AUTOMATIC TRANSMISSION

CONTENTS

23109000040

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WARNING REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICULES

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 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

23100030031

Items		Specifications
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		2.9 – 3.5
Resistance of Low-Reverse solenoid valve coil (at 20°C) Ω		2.9 – 3.5
Resistance of second solenoid valve coil (at 20°C) Ω		2.9 – 3.5
Resistance of underdrive solenoid valve coil (at 20°C) Ω		2.9 – 3.5
Resistance of overdrive solenoid valve coil (at 20°C) Ω		2.9 – 3.5
Stall speed r/min		2,100 – 2,600

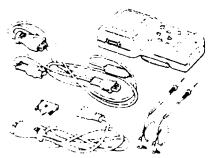
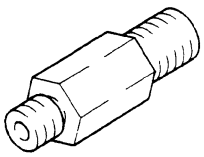
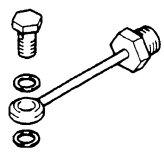
LUBRICANTS

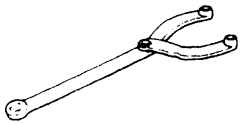
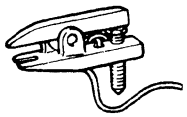
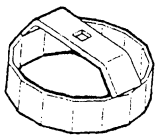
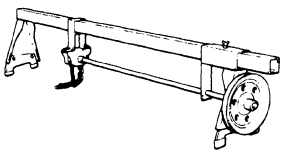
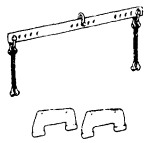
23100040034

Items	Specified lubricant	Quantity ℓ
Transmission fluid	DIA QUEEN ATF SP-II or equivalent	7.8

SPECIAL TOOLS

23100060030

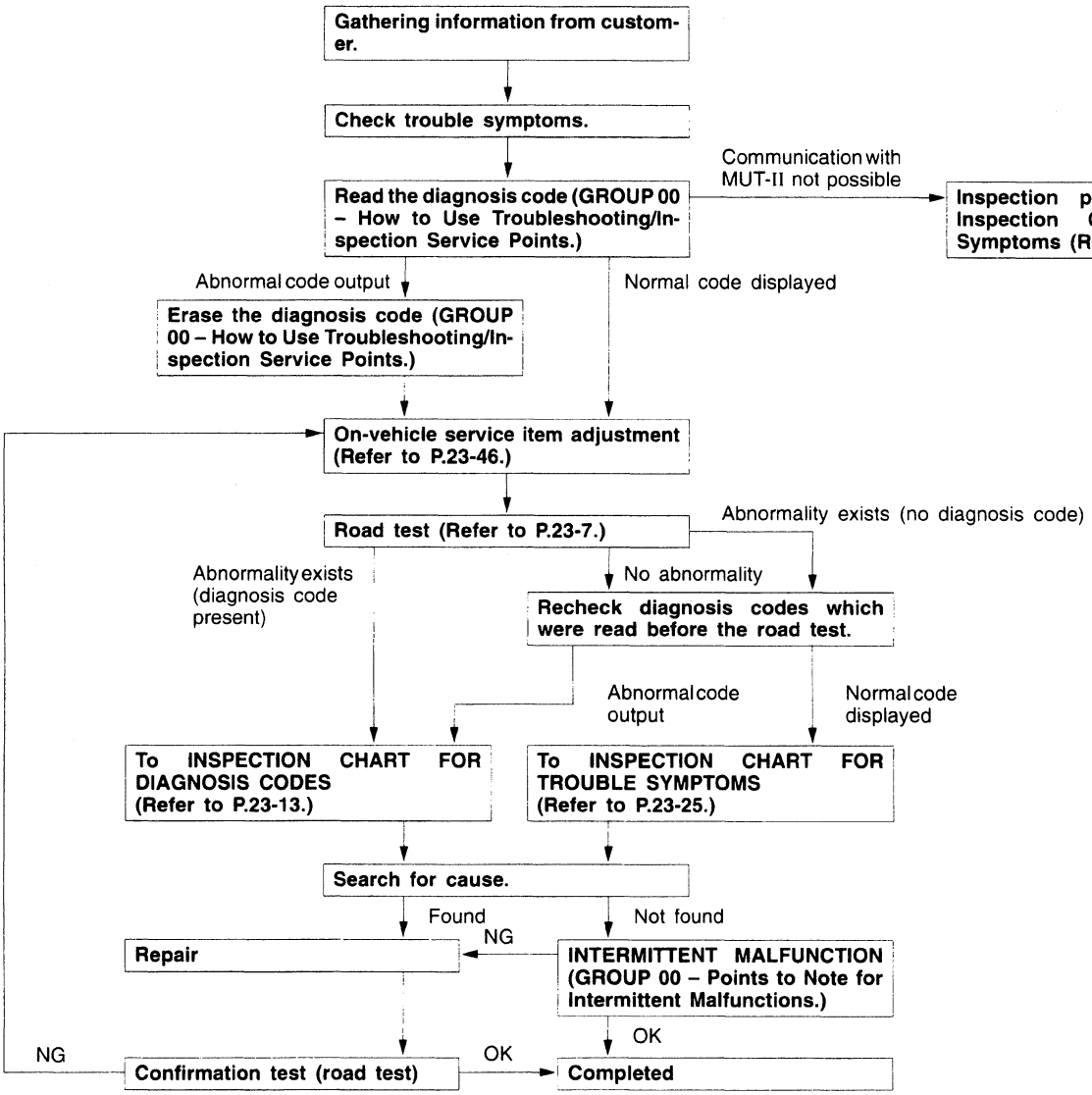
Tool	Number	Name	Use
	MB991502	MUT-II sub assembly	Checking of the diagnosis code
	MD998330 (including MD998331)	Oil pressure gauge (2,942 kPa)	Measurement of oil pressure
	MD998332	Adapter	
	MD998900	Adapter	

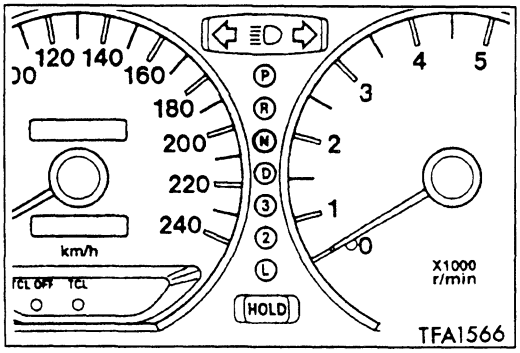
Tool	Number	Name	Use
	MB990767	End yoke holder	Fixing the hub
	MB990635 or MB991113	Steering linkage puller	Removal of the tie rod end and the lower arm
	MB991610	Oil filter wrench	Removal and installation of automatic transmission oil filter
	GENERAL SERVICE TOOL MZ203827	Engine lifter	Supporting the engine assembly during removal and installation of the transmission
	MB991453	Engine hanger assembly	Supporting the engine assembly during removal and installation of the transmission

TROUBLESHOOTING

23100760039

STANDARD FLOW OF DIAGNOSIS TROUBLESHOOTING





DIAGNOSIS FUNCTION

23100770032

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

23100780035

Check by the following procedure.

No.	Condition	Operation	Judgement value	Check item	Code No.	Inspection procedure page if there is an abnormality
1	Ignition switch: OFF	Ignition switch (1) ON	Data list No. 54 Battery voltage [mV]	Control relay	54	A/T Control relay system (23-24)
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 (23-35)
		Accelerator pedal (1) Fully closed (2) Depressed (3) Fully open	Data list No. 11 (1) 400 – 1,000 mV (2) Gradually rises from (1) (3) 4,500 – 5,000 mV	TPS <without TCL> APS <with TCL>	11 12 14	TPS <without TCL> APS <with TCL> (23-14)
		Brake pedal (1) Depressed (2) Released	Data list No. 26 (1) ON (2) OFF	Stop lamp switch	26	Stop lamp 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 (23-27)
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 (23-14)

No.	Condition	Operation	Judgement value	Check item	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 (23-17)
		A/C switch (1) ON (2) OFF	Data list No. 65 (1) ON (2) OFF	Dual pressure switch	–	Dual pressure switch system (23-36)
		Accelerator pedal (1) Fully closed (2) Depressed	Data list No. 64 (1) ON (2) OFF	Idle switch	–	Idle switch system (23-36)
			Data list No. 21 (1) 650 – 900 rpm Gradually rises from (1)	Crank angle sensor	21	Crank angle sensor system (23-15)
			Data list No. 57 (2) Data changes	Communication with engine ECU <without TCL> Communication with TCL-ECU <with TCL>	51	Serial communication system (23-24)
		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 (23-29)
					–	Shocks when changing from N to D and large time lag (23-29)
					–	Shocks when changing from N to R and large time lag (23-30)
					–	Shocks when changing from N to D,N to R and large time lag (23-31)
				Driving impossible	–	Does not move forward (23-27)
					–	Does not reverse (23-28)
					–	Does not move (forward or reverse) (23-28)

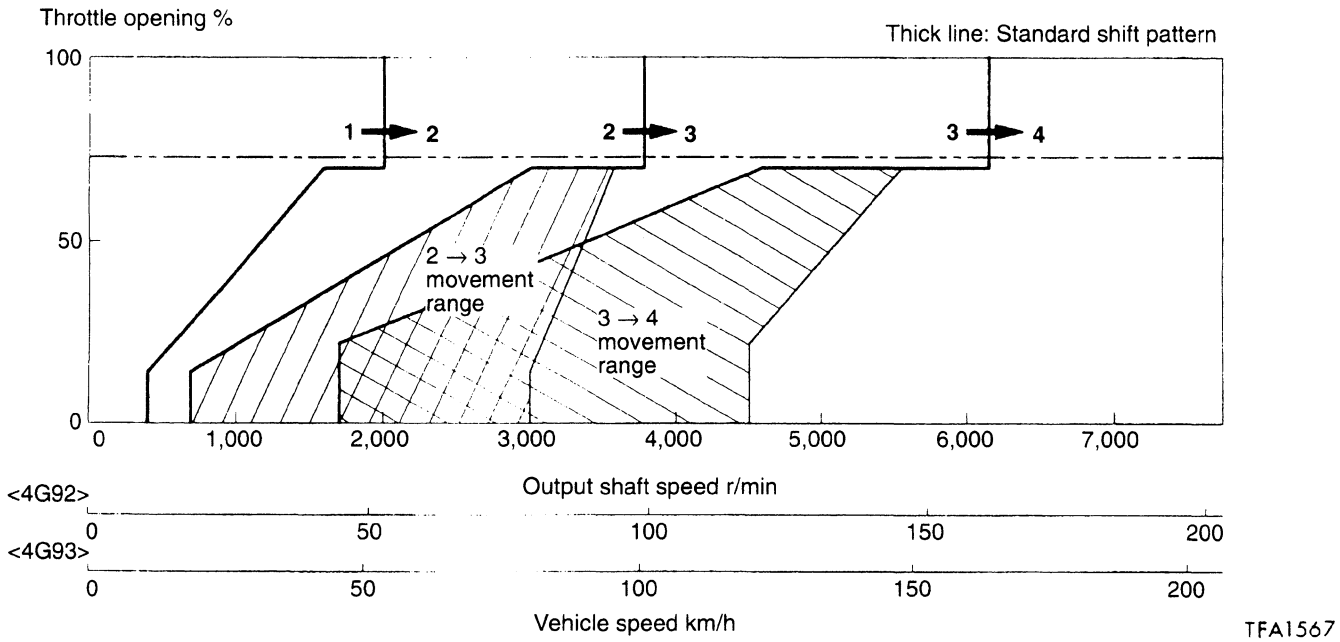
No.	Condition	Operation	Judgement value	Check item	Code No.	Inspection procedure page if there is an abnormality
6	HOLD mode	Selector lever position and vehicle speed (1) Idling in L range (Vehicle stopped) (2) Driving at constant speed of 10 km/h in L position (3) Driving at constant speed of 30 km/h in 2 position (4) Driving at 50 km/h in 3 position with accelerator fully closed (5) Driving at constant speed of 70 km/h in 3 position (6) Driving at constant speed of 70 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, (6) 4th	Shift condition	–	–
			Data list No. 31 (2) 0 %, (4) 100 %, (3) 100 %, (6) 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 %, (6) 100 %	Underdrive solenoid valve	32	Underdrive solenoid valve system (23-18)
			Data list No. 33 (2)100 %, (4) 0 %, (3) 0 %, (6) 0 %	Second solenoid valve	33	Second solenoid valve system (23-18)
			Data list No. 34 (2) 100 %, (4) 0 %, (3) 100 %, (6) 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 (23-37)
			Data list No. 22 (4) 1,900 – 2,100 rpm	Input shaft speed sensor	22	Input shaft speed sensor system (23-15)
			Data list No. 23 (4) 1,900 – 2,100 rpm	Output shaft speed sensor	23	Output shaft speed sensor system (23-16)
			Data list No. 36 (3) 0 % (5) Approx. 70 – 90 %	Damper clutch control solenoid valve	36 52	Damper clutch control solenoid valve system (23-18)
			Data list No. 52 (3) Approx. 100 – 300 rpm (5) Approx. 0 – 10 rpm			

No.	Condition	Operation	Judgement value	Check item	Code No.	Inspection procedure page if there is an abnormality
7	Use the MUT-II to stop the INVECS-II function. Selector lever position: D	Monitor data list No. 11, 23, and 63 with the MUT-II. (1) Accelerate to 4th gear at a throttle position sensor output of 1.5V (accelerator opening angle of 30 %). (2) Gently decelerate to a standstill. (3) Accelerate to 4th gear at a throttle position sensor output of 2.5 V (accelerator opening angle of 50%). (4) While driving at 60 km/h in 4th gear, shift down to 3 range. (5) While driving at 40 km/h in 3rd gear, shift down to 2 range. (6) While driving at 20 km/h in 2nd gear, shift down to L range.	For (1), (2) and (3), the reading should be the same as the specified output shaft torque, and no abnormal shocks should occur. For (4), (5) and (6), downshifting should occur immediately after the shifting operation is made.	Malfunction when shifting	–	Shocks and running up (23-31)
				Displaced shifting points	–	All points (23-32)
					–	Some points (23-33)
				Does not shift	–	No diagnosis code (23-33)
					22	Input shaft speed sensor system (23-15)
					23	Output shaft speed sensor system (23-16)
				Does not shift from 1 to 2 or 2 to 1	31	Low and reverse solenoid valve system (23-18)
					33	Second solenoid valve system (23-18)
					41	1st gear ratio is not specified (23-19)
					42	2nd gear ratio is not specified (23-20)
				Does not shift from 2 to 3 or 3 to 2	33	Second solenoid valve system (23-18)
					34	Overdrive solenoid valve system (23-18)
					42	2nd gear ratio is not specified (23-20)
					43	3rd gear ratio is not specified (23-21)
				Does not shift from 3 to 4 or 4 to 3	32	Underdrive solenoid valve system (23-18)
					33	Second solenoid valve system (23-18)
					43	3rd gear ratio is not specified (23-21)
					44	4th gear ratio is not specified (23-22)

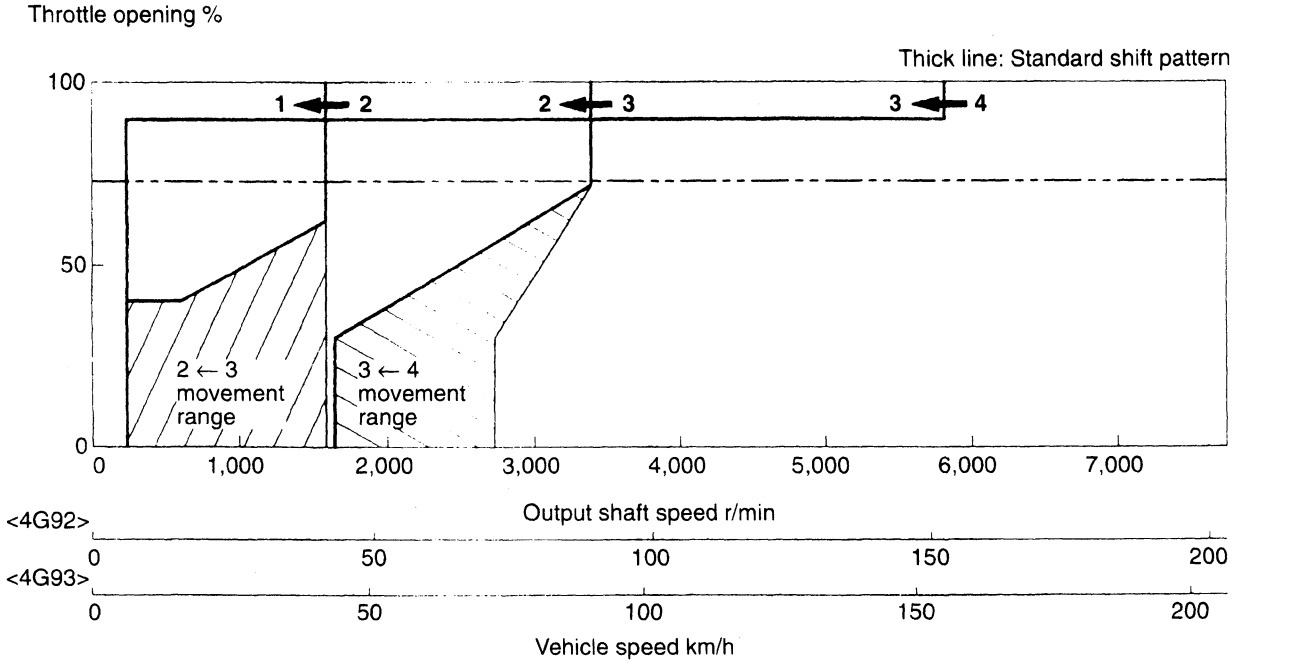
No.	Condition	Operation	Judgement value	Check item	Code No.	Inspection procedure page if there is an abnormality
8	Selector lever position: N	Monitor data list No. 22 and No. 23 with the MUT-II. (1) Move selector lever to R range, drive at constant speed of 10 km/h.	The ratio between data list No. 22 and No. 23 should be the same as the gear ratio when reversing.	Does not shift	22	Input shaft speed sensor system (23-15)
					23	Output shaft speed sensor system (23-16)
					46	Reverse gear ratio is not specified (23-23)

SHIFT PATTERN

UPSHIFT PATTERN

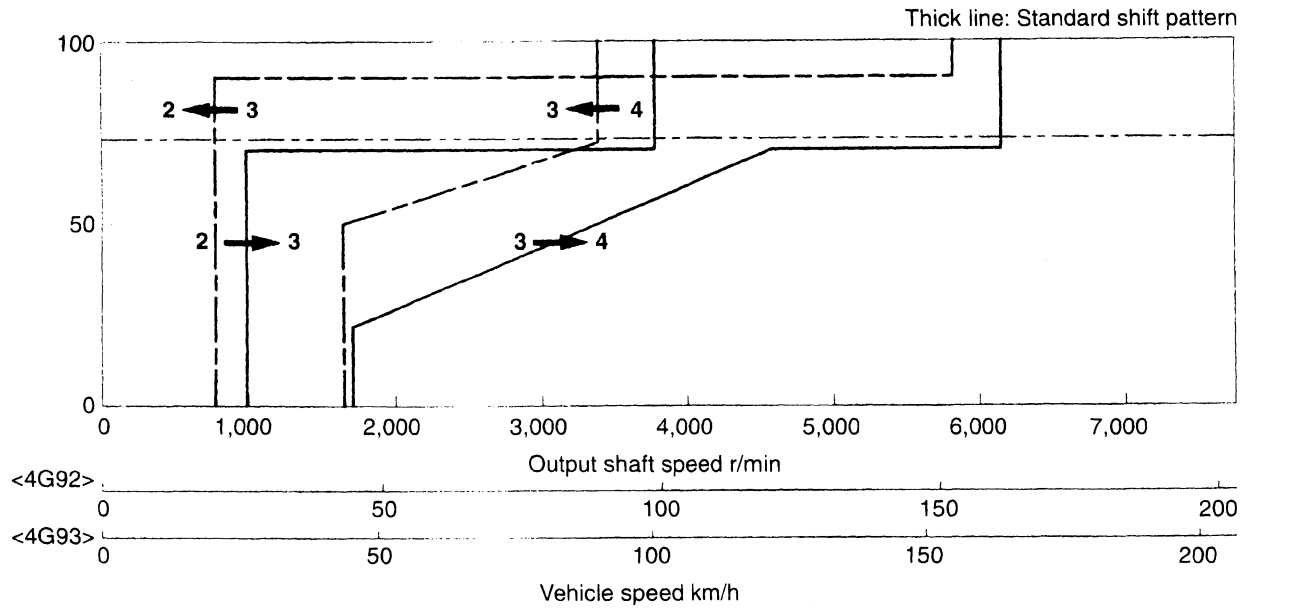


DOWNSHIFT PATTERN



TFA1760

HOLD MODE PATTERN



TFA1761

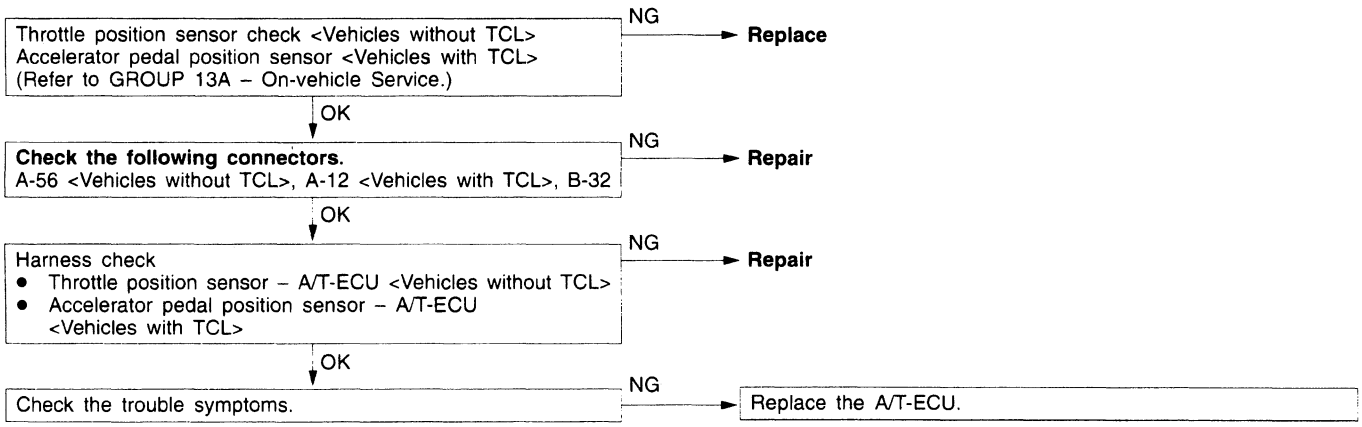
INSPECTION CHART FOR DIAGNOSIS CODE

23100790038

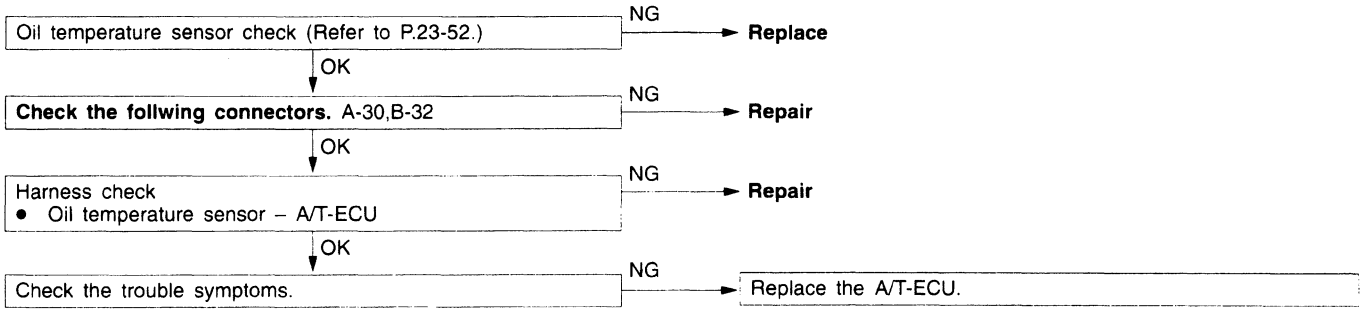
Code	Diagnosis item		Reference page
11	Throttle position sensor system <Vehicles without TCL> Accelerator pedal position sensor <Vehicles with TCL>	Short circuit	23-14
12		Open circuit	23-14
14		Sensor maladjustment	23-14
15	Oil temperature sensor system	Open circuit	23-14
21	Crank angle sensor system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

