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User manual MITSUBISHI LANCER EVOLUTION IX
User guide MITSUBISHI LANCER EVOLUTION IX
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Workshop Manual - Supplement

LANCER *Evolution - IX*

- Chassis
- Engine
- Wiring Diagrams
- Technical Information



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Manual abstract:

@@Please note that all the units shown in this manual follow the internationally recognized SI unit system, and that the used previously are not shown alongside the SI units. (Nevertheless, please take care because units in reference documents may be shown in the units which were previously used). Any opinions, requests or questions concerning this manual, should be written on the 'Servicing Comments Form' at the end of the manual, and sent to us by fax.

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.... March 2005 MITSUBISHI MOTOR CORPORATION Interior and SRS Airbag.....

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.... This manual is printed on recycled paper Related materials Title New model manuals · Lancer Sedia · Lancer Sedia · Lancer Evolution VII · Lancer Sedia · Lancer Sedia · Lancer Evolution VII · Lancer Sedia · Lancer Evolution VII · Lancer · Lancer · Lancer Evolution VII_MR · Lancer* · Lancer · Lancer Evolution IX Service manuals · Lancer Sedia · Lancer Sedia (supplement) · Lancer Evolution VII (supplement) · Lancer Sedia (supplement) · Lancer Sedia (supplement) · Lancer Evolution VII (supplement) · Lancer Sedia (supplement) · Lancer Evolution VII (supplement) · Lancer Sedia (supplement) · Lancer Sedia (supplement) · Lancer Evolution VII MR · Lancer* · Lancer 1036K00 1036K01 1036K02 2000/5 2000/7 2001/1 1036K30 1036K31 1036K32 1036K33 1036K34 1036K35 1036K36 1036K37 1036K38 1036K39 1036K40 1036K41 1036K42 1036K43 2000/5 2000/7 2001/1 2001/5 2001/5 2002/1 2002/5 2003/1 2003/2 2003/12 2004/2 2004/3 2005/1 2005/3 Engine service manual · 4G6 engine · 4G6 engine (supplement) · 4G6 engine (supplement) 1039G46 1039G63 1039G71 2001/1 2003/1 2003/3 Electrical wiring service manual · Lancer Evolution IX 1036K82 2005/3 No. Issue date Title Body edition service manual · Lancer Sedia · Lancer Sedia (supplement) · Lancer Evolution VII (supplement) · Lancer Sedia (supplement) · Lancer Evolution VII_MR (supplement) 1036K53 1036K54 2001/10 2004/2 1036K50 1036K51 1036K52 2000/5 2000/7 2001/5 No. Issue date 1036K03 1036K04 1036K05 2001/5 2001/10 2002/1 Transmission service manuals · W5M51 manual transmission 1039M17 1039M22 1039M23 2001/1 2003/1 2003/1 1036K06 1036K07 2002/5 2003/1 · W5M51 manual transmission (supplement) · WGMAA manual transmission 1036K08 1036K09 1036K10 1036K41 1036K11 2003/2 2003/12 2004/2 2004/3 2005/1 *Indicates where the new model manual was published with the service manual in a single volume. WARNING REGARDING THE SERVICING OF VEHICLES FITTED WITH SRS AIR BAGS AND SEATBELTS WITH PRETENSIONERS Warning 1. Improper servicing or maintenance of any SRS air bag or pre-tensioner fitted seatbelt component, or related parts, could cause serious injury through the SRS air bag or pre-tensioner fitted seatbelt being activated unintentionally or accidentally. 2.

The SRS-ECU, the driver's side air bag module, the passenger side air bag module, the pre-tensioner fitted seatbelts and the clock spring, should be removed if there is a chance of them being affected by heat during painting work. · 93°C and above: the SRS-ECU, the driver's air bag module, the passenger's air bag module and the clock spring should be removed. · 90°C and above: the pre-tensioner fitted seatbelts should be removed. 3. Servicing and maintenance of any SRS air bag or pre-tensioner fitted seatbelt components, or related parts, must be performed by an authorized Mitsubishi dealer.

4. Servicing and maintenance of any SRS air bag or pre-tensioner fitted seatbelt components, or related parts, must only be undertaken after this service manual (specifically Section 52B-SRS air bags) has been carefully studied. GENERAL TROUBLESHOOTING FOR INSPECTIONS, MODEL LINE-UP, RELEVANT VEHICLE NUMBERS 00-1 SECTION 00 GENERAL CONTENTS Inspection guidelines and troubleshooting...

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1 Inspection guidelines and troubleshooting With the introduction of new settings for the MB992006 (Extra Fine Probe) special tool, the guidelines for inspecting the connector have been changed. Other servicing guidelines remain unchanged. Relevant vehicle numbers ...

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.1 Making an inspection with the connector attached (so the electrical circuit is complete) <non-waterproof connector> The test bar should be inserted from the harness side. If the control unit or the connector is too small, and the test bar cannot be inserted, do not attempt to force it in. Instead, use the MB992006 (Extra Fine Probe) special tool. Model line-up Note Indicates a new model, indicates a special model, X indicates a discontinued model.

Relevant vehicle numbers GH-CT9A: CT9A-0400001 ~ ENGINE GENERAL, SERVICING STANDARDS, SEALANTS 11-1 SECTION 11 ENGINE

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.28 General The following servicing guidelines have been prepared for vehicles which use the 4G63-MIVEC-T/C engine. Other servicing guidelines remain unchanged. Servicing standards Sealants Note The code inside the brackets () is the actual product number. 11-2 Special tools Tool ENGINE SPECIAL TOOLS Number MB991502 Name MUT-II Sub ASSY Function Checking and adjusting the tension in timing belt B MB991955 A: MB991824 B: MB991827 C: MB991910 D: MB991911 E: MB991825 F: MB991826 DO NOT USE Note If a MUT-III main harness A is connected to a vehicle not fitted with CAN, there is a chance that a pulse signal will be entered in the simulated vehicle speed line, when the MUT-III is MUT-III Sub ASSY activated.

Therefore, use a MUT-III main harness B with vehicles not fitted with A: Vehicle Communication CAN. Interface (VCI) B: USB cable C: MUT-III Main harness A (For vehicles fitted with CAN) D: MUT-III Main harness B (For vehicles not fitted with CAN) E: Adaptor F: Trigger harness MB991668 A: MB991969 B: MB991670 Belt tension meter · Checking the tension in the drive belt. set (Use in conjunction with VCI) A: Tension meter · Checking the tension in the balancer cartridge timing belt. B: Mic ASSY Adjusting (Use in conjunction with VCI) Valve spring compressor Compression of the valve spring. MD998772 ENGINE SPECIAL TOOLS Tool Number MD998737 11-3 Name Valve stem seal installer Function Valve stem seal installation MD998713 Camshaft oil seal installer Camshaft oil seal installation MB991654 Cylinder head bolt wrench Cylinder head bolt removal, installation MB991367 Special spanner Holding the crankshaft sprocket MB991385 Pins MB991704 Battery harness Checking and adjustment of the tension in the balancer timing belt (Use in conjunction with VCI or MUT-II) MD998738 Adjusting bolt Holding the tensioner arm or the auto-tensioner adjuster MD998767 Tensioner pulley socket wrench Adjusting the tension of the timing belt 11-4 Tool ENGINE SPECIAL TOOLS, ENGINE TUNING, CAMSHAFT, VALVE STEM SEAL Number MB991454 Name Engine hanger balancer Function Holding the engine assembly while the transmission assembly is removed/installed Recommended tools MZ203830 panzai or MZ203831 safe vehicle handling Mechanical engine hanger Slide bracket (HI) MB991928 A: MB991929 B: MB991930 C: MB991931 D: MB991932 E: MB991933 F: MB991934 Engine hanger A: joint (50) x2 B: joint (90) x2 C: joint (140) x2 D: Foot (standard) x4 E: Foot (short) x4 F: Chain and hook ASSY Engine tuning 1.



