

AT

AUTOMATIC TRANSMISSION

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INTRODUCTION

This manual describes the checking and servicing procedures for the automatic transmission which is mounted on the vehicle. As for the checking and servicing procedures for the unit itself, refer to the unit section.

Service Manual Unit Section: No. 973B

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INSTRUCTION ON AUTOMATIC TRANSMISSION VEHICLES

1. When towing the automatic transmission vehicles with a wrecker, be sure to use a towing dolly.
2. Instruction on installation and removal of parts
 - (1) Remove completely sands and dirt which have adhered to the external surface so that no foreign matters can enter the transmission.
 - (2) The disassembling should be performed at a clean place free of dust and dirt.
 - (3) When disassembling, do not use gloves or cloth.
 - (4) Before disassembling, be sure to check for oil leakage.
 - (5) Carefully consider the contents of malfunction so as to avoid unnecessary removing of parts.
 - (6) When disassembling connected parts, such as the case, lightly tap them with a plastic hammer or the like, not prying with a screwdriver.
 - (7) Be sure to apply automatic transmission fluid to sliding sections.
 - (8) When gaskets, O-rings, etc. have been removed, be sure to install new ones.

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BASIC CHECKS AND ADJUSTMENT

1. Preparation prior to check
 - (1) Park the vehicle on a flat place. Apply the parking brake.
 - (2) Confirm safety before and after the vehicle.

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2. Check of transmission fluid level and its condition

- (1) Check the idle speed.

NOTE:

- The check should be performed with the engine fully warmed up.

Specified Value: 650 - 750 rpm

[During ISC operation, accessory switch turned OFF]

If the measured value does not comply with the specification, refer to the EM section.

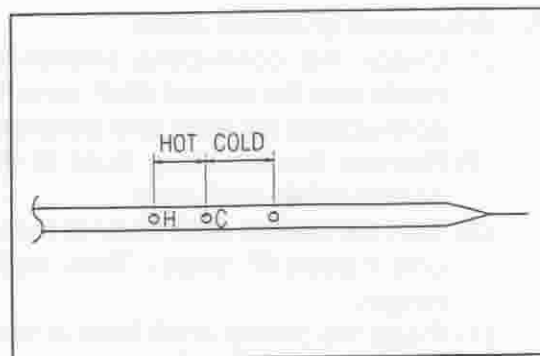
- (2) With the engine idling, move the shift lever slowly from the P to L, passing through each range. Then, return the lever to the P range.
- (3) Pull out the transmission fluid level gauge and wipe out the oil with a cloth. Remove lint, etc. by blowing compressed air.
- (4) Push it back fully into the tube.

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- (5) Pull it out and check that the fluid level is in the HOT range.

NOTE:

- If it necessary to check the fluid level at low temperature (20 - 30°C), e.g. at the time of fluid change, first adjust the fluid level so that it may become within the COLD level. Then, recheck the fluid level under the hot conditions.
- If the fluid level fails to reach the COLD level on the fluid level gauge, be sure to check the transaxle for fluid leakage.



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- (6) Check the fluid condition
If the fluid smells burning or it presents a black appearance, change the fluid.

3. Change the transmission fluid

- (1) Remove the transmission oil by removing the drain plug with the gasket.
- (2) Drain the fluid.

WARNING:

- Be careful not to scald yourself.

- (3) With the new gasket interposed, tighten the drain plug securely.

Tightening Torque: 19.6 - 29.4 N·m

NOTE:

- Never reuse the removed gasket.

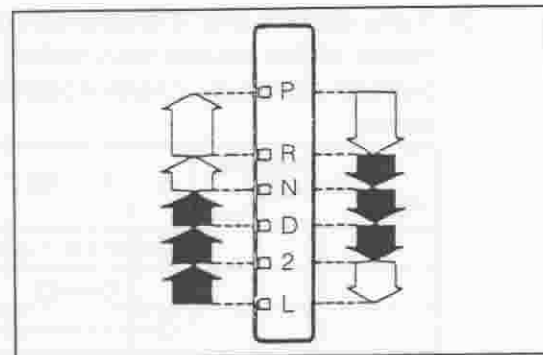
- (4) Add the new fluid through the oil filler tube.
Specified Value: 1.5 liter (Drain and refill)

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- (5) Adjust the fluid level. (Refer to page AT-2.)

4. Check of shift lever position

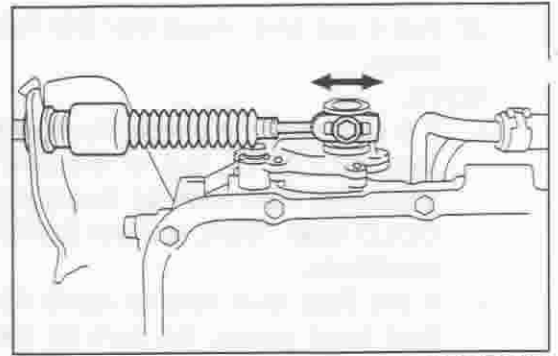
- (1) Move the shift lever from the N range to each range. Ensure that the shift lever button and shift lever can be operated smoothly with a positive detent feeling at each range. Check that the position indicator functions properly.
- (2) Start the engine. Ensure that the vehicle moves forward when you move the shift lever from the N range to the D, 2 and L ranges, respectively. Make sure that the vehicle moves backward when you move the shift lever to the R range.
- (3) With the ignition switch set to the ON position, move the shift lever from the P to R range and from the N to R range while depressing the brake pedal.
 - ⇒ mark: Shift can be made only while shift lever button is being pushed
 - ➔ mark: Shift can be made without pushing shift lever button



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5. Adjustment of control cable

- (1) Check the connecting section between the control cable and the control shaft lever for wear. Check other connections for wear and deformation.
- (2) Remove the attaching bolts of the control cable and control cable shaft lever.
- (3) Turn the control shaft lever to the vehicle front direction until it stops (P range). Then, back off two notches. (N range).
- (4) Place the control shaft lever in the N range. Without allowing any slack of the control cable, tighten the attaching bolts to the specified torque.
Tightening Torque: 6.9 - 9.8 N·m



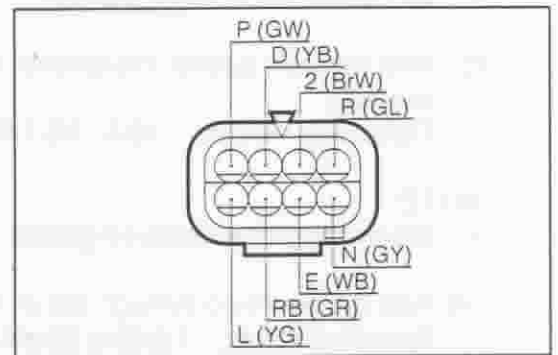
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- (5) After completion of adjustment, check the operating condition and function.

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6. Check of neutral start switch

- (1) Apply parking brake.
- (2) Ensure that the engine can start only when the shift lever is placed in the P or N range. Ensure that the engine will not start in other ranges.
- (3) Ensure that the backup lamp goes on only when the shift lever is placed in the R range.
- (4) With the ignition switch turned ON, move the shift lever. Ensure that the shift position indicator in the combination meter goes on correctly according to the shift lever position.
- (5) If any abnormality is encountered, disconnect the connector of the neutral start switch. Using an ohmmeter, perform continuity check according to the table given below.



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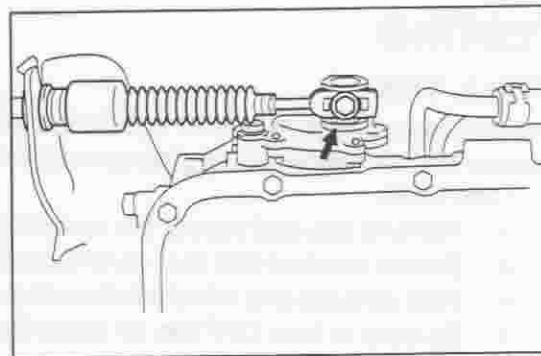
Terminal \ Range	E	R	RB	P	N	D	2	L
P	○	—	—	○				
R		○	○					
N	○	—	—	—	○			
D	○	—	—	—	—	○		
2	○	—	—	—	—	—	○	
L	○	—	—	—	—	—	—	○

If the continuity does not conform to the specifications, replace the switch.

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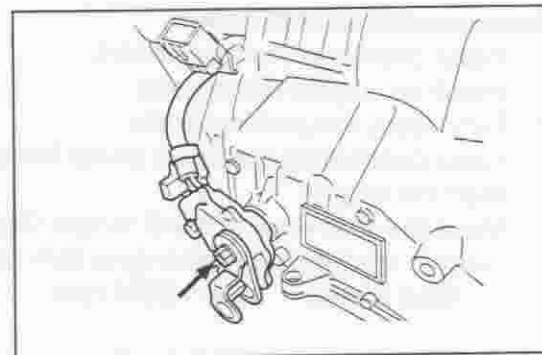
7. Adjustment of neutral start switch

- (1) Remove a bolt of the control cable assembly.



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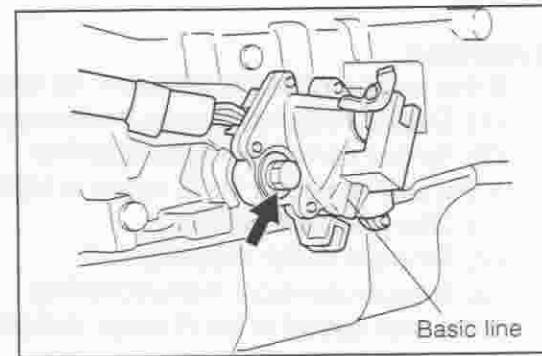
- (2) Remove a nut of the transmission control shaft lever assembly.
 (3) Back off the manual lever shaft two notches from the parking position and remove the manual lever.



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- (4) Place the SST and tighten the screw.
 SST: 09302-87201-000

- (5) Loosen the tightening bolt
 (6) Align the groove with the basic line.
 (7) Tighten the bolt.
 Tightening Torque: 14.7 - 21.6 N·m



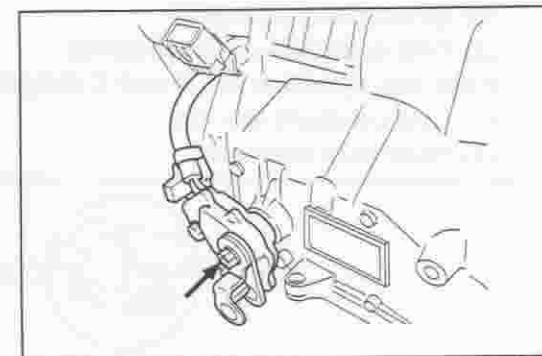
Basic line

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NOTE:

- Make sure that the bolt is tightened to the specified tightening torque.

- (8) Install the transmission control shaft lever assembly and tighten it with the nut.
 Tightening Torque: 9.8 - 15.7 N·m

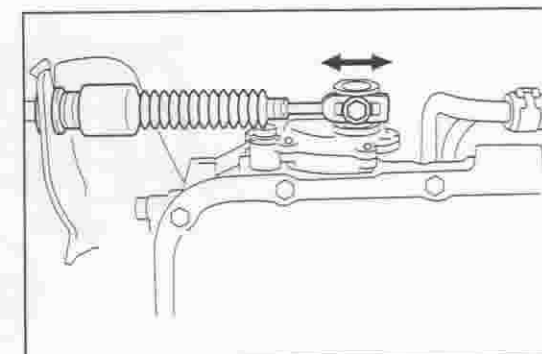


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NOTE:

- Make sure that the nut is tightened to the specified tightening torque.

- (9) Tighten the control cable assembly with the bolt.
 Tightening Torque: 6.9 - 9.8 N·m



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- (10) Check the continuity of the terminals in the neutral start switch connector.
 (11) Inspection of shift lever position
 (12) Inspection of engine idling speed
 (Refer to the EM section.)

TESTING

STALL TEST

The purpose of this test is to check the overall performance of the automatic transmission and engine by measuring the maximum engine speeds in the D and R ranges.

CAUTION:

- Perform the stall test at the normal fluid operating temperature (70 - 90°C).
- Do not conduct this test continuously for more than five seconds.
- Wait at least one minute before the switching is made from the D range to the R range.
- Be sure to turn OFF the air conditioner (if equipped so on).

Measurement of stall speed

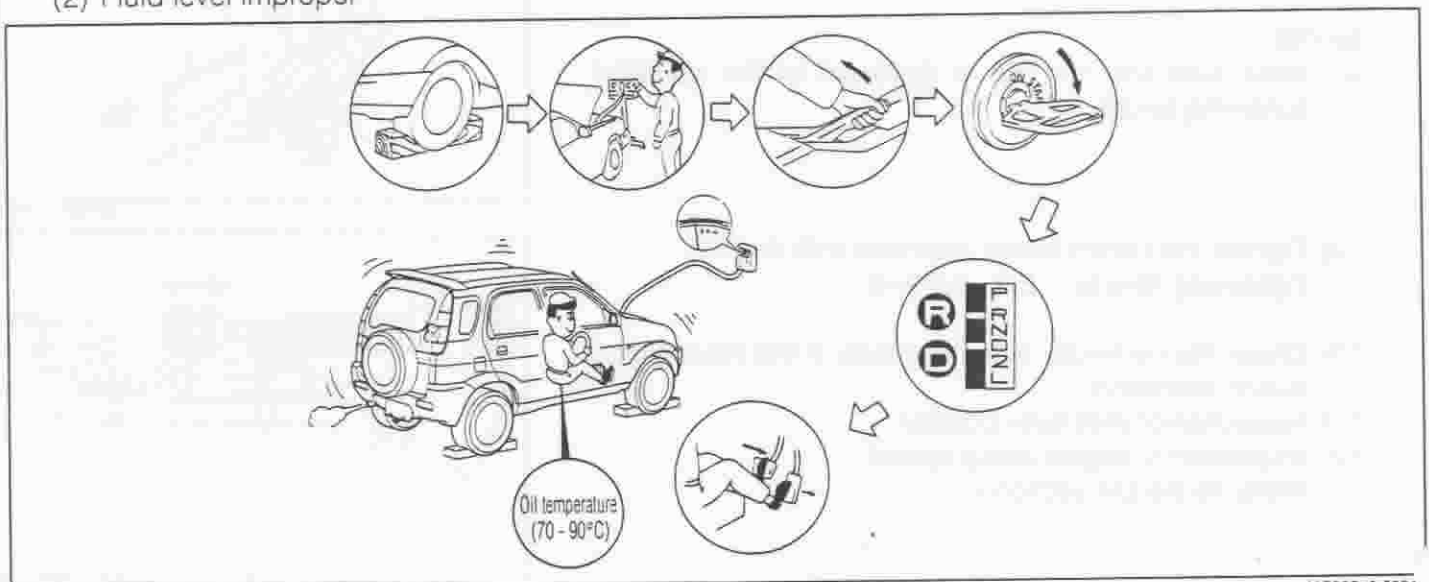
1. Place chocks at the four wheels.
2. Install an engine tachometer.
3. Fully apply the parking brake.
4. Keep depressing the brake pedal firmly by your left foot during the test.
5. Start the engine.
6. Move the shift lever to the D range. Depress the accelerator pedal fully by your right foot. Quickly read the highest engine rpm at this time.

Stall Speed: 2100 - 2600 rpm

7. Perform the same test in the R range.

Evaluation

1. If the engine speed is the same for both ranges (D, R) but lower than specified value:
 - (1) Engine output probably insufficient
 - (2) Torque converter malfunctioning
2. If the stall speed at the D range is higher than specified value:
 - (1) Line pressure too low
 - (2) Forward clutch slipping
 - (3) Torque converter malfunctioning
3. If the stall speed in the R range is higher than specified value:
 - (1) Line pressure too low
 - (2) Direct clutch slipping
 - (3) First & reverse brake slipping
4. If the stall speed in the R and D ranges is higher than specified value:
 - (1) Line pressure too low
 - (2) Fluid level improper



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TIME LAG TEST

When the shift lever is shifted while the engine is idling, there will be a certain time lapse or lag before you can feel a shock. This time lag can be used for checking those conditions of the forward clutch, the direct clutch and the first & reverse brake.

CAUTION:

- Perform the time lag test at the normal fluid operating temperature (70 - 90°C).
- Be sure to allow one minute intervals between tests.
- Conduct the measurement three times and take the average value.

Measurement of time lag

1. Place chocks at the four wheels.
2. Fully apply the parking brake.
3. Start the engine and check the idle speed.
(Refer to the EM Section.)
4. Move the shift lever from the N to the D range. Using a stopwatch, measure the time required from the lever shifting to the time when you feel a shock.

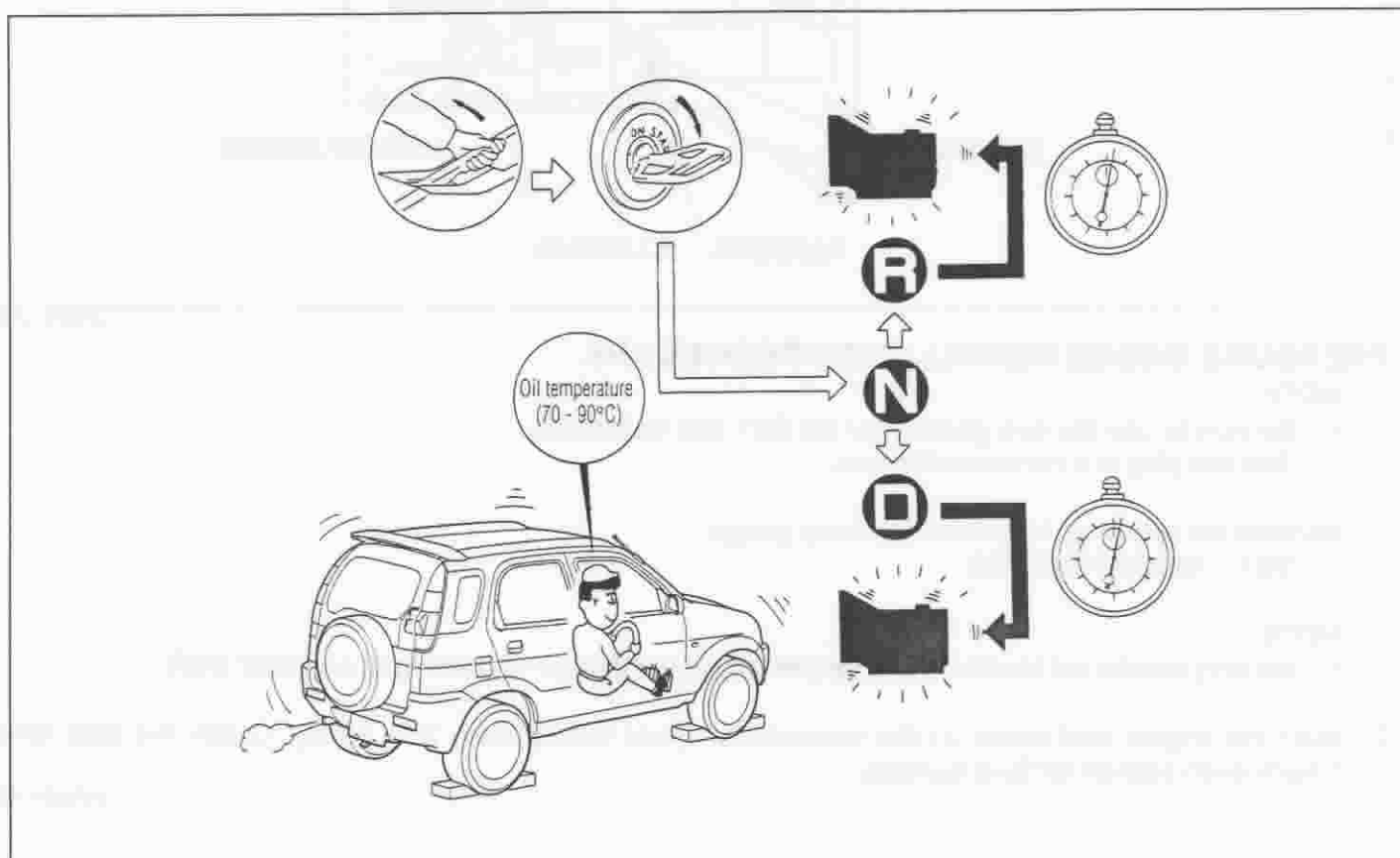
Time Lag: Not to exceed 1.0 second

5. In the same manner, measure the time lag when shifting is made from the N to the R range.

Time Lag: Not to exceed 1.0 second

Evaluation




1. If the N-to-D time lag is longer than the specified value:
 - (1) Line pressure too low
 - (2) Forward clutch worn
2. If the N-to-R time lag is longer than the specified value:
 - (1) Line pressure too low
 - (2) Direct clutch worn
 - (3) First & reverse brake worn



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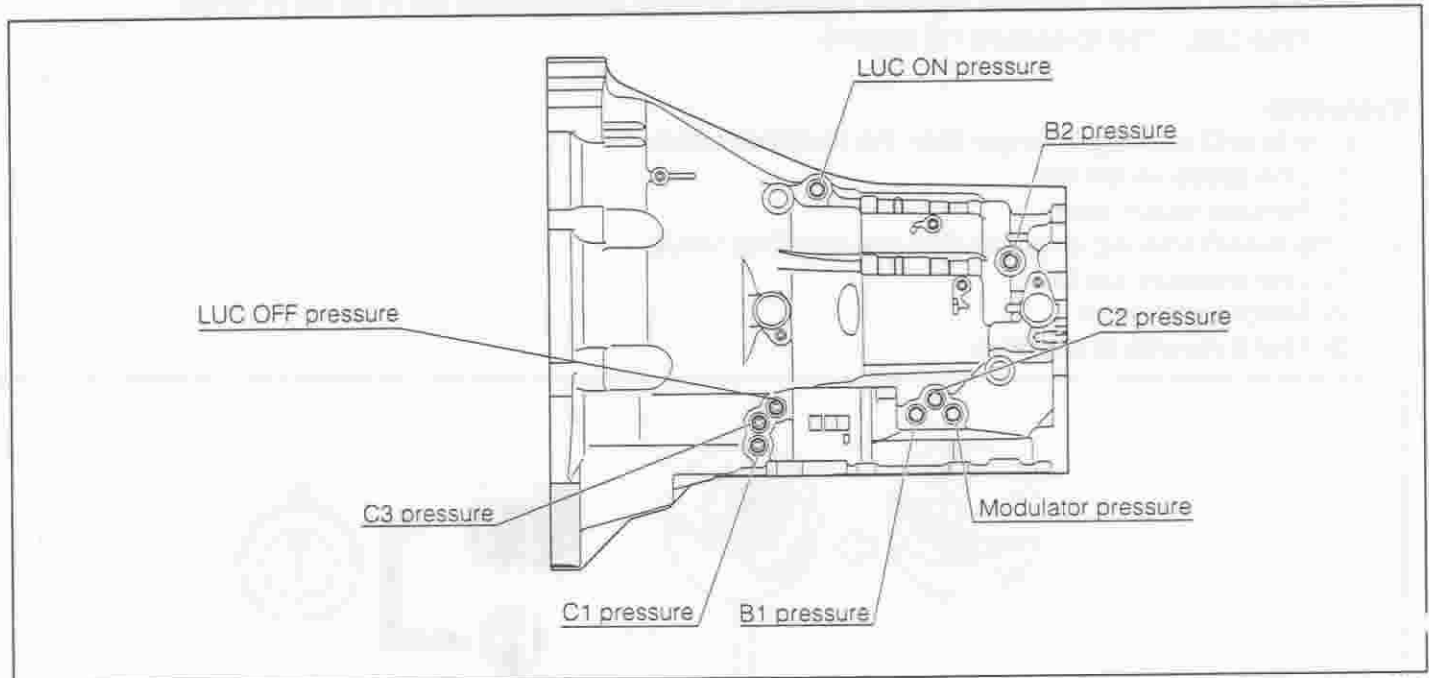
HYDRAULIC PRESSURE TEST

ARTICLES TO BE PREPARED

	Shape	Part number, part name	Use
SST		09325-87201-000 A/T pressure gauge No. 1 adapter	For checking hydraulic pressure of automatic transmission
Instrument		Oil pressure gauge for A/T	For hydraulic pressure test
		Oil pressure gauge adapter	For hydraulic pressure test
Lubricant	DEXRON® III or DEXRON® II		

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POSITION OF HYDRAULIC PRESSURE TEST PLUG



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PRESSURE GAUGE INSTALLATION PROCEDURE

NOTE:

- Be sure to use the new gaskets for the SST and instrument. The test plug is a non-reusable part.

1. Remove the test plug. Install the pressure gauge.
SST: 09325-87201-000

NOTE:

- Be very careful not to allow the pressure gauge to interfere with the front propeller shaft.

2. Start the engine and warm up the transmission (fluid temperature 70 - 90°C). Check the fluid level. Check each section for fluid leakage.

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HYDRAULIC PRESSURE MEASURING PROCEDURE**Pressure C2**

1. Apply the parking brake. Place chocks.
2. Start the engine.
3. While depressing the brake pedal strongly by your left foot, move the shift lever to the D range. Operate the accelerator pedal with your right foot and measure the hydraulic pressure.

Pressure C1, pressure B2

1. Apply the parking brake. Place chocks.
2. Start the engine.
3. While depressing the brake pedal strongly by your left foot, move the shift lever to the R range. Operate the accelerator pedal with your right foot and measure each hydraulic pressure.

Pressure B1

1. Jack up the four wheels. Support the vehicle with rigid racks.
2. Start the engine.
3. Place the shift lever in the D range. Depress the accelerator pedal gradually so that a shifting to the 2nd gear takes place. Measure the hydraulic pressure at the engine speed of 2000 rpm.

Pressure C3

1. Jack up the four wheels. Support the vehicle with rigid racks.
2. Start the engine.
3. Place the shift lever in the D range. Depress the accelerator pedal gradually so that a shifting to the 3rd gear takes place. Measure the hydraulic pressure when you release the accelerator pedal.

LUC OFF pressure

1. Jack up the four wheels. Support the vehicle with rigid racks.
2. Start the engine.
3. Place the shift lever in the D range. Measure the hydraulic pressure. (Hydraulic pressure when lock up is OFF)
4. Depress the accelerator pedal gradually so that a shifting to the 3rd gear takes place. Further accelerate gradually. Measure the vehicle hydraulic pressure at the time when the lock up takes place. (Hydraulic pressure when lock up is ON)

NOTE:

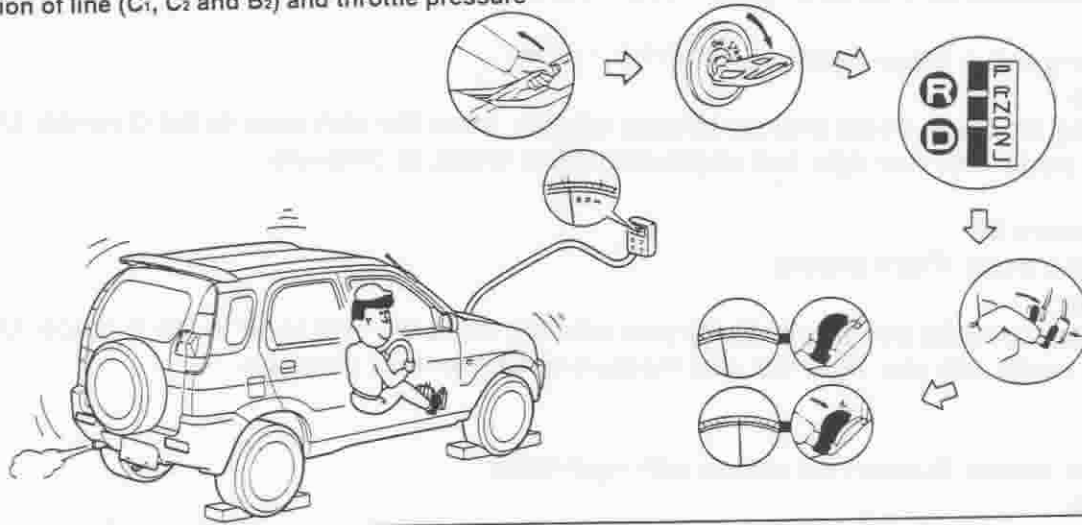
- The lock up in the 3rd gear takes place when the vehicle speed is about 47 km/h and the throttle opening is 6 - 25 %.

Specifications

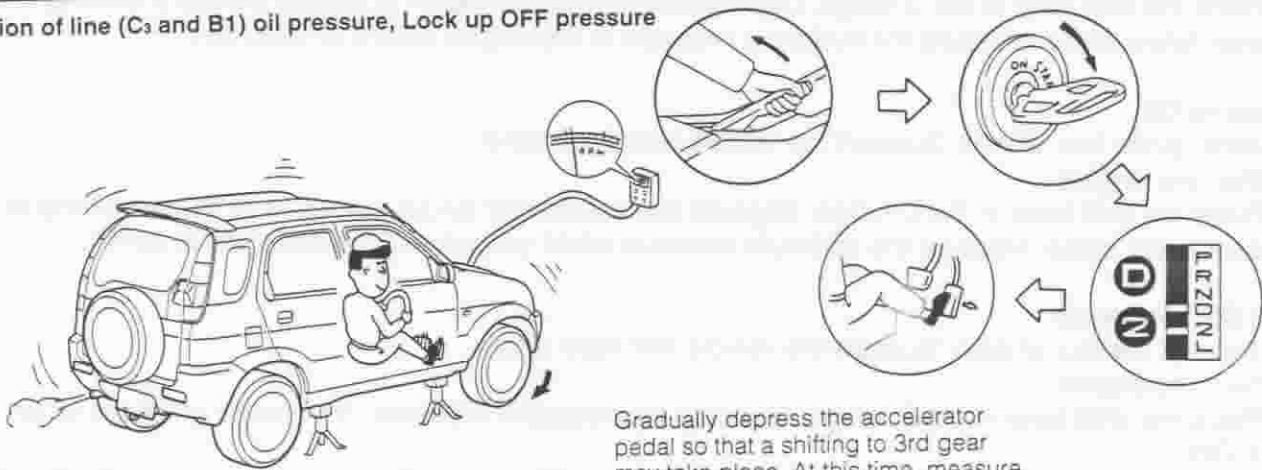
Item	Measuring condition		Specified value (kPa)
	Range	Running condition	
C2	D	Stall revolving condition	930 - 1120
C1, B2	R	Stall revolving condition	1520 - 2110
C3	D	3rd gear, accelerator OFF (When lock up is OFF)	440 - 640
B1	D	2nd gear, engine revolution 2000 rpm	930 - 1130
LUC OFF pressure:	D	When lock up is OFF	590 - 750
		When lock up is ON	20 or less

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Inspection of line (C₁, C₂ and B₂) and throttle pressure



Inspection of line (C₃ and B1) oil pressure, Lock up OFF pressure



Gradually depress the accelerator pedal so that a shifting to 3rd gear may take place. At this time, measure the hydraulic pressure. (Hydraulic pressure after the accelerator pedal is released)

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RUNNING TEST**Items to be observed****NOTE:**

- Assure thoroughly the safety on the road during the tests.
- The fluid should be at the normal running temperature. (70 - 80°C)

D range test

1. Move off with the D range. Check to see if upshifts and downshifts take place between the 1st ↔ 2nd, 2nd ↔ 3rd, 3rd ↔ 4th (O/D) gears, and if those shifting points comply with the specifications. Moreover, check that there is no abnormal shocks, slipping, etc.
2. While driving with the D range, 4th (O/D), 3rd and 2nd gears, perform kickdown operations. Check to see if a kickdown takes place from the 4th (O/D) to 3rd gear, from 3rd to 2nd gear, from 2nd to 1st gear. Also ensure that the limit vehicle speed at which kickdown is possible complies with the specification. Moreover, check that there is no abnormal shocks, slipping, etc.
3. While running with the 4th gear (O/D), ensure that a downshift from the 4th gear (O/D) to the 3rd gear takes place when the O/D switch is turned OFF.

