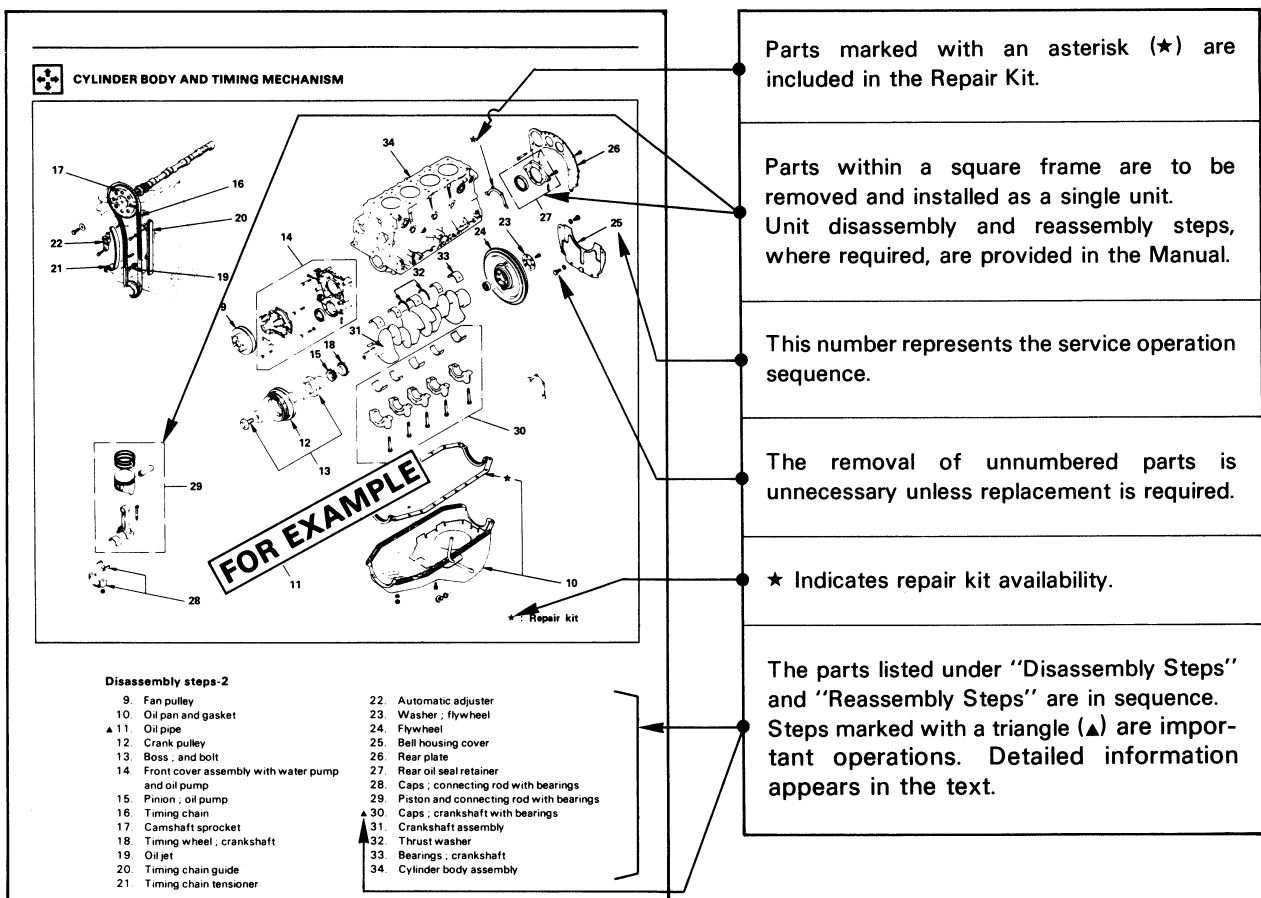


NOTES ON THE FORMAT OF THIS MANUAL

1. Find the applicable Section by referring to the index at the front of the Workshop Manual binder.
2. The following technical service information is included in this Section:
 - Identification
 - Maintenance schedules
 - Recommended lubricants
 - Recommended fuels
 - Oil viscosity charts
3. Individual Sections of this Workshop Manual are divided into the following categories:
 - Main data and specifications
 - Torque specifications
 - Recommended liquid gasket
 - Loctite application procedure
 - Servicing
 - Removal and installation
 - Disassembly
 - Inspection and repair
 - Reassembly
 - Troubleshooting
4. Each "Major Components" page of this Workshop Manual has an exploded view of the applicable area.
A brief explanation of the notation used follows:

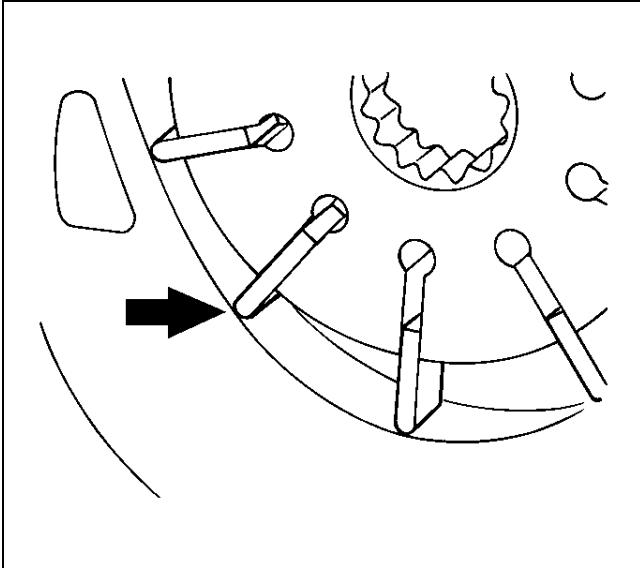


Reassembly

1. Install oil seal to front housing. Be sure to discard used oil seal, and always use new parts for installation.

CAUTION: When installing the oil seal, be careful not to damage the oil seal contacting surface of the housing.

2. Install shaft assembly.
3. Install the vanes to roter with curved face in contact with the inner wall of cam.



442RS005

4. Install roter and vanes to cam.
5. Install pin to front housing.
6. Install two new O-rings to front housing. Be sure to discard used O-ring.
7. Install side plate.