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Checking revolutions when the engine is idling The standard revolutions for when the engine is idling have been changed. Other servicing guidelines remain unchanged. Standard revolutions: 800 ± 50 r/min 2. Checking compression pressure The standard for compression pressure and the limit for compression pressure have been changed. Other servicing guidelines remain unchanged.

Standard compression pressure: 1000 kPa 250 r/min Compression pressure limit: 650 kPa 250r/min Camshaft, valve stem seal Removal and fitting Caution 1. If Brembo brake callipers are being used take care that they are not scratched by other components or tools because there is a chance that the paint might peel off. In addition, if any brake fluid gets on the callipers, it should be wiped off immediately. 2. Parts marked with * should be removed and then fitted for each cylinder in turn. Jobs to be completed before removal and after fitting · Removal and refitting of the undercover (Ref Section 51: Front bumper) · Checking the tension of the drive belt (only after fitting) · Draining and refilling of the coolant · Removal and refitting of the air duct · Removal and refitting of air pipe C · Removal and refitting of the timing belt (refer to P11-20) ENGINE CAMSHAFT, VALVE STEM SEAL 11-5 O O Removal procedure 1. Oil feeder control valve connector 2. Oil feeder control valve 3. O-ring 4. Breather hose · Secondary air control valve (refer to Section 15-2: Secondary Air Control System) 5.

Centre cover · Ignition coil 6. O2 sensor connector 7. Crank angle sensor connector A N M 8. Connection of the control harness 9. Vacuum hose 10. PCV hose 11. Connection of the radiator upper hose 12. Camshaft position sensor connector (exhaust side) 13. Camshaft position sensor connector (inlet side) 14. Connection of the earth cable 15.

Rocker cover ASSY 16. Spark plug hole gasket 17. Rocker cover gasket 11-6 ENGINE CAMSHAFT, VALVE STEM SEAL During assembly, apply engine oil to all sliding parts. L J K J I G F F B 18. Camshaft position sensor support cover 19. Camshaft position sensor support cover gasket 20. Camshaft position sensing cylinder (exhaust side) 21. Camshaft position sensor support 22. Camshaft position sensor support cover 23. Camshaft position sensor support cover gasket 24.

Camshaft position sensing cylinder (inlet side) 25. Camshaft position sensor support 26. Camshaft sprocket (exhaust side) 27. Camshaft oil seal 28. Camshaft bearing cap front 29. Camshaft bearing cap rear left F F F F E B H G F F F F F F E 30. Camshaft bearing cap No. 2 31. Camshaft bearing cap No. 5 32. Camshaft bearing cap No. 3 33. Camshaft bearing cap No. 4 34. Exhaust camshaft 35.

Camshaft sprocket cap 36. Washer 37. Camshaft sprocket (inlet side) 38. Camshaft oil seal 39. Camshaft bearing cap front 40.

Camshaft bearing cap rear right 41. Cam the front bearing cap, and on bearing cap Nos. 2~5). I: inlet side E: exhaust side Front of engine 3. Apply sealant at the 8 places shown in the diagram of the top view of the cylinder head. Semi-dry sealant: Three bond 1207D <Inlet side> front mark Front of engine 4. Fit the rear camshaft bearing cap in the direction indicated by the front mark. 5. In just the same way as for bearing caps Nos. 2~5, check the identification marks on the front camshaft bearing cap so that the exhaust side and the inlet side are not mistaken.

6. Tighten the bearing cap mounting bolts gradually, 2~3 turns at a time, to the specified torque. Tightening torque: 20 ± 1 N·m 7. Check that the rocker arm has been fitted correctly. Note Completely wipe away any sealant that has been squeezed out. <Exhaust side> front mark Front of engine camshaft oil seal G Fitting the camshaft oil seal 1. Apply engine oil around the entire circumference of the oil seal lip. 2. Insert the oil seal using the special tool for installing the camshaft oil seal (MD998713), as shown in the diagram. (engine oil) 11-12 ENGINE CAMSHAFT, VALVE STEM SEAL H Fitting the camshaft sprocket (inlet side) I.

Apply engine oil to the edges of the camshaft, and to the parts of the camshaft sprocket which will make contact with the camshaft. 2. Match up the camshaft dowel pins with the dowel pin holes in the camshaft sprocket, and fit the camshaft into the camshaft sprocket. 3. Hold the hexagonal part of the camshaft with a wrench, and check that the camshaft sprocket cannot be twisted.

Note This operation is necessary because it is impossible to check by looking whether the camshaft dowel pins are inserted into the dowel pin holes in the camshaft sprocket. 4. Apply engine oil to the screw thread and the underside of the camshaft sprocket mounting bolt, and in the same way as when the camshaft sprocket was removed, hold the camshaft in place using a wrench and tighten the bolt to the specified torque. Tightening torque: 65 ± 5 N·m Front of engine (engine oil) camshaft sprocket Front of engine (engine oil) camshaft sprocket I Fitting the camshaft sprocket (exhaust side) In the same way as when the camshaft sprocket was removed, hold the hexagonal part of the camshaft with a wrench and tighten the bolt to the specified torque. Tightening torque: 89 ± 9 N·m <Exhaust side> J Fitting the camshaft position sensor support I.

Remove any sealant from the camshaft position sensor support. 2. As shown in the diagram, apply sealant to the flange of the camshaft position sensor support, and then fit it to the cylinder head. Semi-dry sealant: Three bond 1207F 3. Tighten the mounting bolts for the camshaft position sensor support to the specified torque. Tightening torque: 14 ± 1 N·m <Inlet side> ENGINE CAMSHAFT, VALVE STEM SEAL <Intake side> dowel pin 11-13 K Fitting the camshaft position sensing cylinder (inlet side) I. Set the inlet camshaft dowel pin in the position shown in the diagram (No.1 cylinder compression top dead centre). 2. Tighten the mounting bolts for the camshaft position sensing cylinder to the specified torque.

