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NOTICE: Do not overfill. Do not start the engine. DISCONNECT HIGH-TENSION CORDS FROM SPARK PLUGS Disconnect the high - tension cords at the rubber boot. Page 593 IG-25 IGNITION SYSTEM - (3VZ- E) 3. Page 179 EG1-145 ENGINE - MFI SYSTEM Condition STD Voltage Terminals Trouble Throttle valve open Ignition No voltage switch ON Throttle valve fully closed Throttle valve fully open IDL – E2 (E21) (1) There is no voltage between ECM terminals IDL and E2 (E21). CHECK FOR OPEN CIRCUIT Using an ohmmeter, measure the resistance between ECM terminals as illustrated. Page 207 EG1-173 ENGINE – MFI SYSTEM Condition Terminals Trouble STD Voltage No voltage between ECM terminals as illustrated. Page 207 EG1-173 ENGINE – MFI SYSTEM Condition Terminals Trouble STD Voltage No voltage between ECM terminals as illustrated. Page 207 EG1-173 ENGINE – MFI SYSTEM Condition Terminals Trouble STD Voltage No voltage between ECM terminals as illustrated. Page 207 EG1-173 ENGINE – MFI SYSTEM Condition Terminals Trouble STD Voltage No voltage between ECM terminals + B (+ B1) and E1. FUEL LINES AND CONNECTIONS INSPECTION (a) Inspect the fuel lines for cracks or leakage, and all connections for deformations. "Cold' is from -10SC (14SF) to 50SC (122SF) and "Hot' is from 50S C 0 22SF) to 100SC (212SF). INSTALL CRANKSHAFT PULLEY (a) Align the pulley set key with the key groove of the crankshaft pulley. HINT: Install a suitable vinyl tube unto the injector to prevent gasoline from splashing out. Page 248 EG1– 214 ENGINE - MFI SYSTEM EGR GAS TEMPERATURE SENSOR EGR GAS TEMP. 24. SST 09213-31021 22. (b) Apply a light coat of gasoline to the O-rings and install the injectors into the delivery pipe. (i) (California and C &... RADIATOR CAP The radiator cap is a pressure type cap which seals the radiator, resulting in pressurization of the radiator as the coolant expands. REMOVE GASKET MATERIAL ON CYLINDER BLOCK COMPONENTS INSPECTION 1. Torque the union bolt. 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. Page 82 EG1-48 ENGINE - ENGINE MECHANICAL (c) (w/Cruise control) Cruise control cable 14. (b) Remove the five bolts, the oil pump assembly and O- ring. (b) Disconnect the timing pulleys. Standard thrust clearance: 0.150 - 0.330 mm (0.0059 - 0.0130 in.) Maximum thrust clearance: 0.38 mm (0.0150 in.) If the thrust clearance is greater than maximum, re-... INSTALL OIL PAN BAFFLE PLATE Apply seal packing to the baffle plate as shown in the illustration. (d) Install and tighten the rod nuts alternately and in two or three passes. Page 128 EG1-94 ENGINE - EMISSION CONTROL SYSTEMS 6. INSTALL NO.1 WATER BY-PASS PIPE Install the pipe with the two bolts. Remove the eighteen cylinder head bolts and plate washers. Circuit Breaker Cab and Chassis C&C Dash Pot Double Rear Wheel Electronic Control Unit Emergency Locking Retractor Electronic Spark Advance... INSPECT HEATER RESISTANCE OF HEATED OXYGEN SENSOR Using an ohmmeter, measure the resistance between the terminals +B and HT. Seal packing: Part No. 08826-00080 or equivalent (b) Install the gasket to the cylinder head. Page 373 EG2-96 ENGINE - ENGINE MECHANICAL 8. (d) Connect the No.1 air hose to the reed valve. (b) Remove the gasket from the thermostat. 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. 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 09213-5\$012 Crankshaft Pulley Holding Tool (90201-08131) Washer (91111-50845) Bolt... CHECK SIGNAL GENERATOR (PICKUP COIL) Using an ohmmeter, check the resistance of the signal generator (pickup coil). DISCONNECT CONNECTING ROD FROM PISTON (a) Using needle - nose pliers, remove the snap rings from the piston. code 21, code 25 and code 261 Repair the relevant diagnostic trouble code. Standard resistance (Cold): 2.8 - 3.0 If there is no continuity, replace the rotor. Install cylinder head (6 pointed head) bolts (a) Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts. (4WD) INSTALL FRONT DIFFERENTIAL (See page SA-106) 9. (e) Install two new gaskets, the EGR valve, pipes as - sembly, air intake chamber stay and throttle cable bracket with the six nuts and two bolts. REMOVE ENGINE STAND 20. Page 508 EG2-231 ENGINE - MFI SYSTEM FUEL TANK AND LINE COMPONENTS... Page 260 EG1-226 ENGINE - COOLING SYSTEM WATER PUMP COMPONENTS WATER PUMP REMOVAL 1. REMOVE THERMOSTAT 3. (b) Remove the TVV from the intake manifold. Page 259 EG1-225 ENGINE - COOLING SYSTEM COOLANT CHECK AND REPLACEMENT 1. (c) Set No.1 cylinder to TDC/compression. SENSOR INSPECTION MEASURE RESISTANCE OF ENGINE COOLANT TEMP. Page 486 EG2-209 ENGINE - MFI SYSTEM COLD START INJECTOR REMOVAL (See Components for Removal and Installation) 1. Page 496 EG2-219 ENGINE - MFI SYSTEM 3. 1 WATER BY-PASS PIPE Remove the two bolts and pipe. If the same case is detected again during the second drive test, this second detection causes the Malfunction Indica-... Page 419 EG2-142 ENGINE - EMISSION CONTROL SYSTEMS LAYOUT AND SCHEMATIC DRAWING... REMOVE CRANKSHAFT TIMING PULLEY If the timing pulley cannot be removed by hand, use two screwdrivers. Page 133 EG1-99 ENGINE - EMISSION CONTROL SYSTEMS THREE-WAY CATALYTIC CONVERTER (TWC) SYSTEM To reduce HC, CO and NOx emissions, they are oxidized, reduced and converted to nitrogen (N), carbon dioxide) and water (H O) by the catalytic converter. Page 154 EG1-120 ENGINE - MFI SYSTEM DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN (Cont'd) Purpose of the driving pattern. (b) Hold the cord end approx. 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. Page 355 EG2-78 ENGINE – ENGINE MECHANICAL. (f) Check the crank pin and bearing for pitting and scr- atches. 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 530 EG2-253 ENGINE – MFI SYSTEM CONTINUED FROM PAGE EG2-252 Disconnect terminals TE1 and E1 of the DLC1. OPERATION The cooling system is composed of the water jacket (inside the cylinder head), radiator, water pump, thermostat, cooling fan, fluid coupling, hoses and other components. (IG SW ON) Refer to No. Page 193 EG1-159 ENGINE – MFI SYSTEM CHECK PROCEDURE (4WD A/T) HINT: Perform all voltage measurements with the connect tors connected. Page 390 EG2-113 ENGINE – ENGINE MECHANICAL eotts-01 CRANKSHAFT INSPECTION AND REPAIR 1. Page 169 EG1-135 ENGINE - MFI SYSTEM Condition Terminals Trouble STD Voltage W - E1 No voltage between ECM terminals W and E1. CLEAN THROTTLE BODY BEFORE INSPECTION (a) Wash and clean the cast parts with a soft brush and carburetor cleaner. Resistance: 2 -4 (c) Connect the cold start injector connector. REMOVE OIL STRAINER Remove the four bolts holding the oil strainer. sensor connector. TRANSFER (4... (b) Blow air into pipe E and check that air comes out of pipe G. Page 138 EG1-104 ENGINE - MFI SYSTEM EQUIPMENT Graduated cylinder Injector Carburetor cleaner Throttle body Sound scope Injector Tachometer Torque wrench Vacuum gauge Soft brush Throttle body... (IG SW ON) (3) Check wiring between ECM terminal E1 and body ground. INSTALL CRANKSHAFT SPROCKET AND CHAIN (a) Turn the crankshaft until the shaft key is on top. 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 526 EG2-249 ENGINE - MFI SYSTEM FUEL PRESSURE CONTROL SYSTEM FUEL PRESSURE VSV INSPECTION 1. Check that: Tie rod ends and relay rod ends do not have excessive play. REMOVE CLUTCH ASSEMBLY AND GEARS FROM STARTER HOUSING 4. INSTALL NO.4 TIMING BELT COVER Install the timing belt cover with the four bolts. INSTALL PS PUMP 21. Page 448 EG2-171 ENGINE - MFI SYSTEM MALFUNCTION INDICATOR LAMP CHECK 1. Repair or replace. MEASURE CAMSHAFT THRUST CLEARANCE Using a dial gauge, measure the camshaft thrust clearance. (b) Remove the engine mounting bolt of the best for excessive wear, frayed cords etc. Standard oil clearance: 0.025 -... Page 422 EG2-145 ENGINE - EMISSION CONTROL SYSTEMS EVAPORATIVE (EVAP) EMISSION CONTROL SYSTEM To reduce HC emission, evaporated fuel from the fuel tank is routed through the charces of the integration in the cylinders. Page 31 MA-20 MAINTENANCE - MAINTENANCE OPERATIONS Differential - 7.5 in. INSPECT THAT COMMUTATOR IS NOT GROUNDED Using an ohmmeter, check that there is no continuity be- tween the commutator and armature coil core. B. Page 50 EG1-16 ENGINE -ENGINE MECHANICAL PREPARATION FOR REMOVAL 1. Page 563 EG2-286 ENGINE - LUBRICATION SYSTEM 3. (c) Check that there is pressure in the fuel inlet hose. COMPONENTS FOR REMOVAL AND INSTALLATION FUEL PUMP REMOVAL 4. Page 90 EG1-56 ENGINE - ENGINE MECHANICAL 3. THROTTLE BODY REMOVAL 1. Remove cap, filter and separator from DP D. (a) Disconnect the No.1 fuel hose from the fuel tube. (4WD) REMOVE FRONT DIFFERENTIAL (See page SA-57) 3. Page 577 IG-9 IGNITION SYSTEM - (22R- E) DISTRIBUTOR REMOVAL 1. (b) When placing a new 0-ring on the injector, take care not to damage it in any way. EG2-263 ENGINE - COOLING SYSTEM PREPARATION EQUIPMENT Heater Torque wrench ENGINE COOLANT Classification Item Capacity Ethylene-glycol base 9.9 liters (110.5 US qts, 8.7 Imp. Page 165 EG1-131 ENGINE - WFI SYSTEM STD Voltage Condition Trouble Terminals Coolant temperature 80 Ignition switch No. (4) State and set of the fuel set of the fuel interview of the fuel interview of the fuel set of t voltage (176 (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. (IG SW ON) Refer to No. Page 166 EG1-132 ENGINE - MFI SYSTEM Condition Terminals Trouble STD Voltage STA - E 1 No voltage Ignition switch START position 6 -12v (1) There is no voltage between ECM terminals STA and E1 (IG SW START) Check starter Check wiring between ECM and operation. Oil grade: API grade SG Energy-Conserving II multigrade engine oil. (c) Lubricate the new 0-ring with spindle oil or gasoline before installing -... Page 370 EG2-93 ENGINE - ENGINE MECHANICAL 19. Page 458 EG2-181 ENGINE - MFI SYSTEM DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN (Cont'd) Purpose of the driving pattern. Page 195 EG1-161 ENGINE - MFI SYSTEM Terminals Trouble Condition STD Voltage No voltage Ignition switch ON BATT - E 1 (1) There is no voltage between ECM terminals BATT and E1. Valve stem diameter: Intake 7.970 -... Page 557 EG2-280 ENGINE - LUBRICATION SYSTEM OIL PUMP COMPONENTS OIL PUMP REMOVAL 1. (m) Connect the cold start injector tube with a new gasket and the union bolt. Page 437 EG2-160 ENGINE - MFI SYSTEM OPERATION FUEL SYSTEM Fuel is pumped. DISCONNECT FOLLOWING WIRES: (a) Cold start injector tube with a new gasket and the union bolt. Page 437 EG2-160 ENGINE - MFI SYSTEM OPERATION FUEL SYSTEM Fuel is pumped. DISCONNECT FOLLOWING WIRES: (a) Cold start injector tube with a new gasket and the union bolt. Page 437 EG2-160 ENGINE - MFI SYSTEM OPERATION FUEL SYSTEM Fuel is pumped. DISCONNECT FOLLOWING WIRES: (a) Cold start injector tube with a new gasket and the union bolt. Page 492 EG2-215 ENGINE - MFI SYSTEM (n) Disconnect the No.1 air hose from the PAIR reed valve. 12.5 mm (0.50 in.) from engine ground of vehicle. VISUALLY INSPECT CHARCOAL CANISTER CASE Look for cracks or damage. VISUALLY INSPECT FUEL TANK Look for deformation, cracks or fuel leakage. (c) Push the piston, connecting rod assembly and upper bearing through the top of the cylinder block. (See page EG1-66) 4. Page 76 EG1-42 ENGINE – ENGINE MECHANICAL 10. (c) Check that one shows continuity and the other shows no continuity. INSPECT PISTON A. Page 292 EG2-15 ENGINE – ENGINE MECHANICAL 10. (c) Check that one shows continuity and the other shows no continuity. INSPECT PISTON A. Page 292 EG2-15 ENGINE – ENGINE MECHANICAL 10. (c) Check that one shows continuity and the other shows no continuity. INSPECT PISTON A. Page 292 EG2-15 ENGINE – ENGINE MECHANICAL HIGH–TENSION CORDS INSPECTION 1. CHECK ENGINE COOLANT LEVEL IN RESERVOIR TANK The engine coolant level should be between the "LOW" and "FULL" lines. (b) Remove the air cleaner cap with volume air flow meter. (e) Tighten the hold-down bolt, and recheck the ignition timing. Page 111 EG1-77 ENGINE – ENGINE – ENGINE MECHANICAL SERVICE SPECIFICATIONS SERVICE DATA Compression pressure Limit Difference between each cylinder Limit Cylinder head Head surface warpage Intake Valve seat Refacing angle Exhaust Contacting width Intake Inner diameter Valve guide bushing Exhaust Outer diameter... Page 589 IG-21 IGNITION SYSTEM - (3VZ-E) 3. Check that the rocker arms on the No. Page 70 EG1-36 ENGINE - ENGINE MECHANICAL 8. Page 446 EG2-169 ENGINE - MFI SYSTEM 3. REMOVE DISTRIBUTOR CAP AND DUST PROOF PACKING 4. Page 412 EG2-135 ENGINE MECHANICAL SERVICE SPECIFICATIONS SERVICE DATA Battery specific gravity (Ex. Delco battery) Tune - up 55D 23R type 80D 26R type 80 that there is voltage between ECM terminal IGt and body ground. 