CAUTION: When installing side plate, be careful not to damage its inner surface. Damaged side plate may cause poor pump performance, pump seizure or oil leakage.

8. Install pump cartridge assembly to front housing.
9. Install snap ring to shaft end.
10. Install rear housing with a new O-ring. Be sure to discard used O-ring. Then install bolt and tighten it to specified torque.

Torque: 22-26 N·m (2.2-2.7kg·m/16-20 lb ft)

11. Install suction pipe with a new O-ring. Be sure to discard used O-ring. Then install bolt and tighten it to specified torque.

Torque: 7.8-12 N·m (0.8-1.2kg·m/69-104 lb in)

12. Install relief valve and spring.
13. Install connector with a new O-ring. Be sure to discard used O-ring. Tighten the connector to specified torque.

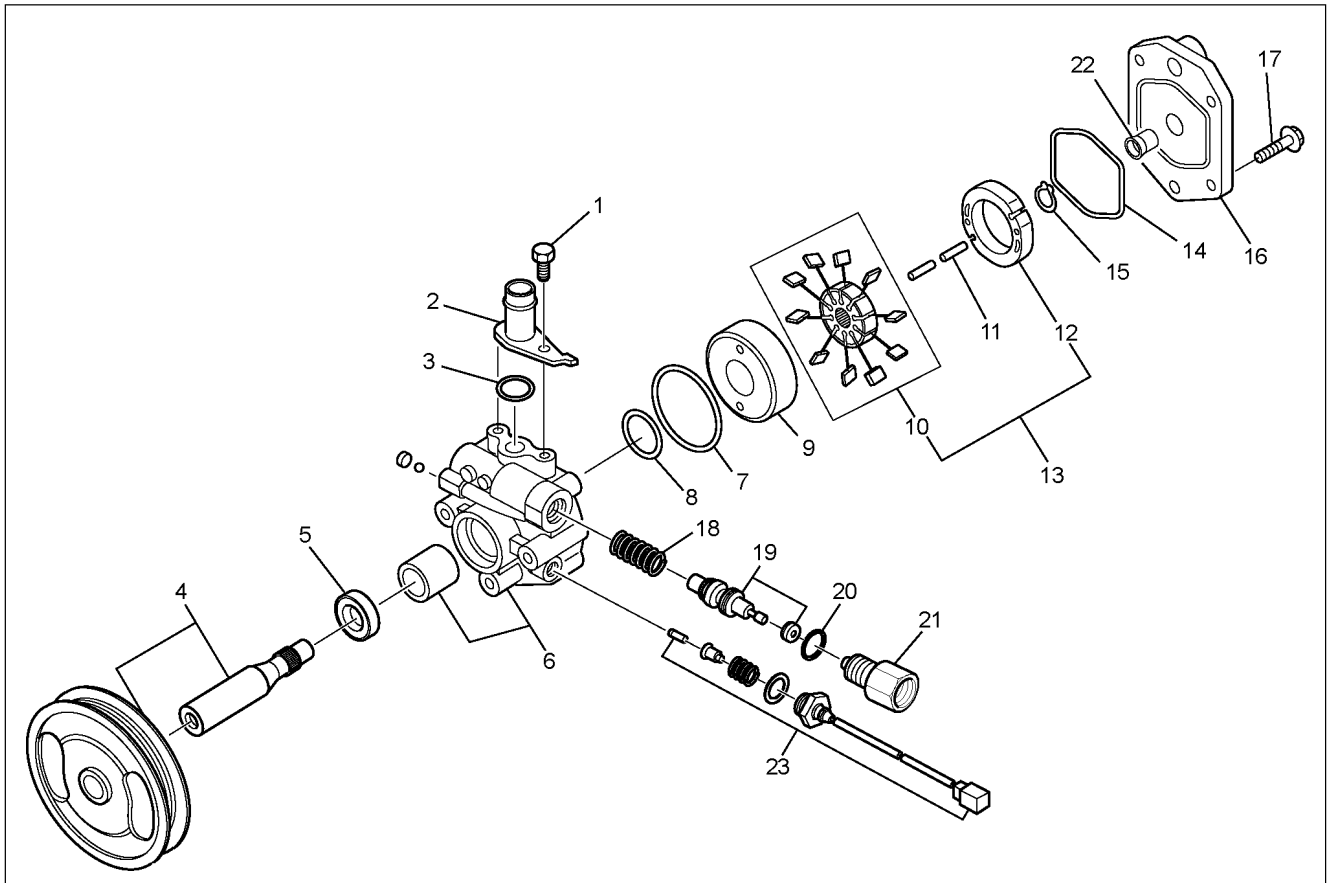
Torque: 49-69 N·m (5.0-7.0kg·m/36-51 lb ft)