2 range test

1. Move off with the 2 range. Check to see if an upshift and a downshift take place between the 1st ↔ 2nd gears, and if those shifting points comply with the specifications. Moreover, check that there is no abnormal shocks, slipping, etc.
2. Move off with the 2 range. Ensure that an upshift of the 1st to 2nd gear takes place, and no upshift to the 3rd gear takes place.
3. While driving with the 2 range, 2nd gear, perform a kickdown operation. Check to see if a kickdown takes place from the 2nd to 1st gear. Also ensure that the limit vehicle speed at which kickdown is possible complies with the specification. Moreover, check that there is no abnormal shocks, slipping, etc.
4. While driving with the D range, 3rd gear, move the shift lever to the 2 range. Ensure that a downshift takes place from the 3rd gear to 2nd gear, and the engine brake is working. Also ensure that the shifting point complies with the specification.

L range test

1. Move off with the L range. Ensure that no upshift to the 2nd gear takes place.
2. While driving with the D range, 3rd gear, move the shift lever to the L range. Ensure that downshifts take place from the 3rd gear to 2nd gear, and finally to the 1st gear, and the engine brake is working. Also ensure that the shifting points comply with the specification.

Lockup test

1. While running in the 3rd gear, gradually accelerate. Ensure that the vehicle speed at which the lockup is turned ON and the engine speed drops complies with the specified timing of the lockup ON. Also check that no significant change in engine speed occurs when you depress lightly the accelerator pedal.
2. Perform the same test for the 4th gear.

P range test

1. Park the vehicle at an uphill (about 5° or more). Move the shift lever to the P range and release the parking lever. At this time, ensure that the vehicle will not move because of the parking lock mechanism.
2. Perform the same test when the vehicle is parked at a downhill.
3. Under the conditions above, check to see if the vehicle moves when the shift lever is moved from the P range to other range.

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SPECIFICATIONS
Shift point speeds

Throttle opening degree	Range	Gear shifting	Vehicle speed			
			2WD		4WD	
			Economy mode diagram	Power mode diagram	Economy mode diagram	Power mode diagram
100%	D	1st → 2nd	43 - 58	←	42 - 57	←
		2nd → 3rd	83 - 98	←	80 - 95	←
		3rd → 4th	128 - 143	←	124 - 139	←
		4th → 3rd	103 - 118	113 - 128	100 - 115	110 - 125
		3rd → 2nd	65 - 80	65 - 80	62 - 77	←
		2nd → 1st	25 - 40	30 - 45	25 - 40	←
0%	D	4th → 3rd	20 - 35	37 - 52	19 - 34	35 - 50
		3rd → 2nd	8 - 23	←	8 - 23	6 - 21
		2nd → 1st	8 - 23	←	8 - 23	6 - 21
0 - 100%	D ② L	4th → 3rd	122 - 137	←	120 - 135	←
		3rd → 2nd	79 - 94	←	77 - 92	←
		2nd → 1st	41 - 56	←	40 - 55	←

- The shift point speeds in the 1st (2nd gears of the ② range with the throttle opening set to 100% and 0% are the same as with the D range.
- The economy mode diagram or power mode diagram is automatically selected, depending upon the throttle opening speed. Hence, evaluation should be made based on either shift point speed.

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SPECIFICATIONS
Lockup vehicle speed

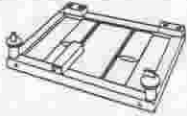


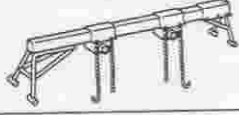
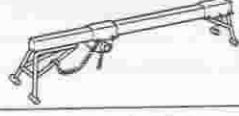
Throttle opening degree	Gear position	Lockup	Vehicle speed
6. ~ 30%	3rd	ON	42 ~ 57
	4th	ON	62 ~ 77
	3rd	OFF	38 ~ 53
	4th	OFF	58 ~ 73

The accelerator pedal should be depressed gradually.

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REMOVAL AND INSTALLATION OF AUTOMATIC TRANSMISSION

ARTICLES TO BE PREPARED

	Shape	Part number, part name	Use
SST		09994-87201-000 Engine frame holder	For removal/ installation of engine frame
		09210-87701-000 Flywheel holder	For removal/ installation of drive plate & ring gear
Tools		High transmission jack Banzai HMJ-450-TW Iyasaka ML450	For removal/ installation of transaxle
		Engine support bridge Supplied by Banzai	For suspending engine and transmission
		Engine support bridge Supplied by Banzai	For suspending engine and transmission
Instrument	Torque wrench, dial gauge		
Lubricant	DEXRON® III or DEXRON® II		

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OPERATIONS PRIOR TO REMOVAL

1. Disconnect the negative (-) terminal of the battery.

NOTE:

- It must be remembered that, when disconnecting the negative (-) terminal of the battery, the diagnosis contents and memories of the radio, etc. will be erased at the same time.

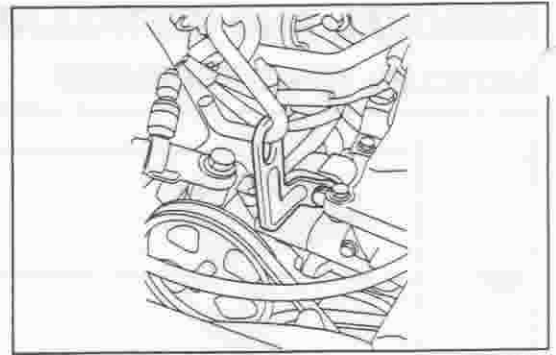
2. Remove the air cleaner assembly.
3. Remove the intake manifold.
4. Remove the starter assembly.
5. Drain automatic transmission fluid.
6. Remove the propeller front shaft. (4WD vehicles)
7. Remove the propeller shaft.
8. Remove the front exhaust pipe.
9. Disconnect the control cable at the transmission side.
10. Disconnect the neutral start switch connector and solenoid wire connector from the transmission.
11. Remove the earth wire.

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12. Install the engine hanger No. 2 to the engine.

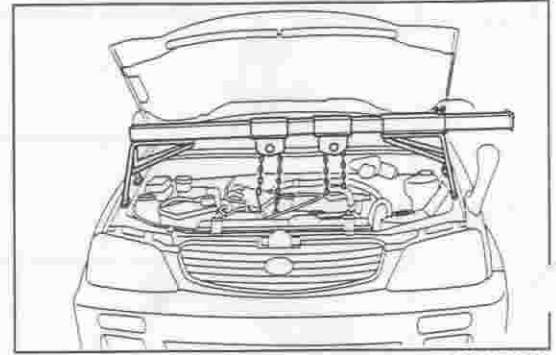
NOTE:

- The engine hanger No. 2 and attaching bolts are replacement parts.



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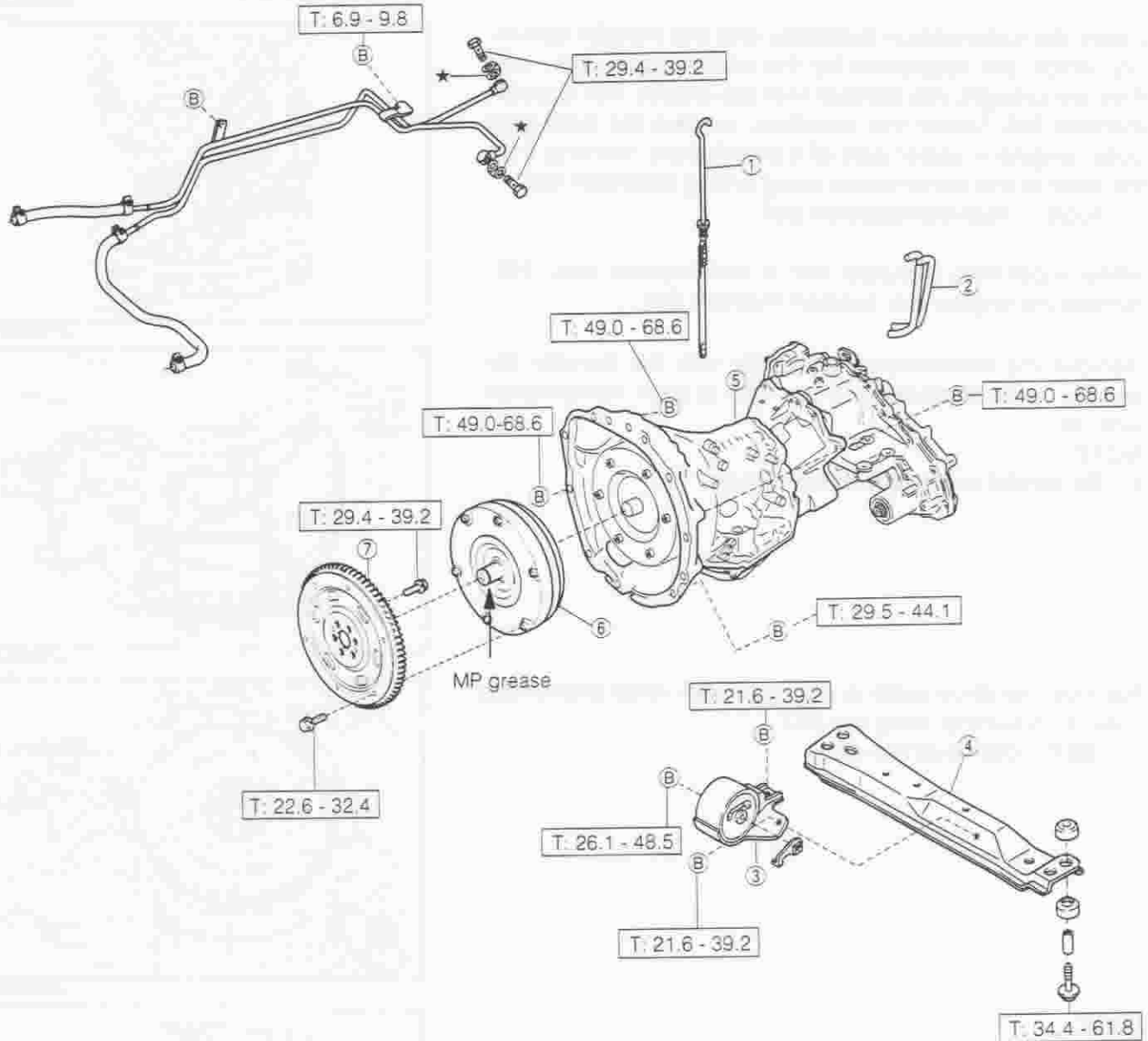
13. Hang the front part of the engine assembly, using the engine support bridge.



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REMOVAL AND INSTALLATION PROCEDURES

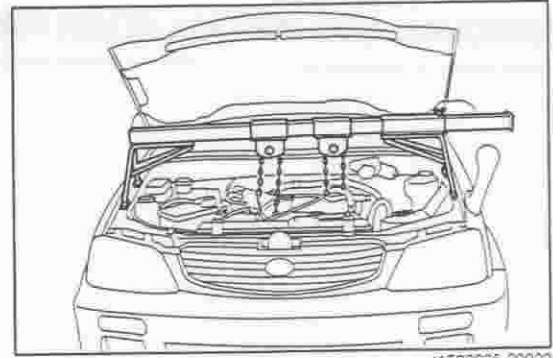
□ : Tightening torque
 * : Non-reusable parts
 Unit : N·m



- ① Oil level gauge
- ② Vacuum hose
- ③ Engine mounting rear insulator
- ④ Engine rear support member S/A
- ⑤ Transmission Ay with transfer Ay
- ⑥ Torque converter Ay
- ⑦ Drive plate & ring gear S/A

MAIN POINTS OF REMOVAL

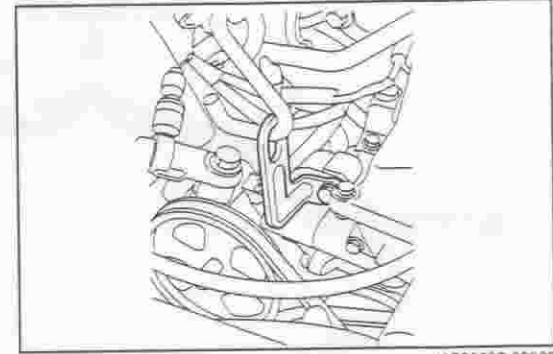
1. While holding the front of the engine with the engine support bridge, remove the engine mounting rear insulator.



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2. Lower the transmission assembly with the transfer assembly, which are supported by the transmission jack, until they are brought into contact with the engine rear support member S/A. Under this condition, remove the bolts (two bolts, engine x upper part of transmission), working from the back of the transmission using a long extension bar.

Tools: High transmission jack



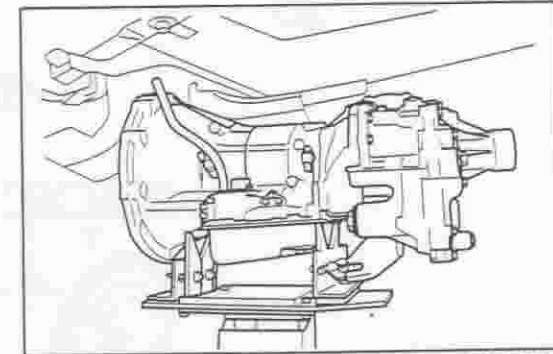
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3. While supporting securely with a transmission jack, etc., remove the engine rear support member S/A.

4. Remove the transmission assembly with the transfer assembly, while supporting them with a high transmission jack, etc.

NOTE:

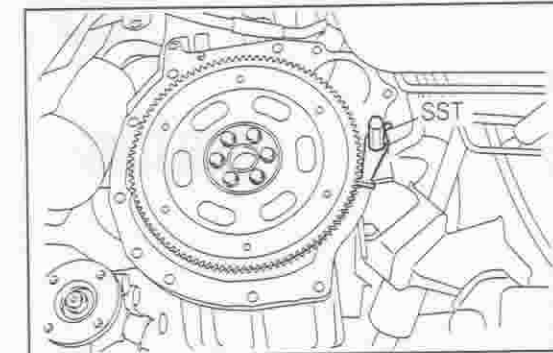
- Be careful not to deform the oil pan.



JAT00037-00024

5. Remove the drive plate & ring gear S/A while preventing them from turning using the SST.

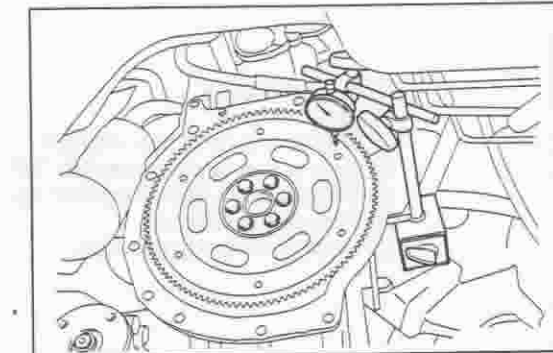
SST: 09210-87701-000



JAT00038-00025

CHECK

1. Check the drive plate for run-out.
Limit: 0.25 mm

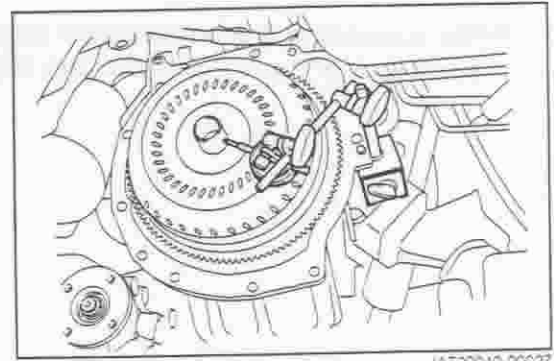


JAT00039-00026

2. Install the torque converter to the drive plate. Check the axial runout, using a dial gauge.
Limit: 0.3 mm

NOTE:

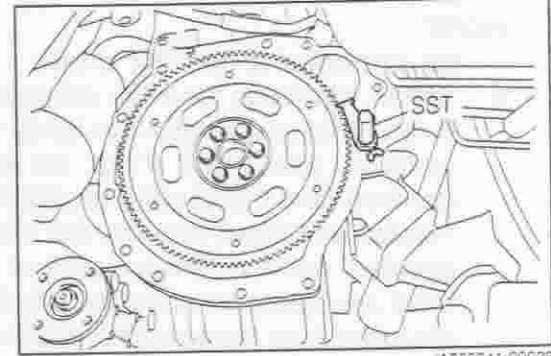
- Be careful not to drop the torque converter.



MAIN POINTS OF INSTALLATION

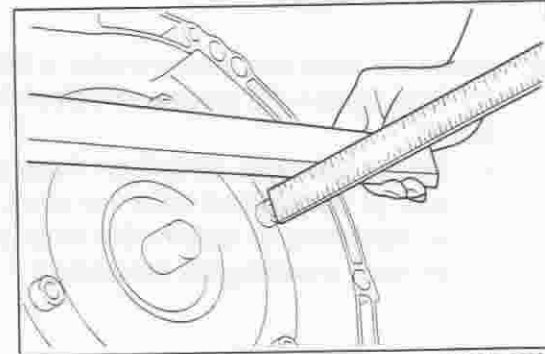
1. Install the drive plate & ring gear S/A while preventing them from turning by means of the SST.

SST: 09210-87701-000



2. Insert the torque converter assembly to the transmission assembly. Ensure that the insertion has been made positively.

Specified Value: Dimension A = 16.5 mm or more
(Dimension A: Distance between housing end surface and drive plate installation seat of torque converter)

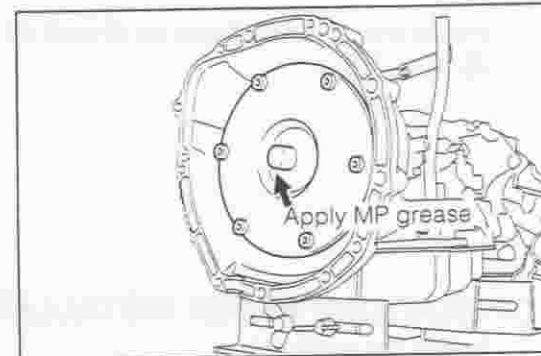


REFERENCE:

- If any difficulty is encountered in inserting the assembly to the specified dimension, slightly lift or lightly push the torque converter repeatedly.

3. Apply Ammix MP grease to the forward end of the torque converter.

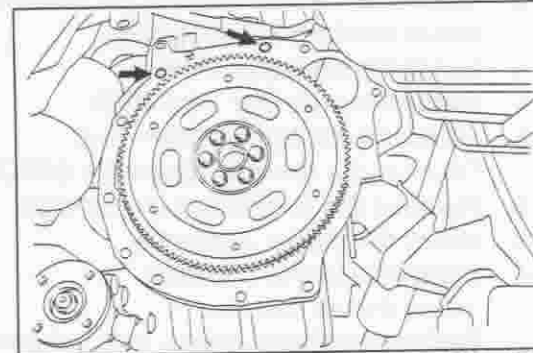
Grease: MP grease



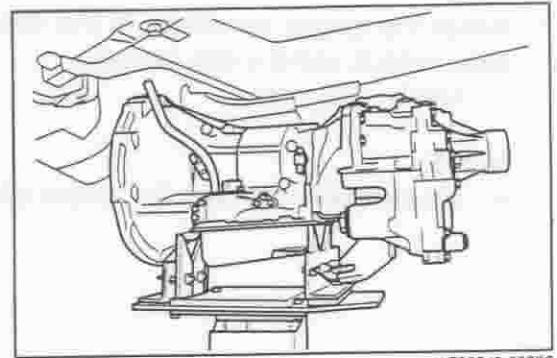
4. Install the transmission assembly with transfer.
 - (1) Set the engine support bridge in such a way that the front end of the engine is raised.
 - (2) Clean the seal bolt hole of the engine block.

NOTE:

- The seal bolts are non-reusable parts.



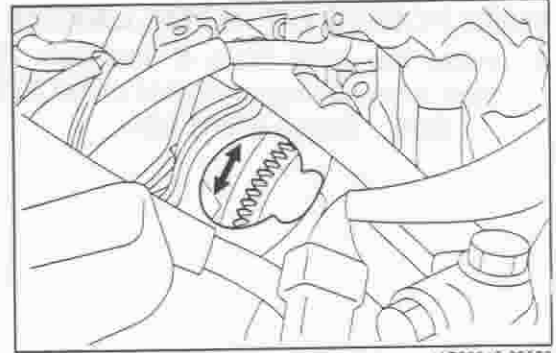
5. While supporting the transmission assembly with a transmission jack or the like, connect the engine.



JAT00045-00032

NOTE:

- Be careful not to dent the oil pan.
- Before tightening the bolts (engine × transmission) securely, confirm that you can lightly turn the torque converter by your finger. If not, the torque converter has deviated from the specified position. Remove the transmission and insert securely the torque converter to the specified position (Dimension A at page AT-17). (If the bolts are tightened securely with the torque converter deviating from the specified position, the oil pump may be damaged.)



JAT00046-00033

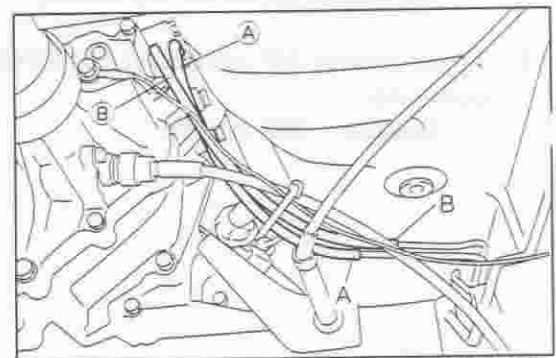
6. Install the bolts (torque converter × drive plate).
(1) First tighten the reference bolt of the drive plate.

NOTE:

- Do not use bolts other than those shown in the right figure. (If unspecified bolts are used, it will cause improper tightening or deform the inner shape of the converter, thus impairing the functions.)

JAT00047-00000

7. Install the vacuum hose as shown at the right figure. (A to ①, B to ②)



JAT00048-00035

OPERATIONS AFTER INSTALLATION

1. Install the earth wire.
2. Install the control cable at the transmission side.
3. Install the front exhaust pipe.
4. Install the propeller shaft.
5. Install the propeller front shaft.
6. Fill automatic transmission fluid.
7. Fill oil to the transfer assembly. (4WD vehicle)
8. Remove the engine support bridge.
9. Install the starter assembly.
10. Install the intake manifold.
11. Install the air cleaner.
12. Perform the basic check and adjustment.
13. Erase the learning values of the A/T ECU. (Refer to AT-35.)

JAT00049-00000

REMOVAL OF OIL PAN AND OIL STRAINER

ARTICLES TO BE PREPARED

Instrument	Torque wrench
Lubricant	DEXRON® III or II, Three bond 1281B

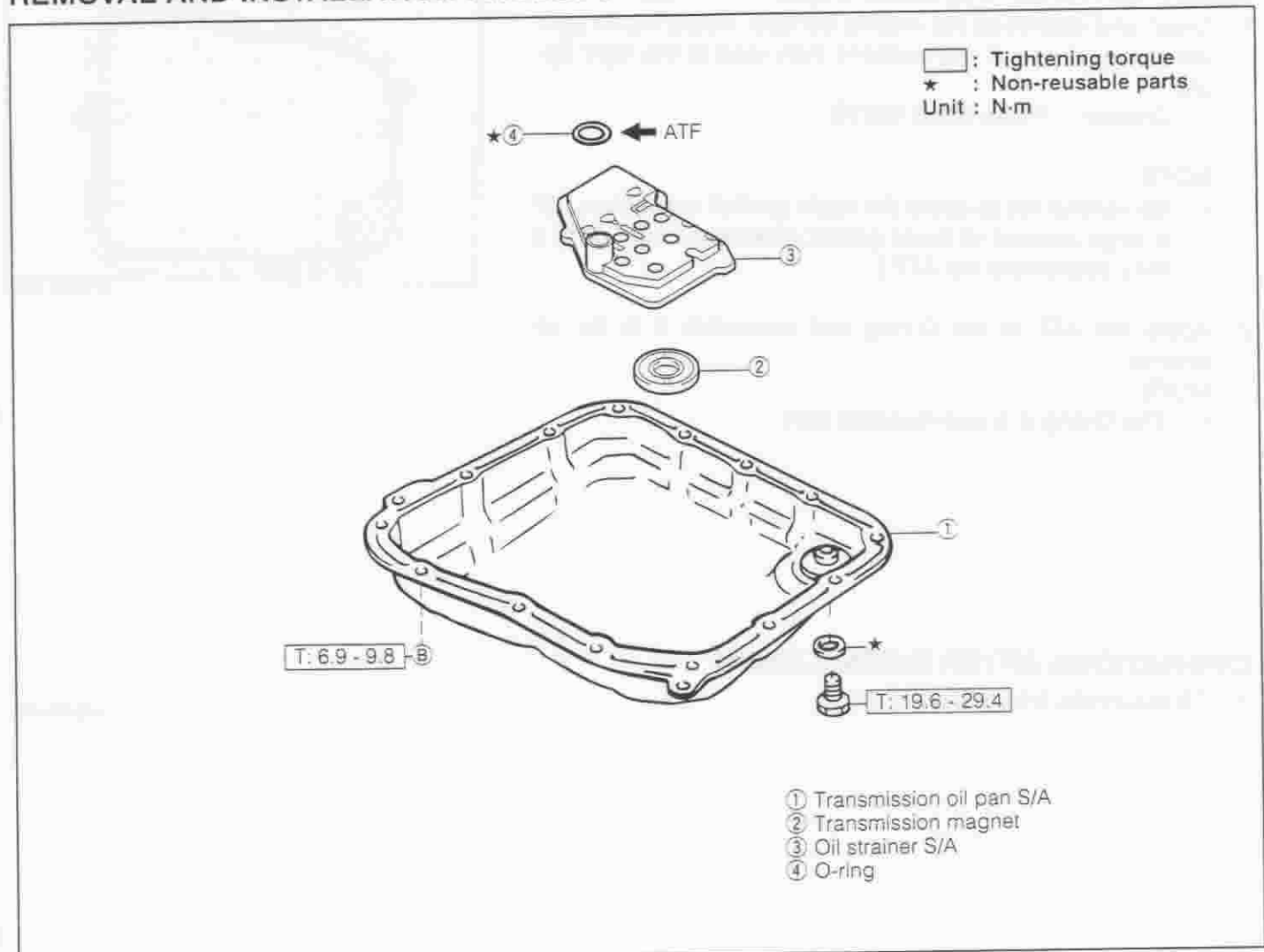
JAT00050-00003

OPERATIONS PRIOR TO REMOVAL

1. Drain automatic transmission fluid.

JAT00051-00000

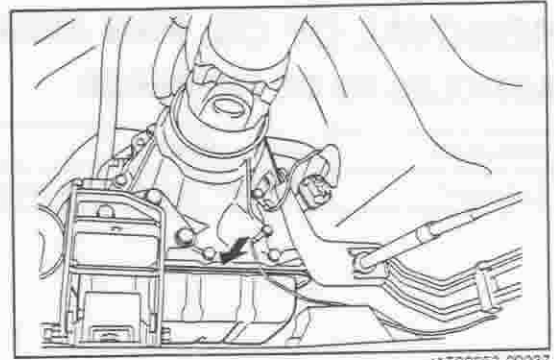
REMOVAL AND INSTALLATION PROCEDURES



JAT00052-00006

MAIN POINTS OF REMOVAL

1. Remove the attaching bolts of the oil pan. While holding the oil pan with your hand, remove the oil pan flange section by tapping it lightly with a plastic hammer.

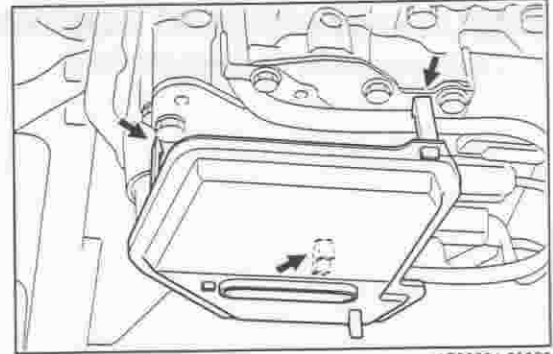


JAT00053-00037

2. Remove the oil strainer.

NOTE:

- The oil strainer is installed to the valve body by means of a pawl at the position shown in the figure. Therefore, carefully remove the oil strainer by widening the pawl in such a way that no excessive force is applied to the oil strainer.



JAT00054-00038

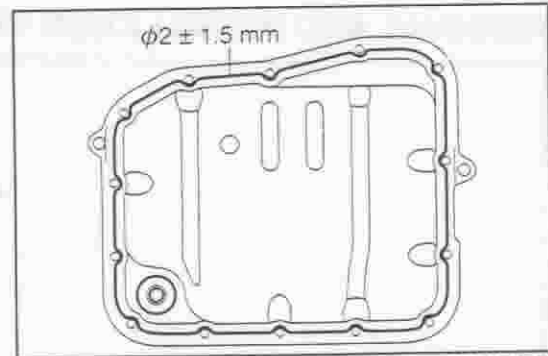
MAIN POINTS OF INSTALLATION

1. Clean and degrease the mating surface. Apply liquid gasket to the oil pan at the sections indicated at the right figure.

Grease: Three Bond 1281B

NOTE:

- Be careful not to apply the liquid gasket excessively. (If a large amount of liquid gasket dissolves to the ATF, it may deteriorate the ATF.)



JAT00055-00039

2. Apply the ATF to the O-ring and assemble it to the oil strainer.

NOTE:

- The O-ring is a non-reusable part.


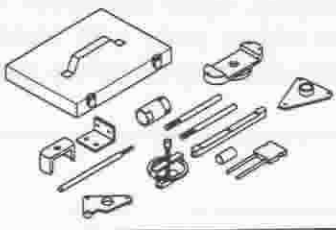
OPERATIONS AFTER INSTALLATION

1. Fill automatic transmission fluid

JAT00056-00000

REMOVAL/INSTALLATION OF VALVE BODY

ARTICLES TO BE PREPARED

	Shape	Part number, part name	Use
		★ 09350-97201-000 Manual valve idler shaft holder	For preventing manual valve idler shaft from dropping
SST		09350-87202-000 Automatic transmission set tool	For hydraulic pressure test
Instrument	Torque wrench		
Lubricant	DEXRON® III or II		

The "★" mark shows a newly provided part.

