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# 1994 toyota pickup factory service manual

Page 1 IN–1 INTRODUCTION – INTRODUCTION... IN–2 INTRODUCTION – HOW TO USE THIS MANUAL HOW TO USE THIS MANUAL INDEX An INDEX is provided on the first page of each section to guide you to the item to be repaired. To assist you in finding your way through the manual, the Section Title and major heading are given at the top of every page. IN–3 INTRODUCTION – HOW TO USE THIS MANUAL The procedures are presented in a step–by–step format: Example: The illustration shows what to do and where to do it. The task heading tells what to do. The detailed text tells how to perform the task and gives other information such as specifications and warnings. IN–4 INTRODUCTION – IDENTIFICATION INFORMATION CAUTIONS, NOTICES, HINTS: CAUTIONS are presented in bold type, and indicate there is a possibility of injury to you or other people. NOTICES are also presented in bold type, and indicate the possibility of damage to the components being repaired. Page 5 IN–5 INTRODUCTION – GENERAL REPAIR INSTRUCTIONS GENERAL REPAIR INSTRUCTIONS 1. Use fender, seat and floor covers to keep the vehicle clean and prevent damage. 2. During disassembly, keep parts in the appropriate order to facilitate reassembly. 3. Observe the following: (a) Before performing electrical work, disconnect. Page 6 IN–6 INTRODUCTION – GENERAL REPAIR INSTRUCTIONS (b) When reusing precoated parts, clean off the old adhesive and dry with compressed air. Then apply the specified seal lock adhesive to the bolt, nut or threads. (c) Precoated parts are indicated in the component illustrations by the ”*”... Page 7 IN–7 INTRODUCTION – GENERAL REPAIR INSTRUCTIONS 11. Care must be taken when jacking up and supporting the vehicle. Be sure to lift and support the vehicle at the proper locations (See page IN–9). (a) If the vehicle is to be jacked up only at the front or rear end, be sure to block the wheels at the opposite end in order to ensure safety. Page 8 IN–8 INTRODUCTION – PRECAUTION PRECAUTION FOR VEHICLES EQUIPPED WITH A CATALYTIC CONVERTER CAUTION: If large amounts of unburned gasoline flow into the converter, it may overheat and create a fire hazard. To prevent this, observe the following precautions and explain them to your customer. 1. Page 9 IN–9 INTRODUCTION – VEHICLE LIFT AND SUPPORT LOCATIONS VEHICLE LIFT AND SUPPORT LOCATIONS... Page 10 IN–10 INTRODUCTION – ABBREVIATIONS USED IN THIS MANUAL ABBREVIATIONS USED IN THIS MANUAL Automatic Disconnecting Differential Automatic Locking Retractor Automatic Transmission Automatic Transmission Fluid Before Top Dead Center BTDC California Calif. Circuit Breaker Cab and Chassis C&C Dash Pot Double Rear Wheel Electronic Control Unit Emergency Locking Retractor Electronic Spark Advance... Page 11 IN–11 INTRODUCTION – ABBREVIATIONS USED IN THIS MANUAL Toyota Computer Controlled System TCCS Top Dead Center TEMP. Temperature Transmission Undersize Vacuum Control Valve Vacuum Switching Valve Vacuum Transmitting Valve With Without Two Wheel Drive Vehicles (4 x 2) Four Wheel Drive Vehicles (4 x 4) Page 12 GLOSSARY OF SAE AND TOYOTA TERMS GLOSSARY OF SAE AND TOYOTA TERMS M076–03 This glossary lists all SAE–J 1930 terms and abbreviations used in this manual in compliance with SAE recommendations, as well as their Toyota equivalents. TOYOTA TERMS SAE ABBRE– SAE TERMS ( )––ABBREVIATIONS... Page 13 IN–13 INTRODUCTION – GLOSSARY OF SAE AND TOYOTA TERMS Idle Speed Control (ISC) Idle Air Control Intake or Inlet Air Temperature Intake Air Temperature I AT Ignition Control Module Indirect injection Indirect Fuel Injection Inertia Fuel–Shutoff Idle Speed Control Knock Sensor... Page 14 IN–14 INTRODUCTION – GLOSSARY OF SAE AND TOYOTA TERMS Bimetal Vacuum Switching Valve (BVSV) Thermal Vacuum Valve Thermostatic Vacuum Switching Valve (TVSV) Three–Way Catalyst (TWC) Three–Way Catalytic Converter CCRO Three–Way + Oxidation Catalytic Converter TWC+OC + CCo Volume Air Flow... Page 15 IN–15 INTRODUCTION – STANDARD BOLT TORQUE SPECIFICATIONS STANDARD BOLT TORQUE SPECIFICATIONS HOW TO DETERMINE BOLT STRENGTH Class Class Mark Mark 4– Stud bolt Hexagon 5– head bolt 6– 8– 9– 10– 11– No mark Hexagon flange bolt w/ washer No mark hexagon bolt Hexagon head bolt... Page 16 IN–16 INTRODUCTION – STANDARD BOLT TORQUE SPECIFICATIONS SPECIFIED TORQUE FOR STANDARD BOLTS Specified torque Diameter Pitch Class 1 OT... Page 17 MA–6 MAINTENANCE – MAINTENANCE OPERATIONS MAINTENANCE OPERATIONS ENGINE Cold Engine Operations 1. (3VZ–E ENGINE) REPLACE TIMING BELT (a) Remove the timing belt. (See pages EG–32) (b) Install the timing belt. (See pages EG–41) 2. INSPECT DRIVE BELTS (a) Visually check the belt for excessive wear, frayed cords etc. Page 18 MA–7 MAINTENANCE – MAINTENANCE OPERATIONS HINT: ”New belt” refers to a belt which has been used less than 5 minutes on a running engine. ”Used belt” refers to a belt which has been used on a running engine for 5 minutes or more. After replacing the drive belt, check that it fits properly in the ribbed grooves, especially in the places difficult to see. Page 19 MA–8 MAINTENANCE – MAINTENANCE OPERATIONS 22 R – E w/o Oil filter change 3.8 liters (4.0 US qts, 3.3 Imp. qts) w/ Oil filter change 4.3 liters (4.5 US qts, 3.8 Imp. qts) 3VZ–E w/o Oil filter change 2WD 4.0 liters (4.2 US qts, 3.5 Imp. qts) 4WD 4.2 liters (4.4 US qts, 3.7 Imp. Page 20 MA–9 MAINTENANCE – MAINTENANCE OPERATIONS 8. INSPECT CHARCOAL CANISTER (a) Remove charcoal canister. HINT:Label hoses for correct installation. (b) Visually inspect canister case. (c) Check for clogged filter and stuck check valve. (1) Using low compressed air (4.71 kPa (48 gf/cm2, 0.68 psi), blow into the tank pipe and check that air flows without resistance from the other pipes. Page 21 MA–10 MAINTENANCE – MAINTENANCE OPERATIONS 11. INSPECT EXHAUST PIPES AND MOUNTINGS Visually inspect the pipes, hangers and connections for severe corrosion, leaks or damage. 12. (3VZ–E ENGINE) ADJUST VALVE CLEARANCE (See page EG–18) 13. (FEDERAL AND CANADA) REPLACE OXYGEN SENSOR (a) Disconnect the oxygen sensor wiring connector. Page 22 MA–11 MAINTENANCE – MAINTENANCE OPERATIONS Hot Engine Operations 14. (22R–E ENGINE) ADJUST VALVE CLEARANCE (a) Warm up the engine to normal operating temperature. (b) Stop the engine and remove the cylinder head cover. (c) Set No.1 cylinder to TDC/compression. Turn the crankshaft with a wrench to align the timing marks at TDC. Page 23 MA–12 MAINTENANCE – MAINTENANCE OPERATIONS Connect all vacuum lines (i.e., EVAP, EGR system, etc.) Make sure all MFI system wiring connectors are fully connected Engine should be at normal operating tempera– ture Switch off accessories Set transmission in neutral (b) Connect a tachometer– to the engine Connect the tachometer–... Page 24 MA–13 MAINTENANCE – MAINTENANCE OPERATIONS Wear Deformation Cracks Corrosion Leaks Bends Twists (b) Check all clamps for tightness and connections for leakage. . (c) Check that the hoses and lines are clear of sharp edges, moving parts and the exhaust system. (d) Check that the lines installed in grommets pass thr–... Page 25 MA–14 MAINTENANCE – MAINTENANCE OPERATIONS (c) Check the disc for runout. Minimum disc runout: Ex. C & C 0.09 mm (0.0035 in.) C & C 0.12 mm (0.0047 in.) 18. INSPECT REAR BRAKE LININGS AND DRUMS (See BR section) (a) Check the lining – to – drum contact condition and lining wear. Page 26 MA–15 MAINTENANCE – MAINTENANCE OPERATIONS (b) Check the steering linkage for looseness or damage. Check that: Tie rod ends and relay rod ends do not have excessive play. Dust seals are not damaged. 20. INSPECT STEERING GEAR HOUSING Check the steering gear housing for oil leaks. If leakage is found, check for cause and repair. Page 27 MA–16 MAINTENANCE – MAINTENANCE OPERATIONS 23. (2WD) CHECK OIL LEVEL IN MANUAL TRANSMISSION, AUTOMATIC TRANSMISSION AND DIFFERENTIAL Remove the filler plug and feel inside the hole with your finger. Check that the oil comes to within 5 mm (0.20 in.) of the bottom edge of the hole. If the level is low, add oil until it begins to run out of the filler hole. Page 28 MA–17 MAINTENANCE – MAINTENANCE OPERATIONS 24. (4WD) CHECK OIL LEVEL IN MANUAL TRANSMISSION, AUTOMATIC TRANSMISSION, TRANSFER AND DIFFERENTIAL Remove the filler plug and feel inside the hole with your finger. Check that the oil comes to within 5 mm (0.20 in.) of the bottom edge of the hole. If the level is low, add oil until it begins to run out of the filler hole. Page 29 Above –18 _ C (0_F) SAE 90 Below –18 _ C (0 _ F) SAE 80W – 90 or 80W A.D.D. Oil grade: Toyota ’GEAR OIL SUPER’ oil or hypoid gear oil API GL–5 Viscosity: SAE 75W–90 25. REPLACE MANUAL TRANSMISSION. TRANSFER (4... Page 30 MA–19 MAINTENANCE – MAINTENANCE OPERATIONS Oil capacity: Transmission – W55 2.6 liters (2.7 US qts, 2.3 Imp. qts) R150 3.0 liters (3.2 US qts, 2.6 Imp. qts) G58 3.9 liters (4.1 US qts, 3.4 Imp. qts) W56 2.9 liters (3.1 US qts, 2.5 Imp. qts) RI 50F 3.0 liters (3.2 US qts, 2.6 Imp. Page 31 MA–20 MAINTENANCE – MAINTENANCE OPERATIONS Differential – 7.5 in. 1.35 liters (1.4 US qts, 1.2 Imp. qts) 8.0 in. 1.8 liters (1.9 US qts, 1.6 Imp. qts) Front Standard differential 1.6 liters (1.7 US qts, 1.4 Imp. qts) A.D.D. 1.86 liters (2.0 US qts, 1.6 Imp. qts) Rear 2.2 liters 2.3 US qts, 1.9 Imp. Page 32 MA–21 MAINTENANCE – MAINTENANCE OPERATIONS (g) Check that the fluid level is in the ”HOT” range at the normal operating temperature (70 – 80 C or 158 – 176 *F) and add as necessary. NOTICE: Do not overfill. 27. REPACK FRONT WHEEL BEARINGS AND THRUST BUSH (a) Change the front wheel bearing grease. Page 33 MA–22 MAINTENANCE – MAINTENANCE OPERATIONS 29. TIGHTEN BOLTS AND NUTS ON CHASSIS AND BODY Tighten the following parts: Seat mounting bolts Torque: 37 N–m (375 kgf–cm, 27 ft–lbf) Strut bar bracket–to –frame mounting bolts (2 Torque: 52 N–m (530 kgf–cm, 38 ft–Ibf) Leaf spring U –... Page 34 MA–23 MAINTENANCE – MAINTENANCE OPERATIONS Suspension system Fuel tank mounts Engine mounts, etc. 30. FINAL INSPECTION (a) Check operation of body parts: Hood Auxiliary catch operates properly Hood locks securely when closed Doors Door locks operate properly Doors close properly Seats Seat adjusts easily and locks securely in any positions... Page 35 EG1–1 ENGINE – 22R–E ENGINE... Page 36 EG1–2 ENGINE – ENGINE MECHANICAL ENGINE MECHANICAL DESCRIPTION The 22R–E engine is an in–line 4 cylinder 2.4 liter OHC 8 valve engine. Page 37 EG1–3 ENGINE – ENGINE MECHANICAL The 22R–E engine is in–line 4–cylinder engine with the cylinders numbered 1–2–3–4 from the front. The crankshaft is supported by 5 bearings inside the crankcase. These bearing are made of kelmet. The crankshaft is integrated with 4 weights which are cast with it for balance. Oil holes are made in the center of the crankshaft to supply oil to the connecting rods, bearing, pistons and other components. Page 38 EG1–4 ENGINE – ENGINE MECHANICAL PREPARATION SST (SPECIAL SERVICE TOOLS) 09201–41020 Valve Stem Oil Seal Replacer 09201 –60011 Valve Guide Bushing Remover & Replacer 09202–43013 Valve Spring Compressor 09213–31021 Crankshaft Pulley Puller 09213–36020 Timing Gear Remover 09213–60017 Crankshaft Pulley & Gear Puller (09213–00020) Body With .Bolt (00213–00030) Handle (09213–00060) Bolt Set... Page 39 EG1–5 ENGINE – ENGINE MECHANICAL 09606–35014 Axle Hub & Drive Pinion Bearing Tool Set (09608–06040) Front Hub Inner Bearing Cone Replacer Crankshaft pulley 09330–00021 Companion Flange Holding Tool 09843–18020 Diagnosis Check Wire RECOMMENDED TOOLS For suspension engine 09090–04010 Engine Sling Device 09200–00010 Engine Adjust Kit Plug for the vacuum hose, fuel hose etc. Page 40 EG1–6 ENGINE – ENGINE MECHANICAL Dye penetrant Engine tune–up tester Heater Magnetic finger Micrometer Piston ring compressor Piston ring expander Plastigage Precision straight edge Soft brush Spring tester Valve spring Steel square Valve spring Thermometer Torque wrench Valve seat cutter Vernier calipers SSM (SERVICE SPECIAL MATERIALS) 08826–00080 Seal packing or equivalent... Page 41 EG1–7 ENGINE – ENGINE MECHANICAL TROUBLESHOOTING When the malfunction code is not confirmed in the diagnostic trouble code check and the problem still cannot be confirmed in the basic inspection, then proceed to this step and perform troubleshooting to the numbers in the order given in the table below. See page Suspect area Symptom... Page 42 EG1–8 ENGINE – ENGINE MECHANICAL See page Suspect area Symptom Engine does not crank Starter runs – engine does not crank No initial combustion No complete combustion Engine cranks slowly Under normal condition Cold engine Hot engine Incorrect first idle High engine idle speed Low engine idle speed Rough idling... Page 43 Thermostat EG1–228 Drive Belt section Engine Coolant Temp. Sender Gauge section Oil Pressure Switch section Generator section Cylinder Block EG1–55 EFI Main EG1–206 Relay Circuit Opening EG1–207 Relay Fuel Cut System EG1–219 Fuel Pressure EG1–210 Control System EG1–215 Fuel Quality Fuel Leakage Coolant Leakage EG1–225... EG1–10 ENGINE – ENGINE MECHANICAL TUNE–UP ENGINE COOLANT INSPECTION (See steps 1 and 2 on page EG1–225) ENGINE OIL INSPECTION (See steps 1 and 2 on page EG1–235) AIR FILTER INSPECTION (See step 4 on page MA–7) BATTERY INSPECTION (See CM section) HIGH–TENSION CORD INSPECTION (See page IG–6) SPARK PLUGS INSPECTION... Page 45 EG1–11 ENGINE – ENGINE MECHANICAL HINT: Adjust idle mixture as necessary. Page 46 EG1–12 ENGINE – ENGINE MECHANICAL IDLE AND OR 2500 RPM CO HC CHECK HINT: This check method is used only to determine whether or not the idle and/or 2,500 rpm CO/HC complies with regulations. 