Tightening torque: 22 ± 4 N·m pane approx. 45° pane (small) dowel pin pane (large) L Fitting the camshaft position sensing cylinder (exhaust side) I. Set the exhaust camshaft dowel pin in the position shown in the diagram (No.1 cylinder compression top dead centre). Note Under pressure from the exhaust valve spring, it will turn slightly in an anti-clockwise direction. 2. As shown in the diagram, fit the pane (small) of the camshaft position sensing cylinder (exhaust side) so that it is in a position approximately 45° to the exhaust camshaft dowel pin. 3. Tighten the mounting bolts for the camshaft position sensing cylinder to the specified torque. Tightening torque: 22 ± 4 N·m Front of engine M Fitting the locker cover assembly I.

Apply sealant to the 8 places on the rocker cover gasket as shown in the diagram.



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Semi-dry sealant: Three bond 1207D 2. Fit the rocker cover assembly onto the cylinder head. Protrusion N Connecting the radiator upper hose 1. Insert the radiator upper hose as far as the protrusion on the water outlet fitting.

2. Match up the indicator marks on the radiator upper hose and the hose clamp, in order to fit the radiator upper hose. water outlet fitting indicator marks 11-14 ENGINE CAMSHAFT, VALVE STEM SEAL, CYLINDER HEAD GASKET O Fitting the O-ring/oil feeder control valve Caution 1. Do not re-use O-rings. 2.

When fitting O-rings, first wind some non-adhesive tape (seal tape etc) around the oil channel of the oil feeder control valve, in order to prevent damage to the O-ring. If the O-ring touches the oil it could start an oil leak. 1. Apply engine oil to the O-ring on the oil feeder control valve. 2. Fit the oil feeder control valve to the cylinder head. 3. Tighten the mounting bolts for the oil feeder control valve to the specified torque. Tightening torque: 11 ± 1 N-m Tape Cylinder head gasket Removal and fitting Jobs to be completed before removal and after fitting · Measures to prevent fuel leaking. <Only before removal> · Check for fuel dripping.

<Only after fitting> · Removal and refitting of the strut tower bar. · Removal and refitting of the valence. (Ref Section 51: Front bumper) · Check the tension of the drive belt. <Only after fitting> · Adjustment of the axle letter cable. <Only after fitting> · Draining and replacing the engine oil. · Draining and replacing the coolant. · Removal and refitting of the air cleaner. · Removal and refitting of air pipe C. · Removal and refitting of the battery and the battery tray. · Removal and refitting of the centre cover.

(Ref P11-5) · Removal and refitting of the axle letter cable. · Removal and refitting of the radiator. · Removal and refitting of the front exhaust pipe. · Removal and refitting of the timing belt. (Ref P11-20) ENGINE CYLINDER HEAD GASKET 11-15 (engine oil) Removal procedure 1.

Ignition coil connector 2. O2 sensor connector 3. Oil feeder control valve connector 4. Crank angle sensor connector 5. Manifold absolute pressure sensor connector 6.

Fuel pressure solenoid valve connector 7. Knock sensor connector 8. Purge control solenoid valve connector 9. Throttle position sensor connector 10. Injector connector 11. Exhaust camshaft position sensor connector 12. Inlet camshaft position sensor connector 13. Water temperature gauge unit connector 14. Joint control harness and transmission harness 15. Water temperature sensor connector 16.

Secondary air control solenoid valve connector 17. Vacuum tank, solenoid valve, vacuum pipe and hose assembly 18. Brake booster vacuum hose connection 19. Oil level gauge and guide assembly 20. O-ring 21. Purge hose connection 11-16 ENGINE CYLINDER HEAD GASKET (engine oil) (when cool) (engine oil) E 22. 23. 24. 25. 26.

27. 28. 29. 30. 31.

32. 33. 34. Alternator bracket connection Inlet manifold stay Eye bolt Gasket Eye bolt Gasket Oil feeder control valve pipe Filter Oil pipe joint Gasket Oil return pipe gasket Oil return pipe Oil return pipe gasket D A C C B A 35. Oil return pipe gasket 36.

Exhaust fitting bracket · Water outlet fitting and thermostat case assembly (Refer to Section 14: Water hose pipe) 37. Water hose connection 38. Heater hose connection 39. Fuel return hose connection 40. Fuel high pressure hose connection 41. O-ring 42. Cylinder head bolt 43. Cylinder head assembly 44.

Cylinder head gasket ENGINE CYLINDER HEAD GASKET 11-17 Removal guidelines A Removing the cylinder head bolts Use the special wrench for cylinder head bolts (MB991654) to turn the bolts 2~3 times in order to loosen them, before removing them in the numerical order as shown in the diagram.

Front of engine Fitting guidelines A Fitting the cylinder head gasket 1.

Remove the gaskets which have been stuck onto the surface of the gasket. Caution Do not allow any foreign matter to get into the channels for coolant or oil, or into the cylinder. 2. Fit the cylinder head gasket to the cylinder head, so that the holes in the cylinder head gasket match up with the holes in the cylinder head. (engine oil) B Fitting the cylinder head bolts 1. Check that the length of the body of cylinder head bolts is less than the maximum permitted. If the length is in excess of the maximum permitted, replace the bolt with a brand new one. Maximum length (A): 99.4mm 2. Apply a small amount of engine oil to the screw thread of the bolt, and to the washer.

11-18 ENGINE CYLINDER HEAD GASKET 3. Use the special wrench for cylinder head bolts (MB991654) to (loosely) tighten the bolts in the following order. (1) In the order shown in the diagram, tighten the bolts to 78 ± 2 N-m. (2) In reverse order to that shown in the diagram, completely loosen the bolts.

(3) In the order shown in the diagram, tighten the bolts to 20 ± 2 N-m.

Front of engine Procedure number (4) Procedure number (5) paint mark paint mark (4) Make a paint mark on the top of the cylinder head bolt, and on the cylinder head, and tighten them to 90° as shown in the diagram. (5) Tighten the bolts to 90° as shown in the diagram, and check that the paint mark on the top of the cylinder head bolt and the paint mark on the cylinder head are in line. Caution 1) If a bolt is tightened to an angle of less than 90° it has not been tightened sufficiently. 2) If the angle of tightening exceeds the regulation level, remove the bolt and start again from procedure number (1). C Fitting the O-ring/fuel high pressure hose 1.

Apply a little fresh engine oil to the O-ring. Caution Ensure that engine oil does not get inside the delivery pipe. 2. Without damaging the O-ring, twist the fuel high pressure hose to fit it to the delivery pipe, making sure that it is twisted smoothly. 3. If the hose cannot be twisted smoothly, there is a possibility that it may be biting into the O-ring, so remove the fuel high pressure hose, and check for any damage to the O-ring. If the O-ring is undamaged, reinsert it into the delivery pipe and check once more whether the hose can be turned smoothly. 4. Tighten the mounting bolts for the fuel high pressure hose to the specified torque. Tightening torque: 5.

0 ± 1.0 N-m. ENGINE CYLINDER HEAD GASKET 11-19 D Fitting the oil return pipe gasket Replace the gasket with a new one, and fit it to the protruded part shown in the diagram. Note: For the oil return pipe gasket on the turbocharger side, there is no direction for slotting it in. Protrusion E Fitting the eyebolts Caution When tightening the eyebolts, hold the oil pipe joint in place with a spanner so that it does not turn round as the eyebolts are tightened.

