GENERAL REPAIR INSTRUCTIONS

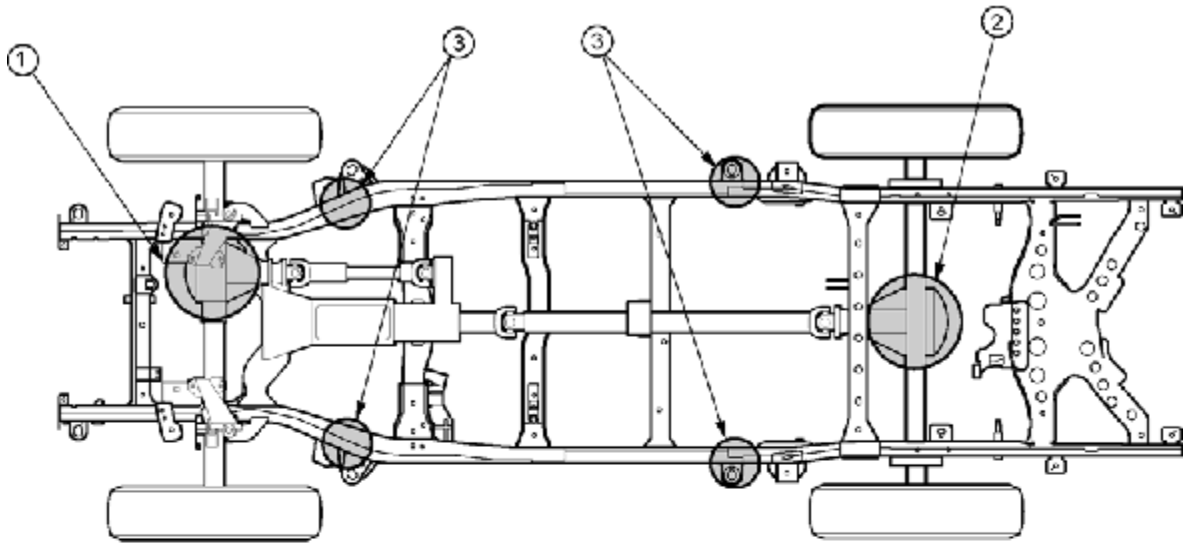
1. Park the vehicle on level ground and chock the front or rear wheels before lifting the vehicle.
2. Raise the vehicle with a jack set against the axle or the frame.
3. Support the vehicle on chassis stands.
4. Use covers on the vehicle body, seats, and floor to prevent damage and/or contamination.
5. Disconnect the grounding cable from the battery before performing service operations.
   This will prevent cable damage or burning due to short circuiting.
6. Handle brake fluid and antifreeze solution with great care.
   Spilling these liquids on painted surfaces will damage the paint.
7. The use of the proper tool(s) and special tool(s) where specified is essential to efficient, reliable, and safe service operations.
8. Always use genuine ISUZU replacement parts.
9. Discard used cotter pins, gaskets, O-rings, oil seals, lock washers, and self-locking nuts at disassembly.
   Normal function of these parts cannot be guaranteed if they are reused.
10. Prepare new cotter pins, gaskets, O-rings, oil seals, lock washers, and self-locking nuts for installation.
11. Keep the disassembled parts neatly in groups.
    This will facilitate smooth and correct reassembly.
12. Keep fixing nuts and bolts separate.
    Fixing nuts and bolts vary in hardness and design according to installation position.
13. Clean all parts before inspection or reassembly.
14. Clean the oil ports and other openings with compressed air to make certain that they are free from dirt and obstructions.
15. Lubricate the rotating and sliding faces of all moving parts with oil or grease before installation.
16. Use the recommended liquid gasket to prevent leakage.
17. Carefully observe all nut and bolt torque specifications.
18. When removing or replacing parts that require refrigerant to the discharged from the air conditioning system, be sure to use the Vehicle Refrigerant Recovery and Recycling Equipment (VRRRE) to recover and recycle R134a, to promote the aim of the protection of the ozone layer covering the earth.
19. Check and recheck your work. No service operation is complete until you have done this.

LIFTING INSTRUCTIONS

If a lifting device other than the original jack is used, it is most important that the device be applied only to the correct lifting points. (See the illustration.) Raising the vehicle from any other point may result in serious damage.

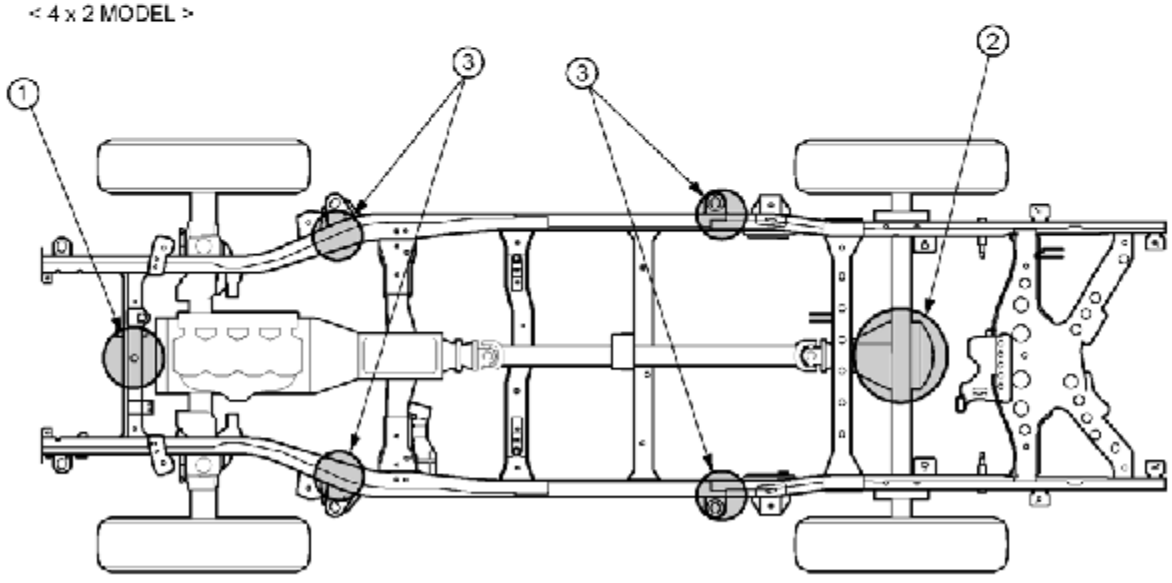
Lifting Points and Supportable Point-Locations