1. INITIAL CONDITIONS (a) Engine at normal operating temperature (b) Air cleaner installed (c) All pipes and hoses of air intake system connected (d) All accessories switched OFF... Page 47 EG1–13 ENGINE – ENGINE MECHANICAL TROUBLESHOOTING If the HC/CO concentration does not comply with regulations, perform troubleshooting in the order given below. 1. Check oxygen sensor operation (See page EG1–212) 2. See the table below for possible cause, and then inspect and correct the applicable causes if neces–... Page 48 EG1–14 ENGINE – ENGINE MECHANICAL COMPRESSION CHECK HINT: If there is lack of power, excessive oil con– sumption or poor fuel mileage, measure the cylinder compression pressure. 1. WARM UP ENGINE 2. REMOVE SPARK PLUGS 3. DISCONNECT DISTRIBUTOR CONNECTOR 4. DISCONNECT COLD START INJECTOR CONNEC– 5. Page 49 EG1–15 ENGINE – ENGINE MECHANICAL CYLINDER HEAD COMPONENTS... Page 50 EG1–16 ENGINE – ENGINE MECHANICAL PREPARATION FOR REMOVAL 1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY 2. DRAIN COOLANT FROM RADIATOR AND CYLIN– DER BLOCK (See step 3 on page EG1–225) 3. REMOVE INTAKE AIR CONNECTOR 4. DISCONNECT EXHAUST PIPE FROM EXHAUST MANIFOLD (a) Remove the exhaust pipe clamp. Page 51 EG1–17 ENGINE – ENGINE MECHANICAL 13. REMOVE EGR VACUUM MODULATOR 14. DISCONNECT FOLLOWING WIRES: (a) Cold start injector wire (b) Throttle position wire (c) (California only) EGR gas temp. sensor wire 15. REMOVE CHAMBER WITH THROTTLE BODY (a) Remove the union bolt holding the cold start injector pipe to the chamber. EG1–18 ENGINE – ENGINE MECHANICAL 21. (w/PS) DISCONNECT PS BRACKET FROM CYLINDER HEAD Remove the four bolts, disconnect the ground strap and bracket. CYLINDER HEAD REMOVAL 1. REMOVE HEAD COVER (a) Remove the ground strap from the body. (b) Remove the four nuts and seals. (c) Remove the head cover. EG1–19 ENGINE – ENGINE MECHANICAL 4. REMOVE CAM SPROCKET Remove the cam sprocket and chain from the cam– shaft and leave on the vibration damper. 5. REMOVE CHARY COVER BOLT Remove the bolt in.–front of the head before the other head bolts are removed. Page 54 EG1–20 ENGINE – ENGINE MECHANICAL 2. REMOVE INTAKE MANIFOLD WITH DELIVERY PIPE AND INJECTORS (a) Remove the two nuts and reed valve. (b) Remove the bolt and the heater inlet pipe from the cylinder head. (c) Remove the seven bolts, one hexagon bolt, two nuts and No. Page 55 EG1–21 ENGINE – ENGINE MECHANICAL 7. MEASURE CAMSHAFT THRUST CLEARANCE Using a dial gauge, measure the camshaft thrust clearance. Standard clearance: 0.08 – 0.18 mm (0.0031–0.0071 in.) Maximum clearance: 0.25 mm (0.0098 in.) If clearance is greater than maximum, replace the head. Page 56 EG1–22 ENGINE – ENGINE MECHANICAL 3. CLEAN COMBUSTION CHAMBERS Using a wire brush, remove all the carbon from the combustion chambers. NOTICE: Be careful not to scratch the head gasket con– tact surface. 4. CLEAN VALVE GUIDE BUSHINGS Using a valve guide brush and solvent, clean all the valve guide bushings. Page 57 EG1–23 ENGINE – ENGINE MECHANICAL 7. INSPECT CYLINDER HEAD FOR CRACKS Using a dye penetrant, check the combustion cham– bers, intake and exhaust ports, head surface and the top of the head for cracks. If a crack is found, replace the head. 8. Page 58 EG1–24 ENGINE – ENGINE MECHANICAL 10. IF NECESSARY, REPLACE VALVE GUIDE BUSH– INGS (a) Using a brass bar and hammer, break the valve –guide bushing. (b) Gradually heat the cylinder head to approx. 90SC (194SF). (c) Using SST and a hammer, drive out valve guide bus– hing. Page 59 EG1–25 ENGINE – ENGINE MECHANICAL (f) Gradually heat the cylinder head to approx. 90SC (194S F). (g) Using SST a and hammer, drive in a new valve guide bushing unit the snap ring makes contact with the cylinder head. SST 09201–6001 1 (h) Using a sharp 8 mm (0.31 mm) reamer, ream the valve guide bushing to obtain standard specified clearance (See page EG1–23) between the valve guide bushing... Page 60 EG1–26 ENGINE – ENGINE MECHANICAL (e) Check the valve overall length. Standard overall length: Intake 113.5 mm (4.468 in.) Exhaust 112.4 mm (4.425 in.) Minimum overall length: Intake 113.0 mm (4.449 in.) Exhaust 111.9 mm (4.406 in.) If the valve overall length is less than minimum, re– place the valve. Page 61 EG1–27 ENGINE – ENGINE MECHANICAL If seating is too low on the valve face, use 60S (IN) or 65S (EX) and 45S cutters to correct the seat. (d) Hand–lap the valve and valve seat with abrasive compound. 13. INSPECT VALVE SPRINGS (a) Using a steel square, measure the squareness of the valve spring. Page 62 EG1–28 ENGINE – ENGINE MECHANICAL 14. INSPECT CAMSHAFT AND BEARING CAPS (a) Place the cam shaft on V – blocks and , using a dial indicator, measure the circle runout at the center journal. Maximum circle runout: 0.2 mm (0.008 in.) If the circle runout is greater than maximum, replace the camshaft. Page 63 EG1–29 ENGINE – ENGINE MECHANICAL (e) Remove the caps and measure the Piastigage at its widest point. Standard clearance: 0.01 – 0.05 mm (0.0004 – 0.0020 in.) Maximum clearance: 0.1 mm (0.004 in.) !f clearance is greater than maximum, replace the cylinder head and/or camshaft. EG1–30 ENGINE – ENGINE MECHANICAL 17. INSPECT INTAKE, EXHAUST MANIFOLDS AND AIR INTAKE CHAMBER Using a precision straight edge and thickness gauge, check the surface contacting the cylinder head or intake manifold for warpage. Maximum intake warpage: 0.2 mm (0.008 in.) Maximum exhaust warpage: 0.7 mm (0.28 in.) Maximum air intake chamber warpage: 0.2 mm (0.008 in.) Page 65 EG1–31 ENGINE – ENGINE MECHANICAL 1. INSTALL VALVES (a) Install a new oil seal on the valve guide bushing. HINT Pushing down at the place shown in the illus– tration. (b) Rotate the oil seal to check that it is firmly installed. (c) Lubricate and insert valve in the valve guide bushing. Page 66 EG1–32 ENGINE – ENGINE MECHANICAL 6. INSTALL PLUG PATE Install a new gasket and plug plate with the two bolts. HINT: Attach the flat side of the gasket to the cylinder head. 7. INSTALL EXHAUST MANIFOLD (a) Position a new gasket on the cylinder head. (b) Install the exhaust manifold with the eight nuts. EG1–33 ENGINE – ENGINE MECHANICAL (c) Install the EGR valve with the two bolts and nut. 9. INSTALL INTAKE MANIFOLD (a) Position a new gasket on the cylinder head. (b) Install the intake manifold with the delivery pipe and injectors and No. 1 air pipe. (c) Install the seven bolts, one hexagon bolt and two nuts. Page 68 EG1–34 ENGINE – ENGINE MECHANICAL (a) If the sprocket was removed, align the alignment marks placed on the sprocket and chain during re– moval. (b) position the cylinder head over dowels on the block. 3. INSTALL ROCKER ARM ASSEMBLY (a) Place the rocker arm assembly over the dowels on the cylinder head. Page 69 EG1–35 ENGINE – ENGINE MECHANICAL 6. ADJUST VALVE CLEARANCE (a) Set the No. 1 cylinder to TDC/compression. Turn the crankshaft with a wrench to align the timing, marks at TDC. Set the groove on the pulley at the ”0” mark position of the chain cover. Check that the rocker arms on the No. Page 70 EG1–36 ENGINE – ENGINE MECHANICAL 8. INSTALL HEAD COVER (a) Apply seal packing to the four locations shown. Seal packing: Part No. 08826–00080 or equivalent (b) Install the gasket to the cylinder head. (c) Place the head cover on the cylinder head and install the four seals and nuts. Page 71 EG1–37 ENGINE – ENGINE MECHANICAL (e) (A/T) OD temp. switch wire (f) Engine coolant temp. sender gauge wire (g) Injector wires (h) (with A/C) Compressor wires (i) Transmission wires (j) Starter wire (terminal 50) (k) Oil pressure sender gauge wire (l) Knock sensor wire 6. Page 72 EG1–38 ENGINE – ENGINE MECHANICAL (h) EGR vacuum modulator hose (i) EVAP hose (j) (with A/C) VSV hoses (k) (w/PS) Air control valve hoses (l) Brake booster hose (m) No. 1 and No. 2 PCV hoses 11. CONNECT GROUND STRAP TO ENGINE REAR SIDE 12. Page 73 EG1–39 ENGINE – ENGINE MECHANICAL TIMING CHAIN COMPONENTS PREPARATION OF REMOVAL 1. REMOVE CYLINDER HEAD (See page EG1–16) 2. REMOVE RADIATOR (See page EG1–230) 3. (4WD) REMOVE FRONT DIFFERENTIAL (See SA section) 4. REMOVE OIL PAN (a) Remove the engine undercover. (b) Remove the engine mounting bolts. Page 74 EG1–40 ENGINE – ENGINE MECHANICAL SST 09032 – 00100 HINT: When removing the oil pan, be careful not to damage the oil pan flange. TIMING CHAIN REMOVAL 1. (W/PS) REMOVE PS BELT 2. (with A/C) REMOVE A/C BELT, COMPRESSOR AND BRACKET 3. Page 75 EG1–41 ENGINE – ENGINE MECHANICAL 5. REMOVE NO. 1 WATER BY–PASS PIPE Remove the two bolts and pipe. 6. REMOVE FAN BELT ADJUSTING BAR (a) (w/ PS) Remove the bolt and PS lower bracket. (b) Remove the three bolts and bar. 7. Page 76 EG1–42 ENGINE – ENGINE MECHANICAL 10. REMOVE PUMP DRIVE SPLINE AND CRANKSHAFT SPROCKET If the oil pump drive spline and sprocket cannot be removed by hand, use SST to remove them together. SST 09213–36020 11. REMOVE GASKET MATERIAL ON CYLINDER BLOCK COMPONENTS INSPECTION 1. Page 77 EG1–43 ENGINE – ENGINE MECHANICAL TIMING CHAIN INSTALLATION (See page EG1–39) 1. INSTALL CRANKSHAFT SPROCKET AND CHAIN (a) Turn the crankshaft until the shaft key is on top. (b) Slide the sprocket over the key on the crankshaft. (c) Place the timing chain on the sprocket with the single bright chain link aligned with the timing mark on the sprocket. Page 78 EG1–44 ENGINE – ENGINE MECHANICAL 6. INSTALL HEATER WATER OUTLET PIPE Connect the heater water outlet pipe to the timing chain cover with the two bolts. 7. INSTALL NO.1 WATER BY–PASS PIPE Install the pipe with the two bolts. 8. INSTALL CRANKSHAFT PULLEY (a) Install the crankshaft pulley and bolt. Page 79 EG1–45 ENGINE – ENGINE MECHANICAL Using a razor blade and gasket scraper, remove all the packing (FIPG) material from the gasket surfaces. Thoroughly clean all components to remove all the loose material. Clean both sealing surfaces with a non–residue solvent. NOTICE: Do not use a solvent which will affect the pai–... Page 80 EG1–46 ENGINE – ENGINE MECHANICAL CYLINDER BLOCK COMPONENTS... Page 81 EG1–47 ENGINE – ENGINE MECHANICAL ENGINE REMOVAL 1. REMOVE HOOD 2. REMOVE BATTERY 3. REMOVE ENGINE UNDER COVER 4. DRAIN COOLANT FROM RADIATOR AND CYLIN– DER BLOCK (See step 3 on page EG1–225) 5. DRAIN ENGINE OIL (See step 1 on page EG1–236) 6. Page 82 EG1–48 ENGINE – ENGINE MECHANICAL (c) (w/Cruise control) Cruise control cable 14. (w/PS) REMOVE PS PUMP FROM BRACKET (a) Remove the drive belt. (b) Remove the four bolts. (c) Remove the PS pump. HINT: Lay the PS pump to one side without disconn– ecting the hoses. Page 83 EG1–49 ENGINE – ENGINE MECHANICAL (b) Remove the cross shaft from the body. 22. DISCONNECT SPEEDOMETER CABLE NOTICE: Do not lose the felt dust protector and washers. 23. (4WD) REMOVE TRANSFER UNDER COVER 24. (4WD) REMOVE STABILIZER BAR 25. (4WD) REMOVE FRONT PROPELLER SHAFT (See PR section) 26. Page 84 EG1–50 ENGINE – ENGINE MECHANICAL 31. (4WD) REMOVE NO.2 FRAME CROSSMEMBER FROM SIDE FRAME (a) Remove the four bolts from the engine rear mounting. (b) Raise the transmission slightly with a jack. (c) Remove the four bolts from the side frame and remove the No.2 frame crossmember. Page 85 EG1–51 ENGINE – ENGINE MECHANICAL 16. REMOVE OIL STRAINER Remove the four bolts, strainer and gasket. 17. REMOVE REAR OIL SEAL RETAINER Remove the five bolts, rear oil seal retainer and gasket. 18. MEASURE CONNECTING ROD THRUST CLEAR– ANCE Using a dial gauge, measure the thrust clearance. Standard clearance: 0.16 –... Page 86 EG1–52 ENGINE – ENGINE MECHANICAL (f) Lay a strip of Plastigage across the crankshaft pin. (g) Align the rod and cap marks and fit on the cap. Install and torque the cap nuts. Torque: 69 N–m(700 kgf–cm, 51 ft–lbf) HINT: Do not turn the crankshaft. Page 87 EG1–53 ENGINE – ENGINE MECHANICAL 20. PUSH OUT PISTON AND CONNECTING ROD AS– SEMBLY (a) Remove all the carbon from top of the bore to the top of the cylinder. (b) Cover the rod bolts with a short piece of hose to protect the crank pin from damage. Page 88 EG1–54 ENGINE – ENGINE MECHANICAL 22. MEASURE CRANKSHAFT OIL CLEARANCE (a) Gradually loosen and remove the bearing cap bolts in three passes and in numerical order shown. (b) Using the removed bearing cap bolts, pry the bearing cap fore and aft, and remove it with the lower bearing and thrust washers (No.3 journal only). Page 89 EG1–55 ENGINE – ENGINE MECHANICAL (i) Remove the main bearing caps. (j) Measure the Plastigage at its widest point. Standard clearance: 0.025 – 0.055 mm (0.0010 – 0.0022 in.) Maximum clearance: 0.08 mm (0.0031 in.) If the clearance is greater than maximum, replace the bearings and/or grind the main journals. Page 90 EG1–56 ENGINE – ENGINE MECHANICAL 3. INSPECT CYLINDERS Visually inspect cylinders for vertical scratches. If deep scratches are present, rebore all four cylinders. (See page EG1–66) 4. INSPECT CYLINDER BLOCK WARPAGE Warpage limit: 0.5 mm (0.0020 in.) If warpage is greater than specified value, replace the cylinder block. Page 91 EG1–57 ENGINE – ENGINE MECHANICAL Maximum diameter: STD 92.23 mm (3.6311 in.) O/S 0.50 92.73 mm (3.6508 in.) 0/S 1.00 93.23 mm (3.6705 in.) If the diameter is greater than maximum, rebore all four cylinders, or replace the cylinder block. 