

REAR AXLE

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GENERAL

OUTLINE OF CHANGE

- The descriptions of the service procedures for the AYC system including the troubleshooting using an MUT-II tester has been incorporated.

SERVICE SPECIFICATIONS

<Vehicles with AYC>

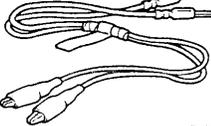
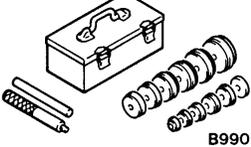
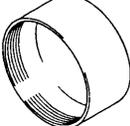
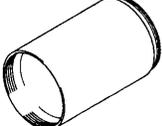
Items	Standard value	Limit
Rear axle total backlash mm	–	5
Pressure generated by hydraulic unit MPa	0 – 1.6	–
Wheel bearing axial play mm	–	0.05
Wheel bearing rotation starting torque Nm	–	1.0 or less

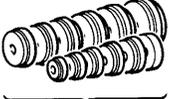
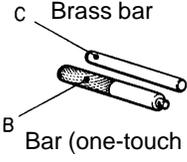
LUBRICANT

<Vehicles with AYC>

Items			Specified lubricant	Capacity
Gear oil	Torque transfer differential	Differential	Hypoid gear oil API classification GL-5 or higher SAE viscosity No. 90, 80W	0.41 ± 0.02 ℓ
		Torque transfer mechanism	MITSUBISHI GENUINE DIA QUEEN AYC FLUID	0.70 ⁺⁰ / _{-0.05} ℓ
Hydraulic piping fluid			Dia Queen ATF SPII or equivalent	1 ℓ
Torque transfer mechanism oil seal lips			Vaseline	As required

SPECIAL TOOLS

Tool	Number	Name	Use
 <p>B991502</p>	MB991502	MUT-II sub-assembly	Inspection of AYC (diagnosis display by MUT-II)
 <p>B991529</p>	MB991529	Diagnosis code check harness	Inspection of AYC (diagnosis display by AYC warning lamp)
	MD998330 (MD998331)	Oil pressure gauge (2,942 kPa)	Hydraulic pressure measurement <vehicles with AYC>
 <p>B991705</p>	MB991705	Hose adapter	
 <p>B990925</p>	MB990925	Bearing & oil seal installer set	Pressfitting of oil seal <differential>
 <p>B991115</p>	MB991115	Oil seal installer	Pressfitting of oil seal <differential> (used in combination with MB990938)
	MD998812	Installer cap	Pressfitting of oil seal <torque transfer mechanism of vehicles with AYC>
	MD998813	Installer 100	
	MD998829	Installer adapter (60)	

MB990925 <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;">    </div> <div style="text-align: right; margin-top: 10px;">11W0113</div>					
	Tool number (MB990925)	O.D. mm		Tool number (MB990925)	O.D. mm
A	MB990926	39.0	A	MB990933	63.5
	MB990927	45.0		MB990934	67.5
	MB990928	49.5		MB990935	71.5
	MB990929	51.0		MB990936	75.5
	MB990930	54.0		MB990937	79.0
	MB990931	57.0	B	MB990938	–
	MB990932	61.0	C	MB990939	–

TROUBLESHOOTING <AYC>

BASIC TROUBLESHOOTING CONDITIONS

Refer to Group 00 – How to Use Troubleshooting / Inspection Service Points.

NOTE

Before starting the troubleshooting procedure, make sure that the following items have been checked okay.

- The correct steering wheel has been properly installed in the neutral position of the steering column shaft.
- Tire and wheel sizes are correct with correct specifications. Inflation pressure, balance, and wear conditions are okay.
- Wheel alignment is correct.
- The engine, suspension, and other parts have not been remodeled so as to affect the AYC system.

DIAGNOSIS FUNCTION

READING THE DIAGNOSIS CODE

Read the diagnosis code using an MUT-II tester or the AYC warning lamp.
(Refer to Group 00 – How to Use Troubleshooting / Inspection Service Points.)

ERASING THE DIAGNOSIS CODE

Refer to Group 00 – How to Use Troubleshooting / Inspection Service Points.

3. INSPECTION CHART FOR DIAGNOSIS CODE

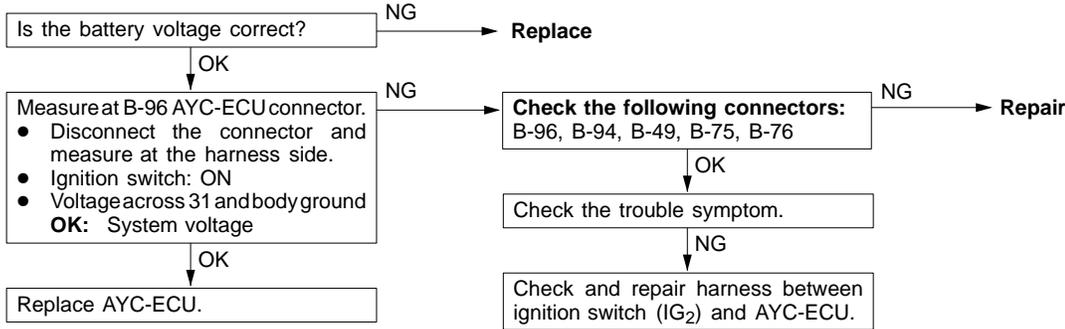
Diagnosis code No.	Diagnosis items	Ref. page
12	Power supply voltage (valve power supply) system (open- or short-circuit)	27-6
21	FR wheel speed sensor system (open- or short-circuit)	27-6
22	FL wheel speed sensor system (open- or short-circuit)	27-6
23	RR wheel speed sensor system (open- or short-circuit)	27-6
24	RL wheel speed sensor system (open- or short-circuit)	27-6
25	Wrong-diameter tire	27-8
26	Faulty wheel speed sensor	27-9
31	Steer sensor (ST-1, ST-2, ST-N) system (open-circuit)	27-10
32	Steer sensor (ST-N) system (short-circuit)	27-10
33	Steer sensor (ST-N) system	27-11
34	Steer sensor (ST-1, ST-2) system (short-circuit)	27-11
41	TPS system (open- or short-circuit)	27-12
51	Longitudinal acceleration sensor system (open- or short-circuit)	27-12
52	Longitudinal acceleration sensor	27-13
56	Lateral acceleration sensor system (open- or short-circuit)	27-12
61	Stop lamp switch system (open-circuit)	27-13
65	ABS monitor system (open-circuit or defective ABS)	27-14
71	Proportioning valve system (open- or short-circuit)	27-14
72	Directional control valve (right) system (open- or short-circuit)	27-15
73	Directional control valve (left) system (open- or short-circuit)	27-16
81	AYC relay system (open- or short-circuit)	27-17
82	Electric pump system	27-18
83	Electric pump system	27-19

4. INSPECTION PROCEDURES FOR DIAGNOSIS CODES

Code No. 12: Power supply voltage (valve power supply) system	Probable cause
This code is output when the AYC-ECU power supply voltage drops below, goes beyond, a specified level.	<ul style="list-style-type: none"> ● Defective harness or connector ● Defective battery ● Defective AYC-ECU

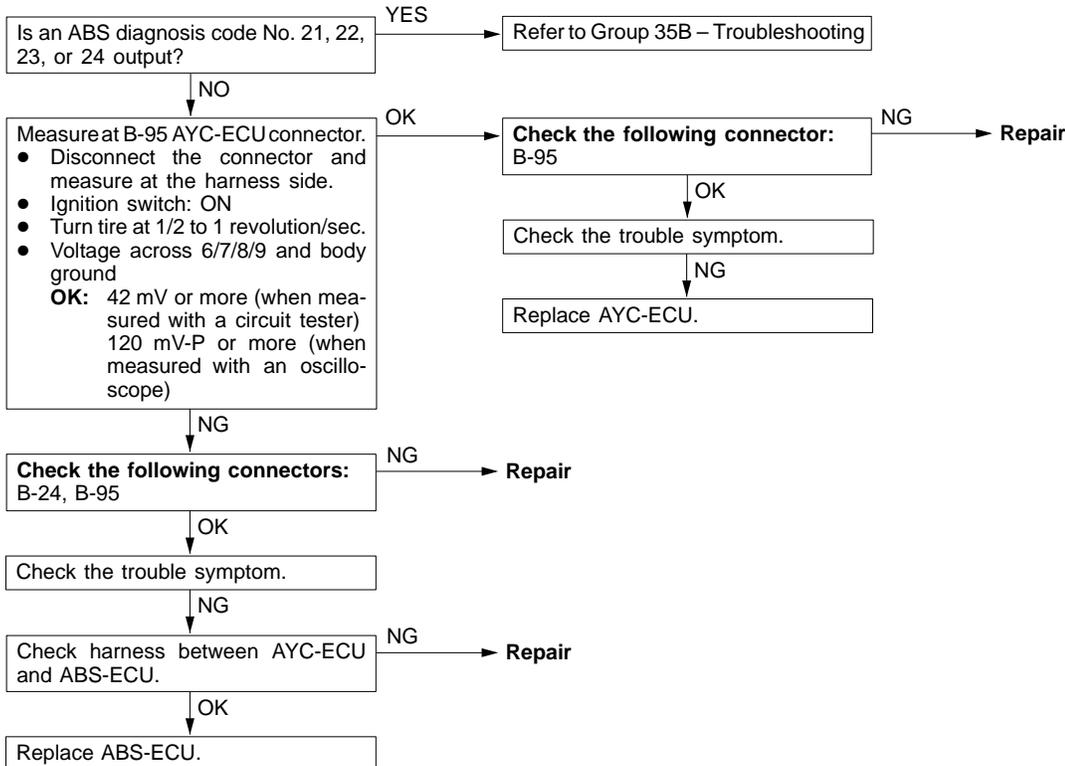
NOTE

Refer to the corresponding item if any other diagnosis code is being output.

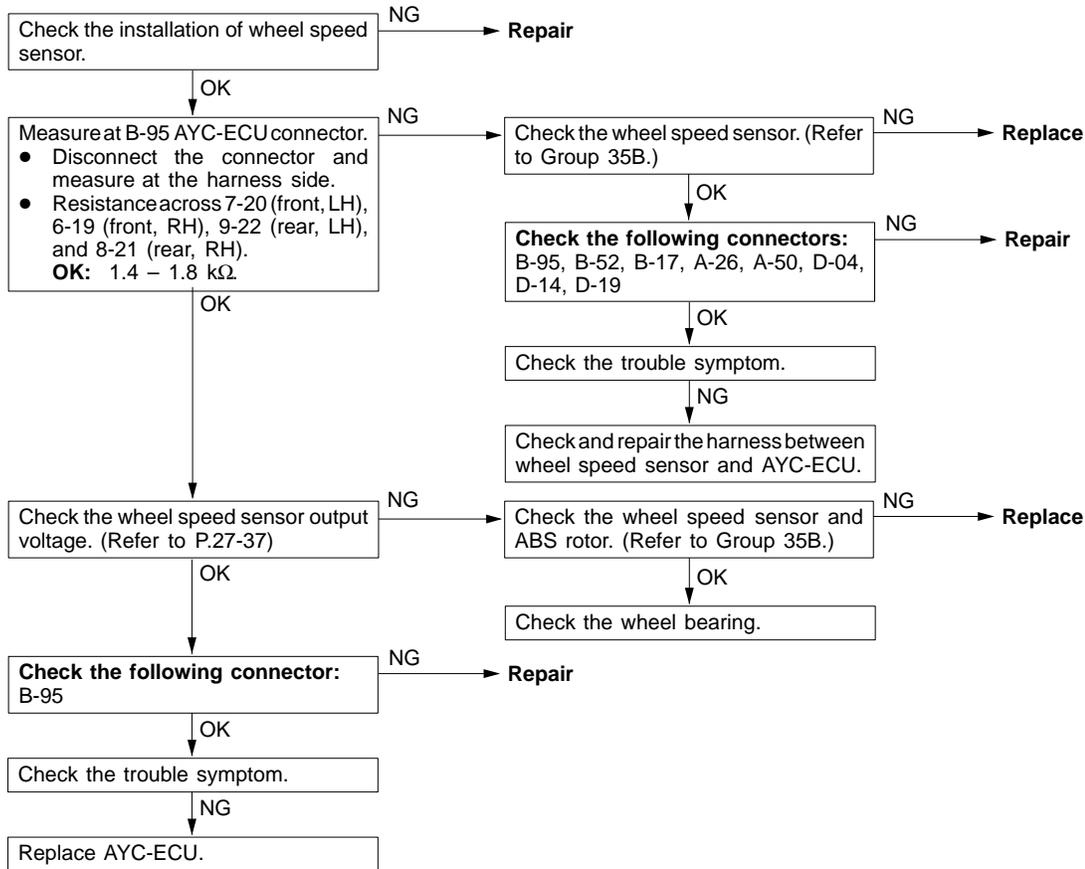


Code Nos. 21, 22, 23, 24: Wheel speed sensor system	Probable cause
This code is output if any one of three wheel speed sensors fails to provide an input even after the other wheel exceeded 8 km/h.	<ul style="list-style-type: none"> ● Defective harness or connector ● Defective ABS-ECU ● Defective AYC-ECU