JAT00057-00040

OPERATIONS PRIOR TO REMOVAL

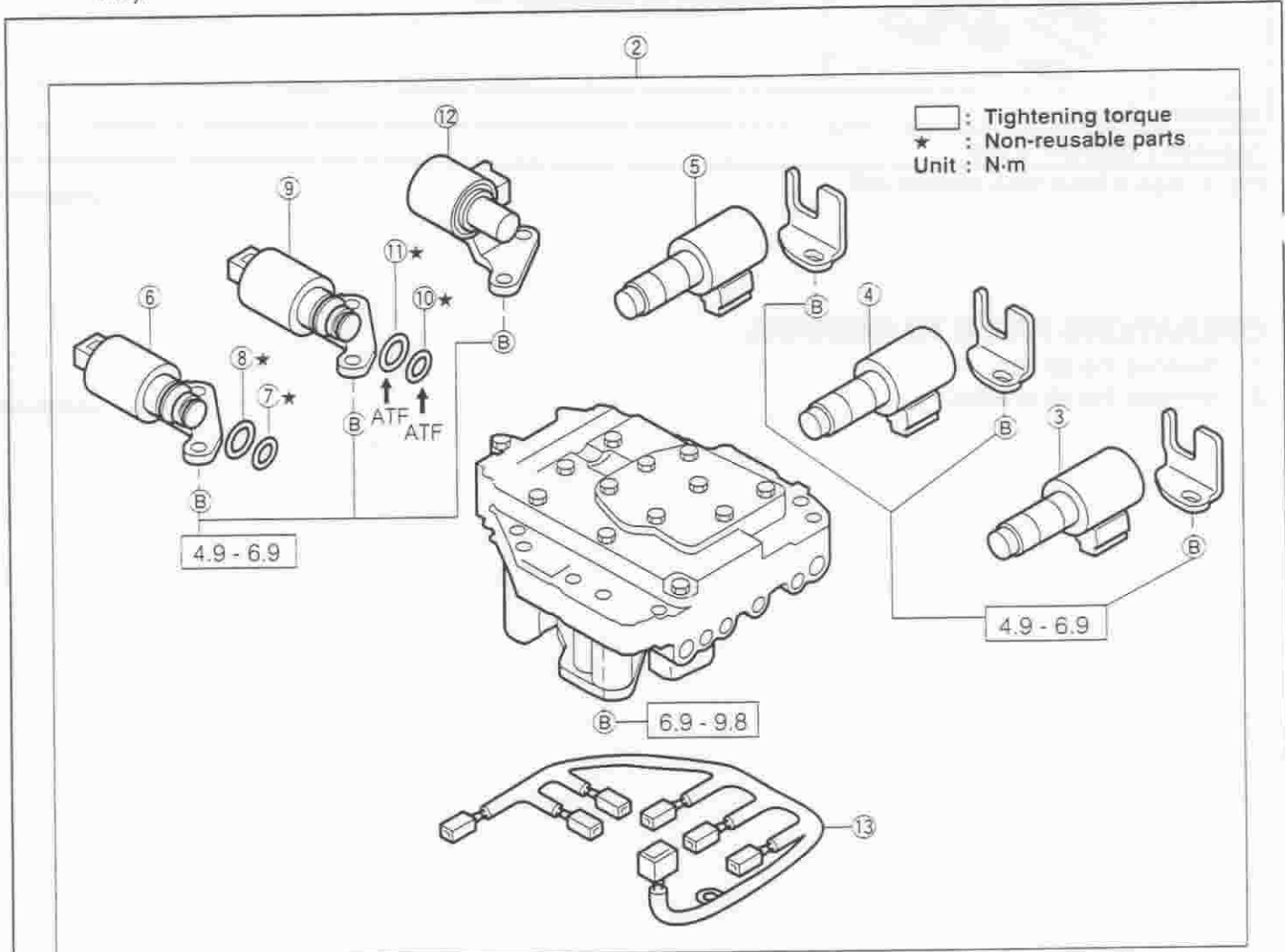
1. Remove the oil pan.
2. Remove the oil strainer.

JAT00058-00000

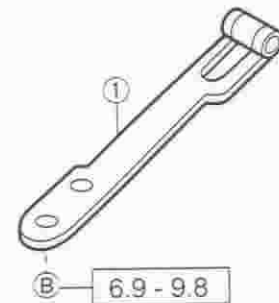
REMOVAL AND INSTALLATION PROCEDURES

NOTE:

- Prior to the operations, be sure to completely remove sands and mud that have adhered to the external of the transaxle so that no foreign matters enter the transaxle.
- Perform the operations at a clean place free of dirt and dust.
- perform the operations with bare hands or by wearing vinyl gloves. Do not use working gloves nor cloth to prevent admission of lints. (Use nylon cloth, or paper cloth.)
- Place removed parts in order at all times. Take a measure to keep them away from dust.
- Thoroughly wash the removed parts before assembling. After drying, apply automatic transmission fluid (DEXRON® III or II). However, do not wash aluminum and rubber parts with alkali chemicals. Never wash rubber parts, such as O-rings, gaskets, oil seals, with cleaning oil (white gasoline or the like).

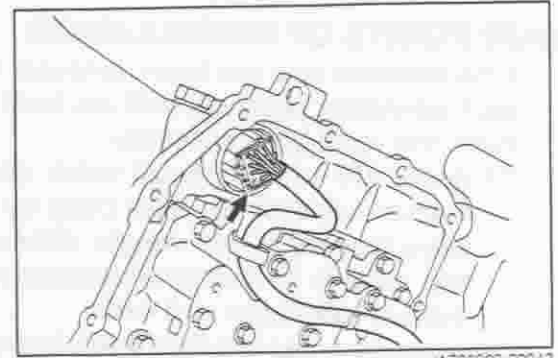


- ① Manual detent spring
- ② Transmission valve body Ay
- ③ Clutch control solenoid Ay No. 3 (C3 & B2 solenoid) (White connector)
- ④ Clutch control solenoid Ay No. 2 (B1 solenoid) (Black connector)
- ⑤ Clutch control solenoid Ay No. 1 (C2 solenoid) (White connector)
- ⑥ Transmission 3-way solenoid Ay (Solenoid relay solenoid)
- ⑦ O-ring
- ⑧ O-ring
- ⑨ Transmission 3-way solenoid Ay (Lockup clutch shift solenoid)
- ⑩ O-ring
- ⑪ O-ring
- ⑫ Lockup clutch control solenoid Ay
- ⑬ Solenoid wire Ay



MAIN POINTS OF REMOVAL

1. Remove the valve body.
 - (1) Disconnect the solenoid connector and solenoid wire connector.

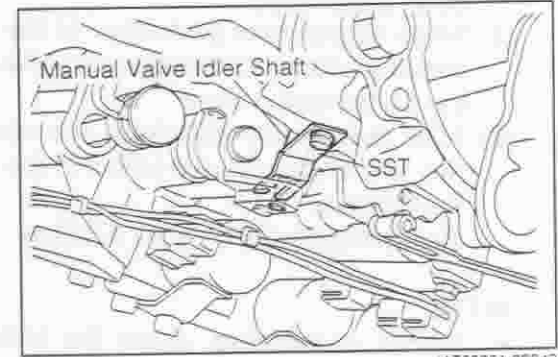


- (2) Support the manual valve idler shaft, using the following SST.

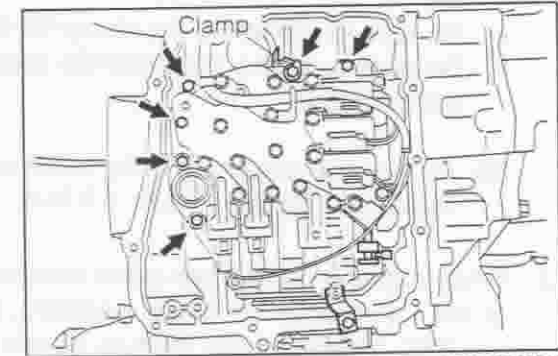
SST: 09350-97201-000

NOTE:

- If the SST is not used, the manual valve idler shaft will drop when the valve body is removed. As a result, it will be difficult to perform re-assembling on the vehicle.

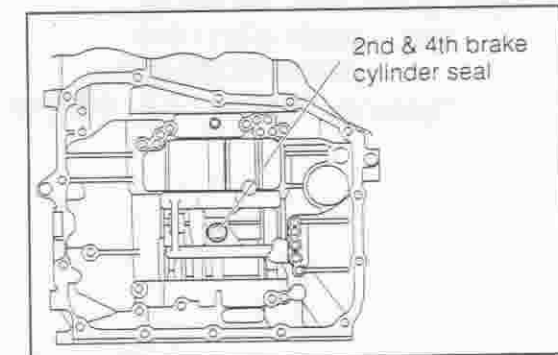


- (3) Remove the manual detent spring by loosening the two bolts evenly.
 - (4) Remove the valve body assembly by loosening the six bolts evenly.

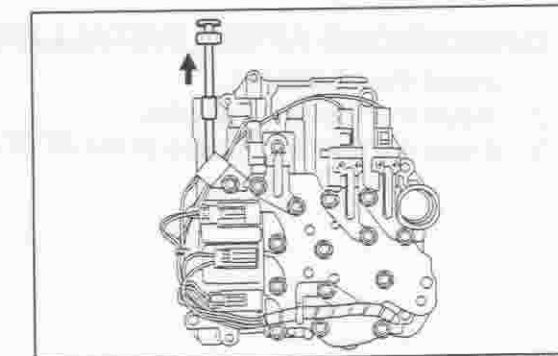


NOTE:

- Care must be exercised as to the possibility that the 2nd & 4th brake cylinder seal may fall during the removal of the valve body.



- (5) Remove gently the manual valve from the valve body assembly.



MAIN POINTS OF INSTALLATION

1. If the solenoid wire has been removed, be sure to connect each connector positively until you hear a clicking sound.
2. Install the valve body assembly.
 - (1) Apply ATF to the manual valve. Gently assemble the manual valve to the valve body by letting the manual valve drop by its own weight. After assembling, ensure that there is no abnormal sticking when you move the manual valve back and forth.
 - (2) Make sure that the 2nd & 4th brake cylinder seal has been assembled.
 - (3) While aligning the protrusion of the manual valve lever with the groove of the manual valve, assemble them in the transmission case.
 - (4) After temporarily attaching the six bolts, tighten the two reference bolts (★ marks in the figure) to the specified torque.

Tightening Torque: 6.9 - 9.8 N·m

NOTE:

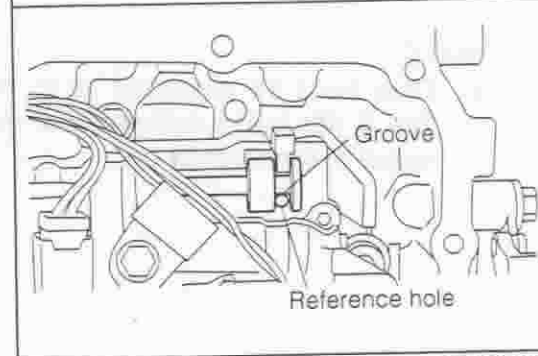
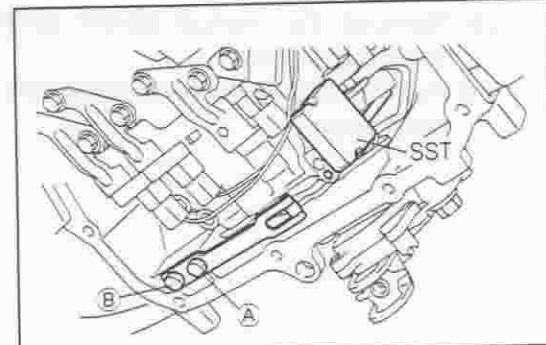
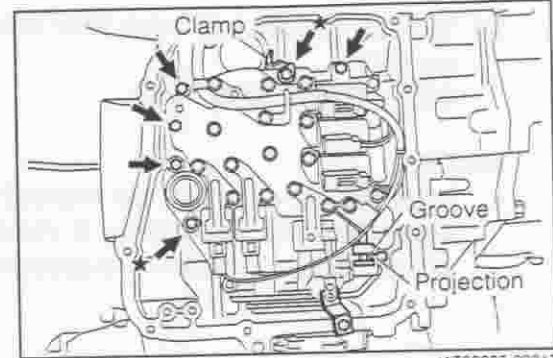
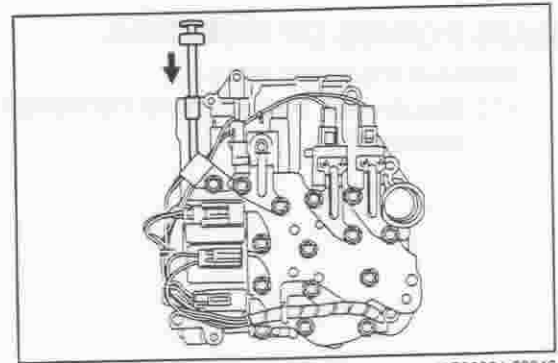
- Before assembling, clean the bolts with compressed air.
- Be sure to assemble the clamp for the solenoid wire.
- Be sure to clamp the solenoid wire to the clamp mentioned above.

- (5) Tighten the remaining bolts to the specified torque.
Tightening Torque: 6.9 - 9.8 N·m

3. While aligning the groove of the manual valve with the hole of the valve body (N range position), by using the following SST, assemble the manual detent spring. Tighten the bolt (A) first, then, the bolt (B).

SST: 09351-87211-000
(09350-87202-000)

Tightening Torque: 6.9 - 9.8 N·m

**OPERATIONS AFTER INSTALLATION**

1. Install the oil strainer.
2. Install the transaxle oil pan.
3. Erase the learning values of the AT ECU.

JAT0067-00000

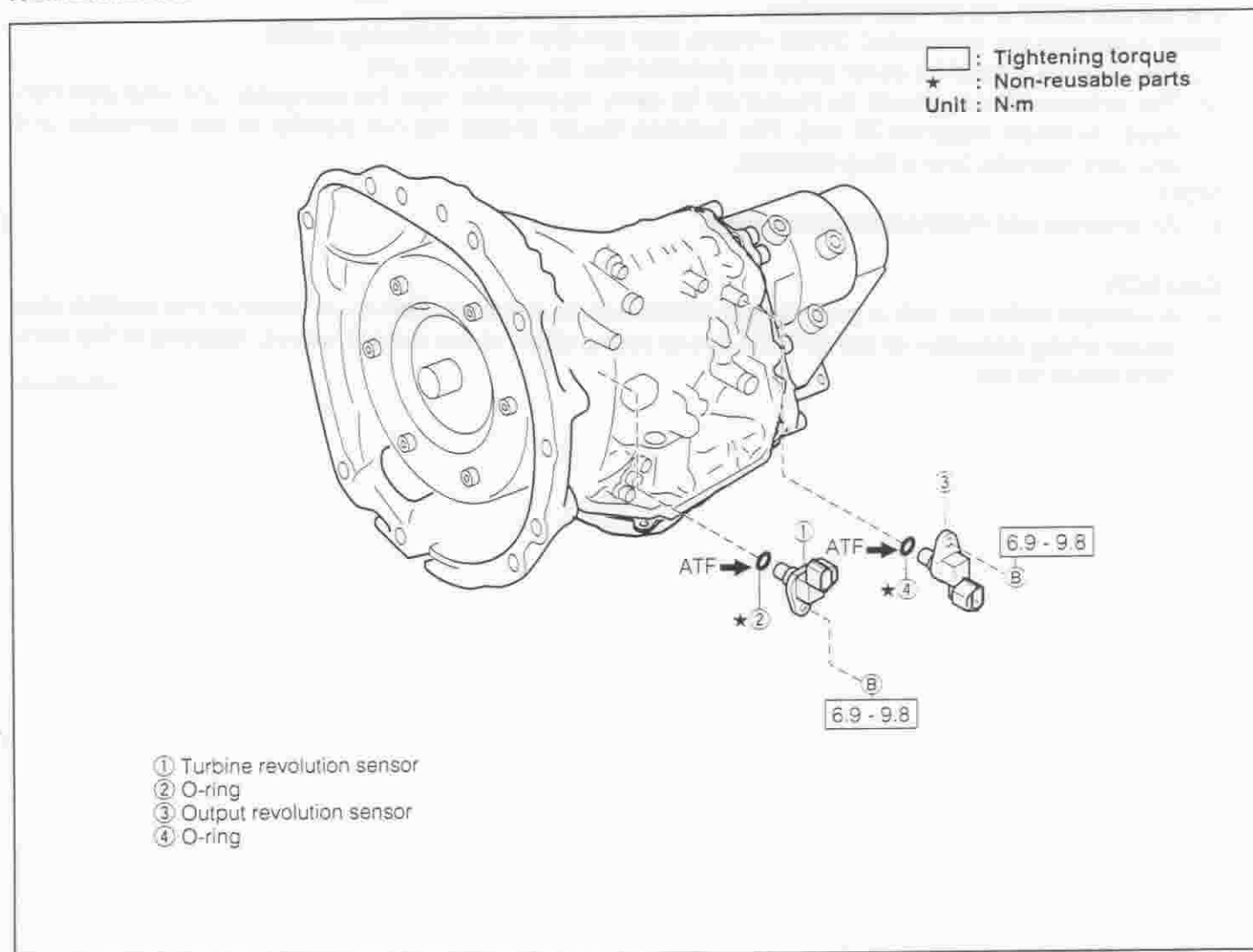
REMOVAL AND INSTALLATION OF TURBINE REVOLUTION SENSOR AND OUTPUT REVOLUTION SENSOR

Articles to be prepared

Lubricant	DEXRON® III or II
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JAT00068-00000

REMOVAL AND INSTALLATION PROCEDURES



ELECTRONIC CONTROL SYSTEM

HANDLING INSTRUCTION OF ELECTRONIC CONTROL SYSTEM

1. The computer unit and sensors are precision parts. Be very careful not to apply great shocks to these parts during the removal and installation.
Do not use any part which has been subjected to a great shock, such as the one which was dropped onto a floor.
2. Care must be exercised as to admission of water during the check on a rainy day or during car washing. Be careful not to allow water to get to the computer unit, sensors, etc.
3. When the computer unit was judged to be abnormal and the vehicle resumes the normal condition after the unit has been replaced, once again install the computer unit which was judged to be abnormal. If you can confirm that the malfunction originally observed is reproduced, you can make a final judgment that the computer unit is malfunctioning.
4. When a wireless set is mounted on the vehicle, pay attention to the following points.
 - (1) The antenna should be as far away as possible from the computer unit.
 - (2) The antenna feeder should be routed as far away as possible from the computer unit and wire harness (minimum distance 30 cm). The antenna feeder should not run parallel to the computer unit and wire harness over a long distance.

NOTE:

- An antenna well matched should be used.

CAUTION:

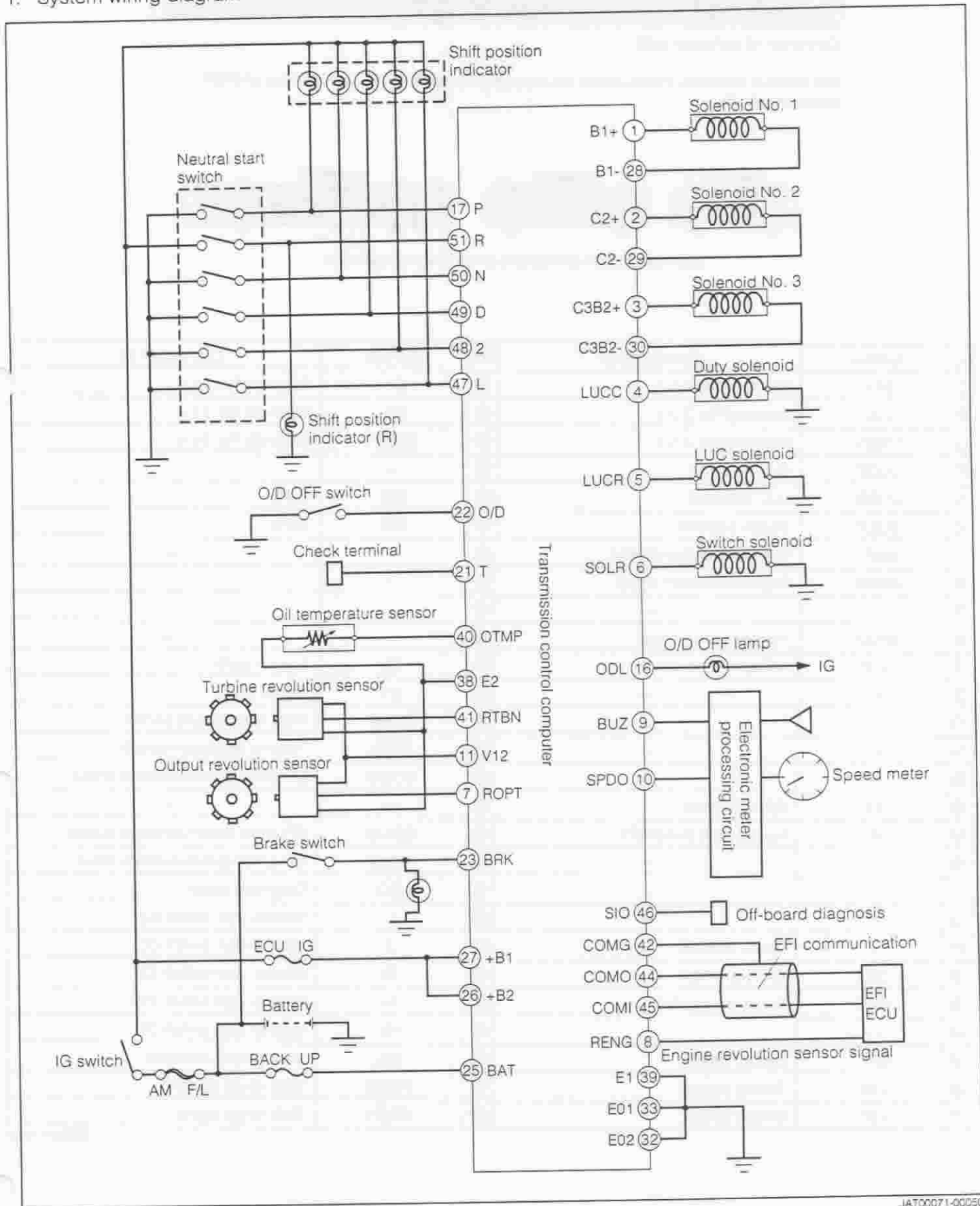
- A wireless radio set with a great output should not be mounted. Failure to observe this caution may cause wrong operation of the AT-ECU due to strong effect of the electric waves, resulting in the vehicle's failure to run.

JAT00070-00000

CHECK OF CONNECTORS, ETC.

System description

1. System wiring diagram



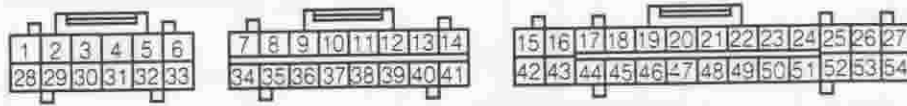
JAT00071-00050

Diagram showing connector terminal arrangement of transmission control computer



Connector at computer side

The terminal numbers shown above are the same as those for the sub-harness and EFI computer check.

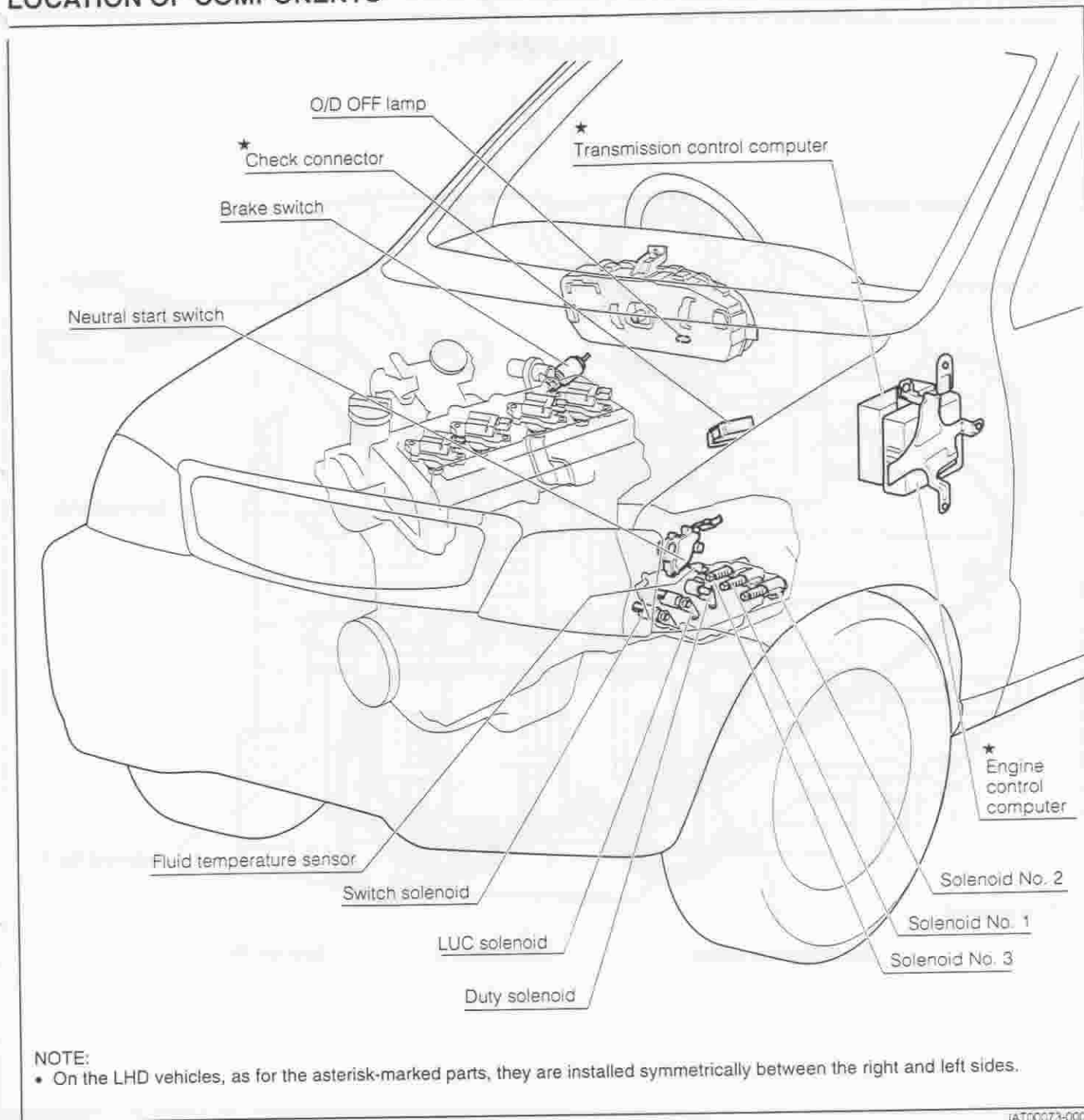


ECU connection connectors at vehicle harness side

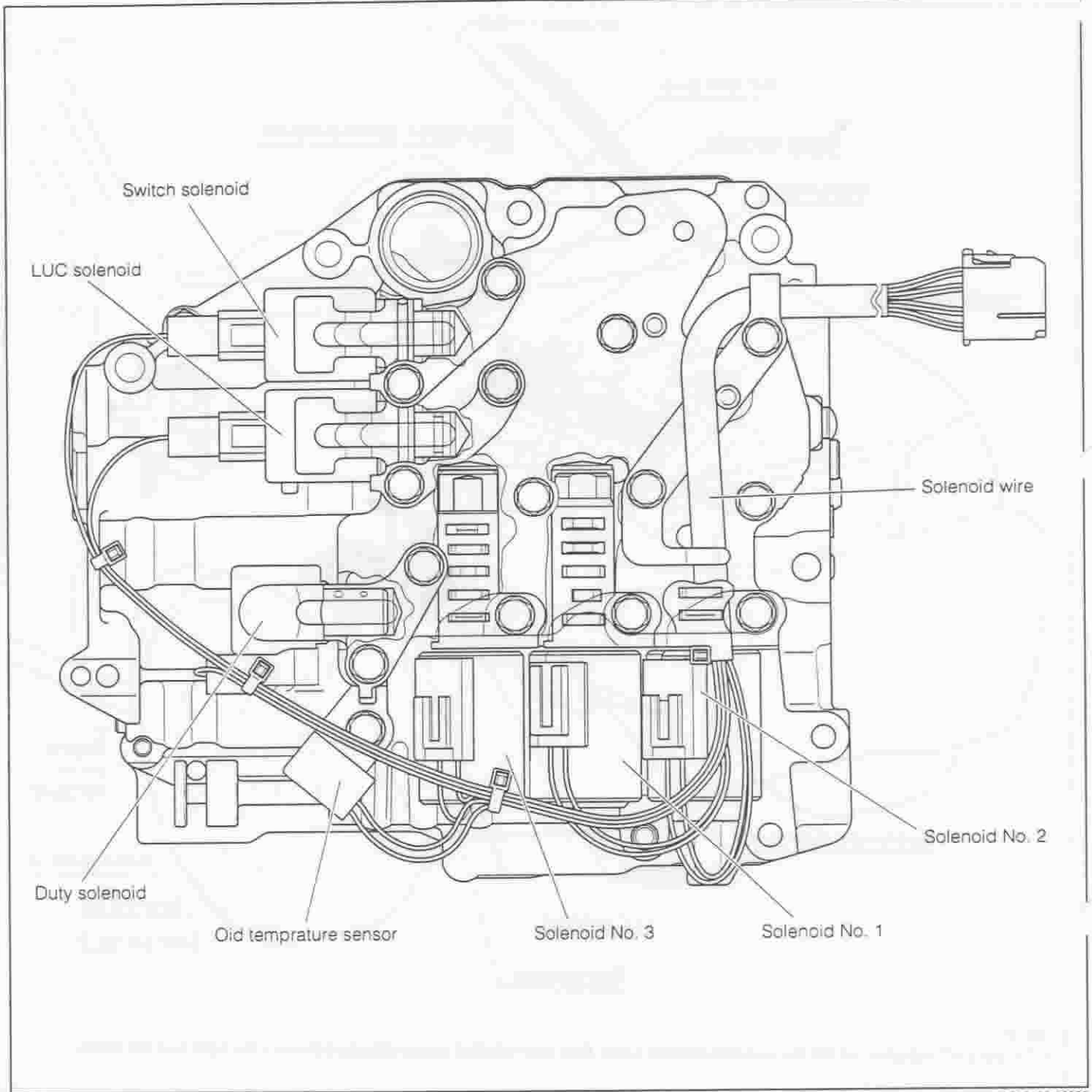
No.	Symbol	Connected to:	No.	Symbol	Connected to:
①	B1+	Solenoid No. 1 (+)	⑳	B1-	Solenoid No. 1 (-)
②	C2+	Solenoid No. 2 (+)	㉑	C2-	Solenoid No. 2 (-)
③	C3B2+	Solenoid No. 3 (+)	㉒	C3B2-	Solenoid No. 3 (-)
④	LUCC	Duty solenoid	㉓	—	—
⑤	LUCR	LUC solenoid	㉔	E02	Earth
⑥	SOLR	Switch solenoid	㉕	E01	Earth
⑦	ROPT	Output revolution sensor	㉖	—	—
⑧	RENG	Engine revolution signal	㉗	—	—
⑨	—	—	㉘	—	—
⑩	SPDO	Vehicle speed signal	㉙	—	—
⑪	V12	A/T sensor power	㉚	E2	Sensor earth
⑫	—	—	㉛	E1	Signal earth
⑬	—	—	④⑩	OTMP	Fluid temperature sensor
⑭	—	—	④⑪	RTBN	Turbine revolution sensor
⑮	—	—	④⑫	COMG	EFI serial communication shield
⑯	ODL	O/D OFF lamp	④⑬	—	—
⑰	P	Neutral start switch (P)	④⑭	COMO	EFI serial communication output
⑱	—	—	④⑮	COMI	EFI serial communication input
㉀	—	—	④⑯	SIO	Diagnosis tester
㉁	T	Check terminal	④⑰	L	Neutral start switch (L)
㉂	O/D	O/D cut switch	④⑱	2	Neutral start switch (2)
㉃	BRK	Brake lamp switch	④㉀	D	Neutral start switch (D)
㉄	—	—	④㉁	N	Neutral start switch (N)
㉅	BAT	Battery power	④㉂	R	Neutral start switch (R)
㉆	+B2	Battery power	④㉃	SEL	Shift lamp illuminated
㉇	+B1	Battery power	④㉄	RNG2	Shift range signal 2
			④㉅	RNG1	Shift range signal 1

JAT00072-00051

LOCATION OF COMPONENTS



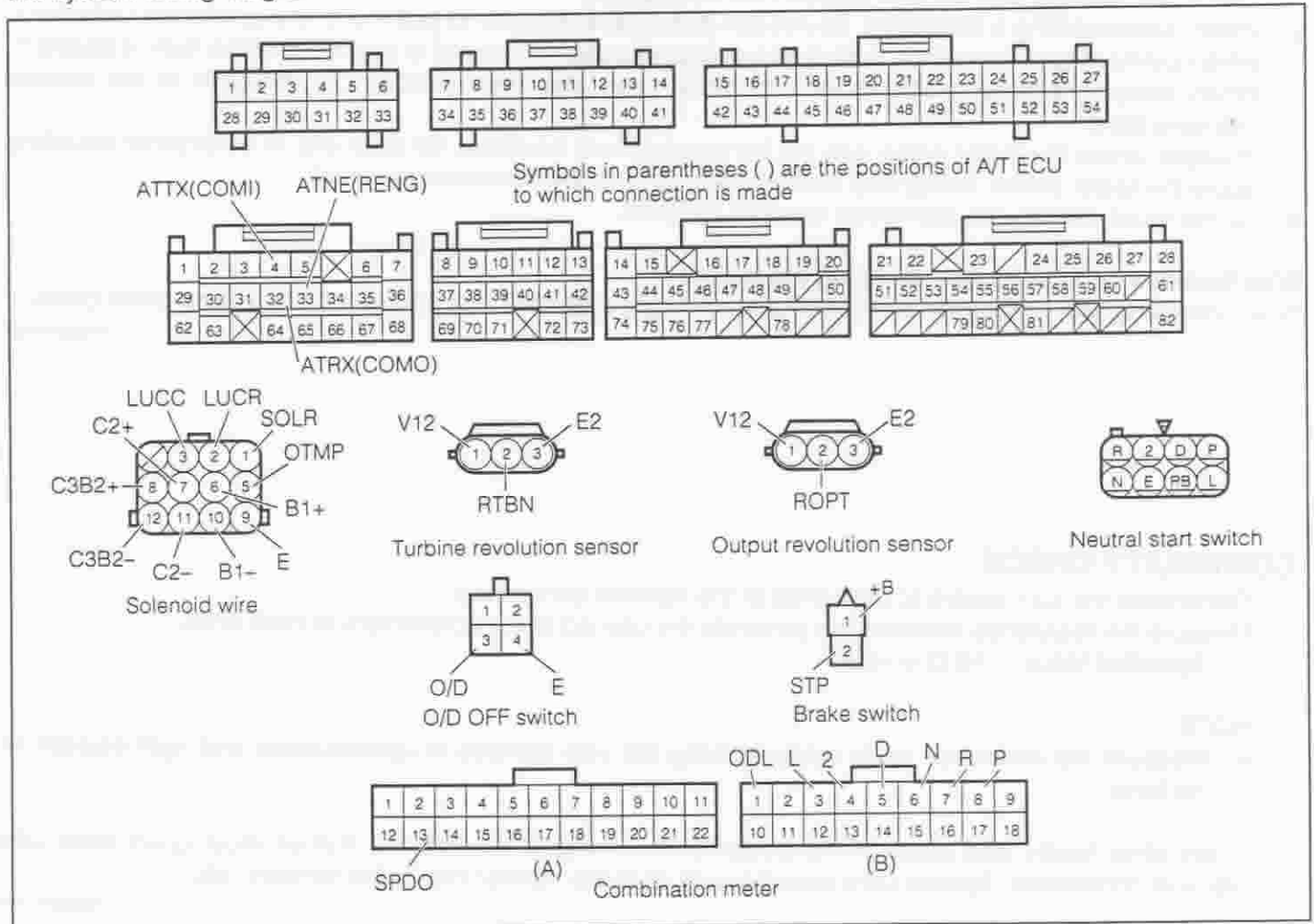
LOCATION OF COMPONENTS (VALVE BODY SECTION)



JAT00168-0093

DIAGRAM SHOWING ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS

For the terminal names of the vehicle harness side connector of the transmission control computer, refer to the system wiring diagram.