9. (c) Remove the radiator hoses. Page 478 EG2-201 ENGINE - MFI SYSTEM (1) There is no voltage between ECM terminals THG and E2 (E21). qts) Oil capacity (4WD): Drain and refill w/o Oil filter change... Page 294 EG2-17 ENGINE - ENGINE MECHANICAL 6. VISUALLY INSPECT FUEL TANK CAP Look for a damaged or deformed gasket and cap. Page 143 EG1-109 ENGINE - MFI SYSTEM 3. (g) Disconnect the cold start injector connector. Page 160 EG1-126 ENGINE - MFI SYSTEM 4. (d) Install the bearing caps. Page 306 EG2-29 ENGINE - ENGINE MECHANICAL (d) Install the bearing caps. Page 306 EG2-29 ENGINE - ENGINE MECHANICAL Toubleshooting in the order given below. (4WD) REMOVE FRONT PROPELLER SHAFT (See PR section) 26. IF NO PROBLEM IS FOUND WITH THIS INSPECTION, THE SYSTEM IS OKAY;... (f) Reconnect the vacuum hose to the throttle opener. REMOVE WATER PUMP Remove the seven bolts and water- pump. Check wiring between Does malfunction indicator lamp come on when ECM terminal E1 and body Try another ECM. BLOW AIR FROM CYLINDER HEAD SIDE Check that air passes through easily. INSTALL VALVE LIFTERS AND SHIMS (a) Install the valve lifter- and shim. INSTALL THERMOSTAT AND WATER INLET 16. REMOVE NO.2 AND NO.3 FUEL PIPES Remove the four union bolts, No.2, No.3 fuel pipes and eight gaskets. Remove gasket material Using a gasket scraper, remove all the gasket material from the top surface of the cylinder block. Page 522 EG2-245 ENGINE - MFI SYSTEM (d) install and torque the bolts. NOTICE: Do not use a solvent which will affect the pai-... INSTALL FAN BRACKET (a) Install the gasket to the fan pulley bracket. (d) Remove the three nuts, and disconnect the exhaust manifold. Be sure to lift and support the vehicle at the proper locations (See page IN-9). Push in the pipe and insert-type hose to the specified location. 90SC (194S F). INSTALL STARTER HOUSING (a) Apply grease to the return spring. Page 544 EG2-267 ENGINE - COOLING SYSTEM (c) Install the water pump with the seven bolts. Standard clearance: 0.3 mm (0.0012 in.) If the clearance is greater than maximum, replace the... Page 616 CH-8 CHARGING SYSTEM - Generator DISASSEMBLY OF GENERATOR (See page CH-5) 1. DISCONNECT INTAKE AIR CONNECTOR 2. Page 229 EG1-195 ENGINE - MFI SYSTEM VAF METER REMOVAL 1. INSTALL NO.2 ENGINE HANGER Install the engine hanger with the two bolts. (3VZ-E Engine) Place the starter motor in the flywheel bellhousing, and in- stall and torque the starter mounting bolts. 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. (f) Remove the No.5 water by-pass hose from the water by-pass pipe. (b) Cover the rod bolts with a short piece of hose to protect the crank pin from damage. INSTALL DRIVE BELT (See step 3 on page CH-2) 3. Check that there is voltage between ECM terminals + B1 (+ B) and E1. Page 404 EG2-127 ENGINE - ENGINE MECHANICAL 12. Page 365 EG2-88 ENGINE - ENGINE MECHANICAL 31. (b) Stop the engine and remove the cylinder head cover. Page 287 EFI Main EG2-245 Relay Circuit Opening EG2-246 Relay Fuel Cut System EG2-257 Fuel Pressure EG2-249 Control System Engine Coolant Leakage Oil Leakage Engine Coolant Leakage Engine Coolant Leakage Oil Leakage Starter Relay ST-13 PNP SW or AT 83,144 Clutch Start SW CL-4 Starter ST-2... (IG SW ON) (2) Check throttle position sensor. SST 09268-41045 (09268-52010) (c) Remove the fuel pressure regulator. Turn the ignition switch ON. 6. Between terminals Resistance (Ω) Coolant temperature below 10 C (54 F) 30-... 26. Page 341 EG2-64 ENGINE – ENGINE MECHANICAL D. , SST 09843-18020 (e) Turn the ignition switch OFF. Page 20 MA-9 MAINTENANCE – MAINTENANCE OPERATIONS 8. (4WD) REMOVE TRANSFER UNDER COVER 24. Page 518 EG2-241 ENGINE – MFI SYSTEM THROTTLE BODY INSPECTION 1. 'Engine Check Check Valve is Charcoal Canister Throttle Valve Coolant Evaporated Fuel (HC) Page 423 EG2-146 ENGINE – EMISSION CONTROL SYSTEMS FUEL VAPOR LINES, FUEL TANK AND TANK CAP INSPECTION 1. Terminals Ignition Measuring plate fully closed switch Measuring plate fully open No voltage Idling Intake air temperature 20 C Ignition switch (68 F) Vc -E2 (E21) (1) There is no voltage between ECM terminals Vc and E2 (E21). Page 302 EG2-25 ENGINE – ENGINE – ENGINE MECHANICAL IGNITION TIMING INSPECTION AND ADJUSTMENT 1. MEASURE RING END GAP (a) Insert the piston ring into the cylinder. (b) Install the PAIR reed valve and injection manifold assembly with the two nuts and two bolts. Page 5 IN-5 INTRODUCTIONS 1. (c) Using needle-nose pliers, remove the oil seal. The various sensors detect the intake air volume, engine speed, oxygen density in the exhaust gas, engine coolant temperature, intake air temperature and atmospheric pressure etc. (d) Hand-lap the valve and valve seat with an abrasive compound. (d) Install the radiator hoses. REMOVE CHAMBER WITH THROTTLE BODY (a) Remove the union bolt holding the cold start injector pipe to the chamber. EG1-30 ENGINE - ENGINE MECHANICAL 17. 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 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. Page 167 EG1-133 ENGINE - MFI SYSTEM STD Voltage Condition Trouble Terminals .No voltage Ignition switch ON (1) There is no voltage between ECM terminals No. 10 and/or E02. CHECK PAIR SYSTEM WITH COLD ENGINE (a) The coolant temperature should be below 30 SC(86S (b) Disconnect the NO.1 PAIR hose from the air cleaner case. System normal. Page 353 EG2-76 ENGINE - ENGINE MECHANICAL CYLINDER HEADS INSTALLATION (See Components) 1. HINT:Label hoses for correct installation. INSTALL TRANSMISSION TO ENGINE 3. (c) Make sure that the injectors rotate smoothly. (4WD) INSTALL OIL COOLER (a) Install new 0-ring and gasket to the oil cooler. Page 239 EG1-205 ENGINE - MFI SYSTEM 2. Engine Coolant Throttle Valve Condition... Exhaust Port Exhaust Gas EXHAUST PIPE ASSEMBLY INSPECTION 1. 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. operation. Page 187 EG1-153 ENGINE - MFI SYSTEM STD Voltage Condition Trouble Terminals No trouble (MIL off) and engine running No voltage (1) There is no voltage between ECM terminals W and E1. (a) Never reuse the O-ring. DISCONNECT COLD START INJECTOR CONNEC- 5. (m) Remove the five nuts, EGR valve with the pipes and two gaskets. Page 582 IG-14 IGNITION SYSTEM - (3VZ- E) The ECM monitors the engine condition by signals from each sensor, calculates the ignition signal to the ignition signal to the igniter. CAREFULLY REMOVE HIGH-TENSION CORDS BY THEIR RUBBER BOOTS FROM SPARK PLUGS CAUTION: Do not pull on or bend the cords to avoid damaging the conductor inside. NOTICES are also presented in bold type, and indicate the possibility of damage to the components being repaired. Measure the valve clearance. 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 terminals THW and E2 (E21). Page 619 CH-11 CHARGING SYSTEM - Generator Brushes 1. REMOVE FAN BELT ADJUSTING BAR (a) (w/ PS) Remove the bolt and PS lower bracket. Page 42 EG1-8 ENGINE - ENGINE MECHANICAL See page Suspect area Symptom Engine does not crank combustion No complete combustion Engine idle speed Rough idling... 60SC(140SF). (e) Clean the crank pin and bearing. 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 Fuel leakage Resistance flow meter Throttle body fully closed angle T normal operating temperature. Page 498 EG2-221 ENGINE - MFI SYSTEM INJECTORS REMOVAL (See Components for Removal and Installation) 1. Page 280 EG2-3 ENGINE - ENGINE MECHANICAL The 3VZ-E engine has 6-cylinders in a V arrangement at a bank angle of 60S. Clean cylinder block Using a soft brush and solvent, thoroughly clean the cylinder block. Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing groove. Page 439 EG2-162 ENGINE - MFI SYSTEM The control system consists of sensors which detect various engine conditions, and an ECM which determines the injection volume (timing) based on the signals from the sensors. (IG SW ON) (2) Check that there is voltage between ECM terminals Vc and E2 (E201). Page 51 EG1-17 ENGINE - ENGINE MECHANICAL 13. INSTALL TIMING BELT (See pages EG2-41 to 48) 19. Install cylinder head (12 pointed head) bolts HINT: The cylinder head bolts are tightened in three progressive steps (steps (c), (e) and (f)). 31. Page 464 EG2-187 ENGINE - MFI SYSTEM +B (+B1) -E1 (1) There is no voltage between ECM terminals + B (+ B1) -E1 (1) THETWEEN TERMINALS + B (+ B1) -E1 (1) THETWEEN TERMIN Page 445 EG2-168 ENGINE – MFI SYSTEM (b) Insert the tester probe into the connector from the wiring side when checking the continuity, amperage or voltage. CLEAN COMBUSTION CHAMBERS Using a wire brush, remove all the carbon from the combustion chambers. Page 360 EG2-83 ENGINE – ENGINE MECHANICAL 17. Keys to Quality Maintenance Toyota Owner manuals and warranty information are the keys to quality maintenance for your vehicle. Disconnect the connectors from the ECM. Page 457 EG2-180 ENGINE - MFI SYSTEM DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN (Cont'd) Purpose of the driving pattern. SENSOR (a) Disconnect the connectors from the ECM. Page 584 IG-16 IGNITION SYSTEM - (3VZ- E) SYSTEM CIRCUIT OPERATION To maintain the most appropriate ignition timing, the ECM sends a control signal so that the igniter sends current to the igniter sends current to the ignition timing, the ECM sends a control signal so that the igniter sends current to the ignition timing, the ECM sends a control signal so that the igniter sends current to the igniter sends current to the ignition timing. CORDS AND WIRING CONNECTOR 2. INSTALL DUST PROOF PACKING AND DISTRIBUTOR CAP 4. Standard 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. INSTALL ENGINE WIRE Install the engine wire with the two bolts. Page 581 IG-13 IGNITION SYSTEM - (3VZ-E) DESCRIPTION The ECM is programmed with data for optimum ignition timing under ail operating conditions. 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. SST 09843-18020 HINT: The DLC1 is located near the No. 2 relay block. (d) After the check, securely install the water-proofing rubber on the connector. Page 87 EG1-53 ENGINE – ENGINE MECHANICAL 20. CHECK FUEL PUMP OPERATION (a) Turn the ignition switch ON. 09904-00010 Expander Set EQUIPMENT Battery specific gravity gauge Belt tension gauge Col/HC meter... 8. INSTALL ROTOR TO DRIVE END FRAME 2. Page 612 CH-4 CHARGING SYSTEM - On-Vehicle Inspection 7. INSTALL CRANKSHAFT TIMING PULLEY (a) Align the timing pulley set key with the key groove of the pulley. TOYOTA TERMS SAE ABBRE- SAE TERMS ()--ABBREVIATIONS... Sender Gauge section Oil Pressure EG1-210 Control System EG1-215 Fuel Pressure EG1-210 Control System EG1-215 Fuel Quality Fuel Leakage Coolant Leakage EG1-225... Page 396 EG2-119 ENGINE - ENGINE MECHANICAL (d) Retighten the main bearing cap bolts 90S in the nu- merical order shown. INSTALL TIMING BELT (See page EG2-41) 8. (b) Place anew gasket and install the throttle body with the four bolts. Page 311 EG2-34 ENGINE - ENGINE MECHANICAL 13. Page 406 EG2-129 ENGINE - ENGINE MECHANICAL 17. Page 436 The air induction system provides just the right amount of air for the engine operating condition. Page 24 MA-13 MAINTENANCE - MAINTENANCE OPERATIONS Wear Deformation Cracks Corrosion Leaks Bends Twists (b) Check all clamps for tightness and connections for leakage. (q) Remove the six bolts, two nuts, intake chamber and gasket. (b) Slowly lower the engine and transmission assembly into the engine compartment. INSTALL BRUSH HOLDER AND IC REGULATOR (a) Place the brush holder. STJ - E 1 No voltage 6 -12V (176_F) START position (1) There is no voltage between ECM terminals STJ and E1. Oil grade: API grade SG Energy-Conserving ll multigr-... Take great care during troubleshooting as there are numerous transistor circuits and even slight termi- nal contact can cause further troubles. 