<Vehicles with ABS>

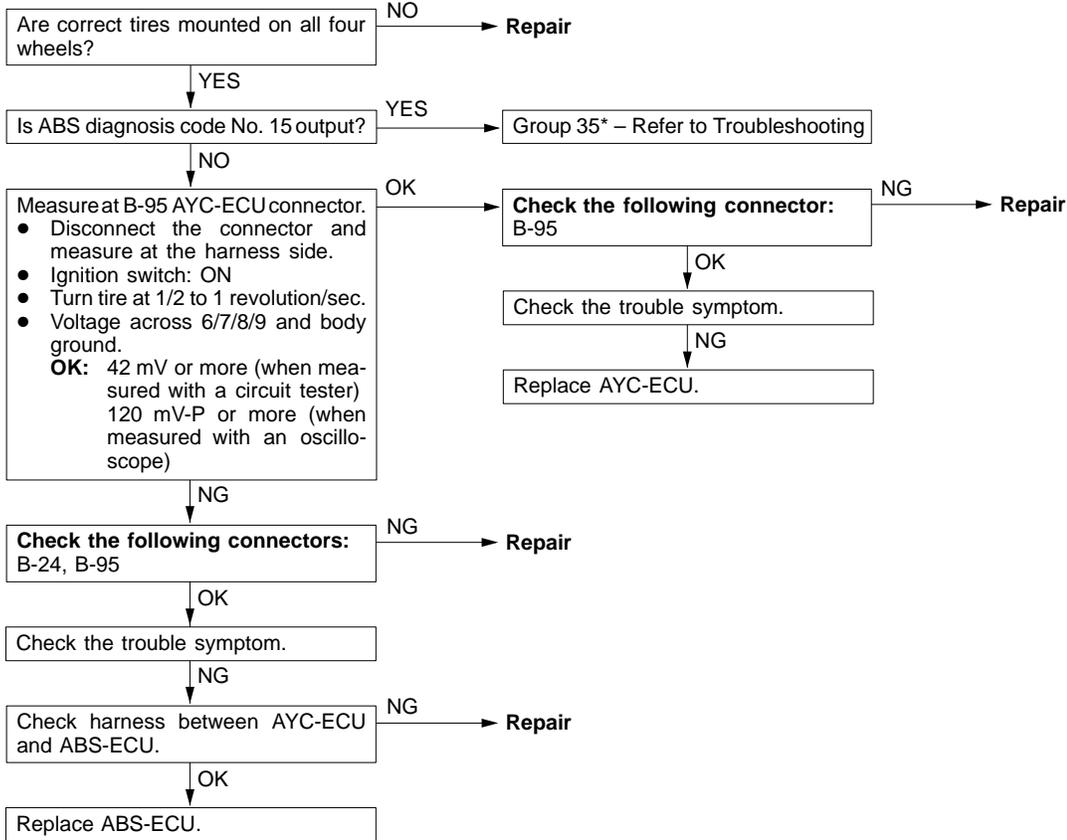


<Vehicles without ABS>

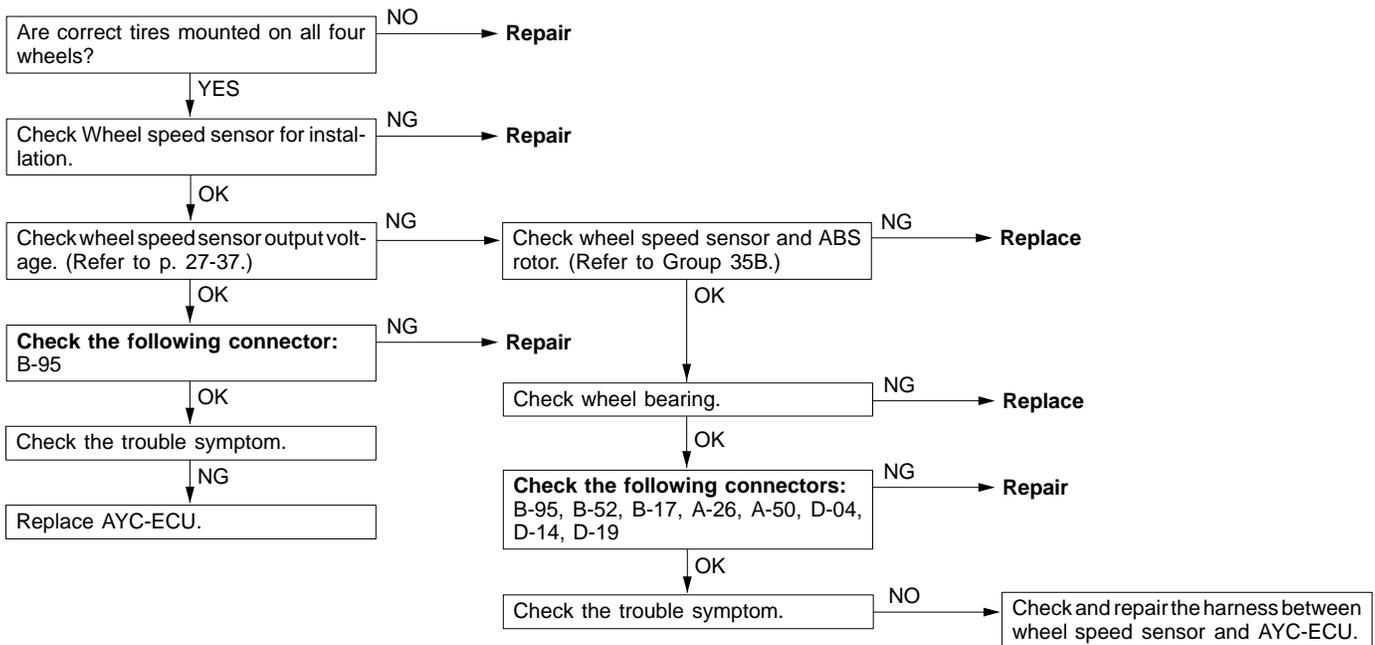


Code No. 25: Wrong-diameter tire	Probable cause
This code is output if the speed of any one of the four wheels exceeds a specified level with respect to the average of the four wheel speed sensor outputs when the steering wheel is in the straight-ahead position and the vehicle speed exceeds 20 km/h. At this time, the warning lamp does not light up.	<ul style="list-style-type: none"> ● Defective harness or connector ● Defective AYC-ECU ● Defective ABS-ECU

<Vehicles with ABS>

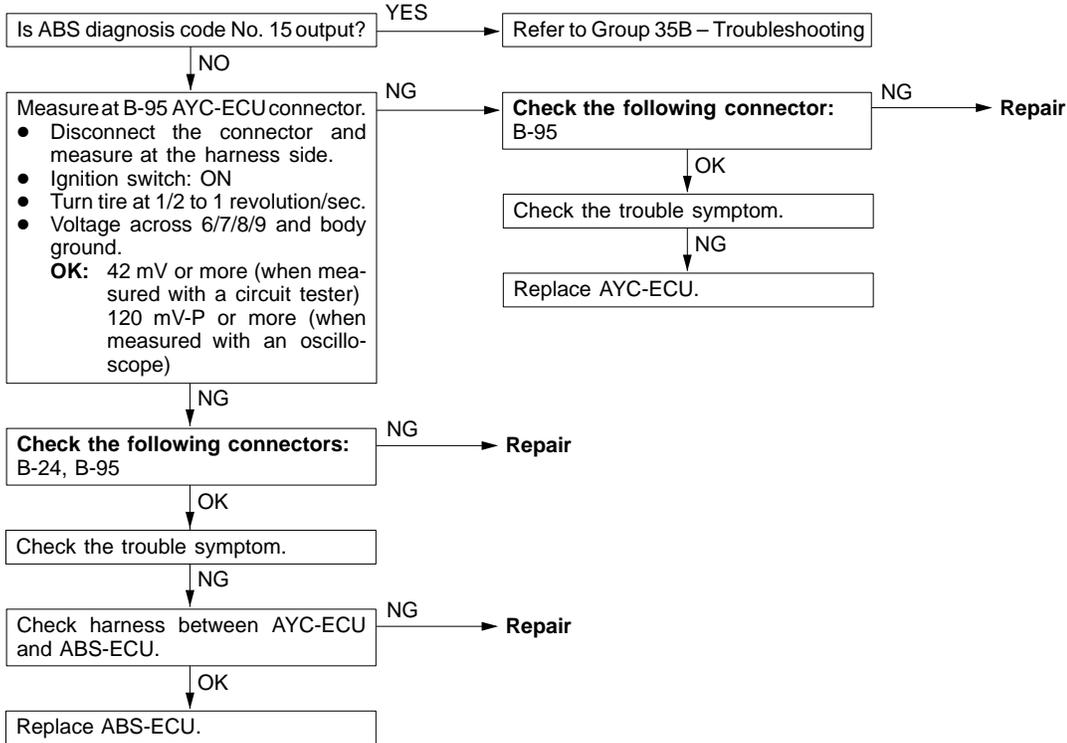


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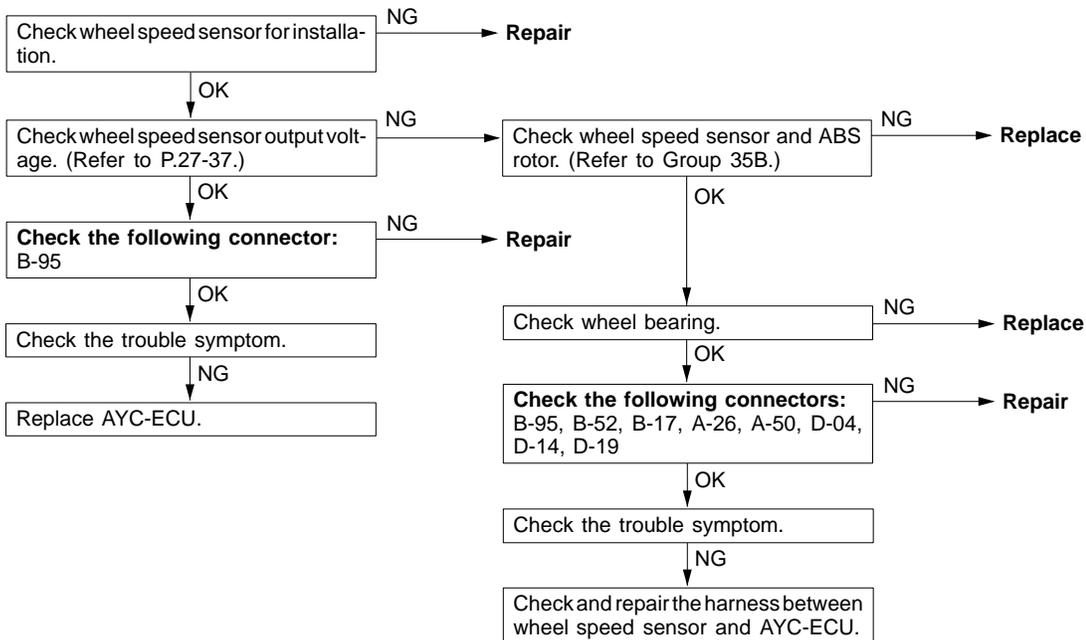


Code No. 26: Wheel speed sensor system (faulty output signal)	Probable cause
This code is output if the speed of one of the four wheels exceeds a specified level when the vehicle speed is 20 km/h or more. At this time, the warning lamp is turned on.	<ul style="list-style-type: none"> ● Defective harness or connector ● Defective AYC-ECU ● Defective ABS-ECU

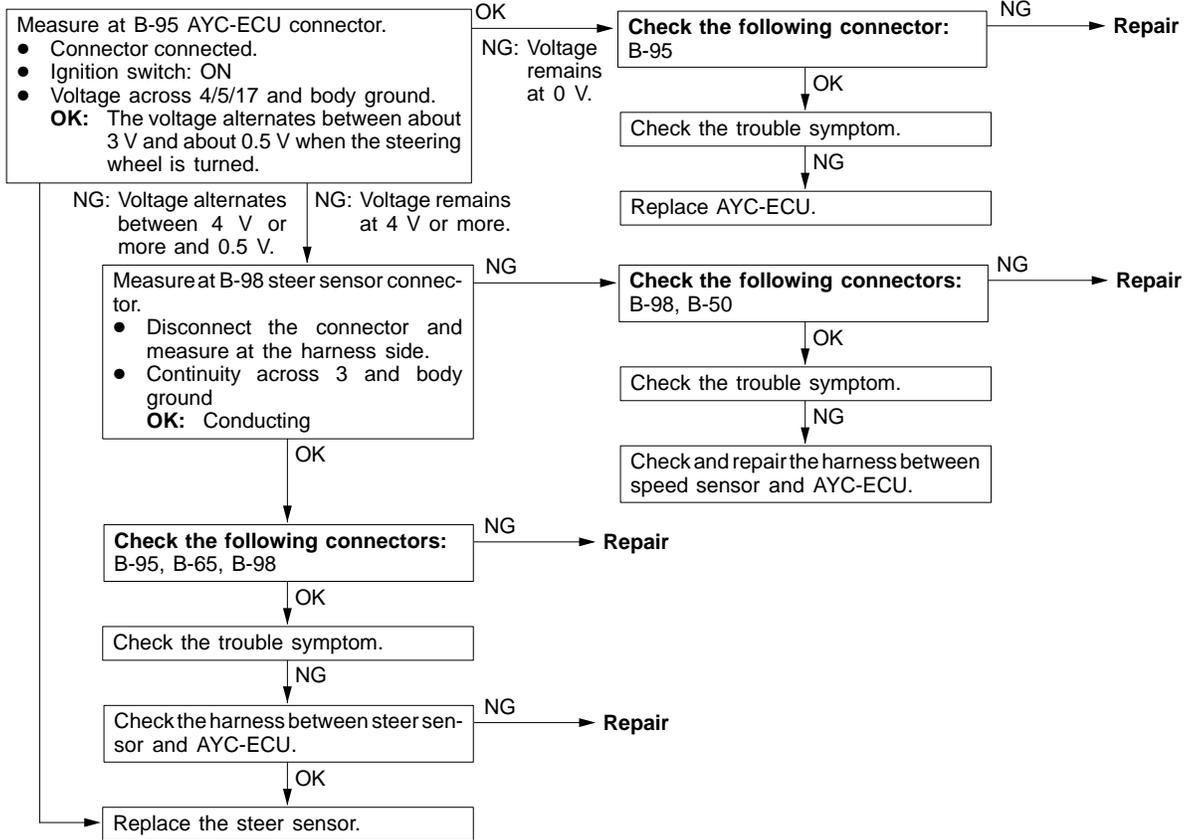
<Vehicles with ABS>



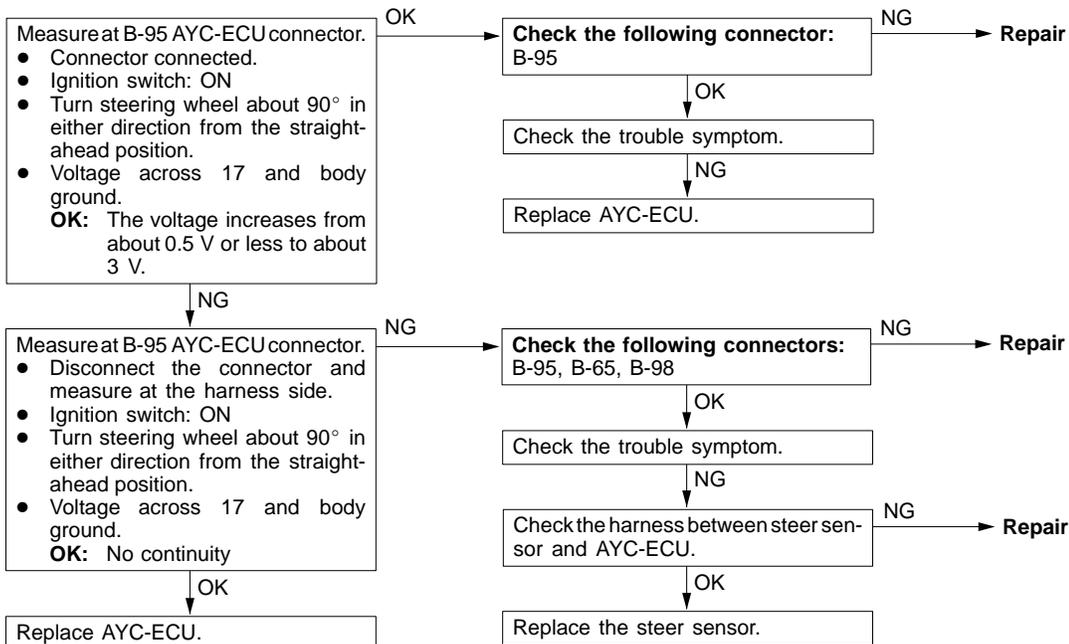
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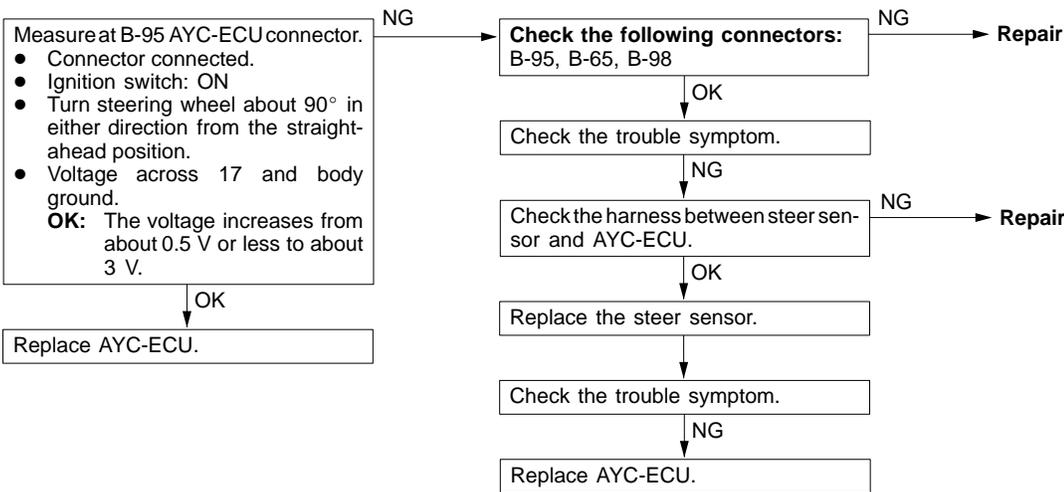
Code No. 31: Steer sensor (ST-1, ST-2, ST-N) system	Probable cause
This code is output when any of the steer sensors ST-1, ST-2, and ST-N is open-circuited or the steer sensor ground wire is open-circuited.	<ul style="list-style-type: none"> ● Defective steer sensor ● Defective harness or connector ● Defective AYC-ECU