< 4 x 4 MODEL >



① Front axle center
② Rear axle center
③ Side frame

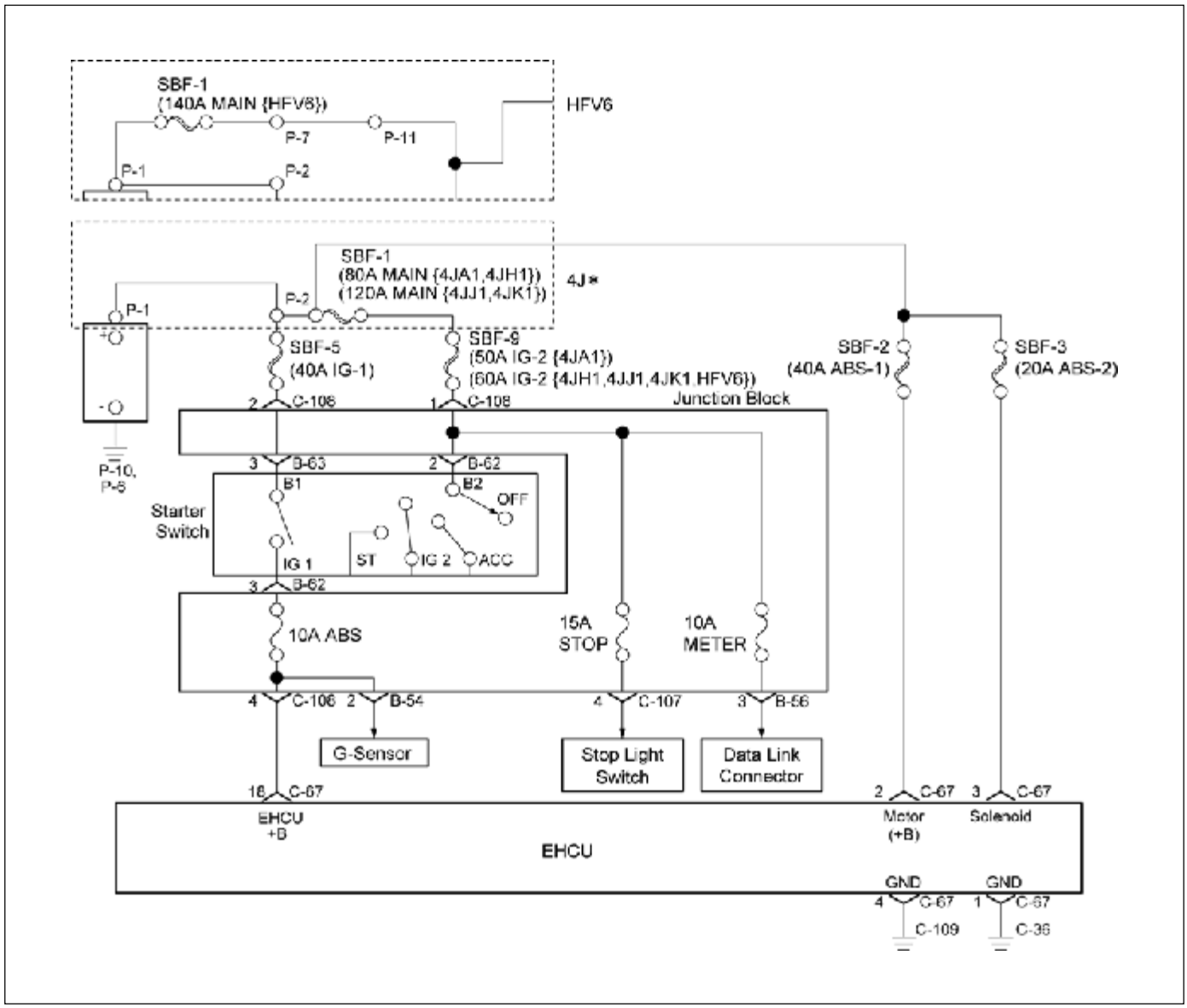
< 4 x 2 MODEL >



① 1st cross member center
② Rear axle center
③ Side frame

RTW50AXF000201

DTC C0271 (Flash Code 71) ECU Malfunction



RTW75ALF000301

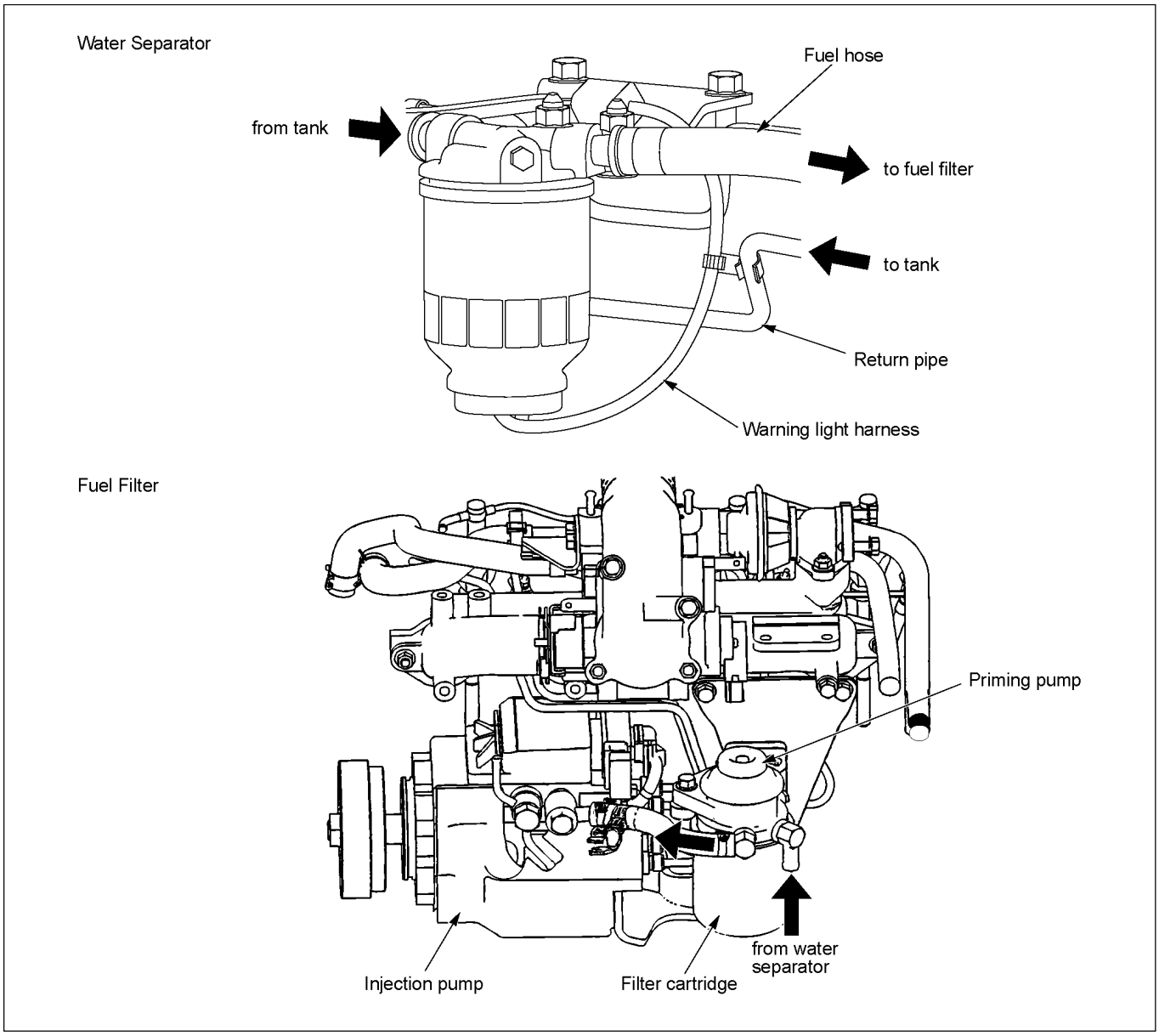
Step	Action	Value(s)	Yes	No
1	Were the steps of the “Basic Diagnostic Flow Chart” performed?	-	Go to Step 2	Go to Basic Diagnostic Flow Chart
2	1. Ignition “OFF”. 2. Check the EHCU circuit for an open, short to ground, or short to voltage. Also, check the EHCU ignition feed circuit for an open or short to ground and the EHCU ground circuit for an open or short to voltage. 3. If a problem is found, repair as necessary. Was a problem found?	-	Verify repair	Go to Step 3

6C – 4 FUEL SYSTEM

FUEL FILTER AND WATER SEPARATOR

As the inside of the injection pump is lubricated by the fuel which it is pumping, the fuel must be perfectly clean. The fuel filter and the water separator remove water particles and other foreign material from the fuel before it reaches the injection pump.
The water separator has an internal float. When the float reaches the specified level, a warning light comes on to remind you to drain the water from the water separator.
A diaphragm type priming pump is installed at the top of the fuel filter. It is used during the air bleeding procedures.

(Except EURO III model)



RTW36CLF000701

DTC P0561 (Symptom Code A) (Flash Code 18)

Circuit Description

The engine control module (ECM) main relay is energized when the ECM receives an ignition voltage switch ON signal. When the ignition switch is OFF, the ECM main relay is de-energized after a certain length of time passed. If the ECM detects the ignition voltage switch signal is changed to OFF during the ECM is energized, this DTC will set.

Condition for Setting the DTC

- The ECM detects that the ignition voltage circuit is changed ON to OFF during initialization.

Action Taken When the DTC Sets

- The ECM does not illuminate the malfunction indicator lamp (MIL) when the diagnostic runs and fails.