INSPECTION PROCEDURES FOR DIAGNOSIS CODES

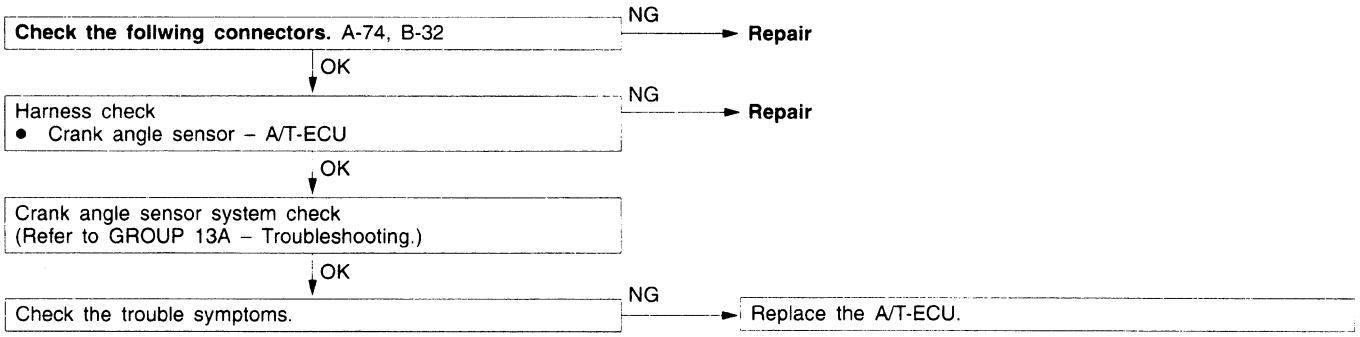
Code No. 11, 12, 14 Throttle position sensor system <Vehicles without TCL>, accelerator pedal position sensor <Vehicles with TCL>	Probable cause
If the TPS or APS output voltage is 4.8 V or higher when the engine is idling, the output is judged to be too high and diagnosis code No. 11 is output. Code 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.	• Malfunction of the throttle position sensor <Vehicles without TCL> • Malfunction of the accelerator pedal position sensor <Vehicles with TCL> • Malfunction of connector • Malfunction of the A/T-ECU



Code No. 15 Oil temperature sensor system	Probale cause
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.	• Malfunction of the oil temperature sensor • Malfunction of connector • Malfunction of the A/T-ECU

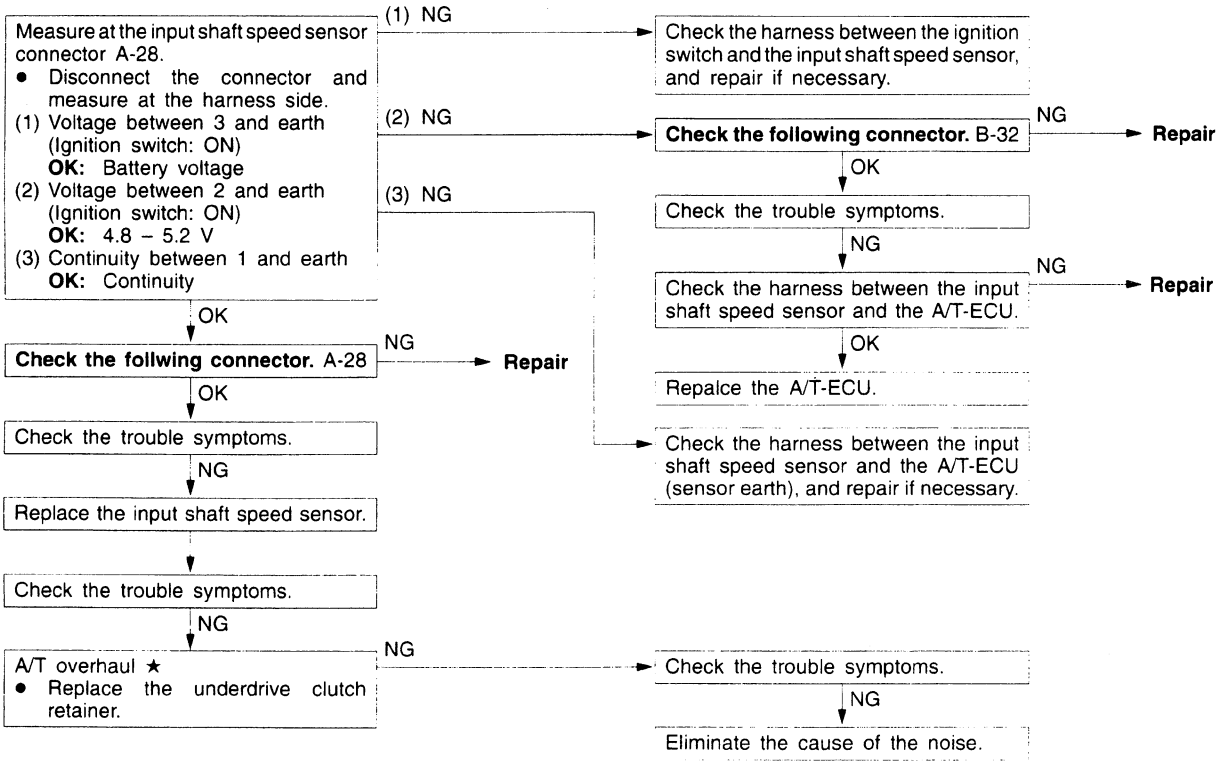


Code No. 21 Crank angle sensor system	Probable cause
If no output pulse is detected from the crank angle sensor for 5 seconds or more while driving at 25 km/h or more, it is judged that there is an open circuit in the crank angle sensor and diagnosis code No. 21 is output.	• Malfunction of the crank angle sensor • Malfunction of connector • Malfunction of the A/T-ECU



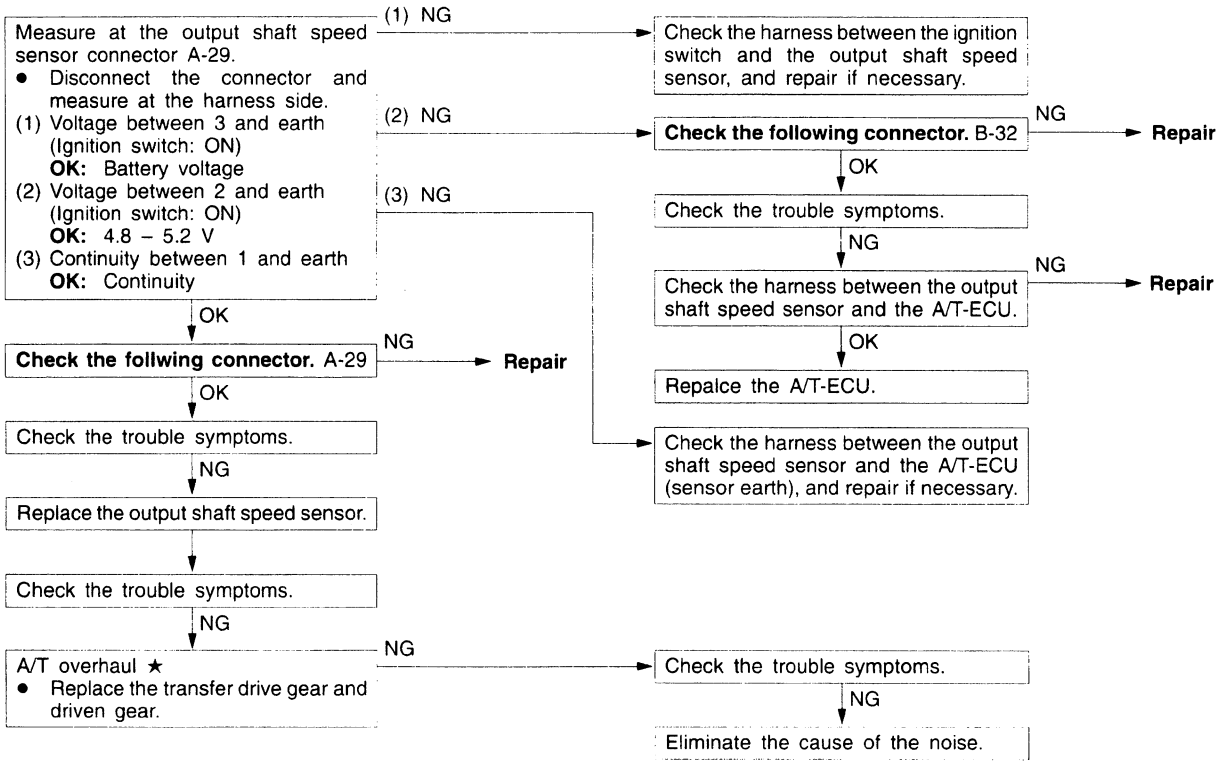
Code No. 22 Input shaft speed sensor system	Probable cause
If no output pulse is detected from the input shaft speed sensor for 1 second or more while driving in 3rd or 4th gear at a speed of 30 km/h or more or while driving in 1st or 2nd gear at an engine speed of 2,600 r/min or more, there is judged 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 or 2nd gear as a fail-safe measure, and the N range lamp flashes at a frequency of 1 Hz.	• Malfunction of the input shaft speed sensor • Malfunction of the underdrive clutch retainer • Malfunction of connector • Malfunction of the A/T-ECU

★: Refer to the Transmission Workshop Manual.

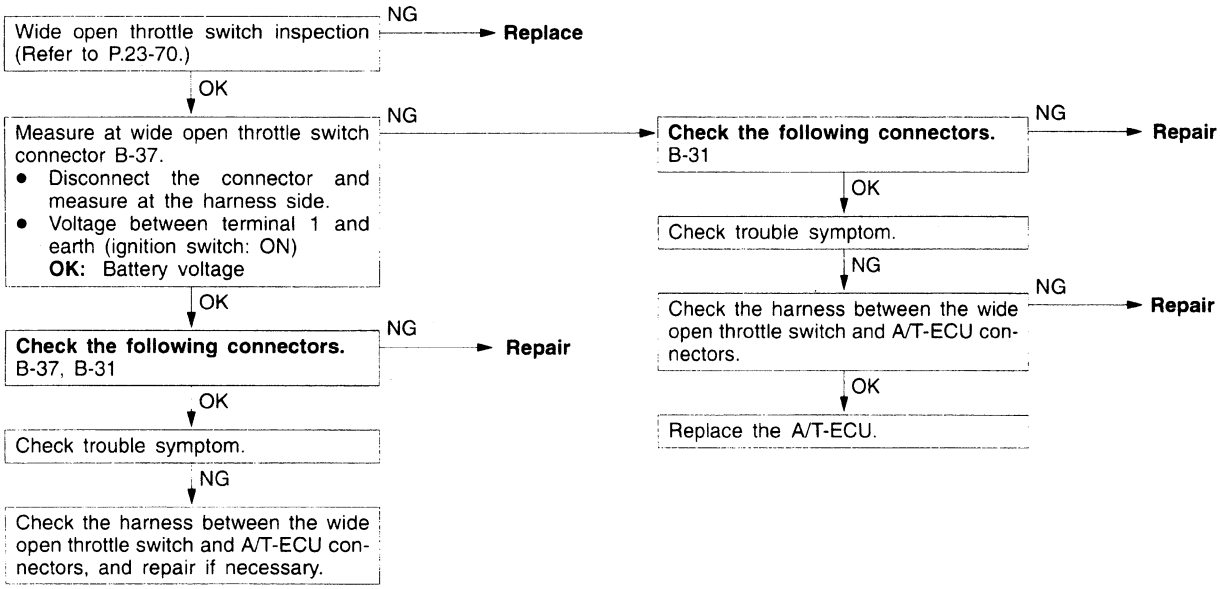


Code No. 23 Output shaft speed sensor system	Probable cause
If the output from the output shaft speed sensor is continuously 50% lower than the vehicle speed for 1 second or more while driving in 3rd or 4th gear at a speed of 30 km/h or more or while driving in 1st or 2nd gear at an engine speed of 2,600 r/min 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. If diagnosis code No. 23 is output four times, the transmission is locked into 3rd gear or 2nd gear as a fail-safe measure, and the N range lamp flashes at a frequency of 1 Hz.	• Malfunction of the output shaft speed sensor • Malfunction of the transfer drive gear or driven gear • Malfunction of connector • Malfunction of the A/T-ECU

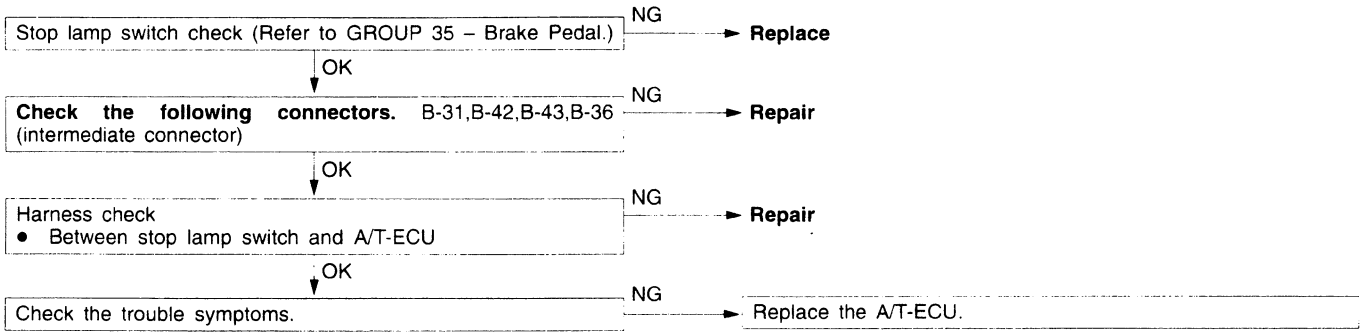
★: Refer to the Transmission Workshop Manual.



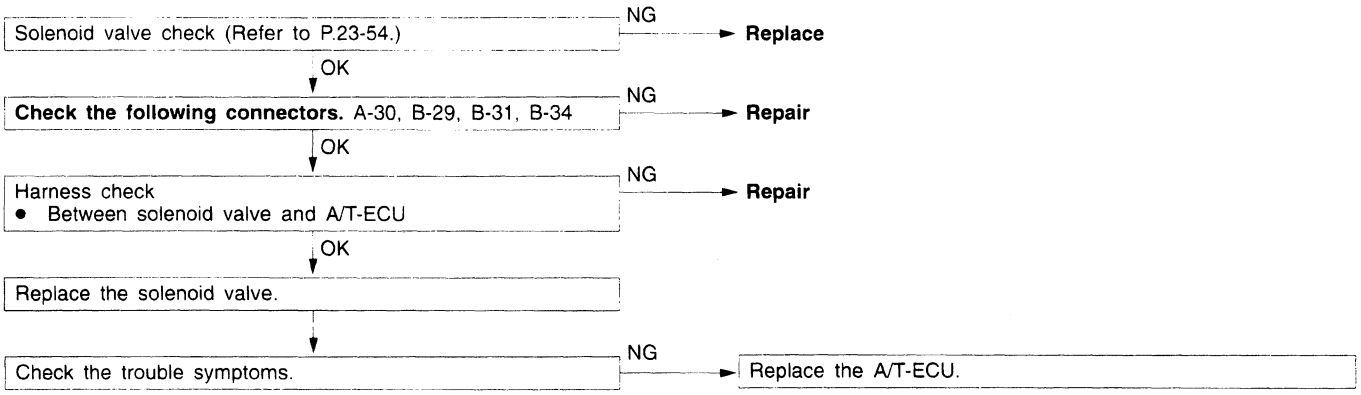
Code No. 25 Wide open throttle switch system	Probable cause
If the wide open throttle switch does not turn OFF when the accelerator pedal is not depressed, there is a short circuit in the wide open throttle switch and diagnosis code No. 25 is output.	• Malfunction of wide open throttle switch • Malfunction of connector • Malfunction of A/T-ECU



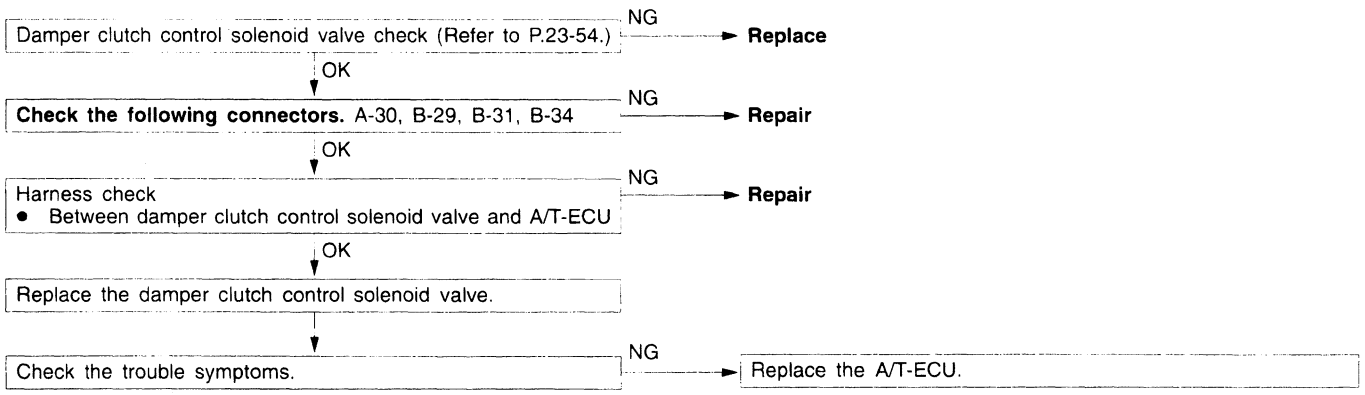
Code No. 26 Stop lamp switch system	Probable cause
If the stop lamp switch is on for 5 minutes or more while driving, it is judged that there is a short circuit in the stop lamp switch and diagnosis code No. 26 is output.	• Malfunction of the stop lamp switch • Malfunction of connector • Malfunction of the A/T-ECU



Code No. 31 Low and reverse solenoid valve system Code No. 32 Underdrive solenoid valve system Code No. 33 Second solenoid valve system Code No. 34 Overdrive solenoid valve system	Probable cause
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.	• Malfunction of solenoid valve • Malfunction of connector • Malfunction of the A/T-ECU



Code No. 36, 52 Damper clutch control solenoid valve system	Probable cause
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.	• Malfunction of the damper clutch control solenoid valve • Malfunction of connector • Malfunction of the A/T-ECU



Code No. 41 1st gear ratio is not specified	Probable cause
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.	• Malfunction of the input shaft speed sensor • Malfunction of the output shaft speed sensor • Malfunction of the underdrive clutch retainer • Malfunction of the transfer drive gear or driven gear • Malfunction of the low and reverse brake system • Malfunction of the underdrive clutch system • Noise generated

★: Refer to the Transmission Workshop Manual.

MUT-II SELF DIAG. CODE
Is the diagnosis code No. 22 output?
- Yes → Code No. 22 Input shaft speed sensor system check (Refer to P.23-15.)
- No ↓

MUT-II SELF DIAG. CODE
Is the diagnosis code No. 23 output?
- Yes → Code No. 23 Output shaft speed sensor system check (Refer to P.23-16.)
- No ↓

Measure output waveform from the input shaft speed sensor. (using an oscilloscope)
- Connect the connector B-32 and measure voltage between 31 and 43 at the A/T-ECU.
- Engine: 2,000 r/min (approx. 50 km/h)
- Selector lever position: 3

(Voltage)
OK: A waveform such as the one shown on P.23-45 (Inspection Procedure Using an Oscilloscope) is output (flalshing between 0 ←→ 5V) and there is no noise appearing in the waveform.

- NG → Replace the input shaft speed sensor.
  - Check the trouble symptoms.
    - NG → A/T overhaul ★
      - Replace the underdrive clutch retainer.
      - Check the trouble symptoms.
        - NG → Eliminate the cause of the noise.
- OK ↓

Measure output waveform from the output shaft speed sensor. (using an oscilloscope)
- Connect the connector B-32 and measure voltage between 32 and 43 at the A/T-ECU.
- Engine: 2,000 r/min (approx. 50 km/h)
- Selector lever position: 3

(Voltage)
OK: A waveform such as the one shown on P.23-45 (Inspection Procedure Using an Oscilloscope) is output (flalshing between 0 ←→ 5V) and there is no noise appearing in the waveform.

- NG → Replace the output shaft speed sensor.
  - Check the trouble symptoms.
    - NG → A/T overhaul ★
      - Replace the transfer drive gear and driven gear.
      - Check the trouble symptoms.
        - NG → Eliminate the cause of the noise.
- OK ↓

A/T overhaul ★
- Underdrive clutch system check
- Low and reverse brake system check

Code No. 42 2nd gear ratio is not specified	Probable cause
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.	• Malfunction of the input shaft speed sensor • Malfunction of the output shaft speed sensor • Malfunction of the underdrive clutch retainer • Malfunction of the transfer drive gear or driven gear • Malfunction of the second brake system • Malfunction of the underdrive clutch system • Noise generated

★: Refer to the Transmission Workshop Manual.

MUT-II SELF DIAG. CODE
Is the diagnosis code No. 22 output?
- Yes → Code No. 22 Input shaft speed sensor system check (Refer to P.23-15.)
- No ↓

MUT-II SELF DIAG. CODE
Is the diagnosis code No. 23 output?
- Yes → Code No. 23 Output shaft speed sensor system check (Refer to P.23-16.)
- No ↓

Measure output waveform from the input shaft speed sensor. (using an oscilloscope)
- Connect the connector B-32 and measure voltage between 31 and 43 at the A/T-ECU.
- Engine: 2,000 r/min (approx. 50 km/h)
- Selector lever position: 3

(Voltage)
OK: A waveform such as the one shown on P.23-45 (Inspection Procedure Using an Oscilloscope) is output (flalshing between 0 ←→ 5V) and there is no noise appearing in the waveform.

- NG → Replace the input shaft speed sensor.
  - Check the trouble symptoms.
    - NG → A/T overhaul ★
      - Replace the underdrive clutch retainer.
      - Check the trouble symptoms.
        - NG → Eliminate the cause of the noise.
- OK ↓

Measure output waveform from the output shaft speed sensor. (using an oscilloscope)
- Connect the connector B-32 and measure voltage between 32 and 43 at the A/T-ECU.
- Engine: 2,000 r/min (approx. 50 km/h)
- Selector lever position: 3

(Voltage)
OK: A waveform such as the one shown on P.23-45 (Inspection Procedure Using an Oscilloscope) is output (flalshing between 0 ←→ 5V) and there is no noise appearing in the waveform.

- NG → Replace the output shaft speed sensor.
  - Check the trouble symptoms.
    - NG → A/T overhaul ★
      - Replace the transfer drive gear and driven gear.
      - Check the trouble symptoms.
        - NG → Eliminate the cause of the noise.
- OK ↓

A/T overhaul ★
- Underdrive clutch system check
- Second brake system check

Code No. 43 3rd gear ratio is not specified	Probable cause
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.	• Malfunction of the input shaft speed sensor • Malfunction of the output shaft speed sensor • Malfunction of the underdrive clutch retainer • Malfunciton of the transfer drive gear or driven gear • Malfunction of the underdrive clutch system • Malfunction of the overdrive clutch system • Noise generated

★: Refer to the Transmission Workshop Manual.