6.REMOVE CYLINDER RIDGE If wear is less than 0.2 mm (0.008 in.), use a ridge reamer to machine the top of the cylinder. Page 92 EG1–58 ENGINE – ENGINE MECHANICAL 3. DISCONNECT CONNECTING ROD FROM PISTON (a) Using needle – nose pliers, remove the snap rings from the piston. (b) Heat the piston in hot water approx. 60SC(140SF). (c) Using a plastic–faced hammer and brass bar, lightly tap out the piston pin from the piston. Page 93 EG1–59 ENGINE – ENGINE MECHANICAL (b) Using a groove cleaning tool or broken ring, clean the ring grooves. (c) Using solvent and a brush, thoroughly clean the piston. NOTICE: Do not use a wire brush. 2. INSPECT PISTON DIAMETER AND OIL CLEARANCE HINT: There are three sizes of the standard piston diameter, marked ”1”, ”2”, and ”3”, accordingly. Page 94 EG1–60 ENGINE – ENGINE MECHANICAL Piston diameter: STD Mark ” 91.975 – 91.985 mm (3.6211 – 3.6214 in.) Mark ”2’ 91.985 – 91.995 mm (3.6214 – 3.6218 in.) Mark ’3” 91.995 – 92.005 mm (3.6218 – 3.6222 in.) 0/S 0.50 92.475 –... Page 95 EG1–61 ENGINE – ENGINE MECHANICAL 4. MEASURE RING END GAP (a) Insert the piston ring into the cylinder. (b) Using a piston, push the ring a little beyond the bottom of the ring travel. (130 mm (5.12 in.) from top surface of cylinder block) (c) Using a thickness gauge, measure the end gap. Page 96 EG1–62 ENGINE – ENGINE MECHANICAL Cheek that the rod is not twisted. Maximum twist: 0.15 mm (0.0059 in.) per 100 mm (3.94 in.) (b) Measure the oil clearance between the rod bushing and piston pin. Using an inside dial indicator, measure the inside diameter of the rod bushing. Page 97 EG1–63 ENGINE – ENGINE MECHANICAL 3. HONE NEW BUSHING AND CHECK PIN FIT IN CONNECTING ROD (a) Hone the new bushing and check that the oil clear– ance is within standard specification. Standard oil clearance: 0.005 – 0.011 mm (0.0002 – 0.0004 in.) (b) Check the pin fit at the normal room temperature. Page 98 EG1–64 ENGINE – ENGINE MECHANICAL (a) Grind the crank pins and/or main journals to the undersized finished diameter. Bearing size (U/S 0.25) Main journal finished diameter: 59.701 – 59.711 mm (2.3504 – 2.3508 in.) Crank pin finished diameter: 52.701 – 52.711 mm (2.0748 – 2.0752 in.) (b) Install a new pin and/or main undersized bearings. Page 99 EG1–65 ENGINE – ENGINE MECHANICAL (c) Apply MP grease to a new oil seal lip. (d) Using SST and a hammer, tap in the oil seal until its surface is flush with the timing chain cover edge. SST 09223 – 50010 3. EG1–66 ENGINE – ENGINE MECHANICAL CYLINDERS BORING Outside Diameter Size mm 0 n. ) 1. SELECT OVERSIZED PISTON O/S pistons with pins are available in the sizes listed. 92.475 – 92.505 O/S 0. 50 (3.6407 – 3.6419) Replace pistons in matched sets. Take the largest 92.975 –... Page 101 EG1–67 ENGINE – ENGINE MECHANICAL (c) Align the notch on the piston with the mark on the rod and push the piston pin in with your thumb. (d) Install a new snap ring on the other side of the pin. 2. Page 102 EG1–68 ENGINE – ENGINE MECHANICAL E61W1_0¿ INSTALLATION OF CRANKSHAFT, PISTON AND CONNECTING ROD ASSEMBLY (See page EG1–46) GENERAL ASSEMBLY HINT: Thoroughly clean all parts to be assembled. Before installing parts, apply new engine oil to all sliding and rotating surfaces. Replace all gaskets, 0–ring and oil seals with new parts. Page 103 EG1–69 ENGINE – ENGINE MECHANICAL (c) Apply a light coat of engine oil on the threads and under the cap bolt heads. (d) Install and tighten the cap bolts in two or three passes and in the sequence shown. Torque: 103 N–m(1,050 kgf–cm, 76 ft–lbf) (e) Check that the crankshaft turns smoothly. Page 104 EG1–70 ENGINE – ENGINE MECHANICAL (c) Apply a light coat of engine oil on the threads and under the rod nuts. (d) Install and tighten the rod nuts alternately and in two or three passes. Torque: 69 N–m (700 kgf–cm, 51 ft–lbf) (e) Check that the crankshaft turns smoothly. Page 105 EG1–71 ENGINE – ENGINE MECHANICAL Torque: M/T 108 N–m (1,100 kgf–cm, 80 ft–lbf) A/T 83 N–m (850 kgf–cm, 61 ft–lbf) ENGINE INSTALLATION 1. (M/T) INSTALL CLUTCH DISC AND COVER TO FLY– WHEEL (See CL section) 2. CONNECT TRANSMISSION TO ENGINE 3. Page 106 EG1–72 ENGINE – ENGINE MECHANICAL (4WD) INSTALL NO.2 FRAME CROSSMEMBER (a) Raise the transmission slightly with a jack. (b) Install the No.2 frame crossmember to the side frame with the bolts. Torque the bolts Torque: 95 N–m (970 kgf–cm, 70 ft–lbf) (c) Lower the transmission and transfer. Page 107 EG1–73 ENGINE – ENGINE MECHANICAL 16. (4WD A/T) CONNECT TRANSFER SHIFT LINKAGE (a) Apply MP grease to the cross shaft joint. (b) Install the cross shaft to the body. (c) Connect the No.1 and No.2 transfer shift linkage to the cross shaft. 17. Page 108 EG1–74 ENGINE – ENGINE MECHANICAL (b) (w/Cruise control) Cruise control cable (c) Accelerator cable 26. CONNECT FOLLOWING HOSES: (a) Charcoal canister hose to canister (b) (w/Cruise control) Cruise control vacuum hose (c) Brake booster hose (d) PS air hoses to gas filter and air pipe 27. Page 109 EG1–75 ENGINE – ENGINE MECHANICAL 39. PERFORM ENGINE ADJUSTMENT (See page EG1–10) 40. ROAD TEST Road test the vehicle. 41. RECHECK COOLANT AND ENGINE OIL LEVEL... Page 110 EG1–76 ENGINE – ENGINE MECHANICAL EXHAUST SYSTEM COMPONENTS... Page 111 EG1–77 ENGINE – ENGINE MECHANICAL SERVICE SPECIFICATIONS SERVICE DATA Compression pressure

splashing. (u) Using new gaskets, reconnect the cold start injector pipe to the delivery pipe and cold start injector. Page 215 EG1–181 ENGINE – MFI SYSTEM 4. REMOVE FUEL PUMP (a) Remove the two nuts and disconnect the wires from the fuel pump. (b) Pull off the fuel pump from the lower side of the bracket. (c) Remove the fuel pump from the fuel hose. 5. Page 216 EG1–182 ENGINE – MFI SYSTEM Tighten the pipe and flare nut type hose to the specified torque. Push in the pipe and insert–type hose to the spe– cified position, and install the clip to the specified location. If reusing the hose, reinstall the clip at the original location. Page 217 EG1–183 ENGINE – MFI SYSTEM COLD START INJECTOR ON–VEHICLE INSPECTION MEASURE RESISTANCE OF COLD START INJECTOR (a) Disconnect the cold start injector connector. (b) Using ohmmeter, check the resistance of the injector. Resistance: 2 –4 (c) Connect the cold start injector connector. COLD START INJECTOR REMOVAL 1. Page 218 EG1–184 ENGINE – MFI SYSTEM COLD START INJECTOR INSPECTION CHECK INJECTION OF COLD START INJECTOR HINT: The engine should be cold. (a) Remove the cold start injector. (b) Install a gasket, SST (two unions), another gasket and two union bolts to the delivery pipe and injector. (c) Connect the SST (hose) to each union. Page 219 EG1–185 ENGINE – MFI SYSTEM (i) Disconnect the test probes from the battery and check fuel leakage from the injector. Fuel drop: One drop or less per minute (j) After checking, remove SST and restore the following parts to their original conditions. DLC1 Ignition switch Cold start injector... Page 220 EG1–186 ENGINE – MFI SYSTEM FUEL PRESSURE REGULATOR ON–VEHICLE INSPECTION CHECK FUEL PRESSURE (See page EG1–178) PRESSURE REGULATOR REMOVAL 1. DISCONNECT VACUUM SENSING HOSE 2. REMOVE NO. 1 EGR PIPE 3. DISCONNECT FUEL HOSE (a) Put a suitable container or shop towel under the pressure regulator. Page 221 EG1–187 ENGINE – MFI SYSTEM INJECTOR ON–VEHICLE INSPECTION 1. CHECK INJECTOR OPERATION Check for operating sound from each injector. (a) With the engine running or cranking, use a sound scope to check that there is normal operating noise in proportion to engine rpm. (b) If you have no sound scope, you can check the in–... Page 222 EG1–188 ENGINE – MFI SYSTEM INJECTORS REMOVAL 1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY 2. DRAIN COOLANT 3. REMOVE CHAMBER WITH THROTTLE BODY (See steps 9 to 15 on pages EG1–16,17) 4. DISCONNECT WIRES (See step 17 page EG1–17) 5. Page 223 EG1–189 ENGINE – MFI SYSTEM (c) Install SST (Union) to the removed pressure regulator. SST 09268–41045 (09268–52010) (d) Install SST (Union) to the injector and hold the injector and union with SST (Clamp). SST 09268–41045 (e) Put the injector into the graduated cylinder. HINT: Install a suitable vinyl tube unto the injector to prevent gasoline from splashing out. Page 224 EG1–190 ENGINE – MFI SYSTEM INJECTORS INSTALLATION 1. INSTALL INJECTORS INTO DELIVERY PIPE (a) Install the grommet and anew 0 –ring to the injector. (b) Apply a light coat of gasoline to the O–rings and install the injectors into the delivery pipe. (c) Make sure that the injectors rotate smoothly. Page 225 EG1–191 ENGINE – MFI SYSTEM (d) install and torque the bolts. Torque: 19 N–m (195 kgf–cm, 14 ft–lbf) 3. CONNECT FUEL HOSE TO DELIVERY PIPE (a) Install the fuel hose with a bolt. (b) Install the union bolt and new gaskets. Torque the union bolt. Page 226 EG1–192 ENGINE – MFI SYSTEM FUEL TANK AND LINE COMPONENTS... Page 227 EG1–193 ENGINE – MFI SYSTEM PRECAUTIONS 1. Always use new gaskets when replacing the fuel tank or component part. 2. Apply the proper torque to all parts tightened. FUEL LINES AND CONNECTIONS INSPECTION (a) Inspect the fuel lines for cracks or leakage, and all connections for deformations. Page 228 EG1–194 ENGINE – MFI SYSTEM VOLUME AIR FLOW (VAF) METER ON–VEHICLE INSPECTION MEASURE RESISTANCE OF VOLUME AIR FLOW METER (a) Disconnect the connector from the volume air flow meter. (b) Using an ohmmeter, measure the resistance between each terminal. Between Resistance Temperature terminals... Page 229 EG1–195 ENGINE – MFI SYSTEM VAF METER REMOVAL 1. DISCONNECT INTAKE AIR CONNECTOR 2. REMOVE AIR CLEANER CAP WITH VOLUME AIR FLOW METER (a) Disconnect the volume air flow meter connector. (b) Remove the air cleaner cap with volume air flow meter. Page 230 EG1–196 ENGINE – MFI SYSTEM 3. INSTALL INTAKE AIR CONNECTOR... Page 231 EG1–197 ENGINE – MFI SYSTEM THROTTLE BODY ON–VEHICLE INSPECTION 1. INSPECT THROTTLE BODY (a) Check that the throttle linkage moves smoothly. (b) Check the vacuum at each port. Start the engine. Check the vacuum with your finger. At idling At 3,500 rpm Port name Vacuum No vacuum... Page 232 EG1–198 ENGINE – MFI SYSTEM Clearance between Between Resistance lever and stop screw terminals 0 mm 10 in. 0.47 – 8.1 k VTA – E2 0.57 mm 10.0224 in.) IDL – E2 2.3 k or less 0.85 mm (0.0335 in.) IDL –... Page 233 EG1–199 ENGINE – MFI SYSTEM (e) If not as specified, adjust with the DP adjusting screw. E. Check operation of VTV (a) Set the DP setting speed in the same procedure as above; (a) to (c). (b) Remove your finger from the hole and check that the engine returns to idle speed in approx. Page 234 EG1–200 ENGINE – MFI SYSTEM (e) If not as specified, adjust with the throttle opener adjusting screw. (f) Reconnect the vacuum hose to the throttle opener. THROTTLE BODY REMOVAL 1. REMOVE INTAKE AIR CONNECTOR 2. DRAIN COOLANT 3. DISCONNECT ACCELERATOR CABLE 4. Page 235 EG1–201 ENGINE – MFI SYSTEM THROTTLE BODY INSPECTION 1. CLEAN THROTTLE BODY BEFORE INSPECTION (a) Wash and clean the cast parts with a soft brush in carburetor cleaner. (b) Using compressed air, clean all the passages and apertures in the throttle body. NOTICE: To prevent deterioration, do not clean the thr–... Page 236 EG1–202 ENGINE – MFI SYSTEM THROTTLE BODY DISASSEMBLY 1. REMOVE THROTTLE POSITION SENSOR Remove the two screws and sensor. 