11-20 ENGINE TIMING BELT, TIMING BELT B TIMING BELT, TIMING BELT B Removal and fitting Caution If Brembo brake callipers are being used take care that they are not scratched by other components or tools because there is a chance that the paint might peel off.



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In addition, if any brake fluid gets on the callipers, it should be wiped off immediately. Jobs to be completed before removal and after fitting · Removal and refitting of the valence. (Ref Section 51: Front bumper) · Removal and refitting of the LH side cover. · Checking and adjustment of the tension of the drive belt. <Only after fitting> · Removal and refitting of the crankshaft pulley. · Removal and refitting of the cross member bar. · Removal and refitting of the front exhaust pipe. Removal procedure 1. Pressure hose connection 2.

Timing belt front upper cover 3. Water pump pulley 4. Idler pulley 5. Drive belt auto-tensioner 6. Timing belt front lower cover G A F E D · Remove the engine mount bracket Adjust the tension of the timing belt <Only after fitting> 7.

Timing belt 8. Tensioner pulley 9. Tensioner arm 10. Auto-tensioner ENGINE TIMING BELT, TIMING BELT B 11-21 (engine oil) B 10. 11. 12. 13. 14. 15. Power steering oil pressure switch connector Heat protector Power steering oil pump ASSY Power steering oil pump bracket Idler pulley Crank angle sensor C C C B A A D 16.

Crankshaft sprocket 17. Crankshaft sensing blade · Adjust the tension of the timing belt B <Only after fitting> 18. Timing belt B tensioner 19. Timing belt B Timing marks Removal guidelines A Removing the timing belt 1. Turn the crankshaft in a clockwise direction, and match up all the timing marks until the No.1 cylinder is in the compressor top dead centre position. Caution Turn the crankshaft in the normal way. 2. Remove the rubber plug from the rear cover of the timing belt, and prepare the special tool for adjusting bolts (MD998738). Timing belt valence 11-22 timing belt tensioner arm ENGINE TIMING BELT, TIMING BELT B 3.

Twist the special tool for adjusting bolts (MD998738) by hand until it touches the tensioner arm. Caution The special tool for adjusting bolts (MD998738) can be slowly twisted at a rate of about 30° per second but if it is suddenly twisted the auto-tensioner rod cannot be easily withdrawn, and this may lead to problems with twisting and the possibility that the special tool for adjusting bolts (MD998738) may become bent. 4. Twist the special tool for adjusting bolts (MD998738) a little, and align the auto-tensioner rod with setting hole A, and the tensioner cylinder with setting hole B. bolt for fitting the timing belt tensioner 5.

Insert a wire or a pin into the aligned holes. 6. Remove the special tool for adjusting bolts (MD998738), and then loosen the bolt for fitting the timing belt tensioner, and remove the timing belt. Caution If a timing belt is being re-used, check and make a note of the direction of the arrows indicating the rotational direction (clockwise direction) on the back of the belt. wire or pin B Removing the power steering oil pump ASSY Remove the power steering oil pump ASSY from its bracket, with the hose intact.

Note Secure the removed power steering oil pump ASSY with string, and put it somewhere where it will not hinder the removal or fitting of the timing belt. C Removing the crankshaft sprocket 1. Hold the crankshaft sprocket in place using the special spanner (MB991367) and the special pin (MB991385). 2. Remove the crankshaft sprocket. Crankshaft sprocket ENGINE TIMING BELT, TIMING BELT B D Removing timing belt B 11-23 Caution If planning to re-use a timing belt B, ensure that it will be refitted the same way round, by marking the back of the belt with chalk arrows indicating the direction of movement. timing marks side of belt under tension timing marks balancer shaft sprocket Fitting guidelines A Fitting timing belt B and the timing belt B tensioner 1. Check that the timing marks for the crankshaft sprocket and the balancer shaft sprocket are aligned. 2. Fit timing belt B onto the crankshaft sprocket and the balancer shaft sprocket.

Ensure that the side of the belt under tension is not slack. crankshaft sprocket centre of the pulley 3. As a temporary step, fit the timing belt B tensioner pulley so that its centre is to the upper left of the centre of the mounting bolt, and so that the flange of the pulley is facing towards the front of the engine. 4. Adjust the tension of timing belt B. centre of the mounting bolt B Adjusting the tension of timing belt B 1. Hold the timing belt B tensioner between fingertips and in the direction of the arrows, apply tension torque (3.0 ± 0.4 N·m) to timing belt B until the side of the belt under tension becomes taught. In this condition, tighten the mounting bolt to the specified torque, and fit the tensioner.

Tightening torque: 19 ± 3 N·m Caution When tightening the mounting bolt, ensure that the tensioner does not turn round with it. If the tensioner turns with the mounting bolt, it could cause the tension in the belt to become too high. 11-24 ENGINE TIMING BELT, TIMING BELT B 2. <Measuring the amount of give> (1) As shown in the diagram, apply a force of about 100N to the middle of the belt between the sprockets (indicated by the arrow), and check that the amount of give is as specified. Specified values: <when adjusted> 5~7mm <when replaced> 5~7mm (2) If the specified values are not met, readjust the tension of the belt.

approx. 100 N amount of give 3. <When using MUT-II/III> (1) Connect the special belt tension meter set (MB991668) to the MUT-II/III. (2) Connect the special battery harness (MB991704) to the MUTII/III, and also connect it to the batteries. (3) Give the crankshaft two turns in a clockwise direction, and check that the No.

1 cylinder is in the top dead centre position, and that the timing marks on each sprocket are aligned. (4) Select the "belt tension measurement" option from the display on the MUT-II/III. pull lightly with fingertips (5) As shown in the diagram hold the special belt tension meter set (MB991668) in the middle of the belt between the sprockets (indicated by the arrow), 10~20mm away from the outer side of the belt and vertically to the belt (not leaning more than ±15° away from vertical). (6) As shown in the diagram, lightly pull the middle of the belt between the sprockets (indicated by the arrow) using fingertips and check that the vibration frequency of the belt is within the limits specified. Specified values: 76 ~ 92 Hz Caution (1) The meter may give an incorrect reading if the microphone is affected by a strong wind, or if there are loud noises nearby, while testing is taking place. (2) The meter may give an incorrect reading if testing is performed while the microphone is touching the belt. (7) If the specified values are not met, readjust the tension of the belt. ENGINE TIMING BELT, TIMING BELT B C Front of engine 11-25 1. crankshaft crankshaft sprocket washer clean here 2. 3.

4. 5. 6. Fitting the crankshaft sensing blade and the crankshaft sprocket Clean, and remove any grease from the crankshaft sensing blade, the crankshaft sprocket, and the surface of the crankshaft to which the crankshaft sprocket will be fitted.