MUT-II SELF DIAG. CODE
Is the diagnosis code No. 22 output?
Yes → Code No. 22 Input shaft speed sensor system check (Refer to P.23-15.)
No ↓

MUT-II SELF DIAG. CODE
Is the diagnosis code No. 23 output?
Yes → Code No. 23 Output shaft speed sensor system check (Refer to P.23-16.)
No ↓

Measure output waveform from the input shaft speed sensor. (using an oscilloscope)
- Connect the connector B-32 and measure voltage between 31 and 43 at the A/T-ECU.
- Engine: 2,000 r/min (approx. 50 km/h)
- Selector lever position: 3

(Voltage)
OK: A waveform such as the one shown on P.23-45 (Inspection Procedure Using an Oscilloscope) is output (flashing between 0 ←→ 5V) and there is no noise appearing in the waveform.

NG → Replace the input shaft speed sensor.
↓ Check the trouble symptoms.
NG → A/T overhaul ★
- Replace the underdrive clutch retainer.

↓ Check the trouble symptoms.
NG → Eliminate the cause of the noise.

OK ↓

Measure output waveform from the output shaft speed sensor. (using an oscilloscope)
- Connect the connector B-32 and measure voltage between 32 and 43 at the A/T-ECU.
- Engine: 2,000 r/min (approx. 50 km/h)
- Selector lever position: 3

(Voltage)
OK: A waveform such as the one shown on P.23-45 (Inspection Procedure Using an Oscilloscope) is output (flashing between 0 ←→ 5V) and there is no noise appearing in the waveform.

NG → Replace the output shaft speed sensor.
↓ Check the trouble symptoms.
NG → A/T overhaul ★
- Replace the transfer drive gear and driven gear.

↓ Check the trouble symptoms.
NG → Eliminate the cause of the noise.

OK ↓

A/T overhaul ★
- Underdrive clutch system check
- Overdrive clutch system check

Code No. 44 4th gear ratio is not specified	Probable cause
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.	• Malfunction of the input shaft speed sensor • Malfunction of the output shaft speed sensor • Malfunction of the underdrive clutch retainer • Malfunction of the transfer drive gear or driven gear • Malfunction of the second brake system • Malfunction of the overdrive clutch system • Noise generated

★: Refer to the Transmission Workshop Manual.

MUT-II SELF DIAG. CODE
Is the diagnosis code No. 22 output?
- Yes → Code No. 22 Input shaft speed sensor system check (Refer to P.23-15.)
- No ↓

MUT-II SELF DIAG. CODE
Is the diagnosis code No. 23 output?
- Yes → Code No. 23 Output shaft speed sensor system check (Refer to P.23-16.)
- No ↓

Measure output waveform from the input shaft speed sensor. (using an oscilloscope)
- Connect the connector B-32 and measure voltage between 31 and 43 at the A/T-ECU.
- Engine: 2,000 r/min (approx. 50 km/h)
- Selector lever position: 3

(Voltage)
OK: A waveform such as the one shown on P.23-45 (Inspection Procedure Using an Oscilloscope) is output (flashing between 0 ←→ 5V) and there is no noise appearing in the waveform.

- NG → Replace the input shaft speed sensor.
  - Check the trouble symptoms.
    - NG → A/T overhaul ★
      - Replace the underdrive clutch retainer.
      - Check the trouble symptoms.
        - NG → Eliminate the cause of the noise.
- OK ↓

Measure output waveform from the output shaft speed sensor. (using an oscilloscope)
- Connect the connector B-32 and measure voltage between 32 and 43 at the A/T-ECU.
- Engine: 2,000 r/min (approx. 50 km/h)
- Selector lever position: 3

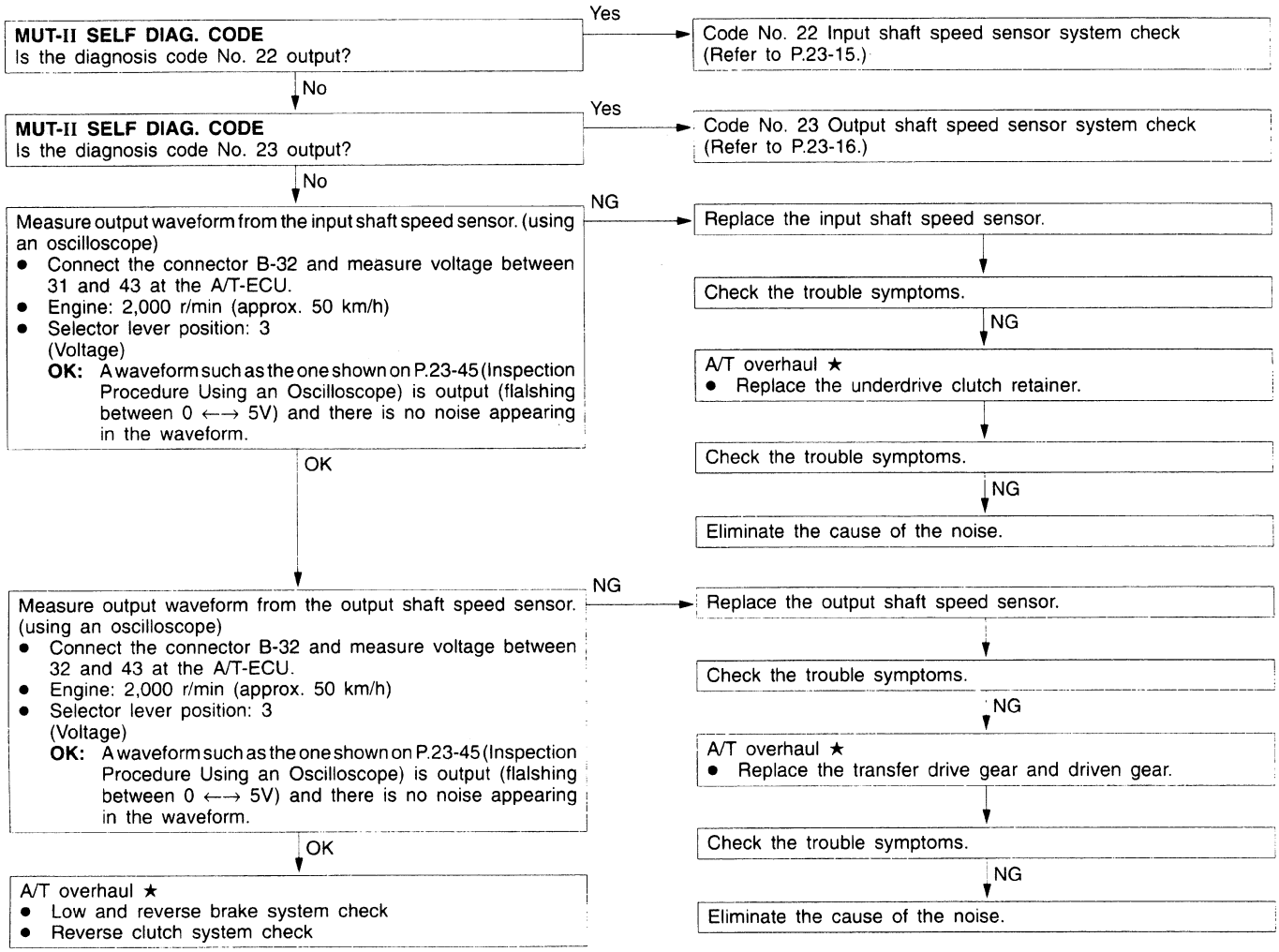
(Voltage)
OK: A waveform such as the one shown on P.23-45 (Inspection Procedure Using an Oscilloscope) is output (flalshing between 0 ←→ 5V) and there is no noise appearing in the waveform.

- NG → Replace the output shaft speed sensor.
  - Check the trouble symptoms.
    - NG → A/T overhaul ★
      - Replace the transfer drive gear and driven gear.
      - Check the trouble symptoms.
        - NG → Eliminate the cause of the noise.
- OK ↓

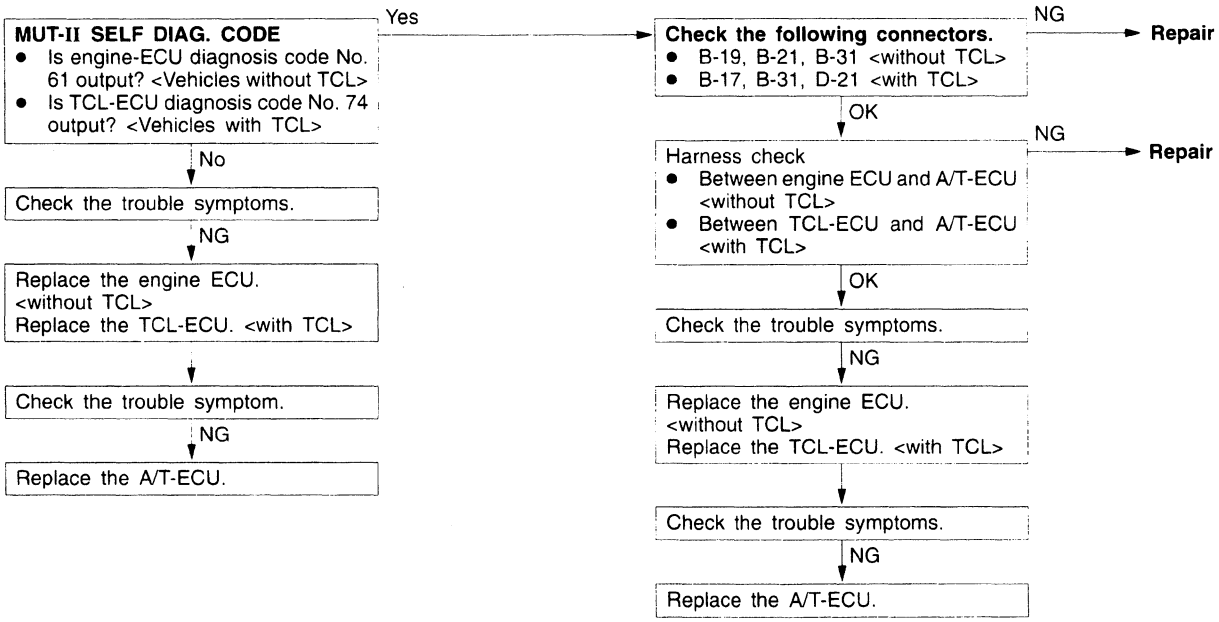
A/T overhaul ★
- Second brake system check
- Overdrive clutch system check

Code No. 46 Reverse gear ratio is not specified	Probable cause
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.	• Malfunction of the input shaft speed sensor • Malfunction of the output shaft speed sensor • Malfunction of the underdrive clutch retainer • Malfunciton of the transfer drive gear or driven gear • Malfunction of the low and reverse brake system • Malfunction of the reverse clutch system • Noise generated

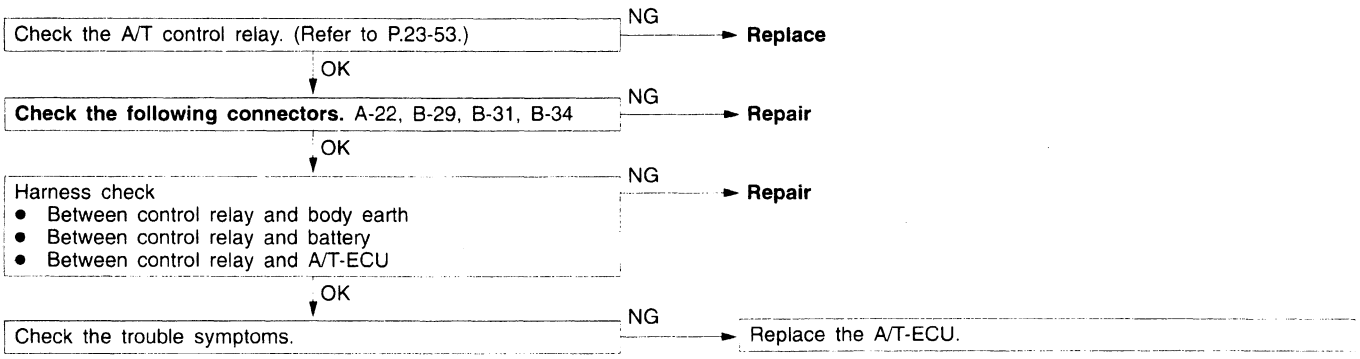
★: Refer to the Transmission Workshop Manual.



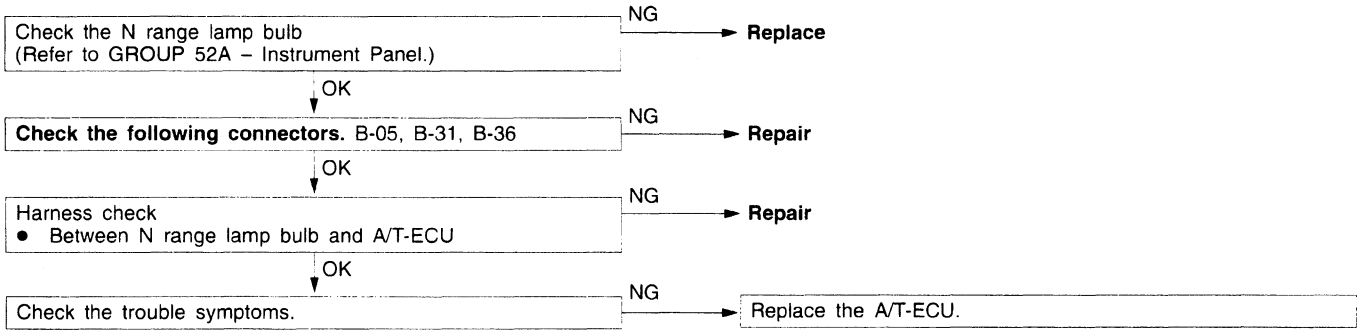
Code No. 51 Abnormal communication with engine ECU <Vehicles without TCL> Abnormal communication with TCL-ECU <Vehicles with TCL>	Probable cause
If normal communication is not possible for a continuous period of 1 second or more when the ignition switch is at the ON position, the battery voltage is 10 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.	• Malfunction of connector • Malfunction of the engine ECU <Vehicles without TCL> • Malfunction of the TCL-ECU <Vehicles with TCL> • Malfunction of the A/T-ECU



Code No. 54 A/T Control relay system	Probable cause
If the control relay voltage is less than 7 V after the ignition switch has been turned to 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. The transmission is locked into 3rd gear as a fail-safe measure, and the N range lamp flashes at a frequency of 1 Hz.	• Malfunction of the A/T control relay • Malfunction of connector • Malfunction of the A/T-ECU



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.	• Malfunction of the N range lamp bulb • Malfunction of connector • Malfunction of the A/T-ECU



Code No. 71 Malfunction of A/T-ECU	Probale cause
There is an abnormality in the A/T-ECU. The transmission is locked into 3rd gear as a fail-safe measure.	• Malfunction of the A/T-ECU

Replace the A/T-ECU.

INSPECTION CHART FOR TROUBLE SYMPTOMS

23100800038

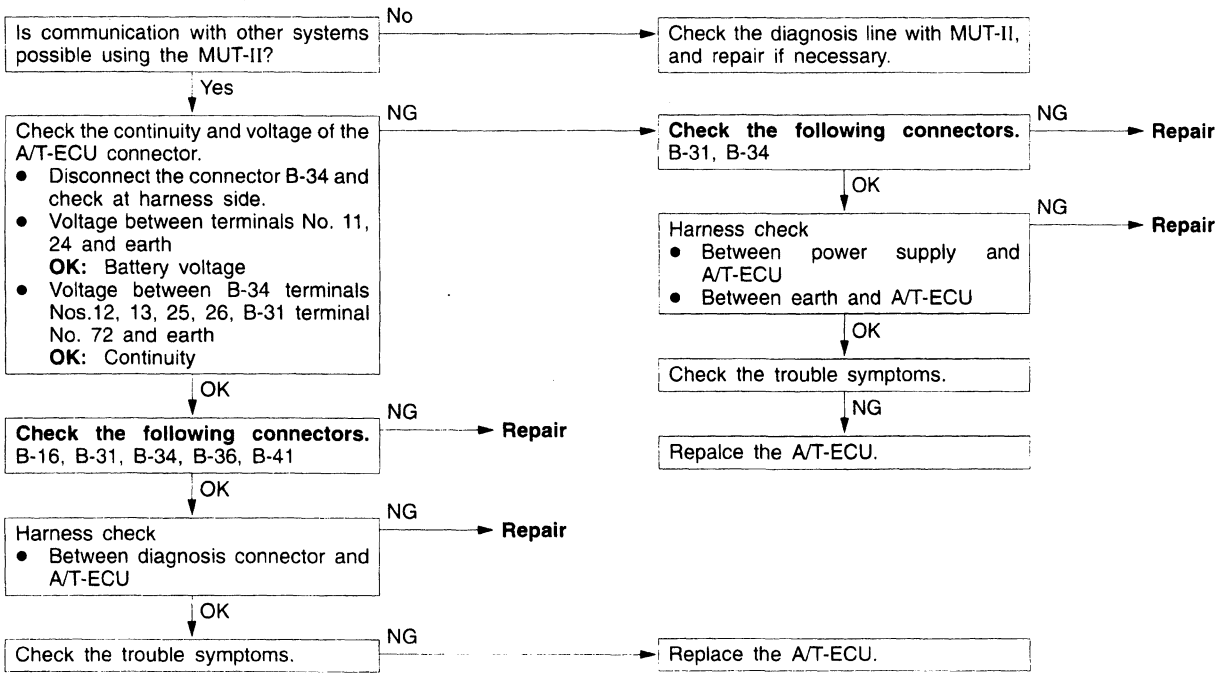
Trouble symptom		Inspection procedure No.	Reference page
Communication with MUT-II is not possible		1	23-26
Driving impossible	Starting impossible	2	23-27
	Does not move forward	3	23-27
	Does not reverse	4	23-28
	Does not move (forward or reverse)	5	23-28
Malfunction when starting	Engine stalling when shifting	6	23-29
	Shocks when changing from N to D and large time lag	7	23-29
	Shocks when changing from N to R and large time lag	8	23-30
	Shocks when changing from N to D, N to R and large time lag	9	23-31
Malfunction when shifting	shocks and running up	10	23-31
Displaced shifting points	All points	11	23-32
	Some points	12	23-33
Does not shift	No diagnosis codes	13	23-33
Malfunction while driving	Poor acceleration	14	23-34
	Vibration	15	23-34
Inhibitor switch system		16	23-35

Trouble symptom	Inspection procedure No.	Reference page
Mode control switch system	17	23-35
Idle position switch system	18	23-36
Dual pressure switch system	19	23-36
Vehicle speed sensor system	20	23-37
Auto-cruise-ECU signal system <F4A42>	21	23-37

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.	• Malfunction of diagnosis line • Malfunction of connector • Malfunction of the A/T-ECU



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.	• Malfunction of the engine system • Malfunction of the torque converter • Malfunction of the oil pump

★: Refer to the Transmission Workshop Manual.

Check the engine system.
- Control system, ignition system, fuel system, main engine system

NG → **Repair, replace**

OK ↓

Torque converter check
- Check for incorrect installation (inserted at an angle, etc.) and for damaged splines.

NG → Repair if possible. If the splines are damaged and repairs are not possible, replace the torque converter assembly.

OK ↓

Repalce the oil pump assembly. ★
(The oil pump cannot be disassembled.)

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.	• Abnormal line pressure • Malfunction of the underdrive solenoid valve • Malfunction of the underdrive clutch • Malfunction of the valve body

★: Refer to the Transmission Workshop Manual.

MUT-II ACTUATOR TEST
- No. 2 Underdrive solenoid valve
  OK: Sound of operation can be heard.

NG → Replace the solenoid valve. ★

OK ↓

Hydraulic pressure test (Refer to P.23-56.)
- Measure the hydraulic pressure for each element when in L range.
  Standard value: Refer to P.23-56.

NG → Valve body disassembly, cleaning and reassembly ★
- Pay particular attention to loosening of bolts, and to damage and slippage of O-rings, valves and valve bodies.
- If the damage cannot be repaired, replace the valve body assembly.

OK ↓

Underdrive clutch system check ★
- Remove the transmission assembly, valve body cover and valve body.
- Pistons should operate and pressure should be maintained when air is blown through the underdrive clutch oil hole in the transmission case.

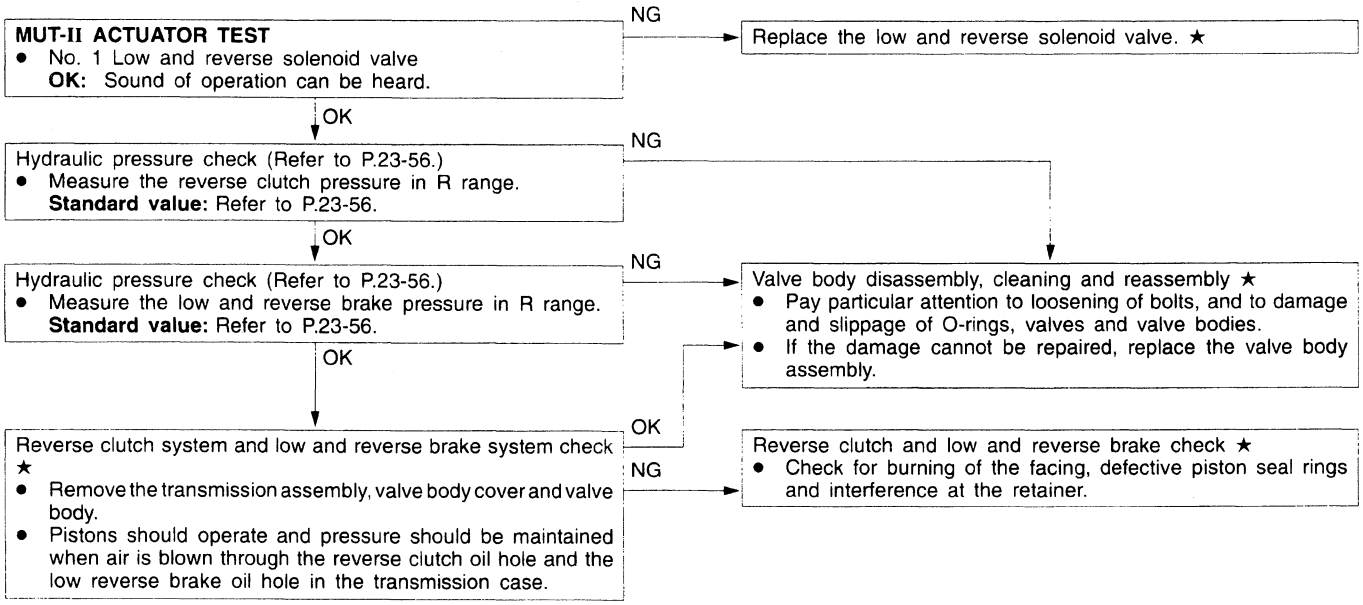
OK → Valve body disassembly, cleaning and reassembly ★

NG → Underdrive clutch check ★
- Check for burning of the facing, defective piston seal rings and interference at the retainer.