Main Data and Specifications

General Specifications

Oil pump	Type	Vane
	Operating fluid	ATF DEXRON®—III

Power Steering Pump Disassembled View



RTW43BMF000301

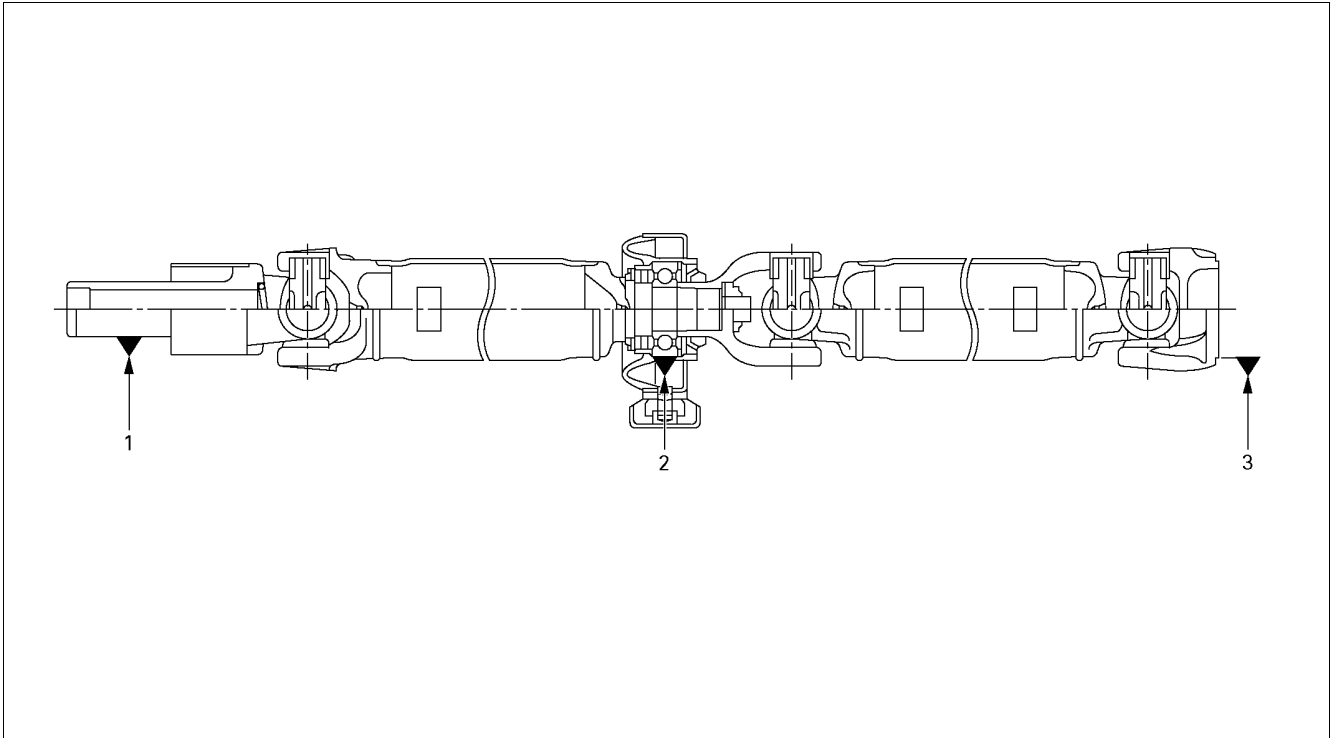
Legend

- | | |
|---------------------|-------------------------------|
| (1) Bolt | (13) Pump Cartridge Assembly |
| (2) Suction Pipe | (14) O-ring |
| (3) O-ring | (15) Snap Ring |
| (4) Shaft Assembly | (16) Rear Housing |
| (5) Oil Seal | (17) Bolt |
| (6) Front Housing | (18) Spring |
| (7) O-ring | (19) Relief Valve |
| (8) O-ring | (20) O-ring |
| (9) Side Plate | (21) Connector |
| (10) Rotor and Vane | (22) Bush |
| (11) Pin | (23) Pressure Switch Assembly |
| (12) Cam | |

Disassembly

1. Clean the oil pump with solvent (plug the discharge and suction ports to prevent the entry of solvent). Be careful not to expose the oil seal of shaft assembly to solvent.
 2. Remove the bolt, suction pipe and O-ring.
Remove the O-ring.
 3. Remove the connector, O-ring, relief valve and spring.
 4. Remove the pressure switch assembly.
 5. Remove the bolt, rear housing and O-ring.
 6. Remove the snap ring.
 7. Remove the shaft assembly.
 8. Remove the oil seal.
- CAUTION: When removing the oil seal, be careful not to damage the housing.**
9. Remove the pump cartridge assembly from the front housing.
 10. Remove two O-rings.

Propeller Shaft Run-Out



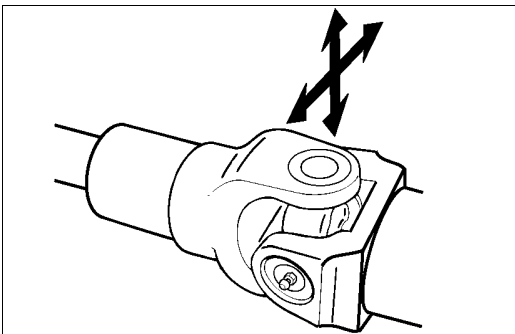
401R300005

Support 1 of splined yoke, 2 of center bearing and 3 of flange yoke and check for static run-out by holding the probe of a dial indicator in contact with the center part of the shaft and turning the propeller shaft.

If the amount of run-out is beyond the limit value, correct with a bench press or replace the shaft with a new one.

mm(in)

Limit	
1.0 (0.04)	