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Fit the crankshaft sensing blade and the crankshaft sprocket in the direction shown in the diagram. Clean the screw hole in the crankshaft. Place the washer with the larger surface side in the direction as shown in the diagram, and fit it to the crankshaft bolt. Apply a small quantity of engine oil to the top and to the screw thread parts of the crankshaft bolt. In the same way as when it was removed, hold the crankshaft sprocket using the special tool, and tighten the crankshaft bolt to the specified torque. Tightening torque: 167 N·m remove grease crankshaft bolt crankshaft sensing blade D Fitting the auto-tensioner 1. If the auto-tensioner rod remains in an extended state, install it using the following procedure. (1) Using a press or a vice, slowly compress the autotensioner rod and align the rod with setting hole A and the tensioner cylinder with setting hole B. Caution If the speed of compression is too fast, there is a chance that the rod may break, so carry out this operation slowly. (2) wire or pin Insert a wire or pin into the aligned holes. Note If a brand new or a replacement auto-tensioner is being used, use a pin to set the auto-tensioner in place.

2. Fit the auto-tensioner into the engine and tighten the mounting bolt to the specified torque. Do not remove the wire or pin until the tension of the timing belt has been adjusted. Tightening torque: 23 ± 3 N·m E Fitting the tensioner pulley As a temporary step, fit the tensioner pulley as shown in the diagram. tensioner pulley holes 11-26 timing marks ENGINE TIMING BELT, TIMING BELT B F Fitting the timing belt 1.

Check that all the timing marks for the camshaft sprocket, the crankshaft sprocket and the oil pump sprocket are aligned. camshaft sprocket (inlet side) camshaft sprocket (exhaust side) timing marks timing marks crankshaft sprocket oil pump sprocket plug more than 60 mm screwdriver balancer shaft 2. After the timing marks for the oil pump sprocket have been aligned, remove the plug from the cylinder block and insert a posidrive (+) with a diameter of 8 mm into the plug hole. Check that more than 60 mm of the shaft of the screwdriver can be inserted. If the screwdriver strikes the balancer shaft and can only be inserted to a depth of 20 ~ 25 mm, turn the sprocket one complete turn, realign the timing marks, and check that more than 60 mm of the screwdriver can be inserted. Do not remove the screwdriver until the timing belt has been fitted. camshaft sprocket (inlet side) camshaft sprocket (exhaust side) 3. Install the timing belt in accordance with the following guidelines so that the side that is under tension does not get slack. (1) Fit the timing belt around the crankshaft sprocket first, then the oil pump sprocket and then fit it around the idler pulley. tensioner pulley idler pulley oil pump sprocket crankshaft sprocket paper clip (2) Fit the timing belt around the camshaft sprocket (exhaust side) and hold it in place with a paper clip at the position shown in the diagram.

ENGINE TIMING BELT, TIMING BELT B paper clips 11-27 (3) Use a wrench to align the timing marks on the rocker cover and the camshaft sprocket, and whilst doing so, fit the timing belt around the camshaft sprocket (inlet side) and hold it in place with a paper clip at the position shown in the diagram. (4) Fit the timing belt around the tensioner pulley. (5) Remove the two paper clips. Caution After the timing belt has been installed, apply some force in an anti-clockwise direction to the camshaft sprocket and check once more that all the timing marks are in the correct position when the side of the belt under tension is taught. 4. Using the special wrench for the tensioner pulley socket (MD998767), tense the timing belt by turning the tensioner pulley in the direction shown in the diagram, and temporarily tighten the mounting bolt for the tensioner pulley. 5. Check that all the timing marks are aligned. 6. Remove the screwdriver, and replace the plug.

7. Adjust the tension of the timing belt. G Adjusting the tension of the timing belt 1. Remove the rubber plug from the rear cover of the timing belt and put the special adjusting bolt (MD998738) in position. Slowly twist the adjusting bolt a little at a time, so that the wire or pin inserted when fitting the auto-tensioner, only moves a little.

Caution There is a possibility that the wire or pin inserted in the auto-tensioner may break if the adjusting bolt is twisted with a spanner or a similar tool, so it must be twisted by hand. 2. Turn the crankshaft a quarter turn in an anti-clockwise direction. 3. Turn the crankshaft in a clockwise direction, realign all the timing marks and set the No.

1 cylinder in the top dead centre position. 4. Loosen the mounting bolt for the tensioner pulley which had been temporarily tightened. 11-28 ENGINE TIMING BELT, TIMING BELT B, ENGINE ASSY 5. Using the special wrench for the tensioner pulley socket (MD998767) or a torque wrench, apply tension torque (3.5 N·m) to the timing belt in the direction shown in the diagram, and tighten the mounting bolt for the tensioner pulley to the specified torque. Tightening torque: 48 ± 5 N·m Caution When tightening the installed bolt, take care that the tensioner pulley does not turn around with it. If the pulley does turn around with the bolt, the tension of the belt will become too strong. 6. Remove the wire or pin which had been inserted when the autotensioner was fitted.

7. Remove by hand the special adjusting bolt (MD998738) which had been fitted in step 1. 8. Turn the crankshaft two complete turns in a clockwise direction, and leave it for about 15 minutes. 9. Reinsert the wire or pin which had been removed in step 6, and check that it can be easily pulled out again. If the wire or pin can be easily pulled out the tension of the timing belt is just right, so the wire or pin should be removed completely. At this point check that the auto-tensioner rod is not projecting more than the amount specified. Specified projection (A): 3.8 ~ 4.

5 mm 10. If the wire or pin cannot be easily pulled out, repeat steps 1 to 8 until the tension of the timing belt is just right. 11. Recheck that the timing marks on all of the sprockets are in line. Caution If the crankshaft bolt is turned in an anti-clockwise direction, the tightening torque of the crankshaft bolt must be checked, and if it is loose, it must be retightened.

ENGINE ASSY Removal and fitting Jobs to be completed before removal and after fitting · Measures to prevent fuel leaking. <Only before removal> · Check for fuel dripping. <Only after fitting> · Removal and refitting of the bonnet. · Removal and refitting of the strut tower bar. · Removal and refitting of the valence.

(Ref Section 51: Front bumper) · Checking the tension of the drive belt. <Only after fitting> · Adjustment of the axle letter cable.



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<Only after fitting> · Draining and replacing the engine oil. · Draining and replacing the coolant. · Removal and refitting of the air cleaner. · Removal and refitting of air pipe C. · Removal and refitting of the battery and the battery tray. · Removal and refitting of the centre cover. (Ref P11-5) · Removal and refitting of the axle letter cable. · Removal and refitting of the radiator.

· Removal and refitting of the front exhaust pipe. ENGINE ENGINE ASSY 11-29 Removal procedure 1. Ignition coil connector 2. O2 sensor connector 3. Oil feeder control valve connector 4. Crank angle sensor connector 5. Manifold absolute pressure sensor connector 6. Fuel pressure solenoid valve connector 7. Knock sensor connector 8. Purge control solenoid valve connector 9.

Throttle position connector 10. Injector connector A 11. Exhaust cam position sensor connector 12. Inlet cam position sensor connector 13. Water temperature gauge unit connector 14.