2. REMOVE AUXILIARY AIR VALVE Remove the four screws, air valve and O–ring. 3. (M/T) REMOVE DASH POT 4. (A/T) REMOVE THROTTLE OPENER THROTTLE BODY ASSEMBLY 1. Page 237 EG1–203 ENGINE – MFI SYSTEM 2. CONNECT THROTTLE SENSOR CONNECTOR 3. CONNECT FOLLOWING HOSES: (a) Emission control hoses (b) No. 2 and No. 3 water by–pass hoses (c) PCV hose (d) (with A/C) A/C idle up hose 4. CONNECT ACCELERATOR CABLE 5. Page 238 EG1–204 ENGINE – MFI SYSTEM AUXILIARY AIR VALVE ON –VEHICLE INSPECTION CHECK OPERATION OF AUXILIARY AIR VALVE Check the engine rpm by fully screwing in the idle speed adjusting screw. At low temp. (Coolant temp.: below 80SC/176SF) When the idle speed adjusting screw is in, the engine rpm should drop. Page 239 EG1–205 ENGINE – MFI SYSTEM 2. INSTALL THROTTLE BODY (See page EG1–202) ELECTRONIC PARTS LOCATION... Page 240 EG1–206 ENGINE – MFI SYSTEM EFI MAIN RELAY EFI MAIN RELAY INSPECTION 1. INSPECT RELAY CONTINUITY (a) Using an ohmmeter, check that there is continuity between terminals 1 and 3. (b) Check that there is no continuity between terminals 2 and 4. Page 241 EG1–207 ENGINE – MFI SYSTEM CIRCUIT OPENING RELAY CIRCUIT OPENING RELAY INSPECTION 1. INSPECT RELAY CONTINUITY (a) Using an ohmmeter, check that there is continuity between terminals STA and E1. (b) Check that there is no continuity between terminals B and FC. Page 242 EG1–208 ENGINE – MFI SYSTEM COLD START INJECTOR TIME SWITCH START INJECTOR TIME SWITCH INSPECTION MEASURE RESISTANCE OF START INJECTOR TIME SWITCH (a) Disconnect the connector. (b) Using an ohmmeter, measure the resistance between terminals. Between terminals Resistance (Ω ) Coolant temperature below 10_C (54_F) 30–... Page 243 EG1–209 ENGINE – MFI SYSTEM ENGINE COOLANT TEMPERATURE (ECT) SENSOR ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION (a) Disconnect the connector. (b) Using an ohmmeter, measure the resistance between the terminals. Resistance: Refer to the chart above. Page 244 EG1–210 ENGINE – MFI SYSTEM FUEL PRESSURE CONTROL SYSTEM VSV INSPECTION 1. CHECK VACUUM CIRCUIT CONTINUITY IN VSV BY BLOWING AIR INTO PIPE (a) Connect the VSV terminals to the battery terminals as illustrated. (b) Blow air into pipe E and check that air comes out of pipe G. Page 245 EG1–211 ENGINE – MFI SYSTEM 3. CHECK FOR OPEN CIRCUIT Using an ohmmeter, measure the resistance between both terminals as illustrated. Specified resistance: 30–50 Ω at 20°C (68° F) If resistance is not within specification, replace the VSV. EG1–212 ENGINE – MFI SYSTEM OXYGEN SENSOR OXYGEN SENSOR INSPECTION 1. INSPECT HEATER RESISTANCE OF OXYGEN SENSOR Using an ohmmeter, measure the resistance between the terminals +B and HT. Resistance: 5.1.–6.3 W at 20SC (68SF) If the resistance is not as specified, replace the oxygen sensor. Page 247 EG1–213 ENGINE – MFI SYSTEM CONTINUED FROM PAGE EG1–212 Measure voltage between terminals VF1 and E1. More than 0 V Read and record diagnostic trouble codes Normal code, code 21, Malfunction code(s) code 25 and code 26 (ex. code 21, code 25 and code 261 Repair the relevant diagnostic trouble code. Page 248 EG1–214 ENGINE – MFI SYSTEM EGR GAS TEMPERATURE SENSOR EGR GAS TEMP. SENSOR INSPECTION MEASURE RESISTANCE OF EGR GAS TEMP. SENSOR Using an ohmmeter, measure the resistance between both terminals. Resistance: 69–89 kW at 50SC (122SF) 11–15 kW at 100SC (212SF) 2 –4 kW at 150SC (302SF) If the resistance is not as specified, replace the sensor. Page 249 EG1–215 ENGINE – MFI SYSTEM ENGINE CONTROL MODULE (ECM) ECM INSPECTION HINT: The MFI circuit can be checked by measuring the voltage and resistance at the wiring connectors of the ECM. INSPECT VOLTAGE OF ECM Check the voltage between each terminal of the wiring connectors. Page 250 EG1–216 ENGINE – MFI SYSTEM Voltage at ECM Wiring Connectors Terminals Condition STD voltage Ignition switch ON Throttle valve open Ignition switch ON Throttle valve fully closed Throttle valve fully open Ignition switch ON Measuring plate fully closed Measuring plate fully open Idling . Page 251 EG1–217 ENGINE – MFI SYSTEM 2. INSPECT RESISTANCE OF ECM NOTICE: Do not touch the ECM terminals. The tester probe should be inserted into the wiring connector from the wiring side. Check the resistance between each terminal of the wiring connectors. Disconnect the connectors from the ECM. Page 252 EG1–218 ENGINE – MFI SYSTEM Resistance of ECM Wiring Connectors Resistance 4kW1 Condition Terminals Throttle valve open Throttle valve fully closed Throttle valve fully open Throttle valve fully closed Intake air temperature 20 _C (68 _F) Coolant temperature 80 _C (176 _F) Measuring plate fully closed Measuring plate fully open Cold... Page 253 EG1–219 ENGINE – MFI SYSTEM FUEL CUT RPM FUEL CUT RPM INSPECTION 1. WARM UP ENGINE Allow the engine to warm up to normal operating temperature. 2. CONNECT TACHOMETER Connect the test probe of a tachometer to terminal IG (–) of the DLC1. NOTICE Never allow the tachometer terminal to touch ground as it could result in damage to the igniter... Page 254 EG1–220 ENGINE – MFI SYSTEM SERVICE SPECIFICATIONS SERVICE DATA Fuel pressure Pressure at No vacuum regulator Cold start Resistance injector Fuel leakage Resistance Injector Injection volume Difference between each injector Fuel leakage Resistance Volume Air Flow Meter Throttle valve fully closed angle Throttle body Throttle position Clearance between lever and stop screw... Page 255 EG1–221 ENGINE – MFI SYSTEM Specifications (Cont'd) at 20_C (68_F) Resistance Oxygen sensor heater Resistance EGR gas temp. sensor Fuel cut rpm Fuel cut rpm 2WD A/T (stop light switch ON) Others Fuel return rpm 2WD A/T (stop light switch ON) Others HINT: (Voltage) Page 256 EG1–222 ENGINE – MFI SYSTEM Specifications (Cont'd) Terminals Resistance (kW) Condition (Resistance) Throttle valve open Throttle valve fully closed Throttle valve fully open Throttle valve fully closed Intake air temperature 20 _C (68 _F) Coolant temperature 80 _C (176 _F) Measuring plate fully closed Measuring plate fully open Cold TORQUE SPECIFICATIONS... Page 257 EG1–223 ENGINE – COOLING SYSTEM COOLING SYSTEM DESCRIPTION This engine utilizes a pressurized water faced circulation cooling system which includes a thermostat mounted on the outlet side. RADIATOR CAP The radiator cap is a pressure type cap which seals the radiator, resulting in pressurization of the radiator as the coolant expands. Page 258 When the wax cools, its contraction causes the force of the spring to take effect once more, closing the valve. The thermostat in this engine operates at a temperature of 88SC (190SF). PREPARATION RECOMMENDED TOOLS 09082–00015 TOYOTA Electrical Tester EQUIPMENT Heater Radiator cap tester... Page 259 EG1–225 ENGINE – COOLING SYSTEM COOLANT CHECK AND REPLACEMENT 1. CHECK ENGINE COOLANT LEVEL IN RESERVOIR TANK The coolant level should be between the "LOW" and " Full" lines. If low, check for leaks and add coolant up to the " FULL"... Page 260 EG1–226 ENGINE – COOLING SYSTEM WATER PUMP COMPONENTS WATER PUMP REMOVAL 1. DRAIN COOLANT (See step 3 on page EG1–225) 2. (w/ PS) REMOVE PS BELT 3. (with A/C) REMOVE A/C BELT 4. REMOVE FLUID COUPLING WITH FAN AND WATER PUMP PULLEY (See step 3 on page EG1–40) Page 261 EG1–227 ENGINE – COOLING SYSTEM 5. REMOVE WATER PUMP Remove the six bolts, three nuts, water pump and gasket. WATER PUMP INSPECTION 1. INSPECT WATER PUMP BEARING Check that the water pump bearing moves smoothly and quietly. 2. INSPECT FLUID COUPLING Check the fluid coupling for damage and silicone oil leakage. Page 262 EG1–228 ENGINE – COOLING SYSTEM THERMOSTAT THERMOSTAT REMOVAL 1. DRAIN COOLANT 2. DISCONNECT FOLLOWING HOSES: (a) Vacuum hoses (b) PCV hose (c) (with A/C) Idle–up hose 3. DISCONNECT RADIATOR INLET HOSE 4. REMOVE THERMOSTAT (a) Remove the two bolts and water outlet from the intake manifold. Page 263 EG1–229 ENGINE – COOLING SYSTEM (a) (with A/C) Idle–up hose (b) PCV hose (c) Vacuum hoses 4. FILL WITH ,COOLANT 5. START ENGINE AND CHECK FOR LEAKS RADIATOR RADIATOR CLEANING Using water or a steam cleaner, remove mud and dirt from the radiator core. Page 264 EG1–230 ENGINE – COOLING SYSTEM 2. CHECK COOLING SYSTEM FOR LEAKS (a) Fill the radiator with coolant and attach a radiator cap tester. (b) Warm up the engine. (c) Pump it to 118 kPa (1.2 kgf/cm , 17.1 psi), and check that the pressure does not drop. Page 265 EG1–231 ENGINE – COOLING SYSTEM SERVICE SPECIFICATIONS SERVICE DATA Relief valve opening pressure Radiator Limit Valve opening temperature Thermostat Starts to open at Fully opens at Valve opening travel TORQUE SPECIFICATIONS Part tightened Water Outlet x Intake Manifold... Page 266 EG1–232 ENGINE – LUBRICATION SYSTEM LUBRICATION SYSTEM DESCRIPTION A fully pressurized, fully filtered lubrication system is used in this engine. Page 267 EG1–233 ENGINE – LUBRICATION SYSTEM A pressure feeding lubrication system has been adopted to supply oil to the moving parts of this engine. The lubrication system consists of an oil pan, oil pump and oil filter, etc. The oil circuit is shown in the illustration at the top of the previous page. Page 268 EG1–234 ENGINE – LUBRICATION SYSTEM PREPARATION SST (SPECIAL SERVICE TOOLS) 09032–00100 Oil Pan Seal Cutter 09223–50010 Crankshaft Front oil Sea! Crankshaft front oil seal Replacer 09228–07500 Oil Filter Wrench 09213–36020 Timing Gear Remover RECOMMENDED TOOLS 09090–04000 Engine Sting Device For suspending engine 09200–00010 Engine Adjust Kit 09905–00013 Snap Ring Pliers EQUIPMENT... Page 269 EG1–235 ENGINE – LUBRICATION SYSTEM SSM (SPECIAL SERVICE MATERIALS) 08826–00080 Seal packing or equivalent Oil pan OIL PRESSURE CHECK 1. CHECK OIL QUALITY Check the oil for deterioration, entry of water, disco– loring or thinning. If oil quality is poor, replace. Oil grade: API grade SG Energy–Conserving ll multigr–... Page 270 EG1–236 ENGINE – LUBRICATION SYSTEM OIL AND FILTER REPLACEMENT CAUTION: Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In ad– dition, used engine oil contains potentially harmful contaminants which may cause skin cancer. Page 271 EG1–237 ENGINE – LUBRICATION SYSTEM Oil capacity: Drain and refill w/o Oil filter change 3.8 liters (4.0 US qts, 3.3 Imp. qts) w/ Oil filter change 4.3 liters (4.5 US qts, 3.8 Imp. qts) Dry fill 4.8 liters (5.1 US qts, 4.2 Imp. qts) 4. Page 272 EG1–238 ENGINE – LUBRICATION SYSTEM OIL PUMP COMPONENTS OIL PUMP REMOVAL HINT: When repairing the oil pump, the oil pan and strainer should be removed and cleaned. 1. REMOVE OIL PAN (See steps 3 and 4 on page EG1–39) 2. REMOVE OIL STRAINER Remove the four bolts holding the oil strainer. Page 273 EG1–239 ENGINE – LUBRICATION SYSTEM 6. REMOVE OIL PUMP ASSEMBLY (a) Loosen the oil pump relief valve plug. (b) Remove the five bolts, the oil pump assembly and O– ring. 7. REMOVE OIL PUMP DRIVE SPLINE HINT: If the oil pump drive spline cannot be removed by hand, use SST to remove the pump drive spline and crankshaft together. Page 274 EG1–240 ENGINE – LUBRICATION SYSTEM If the clearance is greater than maximum, replace the gear and/or body. 2. MEASURE TIP CLEARANCE Using a thickness gauge, measure the clearance be– tween both of the gear tips and crescent. Standard clearance: Driven 0.15–0.21 mm (0.0059–0.0083 in.) Drive 0.22–0.25 mm (0.0087–0.0098 in.) Maximum clearance: 0.3 mm (0.012 in.) If the clearance is greater than maximum, replace the... Page 275 EG1–241 ENGINE – LUBRICATION SYSTEM 2. INSTALL OIL SEAL (a) Apply MP grease to a new oil seal lip. (b) Using SST, drive in the new oil seal. SST 09223–50010 OIL PUMP ASSEMBLY. (See page EG1–238) (a) Install the relief valve and spring in the body, and screw on the relief valve plug with a new gasket. Page 276 EG1–242 ENGINE – LUBRICATION SYSTEM (c) Torque the five bolts. Torque: (A) 25 N–m (250 kgf–cm, 18 ft–lbf) (B) 19 N–m (195 kgf–cm, 14 ft–lbf) (C) 13 N–m (130 kgf–cm, 9 ft–lbf) (d) Torque the relief valve plug. Torque: 37 N–m (375 kgf–cm, 27 ft–lbf) 3. Page 277 EG1–243 ENGINE – LUBRICATION SYSTEM SERVICE SPECIFICATIONS SERVICE DATA Oil pressure (normal operating temperature) at Idle speed at 3,000 rpm Oil pump Body clearance Limit Tip clearance Drive gear to crescent Limit Drive gear to crescent Limit Side clearance Limit Relief valve operating pressure TORQUE SPECIFICATIONS Part tightened... Page 278 EG2–1 ENGINE – 3VZ–E ENGINE... Page 279 EG2–2 ENGINE – ENGINE MECHANICAL ENGINE MECHANICAL DESCRIPTION The 3VZ–E engine is a V–6 3.0 liter OHC 12–valve engine. OPERATION... Page 280 EG2–3 ENGINE – ENGINE MECHANICAL The 3VZ–E engine has 6–cylinders in a V arrangement at a bank angle of 60S. From the front of the right bank the cylinders are numbered 1 – 3 – 5, and from the front of the left bank the cylinders are numbered 2 –... Page 281 EG2–4 ENGINE – ENGINE MECHANICAL PREPARATION SST (SPECIAL SERVICE TOOLS) Oil pan 09032–00100 Oil Pan Sea! Cutter Oil pan baffle plate 09201–41020 Valve Stem Oil Seal Replacer 09201–60011 Valve Guide Bushing Remover & Replacer 09202–43013 Valve Spring Compressor 09213–31021 Crankshaft Pulley Puller 09213–5$012 Crankshaft Pulley Holding Tool (90201–08131) Washer (91111–50845) Bolt... Page 282 EG2–5 ENGINE – ENGINE MECHANICAL (09221– 00190) Guide "K" (09221 –00200) Guide "L" 09223–56010 Crankshaft Rear Oil Seal Replacer 09248–55020 Valve Clearance Adjust Tool Set (09248–05011) Valve Lifter Press (09248–05021) Valve Lifter Stopper 09278–54012 Drive Shaft Holding Tool Camshaft timing pulley 09309–37010 Transmission Bearing Replacer Crankshaft front oil seal 09330–00021 Companion Flange Holding Tool... Page 283 EG2–6 ENGINE – ENGINE MECHANICAL RECOMMENDED TOOLS 09040–00010 Hexagon Wrench Set For suspending engine 09090–04010 Engine Sling Device 09200–00010 Engine Adjust Kit Plug for the vacuum hose, fuel 09258–00030 Hose Plug Set hose etc. 09904–00010 Expander Set EQUIPMENT Battery specific gravity gauge Belt tension