JAT00074000053

ARTICLES TO BE PREPARED

	Shape	Part number, part name	Use
SST		09842-97205-000 Transmission control computer check sub-harness	Transmission control computer check
		09991-87404-000 Engine control system inspection wire	Start and erasure of diagnosis
		09991-87403-000 Diagnosis check wire	Start and erasure of diagnosis
		09990-97201-000 A/T solenoid wire check sub-harness	For in-vehicle check of solenoid wires instruments
Instrument	Tester, Oscilloscope, DS-21 diagnosis tester		

JAT00135-00076

OPERATING INSTRUCTIONS

Handling of connectors

1. Before disconnecting a connector from its terminal or connecting it, turn OFF the IG switch or disconnect the negative (-) terminal of the battery. Otherwise, the computer will judge that an open wire occurs in the harness and fail safe function will be applied.
2. When disconnecting a connector, do not pull its harness. Be sure to pull it with the connector unlocked. When connecting a connector, push it securely until a clicking sound is emitted and the lock is applied.
3. When applying a tester probe to the connector, insert the tester probe from the back of the coupler (harness side).
In cases where the tester probe can not be inserted from the back, for example, in waterproof couplers, apply the tester probe, being very careful not to deform the connector terminal.
4. Do not touch directly the connector terminal by hand.

Wire harness and connector checking procedure

When checking wire harnesses and connectors during a system check, follow the procedure given below.

JAT00075-00000

CONTINUITY CHECK

1. Disconnect the connectors at both ends of the harness concerned.
2. Measure the resistance between the terminals concerned of the connectors at both ends.
Specified Value: 10 Ω or less

NOTE:

- Measure the resistance while lightly shaking the wire harness in up-and-down and right-and-left directions.

Open wires hardly take place at the center of the wiring of the vehicle. Rather, most open wires take place at connectors. Special care must be paid as to the connectors of the sensors, etc.

JAT00076-00000

CHECK OF SHORT

1. Disconnect the connectors at both ends of the harness concerned.
2. Measure the resistance between the terminals concerned of the connectors at both ends.
Specified Value: 1 M Ω or more

NOTE:

- Measure the resistance while lightly shaking the wire harness in up-and-down and right-and-left directions.

3. Measure the resistance between the terminal of the connector concerned and a terminal which is in the same connector as that one (except between the power systems, or between earth systems). Perform the check at the connectors at both ends.
Specified Value: 1 M Ω or more

NOTE:

- Some short circuits are produced by wires of the vehicle interior which are caught by the body, or by faulty clamps.

JAT00077-00000

VISUAL INSPECTION AND CONTACT PRESSURE CHECK

1. Disconnect the connectors at both ends of the harness concerned.
2. Visually check that there is no rust formation nor admission of foreign matters at the connector terminals.
3. Ensure that staked sections exhibit no looseness nor damage. Also ensure that the wire harness will not be pulled off when you pull lightly the wire harness from the coupler.
4. Prepare the same terminal as the male terminal of the connector terminal. Insert this terminal into the female terminal. Check the pulling force. When some terminals have a smaller pulling force compared with other terminals, these terminals may have poor contact.

NOTE:

- When terminals have rust formation, admission of foreign matters, or poor contact due to a drop of the contact pressure between the male and female terminals, such problems sometimes are solved by removing the connectors and installing them again. Hence, first check the wire harnesses and connectors. If they are normal, confirm the malfunction phenomenon again. If the malfunction is no longer reproduced, you may conclude that the wire harnesses and connectors were causing the problem.

JAT00078-00000

POWER SUPPLY CIRCUIT CHECK

Checking procedure

Perform the power supply circuit check during the check according to the system, following the procedure given below. Repair any faulty circuit or connector. If they are normal, replace the computer unit.

1. Visual check and contact pressure check of computer unit connectors
Check the connectors of the computer unit.
2. Earth circuit check of computer unit
Disconnect the connector of the computer unit. Measure the resistance between each earth terminal and the body earth.
Specified Value: 10 Ω or less
3. Power supply circuit check of computer unit
Disconnect the connector of the computer unit. Measure the voltage between each power supply terminal and the body earth.
Specified Value: Battery voltage

NOTE:

- During the check of the computer unit, some problems are solved by disconnecting connectors, for this operation can change the contact state of the terminals. Therefore, if the check results of the computer unit circuit suggest the possibility of the computer units fault, first connect the computer unit connector again and see if the problem still persists. Then, consider whether the computer unit is normal or malfunctioning.
- Measurements by the diagnosis tester are also possible.

JAT00079-00000

DIAGNOSIS CHECK

When any malfunction takes place in the input or output system of the computer, the O/D OFF light flashes. In this case, you can know the content of the malfunction in the following way.

1. Checking method without using diagnosis tester

(1) How to display diagnosis codes

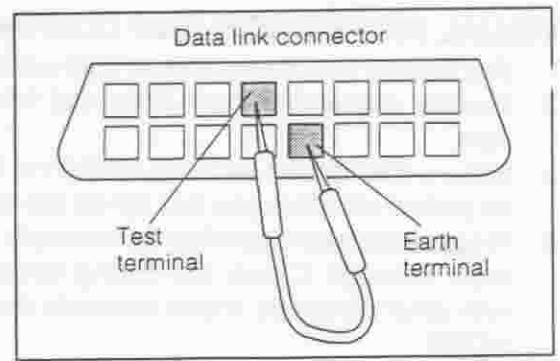
With the ignition switch turned ON, short the test terminal of the DLC (data link connector) located under the glove box with the earth terminal. Then, the O/D OFF light flashes in a certain pattern according to the content of the malfunction.

You can know the diagnosis codes from that flashing pattern by referring to the attached table.

When there are more than one diagnosis codes, these codes are repeatedly displayed one by one.

CAUTION:

- Never short an undesignated terminal, for it will cause malfunction.
- When the check terminal is shorted, the warning lamps other than that of the electronically-controlled A/T system will flash. However, it does not mean that the system is malfunctioning.



JAT00C80-0007 1

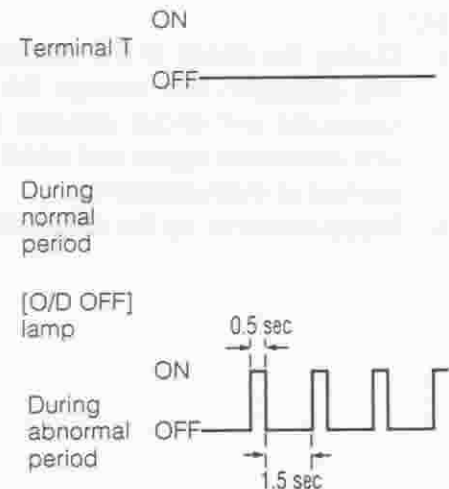
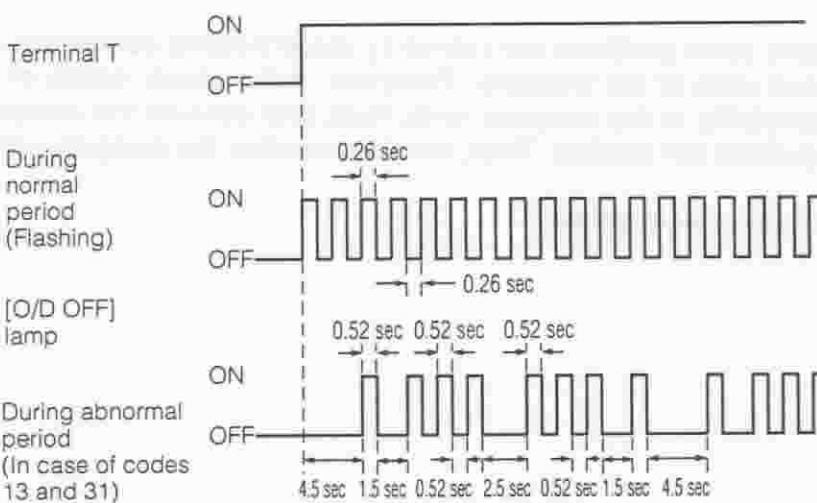
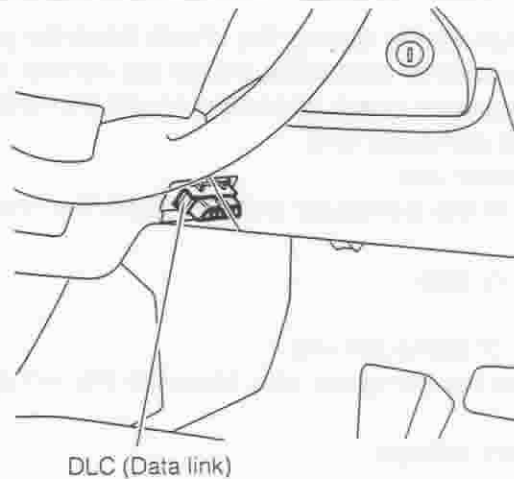


Illustration 2 (Warning function)

JAT00130-00072

(2) How to erase diagnosis code

To erase the diagnosis codes after completion of repair, turn OFF the ignition switch and keep the backup fuse removed at least 30 seconds. (Illustration 2)

NOTE:

- When the backup fuse is removed, the memories in the radio and clock are reset. You need to set them again.

JAT00132-00073

2. Checking method by using diagnosis tester

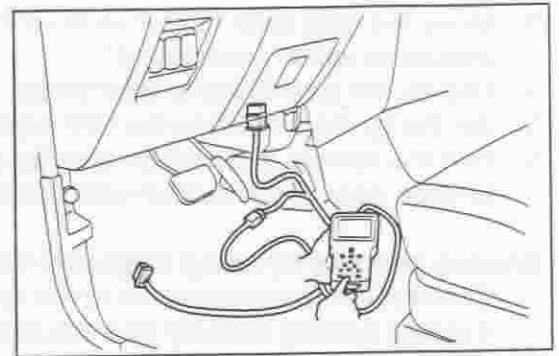
(1) How to display diagnosis codes

Connect the DS-21 diagnosis tester or general diagnosis tester to the DLC (Data link connector) located under the glove box.

When you select the diagnosis code display menu of the diagnosis tester, the diagnosis code will be displayed.

CAUTION:

- Before connecting/disconnecting the DLC with/from the diagnosis tester, be sure to turn OFF the ignition switch and switch off the power of the diagnosis tester. If connection/disconnection is made with the power switched on, the diagnosis tester may be damaged.



JAT00133-00074

NOTE:

- As for how to use the diagnosis tester, see the instruction manual of the diagnosis tester.

(2) How to erase diagnosis code

You can erase the diagnosis codes after completion of repair, by going to the diagnosis code erasing menu. For further details, see the instruction manual of the diagnosis tester.

ERASING LEARNING VALUES OF TRANSMISSION CONTROL COMPUTER

Erasing memory without using diagnosis tester

When the automatic transaxle assembly and valve body assembly (including the solenoid valve) have been replaced, it is necessary to erase the learning values of the transmission control computer. To erase the learning values, follow the procedure given below.

Erasing memory without using diagnosis tester

1. Short the terminal ECUT with the terminal E in the check connector. (Refer to page AT-34)
2. Depress the brake pedal within three seconds after the ignition switch is set to the ON position (without starting the engine). Keep the brake depressed, until the operations in the steps 3 and 4 are completed.
3. Move the shift lever from P → R → P within one second. (The time spent for moving from P → R → P should be within one second.)
4. Repeat the step 3 above eight times.
5. Set the ignition switch to the OFF position. Set the ignition switch to the ON position again.
6. Run the vehicle in an urban area for about fifteen minutes. (Go through all operations, such as shifting to each gear and kickdown operations.)

Erasing memory by using diagnosis tester

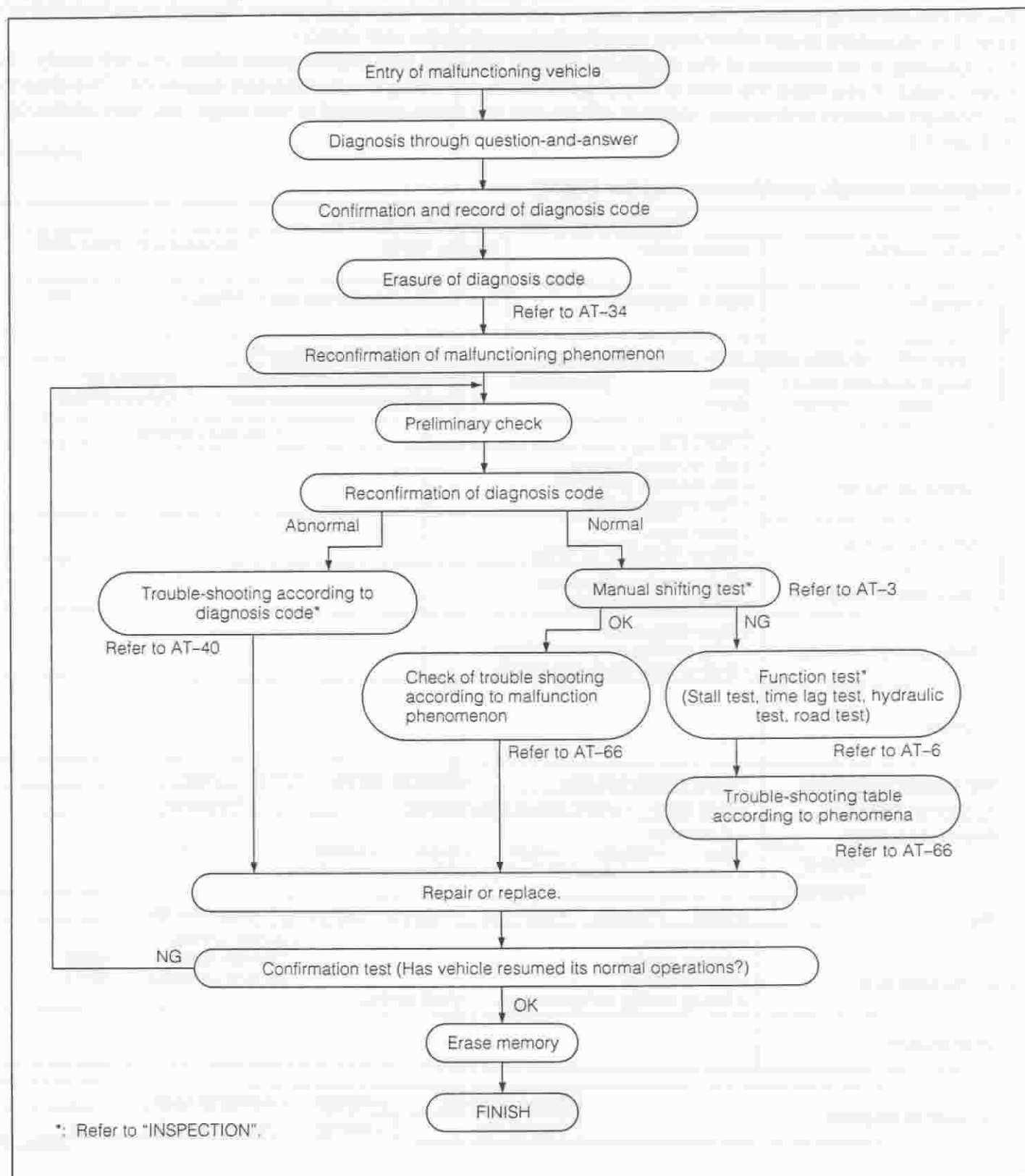
1. Connect the diagnosis tester to the vehicle. Set the ignition key to the ON position.
2. Execute Erasing memory from the individual function of the diagnosis tester.
3. Set the ignition switch to the OFF position. Remove the diagnosis tester. Set the ignition switch to the ON position.
4. Run the vehicle in an urban area for about fifteen minutes. (Go through all operations, such as shifting to each gear and kickdown operations.)

JAT00136-00000

TROUBLE-SHOOTING

TROUBLE-SHOOTING PROCEDURES

The engine control system is equipped with the diagnosis function which diagnoses the malfunctioning points. This gives important clues when performing the trouble shooting. The diagnosis of this system is provided with the battery backup function (function which supplies power for the diagnosis memory even when the ignition switch is turned OFF).



DIAGNOSIS THROUGH QUESTION-AND-ANSWER

When you try to remove the cause of a malfunction that is occurring in the vehicle, if you have not confirmed the malfunction phenomenon, you can not pinpoint the cause and the vehicle may not resume the normal condition in spite of your efforts. The purpose of diagnosis through question-and-answer is to collect information from the customer before you confirm the malfunction phenomenon. The diagnosis through question-and-answer gives you an important clue to reproducing the malfunction phenomenon.

Furthermore, the information obtained in the diagnosis through question-and-answer will be very helpful in the trouble-shooting process. Therefore, rather than merely performing diagnosis through question-and-answer, it is necessary to get information specifically regarding the malfunction.

The following is an example of the diagnosis through question-and-answer sheet which you will surely find it very useful. If you make the most of this sheet, it will avoid failing to ask important questions. (The diagnosis through question-and-answer sheet of JIS A4 size has been provided at this page. You may photocopy and use it.)

JATCG082-0000

[Diagnosis through question-and-answer Sheet]

Diagnosis through question-and-answer sheet				
Name of customer		Vehicle model	Engine: K3-VE	Transmission: 4WD, 2WD
Details of vehicle	Frame No.	Date of registration	Date when malfunction took place	Mileage km
	Equipment: Tire [Bias, radial, snow, spike, other ()] Wheel [steel, aluminum]			
	[Sex] of customer (driver) Male Female	[Age] about	[Occupation]	[Principal area where vehicle is used] Town/suburb/seashore/mountain/other
Symptom	Phenomena		Concrete contents	
	Vehicle will not run.	<ul style="list-style-type: none"> • Will not move forward. • Will not move backward. • Poor engine starting 		
	Abnormal running	<ul style="list-style-type: none"> • Clutch slips. • Moves off at [P] or [N] range. 		
	Faulty gear shifting	<ul style="list-style-type: none"> • Shifting will not take place. • Shifting point deviated. 		
	Shifting shock, time lag	<ul style="list-style-type: none"> • Big shifting shock • Long time lag at time of shifting • Engine races up during shifting. 		
	Others			
When malfunction began to occur		<ul style="list-style-type: none"> • Since vehicle was new • Recently (since month year) 		
Occurrence frequency		<ul style="list-style-type: none"> • At all times • Under certain circumstance () • Frequently 		
Meteorological conditions		<ul style="list-style-type: none"> • At all times • Fine • Cloudy • Rain • Snow • Others () • Temperature (about°C) (Spring, summer, autumn, winter) 		
Road		<ul style="list-style-type: none"> • Town • Suburb • High way • Mountainous road (climbing, downhill) 		
Driving conditions		<ul style="list-style-type: none"> • No relations • During starting • During racing • During turning (• Right turning • Left turning) • During running (Vehicle speed: km/h) (Engine revolution: rpm) 		
Other situation				
Indication of diagnosis		During checking	<ul style="list-style-type: none"> • Normal • Abnormal code () 	
		Second time	<ul style="list-style-type: none"> • Normal • Abnormal code () 	

JATCG083-0000

CONFIRMATION OF PHENOMENON

When performing the trouble-shooting, it is impossible to pinpoint the cause, unless first the operator confirms the phenomenon. In order to confirm the phenomenon, it is indispensable to reproduce the malfunction phenomenon concerned by producing the conditions and environment similar to those where the malfunction took place, based on the information obtained at the time of the diagnosis through question-and-answer.

As for the phenomenon which is difficult to reproduce, it is necessary to produce the situation close to the running conditions where the malfunction took place (road conditions, meteorological conditions and driving conditions), based on the information obtained at the time of the diagnosis through question-and-answer. To this end, it is of great importance to produce the phenomenon perseveringly by applying external factors, such as vibration (moving wire harnesses or relays by hands), heat (applying hot wind) and water (giving humidity).

JAT00084-00000

RE-CHECK OF DIAGNOSIS CODE

Re-check the diagnosis code after confirmation of the malfunction phenomenon. In this way, it is possible to judge whether the system for which the code was indicated before confirmation is now functioning properly or the malfunction still persists.

1. In cases where the malfunction takes place at time of re-confirmation and the abnormality code still persists even after the re-confirmation, perform the trouble-shooting according to the codes.
2. In cases where the malfunction took place but the normal code is now indicated after the re-confirmation, most likely the malfunction is caused by systems other than the diagnosis system. Therefore, perform the checks described in the trouble shooting table on the next page or the checks of trouble shooting according to malfunction phenomenon (Refer to AT-68).
3. In cases where no malfunction took place and the normal code is indicated after the confirmation, most likely the harness or connector sections had malfunctions, such as poor contact in the past, but now those sections are functioning normally.

Therefore, check the system for which the code was indicated before confirmation of the phenomenon.

JAT00085-00000

TROUBLE SHOOTING ACCORDING TO DIAGNOSIS CODE

LIST OF DIAGNOSIS CODES

Diagnosis code		Warning Indication	Code memory	Contents of malfunction	See page
4 digits*	2 digits				
P0705	55	○	×	No neutral start switch input	AT-44
P0705	56	○	○	Multi input of neutral start switch	AT-44
P0710	38	○	○	Open wire or short of fluid temperature sensor circuit	AT-60
P0711	38	○	○	Abnormal rising characteristics of fluid temperature of fluid temperature sensor	AT-60
P0715	37	○	○	No turbine revolution input	AT-62
P0720	42	○	○	No output revolution input	AT-42
P0725	86	○	○	No engine revolution input	AT-46
P0753	61	○	○	Open wire or short of solenoid No. 1 (B1) circuit	AT-48
P0758	62	○	○	Open wire or short of solenoid No. 2 (C2) circuit	AT-50
P0763	63	○	○	Open wire or short of solenoid No. 3 (C3/B2) circuit	AT-52
P0768	64	○	○	Open wire or short of duty solenoid circuit	AT-54
P0773	65	○	○	Open wire or short of LUC solenoid circuit	AT-56
P1602	82	○	○	Faulty communication with EFI-ECU	AT-58
P1703	72	○	○	Lockup revolution speed not matching	AT-41
P1780	66	○	○	Open wire or short of switch solenoid circuit	AT-64

* Denotes those output code when the DS-21 is used.

JAT00087-00000

DIAGNOSIS CODE NO. P1703

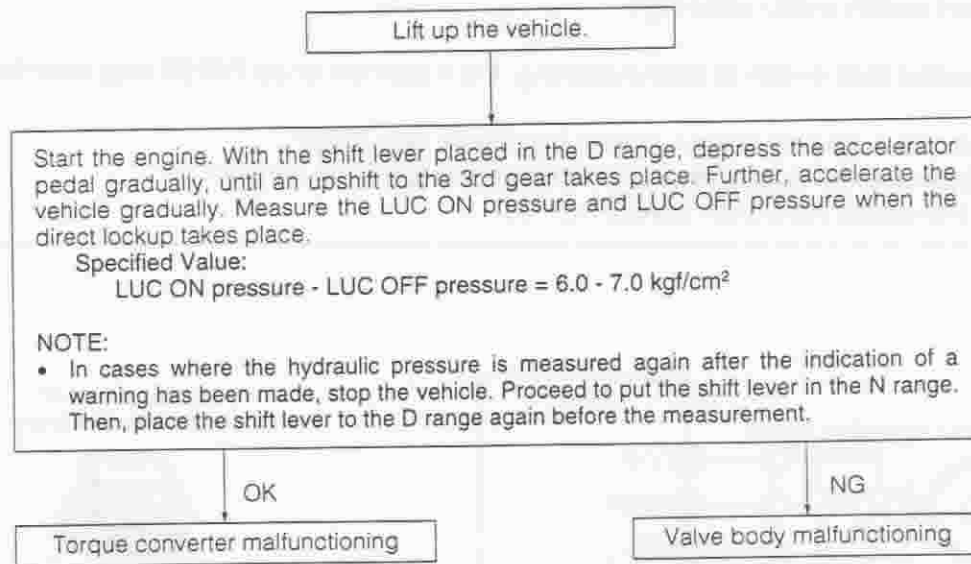
1. The diagnosis code No. P1703 is outputted from the A/T ECU if the engine revolution speed differs greatly from the turbine revolution speed when the torque converter is operating in the direct lockup state.

Checking points

1. Is the valve body assembly normal?
2. Is the torque converter assembly normal?

JAT00115-00000

Checking method



JAT00116-00000

DIAGNOSIS CODE NO. P0720

1. The diagnosis code No. P0720 is outputted when ECU of A/T evaluates that malfunction has occurred in the output rotation sensor.

Evaluation Conditions:

When the vehicle is running at a speed of 5 km/h or more, the present vehicle speed is compared with that 16 ms before. If deceleration exceeds a certain level, it is evaluated that the output revolution sensor is malfunctioning, thereby outputting the diagnosis code No. P0720.

JAT00089-00000

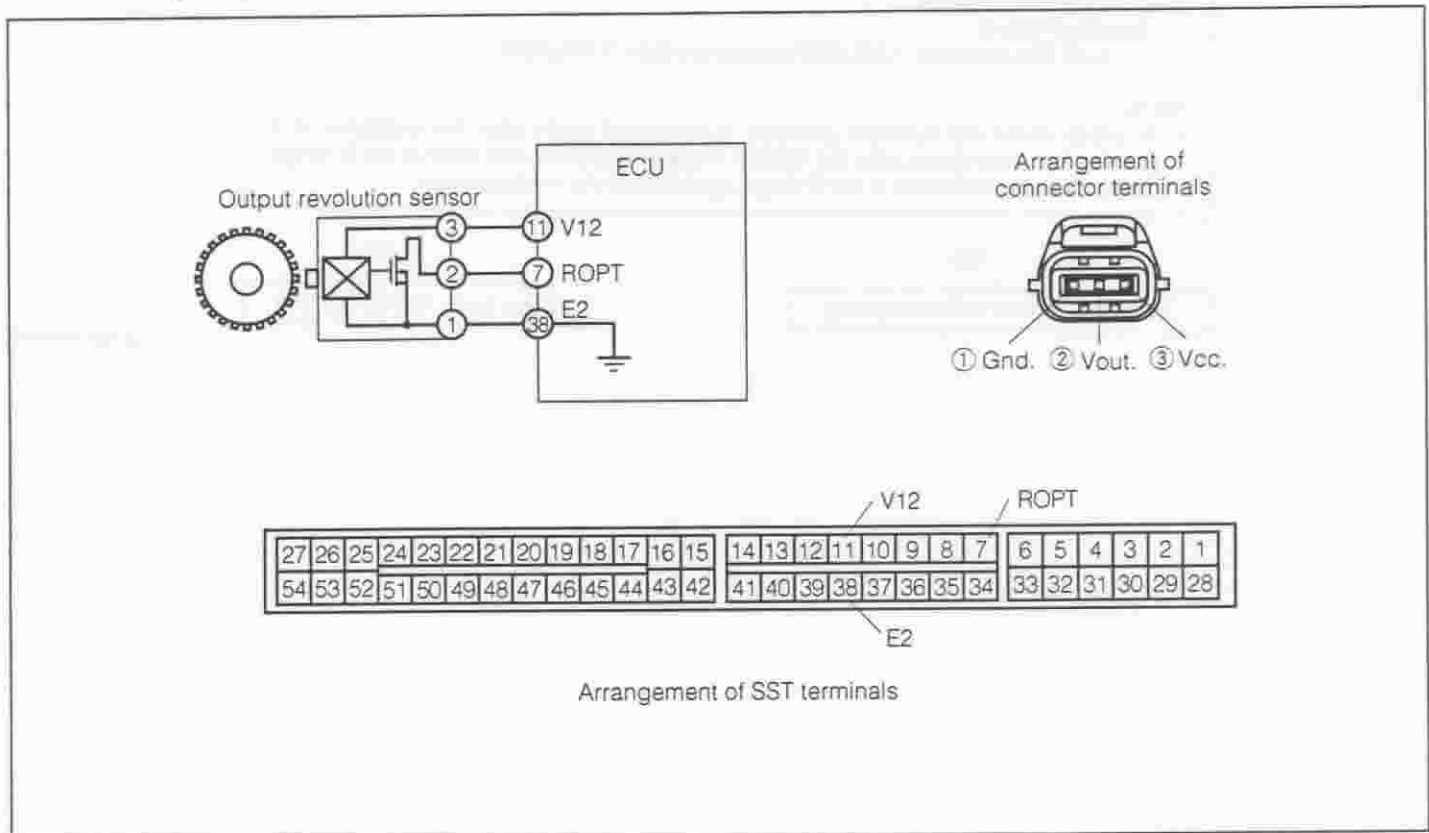
Checking points

1. Is the neutral start switch malfunctioning?

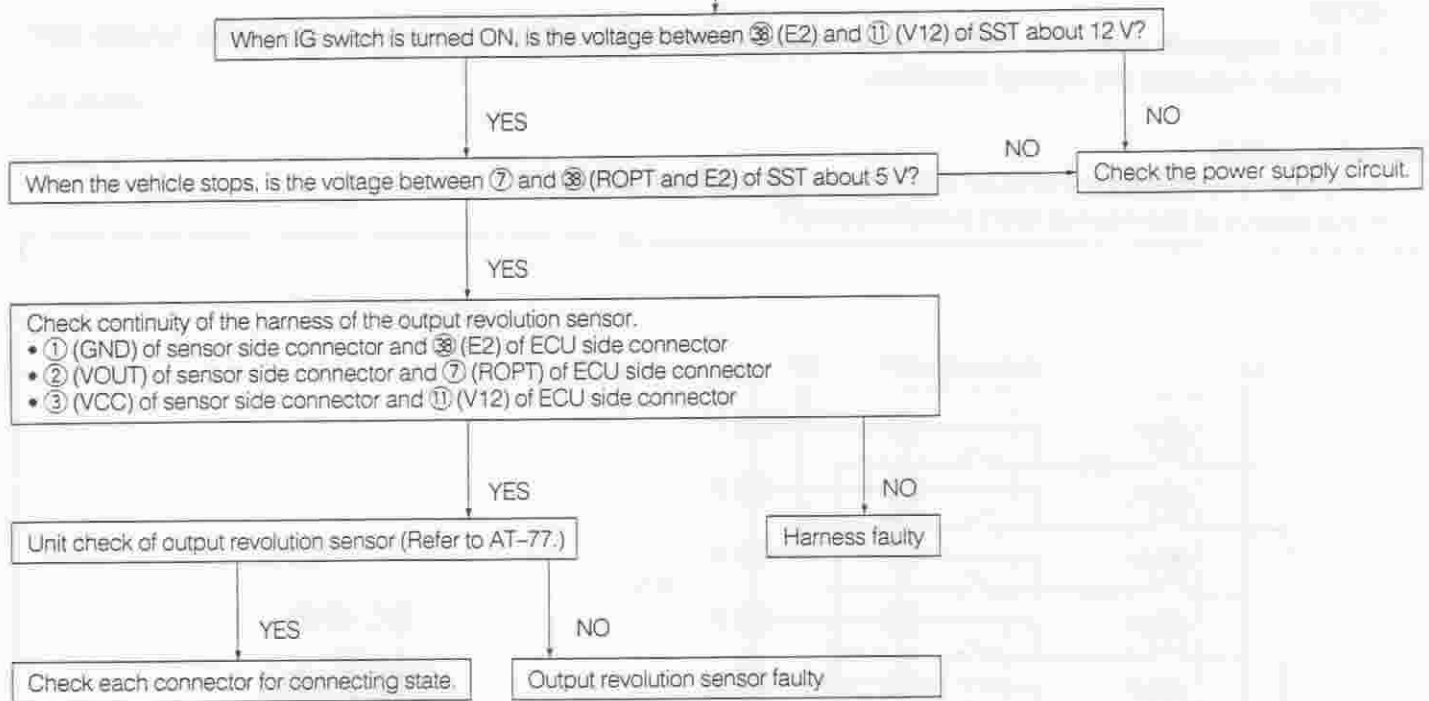
NOTE:

- When the neutral start switch is malfunctioning, the diagnosis code P0720 may also be outputted.