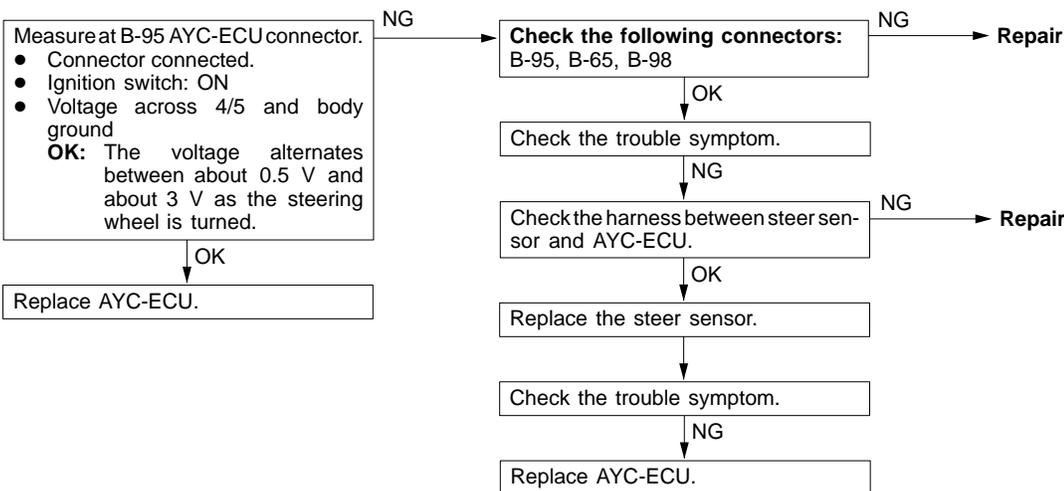
Code No. 32: Steer sensor (ST-N) system	Probable cause
This code is output when the steering wheel is considered to be turned 40° or more as determined with ST-1 and ST-2 with ST-N ON (LOW voltage).	<ul style="list-style-type: none"> ● Defective steer sensor ● Defective harness or connector ● Defective AYC-ECU



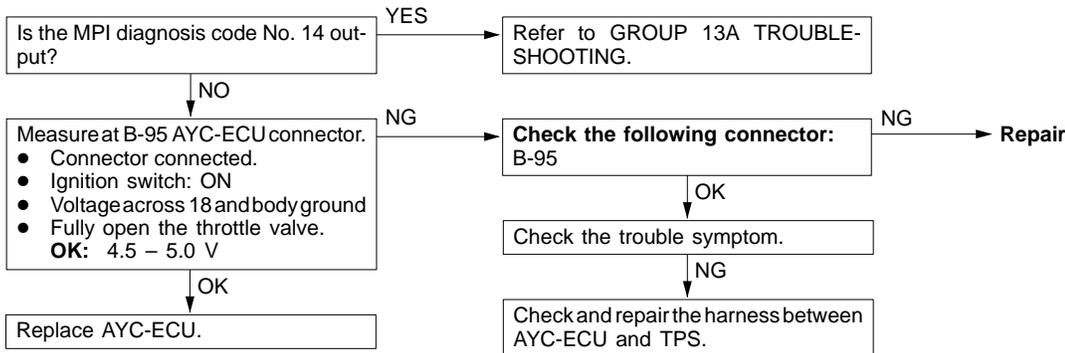
Code No. 33: Steer sensor (ST-N) system	Probable cause
This code is output when the steering wheel is turned 400° or more in the same direction with ST-N OFF (HIGH voltage).	<ul style="list-style-type: none"> ● Defective steer sensor ● Defective harness or connector ● Defective AYC-ECU



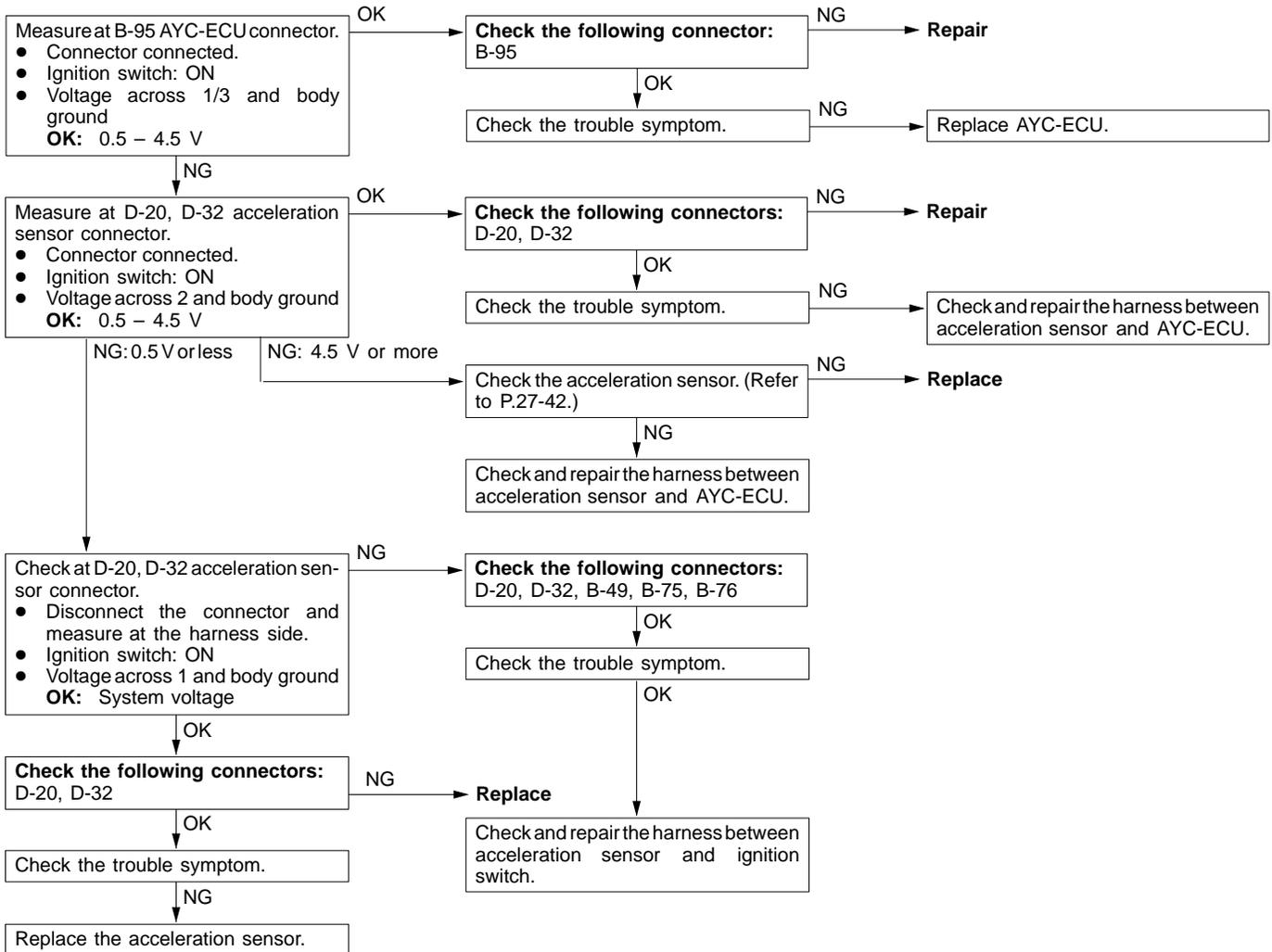
Code No. 34: Steer sensor (ST-1, ST-2) system	Probable cause
This code is output if a turning condition is detected for a cumulative period of time of 15 min. or more, during which there is no change in the steer sensor (ST-1, ST-2) signals with the wheel speed 15 km/h or more.	<ul style="list-style-type: none"> ● Defective steer sensor ● Defective harness or connector ● Defective AYC-ECU



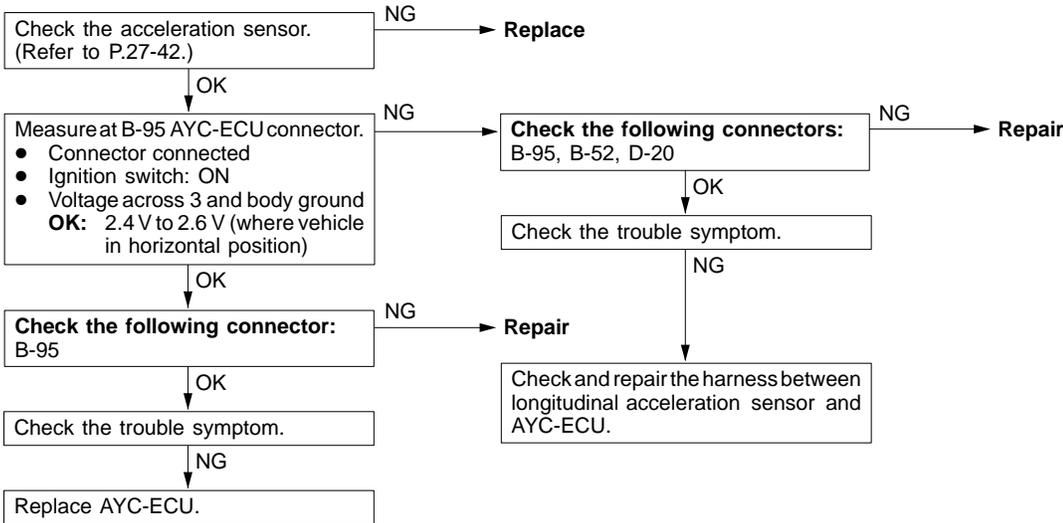
Code No. 41: TPS system	Probable cause
This code is output when the input from the throttle position sensor falls short of 0.2 V.	<ul style="list-style-type: none"> ● Defective TPS ● Defective harness or connector ● Defective AYC-ECU



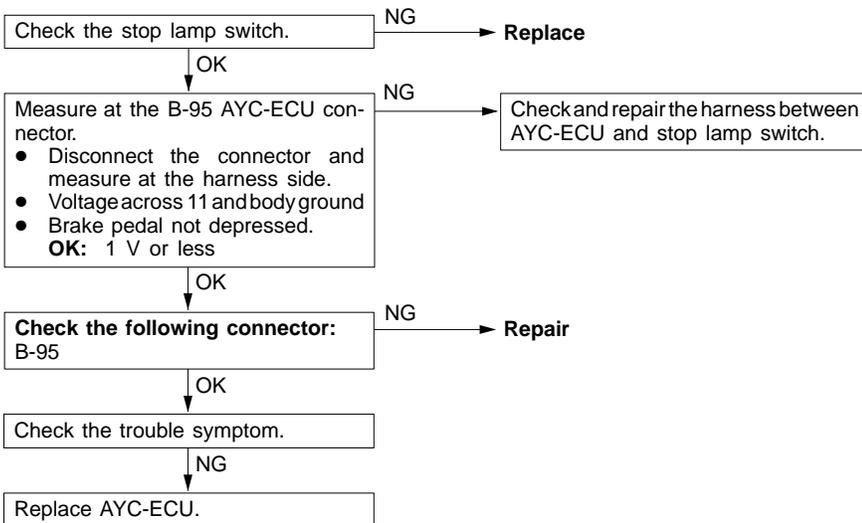
Code No. 51: Longitudinal acceleration sensor system	Probable cause
Code No. 56: Lateral acceleration sensor system This code is output when the output from the acceleration sensor becomes 0.5 V or less or 4.5 V or more.	<ul style="list-style-type: none"> ● Defective longitudinal acceleration sensor ● Defective lateral acceleration sensor ● Defective harness or connector ● Defective AYC-ECU



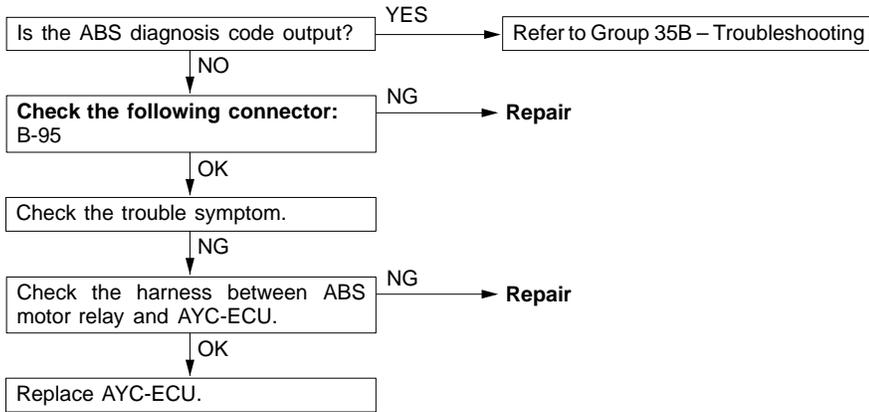
Code No. 52: Longitudinal acceleration sensor system	Probable cause
This code is output when the longitudinal acceleration exceeds a predetermined value while the vehicle is running with both ABS and brakes being inactive.	<ul style="list-style-type: none"> ● Defective longitudinal acceleration sensor ● Defective harness or connector ● Defective AYC-ECU



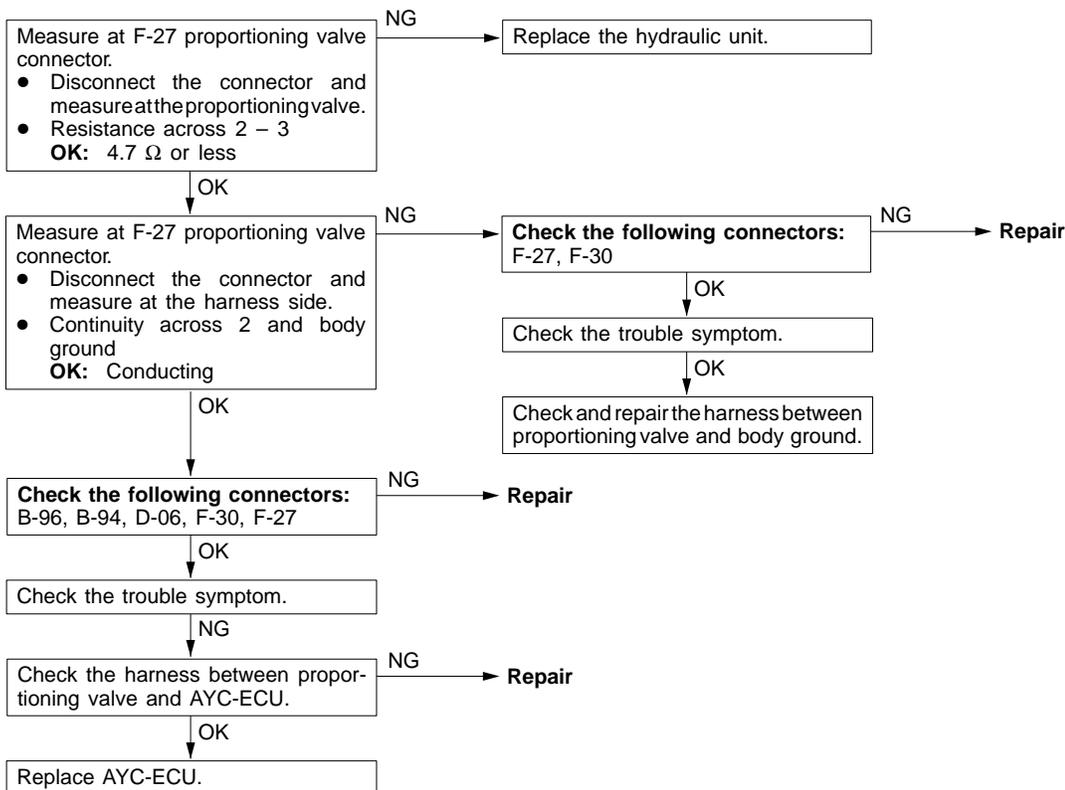
Code No. 61: Stop lamp switch system	Probable cause
This code is output under either of the following conditions: <ul style="list-style-type: none"> ● Stop lamp switch remains ON for 15 min. or more. ● There is an open-circuit in the harness between AYC-ECU and stop lamp switch. 	<ul style="list-style-type: none"> ● Defective stop lamp switch ● Defective harness or connector ● Defective AYC-ECU