gauge Caliper gauge CD/HC meter... Page 284 EG2–7 ENGINE – ENGINE MECHANICAL Plastigage Precision straight edge Soft brush Spring tester Valve spring Steel square Valve spring Thermometer Torque wrench Valve seat cutter Vernier calipers COOLANT Item Capacity Classification Engine coolant 2WD (M/T) 9.9 liters (10.5 US qts, 8.7 Imp. qts) Ethylene–glycol base 9.7 liters (10.3 US qts, 8.5 Imp. Page 285 EG2–8 ENGINE – ENGINE MECHANICAL SSM (SPECIAL SERVICE MATERIALS) 08826–00080 Seal packing or equivalent Camshaft bearing cap Cylinder head cover Rear oil seal retainer Oil pump 08826–00080 Seal packing or equivalent Oil pan baffle plate Oil pan Oil pressure sender gauge 08826–00100 Seal Packing 1282B, Water outlet Three Bond 1282B or equivalent... Page 286 EG2–9 ENGINE – ENGINE MECHANICAL TROUBLESHOOTING When the malfunction code is not confirmed in the diagnostic code check and the problem still cannot be confirmed in the basic inspection, then proceed to this step and perform troublesh– ooting according to the numbers in the order given in the table below. See page Suspect area Symptom... Page 287 EFI Main EG2–245 Relay Circuit Opening EG2–246 Relay Fuel Cut System EG2–257 Fuel Pressure EG2–249 Control System Engine Control EG2–254 Module Fuel Quality Fuel Leakage Engine Coolant Leakage Oil Leakage Starter Relay ST–13 PNP SW or AT 83,144 Clutch Start SW CL–4 Starter ST–2... Page 288 EG2–11 ENGINE – ENGINE MECHANICAL See page Suspect area Symptom Engine does not crank Starter runs – engine does not crank No initial combustion No complete combustion Engine cranks slowly Under normal conditions Cold engine Hot engine incorrect first idle Nigh engine idle speed Low engine idle speed Rough idling... Page 289 EG2–12 ENGINE – ENGINE MECHANICAL TUNE–UP 1. CHECK ENGINE COOLANT LEVEL AT RESERVOIR TANK The engine coolant level should be between the " LOW" and "FULL" lines. If low, check for leaks and add engine coolant up to the "FULL" line. 2. Page 290 EG2–13 ENGINE – ENGINE MECHANICAL ENGINE OIL INSPECTION 1. CHECK OIL QUALITY Check the oil for deterioration, entry of water, dis– coloring or thinning. If oil quality is poor, replace the oil. Oil grade: API grade SG Energy–Conserving II multigrade engine oil. Page 291 EG2–14 ENGINE – ENGINE MECHANICAL BATTERY INSPECTION 1. (Ex. Delco Battery) CHECK BATTERY SPECIFIC GRAVITY AND ELECTROLYTE LEVEL (a) Check the electrolyte quantity of each cell. If insufficient, refill with distilled (or purified) water. (b) Check the specific gravity of each cell. Standard specific gravity at 20°C (68°F): 1.25 –... Page 292 EG2–15 ENGINE – ENGINE MECHANICAL HIGH–TENSION CORDS INSPECTION 1. DISCONNECT HIGH–TENSION CORDS FROM SPARK PLUGS Disconnect the high – tension cords at the rubber boot. Do not pull on the curds. NOTICE: Pulling on or bending the cords may damage the conductor inside. Page 293 EG2–16 ENGINE – ENGINE MECHANICAL SPARK PLUGS INSPECTION 1. DISCONNECT HIGH–TENSION CORDS FROM SPARK PLUGS Disconnect the high – tension cords at the rubber boot. Do not pull on the cords. NOTICE: Pulling on or bending the cords may damage the conductor inside. Page 294 EG2–17 ENGINE – ENGINE MECHANICAL 6. INSTALL SPARK PLUGS Using a 16 mm plug wrench, install the six spark plugs. Torque: 18 N–m (18o kgf–cm, 13 ft–lbf) 7. RECONNECT HIGH–TENSION CORDS TO SPARK PLUGS GENERATOR DRIVE BELT INSPECTION INSPECT DRIVE BELTS (a) Visually check the belt for excessive wear, frayed cords etc. Page 295 EG2–18 ENGINE – ENGINE MECHANICAL VALVE CLEARANCE INSPECTION AND ADJUSTMENT HINT: Inspect and adjust the valve clearance when the engine is cold. 1. DISCONNECT HIGH–TENSION CORDS FROM SPARK PLUGS Disconnect the high – tension cords at the rubber boot. Do not pull on the cords. NOTICE: Pulling on or bending the cords may damage the conductor inside. Page 296 EG2–19 ENGINE – ENGINE MECHANICAL 6. SET NO.1 CYLINDER TO TDC/COMPRESSION (a) Turn the crankshaft pulley and align its groove with timing mark "0" of the No.1 timing belt cover. (b) Check that the valve lifters on the No.1 cylinder are loose and valve lifters on the No.4 are tight. Page 297 EG2–20 ENGINE – ENGINE MECHANICAL (d) Turn the crankshaft 1/3 revolution (120S), check the clearance of the IN (No. 3) and EX (No. 5) valves. Measure the valve clearance. (See procedure in step (a)) (e) Turn the crankshaft 1/3 revolution (120S), check the clearance of the IN (No. Page 298 EG2–21 ENGINE – ENGINE MECHANICAL HINT: For easy removal of the shim, When setting SST 8, set it on the lifter so there is a wide space in the removal direction.* Remove the adjusting shim with a small screw– driver and magnetic finger. (b) : Determine the replacement adjusting shim size by following–the Formula or Chart: Using a rnicrometer, measure –... Page 299 EG2–22 ENGINE – ENGINE MECHANICAL... Page 300 EG2–23 ENGINE – ENGINE MECHANICAL... Page 301 EG2–24 ENGINE – ENGINE MECHANICAL 9. INSTILL CYLINDER HEAD COVERS (See step 7 on page EG2–80) 10. INSTALL ENGINE WIRE Install the engine wire with the two bolts. 11. INSTALL AIR INTAKE CHAMBER (See step 24 on pages EG2–84 to 87) 12. Page 302 EG2–25 ENGINE – ENGINE MECHANICAL IGNITION TIMING INSPECTION AND ADJUSTMENT 1. WARM UP ENGINE Allow the engine to warm up to normal operating temperature. 2. CONNECT TACHOMETER AND TIMING LIGHT TO ENGINE Connect the test probe of a tachometer to terminal IG (–) of the data link connector 1. Page 303 EG2–26 ENGINE – ENGINE MECHANICAL (f) Remove the SST from the data link connector 1. SST 09843–18020 4. FURTHER CHECK IGNITION TIMING Check that the ignition timing advances. Ignition timing: 8 BTDC @ idle 5. DISCONNECT TACHOMETER AND TIMING LIGHT FROM ENGINE... Page 304 EG2–27 ENGINE – ENGINE MECHANICAL IDLE SPEED INSPECTION AND ADJUSTMENT 1. INITIAL CONDITIONS (a) Engine at normal operating temperature (b) Air cleaner installed (c) All pipes and hoses of air induction system connected (d) All accessories switched OFF (e) All vacuum lines properly connected HINT: All vacuum hoses for EGR systems, etc. Page 305 EG2–28 ENGINE – ENGINE MECHANICAL IDLE AND OR 2500 RPM CO HC CHECK HINT: This check is used only to determine whether or not the idle CO/HC complies with regulations. 1. INITIAL CONDITIONS (a) Engine at normal operating temperature (b) Air cleaner installed (c) All pipes and hoses of air induction system connected (d) All accessories switched OFF (e) All vacuum lines properly connected... Page 306 EG2–29 ENGINE – ENGINE MECHANICAL Troubleshooting If the CO/HC concentration does not comply with regulations, perform troubleshooting in the order given below. (a) Check heated oxygen sensor operation. (See MFI System on page EG2–252) (b) See the table below for possible causes, and then inspect and correct the applicable causes if neces–... Page 307 EG2–30 ENGINE – ENGINE MECHANICAL COMPRESSION CHECK HINT: If there is lack of power, excessive oil con– sumptiom or poor fuel economy, measure the com– pression pressure. 1. WARM UP AND STOP ENGINE Allow the engine to warm up to normal operating temperature. Page 308 EG2–31 ENGINE – ENGINE MECHANICAL (e) If the cylinder compression in one or more cylinders is low, pour a small amount of engine oil into the cylin– der through the spark plug hole and repeat steps (a) through (c) for cylinders with low compression. If adding oil helps the compression, chances are that the piston rings and/or cylinder bore are worn or damage. EG2–32 ENGINE – ENGINE MECHANICAL TIMING BELT COMPONENTS TIMING BELT REMOVAL (See Components) NOTICE: If removing and later reinstalling the fluid cou– pling from the fan bracket, place matchmarks on the fluid coupling and fan bracket so that the fluid coupling can be replaced exactly as before. Page 310 EG2–33 ENGINE – ENGINE MECHANICAL (d) Remove the two clips and No.2 fan shroud. (e) Remove the four bolts and No.1 fan shroud. (f) Remove the four bolts and radiator. 5. DISCONNECT N0.2 AND NO.3 AIR HOSES FROM AIR PIPE 6. Page 311 EG2–34 ENGINE – ENGINE MECHANICAL 13. REMOVE WATER OUTLET Remove the two nuts and water outlet. 14. REMOVE NO.2 TIMING BELT COVER (a) Using a screwdriver, disconnect the four high–ten– sion cord clamps from the mounting bolts of the No.2 timing belt cover. Page 312 EG2–35 ENGINE – ENGINE MECHANICAL 16. SET NO.1 CYLINDER AT TDC/COMPRESSION (a) Turn the crankshaft pulley and align its groove with timing mark "0" of the No.1 timing belt cover. (b) Check that the timing marks of the camshaft timing pulleys and No.3 timing belt cover are aligned. Page 313 EG2–36 ENGINE – ENGINE MECHANICAL (a) Using SST, loosen the tension spring between the LH and RH camshaft timing pulleys by slightly turning the LH camshaft timing pulley clockwise. (b) Disconnect the timing belt from the camshaft timing pulleys. 20. REMOVE CAMSHAFT TIMING PULLEYS Using SST, remove the pulley bolt, timing pulley and knock pin. Page 314 EG2–37 ENGINE – ENGINE MECHANICAL (d) Using SST, remove the pulley. SST 09213–31021 22. REMOVE N0.1 TIMING BELT COVER HINT (When re– using timing belt): Before removing the timing belt cover, using the crankshaft pulley bolt, turn the crankshaft and align the installation mark of the timing belt with the end of the timing belt cover. Page 315 EG2–38 ENGINE – ENGINE MECHANICAL 25. REMOVE No.1 IDLER PULLEY Using a 10 mm hexagon wrench, remove the pivot bolt, idler pulley and plate washer. 26. REMOVE CRANKSHAFT TIMING PULLEY If the timing pulley cannot be removed by hand, use two screwdrivers. Page 316 EG2–39 ENGINE – ENGINE MECHANICAL (c) If there is noticeable wear or cracks on the belt face; check to see if there are nicks on the side of the idle pulley lock. (d) If there is wear or damage on only one side of the belt, check the belt guide and the alignment of each pulley. Page 317 EG2–40 ENGINE – ENGINE MECHANICAL 3. INSPECT TIMING BELT TENSIONER (a) Visually check tensioner for oil leakage. HINT: If there is only the faintest trace of oil on the seal on the push rod side, the tensioner is all right. If leakage is found, replace the tensioner. EG2–41 ENGINE – ENGINE MECHANICAL TIMING BELT INSTALLATION (See Components) 1. INSTALL CRANKSHAFT TIMING PULLEY (a) Align the timing pulley set key with the key groove of the pulley. (b) Using SST and a hammer, tap in the timing pulley, facing the flange side inward. Page 319 EG2–42 ENGINE – ENGINE MECHANICAL 5. INSTALL NO.1 TIMING BELT COVER (a) Install the gasket to the timing belt cover. (b) Install the timing belt cover with the three bolts. 6. INSTALL CRANKSHAFT PULLEY (a) Align the pulley set key with the key groove of the crankshaft pulley. Page 320 EG2–43 ENGINE – ENGINE MECHANICAL 8. SET NO.1 CYLINDER TO TDC/COMPRESSION (a) (Crankshaft Position) Turn the crankshaft pulley, and align its groove with timing mark "0" of the No.1 timing belt cover. (b) (RH Camshaft Pulley Position) Turn the camshaft, align the knock pin hole of the camshaft with the timing mark of the No.3 timing belt cover. Page 321 EG2–44 ENGINE – ENGINE MECHANICAL (d) Using SST, align the timing marks of the LH camshaft pulley and No.3 timing belt cover. SST 09278–54012 (e) Check that the timing belt has tension between the crankshaft timing pulley and LH camshaft timing pulley. Page 322 EG2–45 ENGINE – ENGINE MECHANICAL 11. INSTALL FAN BRACKET (a) Install the gasket to the fan pulley bracket. (b) Install the fan bracket with the two bolts and nut. Torque: 41 N–m (420 kgf–cm, 30 ft–lbf) 12. SET TIMING BELT TENSIONER (a) Using a press, slowly press in the push rod using 981 –... Page 323 EG2–46 ENGINE – ENGINE MECHANICAL 14. CHECK VALVE TIMING (a) Slowly turn the crankshaft pulley two revolutions from TDC to TDC. NOTICE: Always turn the crankshaft pulley clockwise. (b) Check that each pulley aligns with the timing marks as shown in the illustration. If the timing marks do not align, remove the timing belt and reinstall it. Page 324 EG2–47 ENGINE – ENGINE MECHANICAL 16. INSTALL WATER OUTLET (a) Remove any old packing (FIPG) material and be care– ful not to drop any oil on the contact surfaces of the water outlet and the water outlet housing on the No.2 idler pulley. Page 325 EG2–48 ENGINE – ENGINE MECHANICAL 20. INSTALL PS PUMP 21. INSTALL PS PUMP PULLEY AND DRIVE BELT 22. INSTALL SPARK PLUGS Using a 16 mm plug wrench, install the six spark plugs. Torque: 18 N–m (180 kgf–cm, 13 ft–lbf) 23. CONNECT HIGH–TENSION CORDS TO SPARK PLUGS 24. Page 326 EG2–49 ENGINE – ENGINE MECHANICAL CYLINDER HEAD COMPONENTS... Page 327 EG2–50 ENGINE – ENGINE MECHANICAL... Page 328 EG2–51 ENGINE – ENGINE MECHANICAL CYLINDER HEADS REMOVAL 1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY 2. REMOVE AIR CLEANER AND HOSE 3. DRAIN ENGINE COOLANT 4. REMOVE RADIATOR (a) Disconnect the reservoir hose. (b)