- The ECM turns OFF the ECM if the ignition voltage circuit is OFF even 1 second passes from the judgement.
- The ECM limits fuel injection quantity if the ignition voltage circuit is returned ON within 1 second from the judgement.

Condition for Clearing the DTC

- A history DTC clears after 40 consecutive driving cycles without a fault. Or clear with the scan tool.

Diagnostic Aids

- If an intermittent condition is suspected, refer to Intermittent Conditions in this section.
- Faulty or sticking ECM main relay may set this DTC.

Notice:

- Quick repetition ON and OFF of ignition switch may set this DTC.

Test Description

The numbers below refer to the step number on the diagnostic table.

2. If DTC P1625 (Symptom Code A) is present, scan tool can communicate with the ECM when the ignition switch is OFF.

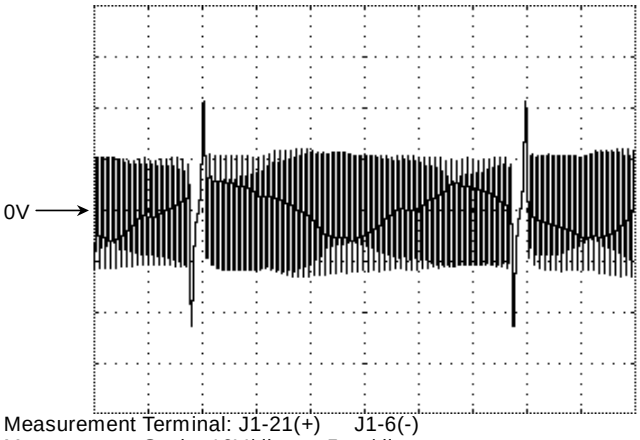
DTC P0561 (Symptom Code A) (Flash Code 18)
Schematic Reference: Engine Controls Schematics
Connector End View Reference: Engine Controls Connector End Views or Engine Control Module (ECM) Connector End Views

Step	Action	Value(s)	Yes	No
1	Did you perform the Diagnostic System Check-Engine Controls?	—	Go to Step 2	Go to Diagnostic System Check-Engine Controls
2	1. Install the scan tool. 2. Turn OFF the ignition for 30 seconds. 3. Monitor the Diagnostic Trouble Code (DTC) Information with the scan tool. Is DTC P1625 (Symptom Code B) set?	—	Go to Applicable DTC	Go to Step 3
3	1. Turn OFF the ignition. 2. Disconnect the battery voltage feed harness connector (C-108) from the junction block (behind the cabin fuse block). 3. Inspect for an intermittent, for a poor connection and corrosion at the harness connector of the battery voltage feed (pin 2 of C-108 connector). 4. Disconnect the ignition switch harness connectors (B-62 and B-63) from the junction block (behind the cabin fuse block). 5. Inspect for an intermittent, for poor connections and corrosion at the harness connector of the ignition switch (pin 3 of B-62 connector and pin 3 of B-63 connector). 6. Repair the connection(s) as necessary. Did you find and correct the condition?	—	Go to Step 6	Go to Step 4