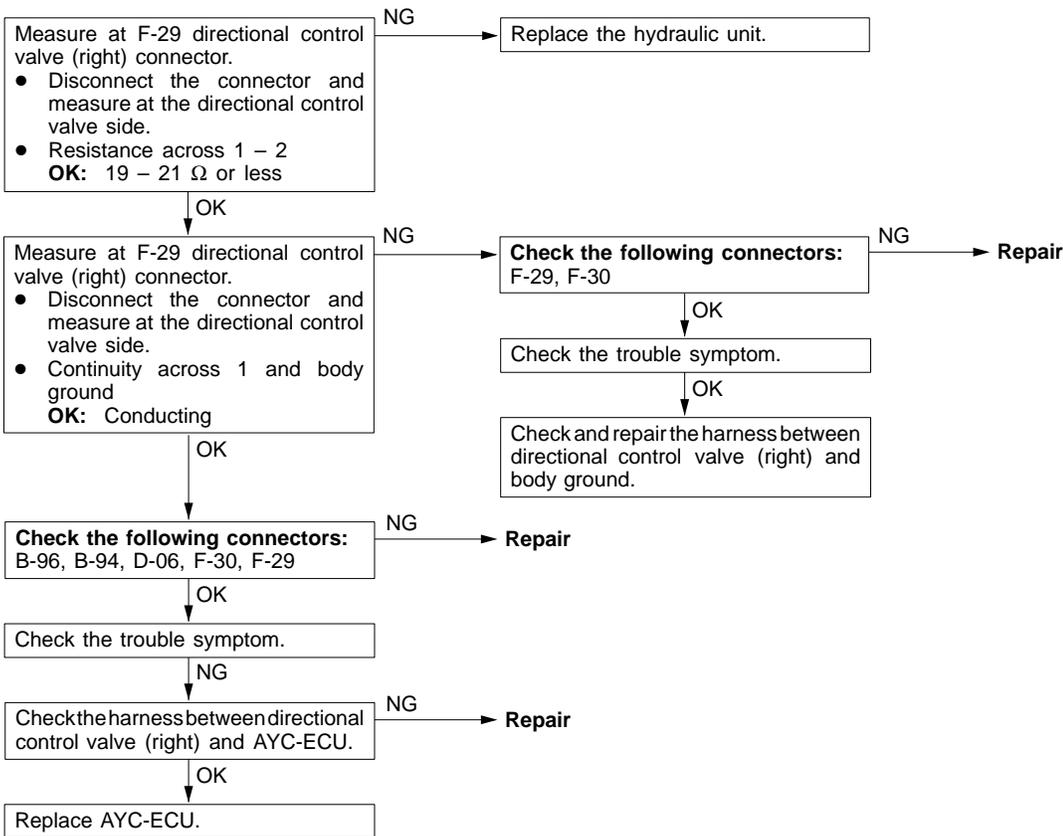
Code No. 65: ABS monitor system	Probable cause
This code is output when ABS is considered to remain activated (motor relay remains ON) for a continuous 1-min.-or-more period. It is output also when there is an open-circuit in the harness between ABS motor relay and AYC-ECU.	<ul style="list-style-type: none"> ● Defective harness or connector ● Defective AYC-ECU



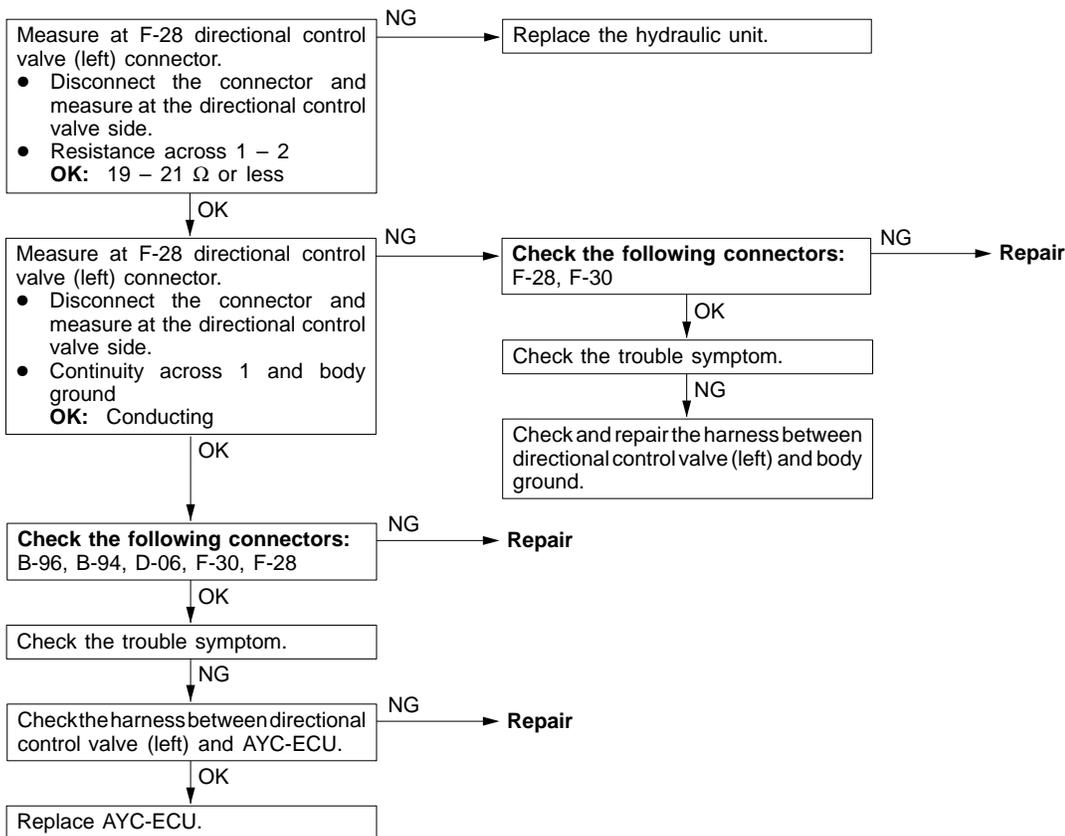
Code No. 71: Proportioning valve system	Probable cause
This code is output when the proportioning valve control circuit is open- or short-circuited.	<ul style="list-style-type: none"> ● Defective proportioning valve ● Defective harness or connector ● Defective AYC-ECU



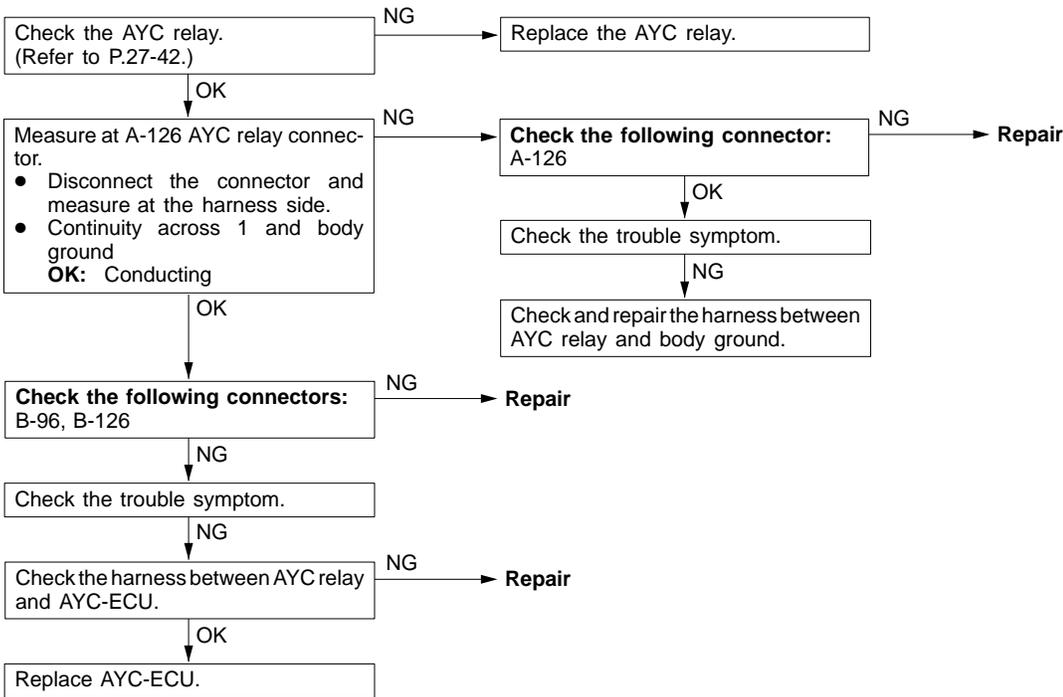
Code No. 72: Directional control valve (right) system	Probable cause
This code is output when the directional control valve (right) control circuit is open- or short-circuited.	<ul style="list-style-type: none"> ● Defective directional control valve (right) ● Defective harness or connector ● Defective AYC-ECU



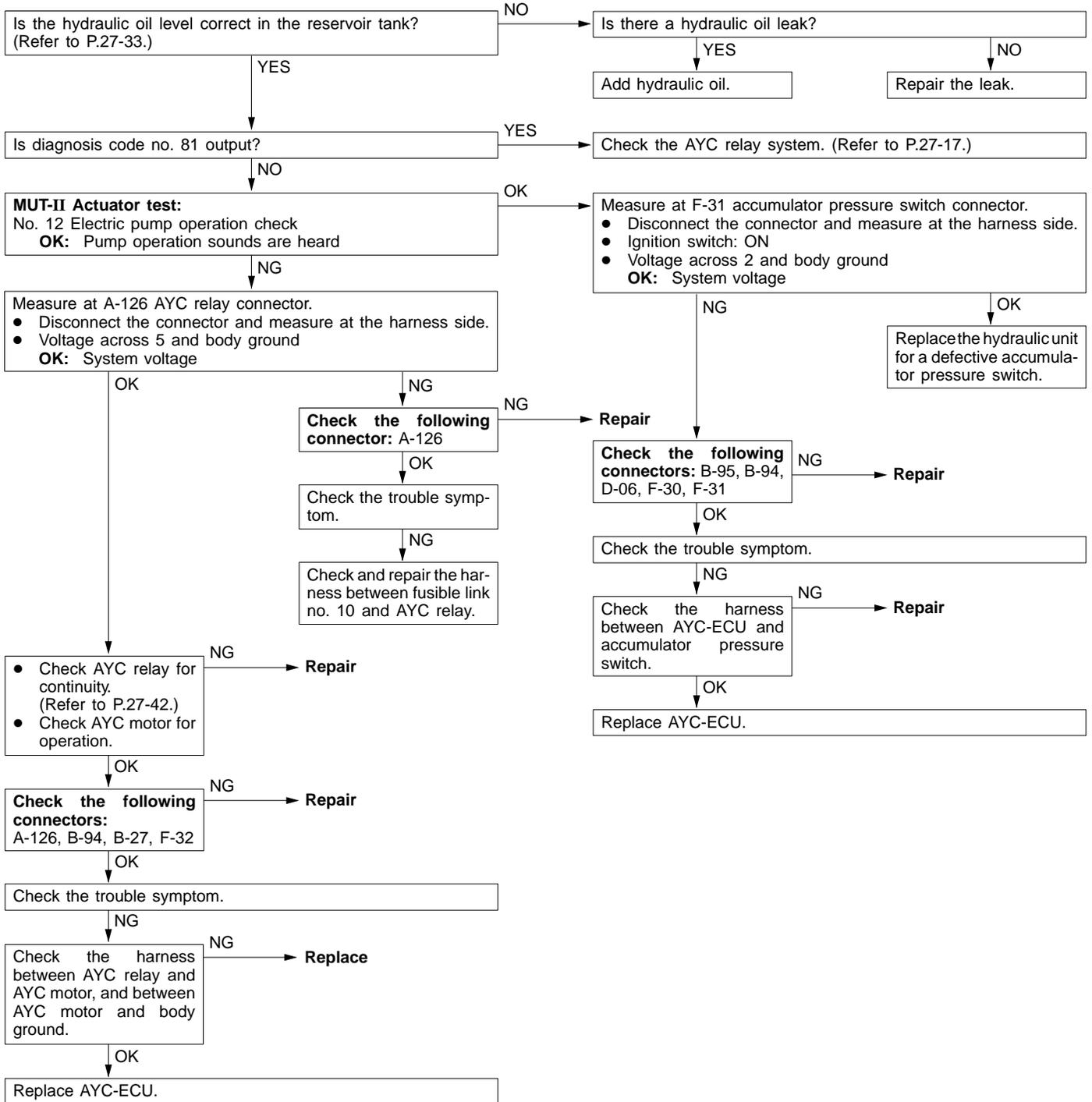
Code No. 73: Directional control valve (left) system	Probable cause
This code is output when the directional control valve (left) control circuit is open- or short-circuited.	<ul style="list-style-type: none"> ● Defective directional control valve (left) ● Defective harness or connector ● Defective AYC-ECU



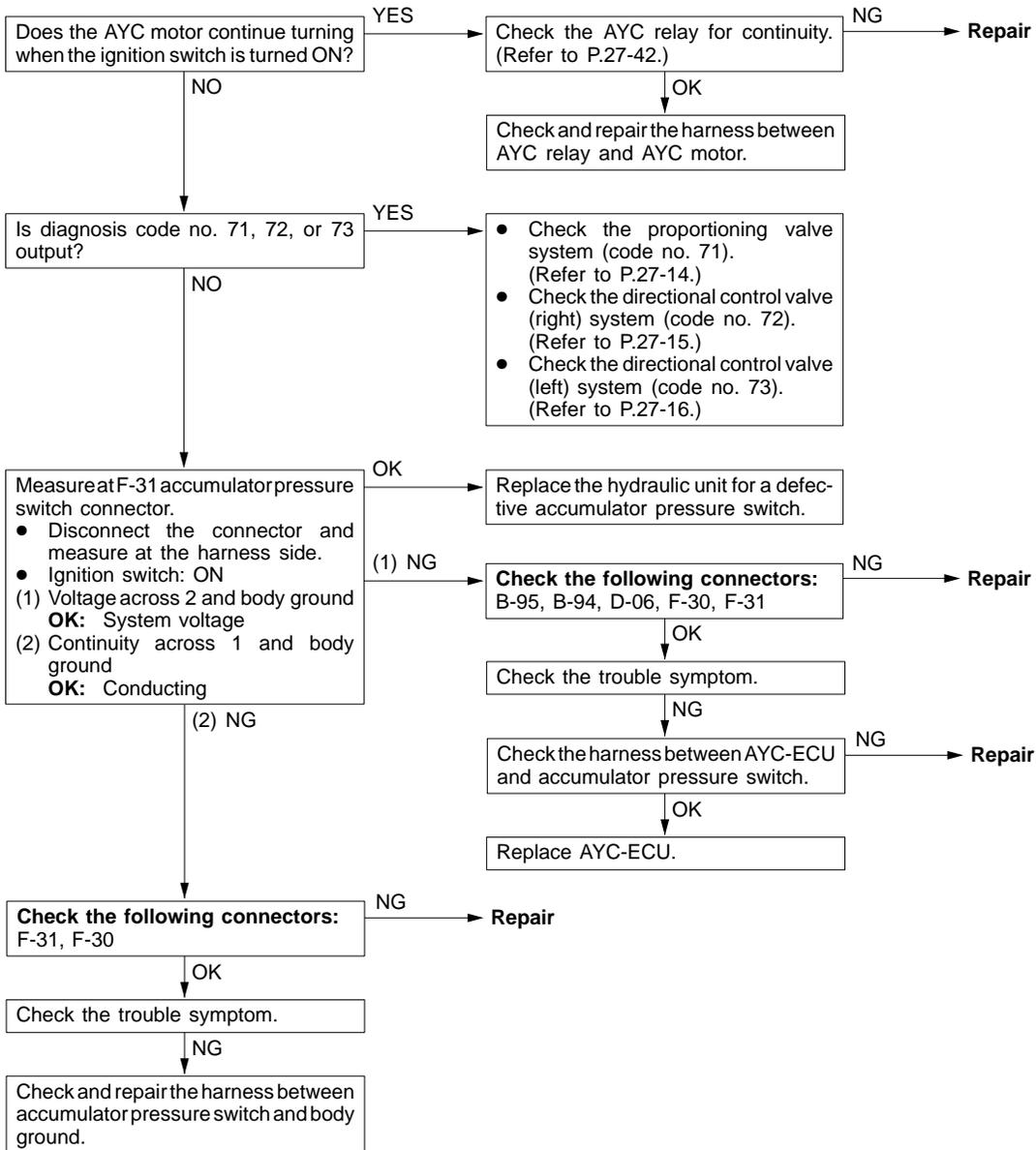
Code No. 81: AYC relay system	Probable cause
This code is output when the coil circuit of the AYC relay is open- or short-circuited.	<ul style="list-style-type: none"> ● Defective AYC relay ● Defective harness or connector ● Defective AYC-ECU



