GROUP 23A

CVT

CONTENTS

SERVICE SPECIFICATIONS

M1231200300579

Item		Standard value
CVT fluid temperature sensor resistance kΩ	at 0°C	Approximately 15.5
	at 20°C	Approximately 6.5
	at 40°C	Approximately 3.1
	at 60°C	Approximately 1.6
	at 80°C	Approximately 0.9
	at 100°C	Approximately 0.5
Line pressure solenoid valve coil resistance (fluid temperature: 20°C) Ω		Approximately 5.6 – 6.6
Secondary pressure solenoid valve coil resistance (fluid temperature: 20°C) Ω		Approximately 5.6 – 6.6
Lockup/select switching solenoid valve coil resistance (fluid temperature: 20°C) Ω		Approximately 25.5 – 29.3
Lockup solenoid valve coil resistance (fluid temperature: 20°C) Ω		Approximately 5.6 – 6.6
Shift lock solenoid resistance Ω		24 ± 1.2
Engine stall speed r/min	D range	2,400 – 2,900
	R range	2,400 – 2,900

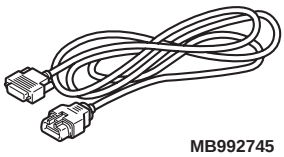
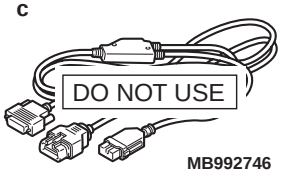
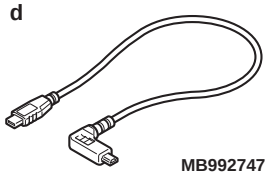
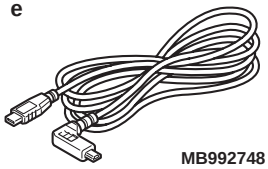
LUBRICANTS

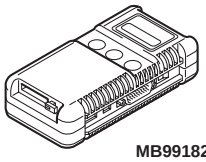
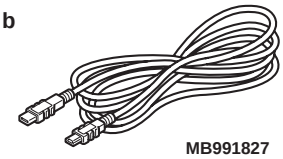
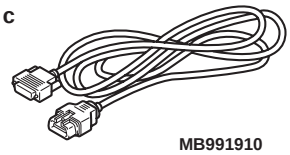
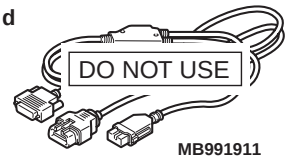
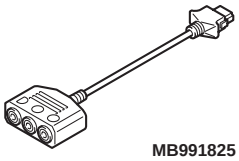
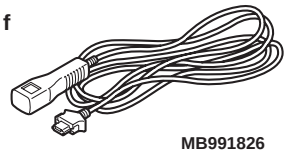
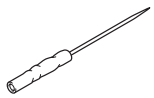
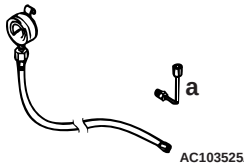
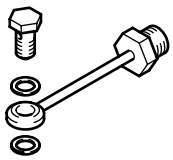
M1231200400800

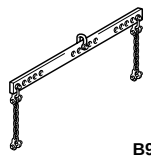
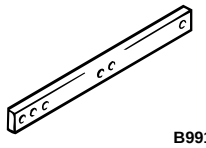
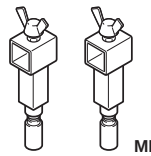
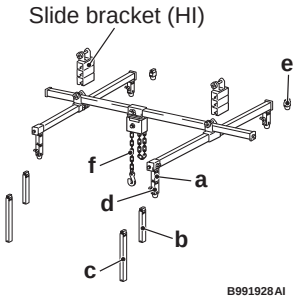
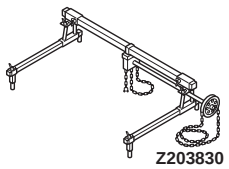
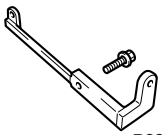
Item	Brand name	Capacity L
CVT fluid	MITSUBISHI MOTORS GENUINE CVTF-J4	7.1
Transfer oil	MITSUBISHI MOTORS GENUINE super hypoid gear oil API classification GL-5 SAE80	0.47

SPECIAL TOOLS

M1231200600677

Tool	Number	Name	Use
a  MB992744 b  MB992745 c  MB992746 d  MB992747 e  MB992748 ACB05421AB	a. MB992744 b. MB992745 c. MB992746 d. MB992747 e. MB992748	a. Vehicle communication interface-Lite (V.C.I.-Lite) b. V.C.I.-Lite main harness A (for vehicles with CAN communication) c. V.C.I.-Lite main harness B (for vehicles without CAN communication) d. V.C.I.-Lite USB cable short e. V.C.I.-Lite USB cable long	CVT check (M.U.T.-III diagnosis code display and service data display)

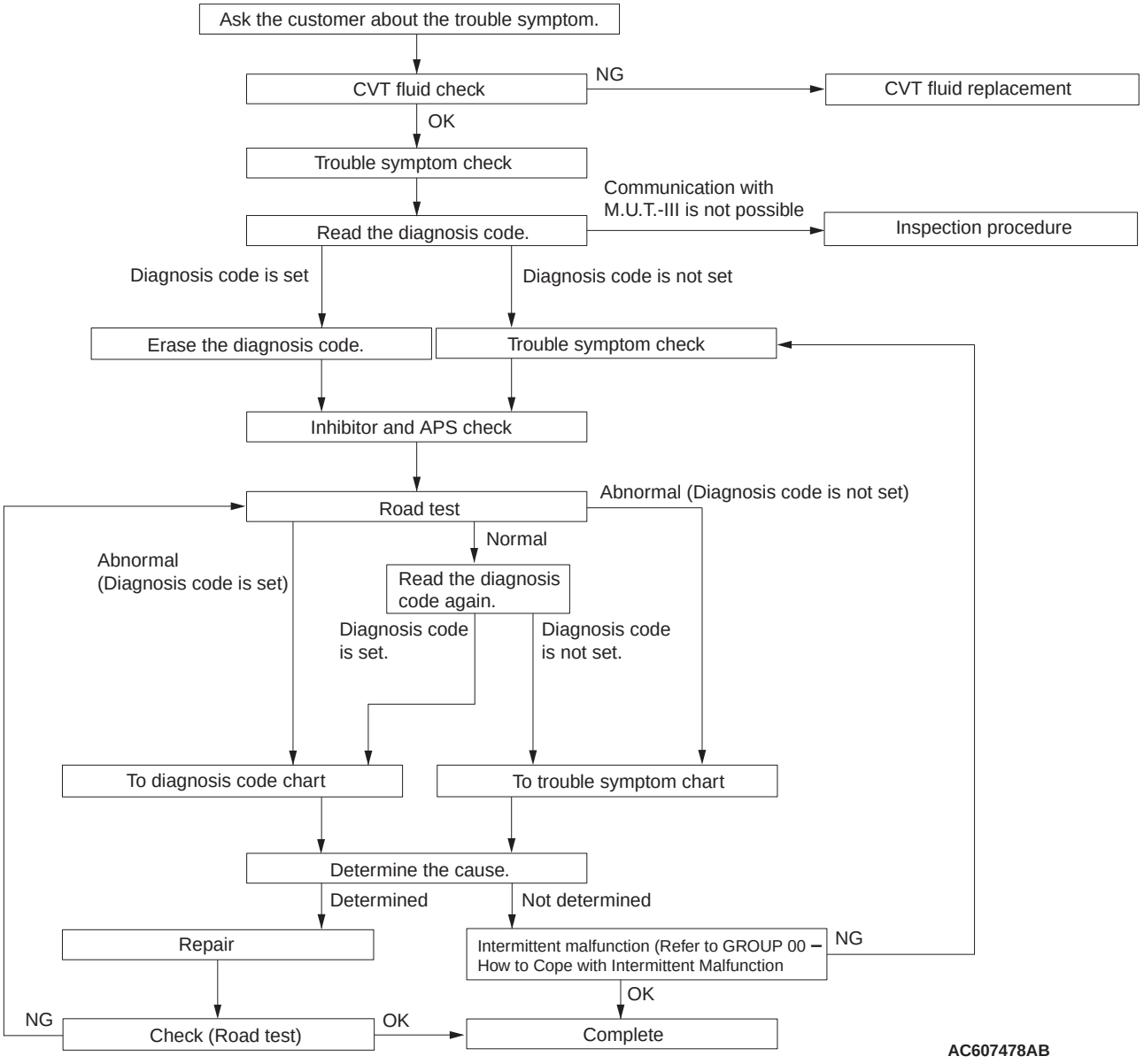
Tool	Number	Name	Use
a  MB991824 b  MB991827 c  MB991910 d  MB991911 e  MB991825 f  MB991826 MB991955	MB991955 a: MB991824 b: MB991827 c: MB991910 d: MB991911 e: MB991825 f: MB991826	M.U.T.-III sub-assembly a: Vehicle communication interface (V.C.I.) b: USB cable c: M.U.T.-III main harness A (applicable to vehicles with CAN communication) d: M.U.T.-III main harness B (applicable to vehicles without CAN communication) e: Measurement adapter f: Trigger harness	⚠ **CAUTION** **For vehicles with CAN communication, use the M.U.T.-III main harness A to send the simulated vehicle speed. If you connect the M.U.T.-III main harness B instead, the CAN communication does not function correctly.** CVT check (M.U.T.-III diagnosis code display and service data display)
 MB992006	MB992006	Extra fine probe	Continuity check and voltage measurement at harness wire or connector
 AC103525	MD998330 a: MD998331	Oil pressure gauge (3.0 MPa) a: Joint	Hydraulic pressure measurement
	MB992127	Joint	

Tool	Number	Name	Use
 B991454	MB991454	Engine hanger balancer	Engine assembly support during automatic transmission assembly removal and installation {For the engine hanger balancer (MB991454), use chains only.} *NOTE: Engine hanger balancer (MB991454) is a part of the engine hanger assembly (MB991453).*
 B991527	MB991527	Engine hanger	
 MB992906	MB992906	Engine hanger attachment	
 B991928AI	MB991928 a: MB991929 b: MB991930 c: MB991931 d: MB991932 e: MB991933 f: MB991934	Engine hanger a: Joint (50) ×2 b: Joint (90) ×2 c: Joint (140) ×2 d: Foot (standard) ×4 e: Foot (short) ×2 f: Chain and hook assembly	
 Z203830	MB991895	Engine hanger	
 B992853	MB992853	Engine hanger plate	

TROUBLESHOOTING

STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING

M1231213500153



INITIALISATION PROCEDURE FOR CVT LEARNED VALUE

M1231202400301

PURPOSE

After the CVT assembly, engine assembly, and valve body assembly are replaced, their learned value must be initialised. The initialisation procedure is as below.

3. Depress the accelerator pedal while depressing the brake pedal. (Engine is not running.) Using the M.U.T.-III, execute the clear diagnosis code function for the CVT ECU (even if no codes are set).

INITIALISATION PROCEDURE

1. Move the selector lever to the P range and turn the ignition switch to the LOCK (OFF) position. Then, connect M.U.T.-III to the diagnosis connector.
2. Turn the ignition switch to the ON position, and then move the selector lever to the R range.

NOTE: Performing initialisation of the learned value will also erase the diagnosis code.

LEARNING PROCEDURE FOR CVT HYDRAULIC CONTROL

M1231225500428

PURPOSE

After initialisation, the CVT-ECU does not have any learned value. This may degrade the shifting operation quality. The learning procedure is described below.

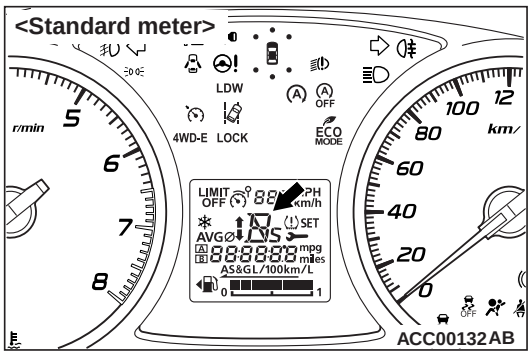
LEARNING PROCEDURES

Steps	Item		Contents
1	Learning procedure for engine idling		Refer to GROUP 00 "Learning Procedures for Engine Idling ."
2	Fluid cooling		Park the vehicle in a cooler place, stop the engine, and leave the vehicle until the CVT fluid temperature is lowered to the ambient temperature.
3	Learning in cold engine condition	(1) Fluid temperature measurement	Use M.U.T.-III to measure the CVT fluid temperature. (Check that the fluid temperature is the same as the ambient temperature.)
		(2) Line pressure & shift control learning	Let the engine idle for 20 seconds in the D range.
		(3) Direct control learning	Run the vehicle at 40 to 50 km/h for 5 seconds in the D range with steady operation.
4	Learning in hot engine condition	(1) Fluid temperature adjustment	**⚠ CAUTION** **When the CVT fluid temperature does not increase to 80°C in cold region, raise the fluid temperature to a maximum extent.** Raise the CVT fluid temperature to 80°C.
		(2) Direct control learning	The same procedure as for "Learning in cold engine condition"

DIAGNOSTIC FUNCTION

M1231219000338

WARNING INDICATOR <STANDARD METER>



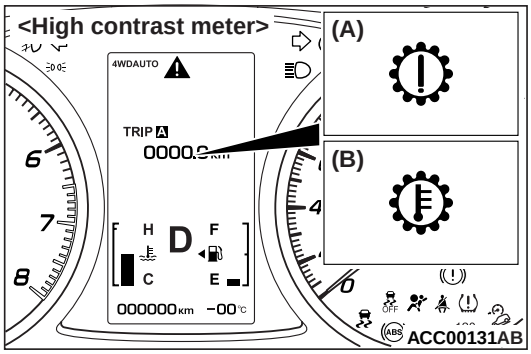
If a malfunction occurs in the CVT system, any of "R", "N", "D", "Ds", "L" or "A" will flash (one flash per two seconds) on the selector lever position indicator in the multi-information display.

NOTE:

- *The selector lever position indicator "P" does not flash when a malfunction occurs in the CVT system.*
- *When the system is normal, the selector lever position indicator "A" does not illumination. Only when a malfunction occurs in the indicator switch, the indicator will flash.*

If the selector lever position indicator flashes rapidly (one flash per one second), the CVT fluid temperature is too high. (Illuminates when the fluid temperature is approximately 138℃ or higher, and goes out automatically when the fluid temperature drops below approximately 135℃.)

<HIGH CONTRAST METER>



If a malfunction relating to the CVT system occurs, the symbol (A) will be displayed on the information screen in the multi-information display.
Check if the diagnosis code is set when the symbol (A) continues being displayed in the information screen in the multi information display.

When the symbol (B) is displayed in the information screen in the multi information display, the CVT fluid temperature is high. (Symbol (B) is turned on when the fluid temperature is approximately 138°C or higher and turned off automatically when the fluid temperature drops below approximately 135°C.)

HOW TO READ DIAGNOSIS CODE

Use M.U.T.-III to read the diagnosis code (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points).

HOW TO ERASE DIAGNOSIS CODE

Use M.U.T.-III to erase the diagnosis code (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points).

ROAD TEST

M1231207800575

Steps	Conditions for test/operation	Test/Operation	Judgement standard	Check item	Diagnosis code No.	Reference for checking procedure in case of error
1	Ignition switch: LOCK (OFF)	Ignition switch (1) ON	Data list No. 6 (1) System voltage	ECU power supply	–	Communication with the M.U.T.-III is not possible.

Steps	Conditions for test/operation	Test/Operation	Judgement standard	Check item	Diagnosis code No.	Reference for checking procedure in case of error
2	Ignition switch: ON Engine: Stopped	Selector lever position (1) P (2) R (3) N (4) D (5) Ds <Vehicles without paddle shift> (6) L	Data list No. 49 (1) P, (2) R (3) N (4) D (5) Ds/L (6) Ds/L	Inhibitor switch	P0705	Malfunction of inhibitor switch
			Data list No. 42 (1) ON (2) OFF (3) OFF (4) OFF (5) OFF (6) OFF			
			Data list No. 43 (1) OFF (2) ON (3) OFF (4) OFF (5) OFF (6) OFF			
			Data list No. 44 (1) OFF (2) OFF (3) ON (4) OFF (5) OFF (6) OFF			
			Data list No. 45 (1) OFF (2) OFF (3) OFF (4) ON (5) OFF (6) OFF			
			Data list No. 46 (1) OFF (2) OFF (3) OFF (4) OFF (5) ON (6) ON			
			Data list No. 51 <Vehicles with paddle shift> (1) OFF (2) OFF (3) OFF (4) OFF (5) ON (6) ON	Ds position switch	P071B	Malfunction of Ds position switch

Steps	Conditions for test/operation	Test/Operation	Judgement standard	Check item	Diagnosis code No.	Reference for checking procedure in case of error
2	Ignition switch: ON Engine: Stopped	Paddle shift lever position (1) Upshift (right side operation of the lever) and hold (2) Release the lever.	Data list No. 54 (1) ON (2) OFF	Paddle shift switch	P0815, P0816	Malfunction of paddle shift switch
		Paddle shift lever position (1) Downshift (left side operation of the lever) and hold (2) Release the lever.	Data list No. 55 (1) ON (2) OFF			
		Selector lever position (1) P, N (2) 5 or more seconds have passed after the selector lever has been moved to the R, D, Ds or L position.	Data list No. 36 (1) ON (2) OFF	Lockup/select switching solenoid valve	P1740	Malfunction of lockup/select switching solenoid valve
			Data list No. 37 (1) ON (2) OFF			
3	Ignition switch: ON Engine: Stopped Selector lever position: P	Accelerator pedal (1) Fully closed (2) Depressed (3) Fully opened	Data list No. 13 (1) 0% (2) Gradually increases from (1). (3) 100%	APS	–	–
		Brake pedal (1) Depressed (2) Released	Data list No. 50 (1) ON (2) OFF	Stop lamp switch	P0703	Malfunction of stop light switch
4	Ignition switch: START	Perform the starting test in the P or N position.	Engine can be started.	Starting possible/not possible	–	–
5	Engine warming up	Drive the vehicle for 15 minutes or more to raise the CVT fluid temperature to 45 to 100°C.	Data list No. 5 Voltage drops gradually.	CVT fluid temperature sensor	P0711, P0712, P0713	Malfunction of the CVT fluid temperature sensor
			Data list No. 20 COUNT increases as the fluid temperature increases.			

Steps	Conditions for test/operation	Test/Operation	Judgement standard	Check item	Diagnosis code No.	Reference for checking procedure in case of error
6	Engine: Idling	• Selector lever position: P • Accelerator pedal fully closed	Data list No. 9 600 to 800 r/min	Engine revolution	P0725	Abnormal engine speed
		Selector lever position: P → R → N → D	No abnormal shift shock Delay: 2 seconds or less	Malfunction at startup	–	Shock is experienced during N to D and/or N to R shifting operation.
					–	Vehicle Creeps in the N Range.
		Selector lever position: N	Data list No. 4 0.5 – 3.0 V	Secondary pressure sensor	P0840	Malfunction of secondary pressure sensor
			Data list No. 32 0.45 – 0.75 A	Line pressure solenoid valve	P0745	Malfunction of line pressure solenoid valve
			Data list No. 34 0.45 – 0.75 A	Secondary pressure solenoid valve	P0778	Malfunction of secondary pressure solenoid valve

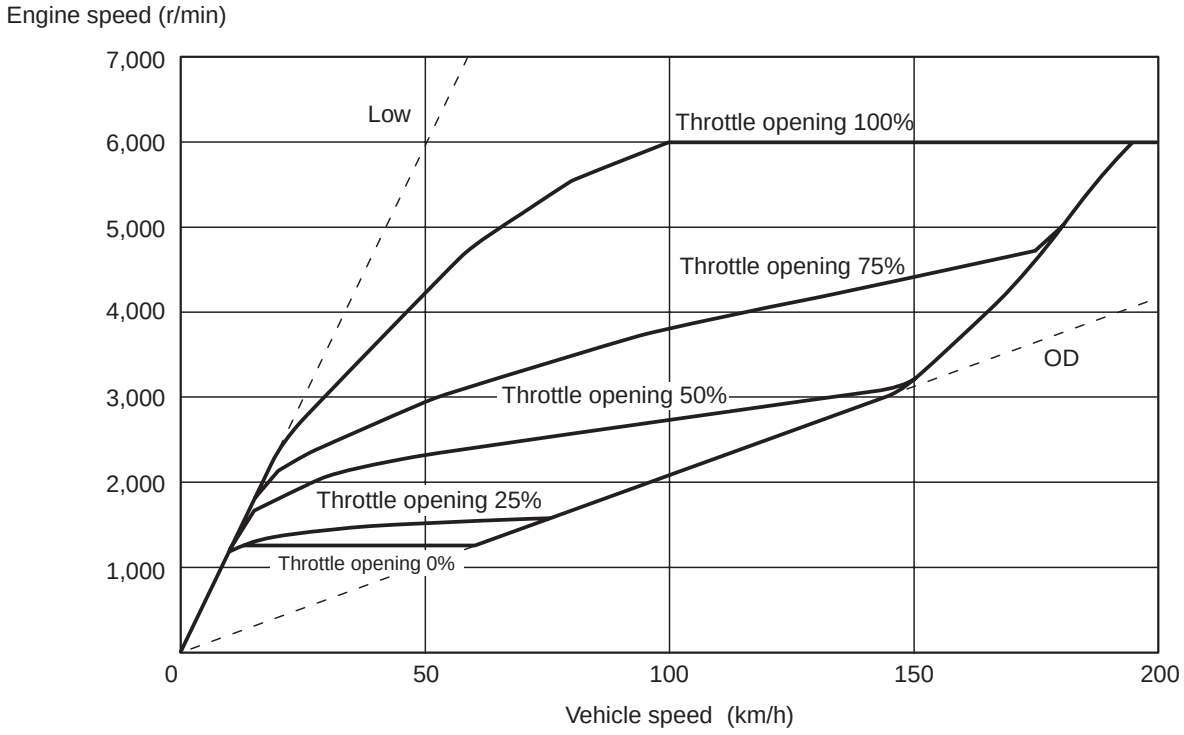
Steps	Conditions for test/operation	Test/Operation	Judgement standard	Check item	Diagnosis code No.	Reference for checking procedure in case of error
7	Running	Selector lever position: D	Data list No. 1 Nearly the same as the speedometer display	Primary speed sensor	P0715	Malfunction of primary speed sensor
			Data list No. 2 Nearly the same as the speedometer display	Secondary speed sensor	P0720	Malfunction of the secondary speed sensor
			Data list Nos. 38, 39, 40, 41 ON/OFF switches alternately.	Stepper motor	P1777, P1778	Malfunction of stepper motor
		Sport mode <Vehicles with paddle shift> (1) ON (via the paddle shift) (2) OFF (via the paddle shift)	Data list No. 47 (1) ON (2) OFF	Paddle shift switch	P0815, P0816	Malfunction of paddle shift switch
		Stop the vehicle, and then accelerate to 60 km/h on a level road.	Data list No. 30 0 – 0.7 A	Lockup solenoid valve	P0740, P0741	Malfunction of lockup solenoid valve
		Paddle shift lever position (1) Stopped while idling the engine. (2) Driving at a constant speed of 30 km/h in 2nd gear (3) Driving at a constant speed of 35 km/h in 3rd gear (4) Driving at a constant speed of 40 km/h in 4th gear (5) Driving at a constant speed of 50 km/h in 5th gear (6) Driving at a constant speed of 60 km/h in 6th gear	Data list No. 60 (1) 1st (2) 2nd (3) 3rd (4) 4th (5) 5th (6) 6th	Poor acceleration or incomplete shifting operation	–	Poor acceleration or incomplete shifting operation

