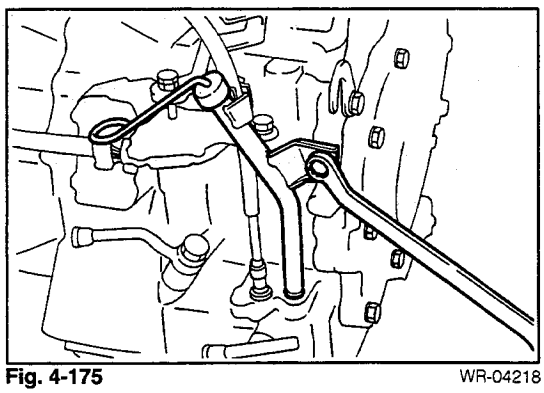


Fig. 4-175 WR-04218

21. Installation of the test plug at the detecting hole
(1) Install the "O" ring and tighten the plug.
Tightening Torque: 0.6 - 0.9 kg-m (4.3 - 6.5 ft-lb)
NOTE:
Apply the automatic fluid to the "O" ring.

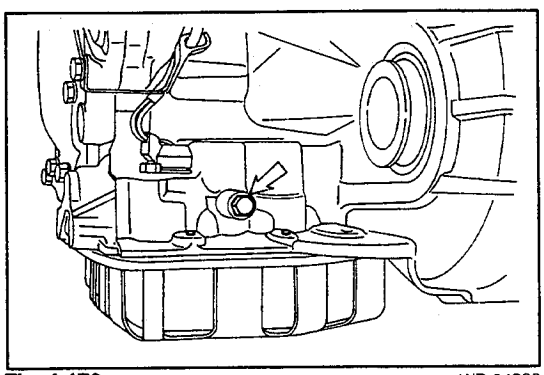


Fig. 4-176 WR-04220

2. Installation of the torque converter
   (1) Install the torque converter. Check to see if the attaching dimension indicated in the right figure complies with the specification.

NOTE 1:
Be careful not to damage the oil seal.

NOTE 2:
Make sure that the torque converter rotates lightly.

NOTE 3:
Apply grease to the point indicated in the figure.