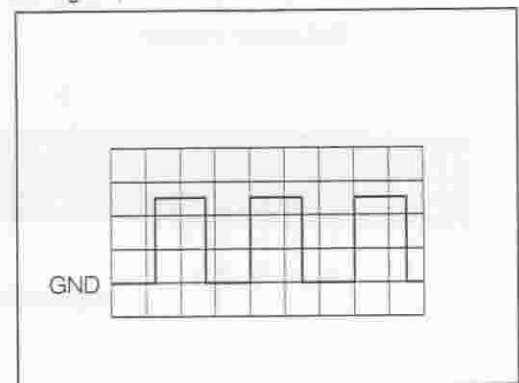
2. Is the signal from the output revolution sensor inputted to the ECU?
3. Is the harness between the output revolution sensor and the ECU normal?
4. Is the output of the output revolution sensor normal?



JAT00089-00054



Waveform of voltage between E2 and ROPT during output revolution



JAT00090-00055

DIAGNOSIS CODE NO. P0705

- The vehicle can resume to the normal condition.
The diagnosis code No. P0705 is outputted from the A/T ECU when abnormality takes place in the input from the neutral start switch.

Evaluation Conditions:

The diagnosis code No. P0705 is outputted when no signal is available from the neutral start switch for 2 seconds or more, or when more than one signals are inputted from the neutral start switch for 2 seconds or more.

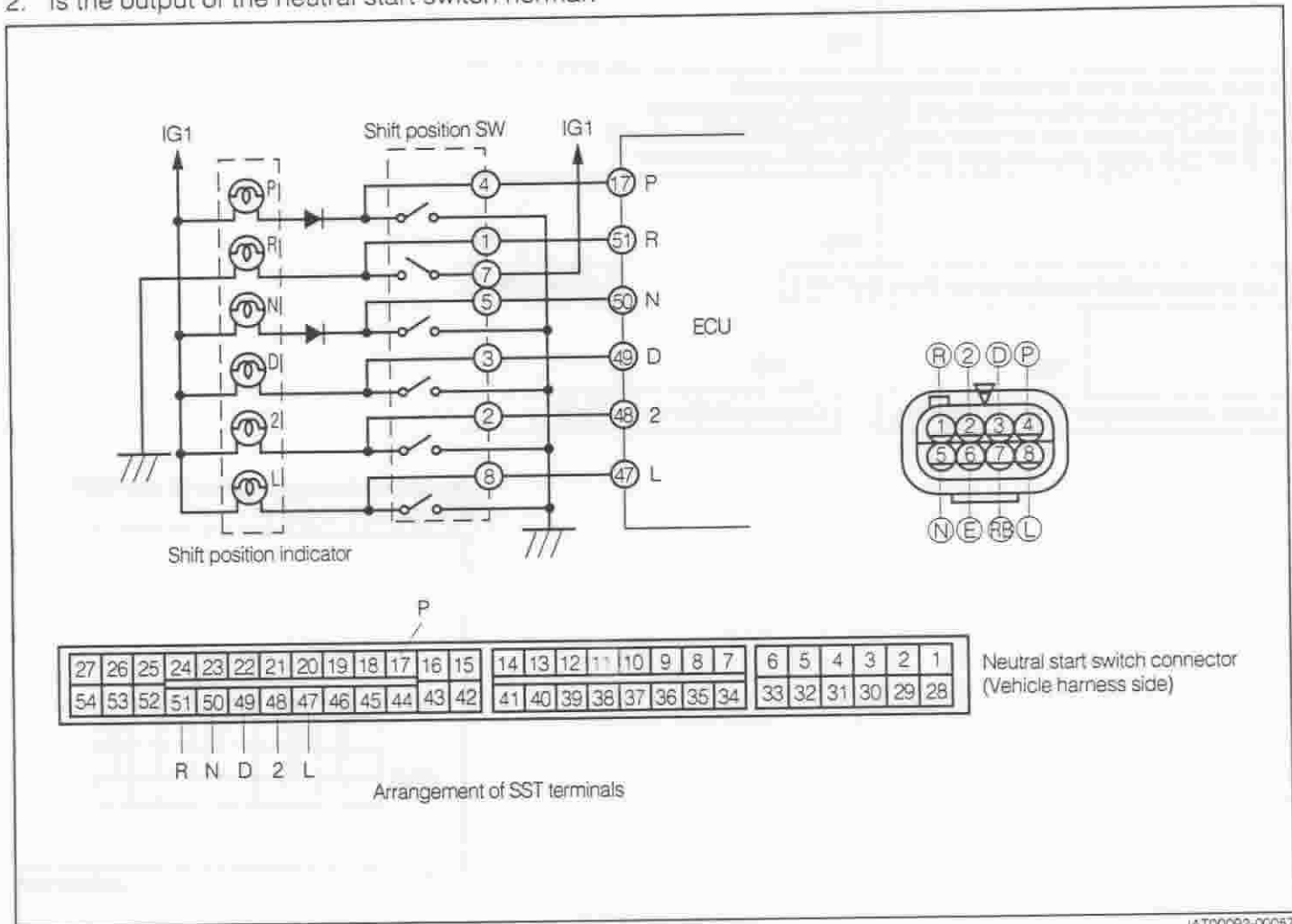
NOTE:

- The diagnosis code No. P0705 is not memorized in the ECU. It is erased when the neutral start switch resumes the normal condition.

JAT00091-00000

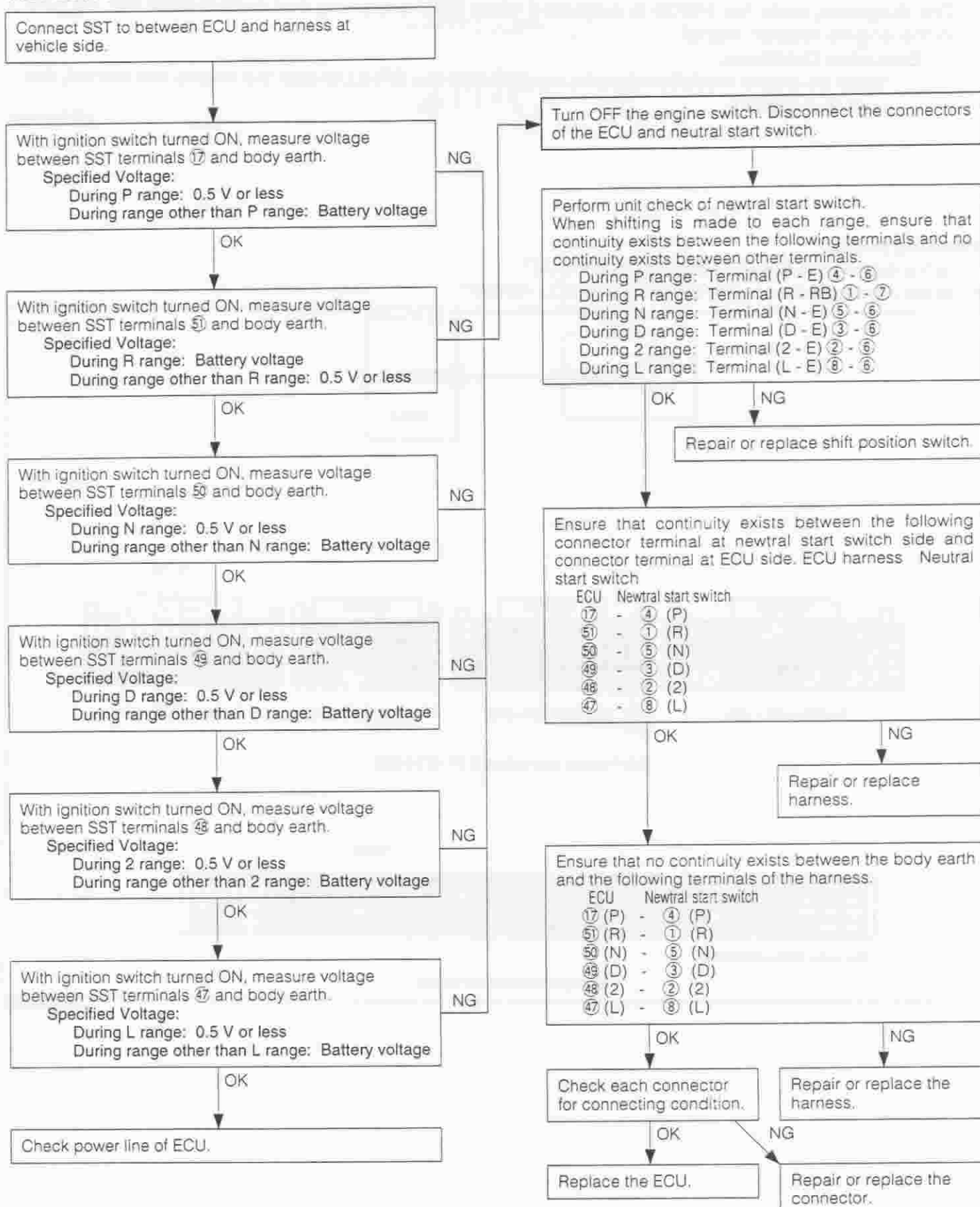
Checking points

- Is the harness between the ECU and the neutral start switch normal?
- Is the output of the neutral start switch normal?



JAT00092-00057

INSPECTION PROCEDURE



DIAGNOSIS CODE NO. P0725

1. The diagnosis code No. P0725 is outputted when ECU evaluates that malfunction has occurred in the engine rotation signal.

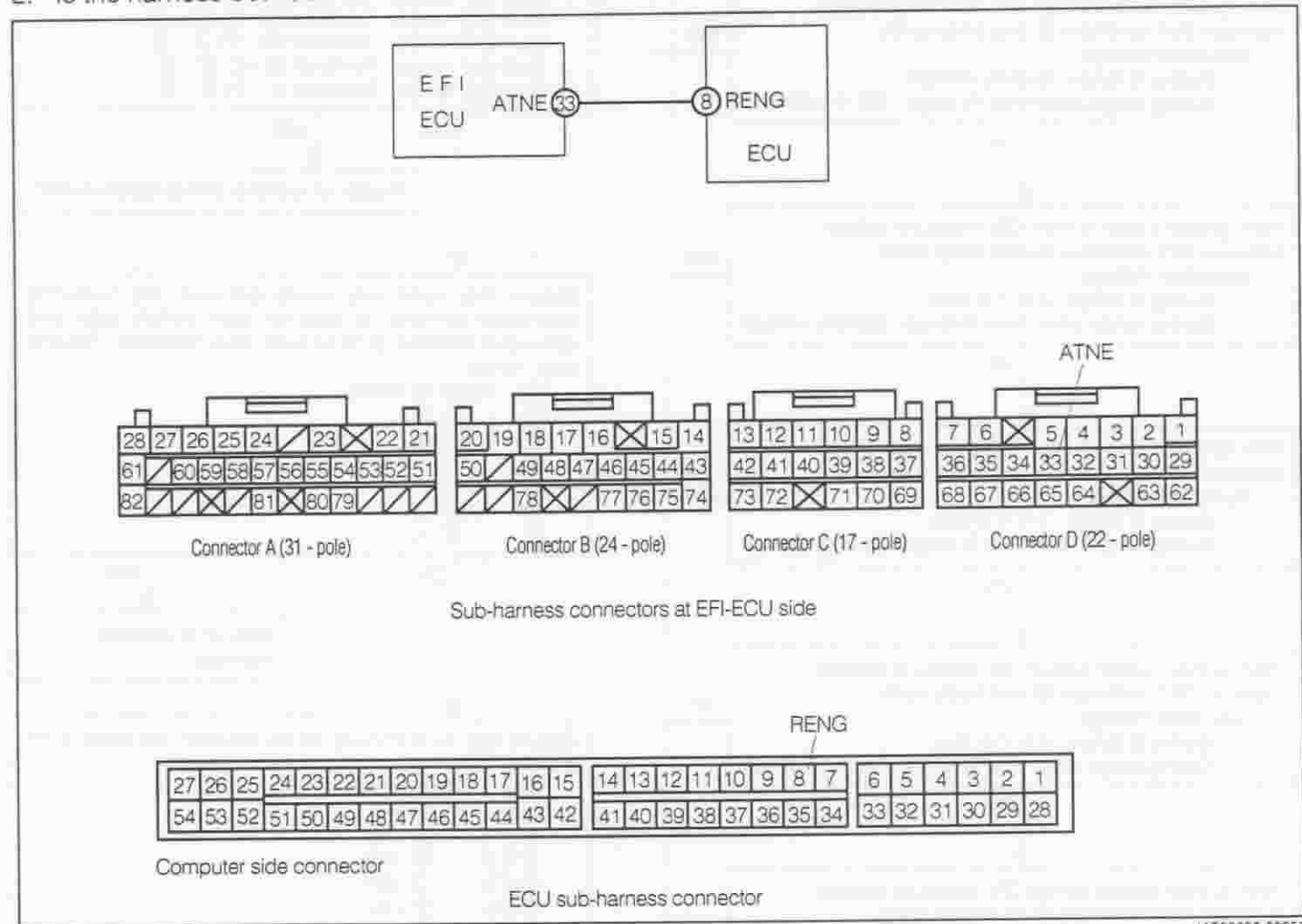
Evaluation Conditions:

When no engine revolution signal is inputted from the EFI-ECU after the engine has started, this code is outputted.

JAT00094-00000

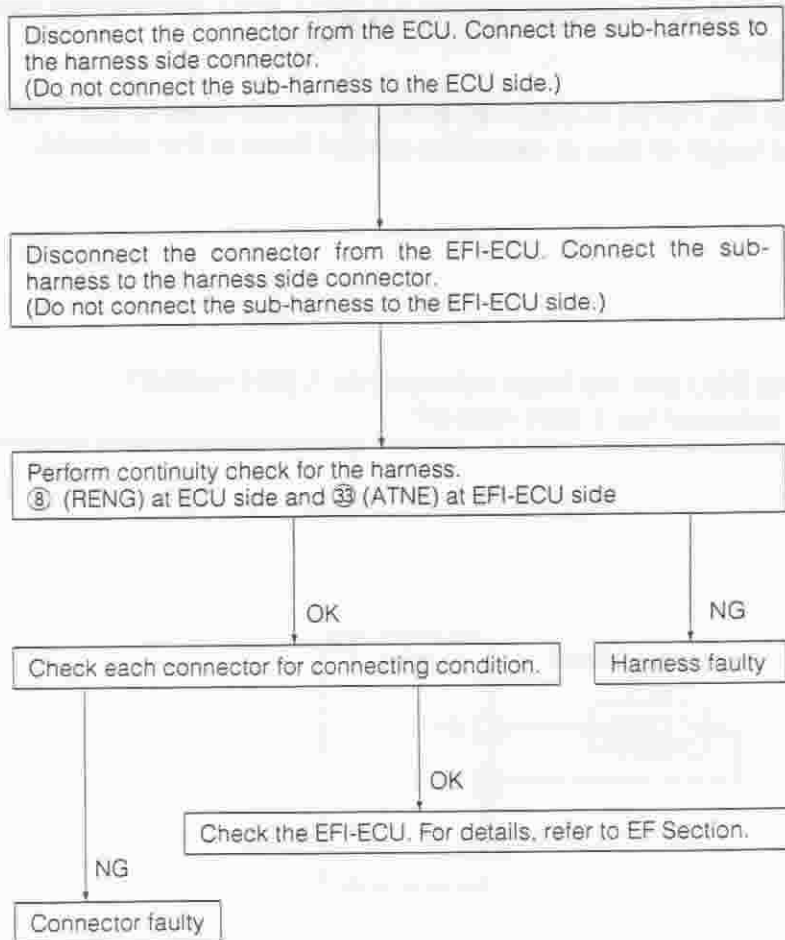
Checking points

1. Is the signal from EFI-ECU inputted to the ECU?
2. Is the harness between the EFI-ECU and ECU normal?



JAT00095-00058

Checking method



JAT00096-00000

DIAGNOSIS CODE NO. P0753

1. The diagnosis code No. P0753 is outputted from the A/T ECU when abnormality takes place in the linear solenoid No. 1 (B1) circuit.

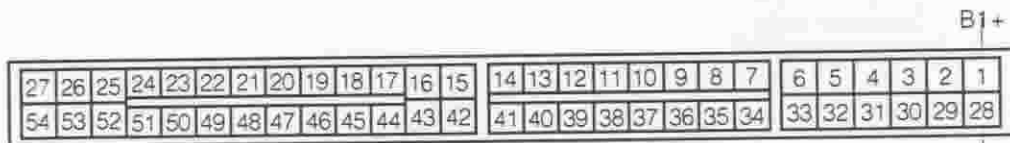
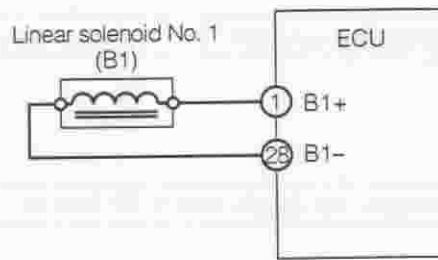
Evaluation Conditions:

The diagnosis code No. P0753 is outputted when no current flows to the linear solenoid No. 1 (B1) for a specified length of time or excessive current flows to the solenoid.

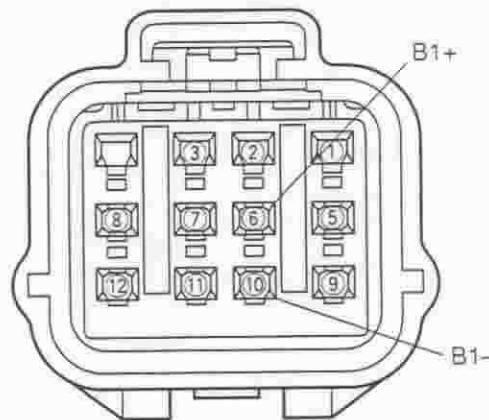
JAT00097-00000

Checking points

1. Is the harness between the ECU and the linear solenoid No. 1 (B1) normal?
2. Is the output of the linear solenoid No. 1 (B1) normal?



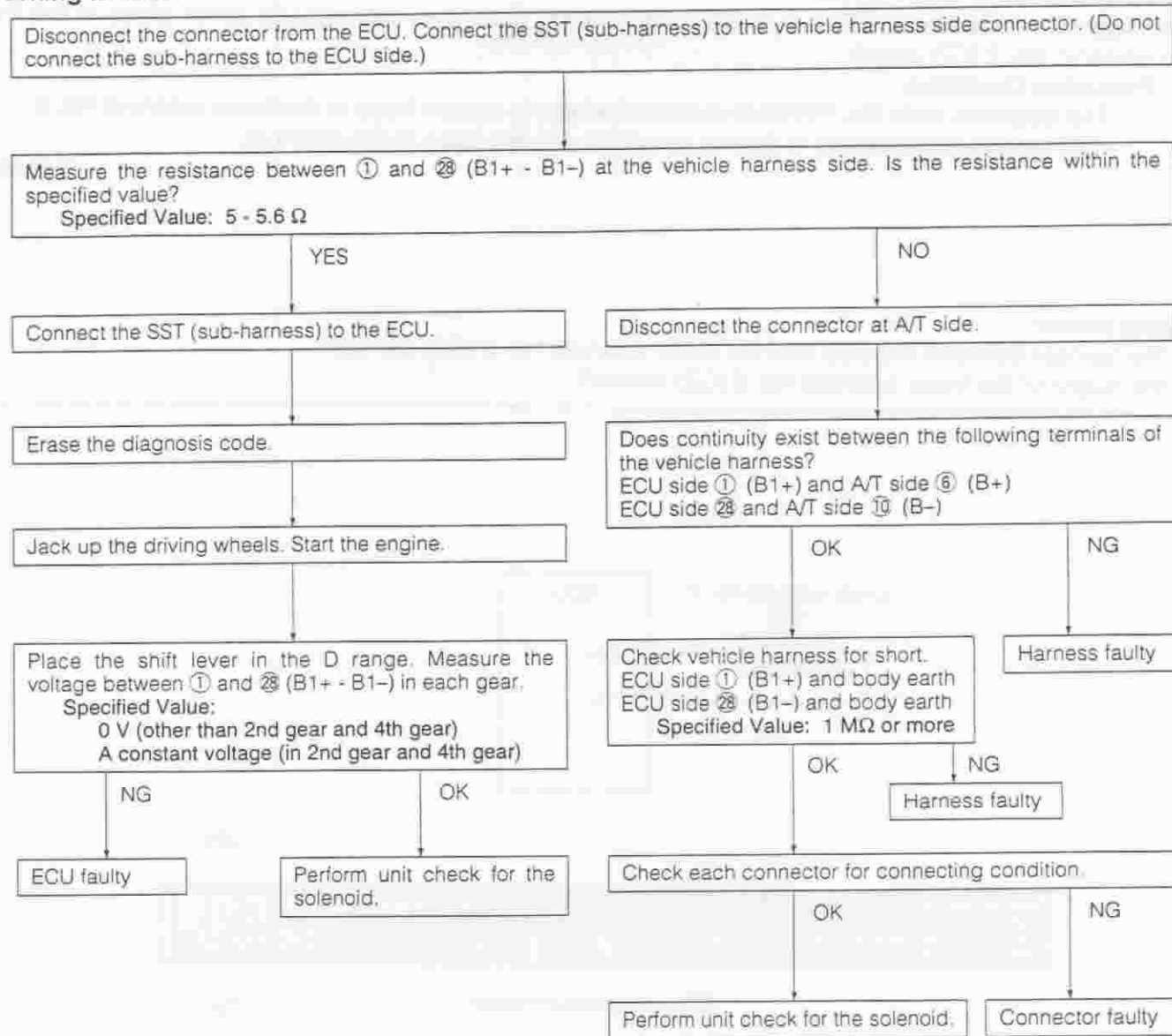
ECU sub-harness connector



Linear solenoid connector (at vehicle harness side)

JAT00098-00059

Checking method



JAT00099-00000

DIAGNOSIS CODE NO. P0758

1. The diagnosis code No. P0758 is outputted from the A/T ECU when abnormality takes place in the linear solenoid No. 2 (C2) circuit.

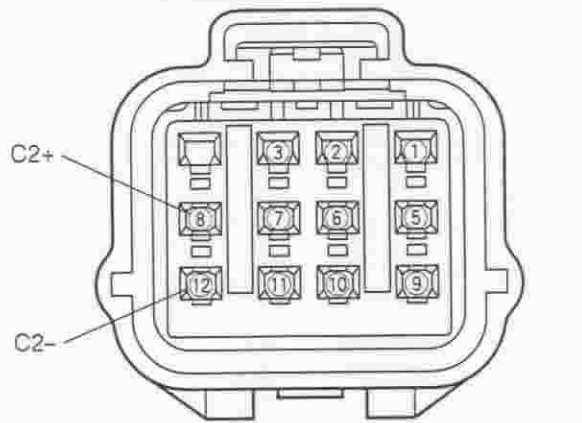
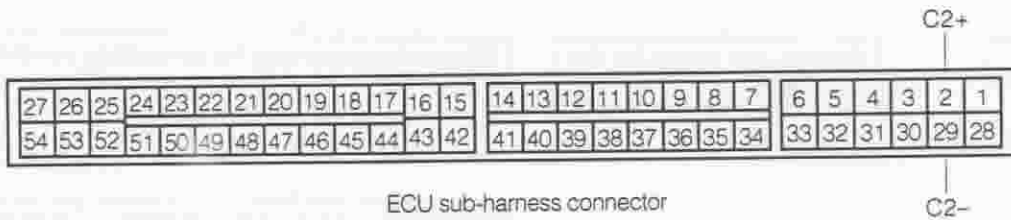
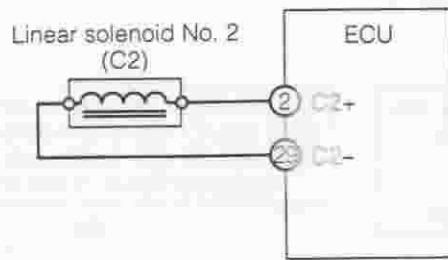
Evaluation Conditions:

The diagnosis code No. P0758 is outputted when no current flows to the linear solenoid No. 2 (C2) for a specified length of time or excessive current flows to the solenoid.

JAT00100-00000

Checking points

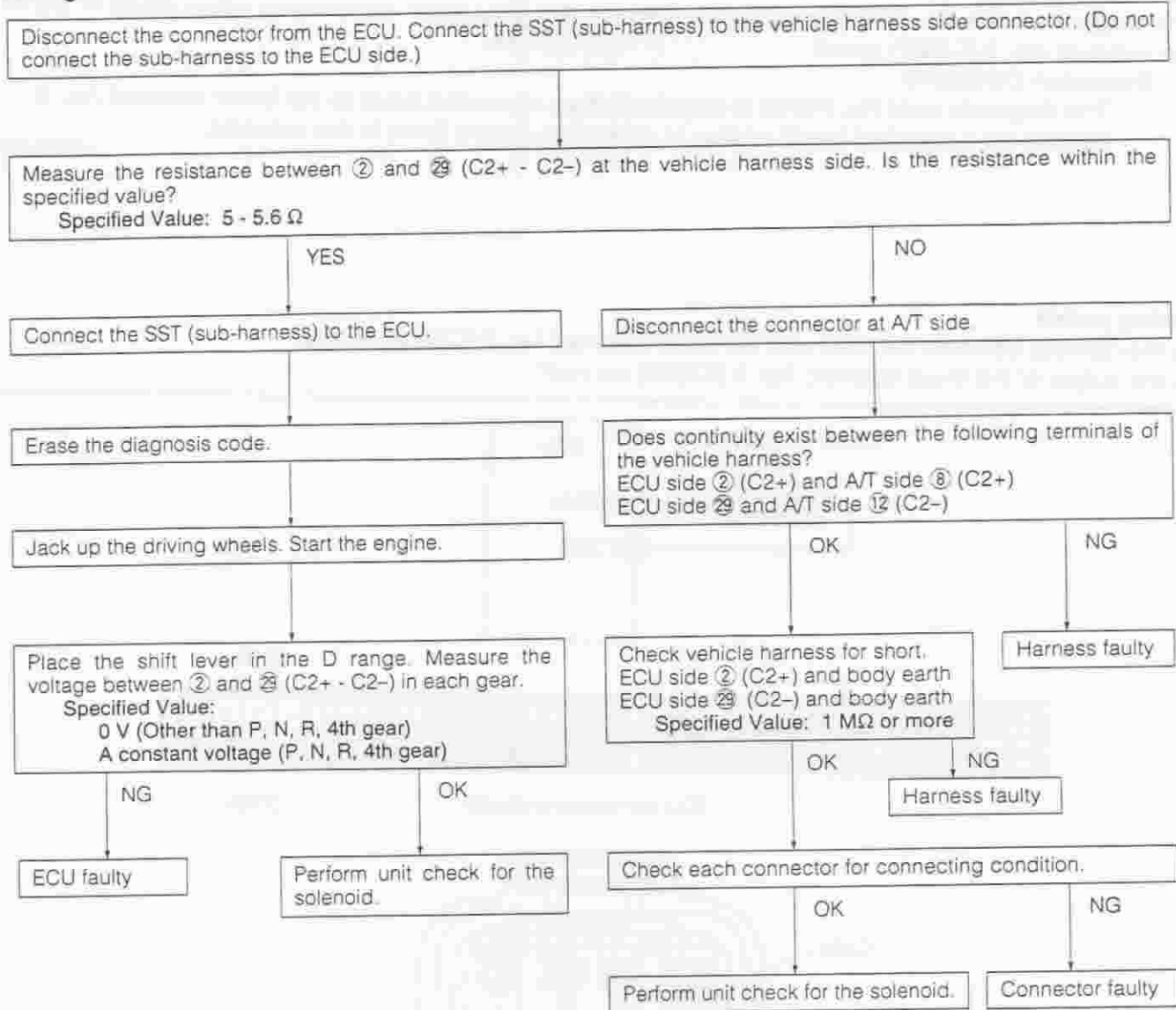
1. Is the harness between the ECU and the linear solenoid No. 2 (C2) normal?
2. Is the output of the linear solenoid No. 2 (C2) normal?



Linear solenoid connector (at vehicle harness side)

JAT00101-00060

Checking method



JAT00102-00000

DIAGNOSIS CODE NO. P0763

1. The diagnosis code No. P0763 is outputted from the A/T ECU when abnormality takes place in the linear solenoid No. 3 (C3/B2) circuit.