RATIO PATTERN

M1231202600640

D RANGE

<4B11>



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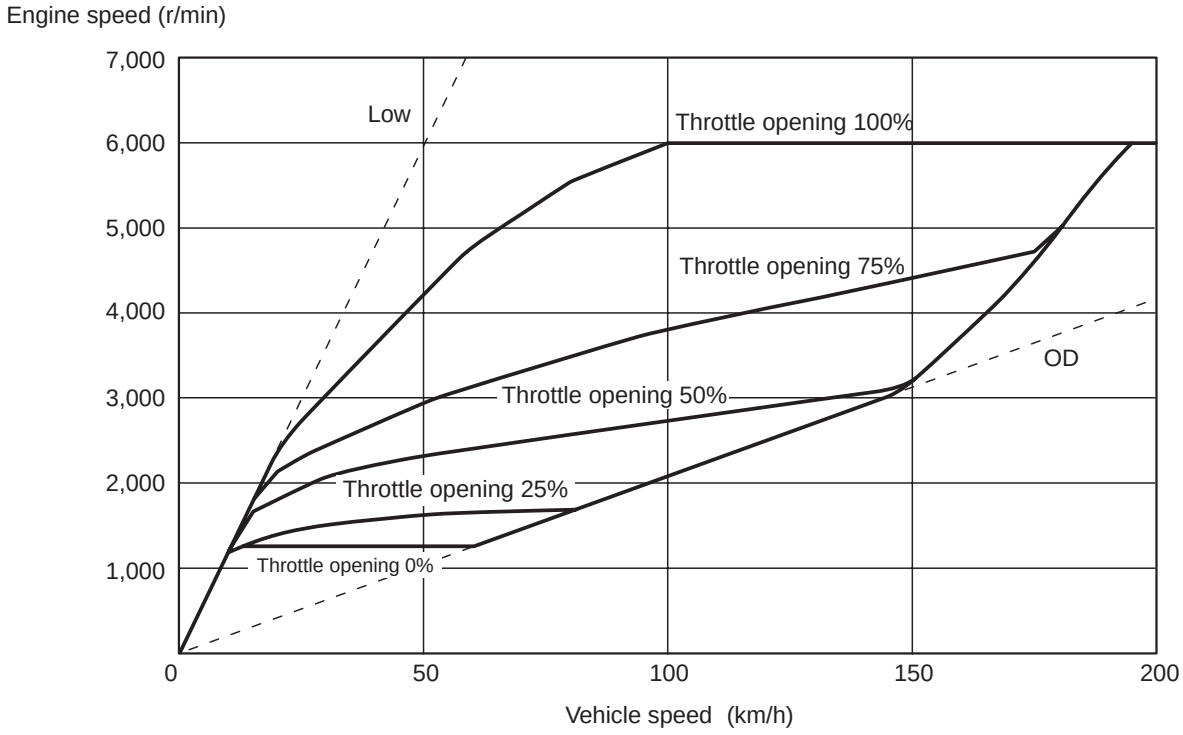

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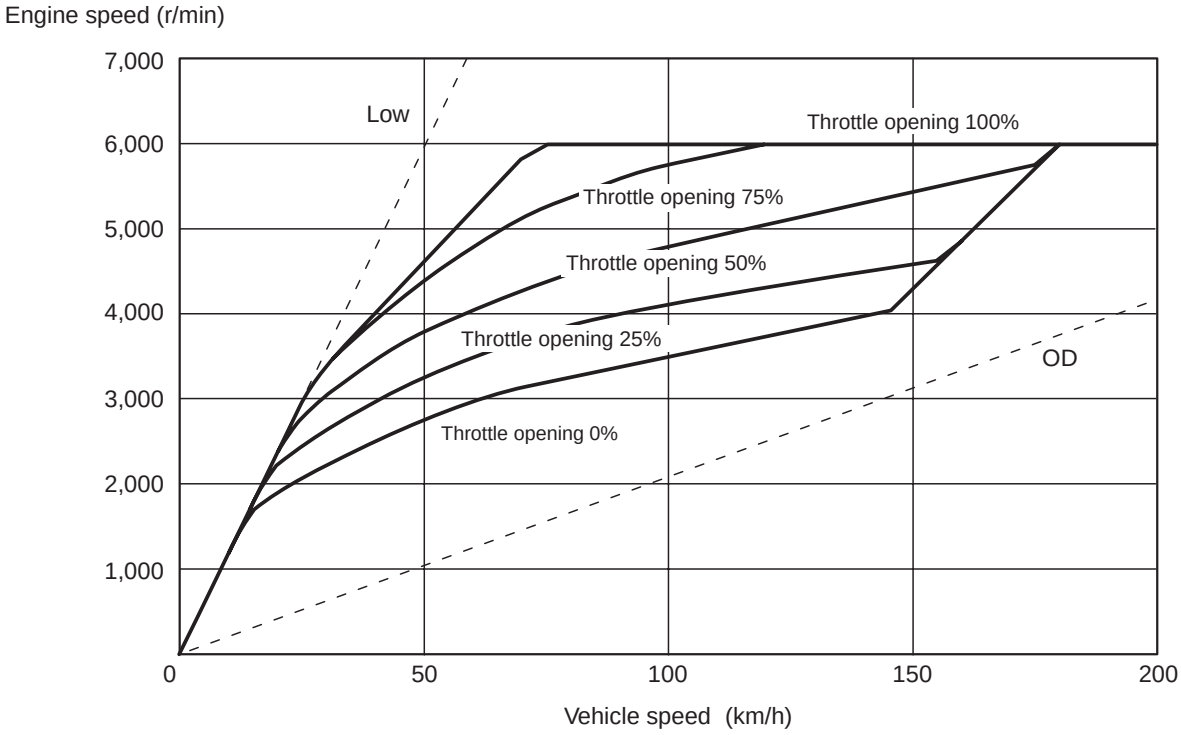
Ds RANGE <VEHICLES WITHOUT PADDLE SHIFT>



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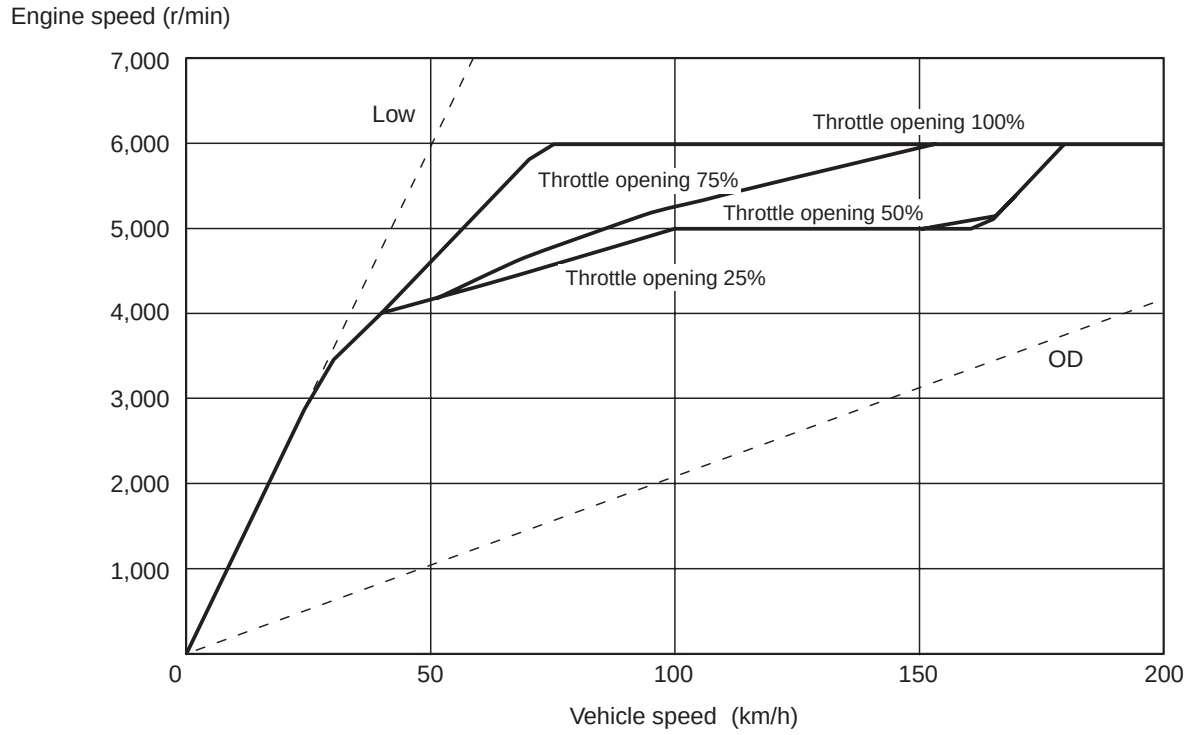
L RANGE



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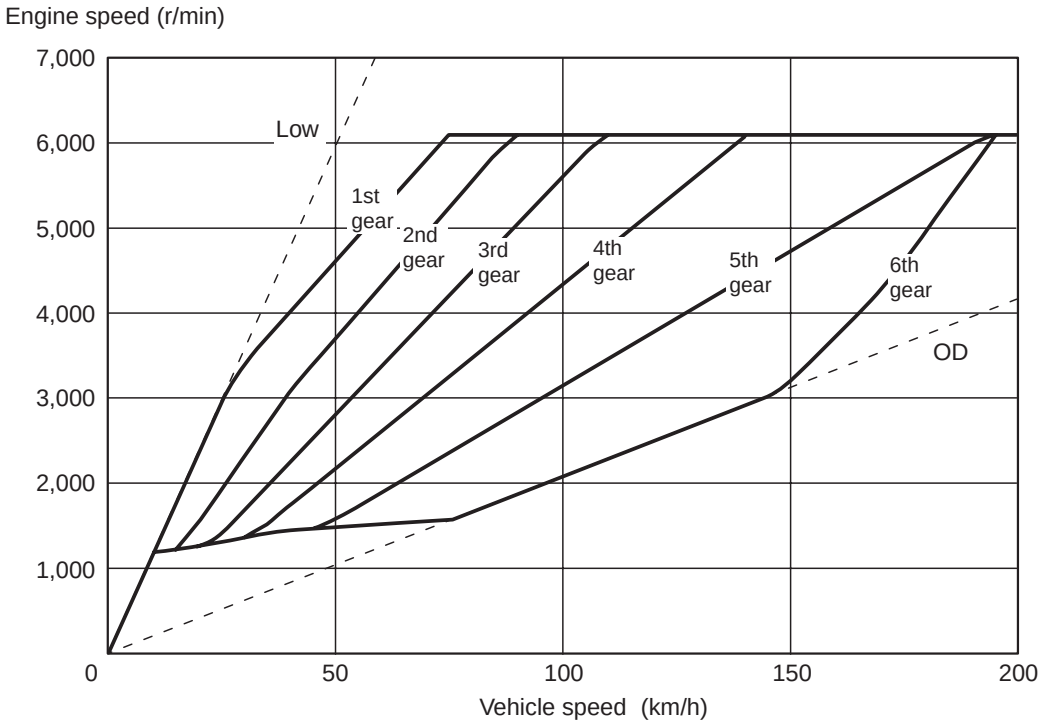
SPORT MODE <VEHICLES WITH PADDLE SHIFT>



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DAMPER CLUTCH OPERATION ZONE

M1231204100511

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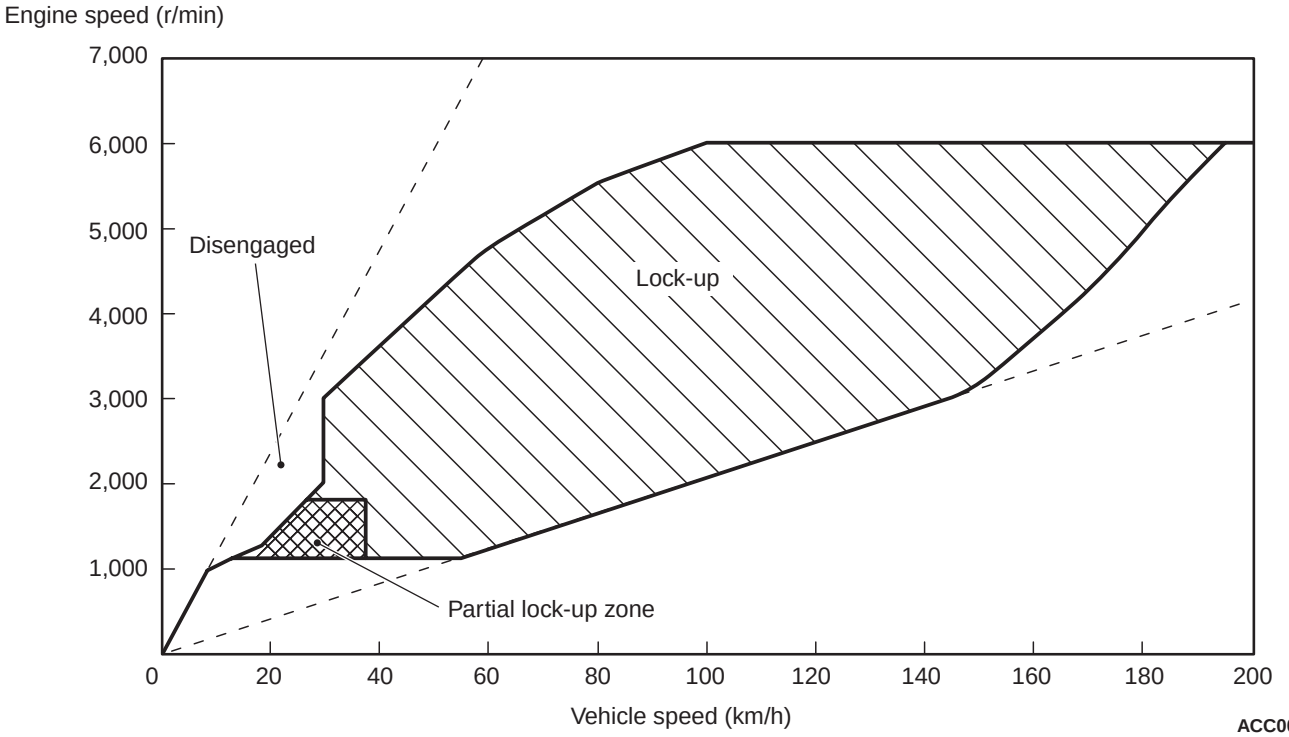

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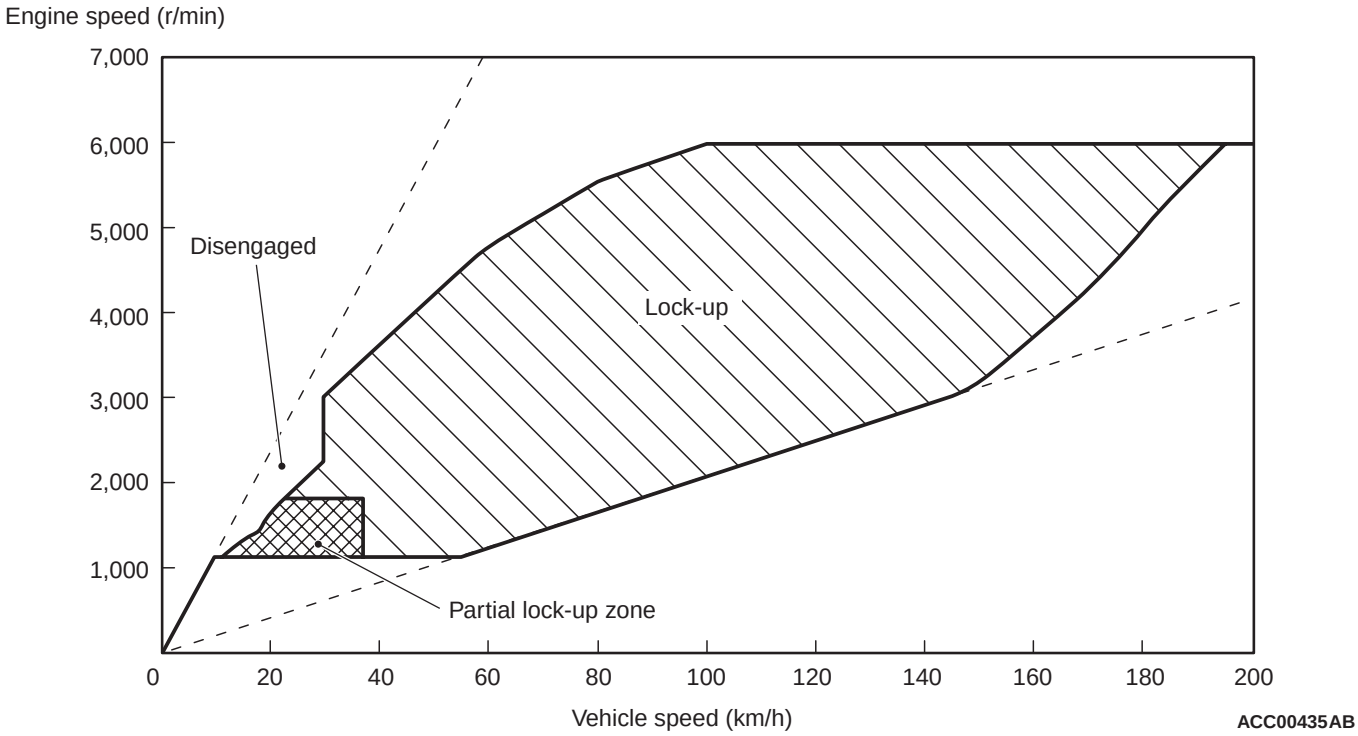


DIAGNOSIS CODE CHART

M1231207900862

⚠ CAUTION

During diagnosis, a diagnosis code associated with other system may be set when the ignition switch is turned on with connector(s) disconnected. On completion, confirm all systems for diagnosis code(s). If diagnosis code(s) are set, erase them all.

Diagnosis code No.	Diagnostic item	Reference page
P0703	Malfunction of stop lamp switch	P.23A-18
P0705	Malfunction of inhibitor switch	P.23A-19
P0711	Malfunction of the CVT fluid temperature sensor (Abnormality in CVT fluid temperature sensor function)	P.23A-20
P0712	Malfunction of the CVT fluid temperature sensor (short)	P.23A-20
P0713	Malfunction of the CVT fluid temperature sensor (open)	
P0715	Malfunction of primary pulley speed sensor	P.23A-21
P071B	Malfunction of Ds position switch	P.23A-22
P0720	Malfunction of secondary pulley speed sensor	P.23A-22
P0725	Malfunction of engine speed	P.23A-23
P0740	Malfunction of lockup solenoid valve	P.23A-24
P0741	Abnormality in lockup function	P.23A-24
P0745	Malfunction of line pressure solenoid valve	P.23A-25

Diagnosis code No.	Diagnostic item	Reference page
P0746	Abnormality in hydraulic control system function	P.23A-25
P0776	Abnormality in secondary pressure solenoid valve function	P.23A-26
P0778	Malfunction of secondary pressure solenoid valve	P.23A-26
P0815	Malfunction of paddle shift up switch <Vehicles with paddle shift>	P.23A-27
P0816	Malfunction of paddle shift down switch <Vehicles with paddle shift>	P.23A-28
P0840	Malfunction of secondary pressure sensor	P.23A-28
P0841	Abnormality in line pressure sensor function	P.23A-29
P0868	Secondary pressure drop	P.23A-29
P0882	Malfunction of power supply system (Low)	P.23A-30
P0883	Malfunction of power supply system (High)	
P1637	Malfunction of memory backup	P.23A-30
P1706	Malfunction of throttle signal	P.23A-31
P1710	Malfunction of vehicle speed signal	P.23A-31
P1723	Abnormality in speed sensor system function	P.23A-32
P1740	Malfunction of lockup/select switching solenoid valve	P.23A-32
P1745	Monitoring of percentage change in gear ratio	P.23A-33
P1773	Malfunction of ABS	P.23A-34
P1777	Malfunction of stepper motor	P.23A-34
P1778	Malfunction of stepper motor function	P.23A-34
P1902	Malfunction of engine system	P.23A-35
U0001	Malfunction of CAN communication circuit (Bus off)	P.23A-35
U0100	CAN time-out error (Engine)	P.23A-35
U0121	CAN time-out error (ABS/ASC)	P.23A-35
U0141	CAN time-out error (ETACS)	P.23A-35
U1195	Coding not implemented	P.23A-36
U1197	Wrong coding data received	P.23A-36

DIAGNOSIS CODE PROCEDURES

Code No. P0703: Malfunction of Stop Lamp Switch

DIAGNOSTIC FUNCTION
CVT-ECU detects malfunction using the stop lamp switch signal sent from the ETACS-ECU.

JUDGEMENT CRITERIA
Drive the vehicle at 30 km/h or more for 10 seconds, and then turn the ignition switch to the OFF position. In this sequential operation, no variation has been found in the stop lamp switch input signal in two consecutive times.

PROBABLE CAUSES
- Malfunction of the CAN bus

- Malfunction of the stop lamp switch
- Damaged wiring harness and connectors
- Malfunction of CVT-ECU
- Malfunction of ETACS-ECU

DIAGNOSTIC PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 2.
NO : Repair the CAN bus lines (Refer to GROUP 54C – Troubleshooting, Diagnosis Code Chart).