Step	Action	Value(s)	Yes	No
3	1. Turn OFF the ignition. 2. Disconnect the MAF sensor harness connector. 3. Connect a test lamp between the ignition voltage feed circuit (pin 1 of E-47) and a known good ground. 4. Turn ON the ignition, with the engine OFF. Does the test lamp illuminate?	—	Go to Step 4	Go to Step 5
4	1. Turn OFF the ignition for 30 seconds. 2. Connect a 3-amp fused jumper wire between the ignition voltage feed circuit and the signal circuit (pins 1 and 3 of E-47). 3. Turn ON the ignition, with the engine OFF. Is the MAF Sensor parameter more than the specified value?	4.9 volts	Go to Step 7	Go to Step 6
5	Repair the open circuit or high resistance between the ECM Main Relay (pin 1 of X-12) and the MAF sensor (pin 1 of E-47) for and open circuit or high resistance. Check the Engine (10A) fuse first. Did you complete the repair?	—	Go to Step 11	—
6	1. Test the signal circuit between the ECM (pin 40 of E-90) and the MAF sensor (pin 3 of E-47) for the following conditions: • An open circuit • A short to ground • A short to the low reference circuit • High resistance 2. Repair the circuit(s) as necessary. Did you find and correct the condition?	—	Go to Step 11	Go to Step 8
7	1. Inspect for an intermittent and for poor connections at the harness connector of the MAF sensor (pins 1 and 3 of E-47). 2. Repair the connection(s) as necessary. Did you find and correct the condition?	—	Go to Step 11	Go to Step 9
8	1. Turn OFF the ignition. 2. Disconnect the ECM harness connector. 3. Inspect for an intermittent and for a poor connection at the harness connector of the ECM (pin 40 of E-90). 4. Repair the connection(s) as necessary. Did you find and correct the condition?	—	Go to Step 11	Go to Step 10
9	Replace the MAF sensor. Refer to MAF Sensor Replacement. Did you complete the replacement?	—	Go to Step 11	—
10	**Important:** Replacement ECM must be programmed and learned. Replace the ECM. Refer to ECM Replacement. Did you complete the replacement?	—	Go to Step 11	—

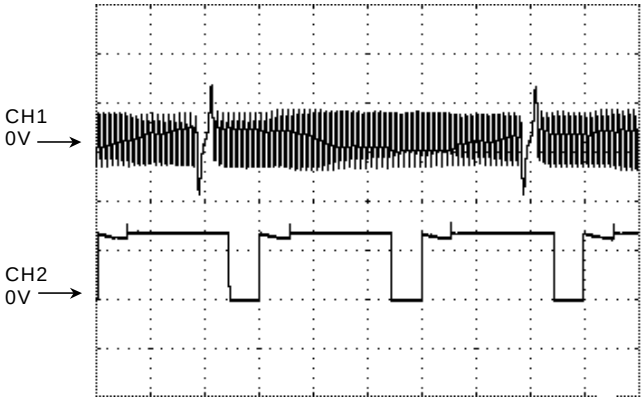
Reference Wave Form

Crankshaft Position (CKP) Sensor Reference Wave Form



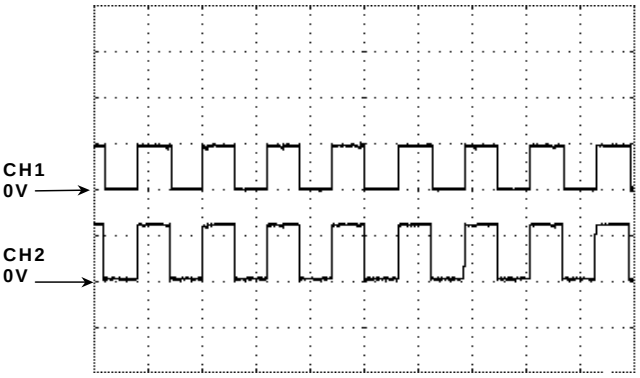
Measurement Terminal: J1-21(+) J1-6(-)
Measurement Scale: 10V/div 5ms/div
Measurement Condition: Approximately 2000rpm

Crankshaft Position (CKP) Sensor & Tacho Output Signal Reference Wave Form



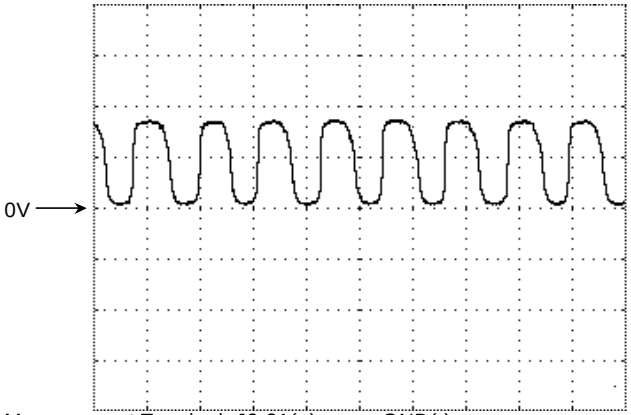
Measurement Terminal: CH1: J1-21(+) / CH2: J2-25(+) GND(-)
Measurement Scale: CH1: 2V/div / CH2: 10V/div 5ms/div
Measurement Condition: Approximately 2000rpm

Vehicle Speed Sensor (VSS) Reference Wave Form



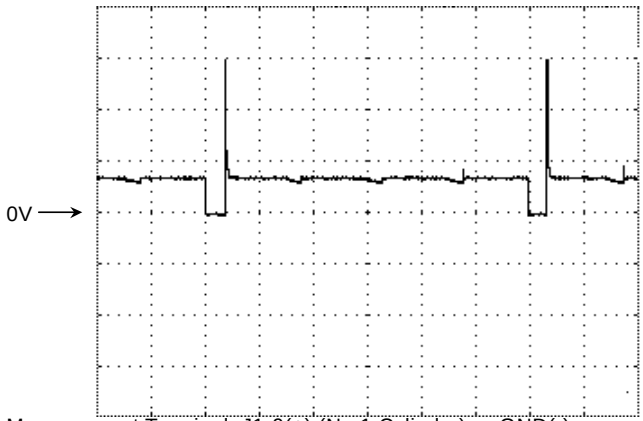
Measurement Terminal: CH1: ECM J2-23(+) / CH2: VSS 3(+) GND(-)
Measurement Scale: CH1: 10V/div / CH2: 10V/div 50ms/div
Measurement Condition: Approximately 20km/h
Note: The vehicle is without immobilizer system,
CH1 signal is same as CH2.

