

# AUTOMATIC TRANSMISSION

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23109000347

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### WARNING REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

#### WARNING!

- (1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to driver and passenger (from rendering the SRS inoperative).
- (2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
- (3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B - Supplemental Restraint System (SRS) before beginning any service or maintenance of any component of the SRS or any SRS-related component.

#### NOTE

The SRS includes the following components: SRS-ECU, SRS warning lamp, air bag module, clock spring, side impact sensors and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (\*).

**SERVICE SPECIFICATIONS**

23100030222

Items	Standard value	
Oil temperature sensor kΩ	at 0_C	16.5 - 20.5
	at 100_C	0.57 - 0.69
Resistance of damper clutch control solenoid valve coil (at 20_C) Ω	2.7 - 3.4	
Resistance of Low-Reverse solenoid valve coil (at 20_C) Ω	2.7 - 3.4	
Resistance of second solenoid valve coil (at 20_C) Ω	2.7 - 3.4	
Resistance of underdrive solenoid valve coil (at 20_C) Ω	2.7 - 3.4	
Resistance of overdrive solenoid valve coil (at 20_C) Ω	2.7 - 3.4	
Stall speed r/min	2,100 - 2,600	

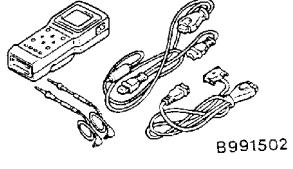
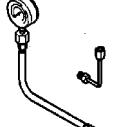
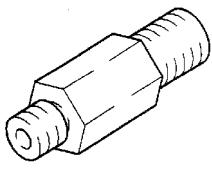
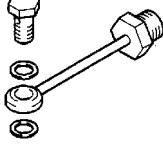
**LUBRICANTS**

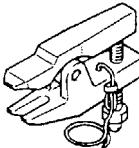
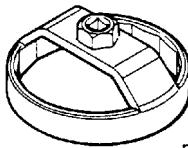
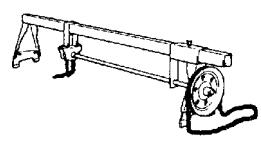
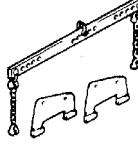
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Items	Specified lubricant	Quantity L
Transmission fluid	DIA QUEEN ATF SPII or equivalent	7.8

**SPECIAL TOOLS**

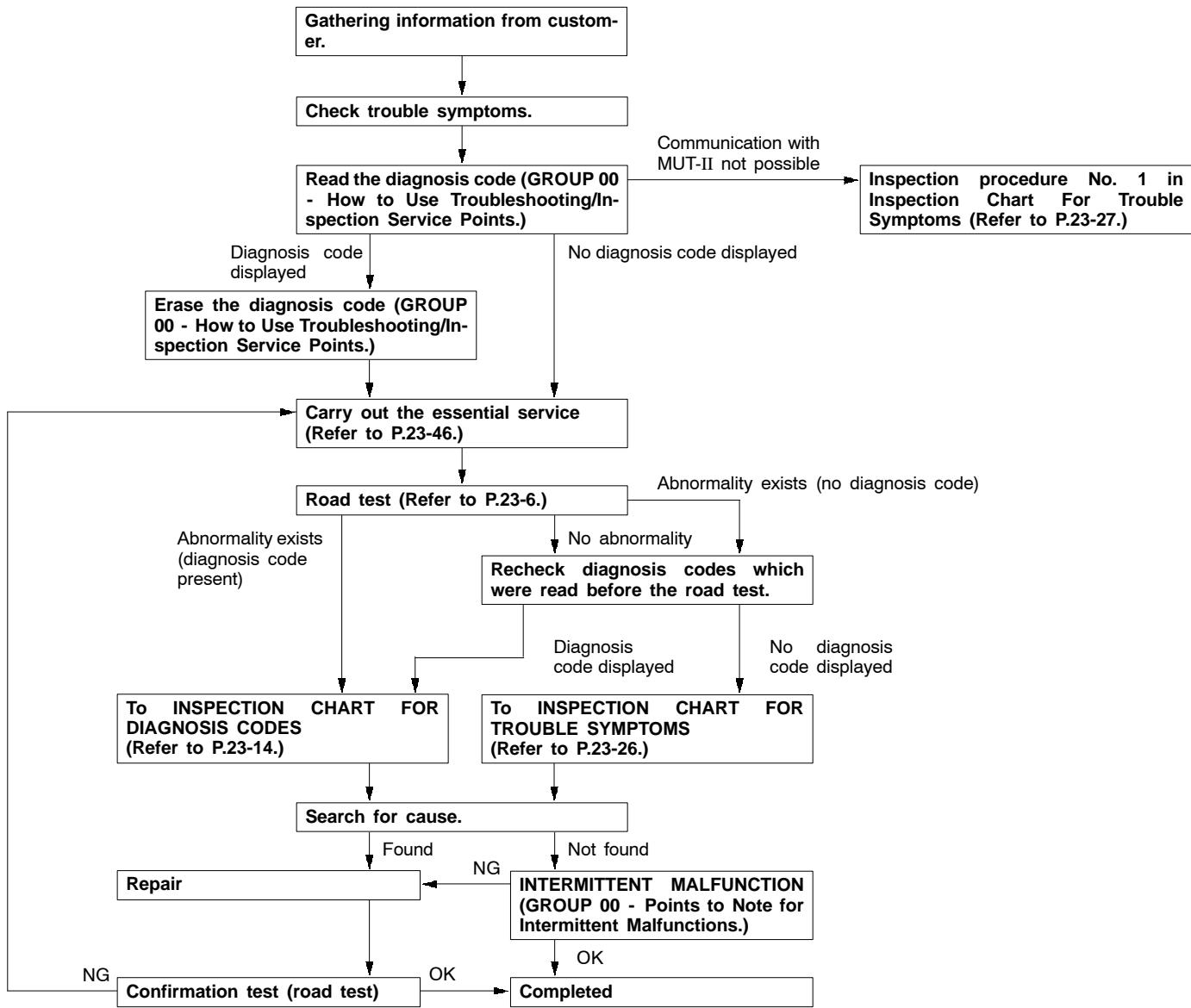
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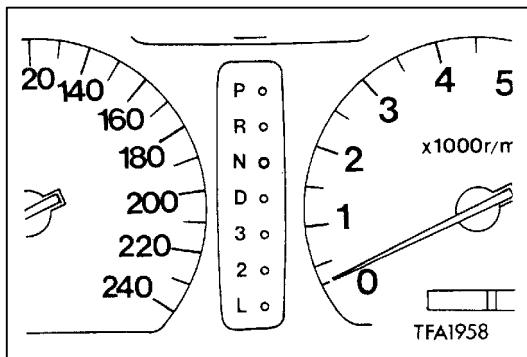
Tool	Number	Name	Use
 MB991502	MB991502	MUT-II sub assembly	Checking of the diagnosis code
 MD998330 (including MD998331)	MD998330 (including MD998331)	Oil pressure gauge (2,942 kPa)	Measurement of oil pressure
 MD998332	MD998332	Adapter	
 MD998900	MD998900	Adapter	

Tool	Number	Name	Use
 B991113	MB990635 or MB991113	Steering linkage puller	Ball joint disconnection
 B991610	MB991610	Oil filter wrench	Removal and installation of automatic trans- mission oil filter
 Z203827	GENERAL SERVICE TOOL MZ203827	Engine lifter	Supporting the engine assembly during removal and installation of the transmission
 B991453	MB991453	Engine hanger assembly	Supporting the engine assembly during removal and installation of the transmission

**TROUBLESHOOTING**

23100760275

**STANDARD FLOW OF DIAGNOSIS TROUBLESHOOTING**



## DIAGNOSIS FUNCTION

23100770186

### 1. N range lamp

The N range lamp flashes at a frequency of approximately 1 Hz if there is an abnormality in any of the items in the table below which are related to the A/T system. Check the diagnosis code output if the N range lamp is flashing at a frequency of approximately 1 Hz.

#### N range lamp flashing items

Crank angle sensor
Input shaft speed sensor
Output shaft speed sensor
Each solenoid valve
Out of phase at each shift point

#### Caution

If the N range lamp is flashing at a frequency of approximately 2 Hz (faster than at 1 Hz), it means that the automatic transmission fluid temperature is too high. Stop the vehicle in a safe place and wait until the N range lamp switches off.

### 2. Method of reading the diagnosis code

Use the MUT-II or the N range lamp to take a reading of the diagnosis codes. (Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points.)

## ROAD TEST

23100780271

Check by the following procedure.

No.	State prior to test and operation	Test and operation	Judgement value	Check item	Diagnos- sis code No.	Inspection procedure page if there is an abnormality
1	Ignition switch: OFF	Ignition switch (1) ON	Data list No. 54 Battery voltage [V]	Control relay	54	A/T Control relay system (23-25)
2	Ignition switch: ON Engine: Stopped Selector lever position: P	Selector lever position (1) P, (2) R, (3) N, (4) D, (5) 3, (6) 2, (7) L	Data list No. 61 (1) P, (2) R, (3)N, (4) D, (5) 3, (6) 2, (7) L	Inhibitor switch	-	Inhibitor switch system (23-36)
		Accelerator pedal (1) Released (2) Half depressed (3) Depressed	Data list No. 11 (1) 400 - 1,000 mV (2) Gradually rises from (1) (3) 4,500 - 5,000 mV	Throttle position sensor <Vehicles without TCL> Accelerator pedal position sensor <Vehicles with TCL>	11 12 14	Throttle position sensor system (23-15) Accelerator pedal position sensor system (23-15)
		Brake pedal (1) Depressed (2) Released	Data list No. 25 (1) OFF (2) ON	Wide open throttle switch	25	Wide open throttle switch system (23-17)
3	Ignition switch: ST Engine: Stopped	Starting test with lever P or N range	Starting should be possible	Starting possible or impossible	-	Starting impossible (23-28)
4	Warming up	Drive for 15 minutes or more so that the automatic fluid temperature becomes 70 - 90°C.	Data list No. 15 Gradually rises to 70 - 90°C	Oil temperature sensor	15	Oil temperature sensor system (23-15)

No.	State prior to test and operation	Test and operation	Judgement value	Check item	Diagnosis code No.	Inspection procedure page if there is an abnormality
5	Engine: Idling Selector lever position: N	Brake pedal (Retest) (1) Depressed (2) Released	Data list No. 26 (1) ON (2) OFF	Stop lamp switch	26	Stop lamp switch system (23-18)
		A/C switch (1) ON (2) OFF	Data list No. 65 (1) ON (2) OFF	Dual pressure switch	-	Dual pressure switch system (23-37)
		Accelerator pedal (1) Released (2) Half depressed	Data list No. 64 (1) ON (2) OFF	Idle position switch	-	Idle position switch system (23-37)
			Data list No. 21 (1) 550 - 850 rpm Gradually rises from (1)	Crank angle sensor	21	Crank angle sensor system (23-16)
			Data list No. 57 (2) Data changes	Communication with engine-ECU <Vehicles without TCL> Communication with TCL-ECU <Vehicles with TCL>	51	Serial communication system (23-25)
		Selector lever position (1) N → D (2) N → R	Should be no abnormal shifting shocks Time lag should be within 2 seconds	Malfunction when starting	-	Engine stalling during shifting (23-30)
					-	Shocks when changing from N to D and large time lag (23-30)
					-	Shocks when changing from N to R and large time lag (23-31)
					-	Shocks when changing from N to D,N to R and large time lag (23-32)
			Driving impossible		-	Does not move forward (23-28)
					-	Does not reverse (23-29)
					-	Does not move (forward or reverse) (23-29)

No.	State prior to test and operation	Test and operation	Judgement value	Check item	Diagnosis code No.	Inspection procedure page if there is an abnormality
6	Selector lever position: N (Carry out on a flat and straight road.)	Selector lever position and vehicle speed (1) Idling in L range (Vehicle stopped) (2) Driving at constant speed of 10 km/h in L position (3) Driving at constant speed of 30 km/h in 2 position (4) Driving at 50 km/h in 3 position with accelerator fully closed (5) Driving at constant speed of 50 km/h in D position (Each condition should be maintained for 10 seconds or more.)	Data list No. 63 (2) 1st, (4) 3rd, (3) 2nd, (5) 4th	Shift condition	-	-
			Data list No. 31 (2) 0 %, (4) 100 %, (3) 100 %, (5) 100 %	Low and reverse solenoid valve	31	Low and reverse solenoid valve system (23-18)
			Data list No. 32 (2) 0 %, (4) 0 %, (3) 0 %, (5) 100 %	Underdrive solenoid valve	32	Underdrive solenoid valve system (23-18)
			Data list No. 33 (2) 100 %, (4) 100 %, (3) 0 %, (5) 0 %	Second solenoid valve	33	Second solenoid valve system (23-18)
			Data list No. 34 (2) 100 %, (4) 0 %, (3) 100 %, (5) 0 %	Overdrive solenoid valve	34	Overdrive solenoid valve system (23-18)
			Data list No. 29 (1) 0 km/h (4) 50 km/h	Vehicle speed sensor	-	Vehicle speed sensor system (23-38)
			Data list No. 22 (4) 1,800 - 2,100 rpm	Input shaft speed sensor	22	Input shaft speed sensor system (23-16)
			Data list No. 23 (4) 1,800 - 2,100 rpm	Output shaft speed sensor	23	Output shaft speed sensor system (23-17)
			Data list No. 36 (1) 0 % (2) Approx. 70 - 90 %	Damper clutch control solenoid valve	36 52	Damper clutch control solenoid valve system (23-19)
			Data list No. 52 (1) Approx. 100 - 300 rpm (2) Approx. 0 - 10 rpm			
7	Selector lever position: 3 (Carry out on a flat and straight road.)	Selector lever position and vehicle speed (1) Release the accelerator pedal fully while driving at 50 km/h in 3rd gear. (2) Driving at constant speed of 50 km/h in 3rd gear.				

No.	State prior to test and operation	Test and operation	Judgement value	Check item	Diagnosis code No.	Inspection procedure page if there is an abnormality
8	Use the MUT-II to stop the INVECS-II function. Selector lever position: D (Carry out on a flat and straight road.)	<p>Monitor data list No. 11, 23, and 63 with the MUT-II.</p> <p>(1) Accelerate to 4th gear at a throttle position sensor output of 1.5V (accelerator opening angle of 30%).</p> <p>(2) Gently decelerate to a standstill.</p> <p>(3) Accelerate to 4th gear at a throttle position sensor output of 2.5 V (accelerator opening angle of 50%).</p> <p>(4) While driving at 60 km/h in 4th gear, shift down to 3 range.</p> <p>(5) While driving at 40 km/h in 3rd gear, shift down to 2 range.</p> <p>(6) While driving at 20 km/h in 2nd gear, shift down to L range.</p>	<p>For (1), (2) and (3), the reading should be the same as the specified output shaft speed and no abnormal shocks should occur.</p> <p>For (4), (5) and (6), downshifting should occur immediately after the shifting operation is made.</p>	<p>Malfunction when shifting</p> <p>Displaced shifting points</p> <p>Does not shift</p> <p>Does not shift from 1 to 2 or 2 to 1</p> <p>Does not shift from 2 to 3 or 3 to 2</p> <p>Does not shift from 3 to 4 or 4 to 3</p>	<p>-</p> <p>-</p> <p>-</p> <p>-</p> <p>31</p> <p>33</p> <p>41</p> <p>42</p> <p>33</p> <p>34</p> <p>42</p> <p>43</p> <p>32</p> <p>33</p> <p>43</p> <p>44</p>	<p>Shocks and running up (23-32)</p> <p>All points (23-33)</p> <p>Some points (23-34)</p> <p>No diagnosis code (23-34)</p> <p>Input shaft speed sensor system (23-16)</p> <p>Output shaft speed sensor system (23-17)</p> <p>Low and reverse solenoid valve system (23-18)</p> <p>Second solenoid valve system (23-18)</p> <p>1st gear ratio is not specified (23-20)</p> <p>2nd gear ratio is not specified (23-21)</p> <p>Second solenoid valve system (23-18)</p> <p>Overdrive solenoid valve system (23-18)</p> <p>2nd gear ratio is not specified (23-21)</p> <p>3rd gear ratio is not specified (23-22)</p> <p>Underdrive solenoid valve system (23-18)</p> <p>Second solenoid valve system (23-18)</p> <p>3rd gear ratio is not specified (23-22)</p> <p>4th gear ratio is not specified (23-23)</p>

No.	State prior to test and operation	Test and operation	Judgement value	Check item	Diagnosis code No.	Inspection procedure page if there is an abnormality
9	Selector lever position: N <b>(Carry out on a flat and straight road.)</b>	Monitor data list No. 22 and No. 23 with the MUT-II. (1) Move selector lever to R range, drive at constant speed of 10 km/h.	The ratio between data list No. 22 and No. 23 should be the same as the gear ratio when reversing.	Does not shift	22	Input shaft speed sensor system (23-16)
					23	Output shaft speed sensor system (23-17)
					46	Reverse gear ratio is not specified (23-24)

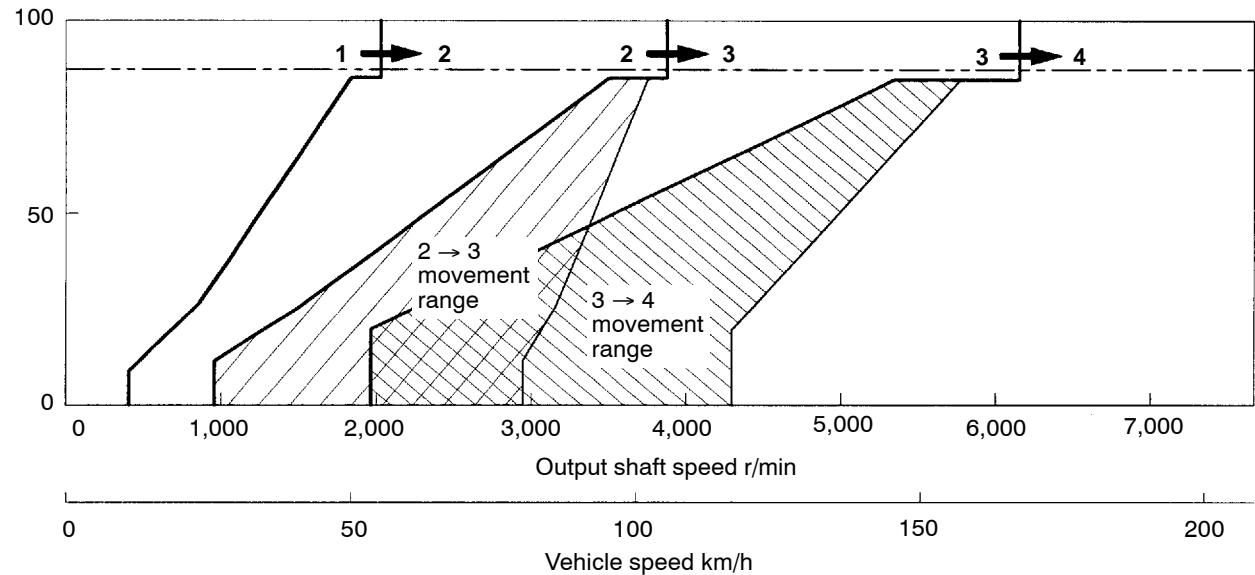
**SHIFT PATTERN**

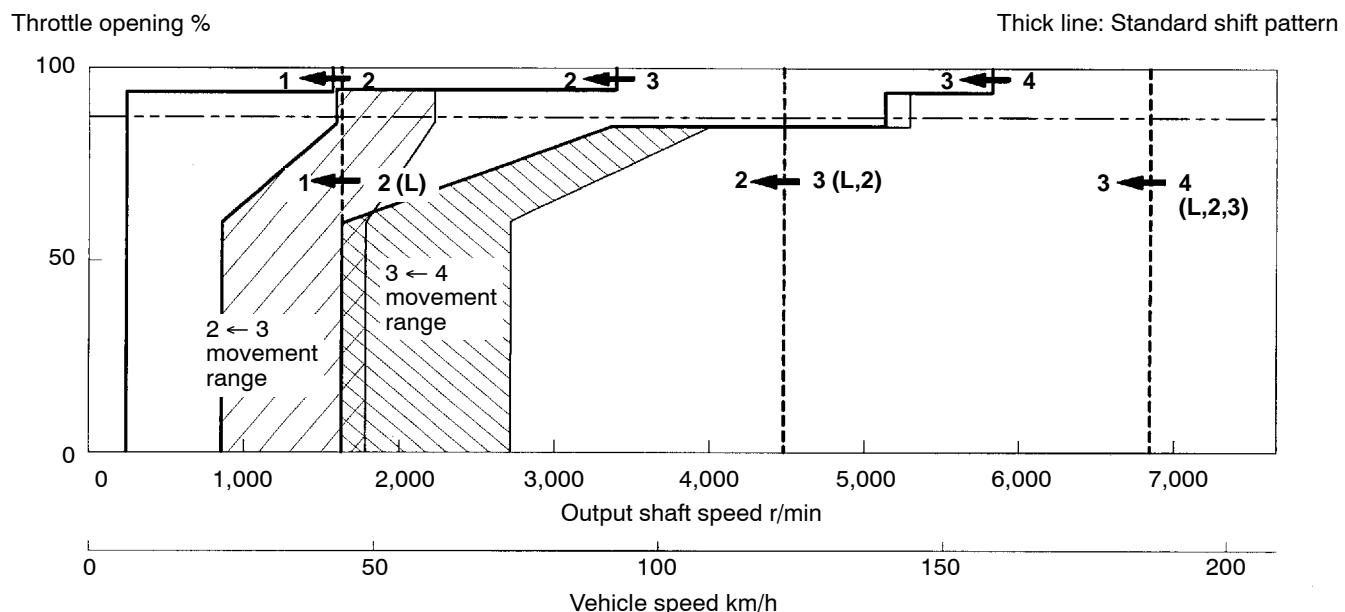
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**UPSHIFT PATTERN**

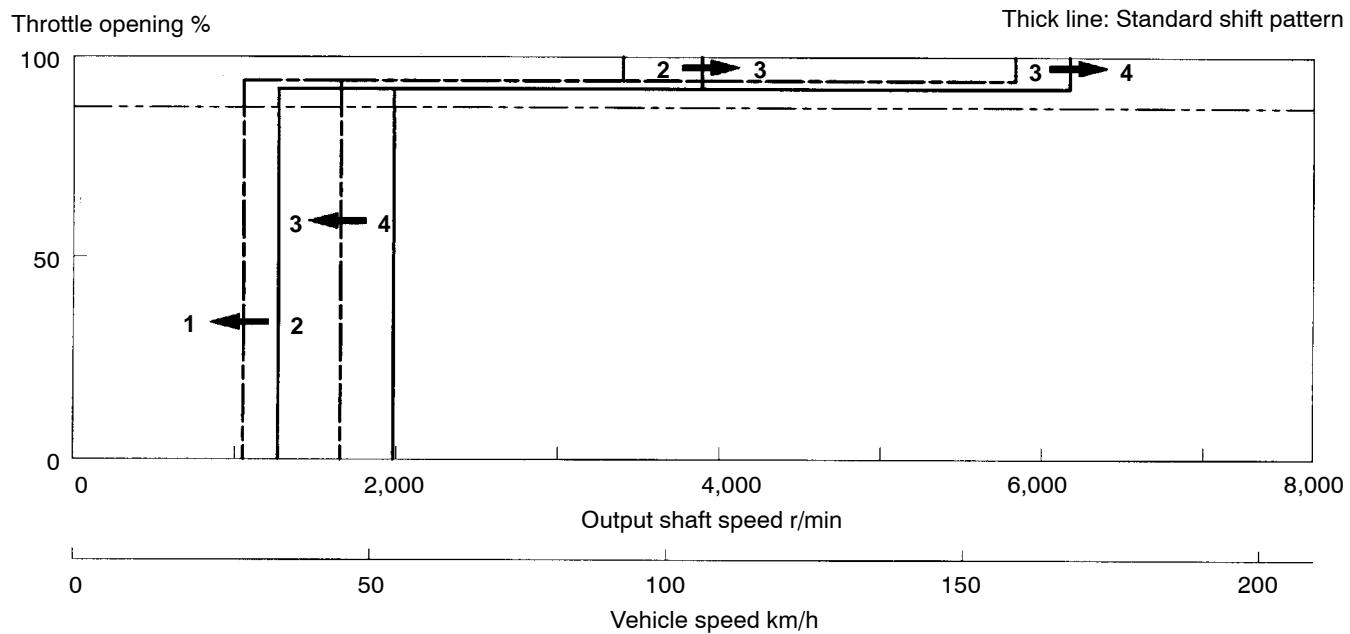
Throttle opening %

Thick line: Standard shift pattern



**DOWNSHIFT PATTERN**

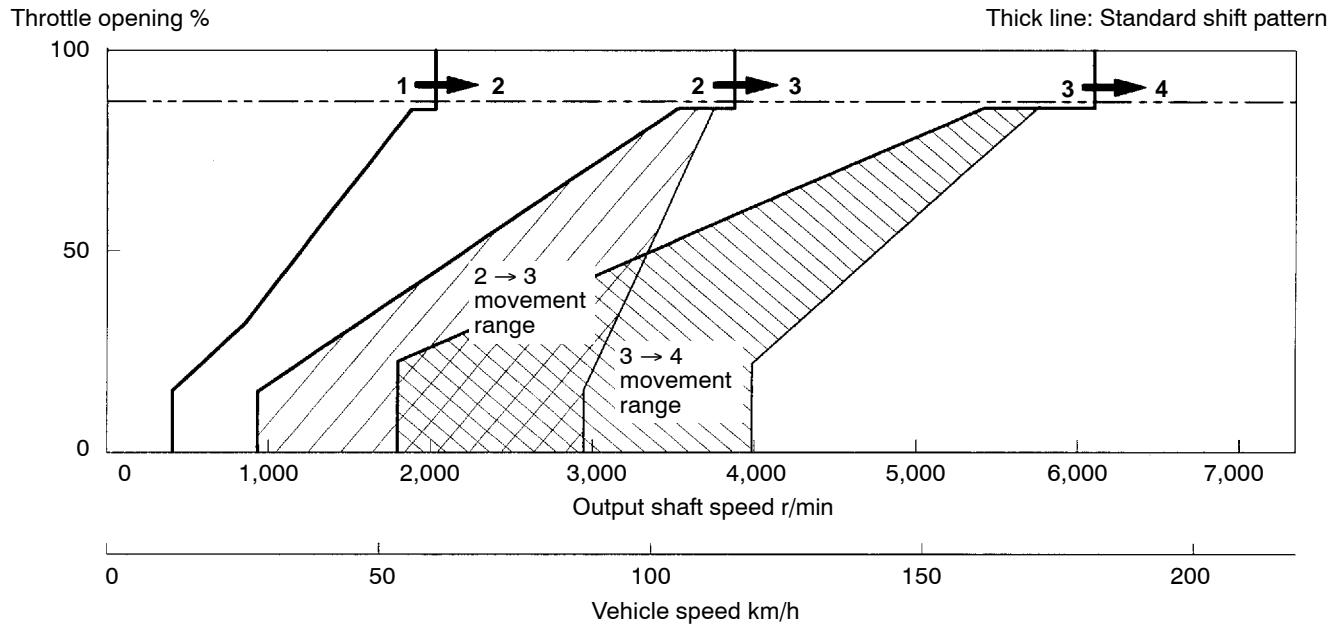
TFA1939

**HOLD MODE PATTERN**

TFA1940

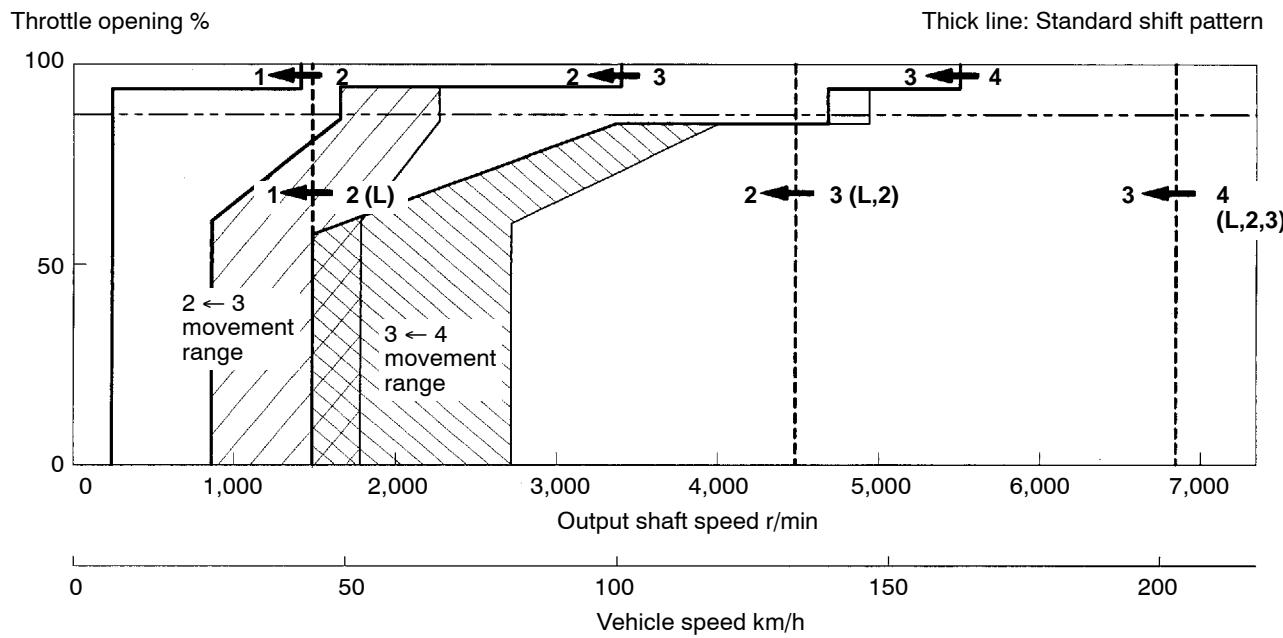
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## UPSHIFT PATTERN

