ENGINE <2.4L>

CONTENTS

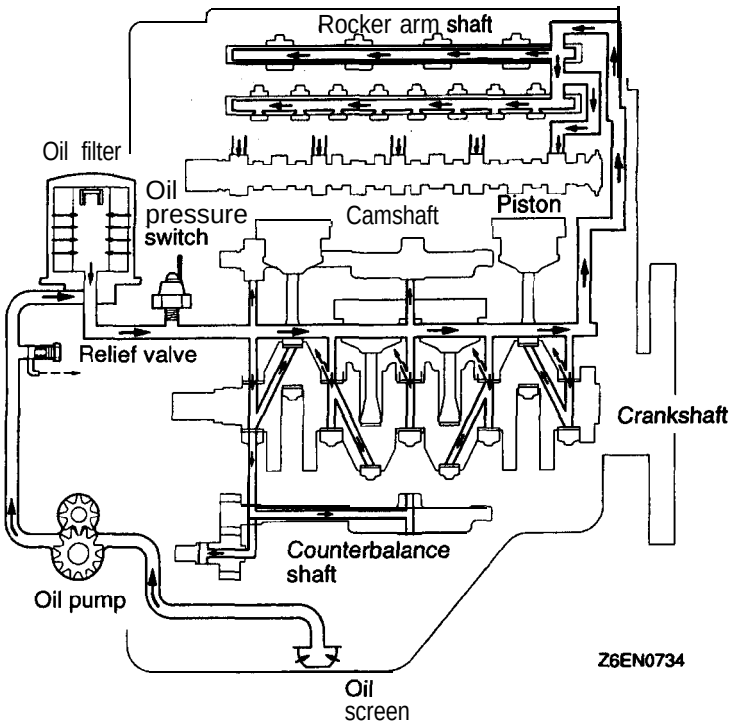
11109000207

GENERAL INFORMATION

11100010148

Items			Specifications
Type			In-line OHV, SOHC
Number of cylinders			4
Bore mm(in.)			86.5(3.41)
Stroke mm(in.)			1 00(3.94)
Piston displacement cm^3(cu.in.)			2,351(143.4)
Compression ratio			9.5
Firing order			1-3-4-2
Counterbalance shaft			Equipped
Valve timing	Intake valve	Opens	18" BTDC
		Closes	58" ABDC
	Exhaust valve	Opens	58" BBDC
		Closes	18" ATDC
Lubrication system			Pressure feed-full flow filtration

LUBRICATION SYSTEM



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SERVICE SPECIFICATIONS

11100030212

Items			Standard value	Limit
Drive belt (For generator)	Tension N (lbs.)	When checked When a new belt is installed When a used belt is installed	245 – 490 (55.1 – 110.2) 490 – 686 (110.2 – 154.3) 392 (88.2)	–
	Deflection mm (in.) <Reference value>	Whenchecked When a new belt is installed When a used belt is installed	9.0 – 11.5 (.35 – .45) 7.5 – 9.0 (.30 – .35) 10.0 (.39)	–
Drive belt (For power steering pump)	Tension N (lbs.)	When checked When a new belt is installed When a used belt is installed	245 – 490 (55.1 – 110.2) 490 – 686 (110.2 – 154.3) 343 – 441 (77.2 – 99.2)	–
	Deflection mm (in.)	Whenchecked When a new belt is installed When a used belt is installed	5.5 – 8.0 (.22 – .32) 4.5 – 5.5 (.18 – .22) 6.0 – 7.0 (.24 – .28)	–
Drive belt (For A/C compressor)	Tension N (lbs.)	When checked When a new belt is installed When a used belt is installed	255 – 333 (57.3 – 75.0) 382 – 441 (86.0 – 99.2) 255 – 333 (57.3 – 75.0)	–
	Deflection mm (in.)	Whenchecked When a new belt is installed When a used belt is installed	6.5 – 7.5 (.26 – .30) 5.5 – 6.0 (.22 – .24) 6.5 – 7.5 (.26 – .30)	–
Basic ignition timing at idle			5°BTDC ± 3"	–
Actual ignition timing at idle			Approx. 10° BTDC	–
Curb idle speed r/min			750 ± 100	
CO contents %			0.5 or less	
HC contents ppm			100 or less	–
Compression pressure (at 250 – 400 r/min) kPa (psi)			1,350 (192)	min. 1,020 (145)
Compression pressure difference of all cylinder kPa (psi)				max. 100 (14)
Intake manifold vacuum kPa (in. Hg)				min. 60 (18)
Cylinder head bolt length mm (in.)				99.4 (3.91)
Auto tensioner push rod movement mm (in.)			Within 1 (.04)	
Timing belt tension torque Nm (ft.lbs)			3.5 (2.6)	–
Auto tensioner rod protrusion mm (in.)			3 . 8 - 4 . 5 (.150 – .177)	–
Timing belt B tension mm (in.)			5 – 7 (.20 – .28)	