401R300008

Play in Spider Bearing

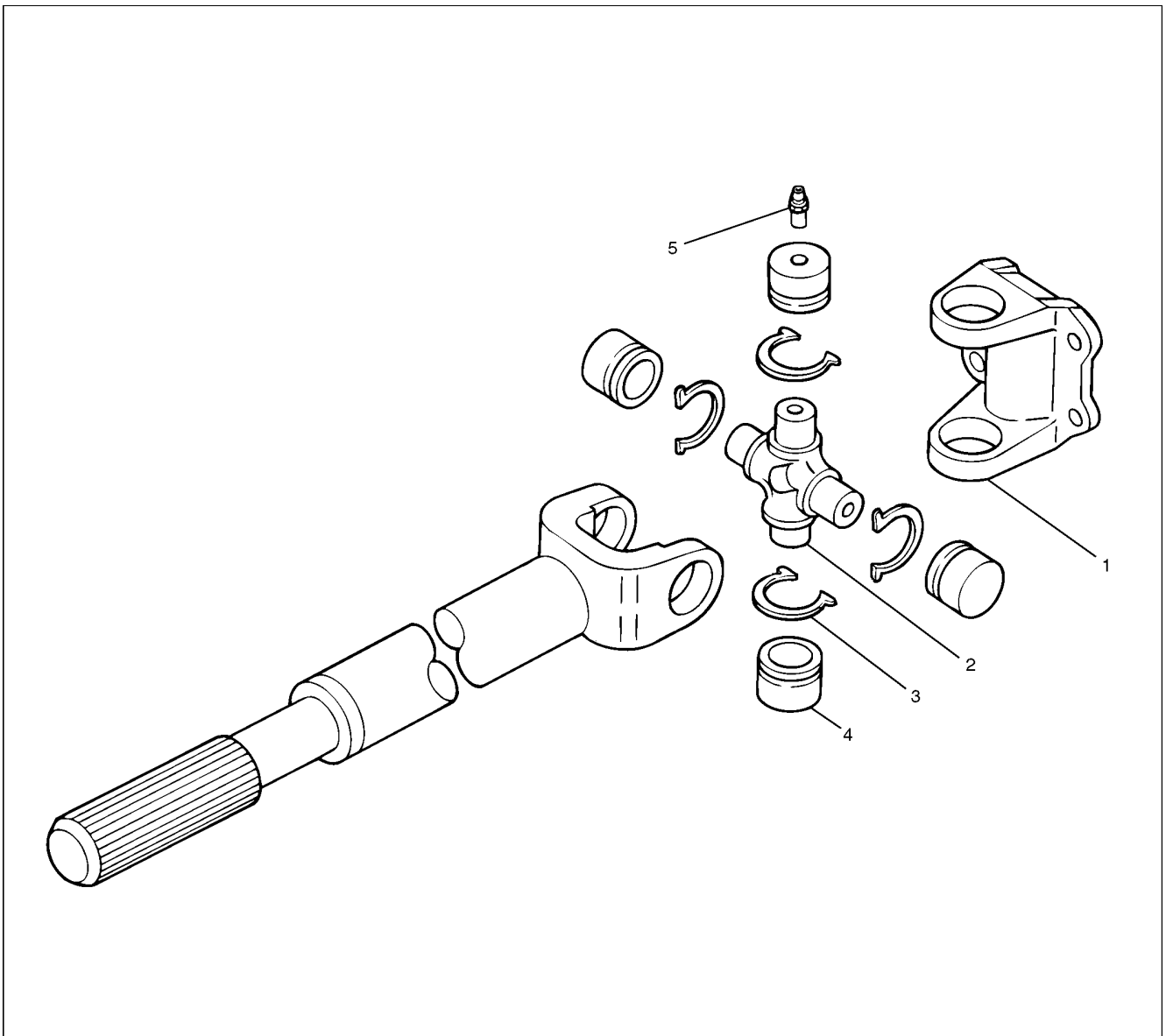
- (1) Check the spider bearings for wear or damage.
- (2) Check the amount of axial and radial play in spider bearing by moving the yoke back and forth on the spider axes and shaft axis.

mm(in)

Limit	0.1(0.004)

If the limit is exceeded, replace the shaft assembly.

Universal Joint Disassembly and Reassembly



401RW055

Legend

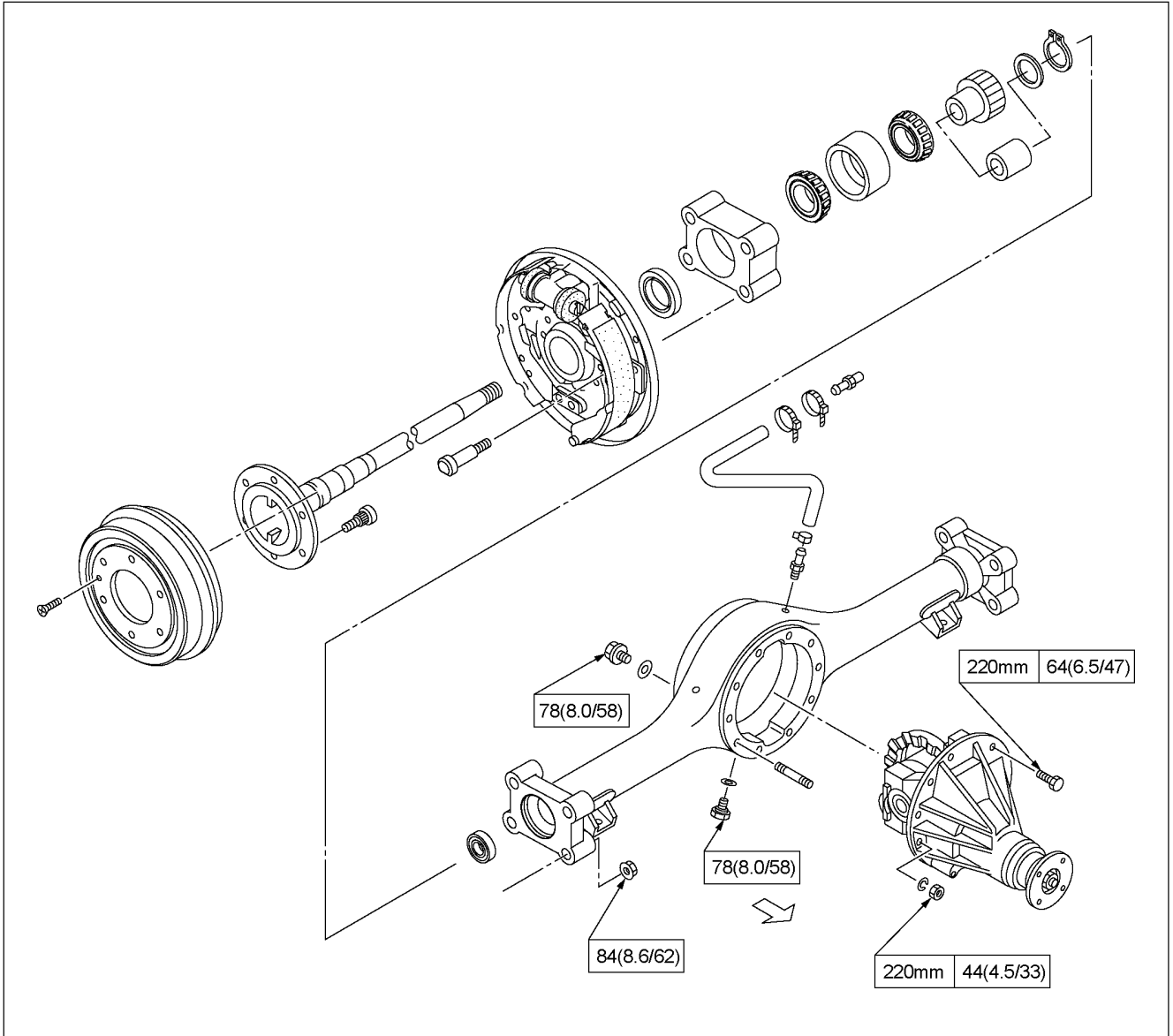
- (1) Flange Yoke
- (2) Spider
- (3) Snap Ring