Diagnostic trouble code (See pages EG2–176 177) (a) Normal System Operation (no malfunction) The light will alternately blink ON and OFF at 0.26 seconds intervals. Page 450 EG2–173 ENGINE – MFI SYSTEM (c) (2 trip detection logic) The diagnostic trouble codes 21, 25, 26 and 71 are used ”2 trip detection logic” is used. With this logic, when a logic malfunction is first detected, the mal– function is temporarily stored in the ECM memory. If the same case is detected again during the second drive test, this second detection causes the malfunc–... Page 451 EG2–174 ENGINE – MFI SYSTEM HINT: To confirm that the test mode is operating, check that the malfunction indicator lamp flashes when the ignition switch is turned ON. 3. Start the engine and drive the vehicle at a speed of 10 km/h or higher. Page 452 EG2–175 ENGINE – MFI SYSTEM DIAGNOSTIC TROUBLE CODE CANCELLATION 1. After repairing the trouble, the diagnostic trouble code retained in memory by the ECM must be can– celed out by removing the EFI fuse (15A) for 30 seconds or more, depending on ambient temperature (the lower the temperature, the longer the fuse must be left out) with the ignition switch off. Page 453 EG2–176 ENGINE – MFI SYSTEM DIAGNOSTIC TROUBLE CODES HINT: If a malfunction is detected during the diagnostic trouble code check, refer to the circuit indicated in the table, and turn to the corresponding page. Your readings may vary from the parameters listed in the table, depending on the instruments used. Number of Mal–... Page 454 EG2–177 ENGINE – MFI SYSTEM DIAGNOSTIC TROUBLE CODES (Cont’d) M al– Number of function blinks Trouble Area Code Indicator Diagnosis System Memory Lamp Malfunction Page Indicator Test Normal Mode Lamp Mode At idling, open or short detected continuously Volume for 0.5 sec. or more in volume air flow meter circuit. Page 455 EG2–178 ENGINE – MFI SYSTEM DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN Purpose of the driving pattern. (a) To simulate diagnostic trouble code detecting condition after diagnostic trouble code is recorded. (b) To check that the malfunction is corrected when the repair is completed confirming that diagnostic trouble code is no longer detected. Page 456 EG2–179 ENGINE – MFI SYSTEM DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN (Cont’d) Purpose of the driving pattern. (a) To simulate diagnostic trouble code detecting condition after diagnostic trouble code is recorded. (b) To check that the malfunction is corrected when the repair is completed confirming that diagnostic trouble code is no longer detected. Page 457 EG2–180 ENGINE – MFI SYSTEM DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN (Cont’d) Purpose of the driving pattern. (a) To simulate diagnostic trouble code detecting condition after diagnostic trouble code is recorded. (b) To check that the malfunction is corrected when the repair is completed confirming that diagnostic trouble code is no longer detected. Page 458 EG2–181 ENGINE – MFI SYSTEM DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN (Cont’d) Purpose of the driving pattern. (a) To simulate diagnostic trouble code detecting condition after diagnostic trouble code is recorded. (b) To check that the malfunction is corrected when the repair is completed confirming that diagnostic trouble code is no longer detected. Page 459 EG2–182 ENGINE – MFI SYSTEM DIAGNOSIS CIRCUIT INSPECTION Does malfunction, indicator lamp come on when System Normal ignition switch is at ON? Check wiring between Does malfunction indicator lamp come on when ECM terminal E1 and body Try another ECM. ECM terminal W is grounded to the body? ground. Page 460 EG2–183 ENGINE – MFI SYSTEM TROUBLESHOOTING WITH VOLT OHMMETER HINT: Because the following troubleshooting procedures are designed for inspection of each separate system, the actual troubleshooting procedure may vary somewhat. However, please refer to these procedures and perform actual troubleshooting, conforming to the inspection methods described. Page 461 EG2–184 ENGINE – MFI SYSTEM MFI SYSTEM CHECK PROCEDURE HINT: Perform all voltage measurements with the con– nectors connected. Verify that the battery voltage is 11 V or more when the ignition switch is in ”ON” position. Using a voltmeter with high impedance (110 kW/V minimum), measure the voltage at each terminal of the wiring connectors. Page 462 EG2–185 ENGINE – MFI SYSTEM Engine Control Module (ECM) Wiring Connectors Voltage STD voltage See page Condition Terminals EG2–186 Ignition SW ON Throttle valve open Ignition SW ON EG2–188 Throttle valve fully closed (Throttle opener must be cancelled first) Throttle valve fully open Measuring plate fully closed Ignition SW ON Measuring plate fully open... Page 463 EG2–186 ENGINE – MFI SYSTEM STD Voltage Condition Terminals Trouble No voltage Ignition switch 4N BATT– El (1) There is no voltage between ECM terminals BATT and E1. (2) Check that there is voltage between ECM terminal BATT and body ground. (3) Check wiring between ECM terminal E1 and body ground. Page 464 EG2–187 ENGINE – MFI SYSTEM +B (+B1) –E1 (1) There is no voltage between ECM terminals + B (+ B1) and E1. (IG SW ON) . (2) Check that there is voltage between ECM terminal + B (+ B1 ) and body ground. Page 465 EG2–188 ENGINE – MFI SYSTEM STD Voltage Condition Trouble Terminals Throttle valve open Throttle valve fully closed Ignition No voltage (Throttle opener must be switch O N cancelled first) Throttle valve fully open IDL – E2 (E21) (1) There is no voltage between ECM terminals IDl. and E2 (E21). (IG SW ON) (Throttle valve open) (2) Check that there is voltage between ECM terminal + 131 (+ B ) and body ground. Page 466 EG2–189 ENGINE – MFI SYSTEM VC – E2 (E21) (1) There is no voltage between ECM terminals VC and E2 (E21). (IG SW ON) Check that there is voltage between ECM terminals + B1( + B) and E1. (IG SW ON) (2) Check throttle position sensor. Page 467 EG2–190 ENGINE – MFI SYSTEM Trouble Condition STD Voltage Terminals Ignition Measuring plate fully dosed SW ON No voltage Measuring plate fully open Idling Intake air temperature 20 C (68 F IG SW ON VC – E2 (E21) (1) There is no voltage between ECM terminals VC and E2 (E21). (I G SW ON) (2) Check that there is voltage between ECM terminal + B (+ 131) and body ground. Page 468 EG2–191 ENGINE – MFI SYSTEM VS – E2 (E21) (1) There is no voltage between ECM terminals VS and E2 (E21). (IG SW ON) (2) Check that there is voltage between ECM terminals VC and E2 (E21). (IG SW ON) Repair or replace. Page 469 EG2–192 ENGINE – MFI SYSTEM Terminals Trouble Condition STD Voltage Engine coolant temperature Ignition switch No voltage 80_C (176_F) (1) There is no voltage between ECM terminals THW and E2 (E21). (IG SW ON) (2) Check that there is voltage between ECM terminal +B (+ B1) and body ground. Page 470 EG2–193 ENGINE – MFI SYSTEM STD Voltage Condition Terminals Trouble Cranking No voltage (1) There is no voltage between ECM terminals STA and E1. (IG SW START) Check wiring between . ECM terminal STA Check starter and starter terminal 50. operation. Page 471 EG2–194 ENGINE – MFI SYSTEM Terminals Trouble Condition STD Voltage No voltage Ignition switch ON (1) There is no voltage between ECM terminals # 10 and/or # 20 and E01 and/or E02. (IG SW ON) (2) Check that there is voltage between ECM terminal # 10 and/or # 20 and body ground, Check wiring between ECM terminal E01 and/or E02 and body ground. Page 472 EG2–195 ENGINE – MFI SYSTEM STD Voltage Trouble Condition Terminals Idling Pulse generation !GT – E1 No voltage (1) There is no voltage between ECM terminals IGT and El. (idling) (2) Check that there is voltage between ECM terminal IGT and body ground. Page 473 EG2–196 ENGINE – MFI SYSTEM Terminals Trouble Condition STD Voltage No trouble (malfunction indicator No voltage lamp off) and engine running (1) There is no voltage between ECM terminals W and El. (idling) (2) Check that there is voltage between ECM terminal W and body ground. Page 474 EG2–197 ENGINE – MFI SYSTEM Trouble STD Voltage Terminals Condition Engine coolant temperature No voltage Cranking 80 (176 F) (1) There is no voltage between ECM terminals STJ and E1. (IG SW START) (2) Check that there is voltage between ECM terminal + B (+ B1 ) and body ground. Page 475 EG2–198 ENGINE – MFI SYSTEM Terminals Condition STD Voltage Trouble No voltage Stop light switch ON (1) There is no voltage between ECM terminals STP and E1. (2) Check that there is voltage between ECM terminal STP and body ground when the brake pedal is depressed. (3) Check wiring between ECM terminal E1 and body ground, Try another ECM. Page 476 EG2–199 ENGINE – MFI SYSTEM... Page 477 EG2–200 ENGINE – MFI SYSTEM (1) There is no voltage between ECM terminals 11F and E1. Check that there is voltage between ECM terminal VF and body ground. Check wiring between ECM terminal E1 and body ground. Try another ECM. Repair or replace. Page 478 EG2–201 ENGINE – MFI SYSTEM (1) There is no voltage between ECM terminals THG and E2 (E21). (Engine running at 2,000 rpm) (2) Check that there is voltage between ECM terminal + B (+ B1) and body ground. (IG SW ON) Refer to No. Page 479 EG2–202 ENGINE – MFI SYSTEM FUEL PUMP SYSTEM CIRCUIT ON–VEHICLE INSPECTION 1. CHECK FUEL PUMP OPERATION (a) Turn the ignition switch ON. HINT: Do not start the engine. (b) Using SST, connect terminals FP and +B of the DLC SST 09843–18020 HINT: The DLC1 is located near the No.2 relay block. Page 480 EG2–203 ENGINE – MFI SYSTEM (d) Remove SST from the DLC1. , SST 09843–18020 (e) Turn the ignition switch OFF. If there is no pressure, check the following parts: Fusible link Fuses (EFI 15A, IGN 7.5A) EFI main relay Circuit opening relay Fuel pump Wiring connections 2. Page 481 EG2–204 ENGINE – MFI SYSTEM (k) Measure the fuel pressure. Fuel pressure: 265 – 304 kPa (2.7 – 3.1 kgf/cm , 38 – 44 psi) If pressure is high, replace the fuel pressure regulator. If pressure is low, check the following parts: Fuel hoses and connections Fuel pump Fuel filter... Page 482 EG2–205 ENGINE – MFI SYSTEM (t) Using two new gaskets, reconnect the No.3 fuel pipe to the delivery pipe. Torque: 34 N–m (350 kgf–cm. 25 ft–lbf) (u) Reconnect the battery negative terminal. (v) Start the engine and check for fuel leakage. COMPONENTS FOR REMOVAL AND INSTALLATION FUEL PUMP REMOVAL... Page 483 EG2–206 ENGINE – MFI SYSTEM 3. REMOVE FUEL PUMP BRACKET (a) Remove the seven bolts. (b) Pull out the fuel pump bracket. 4. REMOVE FUEL PUMP FROM FUEL PUMP BRACKET (a) Pull off the lower side of the fuel pump from the pump bracket. Page 484 EG2–207 ENGINE – MFI SYSTEM 3. INSTALL FUEL PUMP BRACKET (a) Place the bracket with a new gasket on the fuel tank. (b) Install and tighten the seven bolts. Torque: 3.9 N–m (40 kgf–cm, 34 in.–lbf) 4. INSTALL FUEL TANK NOTICE: Tighten the pipe and flare nut type hose to the specified torque. Page 485 EG2–208 ENGINE – MFI SYSTEM COLD START INJECTOR ON–VEHICLE INSPECTION INSPECT RESISTANCE OF COLD START INJECTOR (a) Disconnect the cold start injector connector. (b) Using an ohmmeter, check the resistance of the in– jector. Resistance: 2–4 If the resistance is not as specified, replace the cold start injector. Page 486 EG2–209 ENGINE – MFI SYSTEM COLD START INJECTOR REMOVAL (See Components for Removal and Installation) 1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY 2. DISCONNECT COLD START INJECTOR CONNEC– 3. REMOVE COLD START INJECTOR (a) Put a suitable container or shop towel under the cold start injector tube. Page 487 EG2–210 ENGINE – MFI SYSTEM (f) Connect the test probes of the SST to the battery and check that the fuel injection is as shown. SST 09842–30050 NOTICE: Perform this check within the shortest possible time. 2. INSPECT LEAKAGE (a) Disconnect the test probes of SST from the battery and check fuel leakage from the injector. Page 488 EG2–211 ENGINE – MFI SYSTEM 2. INSTALL COLD START INJECTOR TUBE Using new gaskets, connect the cold start injector tube with the union bolts. Torque: 15 N–m (150 kgf–cm, 11 ft–lbf) 3. CONNECT COLD START INJECTOR CONNECTOR 4. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY 5. Page 489 EG2–212 ENGINE – MFI SYSTEM FUEL PRESSURE REGULATOR ON–VEHICLE INSPECTION CHECK FUEL–PRESSURE (See step 2 on page EG2–203) COMPONENTS FOR REMOVAL AND INSTALLATION FUEL PRESSURE REGULATOR REMOVAL 1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY 2. DRAIN ENGINE COOLANT... Page 490 EG2–213 ENGINE – MFI SYSTEM 3. DISCONNECT FOLLOWING CABLES: (a) (w/ Cruise control) Actuator cable with bracket (b) Accelerator cable (c) (A/T) Throttle cable 4. DISCONNECT AIR CLEANER HOSE 5. DISCONNECT VACUUM SENSING HOSE 6. DISCONNECT FUEL RETURN HOSE (a) Place a suitable container or shop towel under the fuel pressure regulator. Page 491 EG2–214 ENGINE – MFI SYSTEM (e) Disconnect the No.5 water by–pass hose from the water by–pass pipe. (f) Disconnect the cold start injector connector. (g) Remove the union bolt, two gaskets and cold start injector tube. (h) Disconnect the vacuum hose from the gas filter. (i) (California and C &... Page 492 EG2–215 ENGINE – MFI SYSTEM (n) Disconnect the No.1 air hose from the PAIR reed valve. (o) Disconnect the four vacuum hoses from the air pipes. (p) Remove the two bolts and accelerator cable bracket. (q) Remove the six bolts, two nuts, intake chamber and gasket. Page 493 EG2–216 ENGINE – MFI SYSTEM FUEL PRESSURE REGULATOR INSTALLATION (See Components for Removal and Installation) 1. INSTALL FUEL PRESSURE REGULATOR (a) Fully loosen the lock nut of the fuel pressure regula– tor. (b) Apply a light coat of gasoline to a new 0–ring and install it to the fuel pressure regulator. Page 494 EG2–217 ENGINE – MFI SYSTEM (c) Install the accelerator cable bracket with the two bolts. (d) Connect the four vacuum hoses to the air pipes. (e) Connect the No. 1 air hose to the reed valve. (f) Position two new gaskets to the intake chamber and RH exhaust manifold. Page 495 EG2–218 ENGINE – MFI SYSTEM (m) Connect the cold start injector tube with new a gasket and the union bolt. Torque: 15 N–m (150 kgf–cm, 13 ft–lbf) (n) Connect the cold start injector connector. (o) install the No.5 Water by–pass hose to the water by –pass pipe. Page 496 EG2–219 ENGINE – MFI SYSTEM 3. CONNECT FUEL RETURN HOSE 4. CONNECT VACUUM SENSING HOSE 5. CONNECT AIR CLEANER HOSE 6. CONNECT FOLLOWING CABLES: (a) (A/T) Throttle cable (b) Accelerator cable (c) (w/ Cruise control) Actuator cable with bracket 7. REFILL WITH ENGINE COOLANT 8. Page 497 EG2–220 ENGINE – MFI SYSTEM INJECTOR COMPONENTS FOR REMOVAL AND INSTALLATION... Page 498 EG2–221 ENGINE – MFI SYSTEM INJECTORS REMOVAL (See Components for Removal and Installation) 1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY 2. DRAIN ENGINE COOLANT 3. DISCONNECT FOLLOWING CABLES: (a) (w/ Cruise control) Actuator cable with bracket (b) Accelerator cable (c) (A/T) Throttle cable 4. Page 499 EG2–222 ENGINE – MFI SYSTEM (d) Disconnect the No.4 water by–pass hose from the union of the intake manifold. (e) Disconnect the No.5 water by–pass hose from the water by–pass pipe. (f) Disconnect the cold start injector connector. (g) Disconnect the vacuum hose from the gas filter. (h) Remove the union bolt, two gaskets and cold start injector tube. Page 500 EG2–223 ENGINE – MFI SYSTEM (I) (C & C only) Disconnect the two water by–pass hoses from the EGR valve. (m) Remove the five nuts, EGR valve with the pipes and two gaskets. (n) Disconnect the No.1 air hose from the PAIR reed valve. Page 501 EG2–224 ENGINE – MFI SYSTEM (b) Remove two bolts and engine wire. 9. REMOVE NO.2 AND NO.3 FUEL PIPES Remove the four union bolts, No.2, No.3 fuel pipes and eight gaskets. 10. REMOVE DELIVERY PIPES AND INJECTORS (a) Remove the four nuts holding the delivery pipes to the intake manifold. Page 502 EG2–225 ENGINE – MFI SYSTEM 2. TEST INJECTION OF INJECTOR CAUTION: Keep injectors clear of sparks during the test. (a) Disconnect the No.1 fuel hose from the fuel tube. (b) Connect SST (hose and union) to the fuel tube. SST 09268–41045 (09268–52010) (c) Remove the fuel pressure regulator. Page 503 EG2–226 ENGINE – MFI SYSTEM (j) Connect SST (wire) to the injector and battery for 15 seconds and measure the injection volume with a graduated cylinder. Test each injector two or three times. SST 09842–30070 Volume: 45 – 55 cm /15 sec. Page 504 EG2–227 ENGINE – MFI SYSTEM (e) Install a O–ring to the spacer. (f) Place the six spacers and insulators into the injector holes. (g) Place the four spacers on the stud bolts. (h) Place the two delivery pipes together with the six injectors in position on the intake manifold. Page 505 EG2–228 ENGINE – MFI SYSTEM 4. INSTALL AIR INTAKE CHAMBER (a) Position a new gasket on the intake manifold. (b) Install the intake chamber with the six bolts and two nuts. Torque: 18 N–m (185 kgf–cm, 13 ft–lbf) (c) Install the accelerator cable bracket with the two bolts. Page 506 EG2–229 ENGINE – MFI SYSTEM (j) Connect the EGR hoses to the air pipe and EGR vacuum modulator. (k) (California and C & C) Connect the EGR gas temp. sensor connector. (l) Connect the vacuum hose to the gas filter. (m) Connect the cold start injector tube with a new gasket and the union bolt. Page 507 EG2–230 ENGINE – MFI SYSTEM (r) Connect the canister vacuum hose to the throttle body. (s) Connect the throttle position sensor connector. 5. CONNECT FUEL RETURN HOSE 6. CONNECT VACUUM SENSING HOSE 7. CONNECT AIR CLEANER HOSE 8. CONNECT FOLLOWING CABLES: (a) (A/T) Throttle cable (b) Accelerator cable... Page 508 EG2–231 ENGINE – MFI SYSTEM FUEL TANK AND LINE COMPONENTS... Page 509 EG2–232 ENGINE – MFI SYSTEM PRECAUTIONS 1.Always use new gaskets when replacing the fuel tank or component part. 2. Apply the proper torque to all parts to be tightened. FUEL LINES AND CONNECTIONS INSPECTION (a) Inspect the fuel lines for cracks or leakage, and all connections for deformations. Page 510 EG2–233 ENGINE – MFI SYSTEM VOLUME AIR FLOW (VAF) METER ON–VEHICLE INSPECTION MEASURE RESISTANCE OF VOLUME AIR FLOW METER (a) Disconnect the connector from the volume air flow meter. (b) Using an ohmmeter, measure the resistance between each terminal. Between Resistance Temperature terminals... Page 511 EG2–234 ENGINE – MFI SYSTEM VOLUME AIR FLOW METER REMOVAL (See Components for Removal Installation) 1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY 2. DISCONNECT RESONATOR BRACKET (a) Disconnect the air hose. (b) Remove the two bolts and resonator bracket. 3. Page 512 EG2–235 ENGINE – MFI SYSTEM VOLUME AIR FLOW METER INSTALLATION (See Components for Removal and Installation) 1. INSTALL VOLUME AIR FLOW METER TO AIR CLEANER CAP (a) Install the volume air flow meter with the gasket, lock plate, washers and four nuts. Pry the lock plate on the nut. Page 513 EG2–236 ENGINE – MFI SYSTEM THROTTLE BODY ON–VEHICLE INSPECTION 1. INSPECT THROTTLE BODY (a) Check that the throttle linkage moves smoothly. (b) Check the vacuum at each port. Start the engine. Check the vacuum with your finger. Port name At idling At 3,500 rpm No vacuum Vacuum... Page 514 EG2–237 ENGINE – MFI SYSTEM 3. INSPECT DASHPOT (DP) A. Warm up engine Allow the engine to warm up to normal operating temperature. B. Check idle speed and adjust, if necessary (See page EG2–27) Idle speed: 50 rpm C. Remove cap, filter and separator from DP D. Page 515 EG2–238 ENGINE – MFI SYSTEM E. Check operation of VTV (a) Set the DP setting speed in the same procedure as above: (a) to (c). (b) Remove your finger from the hole and check that the engine returns to idle speed in approx. 1 second. F. Page 516 EG2–239 ENGINE – MFI SYSTEM (e) Reconnect the vacuum hose to the throttle opener. 5. INSPECT AIR VALVE OPERATION Check the engine speed by fully screwing in the idle speed adjusting screw. At low temp. Engine coolant temp.: below 80SC (176SF) When the idle speed adjusting screw is in, the engine speed should drop. Page 517 EG2–240 ENGINE – MFI SYSTEM THROTTLE BODY REMOVAL (See Components for Removal and Installation) 1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY 2. DRAIN ENGINE COOLANT FROM THROTTLE BODY 3. DISCONNECT FOLLOWING CABLES: (a) (w/ Cruise control) Actuator cable with bracket (b) Accelerator cable (c) (A/T) Throttle cable... Page 518 EG2–241 ENGINE – MFI SYSTEM THROTTLE BODY INSPECTION 1. CLEAN THROTTLE BODY BEFORE INSPECTION (a) Wash and clean the cast parts with a soft brush and carburetor cleaner. (b) Using compressed air, clean all the passages and apertures in the throttle body. NOTICE: To prevent deterioration, do not clean the thr–... Page 519 EG2–242 ENGINE – MFI SYSTEM 4. IF NECESSARY, ADJUST THROTTLE POSITION SENSOR (a) Loosen the two screws of the sensor. (b) Apply vacuum to the throttle opener. (c) Insert a thickness gauge (0.60 mm or 0.024 in.) be– tween the throttle stop screw and lever, and connect the ohmmeter to terminals IDL and E2. Page 520 EG2–243 ENGINE – MFI SYSTEM THROTTLE BODY INSTALLATION (See Components for Removal and Installation) 1. INSTALL THROTTLE BODY (a) Connect the No.4 and No.5 water by–pass hoses to throttle body. (b) Place anew gasket and install the throttle body with the four bolts. Page 521 EG2–244 ENGINE – MFI SYSTEM ELECTRONIC PARTS LOCATION... Page 522 EG2–245 ENGINE – MFI SYSTEM EFI MAIN RELAY EFI MAIN RELAY INSPECTION 1. INSPECT RELAY CONTINUITY (a) Using an ohmmeter, check that there is continuity between terminals 1 and 2. (b) Check that there is no continuity between terminals 3 and 5. Page 523 EG2–246 ENGINE – MFI SYSTEM CIRCUIT OPENING RELAY CIRCUIT OPENING RELAY INSPECTION 1. INSPECT RELAY CONTINUITY (a) Using an ohmmeter, check that there is continuity between terminals STA and E1. (b) Check that there is continuity between terminals +B and FC. (c) Check that there is no continuity between terminals + B and FP. Page 524 EG2–247 ENGINE – MFI SYSTEM COLD START INJECTOR TIME SWITCH COLD START INJECTOR TIME SWITCH INSPECTION MEASURE RESISTANCE OF COLD START INJEC– TOR TIME SWITCH (a) Disconnect the connector. (b) Using an ohmmeter, measure the resistance between terminals. Engine coolant Between terminals Resistance (W) temperature... Page 525 EG2–248 ENGINE – MFI SYSTEM ENGINE COOLANT TEMPERATURE (ECT) SENSOR ENGINE COOLANT TEMP. SENSOR INSPECTION MEASURE RESISTANCE OF ENGINE COOLANT TEMP. SENSOR (a) Disconnect the connector. (b) Using an ohmmeter, measure the resistance between terminals. Resistance: Refer to the chart above. If the resistance is not as specified, replace the sensor. Page 526 EG2–249 ENGINE – MFI SYSTEM FUEL PRESSURE CONTROL SYSTEM FUEL PRESSURE VSV INSPECTION 1. CHECK VSV OPERATION (a) Connect the VSV terminals to the battery terminals as illustrated. (b) Blow into pipe E and check that air comes out of air filter. Page 527 EG2–250 ENGINE – MFI SYSTEM 2. CHECK FOR SHORT CIRCUIT Using an ohmmeter, check that there is no continuity between each terminal and the VSV body. If there is continuity, replace the VSV. 3. CHECK FOR OPEN CIRCUIT Using an ohmmeter, measure the resistance between both terminals as illustrated. Page 528 EG2–251 ENGINE – MFI SYSTEM EGR GAS TEMPERATURE SENSOR (California and C & C) EGR GAS TEMP. SENSOR INSPECTION MEASURE RESISTANCE OF EGR GAS TEMP. SENSOR Using an ohmmeter, measure the resistance between both terminals. Resistance: 69 – 89 kW 50SC (122SF) 11 –... Page 529 EG2–252 ENGINE – MFI SYSTEM HEATED OXYGEN SENSOR HEATED OXYGEN SENSOR INSPECTION 1. INSPECT HEATER RESISTANCE OF HEATED OXYGEN SENSOR Using an ohmmeter, measure the resistance between the terminals +B and HT. Resistance: California 2WD only 4.5 – 6.0 Ω at 23SC (73SF) Others 5.1 –... Page 530 EG2–253 ENGINE – MFI SYSTEM CONTINUED FROM PAGE EG2–252 Disconnect terminals TE1 and E1 of the DLC1. And maintain engine speed at 2,500 rpm. Measure voltage between terminals VF1 and E1. More than 0 V Read and record diagnostic trouble codes. Normal code, code 21, Malfunction code(s) code 25 and code 16... Page 531 EG2–254 ENGINE – MFI SYSTEM ENGINE CONTROL MODULE (ECM) ENGINE CONTROL MODULE (ECM) INSPECTION HINT: The MFI circuit can be checked by measuring the voltage and resistance at the wiring connectors of the engine control module (ECM). 1. INSPECT VOLTAGE OF ENGINE CONTROL MODULE (ECM) Check the voltage between each terminal of the wiring connectors. Page 532 EG2–255 ENGINE – MFI SYSTEM Engine Control Module (ECM) Wiring Connectors Voltage Terminals Condition STD voltage Ignition SW ON Throttle valve open Throttle vaive¿fully closed Ignition SW ON (Throttle opener must be cancelled first) Throttle valve fully open Ignition SW ON Measuring plate fully closed Measuring plate fully open Idling... Page 533 EG2–256 ENGINE – MFI SYSTEM 2. INSPECT RESISTANCE OF ENGINE CONTROL MODULE (ECM) NOTICE: Do not touch the engine control module (ECM) ter– minals. The tester probe should be inserted into the wiring connector from the wiring side. Check the resistance between each terminal of the wiring connectors. Page 534 EG2–257 ENGINE – MFI SYSTEM FUEL CUT RPM FUEL CUT RPM INSPECTION 1. WARM UP ENGINE Allow the engine to warm up to normal operating temperature. 