Code No. 82: Electric pump system	Probable cause
This code is output if the pressure switch is not set to high-pressure position despite the AYC-ECU's command to drive the AYC relay for a given period of time.	<ul style="list-style-type: none"> ● Low hydraulic oil level ● Oil leak ● Defective fusible link ● Defective AYC relay ● Defective harness or connector ● Defective AYC motor ● Defective accumulator pressure switch ● Defective AYC-ECU



Code No. 83: Electric pump system	Probable cause
This code is output if the pressure switch is not set to low-pressure position despite the AYC-ECU's command to change the driving force.	<ul style="list-style-type: none"> • Defective accumulator pressure switch • Defective harness or connector



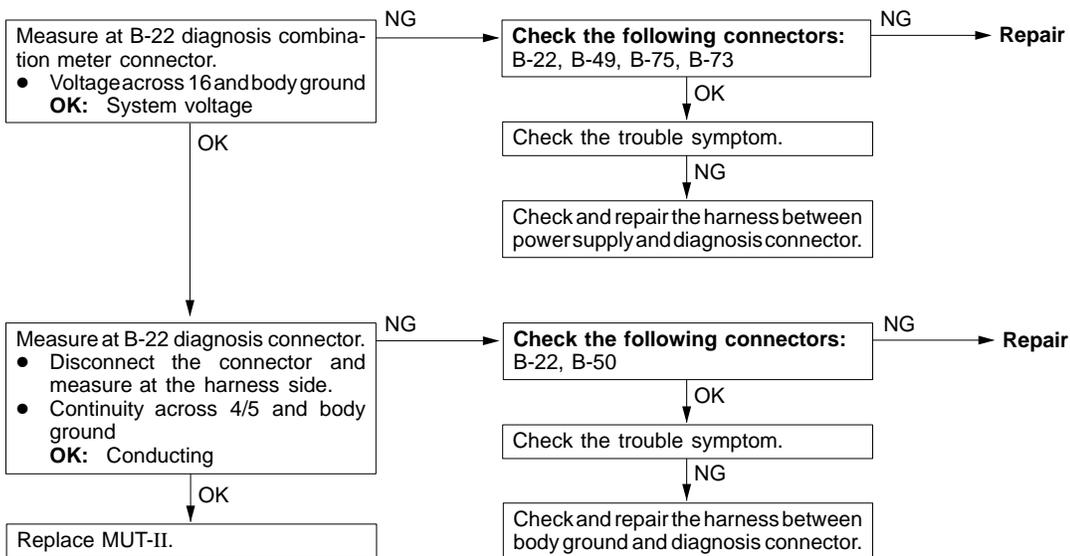
5. INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom	Inspection procedure No.	Ref. page
Communication between MUT-II and the whole system is not possible.	1	27-20
Communication between MUT-II and AYC-ECU is not possible.	2	27-21
AYC warning lamp does not light up when the ignition key is turned to "ON" (engine stationary).	3	27-22
AYC warning lamp remains lit up after the engine has started.	4	27-23
AYC is inoperative. Unable to start or accelerate on slippery road surfaces.	5	27-23
Rear tires are noisy during low-speed cornering. Vehicle skews.	6	27-24

6. INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

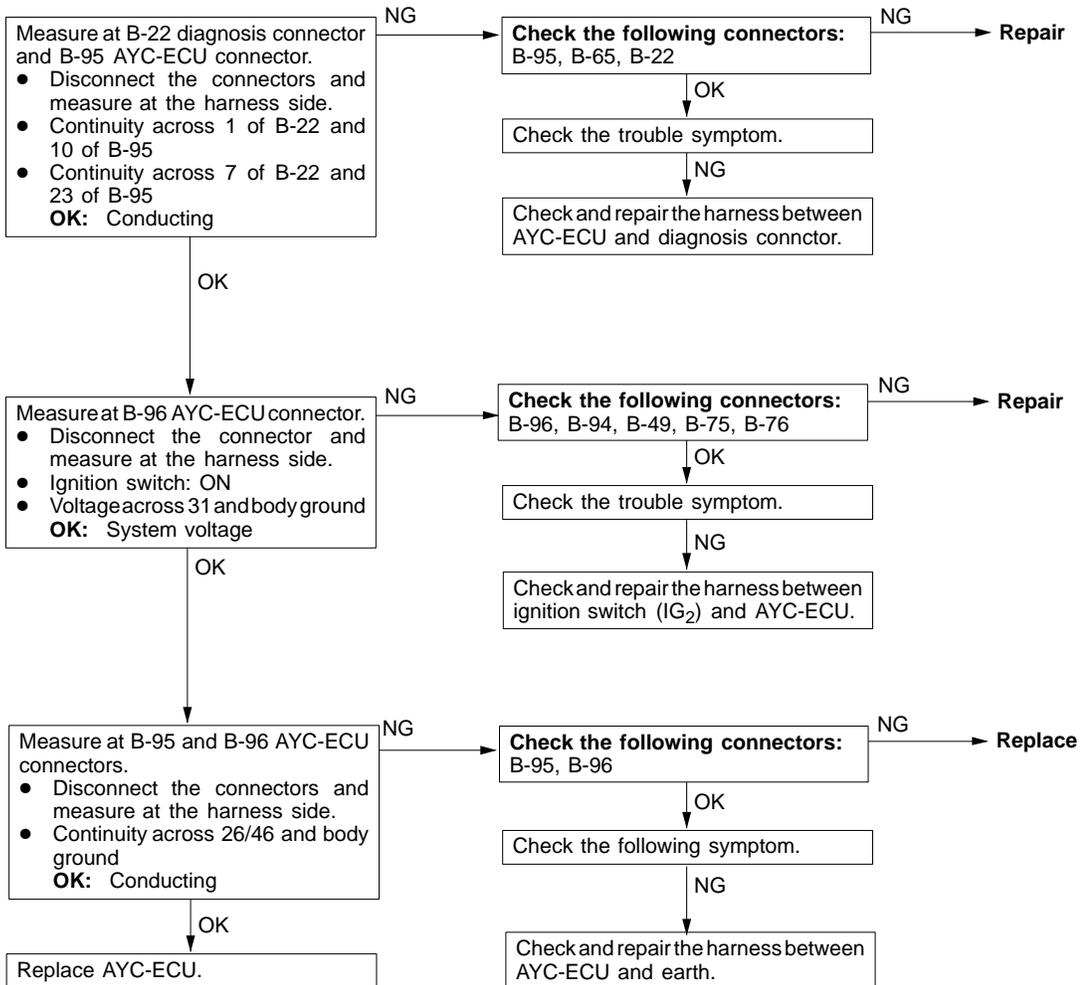
INSPECTION PROCEDURE 1

Communication between MUT-II and the whole system is not possible.	Probable cause
The cause may be a malfunction of the power supply circuit or the ground circuit of the diagnosis connector.	<ul style="list-style-type: none"> Defective diagnosis connector Defective harness or connector



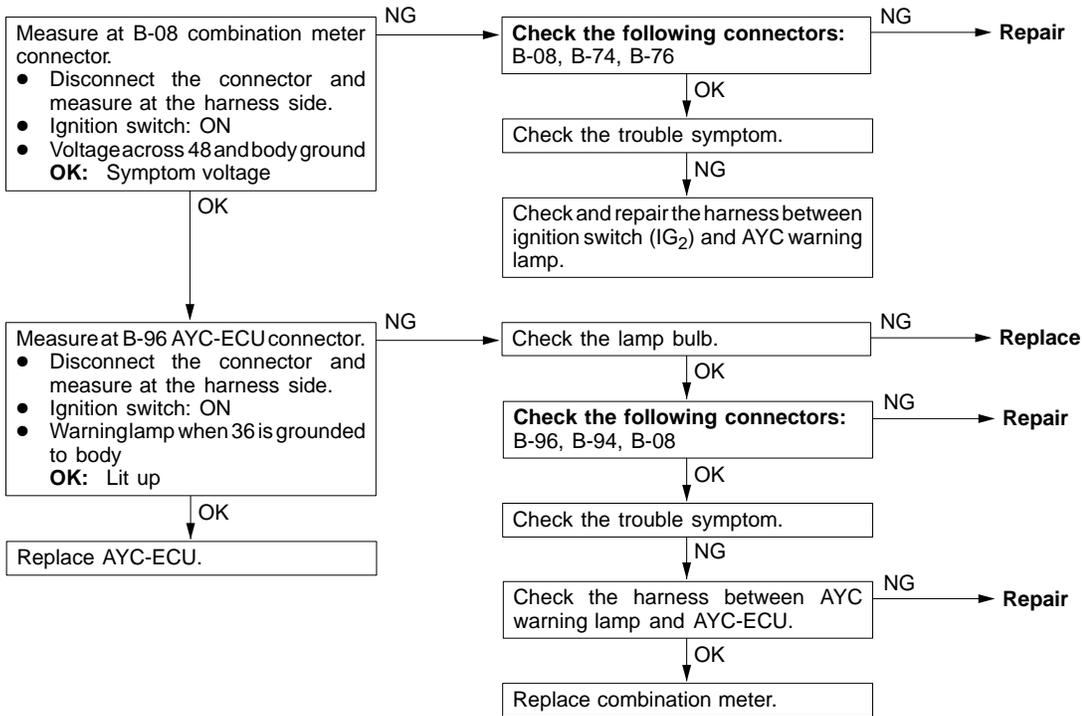
INSPECTION PROCEDURE 2

Communication between MUT-II and the AYC-ECU is not possible.	Probable cause
The cause may be a malfunction of the AYC-ECU power supply circuit or an open circuit in the diagnosis output circuit.	<ul style="list-style-type: none"> ● Blown fuse ● Defective harness or connector ● Defective AYC-ECU



INSPECTION PROCEDURE 3

AYC warning lamp does not light up when the ignition key is turned to "ON" (engine stationary).	Probable cause
The lamp power supply circuit is probably open-circuited, lamp bulb is out, or the circuit between AYC warning lamp and AYC-ECU or AYC-ECU itself is defective.	<ul style="list-style-type: none"> ● Blown fuse ● AYC warning lamp out ● Defective harness or connector ● Defective AYC-ECU

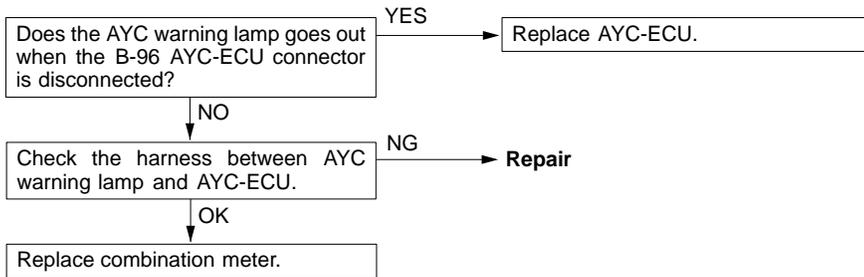


INSPECTION PROCEDURE 4

AYC warning lamp remains lit up after the engine has started.	Probable cause
The AYC warning lamp ON circuit is probably short-circuited.	<ul style="list-style-type: none"> ● Defective combination meter ● Defective harness (short-circuit) ● Defective AYC-ECU

NOTE

This symptom is limited only when the communication with MUT-II is possible with AYC-ECU power supply in normal condition and the diagnosis code is correct.

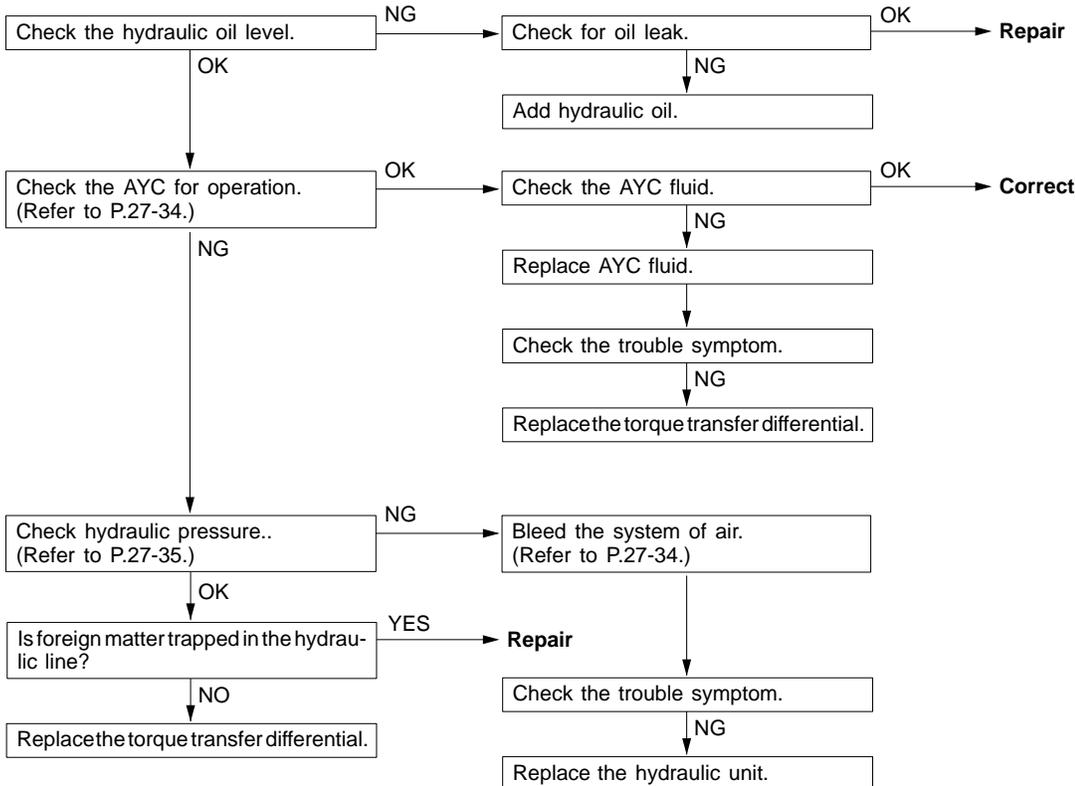


INSPECTION PROCEDURE 5

AYC is inoperative. Unable to start or accelerate on slippery road surfaces.	Probable cause
The hydraulic oil level is probably low, there is an oil leak, the hydraulic unit is defective, or the torque transfer differential is defective.	<ul style="list-style-type: none"> ● Low hydraulic oil level ● Oil leak ● Defective hydraulic unit ● Defective torque transfer differential

NOTE

This symptom is limited only when the diagnosis code is correct.

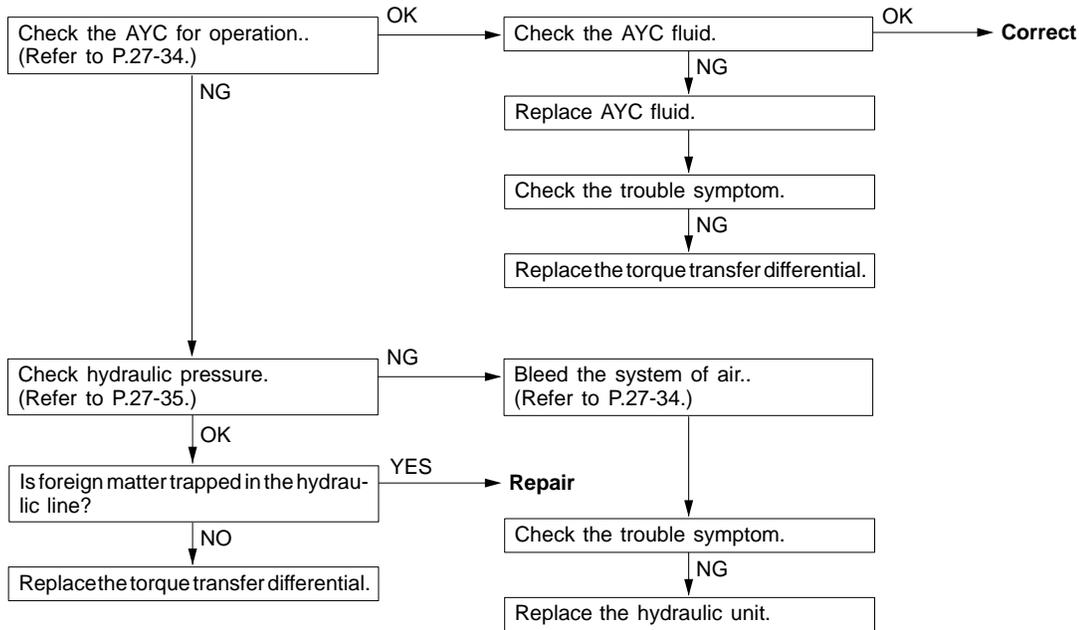


INSPECTION PROCEDURE 6

Rear tires are noisy during low-speed cornering. Vehicle skews.	Probable cause
The hydraulic unit or torque transfer differential is probably defective.	<ul style="list-style-type: none"> ● Defective hydraulic unit ● Defective torque transfer differential

NOTE

This symptom is limited only when the diagnosis code is correct.