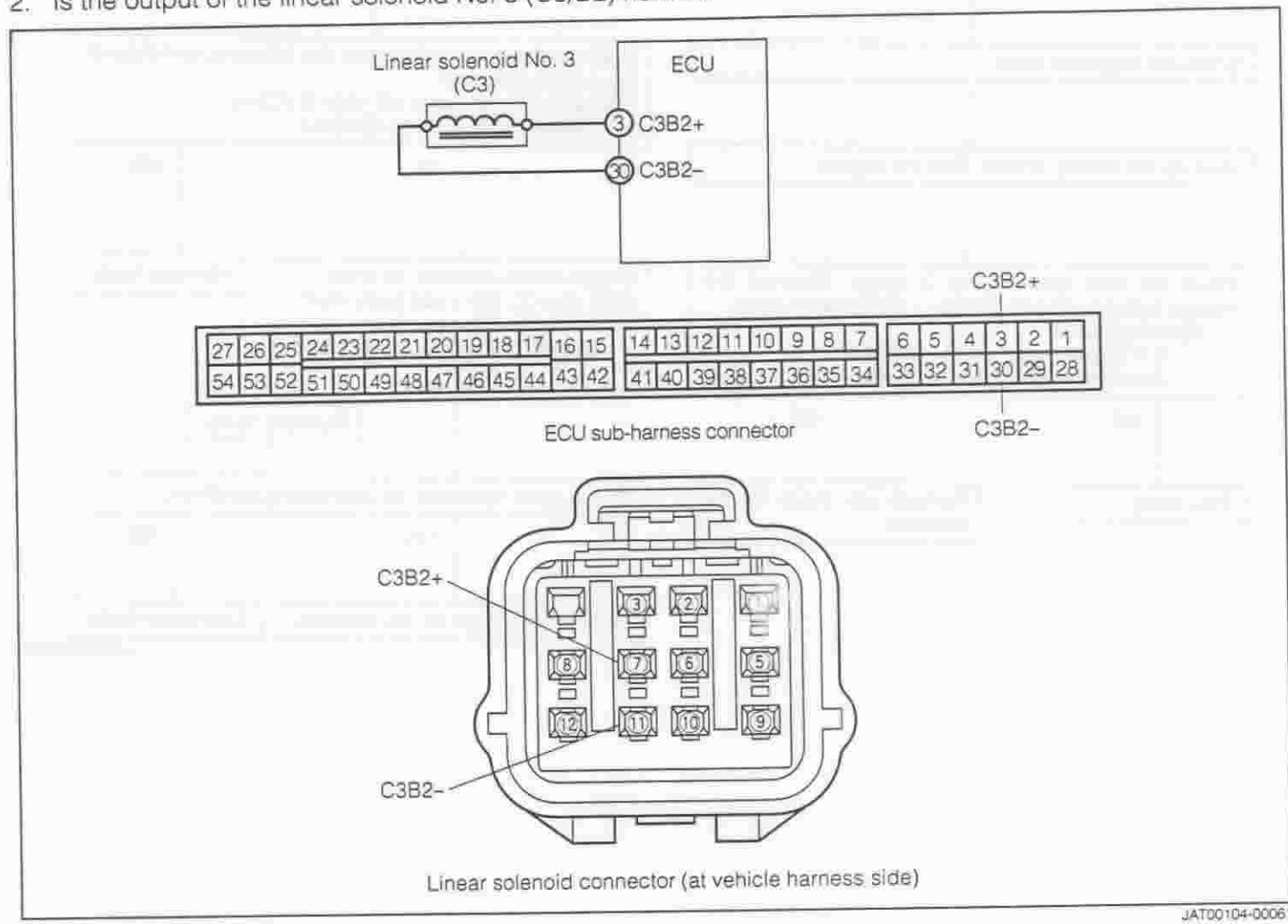
Evaluation Conditions:

The diagnosis code No. P0763 is outputted when no current flows to the linear solenoid No. 3 (C3/B2) for a specified length of time or excessive current flows to the solenoid.

JAT00103-00000

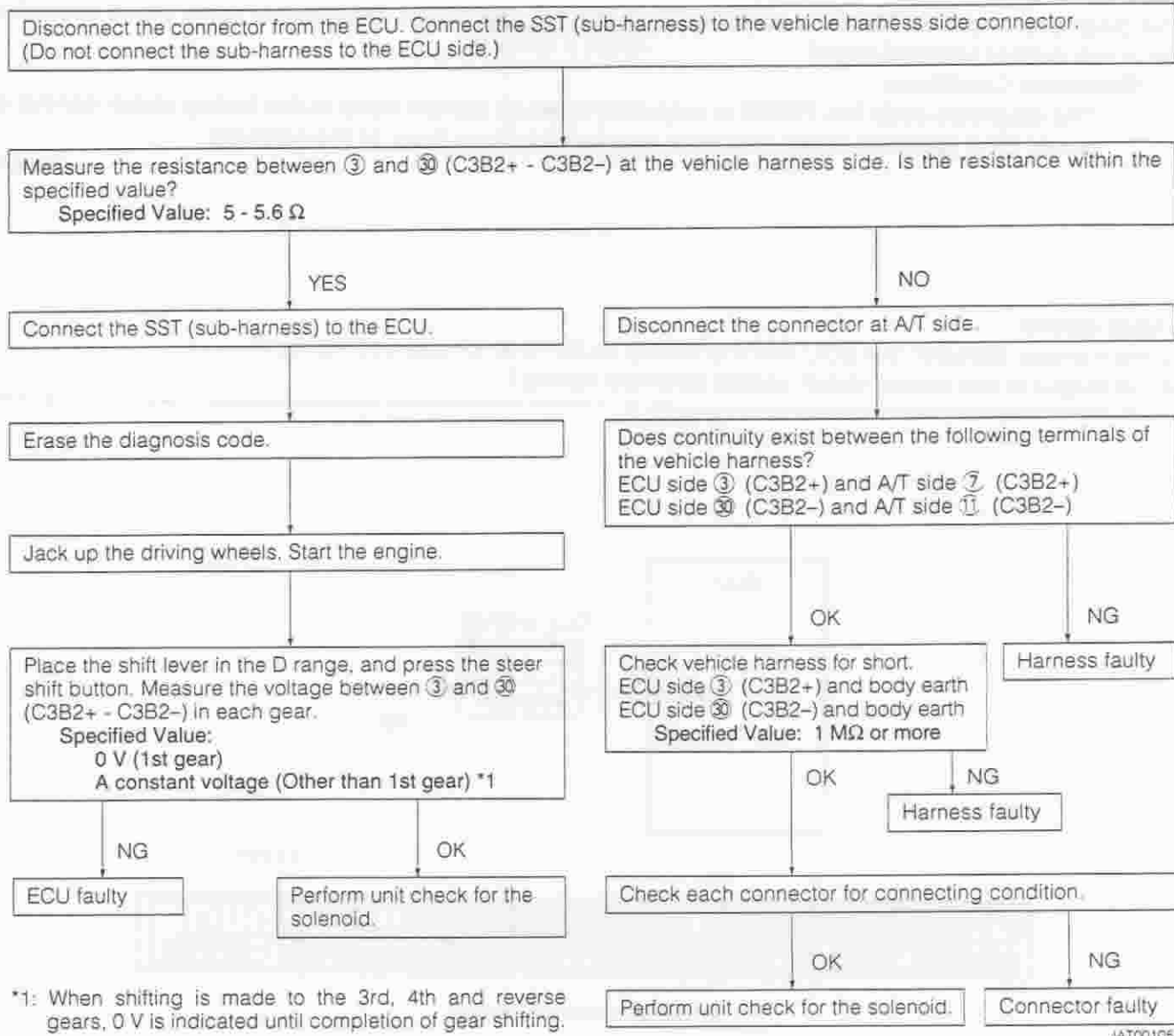
Checking points

1. Is the harness between the ECU and the linear solenoid No. 3 (C3/B2) normal?
2. Is the output of the linear solenoid No. 3 (C3/B2) normal?



JAT00104-00061

Checking method



*1: When shifting is made to the 3rd, 4th and reverse gears, 0 V is indicated until completion of gear shifting.

JAT00105-00000

DIAGNOSIS CODE NO. P0768

1. The diagnosis code No. P0768 is outputted from the A/T ECU when abnormality takes place in the lock-up clutch control solenoid circuit.

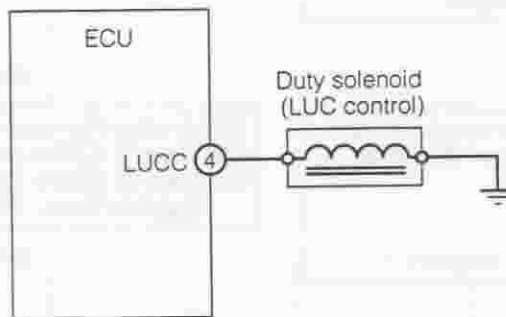
Evaluation Conditions:

The diagnosis code No. P0768 is outputted when no current flows to the lockup clutch control solenoid for a specified length of time or excessive current flows to the solenoid.

JAT00106-00000

Checking points

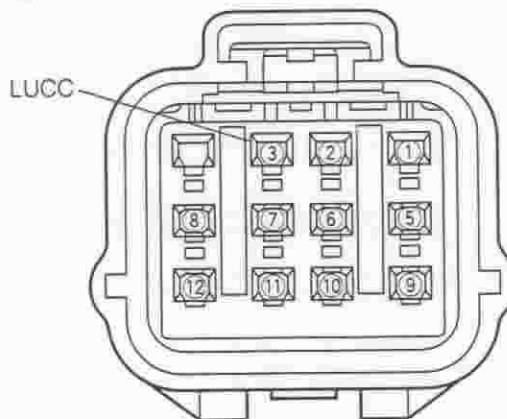
1. Is the harness between the ECU and the lockup clutch control solenoid normal?
2. Is the output of the lockup clutch control solenoid normal?



27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28

ECU sub-harness connector

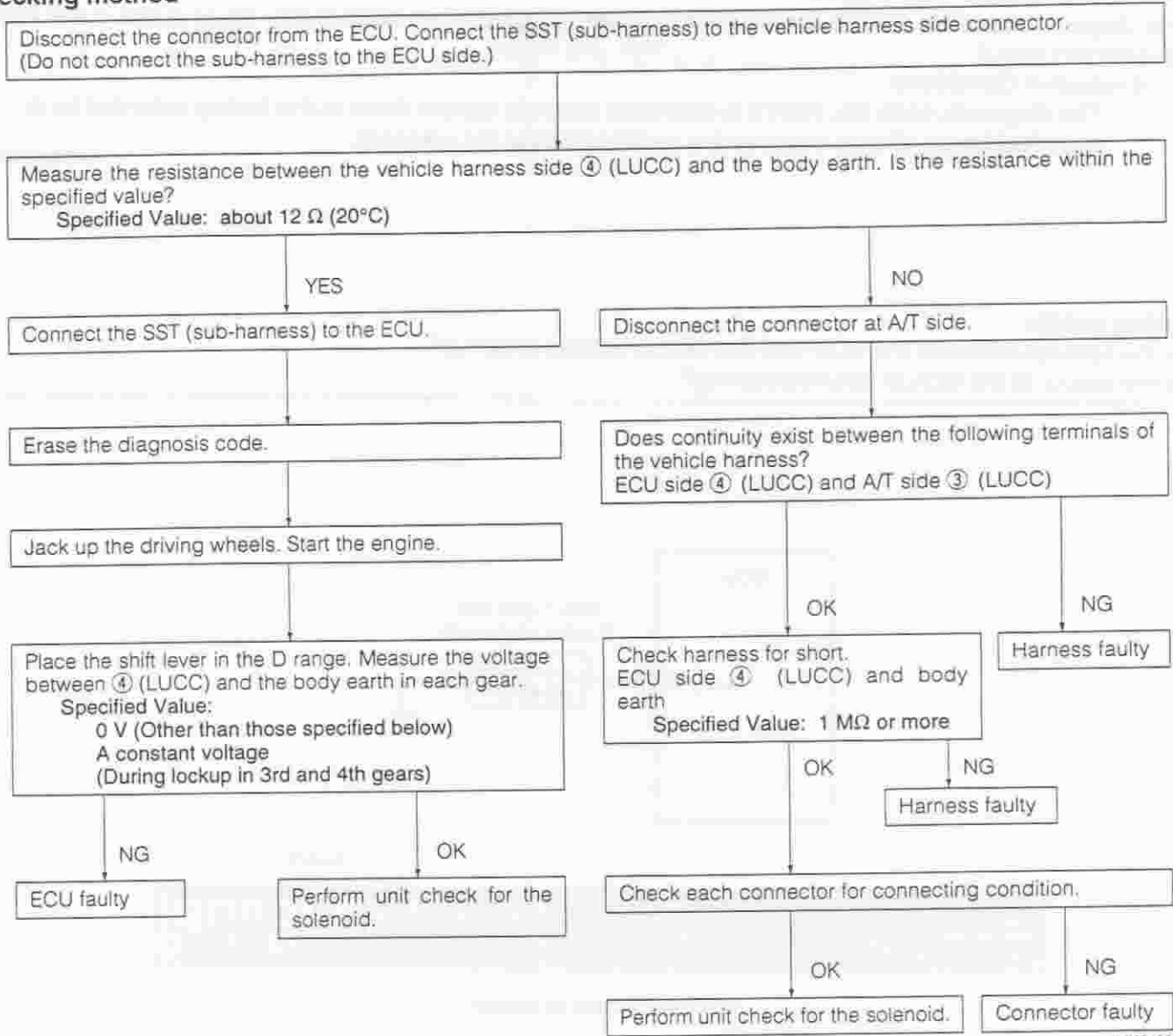
Computer side connector



Linear solenoid connector (at vehicle harness side)

JAT00107-00082

Checking method



JAT00108-00000

DIAGNOSIS CODE NO. P0773

1. The diagnosis code No. P0773 is outputted from the A/T ECU when abnormality takes place in the lock-up solenoid circuit.

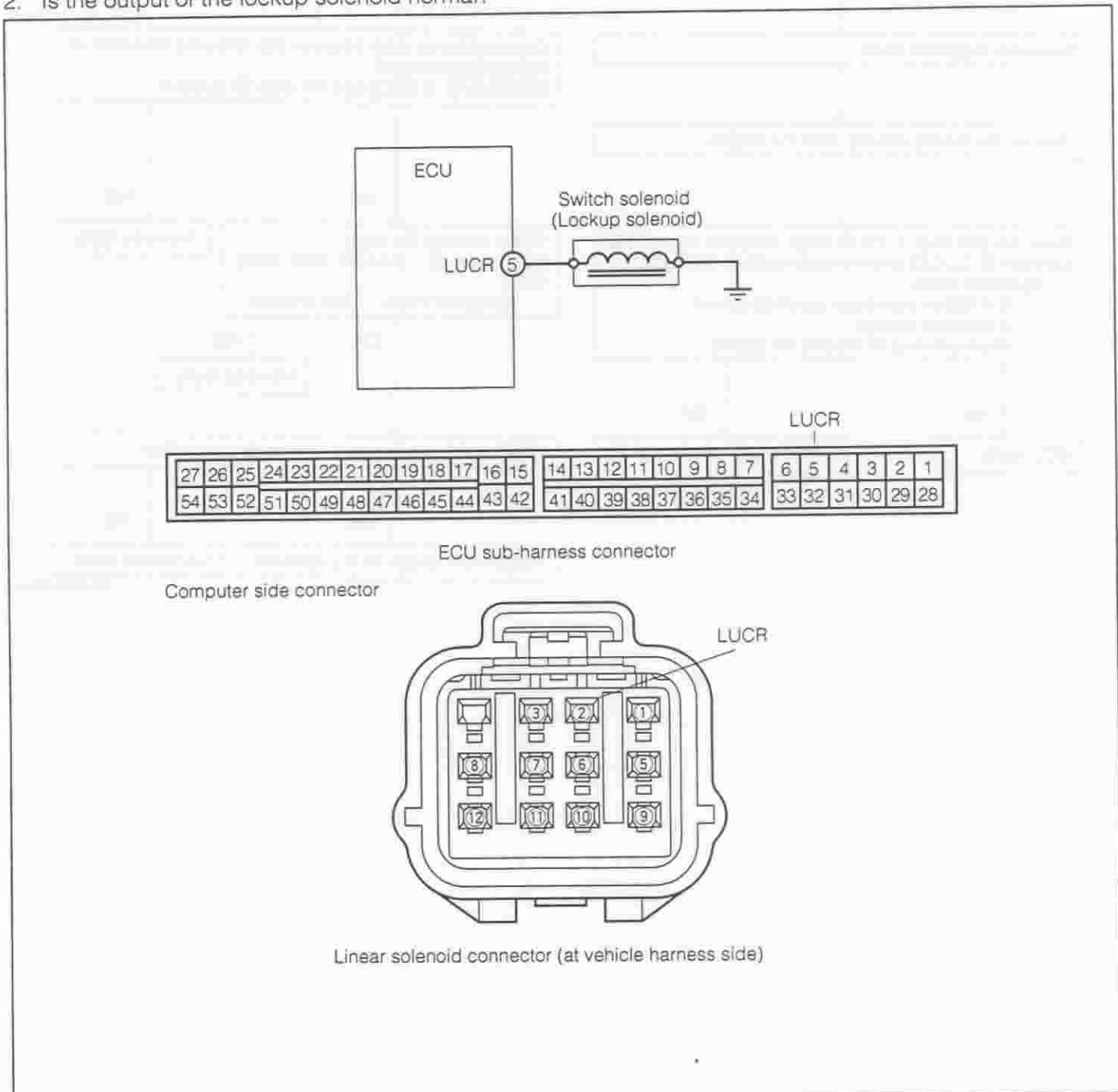
Evaluation Conditions:

The diagnosis code No. P0773 is outputted when no current flows to the lockup solenoid for a specified length of time or excessive current flows to the solenoid.

JAT00109-00000

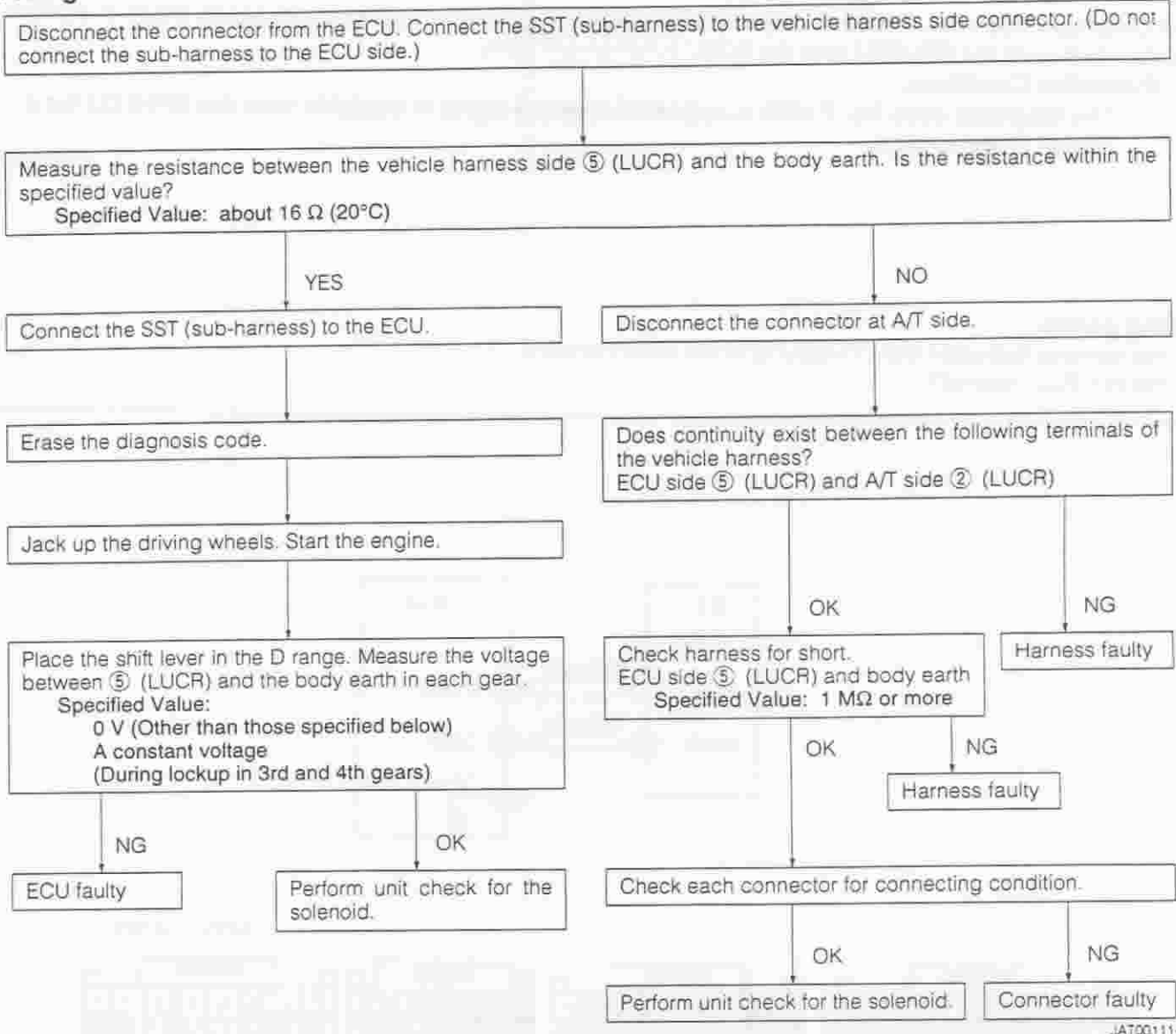
Checking points

1. Is the harness between the ECU and the lockup solenoid normal?
2. Is the output of the lockup solenoid normal?



JAT00110-00063

Checking method



JAT700111-00000

DIAGNOSIS CODE NO. P1602

- The diagnosis code No. P1602 is outputted from the A/T ECU when abnormality takes place in communication between the EFI-ECU and the ECU.

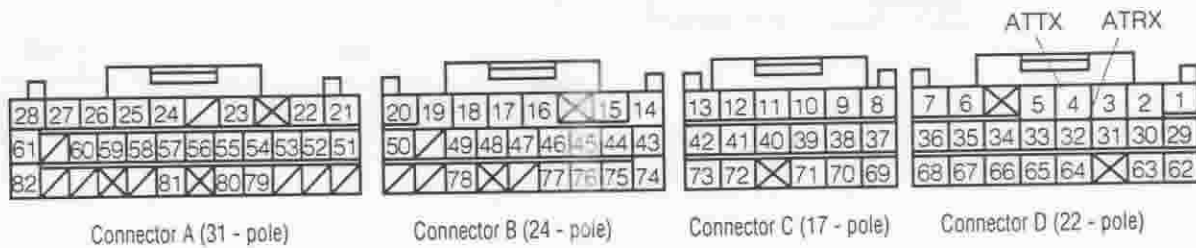
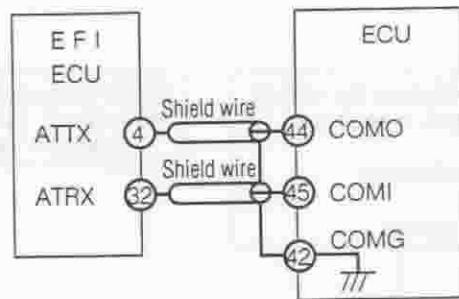
Evaluation Conditions:

The diagnosis code No. P1602 is outputted when no signal is available from the EFI-ECU for a certain length of time.

JAT00112-00000

Checking points

- Is the harness between the EFI-ECU and the ECU normal?
- Is the EFI-ECU normal?



EFI-ECU side sub-harness connector

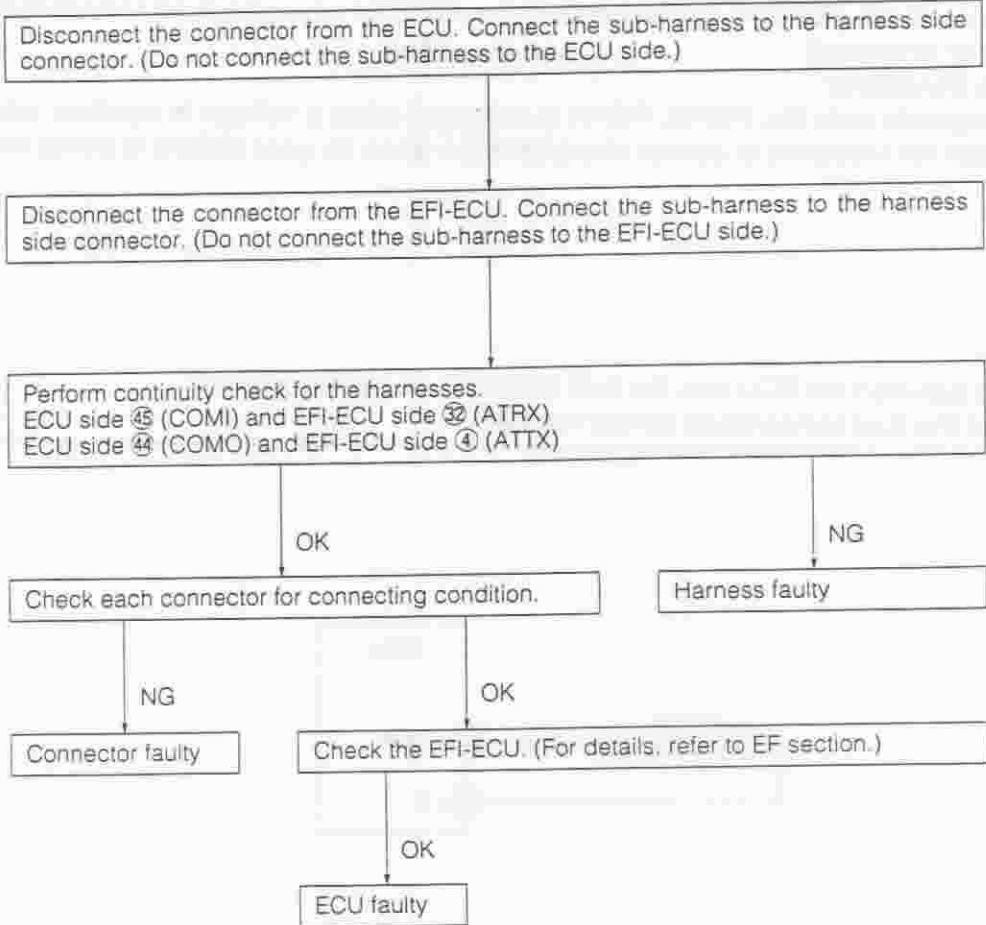


COMI COMO COMG

ECU sub-harness connector

JAT00113-00064

Checking method



JAT00114-00000

DIAGNOSIS CODE NO. P0710, P0711

1. The diagnosis code No. P0710 is outputted from the A/T ECU when the fluid temperature sensor circuit has open wire or is shorted.

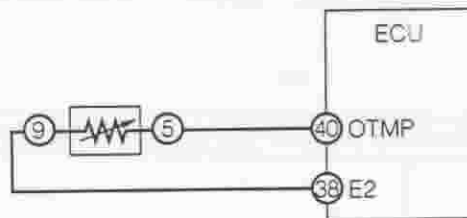
Evaluation Conditions:

The diagnosis code No. P0710, P0711 is outputted when a voltage is inputted, which is unthinkable from the viewpoint of sensor characteristics when no gear shifting is being made.

JAT00121-0000

Checking points

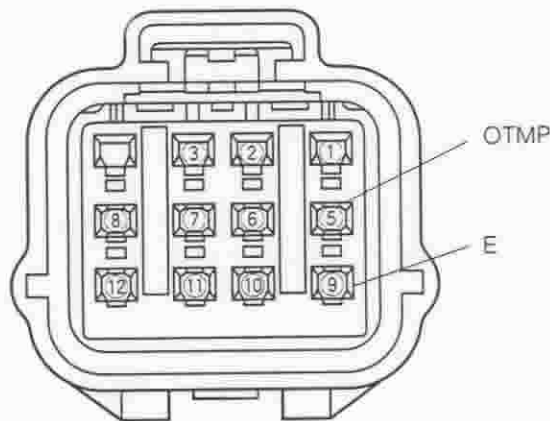
1. Is the harness between the ECU and the fluid temperature sensor normal?
2. Is the output of the fluid temperature sensor normal?



ECU side sub-harness connector

27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28

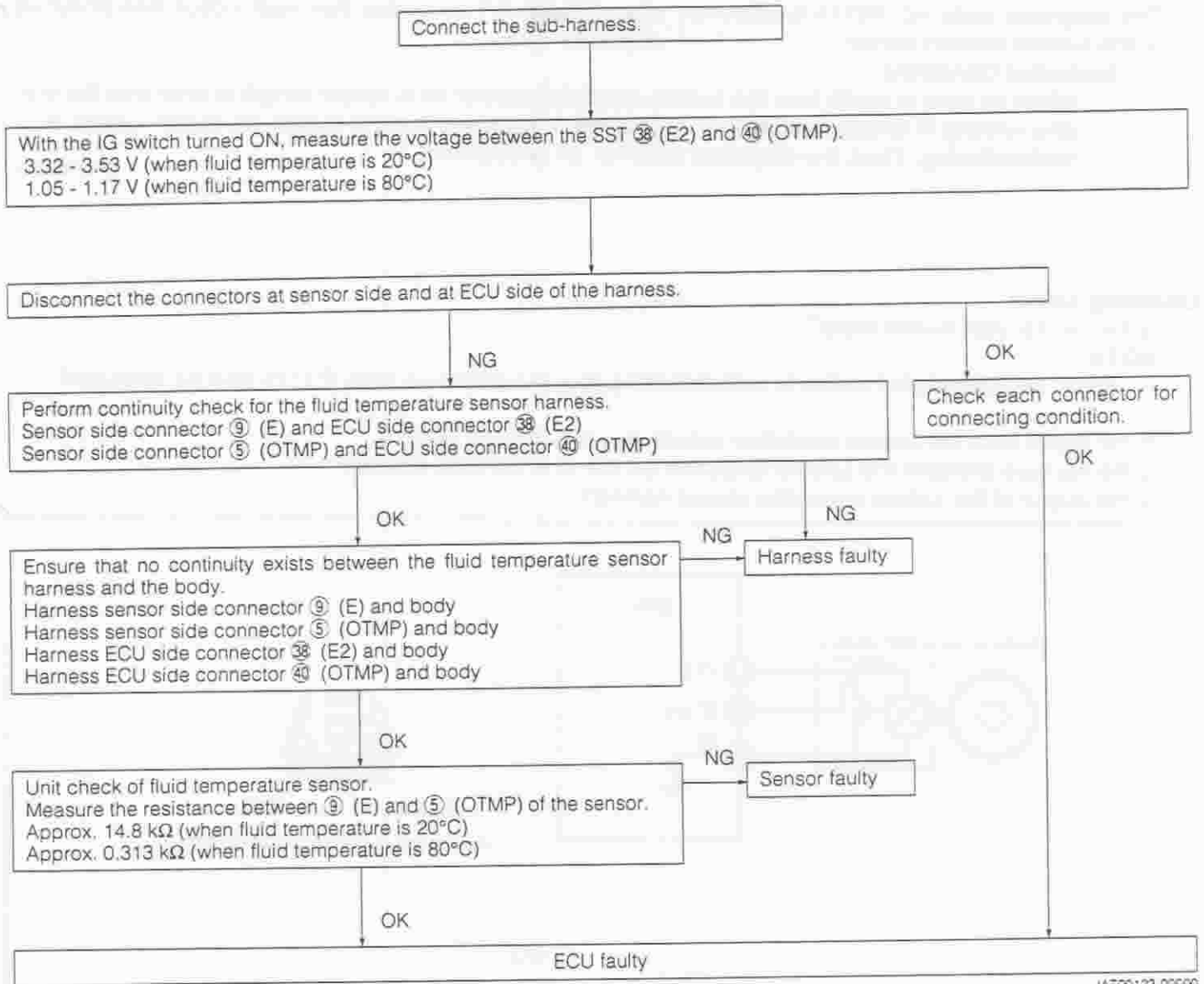
OTMP E2



Fluid temperature sensor connector (vehicle harness side)

JAT00122-0006

Checking method.



JAT00123-00000

DIAGNOSIS CODE NO. P0715

1. The diagnosis code No. P0715 is outputted when ECU of A/T evaluates that malfunction has occurred in the Turbine rotation sensor.

Evaluation Conditions:

When no input is made from the turbine revolution sensor for a certain length of time with the engine running in ranges other than P or N range, it is judged that the turbine revolution sensor is malfunctioning. Then, the diagnosis code No. 37 is outputted.