Joint control harness and transmission harness 15. Water temperature sensor connector 16. Alternator connector and terminal 17. Secondary air control solenoid valve connector 18. Engine oil pressure switch connector 19.

Drive belt 11-30 ENGINE ENGINE ASSY Caution Parts marked * should be temporarily tightened, and then tightened properly when the full weight of the engine is being supported by the chassis. (engine oil) B B 20. Vacuum tank, solenoid valve, vacuum pipe and hose ASSY 21. Brake booster vacuum hose connection 22. Purge hose connection 23. Power steering oil pressure switch connector 24. Heat protector 25. Power steering oil pump 26. A/C compressor connector <For cars fitted with A/C> 27. A/C compressor <For cars fitted with A/C> C D E D D C B A 28.

Heater hose connection 29. Fuel return hose connection 30. Fuel high pressure hose connection 31. O-ring · Transfer ASSY, transmission ASSY 32. Engine mount bracket & stopper ASSY 33. Engine ASSY ENGINE ENGINE ASSY Removal guidelines 11-31 A Removing the drive belt The following operations are necessary because the engine uses a serpentine drive system with auto-tensioner. 1. Insert a 12.7sq spinner handle into the auto-tensioner tool hole, and turn the auto-tensioner in an anti-clockwise direction before it reaches the stopper. 2.

Align hole A and hole B, insert an L-shaped hexagonal Allen Key, to hold the position, and remove the drive belt. B hole A hole Caution If planning to re-use the drive belt, ensure that it will be refitted the same way round, by marking the back of the belt with chalk arrows indicating the direction of movement. L-shaped hexagonal Allen wrench B Removing the power steering oil pump and the A/C compressor 1. Remove the power steering oil pump and the A/C compressor from the bracket with the hoses intact. 2.

Secure the removed power steering oil pump and the removed A/C compressor with string, and put them somewhere where they will not hinder the removal or fitting of the engine ASSY. C Removing the transfer ASSY and the transmission ASSY 1. In order to prepare the special mechanical engine hanger (MZ203830, MZ203831 or MB991928), the radiator support upper insulator mounting bolts should be tightened on the chassis (2 places). 2. Remove the transfer ASSY and the transmission ASSY.

11-32 ENGINE ENGINE ASSY MZ203830 or MZ203831 D Removing the engine mount bracket & stopper ASSY 1. Support the engine using a garage jack. 2. Remove the special mechanical engine hanger (MZ203830, MZ203831 or MB991928). slide bracket (HI) 3. Hold the engine ASSY using a chain block. 4. Support the engine oil pan component with the garage jack through the engine block, so that the weight of the engine is not taken by the engine mount bracket. 5. Loosen the nuts and bolts and remove the engine mount bracket and stopper ASSY.

E Removing the engine ASSY After checking that all of the cables, hoses and harness connectors etc have been disconnected, slowly hoist the engine using a chain block and remove the engine from the engine compartment. Fitting guidelines A Fitting the engine ASSY Install the engine whilst checking that cables, hoses and harness connectors etc will not be squashed beneath it. ENGINE ENGINE ASSY engine side engine side 11-33 engine mount stopper <viewed from rear of chassis> <viewed from front of chassis> B Fitting the engine mount bracket & stopper ASSY 1. Support the engine oil pan component with the garage jack through the engine block, and fit the engine mount bracket & stopper ASSY whilst checking the position of the engine. Fix the engine mount stopper so that the arrow points in the direction shown in the diagram. 2. Support the engine ASSY with a garage jack. 3. Remove the chain block. 4.

In the same way as when it was removed, hold the engine ASSY with the special tool. MZ203830 or MZ203831 (1) <When using the special mechanical engine hanger (MZ203830 or MZ203831)> Install the special mechanical engine hanger (MZ203830 or MZ203831). slide bracket (HI) front of chassis (2) <When using the special engine hanger (MB991928)> Fit the following parts to the base hanger. · Slide bracket (HI) · Foot (standard) (MB991932) · Joint (90) (MB991930) Install the special engine hanger (MB991928) joint (90) (MB991930) foot (standard) (MB991932) slide bracket (HI) C Fitting the transfer ASSY and the transmission ASSY 1. Fit the transfer ASSY and the transmission ASSY.

2. Remove the radiator support upper insulator mounting bolts from the chassis (2 places). 11-34 ENGINE ENGINE ASSY D Fitting the O-ring and the fuel high pressure hose 1. Apply a little fresh engine oil to the O-ring. Caution Ensure that no engine oil gets inside the delivery pipe.

2. Without damaging the O-ring, fit the fuel high pressure hose to the delivery pipe by twisting it from left to right. Ensure that the hose is twisted smoothly. 3. If the hose cannot be twisted smoothly, there is a possibility that it may be biting into the O-ring, so remove the fuel high pressure hose, and check for any damage to the O-ring. If the O-ring is undamaged, reinsert it into the delivery pipe and check once more whether the hose can be turned smoothly. 4. Tighten the mounting bolts for the fuel high pressure hose, to the specified torque. Tightening torque: 5.0 ± 1 .

0 N.m. MPI GENERAL 13A-1 SECTION 13A MPI (Multi-point Fuel Injection) CONTENTS General.....

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.....29 1. *Adjusting specified revolutions when idling.*

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..30 *GENERAL Servicing guidelines have been changed because of the changes listed below. · A variable valve timing control system (V.V.T.) has been adopted. Because of this, an oil feeder control valve and an intake cam position sensor have been added.*



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1036K07) MPI TROUBLESHOOTING Continued from previous page OK Check the spark plug wire (Ref: Section 16: Ignition apparatus) OK Check the spark plug (Ref: Section 16: Ignition apparatus) OK NG Check connectors B-123 & B-119 OK NG Check the ignition coil (Ref: Section 16: Ignition Apparatus) OK NG Inspect the harness and the connectors between each cylinder's ignition coil and the body earth, and between the engine ECU and the ignition coil. Check for cut or short circuited wires, or other damage. OK NG MUT-II/III Actuator test · No.12: Waste gate solenoid valve (Ref: P13A-87)*2 OK Check the supercharge pressure of the turbo charger (Ref: Section 15: Intake/Exhaust car servicing) OK NG Check the supercharge pressure control system (Ref: Section 15: Intake/Exhaust car servicing) OK NG MUT-II/III Actuator test · No.09: Fuel pressure control solenoid valve (Ref: P13A-87) OK NG Check the fuel pressure (Ref: P13D-109) OK NG Check the compression pressure (Ref: Section 11: Engine tuning) OK NG Measurements taken at B-108 air temperature sensor connector · Using the test harness (MB991658), connect it to only connectors No.1 and No.2 and measure at the pickup harness component · Ignition switch: ON · Voltage across earth at 1 OK: surrounding temperature -20°C 3.8~4.4V surrounding temperature 0°C 3.2~3.8V surrounding temperature 20°C 2.3~2.9V surrounding temperature 40°C 1.5~2.1V surrounding temperature 60°C 0.8~1.4V surrounding temperature 80°C 0.4~1.