DATA LIST REFERENCE TABLE

The following items can be read by t01he MUT-II from the ECU input data.

Item No.	Check item	Checking requirements		Normal value
01	Front-right wheel speed	Perform a test run.		Vehicle speeds displayed on the speedometer and MUT-II are identical.
02	Front-left wheel speed			
03	Rear-right wheel speed			
04	Rear-left wheel speed			
05	Front-right wheel speed (0.2 km/h)			
06	Front-left wheel speed (0.2 km/h)			
07	Rear-right wheel speed (0.2 km/h)			
08	Rear-left wheel speed (0.2 km/h)			
10	Vehicle speed			
11	System voltage	Ignition switch: ON		Battery voltage
15	TPS opening	Accelerator pedal position/ignition switch: ON	Fully closed	300 – 1000mV
			Partially open	Gradually increases from the above value.
			Fully open	4500 – 5000mV
19	Longitudinal acceleration sensor	Vehicle stands on level ground		2.4 – 2.6V
		Perform a test run.		Reading fluctuates up or down with 2.5V as its center.
20	Lateral acceleration sensor	Vehicle stands on level ground		2.4 – 2.6V
		Perform a test run.		Reading fluctuates up or down with 2.5V as its center.
22	Steering wheel operation	Steering wheel turning direction Ignition switch: ON	90 deg. clockwise	R90 deg
			90 deg counter-clockwise	L90 deg
23	Steering wheel turning angular velocity	Steering wheel position Ignition switch: ON	Not turned	0 deg/s
			Turned	Reading varies according to turning speeds.
45	Idle position switch	Accelerator pedal position Ignition position: ON	Not depressed	ON
			Depressed	OFF

Item No.	Check item	Checking requirements		Normal value
46	Steer sensor (ST-N)	Steering wheel position Ignition switch: ON	Neutral position	ON
			90 deg. turned from neutral position	OFF
47	Steer sensor (ST-1)	Steering wheel position: Turn slowly counterclockwise. Ignition switch: ON		ON and OFF are indicated alternately.
48	Steer sensor (ST-2)	Steering wheel position: Turn slowly clockwise. Ignition switch: ON		ON and OFF are indicated alternately.
50	Stop lamp switch	Accelerator pedal position Ignition switch: ON	Depressed	ON
			Released	OFF
56	Pressure switch	Forced activation No.13 or No.14 is being executed.	Electric pump in operation	Low
			Electric pump not in operation	High
59	ABS monitor	ABS monitor		ON
		ABS not in operation		OFF

ACTUATOR TEST REFERENCE TABLE

The following items can be tested by driving the corresponding actuator forcibly using the MUT-II.

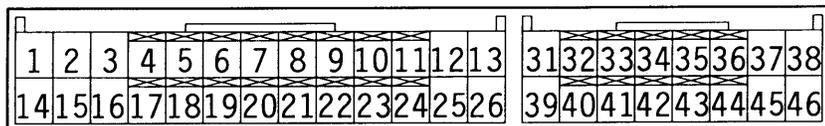
Item No.	Check item	Checking requirements	Normal value
10	Air bleeding	Supply current to proportioning valve in accordance with steering angle to operate directional valve.	No air is to be bled from the bleeder plug on the torque transfer differential.
11	Oil level check	Let the directional valve operate to left and right 20 times.	To be checked by oil level in reservoir tank.
12	Electric pump operation	Let the electric pump operate for 5 seconds.	Operation sounds of the electric pump are to be heard.
13	Clutch operation (left)	Let the directional valve operate to supply the maximum pressure to the left clutch.	The operation conditions are to be checked by the speed difference between left and right rear wheels with the wheels raised. For details, refer to AYC Operation Check on P.27-34.
14	Clutch operation (right)	Let the directional valve operate to supply the maximum pressure to the right clutch.	The operation conditions are to be checked by the speed difference between left and right rear wheels with the wheels raised. For details, refer to AYC Operation Check on P.27-34.
15	Control OFF	Turn off the electric pump relay to deactivate AYC control.	During the test run, some differences are to be recognized in running behaviors between when the system is ON and when it is OFF.

NOTE

- (1) The actuator test is feasible only when the following requirements are all satisfied.
 - All of inputs from four wheel speed sensors show 20 km/h or lower.
 - No system failure is registered.
 - The steering angle is within ± 30 deg. from the neutral position.
- (2) The actuator test comes to an end when either of the following conditions is met since the forced actuation is canceled.
 - Either of inputs from four wheel sensors shows higher than 20 km/h (with exception of Item No.15 "Control OFF").
 - Some trouble with the system is registered.
 - Forced activation time expires.
 - MUT-II is removed.
 - The clear key of MUT-II is operated.

CHECK AT AYC-ECU TERMINALS**TERMINAL VOLTAGE LISTING**

- The voltage is to be measured across each terminal and ground terminal.
- Fig. below shows the arrangement of the terminals.



1110060

Terminal No.	Check item	Check requirement	Normally
1	Lateral acceleration sensor	Ignition switch: ON	2.4 – 2.6 V (horizontal position)
2	Longitudinal acceleration sensor ground Lateral acceleration sensor ground	At all times	0 V
3	Longitudinal acceleration sensor	Ignition switch: ON	2.4 – 2.6 V (horizontal position)
4	Steer sensor (ST-2)	Engine: Idle speed Turn steering wheel slowly.	0 V ↔ approx. 3 V flashing
5	Steer sensor (ST-1)	Engine: Idle speed Turn steering wheel slowly.	0 V ↔ approx. 3 V flashing
6*1	FR wheel speed	Vehicle stationary	1 V or less
		Forward vehicle slowly.	0 – 5 V
7*1	FL wheel speed	Vehicle stationary	1 V or less
		Forward vehicle slowly.	0 – 5 V
8*1	RR wheel speed	Vehicle stationary	1 V or less
		Forward vehicle slowly.	0 – 5 V
9*1	FL wheel speed	Vehicle stationary	1 V or less
		Forward vehicle slowly.	0 – 5 V
10	Diagnosis selection input	When MUT-II is connected	1 V or less
		When MUT-II is disconnected	System voltage
11	Stop lamp switch	Ignition switch: ON Stop lamp switch: ON	System voltage
		Stop lamp switch: OFF	1 V or less
12*1	ABS monitor	When ABS monitor is activated	System voltage
		When ABS monitor is deactivated	1 V or less

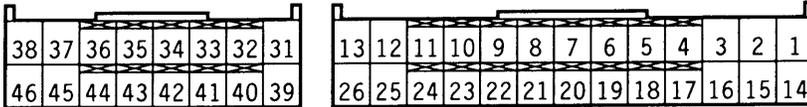
Terminal No.	Check item	Check requirement		Normally
17	Steer sensor (ST-N)	Engine: Idle speed	Steering wheel: Neutral position	0.5 V or less
			Steering wheel: Turned 90° from neutral position	2.5 – 3.5 V
18	TPS	Ignition switch: ON	Accelerator pedal: Fully closed	0.3 – 1.0 V
			Accelerator pedal: Fully open	4.5 – 5.0 V
23	Diagnosis data input/output	When MUT-II is connected		Serial communication with MUT-II
		When MUT-II is disconnected		1 V or less
24	Idle position switch	Ignition switch: ON	Accelerator pedal: Fully closed	2 V or less
			Accelerator pedal: Fully open	4.5 – 5.0 V
25	Accumulator pressure switch	Ignition switch: ON	Accumulator internal pressure: Low	2 V or less
			Accumulator internal pressure: High	System voltage
26	ECU ground	At all times		0 V
31	AYC-ECU power supply	Ignition switch: ON		System voltage
		Ignition switch: OFF		0 V
35	AYC motor relay	Ignition switch: ON	When motor is energized	System voltage
			When motor is deenergized	2 V or less
36	AYC warning lamp	Ignition switch: ON	When lamp is OFF	System voltage
			When lamp is ON	2 V or less
37	Directional control valve (right)	Ignition switch: ON	Right clutch: ON	System voltage
			Right clutch: OFF	0 V
38	Proportioning valve	Ignition switch: ON	AYC-ON	0 V to system voltage
			AYC-OFF	0 V
39	ECU backup power supply	At all times		System voltage
45	Directional control valve (left)	Ignition switch: ON	Left clutch: ON	System voltage
			Left clutch: OFF	0 V
46	ECU ground	At all times		0 V

NOTE

*1: Indicates the vehicles with ABS.

LISTING OF RESISTANCE AND CONTINUITY ACROSS CONNECTOR TERMINALS ON HARNESS SIDE

- Measure the resistance and check for continuity with the ignition switch in the “OFF” position and AYC-ECU connector disconnected.
- Measure the resistance and check for continuity across terminals listed below.
- Fig. below shows the arrangement of terminals.



1110061

Terminal No.	Signal name	Normally
2 – body ground	Longitudinal acceleration sensor ground, lateral acceleration sensor ground	Conducting
26 – body ground	ECU ground	Conducting
35 – body ground	AYC motor relay	Conducting
37 – body ground	Directional control valve (right)	15.4 – 16.4 Ω
38 – body ground	Proportioning valve	3.4 – 4.0 Ω
45 – body ground	Directional control valve (left)	15.4 – 16.4 Ω
46 – body ground	ECU ground	Conducting
6 – 19*2	Speed sensor (front, RH)	1.4 – 1.8 kΩ
7 – 20*2	Speed sensor (front, LH)	1.4 – 1.8 kΩ
8 – 21*2	Speed sensor (rear, RH)	1.4 – 1.8 kΩ
9 – 22*2	Speed sensor (rear, LH)	1.4 – 1.8 kΩ

NOTE

*2: Indicates the vehicles without ABS.

ON-VEHICLE SERVICE <VEHICLES WITH AYC>

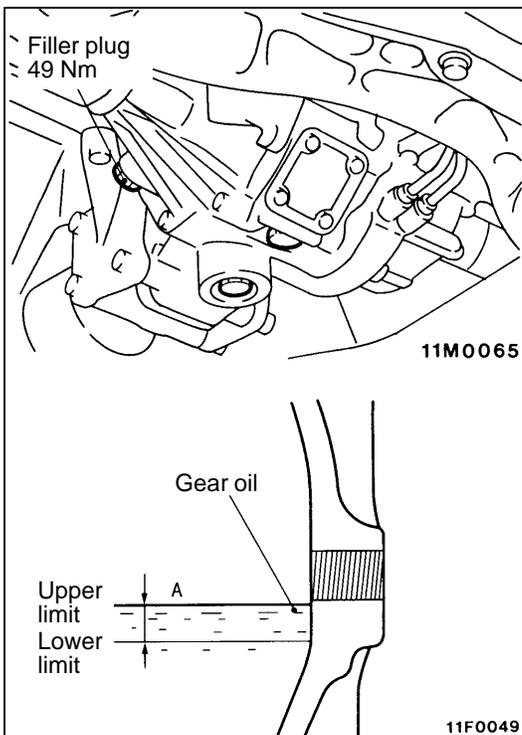
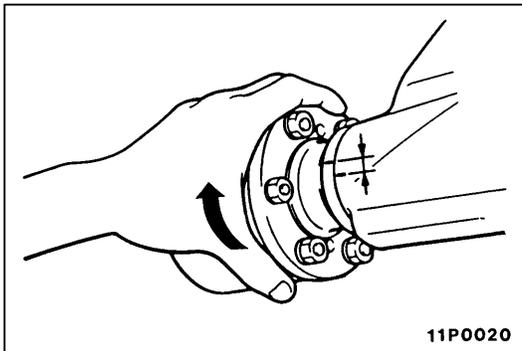
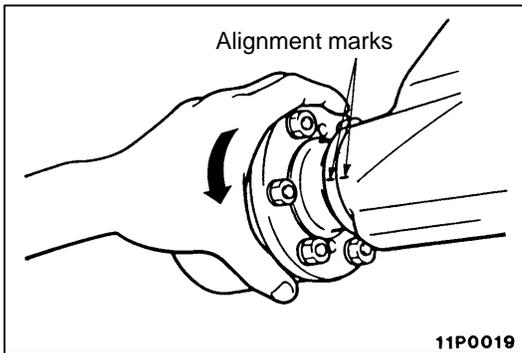
REAR AXLE TOTAL BACKLASH CHECK

If the drive system roars or the vehicle vibrates, use the following procedure to measure total backlash in the rear axle. Based on the measurement taken, determine whether the differential carrier assembly needs to be removed or not.

1. Place the shift lever in the neutral position and operate the parking brake.
2. Turn the propeller shaft fully clockwise and make an alignment mark on the companion flange dust cover and gear carrier.
3. Turn the propeller shaft fully counterclockwise and measure the deviation between the alignment marks.

Limit: 5 mm

4. If the backlash exceeds the limit, replace the differential carrier assembly.



GEAR OIL LEVEL CHECK

DIFFERENTIAL

1. Remove the filler plug.
2. Check that the gear oil level is within the specified range from the bottom end of the filler plug hole.

Standard value (A): 6 mm

3. If the gear oil level exceeds the standard value, add the specified gear oil up to the bottom end of the filler plug hole.

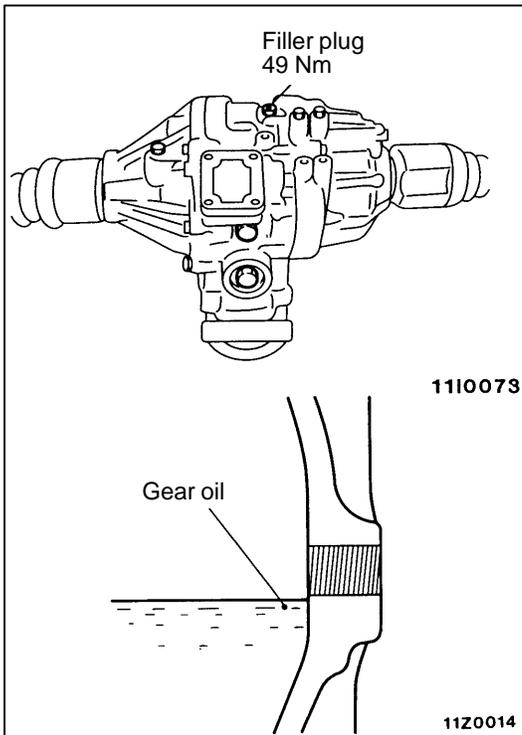
Specified gear oil:

**Hypoid gear oil API classification GL-5 or higher
SAE viscosity Number 90, 80W.**

NOTE

10°C or more: #90, less than 10°C: #80

4. Fit the filler plug and tighten it to the specified torque.

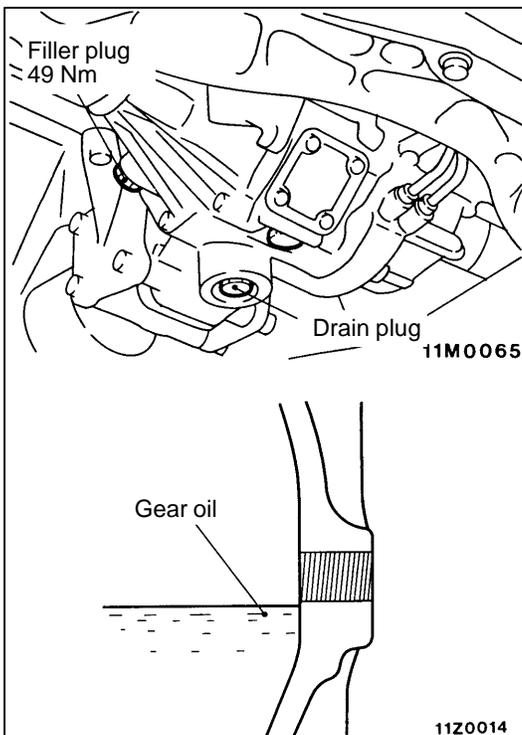
**TORQUE TRANSFER MECHANISM**

1. Remove the filler plug.
2. Check that the gear oil level is up to the bottom end of the filler plug hole.
3. If the gear oil level is lower than the bottom end of the filler plug hole, add the specified gear oil up to the bottom end of the filler plug hole.