STEP 2. M.U.T.-III data list
Item 50: Brake switch

OK: The service data changes in response to the brake operation.

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Go to Step 3.

STEP 3. Stop Lamp Switch Check
Refer to GROUP 35A – Brake Pedal and Stop Lamp Switch Continuity Check (Refer to).

Q: Is the check result normal?
YES : Go to Step 4.
NO : Replace the stop lamp switch.

STEP 4. Check for open circuit in STP line between the stop lamp switch connector and the ETACS-ECU connector

Q: Is the check result normal?
YES : Go to Step 5.
NO : Repair the connector(s) or wiring harness.

STEP 5. Check for open circuit or short to earth in BKLP line between the ETACS-ECU connector and the stop lamp switch connector

Q: Is the check result normal?
YES : Go to Step 6.
NO : Repair the connector(s) or wiring harness.

STEP 6. Symptom recheck after erasing diagnosis code

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Replace the ETACS-ECU, and then go to Step 7.

STEP 7. Symptom recheck after erasing diagnosis code

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Replace CVT-ECU.

Code No. P0705: Malfunction of Inhibitor Switch

DIAGNOSTIC FUNCTION
CVT-ECU monitors the signal from the inhibitor switch, and determines if the abnormal input is present or not.

JUDGEMENT CRITERIA
- CVT-ECU does not detects the inhibitor switch input signal for 5 seconds when the vehicle speed is 1 km/h or more for 10 seconds continuously.
- CVT-ECU detects the multiple inputs from the inhibitor switch for 2 seconds.

PROBABLE CAUSES
- Malfunction of the inhibitor switch
- Improper adjustment of transmission control cable
- Damaged wiring harness and connectors
- Malfunction of CVT-ECU

DIAGNOSTIC PROCEDURE

STEP 1. M.U.T.-III data list
Item 49: Inhibitor SW
Check that the service data changes when the selector lever is moved to all ranges.

OK: The service data changes in response to the selector lever operation.

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Go to Step 2.

STEP 2. Check for open circuit in BLP+ line between the ETACS-ECU connector and the inhibitor switch connector

Q: Is the check result normal?
YES : Go to Step 3.
NO : Repair the connector(s) or wiring harness.

STEP 3. Check for open circuit in INHL, INHD, INHN, INHP line between the inhibitor switch connector and the CVT-ECU connector

Q: Is the check result normal?
YES : Go to Step 4.
NO : Repair the connector(s) or wiring harness.

STEP 4. Inhibitor switch and control cable adjustment
Refer to P.23A-49.

Q: Is the check result normal?
YES : Go to Step 5.
NO : Adjust the inhibitor switch and control cable.

STEP 5. Inhibitor switch continuity check
Refer to P.23A-49.

Q: Is the check result normal?
YES : Go to Step 6.
NO : Replace the inhibitor switch.

STEP 6. Symptom recheck after erasing diagnosis code

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Replace CVT-ECU.

Code No. P0711: Malfunction of CVT Fluid Temperature Sensor (Abnormality in CVT fluid temperature sensor function)

DIAGNOSTIC FUNCTION

CVT-ECU conducts fault detection by monitoring the terminal voltage of the CVT fluid temperature sensor.

JUDGEMENT CRITERIA

- Field A : CVT fluid temperature is less than -20°C
- Field B : CVT fluid temperature is -20°C or more and less than 0°C
- Field C : CVT fluid temperature is 0°C or more and less than 20°C

When the CVT fluid temperature is kept at one of fields A, B and C above for 10 minutes.

PROBABLE CAUSES

- Malfunction of CVT fluid temperature sensor
- Malfunction of CVT fluid cooler piping and oil pump
- Malfunction of CVT-ECU

DIAGNOSTIC PROCEDURE

STEP 1. CVT fluid cooler piping and oil pump check

Q: Is the check result normal?
YES : Go to Step 2.
NO : Repair the failure sections.

STEP 2. CVT fluid temperature sensor check
Refer to P.23A-52.

Q: Is the check result normal?
YES : Go to Step 3.
NO : Replace the valve body assembly.

STEP 3. Symptom recheck after erasing diagnosis code

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Replace CVT-ECU.

Code No. P0712: Malfunction of CVT Fluid Temperature Sensor (Short)
Code No. P0713: Malfunction of CVT Fluid Temperature Sensor (Open)

DIAGNOSTIC FUNCTION

CVT-ECU conducts fault detection by monitoring the terminal voltage of the CVT fluid temperature sensor.

JUDGEMENT CRITERIA

- CVT-ECU detects the fluid temperature −40°C or less for 5 seconds <P0713>.
- CVT-ECU detects the fluid temperature 180°C or more for 5 seconds <P0712>.

PROBABLE CAUSES

- Malfunction of the valve body assembly (Faulty CVT fluid temperature sensor)
- Damaged wiring harness and connectors
- Malfunction of CVT-ECU

DIAGNOSTIC PROCEDURE

STEP 1. M.U.T.-III data list
Item 05: CVT fluid temperature sensor signal (Refer to Service Data Reference Table P.23A-40).

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Go to Step 2.

STEP 2. Check for open circuit and short to earth in SPWR line between the CVT assembly connector and the CVT-ECU connector

Q: Is the check result normal?
YES : Go to Step 3.
NO : Repair the connector(s) or wiring harness.

STEP 3. Check for open circuit in SGND line between the CVT assembly connector and the CVT-ECU connector

Q: Is the check result normal?
YES : Go to Step 4.
NO : Repair the connector(s) or wiring harness.

STEP 4. CVT fluid temperature sensor check
Refer to P.23A-52.

Q: Is the check result normal?
YES : Go to Step 5.
NO : Replace the valve body assembly.

STEP 5. Symptom recheck after erasing diagnosis code

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Replace CVT-ECU.

Code No. P0715: Malfunction of Primary Pulley Speed Sensor

DIAGNOSTIC FUNCTION

CVT-ECU determines that the malfunction is present when the primary pulley speed sensor value changes abruptly or when there is a discrepancy between this sensor and other sensors in sensor reading.

JUDGEMENT CRITERIA

- The status with the secondary pulley speed of 500 r/min or more and with the primary pulley speed of 150 r/min or less continues for 5 seconds.
- 0.1 seconds after the primary pulley speed has dropped abruptly from 1,000 r/min or more to 300 r/min or less
- Primary pulley speed sensor is found abnormal by comparing the engine speed with the secondary pulley speed.

PROBABLE CAUSES

- Malfunction of primary pulley speed sensor
- Damaged wiring harness and connectors
- Malfunction of CVT-ECU

DIAGNOSTIC PROCEDURE

STEP 1. M.U.T.-III data list
Item 01: Primary speed sensor signal (Refer to Service Data Reference Table P.23A-40.)

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Go to Step 2.

STEP 2. Check for open circuit in SGND line between the primary pulley speed sensor connector and the CVT-ECU connector

Q: Is the check result normal?
YES : Go to Step 3.
NO : Repair the connector(s) or wiring harness.

STEP 3. Check for open circuit and short to earth in PRMS line between the primary pulley speed sensor connector and the CVT-ECU connector

Q: Is the check result normal?
YES : Go to Step 4.
NO : Repair the connector(s) or wiring harness.

STEP 4. Check for open circuit in the power supply line between the CVT control relay and the primary pulley speed sensor connector

Q: Is the check result normal?
YES : Go to Step 5.
NO : Repair the connector(s) or wiring harness.

STEP 5. Primary pulley speed sensor check
Visually check the tip of the sensor for foreign materials or damage.

Q: Is the check result normal?
YES : Go to Step 6.
NO : Repair.

STEP 6. Diagnosis code recheck after replacing the primary pulley speed sensor

Q: Is the check result normal?
YES : The inspection is complete.
NO : Replace CVT-ECU.

Code No. P071B Malfunction of Ds position switch <Vehicles without paddle shift>

DIAGNOSTIC FUNCTION
The CVT-ECU detects that the Ds position switch is stuck to ON.

JUDGMENT CRITERIA
The Ds position switch remains ON for five seconds when the inhibitor switch is at "P", "R", or "N".

PROBABLE CAUSES
- Malfunction of Ds position switch
- Damaged wiring harness and connectors
- Malfunction of CVT-ECU

DIAGNOSTIC PROCEDURE

STEP 1. M.U.T.-III data list
Item 51: Ds position switch

OK: Turns ON when the selector lever is at "Ds" or "L".

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Go to Step 2

STEP 2. Ds position switch single unit check
Refer to P.23A-58.

Q: Is the check result normal?
YES : Go to Step 3
NO : Replace the selector lever assembly.

STEP 3. Check for short to earth in INHS line between the CVT-ECU connector and the Ds position switch connector

Q: Is the check result normal?
YES : Go to Step 4
NO : Repair the connector(s) or wiring harness.

STEP 4. Check for open circuit in earth line between the Ds position switch connector and body erth.

Q: Is the check result normal?
YES : Go to Step 5
NO : Repair the connector(s) or wiring harness.

STEP 5. Symptom recheck after erasing diagnosis code

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Replace CVT-ECU.

Code No. P0720: Malfunction of Secondary Pulley Speed Sensor

DIAGNOSTIC FUNCTION
CVT-ECU determines that the malfunction is present when the secondary pulley speed sensor value changes abruptly or when there is a discrepancy between this sensor and other sensors in sensor reading.

JUDGEMENT CRITERIA

- The status with the primary pulley speed of 1,000 r/min or more and with the secondary pulley speed of 150 r/min or less continues for 5 seconds.
- 0.1 seconds after the vehicle speed computed by CVT has dropped abruptly from 20 km/h or more to 5 km/h or less
- When the secondary pulley speed sensor is found abnormal by comparing the engine speed, primary pulley speed, and vehicle speed

PROBABLE CAUSES

- Malfunction of secondary pulley speed sensor
- Damaged wiring harness and connectors
- Malfunction of CVT-ECU

DIAGNOSTIC PROCEDURE

STEP 1. M.U.T.-III data list
Item 02: Secondary speed sensor signal (Refer to Service Data Table P.23A-40.)

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Go to Step 2.

STEP 2. Check for open circuit in SGND line between the secondary pulley speed sensor connector and the CVT-ECU connector.

Q: Is the check result normal?
YES : Go to Step 3.
NO : Repair the connector(s) or wiring harness.

STEP 3. Check for open circuit and short to earth in SECS line between the secondary pulley speed sensor connector and the CVT-ECU connector

Q: Is the check result normal?
YES : Go to Step 4.
NO : Repair the connector(s) or wiring harness.

STEP 4. Check for open circuit in power supply line between the CVT control relay and the secondary pulley speed sensor connector

Q: Is the check result normal?
YES : Go to Step 5.
NO : Repair the connector(s) or wiring harness.

STEP 5. Secondary pulley speed sensor check
Visually check the tip of the sensor for foreign materials or damage.

Q: Is the check result normal?
YES : Go to Step 6.
NO : Repair.

STEP 6. Diagnosis code recheck after replacing the secondary pulley speed sensor

Q: Is the check result normal?
YES : The inspection is complete.
NO : Replace CVT-ECU.

Code No. P0725: Malfunction of Engine Speed

DIAGNOSTIC FUNCTION

CVT-ECU detects malfunction of engine speed received from the engine-ECU by comparing the primary pulley speed with the secondary pulley speed.

JUDGMENT CRITERIA

- Locked up with the primary pulley speed of 1,000 r/min or more and with the engine speed of 450 r/min or less
- CVT-ECU detects the malfunction in the engine speed by comparing it with the primary pulley speed.
- CAN communication error occurs between engine-ECU and CVT-ECU.

PROBABLE CAUSES

- Malfunction of the CAN bus
- Malfunction of the engine system
- Malfunction of CVT-ECU

DIAGNOSTIC PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 2.
NO : Go to "CAN Troubleshooting."

STEP 2. M.U.T.-III diagnosis code
Check if the engine-related diagnosis code is set.

Q: Is the check result normal?

YES : Go to Step 3.
NO : Go to "Engine Troubleshooting."

STEP 3. Symptom recheck after erasing diagnosis code

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Replace CVT-ECU.

Code No. P0740: Malfunction of Lockup Solenoid Valve

DIAGNOSTIC FUNCTION
CVT-ECU determines malfunction by detecting the abnormality in the lockup solenoid valve.

JUDGEMENT CRITERIA
Specified amount of current is not flown to the lockup solenoid valve because of the open or short circuit.

PROBABLE CAUSES
- Malfunction of valve body assembly (Faulty lockup solenoid valve)
- Damaged wiring harness and connectors
- Malfunction of CVT-ECU

DIAGNOSTIC PROCEDURE

STEP 1. M.U.T.-III data list
- Item 31: Lockup solenoid output current
- Item 30: Lockup solenoid monitoring current

OK: Check if the output current and monitoring current differ largely.

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Go to Step 2.

STEP 2. Check for open circuit and short to earth in LULS line between the CVT-ECU connector and the CVT assembly connector

Q: Is the check result normal?
YES : Go to Step 3.
NO : Repair the connector(s) or wiring harness.

STEP 3. Lockup solenoid valve single unit check
Refer to P.23A-52.

Q: Is the check result normal?
YES : Go to Step 4.
NO : Replace the valve body assembly.

STEP 4. Symptom recheck after erasing diagnosis code

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Replace CVT-ECU.

Code No. P0741: Abnormality in Lock-up Function

DIAGNOSTIC FUNCTION
Abnormality is detected by the CVT-ECU when the torque converter slip speed is high during lockup control.

JUDGMENT CRITERIA
The status with the high torque converter slip speed continues for 30 seconds during lockup control (Primary pulley speed and engine speed are normal, and lockup differential pressure is 0.2 MPa or more).

PROBABLE CAUSES
- Abnormal line pressure
- Malfunction of CVT-ECU

DIAGNOSTIC PROCEDURE

STEP 1. Check other diagnosis codes.

Q: Are other diagnosis codes set?
YES : Carry out the appropriate troubleshooting.
NO : Go to Step 2.

STEP 2. M.U.T.-III data list
- Item 07: Primary speed
- Item 09: Engine speed

OK: No considerable difference is observed between the primary pulley speed and the engine speed.

Q: Is the check result normal?

YES : Intermittent malfunction
NO : Go to Step 3.

STEP 3. Line Pressure Check
Carry out "hydraulic test"(Refer to P.23A-54).

Q: Is the check result normal?
YES : Go to Step 4.
NO : Repair according to the hydraulic pressure diagnosis table.

STEP 4. Symptom recheck after erasing diagnosis code

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Replace CVT-ECU.

Code No. P0745: Malfunction of Line Pressure Solenoid Valve

DIAGNOSTIC FUNCTION
CVT-ECU determines malfunction by detecting the abnormality in the line pressure solenoid valve.

JUDGEMENT CRITERIA
Specified amount of current is not flown to the line pressure solenoid valve because of the open or short circuit.

PROBABLE CAUSES
- Malfunction of valve body assembly (Faulty line pressure solenoid valve)
- Damaged wiring harness and connectors
- Malfunction of CVT-ECU

DIAGNOSTIC PROCEDURE

STEP 1. M.U.T.-III data list
- Item 33: Line pressure solenoid output current
- Item 32: Line pressure solenoid monitoring current

OK: Check if the output current and monitoring current differ largely.

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Go to Step 2.

STEP 2. Check for open circuit and short to earth in PLLS line between the CVT-ECU connector and the CVT assembly connector.

Q: Is the check result normal?
YES : Go to Step 3.
NO : Repair the wiring harness.

STEP 3. Line pressure solenoid valve single unit check
Refer to P.23A-52.

Q: Is the check result normal?
YES : Go to Step 4.
NO : Replace the valve body assembly.

STEP 4. Symptom recheck after erasing diagnosis code

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Replace CVT-ECU.

Code No. P0746: Abnormality in Hydraulic Control System Function

DIAGNOSTIC FUNCTION
CVT-ECU determines that the malfunction is present when gear ratio becomes higher (gear ratio range: 2.349 to 0.394).

JUDGMENT CRITERIA
The status with the gear ratio of 3.5 or more continues for 0.1 seconds or with the gear ratio of 2.7 or more continues for 0.2 seconds.

YES : Carry out the appropriate troubleshooting.

PROBABLE CAUSES
- Abnormal line pressure
- Malfunction of CVT-ECU

DIAGNOSTIC PROCEDURE

STEP 1. Check other diagnosis codes.

Q: Are other diagnosis codes set?
NO : Go to Step 2.

STEP 2. M.U.T.-III data list
Item 33: Line pressure solenoid output current (Refer to Service Data Table P.23A-40.)

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Go to Step 3.

STEP 3. Line Pressure Check
Carry out "hydraulic test"(Refer to P.23A-54).

Q: Is the check result normal?
YES : Go to Step 4.
NO : Repair according to the hydraulic pressure diagnosis table.

STEP 4. Symptom recheck after erasing diagnosis code

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Replace CVT-ECU.

Code No. P0776: Abnormality in Secondary Pressure Solenoid Valve Function

DIAGNOSTIC FUNCTION
CVT-ECU conducts fault detection by measuring the difference between the target value and the actual value for the secondary pressure.

JUDGEMENT CRITERIA
The following three conditions are met for three seconds.
1. Engine speed is 450 r/min or more.
2. Power supply voltage is 10 V or more.
3. Difference between target secondary pressure and actual secondary pressure is 1.20 MPa for 3 seconds continuously.

PROBABLE CAUSES
- Trouble in CAN bus system
- Abnormal line pressure
- Malfunction of CVT-ECU

DIAGNOSTIC PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 2.
NO : Repair the CAN bus lines (Refer to GROUP 54C – Troubleshooting, Diagnosis Code Chart).

STEP 2. Check other diagnosis codes.

Q: Are other diagnosis codes set?
YES : Carry out the appropriate troubleshooting.
NO : Go to Step 3.

STEP 3. M.U.T.-III data list
Item 19: Secondary pressure (Refer to Service Data Table P.23A-40.)

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Go to Step 4.

STEP 4. Line Pressure Check
Carry out "hydraulic test"(Refer to P.23A-54).

Q: Is the check result normal?
YES : Go to Step 5.
NO : Repair according to the hydraulic pressure diagnosis table.

STEP 5. Symptom recheck after erasing diagnosis code

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Replace CVT-ECU.

Code No. P0778: Malfunction of Secondary Pressure Solenoid Valve

DIAGNOSTIC FUNCTION
CVT-ECU determines malfunction by detecting the abnormality in the secondary pressure solenoid valve.

JUDGEMENT CRITERIA
Specified amount of current is not flown to the line pressure solenoid valve because of the open or short circuit.

PROBABLE CAUSES

- Malfunction of valve body assembly (Faulty secondary pressure solenoid valve)
- Damaged wiring harness and connectors
- Malfunction of CVT-ECU

DIAGNOSTIC PROCEDURE

STEP 1. M.U.T.-III data list

- Item 35: Secondary pressure solenoid output current
- Item 34: Secondary pressure solenoid monitoring current

OK: Check if the output current and monitoring current differ largely.

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Go to Step 2.

STEP 2. Check for open circuit and short to earth in SCLS line between the CVT-ECU connector and the CVT assembly connector.

Q: Is the check result normal?
YES : Go to Step 3.
NO : Repair the wiring harness.

STEP 3. Secondary pressure solenoid valve single unit check
Refer to P.23A-52.

Q: Is the check result normal?
YES : Go to Step 4.
NO : Replace the valve body assembly.

STEP 4. Symptom recheck after erasing diagnosis code

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Replace CVT-ECU.

Code No. P0815 Malfunction of paddle shift UP switch

DIAGNOSTIC FUNCTION

CVT-ECU detects that the paddle shift UP switch is stuck to ON.

JUDGMENT CRITERIA

When the paddle shift UP switch being ON consecutively for 60 seconds is detected.

PROBABLE CAUSES

- Malfunction of paddle shift switch
- Damaged wiring harness and connectors
- Malfunction of CVT-ECU

DIAGNOSTIC PROCEDURE

STEP 1. M.U.T.-III data list
Item 54: Paddle shift SW (UP)

OK: The service data changes in response to the paddle shift operation.

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Go to Step 2.

STEP 2. Paddle shift switch single unit check
Refer to P.23A-66.

Q: Is the check result normal?
YES : Go to Step 3.
NO : Replace the paddle shift switch.

STEP 3. Check for short to earth in PDUP line between the CVT-ECU connector and the paddle shift switch connector

Q: Is the check result normal?
YES : Go to Step 4.
NO : Repair the connector(s) or wiring harness.

STEP 4. Check for open circuit in earth line between the paddle shift switch connector and body erth

Q: Is the check result normal?
YES : Go to Step 5.
NO : Repair the connector(s) or wiring harness.

STEP 5. Symptom recheck after erasing diagnosis code

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Replace CVT-ECU.

Code No. P0816 Malfunction of paddle shift DOWN switch

DIAGNOSTIC FUNCTION
CVT-ECU detects that the paddle shift DOWN switch is stuck to ON.

JUDGEMENT CRITERIA
When the paddle shift DOWN switch being ON consecutively for 60 seconds is detected.

PROBABLE CAUSES
- Malfunction of paddle shift switch
- Damaged wiring harness and connectors
- Malfunction of CVT-ECU

DIAGNOSTIC PROCEDURE

STEP 1. M.U.T.-III data list
Item 55: Paddle shift SW (DOWN)

OK: The service data changes in response to the paddle shift operation.

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Go to Step 2.

STEP 2. Paddle shift switch single unit check
Refer to P.23A-66.

Q: Is the check result normal?
YES : Go to Step 3.
NO : Replace the paddle shift switch.

STEP 3. Check for short to earth in PDDW line between the CVT-ECU connector and the paddle shift switch connector

Q: Is the check result normal?
YES : Go to Step 4.
NO : Repair the wiring harness.

STEP 4. Check for open circuit in earth line between the paddle shift switch connector and body erth

Q: Is the check result normal?
YES : Go to Step 5.
NO : Repair the connector(s) or wiring harness.

STEP 5. Retest the system.

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Replace CVT-ECU.

Code No. P0840: Malfunction of Secondary Pressure Sensor

DIAGNOSTIC FUNCTION
CVT-ECU conducts fault detection by monitoring the output voltage of the secondary pressure sensor.

JUDGEMENT CRITERIA
- The status with the fluid temperature of −20°C or more and with the secondary pressure sensor voltage of 4.69 V or more continues for 5 seconds.
- The status with the fluid temperature of −20°C or more and with the secondary pressure sensor voltage of 0.09 V or less continues for 5 seconds.