JAT00124-00000

Checking points

1. Is the neutral start switch faulty?

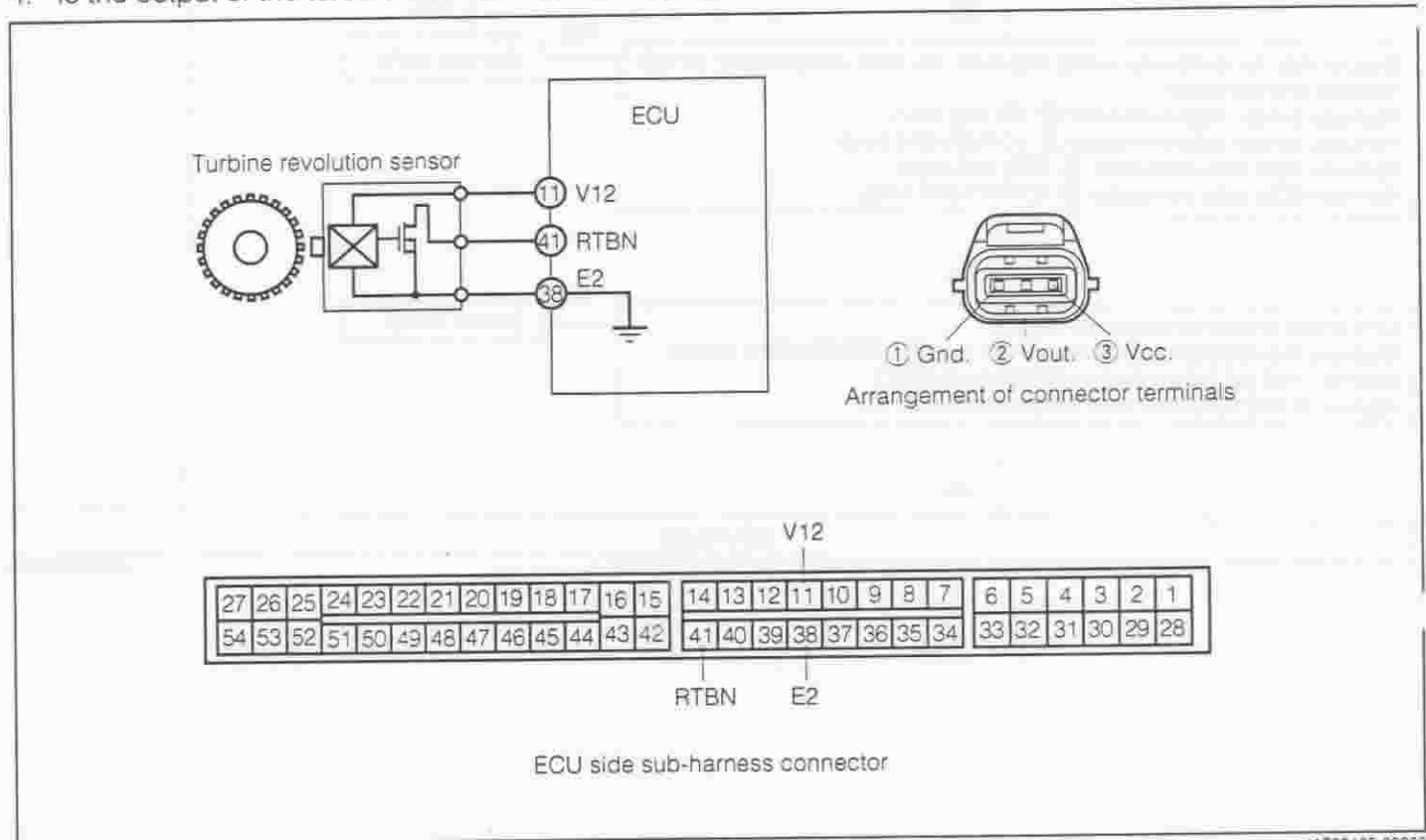
NOTE:

- When the neutral start switch is malfunctioning, too, the diagnosis code P1715 may be outputted.

2. Is the signal from the turbine revolution sensor inputted into the ECU?

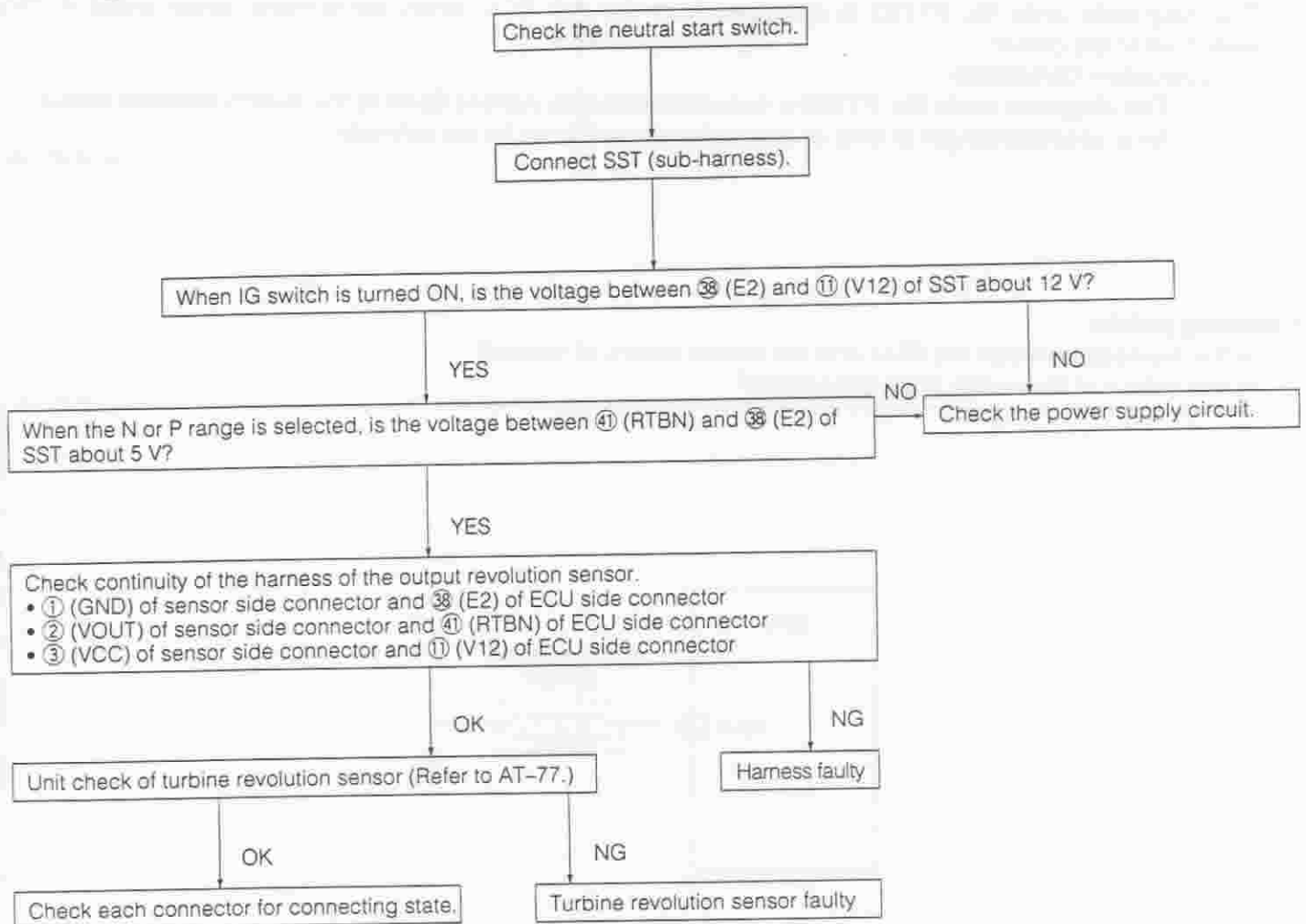
3. Is the harness between the turbine revolution sensor and the ECU normal?

4. Is the output of the turbine revolution sensor normal?

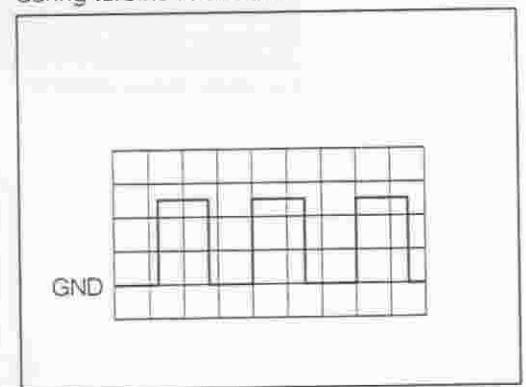


JAT00125-00068

Checking method



Waveform of voltage between E2 and RTBN during turbine revolution



JAT00126-00069

DIAGNOSIS CODE NO. P1780

1. The diagnosis code No. P1780 is outputted from the A/T ECU when abnormality takes place in the switch solenoid circuit.

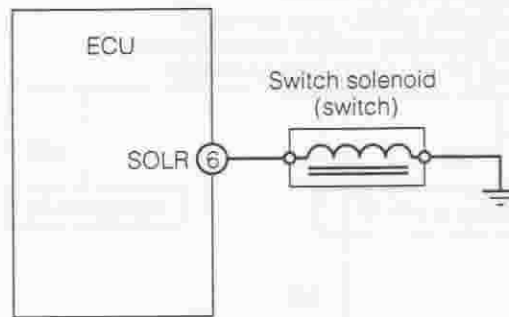
Evaluation Conditions:

The diagnosis code No. P1780 is outputted when no current flows to the switch solenoid circuit for a specified length of time or excessive current flows to the solenoid.

JATCO127-00000

Checking points

1. Is the harness between the ECU and the switch solenoid normal?
2. Is the output of the switch solenoid normal?

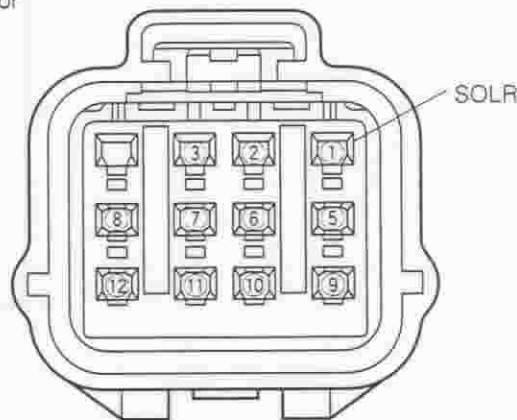


ECU sub-harness connector

SOLR

27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28

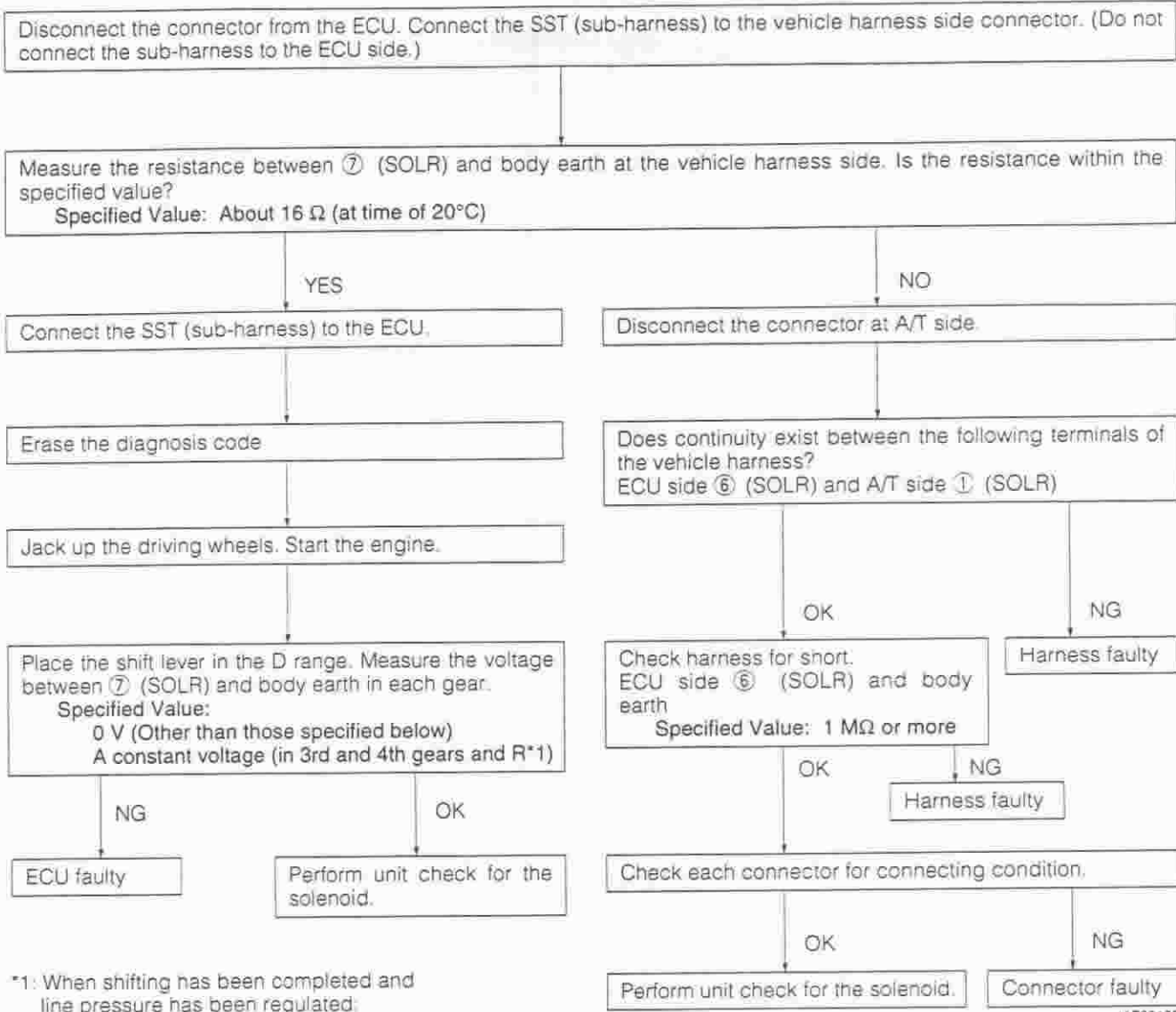
Computer side connector



Linear solenoid connector (at vehicle harness side)

JATCO128-00070

Checking method



*1: When shifting has been completed and line pressure has been regulated.

CHECKING PROCEDURE

(1) Starter will not operate.

1. Check and adjustment of control cable (Refer to AT-4.)
2. Check and adjustment of neutral start switch (Refer to AT-4.)
3. Check of engine cranking system

(2) Vehicle will not move forward nor backward.

1. Check of oil level (Refer to AT-2.)
If it is OK, go to step 2.
If it is NG, adjust the oil level.
2. Check and adjustment of control cable (Refer to AT-4.)
If it is OK, go to step 3.
If it is NG, adjust the control cable.
3. Manual running test
Disconnect the connector of the A/T ECU. Check the gear position of each range.
If it is OK, go to step 4.
If it is NG, go to step 5.

Specifications

Range	P · N	D · 2 · L	R
Gear position	Neutral	3rd	Reverse

4. Check of ECU power supply circuit (Refer to AT-33.)
If it is OK, replace the A/T ECU. If the malfunction still persists after replacement, go to step 5.
If it is NG, repair the connectors or circuits concerned.
5. Remove the oil pan. In the N range, ensure that the manual valve groove is aligned with the hole at the valve body side. (Refer to the AT Unit service manual.)
If it is OK, go to step 6.
If it is NG, adjust the manual valve.
6. Replace the valve body.
If the malfunction still persists, go to step 6.
7. Measure the LUC OFF pressure at time of lockup OFF. (Refer to AT-8.)
If it is OK, replace the torque converter assembly.
If it is NG, go to step 7.
8. Remove the automatic transmission from the vehicle. Check it for cracks of the drive plate and loose bolts.
If it is OK, go to step 8.
If it is NG, replace the drive plate or tighten the bolts.
9. Replace the oil pump assembly.

JAT00137-00000

(3) Vehicle will not move forward.

1. Check and adjustment of control cable (Refer to AT-4.)
If it is OK, go to step 2.
If it is NG, adjust the control cable.
2. Manual running test
Disconnect the connector of the A/T ECU. Check the gear position of each range.
If it is OK, go to step 3.
If it is NG, go to step 4.

Specifications

Range	P · N	D · 2 · L	R
Gear position	Neutral	3rd	Reverse

3. Check of ECU power supply circuit (Refer to AT-33.)
If it is OK, replace the A/T ECU. If the malfunction still persists after replacement, go to step 5.
If it is NG, repair the connectors or circuits concerned.
4. Remove the oil pan. In the N range, ensure that the manual valve groove is aligned with the hole at the valve body side.
If it is OK, go to step 5.
If it is NG, adjust the manual valve. (Refer to the AT Unit service manual.)
5. Unit check of solenoid No. 2 (Operation) (Refer to AT-77.)
If it is OK, go to step 6.
If it is NG, replace the solenoid No. 2.
6. Replace the valve body.
If the malfunction still persists, replace the automatic transmission assembly.

(4) Vehicle will not move backward.

1. Check and adjustment of control cable (Refer to AT-4.)
If it is OK, go to step 2.
If it is NG, adjust the control cable.
2. Manual running test
Disconnect the connector of the A/T ECU. Check the gear position of each range.
If it is OK, go to step 3.
If it is NG, go to step 4.

Specifications

Range	P · N	D · 2 · L	R
Gear position	Neutral	3rd	Reverse

3. Check of ECU power supply circuit (Refer to AT-33.)
If it is OK, replace the A/T ECU. If the malfunction still persists after replacement, go to step 5.
If it is NG, repair the connectors or circuits concerned.
4. Remove the oil pan. In the N range, ensure that the manual valve groove is aligned with the hole at the valve body side. (Refer to the AT Unit service manual.)
If it is OK, replace the automatic transmission assembly.
If it is NG, adjust the manual valve.

JAT00138-00000

(5) Engine stalls when shift is made from N to D-R.

1. Check idle speed. (Refer to AT-2.)
If it is OK, go to step 2.
If it is NG, repair the engine idling system.
2. Unit check of LUC solenoid (Operation) (Refer to AT-77.)
If it is OK, go to step 3.
If it is NG, replace the LUC solenoid.
3. Replace the valve body.
If the malfunction still persists, replace the torque converter assembly.

(6) Clutch slip takes place in 1st gear.

1. Check of oil level (Refer to AT-2.)
If it is OK, go to step 2.
If it is NG, adjust the oil level.
2. Check and adjustment of control cable (Refer to AT-4.)
If it is OK, go to step 3.
If it is NG, adjust the control cable.
3. Manual running test
Disconnect the connector of the A/T ECU. Check the gear position of each range.
If it is OK, go to step 4.
If it is NG, go to step 5.

Specifications

Range	P · N	D · 2 · L	R
Gear position	Neutral	3rd	Reverse

4. Check of ECU power supply circuit (Refer to AT-33.)
If it is OK, replace the A/T ECU. If the malfunction still persists after replacement, go to step 5.
If it is NG, repair the connectors or circuits concerned.
5. Remove the oil pan and strainer. Check the strainer for cut or wear of the O-ring.
If it is OK, go to step 6.
If it is NG, replace the O-ring of the strainer.
6. In the N range, ensure that the manual valve groove is aligned with the hole at the valve body side.
If it is OK, go to step 7.
If it is NG, adjust the manual valve. (Refer to the AT Unit service manual.)
7. Unit check of solenoid No. 2 (Operation) (Refer to AT-77.)
If it is OK, go to step 8.
If it is NG, replace the solenoid No. 2.
8. Replace the valve body.
If the malfunction still persists, replace the automatic transmission assembly.

JAT00139-00000

(7) Clutch slip takes place in 2nd gear.

1. Check of oil level (Refer to AT-2.)
If it is OK, go to step 2.
If it is NG, adjust the oil level.
2. Manual running test
Disconnect the connector of the A/T ECU. Check the gear position of each range.
If it is OK, go to step 3.
If it is NG, go to step 4.

Specifications

Range	P · N	D · 2 · L	R
Gear position	Neutral	3rd	Reverse

3. Check of ECU power supply circuit (Refer to AT-33.)
If it is OK, replace the A/T ECU. If the malfunction still persists after replacement, go to step 4.
If it is NG, repair the connectors or circuits concerned.
4. Remove the oil pan and strainer. Check the strainer for cut or wear of the O-ring.
If it is OK, go to step 5.
If it is NG, replace the O-ring of the strainer.
5. In the N range, ensure that the manual valve groove is aligned with the hole at the valve body side.
(Refer to the AT Unit service manual.)
If it is OK, go to step 6.
If it is NG, adjust the manual valve.
6. Unit check of solenoid No. 2 and duty solenoid (Operation) (Refer to AT-77.)
If it is OK, go to step 7.
If it is NG, replace the solenoid concerned.
7. Replace the valve body.
If the malfunction still persists, replace the automatic transmission assembly.

(8) Clutch slip takes place in 3rd gear.

1. Check of oil level (Refer to AT-2.)
If it is OK, go to step 2.
If it is NG, adjust the oil level.
2. Manual running test
Disconnect the connector of the A/T ECU. Check the gear position of each range.
If it is OK, go to step 3.
If it is NG, go to step 4.

Specifications

Range	P · N	D · 2 · L	R
Gear position	Neutral	3rd	Reverse

3. Check of ECU power supply circuit (Refer to AT-33.)
If it is OK, replace the A/T ECU. If the malfunction still persists after replacement, go to step 4.
If it is NG, repair the connectors or circuits concerned.
4. Remove the oil pan and strainer. Check the strainer for cut or wear of the O-ring.
If it is OK, go to step 5.
If it is NG, replace the O-ring of the strainer.
5. In the N range, ensure that the manual valve groove is aligned with the hole at the valve body side.
(Refer to the AT Unit service manual.)
If it is OK, go to step 6.
If it is NG, adjust the manual valve.

JAT00140-00000

6. Unit check of solenoid No. 2, solenoid No. 3 and switch solenoid (Operation) (Refer to AT-77.)
If it is OK, go to step 7.
If it is NG, replace the solenoid concerned.
7. Replace the valve body.
If the malfunction still persists, replace the automatic transmission assembly.

(9) Clutch slip takes place in 4th gear.

1. Check of oil level (Refer to AT-2.)
If it is OK, go to step 2.
If it is NG, adjust the oil level.
2. Manual running test
Disconnect the connector of the A/T ECU. Check the gear position of each range.
If it is OK, go to step 3.
If it is NG, go to step 4.

Specifications

Range	P · N	D · 2 · L	R
Gear position	Neutral	3rd	Reverse

3. Check of ECU power supply circuit (Refer to AT-33.)
If it is OK, replace the A/T ECU. If the malfunction still persists after replacement, go to step 4.
If it is NG, repair the connectors or circuits concerned.
4. Remove the oil pan and strainer. Check the strainer for cut or wear of the O-ring.
If it is OK, go to step 5.
If it is NG, replace the O-ring of the strainer.
5. In the N range, ensure that the manual valve groove is aligned with the hole at the valve body side.
If it is OK, go to step 6.
If it is NG, adjust the manual valve. (Refer to the AT Unit service manual.)
6. Unit check of solenoid No. 2, solenoid No. 3 and switch solenoid (Operation)
If it is OK, go to step 7.
If it is NG, replace the solenoid concerned. (Refer to AT-77.)
7. Replace the valve body.
If the malfunction still persists, replace the automatic transmission assembly.

JAT00141-00000

(10) Clutch slip takes place in R range.

1. Check of oil level (Refer to AT-2.)
If it is OK, go to step 2.
If it is NG, adjust the oil level.
2. Check and adjustment of control cable (Refer to AT-4.)
If it is OK, go to step 3.
If it is NG, adjust the control cable.
3. Manual running test
Disconnect the connector of the A/T ECU. Check the gear position of each range.
If it is OK, go to step 4.
If it is NG, go to step 5.

Specifications

Range	P · N	D · 2 · L	R
Gear position	Neutral	3rd	Reverse

4. Check of ECU power supply circuit (Refer to AT-33.)
If it is OK, replace the A/T ECU. If the malfunction still persists after replacement, go to step 5.
If it is NG, repair the connectors or circuits concerned.
5. Remove the oil pan and strainer. Check the strainer for cut or wear of the O-ring.
If it is OK, go to step 6.
If it is NG, replace the O-ring of the strainer.
6. In the N range, ensure that the manual valve groove is aligned with the hole at the valve body side.
(Refer to the AT service manual.)
If it is OK, go to step 7.
If it is NG, adjust the manual valve.
7. Unit check of solenoid No. 3 and duty solenoid (Operation) (Refer to AT-77.)
If it is OK, go to step 8.
If it is NG, replace the solenoid concerned.
8. Replace the valve body.
If the malfunction still persists, replace the automatic transmission assembly.

(11) Vehicle starts to move in P or N range.

1. Check and adjustment of control cable (Refer to AT-4.)
If it is OK, go to step 2.
If it is NG, adjust the control cable.
2. Remove the oil pan. In the N range, ensure that the manual valve groove is aligned with the hole at the valve body side.
If it is OK, replace the automatic transmission assembly.
If it is NG, adjust the manual valve. (Refer to the AT service manual.)

(12) Vehicle starts to move when engine revolution is raised in N range.

1. Replace the automatic transmission assembly.

(13) Engine starts in a range other than P and N

1. Check and adjustment of neutral start switch (Refer to AT-4.)
If it is OK, go to step 2.
If it is NG, adjust the position of the neutral start switch.
2. Check and adjustment of control cable (Refer to AT-4.)

(14) No gear shift takes place. (1st gear fixed)

1. Unit check of duty solenoid (Operation) (Refer to AT-77.)
If it is OK, replace the valve body.
If it is NG, replace the duty solenoid.

(15) No gear shift takes place. (3rd gear fixed)

1. Check of ECU power supply circuit (Refer to AT-33.)
If it is OK, replace the A/T ECU.
If it is NG, repair the connectors or circuits concerned.

(16) Vehicle moves off in 2nd gear.

1. Check of input/output signals of transmission control computer (Brake switch system) (Refer to AT-77.)
If it is OK, go to step 2.
If it is NG, check and repair the brake switch system.
2. Check of ECU power supply circuit
If it is OK, replace the A/T ECU.
If it is NG, repair the connectors or circuits concerned.

(17) Gear shift shock and time lag too large (N - D)

1. Check of oil level (Refer to AT-2.)
If it is OK, go to step 2.
If it is NG, adjust the oil level.
2. Check of input/output signals of transmission control computer (Brake switch system) (Refer to AT-77.)
If it is OK, go to step 2.
If it is NG, check and repair the brake switch system.
3. Check of ECU power supply circuit (Refer to AT-33.)
If it is OK, replace the A/T ECU. If the malfunction still persists after replacement, go to step 4.
If it is NG, repair the connectors or circuits concerned.
4. Remove the oil pan and strainer. Check the strainer for cut or wear of the O-ring.
If it is OK, go to step 5.
If it is NG, replace the O-ring of the strainer.
5. Unit check of solenoid No. 2 and duty solenoid (Operation) (Refer to AT-77.)
If it is OK, go to step 6.
If it is NG, replace the solenoid concerned.
6. Replace the valve body.
If the malfunction still persists, replace the automatic transmission assembly.

(18) Gear shift shock and time lag too large (N - R)

1. Check of oil level (Refer to AT-2.)
If it is OK, go to step 2.
If it is NG, adjust the oil level.
2. Check of ECU power supply circuit (Refer to AT-33.)
If it is OK, replace the A/T ECU. If the malfunction still persists after replacement, go to step 3.
If it is NG, repair the connectors or circuits concerned.
3. Remove the oil pan and strainer. Check the strainer for cut or wear of the O-ring.
If it is OK, go to step 4.
If it is NG, replace the O-ring of the strainer.
4. Unit check of solenoid No. 3 and duty solenoid (Operation) (Refer to AT-77.)
If it is OK, go to step 5.
If it is NG, replace the solenoid concerned.
5. Replace the valve body.
If the malfunction still persists, replace the automatic transmission assembly.

JAT0G144-000000

(19) Gear shift shock and time lag too large (1 - 2)

1. Check of oil level (Refer to AT-2.)
If it is OK, go to step 2.
If it is NG, adjust the oil level.
2. Check of ECU power supply circuit (Refer to AT-33.)
If it is OK, replace the A/T ECU. If the malfunction still persists after replacement, go to step 3.
If it is NG, repair the connectors or circuits concerned.
3. Remove the oil pan and strainer. Check the strainer for cut or wear of the O-ring.
If it is OK, go to step 4.
If it is NG, replace the O-ring of the strainer.
4. Unit check of solenoid No. 1 (Operation) (Refer to AT-77.)
If it is OK, go to step 5.
If it is NG, replace the solenoid No. 1.
5. Replace the valve body.
If the malfunction still persists, replace the automatic transmission assembly.

(20) Gear shift shock and time lag too large (2 - 3)

1. Check of oil level (Refer to AT-2.)
If it is OK, go to step 2.
If it is NG, adjust the oil level.
2. Check of ECU power supply circuit (Refer to AT-33.)
If it is OK, replace the A/T ECU. If the malfunction still persists after replacement, go to step 3.
If it is NG, repair the connectors or circuits concerned.
3. Remove the oil pan and strainer. Check the strainer for cut or wear of the O-ring.
If it is OK, go to step 4.
If it is NG, replace the O-ring of the strainer.
4. Unit check of solenoid No. 3 and solenoid No. 1 (Operation) (Refer to AT-77.)
If it is OK, go to step 5.
If it is NG, replace the solenoid concerned.
5. Replace the valve body.
If the malfunction still persists, replace the automatic transmission assembly.

(21) Gear shift shock and time lag too large (3 - 4)

1. Check of oil level (Refer to AT-2.)
If it is OK, go to step 2.
If it is NG, adjust the oil level.
2. Check of ECU power supply circuit (Refer to AT-33.)
If it is OK, replace the A/T ECU. If the malfunction still persists after replacement, go to step 3.
If it is NG, repair the connectors or circuits concerned.
3. Remove the oil pan and strainer. Check the strainer for cut or wear of the O-ring.
If it is OK, go to step 4.
If it is NG, replace the O-ring of the strainer.
4. Unit check of solenoid No. 3 and solenoid No. 1 (Operation) (Refer to AT-77.)
If it is OK, go to step 5.
If it is NG, replace the solenoid concerned.
5. Replace the valve body.
If the malfunction still persists, replace the automatic transmission assembly.

JAT00145-00000

(22) Engine races during gear shifting (2 - 3)

1. Unit check of solenoid No. 1 (Operation) (Refer to AT-77.)
If it is OK, go to step 2.
If it is NG, replace the solenoid No. 1.
2. Check of ECU power supply circuit (Refer to AT-33.)
If it is OK, replace the A/T ECU. If the malfunction still persists after replacement, go to step 3.
If it is NG, repair the connectors or circuits concerned.
3. Replace the valve body.
If the malfunction still persists, replace the automatic transmission assembly.

(23) Engine races during gear shifting (3 - 4)

1. Unit check of solenoid No. 2 (Operation) (Refer to AT-77.)
If it is OK, go to step 5.
If it is NG, replace the solenoid No. 2.
2. Check of ECU power supply circuit (Refer to AT-33.)
If it is OK, replace the A/T ECU. If the malfunction still persists after replacement, go to step 3.
If it is NG, repair the connectors or circuits concerned.
3. Replace the valve body.
If the malfunction still persists, replace the automatic transmission assembly.

(24) Gear shifting takes place only between 1st gear and 3rd gear.

1. Check of ECU power supply circuit (Refer to AT-33.)
If it is OK, replace the A/T ECU. If the malfunction still persists after replacement, go to step 3.
If it is NG, repair the connectors or circuits concerned.
2. Replace the valve body.