S E A L A N T S

11100050195

Items	Specified sealant
Oil pan, cylinder block and thermostat case assembly	MITSUBISHI GENUINE PART MD970389 or equivalent
Flywheel bolt or drive plate bolt	3M Stud locking 4170 or equivalent

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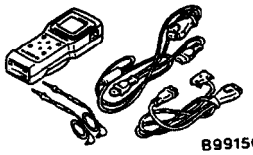
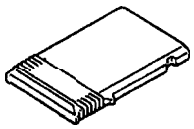
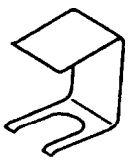
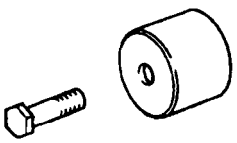
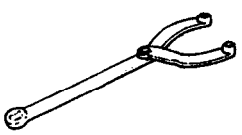
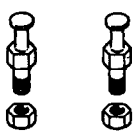
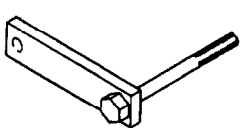
SPECIAL TOOLS

11100060204

Tool	Tool number and name	Supersession	Application
 B991502	MB991502 Scan tool (MUT-II)	MB991 502	Idle speed inspection
 8991325	ROM pack		
	MD998443 Lash adjuster holder	MD998443-01	Supporting of the lash adjuster to prevent it from falling when rocker shaft assembly is removed or installed
	MD998713 Camshaft oil seal installer	MD998713-01	Camshaft oil seal installation
	MD998727 Oil pan gasket cutter	MD998727-01	Oil pan removal
	MB990767 End yoke holder	MB990767-01	Holding camshaft sprocket or crankshaft pulley when loosening and tightening of bolt. Use with MD998754, MD998719
	MD998719 or MD998754 Crankshaft pulley holder	MIT308239	Supporting the crankshaft pulley when crankshaft bolt and pulley are removed or reinstalled. Use together with MB990767 Camshaft pulley supporting
	MD998781 Flywheel stopper	General service tool	Flywheel <M/T> or drive plate <A/T> supporting

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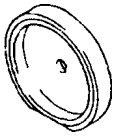
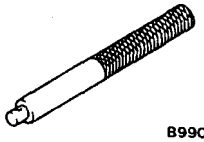
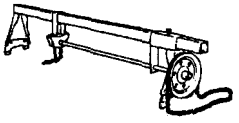
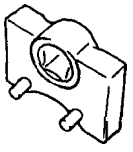
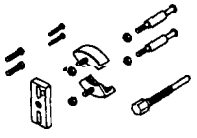
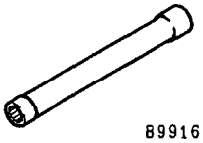
Tool	Tool number and name	Supersession	Application
	MD998776 Crankshaft rear oil seal installer	MD998776-01	Crankshaft rear oil seal installation
 B990938	MB990938 Handle	MB990938-01	
 Z203827	GENERAL SERVICE TOOL MZ203827 Engine lifter	MZ203827-01	Supporting engine assembly when removing and installing transaxle
	MD998767 Tensioner pulley wrench	MD998752-01	Auto tensioner installation
	MD998778 Crankshaft sprocket puller	General service tool	Crankshaft sprocket removal
 B991654	MB991654 Cylinder head bolt wrench (12)	–	Removal and installation of cylinder head bolt