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.	• Abnormal reverse clutch pressure • Abnormal low and reverse brake pressure • Malfunction of the low and reverse solenoid valve • Malfunction of the reverse clutch • Malfunction of the low and reverse brake • Malfunction of the valve body

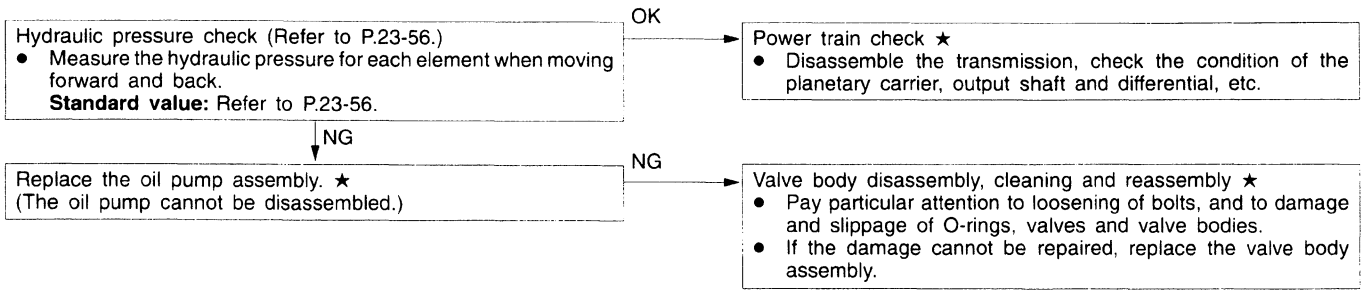
★: Refer to the Transmission Workshop Manual.



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.	• Abnormal line pressure • Malfunction of power train • Malfunction of the oil pump • Malfunction of the valve body

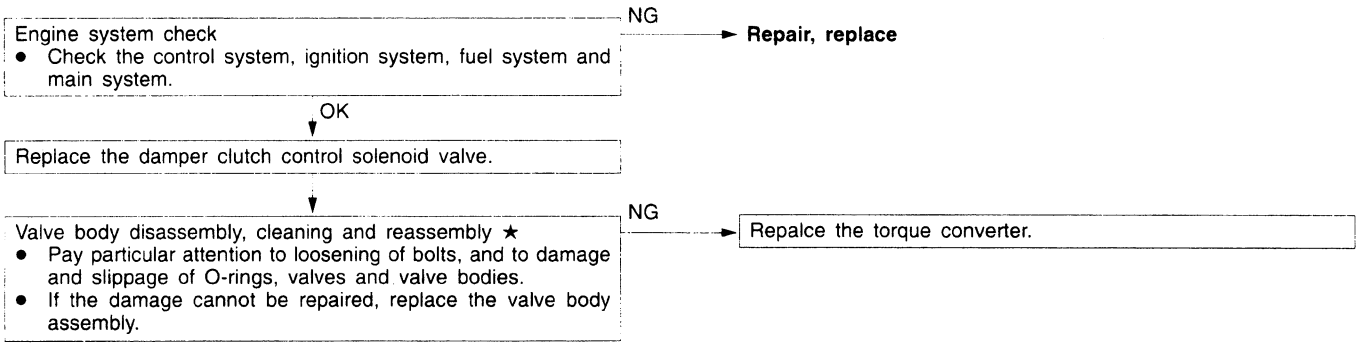
★: Refer to the Transmission Workshop Manual.



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).	• Malfunction of the engine system • Malfunction of the damper clutch control solenoid valve • Malfunction of the valve body • Malfunction of the torque converter (Malfuction of the damper clutch)

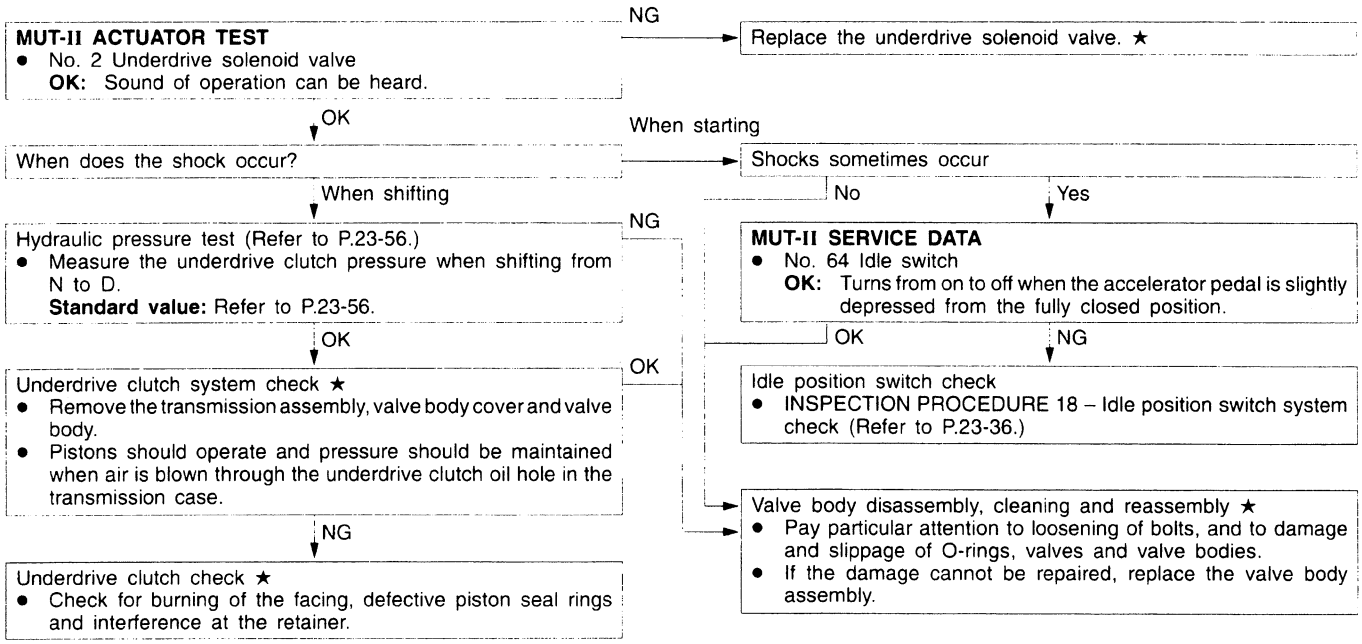
★: Refer to the Transmission Workshop Manual.



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.	• Abnormal underdrive clutch pressure • Malfunction of the underdrive solenoid valve • Malfunction of the underdrive clutch • Malfunction of the valve body • Malfunction of the idle position switch

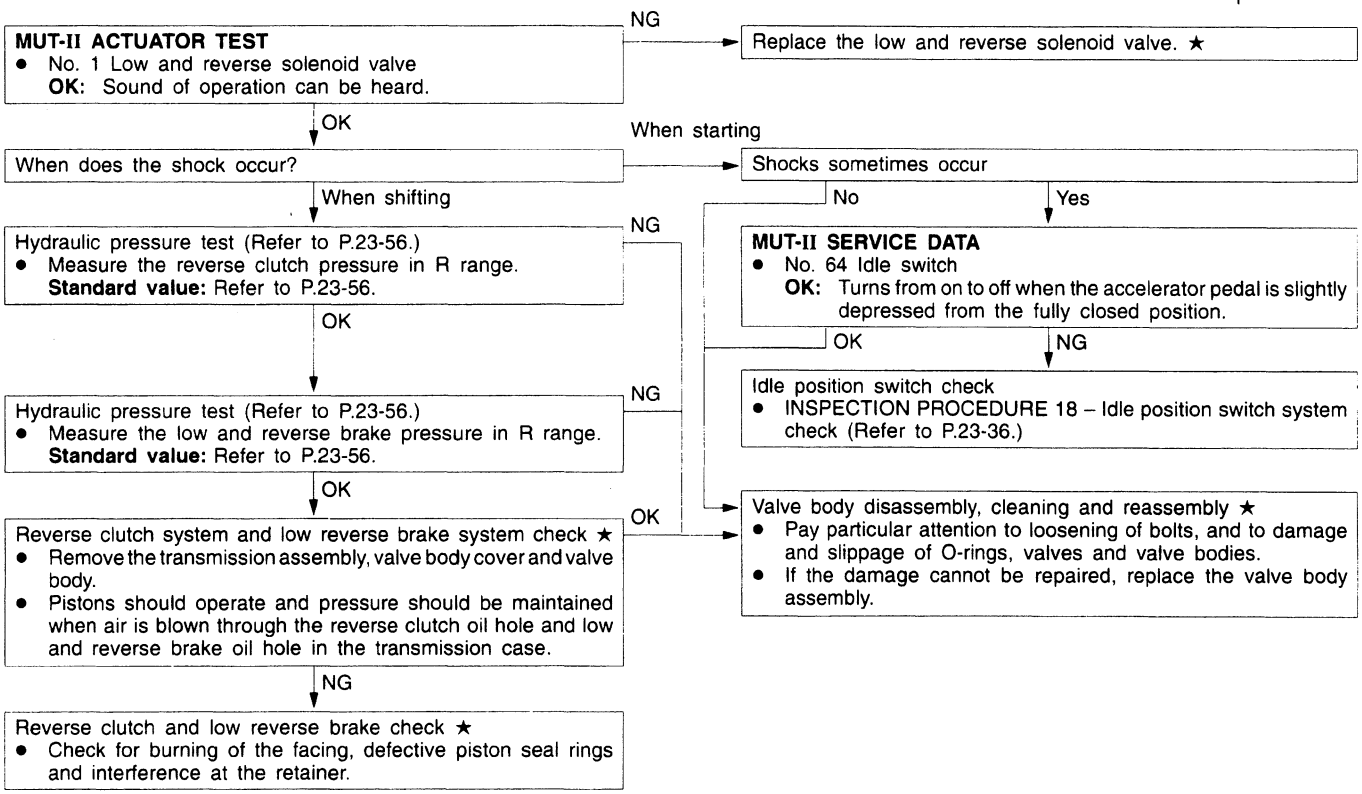
★: Refer to the Transmission Workshop Manual.



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 switch.	• Abnormal reverse clutch pressure • Abnormal low and reverse brake pressure • Malfunction of the low and reverse solenoid valve • Malfunction of the reverse clutch • Malfunction of the low and reverse brake • Malfunction of the valve body • Malfunction of the idle position switch

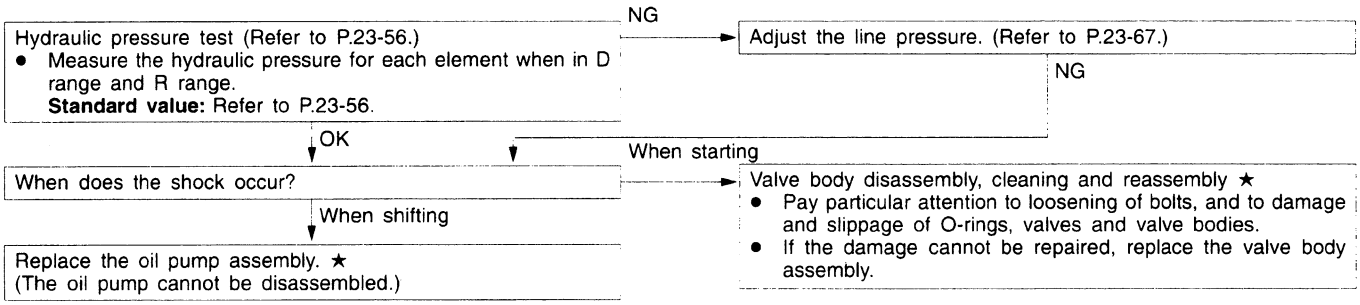
★: Refer to the Transmission Workshop Manual.



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.	• Abnormal line pressure • Malfunction of the oil pump • Malfunction of the valve body

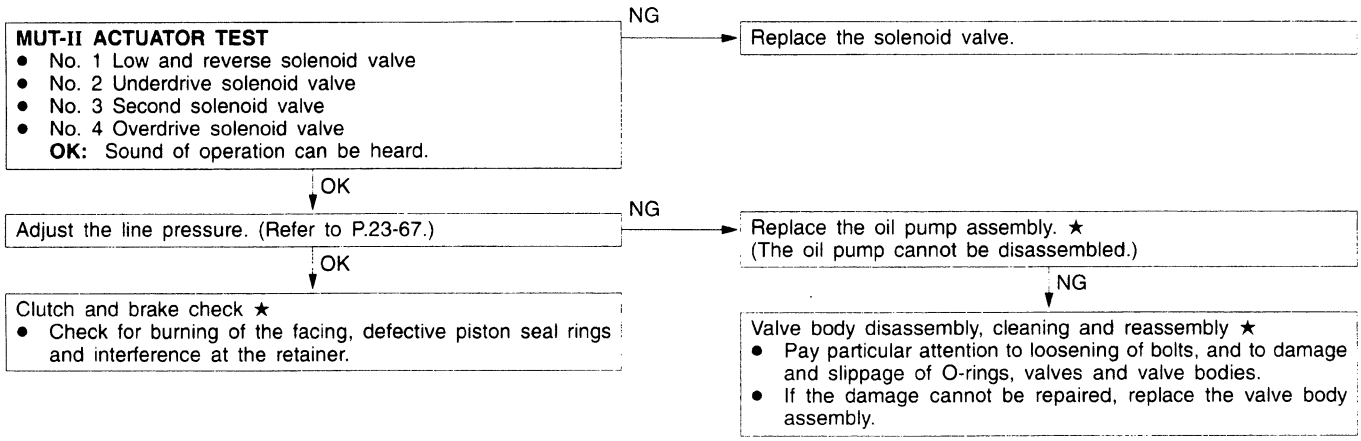
★: Refer to the Transmission Workshop Manual.



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.	• Abnormal line pressure • Malfunction of each solenoid valve • Malfunction of the oil pump • Malfunction of the valve body • Malfunction of each brake or each clutch

★: 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/APS or of a solenoid valve.	• Malfunction of the output shaft speed sensor • Malfunction of the throttle position sensor or the accelerator pedal position sensor • Malfunction of each solenoid valve • Abnormal line pressure • Malfunction of the valve body • Malfunction of the A/T-ECU

★: Refer to the Transmission Workshop Manual.

MUT-II SERVICE DATA
- No. 23 Output shaft speed sensor
  OK: Increases in proportion to vehicle speed.

NG → Code No. 23 – Output shaft speed sensor system (Refer to P.23-16.)

OK ↓

MUT-II SERVICE DATA
- No. 11 TPS/APS
  OK: Increases in proportion to accelerator pedal opening angle

NG → Code No. 11, 12, 14 TPS/APS system check (Refer to P.23-14.)

OK ↓

MUT-II SERVICE DATA
- No. 31 Low and reverse solenoid valve duty %
- No. 32 Underdrive solenoid valve duty %
- No. 33 Second solenoid valve duty %
- No. 34 Overdrive solenoid valve duty %
  OK: Refer to the table below.

NG → Replace the solenoid valve. ★

NG ↓ Repalce the A/T-ECU.

OK ↓

Adjust the line pressure. (Refer to P.23-67.)

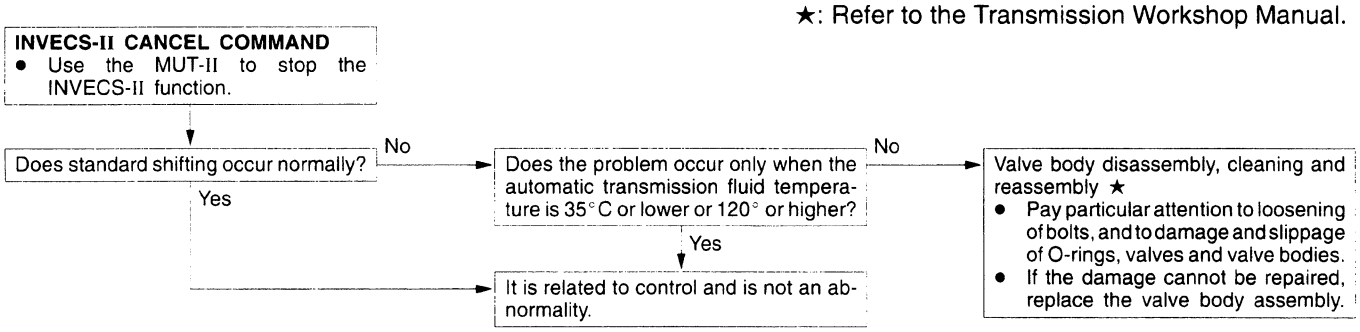
NG → Valve body disassembly, cleaning and reassembly ★
- Pay particular attention to loosening of bolts, and to damage and slippage of O-rings, valves and valve bodies.
- If the damage cannot be repaired, replace the valve body assembly.

	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

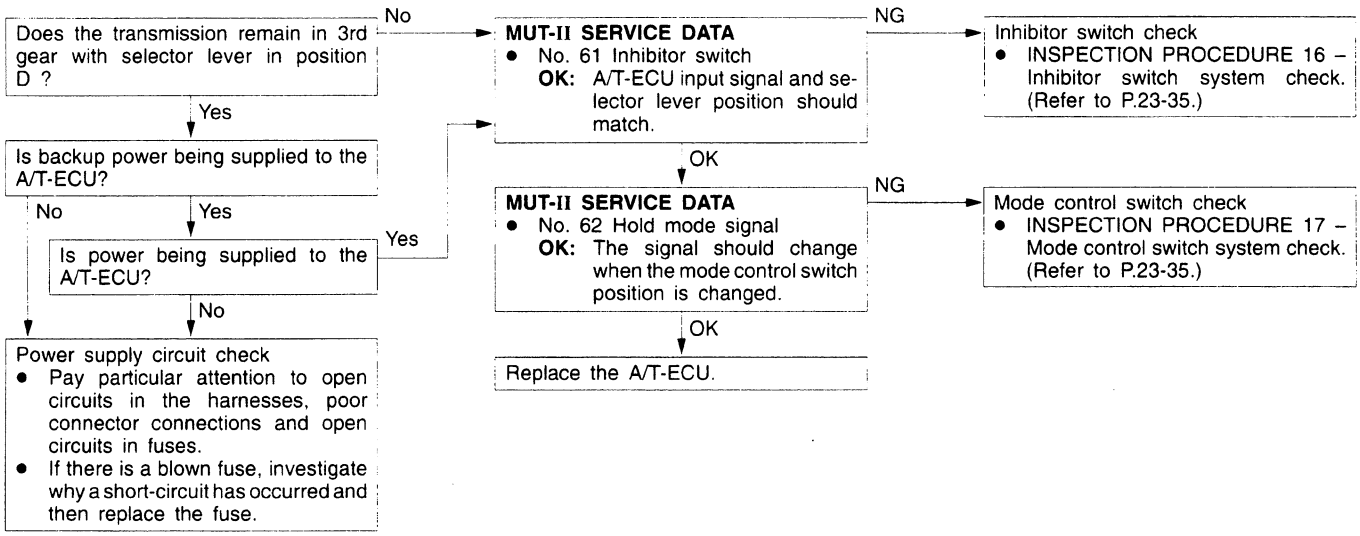
Some points (Displaced shifting points)	Probable cause
If some of the shift points are displaced while driving, the cause is probably a malfunction of the valve body, or it is related to control and is not an abnormality.	• Malfunction of the valve body

★: 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, mode control switch or A/T-ECU.	• Malfunction of the inhibitor switch • Malfunction of the mode control switch • Malfunction of the A/T-ECU



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.	• Malfunction of the engine system • Malfunction of the brake or clutch

★: Refer to the Transmission Workshop Manual.

Engine system check
- Check the control system, ignition system, fuel system and main system.

NG → **Replace, repair**

OK ↓

Brake or clutch check ★
- Check for burning of the facing, defective piston seal rings and interference at the retainer.

INSPECTION PROCEDURE 15

Vibration	Probable cause
If vibration occurs when driving at constant speed or when accelerating 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.	• Abnormal damper clutch pressure • Malfunction of the engine system • Malfunction of the damper clutch control solenoid valve • Malfunction of the torque converter • Malfunction of the valve body

★: Refer to the Transmission Workshop Manual.

MUT-II ACTUATOR TEST
- No. 6 Damper clutch control solenoid valve
  OK: Sound of operation can be heard.

NG → Replace the damper clutch control solenoid valve. ★

OK ↓

Does the problem occur even when the oil temperature sensor connector is disconnected?

Yes → Engine system check
- Check the control system, ignition system, fuel system and main system.

No ↓

Hydraulic pressure test (Refer to P.23-56.)
- Measure the damper clutch pressure.
  Standard value: Refer to P.23-56.

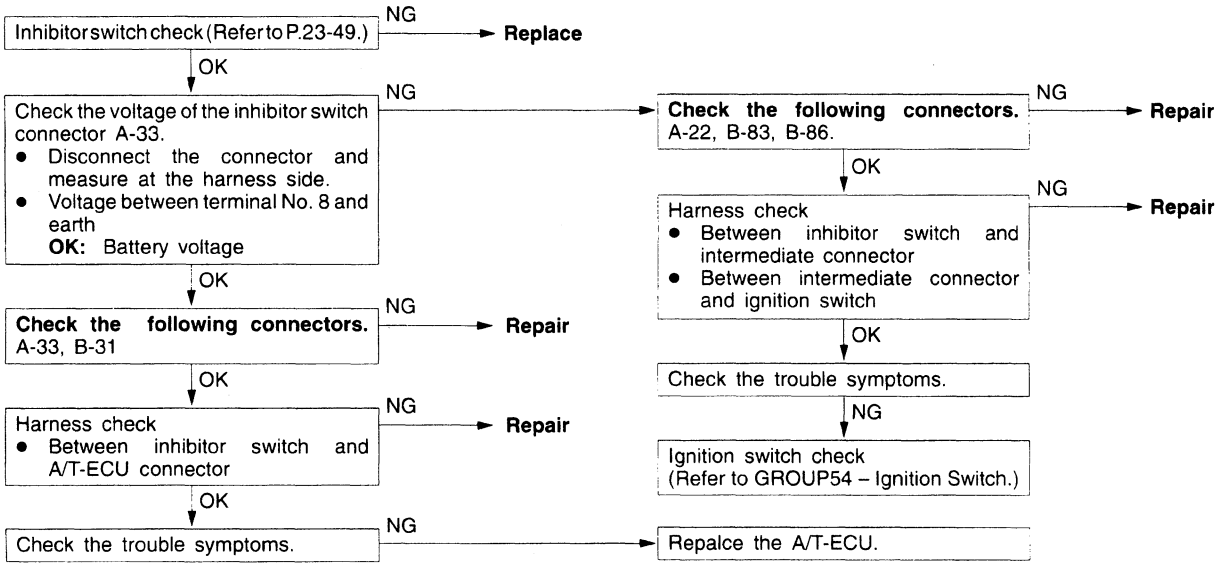
NG → Valve body disassembly, cleaning and reassembly ★
- Pay particular attention to loosening of bolts, and to damage and slippage of O-rings, valves and valve bodies.
- If the damage cannot be repaired, replace the valve body assembly.

OK ↓

Replace the torque converter assembly.