Heated Oxygen Sensor (HO2S) Reference Wave Form



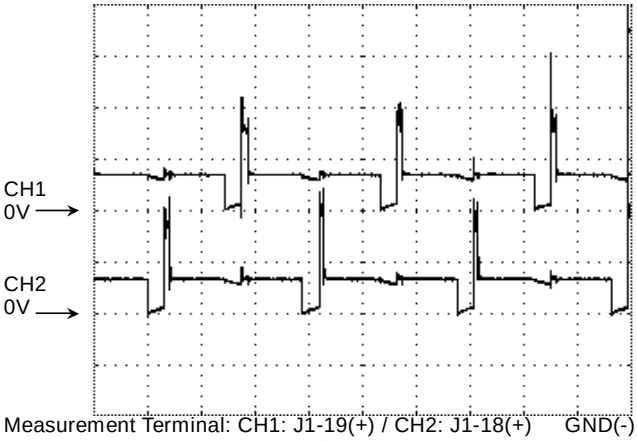
Measurement Terminal: J2-21(+) GND(-)
Measurement Scale: 500mV/div 500ms/div
Measurement Condition: Approximately 2000rpm in Closed Loop

Injector Control Signal Reference Wave Form



Measurement Terminal: J1-9(+) (No.1 Cylinder) GND(-)
Measurement Scale: 20V/div 5ms/div
Measurement Condition: Approximately 2000rpm

Ignition Coil Control Signal Reference Wave Form



Measurement Terminal: CH1: J1-19(+) / CH2: J1-18(+) GND(-)
Measurement Scale: CH1: 20V/div / CH2: 20V/div 10ms
Measurement Condition: Approximately 2000rpm

18 Install the tensioner shaft (1) into the right-hand secondary timing chain tensioner body (2).

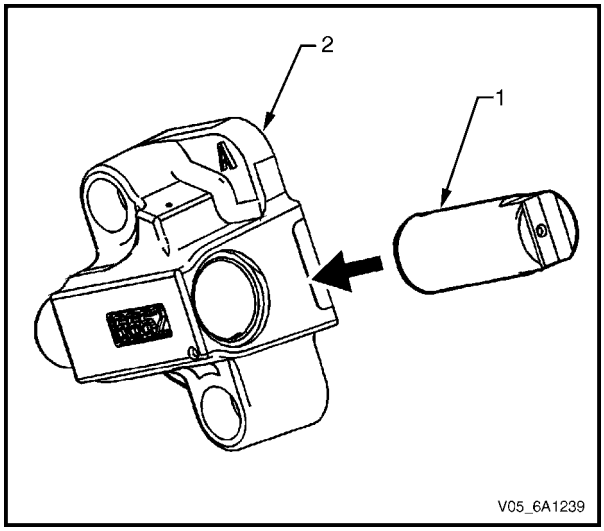


Figure 6A1 – 205

19 Compress the tensioner shaft into the body and lock the tensioner by inserting Tool No. EN 46112 into the access hole in the side of the tensioner body.

20 Slowly release pressure on the right-hand secondary timing chain tensioner. The tensioner should remain compressed.

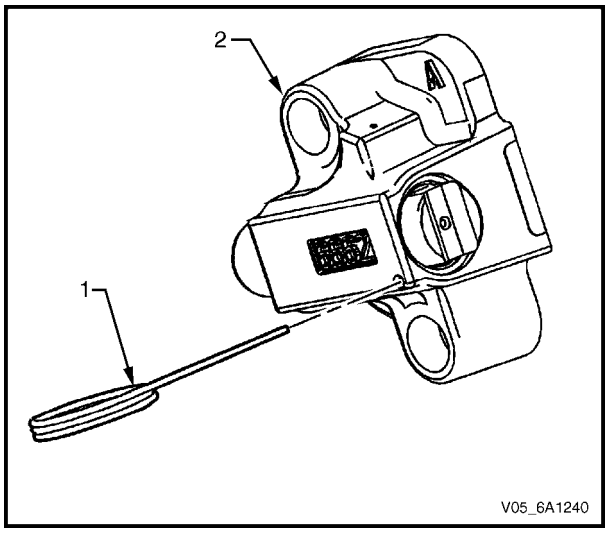


Figure 6A1 – 206

21 Install a new right-hand secondary timing chain tensioner gasket (1) to the tensioner (2).

22 Install the right-hand secondary timing chain tensioner bolts (3) through the tensioner and gasket.

23 Ensure the right-hand secondary timing chain tensioner mounting surface on the right-hand cylinder head does not have any burrs or defects that would affect the sealing of the new tensioner gasket.

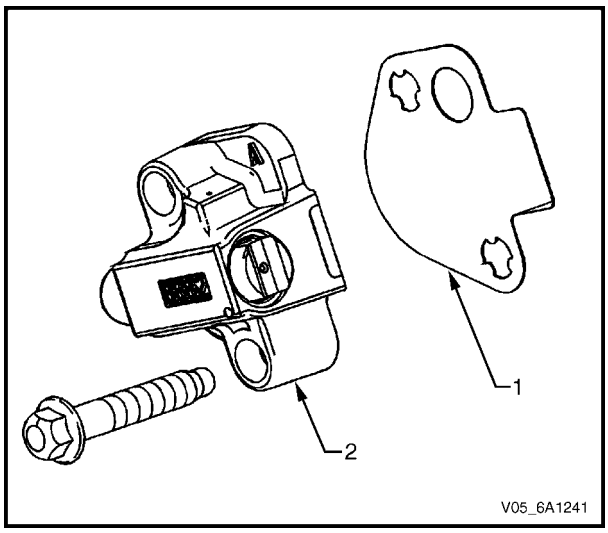


Figure 6A1 – 207

7.19 DTC P0327, P0328, P0332 or P0333

DTC Descriptor

This diagnostic procedure supports the following DTCs:

- DTC P0327 – Knock Sensor Circuit Low Frequency (Bank 1)
- DTC P0328 – Knock Sensor Circuit High Frequency (Bank 1)
- DTC P0332 – Knock Sensor Circuit Low Frequency (Bank 2)
- DTC P0333 – Knock Sensor Circuit High Frequency (Bank 2)

Circuit Description

The ECM supplies the ground to the knock sensor (KS) low reference circuit. The KS produces a signal voltage, which is proportional to the level of the engine vibration or spark knock.