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TROUBLESHOOTING

11100070085

Symptom	Probable cause	Remedy
Compression too low	Cylinder head gasket blown	Replace gasket
	Piston ring worn or damaged	Replace rings
	Piston or cylinder worn	Repair or replace piston and/or cylinder block
	Valve seat worn or damaged	Repair or replace valve and/or seat ring
Oil pressure drop	Engine oil level too low	Check engine oil level
	Oil pressure switch faulty	'Replace oil pressure switch
	Oil filter clogged	Install new filter
	Oil pump gears or cover worn	Replace gears and/or cover
	Thin or diluted engine oil	Change engine oil to correct viscosity
	Oil relief valve stuck (open)	Repair relief valve
	Excessive bearing clearance	Replace bearings
Oil pressure too high	Oil relief valve stuck (closed)	Repair relief valve
Noisy valves	Incorrect lash adjuster	Bleed air or replace lash adjuster
	Thin or diluted engine oil (low oil pressure)	Change engine oil
	Valve stem or valve guide worn or damaged	Replace valve and/or guide
Connecting rod noise/ main bearing noise	Insufficient oil supply	Check engine oil level
	Low oil pressure	Refer to "Oil pressure drop"
	Thin or diluted engine oil	Change engine oil
	Excessive bearing clearance	Replace bearings
Timing belt noise	Incorrect belt tension	Adjust belt tension and/or replace timing belt
Excessive engine rolling and vibration	Loose engine roll stopper (Front, Rear)	Retighten
	Loose transaxle mount bracket	Retighten
	Loose engine mount bracket	Retighten
	Loose center member	Retighten
	Broken transaxle mount insulator	Replace
	Broken engine mount insulator	Replace
	Broken roll stopper insulator	Replace

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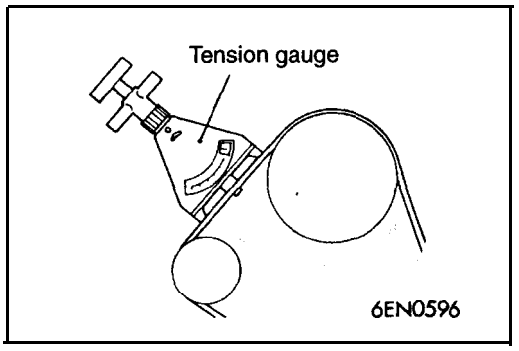

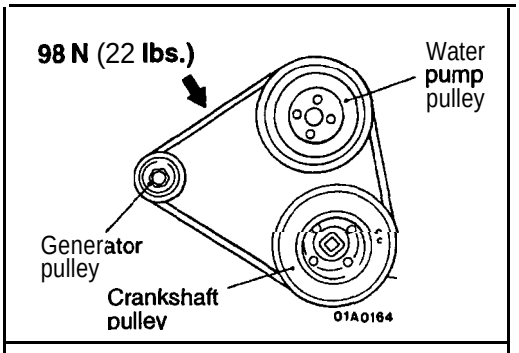

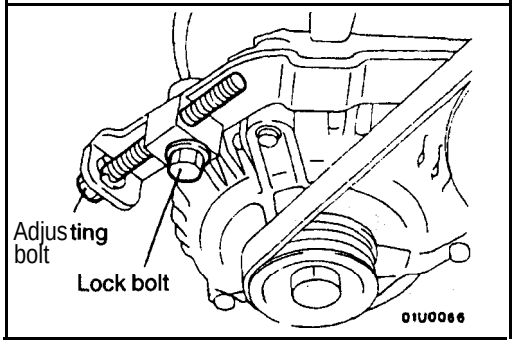

ON-VEHICLE SERVICE

11100090234

DRIVE BELT TENSION CHECK AND ADJUSTMENT

GENERATOR DRIVE BELT TENSION CHECK

Use the belt tension gauge to check belt tension at the shown point or check deflection by applying 98 N (22 lbs.) to the shown point.

Standard value:

Tension: 245 – 490 N (55.1 – 110.2 lbs.)
Deflection <Reference, value>:
9.0 – 11.5 mm (.35 – .45 in.)

GENERATOR DRIVE BELT TENSION ADJUSTMENT

1. Loosen the nut of the generator pivot bolt.
2. Loosen the lock bolt.
3. Turn the adjusting bolt to adjust the belt tension or deflection to the standard value.