Specified gear oil:

MITSUBISHI GENUINE DIA QUEEN SUPER AYC FLUID

4. Fit the filler plug and tighten it to the specified torque.

**GEAR OIL CHANGE****DIFFERENTIAL**

1. Remove the drain plug to discharge the gear oil.
2. Fit the drain plug and tighten it to the specified torque.

Tightening torque: 49 Nm

3. Remove the filler plug and add the specified gear oil up to the bottom end of the filler plug hole.

Specified gear oil:

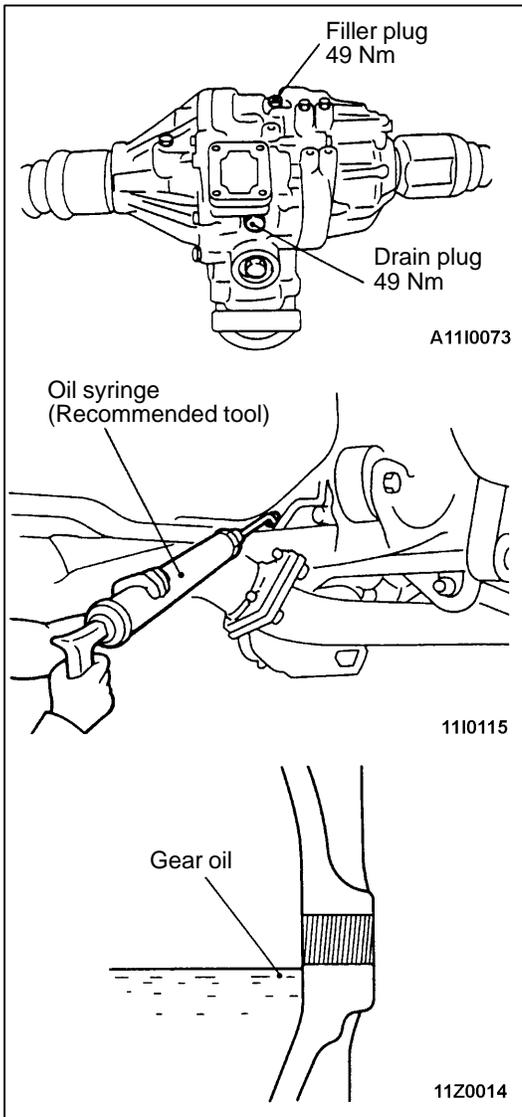
**Hypoid gear oil API classification GL-5 or higher
SAE viscosity Number 90, 80W.**

Quantity used: 0.41 ± 0.02 ℓ

NOTE

10°C or more: #90, less than 10°C: #80

4. Fit the filler plug and tighten it to the specified torque.



TORQUE TRANSFER MECHANISM

1. Remove the drain plug to discharge the gear oil.
2. Fit the drain plug and tighten it to the specified torque.
3. Remove the filler plug.
4. Pour the specified gear oil up to the bottom end of the filler plug hole using an oil syringe (recommended tool) through the gap between the body and the differential support arm.

Specified gear oil:

mitsubishi GENUINE DIA QUEEN SUPER AYC FLUID

Quantity used: 0.70 ⁺⁰/_{-0.05} ℓ

5. Fit the filler plug and tighten it to the specified torque.

FLUID LEVEL CHECK

1. Remove the maintenance lid located in the luggage compartment.
2. **<When MUT-II is not used>**
If the vehicle has been run, leave it for 5 min. or more in an ordinary temperature (10°C to 30°C) to allow the accumulator internal pressure to drop.

NOTE

If the ambient temperature is less than 10°C or less, allow more time to leave the vehicle to stand idle.

<When MUT-II is used>

Connect the MUT-II to the 16-pin diagnosis connector. Turn on the ignition switch. Operate the MUT-II (Item No.11) to activate the hydraulic unit forcibly for removing the pressure from inside the accumulator.

Caution

Before connecting or disconnecting the MUT-II, always turn off the ignition switch.

NOTE

- (1) The forced activation (oil level check mode) will be automatically canceled as soon as the directional valve in the hydraulic unit is activated to the left and right 20 times.
It can also be canceled forcibly by operating the clear key on the MUT-II.
- (2) While this function is being disabled by the fail-safe function, the forced activation of the hydraulic unit can not be executed.

3. Check that the fluid level in the oil reservoir is in the range between MAX and MIN.
4. If the fluid level is lower than MIN, add the specified fluid.

Specified fluid: Dia Queen ATF SP II or equivalent

5. Reinstall the maintenance lid.

BLEEDING

1. Lift up the vehicle.
2. Connect the MUT-II to the 16-pin diagnosis connector.

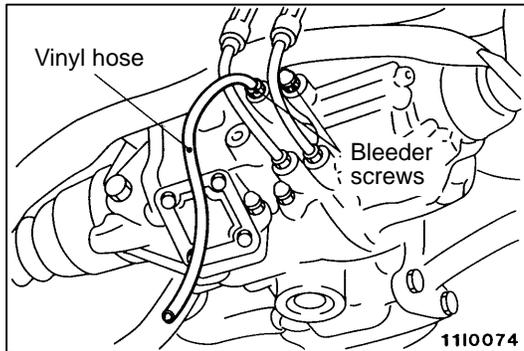
Caution

Before connecting or disconnecting the MUT-II, always turn off the ignition switch.

3. Turn on the ignition switch.
4. Operate the MUT-II (Item No.10) to activate the hydraulic unit forcibly.

NOTE

- (1) The forced activation (air bleeding mode) will be automatically canceled after 5 minutes operation. It can also be canceled forcibly by operating the clear key on the MUT-II.
- (2) While this function is being disabled by the fail-safe function, the forced activation of the hydraulic unit can not be executed.



5. Remove the cap of the left bleeder screw on the torque transfer differential and connect a vinyl hose.
6. Gradually turn the steering wheel clockwise from the straight-ahead position. At this time, loosen the left bleeder screw and check that fluid is discharged with air.
7. After air has been completely discharged, tighten the bleeder screw.

Caution

While the system is being bled of air, add fluid as necessary to ensure that it is left in the oil reservoir during the entire procedure.

8. Repeat steps (6) and (7) two to three times until no air bubbles are recognized in the fluid that comes out. Then, tighten the bleeder screw to the specified torque.

Tightening torque: 9 Nm

9. Perform steps (5) through (8) for the right bleeder screw. Note, however, that the steering wheel should be turned counterclockwise.
10. After the system has been completely bled of air, check for the fluid level. (Refer to P.27-33.)

Caution

If the system is not completely bled of air, the hydraulic unit could generate noise, degrading pump durability.

AYC OPERATION CHECK

1. Lift up the vehicle.
2. Connect the MUT-II to the 16-pin diagnosis connector.

Caution

Before connecting or disconnecting the MUT-II, always turn off the ignition switch.

3. Start the engine.
4. Operate the MUT-II with the transmission in 2nd or a higher gear and check to ensure that the vehicle speed is higher than 10 km/h using the Data List (Item 10).

NOTE

- (1) Hold the steering wheel in the neutral position.
- (2) If the steering wheel is turned, it may happen that the AYC system continues to operate (operation sounds are heard from the torque transfer differential). However, it does not mean a system failure. If such a case is encountered, perform the following operations with the steering wheel in the neutral position to cancel the AYC function.

- Disengage the clutch.
- Set the transmission to neutral.
- Stop the engine.

5. Operate the MUT-II (Item Nos.13 and 14) to activate the torque transfer differential.

NOTE

- (1) The forced activation (clutch operation mode) will be automatically canceled after 1 minute operation. It can also be canceled forcibly by operating the clear key on the MUT-II.

- (2) While this function is being disabled by the fail-safe function, the forced activation of the torque transfer differential can not be executed.

6. Operate the MUT-II to confirm that the several speeds of the wheels are as shown below, using the Data List (Item Nos.07 and 08).

<Forced activation Item No.13 is being executed>

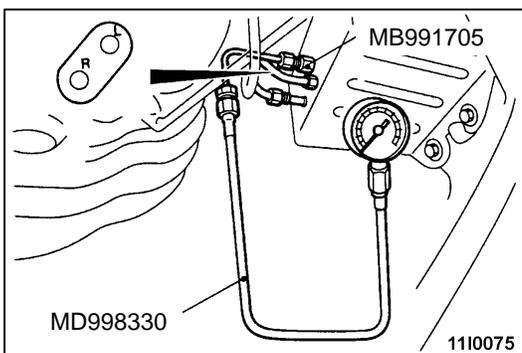
The speed of left rear wheel is more than 2 km/h higher than that of right rear wheel.

<Forced activation Item No.14 is being executed>

The speed of right rear wheel is more than 2 km/h higher than that of left rear wheel.

NOTE

If the above requirements are not satisfied, the system is probably failed. Check the hydraulic pressure.

**HYDRAULIC PRESSURE CHECK**

1. Lift up the vehicle.
2. Connect the MUT-II to the 16-pin diagnosis connector.

Caution

Before connecting or disconnecting the MUT-II, always turn off the ignition switch.

3. Turn on the ignition switch.
4. Disconnect the joint between the hydraulic unit and the hydraulic unit hose assembly. Connect the special tool to the L port. To the R port, attach a blind plug or connect the L port of the removed hydraulic unit hose assembly.
5. Operate the MUT-II (Item No.13) to activate the hydraulic unit.

NOTE

- (1) The forced activation (clutch left side operation check mode) will be automatically canceled after 1 minute operation.

It can also be canceled forcibly by operating the clear key on the MUT-II.

(2) While this function is being disabled by the fail-safe function, the forced activation of the hydraulic unit can not be executed.

6. Check to ensure that the hydraulic pressure generated by the hydraulic unit conforms to the standard value.

Standard value: 1.0 – 1.6 MPa

NOTE

During checking the hydraulic pressure, occasionally replenish the oil reservoir with fluid so that it does not become empty.

7. Check the hydraulic pressure of the clutch right side by repeating the steps (4) through (6). At this time, however, the special tool must be connected to the R port and the blind plug or the R port of the removed hydraulic unit hose assembly must be attached to the L port. Further, the MUT-II must be operated in the forced activation mode Item No. 14 (clutch right side operation check mode).
8. If the measured value exceeds the standard value, replace the hydraulic unit.
9. Connect the hydraulic unit hose assembly to the hydraulic unit and to the torque transfer differential and tighten the flare nuts to the specified torque.

Specified torque: 34 Nm

10. Pour the specified fluid in the oil reservoir up to the MAX mark. Then, bleed the system.

Specified fluid: Dia Queen ATF SP II or equivalent

Fluid amount used: Approx. 1 ℓ

DIFFERENTIAL CARRIER OIL SEAL REPLACEMENT

DIFFERENTIAL

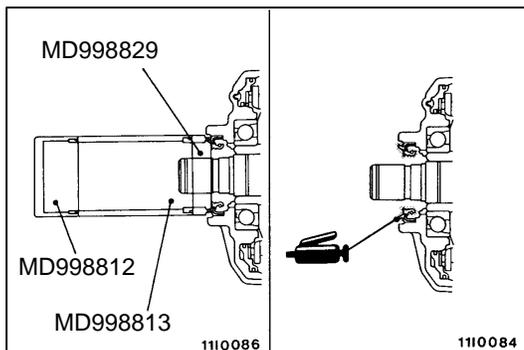
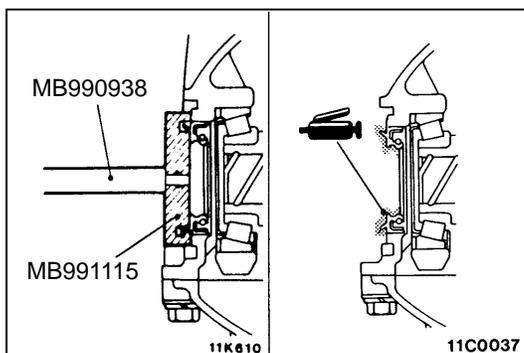
1. Remove the drive shaft.
2. Remove the oil seal from the differential carrier.
3. Using the special tool, drive a new oil seal all the way into position.
4. Coat the oil seal lips and the drive shaft surface in contact with the oil seal with multi-purpose grease.
5. Replace the drive shaft circlip with a new one and mount the drive shaft to the differential carrier.
6. Check for correct wheel alignment.

TORQUE TRANSFER MECHANISM

1. Remove the drive shaft.
2. Remove the oil seal from the differential carrier.
3. Using the special tool, drive a new oil seal all the way into position.
4. Coat the oil seal lips and the drive shaft surface in contact with the oil seal with the specified grease.

Specified grease: Vaseline

5. Replace the drive shaft circlip with a new one and mount the drive shaft to the differential carrier.
6. Check for correct wheel alignment.



WHEEL SPEED SENSOR OUTPUT VOLTAGE MEASUREMENT <VEHICLES WITHOUT ABS>

1. Lift up the vehicle and release the parking brake.
2. Disconnect the AYC-ECU harness connector and take measurements on the harness side connector.

Caution

Insert the probe from the harness side with the double lock of the connector unlocked. Inserting it to the terminal side could result in poor contact.

3. Turn the wheel to be tested at about 1/2 to one revolution/sec. and check for the output voltage using a circuit tester (AC mV range) or oscilloscope.

Terminal nos.

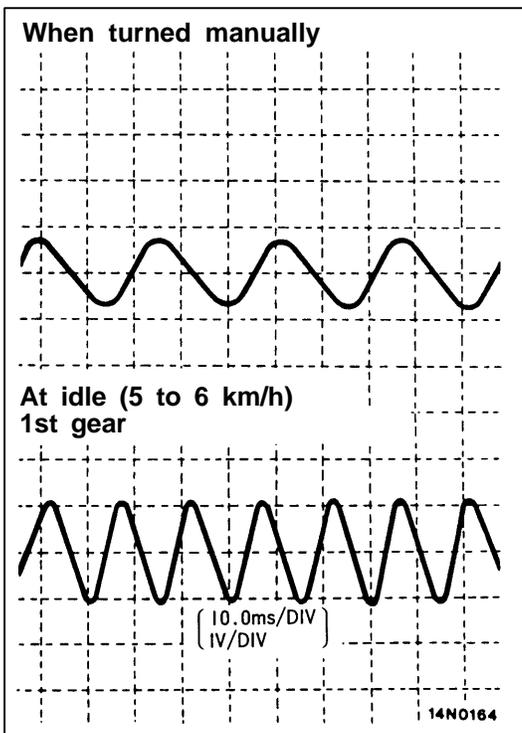
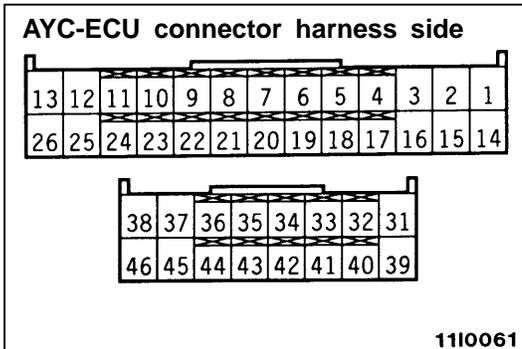
Front LH	Front RH	Rear LH	Rear RH
7	6	9	8
20	19	22	21

Output voltage:

When circuit tester is used: 70 mV or more

When oscilloscope is used: 200 mVp-p or more

- (4) If the output voltage is lower than the above value, it is probably attributable to the following faults. Check or replace the wheel speed sensor as necessary.
 - Excessive clearance between the pole piece and rotor of the wheel speed sensor
 - Defective wheel speed sensor



Waveform Check Using Oscilloscope

Check the harness and connector of the wheel speed sensor for connection. Then, use an oscilloscope to check for output voltage waveform of each sensor as follows.

Start the engine and monitor the sensor by turning the wheel; for a driving wheel, let it turn by shifting into the 1st gear and for a driven wheel turn it manually at a constant speed.