- (4) Needle Roller Bearing
- (5) Grease Fitting

4B-4 REAR AXLE

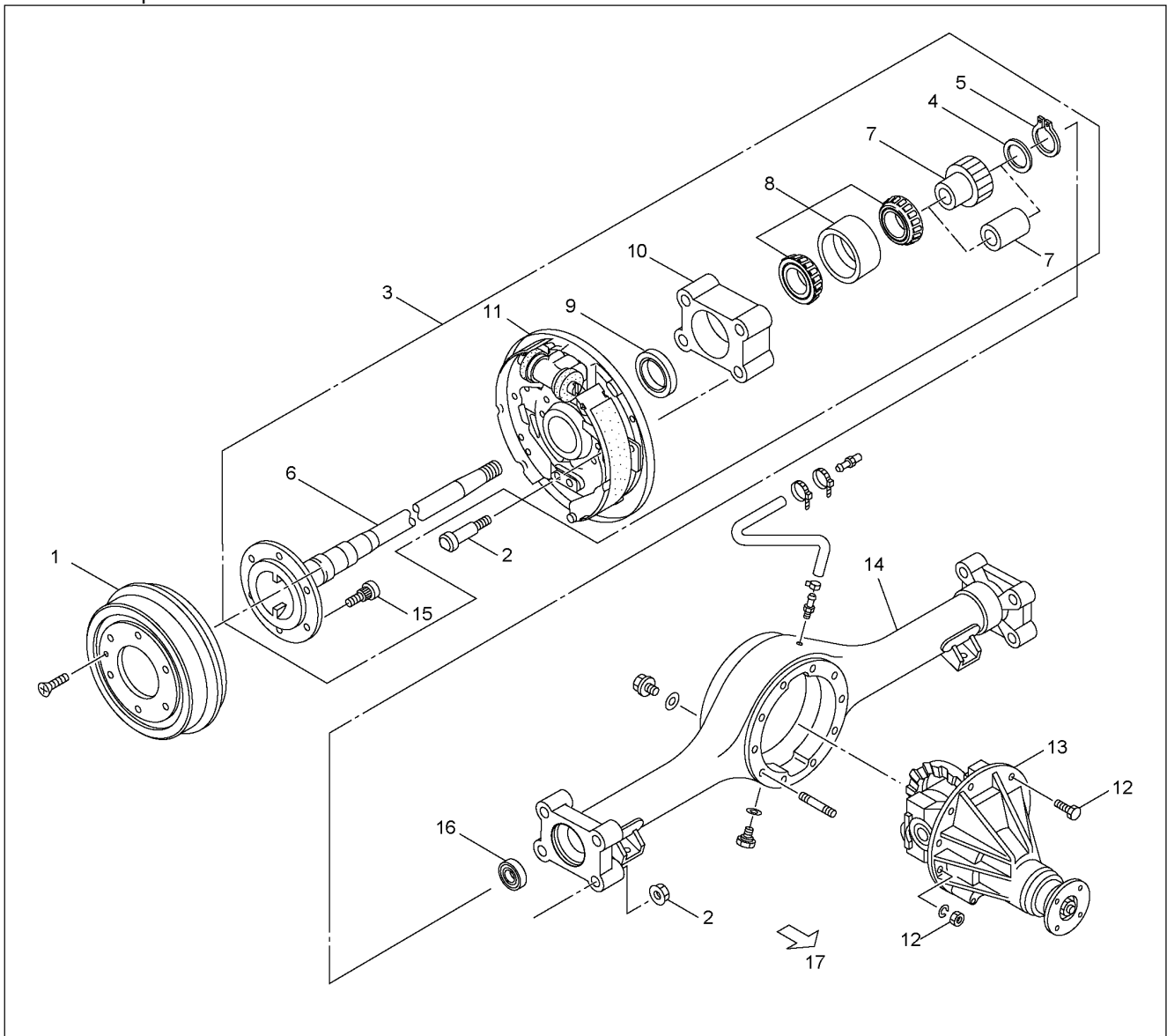
Torque Specifications Rear Axle

N·m (kgf·m/lb·ft)



REAR AXLE

1. Refer to Section 3E "WHEEL and TIRE" for road wheel Disassembly procedure.
2. Refer to Section 5 "BRAKE" for rear brake removal procedure.



RTW34BLF000401

Legend

- | | |
|----------------------------------------------------|-----------------------------|
| 1. Brake Drum | 9. Oil Seal |
| 2. Bolt and Nut | 10. Bearing Holder |
| 3. Axle Shaft Assembly with Brake | 11. Rear Brake |
| 4. Shim | 12. Bolt and Nut |
| 5. Snap Ring | 13. Differential Assembly |
| 6. Axle Shaft | 14. Rear Axle Case Assembly |
| 7. Sensor Rotor (with ABS)
Spacer (without ABS) | 15. Wheel Pin |
| 8. Double Taper Roller Bearing | 16. Axle Case Oil Seal |
| | 17. Front |

TYPICAL SCAN DATA & DEFINITIONS (ENGINE DATA)

4JH1-TC ENGINE

Use the typical values table only after the On-Board Diagnostic System check has been completed, no DTC(s) were noted, and you have determined that the On-Board Diagnostic are functioning properly.

Tech2 values from a properly running engine may be used for comparison with the engine you are diagnosing.