Standard value:

Items	When a new belt is installed	When a used belt is installed
Tension N (lbs.)	490–686 (110.2–154.3)	392 (88.2)
Deflection mm (in.) <Reference value>	7.5–9.0 (.30–.35)	10.0 (.39)

4 Tighten the nut of the generator pivot bolt.

Tightening torque: 23 Nm (17 ft.lbs.)

5. Tighten the lock bolt.

Tightening torque: 23 Nm (17 ft.lbs.)

6. Tighten the adjusting bolt.

Tightening torque: 10 Nm (7 ft.lbs.)

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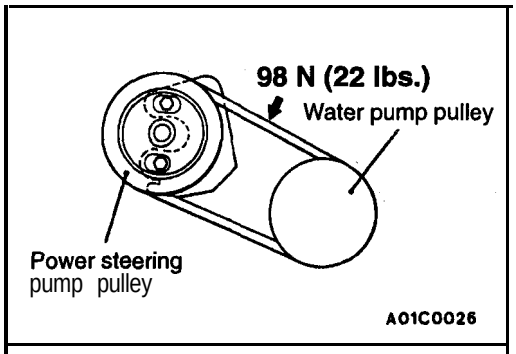
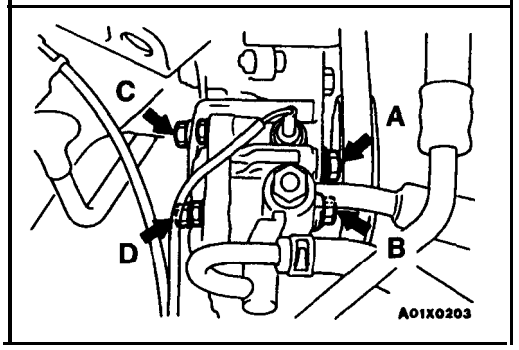




POWER STEERING PUMP DRIVE BELT TENSION CHECK 11100110138

Use the belt tension gauge to check belt tension at the shown point or check deflection by applying 98 **N** (22 **lbs.)** to the shown point.

Standard value:
Tension: 245 – 490 N (55.1 – 110.2 lbs.)
Deflection: 5.5 – 8.0 mm (.22 – .32 in.)

POWER STEERING PUMP DRIVE BELT TENSION ADJUSTMENT

1. Loosen power steering pump fixing bolt **(A, B, C, D).**
2. Move power steering pump, tension belt moderately and adjust tension.

   Standard value:

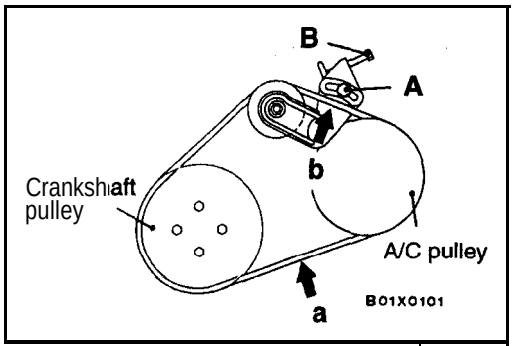
Items	When a new belt is installed	When a used **belt** is **installed**
Tension N (lbs.)	490–686 (110.2–154.3)	343–441 (77.2–99.2)
Deflection mm (in.)	4.5–5.5 (.18–.22)	6.0–7.0 (.24–.28)

3. Tighten fixing bolt (A).

   Tightening torque: 28 Nm (21 ft.lbs.)
4. Tighten the remaining fixing bolts **(B, C** and **D).**

   Tightening torque:
   Bolt B and D 28 Nm (21 ft.lbs.)
   Bolt C 22 Nm (16 ft.lbs.)
5. Check the belt deflection amount and readjust if necessary.

   Caution
   This check should be carried out after turning the crankshaft one full rotation or more in the forward direction (to the right).



A/C COMPRESSOR DRIVE BELT TENSION CHECK 11100100098

Use the belt tension gauge to check belt tension at the shown point (a) or (b), or check deflection by applying 98 **N** (22 lbs.) to the shown point.

Standard value:
Tension: 255 – 333 N (57.3 – 75.0 **lbs.)**
Deflection: 6.5 – 7.5 mm (.26 – .30 in.)