PROBABLE CAUSES
- Malfunction of valve body assembly (Faulty secondary pressure sensor)
- Damaged wiring harness and connectors
- Malfunction of CVT-ECU

DIAGNOSTIC PROCEDURE

STEP 1. M.U.T.-III data list
- Item 04: Secondary pressure sensor signal (Refer to Service Data Reference Table P.23A-40.)

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Go to Step 2.

STEP 2. Check for open circuit and short to earth in LRPS, SGND, SSPW line between the CVT-ECU connector and the CVT assembly connector.

Q: Is the check result normal?
YES : Go to Step 3.
NO : Repair the connector(s) or wiring harness.

STEP 3. Symptom recheck after replacing the valve body assembly

Q: Is the check result normal?

YES : The inspection is complete.
NO : Replace CVT-ECU.

Code No. P0841: Abnormality in Line Pressure Sensor Function

DIAGNOSTIC FUNCTION

CVT-ECU conducts fault detection by comparing the target line pressure reading with the actual secondary pressure reading.

JUDGEMENT CRITERIA

The actual secondary pressure reading is 0.675 MPa or more, and the status over the target line pressure remains for 5 seconds.

PROBABLE CAUSES

- Abnormal line pressure
- Abnormality in secondary pressure sensor system
- Malfunction of CVT-ECU

DIAGNOSTIC PROCEDURE

STEP 1. Check other diagnosis codes.

Q: Are other diagnosis codes set?

YES : Go to the appropriate troubleshooting.
NO : Go to Step 2.

STEP 2. Line pressure check

Carry out "hydraulic test"(Refer to P.23A-54).

Q: Is the check result normal?
YES : Go to Step 3.
NO : Repair according to the hydraulic pressure diagnosis table.

STEP 3. Symptom recheck after erasing diagnosis code

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Replace CVT-ECU.

Code No. P0868: Secondary Pressure Drop

DIAGNOSTIC FUNCTION

CVT-ECU detects the secondary pressure drop during driving.

JUDGEMENT CRITERIA

The value obtained by subtracting the actual secondary pressure sensor reading from the target secondary pressure sensor reading is 0.25 MPa or more.

PROBABLE CAUSES

- Damaged wiring harness and connectors
- Malfunction of CVT assembly
- Malfunction of CVT-ECU

DIAGNOSTIC PROCEDURE

STEP 1. Check other diagnosis codes

Q: Are other diagnosis codes set?

YES : Go to the appropriate troubleshooting.
NO : Go to Step 2.

STEP 2. Check for short to earth in LRPS line between the CVT-ECU connector and the CVT assembly connector

Q: Is the check result normal?
YES : Go to Step 3.
NO : Repair the connector(s) or wiring harness.

STEP 3. Symptom recheck after erasing diagnosis code

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Replace the CVT-ECU, and then go to Step 4.

STEP 4. Retest the system.

Q: Is the check result normal?

YES : The inspection is complete.
NO : Replace the CVT assembly.

Code P0882: Malfunction of power supply system (Low)
Code P0883: Malfunction of power supply system (high)

DIAGNOSTIC FUNCTION

CVT-ECU monitors if power supply system is normal or not and judges the trouble.

JUDGEMENT CRITERIA

- <P0882> : When the engine speed is 450 r/min or more and secondary pressure is above 0.3 MPa, the power supply voltage is 9.0 V or less (for 5 seconds)
- <P0883>: When the engine speed is 450 r/min or more, the secondary pressure is above 0.3 MPa and the vehicle speed is 1 km/h or more, the power supply voltage is 16.0 V or more (for 5 seconds)

PROBABLE CAUSES

- Damaged wiring harness and connectors
- Malfunction of CVT-ECU

DIAGNOSTIC PROCEDURE

STEP 1. Check for short circuit in power supply line between the fusible link and the CVT control relay connector

Q: Is the check result normal?

YES : Go to Step 2.
NO : Repair the connector(s) or wiring harness.

STEP 2. Check for short circuit in VIG1, VIG2 line between the CVT control relay connector and the CVT-ECU connector.

Q: Is the check result normal?
YES : Go to Step 3.
NO : Repair the connector(s) or wiring harness.

STEP 3. Check for open circuit in GND1, GND2 line between the CVT-ECU connector and earth.

Q: Is the check result normal?
YES : Go to Step 4.
NO : Repair the wiring harness.

STEP 4. Symptom recheck after erasing diagnosis code

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Replace CVT-ECU.

Code No. P1637: Malfunction of Memory Backup

DIAGNOSTIC FUNCTION

CVT-ECU checks the consistency between EEP-ROM and the backup memory.

JUDGEMENT CRITERIA

When the ignition switch is turned to the ON position, CVT-ECU determines that the writing to the EEP-ROM area had failed last time the ignition switch was turned to the OFF position.

PROBABLE CAUSES

- Damaged wiring harness and connectors
- Malfunction of CVT-ECU (Faulty EEPROM)

DIAGNOSTIC PROCEDURE

STEP 1. Check if diagnosis code P1637 is erased by turning the ignition switch from the OFF position to the ON position.

Q: Is the check result normal?
YES : This diagnosis code will be set by disconnecting the battery. If the diagnosis code is not erased by turning the ignition switch to the ON position, it is judged to be normal.
NO : Go to Step 2.

STEP 2. Check for open circuit in power supply line

Q: Is the check result normal?
YES : Go to Step 3.
NO : Repair the wiring harness.

STEP 3. Symptom recheck after erasing diagnosis code

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Replace CVT-ECU.

Code No. P1706: Malfunction of Throttle Signal

DIAGNOSTIC FUNCTION

CVT-ECU detects the abnormality in the throttle position signal sent from the engine-ECU.

JUDGMENT CRITERIA

The value inverted against the throttle position signal received from the engine ECU is fixed for one second.

PROBABLE CAUSES

- Malfunction of the CAN bus
- Malfunction of engine system
- Malfunction of CVT-ECU

DIAGNOSTIC PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics

Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 2
NO : Repair the CAN bus lines (Refer to GROUP 54C – Troubleshooting, Diagnosis Code Chart).

STEP 2. M.U.T.-III diagnosis code

Check if the engine-related diagnosis code is set.

Q: Is diagnosis code set?
YES : Diagnose the engine control system.
NO : Go to Step 3

STEP 3. Symptom recheck after erasing diagnosis code

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Replace CVT-ECU.

Code No. P1710: Malfunction of Vehicle Speed Signal

DIAGNOSTIC FUNCTION

CVT-ECU conducts fault detection by detecting the rapid change in the estimated vehicle speed signal received from the ASC-ECU.

JUDGEMENT CRITERIA

- Difference between the estimated vehicle speed and the one measured before 0.1 seconds is 29 km/h or more.
- The status with the vehicle speed of 10 km/h or more and with the estimated vehicle speed of 2 km/h or less continues for 20 seconds.

PROBABLE CAUSES

- Malfunction of the CAN bus
- Malfunction of CVT-ECU

DIAGNOSTIC PROCEDURE

STEP 1. Troubleshoot the CAN system if diagnosis code U0121 is set.

Q: Is the diagnosis code U0121 set?
YES : Diagnose the CAN system.
NO : Go to Step 2.

STEP 2. M.U.T.-III data list

- Item 21: Vehicle speed signal
- Item 22: Vehicle speed

OK: The difference between to vehicle speed signal and the vehicle speed is 10 km/h or less.

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Go to Step 3.

STEP 3. Check ASC-related diagnosis codes.

Q: Is the ASC-related diagnosis code set?
YES : Carry out the appropriate troubleshooting.
NO : Go to Step 4.

STEP 4. Symptom recheck after erasing diagnosis code

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Replace CVT-ECU.

Code No. P1723: Abnormality in Speed Sensor System Function

DIAGNOSTIC FUNCTION

CVT-ECU detects the abnormal wave pattern of the speed sensor signal.

JUDGEMENT CRITERIA

- Rotational fluctuation of primary pulley is large (for 1 second).
- Rotational fluctuation of secondary pulley is large (for 1 second).

PROBABLE CAUSES

- Malfunction of primary pulley speed sensor
- Malfunction of secondary pulley speed sensor
- Malfunction of CVT-ECU

DIAGNOSTIC PROCEDURE

STEP 1. Check the following connector:

- CVT-ECU connector
- Primary pulley speed sensor connector
- Secondary pulley speed sensor connector
- Intermediate connector

Check for the connection with terminals.

Q: Is the check result normal?
YES : Go to Step 2.
NO : Repair the defective connector.

STEP 2. Use an oscilloscope to measure the wave patterns of the primary pulley speed sensor and secondary pulley speed sensor.
Refer to P.23A-47.

Q: Is the check result normal?
YES : Go to Step 3.
NO : Replace the primary pulley speed sensor or secondary pulley speed sensor.

STEP 3. Symptom recheck after erasing diagnosis code

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Replace CVT-ECU.

Code No. P1740: Malfunction of Lockup/Select Switching Solenoid Valve

DIAGNOSTIC FUNCTION

CVT-ECU detects abnormal operation of the lockup/select switching solenoid valve.

JUDGEMENT CRITERIA

- The status with the switching solenoid valve ON and with the monitoring value OFF is detected for 0.2 second.
- The status with the switching solenoid valve OFF and with the monitoring value ON is detected for 0.5 seconds.

PROBABLE CAUSES

- Malfunction of valve body assembly (Faulty lockup/select switching solenoid valve)
- Damaged wiring harness and connectors
- Malfunction of CVT-ECU

DIAGNOSTIC PROCEDURE

STEP 1. M.U.T.-III data list
Item 36: LU/SEL switching solenoid output
Item 37: LU/SEL switching solenoid monitor

OK: Check that the output and monitor do not differ greatly.

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Go to Step 2.

STEP 2. Check for open circuit and short to earth in LUOS line between the CVT-ECU connector and the CVT assembly connector.

Q: Is the check result normal?
YES : Go to Step 3.
NO : Repair the wiring harness.

STEP 3. Lockup/select switching solenoid valve single unit check
Refer to P.23A-52.

Q: Is the check result normal?
YES : Go to Step 4.
NO : Replace the valve body assembly.

STEP 4. Symptom recheck after erasing diagnosis code

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Replace CVT-ECU.

Code No. P1745: Monitoring of Percentage Change in Gear Ratio

DIAGNOSTIC FUNCTION
CVT-ECU conducts fault detection by monitoring the internal calculated value.

JUDGMENT CRITERIA
Percentage change in gear ratio is larger than the standard value.

PROBABLE CAUSES
- Malfunction of CVT-ECU

DIAGNOSTIC PROCEDURE

STEP 1. Symptom recheck after erasing diagnosis code

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Replace CVT-ECU.

Code No. P1773: Malfunction of ABS

DIAGNOSTIC FUNCTION
CVT-ECU detects the ABS abnormality.

JUDGEMENT CRITERIA
When the ABS error signal reception continues for 0.5 seconds.

PROBABLE CAUSES
- Malfunction of the ABS system
- Malfunction of CVT-ECU

DIAGNOSTIC PROCEDURE

STEP 1. ABS system diagnosis code check

Q: Is the ABS system diagnosis code set?
YES : Carry out the troubleshooting for ABS.
NO : Go to Step 2.

STEP 2. Symptom recheck after erasing diagnosis code

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Replace CVT-ECU.

Code No. P1777: Malfunction of Stepper Motor

DIAGNOSTIC FUNCTION

CVT-ECU conducts fault detection by monitoring the voltage of each coil for stepper motors.

JUDGEMENT CRITERIA

The specified voltage is not applied to each coil for stepper motors for 0.2 seconds because of the open or short circuit.

PROBABLE CAUSES

- Malfunction of valve body assembly (Faulty stepper motor)
- Damaged wiring harness and connectors
- Malfunction of CVT-ECU

DIAGNOSTIC PROCEDURE

STEP 1. Check for open circuit and short to earth in SPM1, SPM2, SPM3, SPM4 line between the CVT-ECU connector and the CVT assembly (stepper motor)

Between CVT-ECU connector and body earth

OK: Resistance value is approximately 15 Ω.

Q: Is the check result normal?

YES : Go to Step 3.
NO : Go to Step 2.

STEP 2. Check for open circuit and short to earth in SPM1, SPM2, SPM3, SPM4 line between CVT-ECU connector and the CVT assembly (stepper motor)

Check that there is no continuity in both sides of the connectors and that no short circuit is present between the connectors and the body earth.

Q: Is the check result normal?
YES : Replace the valve body assembly.
NO : Repair the connector(s) or wiring harness.

STEP 3. Symptom recheck after erasing diagnosis code

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Replace CVT-ECU.

Code No. P1778: Malfunction of Stepper Motor Function

DIAGNOSTIC FUNCTION

CVT-ECU conducts the fault detection of the stepper motor by comparing the target value of the primary pulley speed with the actual value. (Target value: Actual secondary pulley speed multiplied by gear ratio corresponding to stepper motor position) (Actual measurement value: Actual primary pulley speed)

JUDGEMENT CRITERIA

The difference between the target value of the primary pulley speed and the actual measurement value is greater than the standard value, the difference between the target gear ratio and the actual gear ratio is 0.3 or greater, and this status continues for 5 seconds.

PROBABLE CAUSES

- Malfunction of CVT-ECU
- Malfunction of valve body assembly (Faulty stepper motor)

DIAGNOSTIC PROCEDURE

STEP 1. Check other diagnosis codes.

Q: Are other diagnosis codes set?
YES : Carry out the appropriate troubleshooting.
NO : Go to Step 2.

STEP 2. Symptom recheck after erasing diagnosis code

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Replace the CVT-ECU, and then go to Step 3.

STEP 3. Retest the system.

Q: Is the check result normal?
YES : The inspection is complete.
NO : Replace the valve body assembly.

Code No. P1902: Malfunction of Engine System

DIAGNOSTIC FUNCTION

- When the engine-ECU detects the malfunction of the ETV system, the engine-ECU enters the limp-home control mode (throttle valve angle: approx. 20 %).
- CVT-ECU begins controlling the following items: lockup inhibition, increase of secondary pressure, fixing of gear ratio line.

JUDGMENT CRITERIA

CVT-ECU receives the limp-home signal from engine-ECU via CAN.

PROBABLE CAUSES

- Malfunction of the engine system (ETV)

Code No. U0001: Malfunction of CAN Communication Circuit (Bus off)

DIAGNOSTIC FUNCTION

CVT-ECU conducts bus-off detection.

JUDGEMENT CRITERIA

When malfunction is detected in the CAN communication system.

PROBABLE CAUSES

- Malfunction of the CAN bus

Code No. U0100: CAN Time-out Error (Engine)

DIAGNOSTIC FUNCTION

CVT-ECU receives periodic communication data from the engine-ECU via CAN bus lines.

JUDGMENT CRITERIA

CVT-ECU cannot receive the periodic communication data from the engine-ECU.

PROBABLE CAUSES

- Malfunction of the CAN bus
- Engine ECU malfunction
- Malfunction of CVT-ECU

Code No. U0121: CAN Time-out Error (ABS/ASC)

DIAGNOSTIC FUNCTION

CVT-ECU determines that malfunction is present if the periodic communication data sent from the ABS/ASC-ECU via CAN bus lines is abnormal.

JUDGEMENT CRITERIA

CVT-ECU cannot receive the periodic communication data from ABS/ASC-ECU.

PROBABLE CAUSES

- Malfunction of the CAN bus
- ABS/ASC-ECU malfunction
- Malfunction of CVT-ECU

Code No. U0141: CAN Time-out Error (ETACS)

DIAGNOSTIC FUNCTION

CVT-ECU determines that malfunction is present if the periodic communication data sent from ETACS-ECU via the CAN bus lines is abnormal.

JUDGMENT CRITERIA
CVT-ECU cannot receive the periodic communication data from ETACS-ECU.

PROBABLE CAUSES
- Malfunction of the CAN bus
- Malfunction of ETACS-ECU
- Malfunction of CVT-ECU

Code No. U1195: Coding not implemented

Diagnostic function
CVT-ECU checks that the coding information is normal.

JUDGEMENT CRITERIA
When the CVT-ECU coding has not been performed.

PROBABLE CAUSES
- Malfunction of CAN bus line
- Variant coding for ETACS-ECU has not been implemented.
- Malfunction of ETACS-ECU
- Malfunction of CVT-ECU

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics
Use the M.U.T.-III to diagnose the CAN bus lines.

Q: Is the check result normal?
YES : Go to Step 2.
NO : Repair the CAN bus lines. (Refer to GROUP 54C – Troubleshooting .)

STEP 2. Use M.U.T.-III to confirm a diagnosis code of other systems.
Check if a coding-related diagnosis code is set in the ETACS-ECU.

Q: Is the diagnosis code set?
YES : Diagnose the ETACS-ECU. (Refer to GROUP 54A – Troubleshooting)
NO : Go to Step 3.

STEP 3. Diagnosis code recheck
Check again if the diagnosis code is set to CVT-ECU.
(1) Erase the diagnosis code.
(2) Turn the ignition switch from the LOCK (OFF) position to the ON position.
(3) Check if the diagnosis code is set.

Q: Is the diagnosis code set?
YES : Replace the CVT-ECU.
NO : Intermittent malfunction.

Code No. U1197: Wrong coding data received

Diagnostic function
CVT-ECU checks that the coding information is normal.

JUDGEMENT CRITERIA
The ETACS-ECU coding information about whether the 4WD-ECU is mounted or not is incorrect.

PROBABLE CAUSES
- Malfunction of the CAN bus line
- ETACS-ECU coding information is abnormal
- ETACS-ECU failure or improper assembly
- Malfunction of CVT-ECU

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics
Use the M.U.T.-III to diagnose the CAN bus lines.

Q: Is the check result normal?
YES : Go to Step 2.
NO : Repair the CAN bus lines. (Refer to GROUP 54C – Troubleshooting .)

STEP 2. Use M.U.T.-III to confirm a diagnosis code of other systems.
Check if the ETACS-ECU sets a diagnosis code.

Q: Is the diagnosis code set?
YES : Diagnose the ETACS-ECU. (Refer to GROUP 54A – Troubleshooting)
NO : Go to Step 3.

STEP 3. ETACS-ECU coding data check
Using M.U.T.-III, check if any abnormality is present in the coding data below which is stored in the ETACS-ECU.

Final drive
OK <2WD vehicles>: Front Drive
OK <4WD vehicles>: 4WD FF Base

Q: Is the check result normal?
YES : Go to Step 4.
NO : Repair the coding data. If repair is impossible, replace the ETACS-ECU.

STEP 4. Diagnosis code recheck
Check again if the diagnosis code is set to CVT-ECU.
(1) Erase the diagnosis code.
(2) Turn the ignition switch from the LOCK (OFF) position to the ON position.
(3) Check if the diagnosis code is set.

Q: Is the diagnosis code set?
YES : Replace the CVT-ECU.
NO : Intermittent malfunction.

TROUBLE SYMPTOM CHART

M1231208000754

⚠ CAUTION
During diagnosis, a diagnosis code associated with other system may be set when the ignition switch is turned on with connector(s) disconnected. On completion, confirm all systems for diagnosis code(s). If diagnosis code(s) are set, erase them all.

Trouble symptom	Inspection procedure number	Reference page
CVT-ECU cannot communicate with M.U.T.-III.	1	P.23A-37
Vehicle creeps in the "N" range.	2	P.23A-38
Shock is experienced during "N" to "D" and/or "N" to "R" shifting operation.	3	P.23A-38
Poor acceleration or incomplete shifting operation	4	P.23A-39
Gears cannot be changed with the paddle shift	5	P.23A-39
The fluid temperature warning lamp illuminates too frequently	6	P.23A-40

SYMPTOM PROCEDURES

Inspection Procedure 1: CVT-ECU cannot communicate with M.U.T.-III.

SYMPTOMS
CVT-ECU cannot be turned ON.

PROBABLE CAUSES
- Damaged wiring harness and connectors
- Malfunction of CVT-ECU

DIAGNOSTIC PROCEDURE

STEP 1. Check for short circuit in power supply line between the fusible link No.37 and the CVT control relay connector.

Q: Is the check result normal?
YES : Go to Step 2.
NO : Repair the connector(s) or wiring harness.

STEP 2. Check for short circuit in VIG1, VIG2 line between the CVT control relay connector and the CVT-ECU connector.

Q: Is the check result normal?
YES : Go to Step 3.
NO : Repair the connector(s) or wiring harness.

STEP 3. Check for open circuit in GND1, GND2 line between the CVT-ECU connector and earth.

Q: Is the check result normal?
YES : Go to Step 4.
NO : Repair the connector(s) or wiring harness.

STEP 4. Retest the system.
Recheck the trouble symptom.

Q: Does the malfunction take place again?

YES : Replace CVT-ECU.
NO : Intermittent malfunction

Inspection Procedure 2: Vehicle Creeps in the N Range.

SYMPTOMS

Engine torque is transferred to the driveshaft in the N range, and the vehicle consequently moves forward or rearward.

PROBABLE CAUSES

- Malfunction of the inhibitor switch
- Malfunction of CVT assembly
- Damaged wiring harness and connectors
- Malfunction of CVT-ECU

DIAGNOSTIC PROCEDURE

STEP 1. M.U.T.-III data list
Item 49: Inhibitor SW
Check that the service data changes when the selector lever is moved to all ranges.

Q: Is the check result normal?
YES : Go to Step 2.
NO : Go to Step 4.

STEP 2. Check of the inhibitor switch and shift control cable
Refer to P.23A-49.

Q: Is the check result normal?
YES : Go to Step 3.
NO : Adjust the inhibitor switch and the control cable.

STEP 3. Retest the system.
- Replace CVT-ECU.
- Recheck the trouble symptom.

Q: Does the malfunction take place again?
YES : Replace the CVT assembly.
NO : The inspection is complete.

STEP 4. Inhibitor switch continuity check
Refer to P.23A-49.

Q: Is the check result normal?
YES : Go to Step 3.
NO : Replace the inhibitor switch.

Inspection Procedure 3: Shock is experienced during N to D and/or N to R shifting operation.

SYMPTOMS

Deep shock is experienced when the selector lever is moved from the N to R range or from the N to D range.

PROBABLE CAUSES

- Abnormal line pressure
- Malfunction of CVT-ECU
- Malfunction of CVT assembly

DIAGNOSTIC PROCEDURE

STEP 1. Engine idling speed check

Q: Is the check result normal?
YES : Go to Step 2.
NO : Refer to the "Engine troubleshooting."