When the ECM detects an excessive spark knock, it retards the ignition timing until the spark knock stops.

To differentiate between a normal engine vibration and the vibration created by a spark knock, the ECM samples the KS signal under different engine speeds and load condition. The ECM uses this samples to determine maximum and minimum KS signal voltage produced when the engine is running under normal conditions.

A knock sensor circuit DTC sets if the ECM detects the KS signal voltage is outside the normal range.

Conditions for Running the DTC

DTC P0327 and P0332

Run continuously once the following conditions are met:

- DTCs P0324, P0335, P0342 and P0343 ran and passed.
- The ECM controls the ignition spark.
- Engine speed is greater than 2000 rpm and steady.
- The engine coolant temperature is greater than 60ºC.
- The volumetric efficiency is steady.

DTC P0328 or P0333

Run continuously once the following conditions are met:

- The ECM controls the ignition spark.
- Engine speed is greater than 2,000 rpm and steady.
- The engine coolant temperature is greater than 60°C.
- The volumetric efficiency is steady.

Conditions for Setting the DTC

DTC P0327 and P0332

The ECM detects the KS signal voltage is less than the minimum KS signal normal range for at least 10 seconds.

DTC P0328 and P0333

The ECM detects the KS signal voltage is greater than the maximum KS signal normal range.

Conditions for Clearing DTC

The knock sensor circuit DTCs are Type B DTCs. Refer to 1.4 Diagnostic Trouble Codes in this Section, for action taken when Type B DTC sets and conditions for clearing Type B DTCs.

9.13 DTC P0500, P0502 or P0503 – Vehicle Speed Sensor Signal Malfunction

DTC Descriptors

This diagnostic procedure supports the following DTC's:

- DTC P0500 – Vehicle speed sensor open circuit, short circuit to battery voltage, short circuit to ground, or undefined error
- DTC P0502 – Vehicle speed sensor sensor low voltage
- DTC P0503 – Vehicle speed sensor intermittant fault

Circuit Description

The PIM applies the ground to the vehicle speed sensor (VSS) low reference circuit.

The VSS in conjunction with the 40X reluctor wheel generates an AC signal voltage. The amplitude and frequency of the signal generated is proportional to the vehicle speed. The PIM uses this signal from the VSS signal circuit to determine the vehicle speed.

A VSS DTC sets if the PIM detects a fault condition in the VSS signal circuit.

Conditions for Running the DTC

DTC P0500

Runs continuously once the following condition is met:

- The ignition is on and the vehicle is stationary.

DTC P0502

Runs continuously once the following condition is met:

- The first time the ignition is on and the vehicle starts to move from the stationary position.

DTC P0503

Runs continuously once the following condition is met:

- The ignition is on and the vehicle is mobile.

Conditions for Setting the DTC

DTC P0500

When the PIM reads back the 15 consecutive readings within 0.5 seconds.

DTC P0502

If the reading is >9.1 Km/Hr the DTC will be set.

DTC P0503

The DTC will set when the sensor detects an occurance of 15 times within 0.5 seconds.

Conditions for Clearing DTC

The DTC's will clear on the next ignition cycle.

Additional Information

- Refer to 7B1_Manual Transmission.

7 If a new spacer plate (1) is installed, it is necessary to fit two filter screens (2 and 3) to the spacer plate.

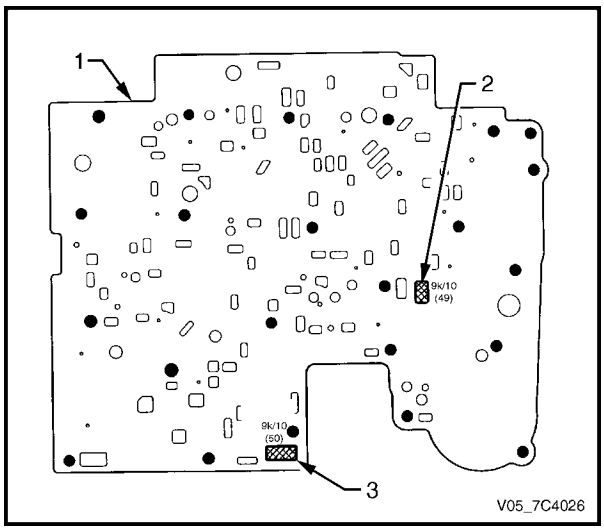


Figure 7C4 – 53

NOTE

When installing the spacer plate locate the gaskets as follows:

- The gasket (2) marked CA is fitted between the spacer plate and the transmission case.
- The gasket (3) marked VB is fitted between the spacer plate and the control valve body.

8 Reinstall the spacer plate (1) with the new gaskets (2 and 3) smeared with petroleum jelly. Hold the spacer plate in place until the 1 – 2 accumulator is reinstalled.

9 While supporting the spacer plate, carefully reinstall the 1 – 2 accumulator assembly (4), refer to 3.12 1 – 2 Accumulator Assembly.