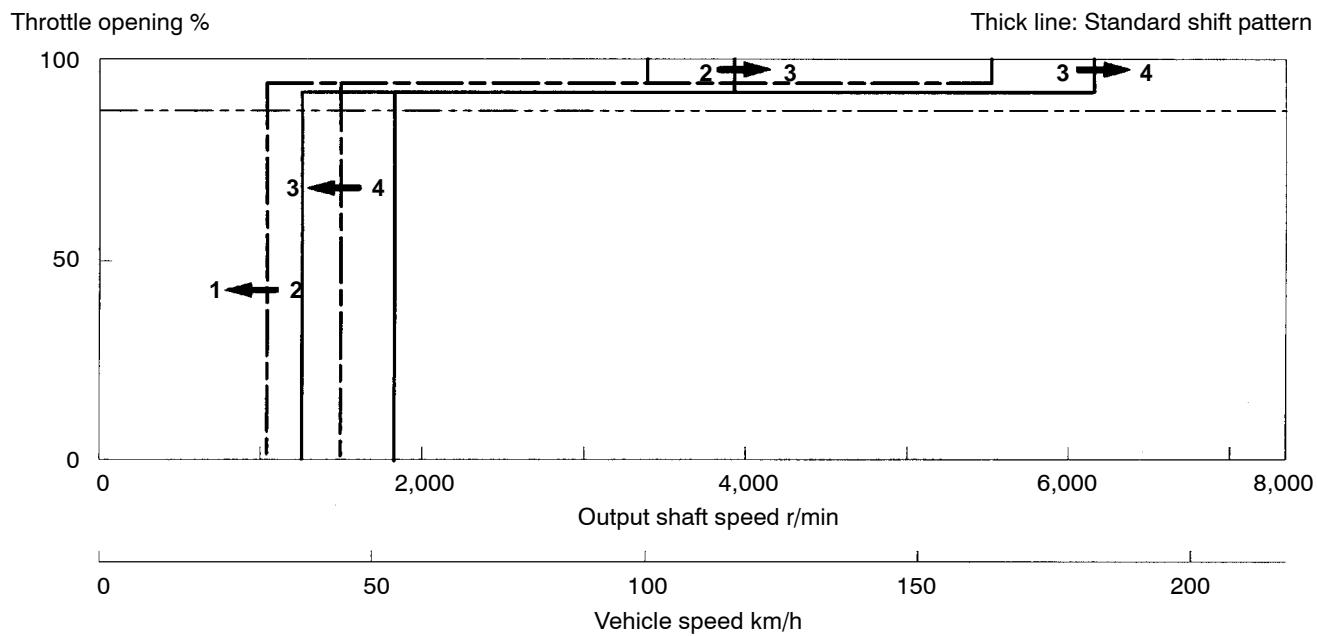


TFA1941

## DOWNSHIFT PATTERN



TFA1942

**HOLD MODE PATTERN**

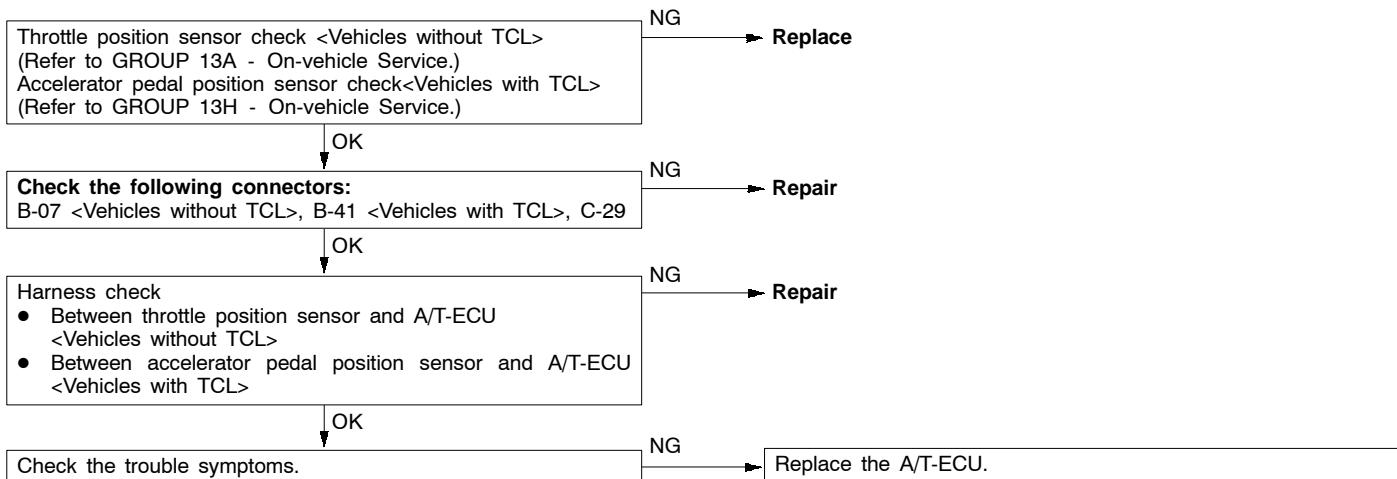
## INSPECTION CHART FOR DIAGNOSIS CODE

23100790243

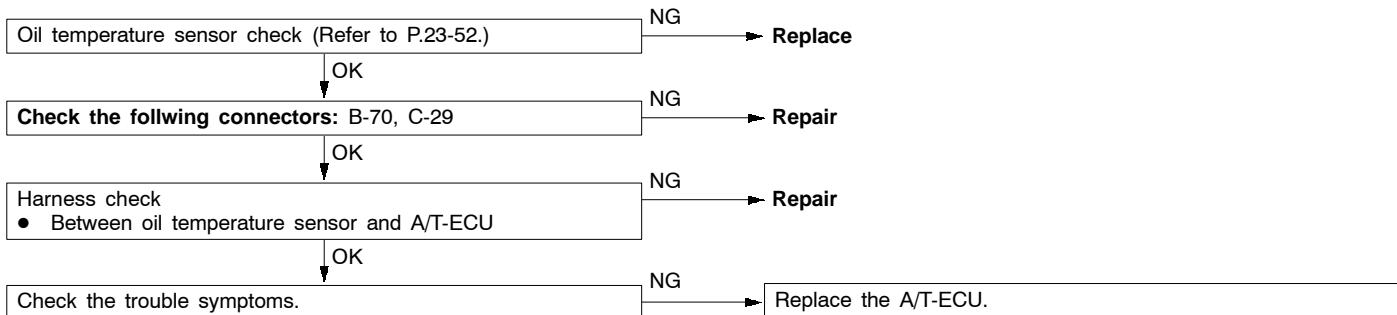
Code	Diagnosis item		Reference page
11	Throttle position sensor system <Vehicles without TCL> Accelerator pedal position sensor system <Vehicles with TCL>	Short circuit	23-15
12		Open circuit	23-15
14		Sensor maladjustment	23-15
15	Oil temperature sensor system	Open circuit	23-15
21	Crank angle sensor system	Open circuit	23-16
22	Input shaft speed sensor system	Short circuit/open circuit	23-16
23	Output shaft speed sensor system	Short circuit/open circuit	23-17
25	Wide open throttle switch system	Short circuit	23-17
26	Stop lamp switch system	Short circuit/open circuit	23-18
31	Low and reverse solenoid valve system	Short circuit/open circuit	23-18
32	Underdrive solenoid valve system	Short circuit/open circuit	23-18
33	Second solenoid valve system	Short circuit/open circuit	23-18
34	Overdrive solenoid valve system	Short circuit/open circuit	23-18
36	Damper control clutch solenoid valve system	Short circuit/open circuit	23-19
41	1st gear ratio does not meet the specification		23-20
42	2st gear ratio does not meet the specification		23-21
43	3rd gear ratio does not meet the specification		23-22
44	4th gear ratio does not meet the specification		23-23
46	Reverse gear ratio does not meet the specification		23-24
51	Abnormal communication with engine-ECU <Vehicles without TCL> Abnormal communication with TCL-ECU <Vehicles with TCL>		23-25
52	Damper control clutch solenoid valve system	Defective system	23-19
54	A/T Control relay system	Short circuit to earth/ open circuit	23-25
56	N range lamp system	Short circuit to earth	23-26
71	Malfunction of A/T-ECU		23-26

## INSPECTION PROCEDURES FOR DIAGNOSIS CODES

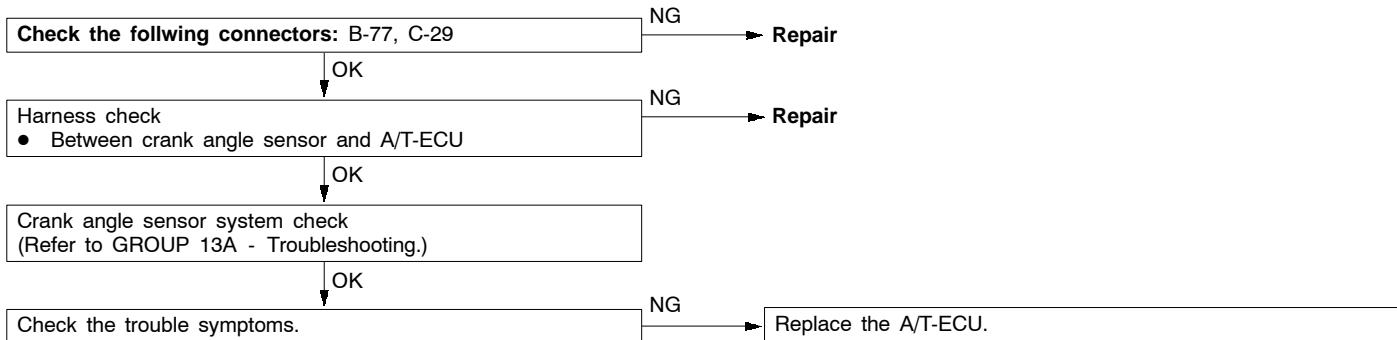
Code No. 11, 12, 14 Throttle position sensor system <Vehicles without TCL>, accelerator pedal position sensor <Vehicles with TCL>	Probable cause
<p>If the TPS or APS output voltage is 4.8 V or higher when the engine is idling, the output is judged to be too high and diagnosis code No. 11 is output. Code No. 11 is also output if there is a problem with the APS and an APS fail-safe signal is received from the TCL-ECU. If the TPS or APS output voltage is 0.2 V or lower at times other than when the engine is idling, the output is judged to be too low and diagnosis code No. 12 is output. If the TPS or APS output voltage is 0.2 V or lower or if it is 1.2 V or higher when the engine is idling, the TPS or APS adjustment is judged to be incorrect and diagnosis code No. 14 is output.</p>	<ul style="list-style-type: none"> <li>● Malfunction of the throttle position sensor &lt;Vehicles without TCL&gt;</li> <li>● Malfunction of the accelerator pedal position sensor &lt;Vehicles with TCL&gt;</li> <li>● Malfunction of connector</li> <li>● Malfunction of the A/T-ECU</li> </ul>



Code No. 15 Oil temperature sensor system	Probable cause
<p>If the oil temperature sensor output voltage is 2.6 V or more even after driving for 10 minutes or more (if the oil temperature does not increase), it is judged that there is an open circuit in the oil temperature sensor and diagnosis code No. 15 is output.</p>	<ul style="list-style-type: none"> <li>● Malfunction of the oil temperature sensor</li> <li>● Malfunction of connector</li> <li>● Malfunction of the A/T-ECU</li> </ul>

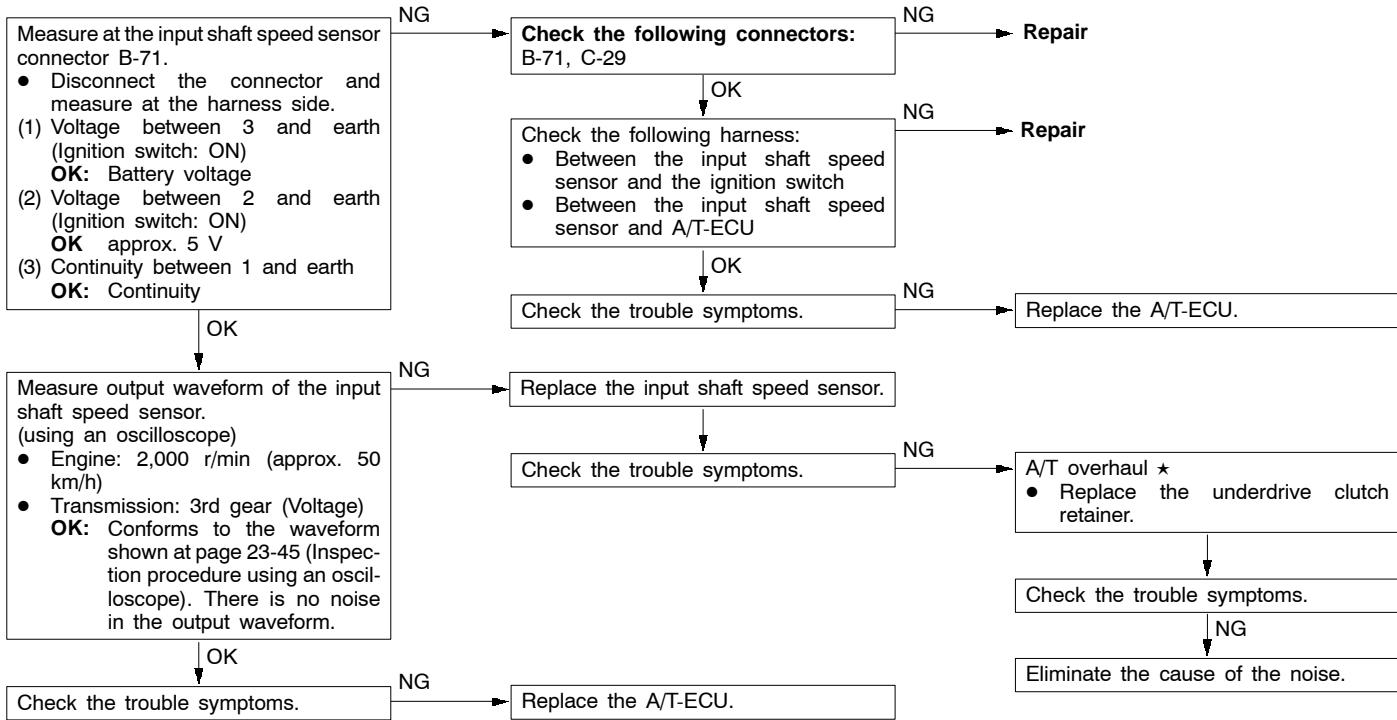


Code No. 21 Crank angle sensor system	Probable cause
If no output pulse is detected from the crank angle sensor for 5 seconds or more while driving at 25 km/h or more, it is judged that there is an open circuit in the crank angle sensor and diagnosis code No. 21 is output.	<ul style="list-style-type: none"> <li>Malfunction of the crank angle sensor</li> <li>Malfunction of connector</li> <li>Malfunction of the A/T-ECU</li> </ul>



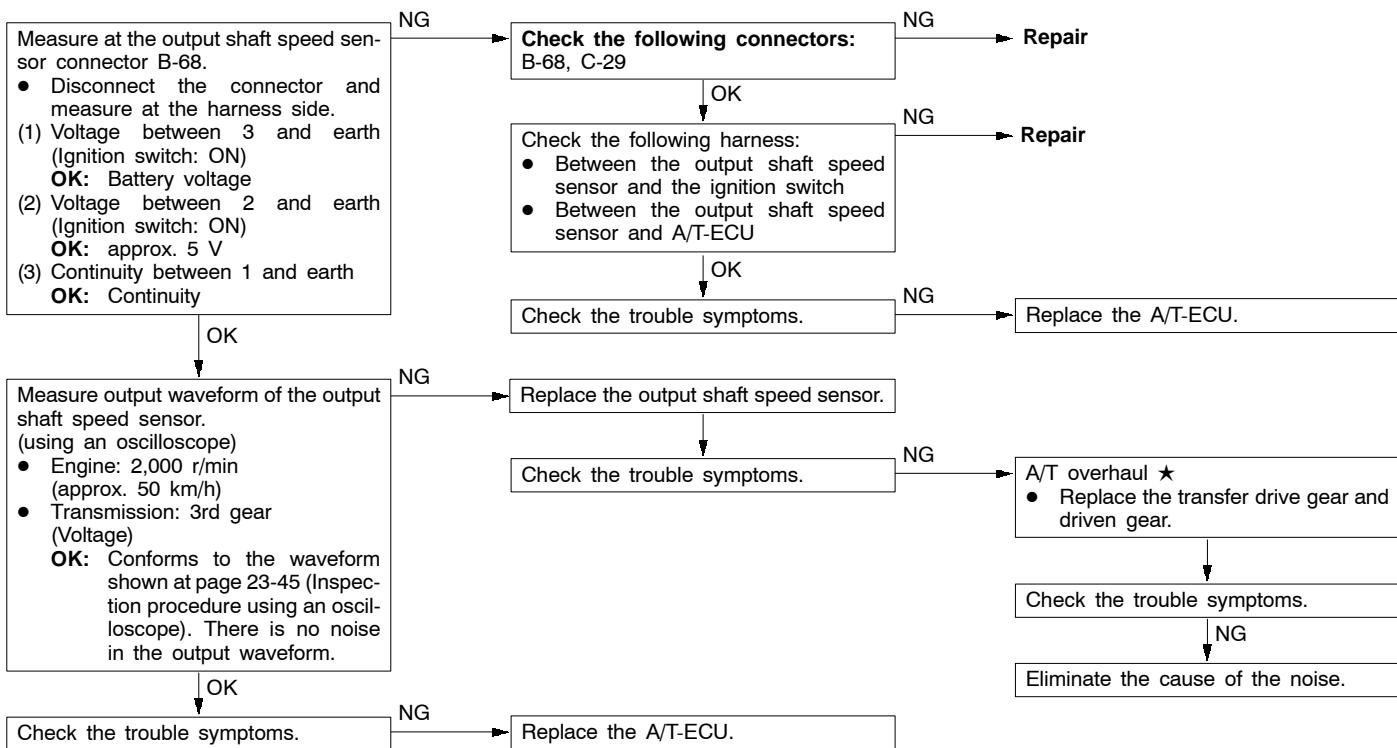
Code No. 22 Input shaft speed sensor system	Probable cause
If no output pulse is detected from the input shaft speed sensor for 1 second or more while driving in 3rd or 4th gear at a speed of 30 km/h or more, there is judged to be an open circuit or short-circuit in the input shaft speed sensor and diagnosis code No. 22 is output. If diagnosis code No. 22 is output four times, the transmission is locked into 3rd gear (D range) or 2nd gear as a fail-safe measure, and the N range lamp flashes at a frequency of 1 Hz.	<ul style="list-style-type: none"> <li>Malfunction of the input shaft speed sensor</li> <li>Malfunction of the underdrive clutch retainer</li> <li>Malfunction of connector</li> <li>Malfunction of A/T-ECU</li> </ul>

★: Refer to the Transmission Workshop Manual.

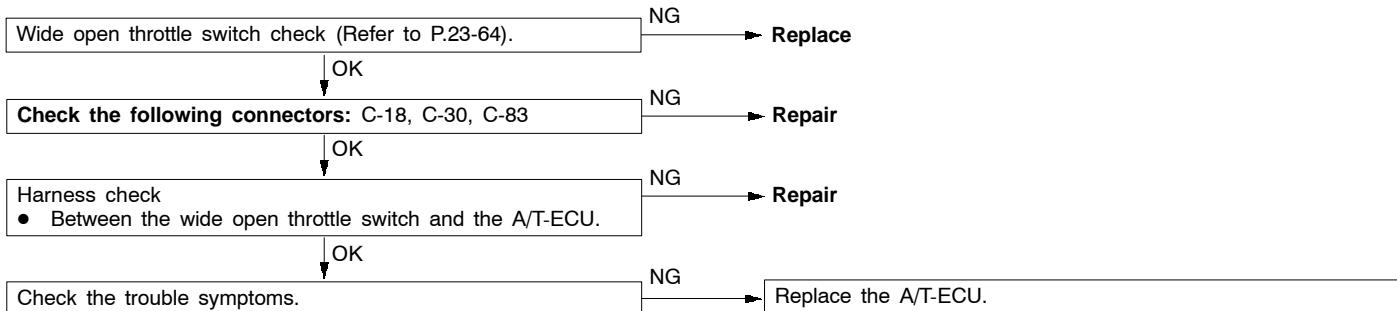


Code No. 23 Output shaft speed sensor system	Probable cause
<p>If the output from the output shaft speed sensor is continuously 50% lower than the vehicle speed for 1 second or more while driving in 3rd or 4th gear at a speed of 30 km/h or more, there is judged to be an open circuit or short-circuit in the output shaft speed sensor and diagnosis code No. 23 is output.</p> <p>If diagnosis code No. 23 is output four times, the transmission is locked into 3rd gear (D range) or 2nd gear as a fail-safe measure, and the N range lamp flashes at a frequency of 1 Hz.</p>	<ul style="list-style-type: none"> <li>● Malfunction of the output shaft speed sensor</li> <li>● Malfunction of the transfer drive gear or driven gear</li> <li>● Malfunction of connector</li> <li>● Malfunction of the A/T-ECU</li> </ul>

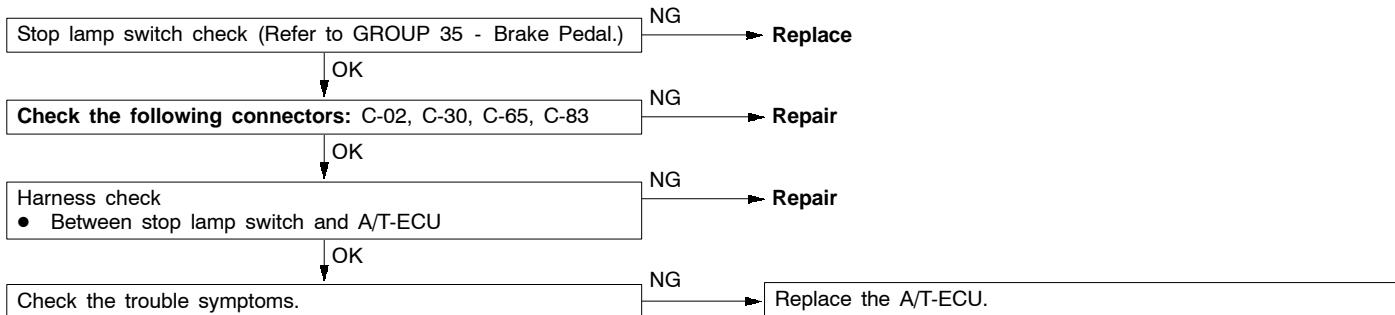
★: Refer to the Transmission Workshop Manual.