STEP 2. Line pressure check
Carry out "hydraulic test"(Refer to P.23A-54).

Q: Is the check result normal?
YES : Go to Step 3.
NO : Repair according to the hydraulic pressure diagnosis table.

STEP 3. Retest the system.
- Replace CVT-ECU.
- Recheck the trouble symptom.

Q: Does the malfunction take place again?
YES : Replace the CVT assembly.
NO : The inspection is complete.

Inspection Procedure 4: Poor Acceleration or Incomplete Shifting Operation

SYMPTOMS
Vehicle does not creep. Incomplete shifting operation or extremely poor acceleration is observed.

PROBABLE CAUSES
- Malfunction of forward clutch
- Malfunction of torque converter
- Malfunction of CVT assembly
- Malfunction of valve body assembly
- Malfunction of CVT-ECU

DIAGNOSTIC PROCEDURE

STEP 1. Engine-related troubleshooting check
Check for engine malfunction.

Q: Is the check result normal?
YES : Go to Step 2.
NO : Carry out the engine-related troubleshooting.

STEP 2. Torque converter stall test implementation
Refer to P.23A-53.

Q: Is the check result normal?
YES : Go to Step 4.
NO (stall speed is low.) : Replace the torque converter.
NO (stall speed is high.) : Go to Step 3.

STEP 3. Retest the system.
Replace CVT-ECU, and then recheck symptoms.

Q: Does the malfunction take place again?
YES : Replace the CVT assembly.
NO : The inspection is complete.

STEP 4. Forward clutch pressure check
Carry out "hydraulic test"(Refer to P.23A-54).

Q: Is the check result normal?
YES : Replace the forward clutch.
NO : Replace the valve body assembly.

Inspection Procedure 5: Gears cannot be Changed with the Paddle Shift.

SYMPTOMS
The transmission does not upshift or downshift when the paddle shift is operated.

PROBABLE CAUSES
- Malfunction of paddle shift switch
- Damaged wiring harness and connectors
- Malfunction of CVT-ECU

DIAGNOSTIC PROCEDURE

STEP 1. M.U.T.-III data list
- Item 54: Paddle shift SW (UP)
- Item 55: Paddle shift SW (DOWN) (Refer to Service Data Reference Table P.23A-40.)

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Go to Step 2.

STEP 2. Paddle shift switch single unit check
Refer to P.23A-66.

Q: Is the check result normal?
YES : Go to Step 3.
NO : Replace the paddle shift assembly.

STEP 3. Check for open circuit in PDDW, PDUP line between the CVT-ECU connector and the paddle shift switch connector

Q: Is the check result normal?
YES : Go to Step 4.
NO : Repair the connector(s) or wiring harness.

STEP 4. Retest the system.

Q: Is the check result normal?
YES : Intermittent malfunction
NO : Replace CVT-ECU.

Inspection Procedure 6: The fluid temperature warning lamp illuminates too frequently.

PROBABLE CAUSES

- Thermal deterioration of the CVT fluid
- Damaged wiring harness and connectors
- Malfunction of the CVT fluid temperature sensor
- Clogged coolant system
- Clogged air-cooled CVT fluid cooler system
- Malfunction of the thermo valve
- Malfunction of CVT-ECU
- Malfunction of CVT assembly

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III special function

Check the deterioration level of the CVT fluid.

NOTE: The CVT fluid deterioration level is the accumulation of the values counted depending on the fluid temperature of a certain period of time, and it shows the thermal deterioration level of the CVT fluid.

Q: Is the deterioration level of the CVT fluid less than 210,000?
YES : Go to Step 2.
NO : Replace the CVT fluid.

STEP 2. M.U.T.-III data list

Item 5: CVT fluid temperature sensor (Refer to Data List Reference Table P.23A-40)

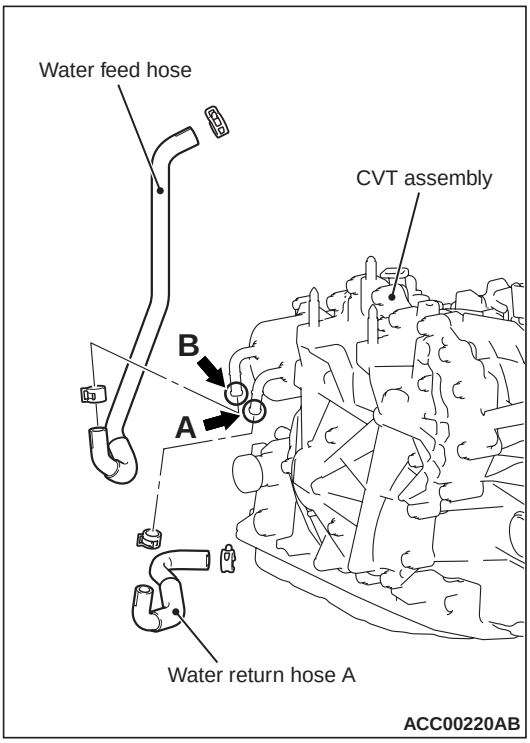
Q: Is the check result normal?
YES : Go to Step 3.
NO : Diagnosis code No.P0711, P0712, P0713: Diagnose the CVT fluid temperature sensor.

STEP 3. Coolant system clogging check

Check if the coolant system is clogged according to the following procedure.

⚠ CAUTION
Do not reuse the drained coolant.

(1) Drain the coolant.
(2) Remove water feed hose and water return hose.



(3) Blow air into the removed parts, and check that the air comes out from the opposite side.
(4) Blow air into the coolant outlet (A in the figure), and check that the air comes out from the opposite side (B in the figure).
(5) Install the parts, and replenish the coolant to the specified quantity.

Q: Is the check result normal?
YES : Go to Step 4.
NO : Replace the part(s) having damage or other problems.

STEP 4. Retest the system.

Q: Does a malfunction take place again?
YES : Replace the CVT assembly.
NO : Intermittent malfunction

DATA LIST REFERENCE TABLE

M1231208100728

Item No.	Check item	Check conditions	Normal conditions
1	Primary speed sensor signal	Vehicle being driven	Nearly the same as the tachometer display
2	Secondary speed sensor signal	Vehicle being driven	Nearly the same as the speedometer display

Item No.	Check item	Check conditions		Normal conditions
3	Primary pressure sensor signal	Always		0 V
4	Secondary pressure sensor signal	• Engine: Idling • Selector lever position: N		0.5 – 3.0 V
5	CVT fluid temperature sensor signal	Ignition switch: ON	CVT fluid temperature: Approx. 20°C	1.9 – 2.2 V
			CVT fluid temperature: Approx. 80°C	0.8 – 1.1 V
6	Power supply voltage	Ignition switch: ON		System voltage
7	Primary speed	Vehicle being driven		Nearly the same as the tachometer display
8	Secondary speed	Vehicle being driven		Approx. 45 x (Speedometer display)
9	Engine revolution	Engine: Idling		Nearly the same as the tachometer display
11	Real variable speed ratio	Vehicle being driven		2.34 – 0.39
13	Accelerator position	Accelerator pedal: Fully closed		0%
		Accelerator pedal: Depressed		Opening angle value increases in response to the depression amount of the accelerator pedal.
		Accelerator pedal: Fully opened		100%
18	Primary pressure	Always		0 MPa
19	Secondary pressure	• Engine: Idling • Selector lever position: N		0.1 – 3.0 MPa
20	CVT fluid temperature *	Ignition switch: ON	CVT fluid temperature: Approx. 20°C	39 – 55 count
			CVT fluid temperature: Approx. 80°C	152 – 170 count
21	Vehicle speed signal	Vehicle being driven		Nearly the same as the speedometer display
22	Vehicle speed	Vehicle being driven		Nearly the same as the speedometer display
26	Actual step count	Vehicle being driven		–20 to 190 step
30	Lockup solenoid monitoring current	From lockup release to engage		0 – 0.7 A

Item No.	Check item	Check conditions		Normal conditions
31	Lockup solenoid output current	From lockup release to engage		0 – 0.7 A
32	Line pressure solenoid monitoring current	• Engine: Idling • Selector lever position: N		0.45 – 0.75 A
		Engine: Stalled		0.08 – 0.3 A
33	Line pressure solenoid output current	From low line pressure to high line pressure		0 – 0.8 A
34	Secondary pressure solenoid monitoring current	• Engine: Idling • Selector lever position: N		0.45 – 0.75 A
		Engine: Stalled		0.08 – 0.3 A
35	Secondary pressure solenoid output current	From low secondary pressure to high secondary pressure		0 – 0.8 A
36	LU/SEL switching solenoid output	Ignition switch: ON	Selector lever position: P, N	ON
			Selector lever position: 5 or more seconds have passed after the selector lever has been moved to R or D position.	OFF
37	LU/SEL switching solenoid monitor	Ignition switch: ON	Selector lever position: P, N	ON
			Selector lever position: 5 or more seconds have passed after the selector lever has been moved to R or D position.	OFF
38	Stepper motor A	Vehicle being driven		ON/OFF switches alternately.
39	Stepper motor B	Vehicle being driven		ON/OFF switches alternately.
40	Stepper motor C	Vehicle being driven		ON/OFF switches alternately.
41	Stepper motor D	Vehicle being driven		ON/OFF switches alternately.
42	Indicator P output	• Ignition switch: ON • Engine: Stopped	Selector lever position: P	ON
			Selector lever position: Other than the above	OFF
43	Indicator R output	• Ignition switch: ON • Engine: Stopped	Selector lever position: R	ON
			Selector lever position: Other than the above	OFF
44	Indicator N output	• Ignition switch: ON • Engine: Stopped	Selector lever position: N	ON
			Selector lever position: Other than the above	OFF

Item No.	Check item	Check conditions		Normal conditions
45	Indicator D output	• Ignition switch: ON • Engine: Stopped	Selector lever position: D	ON
			Selector lever position: Other than the above	OFF
46	Indicator Ds/L output	• Ignition switch: ON • Engine: Stopped	Selector lever position: Ds <Vehicles without paddle shift>, L	ON
			Selector lever position: Other than the above	OFF
47	Indicator SP mode output <Vehicles with paddle shift>	Vehicle being driven	Sport mode (via paddle shift): ON	ON
			Sport mode (via paddle shift): OFF	OFF
48	Idling switch signal	• Ignition switch: ON • Engine: Stopped	Accelerator pedal: Fully closed	ON
			Accelerator pedal: Fully opened	OFF
49	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: Ds <Vehicles without paddle shift>, L	Ds/L
50	Brake switch	• Ignition switch: ON • Engine: Stopped	Brake pedal: Depressed	ON
			Brake pedal: Released	OFF
51	Ds position switch <Vehicles without paddle shift>	• Ignition switch: ON • Engine: Stopped	Selector lever position: Ds, L	ON
			Selector lever position: Other than the above	OFF
54	Paddle shift switch (UP)	• Ignition switch: ON • Engine: Stopped	Paddle shift lever position: Upshift and hold	ON
			Paddle shift lever position: Other than the above	OFF
55	Paddle shift switch (DOWN)	• Ignition switch: ON • Engine: Stopped	Paddle shift lever position: Downshift and hold	ON
			Paddle shift lever position: Other than the above	OFF
56	ABS actuation signal	ABS operated		ON
		ABS not operated		OFF
57	TCL actuation signal	TCL operated		ON
		TCL not operated		OFF
58	ASC actuation signal	ASC operated		ON
		ASC not operated		OFF

Item No.	Check item	Check conditions		Normal conditions
59	Shift position	• Ignition switch: ON • Engine: Stopped	Selector lever position: P	P, N
			Selector lever position: R	R
			Selector lever position: N	P, N
			Selector lever position: D	D
			Selector lever position: Ds <Vehicles without paddle shift>	Ds/L
			Selector lever position: L	L
60	Gear position (SP mode) <Vehicles with paddle shift>	Selector lever position: D Paddle shift lever: Sport mode	Idling	1st
			Drive at a constant speed of 30 km/h in 2nd gear.	2nd
			Drive at a constant speed of 35 km/h in 3rd gear.	3rd
			Drive at a constant speed of 40 km/h in 4th gear.	4th
			Drive at a constant speed of 50 km/h in 5th gear.	5th
			Drive at a constant speed of 60 km/h in 6th gear.	6th

*NOTE: **

CVT-ECU TERMINAL VOLTAGE TABLE

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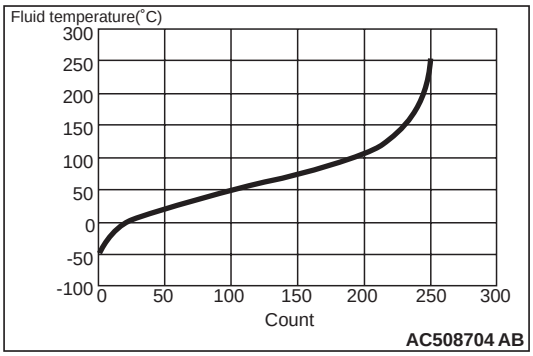
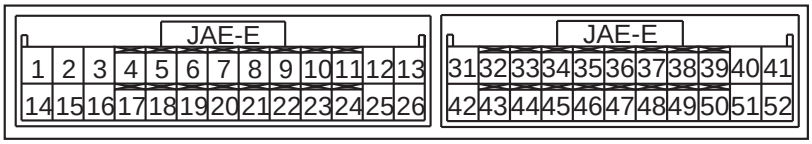


Relation between fluid temperature and COUNT is shown above.



Terminal No.	Terminal code	Check item	Check conditions		Standard value
1	PLLS	Line pressure solenoid valve	• Ignition switch: ON • Engine: Stopped • Selector lever position: P	Accelerator pedal: Fully closed	Approx. 5.0 – 7.0 V
				Accelerator pedal: Fully opened	Approx. 1.0 V

Terminal No.	Terminal code	Check item	Check conditions		Standard value
2	SCLS	Secondary pressure solenoid valve	• Ignition switch: ON • Engine: Stopped • Selector lever position: P	Accelerator pedal: Fully closed	Approx. 5.0 – 7.0 V
				Accelerator pedal: Fully opened	Approx. 3.0 – 4.0 V
3	LULS	Lockup solenoid valve	Driving conditions	Lockup released	Approx. 6.0 V
				Lockup engaged	Approx. 1.5 V
4	CANH	CAN_H	–		–
5	CANL	CAN_L	–		–
12	VIG1	Power supply	Ignition switch: ON		System voltage
			Ignition switch: OFF		1 V or less
13	GND1	Earth	Always		1 V or less
14	LUOS	Lockup/select switching solenoid valve	• Ignition switch: ON • Engine: Stopped	Selector lever position: N, P	System voltage
				Selector lever position: 5 or more seconds have passed after the selector lever has been moved to R or D position.	1 V or less
17	ROM1	ROM assembly (SEL2)	–		–
18	ROM2	ROM assembly (SEL1)	–		–
19	ROM3	ROM assembly (SEL3)	–		–
21	PDDW	Paddle shift switch (down)	Ignition switch: ON	Paddle shift lever position: Downshift and hold	1 V or less
				Paddle shift lever position: Other than the above	System voltage
22	PDUP	Paddle shift switch (up)	Ignition switch: ON	Paddle shift lever position: Upshift and hold	1 V or less
				Paddle shift lever position: Other than the above	System voltage
25	VIG2	Power supply	Ignition switch: ON		System voltage
			Ignition switch: OFF		1 V or less
26	GND2	Earth	Always		1 V or less
31	BATT	Back-up power supply	Always		System voltage
32	INHP	Inhibitor switch P	• Ignition switch: ON • Selector lever position: P		System voltage
			• Ignition switch: ON • Selector lever position: Other than P		1 V or less

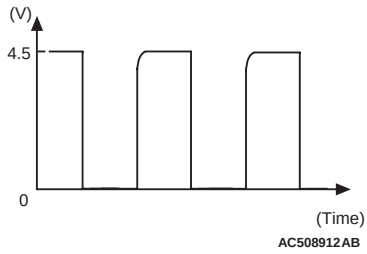
Terminal No.	Terminal code	Check item	Check conditions	Standard value
33	INHR	Inhibitor switch R	• Ignition switch: ON • Selector lever position: R	System voltage
			• Ignition switch: ON • Selector lever position: other than R	1 V or less
34	INHN	Inhibitor switch N	• Ignition switch: ON • Selector lever position: N	System voltage
			• Ignition switch: ON • Selector lever position: Other than N	1 V or less
35	INHS	Ds position switch <Vehicles without paddle shift>	• Ignition switch: ON • Selector lever position: Ds, L	1 V or less
			• Ignition switch: ON • Selector lever position: Other than Ds	System voltage
36	SECS	Secondary pulley speed sensor	• Selector lever position: D • Drive at a constant speed of approx. 20 km/h • Use an oscilloscope to measure the voltage between the terminals No. 36 and No. 48.	Oscilloscope inspection procedure (Refer to P.23A-47.)
37	PRMS	Primary speed sensor	• Selector lever position: D • Drive at a constant speed of approx. 20 km/h • Use an oscilloscope to measure the voltage between the terminals No. 37 and No. 48.	Oscilloscope inspection procedure (Refer to P.23A-47.)
39	LRPS	Secondary pressure sensor	• Engine: Idling • Selector lever position: N	Approx. 1.0 V
40	SPM1	Stepper motor A	Within 2 seconds after the ignition switch is turned to the ON position	Pulse width: 30 ms
41	SPM2	Stepper motor B	Within 2 seconds after the ignition switch is turned to the ON position	Pulse width: 10 ms
45	INHD	Inhibitor switch D	• Ignition switch: ON • Selector lever position: D	System voltage
			• Ignition switch: ON • Selector lever position: other than D	1 V or less
46	INHL	Inhibitor switch L	• Ignition switch: ON • Selector lever position: Ds, L <Vehicles without paddle shift>	System voltage
			• Ignition switch: ON • Selector lever position: other than L	1 V or less
48	SGND	Sensor earth	Always	1 V or less
49	SSPW	Sensor power supply	Ignition switch: ON	5.0 V
50	SPWR	CVT fluid temperature sensor	• Ignition switch: ON • CVT fluid temperature: 20°C	Approx. 2.0 V
			• Ignition switch: ON • CVT fluid temperature: 80°C	Approx. 1.0 V

Terminal No.	Terminal code	Check item	Check conditions	Standard value
51	SPM3	Stepper motor C	Within 2 seconds after the ignition switch is turned to the ON position	Pulse width: 30 ms
52	SPM4	Stepper motor D	Within 2 seconds after the ignition switch is turned to the ON position	Pulse width: 10 ms

OSCILLOSCOPE INSPECTION PROCEDURES

M1231208500254

With the connector remain connected, connect the oscilloscope probe to each terminal of CVT-ECU.

Terminal No.	Check item	Check conditions	Normal conditions	Wave patterns
36 - 26	Secondary pulley rotation sensor	• Selector lever position: D • Drive at a constant speed of approx. 20 km/h	Between 0 and 4.5 V, the pulse cycle is constant.	
37 - 26	Primary pulley rotation sensor			

ON-VEHICLE SERVICE

ESSENTIAL SERVICE

CVT FLUID CHECK

M1231211700656

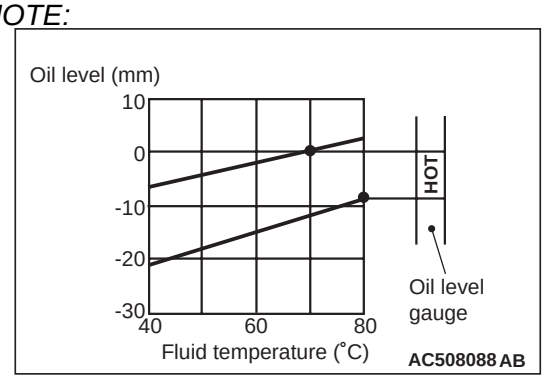
⚠ CAUTION

Replace the CVT fluid whenever the transmission is replaced with a new one or the vehicle is driven in harsh conditions.

1. Drive the vehicle until the CVT fluid is warmed up to the normal operating temperature (70 to 80°C).

   NOTE: Use M.U.T.-III. to measure the CVT fluid temperature.

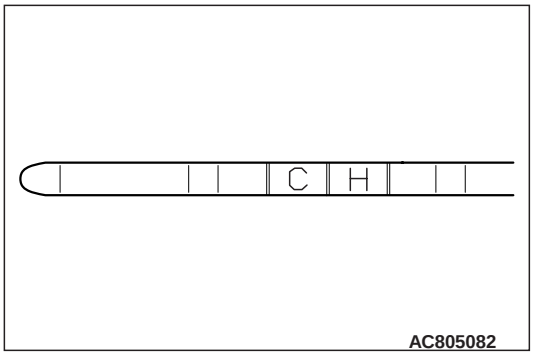
NOTE:



When a certain amount of time is required to warm up the CVT fluid to the normal operating temperature (70 to 80°C), check the oil level referring to the characteristics chart.

2. Park the vehicle on a level surface.
3. Move the selector lever to every position to fill the torque converter and the hydraulic circuit with the CVT fluid, and then move the selector lever to "P" or "N" range.
4. Wipe clean the area around the oil level gauge, and then remove the oil level gauge to check the condition of the CVT fluid.

NOTE: If the CVT fluid smells burnt or is excessively deteriorated or dirty, the CVT fluid is contaminated with particles of the metal bushings and friction material. In these cases, the transmission must be overhauled.



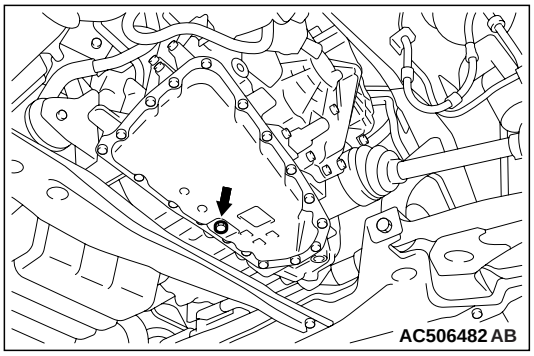
5. Check that the CVT fluid level is within the "HOT" area on the oil level gauge. If the fluid level is low, add the CVT fluid to the "HOT" level.

   CVT fluid: MITSUBISHI MOTORS GENUINE CVTF-J4

   NOTE: When the CVT fluid level is low, the oil pump sucks air together with the CVT fluid, and produces air bubbles in the hydraulic circuit. The air bubbles in the hydraulic circuit decreases the hydraulic pressure, causing the delayed gearshift or slippage of the belt, clutch, and brake. When the CVT fluid level is too high, the fluid is stirred by the gear and foams up, and the problems similar to those when the CVT fluid level is low will occur. In either case, air bubbles cause the overheat and oxidation of the CVT fluid, which prevents normal operation of the valve, clutch, and brake. Beside, when the CVT fluid is foamy, it flows out of the transmission vent hole. This may be taken as the fluid leakage by mistake.
6. Insert the oil level gauge securely.