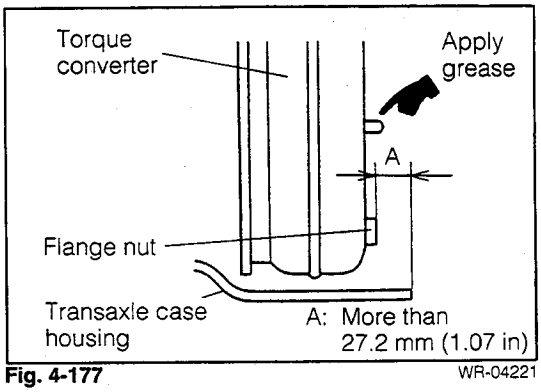


Fig. 4-177 WR-04221

APPENDIX

SHIFT LEVER CONSTRUCTION

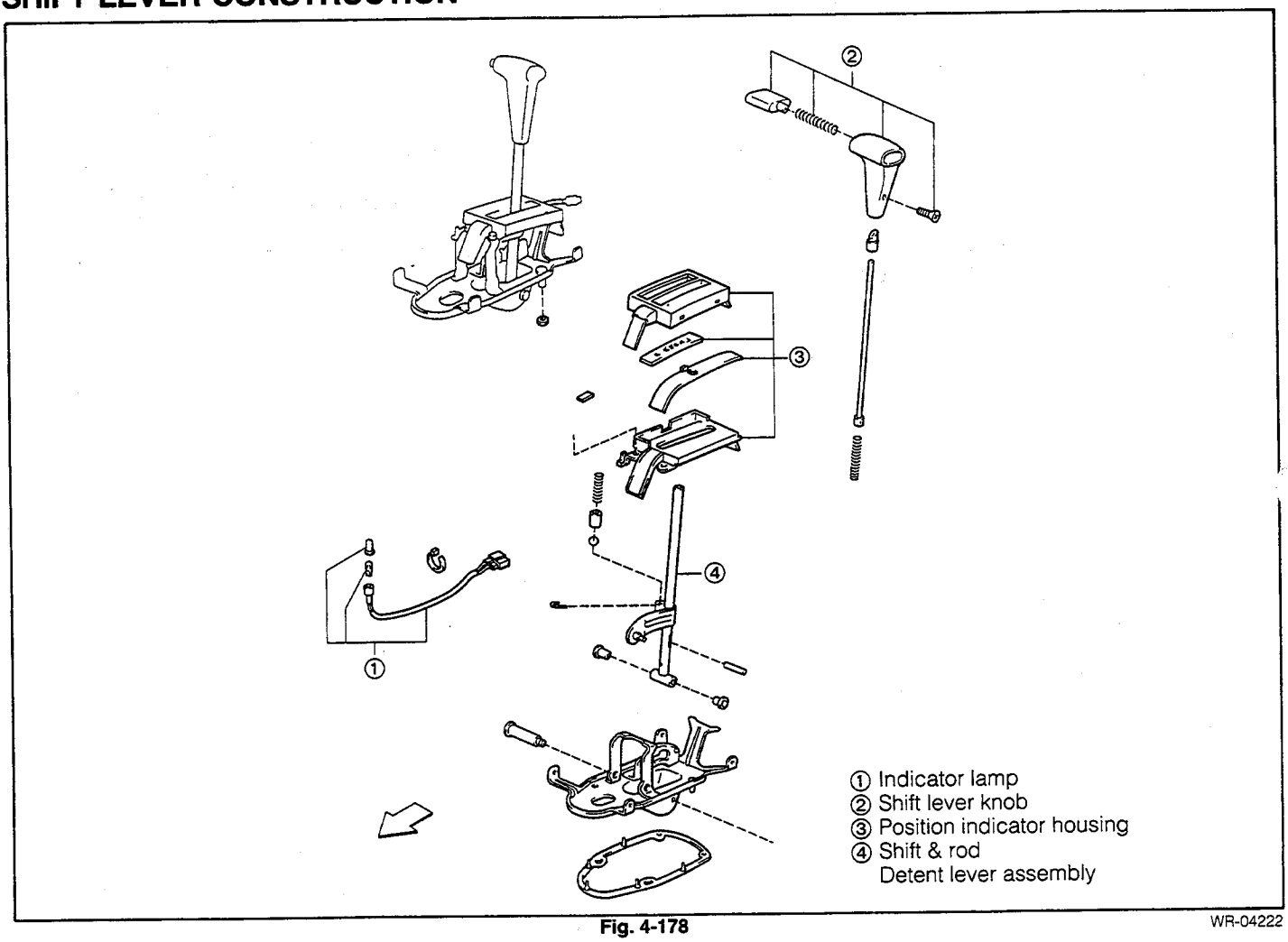


Fig. 4-178

WR-04222

Shift lever components

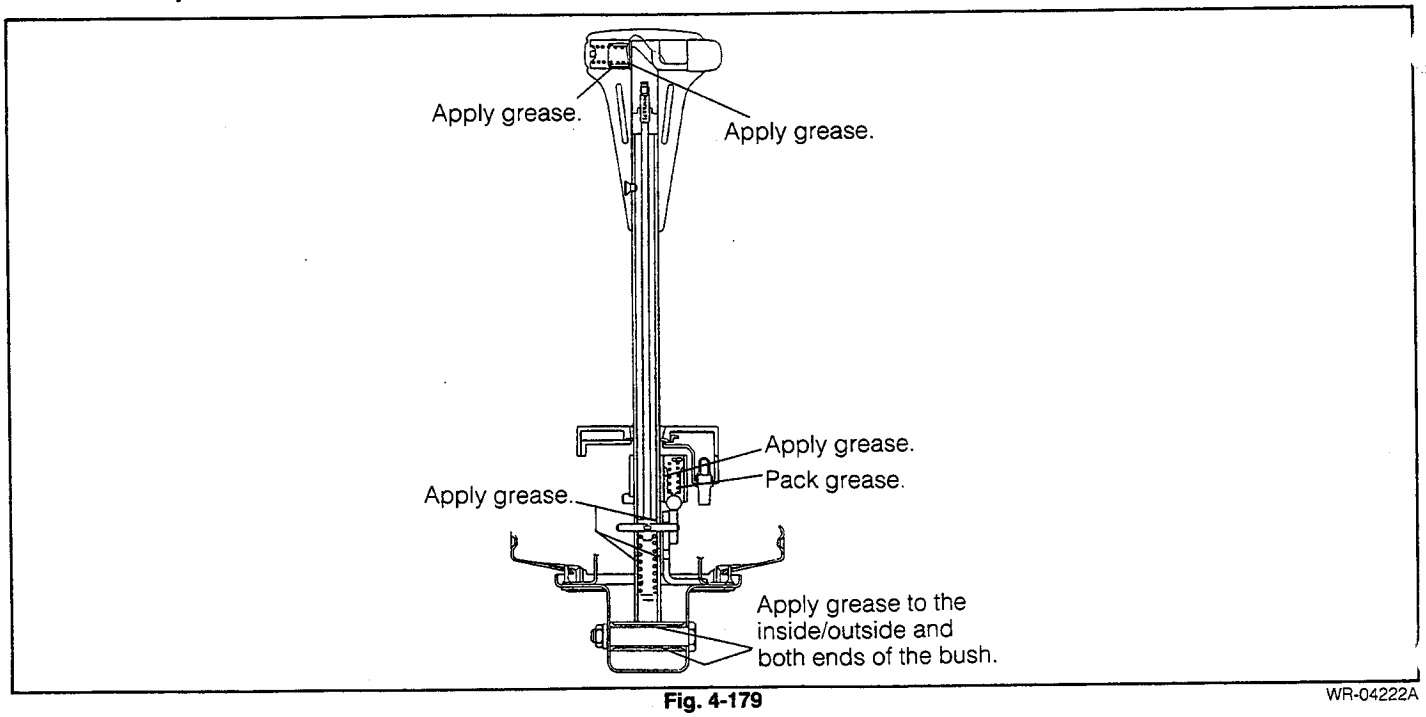