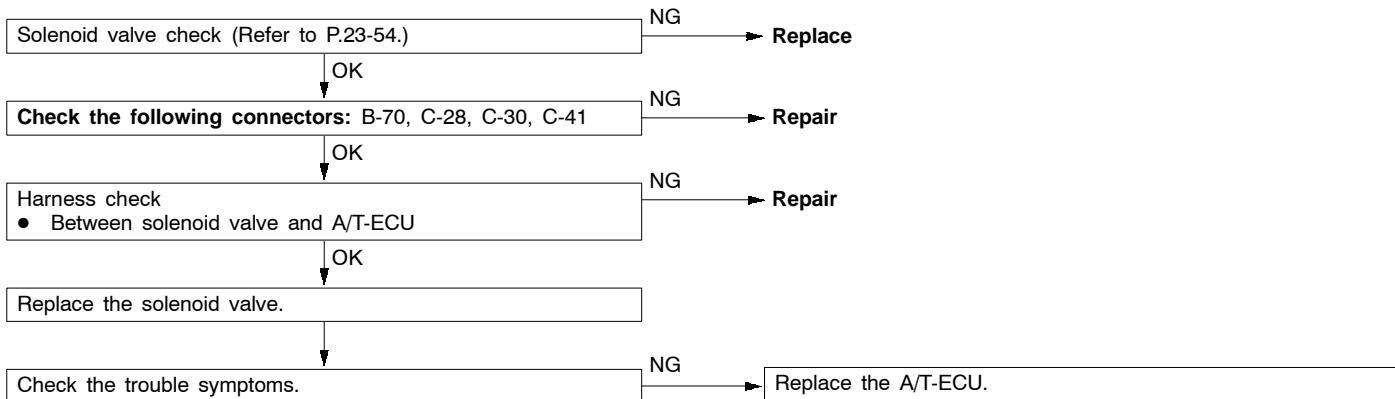
Code No. 25 Wide open throttle switch system	Probable cause
<p>If the wide open throttle switch is on for 1 second or more with the throttle valve opening angle at 70% or less, it is judged that there is a short circuit in the wide open throttle switch and diagnosis code No. 25 is output.</p>	<ul style="list-style-type: none"> <li>● Malfunction of the wide open throttle switch</li> <li>● Malfunction of connector</li> <li>● Malfunction of A/T-ECU</li> </ul>



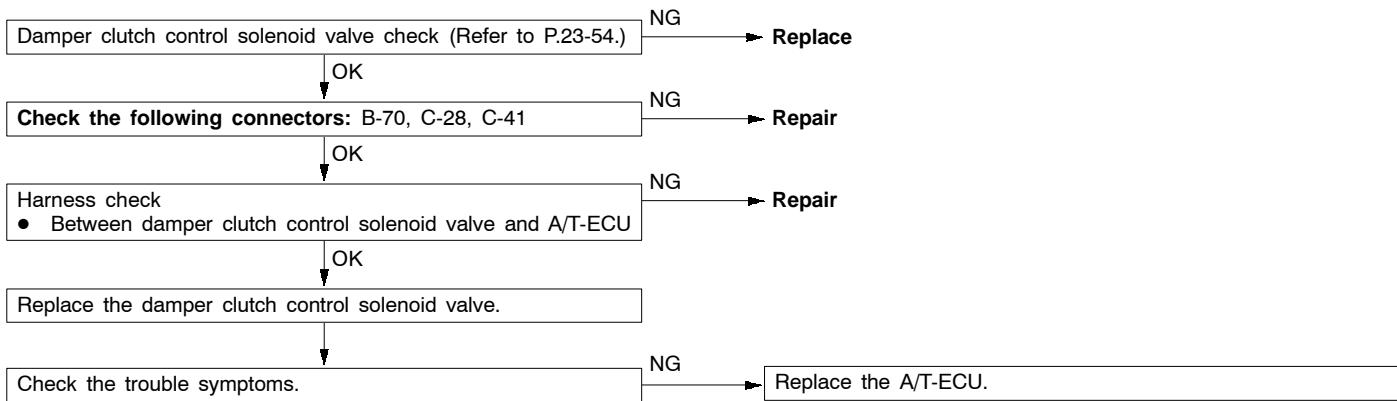
Code No. 26 Stop lamp switch system	Probable cause
<p>If the stop lamp switch is on for 5 minutes or more while driving, it is judged that there is a short circuit in the stop lamp switch and diagnosis code No. 26 is output.</p>	<ul style="list-style-type: none"> <li>● Malfunction of the stop lamp switch</li> <li>● Malfunction of connector</li> <li>● Malfunction of the A/T-ECU</li> </ul>



Code No. 31 Low and reverse solenoid valve system	Probable cause
Code No. 32 Underdrive solenoid valve system	
Code No. 33 Second solenoid valve system	
Code No. 34 Overdrive solenoid valve system	
<p>If the resistance value for a solenoid valve is too large or too small, it is judged that there is a short-circuit or an open circuit in the solenoid valve and the respective diagnosis code is output. The transmission is locked into 3rd gear as a fail-safe measure, and the N range lamp flashes at a frequency of 1 Hz.</p>	<ul style="list-style-type: none"> <li>● Malfunction of solenoid valve</li> <li>● Malfunction of connector</li> <li>● Malfunction of the A/T-ECU</li> </ul>

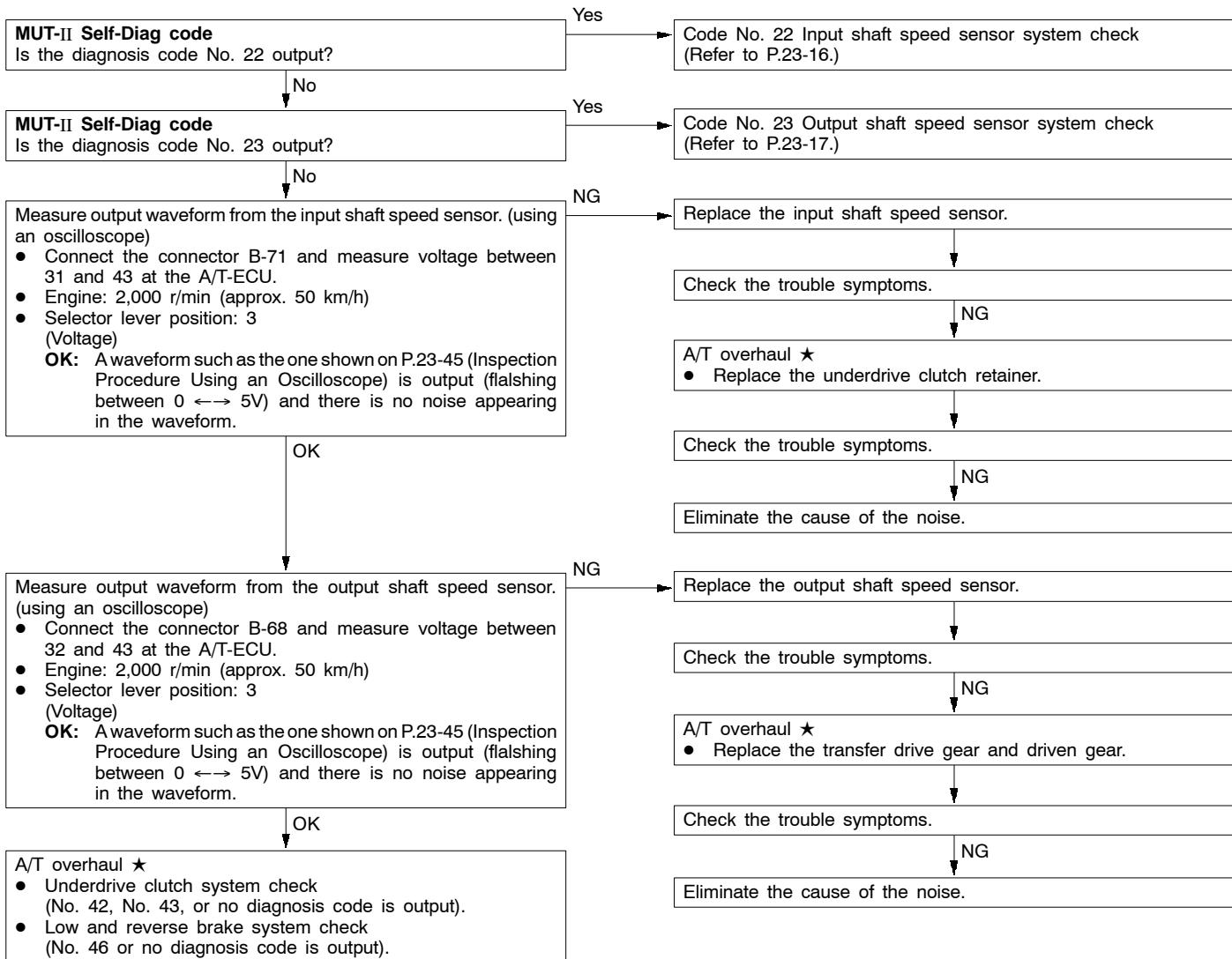


Code No. 36, 52 Damper clutch control solenoid valve system	Probable cause
<p>If the resistance value for the damper clutch control solenoid valve is too large or too small, it is judged that there is a short-circuit or an open circuit in the damper clutch control solenoid valve and diagnosis code No. 36 is output. If the drive duty rate for the damper clutch control solenoid valve is 100 % for a continuous period of 4 seconds or more, it is judged that there is an abnormality in the damper clutch control system and diagnosis code No. 52 is output. When diagnosis code No. 36 is output, the transmission is locked into 3rd gear as a fail-safe measure, and the N range lamp flashes at a frequency of 1 Hz.</p>	<ul style="list-style-type: none"> <li>● Malfunction of the damper clutch control solenoid valve</li> <li>● Malfunction of connector</li> <li>● Malfunction of the A/T-ECU</li> </ul>



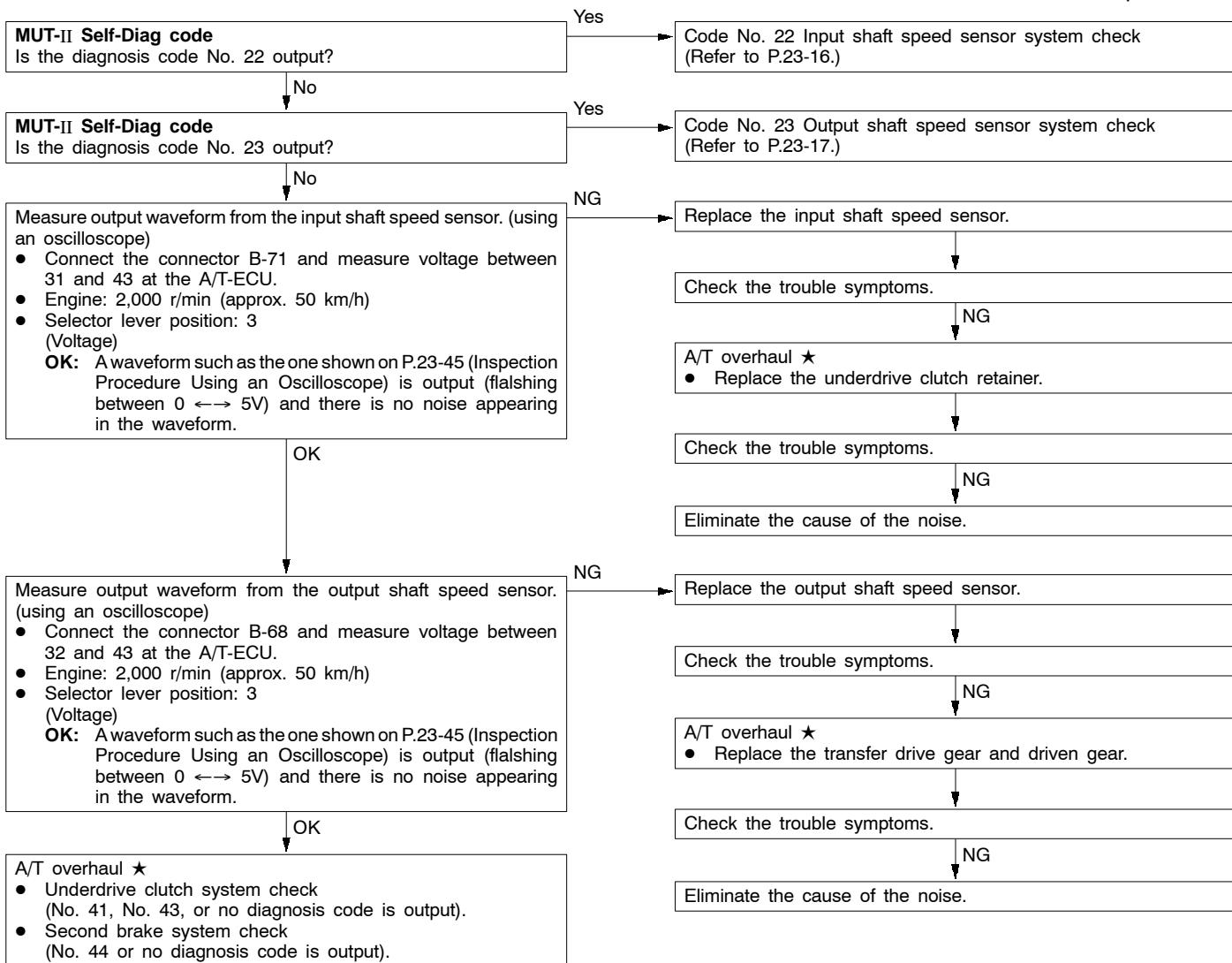
Code No. 41 1st gear ratio does not meet the specification	Probable cause
<p>If the output from the output shaft speed sensor multiplied by the 1st gear ratio is not the same as the output from the input shaft speed sensor after shifting to 1st gear has been completed, diagnosis code No. 41 is output. If diagnosis code No. 41 is output four times, the transmission is locked into 3rd gear as a fail-safe measure, and the N range lamp flashes at a frequency of 1 Hz.</p>	<ul style="list-style-type: none"> <li>● Malfunction of the input shaft speed sensor</li> <li>● Malfunction of the output shaft speed sensor</li> <li>● Malfunction of the underdrive clutch retainer</li> <li>● Malfunction of the transfer drive gear or driven gear</li> <li>● Malfunction of the low and reverse brake system</li> <li>● Malfunction of the underdrive clutch system</li> <li>● Noise generated</li> </ul>

★: Refer to the Transmission Workshop Manual.



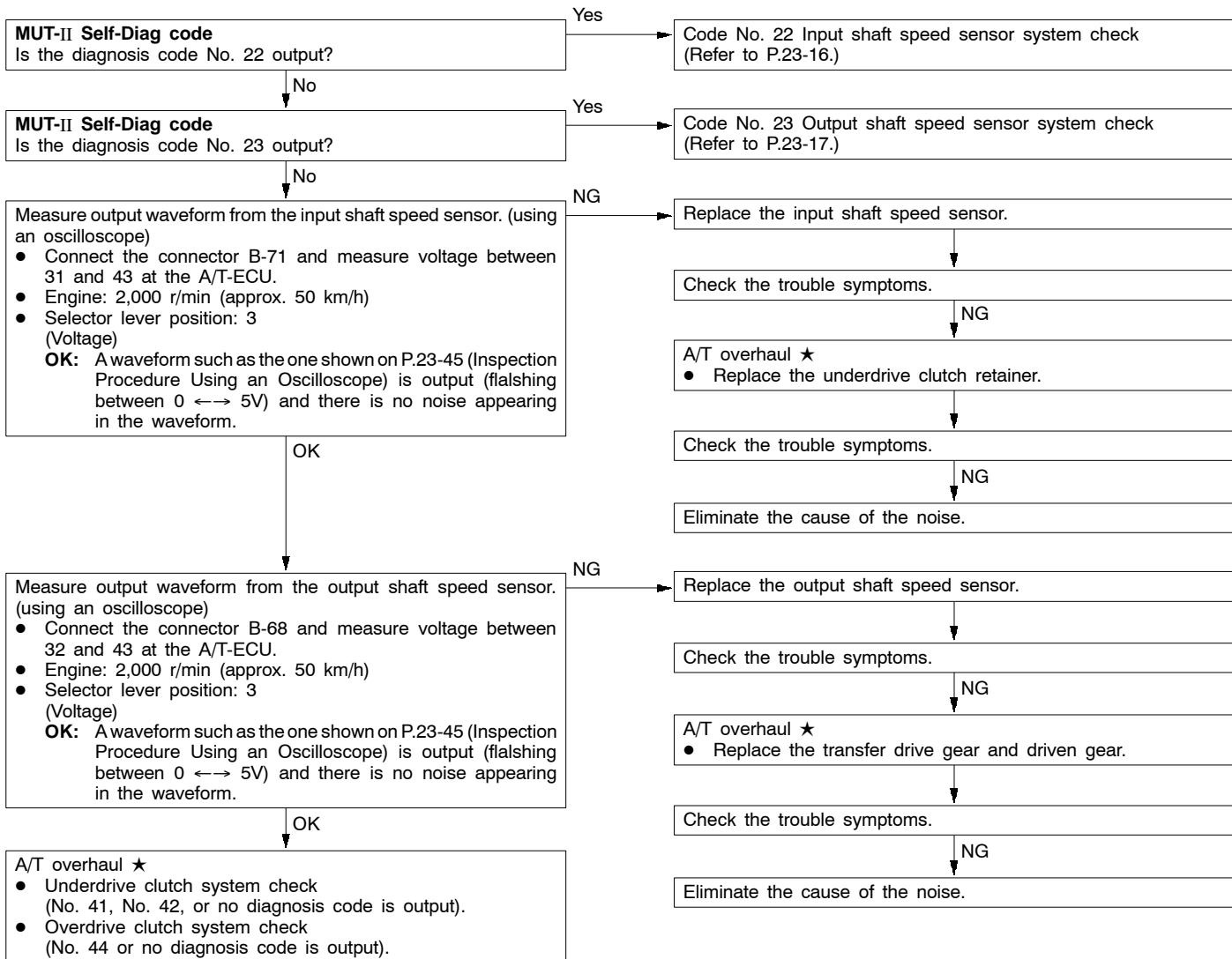
Code No. 42 2nd gear ratio does not meet the specification	Probable cause
<p>If the output from the output shaft speed sensor multiplied by the 2nd gear ratio is not the same as the output from the input shaft speed sensor after shifting to 2nd gear has been completed, diagnosis code No. 42 is output. If diagnosis code No. 42 is output four times, the transmission is locked into 3rd gear as a fail-safe measure, and the N range lamp flashes at a frequency of 1 Hz.</p>	<ul style="list-style-type: none"> <li>● Malfunction of the input shaft speed sensor</li> <li>● Malfunction of the output shaft speed sensor</li> <li>● Malfunction of the underdrive clutch retainer</li> <li>● Malfunction of the transfer drive gear or driven gear</li> <li>● Malfunction of the second brake system</li> <li>● Malfunction of the underdrive clutch system</li> <li>● Noise generated</li> </ul>

★: Refer to the Transmission Workshop Manual.



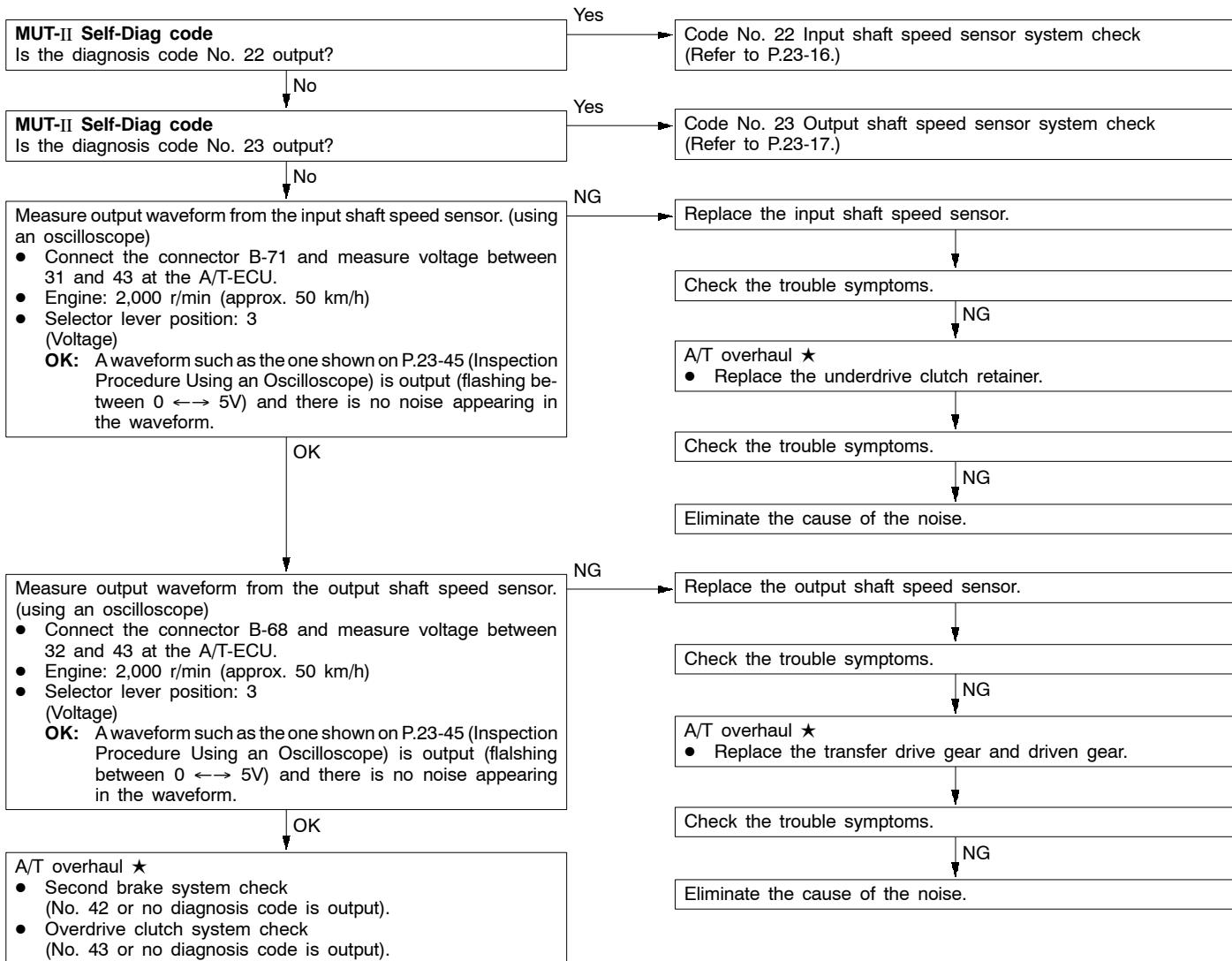
Code No. 43 3rd gear ratio does not meet the specification	Probable cause
<p>If the output from the output shaft speed sensor multiplied by the 3rd gear ratio is not the same as the output from the input shaft speed sensor after shifting to 3rd gear has been completed, diagnosis code No. 43 is output. If diagnosis code No. 43 is output four times, the transmission is locked into 3rd gear as a fail-safe measure, and the N range lamp flashes at a frequency of 1 Hz.</p>	<ul style="list-style-type: none"> <li>● Malfunction of the input shaft speed sensor</li> <li>● Malfunction of the output shaft speed sensor</li> <li>● Malfunction of the underdrive clutch retainer</li> <li>● Malfunction of the transfer drive gear or driven gear</li> <li>● Malfunction of the underdrive clutch system</li> <li>● Malfunction of the overdrive clutch system</li> <li>● Noise generated</li> </ul>

★: Refer to the Transmission Workshop Manual.



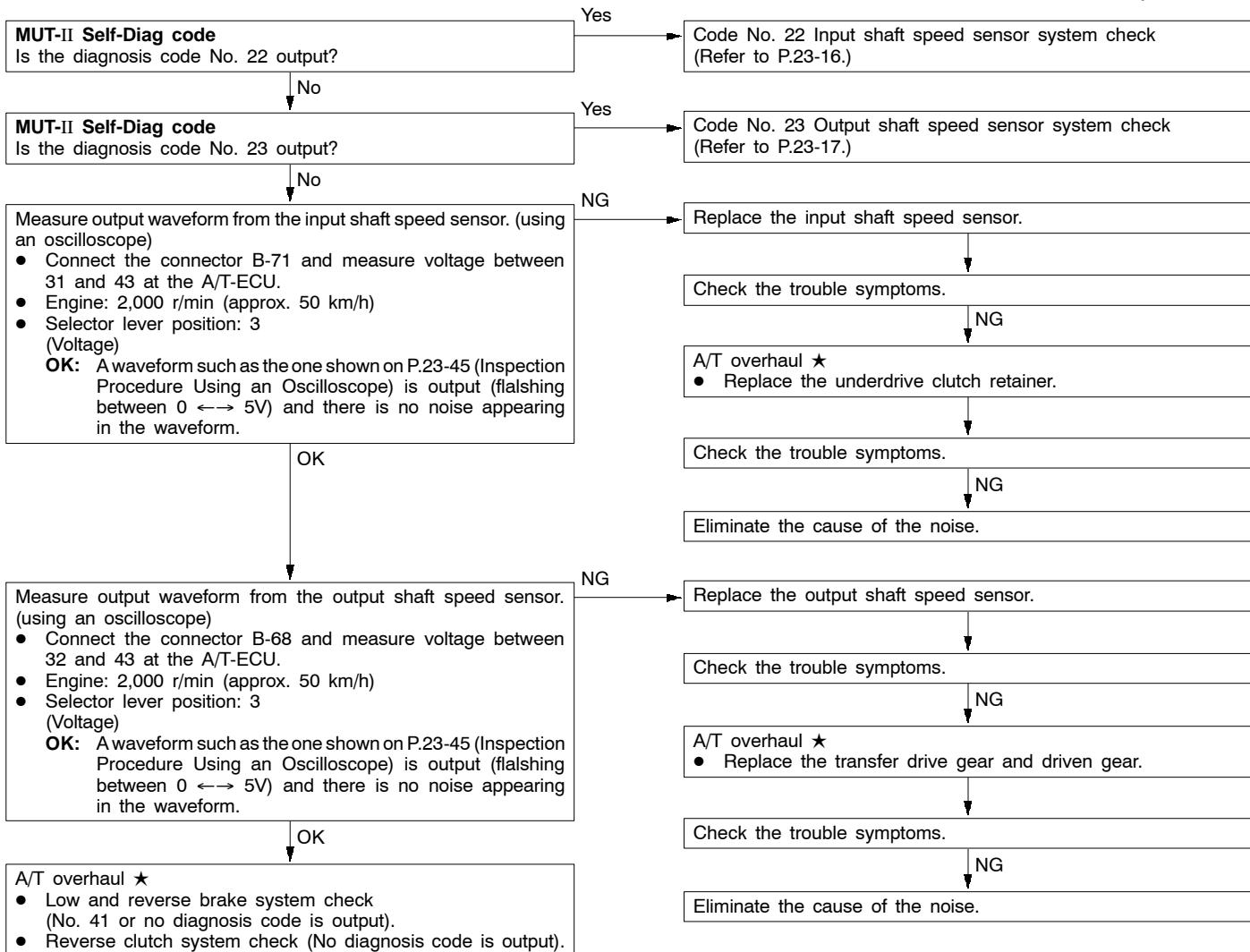
Code No. 44 4th gear ratio does not meet the specification	Probable cause
<p>If the output from the output shaft speed sensor multiplied by the 4th gear ratio is not the same as the output from the input shaft speed sensor after shifting to 4th gear has been completed, diagnosis code No. 44 is output. If diagnosis code No. 44 is output four times, the transmission is locked into 3rd gear as a fail-safe measure, and the N range lamp flashes at a frequency of 1 Hz.</p>	<ul style="list-style-type: none"> <li>● Malfunction of the input shaft speed sensor</li> <li>● Malfunction of the output shaft speed sensor</li> <li>● Malfunction of the underdrive clutch retainer</li> <li>● Malfunction of the transfer drive gear or driven gear</li> <li>● Malfunction of the second brake system</li> <li>● Malfunction of the overdrive clutch system</li> <li>● Noise generated</li> </ul>

★: Refer to the Transmission Workshop Manual.

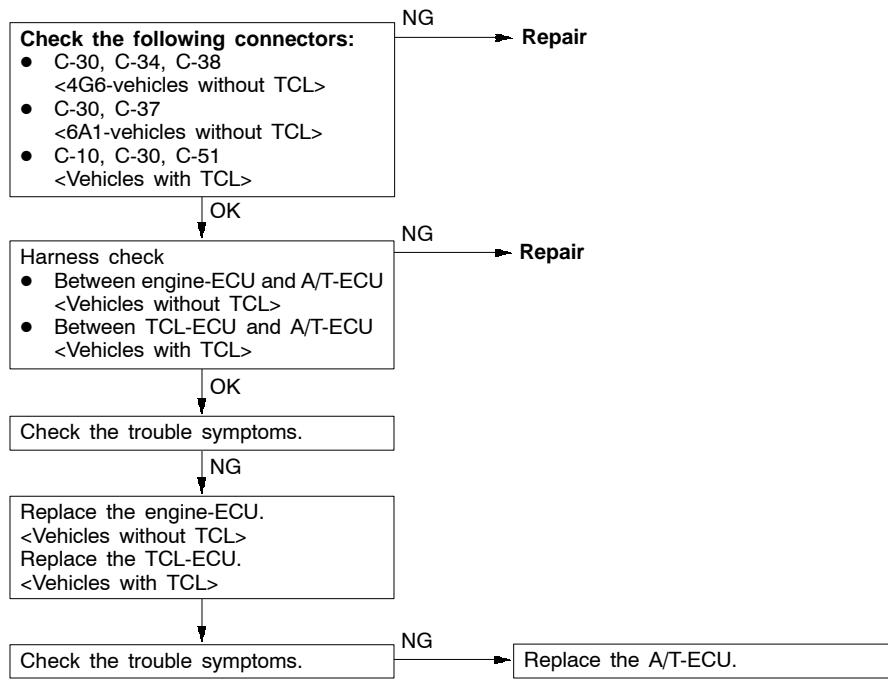


Code No. 46 Reverse gear ratio does not meet the specification	Probable cause
<p>If the output from the output shaft speed sensor multiplied by the reverse gear ratio is not the same as the output from the input shaft speed sensor after shifting to reverse gear has been completed, diagnosis code No. 46 is output. If diagnosis code No. 46 is output four times, the transmission is locked into 3rd gear as a fail-safe measure, and the N range lamp flashes at a frequency of 1 Hz.</p>	<ul style="list-style-type: none"> <li>● Malfunction of the input shaft speed sensor</li> <li>● Malfunction of the output shaft speed sensor</li> <li>● Malfunction of the underdrive clutch retainer</li> <li>● Malfunction of the transfer drive gear or driven gear</li> <li>● Malfunction of the low and reverse brake system</li> <li>● Malfunction of the reverse clutch system</li> <li>● Noise generated</li> </ul>

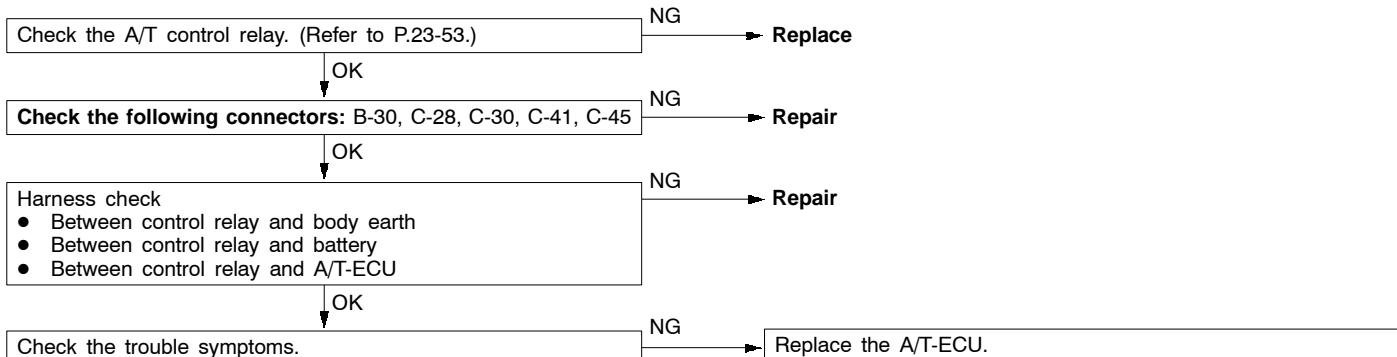
★: Refer to the Transmission Workshop Manual.