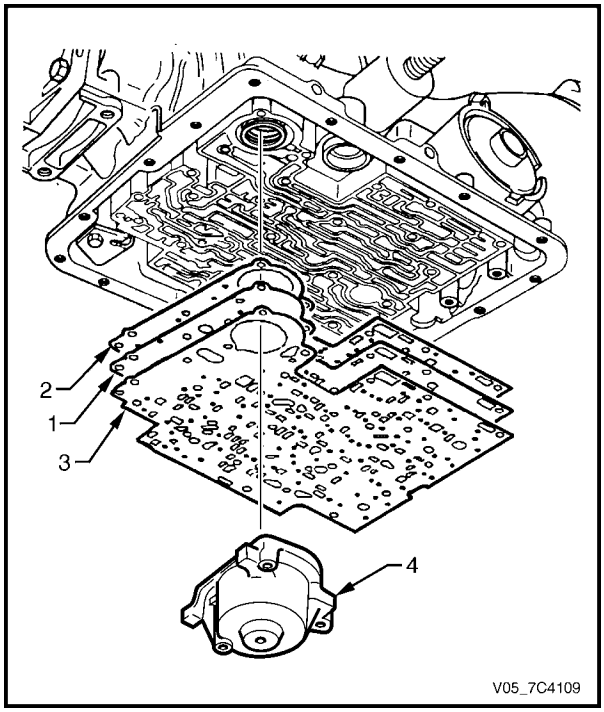


Figure 7C4 – 54

Main Data and Specifications

General Specifications

				Remaks
Model			AW30–40LE	
Engine			4JJ1-TC High Output (3.0L)	
Type			Electronic control planetary gear type	
			3–element 1–stage 2–phase type (with lock-up mechanism)	
Gear ratio	1st		2.804	
	2nd		1.532	
	3rd		1.000	
	4th (O/D)		0.705	
	Reverse		2.394	
Oil used	Name		Exxon Mobil ATF-3309	
	Q'ty (l)		8.7	
Torque converter			2300 ± 200	Stall speed (rpm)
Friction element				
	Forward clutch	C–1	6	Number of discs
	Direct clutch	C–2	5	
	OD direct clutch	C–0	3	
	Second coast brake	B–1	40mm	Band width or Number of discs
	Second brake	B–2	5	Number of discs
	First and reverse brake	B–3	7	
	Overdrive brake	B–0	5	
Clutch				
	One-way clutch No.1	F–1	22	Number of sprage
	One-way clutch No.2	F–2	28	
	OD one-way clutch	F–0	24	
Planetary gear				
	Front planetary	Sun gear	42	Number of teeth
		Pinion gear	19	
		Ring gear	79	
	Rear planetary	Sun gear	33	
		Pinion gear	23	
		Ring gear	79	
	O/D planetary	Sun gear	33	
		Pinion gear	23	
		Ring gear	79	

Disassembly steps

1. Torque converter

- Pull the torque converter free.

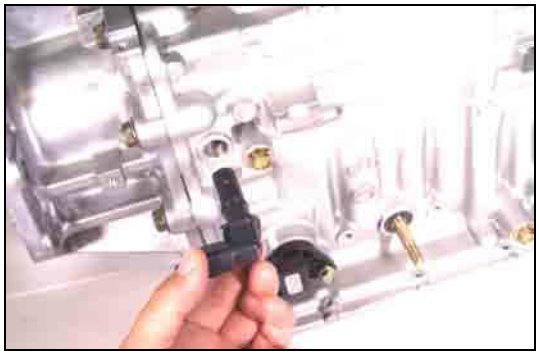
NOTE:
Place a pan beneath the torque converter to catch automatic transmission fluid (ATF) spillage.

- Drain the ATF from the torque converter.

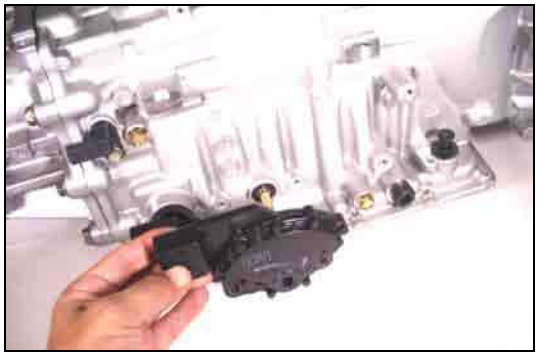

01ASSY101

2. Turbine sensor and speed sensor

- Remove the turbine sensor from the transmission case.

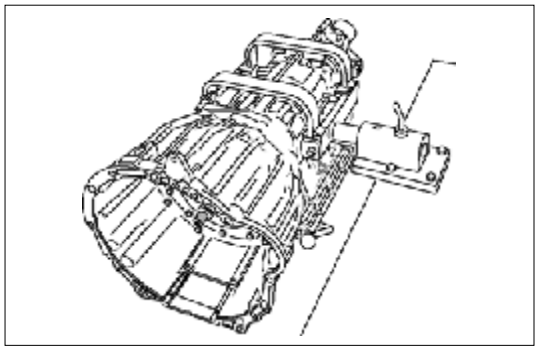

02ASSY103

- Remove the speed sensor from the transmission case.


03ASSY106

3. Inhibitor switch

Remove the 2 bolts and the inhibitor switch from the transmission case.

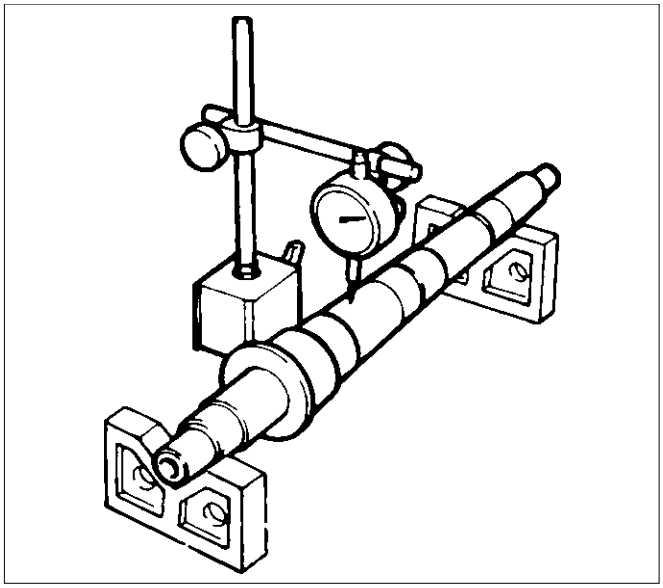

240L300002

4. Oil pan

- Lift and support the transmission with the holding fixture and holding fixture base.
  Holding fixture: 5-8841-0841-0
  Holding fixture base: 5-8840-0003-0
- Remove the drain plug from the oil pan and drain the ATF from the oil pan.
- Rotate the automatic transmission so that the converter housing is facing up and drain the ATF.
- Rotate the automatic transmission so that the oil pan is facing up.
- Remove the 19 bolts and the oil pan.

Mainshaft Run-out

- Install the mainshaft to V-blocks.
- Use a dial indicator to measure the mainshaft central portion run-out.