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. Page 45 EG1-11 ENGINE - ENGINE MECHANICAL 14. Take great care during troubleshooting as there are numerous transistor circuits and even slight terminal contact can cause further troubles. (d) Install the cylinder head cover with the eleven bolts. Page 192 EG1-158 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. INSPECT FAN PULLEY BRACKET Check the turning smoothness of the fan pulley. Page 429 EG2-152 ENGINE - EMISSION CONTROL SYSTEMS PULSED SECONDARY AIR INJECTION (PAIR) SYSTEM To reduce HC and CO emissions, this system draws in air into exhaust ports to accelerate oxidation, using vacuum generated by the exhaust pulsation in the exhaust manifold. 30. Page 541 EG2-264 ENGINE - COOLING SYSTEM COOLANT CHECK AND REPLACEMENT 1. REMOVE EGR VACUUM MODULATOR 14. 5. Page 614 CH-6 CHARGING SYSTEM - Generator REMOVAL OF GENERATOR (22R-E) 1. (e) Place the starter housing on the magnetic switch and install the two screws.) 1. Page 30 MA-19 MAINTENANCE - MAINTENANCE - MAINTENANCE OPERATIONS Oil capacity: Transmission - W55 2.6 liters (2.7 US qts, 2.3 Imp. INSPECT WATER PUMP BEARING Check that the water pump bearing moves smoothly and quietly. However, if your vehicle is equipped with a amateur radio transceiver, etc. Page 499 EG2-222 ENGINE - MFI SYSTEM (d) Disconnect the No.4 water by-pass hose from the union of the intake manifold. (IG SW START) (2) Check that there is voltage between ECM terminal +B (+ B, and body ground. Page 491 EG2-214 ENGINE - MFI SYSTEM (e) Disconnect the No.5 water by-pass hose from the union of the intake manifold. (IG SW START) (2) Check that there is voltage between ECM terminal +B (+ B, and body ground. Page 491 EG2-214 ENGINE - MFI SYSTEM (e) Disconnect the No.5 water by-pass hose from the water by-pass hose from the union of the intake manifold. belt. Page 611 CH-3 CHARGING SYSTEM - On-Vehicle Inspection (b) Using a belt tension gauge, check the drive belt tension . Page 324 EG2-47 ENGINE - ENGINE MECHANICAL 16. Check operation of VTV (a) Set the DP setting speed in the same procedure as above: (a) to (c). No voltage No trouble (MIL off) and engine running (1) There is no voltage between ECM terminals W and E1. Page 146 EG1-112 ENGINE - MFI SYSTEM (c) (2 trip detection logic) The diagnostic trouble codes 21, 25, 26, 27 and 71 use "2 trip detection logic". CONNECT NO.2 OIL COOLER HOSE 3. (c) Check that there is no continuity between terminals + B and FP. EG2-32 ENGINE - ENGINE MECHANICALL TIMING BELT COMPONENTS TIMING BELT REMOVAL (See Components) NOTICE: If removing and later reinstalling the fluid coupling can be replaced exactly as before. (2) All detected diagnostic trouble codes, except for code No. 51 and No 53, will be retained in memory by the ECM from the time of detection until canceled out. (4WD) REMOVE NO.2 FRAME CROSSMEMBER (a) Remove the four bolts holding the engine rear mou-... (c) Remove the No.2 fan shroud. Page 369 EG2-92 ENGINE - ENGINE HOLD REMOVE NO.2 FRAME CROSSMEMBER (a) Remove the four bolts holding the engine rear mou-... (c) Remove the No.2 fan shroud. Page 369 EG2-92 ENGINE - ENGINE INSPECTION 1. (a) Check heated oxygen sensor operation. INSTALL CRANKSHAFT TIMING PULLEY (See step 6 on page EG2-42) 7. Page 206 EG1-172 ENGINE - MFI SYSTEM Terminal Trouble Condition STD Voltage Coolant temperature 80 Ignition switch No voltage (176 START position (1) There is no voltage between ECM terminals STJ and E1. Page 265 EG1-231 ENGINE - COOLING SYSTEM SERVICE DATA Relief valve opening travel TORQUE SPECIFICATIONS Part tightened Water Outlet x Intake Manifold... Page 178 EG1-144 ENGINE - MFI SYSTEM +B (B1) - E1 (1) There is no voltage between ECM terminals + B (+ B1) and E1. INSPECT VOLTAGE OF ECM Check the voltage between each terminal of the wiring connectors. Page 400 EG2-123 ENGINE - ENGINE MECHANICAL (d) Engage the spline teeth of the crankshaft, and slide the oil pump on the crankshaft. INSTALL CONNECTING ROD CAPS A. CONNECT TACHOMETER Connect the test probe of a tachometer to terminal E1 and body ground. (c) Remove the fuel hose. (c) (A/T) Remove the rear plate, drive plate and front spacer. Page 103 EG1-69 ENGINE - ENGINE MECHANICAL (c) Apply a light coat of engine oil on the threads and under the cap bolt heads. Page 570 IG-2 IGNITION SYSTEM - (22R - E) PRECAUTIONS 1. If any bolts is broken or deformed, replace it. 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. (d) Check that the lines installed in grommets pass thr-... (W/PS) REMOVE PS BELT 2. (A/T) REMOVE THROTTLE BODY ASSEMBLY 1. REMOVE INTAKE MANIFOLD WITH DELIVERY PIPE AND INJECTORS (a) Remove the two nuts and reed valve. DRAIN ENGINE COOLANT FROM THROTTLE BODY 3. ECM terminal STA Check starter and starter terminal 50. PREPARATION Disconnect the vacuum hose from the EGR valve and, using a three way union, connect a vacuum gauge to it. SST 09268-45012 (h) Wipe off any splattered gasoline. Page 459 EG2-182 ENGINE - MFI SYSTEM DIAGNOSIS CIRCUIT INSPECTION Does malfunction lamp come on when System Normal ignition switch is at ON? Page 408 EG2-131 ENGINE - ENGINE MECHANICAL 6. (3VZ-E ENGINE) ADJUST VALVE CLEARANCE (See page EG-18) 13. Page 91 EG1-57 ENGINE - ENGINE MECHANICAL 6. (3VZ-E ENGINE) ADJUST VALVE CLEARANCE (See page EG-18) 13. Page 91 EG1-57 ENGINE - ENGINE MECHANICAL 6. (3VZ-E ENGINE) ADJUST VALVE CLEARANCE (See page EG-18) 13. Page 91 EG1-57 ENGINE - ENGINE MECHANICAL 6. (3VZ-E ENGINE) ADJUST VALVE CLEARANCE (See page EG-18) 13. Page 91 EG1-57 ENGINE - ENGINE MECHANICAL 6. (3VZ-E ENGINE) ADJUST VALVE CLEARANCE (See page EG-18) 13. Page 91 EG1-57 ENGINE - ENGINE MECHANICAL 6. (3VZ-E ENGINE) ADJUST VALVE CLEARANCE (See page EG-18) 13. Page 91 EG1-57 ENGINE - ENGINE MECHANICAL 6. (3VZ-E ENGINE) ADJUST VALVE CLEARANCE (See page EG-18) 13. Page 91 EG1-57 ENGINE - ENGINE MECHANICAL 6. (3VZ-E ENGINE) ADJUST VALVE CLEARANCE (See page EG-18) 13. Page 91 EG1-57 ENGINE - ENGINE MECHANICAL 6. (3VZ-E ENGINE) ADJUST VALVE CLEARANCE (See page EG-18) 13. Page 91 EG1-57 ENGINE - ENGINE MECHANICAL 6. (3VZ-E ENGINE) ADJUST VALVE CLEARANCE (See page EG-18) 13. Page 91 EG1-57 ENGINE - ENGINE MECHANICAL 6. (3VZ-E ENGINE) ADJUST VALVE CLEARANCE (See page EG-18) 13. Page 91 EG1-57 ENGINE - ENGINE MECHANICAL 6. (3VZ-E ENGINE) ADJUST VALVE CLEARANCE (See page EG-18) 13. Page 91 EG1-57 ENGINE - ENGINE MECHANICAL 6. (3VZ-E ENGINE) ADJUST VALVE CLEARANCE (See page EG-18) 13. Page 91 EG1-57 ENGINE - ENGINE MECHANICAL 6. (3VZ-E ENGINE) ADJUST VALVE CLEARANCE (See page EG-18) 13. Page 91 EG1-57 ENGINE - ENGINE MECHANICAL 6. (3VZ-E ENGINE) ADJUST VALVE (See page EG-18) 13. Page 91 EG1-57 ENGINE - ENGINE (See page EG-18) 13. Page 91 EG1-57 ENGINE - ENGINE (See page EG-18) 13. Page 91 EG1-57 ENGINE (See page EG-18) 13. Page 91 EG1-57 ENGINE (See page EG-18) 13. Page 91 EG in.) If the diameter is greater than maximum, rebore all four cylinders, or replace the cylinder block. (d) Using SST and a hammer, tap in the oil seal until its surface is flush with the timing chain cover edge. Page 542 EG2-265 ENGINE - COOLING SYSTEM WATER PUMP REMOVAL 1. 92.475 - 92.505 O/S 0. (b) Using an ohmmeter, measure the resistance between the terminals. (M/T) INSTALL CLUTCH DISC AND COVER TO FLY- WHEEL (See CL section) 2. REMOVE 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. Check that there is no continuity between terminals 3 and 5. Page 344 EG2-67 ENGINE - ENGINE MECHANICAL (g) Using SST and a hammer, tap in a new guide bushing until the snap ring makes contact with the cylinder head. Page 62 EG1-28 ENGINE - ENGINE - ENGINE MECHANICAL 14. (2) Check that there is voltage between ECM terminal + B (+ B1) and body ground. Standard clearance: 0.08 - 0.18 mm (0.0031-0.0071 in.) Maximum clearance: 0.08 mm (0.0031-0.0071 in.) Maximum clearance: 0.08 mm (0.0071 in.) Maximum clearance: 0.08 mm (0.08 mm CONNECT THROTTLE SENSOR CONNECTOR 3. Page 333 EG2-56 ENGINE - ENGINE MECHANICAL 19. qts) Dry fill 4.8 liters (5.1 US qts, 4.2 Imp. Page 46 EG1-12 ENGINE - ENGINE MECHANICAL 19. qts) Dry fill 4.8 liters (5.1 US qts, 4.2 Imp. 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. DISCONNECT OIL COOLER HOSES Disconnect the No.1 and No.2 oil cooler hoses. Page 444 EG2-167 ENGINE - MFI SYSTEM 3. 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. 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. RECHECK COOLANT AND ENGINE OIL LEVEL... After repairing the trouble, the diagnostic trouble code retained in memory by the ECM must be canceled out by removing the EFI fuse (15A) for 30 seconds or more, depending on ambient temperature (the lower the temperature of 88SC (190SF). Page 506 EG2-229 ENGINE - MFI SYSTEM (j) Connect the EGR hoses to the air pipe and EGR vacuum modulator. Page 97 EG1-63 ENGINE - ENGINE MECHANICAL 3. E. See page Suspect area Symptom... NOTICE: Pulling on or bending the conductor inside. DRAIN ENGINE OIL 7. Page 291 EG2-14 ENGINE - ENGINE MECHANICAL BATTERY INSPECTION 1. INSTALL THERMOSTAT 4. Page 141 EG1-107 ENGINE - MFI SYSTEM 3. Page 507 EG2-230 ENGINE - MFI SYSTEM (r) Connect the canister vacuum hose to the throttle body. Page 220 EG1-186 ENGINE - MFI SYSTEM FUEL PRESSURE REGULATOR ON-VEHICLE INSPECTION CHECK FUEL PRESSURE (See page EG1-178) PRESSURE REGULATOR REMOVAL 1. CONNECT FUEL RETURN HOSE 6. The upper tank has an inlet for engine coolant from the water jacket and it has a filler inlet. Page 587 IG-19 IGNITION SYSTEM - (3VZ- E) HIGH-TENSION CORDS INSPECTION 1. 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 & Gear Puller (09213-00020) Body With .Bolt (00213-00030) Handle (09213-00060) Bolt Set... Seal packing: Part No. 08826-00080 or equivalent (c) Install the gasket to the head cover. Page 602 ST-7 STARTING SYSTEM - Starter Brush Springs INSPECT BRUSH SPRING LOAD Take the pull scale reading the instant the brush. Page 363 EG2-86 ENGINE - ENGINE MECHANICAL (j) Install No.1 engine hanger. (IG SW ON) (2) Check that there is voltage between ECM terminals VC and E2 (E21). Page 258 When the wax cools, its contraction causes the force of the spring to take effect once more, closing the valve. Page 361 EG2-84 ENGINE - ENGINE MECHANICAL 21. Dust seals are not damaged. Page 440 14 x 17 mm Wrench Set 09842-30050 Wire 'A' EFI Inspection 09842-30070 Wiring "F" EFI Inspection 09843-18020 Diagnosis Check Wire RECOMMENDED TOOLS 09082-00015 TOYOTA Electrical Tester 09200-00010 Engine Adjust Kit 09258-00030 Hose Plug for the vacuum hose, fuel hose etc. Do not allow the ignition switch to be ON for more than 10 minutes if the engine will not start. Page 253 EG1-219 ENGINE - MFI SYSTEM FUEL CUT RPM FUEL CUT RPM INSPECTION 1. CHECK AND CLEAN FILTER IN EGR VACUUM MODULATOR (a) Check the filter for contamination or damage. (b) Insert the return spring into the magnetic hole. (r) Connect the charcoal canister vacuum hose to the throttle body. Page 124 EG1-90 ENGINE - EMISSION CONTROL SYSTEMS 6. Using a gasket scraper, remove all the carbon from the piston top surface. (IG SW ON) Repair-... CONNECT AIR CLEANER HOSE 8. Throttle valve Condition Coolant Temp. Pry the lock plate on the nut. Page 527 EG2-250 ENGINE - MFI SYSTEM 2. Page 480 EG2-203 ENGINE - MFI SYSTEM (d) Remove SST from the DLC1. (b) Install a gasket, SST (two unions), another gasket and two union bolts to the delivery pipe and injector. REMOVE CYLINDER HEAD (See page EG1-16) 2. CHECK FOR ADEQUATE CLEARANCE BETWEEN CATALYTIC CONVERTER AND HEAT