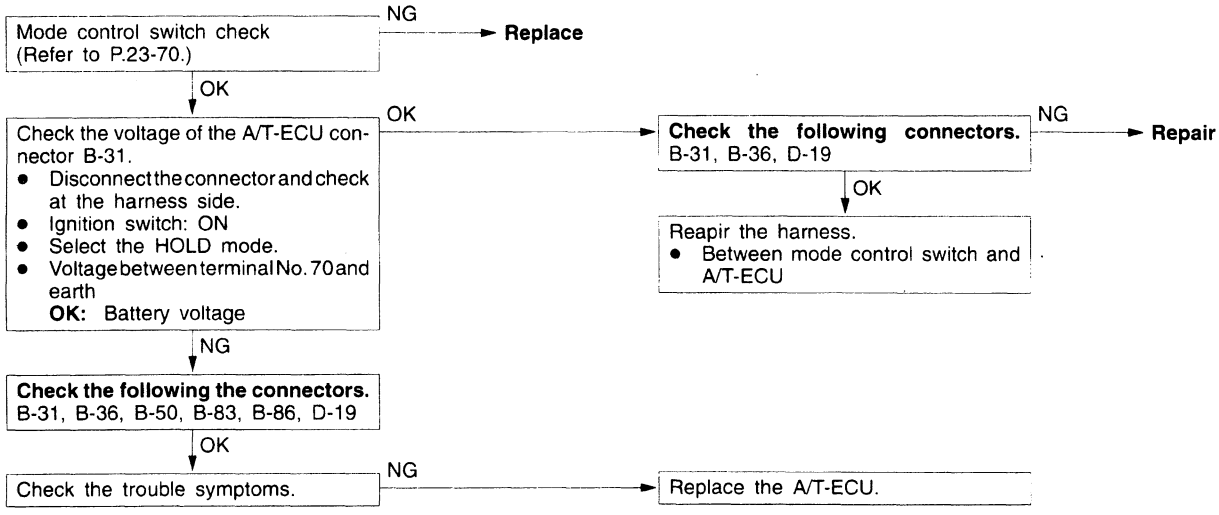
INSPECTION PROCEDURE 16

Inhibitor switch system	Probable cause
The cause is probably a malfunction of the inhibitor switch circuit or ignition switch circuit.	• Malfunction of the inhibitor switch • Malfunction of the ignition switch • Malfunction of connector • Malfunction of the A/T-ECU



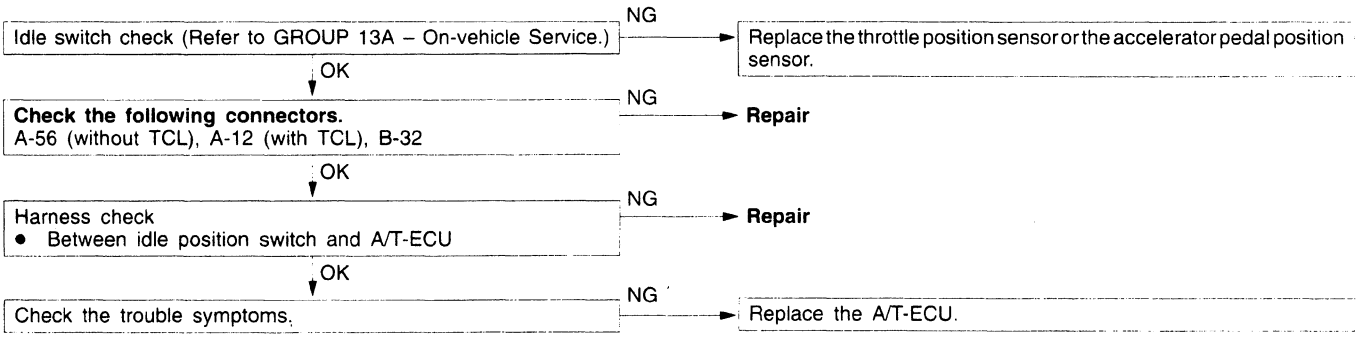
INSPECTION PROCEDURE 17

Mode control switch system	Probable cause
The cause is probably a defective mode control switch circuit or a defective A/T-ECU.	• Malfunction of the mode control switch • Malfunction of connector • Malfunction of the A/T-ECU



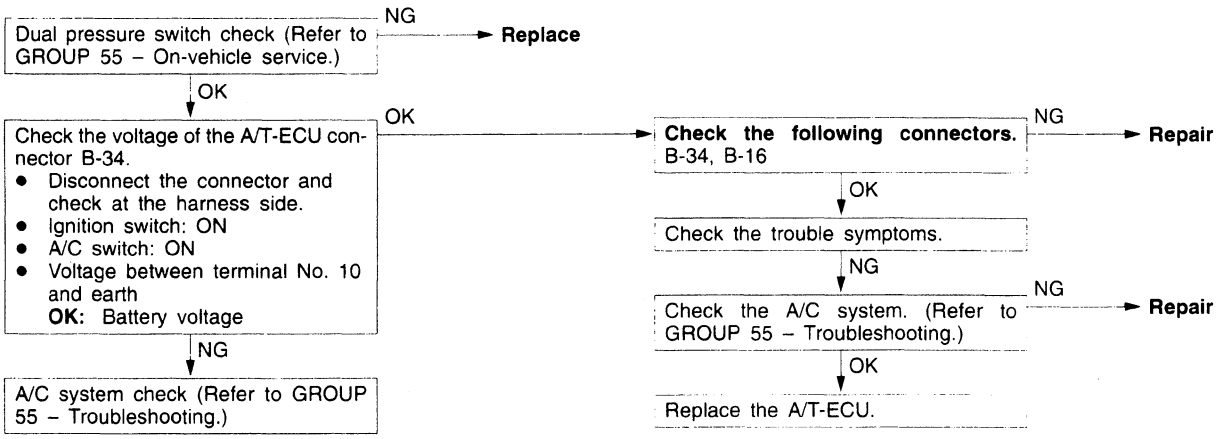
INSPECTION PROCEDURE 18

Idle position switch system	Probable cause
The cause is probably a defective idle position switch circuit or a defective A/T-ECU circuit.	• Malfunction of the idle position switch • Malfunction of connector • Malfunction of the A/T-ECU



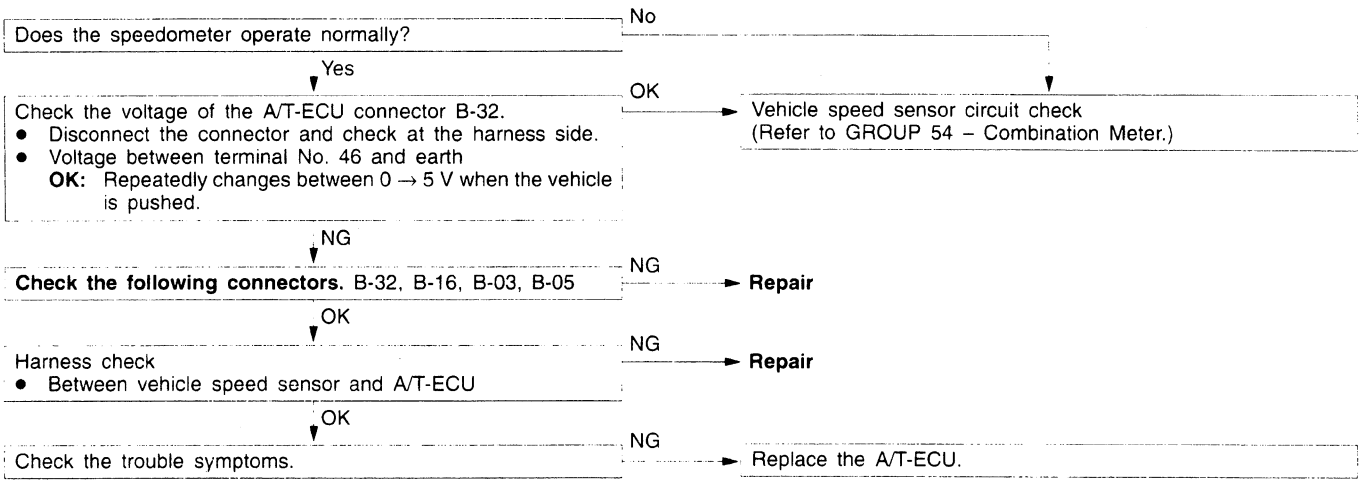
INSPECTION PROCEDURE 19

Dual pressure switch system	Probable cause
The cause is probably a defective dual pressure switch circuit or a defective A/T-ECU.	• Malfunction of the dual pressure switch • Malfunction of connector • Malfunction of A/C system • Malfunction of the A/T-ECU



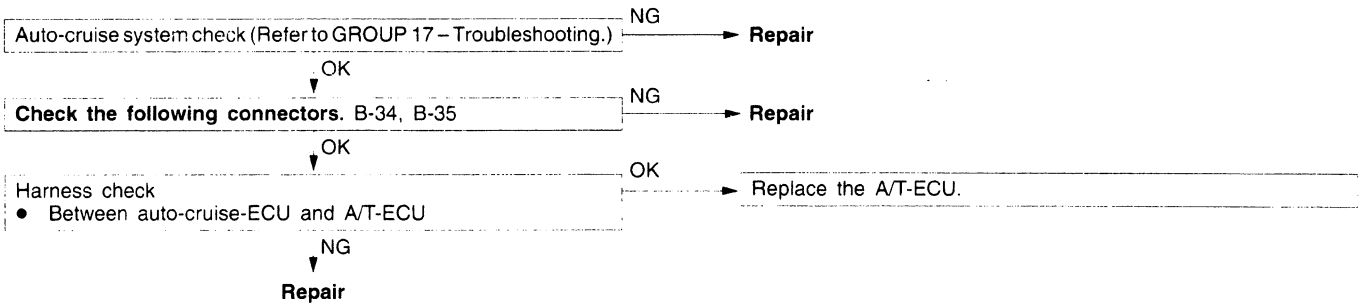
INSPECTION PROCEDURE 20

Vehicle speed sensor system	Probable cause
The cause is probably a defective vehicle speed sensor circuit or a defective A/T-ECU.	• Malfunction of the vehicle speed sensor • Malfunction of connector • Malfunction of the A/T-ECU



INSPECTION PROCEDURE 21

Auto-cruise-ECU signal system <F4A42>	Probable cause
The cause is probably a defective auto-cruise signal line circuit or a defective A/T-ECU.	• Malfunction of connector • Malfunction of the A/T-ECU • Malfunction of the auto-cruise-ECU



SERVICE DATA REFERENCE TABLE

23100810031

Item No.	Check item	Check requirement		Normal value
11	Trottle position sensor (without TCL) Accelerator pedal position sensor (with TCL)	Engine: Stopped Selector lever position: P	Accelerator pedal: Fully closed	400 – 1,000 mV
			Accelerator pedal: Depressed	Gradually rises from the above value
			Accelerator pedal: Fully open	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: Fully closed	650 – 900 rpm
			Accelerator pedal: 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	1,900 – 2,100 rpm
23	Output shaft speed sensor	Selector lever position: 3	Driving at constant speed of 50 km/h in 3rd gear	1,900 – 2,100 rpm
25	Wide open throttle switch	Accelerator pedal position	Fully closed	OFF
			Fully open	ON
26	Stop lamp switch	Ignition switch: ON Engine: Stopped	Brake pedal: Depressed	ON
			Brake pedal: Released	OFF
29	Vehicle speed sensor		Idling with 1st gear (Vehicle stopped)	0 km/h
			Driving at constant speed of 50 km/h in 3rd gear	50 km/h

Item No.	Check item	Check requirement		Normal value
31	Low and reverse solenoid valve duty %	Driving at constant speed	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%
36	Damper clutch control solenoid vlave duty %		Driving at 50 km/h in 3rd gear with accelerator fully closed	0 %
			Driving at constant speed of 70 km/h in 3rd gear	Approx. 70 – 90 %
52	Amount of damper clutch slippage		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: ON → OFF	Battery voltage (mV) → 0 mV
57	Engine volumetric efficiency (except MIVEC engine)		N range with accelerator pedal fully closed → 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

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

Item No.	Check item	Check requirement		Normal value
62	HOLD mode signal	Mode control switch position	HOLD	ON
			AUTO	OFF
63	Shift position	Selector lever position: HOLD mode	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: Fully closed	ON
			Accelerator pedal: Depressed	OFF
65	Dual pressure switch	Engine: Idling Selector lever position: N	A/C switch: ON	ON
			A/C switch: OFF	OFF
66	Auto-cruise-ECU signal	While auro-cruise operating	Plain road	OFF
			Sloping road	ON

ACTUATOR TEST JUDGEMENT VALUE

23100820034

Item No.	Check item	Test content	Check requirement	Normal value
1	Low reverse 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.
2	Underdrive solenoid valve			
3	Second solenoid valve			
4	Overdrive solenoid valve			
6	Damper clutch control solenoid valve			
12	Control relay	Control relay is OFF for 3 seconds.		Data list No. 54 (1) During test: 0 mV (2) Normal: Battery voltage [mV]

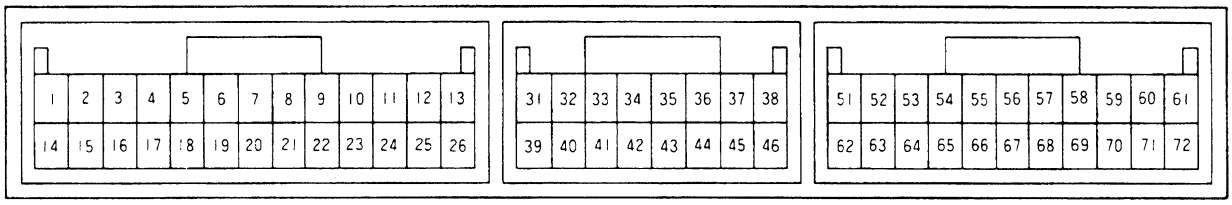
INVECS-II CANCEL COMMAND

23100950016

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 7 in the road tests.

CHECK AT A/T-ECU TERMINALS

23100840030



A9FA0133

Terminal No.	Check item	Check requirement	Standard value	Remarks
1	Underdrive solenoid valve	Selector lever position: D (1st gear)	Battery voltage	
		Selector lever position: R	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-cruise control unit	No OD-OFF request	Battery voltage	F4A42
		OD-OFF request	0 V	
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: D (1st gear)	Approx. 7 – 9 V	

Terminal No.	Check item	Check requirement	Standard value	Remarks
15	Damper clutch control solenoid valve	Selector lever position: D (1st gear)	Battery voltage	
		Selector lever position: D (60 km/h in 3rd gear)	Other than battery voltage	
16	Second solenoid valve	Selector lever position: D (2nd gear)	Battery voltage	
		Selector lever position: D (1st gear)	Approx. 7 – 9 V	
21	Engine ECU torque reduction request signal	Ignition switch: ON (except during shifting)	4 – 5 V	with TCL
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 suuply	Ignition switch: OFF	Battery voltage	

Terminal No.	Check item	Check requirement	Standard value	Remarks
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	Thottle openning sensor (TPS, APS)	Accelerator pedal: Fully closed (Engine stopped)	0.5 – 1.0 V	
		Accelerator pedal: Fully open (Engine stopped)	4.5 – 5.0 V	
46	Vehicle speed sensor	When stopped	0 V	
		Move forward slowly	0 → 5 V flashing	
53	Communication with engine ECU	Engine: Idling Selector lever position: D	Other than 0 V	without TCL
	Communication with TCL-ECU			with TCL
54	Communication with engine ECU	Engine: Idling Selector lever position: D	Other than 0 V	without TCL
	Communication with TCL-ECU			with TCL
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	
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	

Terminal No.	Check item	Check requirement	Standard value	Remarks
63	Diagnosis output	Normal (No diagnosis code output)	0 → 5 V flashing	
65	Wide open throttle switch	Accelerator pedal: Fully closed	4.5 – 5.5 V	
		Accelerator pedal: Fully open	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	
70	Mode control switch	Select HOLD mode	Battery voltage	
		Select AUTO mode	0 V	
71	A/T control relay	Ignition switch: OFF	0 V	
		Ignition switch: ON	Battery voltage	
72	Earth	Ignition switch: ON	0 V	

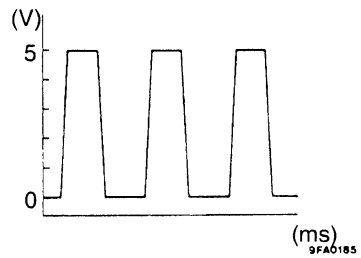
OSCILLOSCOPE INSPECTION PROCEDURE

23100850033

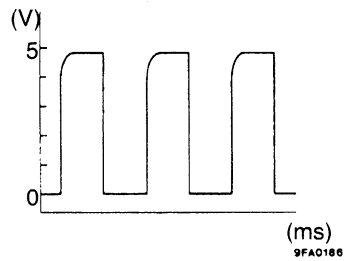
Check item	Check requirement		Normal condition (Waveform sample)
Crank angle sensor	Selector lever position: N	Idling (Vehicle stopped)	Waveform A
Input shaft speed sensor	Selector lever position: 3	Driving at constant speed of 50 km/h in 3rd gear (Engine: 1,900 – 2,100 r/min)	Waveform B
Output shaft 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

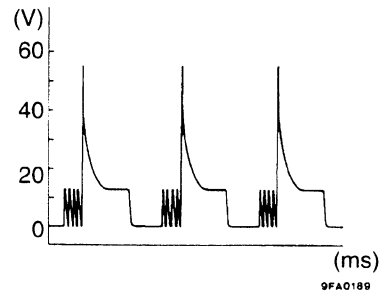
Waveform A

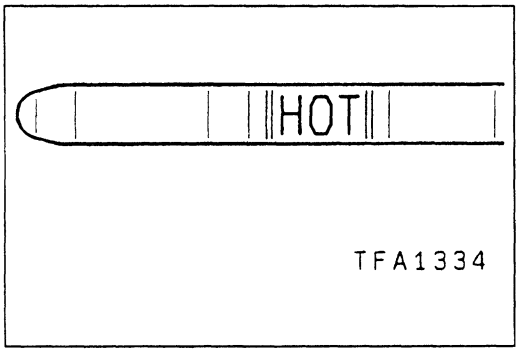


Waveform B



Waveform C





ON-VEHICLE SERVICE

23100090046

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 fine particles from the bushes and friction materials, a transmission overhaul may be necessary.

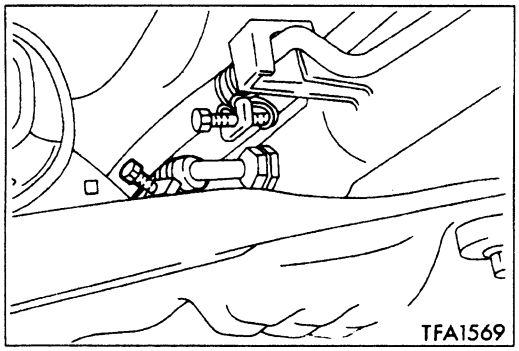
(5) Check that the fluid level is at the HOT mark on the oil level gauge. If the fluid level is lower than this, pour in more fluid until the level reaches the HOT mark.

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 the oil filters should always be replaced when overhauling the transmission or after the vehicle has been driven under severe conditions.
The replacement procedures are given below.
Furthermore, the oil filters are special filters which are only to be used for the automatic transmission.



AUTOMATIC TRANSMISSION FLUID REPLACEMENT

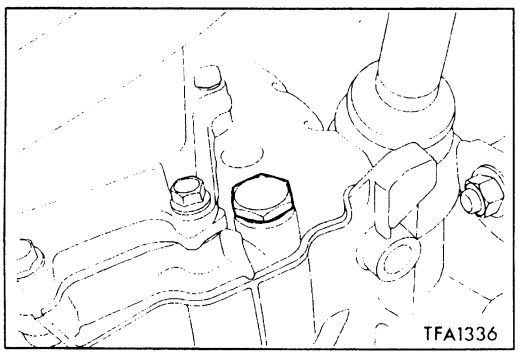
23100100039

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 the gasket, and tighten it to the specified torque.

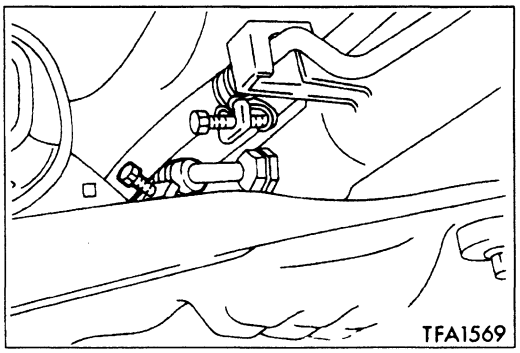
Tightening torque: 32 Nm

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

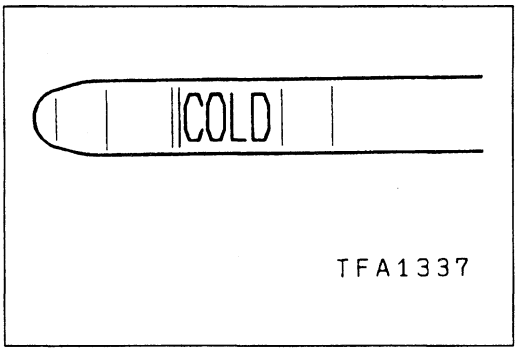
Adding volume: Approx. 5.5 ℓ

NOTE
If the full volume of fluid cannot be poured in, carry out the following step (7) while pouring.

(7) Repeat the procedure from step (2) to discharge all of the fluid from the hose.
(8) Pour the new fluid in through the oil filler tube.


TFA1569

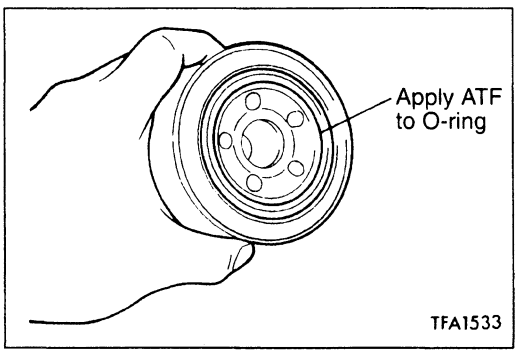
(9) Reconnect the hose which was disconnected in step (1) above, and firmly replace the oil level gauge.
(10) Start the engine and run it at idle for 1–2 minutes.
(11) Move the selector lever through all positions, and then move it to the N position.



(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 much 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 23101050012

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>

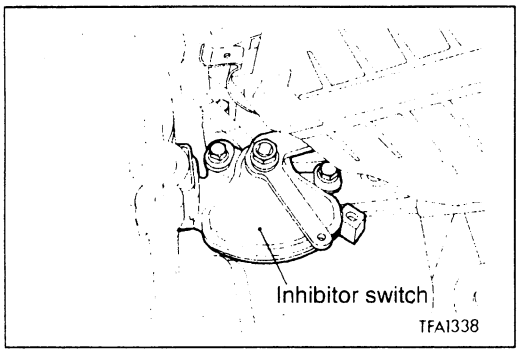
23100190036

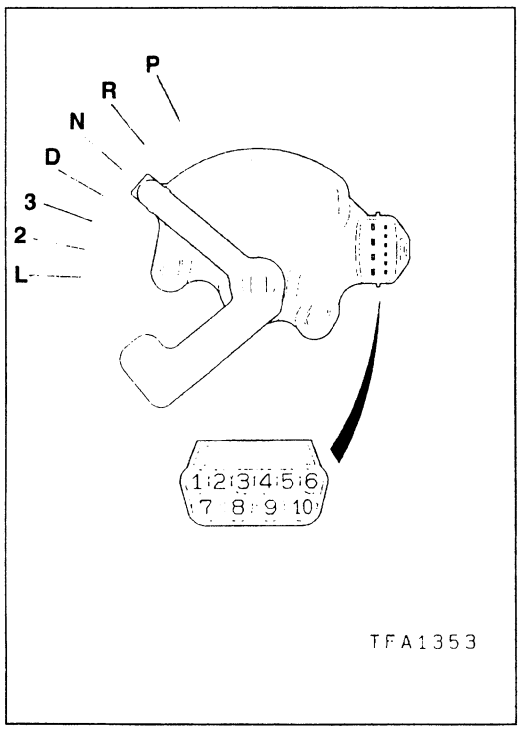
Refer to GROUP 13A – On-vehicle Service.

ACCELERATOR PEDAL POSITION SENSOR ADJUSTMENT <VEHICLES WITH TCL>

23100250024

Refer to GROUP 13A – On-vehicle Service.