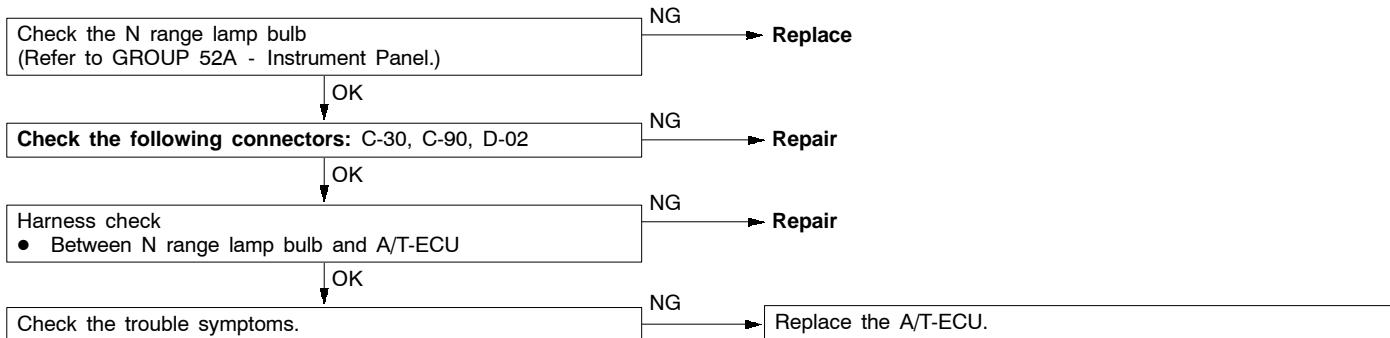
Code No. 51 Abnormal communication with engine-ECU <Vehicles without TCL>  Abnormal communication with TCL-ECU <Vehicles with TCL>	Probable cause
<p>If normal communication is not possible for a continuous period of 1 second or more when the ignition switch is at the ON position, the battery voltage is 10 V or more and the engine speed is 450 r/min or more, diagnosis code No. 51 is output. Diagnosis code No. 51 is also output if the data being received is abnormal for a continuous period of 4 seconds under the same conditions.</p>	<ul style="list-style-type: none"> <li>● Malfunction of connector</li> <li>● Malfunction of the engine-ECU &lt;Vehicles without TCL&gt;</li> <li>● Malfunction of the TCL-ECU &lt;Vehicles with TCL&gt;</li> <li>● Malfunction of the A/T-ECU</li> </ul>



Code No. 54 A/T control relay system	Probable cause
<p>If the A/T control relay voltage is less than 7 V after the ignition switch has been turned ON, it is judged that there is an open circuit or a short-circuit in the A/T control relay earth and diagnosis code No. 54 is output. Then the transmission is locked into 3rd gear as a fail-safe measure, and the N range lamp flashes at a frequency of 1 Hz.</p>	<ul style="list-style-type: none"> <li>● Malfunction of the A/T control relay</li> <li>● Malfunction of connector</li> <li>● Malfunction of the A/T-ECU</li> </ul>



Code No. 56 N range lamp system	Probable cause
If the N range signal is off after an N range lamp illumination instruction (ON instruction) has been given, it is judged that there is a short-circuit in the N range lamp earth and diagnosis code No. 56 is output.	<ul style="list-style-type: none"> <li>Malfunction of the N range lamp bulb</li> <li>Malfunction of connector</li> <li>Malfunction of the A/T-ECU</li> </ul>



Code No. 71 Malfunction of A/T-ECU	Probable cause
There is an abnormality in the A/T-ECU. The transmission is locked into 3rd gear as a fail-safe measure.	<ul style="list-style-type: none"> <li>Malfunction of the A/T-ECU</li> </ul>

Replace the A/T-ECU.

## INSPECTION CHART FOR TROUBLE SYMPTOMS

23100800267

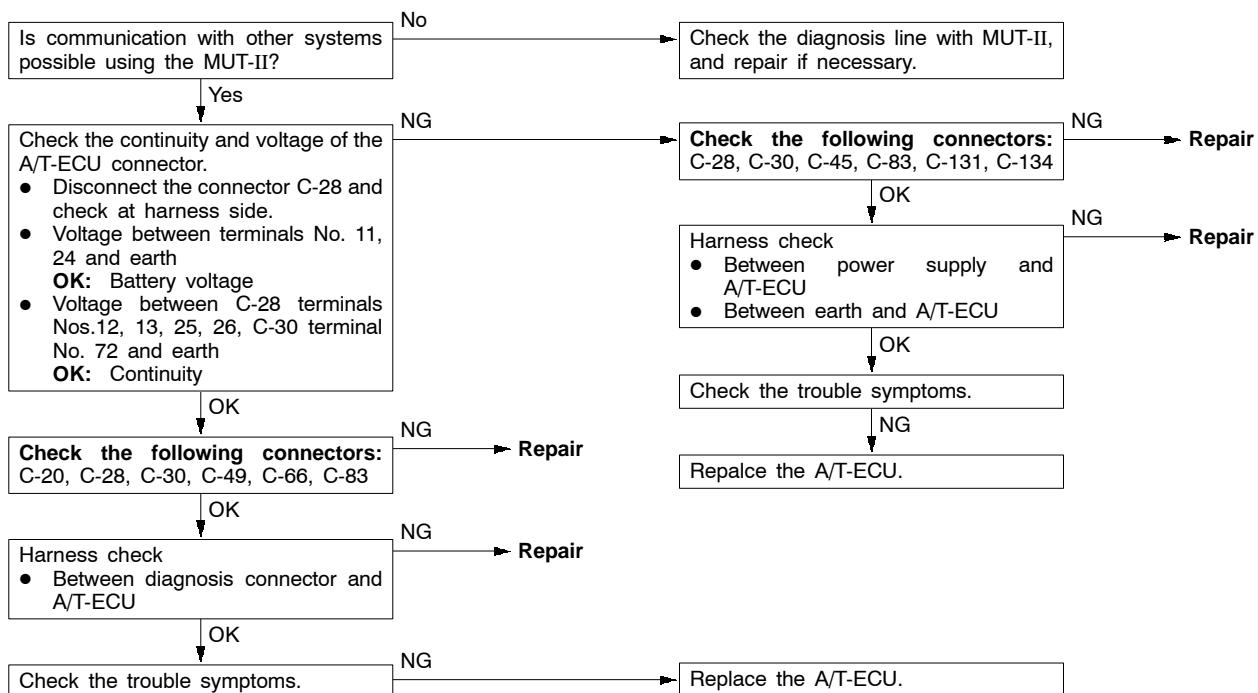
Trouble symptom	Inspection procedure No.	Reference page
Communication with MUT-II is not possible	1	23-27
Driving impossible	Starting impossible	2
	Does not move forward	3
	Does not reverse	4
	Does not move (forward or reverse)	5
Malfunction when starting	Engine stalling when shifting	6
	Shocks when changing from N to D and large time lag	7
	Shocks when changing from N to R and large time lag	8
	Shocks when changing from N to D, N to R and large time lag	9
Malfunction when shifting	Shocks and running up	10
		23-32

Trouble symptom		Inspection procedure No.	Reference page
Displaced shifting points	All points	11	23-33
	Some points	12	23-34
Does not shift	No diagnosis codes	13	23-34
Malfunction while driving	Poor acceleration	14	23-35
	Vibration	15	23-35
Inhibitor switch system		16	23-36
Mode control switch system		17	23-36
Idle position switch system		18	23-37
Dual pressure switch system		19	23-37
Vehicle speed sensor system		20	23-38
Auto-cruise-ECU signal system		21	23-38

## INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

### INSPECTION PROCEDURE 1

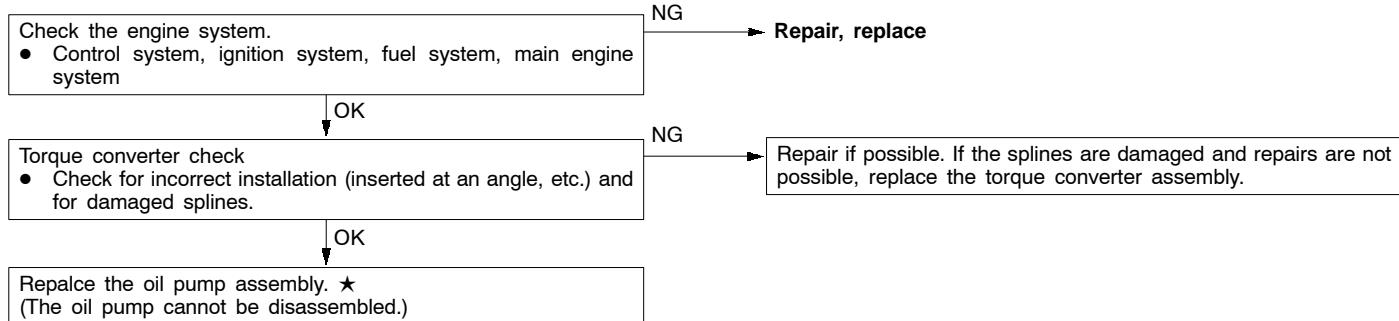
Communication with MUT-II is not possible	Probable cause
If communication with the MUT-II is not possible, the cause is probably a defective diagnosis line or the A/T-ECU is not functioning.	<ul style="list-style-type: none"> <li>Malfunction of diagnosis line</li> <li>Malfunction of connector</li> <li>Malfunction of the A/T-ECU</li> </ul>



## INSPECTION PROCEDURE 2

Starting impossible	Probable cause
Starting is not possible when the selector lever is in P or N range. In such cases, the cause is probably a defective engine system, torque converter or oil pump.	<ul style="list-style-type: none"> <li>Malfunction of the engine system</li> <li>Malfunction of the torque converter</li> <li>Malfunction of the oil pump</li> </ul>

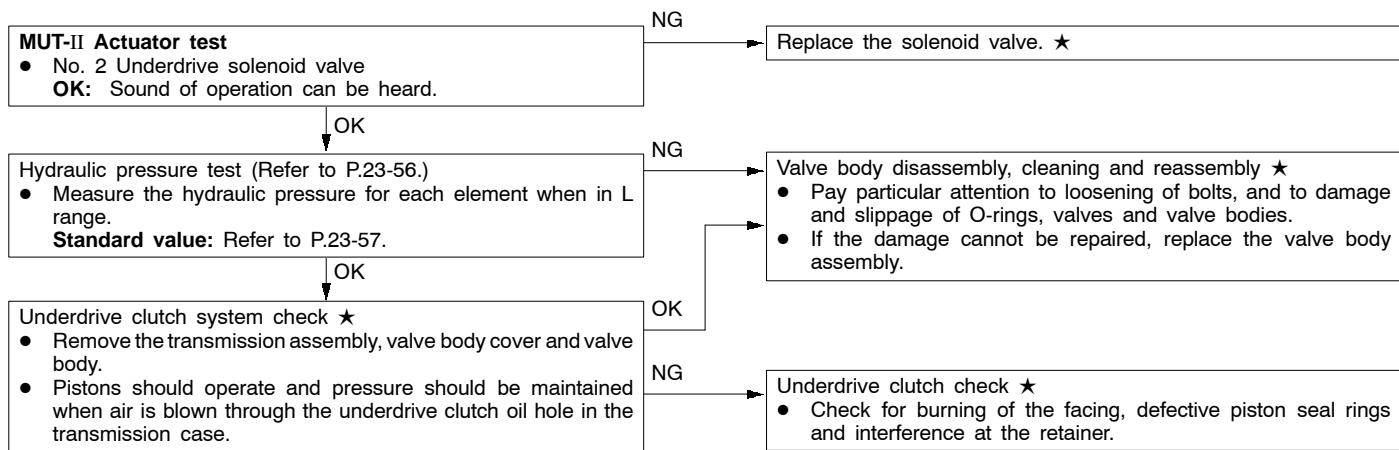
★: Refer to the Transmission Workshop Manual.



## INSPECTION PROCEDURE 3

Does not move (forward)	Probable cause
If the vehicle does not move forward when the selector lever is shifted from N to D, 3, 2 or L range while the engine is idling, the cause is probably abnormal line pressure or a malfunction of the underdrive clutch or valve body.	<ul style="list-style-type: none"> <li>Abnormal line pressure</li> <li>Malfunction of the underdrive solenoid valve</li> <li>Malfunction of the underdrive clutch</li> <li>Malfunction of the valve body</li> </ul>

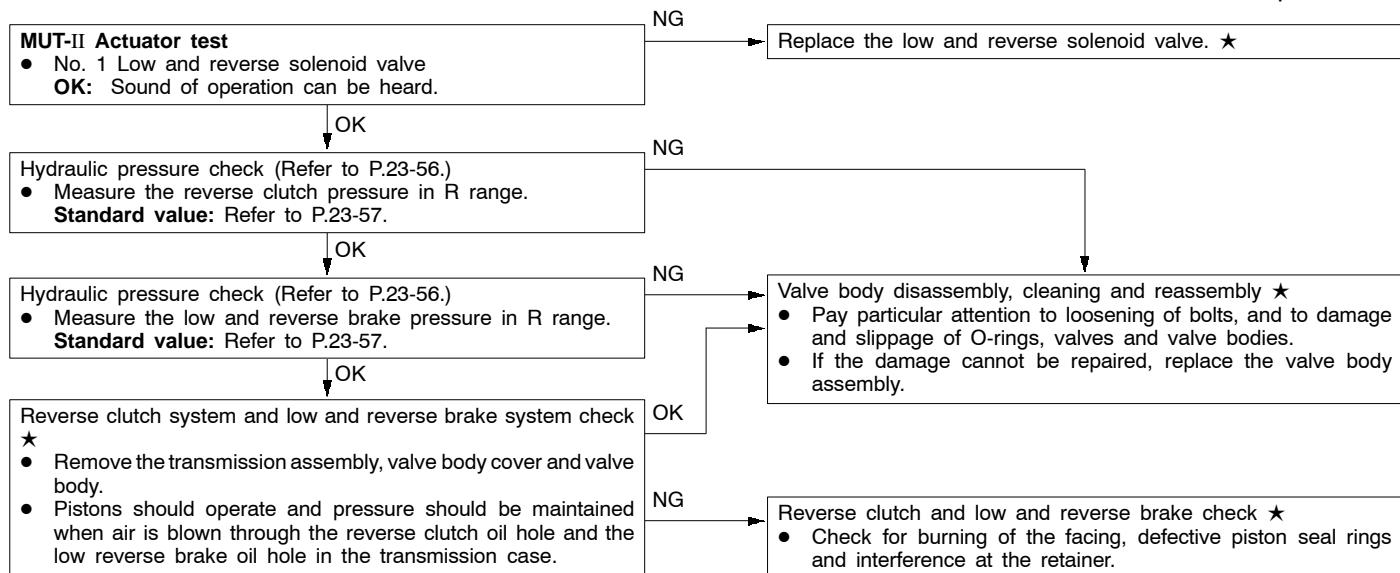
★: Refer to the Transmission Workshop Manual.



## INSPECTION PROCEDURE 4

Does not reverse	Probable cause
If the vehicle does not reverse when the selector lever is shifted from N to R range while the engine is idling, the cause is probably abnormal pressure in the reverse clutch or low and reverse brake or a malfunction of the reverse clutch, low and reverse brake or valve body.	<ul style="list-style-type: none"> <li>Abnormal reverse clutch pressure</li> <li>Abnormal low and reverse brake pressure</li> <li>Malfunction of the low and reverse solenoid valve</li> <li>Malfunction of the reverse clutch</li> <li>Malfunction of the low and reverse brake</li> <li>Malfunction of the valve body</li> </ul>

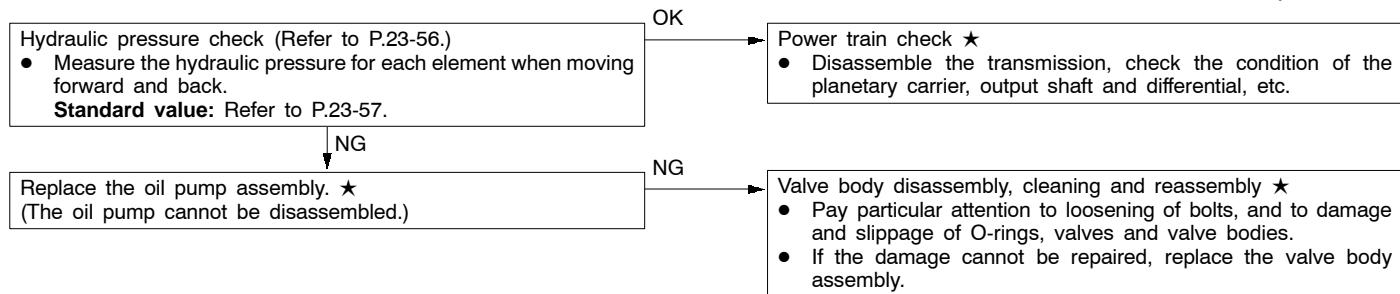
★: Refer to the Transmission Workshop Manual.



## INSPECTION PROCEDURE 5

Does not move (forward or reverse)	Probable cause
If the vehicle does not move forward or reverse when the selector lever is shifted to any position while the engine is idling, the cause is probably abnormal line pressure, or a malfunction of the power train, oil pump or valve body.	<ul style="list-style-type: none"> <li>Abnormal line pressure</li> <li>Malfunction of power train</li> <li>Malfunction of the oil pump</li> <li>Malfunction of the valve body</li> </ul>

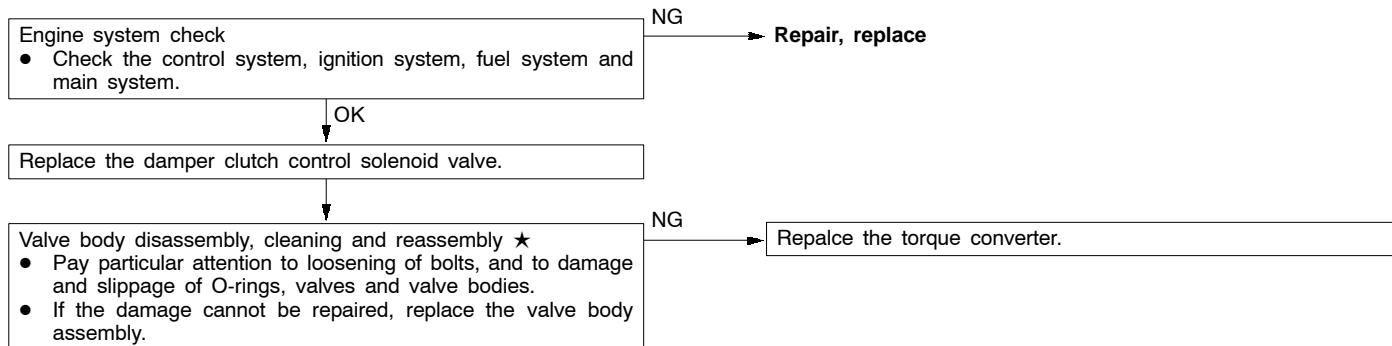
★: Refer to the Transmission Workshop Manual.



## INSPECTION PROCEDURE 6

Engine stalling when shifting	Probable cause
If the engine stalls when the selector lever is shifted from N to D or R range while the engine is idling, the cause is probably a malfunction of the engine system, damper clutch solenoid valve, valve body or torque converter (damper clutch malfunction).	<ul style="list-style-type: none"> <li>• Malfunction of the engine system</li> <li>• Malfunction of the damper clutch control solenoid valve</li> <li>• Malfunction of the valve body</li> <li>• Malfunction of the torque converter (Malfunction of the damper clutch)</li> </ul>

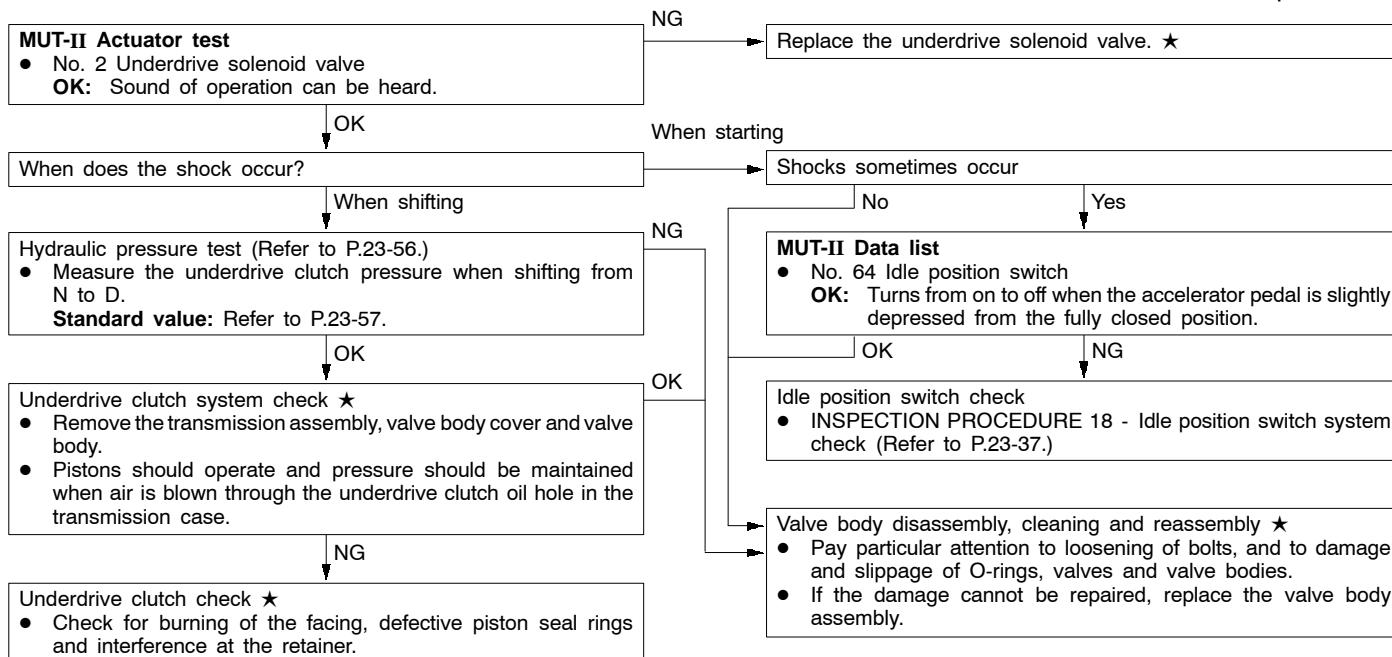
★: Refer to the Transmission Workshop Manual.



## INSPECTION PROCEDURE 7

Shocks when changing from N to D and large time lag	Probable cause
If abnormal shocks or a time lag of 2 seconds or more occur when the selector lever is shifted from N to D range while the engine is idling, the cause is probably abnormal underdrive clutch pressure or a malfunction of the underdrive clutch, valve body or idle position switch.	<ul style="list-style-type: none"> <li>• Abnormal underdrive clutch pressure</li> <li>• Malfunction of the underdrive solenoid valve</li> <li>• Malfunction of the underdrive clutch</li> <li>• Malfunction of the valve body</li> <li>• Malfunction of the idle position switch</li> </ul>

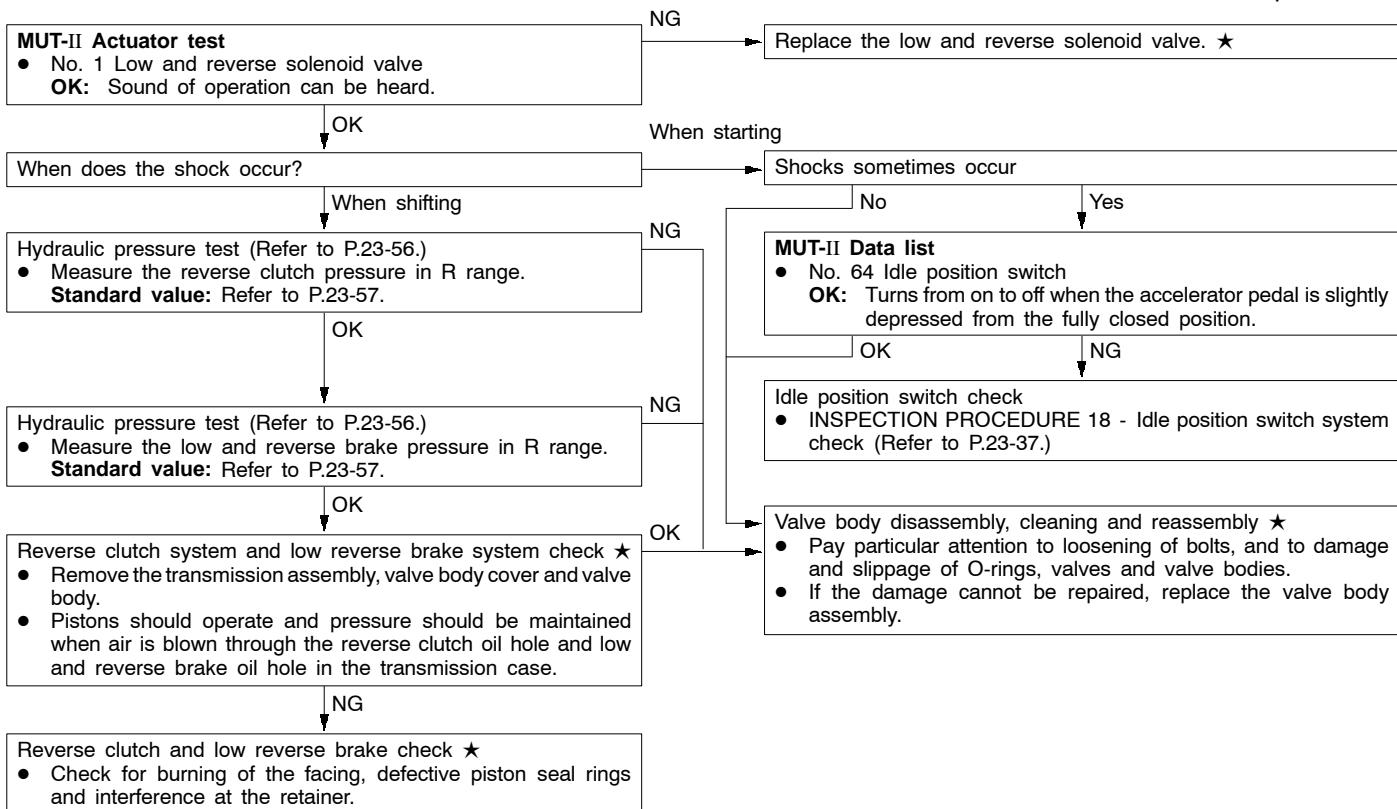
★: Refer to the Transmission Workshop Manual.



## INSPECTION PROCEDURE 8

Shocks when changing from N to R and large time lag	Probable cause
If abnormal shocks or a time lag of 2 seconds or more occurs when the selector lever is shifted from N to R range while the engine is idling, the cause is probably abnormal reverse clutch pressure or low and reverse brake pressure, or a malfunction of the reverse clutch, low and reverse brake, valve body or idle position switch.	<ul style="list-style-type: none"> <li>Abnormal reverse clutch pressure</li> <li>Abnormal low and reverse brake pressure</li> <li>Malfunction of the low and reverse solenoid valve</li> <li>Malfunction of the reverse clutch</li> <li>Malfunction of the low and reverse brake</li> <li>Malfunction of the valve body</li> <li>Malfunction of the idle position switch</li> </ul>

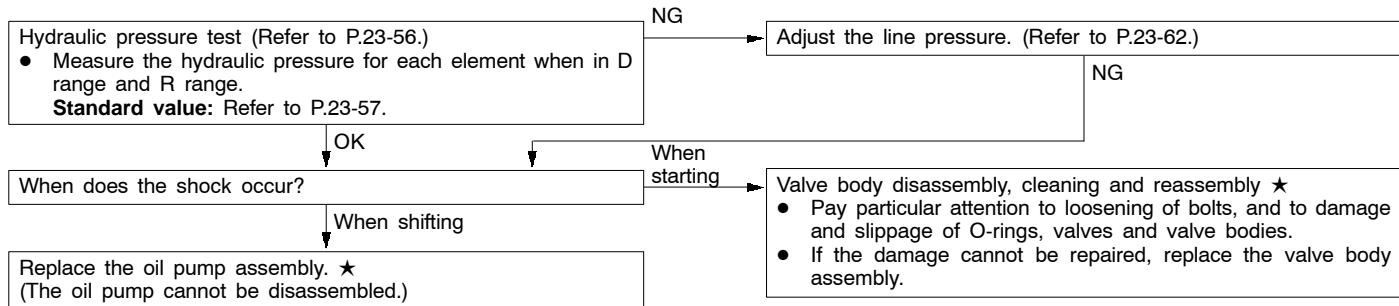
★: Refer to the Transmission Workshop Manual.