Condition : Vehicle stopping, engine running, air conditioning off & after warm-up (Coolant temperature approximately 80 deg. C)

	Tech 2 Parameter	Units	Idle	1500rpm	2000rpm	Definition
1	Engine Speed	rpm	675 - 725	1475 - 1525	1975 - 2025	The engine speed is measured by ECM from the CKP sensor.
2	Vehicle Speed	km/h / MPH	0	0	0	This displays vehicle speed. The vehicle speed is measured by ECM from the vehicle speed sensor.
3	Pump Speed	rpm	335 - 375	725 - 775	975 - 1025	This displays injection pump speed. The injection speed is measured by ECM from the pump cam sensor.
4	Accelerator Position Sensor Signal	%	0	3 - 5	5 - 7	Throttle position operating angle is measured by the ECM from throttle position output voltage. This should display 0% at idle and 99 - 100% at full throttle.
5	Idle Switch	Active/ Inactive 0V	Active	Active/ Inactive 0V	Inactive 0V	This displays operating status of the idle switch. This should display "Active" until the accelerator position nearly 4 - 5%.
6	Mass Air Flow Sensor	mg/stk	420 - 490	380 - 460	410 - 480	This displays calculated intake air volume for one cylinder stroke. The mass air flow is measured by ECM from the MAF sensor output voltage.
7	Desired Mass Air Flow	mg/stk	430 - 470	380 - 420	410 - 470	This displays desired intake air volume for one cylinder stroke. The desired mass air flow is calculated by ECM depending on engine condition.
8	Barometric Pressure	hpa	Depends on altitude	Depends on altitude	Depends on altitude	The barometric pressure is measured by ECM from the sensor in the ECM. This data is changing by altitude.
9	Desired Injection Quantity	mg/stk	6 - 10	6 - 10	7 - 11	This displays desired value from the ECM. The ECM compensates for fuel rate by throttle position and various sensor signals.
10	Injection Quantity	mg/stk	6 - 10	6 - 10	7 - 11	This displays calculated actual fuel quantity from the PSG. The PSG receives desired injection quantity from the ECM. And, it compensates actual injection depending on timer position to determine duration of the high pressure solenoid valve operation.
11	Desired Fuel Injection Start	deg. CA	1 - 3	2 - 4	3 - 5	This displays desired injection timing from the ECM. The ECM compensates for fuel injection timing by throttle position and various sensor signal.
12	Actual Injection Start	deg. CA	1 - 3	2 - 4	3 - 5	This displays calculated actual injection timing based on CKP signal and pump cam signal. The PSG controls TCV duty ratio to meet desired injection timing from the ECM.
13	Coolant Temperature	deg. C / deg. F	80 - 85	80 - 85	80 - 85	The ECT is measured by ECM from ECT sensor output voltage. This data is changing by coolant temperature. When the engine is normally warm upped, this data displays approximately 80 deg. C.
14	Fuel Temperature	deg. C / deg. F	Depends on fuel temp.	Depends on fuel temp.	Depends on fuel temp.	The FT is measured by PSG from FT sensor. This data is changing by fuel temperature.
15	Intake Air Temperature	deg. C / deg. F	Depends on ambient temp.	Depends on ambient temp.	Depends on ambient temp.	The IAT is measured by ECM from IAT sensor output voltage. This data is changing by intake air temperature.
16	Ignition Status	On12V/ Off0V	On 12V	On 12V	On 12V	This displays the key switch status indicated by the ECM with key switch signal. This should display "Off 0V" at key OFF and "On12V" at key ON.
17	Brake Switch 1	Active/ Inactive	Inactive	Inactive	Inactive	This displays operating status of the brake switch. This should display "Active" when the brake pedal is stepped on.

SYMPTOM DIAGNOSIS

PRELIMINARY CHECKS

Before using this section, perform the “On-Board Diagnostic (OBD) System Check” and verify all of the following items:

- The engine control module (ECM) and check engine lamp (MIL=malfunction indicator lamp) are operating correctly.
- There are no Diagnostic Trouble Code(s) stored.
- Tech 2 data is within normal operating range. Refer to Typical Scan Data Values.
- Verify the customer complaint and locate the correct symptom in the table of contents. Perform the procedure included in the symptom chart.

VISUAL/PHYSICAL CHECK

Several of the symptom procedures call for a careful visual/physical check. This can lead to correcting a problem without further checks and can save valuable time. This check should include the following items:

- ECM grounds for cleanliness, tightness and proper location.
- Vacuum hoses for splits, kinks, and proper connection. Check thoroughly for any type of leak or restriction.
- Air intake ducts for collapsed or damaged areas.
- Air leaks at throttle body mounting area, mass air flow (MAF) sensor and intake manifold sealing surfaces.
- Wiring for proper connections, pinches and cuts.

INTERMITTENT

Important: An intermittent problem may or may not turn on the check engine lamp (MIL=malfunction indicator lamp) or store a Diagnostic Trouble Code. Do NOT use the Diagnostic Trouble Code (DTC) charts for intermittent problems.

The fault must be present to locate the problem.

Most intermittent problems are caused by faulty electrical connections or wiring. Perform a careful visual/physical check for the following conditions.

- Poor mating of the connector halves or a terminal not fully seated in the connector (backed out).
- Improperly formed or damaged terminal.
- All connector terminals in the problem circuit should be carefully checked for proper contact tension.
- Poor terminal-to-wire connection. This requires removing the terminal from the connector body to check.
- Check engine lamp (MIL=malfunction indicator lamp) wire to ECM shorted to ground.
- Poor ECM grounds. Refer to the ECM wiring diagrams.

Road test the vehicle with a Digital Multimeter connected to a suspected circuit. An abnormal voltage when the malfunction occurs is a good indication that there is a fault in the circuit being monitored.

Using Tech 2 to help detect intermittent conditions. The Tech 2 have several features that can be used to locate an intermittent condition. Use the following features to find intermittent faults:

To check for loss of diagnostic code memory, disconnect the MAF sensor and idle the engine until the check engine lamp (MIL=malfunction indicator lamp) comes on. Diagnostic Trouble Code P0100 should be stored and kept in memory when the ignition is turned OFF.

If not, the ECM is faulty. When this test is completed, make sure that you clear the Diagnostic Trouble Code P0100 from memory.

An intermittent check engine lamp (MIL=malfunction indicator lamp) with no stored Diagnostic Trouble Code may be caused by the following:

- Check engine lamp (MIL=malfunction indicator lamp) wire to ECM short to ground.
- Poor ECM grounds. Refer to the ECM wiring diagrams.

Check for improper installation of electrical options such as light, cellular phones, etc. Check all wires from ECM to the ignition control module for poor connections.

Check for an open diode across the A/C compressor clutch and check for other open diodes (refer to wiring diagrams in Electrical Diagnosis).

If problem has not been found, refer to ECM connector symptom tables.