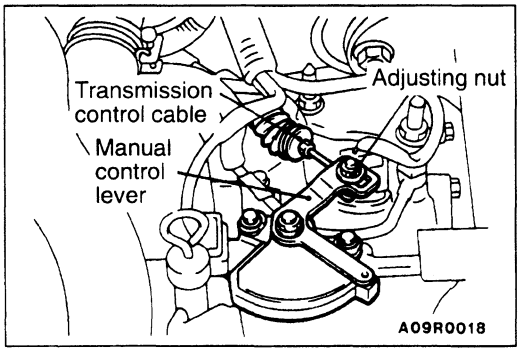




INHIBITOR SWITCH CONTINUITY CHECK

23100140055

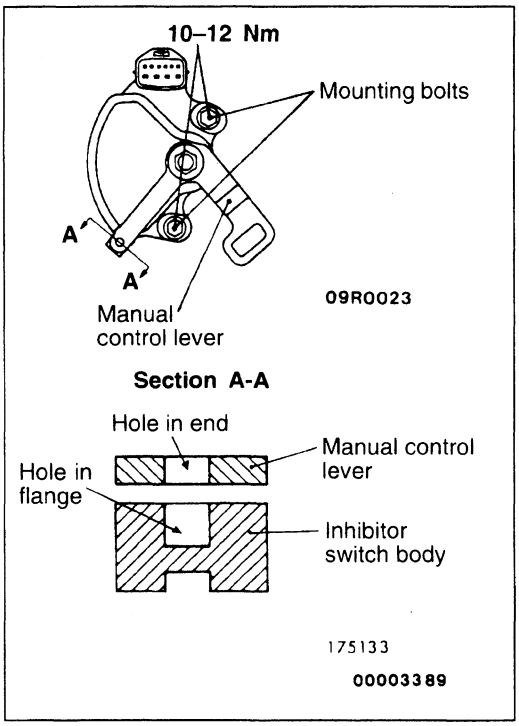
Items	Terminal No.									
	1	2	3	4	5	6	7	8	9	10
P			○					○	○	○
R							○	○		
N				○				○	○	○
D	○							○		
3					○			○		
2		○						○		
L						○		○		



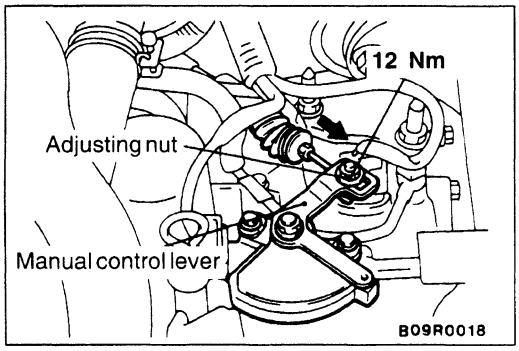
INHIBITOR SWITCH AND CONTROL CABLE ADJUSTMENT

23100150034

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 the 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.

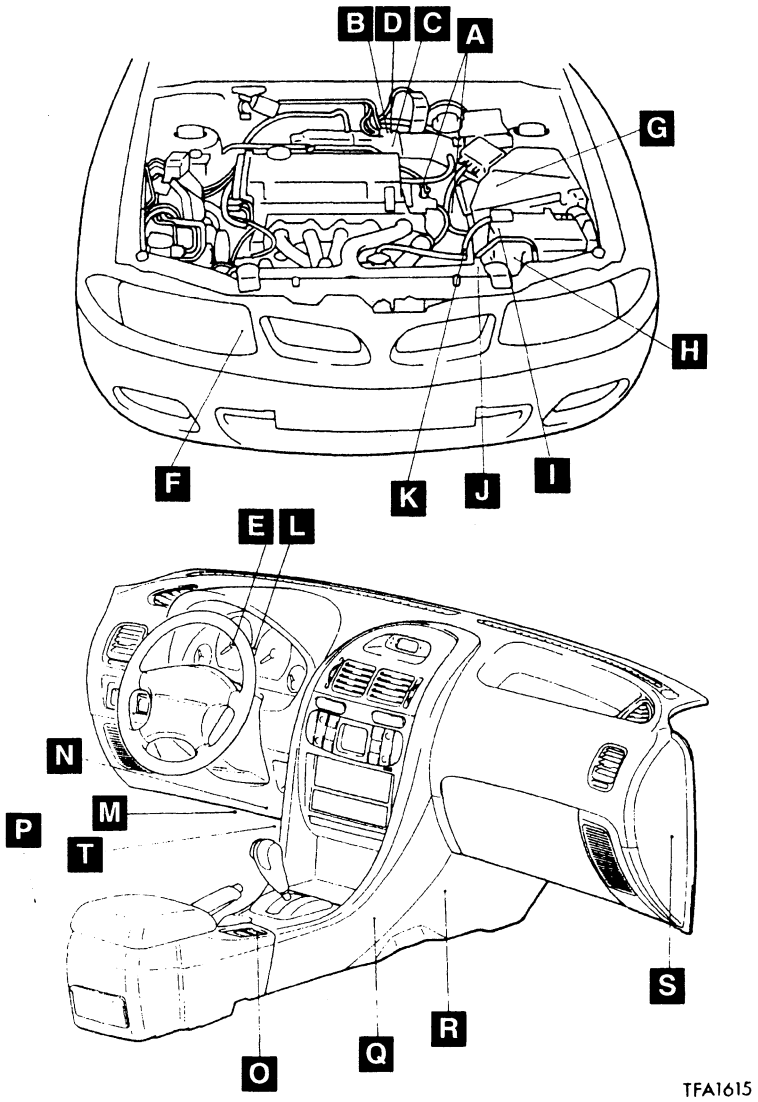


6. Gently pull the transmission control cable in the direction of the arrow, and then tighten the adjusting nut.
7. Check that the selector lever is in the "N" position.
8. Check that each range on the transmission side operates and functions correctly for each position of the selector lever.

A/T CONTROL COMPONENT LOCATION

23100860036

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



TFA1615

A/T CONTROL COMPONENT CHECK 23100900011

1. CRANK ANGLE SENSOR CHECK

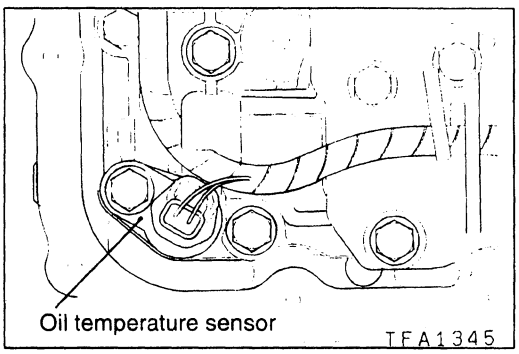
Refer to GROUP 13A – Troubleshooting.

2. THROTTLE POSITION SENSOR CHECK <Vehicles without TCL> 23100390030

Refer to GROUP 13A – On-vehicle Service.

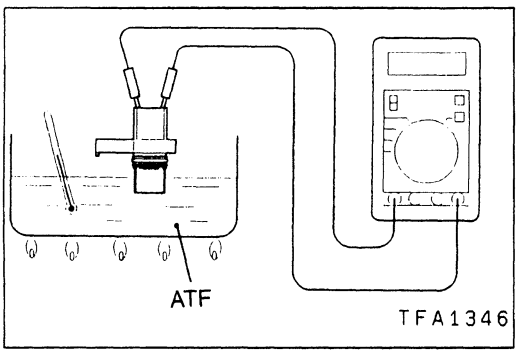
3. ACCELERATOR PEDAL POSITION SENSOR CHECK <Vehicles with TCL> 23100420029

Refer to GROUP 13A – On-vehicle Service.



4. 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

5. INHIBITOR SWITCH CHECK 23100140062

Refer to P.23-49.

6. STOP LAMP SWITCH CHECK 23100910014

Refer to GROUP 35 – Brake Pedal.

7. VEHICLE SPEED SENSOR CHECK 23100460038

Refer to GROUP 54 – On-vehicle Service.

8. DUAL POSITION PRESSURE SWITCH CHECK 23100470031

Refer to GROUP 55 – On-vehicle Service.

9. IDLE POSITION SWITCH CHECK 23100410033

Refer to GROUP 13A – On-vehicle Service.

10. MODE CONTROL SWITCH CHECK 23100920017

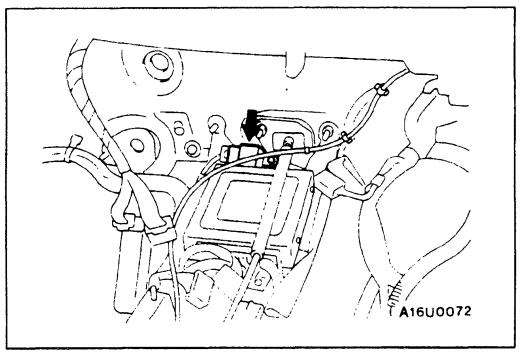
Refer to P.23-70.

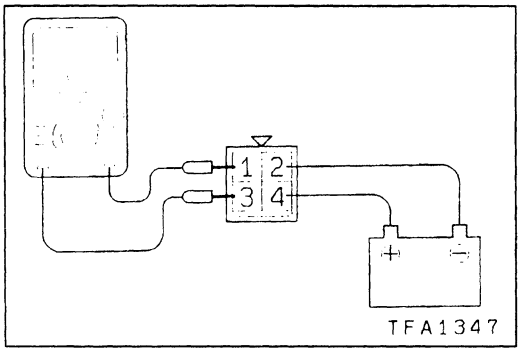
11. WIDE OPEN THROTTLE SWITCH CHECK 23100890042

Refer to P.23-70.

12. A/T CONTROL RELAY CHECK 23100930010

(1) Remove the A/T control relay.

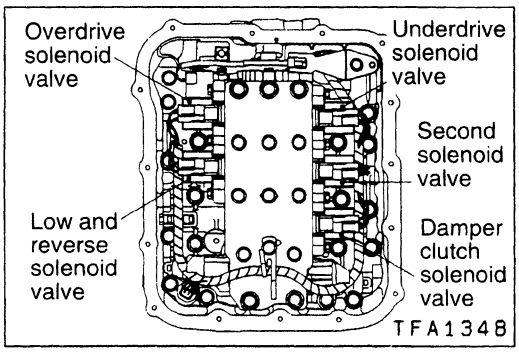




(2) Use jumper wires to connect A/T control relay terminal (2) to the battery (–) terminal and terminal (4) to the battery (+) terminal.
(3) Check the continuity between terminal (1) and terminal (3) of the A/T control relay when the jumper wires are connected to and disconnected from the battery.

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

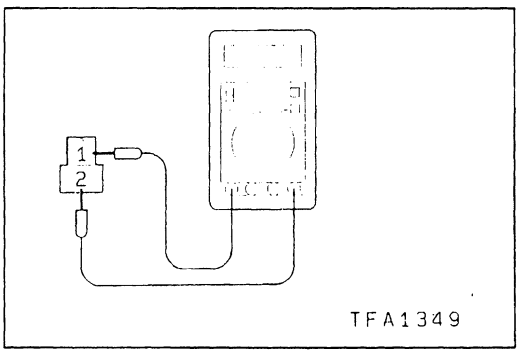
(4) If there is a problem, replace the A/T control relay.



13. SOLENOID VALVE CHECK

23100940013

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

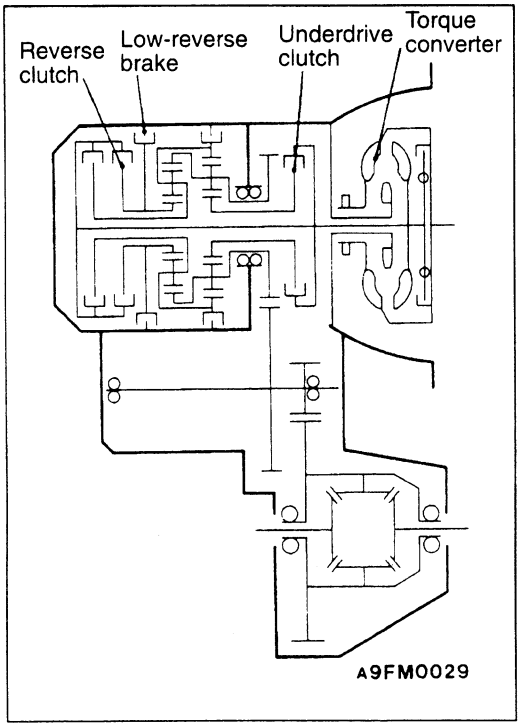


(3) Measure the resistance between terminals 1 and 2 of each solenoid valve.

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 23100540039

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

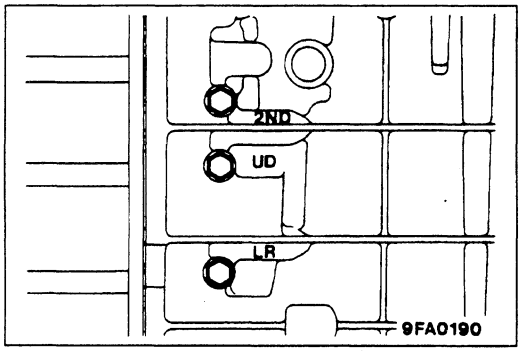
TORQUE CONVERTER STALL TEST JUDGEMENT RESULTS

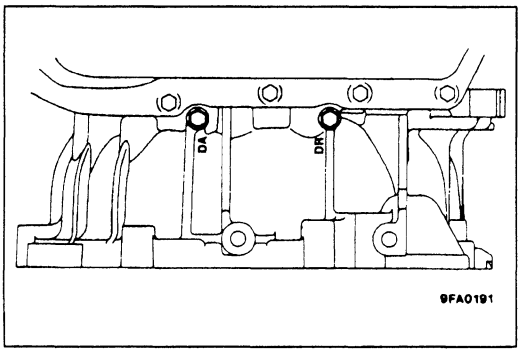
a. Stall speed is too high in both D and R ranges
   - Low line pressure
   - Low & reverse brake slippage

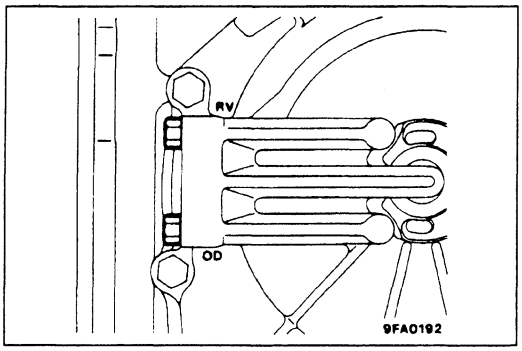
b. Stall speed is too high in D range only
   - Underdrive clutch slippage

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 23100550032

(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

Measurement condition			Standard hydraulic pressure kPa					
Selector lever position	Shift position	Engine speed (rpm)	Underdrive clutch pressure	Reverse clutch pressure	Overdrive clutch pressure	Low and reverse brake pressure	Second brake pressure	Torque converter pressure
P	–	2,500	–	–	–	310–390	–	250–390
R	Reverse	2,500	–	1,270–1,770	–	1,270–1,770	–	500–700
N	2,500	–	–	–	–	310–390	–	250–390
D	1st gear	2,500	1,010–1,050	–	–	1,010–1,050	–	500–700
	2nd gear	2,500	–	–	–	–	1,010–1,050	500–700
	3rd gear	2,500	–	–	590–690	–	–	450–650
	4th gear	2,500	–	–	590–690	–	590–690	450–650

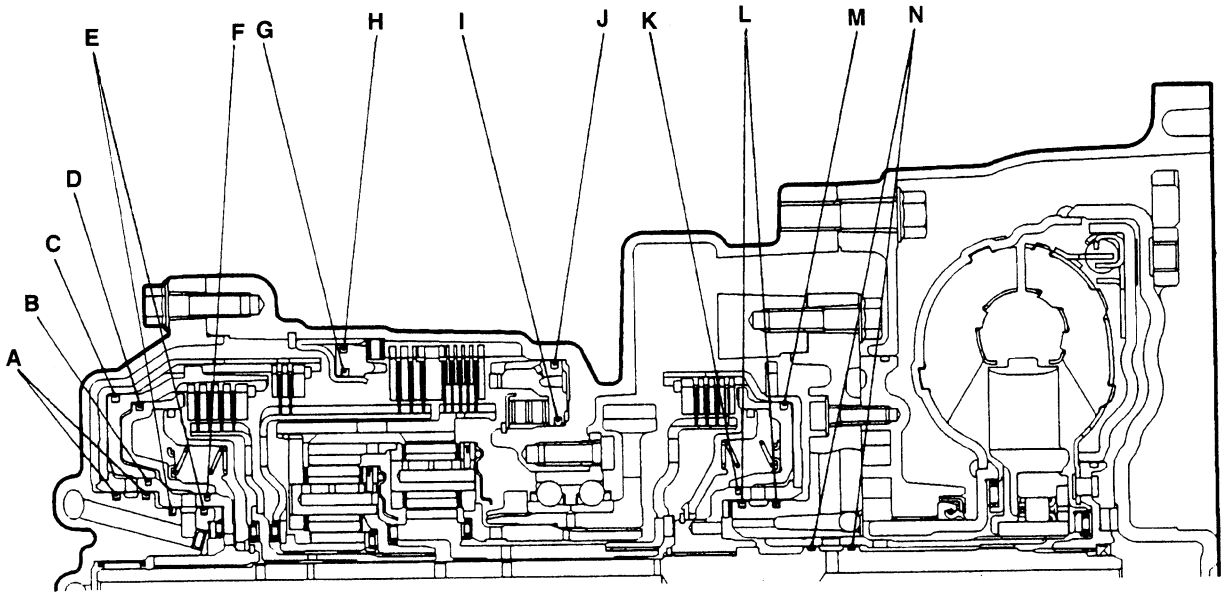
HYDRAULIC PRESSURE TEST DIAGNOSIS TABLE

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
	Incorrect valve body installation

Trouble symptom	Probable cause
Hydraulic pressure is abnormal in "R" range only.	Malfunction of the regulator valve
	Clogged orifice
	Incorrect valve body installation
Hydraulic pressure is abnormal in "3" or "4" range only.	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
	Incorrect valve body installation
Only underdrive hydraulic pressure is abnormal.	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
	Incorrect valve body installation
Only reverse clutch hydraulic pressure is abnormal.	Malfunction of the oil seal A
	Malfunction of the oil seal B
	Malfunction of the oil seal C
	Clogged orifice
	Incorrect valve body installation
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

Trouble symptom	Probable cause
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



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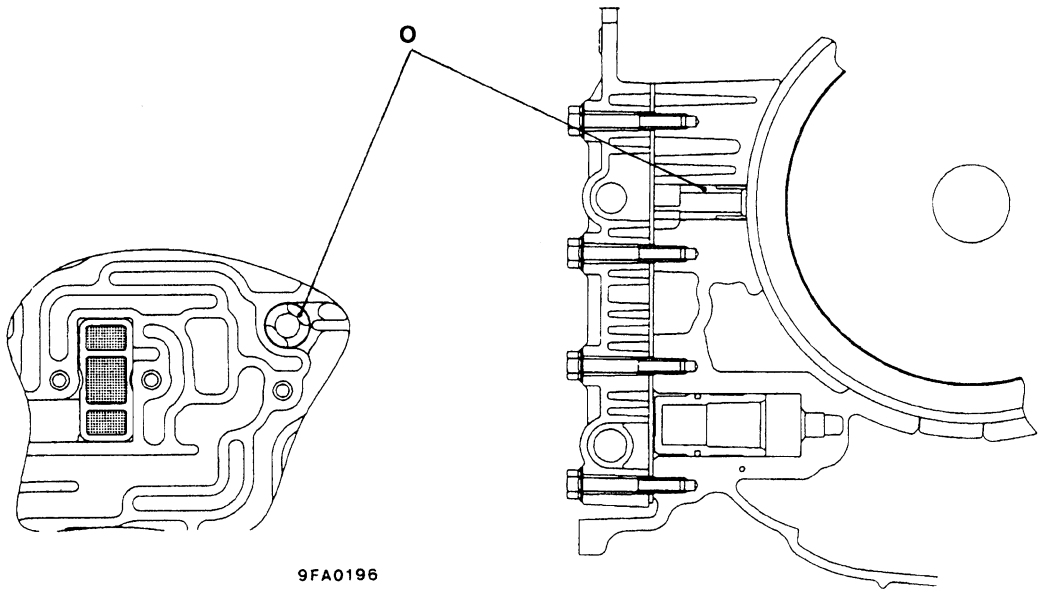

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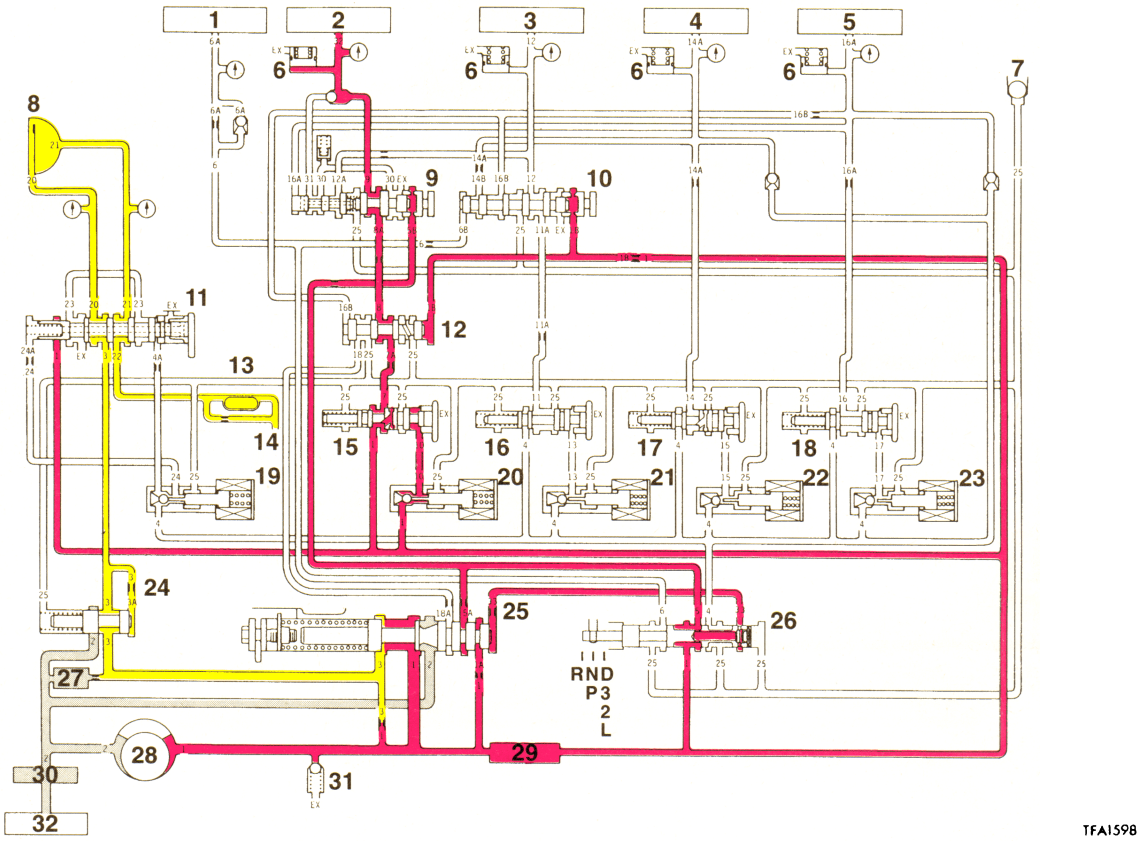
HYDRAULIC CIRCUIT