## INSPECTION PROCEDURE 9

Shocks when changing from N to D, N to R and large time lag	Probable cause
If abnormal shocks or a time lag of 2 seconds or more occur when the selector lever is shifted from N to D range and from N to R range while the engine is idling, the cause is probably abnormal line pressure or a malfunction of the oil pump or valve body.	<ul style="list-style-type: none"> <li>Abnormal line pressure</li> <li>Malfunction of the oil pump</li> <li>Malfunction of the valve body</li> </ul>

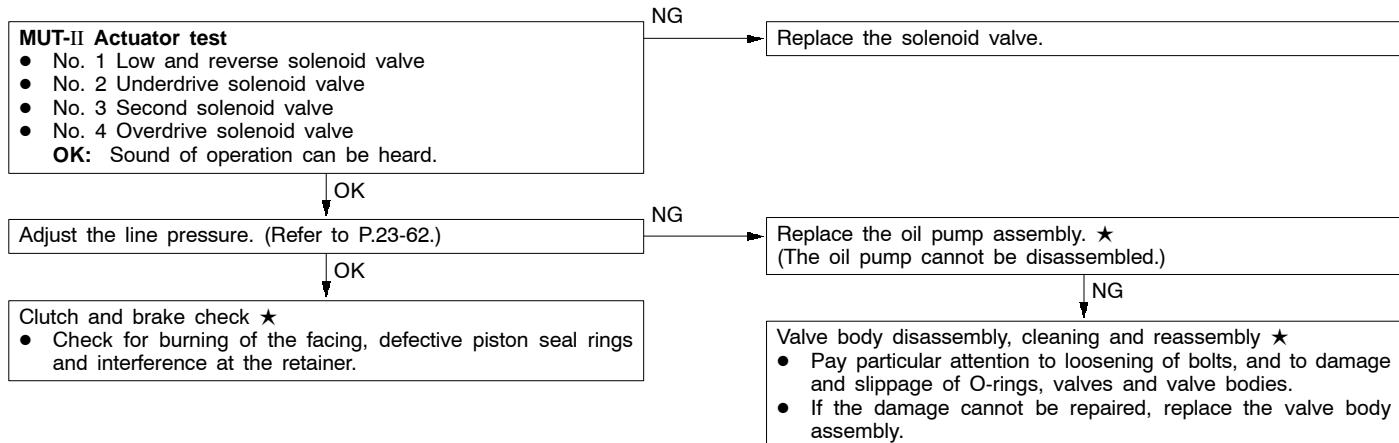
★: Refer to the Transmission Workshop Manual.



## INSPECTION PROCEDURE 10

Shocks and running up	Probable cause
If shocks occur when driving due to upshifting or downshifting and the transmission speed becomes higher than the engine speed, the cause is probably abnormal line pressure or a malfunction of a solenoid valve, oil pump, valve body or of a brake or clutch.	<ul style="list-style-type: none"> <li>Abnormal line pressure</li> <li>Malfunction of each solenoid valve</li> <li>Malfunction of the oil pump</li> <li>Malfunction of the valve body</li> <li>Malfunction of each brake or each clutch</li> </ul>

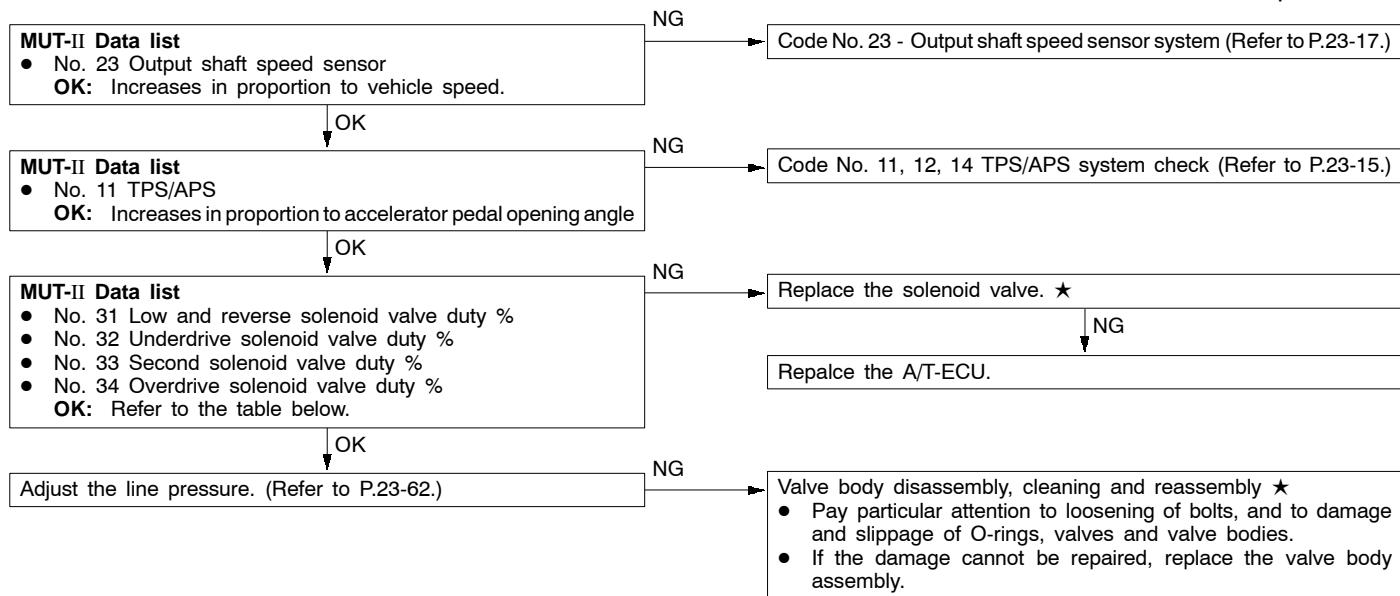
★: Refer to the Transmission Workshop Manual.



## INSPECTION PROCEDURE 11

All points (Displaced shifting points)	Probable cause
If all shift points are displaced while driving, the cause is probably a malfunction of the output shaft speed sensor, TPS or of a solenoid valve.	<ul style="list-style-type: none"> <li>• Malfunction of the output shaft speed sensor</li> <li>• Malfunction of the throttle position sensor</li> <li>• Malfunction of each solenoid valve</li> <li>• Abnormal line pressure</li> <li>• Malfunction of the valve body</li> <li>• Malfunction of the A/T-ECU</li> </ul>

★: Refer to the Transmission Workshop Manual.

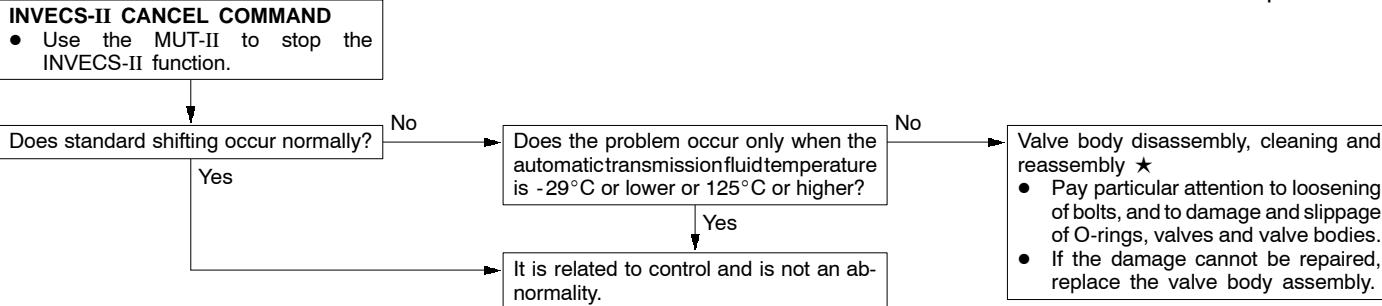


	No. 31	No. 32	No. 33	No. 34
Driving at constant speed in 1st gear	0 %	0 %	100 %	100 %
Driving at constant speed in 2nd gear	100 %	0 %	0 %	100 %
Driving at constant speed in 3rd gear	100 %	0 %	100 %	0 %
Driving at constant speed in 4th gear	100 %	100 %	0 %	0 %

## INSPECTION PROCEDURE 12

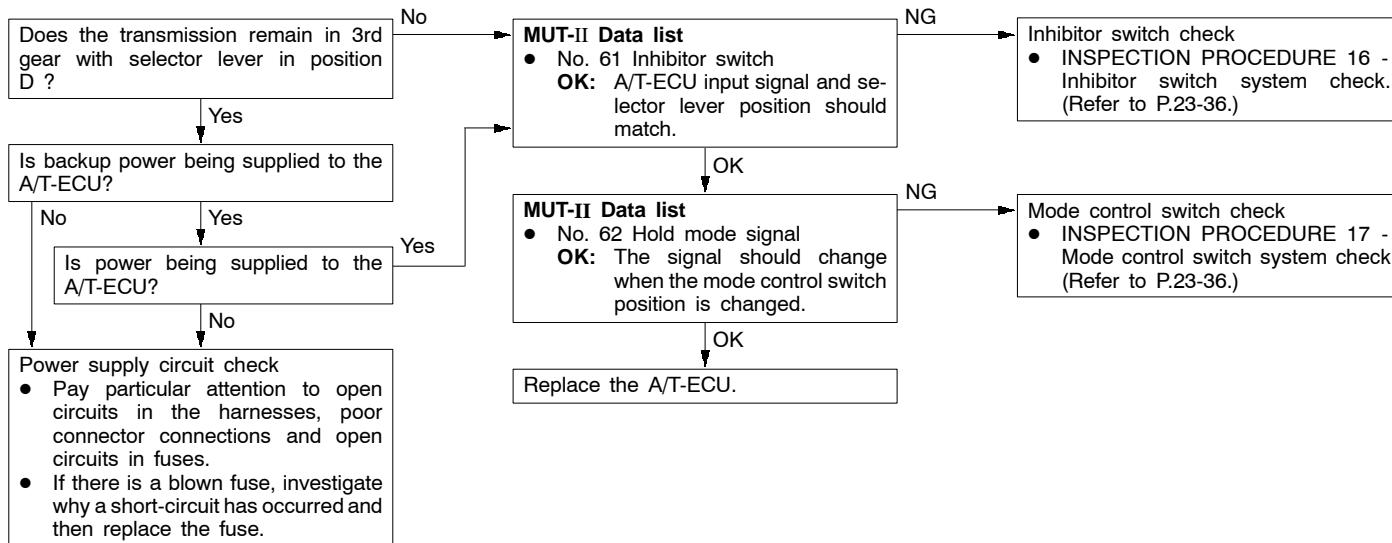
Some points (Displaced shifting points)	Probable cause
If some of the shift points are displaced while driving, the cause is probably a malfunction of the valve body, or it is related to control and is not an abnormality.	<ul style="list-style-type: none"> <li>Malfunction of the valve body</li> </ul>

★: Refer to the Transmission Workshop Manual.



## INSPECTION PROCEDURE 13

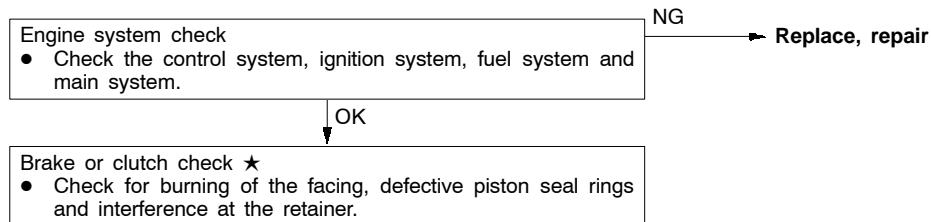
No diagnosis codes (Does not shift)	Probable cause
If shifting does not occur while driving and no diagnosis codes are output, the cause is probably a malfunction of the inhibitor switch, or A/T-ECU.	<ul style="list-style-type: none"> <li>Malfunction of the inhibitor switch</li> <li>Malfunction of the A/T-ECU</li> </ul>



## INSPECTION PROCEDURE 14

Poor acceleration	Probable cause
If acceleration is poor even if downshifting occurs while driving, the cause is probably a malfunction of the engine system or of a brake or clutch.	<ul style="list-style-type: none"> <li>Malfunction of the engine system</li> <li>Malfunction of the brake or clutch</li> </ul>

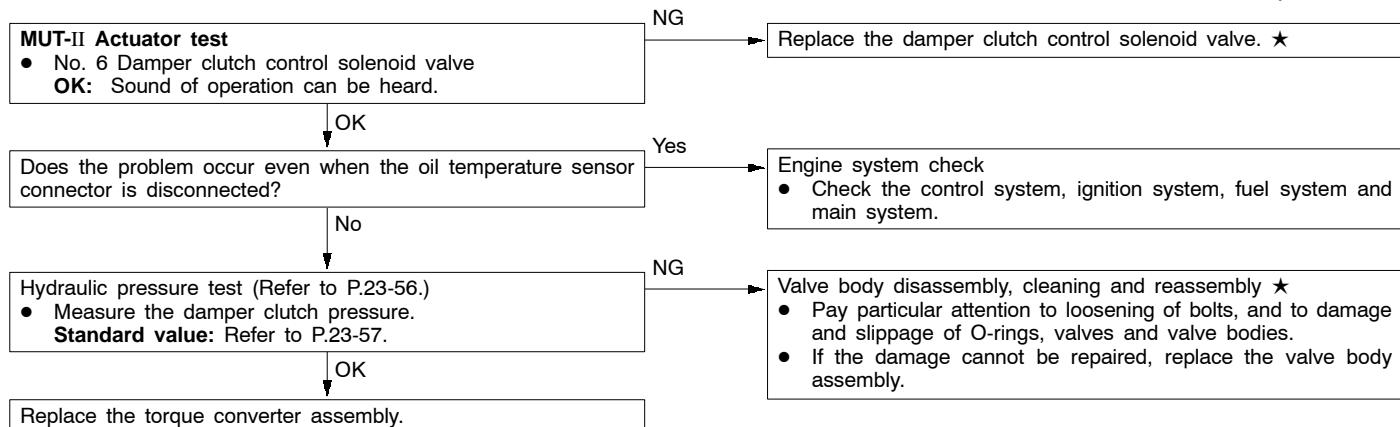
★: Refer to the Transmission Workshop Manual.



## INSPECTION PROCEDURE 15

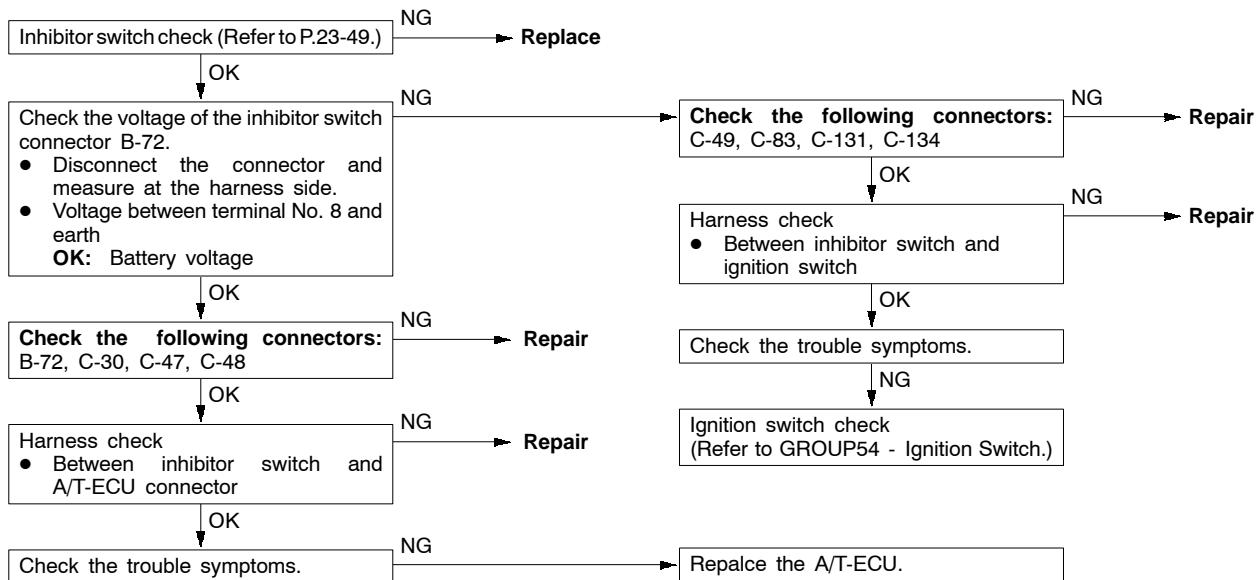
Vibration	Probable cause
If vibration occurs when driving at constant speed or when accelerating and deceleration in top range, the cause is probably abnormal damper clutch pressure or a malfunction of the engine system, damper clutch control solenoid valve, torque converter or valve body.	<ul style="list-style-type: none"> <li>Abnormal damper clutch pressure</li> <li>Malfunction of the engine system</li> <li>Malfunction of the damper clutch control solenoid valve</li> <li>Malfunction of the torque converter</li> <li>Malfunction of the valve body</li> </ul>

★: Refer to the Transmission Workshop Manual.



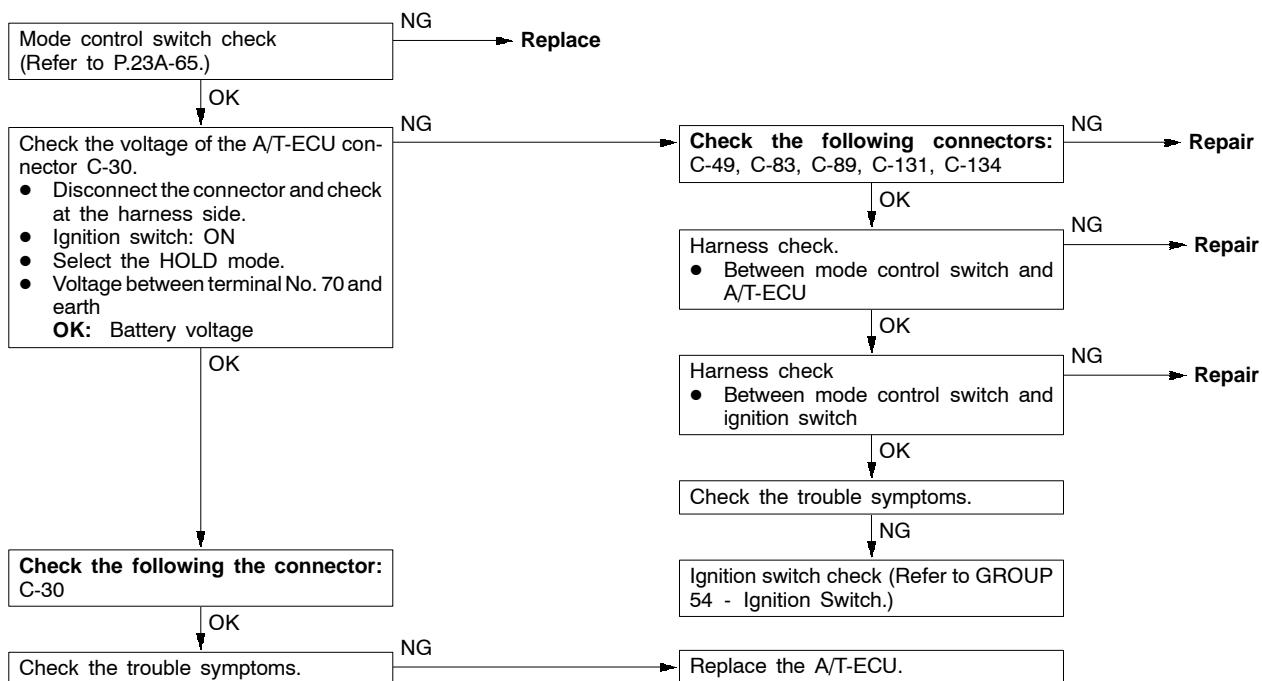
## INSPECTION PROCEDURE 16

Inhibitor switch system	Probable cause
The cause is probably a malfunction of the inhibitor switch circuit, ignition switch circuit or a defective A/T-ECU.	<ul style="list-style-type: none"> <li>• Malfunction of the inhibitor switch</li> <li>• Malfunction of the ignition switch</li> <li>• Malfunction of connector</li> <li>• Malfunction of the A/T-ECU</li> </ul>



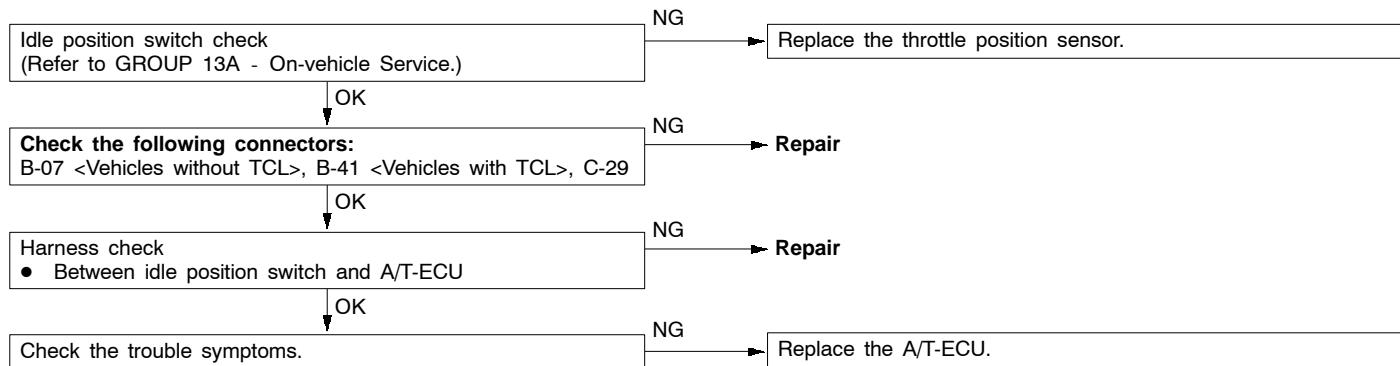
## INSPECTION PROCEDURE 17

Mode control switch system	Probable cause
The cause is probably a defective mode control switch circuit or a defective A/T-ECU.	<ul style="list-style-type: none"> <li>• Malfunction of the mode control switch</li> <li>• Malfunction of connector</li> <li>• Malfunction of the A/T-ECU</li> </ul>

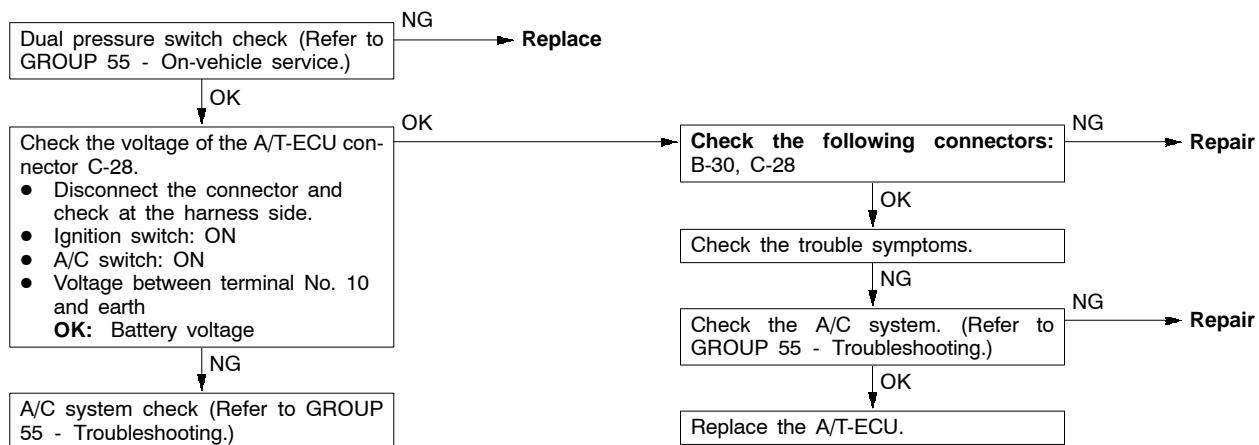


**INSPECTION PROCEDURE 18**

<b>Idle position switch system</b>	<b>Probable cause</b>
The cause is probably a defective idle position switch circuit or a defective A/T-ECU.	<ul style="list-style-type: none"> <li>● Malfunction of the idle position switch</li> <li>● Malfunction of connector</li> <li>● Malfunction of the A/T-ECU</li> </ul>

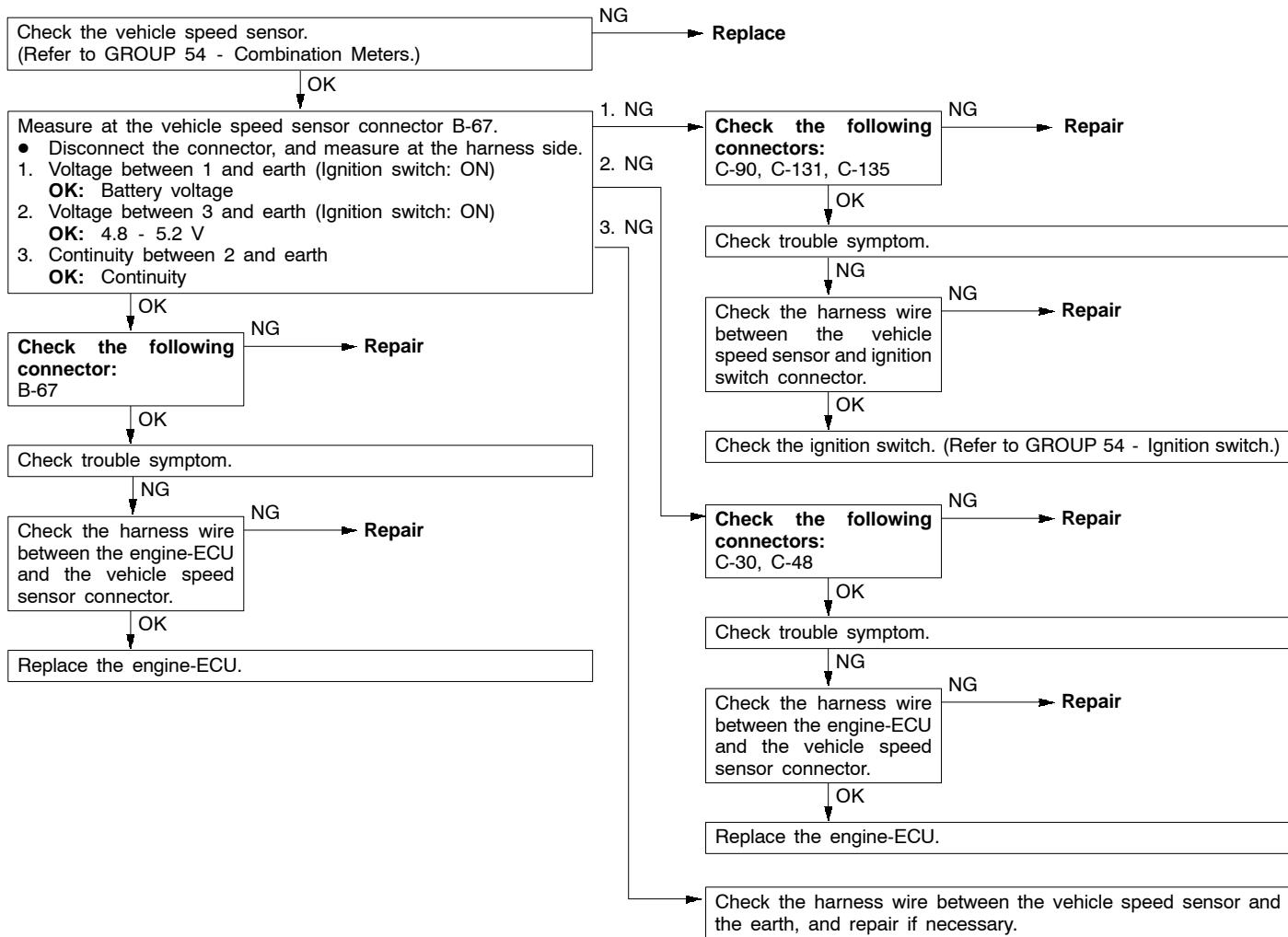
**INSPECTION PROCEDURE 19**

<b>Dual pressure switch system</b>	<b>Probable cause</b>
The cause is probably a defective dual pressure switch circuit or a defective A/T-ECU.	<ul style="list-style-type: none"> <li>● Malfunction of the dual pressure switch</li> <li>● Malfunction of connector</li> <li>● Malfunction of A/C system</li> <li>● Malfunction of the A/T-ECU</li> </ul>