INSULATOR CATALYTIC CONVERTER REPLACEMENT 1. Before working on the fuel system, disconnect the negative terminal from the battery. qts) w/ Oil filter change 4.3 liters (4.5 US qts, 3.8 Imp. Page 531 EG2-254 ENGINE - MFI SYSTEM 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) Adhesive: Part No.08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent (b) Using SST, install the oil pressure sender gauge. (2) Check that there is voltage between ECM terminal VF and body ground. ST-1 STARTING SYSTEM - STARTING SYSTEM... With this logic, when a logic malfunction is first detected, the malfunction is temporarily stored in the ECM memory. INSTALL DRIVE AND DRIVEN ROTORS Put the drive and driven rotors in the pump body. Page 210 EG1-176 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. Page 394 EG2-117 ENGINE - ENGINE MECHANICAL 3. DISCONNECT DISTRIBUTOR CONNECTOR 4. Check wiring between oxygen Repair wiring. Page 131 EG1-97 ENGINE - ENGINE MECHANICAL SPARK PLUGS INSPECTION 1. REMOVE ENGINE UNDER COVER 4. REPLACE MANUAL TRANSMISSION. (b) Using a piston, push the ring a little beyond the bottom of the ring a little beyond the bottom of the ring travel. (o) (C & C only) Disconnect the two water by-pass hoses from the EGR valve. SST 09817-16011 7. (I G SW ON) (2) Check that there is voltage between ECM terminal + B (+ 131) and body ground. INSTALL INJECTORS INTO DELIVERY PIPE (a) Install the grommet and anew 0 -ring to the injector. Page 247 EG1-213 ENGINE - MFI SYSTEM CONTINUED FROM PAGE EG1-212 Measure voltage between terminals VF1 and E1. (4WD) REMOVE FRONT DIFFERENTIAL (See SA section) 4 Page 86 EG1-52 ENGINE - ENGINE MECHANICAL (f) Lay a strip of Plastigage across the crankshaft pin. NOTICE: Do not suck air through the valve. Page 73 EG1-39 ENGINE - ENGINE MECHANICAL TIMING CHAIN COMPONENTS PREPARATION OF REMOVAL 1. CONNECT TACHOMETER AND TIMING LIGHT TO ENGINE Connect the test probe of a tachometer to terminal IG (-) of the data link connector 1. (See step 5 on pages EG2-78 and 79) Torque: 16 N-m (160 kgf-cm, 12 ft-lbf) NOTICE: Do not turn the camshaft. The fuel pressure regulator adjusts the pressure of the fuel from the fuel line (high pressure side) to a pressure 284 kPa (2.9 kgf/crn2, 41 psi) higher than the pressure inside the intake manifold, and excess fuel is returned to the four vacuum hoses to the air pipes. REMOVE WATER PUMP Remove the six bolts, three nuts, water pump and gasket. HOSES AND CABLES (a) Disconnect the following strap, wires and connectors: Ground strap from LH fender apron Generator connector and wire Igniter connector... Page 427 EG2-150 ENGINE - EMISSION CONTROL SYSTEMS 6. Maximum circle runout: 0.2 mm (0.008 in.) If the circle runout is greater than maximum, replace the camshaft. HINT: 1'o prevent gasoline from being injected from injectors during this test, crank the engine for no more than 0 V Read and record diagnostic trouble codes Normal code, code 21, Malfunction code(s) code 25 and code 26 (ex. (IG SW ON) (2) Check that there is voltage between ECM terminals + B (+ B1) and E1. Standard oil clearance: 0.024 - 0.053 mm (0.0009 - 0.0021 in.) U/S 0.25 and U/S 0.20 - 0.069 mm (0.0009 - 0.0027 in.) Maximum oil clearance is greater than maximum, replace the bearings. CHECK HEAT INSULATOR FOR DAMAGE 2. Page 420 EG2-143 ENGINE - EMISSION CONTROL SYSTEMS POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM To reduce HC emission, crankcase blow-by gas (HC) is routed through the PCV valve to the intake manifold for combustion in the cylinders. 23. INSTALL REAR END PLATE Install the rear end plate with the bolt. (w/PS) DISCONNECT PS BRACKET FROM CYLINDER HEAD Remove the four bolts, disconnect the ground strap and bracket. Page 374 EG2-97 ENGINE - ENGINE MECHANICAL (q) Connect the vacuum and fuel hoses to the pressure regulator. The task heading tells what to do. FURTHER CHECK IGNITION TIMING Check that the ignition timing advances. Page 224 EG1-190 ENGINE - MFI SYSTEM INJECTORS INSTALLATION 1. If pressure is low, check that the ignition timing advances. Page 224 EG1-190 ENGINE - MFI SYSTEM INJECTORS INSTALLATION 1. If pressure is low, check that the ignition timing advances. Page 224 EG1-190 ENGINE - MFI SYSTEM INJECTORS INSTALLATION 1. If pressure is low, check that the ignition timing advances. Page 224 EG1-190 ENGINE - MFI SYSTEM INJECTORS INSTALLATION 1. If pressure is low, check that the ignition timing advances. must be performed within 3 to 5 seconds to avoid burning out the coil. INSPECT RELAY CONTINUITY (a) Using an ohmmeter, check that there is continuity be- tween terminals 1 and 2. HINT Pushing down at the place shown in the illus- tration. (See pages EG-32) (b) Install the timing belt. Page 126 EG1-92 ENGINE - EMISSION CONTROL SYSTEMS EXHAUST GAS RECIRCULATION (EGR) SYSTEM (Calif.) Page 127 EG1-93 ENGINE - EMISSION CONTROL SYSTEMS EGR SYSTEM INSPECTION 1. SST 09201-60011 (h) Using a sharp 8 mm reamer, ream the guide bushing to the obtain standard specified clearance (See step 5 above) between the guide bushing and valve stem. 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 EG1-225) AIR FILTER INSPECTION (See steps 1 and 2 on page EG1-225) ENGINE OIL INSPECTION (See steps 1 and 2 on page EG1-225) AIR FILTER INSPECTION (See steps 1 and 2 on page EG1-225) AIR FILTER INSPECTION (See steps 1 and 2 on page EG1-225) ENGINE OIL INSPECTION (See steps 1 and 2 on page EG1-225) AIR FILTER INSPECTION (SEE steps 1 INSPECTION... Check the resistance between each terminal of the wiring connectors. From the front of the right bank the cylinders are numbered 2 -... Handle all MFI parts carefully, especially the ECM. Page 182 EG1-148 ENGINE - MFI SYSTEM Vs - E2 (E21) (1) There is no voltage between ECM terminals Vs and E2 (E21). Page 26 MA-15 MAINTENANCE - MAINTENANCE OPERATIONS (b) Check the steering linkage for looseness or damage. Page 255 EG1-221 ENGINE - MFI SYSTEM Specifications (Cont'd) at 20 C (68 F) Resistance Oxygen sensor heater Resistance EGR gas temp. PREPARATION Disconnect the nose from the EGR valve, and using a three way union, connect a vacuum gauge to 3. SST 09842-30070 Volume: 45 - 55 cm /15 sec. EG1-18 ENGINE Allow the engine to warm up to normal operating temperature. SST 1.0 kW 09285-76010 1.4 kW, 1.6 kW 09201-41020 Magnetic Switch 1. START ENGINE AND CHECK FOR LEAKS 5. DRAIN COOLANT FROM RADIATOR AND CYLIN- DER BLOCK (See step 3 on page EG1-225) 5. (4WD only) INSTALL NO.1 FRONT FLOOR AND BRAKE TUBE HEAT INSULATOR 8. Torque: 15 N-m (150 kgf-cm, 11 ft-lbf) (l) Connect the vacuum hose to the gas filter. Page 600 ST-5 STARTING · Starter INSPECTION OF STARTER Armature Coil 1. Page 151 EG1-117 ENGINE - MFI SYSTEM DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN (Cont'd) Purpose of the driving pattern. Page 28 MA-17 MAINTENANCE - MAINTENANCE OPERATIONS 24. By analyzing various signals shown in the table(See pages EG1-114,115) the detects system malfunctions which are related to the various operating parameter sensors or to the actuator. Page 266 EG1-232 ENGINE - LUBRICATION SYSTEM DESCRIPTION A fully pressurized, fully filtered lubrication system is used in this engine. Page 211 EG1-177 ENGINE - MFI SYSTEM FUEL PUMP. Page 157 EG1-123 ENGINE - MFI SYSTEM CHECK PROCEDURE (2WD) HINT: Perform all voltage measurements with the connec- tors connected. (w/ PS) DRAIN COOLANT 3. The mark is stamped on the piston top. (2) Check that there is voltage between ECM terminal STP and body ground when the brake pedal is depressed. If there is continuity, replace the armature. Page 288 EG2-11 ENGINE – ENGINE MECHANICAL See page Suspect area Symptom Engine does not crank slowly Under normal conditions Cold engine Hot engine incorrect first idle Nigh engine idle speed Low engine idle speed Rough idling... (b) Check that the valve lifters on the No.1 cylinder are loose and valve lifters on the No.4 are tight. If low, check for leaks and nut. EG1-212 ENGINE - MFI SYSTEM OXYGEN SENSOR OXYGEN SENSOR INSPECTION 1. SS 09223-50010 OIL PUMP ASSEMBLY. SST 09213-36020 11. Normal code, code 21, Malfunction code(s) code 25 and code 16... INSTALL STARTER MOTOR ON TRANSAXLE (22R-E Engine) Place the starter motor in the flywheel bellhousing. DISCONNECT VACUUM SENSING HOSE 2. HINT: Keep the lower main bearings and lower thrust washers together with the main bearing cap. Page 474 EG2-197 ENGINE - MFI SYSTEM Trouble STD Voltage Terminals Condition Engine coolant temperature No voltage between ECM terminals STJ and E1. Do not permit parts to receive a severe impact during removal or installation. (b) Install and tighten the seven bolts. Page 22 MA-11 MAINTENANCE - MAINTENANCE - MAINTENANCE OPERATIONS Hot Engine Operations 14. The crankshaft is supported by 5 bearings inside the crankshaft is supported by More than 0 V Read and record diagnostic trouble codes. HINT: If there is only the faintest trace of oil on the seal on the push rod side, the tensioner is all right. Page 613 CH-5 CHARGING SYSTEM - Generator GENERATOR COMPONENTS... Torque: 41 N-m (420 kgf-cm, 30 ft-lbf) 5. REMOVE BATTERY 3. The crankshaft is integrated with 4 weights which are cast with it for balance. Page 72 EG1-38 ENGINE - ENGINE MECHANICAL (h) EGR vacuum modulator hose (i) EVAP hose (i) (w/PS) Air control valve hoses (l) Brake booster hose (m) No. 1 and No. 2 PCV hoses 11. sensor wire 15. Before working on the system, disconnect the neg- ative terminal from the battery. Page 534 EG2-257 ENGINE - MFI SYSTEM FUEL CUT RPM FUEL CUT RPM INSPECTION 1. REMOVE OIL PAN (a) Remove the engine undercover, Page 598 ST-3 STARTING SYSTEM - Starter REMOVAL OF STARTER 1. INSTALL WATER INLET HOSE (a) Install the water inlet hose. The lubrication system consists of an oil pan, oil pump and oil filter, etc. (b) Using a dial indicator, measure the circle runout at the center journal. (c) Install the seven bolts, one hexagon bolt and two nuts. (f) Position two new gaskets to the instruments used. INSPECT HEATER RESISTANCE OF OXYGEN SENSOR Using an ohmmeter, measure the resistance between the terminals +B and HT. Page 529 EG2-252 ENGINE - MFI SYSTEM HEATED OXYGEN SENSOR HEATED OXYGEN SENSOR HEATED OXYGEN SENSOR INSPECTION 1. (IG SW ON) Repair or replace. Read More Read Less To view or download additional manuals for most Toyota models produced prior to 1990, you can subscribe to our Technical Information System (TIS) at . Page 371 EG2-94 ENGINE - ENGINE MECHANICAL (b) Raise the transmission slightly by raising the engine with a jack. DISCONNECT HIGH - TENSION CORDS FROM SPARK PLUGS Disconnect the high - tension cords at the rubber boot. 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. Page 338 EG2-61 ENGINE - LUBRICATION SYSTEM OIL PUMP REMOVAL HINT: When repairing the oil pump, the oil pan and strainer should be removed and cleaned. gts) G58 3.9 liters (4.1 US gts, 3.4 Imp. (a) If a tester is not available, connect the wire from terminal B of the gener-... 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. Page 545 EG2-268 ENGINE - COOLING SYSTEM THERMOSTAT wires (j) Starter wire (terminal 50) (k) Oil pressure sender gauge wire (l) Knock sensor wire 6. (b) Hold the end approx. Page 560 EG2-283 ENGINE - LUBRICATION SYSTEM CRANKSHAFT FRONT OIL SEAL REPLACE MENT HINT: There are two methods (A and B) to replace the oil seal which are as follows: REPLACE CRANKSHAFT FRONT OIL SEAL A. INSERT ENGINE AND TRANSMISSION ASSEMBLY IN VEHICLE (a) Attach the engine chain hoist to the engine chain hoist to the engine system which detects troubles within the engine signal net- work and flashes the Malfunction Indicator Lamp in the combination meter. Page 376 EG2-99 ENGINE - ENGINE MECHANICAL CYLINDER BLOCK DISASSEMBLY (See Components) 1. High voltage from the appropriate order to generate a spark between the electrodes, which ignites the air-fuel mixture. INSTALL VALVES (a) Install a new oil seal on the valve guide bushing. (b) Using compressed air, clean all the passages and apertures in the throttle body. VISUALLY CHECK HOSES AND TUBES FOR CRACKS, KINKS, DAMAGE OR LOOSE CONNEC- TIONS 2. SST 09843-18020 4. Page 561 EG2-284 ENGINE - LUBRICATION SYSTEM OIL PUMP ASSEMBLY (See components) 1. CONNECT TACHOMETER AND TIMING LIGHT TO ENGINE 8. (c) Using solvent and a brush, thoroughly clean the piston. (b) Check that the valve lifter rotates smoothly by hand. INSPECT AIR VALVE OPERATION Check the engine speed by fully screwing in the idle speed adjusting screw. INSTALL GENERATOR Mount the generator on the bracket with the pivot and ad- justing bolt. Torque: 69 N-m (700 kgf-cm, 51 ft-lbf) (e) Check that the crankshaft turns smoothly. INSTALL PS PUMP PULLEY AND DRIVE BELT 22. 