Fig. 4-179

WR-04222A

CONTROL CABLE CONSTRUCTION

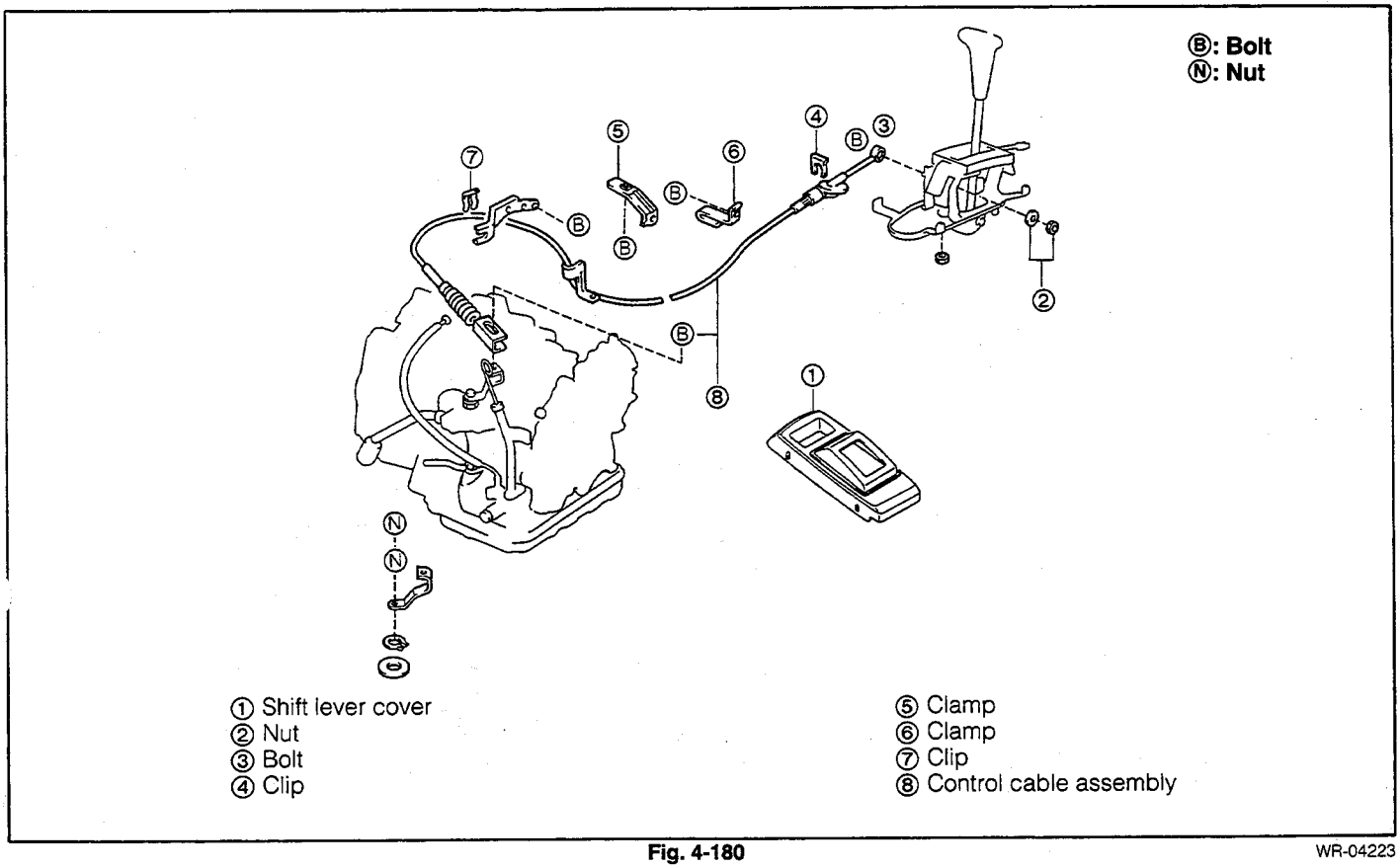


Fig. 4-180 WR-04223