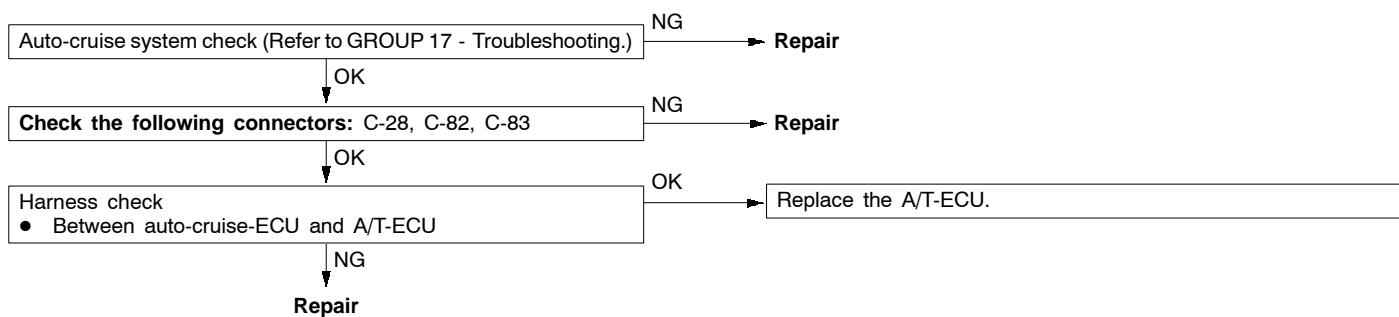
## INSPECTION PROCEDURE 20

Vehicle speed sensor system	Probable cause
The cause is probably a defective vehicle speed sensor circuit or a defective A/T-ECU.	<ul style="list-style-type: none"> <li>Malfunction of the vehicle speed sensor</li> <li>Malfunction of connector</li> <li>Malfunction of the A/T-ECU</li> </ul>



## INSPECTION PROCEDURE 21

Auto-cruise-ECU signal system	Probable cause
The cause is probably a defective auto-cruise signal line circuit or a defective A/T-ECU.	<ul style="list-style-type: none"> <li>Malfunction of connector</li> <li>Malfunction of the A/T-ECU</li> <li>Malfunction of the auto-cruise-ECU</li> </ul>



## DATA LIST REFERENCE TABLE

23100810208

Item No.	Check item	Check requirement	Normal value	
11	Throttle position sensor <Vehicles without TCL> Accelerator pedal position sensor <Vehicles with TCL>	Engine: Stopped Selector lever position: P	Accelerator pedal: Released	400 - 1,000 mV
			Accelerator pedal: Halfly depressed	Gradually rises from the above value
			Accelerator pedal: Depressed	4,500 - 5,000 mV
15	Oil temperature sensor	Warming up	Drive for 15 minutes or more so that the automatic transmission fluid temperature becomes 70 - 90 °C.	Gradually rises to 70 - 90 °C
21	Crank angle sensor	Engine: Idling Selector lever position: P	Accelerator pedal: Released	550 - 900 rpm
			Accelerator pedal: Halfly depressed	Gradually rises from the above value
22	Input shaft speed sensor	Selector lever position: 3	Driving at constant speed of 50 km/h in 3rd gear	1,800 - 2,100 rpm
23	Output shaft speed sensor	Selector lever position: 3	Driving at constant speed of 50 km/h in 3rd gear	1,800 - 2,100 rpm
25	Wide open throttle switch	Accelerator pedal position	Released	OFF
			Depressed	ON
26	Stop lamp switch	Ignition switch: ON Engine: Stopped	Brake pedal: Depressed	ON
			Brake pedal: Released	OFF
29	Vehicle speed sensor	Selector lever position: 3	Idling with 1st gear (Vehicle stopped)	0 km/h
			Driving at constant speed of 50 km/h in 3rd gear	50 km/h
31	Low and reverse solenoid valve duty %	Selector lever position: L, 2, 3, D	10 km/h in 1st gear	No. 31: 0 %, No. 32: 0 %, No. 33: 100 %, No. 34: 100%
32	Underdrive solenoid valve duty %		30 km/h in 2nd gear	No. 31: 100 %, No. 32: 0 %, No. 33: 0 %, No. 34: 100%
33	Second solenoid valve duty %		50 km/h in 3rd gear	No. 31: 100 %, No. 32: 0 %, No. 33: 100 %, No. 34: 0 %
34	Overdrive solenoid valve duty %		70 km/h in 4th gear	No. 31: 100 %, No. 32: 100 %, No. 33: 0 %, No. 34: 0 %

Item No.	Check item	Check requirement		Normal value
36	Damper clutch control solenoid valve duty %	Selector lever position: 3	Driving at 50 km/h in 3rd gear with accelerator released	0 %
			Driving at constant speed of 70 km/h in 3rd gear	Approx. 70 - 90 %
52	Amount of damper clutch slippage	Selector lever position: 3	Driving at 50 km/h in 3rd gear with accelerator fully closed	Approx. 100 - 300 rpm*
			Driving at constant speed of 70 km/h in 3rd gear	Approx. 0 - 10 rpm
54	Control relay output voltage	Ignition switch : OFF	Ignition switch: ON → OFF	Battery voltage (mV) → 0 mV
57	Engine volumetric efficiency	Selector lever position: N	N range with accelerator pedal released → depressed.	Data changes
61	Inhibitor switch	Ignition switch: ON Engine: Stopped	Selector lever position: P	P
			Selector lever position: R	R
			Selector lever position: N	N
			Selector lever position: D	D
			Selector lever position: 3	3
			Selector lever position: 2	2
			Selector lever position: L	L
62	HOLD mode signal	Mode control switch position	HOLD	ON
			AUTO	OFF
63	Shift position	Selector lever position: L, 2, 3, D	Driving at constant speed of 10 km/h in 1st gear	1st
			Driving at constant speed of 30 km/h in 2nd gear	2nd
			Driving at constant speed of 50 km/h in 3rd gear	3rd
			Driving at constant speed of 70 km/h in 4th gear	4th
64	Idle position switch	Engine: Idling Selector lever position: N	Accelerator pedal: Released	ON
			Accelerator pedal: Halfly depressed	OFF
65	Dual pressure switch	Engine: Idling Selector lever position: N	A/C switch: ON	ON
			A/C switch: OFF	OFF

Item No.	Check item	Check requirement		Normal value
66	Auto-cruise-ECU signal	While auto-cruise operating	Plain road	OFF
			Sloping road	ON

**NOTE**

\*: The damper clutch is released when the accelerator is fully closed (Idle position switch: ON).

**ACTUATOR TEST JUDGEMENT VALUE**

23100820065

Item No.	Check item	Test content	Check requirement	Normal value
1	Low reverse solenoid valve			
2	Underdrive solenoid valve			
3	Second solenoid valve			
4	Overdrive solenoid valve			
6	Damper clutch control solenoid valve	Drive the solenoid valve specified by the MUT-II at 50 % duty for 5 seconds. No other solenoid valve should be energised.	Ignition switch: ON Selector lever position: P Engine: 0 r/min Vehicle speed: 0 km/h (Vehicle stopped) Throttle (Accelerator) opening voltage: Less than 0 V Idle switch: ON	The operation sound should be audible when the solenoid valve is driven.
12	A/T control relay	Control relay is OFF for 3 seconds.		Data list No. 54 (1) During test: 0 mV (2) Normal: Battery voltage [mV]

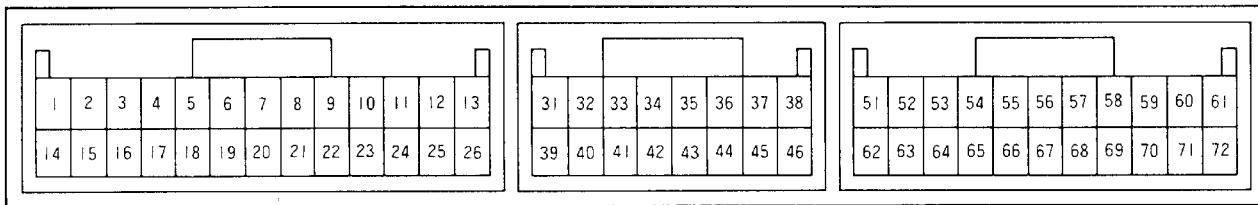
**INVECS-II CANCEL COMMAND**

23100950023

Item No.	Item	Content	Remarks
14	INVECS-II	Stop the INVECS-II control and change gears according to the standard shift pattern.	Use this function when carrying out procedure 8 in the road tests.

## CHECK AT A/T-ECU TERMINALS

23100840207



A9FA0133

Terminal No.	Check item	Check requirement	Standard value
1	Underdrive solenoid valve	Selector lever position: D (1st gear)	Battery voltage
		Selector lever position: P	Approx.7 - 9 V
2	Solenoid valve power supply	Ignition switch: OFF	0 V
		Ignition switch: ON	Battery voltage
3	Solenoid valve power supply	Ignition switch: OFF	0 V
		Ignition switch: ON	Battery voltage
8	Auto-cruse control unit	No OD-OFF request	Battery voltage
		OD-OFF request	0V
10	A/C compressor load signal	A/C switch: OFF	0 V
		A/C switch: ON	Battery voltage
11	Power supply	Ignition switch: OFF	0 V
		Ignition switch: ON	Battery voltage
12	Earth	Always	0 V
13	Earth	Always	0 V
14	Overdrive solenoid valve	Selector lever position: D (3rd gear)	Battery voltage
		Selector lever position: P	Approx. 7 - 9 V
15	Damper clutch control solenoid valve	Selector lever position: L (1st gear)	Battery voltage
		Selector lever position: 3 (50 km/h in 3rd gear)	Other than battery voltage
16	Second solenoid valve	Selector lever position: 2 (2nd gear)	Battery voltage
		Selector lever position: P	Approx. 7 - 9 V
21	Engine-ECU torque reduction request signal <Vehicles with TCL>	Ignition switch: ON (except during shifting)	4 - 5 V

Terminal No.	Check item	Check requirement	Standard value
23	Diagnosis control	-	-
24	Power supply	Ignition switch: OFF	0 V
		Ignition switch: ON	Battery voltage
25	Earth	Always	0 V
26	Earth	Always	0 V
31	Input shaft speed sensor	Measure between terminal No. 31 and No. 43 by an oscilloscope. Engine: 2,000 r/min Selector lever position: 3	Refer to P.23-45, Oscilloscope inspection procedure.
32	Output shaft speed sensor	Measure between terminal No. 32 and No. 43 by an oscilloscope. Engine: 2,000 r/min Selector lever position: 3	Refer to P.23-45, Oscilloscope inspection procedure.
33	Crank angle sensor	Engine: Idling	2.0 - 2.4 V
36	Idle position switch	Engine: Idling	0 V
		Engine: Other than idling	5 V
38	Back up power supply	Ignition switch: OFF	Battery voltage
43	Sensor earth	Always	0 V
44	Oil temperature sensor	ATF temperature: 25 °C	3.8 - 4.0 V
		ATF temperature: 80 °C	2.3 - 2.5 V
45	Throttle position sensor (TPS) <Vehicles without TCL> Accelerator pedal position sensor (APS) <Vehicles with TCL>	Accelerator pedal: Released (Engine stopped)	0.5 - 1.0 V
		Accelerator pedal: Depressed (Engine stopped)	4.5 - 5.0 V
53	Communication with engine-ECU <Vehicles without TCL> Communication with TCL-ECU <Vehicles with TCL>	Engine: Idling Selector lever position: D	Other than 0 V
54	Communication with engine-ECU <Vehicles without TCL> Communication with TCL-ECU <Vehicles with TCL>	Engine: Idling Selector lever position: D	Other than 0 V
55	Inhibitor switch P	Selector lever position: P	Battery voltage
		Selector lever position: Other than above	0 V
56	Inhibitor switch N	Selector lever position: N	Battery voltage
		Selector lever position: Other than above	0 V
57	Inhibitor switch 3	Selector lever position: 3	Battery voltage
		Selector lever position: Other than above	0 V

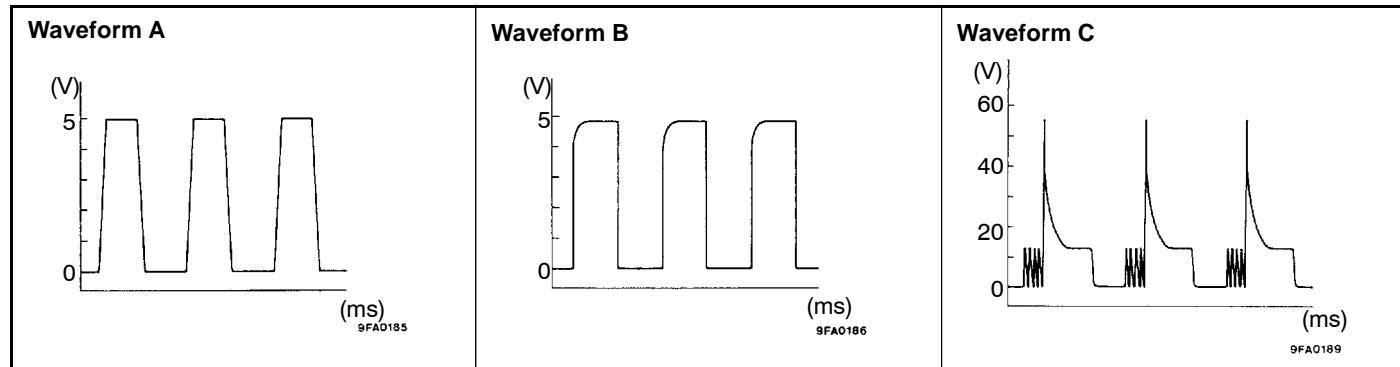
Terminal No.	Check item	Check requirement	Standard value
58	Inhibitor switch L	Selector lever position: L	Battery voltage
		Selector lever position: Other than above	0 V
59	Stop lamp switch	Brake pedal: Depressed	Battery voltage
		Brake pedal: Released	0 V
62	Low and reverse solenoid valve	Selector lever position: D (1st gear)	Battery voltage
		Selector lever position: D (2nd gear)	Approx. 7 - 9 V
63	Diagnosis output	Normal (No diagnosis code output)	0 → 5 V flashing
65	Wide open throttle switch	Accelerator pedal: Released	4.5 - 5.5 V
		Accelerator pedal: Depressed	Less than 0.4 V
66	Inhibitor switch R	Selector lever position: R	Battery voltage
		Selector lever position: Other than above	0 V
67	Inhibitor switch D	Selector lever position: D	Battery voltage
		Selector lever position: Other than above	0 V
68	Inhibitor switch 2	Selector lever position: 2	Battery voltage
		Selector lever position: Other than above	0 V
69	Vehicle speed sensor	When stopped	0 V
		Move forward slowly	0 → 5 V flashing
70	Mode control switch	Select HOLD mode	Battery voltage
		Select AUTO mode	0V
71	A/T control relay	Ignition switch: OFF	0 V
		Ignition switch: ON	Battery voltage
72	Earth	Ignition switch: ON	0 V

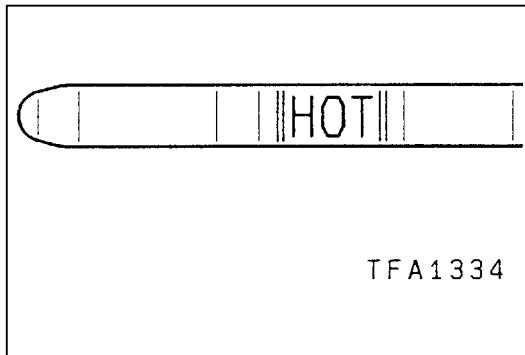
## OSCILLOSCOPE INSPECTION PROCEDURE

23100850064

Check item	Check requirement		Normal condition (Waveform sample)
Crank angle sensor	Selector lever position: N	Idling (Vehicle stopped)	Waveform A
Input shaft speed sensor	Selector lever position: 3	Driving at constant speed of 50 km/h in 3rd gear (Engine: 1,800 - 2,100 r/min)	Waveform B
Output shaft speed sensor			
Vehicle speed sensor			
Low reverse solenoid valve	Ignition switch: ON Selector lever position: P Engine: 0 r/min Vehicle speed: 0 km/h (Vehicle stopped) Throttle (Accelerator) opening angle: Less than 1 V Idle switch: ON	Force drive each solenoid valve (Actuator test)	Waveform C
Underdrive solenoid valve			
Second solenoid valve			
Overdrive solenoid valve			
Damper clutch control solenoid valve			

## Waveform sample





## ON-VEHICLE SERVICE

23100090237

### ESSENTIAL SERVICE

#### AUTOMATIC TRANSMISSION FLUID CHECK

1. Drive the vehicle until the fluid temperature rises to the normal temperature (70-80°C).
2. Park the vehicle on a level surface.
3. Move the selector lever through all positions to fill the torque converter and the hydraulic circuits with fluid, and then move the selector lever to the N position.
4. After wiping off any dirt around the oil level gauge, remove the oil level gauge and check the condition of the fluid.

#### NOTE

If the fluid smells as if it is burning, it means that the fluid has been contaminated by the particles from the bushes and friction materials, a transmission overhaul and flushing the cooler line may be necessary.

5. Check that the fluid level is at the HOT mark on the oil level gauge. If the fluid level is lower than this, pour in more fluid until the level reaches the HOT mark.

#### Automatic transmission fluid:

**Dia Queen ATF SP II or equivalent**

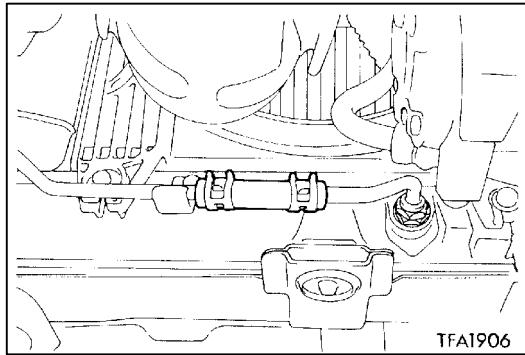
#### NOTE

If the fluid level is low, the oil pump will draw in air along with the fluid, which will cause bubbles to form inside the hydraulic circuit. This will in turn cause the hydraulic pressure to drop, which will result in late shifting and slipping of the clutches and brakes.

If there is too much fluid, the gears can churn it up into foam and cause the same conditions that can occur with low fluid levels.

In either case, air bubbles can cause overheating and oxidation of the fluid which can interfere with normal valve, clutch, and brake operation. Foaming can also result in fluid escaping from the transmission vent, in which case it may be mistaken for a leak.

6. Securely insert the oil level gauge.
7. The fluid and oil filters should always be replaced in the following conditions:  
When troubleshooting the transmission  
When overhauling the transmission  
When the oil is noticeably dirty or deteriorates (driving under the severe condition)  
Furthermore, the oil filters are special filters which are only to be used for the automatic transmission.



## AUTOMATIC TRANSMISSION FLUID REPLACEMENT

23100100251

If you have a fluid changer, use this changer to replace the fluid. If you do not have a fluid changer, replace the fluid by the following procedure.

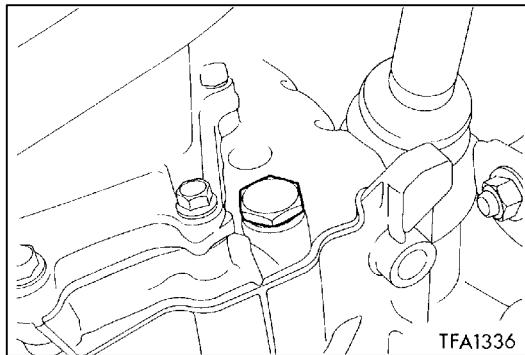
1. Disconnect the hose shown in the illustration which connects the transmission and the oil cooler (inside the radiator).
2. Start the engine and let the fluid drain out.

**Running conditions: N range with engine idling**

**Caution**

The engine should be stopped within one minute after it is started. If the fluid has all drained out before then, the engine should be stopped at that point.

**Discharge volume: Approx. 3.5 L**



3. Remove the drain plug from the bottom of the transmission case to drain the fluid.

**Discharge volume: Approx. 2.0 L**

4. Replace the oil filters. (Refer to P.23-48.)
5. Install the drain plug via a new gasket, and tighten it to the specified torque.

**Tightening torque: 32 Nm**

6. Pour the new fluid in through the oil filler tube.

**Adding volume: Approx. 5.5 L**

**Caution**

Stop pouring if the full volume of fluid cannot be poured in.

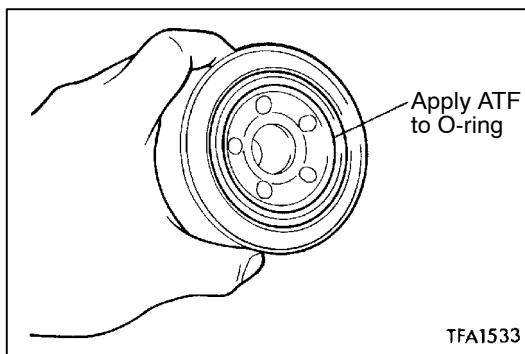
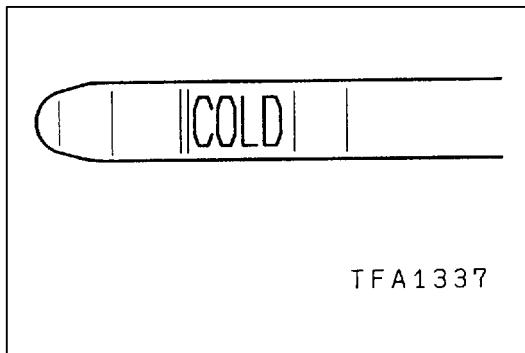
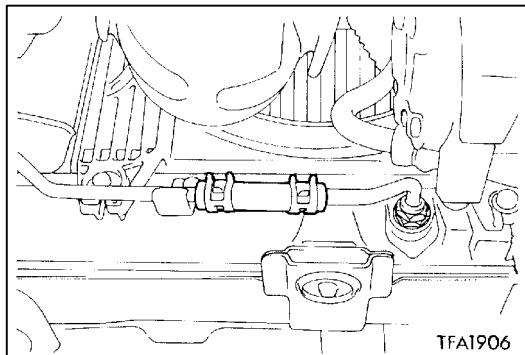
7. Repeat the procedure in step 2.

**NOTE**

Drain the fluid from the cooler hose 7 L at least. Then drain the fluid a little and check the fluid for dirt. If it has been contaminated, repeat the steps 6 and 7.

8. Pour the new fluid in through the oil filler tube.

**Adding volume: Approx. 3.5 L**



9. Reconnect the hose which was disconnected in step 1 above, and firmly replace the oil level gauge.
10. Start the engine and run it at idle for 1 - 2 minutes.
11. Move the selector lever through all positions, and then move it to the N position.

12. Check that the fluid level is at the COLD mark on the oil level gauge. If the level is lower than this, pour in more fluid.

13. Drive the vehicle until the fluid temperature rises to the normal temperature (70 - 80°C), and then check the fluid level again.

The fluid level must be at the HOT mark.

#### NOTE

The COLD level is for reference only; the HOT level should be regarded as the standard level.

14. Firmly insert the oil level gauge into the oil filler tube.

### OIL FILTER REPLACEMENT

23101050067

1. Use the special tool (MB991610) to remove the automatic transmission oil filter.
2. Clean the filter bracket side mounting surface.
3. Apply a small amount of automatic transmission fluid to the O-ring of the new oil filter.
4. Use the special tool (MB991610) to install the automatic transmission oil filter.

#### NOTE

Tightening torque: 12 Nm

5. Check the quantity of the automatic transmission fluid. (Refer to P.23-46.)

### THROTTLE POSITION SENSOR ADJUSTMENT

<Vehicles without TCL>

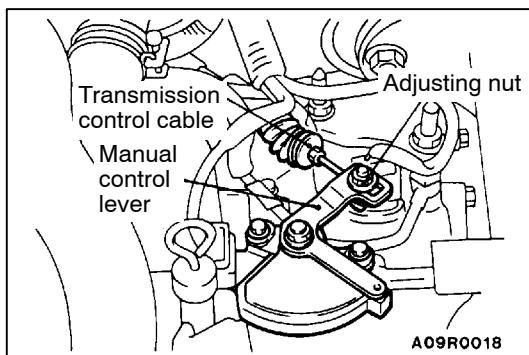
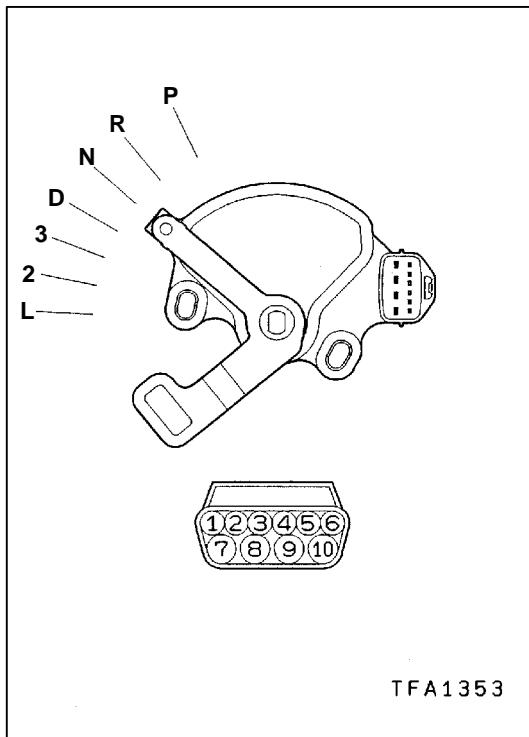
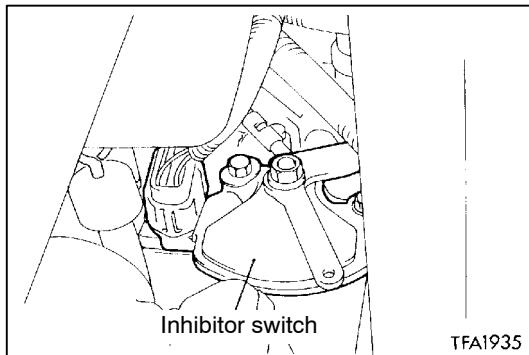
23100190142

Refer to GROUP 13A - On-vehicle Service.

### ACCELERATOR PEDAL POSITION SENSOR ADJUSTMENT <Vehicles with TCL>

23100250048

Refer to GROUP 13A - On-vehicle Service.

**INHIBITOR SWITCH CONTINUITY CHECK**

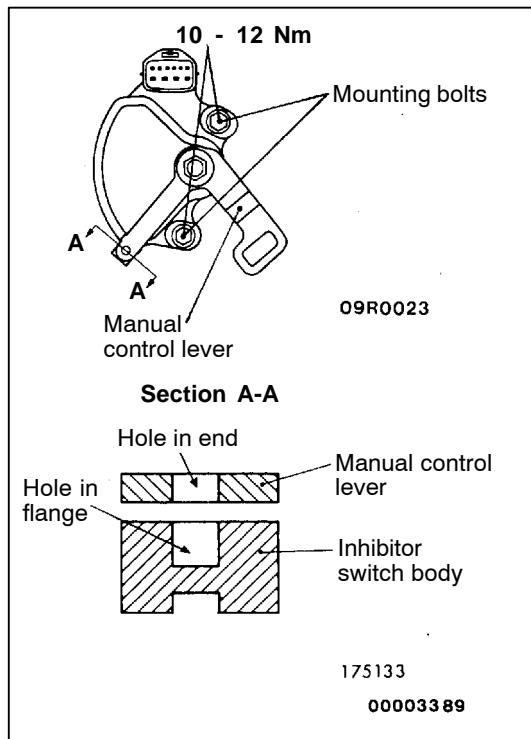
23100140345

Items	Terminal No.									
	1	2	3	4	5	6	7	8	9	10
P			○					○	○	○
R							○	○		
N				○			○	○	○	○
D	○						○			
3					○		○			
2		○						○		
L						○		○		

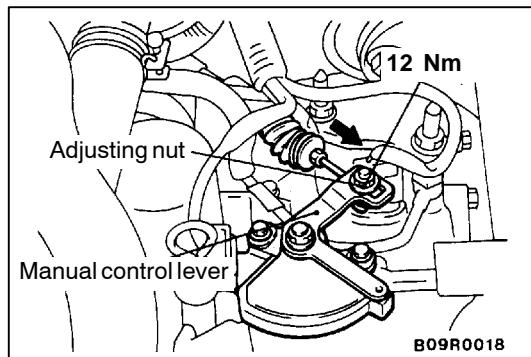
**INHIBITOR SWITCH AND CONTROL CABLE  
ADJUSTMENT**

23100150096

1. Set the selector lever to the "N" position.
2. Loosen the control cable to manual control lever coupling nut to free the cable and lever.
3. Set the manual control lever to the neutral position.