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A/C COMPRESSOR DRIVE BELT TENSION ADJUSTMENT

1. Loosen tension pulley fixing nut A.
2. Adjust belt tension with adjusting bolt B.

Standard value:

Items	When a new belt is installed	When a used belt is installed
Tension N (lbs.)	382-411 (86.0–99.2)	255-333 (57.3–75.0)
Deflection mm (in.)	5.5–6.0 (.22–.24)	8.5-7.5 (.26–.30)

3. Tighten fixing nut A.

Tightening torque: 23-26 Nm (17–20 ft.lbs.)

4. Check the belt deflection amount and readjust if necessary.

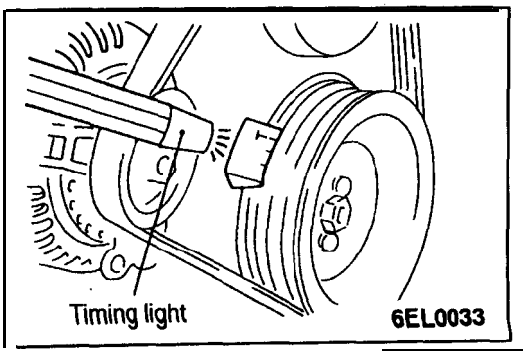
Caution
This check should be carried out after turning the crankshaft one full rotation or more in the forward direction (to the right).

IGNITION TIMING CHECK 11100170198

1. Before inspection and adjustment set vehicle in the following condition.
   - Engine coolant temperature: 80–95°C (176–203°F)
   - Lights, electric cooling fan and all accessories: OFF
   - Transaxle: Neutral (P range on vehicles with A/T)
2. Turn the ignition switch to OFF and connect the scan tool to the data link connector.
3. Set up a timing light.
4. Start the engine and run at idle.
5. Select No. 22 of the SCAN TOOL DATA LIST.
6. Check that engine idle speed is within the standard value.

Standard value: 750 ± 100 r/min

7. Select No. 17 of the SCAN TOOL ACTUATOR TEST.



8. Check that basic ignition timing is within the standard value.

Standard value: 5° BTDC ± 3°

9. If the basic ignition timing is outside the standard value, inspect the MFI components by referring to GROUP 13A – Troubleshooting.

10. Press the scan tool clear key (select a forced driving cancel mode) to release the ACTUATOR TEST

NOTE
If the test is not cancelled, a forced driving will continue for 27 minutes. Driving under this condition may damage the engine.

11. Check that the actual ignition timing is at the standard value.

Standard value: Approx. 10° BTDC

NOTE
1. Ignition timing is variable within about ±7°, even under normal operating.
2. And it is automatically further advanced by about 5° from 10° BTDC at higher altitudes.

CURB IDLE SPEED CHECK 11100190392

1. Before inspection and adjustment, set vehicles in the following condition.
   - Engine coolant temperature: 80–95°C (176–203°F)
   - Lights, electric cooling fan and all accessories: OFF
   - Transaxle: Neutral (P range on vehicles with A/T)
2. Turn the ignition switch to OFF and connect the scan tool to the data link connector.
3. Select No. 17 of the SCAN TOOL ACTUATOR TEST
4. Check the basic ignition timing.

Standard value: 5° BTDC ± 3°

5. Run the engine at idle for 2 minutes.
6. Select No. 22 of the SCAN TOOL DATA LIST.
7. Check the curb idle speed.

Standard value: 750 ± 100 r/min

NOTE
The idle speed is controlled automatically by the idle air control system.

8. If the idle speed is outside the standard value, check the MFI components by referring to GROUP 13A – Troubleshooting.

IDLE MIXTURE CHECK 11100210302

1. Before inspection, set vehicles in the following condition:
   - Engine coolant temperature: 80–95°C (176–203°F)
   - Lights, electric cooling fan and all accessories: OFF
   - Transaxle: Neutral (P range on vehicles with A/T)
2. Turn the ignition switch to OFF and connect the scan tool to the data link connector.
3. Select No. 17 of the SCAN TOOL ACTUATOR TEST.
4. Check that the basic ignition timing is within the standard value.

Standard value: 5°BTDC ± 3°

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