0V OK If the intake hose and the inlet manifold are damaged check the air intake and repair as necessary. *: Refer to the 01-1 Service Manual for the Lancer Evolution VIII (No.1036K02) *: Refer to the 03-1 Service Manual for the Lancer Evolution VIII (No.1036K07) Inspection procedure 38: Inspection of the air temperature sensor (Ref: P13A-22) Repair Repair Repair NG Repair Repair Replace the ignition coil Repair NG Replace the spark plug Replace the spark plug wire 13A-17 Inspection procedure 33: Inspection of the No.1 waste gate solenoid valve (Ref: P13A-78) *2 Inspection procedure 37: Inspection of the No.2 waste gate solenoid valve (Ref: P13A-21) Inspection procedure 31: Inspection of the fuel control solenoid valve (Ref: P13A-76) *2 13A-18 Inspection procedure 15 Miss-timed ignition MPI TROUBLESHOOTING Probable causes of the malfunction . . . YES Malfunction Malfunction Malfunction Malfunction of of of the the the the crank angle sensor exhaust cam position sensor timing belt engine ECU Probable causes of the malfunction are noted in the right hand column. MUT-II/III Diagnosis code · Is the diagnosis code displayed? NO OK Measure the output wave from the crank angle sensor and the cam position sensor (using an oscilloscope). · Engine: idling <Crank angle sensor> · Measure the output wave at the crank angle sensor connector B-122 · Connect test harness (MB998478), to the connector, and take measurements at the pick-up harness component · Voltage across earth at 2 <Exhaust cam position sensor> · Measure the output wave at the exhaust cam position sensor connector B-115 · Connect test harness (MB991709), to the connector and take measurements at the pick-up harness component · Voltage across earth at 2 OK: The output wave timing from both sensors is as shown on P13A-25 (Main points for oscilloscope testing). NG Check the fitting of the crank angle sensor and the exhaust cam position sensor OK Check the timing marks on the timing belt OK Check the crank angle sensor pane OK Check the exhaust cam position sensing cylinder OK Replace the crank angle sensor OK NG NG Refer to the diagnosis code classification table (P13A-6) Check that the problem has been solved NG Replace the engine ECU OK Temporary malfunction (Ref Section 00: Dealing with temporary malfunctions) NG Repair Match up the timing marks on the timing belt NG Replace the crank angle sensor pane Replace the exhaust cam position sensing cylinder Check that the problem has been solved NG Replace the exhaust cam position sensor Check that the problem has been solved NG Replace the engine ECU Repair OK Temporary malfunction (Ref Section 00: Dealing with temporary malfunctions) MPI TROUBLESHOOTING Inspection procedure 35 Inter-cooler water spray circuit system · If the inter-cooler water spray switch (manual) is turned ON, the inter-cooler water spray manual 'ON' signal will be input in the engine ECU. When this signal is received, the engine ECU will turn the inter-cooler water spray relay ON, and will start the inter-cooler water spray motor.

Water will be sprayed into the inter-cooler to cool intake air, and filling efficiency will improve. If the inter-cooler water spray switch (auto) is turned ON, the inter-cooler water spray auto 'ON' signal will be input in the engine ECU. When this signal is received the engine ECU will intermittently run at a high load, it will turn the inter-cooler water spray relay ON, and it will start the inter-cooler water spray motor. Water will be sprayed into the inter-cooler to cool intake air, and filling efficiency will improve. 13A-19 Probable causes of the malfunction . . . Malfunction of the inter-cooler water spray switch. Malfunction of the inter-cooler water spray relay. Malfunction of the inter-cooler water spray motor. Circuit break, short circuit or a faulty connection in the inter-cooler water spray relay circuit. Circuit break, short circuit or a faulty connection in the inter-cooler water spray switch circuit. Malfunction of the ignition switch. Malfunction of the engine ECU. . . . OK Check the operation of the intercooler water spray · Ignition switch: ON · Inter-cooler water spray switch (manual): ON OK: Inter-cooler water spray operates Measure at the inter-cooler water spray switch connector D-32 · Undo the connector and measure on the harness side · Ignition switch: ON · Voltage across earth at 5 OK: battery voltage NG Check connectors: C-22 & C-50 NG OK Repair Inspect the harness between the engine ECU and the inter-cooler water spray switch · Check if the signal wire is cut or has short circuited NG OK Repair NG OK Check the operation of the intercooler water spray · Undo the engine ECU connector C-50, and earth terminal 56. · Ignition switch: ON OK: Inter-cooler water spray operates Replace the engine ECU OK Measure at the inter-cooler water spray switch connector D-32 · Undo the connector and measure on the harness side · Ignition switch: ON · Voltage across earth at 3 & 5 OK: battery voltage NG Check connectors: C-22 & C-50 NG OK Repair Inspect the harness between the engine ECU and the inter-cooler water spray switch · Check if the signal wire is cut or has short circuited NG OK Repair NG NG Replace the inter-cooler water spray relay Replace engine ECU Replace the engine ECU Repair OK OK Check connector: D-32 OK NG Repair Check the inter-cooler water spray switch (Ref Section 15: Intake/Exhaust) OK NG Repair Inspect the harness between the inter-cooler water spray switch and the engine ECU · Check if the signal wire is damaged OK NG Repair Temporary malfunction (Ref Section 00: Dealing with temporary malfunctions) Check connector: D-32 NG OK Repair Check the inter-cooler water spray switch (Ref Section 15: Intake/Exhaust) OK NG Repair Check connector: C-107 OK NG Repair Replace the inter-cooler water spray relay Inspect the harness between the inter-cooler water spray switch and earth · Check if the earth wire is cut or damaged OK NG Repair NG Check connector: C-220 OK Check the inter-cooler water spray relay (Refer to Section 15: Intake/Exhaust) OK Go on to the next page Inspect the harness between the inter-cooler water spray switch and the engine ECU, repair if necessary · Check if the signal wire is damaged 13A-20 Continued from the previous page OK Measure at the inter-cooler water spray relay connector C-220 · Undo the connector, and measure on the harness side · Voltage across earth 3 and 1 (ignition switch: ON) OK: battery voltage OK Measure at the engine ECU connector C-50 · Undo the connector, and measure on the harness side · Voltage across earth 56 (ignition switch: ON) OK: battery voltage OK Check connector: C-31 OK Inspect the harness between the inter-cooler water spray relay and the inter-cooler water spray motor · Check if the power supply wire is cut, has short circuited, or is damaged OK Inspect the harness between the inter-cooler water spray motor and earth · Check if the earth wire is cut, or damaged OK Check connectors C-209, C-210, C-201 and C-208 OK Inspect the harness between the inter-cooler water spray relay and the ignition switch · Check if the power supply wire is damaged OK NG Check connectors C-22 & C-50 OK NG Inspect the harness between the inter-cooler water spray relay and the engine ECU · Check if the signal wire is damaged OK Check connector: A-34 OK Check the inter-cooler water spray motor (Ref Section 15: Intake/Exhaust) OK Replace the engine ECU NG NG NG NG NG NG MPI TROUBLESHOOTING NG Check connectors C-209, C-210, C-201 and C-208 OK Inspect the harness between the inter-cooler water spray relay and the ignition switch · Check if the power supply wire is cut or has short circuited OK Check the ignition switch (Ref to Section 54) NG Check connectors C-22 and C-208 OK Inspect the harness between the inter-cooler water spray relay and the engine ECU · Check if the signal wire is cut or has short circuited Repair NG Repair Repair NG Repair Repair NG Repair Repair Repair Repair Repair MPI TROUBLESHOOTING Inspection procedure 37 No.