1.8 liters (1.9 US qts, 1.6 Imp. Page 319 EG2-42 ENGINE - ENGINE MECHANICAL 5. REMOVE CAMSHAFTS (a) Uniformly loosen and remove the twelve bearing cap bolts one side of each cylinder head in several passes, in the sequence shown, then do the other side as shown. Page 421 EG2-144 ENGINE - MFI SYSTEM ENGINE COOLANT TEMPERATURE (ECT) SENSOR ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION (a) Disconnect the connector. Page 594 IG-26 IGNITION SYSTEM - (3VZ- E) (c) Insert the distributor, aligning the groove on the No.4 cam- shaft bearing cap. CHECK FOR OPEN CIRCUIT Using an ohmmeter, measure the resistance between the terminals. If leakage is found, check for cause and repair. (b) Apply a light coat of gasoline to a new 0-ring and install it to the fuel pressure regulator. 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. Accelerator cable (c) (A/T) Throttle cable... Otherwise the material must be re- moved and reapplied. (c) Temporarily install the seal washer, oil cooler and seal washer with the relief valve and bolt. INSPECT DASHPOT (DP) A. Page 60 EG1-26 ENGINE - MFI SYSTEM INJECTORS REMOVAL 1. (b) Align the front marks of the piston and connecting rod. (a) Never re-use the O-ring. (b) Remove the bolt holding the bracket to the cylinder block. REMOVE RADIATOR (See page EG1-230) 3. Standard clearance: 0.16 -... Do not pull on the cords. Page 56 EG1-22 ENGINE - ENGINE MECHANICAL 3. (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. 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. Page 618 CH-10 CHARGING SYSTEM - Generator INSPECTION AND REPAIR OF GENERATOR Rotor 1. Page 81 EG1-47 ENGINE AIR FLOW METER TO AIR CLEANER CAP (a) Install the volume air flow meter with the gasket, lock plate, washers and four nuts. Page 618 CH-10 CHARGING SYSTEM - Generator INSPECTION AND REPAIR OF GENERATOR Rotor 1. Page 81 EG1-47 ENGINE AIR FLOW METER TO AIR CLEANER CAP (a) Install the volume air flow meter with the gasket, lock plate, washers and four nuts. continuity, replace the VSV. If oil quality is poor, replace the oil. REMOVE CHARY COVER BOLT Remove the bolt in.-front of the head before the other head before cold start injector connector. EG2-41 ENGINE - ENGINE MECHANICAL TIMING BELT INSTALLATION (See Components) 1. REMOVE CHARCOAL CANISTER 2. Page 301 EG2-24 ENGINE - ENGINE MECHANICAL 9. 18. 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. (b) Blow air into pipe E and check that air comes out of pips F. DISCONNECT AIR CLEANER HOSE 5. REMOVE ENGINE UNDER COVER 5. Page 511 EG2-234 ENGINE - MFI SYSTEM VOLUME AIR FLOW METER REMOVAL (See Components for Removal Installation) 1. CLEAN TOP SURFACES OF PISTONS AND CYLINDER BLOCK (a) Turn the crankshaft, and bring each piston to top dead center (TDC). Page 92 EG1-58 ENGINE - ENGINE MECHANICAL 3. REMOVE PCV VALVE 2. NOTICE:Do not suck air through the valve. REMOVE STEEL BALL AND SPRING Using a magnetic finger, remove the spring and steel ball from the clutch shaft hole. DISCONNECT SPEEDOMETER CABLE NOTICE: Do not lose the felt dust protector and washers. Page 84 EG1-50 ENGINE - ENGINE MECHANICAL 31. (M/T) REMOVE DASH POT 4. Check oxygen sensor operation (See page EG1-212) 2. (b) Install the timing belt cover with the three bolts. 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. REMOVE THERMOSTAT (a) Remove the three nuts, water inlet and thermostat with gasket from the water pump. (3) Check wiring between ECM terminal E1 and body ground. (b) Apply a light coat of gasoline to a new O-ring, and install it to the injector. REMOVE BATTERY 4. (b) position the cylinder head over dowels on the block. DRAIN ENGINE COOLANT... REMOVE FUEL PUMP BRACKET (a) Remove the seven bolts. Page 208 EG1-174 ENGINE - MFI SYSTEM (1) There is no voltage between ECM terminals VF and E1. REMOVE REAR END PLATE Remove the bolt and rear end plate. Page 162 EG1-128 ENGINE - MFI SYSTEM Vcc - E2 (E21) (1) There is no voltage between ECM terminals VF and E1. REMOVE REAR END PLATE Remove the bolt and rear end plate. Page 162 EG1-128 ENGINE - MFI SYSTEM Vcc - E2 (E21) (1) There is no voltage between ECM terminals VF and E1. REMOVE REAR END PLATE Remove the bolt and rear end plate. and E1. (2WD) INSTALL OIL COOLER AND BRACKET ASSEMBLY (a) Install a new 0-ring to the oil cooler bracket. Therefore, if necessary, read the diagnosis before removing the battery terminal. HINT: Attach the flat side of the gasket to the cylinder head. (c) Precoated parts are indicated in the component illustrations by the "*"... SST 09816-30010 Torque: 15 N-m (150 kgf-cm. Turn the crankshaft with a wrench to align the timing, marks at TDC. Page 245 EG1-211 ENGINE - MFI SYSTEM 3. Page 245 EG1-211 ENGINE - MFI SYSTEM 3. Page 245 EG1-228 ENGINE - COOLING SYSTEM THERMOSTAT THERMOSTAT REMOVAL 1. Page 234 EG1-200 ENGINE - MFI SYSTEM (e) If not as specified, adjust with the throttle opener adjusting screw. Before installing the parts, apply new engine oil to all sliding and rotating surfaces. Page 607 ST-12 STARTING SYSTEM - Starter INSTALLATION OF STARTER 1. Page 140 EG1-106 ENGINE - MFI SYSTEM IF VEHICLE EQUIPPED WITH A MOBILE RADIO SYSTEM (HAM, CB, ETC.) The ECM is designed so that it will not be affected outside interference. Page 579 IG-11 IGNITION SYSTEM - (22R-E) (c) Using a timing light, check the ignition timing. (b) Install the exhaust manifold with the eight nuts. Page 564 EG2-287 ENGINE - LUBRICATION SYSTEM 6. Page 483 EG2-206 ENGINE - MFI SYSTEM 3. DRAIN ENGINE COOLANT 2. CLEAN VALVE GUIDE BUSHINGS Using a valve guide bushings. Page 240 EG1-206 ENGINE - MFI SYSTEM 483 EG2-206 ENGINE - MFI SYSTEM 3. DRAIN ENGINE COOLANT 2. CLEAN VALVE GUIDE BUSHINGS Using a valve guide bushings. Page 240 EG1-206 ENGINE - MFI SYSTEM 5. Page 240 EG1-206 ENGINE - MFI SYSTEM 5. Page 483 EG2-206 ENGINE - MFI SYSTEM 5. Page 483 ENGINE diagnostic trouble code detecting condition after diagnostic trouble code is recorded. Page 461 EG2-184 ENGINE - MFI SYSTEM MFI SYSTEM MFI SYSTEM MFI SYSTEM MFI SYSTEM CHECK PROCEDURE HINT: Perform all voltage measurements with the con- nectors connected. DISCONNECT N0.2 AND NO.3 AIR HOSES FROM AIR PIPE 6. Take the following precautions when removing and installing the injectors. Page 517 EG2-240 ENGINE - MFI SYSTEM THROTTLE BODY REMOVAL (See Components for Removal and Installation) 1. If abnormal, replace the spark plug. The tester probe should be inserted into the wiring connector from the wiring side. The shape of the piston varies for the RH and LH banks. Page 325 EG2-48 ENGINE - ENGINE MECHANICAL 20. (g) Align the rod and cap marks and fit on the cap. Page 617 CH-9 CHARGING SYSTEM - Generator with SST C in a vise, and install the generator with SST C. Page 273 EG1-239 ENGINE - LUBRICATION SYSTEM 6. CONNECT STRAP, WIRES, CONNECTORS, HOSES AND CABLES (a) Connect the following cables: Accelerator cable (w/ Cruise Control System) Cruise AND HOSE 8. Page 462 EG2-185 ENGINE - MFI SYSTEM Engine Control Module (ECM) Wiring Connectors Voltage STD voltage closed Ignition SW ON Measuring plate fully open... 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. Page 95 EG1-61 ENGINE - ENGINE MECHANICAL 4. (b) Warm up the engine. Page 621 CH-13 CHARGING SYSTEM - Generator (c) Using SST and a press, press the front bearing into the drive end frame. DISCONNECT RADIATOR INLET HOSE 4. Page EG1-160 ENGINE - MFI SYSTEM Voltage at ECM Connectors (4WD A/T) Terminals Condition STD voltage See page EG1-161 Ignition switch ON Throttle valve open Ignition switch ON EG1-163 Throttle valve fully closed Throttle valve fully closed Measuring plate fully open EG1-165 Idling... If a problem is found, replace the VSV. CHECK CHARGING CIRCUIT WITHOUT LOAD HINT: If a battery/generator tester is available connect the tester to the charging circuit according to the manufac- turer's instructions. Then apply the specified seal lock adhesive to the bolt, nut or threads. Page 346 EG2-69 ENGINE - ENGINE MECHANICAL (2) If the seating is too low on the valve face, use 60S and 45S cutters to correct the seat. INSTALL NO.2 AND NO.3 FUEL PIPES (a) Install the No.2 fuel pipe with four new gaskets and two union bolts. Lifter diameter: 37.922 - 37.832 mm (1.4930 - 1.4934 in.) (c) Subtract the lifter diameter measurement from the lifter diameter measurement. (b) Connect the battery to the magnetic switch as shown. (2) Check operation of oxygen sensor. SENSOR Using an ohmmeter, measure the resistance between both terminals. Page 428 EG2-151 ENGINE - EMISSION CONTROL SYSTEM MFI SYSTEM SYS CHECK PROCEDURE (4WD M/T) HINT: Perform all voltage measurements with the connec- tors connected. Page 48 EG1-14 ENGINE - ENGINE MECHANICAL 6. Page 623 CH-15 CHARGING SYSTEM - Generator 5. Specified resistance: 30 -... Page 21 MA-10 MAINTENANCE - MAINTENANCE

lightly tap out the piston pin from the piston. REMOVE GENERATOR ADJUSTING BAR 12. (d) Install a new snap ring on the other side of the pin. (e) Check that the painted mark is now at a 90S angle to the front. With this logic, when a logic malfunction is first detected, the mal- function is temporarily stored in the ECM memory. Page 442 EG2-165 ENGINE - MFI SYSTEM PRECAUTIONS 1. INSTALL AIR INTAKE CHAMBER (See step 24 on pages EG2-84 to 87) 12. (f) Remove the four bolts and radiator. NOTICE: Do not grind off more than minimum. (d) Install and tighten the cap bolts in two or three passes and in the sequence shown. Number of blinks Code... Standard undercut depth: 0.6 mm (0.024 in.) Minimum undercut depth: 0.2 mm (0.008 in.) If the undercut depth is less than minimum, correct it with a hacksaw blade. DISCONNECT RADIATOR OUTLET HOSE 3. (c) Reconnect the vacuum hoses to the proper locations. INSPECT EXHAUST MANIFOLD Using a precision straight edge and feeler gauge, measure the surface contacting the cylinder head for warpage. Page 449 EG2-172 ENGINE - MFI SYSTEM 4. Page 205 EG1-171 ENGINE - MFI SYSTEM 2. Care must be taken when jacking up and supporting the vehicle. INSTALL FIELD FRAME WITH ARMATURE TO MAGNETIC SWITCH ASSEMBLY (a) (1.4, 1. Page 463 EG2-186 ENGINE - MFI SYSTEM STD Voltage Condition Terminals Trouble No voltage Ignition switch 4N BATT- El (1) There is no voltage EG2-202 ENGINE - MFI SYSTEM FUEL PUMP SYSTEM CIRCUIT ON-VEHICLE INSPECTION 1. DISCONNECT FOLLOWING HOSES: (a) Vacuum hoses (b) PCV hose (c) (with A/C) Idle-up hose 3. Page 23 MA-12 MAINTENANCE - MAINTENANCE accessories Set transmission in neutral (b) Connect a tachometer-... Inspect camshaft for runout (a) Place the camshaft on V - blocks. If the same case is detected again during the second drive test, this second detection causes the malfunc-... (IG SW ON) (2) Check that there is voltage between ECM terminal +B (+ B1) and body ground. Page 323 EG2-46 ENGINE - ENGINE MECHANICAL 14. (b) : Determine the replacement adjusting shim size by following-the Formula or Chart: Using a rnicrometer, measure -... Page 312 EG2-35 ENGINE - ENGINE MECHANICAL 14. (b) : Determine the replacement adjusting shim size by following-the Formula or Chart: Using a rnicrometer, measure -... Page 312 EG2-35 ENGINE - ENGINE MECHANICAL 14. (b) : Determine the replacement adjusting shim size by following-the Formula or Chart: Using a rnicrometer, measure -... Page 312 EG2-35 ENGINE - ENGINE MECHANICAL 14. (b) : Determine the replacement adjusting shim size by following-the Formula or Chart: Using a rnicrometer, measure -... Page 312 EG2-35 ENGINE - ENGINE MECHANICAL 14. (b) : Determine the replacement adjusting shim size by following-the Formula or Chart: Using a rnicrometer, measure -... Page 312 EG2-35 ENGINE - ENGINE MECHANICAL 14. (b) : Determine the replacement adjusting shim size by following-the Formula or Chart: Using a rnicrometer, measure -... Page 312 EG2-35 ENGINE - ENGINE MECHANICAL 14. (b) : Determine the replacement adjusting shim size by following-the Formula or Chart: Using a rnicrometer, measure -... Page 312 EG2-35 ENGINE - ENGINE - ENGINE MECHANICAL 14. (b) : Determine the replacement adjusting shim size by following-the Formula or Chart: Using a rnicrometer, measure -... Page 312 EG2-35 ENGINE - EN rod cap with the front mark facing forward. CONNECT FUEL HOSE TO DELIVERY PIPE (a) Install the fuel hose with a bolt. Page 599 ST-4 STARTING SYSTEM - Starter (b) Remove the starter housing with the pinion gear (1.4, 1.6 kW), idler gear, bearing and clutch assembly. If oil pump is removed from cylinder block: (a) Using a screwdriver, pry out the oil seal. Page 268 EG1-234 ENGINE - LUBRICATION SYSTEM PREPARATION SST (SPECIAL SERVICE TOOLS) 09032-00100 Oil Faiter Wrench 09223-50010 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... EG2-107 ENGINE - ENGINE MECHANICAL Using a cylinder bore diameter at positions A, B and C in the thrust and axial directions. 