Control cable components

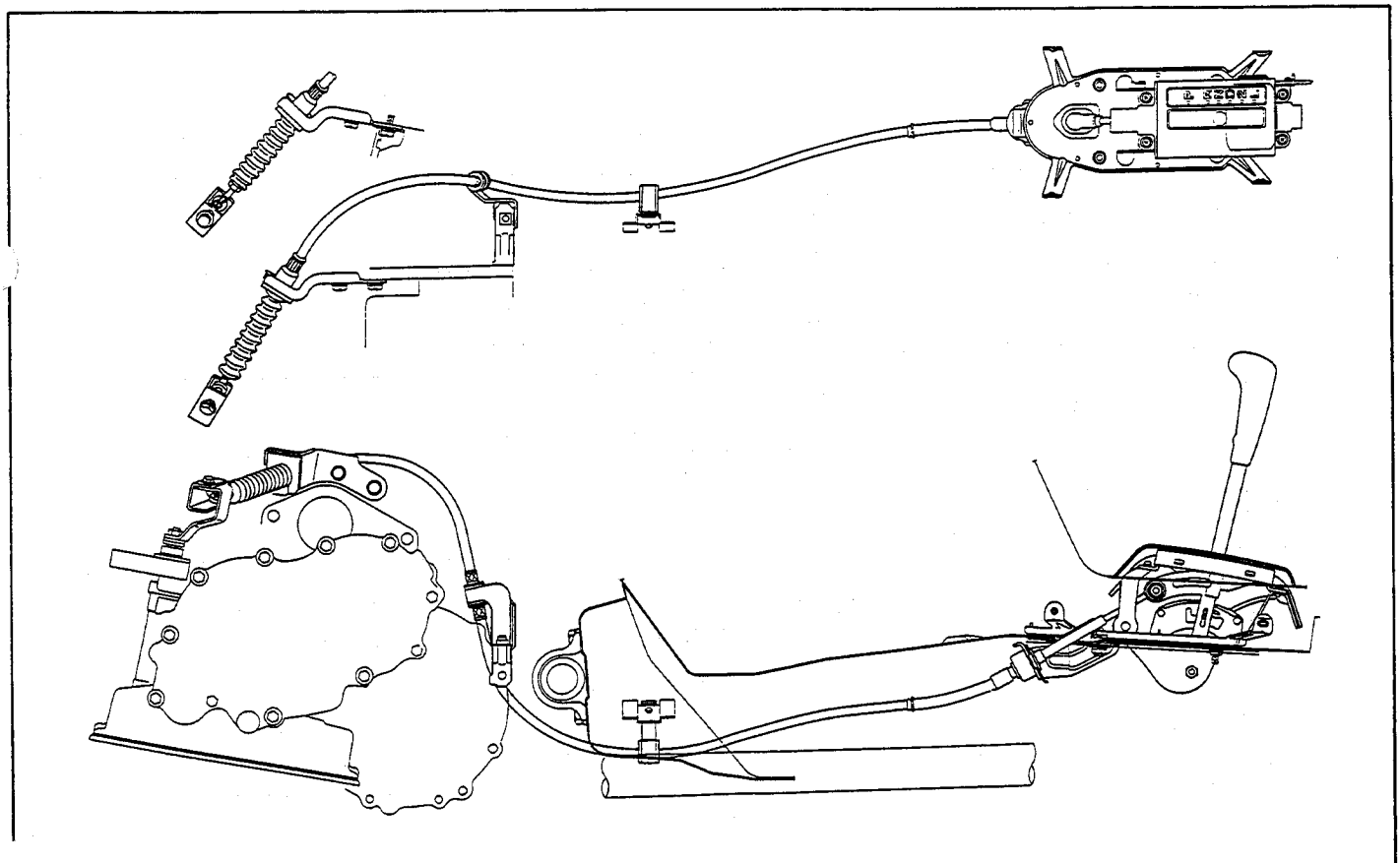
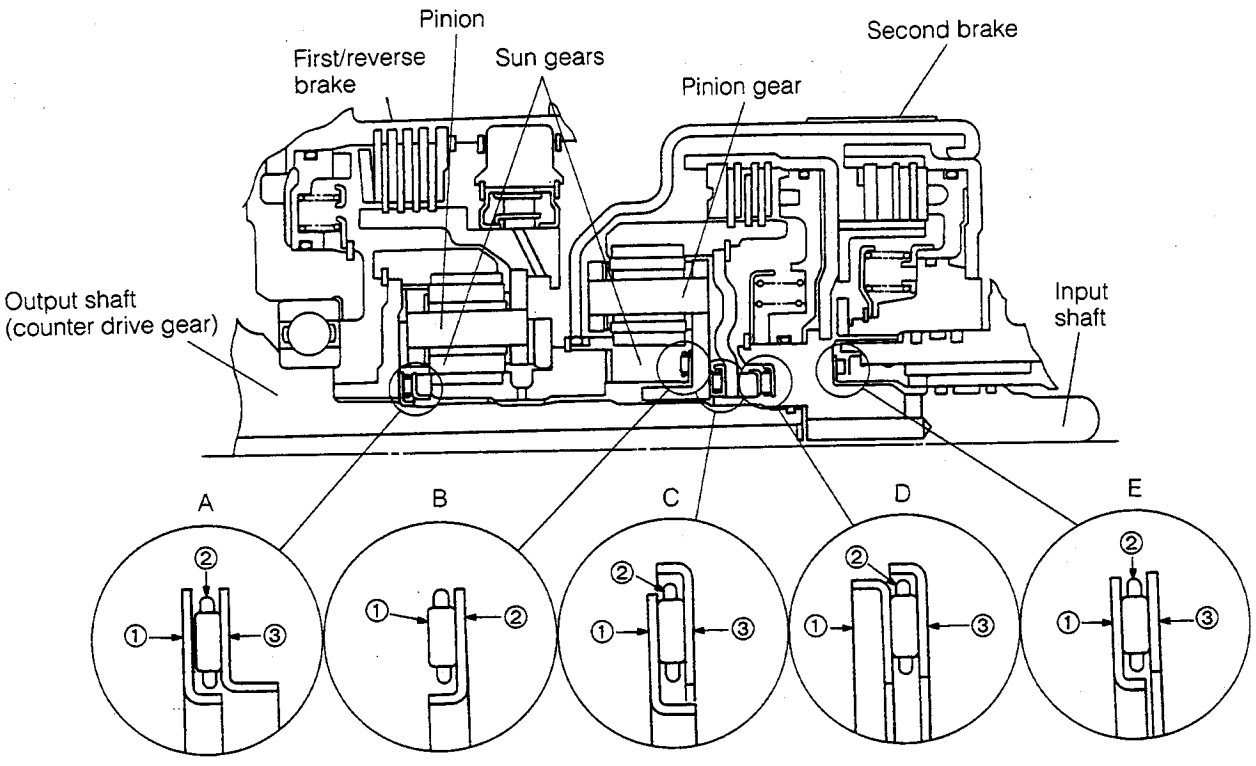