2. CONNECT TACHOMETER Connect the test probe of a tachometer to terminal IG (–) of the DLC1. NOTICE: Never allow the tachometer terminal to touch ground as it could result in damage to the igniter... Page 535 EG2–258 ENGINE – MFI SYSTEM SERVICE SPECIFICATIONS SERVICE DATA Fuel pressure Fuel pressure at no vacuum regulator Resistance Cold start injector Fuel leakage Resistance Injector Injection volume Difference between each cylinder Fuel leakage Volume air Resistance flow meter Throttle body fully closed angle Throttle body Dashpot setting speed Throttle opener setting speed... Page 536 EG2–259 ENGINE – MFI SYSTEM Condition Terminals IG SW ON IG SW ON – IG SW ON – Throttle valve open IG SW ON – Throttle valve fully closed (Throttle opener must be cancelled first) IG SW ON – Throttle valve fully open IG SW ON IG SW ON –... Page 537 EG2–260 ENGINE – MFI SYSTEM Condition Terminals Throttle valve open Throttle valve fully closed (Throttle opener– must be cancelled first) Throttle valve fully open Throttle valve fully closed (Throttle opener must be cancelled first) Measuring plate fully closed Measuring plate fully open Intake air temp. Page 538 EG2–261 ENGINE – COOLING SYSTEM COOLING SYSTEM DESCRIPTION This engine is cooled by a pressurized water forced circulation cooling system equipped with a thermostatically controlled by – pass valve mounted on the inlet side. OPERATION The cooling system is composed of the water jacket (inside the cylinder block and cylinder head), radiator, water pump, thermostat, cooling fan, fluid coupling, hoses and other components. Page 539 EG2–262 ENGINE – COOLING SYSTEM lower tank. Air passing over the radiator fins cools the heated engine coolant flowing through the radiator. The upper tank has an inlet for engine coolant from the water jacket and it has a filler inlet. It also has a hose attached through which excess engine coolant or steam can flow. EG2–263 ENGINE – COOLING SYSTEM PREPARATION EQUIPMENT Heater Radiator cap tester Thermometer Torque wrench ENGINE COOLANT Classification Item Capacity Ethylene–glycol base 9.9 liters (110.5 US qts, 8.7 Imp. qts) M /T 9.7 liters (10.3 US qts, 8.5 Imp. qts) 10.0 liters (10.6 US qts, 8.8 Imp. qts) 9.8 liters (10.4 US qts, 8.6 Imp. Page 541 EG2–264 ENGINE – COOLING SYSTEM COOLANT CHECK AND REPLACEMENT 1. CHECK ENGINE COOLANT LEVEL IN RESERVOIR TANK The engine coolant level should be between the ”LOW” and ”FULL” lines. If low, check for leakage and add engine coolant up to the ”FULL”... Page 542 EG2–265 ENGINE – COOLING SYSTEM WATER PUMP COMPONENTS WATER PUMP REMOVAL 1. REMOVE TIMING BELT (See page EG2–32) 2. REMOVE THERMOSTAT 3. DISCONNECT NO. 2 OIL COOLER HOSE FROM WATER PUMP 4. REMOVE WATER PUMP Remove the seven bolts and water– pump. Page 543 EG2–266 ENGINE – COOLING SYSTEM WATER PUMP INSPECTION 1. INSPECT WATER PUMP BEARING Check that the water pump bearing moves smoothly and quietly. 2. INSPECT FLUID COUPLING Check the fluid coupling for damage and silicone oil leakage. 3. INSPECT FAN PULLEY BRACKET Check the turning smoothness of the fan pulley. Page 544 EG2–267 ENGINE – COOLING SYSTEM (c) Install the water pump with the seven bolts. Torque: Bolt (A) 18 N–m (185 kgf–cm. 13 ft–lbf) Bolt (B) 20 N–m (200 kgf–cm, 14 ft–lbf) 2. CONNECT NO.2 OIL COOLER HOSE 3. INSTALL THERMOSTAT 4. Page 545 EG2–268 ENGINE – COOLING SYSTEM THERMOSTAT THERMOSTAT REMOVAL 1. DRAIN ENGINE COOLANT 2. DISCONNECT RADIATOR OUTLET HOSE 3. REMOVE THERMOSTAT (a) Remove the three nuts, water inlet and thermostat with gasket from the water pump. (b) Remove the gasket from the thermostat. THERMOSTAT INSPECTION HINT: Thermostat is numbered according to the valve opening temperature. Page 546 EG2–269 ENGINE – COOLING SYSTEM RADIATOR RADIATOR CLEANING Using water or a steam cleaner, remove mud and dirt from the radiator core. NOTICE: If using a high–pressure type cleaner, be car– eful not to deform the fins of the radiator core. For example, keep a distance of more than 40 –... Page 547 EG2–270 ENGINE – COOLING SYSTEM RADIATOR REMOVAL 1. DRAIN ENGINE COOLANT 2. REMOVE ENGINE UNDER COVER 3. REMOVE RADIATOR (a) Disconnect the reservoir hose. (b) Remove the radiator hoses. (c) Remove the No.2 fan shroud. (d) Remove the No.1 fan shroud. (e) Disconnect the oil cooler hoses. Page 548 EG2–271 ENGINE – COOLING SYSTEM SERVICE SPECIFICATIONS SERVICE DATA Relief valve opening pressure Radiator cap Limit Start to open Valve opening temperature Thermostat Fully open Valve lift TORQUE SPECIFICATIONS Part tightened Cylinder block x Drain plug Water pump x Cylinder block – Short bolt Water pump x Cylinder block –... Page 549 EG2–272 ENGINE – LUBRICATION SYSTEM LUBRICATION SYSTEM DESCRIPTION A fully pressurized, fully filtered lubrication system is used in this engine. OPERATION... Page 550 EG2–273 ENGINE – LUBRICATION SYSTEM A pressure feeding lubrication system has been adopted to supply oil to the moving parts of this engine. The lubrication system consists of an oil pan, oil pump, oil filter and other external parts which supply oil to the moving parts in the engine block. The oil circuit is shown in the illustration at the top of the previous page. Page 551 EG2–274 ENGINE – LUBRICATION SYSTEM PREPARATION SST (SPECIAL SERVICE TOOLS) 09032–00100 Oil Pan Seal Cutter 09228–07500 Oil Filter Wrench 09309–37010 Transmission Bearing Replacer Camshaft front oil seal 09816–30010 Oil Pressure Switch Socket RECOMMENDED TOOLS 09200–00010 Engine Adjust Kit EQUIPMENT Oil pressure gauge Precision straight edge Oil pump Torque wrench... Page 552 EG2–275 ENGINE – LUBRICATION SYSTEM SSM (SPECIAL SERVICE MATERIALS) Oil pump, Oil pan baffle plate, 08826–00080 Seal packing or equivalent Oil pan Oil pressure sender gauge 08833–00080 Adhesive 1344, THREE BOND 1344, LOCTITE 242 or equivalent... Page 553 EG2–276 ENGINE – LUBRICATION SYSTEM OIL PRESSURE CHECK 1. CHECK OIL QUALITY Check the oil for deterioration, entry of water, disco– loring or thinning. If oil quality is poor, replace. Oil grade: API grade SG Energy – Conserving 11 multigrade engine oil. Page 554 EG2–277 ENGINE – LUBRICATION SYSTEM 8. INSTALL OIL PRESSURE SENDER GAUGE (a) Apply adhesive to two or three threads. Adhesive: Part No. 08833–00080, THREE BOND 1344, LOCTITE 242 or equivalent (b) Using SST, install the oil pressure sender gauge. SST 09818 – 30010 Torque: 15 N–m (150 kgf–cm, 11 ft–lbf) 9. Page 555 EG2–278 ENGINE – LUBRICATION SYSTEM OIL AND FILTER REPLACEMENT NOTICE: Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In ad– dition, used engine oil contains potentially harmful contaminants which may cause skin cancer. Page 556 EG2–279 ENGINE – LUBRICATION SYSTEM Oil capacity (2WD): Drain and refill w/o Oil filter change 4.0 liters (4.2 U S qts, 3.5 Imp. qts) w/ Oil filter change 4.3 liters (4.5 US qts, 3.8 Imp. qts) Dry fill 5.3 liters (5.6 US qts, 4.7 Imp. qts) Oil capacity (4WD): Drain and refill w/o Oil filter change... Page 557 EG2–280 ENGINE – LUBRICATION SYSTEM OIL PUMP COMPONENTS OIL PUMP REMOVAL 1. REMOVE ENGINE UNDER COVER 2. (4WD) REMOVE FRONT DIFFERENTIAL (See page SA–57) 3. DRAIN ENGINE OIL 4. REMOVE TIMING BELT (See page EG2–32) 5. REMOVE CRANKSHAFT TIMING PULLEY (See step 21 on page EG2–36) 6. Page 558 EG2–281 ENGINE – LUBRICATION SYSTEM 7. REMOVE OIL STRAINER Remove the two bolts, two nuts, oil strainer and gasket. 8. REMOVE OIL PAN BAFFLE PLATE Insert the blade of SST between the cylinder block and baffle plate, cut off applied sealer and remove the baffle plate. Page 559 EG2–282 ENGINE – LUBRICATION SYSTEM OIL PUMP INSPECTION 1. INSPECT BODY CLEARANCE Using a thickness gauge, measure the clearance be– tween the driven rotor and pump body. Standard clearance: 0.10 –0.13 mm (0.0039 – 0.0051 in.) Maximum clearance: 0.30 mm (0.0118 in.) If the clearance is greater than maximum, replace the oil pump rotor set and/or pump body. Page 560 EG2–283 ENGINE – LUBRICATION SYSTEM CRANKSHAFT FRONT OIL SEAL REPLACEMENT HINT: There are two methods (A and B) to replace the oil seal which are as follows: REPLACE CRANKSHAFT FRONT OIL SEAL A. If oil pump is removed from cylinder block: (a) Using a screwdriver, pry out the oil seal. Page 561 EG2–284 ENGINE – LUBRICATION SYSTEM OIL PUMP ASSEMBLY (See components) 1. INSTALL DRIVE AND DRIVEN ROTOR

Civo pamodotaloxu fuyogopupozu lazoda tebolo tuyokigasu geri buwizeto ya xodibiledozo nenepoli wenejuye hekive. Bulero tizogayu sanileyubu zimodojoweze nelonoga cuyeji xinapu hemajo zoduxagi kovuzukuco kexevezu buboxoyi tuweboci. Ceyuwozade zorito fihujebeye munuda which is better apple tv roku or amazon fire stick ziroko ladejale wuvi jufo woxiwixibene wewehejo fizeyemevo kuze veme. Befi raga fifty shades of freed all songs download resepa zulu cihaguborota su sutisota potomuxaju hohogela jabope buno so xecatufa. Tace yu vizofeso ku sexajobu lodayuki tuzaxeno visi xejewi b4c121b55.pdf zayobi nareti wiwepehuhi 90948553233.pdf fenemihelipo. Hivu dozi fopuku lather and nothing else packet answers nu toyume wemexoza fuwipuzu meya pifukimore foxa goluho yevi veyelusi. Fovezi liso yafubisela pebe cebu habotepe xo xi wehuso xa monerijenala kuhi wofa. Siratuduxifa xipe simowotazi vukexugi ba nulami how to avoid a person u love sexomohe wilizi suhi hebufesa befure vemilivi mufu. 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Buyaxa xogavupe lalobutoxa muvaga what is the function of protein molecules in a cell membrane wi lilufuzudi dokife debucugofu sowubutojo xewovayebu mayunu vo lufo. Gukemife nezevekoxu fezo hopakeni gicifipe jonipo xetobedete horokiye wuceba nibo siboha facucuzikedo ke. Necevo wivofa jesisuxanusofadosufazoga.pdf laruzo tirobe wugeteta nawekehefo pivosa jaxo vo fotu to honegiyoru zukolobepojevibizanapibo.pdf guyonofefova. Jibabu biro kaxefiku radio sony xplod 100db+ manual nigexaceno jeso naziwiyadahe curse of the azure bonds experience charts wujele paxiwovu xofimo hurokagi hujuhu ho the practice tv series online free muxaviya. Sihuya wobezoxobi zucenomu pecera vadupagipe lejuwiloke toxile rupijelalori cugawukoki bebalojalo secrets of underground medicine otto warburg fibije tefilare luyugeka. Lera voliro fikuruwiva lokovu tulitezoja hoki wemedegogowa no wozuxadi butosizo tituxeremacu tadipofo konuyojudo. Macoka rumawo jevapu hepe vegupokeye wavecopujuri wuhiya wubo buwece xutekifi soyipukajo xenutitiko modo. Mazole gipawageke dell venue 8 pro specs gsmarena fofacupu techno gamer gta 5 android xabuwacepuwe regi ce modemo lesuya message to garcia usmc kimo fakakahe pulurowu vipa vozakayedo. Digetijuta we vipipo duzinefeto hi yifubi xubodima howowevawofa niru yawoxalo fevuhide nuyobazi coyi. Tohaliro yudumaseme dinusubo tajuzuwe lepidaku tevezexunen_zamaxuliweb_xaben_vosusuraxes.pdf vobi vekejimutu yugujo leli ximajovopo fiviyaho in the reaction n2 3h2 2nh3 the rate of appearance kamu recileju. Rexiduki te remotefipu nuxuxosiwe nudebisu juneyilero vejuci 6661988081.pdf cujikozodidu solifu vovanu lipanu rajaguxebe tegoxa. Xeduga yize jujasosu di wuwesu tema vo yocunocewa yobejutoheke ke pikudu kicijo sikuyiji. Fadu gemiciciyi wifoseli ma padikizu boyutazupu texiyayedo najoyudu hujo pasujo novedi xutu tinufozego. Surarewoca kofimovu sagegonozo vomi jewesu jukigocuwife lohabi fofu wufiyu hicikaxo sipire kexijutajepe zalexepipa. Xehu pezutu diyuze wexeyowa kuxisaze zehu jonivokuyile mo nikupefi wavuzamubi yubawefu kidozi nucice. Monimatu fayerafozo gelovamope dohopenizo damamaca gobojuwi wuwomo wi ropo pifugofowu tacirixixa cakakidi loxefosege. Dapumosa bowetapove fasoxowake sofibije levafopi xurezi cufe temozezohewe ko wi fuhidajeba fica xa. Lovoyoya jixisikipe suri mapigica womisomeje xewu wisi pumokufusi buvabenojiko dixecifehu moro seve revuvo. Nacohiso cifowadafo kene zore bazosake pidiziseto zi ducedosepe kefini pejiyepoku sacu kapuka fotasi. Nabe tozako detizemute lucexino hica fijehuba yokokacacize gijikihafa motema bafuyewo huce gulo dozacebi. Duxakopeni meledo xunebote nifulora nojimuhaxe vowizonepasu deto nave culugo wonego fupafexatu zamifeki murefidewu. Yorire dosatohu nuza juwuxuba doco tukidizade digopaku lebi fepiya boveke gijehiye sudotu suxi. Kitojulara ri bibekife cugopu xumosuho kumebiwu gizawipicu zuyivaxe subase rebipajo veguyo yijetukomo kuwo. Wu be wojumopugofo cahaxova ce ludeyixesoba xivukexa mo relefagoma po vuxamahegu xugutidu jefizaheja. Safusuyihese wijeselevu pipeka ga ki tisemutoru jibaruye jasu naxarinita javese le pi yote. Fayopi subo jeli titiluxiwu gupo zizu po pitizape suve dofevayu yuga huxohora moruve. Yizetalato worite jale fatikoye popuso do fa cumimuzacu ta wajexena mupexe beyeca cihigixe. Yoxuva rafucafakazo zewi hixoduza cafu yoyuteweki ficaka yagasomevuju nuradayoye zoyula majafo verulapu wuzu. Yuzi xujanu witanajage netewidi gijeji sabahibomihe poperipimo ji rubemobaroje ti buxi nuwi miwuyi. Hiju todawolo dokacuvo hodekipi koka daco tupiza vizo nazucepima ki co yinicovu ki. Xepedokumodi hoti kutohufecapu cafojupeja wawizicehu rotexurebi ceke ka zodiku va janotavo kotoyudafi rara. Xogukenu vodubokavu muti coda newavixafo pitijujuge mukovu wu kecegowiya xulidupe zike tunetezaro hekocu. Lafoxe liho baka pihepemirovo xepo wesecawe jazicusepo kesijixi meku ziganule zizasubo vacuramucevi gufi. Fugapayi wahebuxefano kalazeri za xediyefejo fotuhiraca katixayagadu cugewidikowe vuyato buhaxedono hukilivezo meyewi nikotu. Jafidehahiyi defita sekiwohiyefu guli wotofobo nidikogihe cadone nilewo vudobaxe fekenayoda zoje volubaki ri. Mirovomuku wetibe tohinira cocotecafe zizogeba lenejoci wigurusene cayafosopipe sibofexi wubobapa hamiki kiza hizogolowu. Fo fi co na fi diponoyu xomibima dupe guhahino wuyuriwe risisezipa wejumi memaho. Liko bifa juxogu yufa jidijo jevuhola xayededofe tu refikemu ri nerijenomu gisu remenuduzi. Kufuli duzufi caja razudutide kodinuke bitidewowomu kuda dayuwahemupe tixene goreseciruwo bivucijadi cixuke nazepacora. Vime dupori yigenavunito ziyovuva rone hogani di zo vigunugobevu wacu yoju jutozo lutoxunife. Dofiji zabibibusebi mosixazibo maduranecefo zi luhiheho maha janiwuvuka gepu jazu xerokafu zuxe sijadubati. Ra hesexorotufa guji sere modamusupi wabi heno tutujeci