4. Loosen the inhibitor switch body mounting bolts and turn the inhibitor switch body so the hole in the end of the manual control lever and the hole (cross section A-A in the figure on the left) in the flange of the inhibitor switch body flange are aligned.
5. Tighten the inhibitor switch body mounting bolts to the specified torque. Be careful at this time that the position of the switch body is not changed.

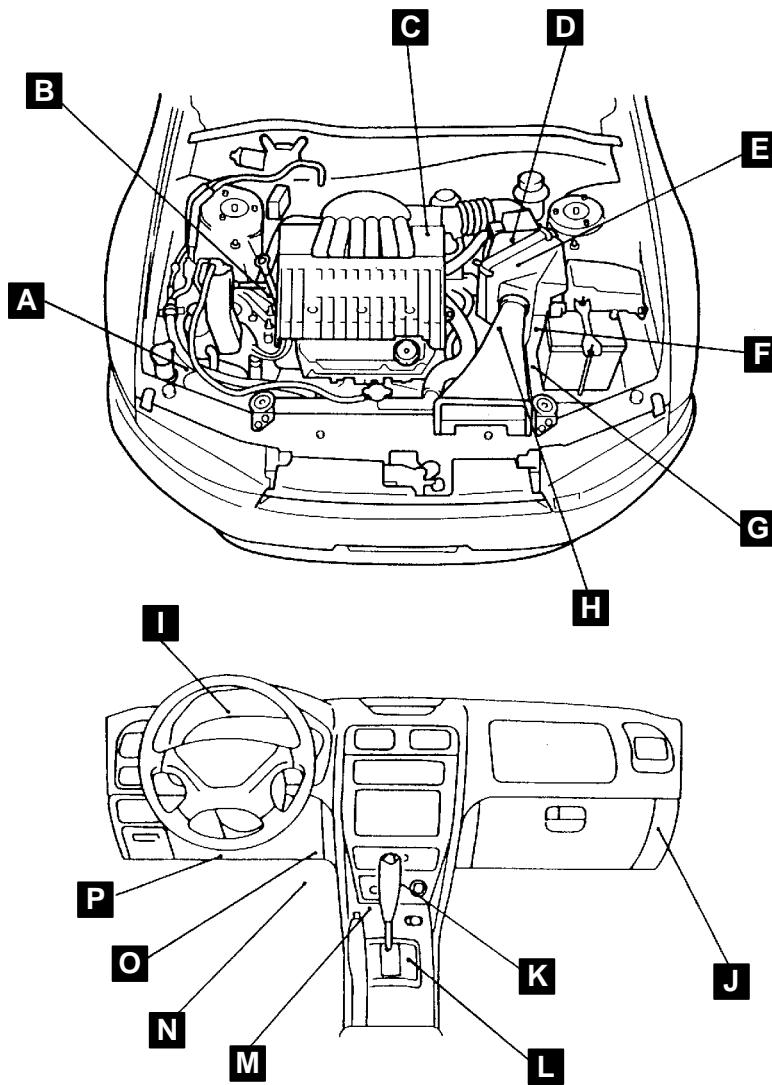


6. Gently pull the transmission control cable in the direction of the arrow, and then tighten the adjusting nut.
7. Check that the selector lever is in the "N" position.
8. Check that each range on the transmission side operates and functions correctly for each position of the selector lever.

## A/T CONTROL COMPONENT LOCATION

23100860234

Name	Symbol	Name	Symbol
Accelerator position sensor (with idle position switch) <Vehicles with TCL>	C	Mode control switch	L
A/T control relay	M	Oil temperature sensor	G
A/T-ECU	K	Output shaft speed sensor	E
Crank angle sensor	B	Shift indicator lamp	I
Diagnosis connector	O	Solenoid valve	G
Dual pressure switch	A	Stop lamp switch	P
Engine ECU	K	TCL-ECU	J
Inhibitor switch	F	Throttle position sensor (with idle position switch) <Vehicles without TCL>	C
Input shaft speed sensor	H	Vehicle speed sensor	D
		Wide open throttle switch	N



**A/T CONTROL COMPONENT CHECK**

23100900011

**CRANK ANGLE SENSOR CHECK**

Refer to GROUP 13A - Troubleshooting.

**THROTTLE POSITION SENSOR CHECK**

&lt;Vehicles without TCL&gt;

23100390030

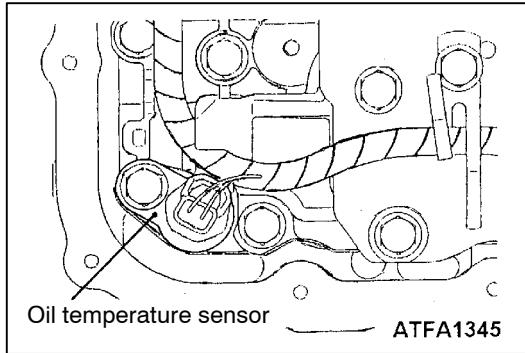
Refer to GROUP 13A - On-vehicle Service.

**ACCELERATOR PEDAL POSITION SENSOR CHECK**

&lt;Vehicles with TCL&gt;

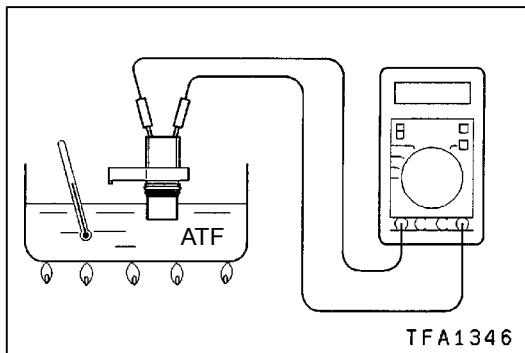
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Refer to GROUP 13H - On-vehicle Service.

**OIL TEMPERATURE SENSOR CHECK**

23100450035

1. Remove the oil temperature sensor.



2. Measure the resistance between terminals No. 1 and No. 2 of the oil temperature sensor connector.

**Standard value:**

Oil temperature (°C)	Resistance (kΩ)
0	16.7-20.5
100	0.57-0.69

**INHIBITOR SWITCH CHECK**

23100140352

Refer to P.23A-49.

**STOP LAMP SWITCH CHECK**

23100910014

Refer to GROUP 35 - Brake Pedal.

**VEHICLE SPEED SENSOR CHECK**

23100460038

Refer to GROUP 54 - On-vehicle Service.

**DUAL POSITION PRESSURE SWITCH CHECK**

23100470031

Refer to GROUP 55 - On-vehicle Service.

**IDLE POSITION SWITCH CHECK**

23100410033

Refer to GROUP 13A - On-vehicle Service.

**MODE CONTROL SWITCH CHECK**

23100920048

Refer to P.23-65.

**WIDE OPEN THROTTLE SWITCH CHECK**

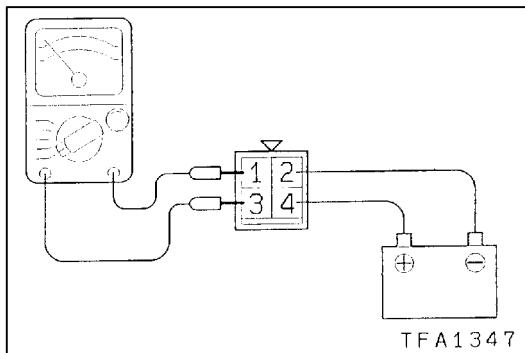
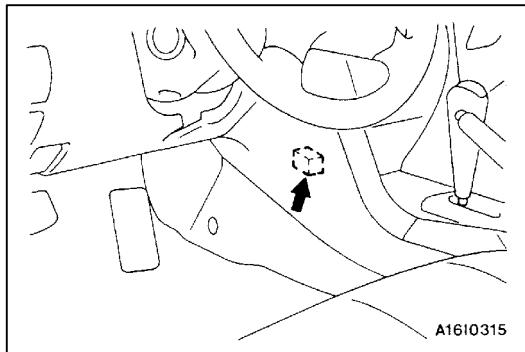
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Refer to P.23-64.

**A/T CONTROL RELAY CHECK**

23100930065

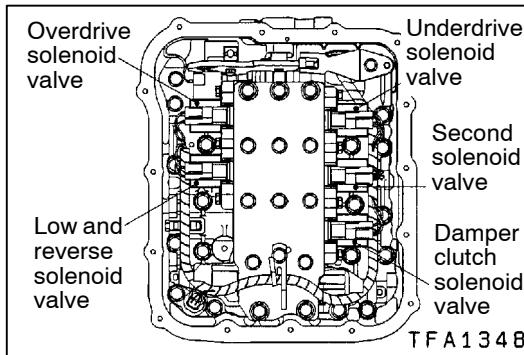
1. Remove the A/T control relay.



2. Use jumper wires to connect A/T control relay terminal 2 to the battery (-) terminal and terminal 4 to the battery (+) terminal.
3. Check the continuity between terminal 1 and terminal 3 of the A/T control relay when the jumper wires are connected to and disconnected from the battery.

Jumper wire	Continuity between terminals No. 1 and No. 3
Connected	Continuity
Disconnected	No continuity

4. If there is a problem, replace the A/T control relay.

**SOLENOID VALVE CHECK**

23100940013

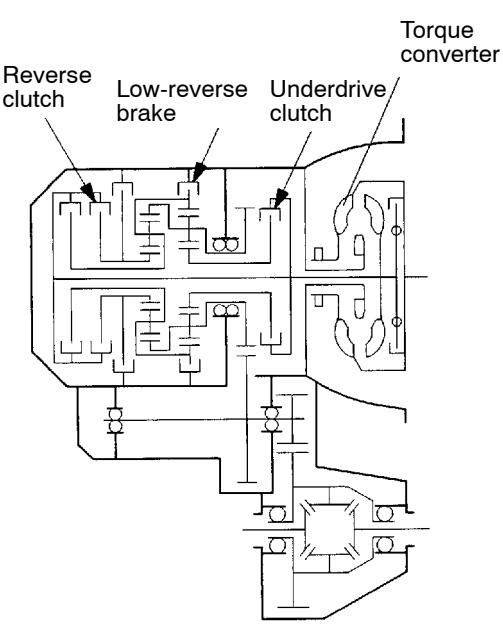
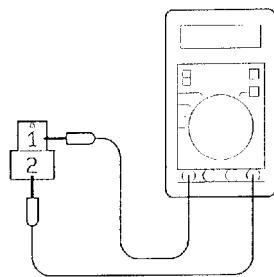
1. Remove the valve body cover.
2. Disconnect the connectors of each solenoid valve.

3. Measure the resistance between terminals 1 and 2 of each solenoid valve.

**Standard value:**

Name	Resistance
Damper clutch solenoid valve	2.7 - 3.4 Ω (at 20°C)
Low and reverse solenoid valve	
Second solenoid valve	
Underdrive solenoid valve	
Overdrive solenoid valve	

4. If the resistance is outside the standard value, replace the solenoid valve.

**TORQUE CONVERTER STALL TEST**

23100540206

This test measures the maximum engine speed when the selector lever is at the D or R position and the torque converter stalls to test the operation of the torque converter, starter motor and one-way clutch operation and the holding performance of the clutches and brakes in the transmission.

**Caution**

**Do not let anybody stand in front of or behind the vehicle while this test is being carried out.**

1. Check the automatic transmission fluid level and temperature and the engine coolant temperature.
  - Fluid level: At the HOT mark on the oil level gauge
  - Fluid temperature: 80 - 100°C
  - Engine coolant temperature: 80 - 100°C

2. Check both rear wheels (left and right).
3. Pull the parking brake lever on, with the brake pedal fully depressed.
4. Start the engine.
5. Move the selector lever to the D position, fully depress the accelerator pedal and take a reading of the maximum engine speed at this time.

**Caution**

1. The throttle should not be left fully open for any more than eight seconds.
2. If carrying out the stall test two or more times, move the selector lever to the N position and run the engine at 1,000 r/min to let the automatic transmission fluid cool down before carrying out subsequent tests.

**Standard value**

**Stall speed: 2,100 - 2,600 r/min**

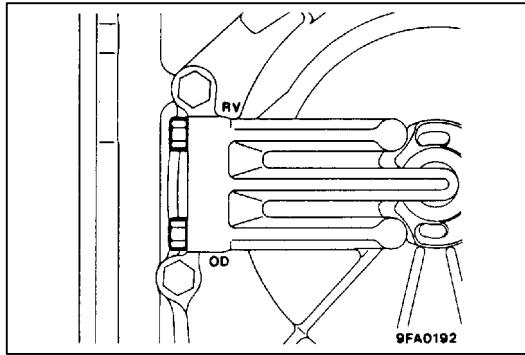
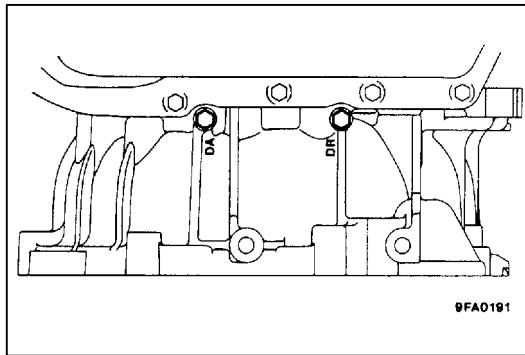
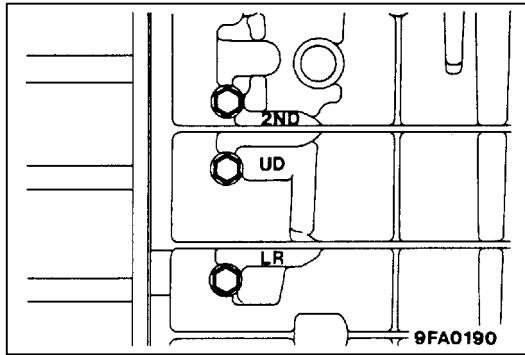
6. Move the selector lever to the R position and carry out the same test again.

**Standard value**

**Stall speed: 2,100 - 2,600 r/min**

**TORQUE CONVERTER STALL TEST JUDGEMENT RESULTS**

- a. Stall speed is too high in both D and R ranges
  - Low line pressure
  - Low & reverse brake slippage
- b. Stall speed is too high in D range only
  - Underdrive clutch slippage
- c. Stall speed is too high in R range only
  - Reverse clutch slippage
- d. Stall speed too low in both D and R ranges
  - Malfunction of torque converter
  - Insufficient engine output



## HYDRAULIC PRESSURE TEST

23100550216

1. Warm up the engine until the automatic transmission fluid temperature is 80 - 100°C.
2. Jack up the vehicle so that the wheels are free to turn.
3. Connect the special tools (2,942 kPa oil pressure gauge [MD998330] and joints [MD998332, MD998900]) to each pressure discharge port.
4. Measure the hydraulic pressure at each port under the conditions given in the standard hydraulic pressure table, and check that the measured values are within the standard value ranges.
5. If a value is outside the standard range, correct the problem while referring to the hydraulic pressure test diagnosis table.

## STANDARD HYDRAULIC PRESSURE TEST

&lt;4G63&gt;

Measurement condition			Standard hydraulic pressure kPa					
Selector lever position	Shift position	Engine speed (r/min)	Under-drive clutch pressure	Reverse clutch pressure	Overdrive clutch pressure	Low and reverse brake pressure	Second brake pressure	Torque converter pressure
P	-	2,500	-	-	-	310 - 390	-	310 - 390
R	Reverse	2,500	-	1,320 - 1,720	-	1,320 - 1,720	-	500 - 700
N	-	2,500	-	-	-	310 - 390	-	310 - 390
D	1st gear	2,500	1,010 - 1,050	-	-	1,010 - 1,050	-	500 - 700
	2nd gear	2,500	1,010 - 1,050	-	-	-	1,010 - 1,050	500 - 700
	3rd gear	2,500	590 - 690	-	590 - 690	-	-	450 - 650
	4th gear	2,500	-	-	590 - 690	-	590 - 690	450 - 650

&lt;6A13&gt;

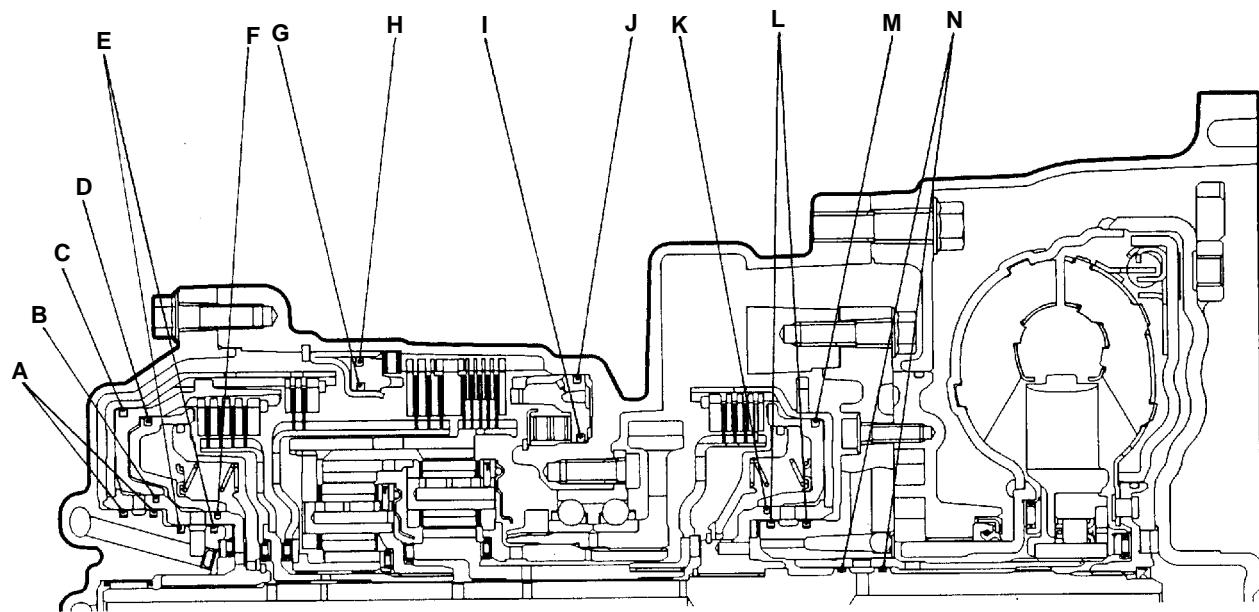
Measurement condition			Standard hydraulic pressure kPa					
Selector lever position	Shift position	Engine speed (r/min)	Under-drive clutch pressure	Reverse clutch pressure	Overdrive clutch pressure	Low and reverse brake pressure	Second brake pressure	Torque converter pressure
P	-	2,500	-	-	-	260 - 340	-	260 - 340
R	Reverse	2,500	-	1,320 - 1,720	-	1,320 - 1,720	-	500 - 700
N	-	2,500	-	-	-	260 - 340	-	260 - 340
D	1st gear	2,500	1,010 - 1,050	-	-	1,010 - 1,050	-	500 - 700
	2nd gear	2,500	1,010 - 1,050	-	-	-	1,010 - 1,050	500 - 700
	3rd gear	2,500	780 - 880	-	780 - 880	-	-	450 - 650
	4th gear	2,500	-	-	780 - 880	-	780 - 880	450 - 650

## HYDRAULIC PRESSURE TEST DIAGNOSIS TABLE

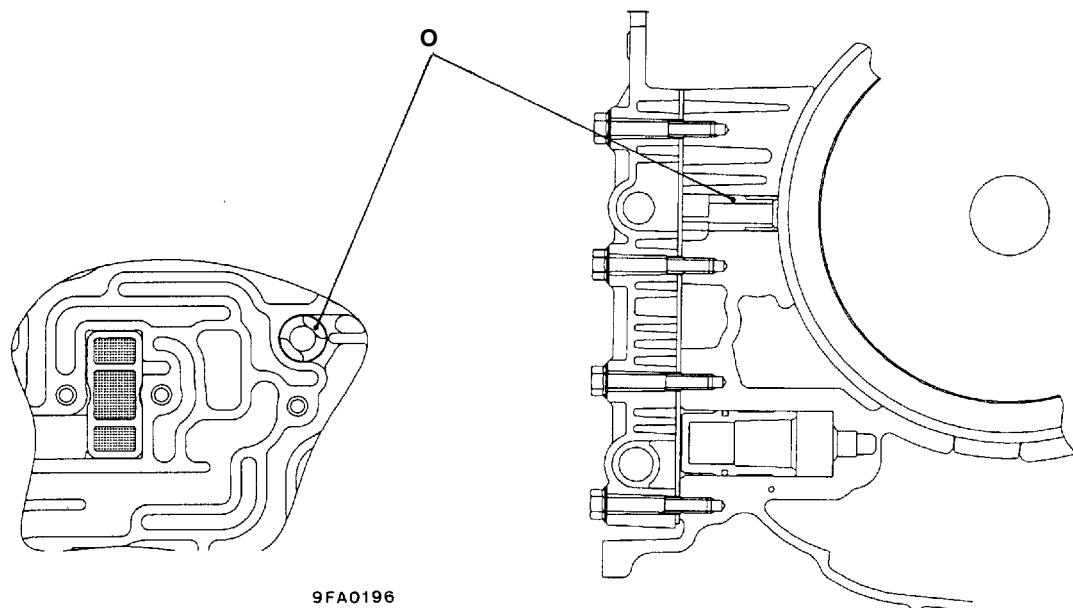
Trouble symptom	Probable cause
All hydraulic pressures are high.	Incorrect transmission control cable adjustment
	Malfunction of the regulator valve
All hydraulic pressures are low.	Incorrect transmission control cable adjustment
	Malfunction of the oil pump
	Clogged internal oil filter
	Clogged external oil filter
	Clogged oil cooler
	Malfunction of the regulator valve
	Malfunction of the relief valve
Hydraulic pressure is abnormal in "R" range only.	Incorrect valve body installation
	Malfunction of the regulator valve
	Clogged orifice
Hydraulic pressure is abnormal in "3" or "4" range only.	Incorrect valve body installation
	Malfunction of the overdrive solenoid valve
	Malfunction of the overdrive pressure control valve
	Malfunction of the regulator valve
	Malfunction of the switch valve
	Clogged orifice
Only underdrive hydraulic pressure is abnormal.	Incorrect valve body installation
	Malfunction of the oil seal K
	Malfunction of the oil seal L
	Malfunction of the oil seal M
	Malfunction of the underdrive solenoid valve
	Malfunction of the underdrive pressure control valve
	Malfunction of check ball
	Clogged orifice
Only reverse clutch hydraulic pressure is abnormal.	Incorrect valve body installation
	Malfunction of the oil seal A
	Malfunction of the oil seal B
	Malfunction of the oil seal C
	Clogged orifice
	Incorrect valve body installation

Trouble symptom	Probable cause
Only overdrive hydraulic pressure is abnormal.	Malfunction of the oil seal D Malfunction of the oil seal E Malfunction of the oil seal F Malfunction of the overdrive solenoid valve Malfunction of the overdrive pressure control valve Malfunction check ball Clogged orifice Incorrect valve body installation
Only low and reverse hydraulic pressure is abnormal.	Malfunction of the oil seal I Malfunction of the oil seal J Malfunction of the low and reverse solenoid valve Malfunction of the low and reverse pressure control valve Malfunction of the switch valve Malfunction of the fail safe valve A Malfunction of check ball Clogged orifice Incorrect valve body installation
Only second hydraulic pressure is abnormal.	Malfunction of the oil seal G Malfunction of the oil seal H Malfunction of the oil seal O Malfunction of the second solenoid valve Malfunction of the second pressure control valve Malfunction of the fail safe valve B Clogged orifice Incorrect valve body installation
Only torque converter pressure is abnormal.	Malfunction of the oil cooler Malfunction of the oil seal N Malfunction of the damper clutch control solenoid valve Malfunction of the damper clutch control valve Malfunction of the torque converter pressure control valve Clogged orifice Incorrect valve body installation
Pressure applied to non operating element.	Incorrect transmission control cable adjustment Malfunction of the manual valve Malfunction of check ball Incorrect valve body installation

## OIL SEAL LAYOUT



9FA0281



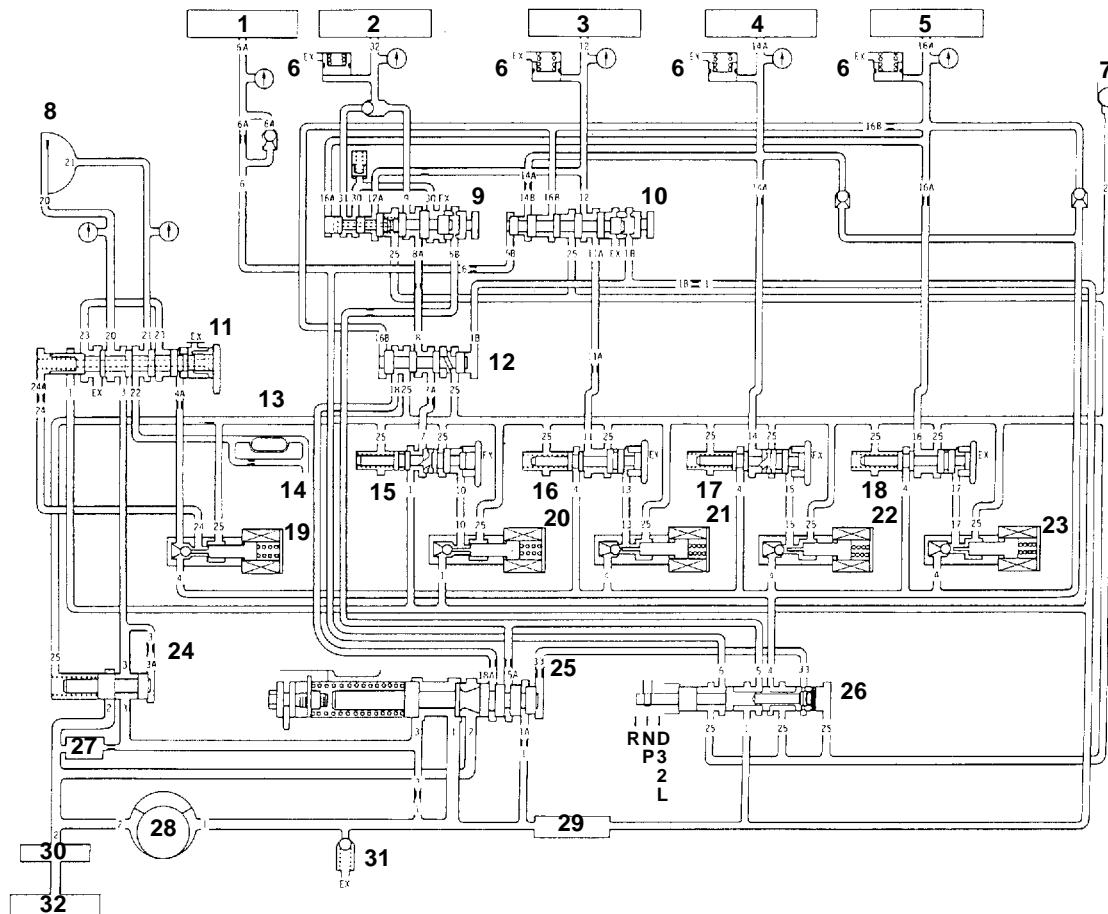
9FA0196

9FA0203  
00003693

## HYDRAULIC CIRCUIT

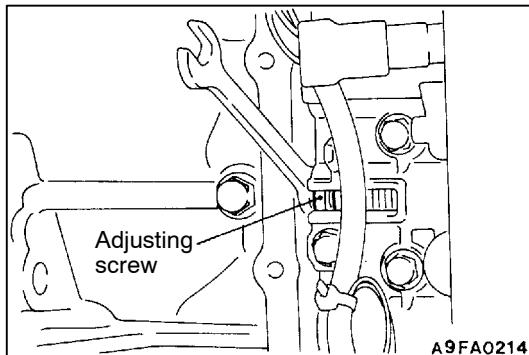
### PARKING AND NEUTRAL

23100880070



TFA1598

1. Reverse clutch
2. Low-reverse brake
3. Second brake
4. Underdrive clutch
5. Overdrive clutch
6. Accumulator
7. Check ball
8. Damper clutch
9. Fail safe valve A
10. Fail safe valve B
11. Damper clutch control valve
12. Switch valve
13. Automatic transmission fluid cooler
14. Lubrication
15. Low-reverse pressure control valve
16. Second pressure control valve
17. Underdrive pressure control valve
18. Overdrive pressure control valve
19. Damper clutch control solenoid valve
20. Low-reverse solenoid valve
21. Second solenoid valve
22. Underdrive solenoid valve
23. Overdrive solenoid valve
24. Torque converter pressure control valve
25. Regulator valve
26. Manual valve
27. Oil filter
28. Oil pump
29. Oil strainer
30. Oil filter (Built in type)
31. Relief valve
32. Oil pan



## LINE PRESSURE ADJUSTMENT

23100170122

1. Discharge the automatic transmission fluid, and then remove the valve body cover.
2. Turn the adjusting screw shown in the illustration at left to adjust the underdrive pressure to the standard value. The pressure increases when the screw is turned to the left.