Fig. 4-181 WR-04223A

ASSEMBLING POSITION AND DIRECTION OF THRUST BEARING



Position	Part	Inner diameter mm (inch)	Outer diameter mm (inch)	Flange	Thickness	Remarks
A	① Race ② Bearing ③ Race	22.15 (0.872) 24 (0.94) 24 (0.94)	37.5 (1.47) 37.5 (1.47) 37.5 (1.47)	Inner diameter flange — Inner diameter flange		
B	① Bearing ② Race	30 (1.18) 28 (1.10)	45 (1.77) 45 (1.77)	— Inner diameter flange		
C	① Race ② Bearing ③ Race	19 (0.75) 22.3 (0.88) 22 (0.87)	35 (1.38) 36 (1.42) 37.9 (1.49)	Inner diameter flange — Outer diameter flange		
D	① Race ② Bearing ③ Race	23 (0.91) 22.3 (0.88) 22 (0.87)	35.8 (1.41) 36 (1.42) 37.9 (1.49)	Outer diameter flange — Outer diameter flange		Shared in common with C ② Shared in common with C ③
E	① Race ② Bearing ③ Race ③ Race	27.1 (1.07) 30 (1.18) 30.5 (1.20) 30.5 (1.20)	42 (1.65) 42 (1.65) 43 (1.69) 43 (1.69)	Inner diameter flange — Not provided Not provided	 0.8 1.4	 Option Option

Fig. 4-182

WR-04224

LIST OF SPRINGS

	Installing position	Color	Free length (Reference value) mm (inch)	Coil outer diameter mm (inch)
Upper valve	Primary regulator valve	Red	52.5 (2.06)	10 (0.39)
	Orifice control valve	Yellow/green	34.1 (1.34)	8.5 (0.33)
	Throttle valve	White	22.25 (0.8760)	9.2 (0.36)
	Throttle valve (Gasoline turbo, diesel turbo)	Purple Light blue	31.81 (1.252) 31.04 (1.252)	Inner diameter 6.0 (0.24) Inner diameter 6.0 (0.24)
	Throttle valve cam	—	—	Inner diameter 14 (0.55)
Lower valve	Secondary regulator valve (Same as above)	Yellow Brown	31.4 (1.24) 30.17 (1.188)	7.4 (0.29) 7.4 (0.29)
	2 - 3 shift valve	Pink	39.6 (1.56)	10.5 (0.413)
	1 - 2 shift valve	Pink	39.6 (1.56)	10.5 (0.413)
	B_2 control valve	Blue	28.1 (1.11)	7.9 (0.31)
	Cooler bypass	Orange	19.9 (0.783)	11.0 (0.433)
Case	B_1 accumulator	—	52.0 (2.05)	10.0 (0.394)
	C_1 accumulator	—	64.1 (2.52)	15.0 (0.591)
B_1 servo	Inner	—	19 (0.75)	23 (0.91)
	Outer	—	45.9 (1.81)	39 (1.5)
C_1	For forward clutch (18 pieces)	—	14.90 (0.5866)	7.7 (0.30)
	Shaft parking pawl	—	—	Inner diameter 10.25 (0.4035)

(NOTE)
1. Figures in ( ) in the column of "Coil outer diameter" represent the inner diameter.
2. Figures in ( ) in the column of "Installing point" represent the number of the part.
3. This list does not post those springs which are incorporated in assemblies.

WR-04225

LIST OF "O" RINGS

Installing point	Inner diameter mm (inch)	Installing point	Inner diameter mm (inch)
Oil pump body	200 (7.87)	B_2 brake	135 (5.31)
Direct clutch drum, inner	75.9 (3.00)	B_1 servo rod	8.8 (0.35)
C_2 piston, outer	117 (4.61)	C_1, B_1 accumulators	23.47 (0.9240)
B_1 servo cover	59.6 (2.35)	B_1 accumulator	15.4 (0.606)
C_1 piston, inner	46.52 (1.831)	Filler tube	9.6 (0.38)
C_1 piston, outer	117 (4.61)	Speedometer	19.7 (0.776)
B_2 brake	94.1 (3.70)		

C_1: Forward clutch
C_2: Direct clutch
B_1: 2nd brake
B_2: 1st & reverse brake

WR-04226

LIST OF BOLTS USED (I)