PARKING AND NEUTRAL

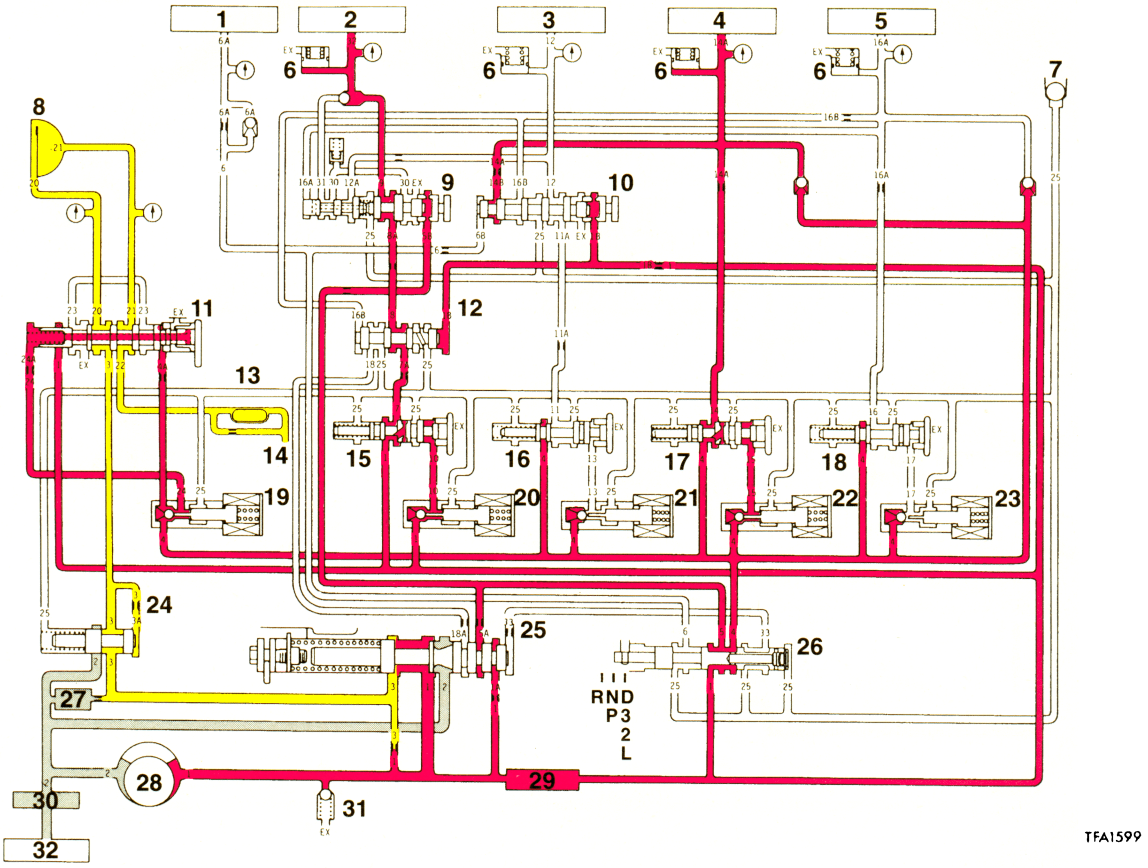
23100880032



: Line pressure
: Oil pump suction pressure
: Damper clutch pressure
: Torque converter and lubrication pressure
: Damper clutch control solenoid valve pressure

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

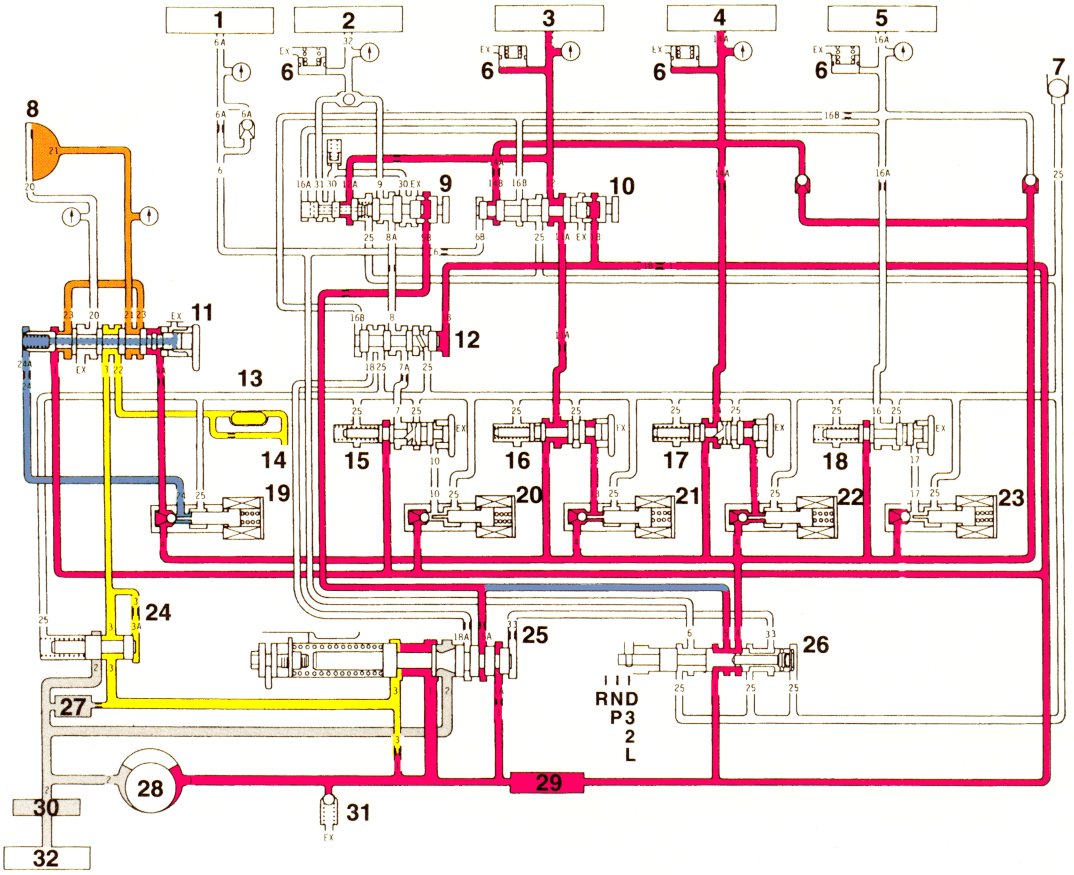
1ST GEAR



: Line pressure
: Oil pump suction pressure
: Damper clutch pressure
: Torque converter and lubrication pressure
: Damper clutch control solenoid valve pressure

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

2ND GEAR

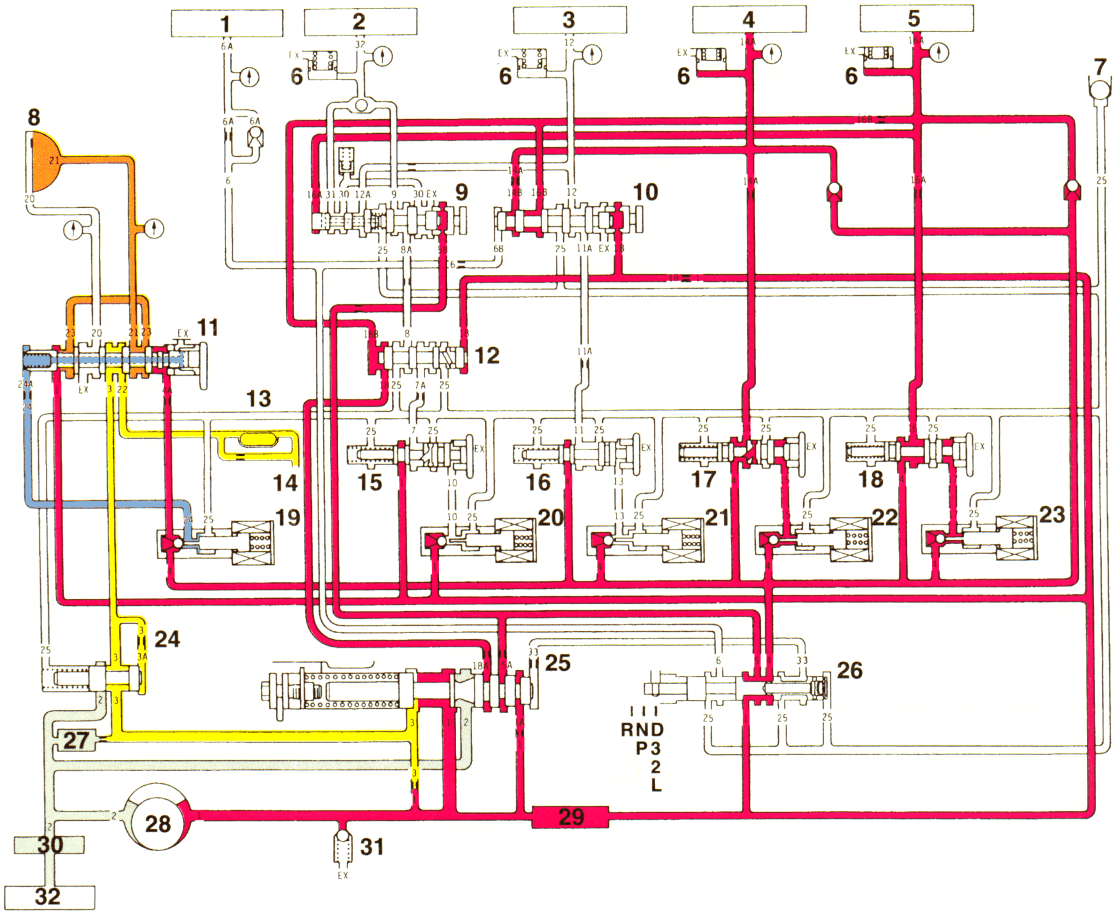


TFA1600

: Line pressure
: Oil pump suction pressure
: Damper clutch pressure
Torque converter and lubrication pressure
Damper clutch control solenoid valve pressure

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

3RD GEAR

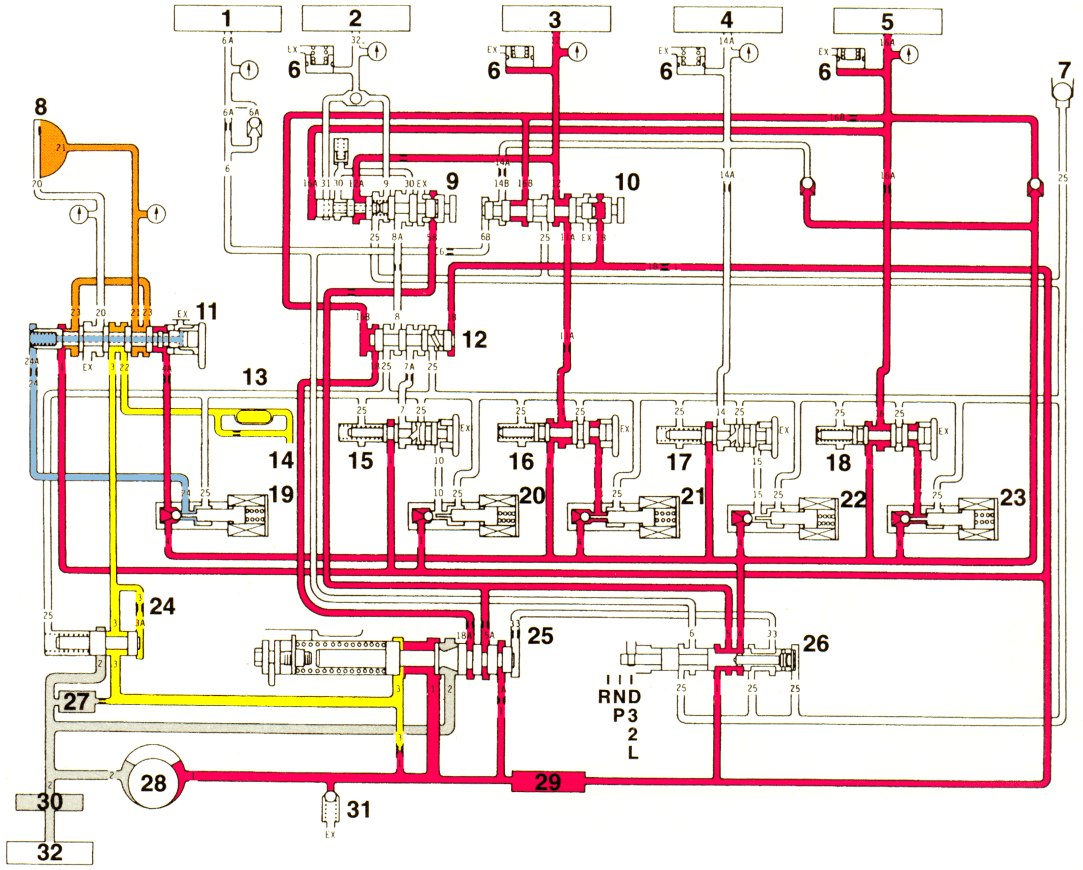


TFA1601

: Line pressure
: Oil pump suction pressure
: Damper clutch pressure
Torque converter and lubrication pressure
Damper clutch control solenoid valve pressure

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

4TH GEAR

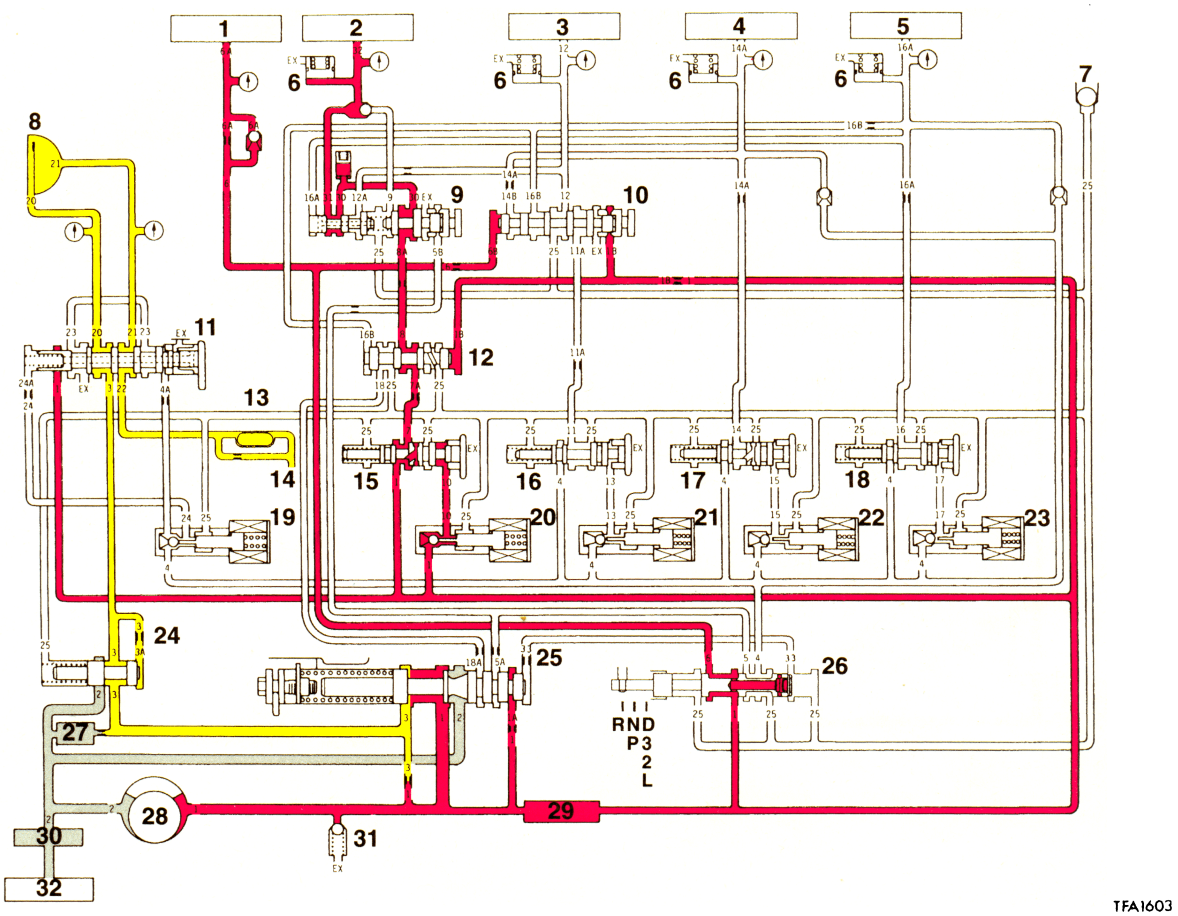


TFAI602

: Line pressure
: Oil pump suction pressure
: Damper clutch pressure
: Torque converter and lubrication pressure
: Damper clutch control solenoid valve pressure

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

REVERSE



: Line pressure
: Oil pump suction pressure
: Damper clutch pressure
: Torque converter and lubrication pressure
: Damper clutch control solenoid valve pressure

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
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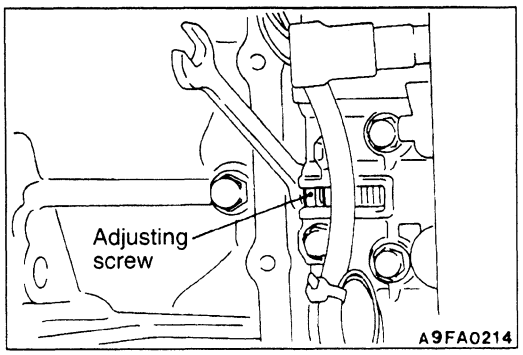
27. Oil filter
28. Oil pump
29. Oil strainer
30. Oil filter (Built in type)
31. Relief valve
32. Oil pan



LINE PRESSURE ADJUSTMENT 23100170030

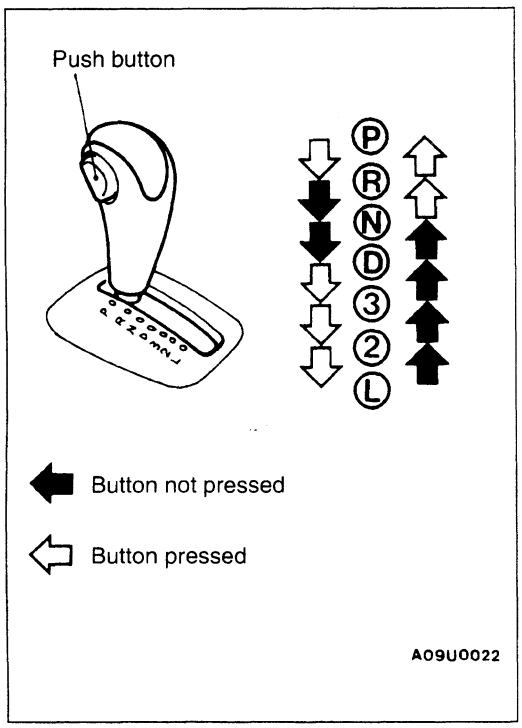
(1) Discharge the automatic transmission fluid, and then remove the valve body cover.
(2) Turn the adjusting screw shown in the illustration at left to adjust the underdrive pressure to the standard value. The pressure increases when the screw is turned to the left.

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

Standard value: 1,010–1,050 kPa

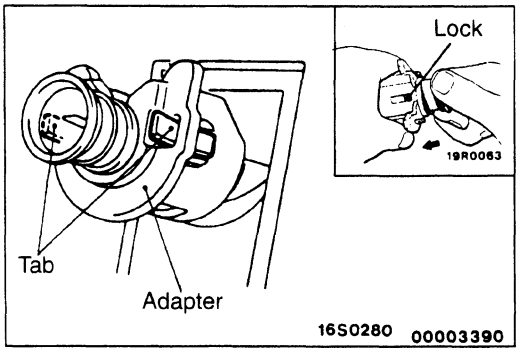
Change in pressure for each turn of the adjusting screw: 35 kPa

(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.



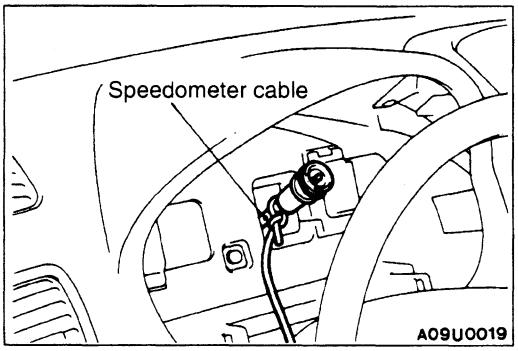
SELECTOR LEVER OPERATION CHECK 23100130038

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.

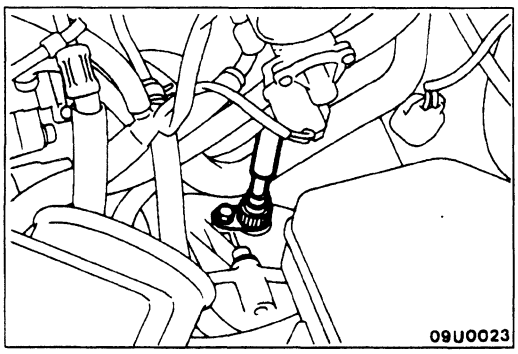


SPEEDOMETER CABLE REPLACEMENT 23100230011

1. Remove the meter bezel and combination meter.
2. Remove the adapter lock.
3. Pull the speedometer cable slightly into the passenger compartment, and remove the rear side of the adapter from the cable.
4. After turning the adapter so that the notched section is aligned with the tab on the cable side, remove the adapter by sliding it backwards.



5. Tie a rope to the end of the speedometer cable that is in the passenger compartment. Then remove the grommet inside the engine compartment, and pull the cable into the engine compartment.
6. Install the new speedometer cable, and install it securely to the adapter.



7. At the transmission end of the speedometer cable, the key joint should be inserted into the transmission, and the nut should be securely tightened.

Caution
If the cable is not correctly and securely connected, it may cause incorrect indication by the speedometer, or abnormal noise. Be sure to connect it correctly.

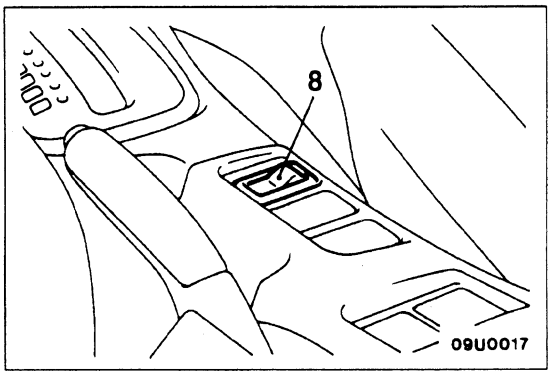
TRANSMISSION CONTROL

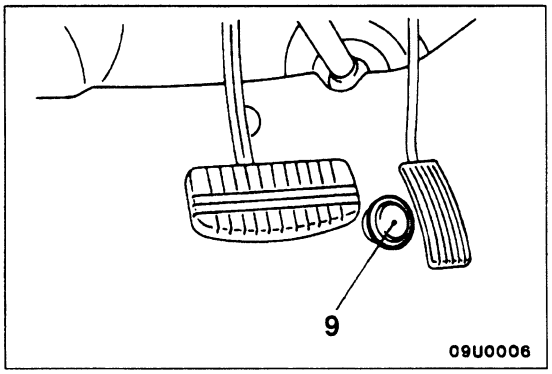
23100660032

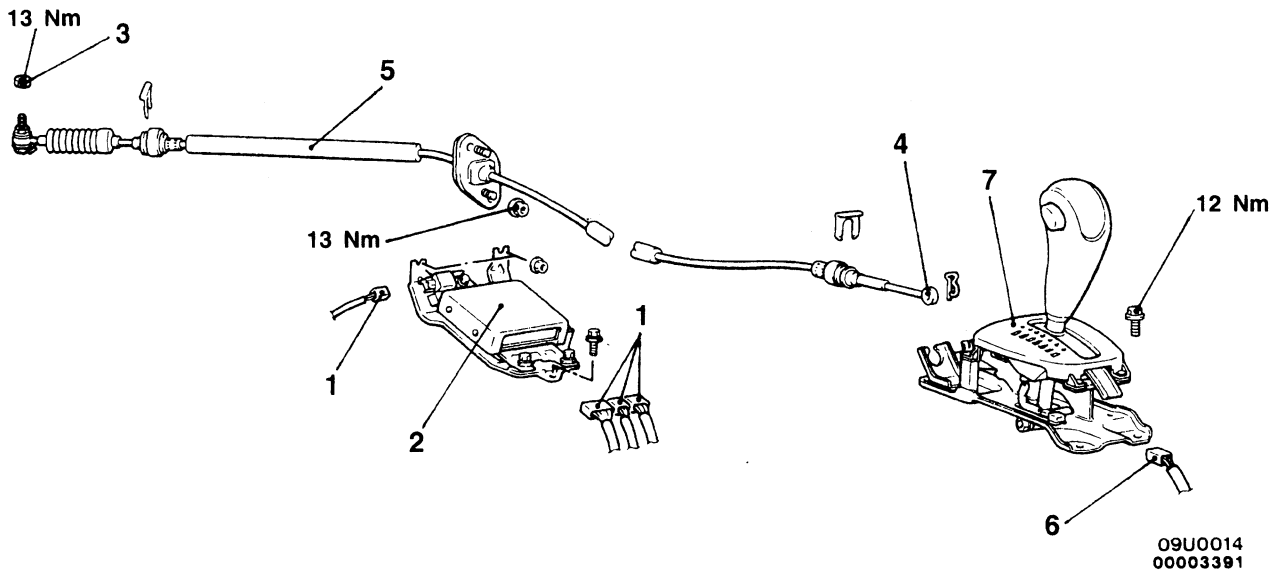
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Floor Console Removal and Installation (Refer to GROUP 52A – Floor Console.)