JAT00148-00000

UNIT CHECK

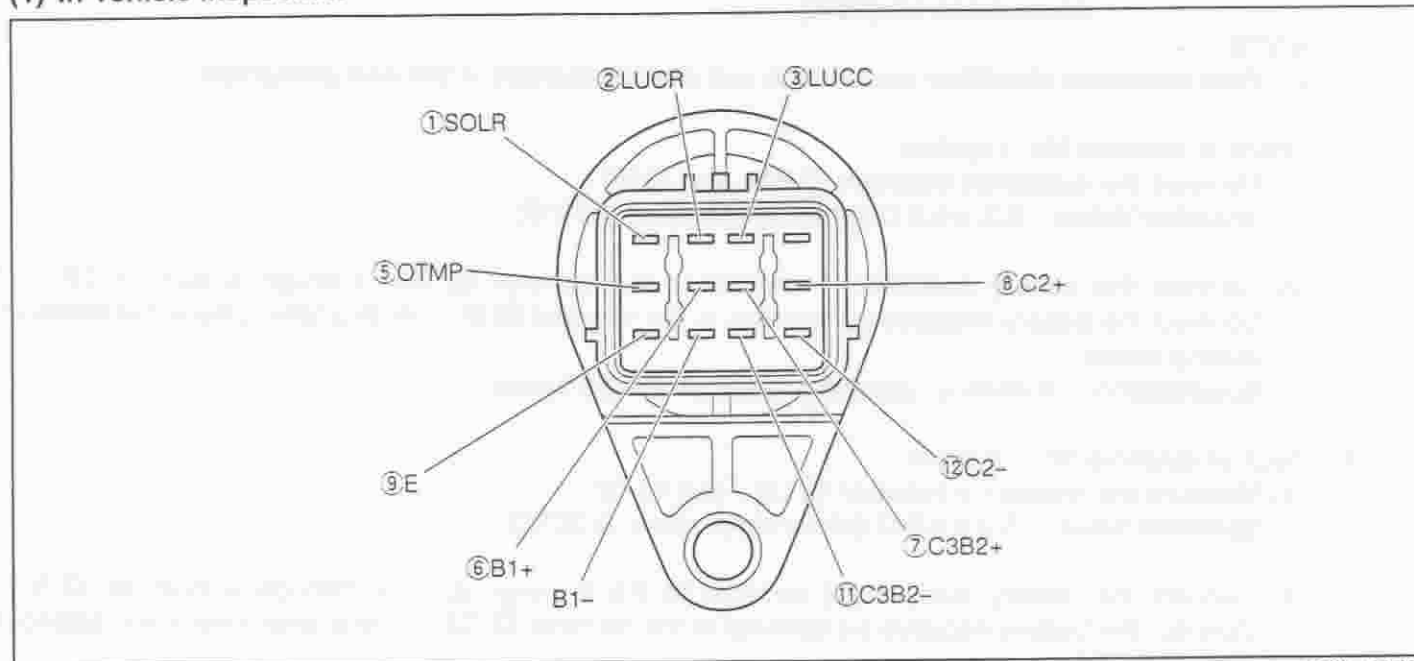
TURBINE REVOLUTION SENSOR AND OUTPUT REVOLUTION SENSOR

1. It is impossible to evaluate whether the turbine revolution sensor and output revolution sensor are faulty or not as the units due to their construction. Therefore, you can make total evaluation by performing the trouble-shooting according to diagnosis codes (No. P0720) or by checking the input/output signals (waveforms by oscilloscope) of the transmission control computer.

JAT00147-00000

SOLENOID WIRE ASSEMBLY (INCLUDING FLUID TEMPERATURE SENSOR)

(1) In-vehicle inspection



JAT00148-00077

1. Disconnect the solenoid connector of the transaxle.
2. Connect the SST to the transaxle.
SST: 09990-97201-000
3. Check of switch solenoid system
 - (1) Measure the resistance between ① SOL and the transmission earth.
Specified Value: $16 \pm 2.0 \Omega$ (when temperature is 20°C)
 - (2) Connect the battery positive (+) terminal to the terminal ① SOL. Connect the battery negative (-) terminal to the transmission earth. At this time, check the solenoid operating sound.
Specification: A clicking operating sound should be heard.
4. Check of LUC solenoid system
 - (1) Measure the resistance between ② LUCR and the transmission earth.
Specified Value: $16 \pm 2.0 \Omega$ (when temperature is 20°C)
 - (2) Connect the battery positive (+) terminal to the terminal ② LUCR. Connect the battery negative (-) terminal to the transmission earth. At this time, check the solenoid operating sound.
Specification: A clicking operating sound should be heard.

JAT00149-00000

5. Check of duty solenoid system

(1) Measure the resistance between ③ LUCC and the transmission earth.
Specified Value: $12 \pm 1 \Omega$ (when temperature is 20°C)

(2) Connect the battery positive (+) terminal to the terminal ③ LUCC. Connect the battery negative (-) terminal to the transmission earth. At this time, check the solenoid operating sound.
Specification: A clicking operating sound should be heard.

6. Check of fluid temperature sensor system

(1) Measure the resistance between ⑤ OTMP and ⑨ E.

Specified Value: $5.63 \pm 0.56 \text{ k}\Omega$ (0°C)
 $0.072 \pm 0.0022 \text{ k}\Omega$ (140°C)

Reference: About $2.4 \text{ k}\Omega$ (20°C)

About $0.313 \text{ k}\Omega$ (80°C)

NOTE:

- Final evaluation should be made in the unit check described in the next paragraph.

7. Check of solenoid No. 1 system

(1) Measure the resistance between ⑥ B1+ and ⑩ B1-.

Specified Value: $5.3 \pm 0.3 \Omega$ (when temperature is 20°C)

(2) Connect the battery positive (+) terminal to the terminal ⑥ B1+ through a bulb of 12 V-21 W. Connect the battery negative (-) terminal to the terminal ⑩ B1-. At this time, check the solenoid operating sound.

Specification: A clicking operating sound should be heard.

8. Check of solenoid No. 2 system

(1) Measure the resistance between ⑧ C2+ and ⑫ C2-.

Specified Value: $5.2 \pm 0.2 \Omega$ (when temperature is 20°C)

(2) Connect the battery positive (+) terminal to the terminal ⑧ C2+ through a bulb of 12 V-21 W. Connect the battery negative (-) terminal to the terminal ⑫ C2-. At this time, check the solenoid operating sound.

Specification: A clicking operating sound should be heard.

9. Check of solenoid No. 3 system

(1) Measure the resistance between ⑦ C3B2+ and ⑪ C3B2-.

Specified Value: $5.2 \pm 0.2 \Omega$ (when temperature is 20°C)

(2) Connect the battery positive (+) terminal to the terminal ⑦ C3B2+ through a bulb of 12 V-21 W. Connect the battery negative (-) terminal to the terminal ⑪ C3B2-. At this time, check the solenoid operating sound.

Specification: A clicking operating sound should be heard.

JATC0150-00000

(2) Unit check

① Solenoid connector ③ - Duty solenoid connector ⑤ (LUCC)

(4) Solenoid No. 1 system

① Solenoid connector ⑥ - Solenoid No. 1 connector ① (B1+)

② Solenoid connector ⑩ - Solenoid No. 1 connector ② (B1-)

(5) Solenoid No. 2 system

① Solenoid connector ⑧ - Solenoid No. 2 connector ① (C2+)

② Solenoid connector ⑫ - Solenoid No. 2 connector ② (C2-)

(6) Solenoid No. 3 system

① Solenoid connector ⑦ - Solenoid No. 3 connector ① (C3B2+)

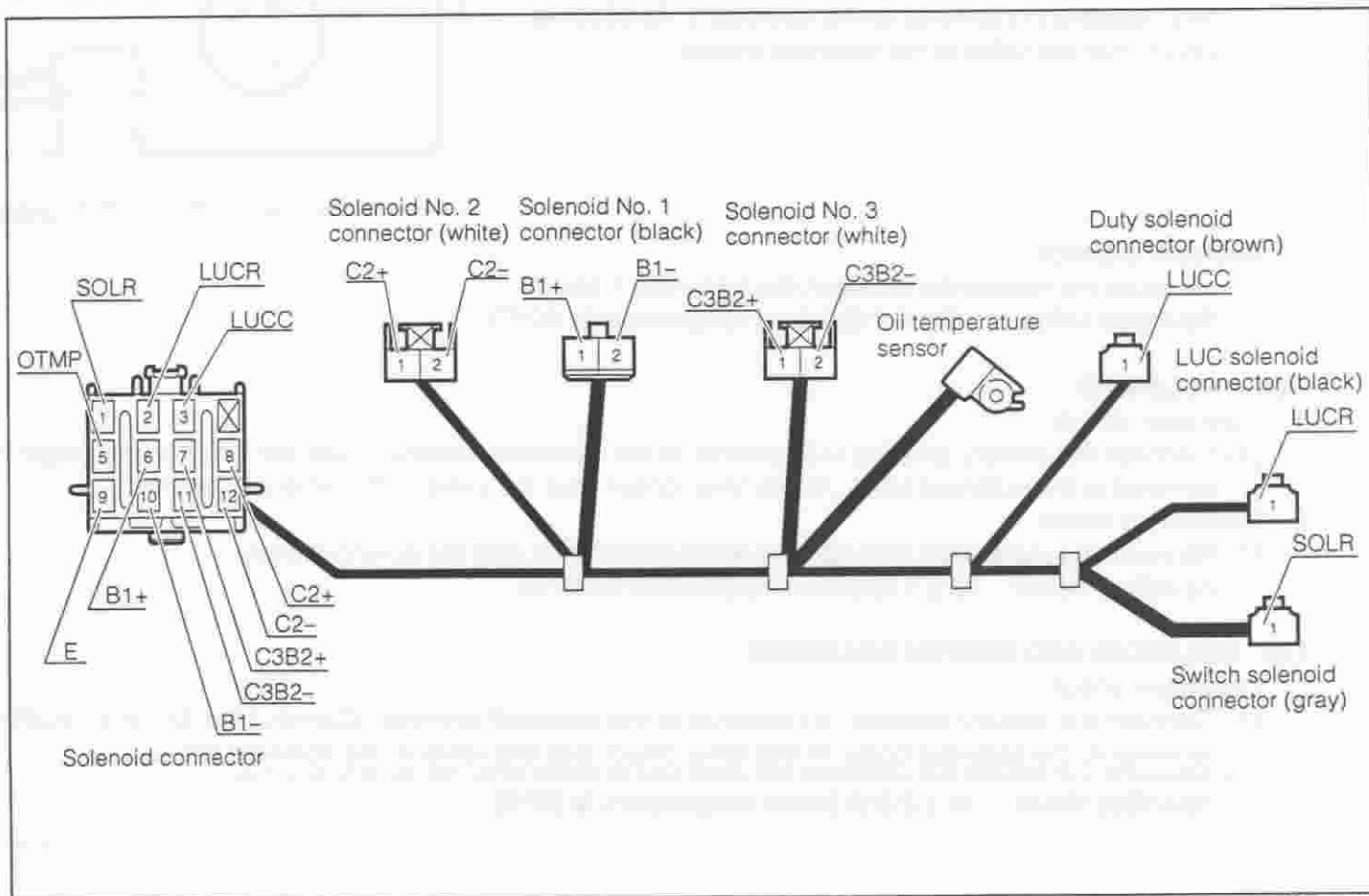
② Solenoid connector ⑪ - Solenoid No. 3 connector ② (C3B2-)

3. Fluid temperature sensor system

(1) Measure the resistance between ⑤ OTMP and ⑨ E of the solenoid connector.

Specified Value: $5.63 \pm 0.56 \text{ k}\Omega$ (0°C)

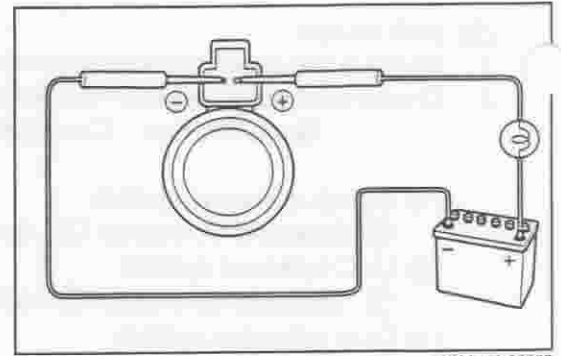
$0.072 \pm 0.0022 \text{ k}\Omega$ (140°C)

4. Check that there is no short between the connector terminals given below.

JAT00151-00078

SOLENOID NO. 1

1. Operation check
 - (1) Connect the battery positive (+) terminal to the terminal 2 through a bulb of 12 V - 21 W. Connect the battery negative (-) terminal to the terminal 1. At this time, check that the valve in the solenoid moves.

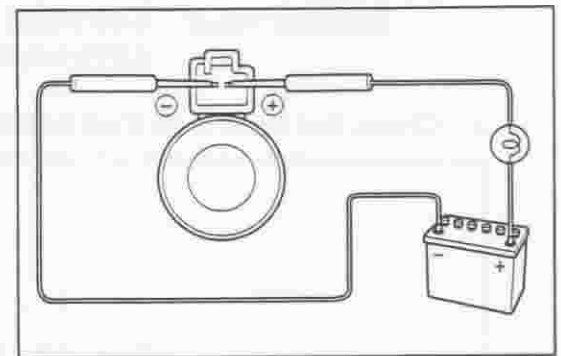


2. Resistance check
 - (1) Measure the resistance between the terminals 1 and 2.
Specified Value:
 $5.3 \pm 0.3 \Omega$ (when temperature is 20°C)

JAT00153-00000

SOLENOID NO. 2 AND SOLENOID NO. 3

1. Operation check
 - (1) Connect the battery positive (+) terminal to the terminal 2 through a bulb of 12 V - 21 W. Connect the battery negative (-) terminal to the terminal 1. At this time, check that the valve in the solenoid moves.



2. Resistance check
 - (1) Measure the resistance between the terminals 1 and 2.
Specified Value: $5.3 \pm 0.2 \Omega$ (when temperature is 20°C)

DUTY SOLENOID

1. Operation check
 - (1) Connect the battery positive (+) terminal to the solenoid terminal. Connect the battery negative (-) terminal to the solenoid body. At this time, check that the valve in the solenoid moves.
2. Resistance check
 - (1) Measure the resistance between the solenoid terminal and the solenoid body.
Specified Value: $12 \pm 1 \Omega$ (when temperature is 20°C)

LUC SOLENOID AND SWITCH SOLENOID

1. Operation check
 - (1) Connect the battery positive (+) terminal to the solenoid terminal. Connect the battery negative (-) terminal to the solenoid body. At this time, check that the valve in the solenoid moves.
2. Resistance check
 - (1) Measure the resistance between the solenoid terminal and the solenoid body.
Specified Value: $16 \pm 2.0 \Omega$ (when temperature is 20°C)

JAT00155-00000

Check system	Terminal	Measuring condition	Specified value	Reference value (Example of measured value)
Earth	③E01 - Body earth	At all times	Continuity exists.	Continuity exists.
	②E02 - Body earth	At all times	Continuity exists.	Continuity exists.

*: Refer to the oscilloscope waveforms in the next paragraph.

JAT00157-00000

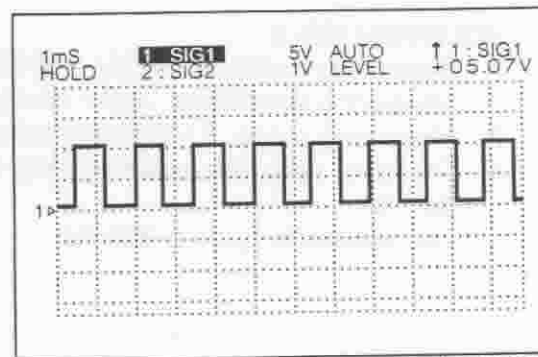
OSCILLOSCOPE WAVEFORMS

(1) Description

Waveforms measured by the oscilloscope function of the diagnosis tester (DS-21) are shown below as reference.

(2) Turbine revolution sensor

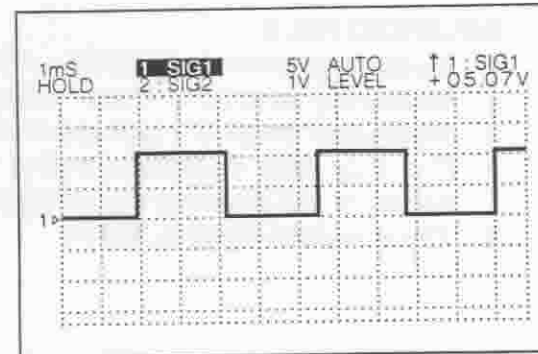
1. Measuring terminals ④ RTBN - ③E2
2. Measuring conditions: during engine idling (The measured waveform is the one at an engine speed of 1360 rpm.)
3. Measuring range: 5 V (voltage axis), 1 ms (time axis)
4. As the turbine revolution rises, the cycle is shortened.



JAT00158-00083

OUTPUT REVOLUTION SENSOR

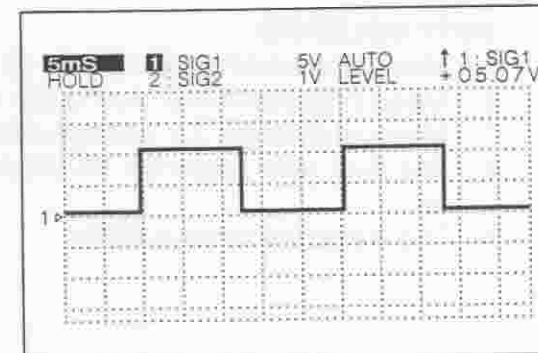
1. Measuring terminals ⑦ ROPT - ③E2
2. Measuring conditions: When vehicle speed is about 20 km/h
3. Measuring range: 5 V (voltage axis), 1 ms (time axis)
4. As the output revolution (vehicle speed) rises, the cycle is shortened.



JAT00159-00084

ENGINE REVOLUTION SIGNAL WAVEFORM

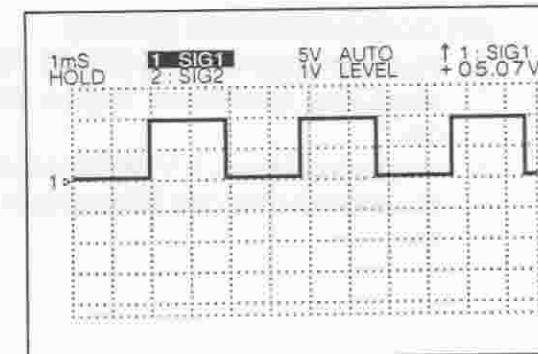
1. Measuring terminals ⑧ RENG - ③E1
2. Measuring conditions: During engine idling (The measured waveform is the one at an engine speed of 1100 rpm.)
3. Measuring range: 5 V (voltage axis), 5 ms (time axis)
4. As the engine revolution rises, the cycle is shortened.



JAT00160-00085

SPEEDOMETER SIGNAL

1. Measuring terminals ⑩ SPDO - ③E1
2. Measuring conditions: When vehicle speed is about 40 km/h
3. Measuring range: 5 V (voltage axis), 10 ms (time axis)
4. As the vehicle speed rises, the cycle is shortened.



JAT00161-00086

SPECIFIED VALUES FOR INPUT/OUTPUT SIGNALS

Check system	Terminal	Measuring condition	Specified value	Reference value (Example of measured value)
Turbine revolution sensor	④RTBN - ③⑧E2	During engine idling	Pulse generation	*
Output revolution sensor	⑦ROPT - ③⑧E2	When vehicle speed is 20 km/h	Pulse generation	*
Sensor power supply	⑩V12 - ③⑧E2	Engine stopped, IG switch turned ON	Battery voltage	13.3 V
Engine revolution signal	⑧RENG - ③⑨E1	During engine idling	Pulse generation	*
Neutral start switch	⑰P - ③⑨E1	[P] range	About 0 V	0 V
		Other than [P] range	Battery voltage	12.1 V
	⑤①R - ③⑨E1	[R] range	Battery voltage	11.2 V
		Other than [R] range	About 0 V	0 V
	⑤①N - ③⑨E1	[N] range	About 0 V	0 V
		Other than [N] range	Battery voltage	11.9 V
	④⑨D - ③⑨E1	[D] range	About 0 V	0 V
		Other than [D] range	Battery voltage	10.8 V
	④⑩2 - ③⑨E1	[2] range	About 0 V	0 V
		Other than [2] range	Battery voltage	12.4 V
	④⑦L - ③⑨E1	[L] range	About 0 V	0 V
		Other than [L] range	Battery voltage	12.3 V
		Button pressed	About 0 V	0 V
Fluid temperature sensor	④⑩OTMP - ③⑧E2	When fluid temperature is 20 °C	About 3.4 V	—
		When fluid temperature is 80 °C	About 1.1 V	—
Brake switch	②3BRK - ③⑨E1	Brake OFF	About 0 V	0 V
		Brake ON	Battery voltage	11.9 V
Self-diagnosis switch	②①T - ③⑨E1	Terminal T opened	Battery voltage	11.9 V
		Terminal T shorted	About 0 V	0 V
Solenoid No. 1	①B1+ - ②3B1-	Under non-energizing conditions	About 0 V	0 V
		Under energizing conditions	Pulse generation	*
Solenoid No. 2	②C2+ - ②3C2-	Under non-energizing conditions	About 0 V	0 V
		Under energizing conditions	Pulse generation	*
Solenoid No. 3	③C3B2+ - ③⑩C3B2-	Under non-energizing conditions	About 0 V	0 V
		Under energizing conditions	Pulse generation	*
Duty solenoid	④LUCC - ③③E01	Lockup OFF	About 0 V	0 V
		Slip lockup	Pulse generation	*
LUC solenoid	⑤LUCR - ③③E01	Under non-energizing conditions	About 0 V	0 V
		Under energizing conditions	Battery voltage	12.6 V
Switch solenoid	⑥SOLR - ③③E01	Under non-energizing conditions	About 0 V	0 V
	⑥SOLR - ③③E01	Under energizing conditions	Battery voltage	12.6 V
Speed meter	⑩⑩SPDO - ③⑨E1	When vehicle speed is about 40 km/h	Pulse generation	*
EFI communication	④COMO - ③③E1	Engine stopped, IG switch turned ON	Pulse generation	*
	④COMI - ③③E1	Engine stopped, IG switch turned ON	Pulse generation	*
	④COMG - ③③E1	At all times	Continuity exists.	Continuity exists.
Power supply	②⑦+B1 - ③③E01	Engine stopped, IG switch turned ON	Battery voltage	12.3 V
	②⑥+B2 - ③③E01	Engine stopped, IG switch turned ON	Battery voltage	12.3 V
	②3BAT - ③③E01	At all times	Battery voltage	12.3 V
Earth	③③E1 - Body earth	At all times	Continuity exists.	Continuity exists.

Check system	Terminal	Measuring condition	Specified value	Reference value (Example of measured value)
Earth	③E01 - Body earth	At all times	Continuity exists.	Continuity exists.
	②E02 - Body earth	At all times	Continuity exists.	Continuity exists.

*: Refer to the oscilloscope waveforms in the next paragraph.

JAT00157-00000

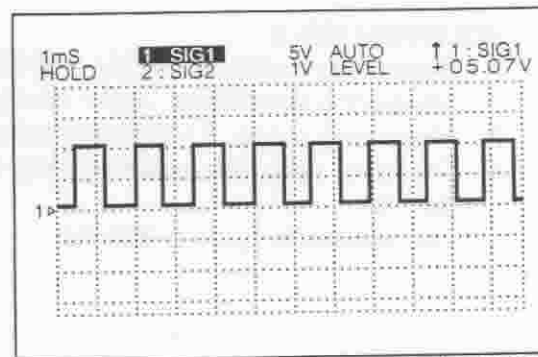
OSCILLOSCOPE WAVEFORMS

(1) Description

Waveforms measured by the oscilloscope function of the diagnosis tester (DS-21) are shown below as reference.

(2) Turbine revolution sensor

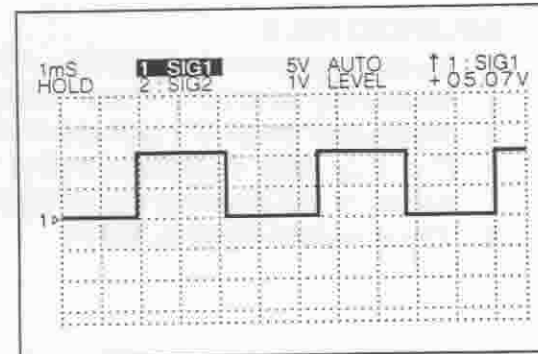
1. Measuring terminals ④ RTBN - ③E2
2. Measuring conditions: during engine idling (The measured waveform is the one at an engine speed of 1360 rpm.)
3. Measuring range: 5 V (voltage axis), 1 ms (time axis)
4. As the turbine revolution rises, the cycle is shortened.



JAT00158-00083

OUTPUT REVOLUTION SENSOR

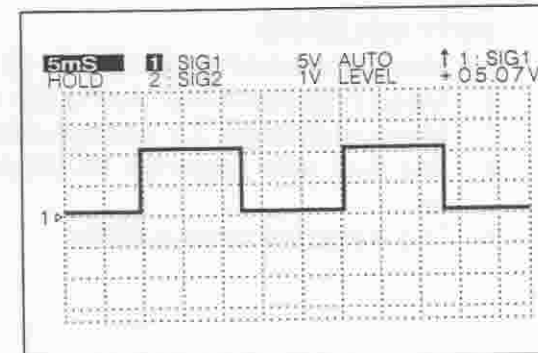
1. Measuring terminals ⑦ ROPT - ③E2
2. Measuring conditions: When vehicle speed is about 20 km/h
3. Measuring range: 5 V (voltage axis), 1 ms (time axis)
4. As the output revolution (vehicle speed) rises, the cycle is shortened.



JAT00159-00084

ENGINE REVOLUTION SIGNAL WAVEFORM

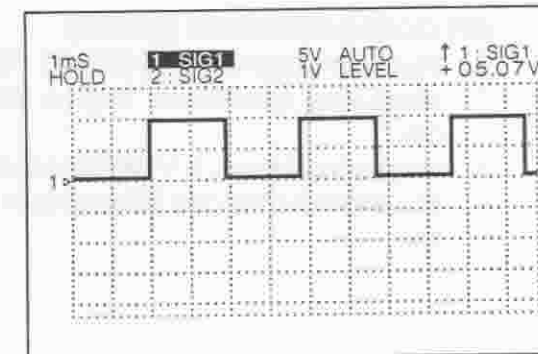
1. Measuring terminals ⑧ RENG - ③E1
2. Measuring conditions: During engine idling (The measured waveform is the one at an engine speed of 1100 rpm.)
3. Measuring range: 5 V (voltage axis), 5 ms (time axis)
4. As the engine revolution rises, the cycle is shortened.



JAT00160-00085

SPEEDOMETER SIGNAL

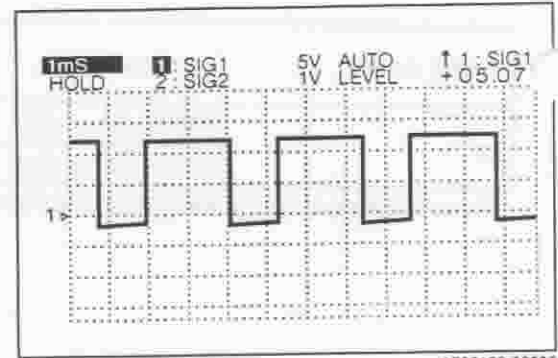
1. Measuring terminals ⑩ SPDO - ③E1
2. Measuring conditions: When vehicle speed is about 40 km/h
3. Measuring range: 5 V (voltage axis), 10 ms (time axis)
4. As the vehicle speed rises, the cycle is shortened.



JAT00161-00086

SOLENOID NO. 1

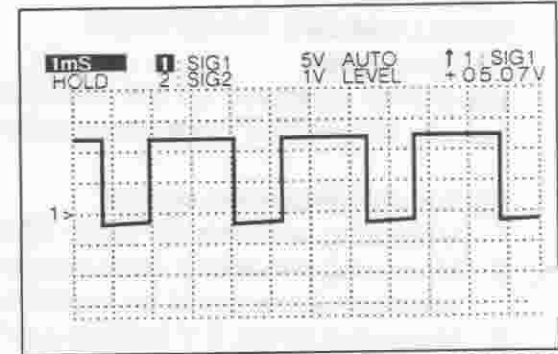
1. Measuring terminals ① B1+ - ② B1-
2. Measuring conditions: Under energizing conditions
3. Measuring range: 5 V (voltage axis), 1 ms (time axis)
4. The duty ratio decreases during the gear shift transient period.
5. The waveform cycle is 300 Hz.



JAT00162-00087

SOLENOID NO. 2

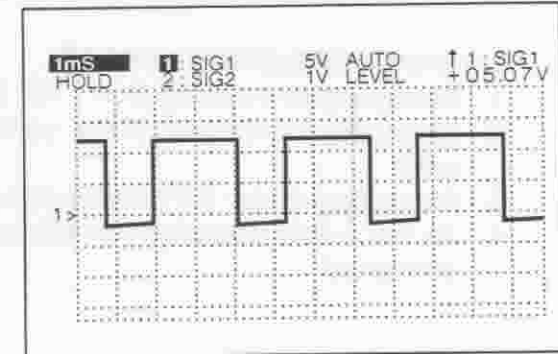
1. Measuring terminals ② C2+ - ③ C2-
2. Measuring conditions: Under energizing conditions
3. Measuring range: 5 V (voltage axis), 1 ms (time axis)
4. The duty ratio decreases during the gear shift transient period.
5. The waveform cycle is 300 Hz.



JAT00163-00088

SOLENOID NO. 3

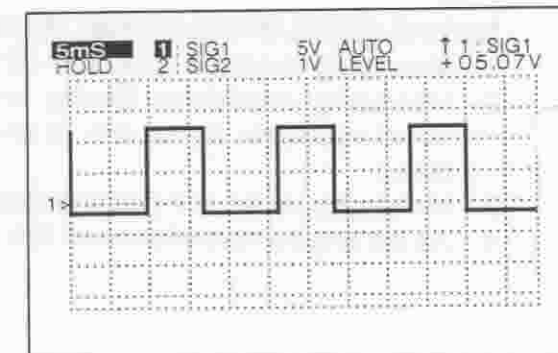
1. Measuring terminals ③ C3B2+ - ④ C3B2-
2. Measuring conditions: Under energizing conditions
3. Measuring range: 5 V (voltage axis), 1 ms (time axis)
4. The duty ratio decreases during the gear shift transient period or line pressure regulating period.
5. The waveform cycle is 300 Hz.



JAT00164-00089

DUTY SOLENOID

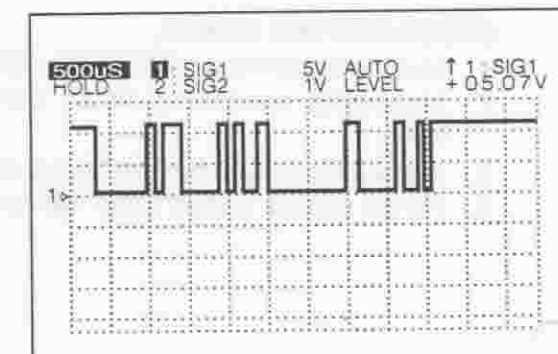
1. Measuring terminals ④ LUCC - ⑤ E01
2. Measuring conditions: during slip lockup period
3. Measuring range: 5 V (voltage axis), 1 ms (time axis)
4. The duty ratio becomes 100 % during direct lockup period.
5. The waveform cycle is 60 Hz.



JAT00165-00090

EFI COMMUNICATION (COMO)

1. Measuring terminals ④ COMO - ⑤ E1
2. Measuring conditions: Engine stopped, IG switch turned ON
3. Measuring range: 5 V (voltage axis), 500 μs (time axis)
4. Waveforms changes according to communication information.



JAT00166-00091

EFI COMMUNICATION (COMI)

1. Measuring terminals ④2 COMG - ④9 E1
2. Measuring conditions: Engine stopped, IG switch turned ON
3. Measuring range: 5 V (voltage axis), 500 μ s (time axis)
4. Waveforms changes according to communication information.