- Check the “Broadcast Code” of the ECM, and compare it with the latest Isuzu service bulletins and/or Isuzu EEPROM reprogramming equipment to determine if an update to the ECM's reprogrammable memory has been released.

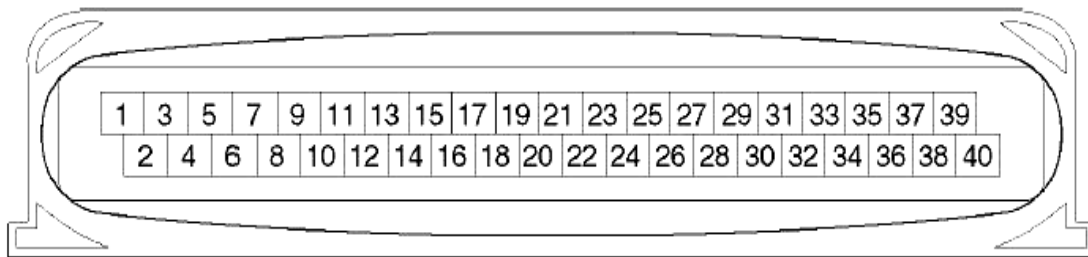
This identifies the contents of the reprogrammable software and calibration contained in the ECM.

If the “Broadcast Code” is not the most current available, it is advisable to reprogram the ECM's EEPROM memory, which may either help identify a hard-to-find problem or may fix the problem.

The Service Programming System (SPS) will not allow incorrect software programming or incorrect calibration changes.

6E-46 3.5L ENGINE DRIVEABILITY AND EMISSIONS

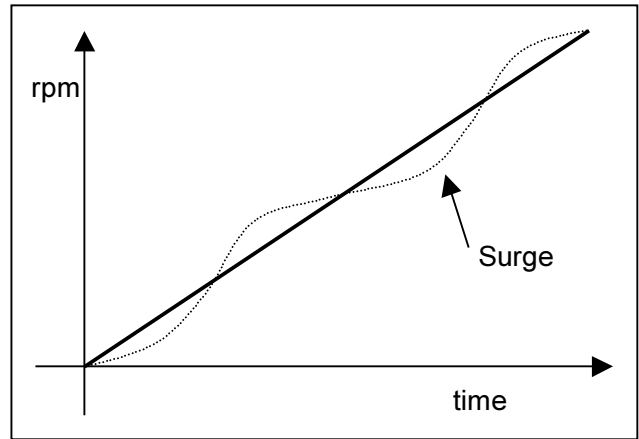
Connector B Port: View Looking Into ECM Case



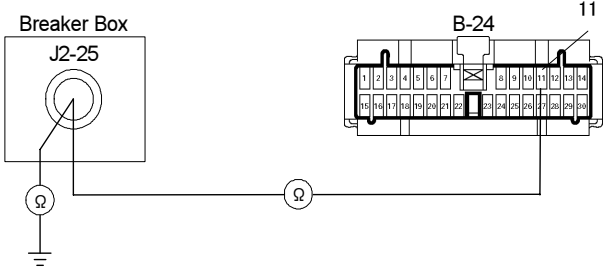
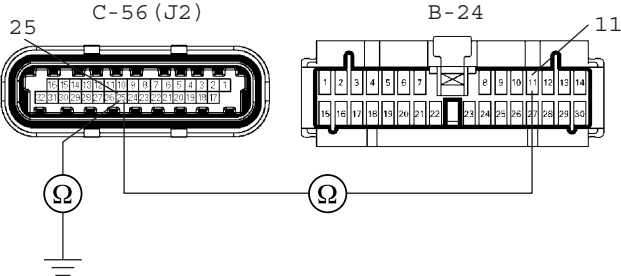
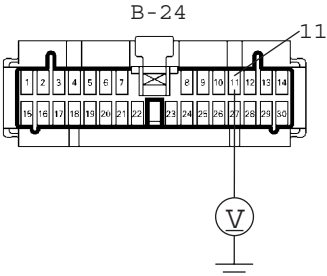
Pin No.	B/Box No.	Pin Function	Wire Color	Signal or Continuity					Tester Position		
				Key SW Off	Key SW On	Engine Idle	Engine 2000rpm	ECM Connection	Range	(+)	(-)
B1	B1	No Connection	-	-	-	-	-	-	-	-	-
B2	B2	No Connection	-	-	-	-	-	-	-	-	-
B3	B3	No. 2 Injector	GRN/ORG	Less than 1V	Wave form or 12-14V			Connect	DC V	B3	GND
B4	B4	No. 4 Injector	GRN/RED	Less than 1V	Wave form or 12-14V			Connect	DC V	B4	GND
B5	B5	No. 6 Injector	GRN/YEL	Less than 1V	Wave form or 12-14V			Connect	DC V	B5	GND
B6	B6	Ground (Power)	BLK	Continuity with ground	-	-	-	Disconnect	Ohm	B6	GND
B7	B7	No. 2 Ignition Coil	RED/BLK	-	-	Wave form		-	-	-	-
B8	B8	No. 4 Ignition Coil	RED/WHT	-	-	Wave form		-	-	-	-
B9	B9	No. 6 Ignition Coil	RED/GRN	-	-	Wave form		-	-	-	-
B10	B10	No Connection	-	-	-	-	-	-	-	-	-
B11	B11	A/C Compressor Relay	GRY/RED	Less than 1V	A/C comp. is operated: Less than 1V A/C comp. is not operated: 10-14V			Connect	DC V	B11	GND
B12	B12	Tachometer Output Signal	BLK/RED	-	-	Wave form or 6.2V	Wave form or 6.2V	Connect	AC V	B12	GND
B13	B13	Idle Air Control (IAC) Valve Coil A High	BLU	Less than 1V	Less than 1V / 10-14V			Connect	DC V	B13	GND
B14	B14	Idle Air Control (IAC) Valve Coil B High	BLU/WHT	Less than 1V	Less than 1V / 10-14V			Connect	DC V	B14	GND
B15	B15	Canister Purge Solenoid Valve	RED/BLU	Less than 1V	Wave form or 12-14V			Connect	AC V	B15	GND