226RS039

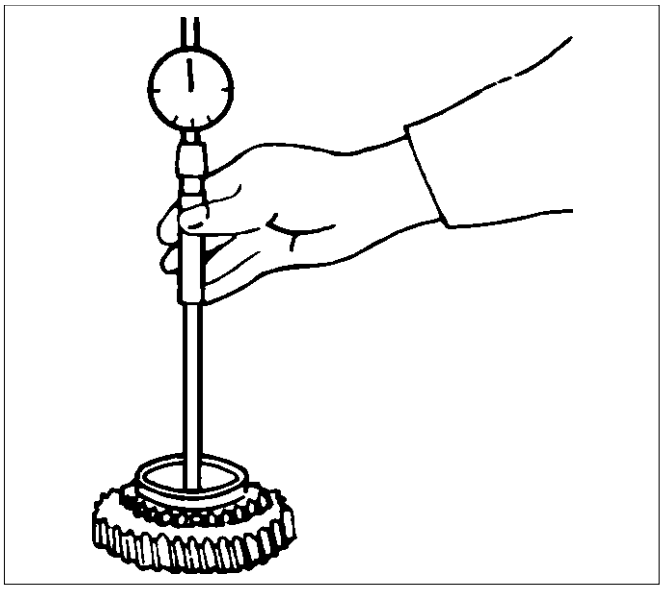
If the measured mainshaft run-out exceeds the specified limit, the mainshaft must be replaced.

Mainshaft Run-out

Limit: 0.05 mm (0.0020 in)

Gear Inside Diameter

- Use an inside dial indicator to measure the gear inside diameter.



226RS040

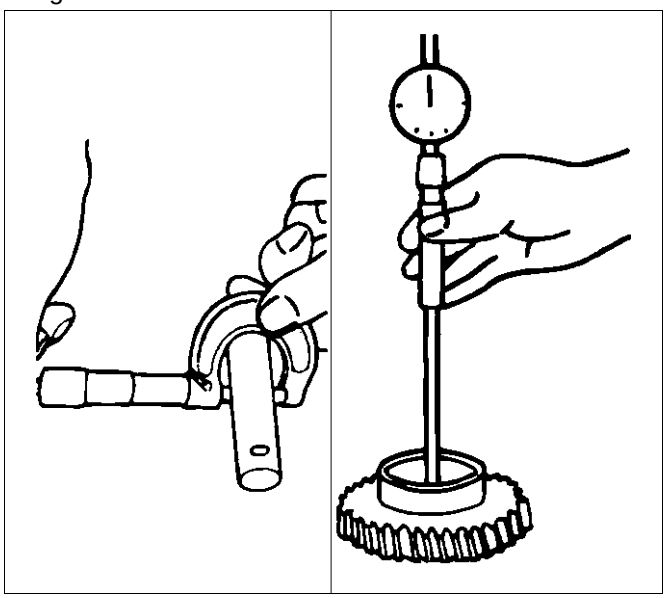
If the measured value is less than the specified limit, the gear must be replaced.

Gear Inside Diameter

	Standard	Limit
1st 3rd	45.000 - 45.013 mm (1.771 - 1.772 in)	45.100 mm (1.776 in)
2nd	52.000 - 52.013 mm (2.047 - 2.048 in)	52.100 mm (2.051 in)
Rev.	48.000 - 48.013 mm (1.889 - 1.890 in)	48.100 mm (1.894 in)
5th	32.000 - 32.013 mm (1.259 - 1.260 in)	32.100 mm (1.246 in)

Reverse Idler Gear and Idler Gear Shaft Clearance

- Use a micrometer to measure the idler gear shaft diameter.
- Use an inside dial indicator to measure the idler gear inside diameter.



226RS041

- Calculate the idler gear and idler gear shaft clearance.

  Idler gear inside diameter-idler gear shaft diameter = idle gear and idler gear shaft clearance.

  If the measured value exceeds the specified limit, the idle gear and/or the idler gear shaft must be replaced

  Idler Gear and Idler Gear Shaft Clearance

  Standard: 0.041 - 0.074 mm (0.0016 -0.0029 in)

  Limit: 0.150 mm (0.0059 in)

Diagnosis

Before determining a trouble (Non-trouble mode)

1. When shifting from 2H to 4H:

1-1-1 When the flashing frequency of the 4WD indicator is changed from 2Hz to 4Hz (Shift on the fly)

If the load is too large to shift the gears synchronously, the operation is repeated up to 3 times. If the shifting is not effected after being repeated 3 times, the indicator frequency is changed from 2Hz to 4Hz. At the same time, the actuator condition is changed to 2H, indicator flashes at 4Hz for 10 seconds, and then goes out.
Cause of excessive synchronous shifting load

- Extremely low temperature (the oil viscosity of the front differential increases requiring a large load for synchronization).
- High speed (since the difference of relative revolutions of gears to be shifted synchronously is too large, required work load per unit time becomes larger).

Step 1-1-1:

Stop the vehicle or decrease the speed and operate as required again.

1-1-2 When the flashing frequency of the 4WD indicator is changed from 2Hz to 4Hz (Rigid and free wheel Hub) / Block out of meshing spline in transfer case.

Step 1-1-2:

Run the vehicle forward and backward several meters and operate as required again.

1-2 When the flashing of 4WD indicator at 2Hz continues more than 11.5 seconds (repetition of 3 times of above No.1 is counted) (Shift on the fly)

If there is difference of revolutions and phases between the front wheel and the axle, connecting the front wheel and axle is difficult.
Until shifting in the transfer and connection of the front wheel and axle are completed*, the indicator flashes at a frequency of 2Hz. In the above case, the indicator continues flashing at a frequency of 2Hz until the connection of the front axle is completed. (If the shifting in the transfer is not completed, the flashing frequency is changed to 4Hz (above No.1).)
By correcting the difference of relative revolutions and deviation of phases, the shifting can be completed.

Step 1-2:

While the vehicle is running, check it is safe around the vehicle and then accelerate or decelerate the vehicle while going straight.

When the vehicle is at a stop, run the vehicle forward and backward several meters.

2. When shifting from 4H to 2H

2-1 When 4WD indicator continues flashing at 2Hz

When shifting from 4H to 2H, the 4WD indicator continues flashing at 2Hz until separation in the transfer and the separation of the front wheel axle are completed*. When torsional torque is accumulated in the drive system, separation in the transfer and separation of the front axle* is difficult. In such a case, they can be separated by removing the torsional torque of the drive system.

Step 2-1:

While the vehicle is running, check it is safe around the vehicle and then accelerate or decelerate the vehicle while going straight.

When the vehicle is in stop, run the vehicle several meters forward and backward.

*: Shift on the fly only.