CVT FLUID REPLACEMENT

M1231211800813



1. Remove the drain plug on the bottom of the transmission case to drain the CVT fluid.

   Draining amount: Approximately 5.5 L
2. Install the drain plug with a new gasket to the transmission case, and tighten it to the specified torque.

   Tightening torque: 34 ± 2 N·m

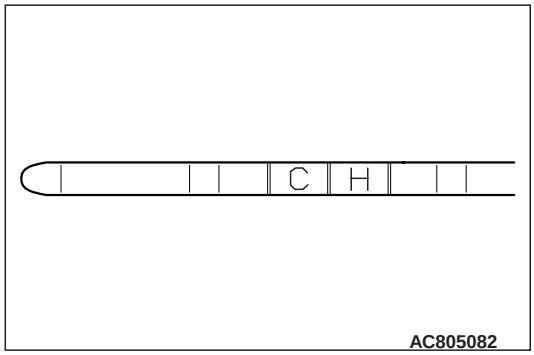
⚠ CAUTION

If the transmission case becomes full before filling 5.5 L of CVT fluid, stop filling the CVT fluid.

3. Fill in the new CVT fluid through the oil filler tube.

   Filling amount: Approximately 5.5 L

   CVT fluid: MITSUBISHI MOTORS GENUINE CVTF-J4
4. Start up the engine and let it idle for 1 to 2 minutes.
5. Move the selector lever to every position, and then move it to the P or N range.
6. Stop the engine and perform the above steps 1 to 5 again.
7. Stop the engine, and discharge a small amount of CVT fluid to check for fouling. If fouling is found, repeat steps 1 to 5 until clean CVT fluid comes out.

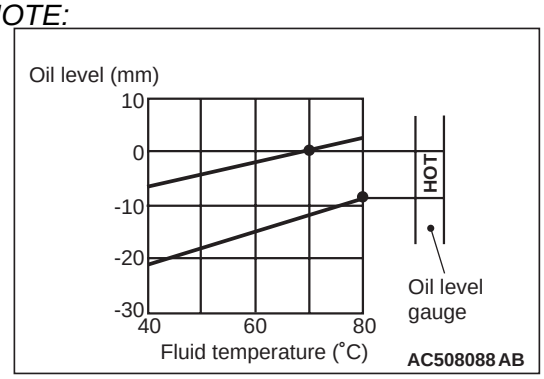


8. Drive the vehicle until the CVT fluid is warmed up to the normal operating temperature (70 to 80°C), and check the CVT fluid level. It must be within the "HOT" area on the oil level gauge.

   NOTE: The "COLD" level is for reference only. Use the "HOT" level as the criteria.

   NOTE: Use M.U.T.-III. to measure the CVT fluid temperature.

NOTE:

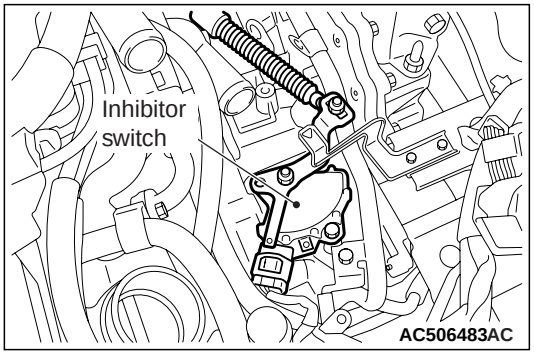


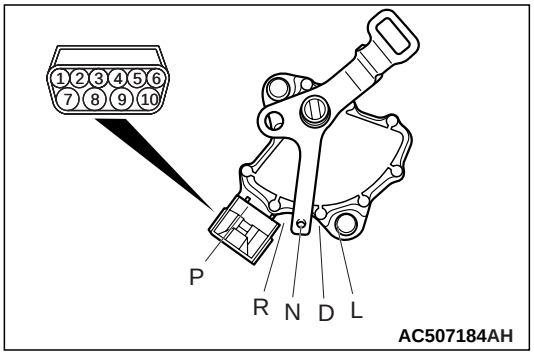
When a certain amount of time is required to warm up the CVT fluid to the normal operating temperature (70 to 80°C), check the oil level referring to the characteristics chart.

9. Adjust the CVT fluid level to the specified level. Refill the CVT fluid when the fluid level is low, and drain the CVT fluid through the drain plug when the fluid level is high.
10. Securely insert the oil level gauge into the oil filler tube.
11. CVT-ECU records the deterioration level of the CVT fluid. After replacing the CVT fluid with new one, use M.U.T.-III to reset the deterioration level recorded in CVT-ECU.

INHIBITOR SWITCH CONTINUITY CHECK

M1231201400502



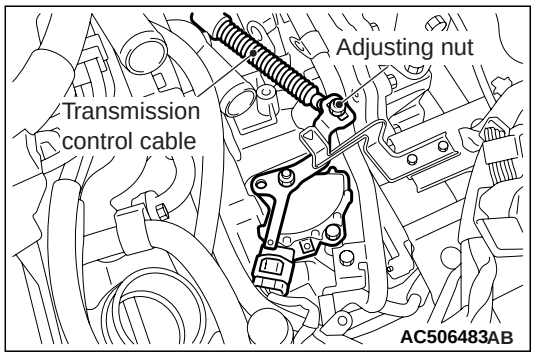


Item	Terminal number	Resistance value
P	3 – 2, 7 – 10	Continuity exists (2 Ω or less).
R	3 – 9	
N	3 – 8, 7 – 10	
D	3 – 5	
L	3 – 1	

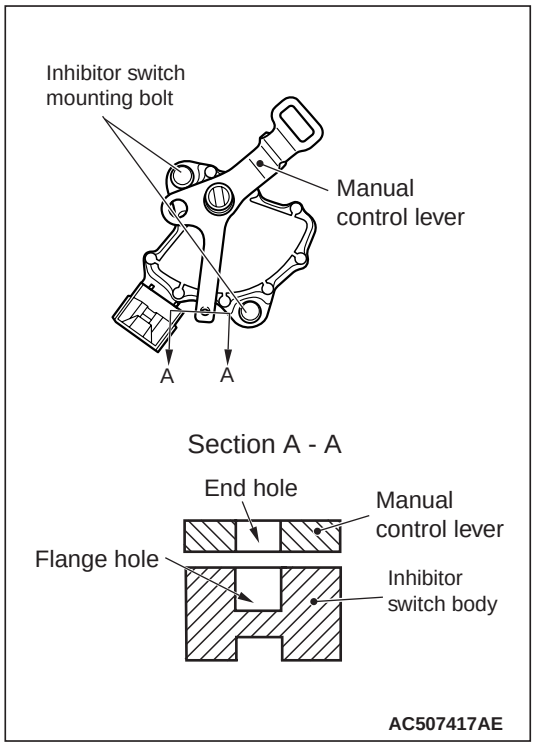
INHIBITOR SWITCH AND CONTROL CABLE ADJUSTMENT

M1231201500424

1. Move the selector lever to the "N" range.

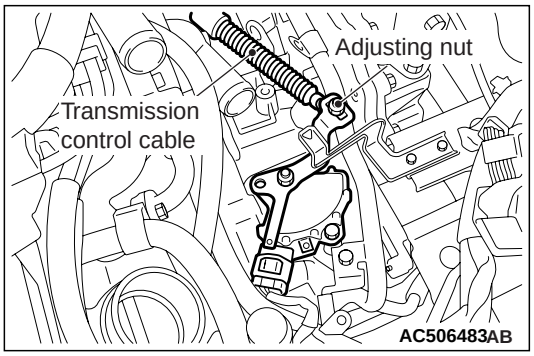


2. Loosen the adjusting nut so that the manual control lever moves freely.
3. Move the manual control lever to Neutral position.



4. Align the hole at the end of the manual control lever and the hole in the inhibitor switch body flange (section A – A).

NOTE: Insert a ϕ5 bar into the aligned holes in the inhibitor switch body flange and on the tip of the manual control lever to position the inhibitor switch body.



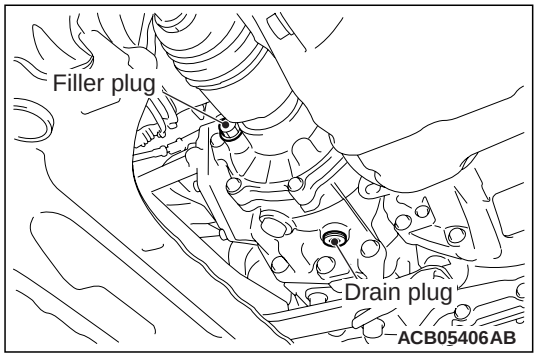
5. Use the adjusting nut to tighten the transmission control cable to the specified torque.

   Tightening torque: 9.5 ± 3.5 N·m

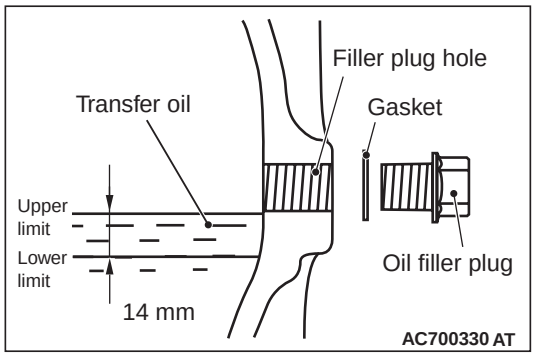
6. Make make sure that the selector lever is in the "N" range.
7. Make sure that the transmission side ranges that are corresponding to the selector lever position operate and function without fail.

TRANSFER OIL CHECK <4WD>

M1231211100524



1. Remove the filler plug and gasket.



2. Check that the oil level is in between the upper limit (bottom of the filler plug hole) and the lower limit as shown.
3. Check that the oil is not excessively foul and has moderate viscosity.
4. If the oil level is not in between the upper limit and the lower limit, refill the specified oil to the bottom of the oil filler plug hole.

   Transfer oil: MITSUBISHI MOTORS GENUINE super hypoid gear oil API classification GL-5 SAE80

5. Install the filler plug and new gasket, and tighten to the specified torque.

   Tightening torque: 32 ± 2 N·m

TRANSFER OIL REPLACEMENT <4WD>

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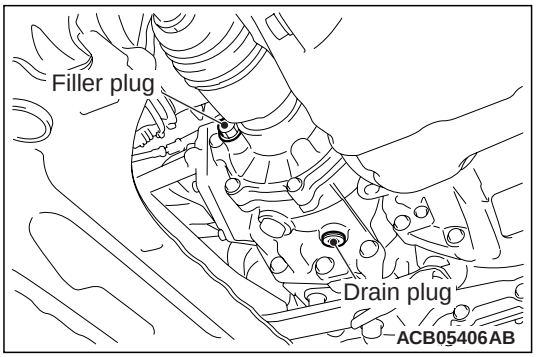
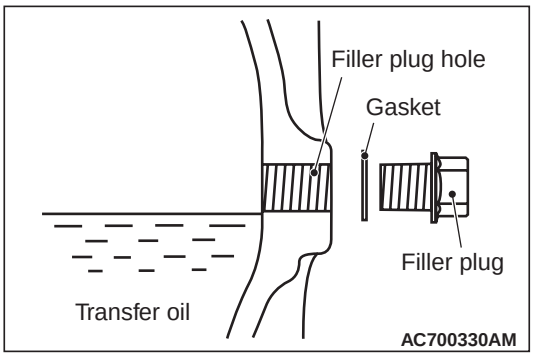




1. Remove the drain plug and gasket, to drain the transfer oil.
2. Install the drain plug and new gasket, and tighten to the specified torque.

   Tightening torque: 32 ± 2 N·m

3. Remove the filler plug and gasket, and fill the transfer oil up to the lower edge of the filler plug hole.

   Transfer oil: MITSUBISHI MOTORS GENUINE hypoid gear oil API classification GL-5 SAE80
   Filling amount: 0.47 L

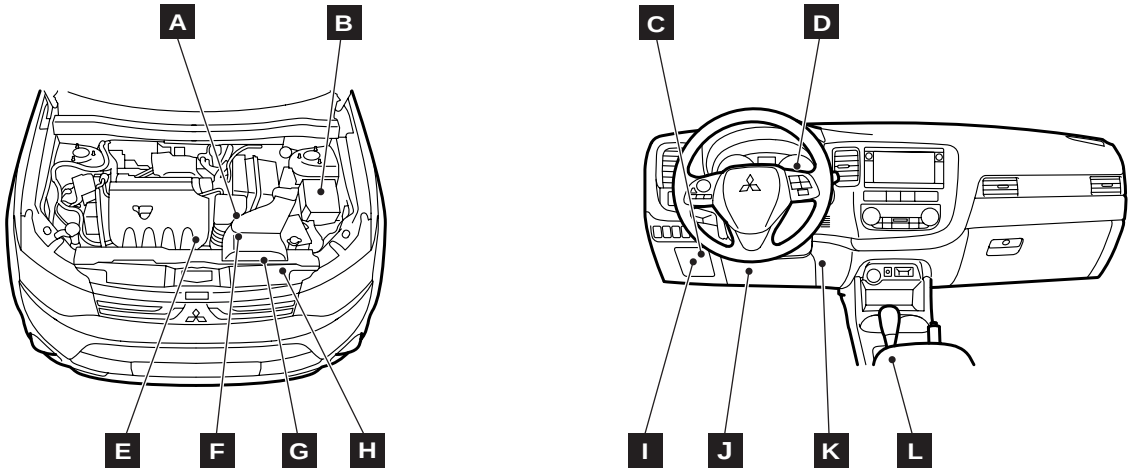
4. Install the filler plug and new gasket, and tighten to the specified torque.

   Tightening torque: 32 ± 2 N·m

CONTROL SYSTEM COMPONENT PART CONFIGURATION DIAGRAM

M1231208600358

Name	Symbol	Name	Symbol
CVT assembly (Solenoid valve assembly, CVT fluid temperature sensor)	H	Selector lever assembly (incorporating shift lock solenoid)	L
CVT-ECU	C	Stop lamp switch	J
CVT control relay	B	Secondary pulley speed sensor	A
Accelerator pedal position sensor	K	Diagnosis connector	I
Inhibitor switch	F	Paddle shift switch	D
Crank angle sensor	E	Primary pulley speed sensor	G



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CVT CONTROL COMPONENT CHECK

ACCELERATOR PEDAL POSITION SENSOR (APS) CHECK

M1231204200132

Refer to GROUP 13D – Troubleshooting .

INHIBITOR SWITCH CHECK

M1231201400290

Refer to P.23A-49.

SELECTOR LEVER ASSEMBLY CONTINUITY CHECK

M1231220900023

Refer to P.23A-58.

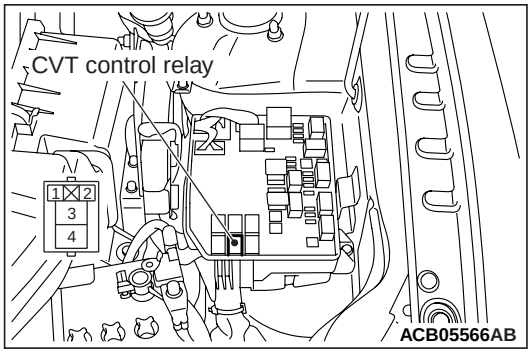
STOP LAMP SWITCH CHECK

M1231210100123

Refer to GROUP 35A – Brake Pedal and Stop Lamp Switch Continuity Check .

CVT CONTROL RELAY CHECK

M1231229400241



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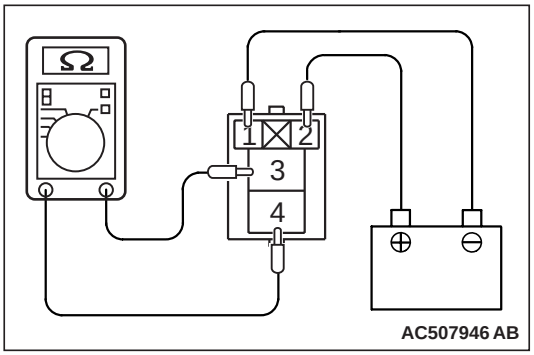
1. Remove the CVT control relay.



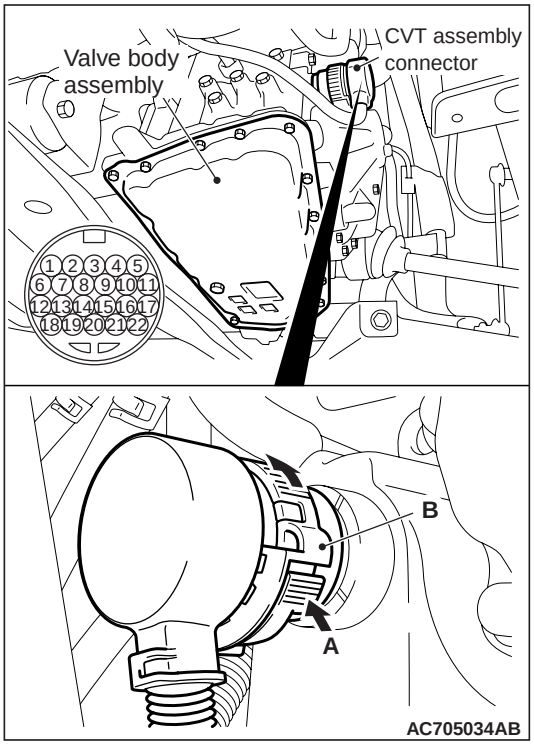
2. Use a jumper wire to connect the positive battery terminal (+) to the CVT control relay terminal No. 2, and the negative battery terminal (–) to the terminal No. 1.
3. Check for continuity between the CVT control relay terminals No. 3 and No. 4.

Jumper wire	Continuity between terminals No. 3 and No. 4
Connect	Yes (2 Ω or less)
Disconnect	No

4. If not as specified, replace the CVT control relay.

SOLENOID VALVE CHECK

M1231229500516



1. While pressing A in the figure, turn B anti-clockwise to unlock the CVT assembly connector, and disconnect the connector.
2. Measure the resistance between the terminals of the applicable solenoid valves and the earth.

Standard value:

Terminal No.	Applicable solenoid valve	Resistance value Ω
1	Line pressure solenoid valve	Approximately 5.6 – 6.6 (fluid temperature: 20°C)
2	Secondary pressure solenoid valve	
3	Lockup solenoid valve	
4	Lockup/select switching solenoid valve	Approximately 25.5 – 29.3 (fluid temperature: 20°C)

3. When the resistance is within the standard value, check the power supply and the earth circuits.

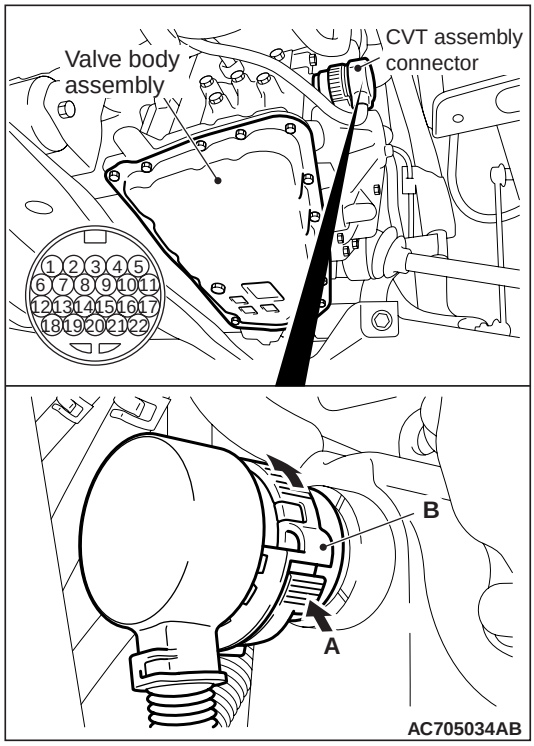
⚠ CAUTION

Each solenoid valve cannot be removed or replaced as a single unit. When replacement of any one of the solenoid valves is necessary, replace the valve body assembly.

4. When the resistance is outside the standard value, replace the valve body assembly and the harness.

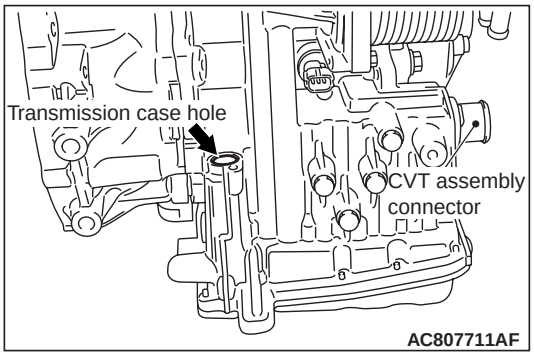
CVT FLUID TEMPERATURE SENSOR CHECK

M1231229600825



1. While pressing A in the figure, turn B anti-clockwise to unlock the CVT assembly connector, and disconnect the connector.

⚠ CAUTION



Insert a thermometer which is made of metal or is put in a metal case (overall length: approximately 150 – 200 mm) into the transmission case hole approximately 80 mm.

2. Remove the oil filler tube assembly (Refer to Transmission Assembly), and insert a thermometer into the transmission case hole.

   NOTE: If a radiation thermometer (noncontact thermometer) is available, use it to measure the surface temperature of the oil pan.

3. Measure the resistance between the sensor-side connector terminal No. 17 of the CVT assembly connector and the earth (terminal No.19).

   Standard value:

Fluid temperature (°C)	Resistance kΩ
0	Approximately 15.5
20	Approximately 6.5
40	Approximately 3.1
60	Approximately 1.6
80	Approximately 0.9
100	Approximately 0.5

⚠ CAUTION

The CVT fluid temperature sensor cannot be removed or replaced as a single unit. When the CVT fluid temperature sensor needs to be replaced, replace the valve body assembly.

4. When the resistance of the CVT fluid temperature sensor is outside the standard value, and the fluid temperature warning comes on/goes out at other than the specified temperatures, replace the valve body assembly and the harness.

TORQUE CONVERTER STALL TEST

M1231205400203

This test measures the maximum engine speed at the time the torque converter stalls with the selector lever in the D or R position. With this test, the holding abilities of the clutch and brake that are incorporated in the transmission can be checked.