3. (4WD) CHECK OIL LEVEL IN MANUAL TRANSMISSION, AUTOMATIC TRANSMISSION, TRANSFER AND DIFFERENTIAL Remove the filler plug and feel inside the hole with your finger. Page 351 EG2-74 ENGINE - ENGINE MECHANICAL CYLINDER HEADS ASSEMBLY (See Components) HINT: Thoroughly clean all parts to be assembled. (b) Disconnect the No.2 air hose from the air pipe. Belt tension gauge Nippondenso BTG-20 (95506-00020) or Borroughs No. BT-33-73F Drive belt tension: 22R-E New belt 125 25 lbf Used belt 80 20 lbf... Page 200 EG1-166 ENGINE - MFI SYSTEM Vs - E2 (E21) (1) There is no voltage between ECM terminals Vs and E2 (E21). INSPECT STEERING GEAR HOUSING Check the steering gear housing for oil leaks. (e) Install and uniformly tighten the twelve bearing cap bolts on one side in several passes, in the sequence shown, then do the other side as shown. (IG SW ON) . REMOVE TIMING BELT (See page EG2-32) 2. 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. DISCONNECT FUEL RETURN HOSE (a) Place a suitable container or shop towel under the fuel pressure regulator. 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. Page 568 EG2-291 ENGINE - LUBRICATION SYSTEM SERVICE SPECIFICATIONS SERVICE DATA Oil pressure At idle speed (normal operating temperature) At 3,000 rpm (normal operating temperature) Body clearance Oil pump Limit Tip clearance Limit Limit Side clearance Relief valve operating pressure TORQUE SPECIFICATIONS Part tightened Oil pressure sender gauge x Cylinder block... (e) Install the oil pump with the eight bolts. REMOVE EXHAUST MANIFOLD FROM LH CYLINDER HEAD (a) Remove the three nuts and exhaust manifold heat insulator. MEASURE TIP CLEARANCE Using a thickness gauge, measure the clearance be- tween both of the gear tips and crescent. Page 315 EG2-38 ENGINE - ENGINE MECHANICAL 25. (IG SW START) Check starter Check wiring between ECM and operation. INSTALL EGR VALVE WITH NEW GASKET... DISCONNECT ACCELERATOR CABLE 4. ENGINE UNDER COVER 10. CHECK FOR SHORT CIRCUIT Using an ohmmeter, check that there is no continuity between the terminals and the VSV body. (b) (A/T only) Disconnect the oil cooler hoses. (o) Disconnect the four vacuum hoses from the air pipes. Page 539 EG2-262 ENGINE - COOLING SYSTEM lower tank. Clean cylinder head. Take the largest 92.975 -... 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. INSTALL CYLINDER HEADS (See pages EG2-76 to 87) 18. (c) Lubricate the O-ring spindle oil or gasoline before installing -... CONNECT OIL COOLER HOSES Connect the No.1 and No.2 oil cooler hoses. Page 79 EG1-45 ENGINE - ENGINE MECHANICAL Using a razor blade and gasket scraper, remove all the packing (FIPG) material from the gasket surfaces. IG-1 IGNITION SYSTEM - IGNITION SYSTEM... 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 303 EG2-26 ENGINE - ENGINE MECHANICAL (f) Remove the SST from the data link connector 1. TEST INJECTION OF INJECTOR CAUTION: Keep injectors clear of sparks during the test. 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. (M/T only) CONNECT CLUTCH RELEASE CYLINDER HOSE 38. To prevent this, observe the following precautions and explain them to your customer By analyzing various signals as shown in the later table (See pages EG2-176 and 177) the ECM detects system malfunctions relating to the sensors of actuator. The self-diagnosis system has... Page 578 IG-10 IGNITION SYSTEM - (22R- E) (b) Turn the crankshaft pulley until No. 1 cylinder is in compression stroke and the timing mark is aligned with 5 S6TDC mark. OPERATION... Page 398 EG2-121 ENGINE - ENGINE MECHANICAL 8. Page 334 EG2-57 ENGINE - ENGINE MECHANICAL 23. INSTALL INTAKE AIR CONNECTOR... Page 295 EG2-18 ENGINE - ENGINE MECHANICAL 23. INSTALL INTAKE AIR CONNECTOR... Page 295 EG2-18 ENGINE - ENGINE MECHANICAL 23. INSTALL INTAKE AIR CONNECTOR... Page 295 EG2-18 ENGINE - ENGINE MECHANICAL 23. INSTALL INTAKE AIR CONNECTOR... Page 295 EG2-18 ENGINE - ENGINE MECHANICAL 23. INSTALL INTAKE AIR CONNECTOR... Page 295 EG2-18 ENGINE - ENGINE MECHANICAL 23. INSTALL INTAKE AIR CONNECTOR... Page 295 EG2-18 ENGINE - ENGINE MECHANICAL 23. INSTALL INTAKE AIR CONNECTOR... Page 295 EG2-18 ENGINE - ENGINE MECHANICAL 23. INSTALL INTAKE AIR CONNECTOR... Page 295 EG2-18 ENGINE - ENGINE MECHANICAL 23. INSTALL INTAKE AIR CONNECTOR... Page 295 EG2-18 ENGINE - ENGINE MECHANICAL 23. INSTALL INTAKE AIR CONNECTOR... Page 295 EG2-18 ENGINE - ENGINE MECHANICAL 23. INSTALL INTAKE AIR CONNECTOR... Page 295 EG2-18 ENGINE - ENGINE MECHANICAL 23. INSTALL INTAKE AIR CONNECTOR... Page 295 EG2-18 ENGINE - ENGINE MECHANICAL 23. INSTALL INTAKE AIR CONNECTOR... Page 295 EG2-18 ENGINE - ENGINE MECHANICAL 23. INSTALL INTAKE AIR CONNECTOR... Page 295 EG2-18 ENGINE - ENGINE MECHANICAL 23. INSTALL INTAKE AIR CONNECTOR... Page 295 EG2-18 ENGINE - ENGINE MECHANICAL 23. INSTALL INTAKE AIR CONNECTOR... PAGE 295 EG2-18 ENGINE - ENGINE MECHANICAL 23. INSTALL INTAKE AIR CONNECTOR... PAGE 295 EG2-18 ENGINE - ENGINE MECHANICAL 23. INSTALL INTAKE AIR CONNECTOR... PAGE 295 EG2-18 ENGINE - ENGINE MECHANICAL 23. INSTALL INTAKE AIR CONNECTOR... PAGE 295 EG2-18 ENGINE - ENGINE MECHANICAL 23. INSTALL INTAKE AIR CONNECTOR... PAGE 295 ENGINE - ENGINE MECHANICAL 23. INSTALL INTAKE AIR CONNECTOR... PAGE 295 ENGINE - ENGINE MECHANICAL 23. INSTALL ENGINE - ENGINE ENGINE - ENGINE ENGINE engine is cold. DRAIN COOLANT FROM RADIATOR AND CYLIN- DER BLOCK (See step 3 on page EG1-225) 3. (FEDERAL AND CANADA) REPLACE OXYGEN SENSOR (a) Disconnect the oxygen sensor wiring connector. 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 327 EG2-50 ENGINE - ENGINE MECHANICAL... ignition switch terminal ST. DISCONNECT WIRES (See step 17 page EG1-17) 5. Page 452 EG2-175 ENGINE - MFI SYSTEM DIAGNOSTIC TROUBLE CODE CANCELLATION 1. With a tachometer is connected to the system, connect the tachometer positive terminal to the IG (-) terminal of the DLC1. INSTALL REAR END FRAME (a) Using a plastic-faced hammer, lightly tap in the rear end frame. Page 505 EG2-228 ENGINE - MFI SYSTEM 4. Page 313 EG2-36 ENGINE - PAGINE - PA Start the engine. 2. Page 137 09631-22020 Power Steering Hose Nut 14 x 17 mm Wrench Set 09842-30070 Wiring "F" EFI Inspection 09843-18020 Diagnosis Check Wire RECOMMENDED TOOLS 09082-00015 TOYOTA Electrical Tester 09200-00010 Engine Adjust Kit Plug for the vacuum hose, fuel 09258-00030 Hose Plug Set hose etc. 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. 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 table below. Page 173 EG1-139 ENGINE - MFI SYSTEM EG1-138 CONTINUED FROM PAGE Check fuel pressure in the EGR EGR Vacuum EG R Exhaust Gas... ROAD TEST Road test the vehicle. Page 435 EG2-158 ENGINE -MFI SYSTEM MFI SYSTEM DESCRIPTION SYSTEM CIRCUIT... Page 399 EG2-122 ENGINE - ENGINE MECHANICAL POST ASSEMBLY (See Components) 1. (b) Check that there is no continuity between terminals 2 and 4. INSPECT BODY CLEARANCE Using a thickness gauge, measure the clearance be- tween the driven rotor and pump body. Page 399 EG2-122 ENGINE - ENGINE MECHANICAL POST ASSEMBLY (See Components) 1. (b) Check that there is no continuity between terminals 2 and 4. INSPECT BODY CLEARANCE Using a thickness gauge, measure the clearance be- tween the driven rotor and pump body. Page 399 EG2-122 ENGINE - ENGINE MECHANICAL POST ASSEMBLY (See Components) 1. (b) Check that there is no continuity between terminals 2 and 4. INSPECT BODY CLEARANCE Using a thickness gauge, measure the clearance be- tween the driven rotor and pump body. Page 399 EG2-122 ENGINE - ENGINE MECHANICAL POST ASSEMBLY (See Components) 1. (b) Check that there is no continuity between terminals 2 and 4. INSPECT BODY CLEARANCE Using a thickness gauge, measure the clearance be- tween terminals 2 and 4. INSPECT BODY CLEARANCE Using a thickness gauge (See Components) 1. (b) Check that there is no continuity between terminals 2 and 4. INSPECT BODY CLEARANCE Using a thickness gauge (See Components) 1. (b) Check that there is no continuity between terminals 2 and 4. INSPECT BODY CLEARANCE Using a thickness gauge (See Components) 1. (b) Check that there is no continuity between terminals 2 and 4. INSPECT BODY CLEARANCE Using a thickness gauge (See Components) 1. (b) Check that there is no continuity between terminals 2 and 4. INSPECT BODY CLEARANCE Using a thickness gauge (See Components) 1. (b) Check that there is no continuity between terminals 2 and 4. INSPECT BODY CLEARANCE Using a thickness gauge (See Components) 1. (b) Check that there is no continuity between terminals 2. (b) Check that there is no continuity (See Components) 1. (c) Check that there is no continuity (See Components) 1. (c) Check that there is no continuity (See Components) 1. (c) Check that there is no 115 Remark: *For inspection and repair of the MFI system, refer to the MFI section this manual. or more in volume air flow meter circuit. Page 337 EG2-60 ENGINE - ENGINE MECHANICAL (b) Uniformly loosen the eight cylinder head bolts one side of each cylinder head bolts one side each cylinder head REMOVE EXHAUST CROSSOVER PIPE Remove the six nuts, crossover pipe and two gaskets. Page 108 EG1-74 ENGINE - ENGINE MECHANICAL (b) (w/Cruise control) Cruise control) Cruise control cable 26. Torque: 34 N-m (350 kgf-cm. REMOVE FLYWHEEL OR DRIVE PLATE (a) Remove the sign and two gaskets. Page 135 EG1-101 ENGINE - MFI SYSTEM MFI SYSTEM DESCRIPTION... CHECK FOR SHORT CIRCUIT Using an ohmmeter, check that there is no continuity between each terminal and the VSV body. 1.35 liters (1.4 US qts, 1.2 Imp. REMOVE CRANKSHAFT TIMING PULLEY (See step 21 on page EG2-36) 6. Page 525 EG2-248 ENGINE - MFI SYSTEM ENGINE COOLANT TEMPERATURE (ECT) SENSOR ENGINE COOLANT TEMP. SST 09223 - 50010 3. (c) Do not apply unnecessary force to the terminal. INSTALL NO.1 TIMING BELT COVER (a) Install the gasket to the timing belt cover. THERMOSTAT INSPECTION HINT: Thermostat is numbered according to the valve opening temperature. 