Caution: SRS
Be careful not to subject the SRS-ECU to any shocks during removal and installation of the floor console, transmission control cable and shift lever assembly.







Transmission control cable assembly removal steps
- Air cleaner assembly
- Battery and battery tray

1. Wiring harness connector
2. A/T-ECU and bracket assembly

▶A◀ 3. Nut

4. Transmission control cable connection
5. Transmission control cable

Selector lever assembly removal steps

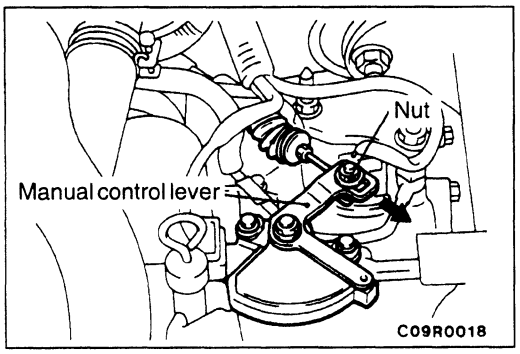
4. Transmission control cable connection
6. Wiring harness connector
7. Selector lever assembly

Mode control switch removal

8. Mode control switch

Wide open throttle switch removal

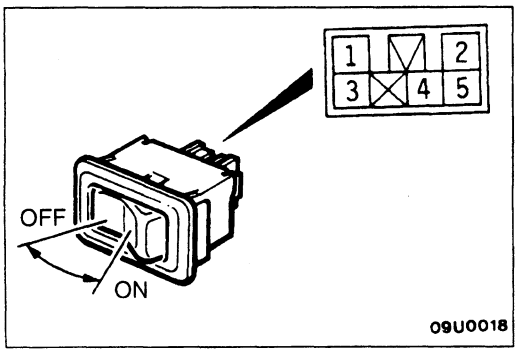
9. Wide open throttle switch



INSTALLATION SERVICE POINT

▶A◀ 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.

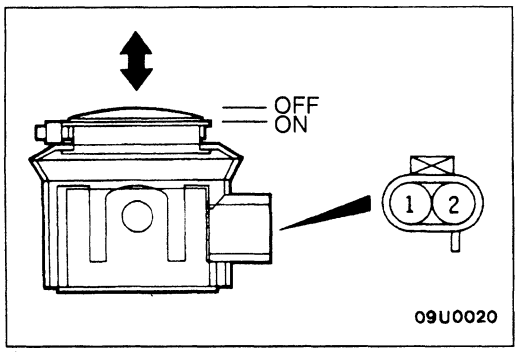


INSPECTION

23100480034

MODE CONTROL SWITCH CHECK

Switch position	Terminal No.					
	2	3	4	1		5
OFF	○	○		○	○	○
ON	○		○			



WIDE OPEN THROTTLE SWITCH CHECK

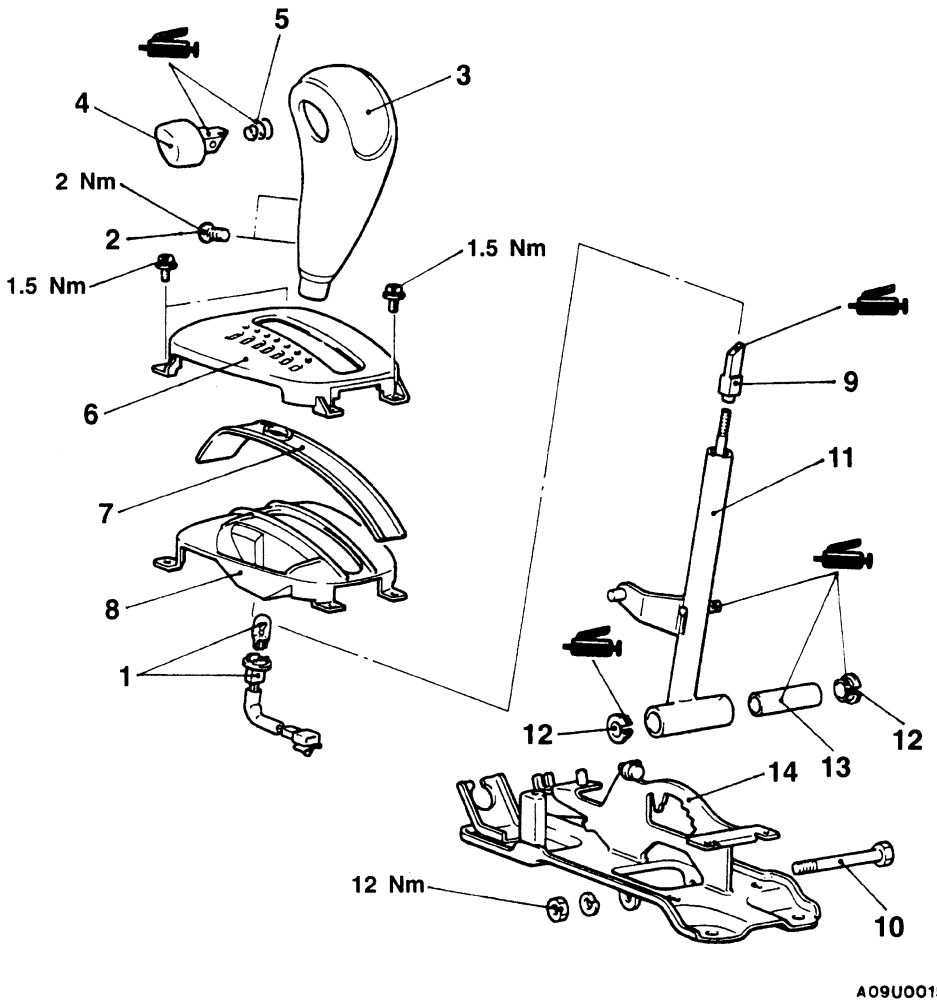
23100890035

Switch position	Terminal No.	
	1	2
OFF		
ON	○	○

SELECTOR LEVER ASSEMBLY

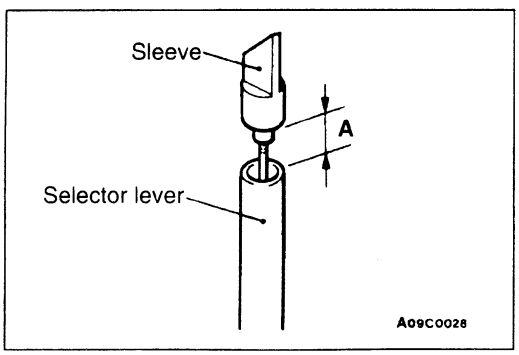
23100680038

DISASSEMBLY AND REASSEMBLY



Disassembly steps

1. Position indicator lamp
2. Screw
3. Selector knob
4. Push button
5. Spring
6. Upper panel
7. Slider
8. Lower panel
▶A◀ 9. Sleeve
10. Bolt
11. Selector lever assembly
12. Bush
13. Pipe
14. Bracket assembly



REASSEMBLY SERVICE POINT

▶A◀ SLEEVE INSTALLATION

Put the selector lever to the "N" position, turn the sleeve and adjust dimension "A" between the sleeve and the end of the lever so it reaches the standard value.

Standard value (A): 21 mm

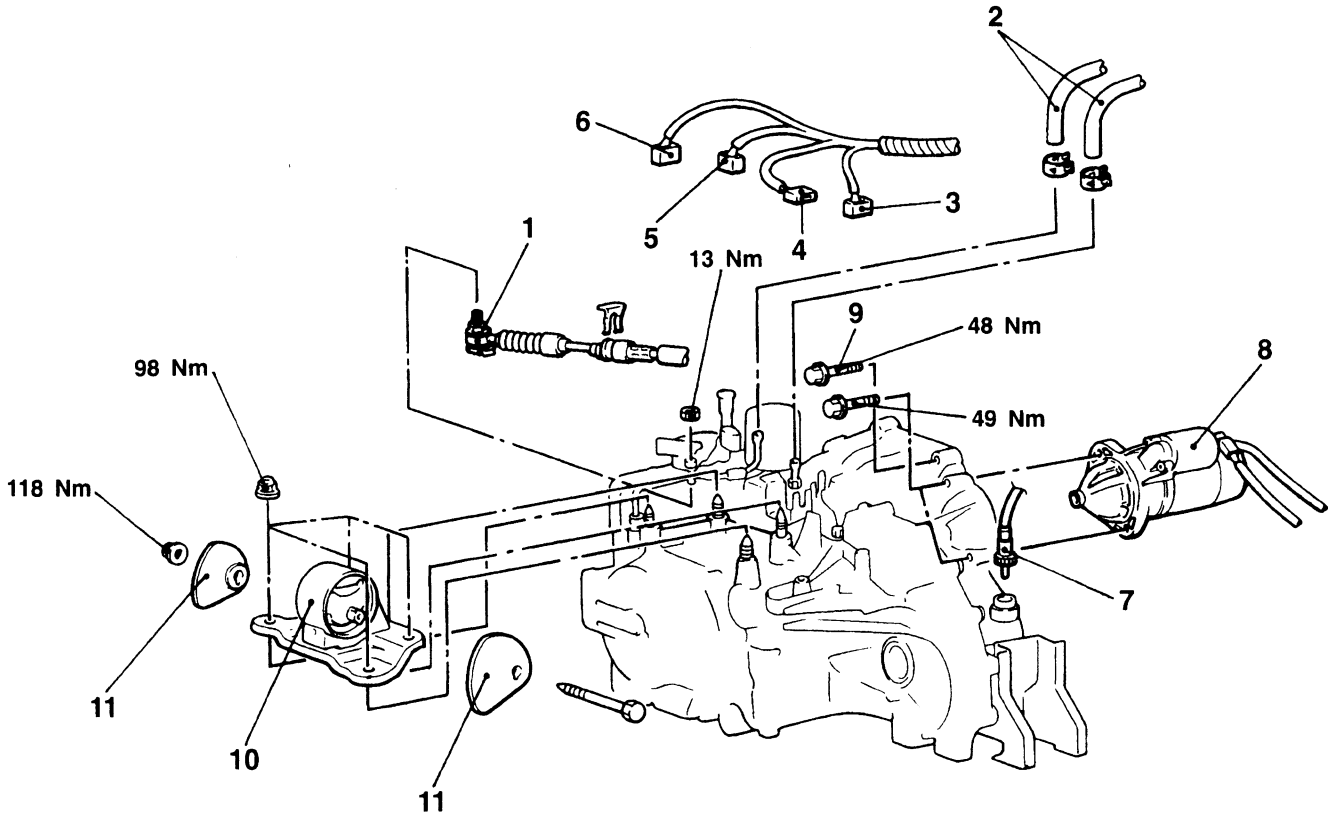
TRANSMISSION ASSEMBLY

23100570038

REMOVAL AND INSTALLATION

Pre-removal Operation
- Transmission Fluid Draining (Refer to P.23-47.)
- Under Cover Removal
- Air Cleaner Assembly Removal
- Battery and Battery Tray Removal
- Canister Removal (Refer to GROUP 17.)

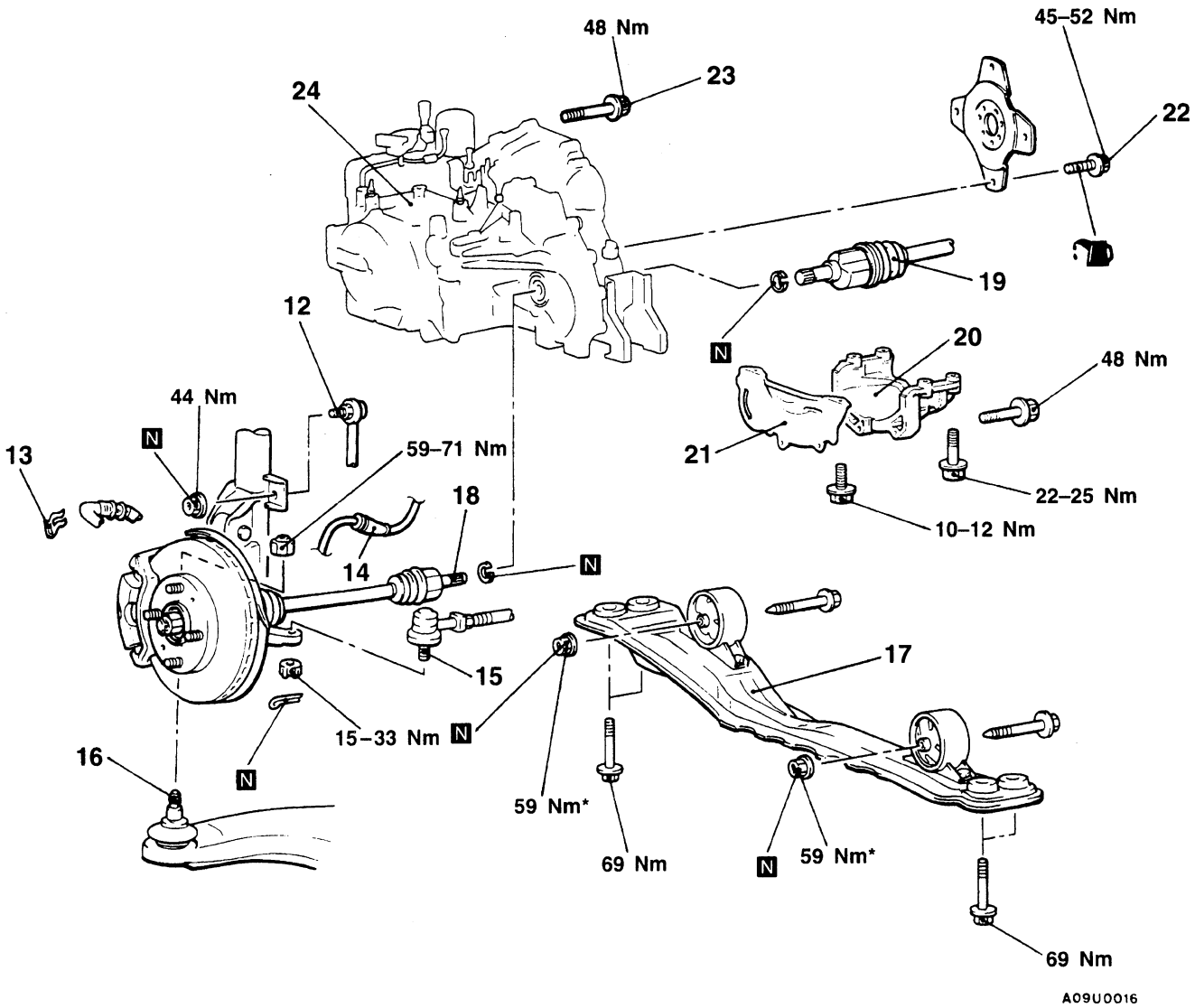
Post-installation Operation
- Transmission Fluid Supplying (Refer to P.23-47.)
- Under Cover Installation
- Canister Installation (Refer to GROUP 17.)
- Battery and Battery Tray Installation
- Air Cleaner Assembly Installation
- Selector Lever Operation Check
- Speedometer operation Check



A09U0021

Removal steps
1. Transmission control cable connection
2. Transmission oil cooler hoses connection
3. Pulse generator "A" connector
4. Pulse generator "B" connector
5. Inhibitor switch connector
6. A/T control solenoid valve connector
7. Speedometer cable connection

◀A▶ 8. Starter motor
9. Transmission assembly upper part coupling bolts
◀B▶ 10. Transmission mount bracket
▶C◀ 11. Transmission mount stopper
◀C▶ • Engine assembly supporting



Lifting up of the vehicle

12. Stabilizer link connection
13. Brake hose clamp
14. Speed sensor cable connection <Vehicles with ABS>
◀D▶ 15. Tie rod end connection
◀D▶ 16. Lower arm ball joint connection
17. Centermember assembly
◀E▶ ▶B◀ 18. Drive shaft <L.H.> connection
◀E▶ ▶B◀ 19. Drive shaft <R.H.> connection
20. Transmission stay
21. Bell housing cover
◀F▶ 22. Drive plate bolts
◀F▶ 23. Transmission assembly lower part coupling bolts
◀F▶ ▶A◀ 24. Transmission assembly

Caution

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

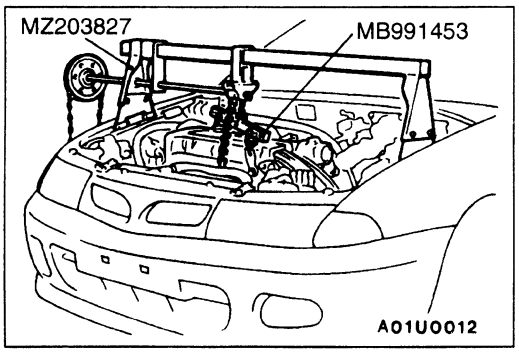
REMOVAL SERVICE POINTS

◀A▶ STARTER MOTOR REMOVAL

Remove the starter motor with the starter motor harness still connected, and secure it inside the engine compartment.

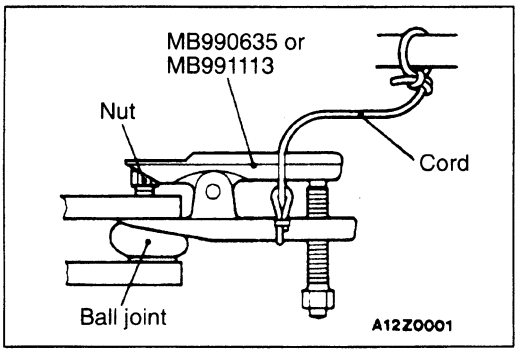
◀B▶ TRANSMISSION MOUNT BRACKET REMOVAL

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



◀C▶ ENGINE ASSEMBLY SUPPORTING

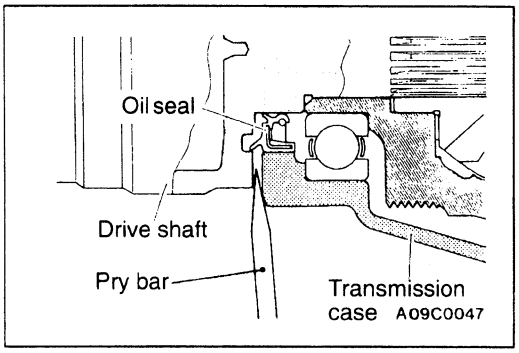
Set the special tool to the vehicle to support the engine assembly.



◀D▶ TIE ROD END/LOWER ARM BALL JOINT DISCONNECTION

Caution

1. **Before using the special tool, 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. to prevent it from coming off.**

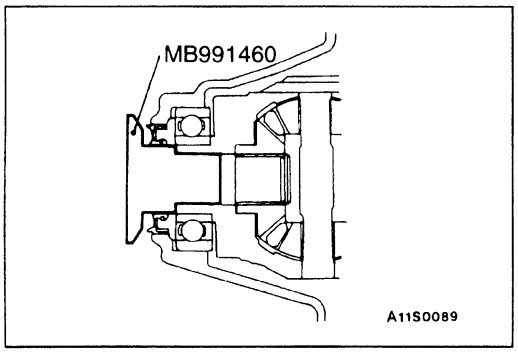


◀E▶ DRIVE SHAFT REMOVAL

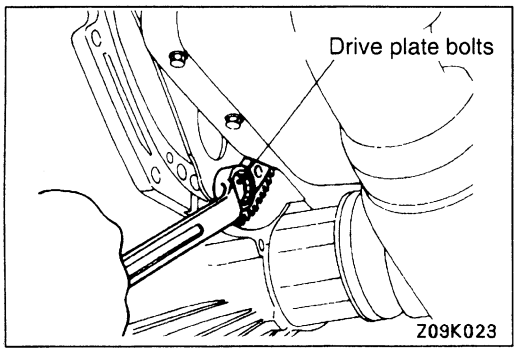
1. Insert a pry bar between the transmission case and the drive shaft, and then pry the drive shaft from the transmission.

   NOTE
   Take out the drive shaft with the hub and knuckle, etc., still attached.

   Caution
   1. **Do not pull on the drive shaft; doing so will damage the T.J. assembly; be sure to use the pry bar.**
   2. **Do not insert the pry bar too deep because this may damage the oil seal.**

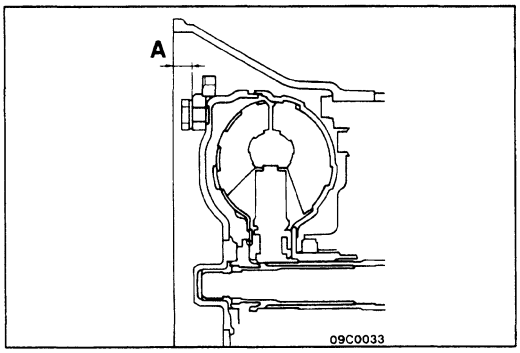


2. Suspend the removed drive shaft with wire so that there are no sharp bends in any of the joints.
3. Use the special tool provided as a cover to prevent the entry of foreign objects into the transmission case.



◀F▶ DRIVE PLATE BOLTS/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.

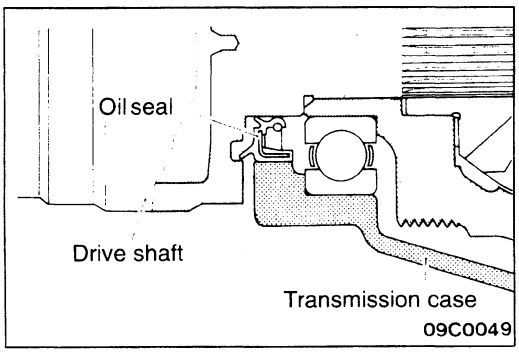


INSTALLATION SERVICE POINTS

▶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.

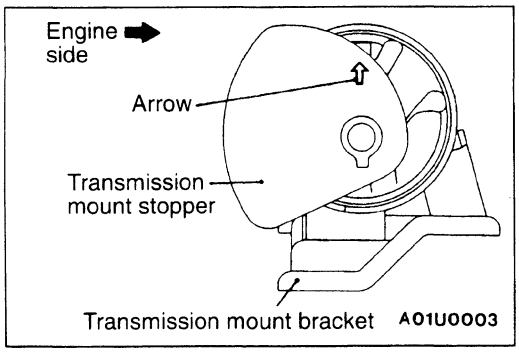
Reference value (A): Approx. 12.2 mm



▶B◀ DRIVE SHAFT INSTALLATION

Provisionally install the drive shaft so that the T.J. case of the drive shaft is straight, and not bent relative to the transmission.

Caution
Care must be taken to ensure that the oil seal lip part of the transmission is not damaged by the serrated part of the drive shaft.



▶C◀ TRANSMISSION MOUNT STOPPER INSTALLATION

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