NOTE

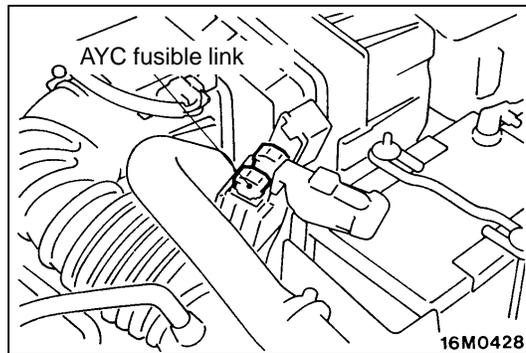
- (1) Waveform may be observed by actually running the vehicle.
- (2) The output voltage is low when the wheel speed remains low and builds up as the wheel speed increases.

Waveform Observation Points

Symptom	Probable cause	Action
Waveform amplitude is too small, or no waveform.	Defective wheel speed sensor	Replace sensor.
Waveform amplitude varies greatly. (No problem if the smallest amplitude is 100 mV or more)	Excessive axle hub lateral and radial runout	Replace hub.
	Poor AYC-ECU grounding	Repair.
Noise on waveform or disturbed waveform	Open-circuited sensor	Replace sensor.
	Open-circuited harness	Repair harness.
	Improperly mounted wheel speed sensor	Correct sensor installation.
	Missing or collapsed ABS rotor tooth	Replace ABS rotor.

Caution

Since the wheel speed sensor cable follows the movement of the front or rear suspension, it may be open-circuited only when the vehicle is run on rough roads and not on ordinary road. The wheel speed sensor output voltage waveform should therefore be checked also by rocking the sensor harness so that driving on rough roads may be simulated.

**ACTION WHEN BATTERY RUNS OUT**

When the engine is started using a booster cable where the battery has completely run down and you attempt to start the vehicle without waiting for the battery to recover a certain charge, the engine can misfire and you just cannot start to move it. In such cases, charge the battery sufficiently; or, remove the AYC fusible link from the engine compartment relay box to make AYC inactive before attempting to start the vehicle. When the fusible link is removed, the AYC warning lamp lights up. After the battery has been recharged, fit the fusible link back again and start the engine to ensure that the AYC warning lamp is off.

HYDRAULIC UNIT <VEHICLES WITH AYC>

REMOVAL AND INSTALLATION

Caution

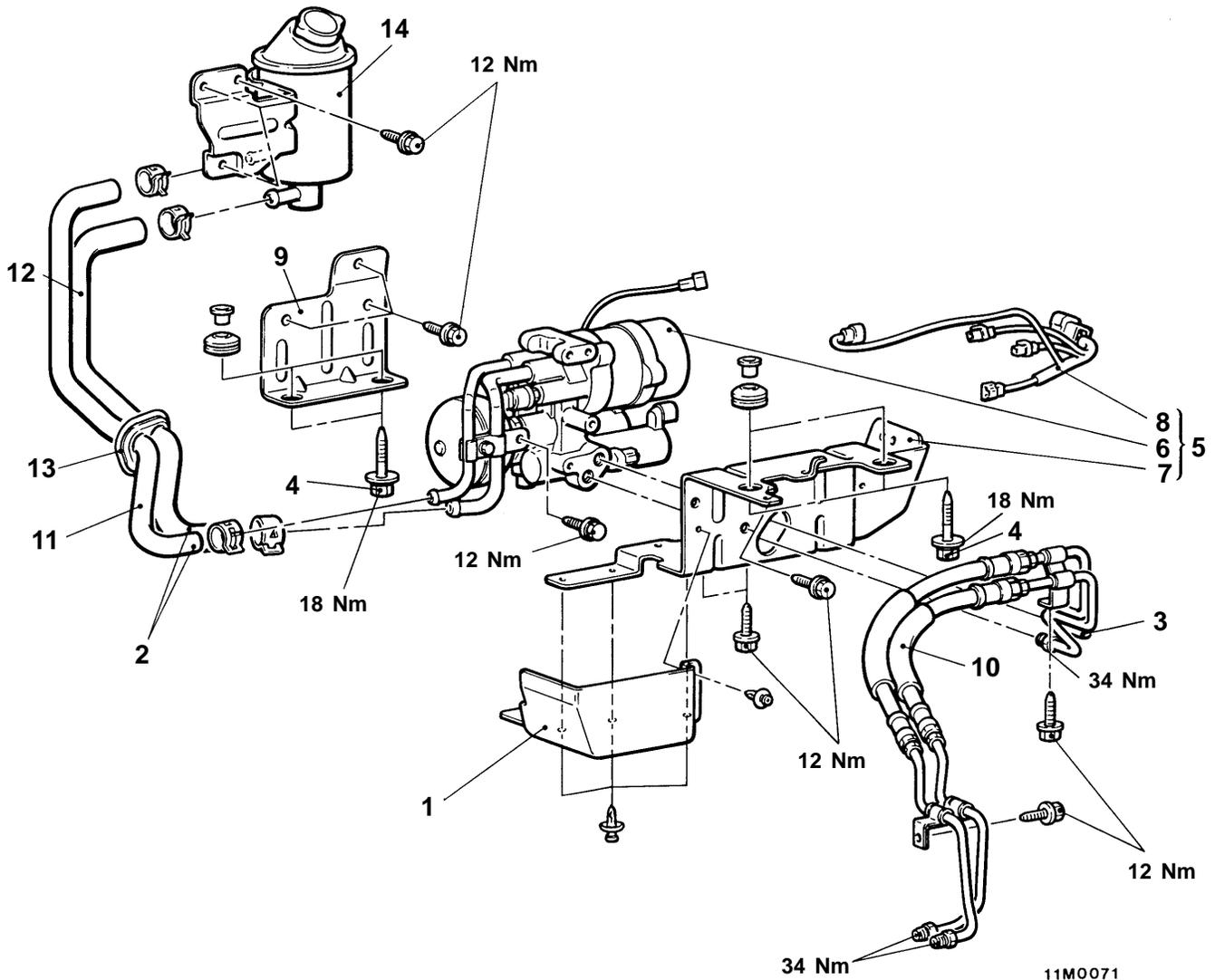
- (1) When connecting the return hose and suction hose, do not apply lubricant.
- (2) No foreign matter should be allowed in the hydraulic piping and joints.

Pre-removal Operation

- Trunk Side Trim Removal
- Hydraulic Piping Fluid Draining

Post-installation Operation

- Hydraulic Piping Fluid Filling and Bleeding (Refer to P.27-32, 34.)
- Trunk Side Trim Installation



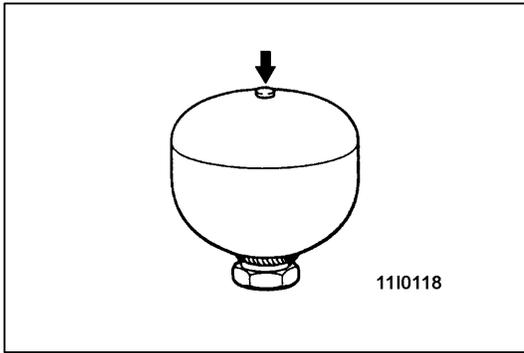
Removal steps

1. Dust guard
2. Suction hose and return hose connection
3. Hydraulic unit hose assembly connection
4. Hydraulic unit and bracket assembly mounting bolt
5. Hydraulic unit and bracket assembly
6. Hydraulic unit

7. Hydraulic unit bracket
8. AYC harness
9. Hydraulic unit bracket
10. Hydraulic unit hose assembly
11. Return hose
12. Suction hose
13. Grommet
14. Oil reservoir



11M0071



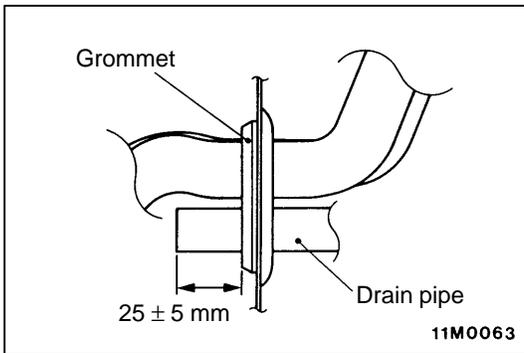
REMOVAL SERVICE POINTS

◀A▶ HYDRAULIC UNIT REMOVAL

Should the hydraulic unit be discarded, drill a hole in the accumulator at the illustrated position beforehand in order to release the inside gas.

Caution

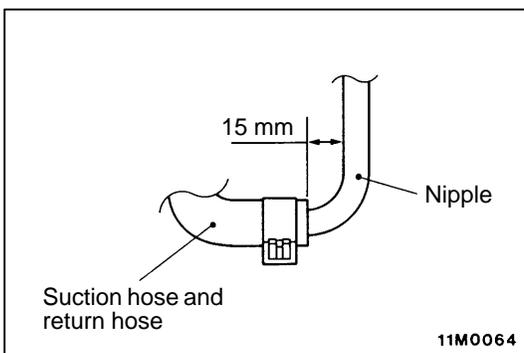
- (1) The hydraulic unit has its accumulator filled with a high pressure gas. Never throw it into a fire. Also, never attempt to disassemble, press, weld or melt it.
- (2) When drilling a hole in the accumulator, be sure to wear safety goggles since drill chips may blow out together with the gas.



INSTALLATION SERVICE POINTS

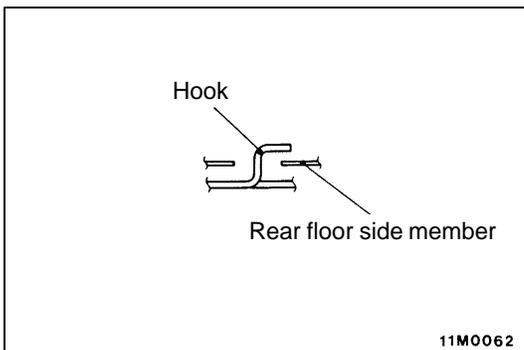
▶A◀ GROMMET INSTALLATION

On the vehicle mounted with a sunroof, mount the drain pipe to the grommet as illustrated.



▶B◀ SUCTION HOSE / RETURN HOSE INSTALLATION

Fit the suction hose and return hose to the nipple of hydraulic unit as illustrated.



▶C◀ HYDRAULIC UNIT AND BRACKET ASSEMBLY INSTALLATION

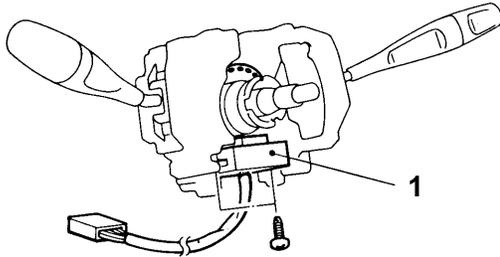
Hook the hydraulic unit bracket hook to the rear floor side member and install the hydraulic unit and bracket assembly mounting bolt.

SENSOR RELAY <VEHICLES WITH AYC>

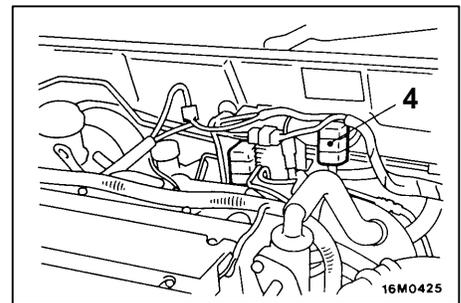
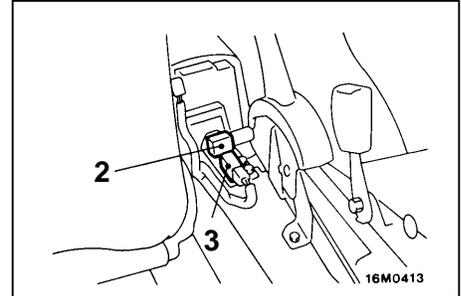
REMOVAL AND INSTALLATION

Caution: SRS

For vehicles with SRS, before removal of air bag module and clock spring, refer to GROUP 52B – Service Precautions and Air Bag Module and Clock Spring.



14W0057



Steer sensor removal steps

- Steering wheel and column cover
- 1. Steer sensor

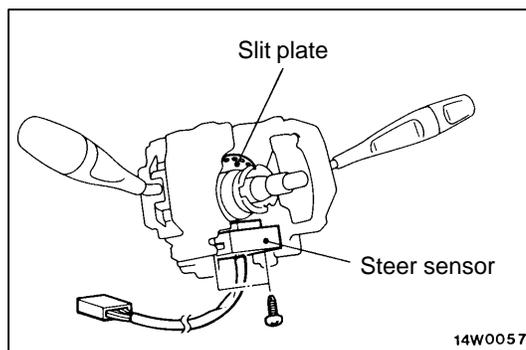


Acceleration sensor and AYC relay removal

2. Longitudinal acceleration sensor
3. Lateral acceleration sensor
4. AYC relay

NOTE

For the wheel speed sensor, refer to GROUP 35B.



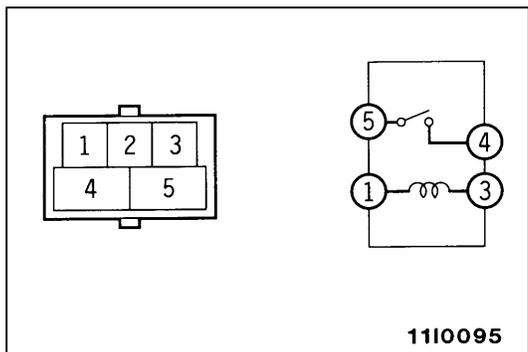
REMOVAL SERVICE POINT

◀▶ STEER SENSOR REMOVAL

Remove the steer sensor from the column switch.

Caution

- (1) A photocoupler is used as the steer sensor. Use care not to allow dust or grease to be on the sensor.
- (2) Do not bend or dirty with grease the slit plate on the column switch side.



INSPECTION

1. LONGITUDINAL AND LATERAL ACCELERATION SENSOR CHECK

Refer to GROUP 35B – Acceleration Sensor.

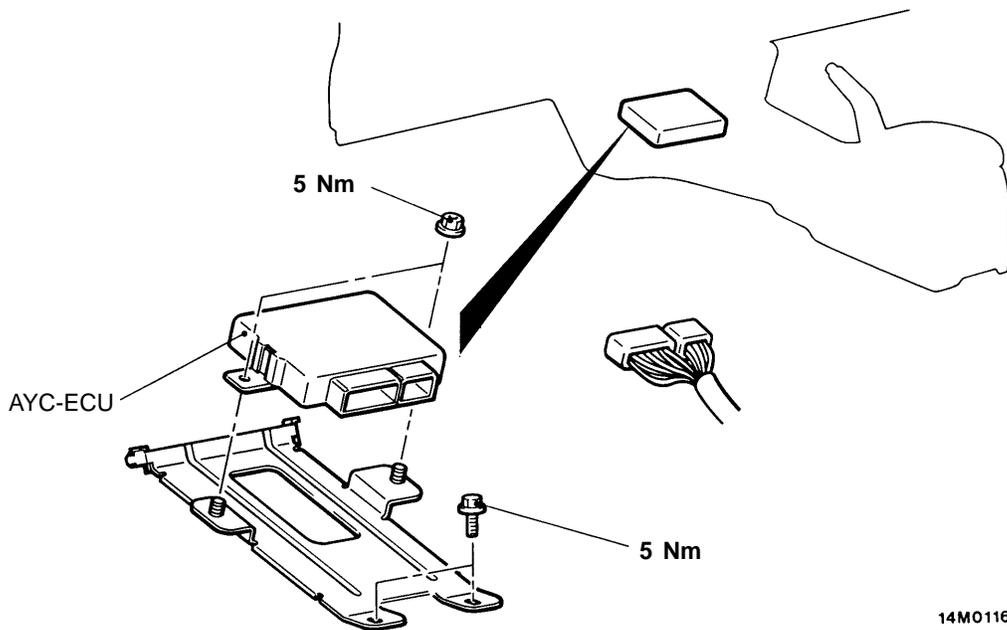
2. AYC RELAY CONTINUITY CHECK

Battery voltage	Terminal No.			
	1	3	4	5
When not energized	○	○		
When energized	⊖	⊕	○	○

AYC-ECU

REMOVAL AND INSTALLATION

- Pre-removal and Post-installation Operation**
- Front Floor Console Removal and Installation



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