⚠ WARNING

For safety, operators must not stand in front of and at the rear of the vehicle during this test.

1. Check the CVT fluid level, CVT fluid temperature, and engine coolant temperature.
   - CVT fluid level: In the "HOT" range on the oil level gauge
   - CVT fluid temperature: 70 to 80°C
   - Engine coolant temperature: 80 to 100°C

   NOTE: Use M.U.T.-III. to measure the CVT fluid temperature.

2. Raise the vehicle.
3. Pull the parking brake lever, and then fully depress the brake pedal.
4. Start the engine.

⚠ CAUTION

- **Do not maintain the WOT condition for 5 seconds or longer.**
- **When continuing the stall test, make sure that the fluid temperature does not exceed 80°C. If the CVT fluid temperature exceeds 80°C, run the engine at around 1,000 r/min for 1 minute or longer to lower the CVT fluid temperature to 80°C or less.**

5. Move the selector lever to the D range and fully depress the accelerator pedal. Quickly read the maximum engine speed at this time.

   Standard value – Stall speed: 2,400 – 2,900 r/min

6. Move the selector lever to the R range, and then repeat the previous step.

   Standard value – Stall speed: 2,400 – 2,900 r/min

JUDGMENT OF TORQUE CONVERTER STALL TEST RESULTS

1. Stall speed is high when selector lever is in both D and R ranges.
   - Malfunction of the torque converter (Torque converter and input shaft spline are slipping)
   - Malfunction of the valve body
   - Damaged wiring harness and connectors
   - Malfunction of CVT-ECU

2. Stall speed is high only when selector lever is in the D ranges.
   - Forward clutch is slipping
3. Stall speed is high only when the selector lever is in the R ranges.
   - Reverse brake is slipping
4. Stall speed is low when selector lever is in both D and R ranges.
   - Malfunction of the torque converter
   - Line pressure is low.
   - Low engine power

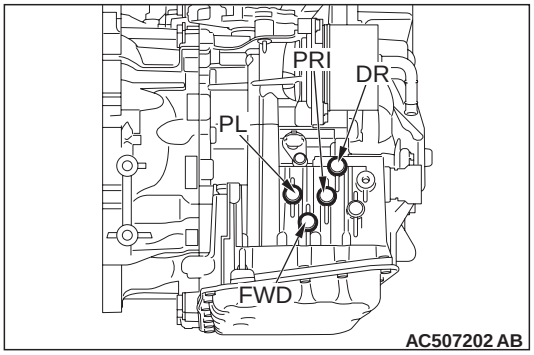
HYDRAULIC PRESSURE TEST

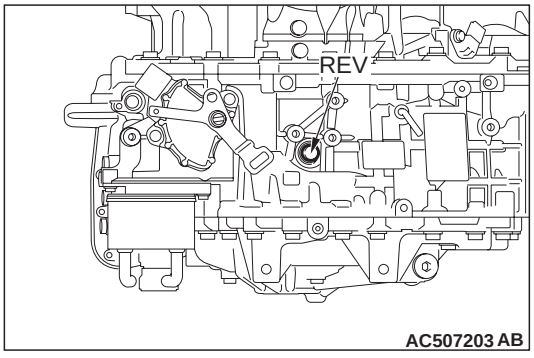
M1231205500567

⚠ CAUTION

This test must be performed with the CVT fluid temperature within the range of 70 to 80°C.

1. Start the engine and warm it up until the CVT fluid temperature reaches 70 to 80°C.
2. Stop the engine and block the RH and LH rear wheels with the wheel chocks.





3. Install the following special tools at the hydraulic pressure outlet ports shown in the figure.
   - Oil pressure gauge <3.0 MPa> (MD998330)
   - Joint (MD998331)
   - Joint (MB992127)

   NOTE:
   DR: Torque converter output pressure port
   PRI: Primary pressure port
   PL: Line pressure port
   FWD: Forward clutch pressure port
   REV: Reverse brake pressure port
4. Restart the engine.
5. Make sure that no CVT fluid leakage is found at the special tool fixing points.
6. Pull the parking brake lever and fully depress the brake pedal. (Maintain this operation until measurement is completed.)

⚠ WARNING

For safety, operators must not stand in front of and at the rear of the vehicle during this test.

7. Measure the hydraulic pressure at each measuring point in the conditions specified in the standard hydraulic pressure table, and check that the measurements are within the standard value.
8. If not within the standard value, take necessary steps according to the hydraulic pressure test diagnosis table.
9. Stop the engine.
10. Replace the O-rings on the plugs for each pressure port.
11. Remove the special tools and fit the plugs in the hydraulic pressure ports.
12. Install the plugs. Then, start the engine and check that no CVT fluid leakage is found around the plugs.

Standard hydraulic pressure table

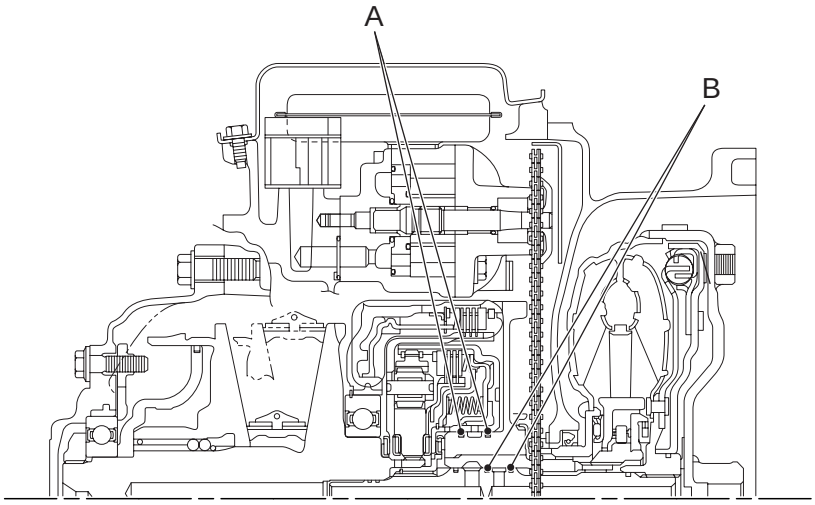
Measuring conditions		**Standard hydraulic pressure (MPa)**				
Selector lever position	Engine speed	Forward clutch pressure [Pressure at FWD]	Reverse brake pressure [Pressure at REV]	Primary pressure [Pressure at PRI]	Line pressure [Pressure at PL]	Torque converter [Pressure at DR]

Measuring conditions		Standard hydraulic pressure (MPa)				
P	Idling	0	0	0.1 – 1.5	0.5 – 1.5	0.1 – 1.0
R		0	0.5 – 1.0	0.1 – 1.5	0.5 – 1.5	0.1 – 1.0
N		0	0	0.1 – 1.5	0.5 – 1.5	0.1 – 1.0
D		0.5 – 1.0	0	0.1 – 1.5	0.5 – 1.5	0.1 – 1.0
Ds <Vehicles without paddle shift>		0.5 – 1.0	0	0.1 – 1.5	0.5 – 1.5	0.1 – 1.0
L		0.5 – 1.0	0	0.1 – 1.5	0.5 – 1.5	0.1 – 1.0

Hydraulic pressure test diagnosis table

Symptom	Faulty part
Hydraulic pressure is high at all measuring points.	Incorrect measuring method
Hydraulic pressure is low at all measuring points.	Malfunction of oil pump Clogged oil strainer Clogged oil cooler Malfunction in valve body assembly Improper installation of valve body assembly
Only forward clutch pressure is abnormal.	Malfunction in valve body assembly Improper installation of valve body assembly Faulty seal ring A
Only reverse brake pressure is abnormal.	Malfunction in valve body assembly Improper installation of valve body assembly
Only primary pressure is abnormal	Malfunction in valve body assembly Improper installation of valve body assembly
Only line pressure is abnormal.	Malfunction in valve body assembly Improper installation of valve body assembly
Only torque converter output pressure is abnormal	Malfunction in valve body assembly Improper installation of valve body assembly Malfunction of torque converter Faulty seal ring B

Seal ring location



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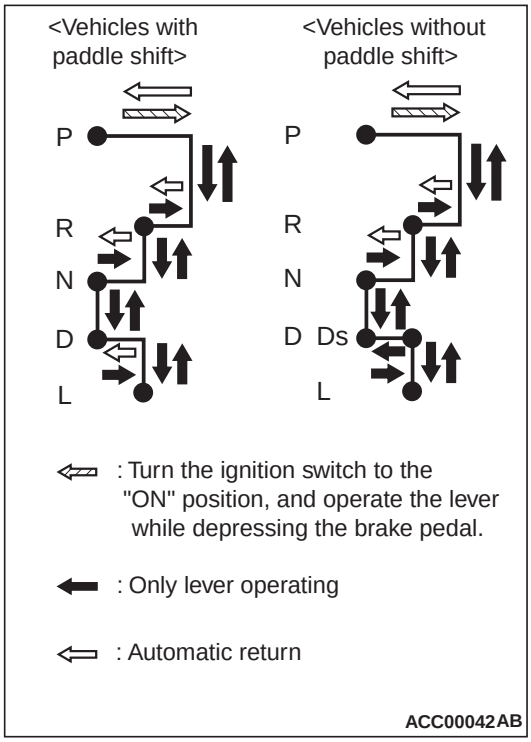
SELECTOR LEVER OPERATION CHECK

M1231202900425

1. Put on the parking brake.



2. Move the selector lever to every range and check that the lever moves smoothly with secure feel of engagement.
3. Make sure that the engine starts when the selector lever is in the "N" or "P" range, and does not start when the selector lever is in other range.
4. Start the engine. Release the parking brake.
5. Make sure that the vehicle moves forward when the selector lever is moved to "D", "Ds" range, or to the "L" range. Also make sure that the vehicle moves backward when the selector lever is moved from the "N" to "R" range.
6. Stop the engine.
7. Turn ON the ignition switch, and move the selector lever from the P to R range. Check that the backup lamp comes on at this time.

   NOTE: Since the vehicle is equipped with the CVT wrong-operation preventive device, the selector lever cannot be moved out of the "P" position without depressing the brake pedal after turning "ON" the ignition switch.

SHIFT LOCK MECHANISM CHECK

M1232100300542

SYSTEM CHECK

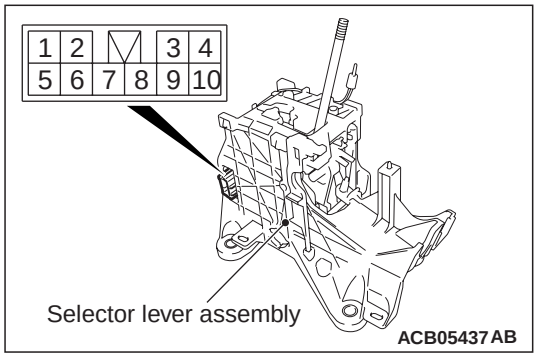
Inspection procedure	Check condition		Items to be checked (Normal condition)	Possible cause of abnormality
1	Brake pedal not depressed	Ignition switch position: Other than "ON"	The selector lever cannot be moved out of the "P" position	• Abnormality in the shift lock link (stuck, disengaged, broken, etc.) • Abnormality in the electrical circuit
2	Brake pedal depressed			• Abnormality in the electrical circuit
3	Brake pedal not depressed	Ignition switch position: "ON"		• Abnormality in the shift lock link (stuck, disengaged, broken, etc.) • Abnormality in the electrical circuit
4	Brake pedal depressed		The selector lever can be moved from the "P" position to other positions smoothly.	• Abnormality in the shift lock link (stuck, disengaged, broken, etc.) • Abnormality in the electrical circuit
5	Shift lock release switch pressed			• Abnormality in the shift lock link (stuck, disengaged, broken, etc.)
6	Brake pedal depressed / not depressed		The selector lever can be moved from the "R" position to the "P" position smoothly.	• Abnormality in the shift lock link (stuck, disengaged, broken, etc.)

COMPONENT PARTS CHECK

SHIFT LOCK LINK

Check each part for damage and disengagement.

SHIFT LOCK SOLENOID



1. Measure the resistance between terminal No.3 and No.7 of the selector lever assembly connector.

   Standard value: 24 ± 1.2 Ω

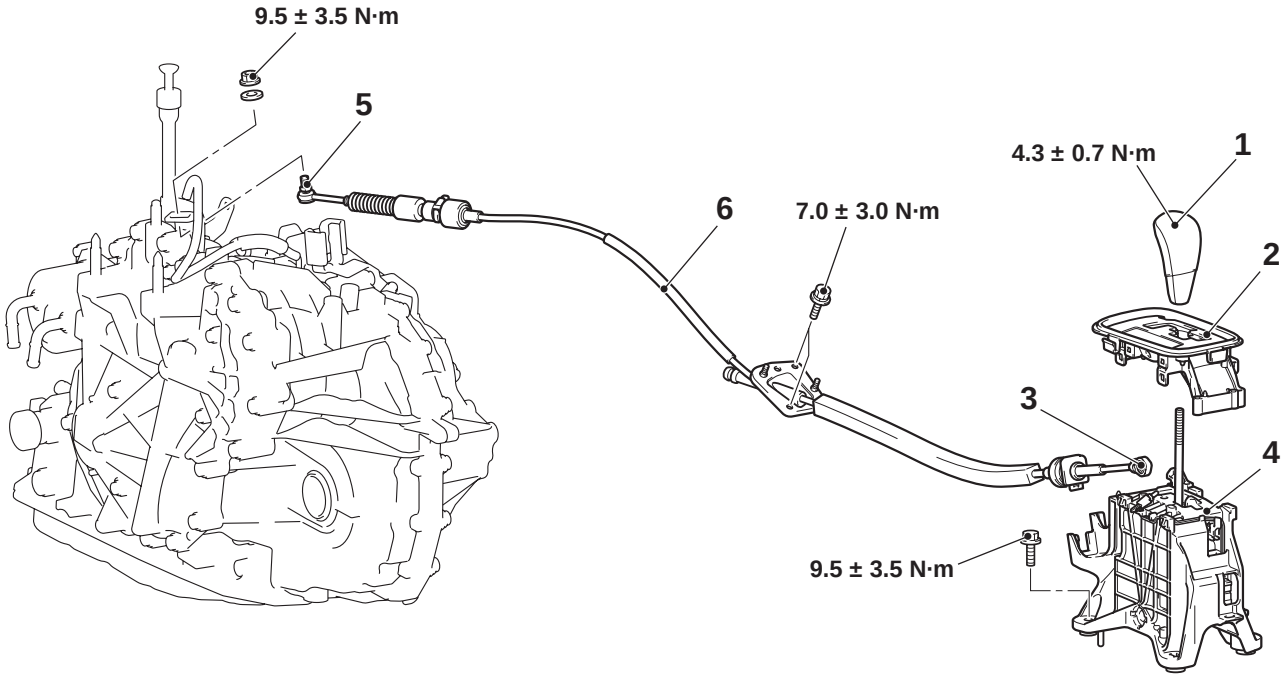
2. When the resistance is outside the standard value, replace the selector lever assembly.

TRANSMISSION CONTROL

REMOVAL AND INSTALLATION

M1231203200753

Pre-removal and post-installation operation
- Inhibitor switch and control cable adjustment check (Refer to P.23A-49.)
- Selector lever operation check (Refer to P.23A-56.)



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Selector lever assembly and transmission control cable assembly removal steps
- Move the selector lever to the N position.

1. Selector lever knob
2. Shift indicator panel
- Floor console centre removal (Refer to GROUP 52A – Floor Console Assembly .)

3. Transmission control cable connection (selector lever side)
- Connectors and harnesses connections

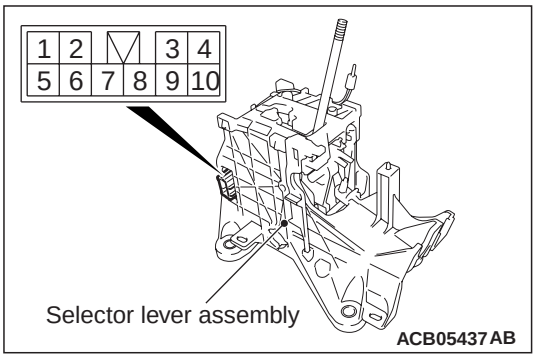
4. Selector lever assembly
- Control unit cover, SRS-ECU (Refer to GROUP 52B – SRS-ECU .)
- Battery and battery tray (Refer to GROUP 54A – Battery .)
- Air Cleaner bracket (Refer to GROUP 15 – Air Cleaner .)

5. Transmission control cable connection (transmission side)
6. Transmission control cable

SELECTOR LEVER ASSEMBLY CONTINUITY CHECK

M1231220900012

SWITCH CHECK



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Item	Selector lever position	Terminal number	Continuity
P position detect switch <Vehicles with KOS>	P	4 – 6	No continuity
	Other than above	4 – 6	Continuity

Item	Selector lever position	Terminal number	Continuity
P position detect switch <Vehicles without KOS>	P	5 – 6	No continuity
	Other than above	5 – 6	Continuity
Ds position switch <Vehicles without paddle shift>	Ds, L	8 – 9	Continuity
	Other than above	8 – 9	No continuity

KEY LOCK REKAY CHECK <VEHICLES WITHOUT KOS>

1. Shift the selector lever to P position.
2. Use a jumper wire to connect terminal No. 5 of the selector lever assembly connector to the battery (+) terminal, terminal No. 6 to the battery (-) terminal. Then apply battery voltage.
3. Check for continuity between the selector lever assembly connector terminals No. 4 and No. 5.

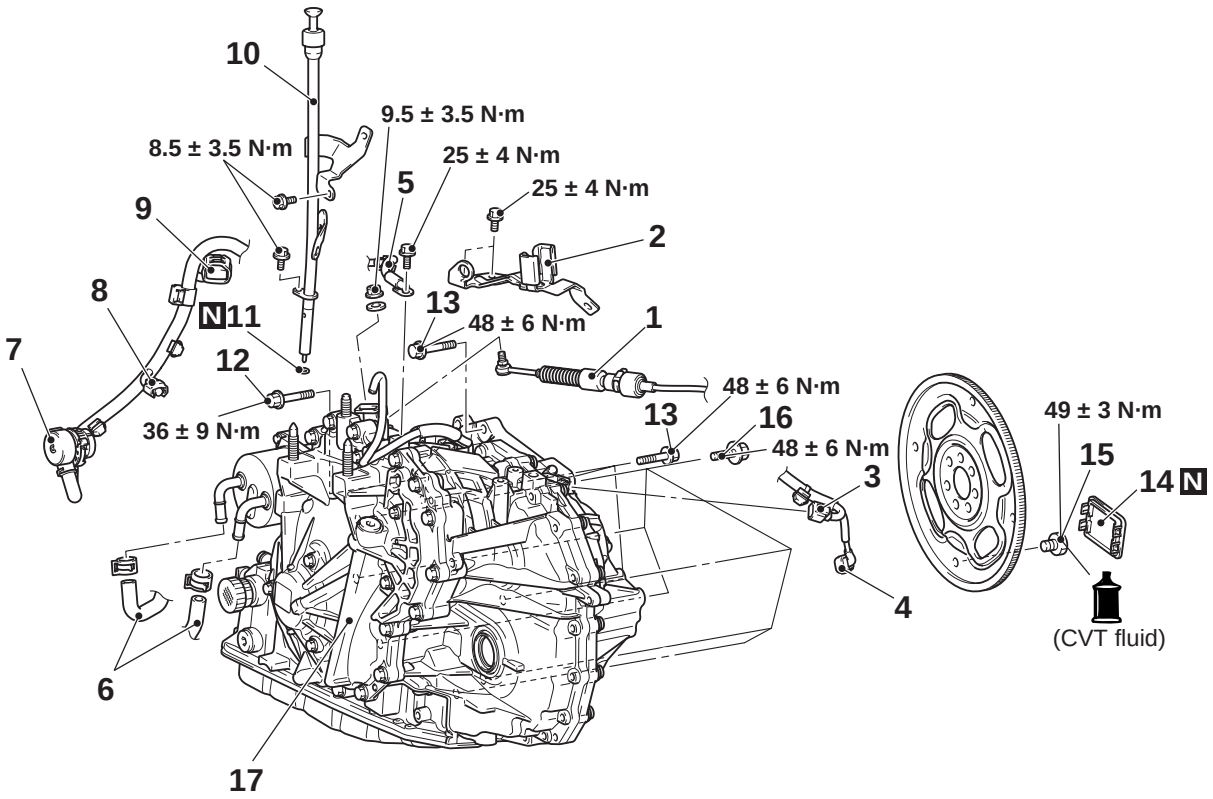
Jumper wire	Continuity between terminals No. 4 and No. 5
Connect	Yes (2 Ω or less)
Disconnect	No

TRANSMISSION ASSEMBLY

REMOVAL AND INSTALLATION

M1231203601044

Pre-removal operation	Post-installation operation
• Engine room under cover removal (Refer to GROUP 51 – Under Cover). • CVT fluid draining (Refer to P.23A-48). • Engine Coolant Draining (Refer to GROUP 14 – On-vehicle Service). • Air cleaner bracket removal (Refer to GROUP 15 – Air Cleaner). • Battery and Battery Tray Removal (Refer to GROUP 54A, Battery). • Engine-ECU removal (Refer to GROUP 13D – Engine-ECU). • Drive shaft removal (Refer to GROUP 26).	• Drive shaft installation (Refer to GROUP 26). • Battery and battery tray installation (Refer to GROUP 54A, Battery). • Engine-ECU installation (Refer to GROUP 13D – Engine-ECU). • Air cleaner assembly installation (Refer to GROUP 15 – Air Cleaner). • Engine room under cover installation (Refer to GROUP 51 – Under cover). • Engine Coolant Refilling (Refer to GROUP 14 – On-vehicle Service). • CVT fluid refilling (Refer to P.23A-48).



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Removal steps

>>C<<
1. Transmission control cable connection
2. Transmission control cable bracket
3. Secondary pulley speed sensor connector
4. Crank angle sensor connector
5. Battery earth
6. Water hose connection

<<A>>

<<B>>

Removal steps

7. CVT assembly connector connection
8. Primary pulley rotation sensor connector
9. Inhibitor switch connector
10. Oil filler tube assembly
11. O-ring
12. Starter mounting bolt
13. Transmission assembly upper part coupling bolt

Removal steps

14. Cover

<<**C**>> 15. Torque converter and drive plate coupling bolt
- Engine roll rod assembly (Refer to GROUP 32 – Engine Roll Stopper Rod)
- Transfer assembly (Refer to P.23A-64.) <4WD>
- While supporting the engine and transmission assembly with a garage jack.
- Transmission mounting bracket (Refer to GROUP 32 – Transmission Mounting)

<<**D**>> >>**B**<<
- Injector protector mounting bolt
- Vacuum pipe assembly (Refer to GROUP 14 – Water Hose and Water Pipe .)