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 -... PREPARATION RECOMMENDED TOOLS 09082-00015 TOYOTA Electrical Tester EQUIPMENT Heater Radiator cap tester... CONNECT VACUUM SENSING HOSE 7. Page 107 EG1-73 ENGINE - ENGINE MECHANICAL 16. Start the engine and drive the vehicle at a speed of 10 km/h or higher. (g) Using SST a and hammer, drive in a new valve guide bushing unit the snap ring makes contact with the cylinder head. (b) (M/T) Remove the flywheel. Standard oil clearance: 0.028 - 0.053 mm (0.0011 - 0.0021 in.) Maximum oil clearance: 0.10 mm (0.0039 in.) If the oil clearance is greater than maximum, replace... Page 354 EG2-77 ENGINE - ENGINE - MFI SYSTEM 2. CHECK CONNECTING ROD THRUST CLEARANCE Using a dial indicator, measure the thrust clearance while moving the connecting rod back and forth. (d) If there is wear or damage on only one side of the belt, check the belt guide and the alignment of each pulley. EG1-66 ENGINE – ENGINE MECHANICAL CYLINDERS BORING Outside Diameter Size mm 0 n. Specified resistance: 30-bit guide and the alignment of each pulley. 50 Ω at 20°C (68° F) If resistance is not within specification, replace the VSV. INSTALL HEAD COVER (a) Apply seal packing to the four bolts. Page 177 EG1-143 ENGINE - MFI SYSTEM STD Voltage Trouble Condition Terminals No voltage Ignition switch ON BATT - E 1 (1) There is no voltage between ECM terminals BATT and E1. At idling At 3,500 rpm Port name Vacuum... See the table below for possible cause, and then inspect and correct the applicable causes if neces-... INSPECT RESISTANCE OF ECM NOTICE: Do not touch the ECM terminals. Page 571 IG-3 IGNITION SYSTEM - (22R-E) SYSTEM CIRCUIT ELECTRONIC SPARK ADVANCE (ESA) The ECM is programmed with data for optimum ignition timing under any and all operating conditions. Observe the following precautions when removing and installing the injectors. (b) Install the No. fan shroud with the four bolts. 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. EG2-95 ENGINE - ENGINE MECHANICAL PREPARATION FOR DISASSEMBLY (See Components) 1. Page 591 IG-23 IGNITION SYSTEM - (3VZ- E) DISTRIBUTOR INSPECTION NOTICE: "Cold" and 'Hot' in the following sentences express the temperature of the coils themselves "Cold' is from -10SC (12SF) to 50SC (122SF) and 'Hot' is from 50SC (122SF) to 100SC (212SF). Page 388 EG2-111 ENGINE - ENGINE MECHANICAL (c) Using a feeler gauge, measure the ring end gap. (b) Install the cylinder head bolt to each cylinder head. Page 176 EG1-142 ENGINE - MFI SYSTEM Voltage at ECM Wiring Connectors (4WD M/T) STD voltage Condition See page Terminals EG1-143 Ignition switch ON Throttle valve open EG1-145 Ignition switch ON Throttle valve open EG1-145 Ignition switch ON Throttle valve fully open Ignition switch ON Throttle valve fully open Ignition switch ON Measuring plate fully closed Measuring plate fully open EG1-147... Page 397 EG2-120 ENGINE - ENGINE MECHANICAL 7. (e) Engine at normal operating temperature. 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. SST 09268-41045 (e) Put the injector into the graduated cylinder. Clean both sealing surfaces with a non-residue solvent. Air passing over the radiator fins cools the heated engine coolant flowing through the radiator. OIL COOLER INSPECTION INSPECT OIL COOLER Check the oil cooler for damage or clogging. (c) Check that the hoses and lines are clear of sharp edges, moving parts and the exhaust system. Page 514 EG2-237 ENGINE - MFI SYSTEM 3. Page 119 EG1-85 ENGINE - EMISSION CONTROL SYSTEMS PCV VALVE INSPECTION 1. HINT: Lay the PS pump to one side without disconn- ecting the hoses. (c) Remove the radiator hoses. (c) Remove the No.2 frame crossmember. REMOVE ENGINE WIRE (a) Disconnect the following: Knock sensor connector Cold start injector time switch connector ECT sensor connector RH ground strap from No.3 camshaft bearing cap Injector connectors (b) Remove the ignition switch on for more than 10 minutes if the engine does not start. DRAIN ENGINE OIL 4. REMOVE No.1 WATER BY-PASS PIPE Remove the two nuts, two bolts and water by-pass pipe. ground. Page 282 EG2-5 ENGINE - ENGINE - ENGINE MECHANICAL (09221-00190) Guide "K" (09223-56010 Crankshaft Rear Oil Seal Replacer 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... CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY 5. Replace all gaskets, 0-ring and oil seals with new parts. Between Resistance Temperature terminals... INSTALL AND ADJUST DRIVE BELT (See page MA-6) 3. TIGHTEN RH AND LH ENGINE MOUNTING INSULATOR BOLTS Tighten the four bolts holding the mountings. Torque: 41 N-m (420 kgf-cm, 30 ft-lbf) 12. Oil grade: API grade SG Energy - Conserving 11 multigrade engine oil. DRAIN COOLANT (See step 3 on page EG1 225) 2. Page 310 EG2-33 ENGINE - ENGINE MECHANICAL (d) Remove the two clips and No.2 fan shroud. Page 33 MA-22 MAINTENANCE - MAINTENANCE OPERATIONS 29. REPLACE CRANKSHAFT REAR OIL SEAL A. (b) Using an ohmmeter, check the resistance of the in- jector. Page 553 EG2-276 ENGINE - LUBRICATION SYSTEM OIL PRESSURE CHECK 1. Page 147 EG1-113 ENGINE - MFI SYSTEM DIAGNOSIS INDICATION (1) When 2 or more codes are indicated, the lowest number (code) will appear first. INSPECT HIGH-TENSION CORD TERMINALS Check the terminals for corrosion, breaks or distor-... Verify that the battery voltage is 11 V or more when the ignition switch ' position. CYLINDER HEADS DISASSEMBLY (See Components) 1. 4. At low temp. INSTALL THROTTLE BODY (See page EG1-202) ELECTRONIC PARTS LOCATION... Page 276 EG1-242 ENGINE - LUBRICATION SYSTEM (c) Torque the five bolts. (i) Remove the union bolt, two gaskets and cold start injector tube. (e) Disconnect the No.5 water by-pass hose from the water by-pass pipe. (c) Remove the seven bolts, one hexagon bolt, two nuts and No. Page 55 EG1-21 ENGINE – ENGINE MECHANICAL 7. Using a voltmeter with high impedance (l0 kΩ/V minimum), measure the voltage at each terminal of the wiring connectors. Torque: 15 N-m (150 kgf-cm, 11 ft-lbf) 3. Page 389 EG2-112 ENGINE - ENGINE MECHANICAL (b) If the cap nut cannot be turned easily, measure the outer diameter of the compressed thread with a ver- nier caliper. Page 493 EG2-216 ENGINE - MFI SYSTEM FUEL PRESSURE REGULATOR INSTALLATION (See Components for Removal and Installation) 1. (c) Remove the bolts at the front and rear of the con-... REMOVE FRONT EXHAUST PIPE (a) Disconnect the heated oxygen sensor connector. During disassembly, keep parts in the appropriate order to facilitate reassembly. PERFORM ENGINE ADJUSTMENT (See page EG1-10) 40. Page 359 EG2-82 ENGINE - ENGINE MECHANICAL 16. Page 624 CH-16 CHARGING SYSTEM - Generator INSTALLATION OF GENERATOR (22R-E) 1. REMOVE BRUSH HOLDER Remove the two screws, brush holder and cover. (b) Gradually heat the cylinder head to approx. HINT: Any diagnostic trouble code retained by the computer will be erased when the battery terminal is removed. 14. (b) Install the union bolt and new gaskets. ST-13 STARTING SYSTEM - Starter Relay, Clutch Start Switch STARTER RELAY INSPECTION OF STARTER RELAY LOCATION: The relay is located in the No. 1 junction block on the driver's side. INSPECT CAMSHAFTS AND BEARINGS A. Page 605 ST-10 STARTING SYSTEM - Starter 5. Page 625 CH-17 CHARGING SYSTEM - Generator INSTALLATION OF GENERATOR (3VZ-E) 1. INSPECT CRANKSHAFT FOR RUNOUT (a) Place the crankshaft on V-blocks. INSTALL PUMP BODY COVER Install the pump body cover with the seven screws. INSTALL PUMP BODY COVER Install the pump body cover with the seven screws. Controlled System (TCCS) which centrally controls the MFI, ESA, A/T (4WD), diagnosis systems, etc. (b) Remove the two bolts and resonator bracket. DO NOT pull on the cords. (e) Connect the No. 1 air hose to the reed valve. 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. Page 209 EG1-175 ENGINE - MFI SYSTEM CONTINUED FROM PAGE EG1-174 Repair or replace. Page 39 EG1-5 ENGINE - MFI SYSTEM CONTINUED FROM PAGE EG1-174 Repair or replace. Page 39 EG1-5 ENGINE - MFI SYSTEM CONTINUED FROM PAGE EG1-174 Repair or replace. 00021 Companion Flange Holding Tool 09843-18020 Diagnosis Check Wire RECOMMENDED TOOLS For suspension engine 09090-04010 Engine Adjust Kit Plug for the vacuum hose, fuel hose etc. 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) Refer to No. 1. (IG SW ON) (2) Check that there is voltage between ECM terminal + B (+B1) and body ground. (130 mm (5.12 in.) from top surface of cylinder block) (c) Using a thickness gauge, measure the end gap. Page 161 EG1-127 ENGINE - MFI SYSTEM STD Voltage Terminals Trouble Condition Throttle valve open Ignition No voltage switch ON Throttle valve fully closed Throttle valve fully open F13877 IDL - E2 (E21) (1) There is no voltage between ECM terminals IDL and E2 (E21). Page 336 EG2-59 ENGINE - ENGINE Here is no voltage between ECM terminals IDL and E2 (E21). Page 336 EG2-59 ENGINE - MFI SYSTEM AIR INDUCTION S volume air flow meter and the amount flowing to the air intake chamber is determined according to the throttle valve opening in the throttle body and the engine speed. Resistance: 69 - 89 kW 50SC (122SF) 11 -... (b) Install the four nuts. Page 6 IN-6 INTRODUCTION - GENERAL REPAIR INSTRUCTIONS (b) When reusing precoated parts, clean off the old adhesive and dry with compressed air. Page 509 EG2-232 ENGINE - MFI SYSTEM PRECAUTIONS 1. Always use new gaskets when replacing the fuel tank or component part. (b) Install the engine under cover. Page 413 EG2-136 ENGINE - ENGINE MECHANICAL Cylinder head Warpage Limit Valve seat Refacing angle Contacting angle Contacting width Valve guide Inside diameter bushing Outside diameter O/S 0.05 Valve Valve overall length Limit (Intake) Stern oil clearance (Exhaust) Limit (Intake) Page 414 EG2-137 ENGINE – ENGINE MECHANICAL Cylinder bore diameter STD (Intake) Stern oil clearance (Exhaust) Limit (Intake) Page 414 EG2-137 ENGINE – ENGINE MECHANICAL Cylinder bore diameter STD (Intake) Stern oil clearance (Exhaust) Limit (Intake) Stern oil clearance (Exhaust) Limit (Intake) Stern oil clearance (Exhaust) Limit (Intake) Stern oil clearance (Exhaust) STD (Intake) Stern oil clearance (Exhaust) Limit (Intake) Stern oil cl diameter Main journal bore diameter Piston and piston ring Piston oil clearance Piston ring groove clearance Piston ring end gap Thrust clearance Piston ring Piston oil clearance Piston ring end gap Thrust clearance Piston ring end g Crankshaft Thrust clearance Limit Thrust washer thickness (Reference) Crank pin diameter Circle runout Limit Main journal diameter Circle runout Limit TORQUE SPECIFICATIONS Part tightened... REMOVE AIR CLEANER AND HOSE 3. Port name At idling At 3,500 rpm No vacuum Vacuum... Exhaust Gas... Page 113 EG1-79 ENGINE - ENGINE MECHANICAL Big end inner diameter Connecting and bearing (cont'd) Connecting rod bearing center wall thickness Pin to bushing oil clearance Limit Rod bend per 100 mm (3.94 in.) Limit Rod twist per 100 mm (3.94 in.) Limit Crankshaft Thrust clearance... Page 71 EG1-37 ENGINE - ENGINE MECHANICAL (e) (A/T) OD temp. REMOVE OIL COOLER (2WD) Remove the two bolts, union bolt, relief valve, gaskets and oil cooler. Page 466 EG2-189 ENGINE - MFI SYSTEM VC - E2 (E21) (1) There is no voltage between ECM terminals VC and E2 (E21). And maintain engine speed at 2,500 rpm. REMOVE TWO SCREWS AND PULL OFF DISTRIB- UTOR CAP 3. Read the diagnostic trouble code as indicated by the number of flashes of the malfunction indicator lamp. Page 88 EG1-54 ENGINE – ENGINE MECHANICAL 22. Page 230 EG1-196 ENGINE - MFI SYSTEM 3. Page 620 CH-12 CHARGING SYSTEM - Generator 2. When a tachometer is connected to the system, connect the tachometer is connected to the system, connect the tachometer is connected to the system. (ldling) (2) Check that there is voltage between ECM terminal W and body ground. 