Installing point	Number	Standard	Tightening torque kg-m (ft-lb)	Nominal length (mm)	Shape
Housing × case	11	M8	1.6 - 2.3 (12 - 16)	35	B, W/W
Rear cover × case	10	M8	1.6 - 2.3 (12 - 16)	35	B, W/W
Rear cover × case	2	M8	0.5 (3.6)	9/16	B, S
Rear cover × case	2	M8	1.1 - 1.5 (8.0 - 10)	—	N
Rear cover × case	2	ϕ 8	—	—	W
Oil pump assembly × case	5	M8	1.8 - 2.7 (14 - 19)	28	B, F
Stater shaft × Oil pump body	11	M6	0.8 - 1.2 (6.0 - 8.5)	17	B, W/W
Case side cover × case	4	M6	0.7 - 0.9 (5.5 - 6.5)	18	B, W/W
Counter shaft × counter driver gear	1	M22	11 - 15 (80 - 108)	—	N
Differential gear × differential ring gear	10	M10	8.0 - 1.0 (58 - 72)	—	B, F
Manual shift shaft × Manual valve outer lever	2	M8	0.9 - 1.7 (6.5 - 12)	—	N
Detent × case	1	M6	0.8 - 1.2 (6.0 - 8.5)	16.5	B, W/W
Detent × case	1	M6	0.2 (1.4)	12/8	B, S
Detent × case	1	M6	0.8 - 1.2 (6.0 - 8.5)	—	N
Detent × case	1	ϕ 6	—	—	W
Valve body assembly × case	7	M6	0.8 - 1.2 (6.0 - 8.5)	36	B, F
Valve body assembly × case	1	M6	0.8 - 1.2 (6.0 - 8.5)	47	B, F
Valve body assembly × case	2	M6	0.8 - 1.2 (6.0 - 8.5)	25	B, F
Valve body assembly × case	1	M6	0.8 - 1.2 (6.0 - 8.5)	32	B, F
Upper valve body × lower valve body	6	M5	0.5 - 0.6 (3.6 - 4.3)	29.5	B, F
Upper valve body × lower valve body	6	M5	0.5 - 0.6 (3.6 - 4.3)	38	B, F
Upper valve body × lower valve body	2	M5	0.5 - 0.6 (3.6 - 4.3)	44	B, F
Upper valve body × lower valve body	2	M5	0.5 - 0.6 (3.6 - 4.3)	29.5	B, F
Lower cover × lower valve body	6	M5	0.5 - 0.6 (3.6 - 4.3)	14	B, F
Strainer × lower valve body	6	M5	0.5 - 0.6 (3.6 - 4.3)	14	B, F
Solenoid × lower valve body	2	M6	0.64 - 0.96 (4.6 - 6.9)	10	B, W/W
Throttle cam × lower valve body	1	M6	0.6 - 0.9 (4.3 - 6.5)	28	B, F
Oil pan × case	13	M6	0.4 - 0.6 (3.0 - 4.3)	16	B, W/W
Drain plug × oil pan	1	M10	1.8 - 2.3 (13 - 17)	8.3	P
Wire-to-solenoid × case	1	M6	0.2 (1.4)	12/8	B, S
Wire-to-solenoid × case	1	M6	0.5 - 0.6 (3.6 - 4.3)	—	N
Wire-to-solenoid × case	1	ϕ 6	—	—	W

WR-04227

LIST OF BOLTS USED (II)

Installing point	Number	Standard	Tightening torque kg-m (ft-lb)	Nominal length (mm)	Shape
Speedometer × housing	1	M6	0.7 - 1.0 (5.1 - 7.2)	12	B, W/W
Filler tube × case	1	M8	0.3 - 0.7 (2.4 - 5.6)	20	B, W/W
Test plug × case	1	5/16 24UNF	0.6 - 0.9 (4.3 - 6.5)	9.5	P
* Oil pan × case	2	M6	0.4 - 0.6 (3.0 - 4.3)	16	S, W/W
* Housing × case	3	M8	1.6 - 2.3 (12 - 16)	35	B, W/W
Housing × case	1	M8	1.6 - 2.3 (12 - 16)	50	B, W/W
Speedometer sleeve plate lock × case	1	M6	0.6 - 0.9 (4.3 - 6.5)	12	B, W/W
Throttle cable clamp × case	1	M6	0.6 - 0.9 (4.3 - 6.5)	12	B, W/W
O/P assembly × case	1	M10	1.8 - 2.7 (14 - 19)	28	B, F
Neutral start switch × case	1	M8	1.6 - 2.3 (12 - 16)	35	B, W/W
Clamp × case	1	M8	0.9 - 1.7 (6.5 - 12)	20	B, W/W
Mount bracket × case	3 (5)	M10	3.0 - 4.5 (22 - 33)	25	B, W/W

: Apply sealant to the bolt bearing the "" mark. case: Transmission case

WR-04228

Explanation of shape

B, W/W	:	Bolt with washer
B, S	:	Stud bolt
N	:	Nut
W	:	Washer
B, F	:	Bolt flange
P	:	Plug
S, W/W	:	Screw with washer

WR-04229