SURGES AND/OR CHUGS SYMPTOM

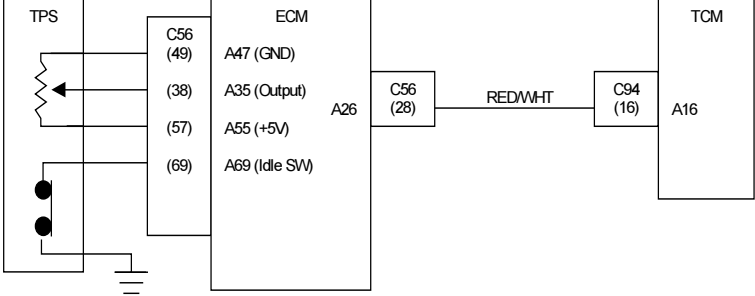
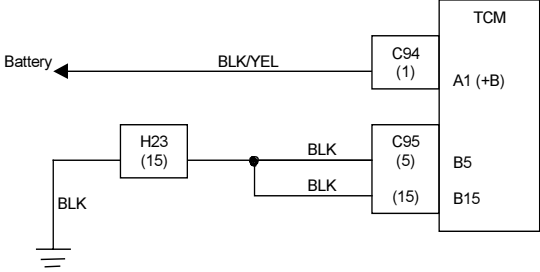
DEFINITIONS: Engine power variation under steady throttle or cruise. Feels like the vehicle speeds up and slows down with no change in the accelerator pedal.



Step	Action	Value (s)	Yes	No
1	Was the "On-Board Diagnostic (OBD) System Check" performed?	-	Go to Step 2	Go to On Board Diagnostic (OBD) System Check
2	1. Perform a bulletin search. 2. If a bulletin that addresses the symptom is found, correct the condition as instructed in the bulletin. Was a bulletin found that addresses the symptom?	-	Verify repair	Go to Step 3
3	Was a visually/physical check performed?	-	Go to Step 4	Go to Visual / physical Check
4	Be sure that the driver understands transmission torque converter clutch and A/C compressor operation as explained in the owner's manual. Inform the customer how the torque converter clutch (TCC) (if A/T model) and the A/C clutch operate. Is the customer experiencing a normal condition?	-	System OK	Go to Step 5
5	1. Using the Tech 2, ignition "On" and engine "On". 2. Monitor the "Mass Air Flow" in the data display. Does the Tech 2 indicate correct "Mass Air Flow" as shown in the following graph, when engine speed is increasing little by little? <div style="text-align: center;"> </div>	-	Go to Step 7	Go to Step 6

Step	Action	Value(s)	Yes	No
6	<p>Using the DVM and check the Tacho output circuit. Breaker box is available:</p> <ol style="list-style-type: none"> 1. Ignition "Off", engine "Off". 2. Install the breaker box as type A. (ECM disconnected) Refer to 6E-88 page. 3. Disconnect the meter connector. 4. Check the circuit for open or short to ground circuit. <p>Was the problem found?</p>  <p>Breaker box is not available:</p> <ol style="list-style-type: none"> 1. Ignition "Off", engine "Off". 2. Disconnect the ECM connector. 3. Disconnect the meter connector. 4. Check the circuit for open or short to ground circuit. <p>Was the problem found?</p> 	—	Repair faulty harness and verify repair	Go to Step 7
7	<p>Using the DVM and check the Tacho output circuit.</p> <ol style="list-style-type: none"> 1. Ignition "On", engine "Off". 2. Disconnect the meter connector. 3. Check the circuit for short to power supply circuit. <p>Was the DVM indicated specified value?</p> 	Less than 1V	Go to Step 8	Repair faulty harness and verify repair
8	<p>Check any accessory parts which may cause electric interference or magnetic interference.</p> <p>Was the problem found?</p>	—	Remove the accessory parts and verify repair	Go to Step 9

7A2-102 DIAGNOSIS (JR405E)

Step	Action	Yes	No
6	<p>Inspect the output voltage and throttle opening signal of the throttle position sensor using a Tech 2 or circuit tester. Is a voltage value in proportion to the throttle opening output?</p> 	Go to Step 7	Repair the defect or replace.
7	<p>Check of power supply to and earth of TCM. Are the power supply and earth proper?</p> 	Go to Step 8	Check the power source harness and earth harness (bolt tightening to the body).
8	<p>Is the stall revolution correct in D, 3, 2 and L range? Refer the STALL TEST section in this manual.</p>	Go to Step 9	Repair the defect or replace.
9	<p>Is the line pressure correct? Refer the LINE PRESSURE TEST section in this manual.</p>	Trouble in the AT assembly or control valve.	Repair the defect or replace.



01BRG16

1. Bearing and bearing race

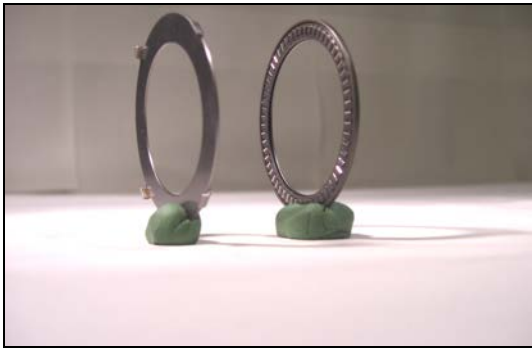
	Outside diameter
Bearing	– 46 mm (1.811 in)
Bearing race	– 45 mm (1.772 in)



02BRG02

2. Bearing (with bearing race)

	Outside diameter
Bearing	– 46 mm (1.811 in)
Bearing race (black color) installation direction	– Facing the front of the transmission.



03BRG04

3. Bearing and bearing race

	Outside diameter
Bearing	– 65 mm (2.559 in)
Bearing race	– 64 mm (2.520 in)



04BRG05

4. Bearing and bearing race

	Outside diameter
Bearing	– 73 mm (2.874 in)
Bearing race	– 72 mm (2.835 in)



05BRG06

5. Bearing (with bearing race)

	Outside diameter
Bearing	– 53 mm (2.087 in)
Bearing race (black color) installation direction	– Facing the front of the transmission.

CIRCUIT DIAGRAM ANTI THEFT WITH SUPER LOCK (RHD)