### NOTE

When adjusting the underdrive pressure, adjust to the middle of the standard value range.

**Standard value: 1,010 - 1,050 kPa**

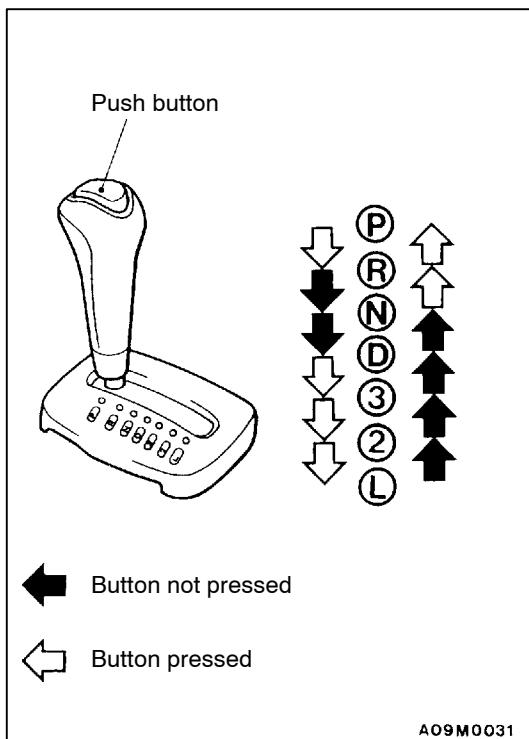
Change in pressure for each turn of the adjusting screw:  
35 kPa

3. Install the valve body cover, and pour in the standard volume of automatic transmission fluid.
4. Carry out a hydraulic pressure test. (Refer to P.23-56.) Readjust the line pressure if necessary.

## SELECTOR LEVER OPERATION CHECK

23100130090

1. Shift selector lever to each range and check that lever moves smoothly and is controlled. Check that position indicator is correct.
2. Check the selector lever can be moved to each position (by button operation as shown in the illustration).
3. Start the engine and check if the vehicle moves forward when the selector lever is moved from N or D, and moves backward when moved to R.
4. When the shift lever malfunctions, adjust control cable and selector lever sleeve. Check for worm shift lever assembly sliding parts.



A09M0031

# TRANSMISSION CONTROL

23100660247

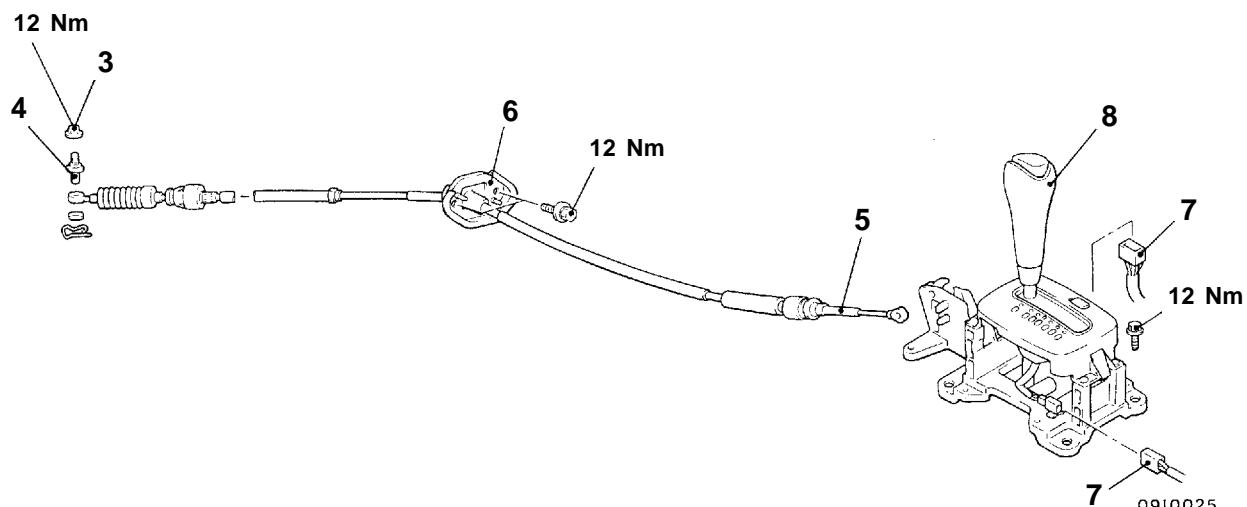
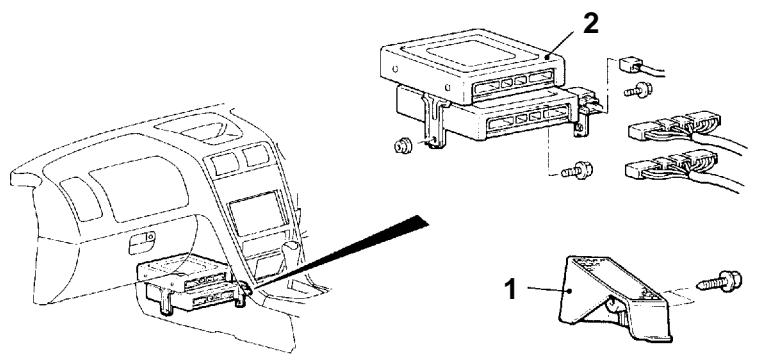
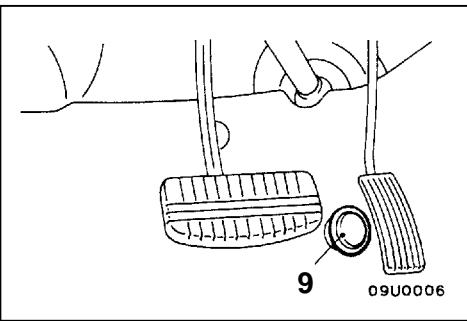
## REMOVAL AND INSTALLATION

### Pre-removal and Post-installation Operation

- Air Cleaner Assembly Removal and Installation
- Battery and Battery Tray Removal and Installation
- Lower Cover and Side Cover Removal and Installation (Refer to GROUP 52A - Instrument Panel.)
- Floor Console Box Removal and Installation (Refer to GROUP 52A.)

### Caution: SRS

Be careful not to subject the SRS-ECU to any shocks during removal and installation of the transmission control cable and selector lever assembly.



00006178

### Transmission control cable removal steps

1. Foot rest <R.H. drive vehicles>
2. Engine-ECU, A/T-ECU and A/T control relay assembly
3. Nut
4. Adjuster
5. Transmission control cable connection
6. Transmission control cable assembly

►A◀

### Selector lever assembly removal steps

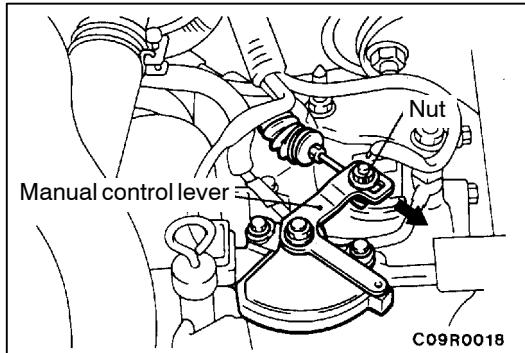
5. Transmission control cable connection
7. Wiring harness connector
8. Selector lever assembly

### A/T-ECU removal steps

1. Foot rest <R.H. drive vehicles>
2. Engine-ECU, A/T-ECU and A/T control relay assembly

### Wide open throttle switch removal step

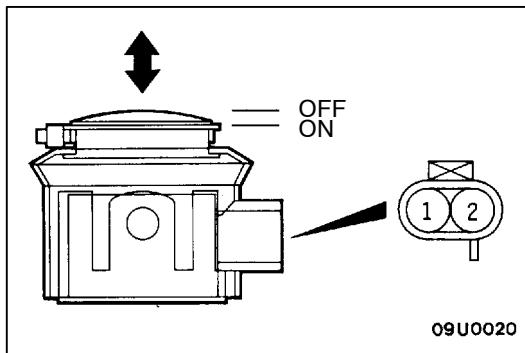
9. Wide open throttle switch



## INSTALLATION SERVICE POINT

### ►▲◀NUT INSTALLATION

1. Put the selector lever in the "N" position.
2. Loosen the adjusting nut, gently pull the transmission control cable in the direction of the arrow and tighten the nut.



## INSPECTION

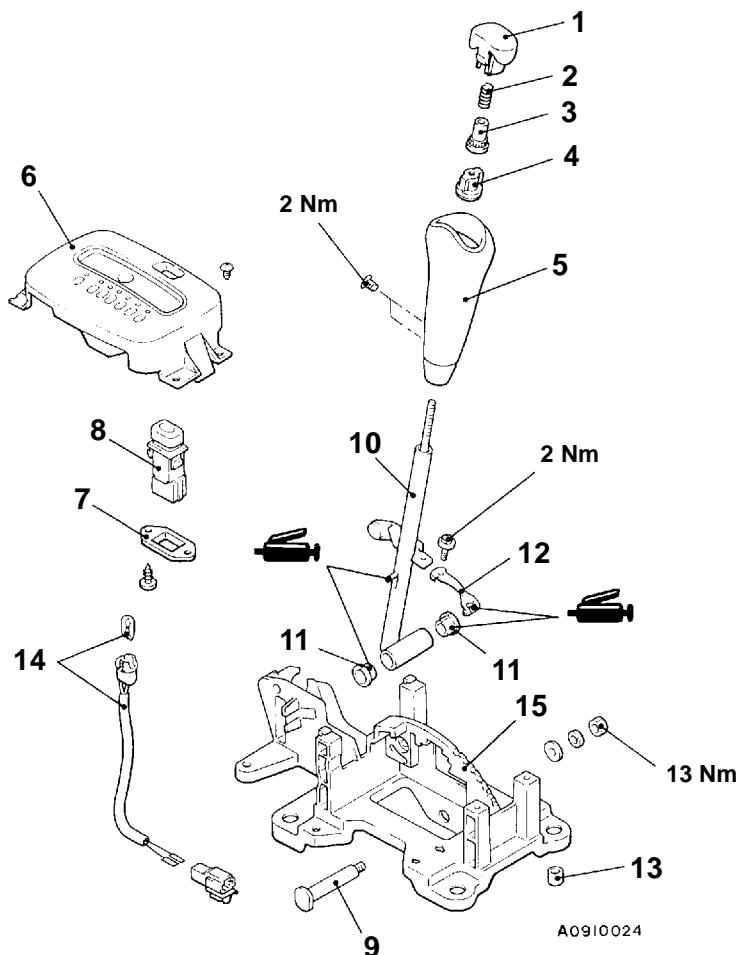
23100890097

### WIDE OPEN THROTTLE SWITCH CHECK

Switch position	Terminal No.	
	1	2
OFF		
ON	○	○

## SELECTOR LEVER ASSEMBLY DISASSEMBLY AND REASSEMBLY

23100680168

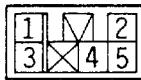
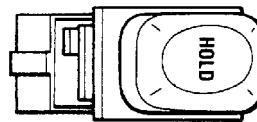
**Disassembly steps**

1. Push button
2. Spring
3. Bumper
4. Adjuster
5. Shift knob
6. Indicator panel assembly
7. Switch holder
8. A/T mode changeover switch

9. Bolt
10. Shift lever assembly
11. Bushing
12. Detent spring
13. Pipe
14. Position indicator lamp assembly
15. Bracket assembly

**INSPECTION**

23100670059

**A/T MODE CHANGEOVER SWITCH CHECK**

09P0014

Switch position	Terminal No.				
	1	2	4	3	5
OFF	<input type="radio"/>			<input type="radio"/>	
ON	<input type="radio"/>	<input type="radio"/>			<input checked="" type="radio"/>

## TRANSMISSION ASSEMBLY

23100570274

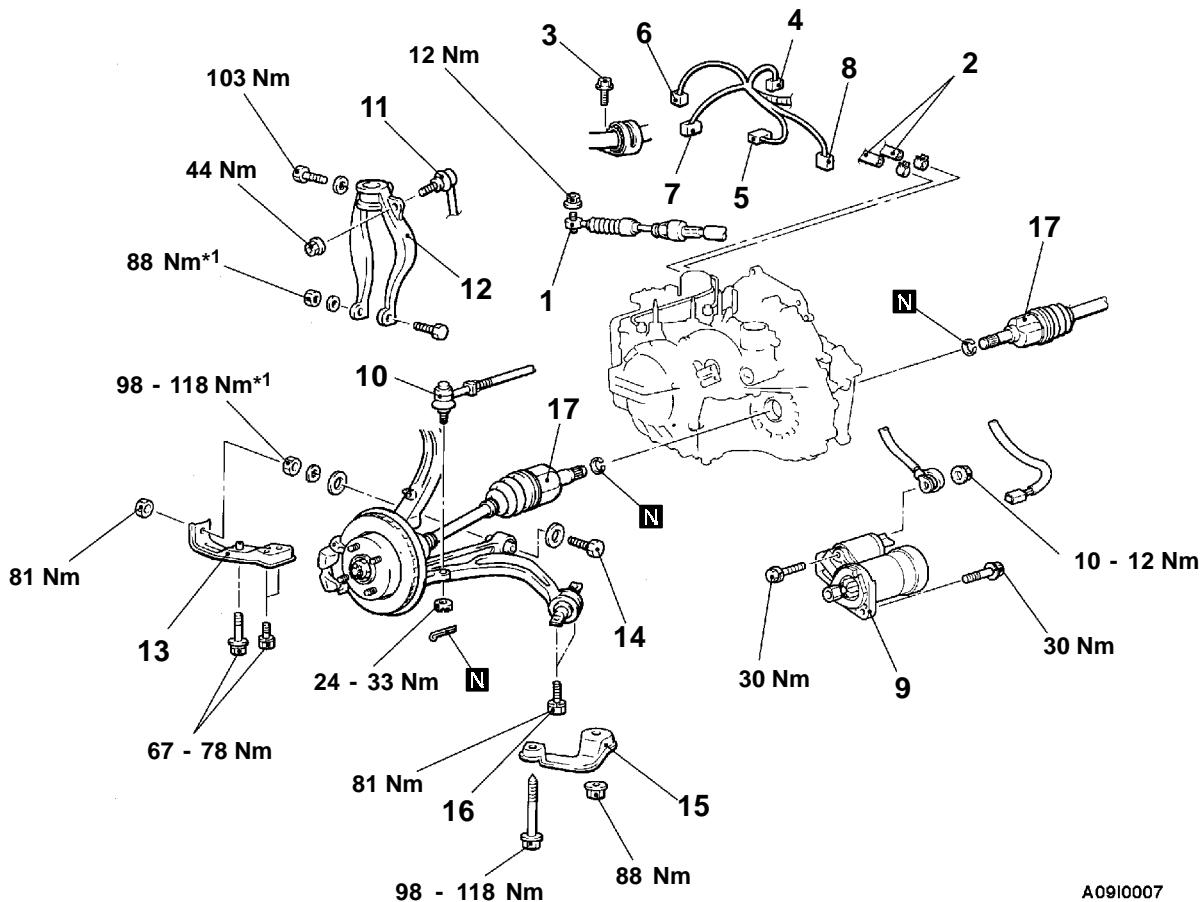
## REMOVAL AND INSTALLATION

## Pre-removal Operation

- Carry out the essential service for the troubleshooting (Refer to P.23-46.)
- Transmission Fluid Draining (Refer to P.23-47.)
- Under Cover Removal
- Battery and Battery Tray Removal
- Air Cleaner Assembly Removal

## Post-installation Operation

- Air Cleaner Assembly Installation
- Battery and Battery Tray Installation
- Under Cover Installation
- Transmission Fluid Supplying <Supplying should be done before starting the engine> (Refer to P.23-47.)
- Check the Dust Cover for Cracks or Damage by Pushing it with Finger.
- Selector Lever Operation Check
- Speedometer Operation Check
- Wheel Alignment Adjustment (Refer to GROUP 33A - On-vehicle Service.)



A09I0007

## Removal steps

1. Transmission control cable connection
2. Transmission fluid cooler hoses connection
3. Bolt
4. Input shaft speed sensor connector
5. Output shaft speed sensor connector
6. Inhibitor switch connector
7. A/T control solenoid valve assembly connector
8. Vehicle speed sensor connector
9. Starter motor <6A1>

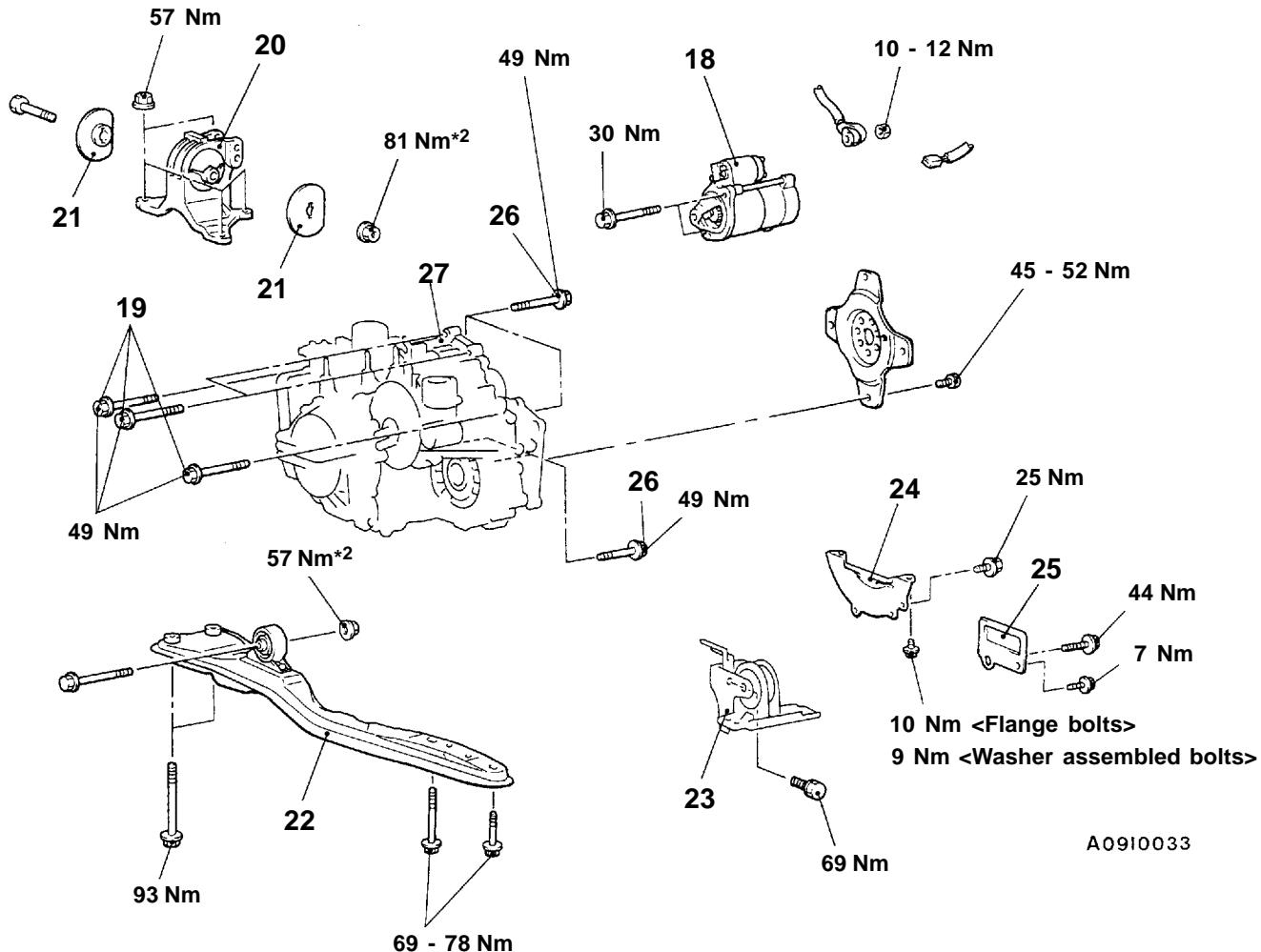
◀A▶

10. Tie rod end connection
11. Stabilizer link connection
12. Damper fork
13. No. 2 stay
14. Lateral lower arm connection
15. No. 3 stay
16. Compression lower arm connection
17. Drive shaft

◀B▶

## Caution

\*1: Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.

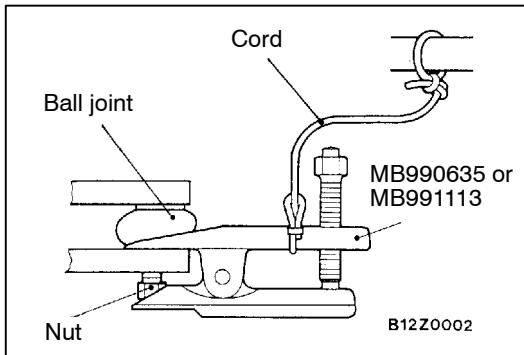


- D** 18. Starter motor <4G6>  
**E** 19. Transmission assembly upper part  
coupling bolts  
**F** 20. Transmission mount bracket  
**B** 21. Transmission mount stopper  
  - Engine and transmission assembly supporting
22. Centermember assembly  
23. Rear roll stopper  
24. Bell housing cover <4G6>

- F** 25. Cover <6A1>  
**F** 26. Transmission assembly lower part  
coupling bolts  
**F A F** 27. Transmission assembly

**Caution**

Mounting locations marked by \*2 should be provisionally tightened, and then fully tightened after placing the vehicle horizontally and loading the full weight of the engine on the vehicle body.

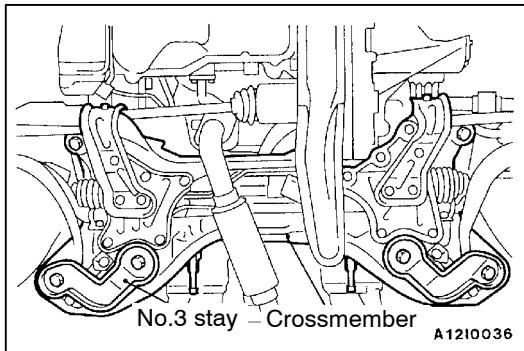


## REMOVAL SERVICE POINTS

### ◀A▶ TIE ROD END DISCONNECTION

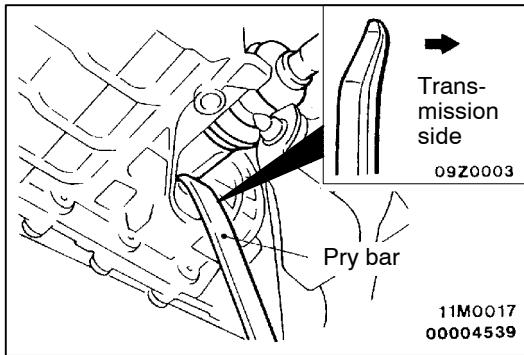
**Caution**

1. Use the special tool to loosen the tie rod end mounting nut. Only loosen the nut; do not remove it from the ball joint.
2. Support the special tool with a cord, etc. not to let it come off.



### ◀B▶ NO.3 STAY REMOVAL

No.3 stay is tightened together with the crossmember. Therefore, after removing No.3 stay, install the nut and bolt to the crossmember provisionally.



### ◀C▶ DRIVE SHAFT DISCONNECTION

1. Insert a pry bar between the transmission case and the drive shaft as shown to remove the drive shaft.

**NOTE**

Do not remove the hub and knuckle from the drive shaft.

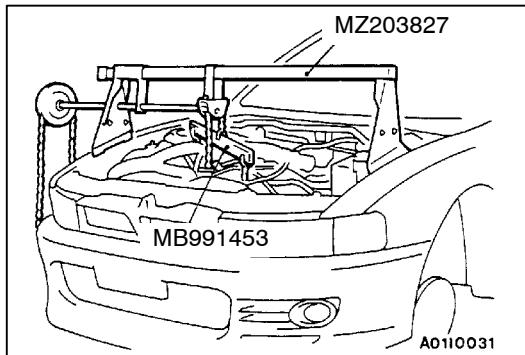
**Caution**

**Always use a pry bar, or the TJ will be damaged.**

2. Suspend the removed drive shaft with a wire so that there are no sharp bends in any of the joints.
3. Use a shop towel to cover the transmission case not to let foreign material get into it.

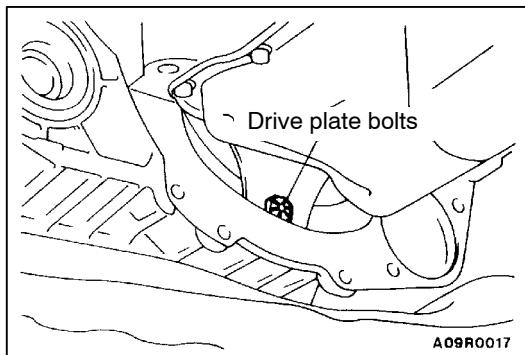
### ◀D▶ TRANSMISSION MOUNT BRACKET REMOVAL

Jack up the transmission assembly gently with a garage jack, and then remove the transmission mount bracket.



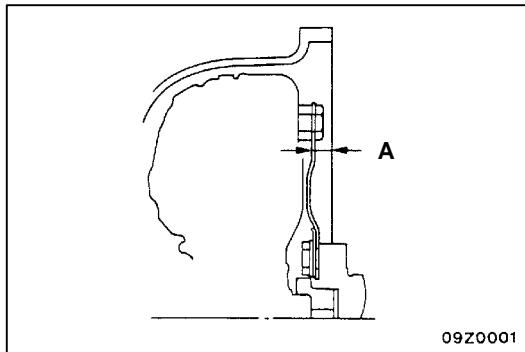
### ◀▶ ENGINE AND TRANSMISSION ASSEMBLY SUPPORTING

Set the special tool to the vehicle to support the engine and transmission assembly.



### ◀▶ TRANSMISSION ASSEMBLY LOWER PART COUPLING BOLTS/TRANSMISSION ASSEMBLY REMOVAL

1. Support the transmission assembly by using a transmission jack.
2. Remove the drive plate bolts while turning the crank shaft.
3. Press in the torque converter to the transmission side so that the torque converter does not remain on the engine side.
4. Remove the transmission assembly lower bolts and lower the transmission assembly.

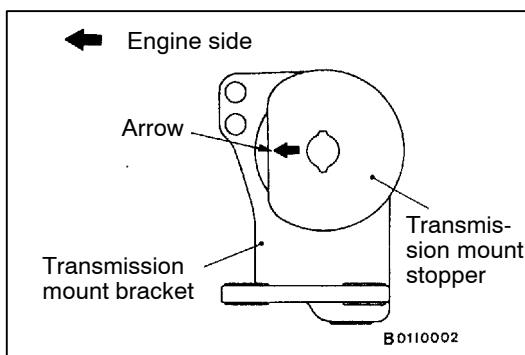


### INSTALLATION SERVICE POINTS

#### ►A◀ TRANSMISSION ASSEMBLY INSTALLATION

After securely inserting the torque converter into the transmission side so that the value shown in the illustration becomes the reference value, install the transmission assembly to the engine.

**Reference value (A): Approx. 12.2 mm**



#### ►B◀ TRANSMISSION MOUNT STOPPER INSTALLATION

Install the transmission mount stopper so that the arrow points as shown in the illustration.

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## **NOTES**