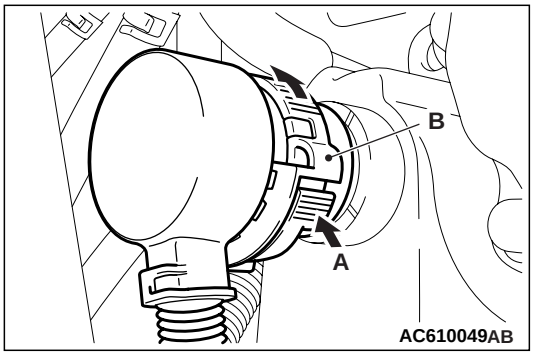
<<**E**>>
- Engine assembly holding

16. Transmission assembly lower part coupling bolt

>>**A**<< 17. Transmission assembly

REMOVAL SERVICE POINTS

<<A>> CVT ASSEMBLY CONNECTOR DISCONNECTION



While pressing A in the figure, turn B anti-clockwise to unlock the CVT assembly connector, and disconnect the connector.

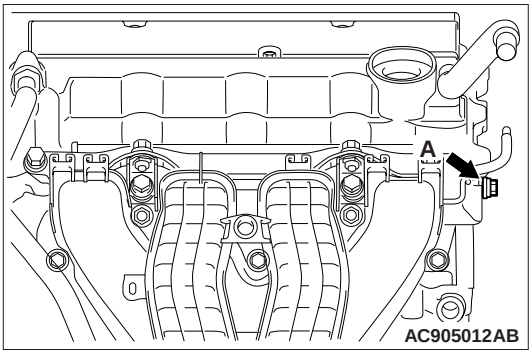
<<B>> TRANSMISSION ASSEMBLY UPPER PART COUPLING BOLT REMOVAL

Only loosen the bolts from the engine and transmission assembly (do not remove).

<<C>> TORQUE CONVERTER AND DRIVE PLATE COUPLING BOLT REMOVAL

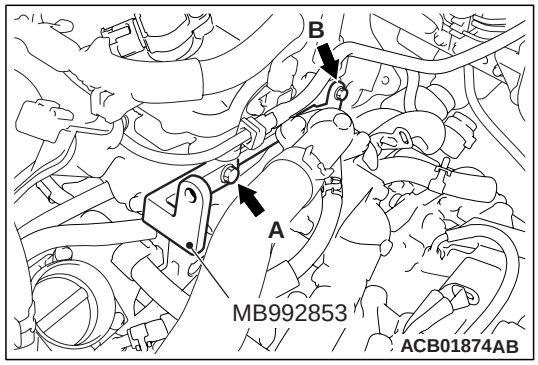
1. Remove the coupling bolts while turning the crankshaft.
2. Fully push the torque converter into the transmission side so that it does not remain on the engine side.

<<D>> INJECTOR PROTECTOR MOUNTING BOLT REMOVAL



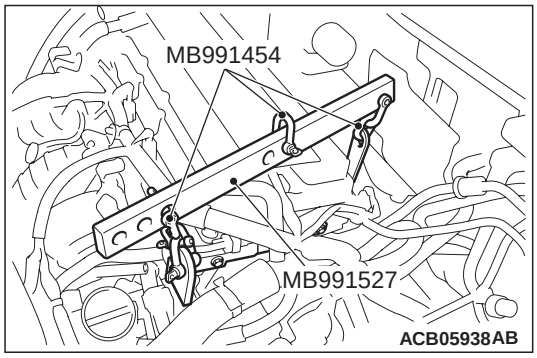
Remove the injector protector mounting bolt (A shown in the illustration).

<<E>> ENGINE ASSEMBLY HOLDING



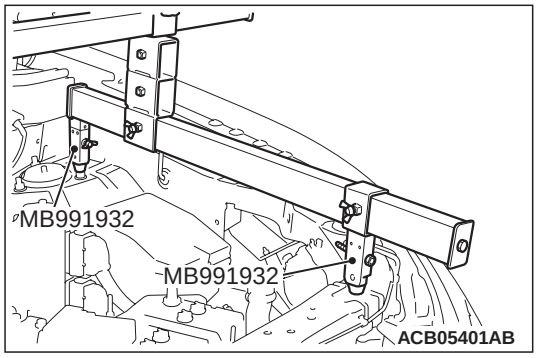
1. Tighten the engine hanger plate (special tool: MB992853) to the specified torque at A in the figure (injector protector rear mounting bolt) and B in the figure (vacuum pipe assembly mounting bolt).

Tightening torque: 20 ± 2 N·m (A in the figure)
Tightening torque: 11 ± 1 N·m (B in the figure)



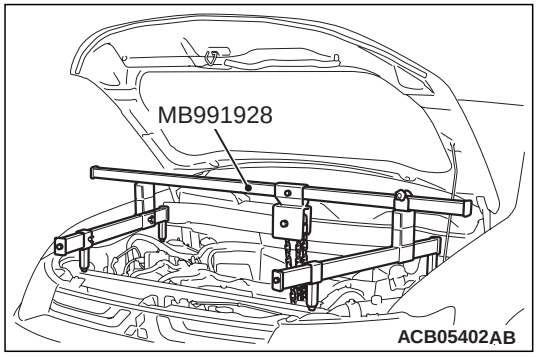
2. Assemble the engine hanger (special tool: MB991527) with the chain of the engine hanger balancer (special tool: MB991454).

3. <When engine hanger (Special tool: MB991928) is used>
   (1) Assemble the engine hanger (Special tool: MB991928). (Set the components below to the base hanger.)
- Slide bracket (HI)
- Foot x 4 (standard) (MB991932)



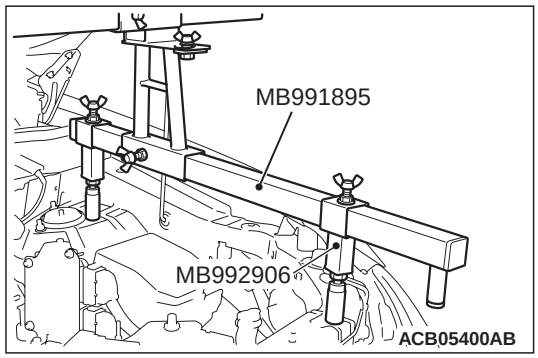
   (2) Set the feet of the special tool as shown in the figure.

   NOTE: Adjust the engine hanger balance by sliding the slide bracket (HI).



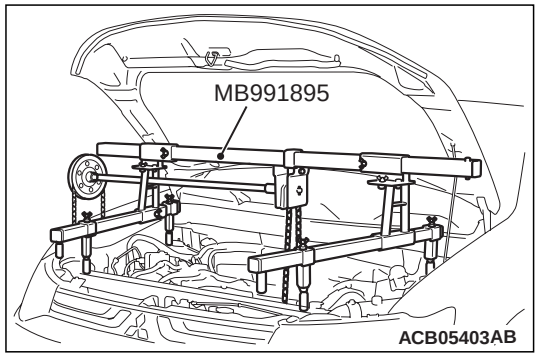
   (3) Connect the engine hanger (Special tool: MB991928) to the engine hanger (special tool: MB991527).Remove the garage jack and then remove the transmission assembly upper part coupling bolts that have been loosened previously.

4. <When engine hanger (Special tool: MB991895) and engine hanger attachment (Special tool: MB992906) are used>



   (1) Set the foot of special tool engine hanger (MB991895) as shown in the figure.

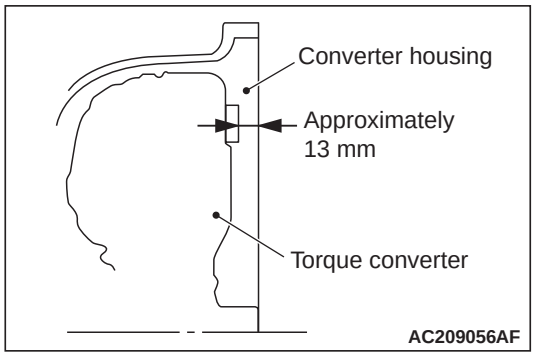
   NOTE: Slide the front foot of special tool engine hanger attachment (Special tool: MB992906) to balance the engine hanger.



   (2) Connect the engine hanger (Special tool: MB991895) to the engine hanger (special tool: MB991527).Remove the garage jack and then remove the transmission assembly upper part coupling bolts that have been loosened previously.

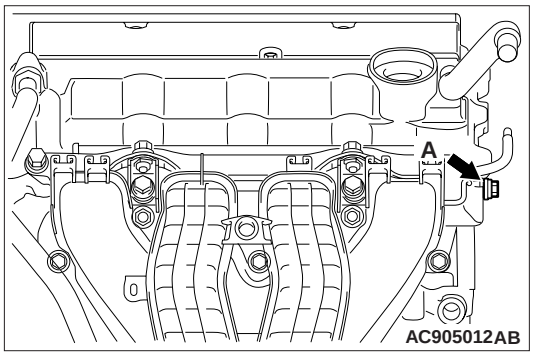
INSTALLATION SERVICE POINTS

>>A<< TRANSMISSION ASSEMBLY INSTALLATION



Fully push the torque converter into the transmission side, and then assemble the transmission assembly to the engine.

>>B<< INJECTOR PROTECTOR MOUNTING BOLT INSTALLATION

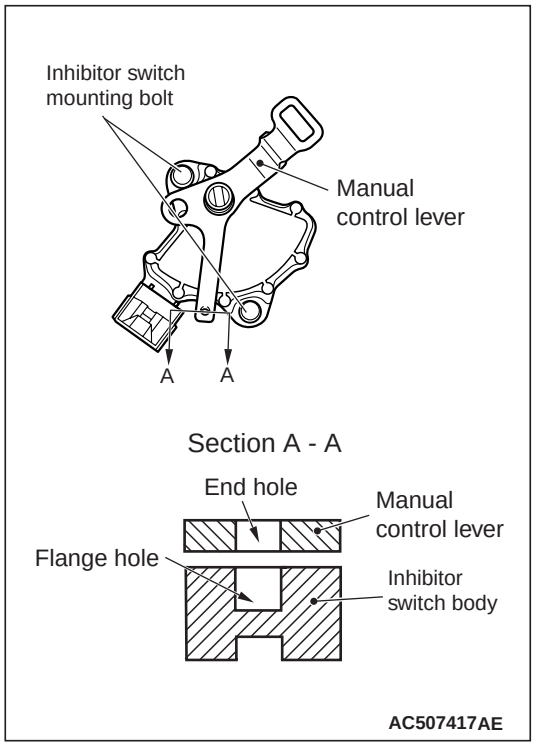


Tighten the injector protector mounting bolt (A in the figure) to the specified torque.

Tightening torque: 20 ± 2 N·m

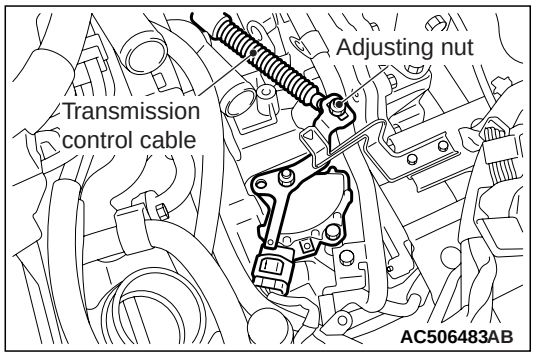
>>C<< TRANSMISSION CONTROL CABLE (TRANSMISSION SIDE) INSTALLATION

1. Move the selector lever to the "N" range.
2. Move the manual control lever to Neutral position.



3. Align the hole at the end of the manual control lever and the hole in the inhibitor switch body flange (section A – A).

   NOTE: Insert a ϕ5 mm bar into the aligned holes in the inhibitor switch body flange and on the tip of the manual control lever to position the inhibitor switch body.



4. Use the adjusting nut to tighten the transmission control cable to the specified torque.

   Tightening torque: 9.5 ± 3.5 N·m

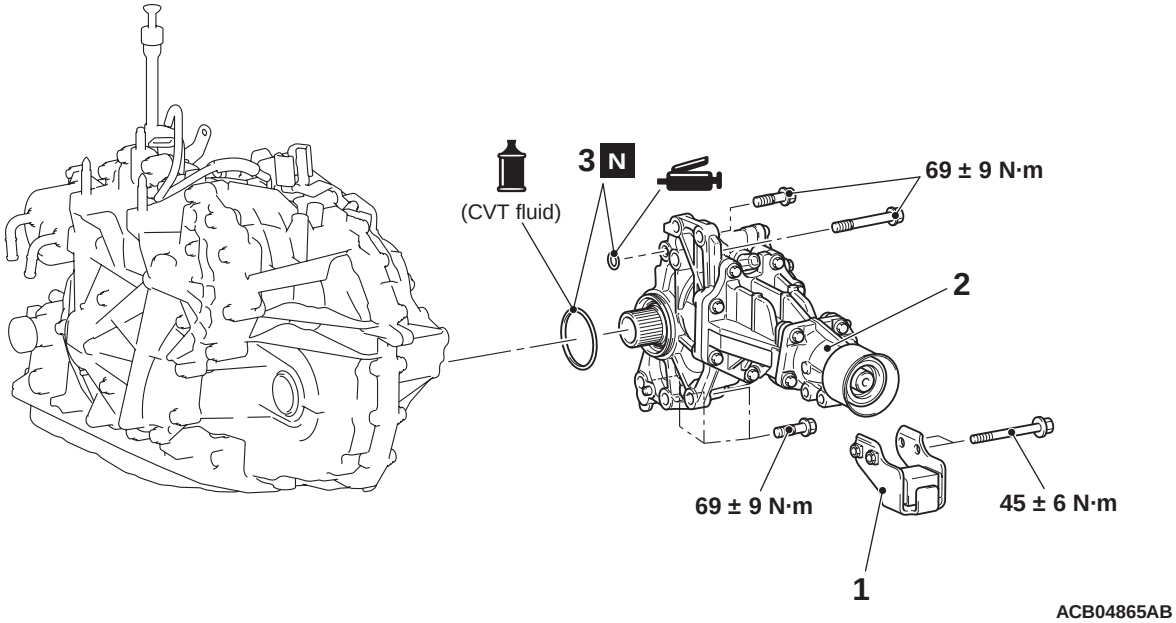
5. Make sure that the transmission side ranges that are corresponding to the selector lever position operate and function without fail.

TRANSFER ASSEMBLY <4WD>

REMOVAL AND INSTALLATION

M1231211000367

Pre-removal and post-installation operation
- Engine room under cover removal and installation (Refer to GROUP 51 – Under Cover .)
- CVT fluid draining and refilling (Refer to P.23A-48.)
- Transfer oil draining and refilling (Refer to P.23A-50.)
- Front exhaust pipe removal and installation (Refer to GROUP 15–Front Exhaust Pipe Muffler .)
- Propeller shaft removal and installation (Refer to GROUP 25–Propeller Shaft .)
- Drive shaft <RH> removal and installation (Refer to GROUP 26–Drive Shaft Assembly .)



Removal steps

<<A>> 1. Dynamic damper
2. Transfer assembly
3. O-ring

REMOVAL SERVICE POINT

<<A>> TRANSFER ASSEMBLY REMOVAL

Move the engine and transmission assembly toward the front of the vehicle to make a gap between the engine/transmission assembly and the crossmember. Pull out the transfer assembly through this gap.

CVT-ECU

REMOVAL AND INSTALLATION

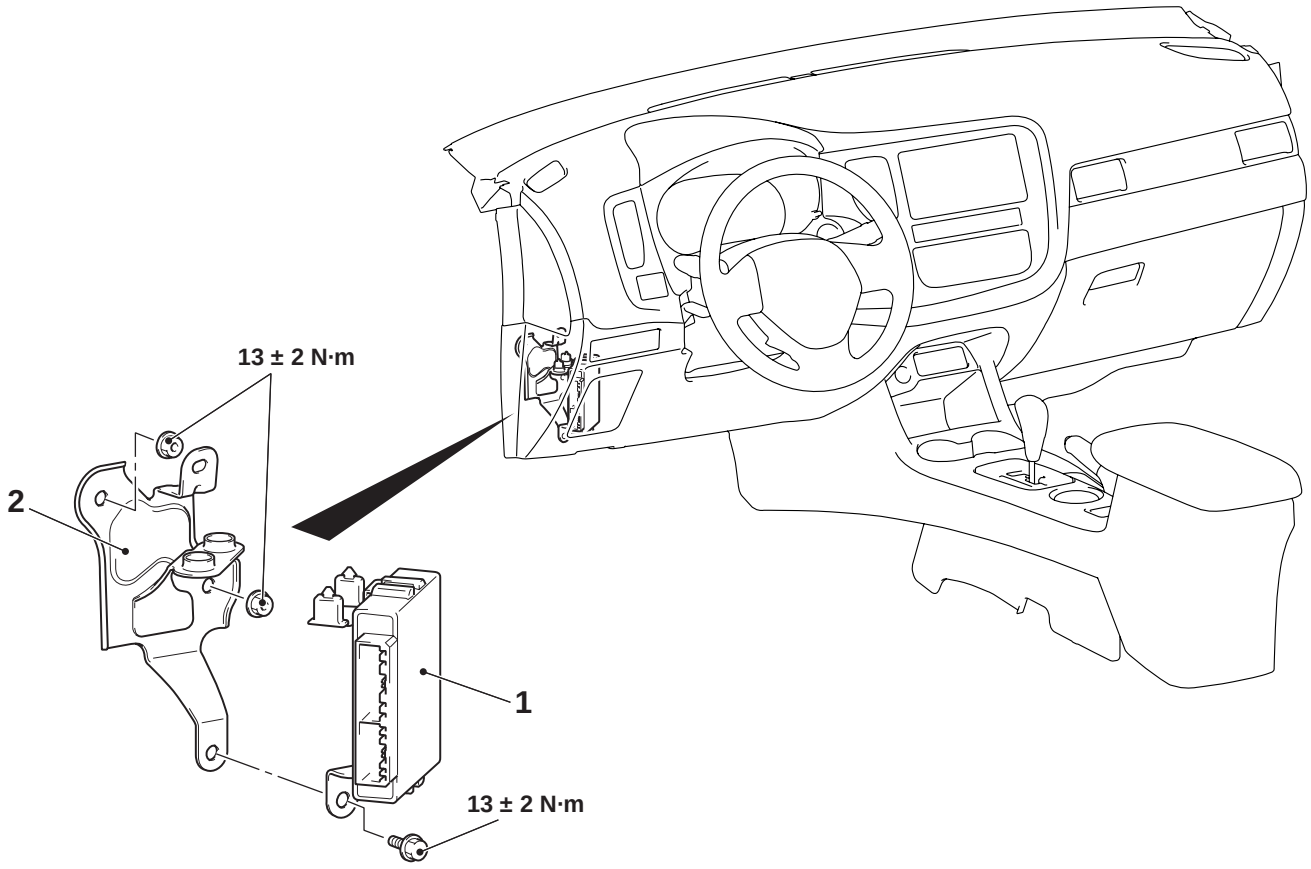
M1231211400310

⚠ CAUTION

To store the change gear ratio status of the CVT assembly in the CVT-ECU memory, drive the vehicle at 3 km/h or faster after replacing the CVT-ECU.

Pre-removal and post-installation operation

- Bottom cover assembly removal and installation (driver's side) (Refer to GROUP 52A – Instrument Panel Assembly .)



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Removal steps

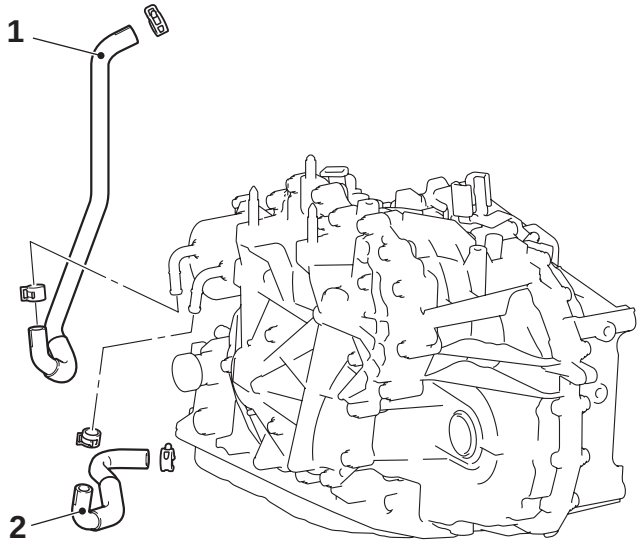
1. CVT-ECU
2. CVT-ECU bracket

CVT FLUID COOLER AND COOLER LINE

REMOVAL AND INSTALLATION

M1231212500332

Pre-removal and post-installation operation
- Engine room under cover front, engine room side cover (Refer to GROUP 51 – Under Cover .)
- Engine coolant draining and refilling (Refer to GROUP 14 – On-vehicle Service – Engine Coolant Replacement .)



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CVT fluid cooler line removal steps
1. Water feed hose
2. Water return hose

PADDLE SHIFT ASSEMBLY

REMOVAL AND INSTALLATION

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Refer to GROUP 37 – Steering Column Shaft Assembly .

PADDLE SHIFT SWITCH CHECK

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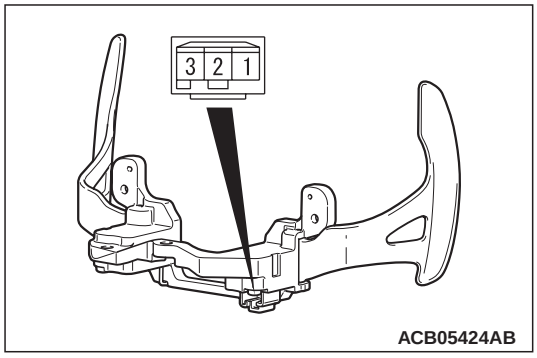

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1. Check the continuity between the paddle shift switch connecter terminals.

Standard value:

Paddle shift lever	Terminal number	Resistance value
Upshift and hold the lever.	3 – 2	Continuity exists (2 Ω or less).
Downshift and hold the lever.	1 – 2	
No operation	No continuity between the terminals.	

2. In the cases other than the above, replace the paddle shift assembly.