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2 waste gate solenoid valve system The No.2 waste gate solenoid valve controls the supercharge pressure introduced to the waste gate actuator in the turbocharger.

13A-21 Probable causes of the malfunction · · Malfunction of the No.2 waste gate solenoid valve. Circuit break, short circuit or a faulty connection in the No.2 waste gate solenoid valve circuit. Malfunction of the engine ECU.

· OK Check connector: B-32 NG NG Repair Measure at the waste gate solenoid valve connector B-32 · Undo the connector and measure on the solenoid valve side · Resistance between 1-2 OK: 29~35(when at 20°C) OK Measure at the waste gate solenoid valve connector B-32 · Undo the connector and measure on the harness side · Ignition switch: ON · Voltage across earth at 63 OK: battery voltage OK NG NG Replace the No.2 waste gate solenoid valve NG Check connector: B-19X OK Inspect the harness between the No.2 waste gate solenoid valve and the engine control relay, and repair if necessary · Check if the power supply wire is cut or has short circuited NG Check connector: C-50 OK NG Inspect the harness between the No.2 waste gate solenoid valve and the engine ECU · Check if the output wire is cut or has short circuited OK Repair Repair Measure at the engine ECU connector C-50 · Measure the voltage at the engine ECU terminal · Ignition switch: ON · Voltage across earth at 63 OK: battery voltage OK Check connector: C-50 OK NG Repair Replace the engine ECU Inspect the harness between the No.2 waste gate solenoid valve and the engine ECU · Check if the output wire is damaged OK NG Repair NG Inspect the harness between the No.2 waste gate solenoid valve and the engine control relay · Check if the power supply wire is damaged OK Replace the engine ECU Repair 13A-22 Inspection procedure 38 Air temperature sensor system MPI TROUBLESHOOTING Probable causes of the malfunction · · Malfunction of the air temperature sensor. Circuit break, short circuit or a faulty connection in the air temperature sensor circuit. Malfunction of the engine ECU. The air temperature sensor controls the temperature inside the inlet manifold, and compensates for any burning of fuel. NG Inspect the air temperature sensor on its own (Ref: P13A-29) OK NG Check connector B-34 OK (1) NG Measure at the air temperature sensor connector B-34 · Undo the connector and measure on the harness side (1) Resistance across earth at 2 OK: Less than 2 (2) Voltage across earth at 1 (Ignition switch: ON) OK: 4.

9~5.1V Check connector: C-50 OK NG Inspect the harness between the air temperature sensor and the engine ECU · Check if the earth wire is cut or damaged OK OK Check that the problem has been solved NG Replace the engine ECU (2) NG Measure at the engine ECU connector C-51 · Measure the voltage at the engine ECU terminal · Ignition switch: ON · Voltage across earth at 96 OK: 4.5~4.9V NG NG Check connector: C-51 NG Inspect the harness between the air temperature sensor and the engine ECU and repair it if necessary. · Check if the output wire is cut OK Check that the problem has been solved NG Replace the engine ECU OK Temporary malfunction (Ref Section 00: Dealing with temporary malfunctions) NG Repair NG Check connector: C-51 OK NG Repair Temporary malfunction (Ref Section 00: Dealing with temporary malfunctions) Repair NG Repair Repair Replace the air temperature sensor Inspect the harness between the air temperature sensor and the engine ECU and repair it if necessary. · Check if the output wire is cut Repair OK Go on to the next page MPI TROUBLESHOOTING Continued from the previous page OK NG Measure at the air temperature sensor connector B-34 · Connect the test harness (MB991658), to the connector and measure at the pick-up harness component. · Ignition switch: ON · Voltage across earth at 1 OK: surrounding temperature -20°C 3.8~4.4V surrounding temperature 0°C 3.2~3.

8V surrounding temperature 20°C 2.3~2.9V surrounding temperature 40°C 1.5~2.1V surrounding temperature 60°C 0.

8~1.4V surrounding temperature 80°C 0.4~1.0V OK OK Check that the problem has been solved NG Replace the engine ECU Temporary malfunction (Ref Section 00: Dealing with temporary malfunctions) Check connector: C-51 OK Inspect the harness between the air temperature sensor and the engine ECU and repair it if necessary. · Check if the earth wire is damaged NG Repair 13A-23 13A-24 6.

Service data table MPI TROUBLESHOOTING 13A-23 7. Engine ECU checks 7-1 Terminal voltage table 13A-24 MPI TROUBLESHOOTING 13A-25 7-2 Table showing resistance and continuity across the terminals of harness side connectors 8. Checks using an oscilloscope Sensor output signals and actuator drive signals can be checked visually by taking waveform measurements using an oscilloscope. exhaust cam position sensor connector crank angle sensor connector oscilloscope 8.1 Exhaust cam position sensor and the crank angle sensor <Measurement method> (1) Disconnect the exhaust cam position sensor connector, and connect the special test harness (MB991709) in its place. (2) Disconnect the crank angle sensor connector, and connect the special test harness (MB998478) in its place. (3) Connect the No.2 terminal of the exhaust cam position sensor connector and the No.2 terminal (the black coloured clip on the special tool) of the crank angle sensor connector, to the probes for each channel on the oscilloscope. Note When measuring at the engine ECU connector, connect the probes for each channel on the oscilloscope to No.

50 terminal (exhaust cam position sensor), and to No.43 terminal (crank angle sensor). 13A-26 <Standard waveforms> Observation conditions MPI TROUBLESHOOTING Exhaust cam position sensor Probe switch AC-GND-DC TIME/DIV. VOLTS/DIV. Other Engine Standard waveform 2 engine revolutions (1 camshaft revolution) Crank angle sensor x1 DC 10 ms 2V - X1 DC 10ms 2V Idling crank angle sensor output waveform exhaust cam position sensor output waveform <Explanation of waveforms> · The exhaust cam position sensor detects the compression top dead centre for each cylinder, and by simultaneous observation of these and other controlling signals, it is possible to distinguish between the cylinders. · The crank angle sensor detects the crank angle for each cylinder. There is an output of 4 evenly spaced crank angle sensor HIGH signals for every 2 revolutions of the engine. Therefore, by measuring the cycle time (seconds), engine revolution speed can be calculated according to the following formula: Engine revolution speed = 2/4T (seconds) x 60 = 30/T (seconds) <Waveform observation points> · Check that the cycle time gets shorter as the engine revolution speed increases.



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