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. Page 604 ST-9 STARTING SYSTEM - Starter ASSEMBLY OF STARTER (See page ST-2) HINT: Use high-temperature grease to lubricate the bear- ings and gears when assembling the starter. (c) Connect the SST (hose) to each union. The lubrication system consists of an oil pump, oil filter and other external parts which supply oil to the moving parts in the engine block. (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 fully closed Intake air temperature 20 C (68 F) Coolant temperature 80 C (176 F) Measuring plate fully closed Measu BODY (a) Check that the throttle linkage moves smoothly. Observe the following: (a) Before performing electrical work, disconnect. DISCONNECT STRAP, WIRES. (M/T only) INSTALL CLUTCH DISC AND COVER 2. Page 304 EG2-27 ENGINE - ENGINE MECHANICAL IDLE SPEED INSPECTION AND ADJUSTMENT 1. Page 17 MA-6 MAINTENANCE 150SC (302SF) If the resistance is not as specified, replace the sensor. C. (c) Using SST and a hammer, drive out valve guide bus- hing. (b) Using a dial indicator, measure the circle runout at the No.2 and No.3 journals. (d) Blow air into a pipe E and check that air comes out of pipe G. Page 275 EG1-241 ENGINE - LUBRICATION SYSTEM 2. Page 189 EG1-155 ENGINE - MFI SYSTEM Condition STD Voltage Terminals Trouble No voltage Stop tight switch ON (1) There is no voltage between ECM terminals STP and E1. 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... DISCONNECT TACHOMETER AND TIMING LIGHT FROM ENGINE... Install and torque the bolt and nut. 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. If reusing the hose, reinstall the clip at the original location. Page 495 EG2-218 ENGINE - MFI SYSTEM (m) Connect the cold start injector tube with new a gasket and the union bolt. Page 368 EG2-91 ENGINE - ENGINE MECHANICAL ENGINE REMOVAL 1. However, please refer to these procedures and perform actual troubleshooting, conforming to the inspection methods described. Page 54 EG1-20 ENGINE - ENGINE MECHANICAL 2. 1. Torque: 37 N-m (375 kgf-cm, 27 ft-lbf) 3. INSTALL FUEL PUMP BRACKET (a) Place the bracket with a new gasket on the fuel tank. (b) Using SST and a hammer, tap in the timing pulley, facing the flange side inward. CONNECT FOLLOWING CABLES: (a) (A/T) Throttle cable (b) Accelerator cable (c) (w/ Cruise control) Actuator cable with bracket 7. Using a voltmeter with high impedance (10 kW/V minimum), voltage at each terminal of the wiring connector. REMOVE GENERATOR DRIVE BELT 15. REMOVE CHAMBER WITH THROTTLE BODY (See steps 9 to 15 on pages EG1-16,17) 4. Page 610 CH-2 CHARGING SYSTEM - Precautions, On-Vehicle Inspection PRECAUTIONS 1. If deep scratches are present, rebore all four cylinders. 1 second. Check injector. Fuel drop: One drop or less per minute (j) After checking, remove SST and restore the following parts to their original conditions. REMOVE WATER OUTLET Remove the two bolts and housing rear cover. IF NECESSARY, REPLACE BEARINGS (a) Using SST, remove the bearing. REPACK FRONT WHEEL BEARINGS AND THRUST BUSH (a) Change the front wheel bearing grease. SST 09268-41045 (09268-52010) (d) Install SST (Union) to the injector and hold the (b) Rotate the oil seal to check that it is firmly installed. Page 37 EG2-100 ENGINE - 22R-E ENGINE - 22R-E ENGINE - 22R-E ENGINE - MFI SYSTEM (California Vehicles only) (1) There is no voltage between ECM terminals VF and E1. (even one with about 10 W output), it may, at times, have an effect upon ECM operation, especially if the antenna and feeder are installed nearby. Page 430 EG2-153 ENGINE - EMISSION CONTROL SYSTEMS PAIR SYSTEM INSPECTION 1. (i) Reconnect the battery negative terminal. If the valve stem tip is worn resurface the tip with a grinder or replace the valve. qts) A.D.D. 1.86 liters (2.0 US qts, 1.6 Imp. Page 407 EG2-130 ENGINE - ENGINE MECHANICAL ENGINE - ENGINE MECHANICAL CYLINDER BLOCK INSPECTION 1. HINT: Do not start the engine. INSTALL RADIATOR (a) Install the radiator with the four bolts. Page 36 EG1-2 ENGINE - ENGINE MECHANICAL DESCRIPTION The 22R-E engine is an in-line 4 cylinder 2.4 liter OHC 8 valve engine. Check Valve in Check Valve Throttle Valve Charcoal Canister Evaporated Fuel (HC) Page 121 EG1-87 ENGINE - EMISSION CONTROL SYSTEMS 3. Page 219 EG1-185 ENGINE - MFI SYSTEM (i) Disconnect the test probes from the battery and check fuel leakage from the injector. Page 392 EG2-115 ENGINE - ENGINE 156 EG1-122 ENGINE - MFI SYSTEM TROUBLESHOOTING WITH VOLT OHMMETER HINT: Because the following troubleshooting procedures are designed for inspection of each separate system, the actual troubleshooting procedures are designed for inspection of each separate system. TORQUE SPECIFICATIONS Part tightened Cylinder head x Cylinder COOLING FAN Remove the four nuts and cooling fan. CLEAN CYLINDER BLOCK A. Fuel pressure: 265 - 304 kPa (2.7 - 3.1 kgf/cm, 38 - 44 psi) If pressure regulator. (4WD A/T) CONNECT TRANSFER SHIFT LINKAGE (a) Apply MP grease to the cross shaft joint. 16. 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. CYLINDER BLOCK ASSEMBLY (See Components) HINT: Thoroughly clean all parts to be assembled. 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 open Ignition switch ON Measuring plate fully open Ignition switch ON Throttle valve fully open Ignition switch ON Measuring plate fully open Igni SYSTEM DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN Purpose of the driving pattern. 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. If oil quality is poor, replace. Page 434 EG2-157 ENGINE - EMISSION CONTROL SYSTEMS SERVICE SPECIFICATIONS SERVICE DATA VSV for EG R VSV for PAIR TORQUE SPECIFICATIONS Part tightened EGR valve x Air intake chamber TWC x Exhaust pipe... INSPECT RELAY CONTINUITY (a) Using an ohmmeter, check that there is continuity between terminals 1 and 2. Page 191 EG1-157 ENGINE - MFI SYSTEM CONTINUED FROM PAGE EG1-156 Check fuel pressure. 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 96 EG1-62 ENGINE - ENGINE MECHANICAL Cheek that the rod is not twisted. -lbf) 4. CHECK ENGINE COOLANT LEVEL IN RESERVOIR TANK The coolant level should be between the "LOW" and " Full" lines. Page 331 EG2-54 ENGINE - ENGINE MECHANICAL (e) Disconnect the No.4 water by-pass hose from the union of intake manifold. Try another ECM. Page 597 ST-2 STARTING SYSTEM - Starter STARTER COMPONENTS... DISCONNECT FOLLOWING CABLES: (a) (w/ Cruise control) Actuator cable (c) (A/T) Throttle cable 4. Page 382 EG2-105 ENGINE - ENGINE MECHANICAL (Reference) Standard sized bearing center wall thickness: N o.1 Mark "1 " 1.991 - 1.994 mm (0.0784 - 0.0785 in.) Mark '2" 1.994 - 1.997 mm (0.0785 - 0.0786 in.) Mark '3' 1.997 - 2.000 mm (0.0786 - 0.0787 in.) Mark '4'... The detailed text tells how to perform the task and gives other information such as specifications and warnings. REMOVE HEAD COVER (a) Remove the ground strap from the body. 22. Check that the oil comes to within 5 mm (0.20 in.) of the bottom edge of the hole. (b) Remove the three bolts and bar. (I) Connect the vacuum hose to the gas filter. INSTALL RH EXHAUST MANIFOLD TO RH CYLINDER HEAD (a) Install a new gasket and the exhaust manifold with the six nuts. 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. Page 153 EG1-119 ENGINE - MFI SYSTEM DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN (Cont'd) Purpose of the driving pattern. qts) RI 50F 3.0 liters (3.2 US qts, 2.6 Imp. Parts must be assembled within 5 minutes of application. Torque: 18 N-m (180 kgf-cm, 13 ft-lbf) 7. Torque: 69 N-m(700 kgf-cm, 51 ft-lbf) HINT: Do not turn the crankshaft. Page 203 EG1-169 ENGINE - MFI SYSTEM STD Voltage Condition Trouble Terminals Ignition switch ON No voltage (1) There is no voltage between ECM terminals No. 10 and/or No. 20 and E01, and/or E02- (IG SW ON) (2) Check that there is voltage between ECM terminals IOt and/or No. Page 204 EG1-170 ENGINE - MFI SYSTEM Terminals IOt and/or No. Page 204 EG1-170 ENGINE - MFI SYSTEM Terminals IOt and Page 57 EG1-23 ENGINE - ENGINE MECHANICAL 7. Page 106 EG1-72 ENGINE - ENGINE MECHANICAL (4WD) INSTALL NO.2 FRAME CROSSMEMBER (a) Raise the transmission slightly with a jack. Page 567 EG2-290 ENGINE - LUBRICATION SYSTEM 2. (IG SW START) (2) Check that there is voltage between ECM terminal +B (+ B1) and body ground. (Ex Delco Battery) CHECK BATTERY SPECIFIC GRAVITY AND ELECTROLYTE LEVEL (a) Check the electrolyte quantity of each cell. Page 401 EG2-124 ENGINE - ENGINE MECHANICAL 3. Using SST, connect terminals TE, and E, of the DLC SST 09843-18020 HINT: The DLC1 is located near the No. 2 relay block. Page 263 EG1-229 ENGINE COOLING SYSTEM (a) (with A/C) Idle-up hose (b) PCV hose (c) Vacuum hoses 4. Page 339 EG2-62 ENGINE - ENGINE MECHANICAL (b) Remove the following parts: (1) Spring seat HINT: Arrange the valves, valve springs, spring seats and spring retainers incorrect order. PREPARATION RECOMMENDED TOOLS 09082-00015 TOYOTA Electrical Tester 09258-00030 Hose Plug Set EQUIPMENT Torque wrench Vacuum gauge... Page 83 EG1-49 ENGINE - ENGINE MECHANICAL (b) Remove the cross shaft from the body. (b) Install the IC regulator and brush holder to the rear end frame horizontally as shown in the illustration. Before installing parts, apply new engine oil to all sliding and rotating surfaces. If no problem is found with this inspection, the system is okay;... REMOVE TIMING BELT (See page EG2-32) 5. (b) Heat the piston in hot water approx. Page 299 EG2-22 ENGINE - ENGINE MECHANICAL... (d) Remove the No.1 fan shroud. Resistance: Refer to the chart above PLACE ARMATURE INTO FIELD FRAME Apply grease to the armature bearings and insert the ar- mature into the field frame. Page 358 EG2-81 ENGINE - ENGINE MECHANICAL 9. INSTALL ROCKER ARM ASSEMBLY (a) Place the rocker arm assembly over the dowels on the cylinder head. (IG SW START) (2) Check that there is voltage between ECM terminal + B (+ B1) and body ground. Page 447 EG2-170 ENGINE - MFI SYSTEM DIAGNOSIS SYSTEM DESCRIPTION The ECM contains a built-in self diagnosis system by which troubles with the engine signal network are detected and a malfunction indicator lamp on the combination meter lights up. 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... These bearing are made of kelmet. 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... switched OFF (e) All vacuum lines properly connected... Page 15 IN-15 INTRODUCTION - STANDARD BOLT TORQUE SPECIFICATIONS HOW TO DETERMINE BOLT STRENGTH Class 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 467 EG2-190 ENGINE - MFI SYSTEM Trouble Condition STD Voltage Terminals Ignition 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). (b) Remove the ten camshaft bearing caps, two oil seals and two camshafts. Page 320 EG2-43 ENGINE - ENGINE MECHANICAL 8. INSTALL OIL DIPSTICK (a) Install the oil dipstick: (b) Install the oil dipstick: (b) Install the oil dipstick guide with the bolt. To purchase copies of Owner's Manuals, please call (800) 782-4356 or visit www.helminc.com. However, if your vehicle is equipped with an amateur radio transceiver, etc. HINT: Check that the rocker arms on the No. 1 cylinder are loose. ELECTRONIC CONTROL SYSTEM The 3VZ-E engine is equipped with a Toyota Computer Controlled System (TCCS) which centrally controls the MFI, ESA, Diagnosis systems, etc. Inspect piston oil clearance HINT: There are three sizes of the standard piston diameter, marked "2" and "3" accordingly. Page 573 IG-5 IGNITION SYSTEM - (22R- E) ON-VEHICLE INSPECTION SPARK TEST (a) Disconnect high-tension cord from the distributor. (IG SW ON) (1) Check that there is voltage between ECM terminals + B (+ B1) and E1. HINT Avoid applying an excessive amount to the surface. CHARCOAL CANISTER INSPECTION 1. (f) Check that the crankshaft turns smoothly. INSPECT CYLINDERS Visually inspect cylinders for vertical scratches. Standard outer diameter: 7.860 - 8.000 mm (0.3034 - 0.3150 in.) Minimum outer diameter: 7.60 mm (0.2992 in.) HINT: If the location of this area cannot be judged by visual inspection, measure the outer diameter at the... CONNECT GROUND STRAP TO ENGINE REAR SIDE 12. If a problem is found, replace it. (Idling) (2) Check that there is voltage between ECM terminal W and body ground. CHECK OIL QUALITY Check the oil for deterioration, entry of water, dis- coloring or thinning. Page 18 MA-7 MAINTENANCE - MAINTENANCE - ENGINE MECHANICAL (c) Apply MP grease to a new oil seal lip. Page 416 EG2-139 ENGINE - ENGINE MECHANICAL (c) Apply MP grease to a new oil seal lip. Page 416 EG2-139 ENGINE - ENGINE MECHANICAL (c) Apply MP grease to a new oil seal lip. Page 416 EG2-139 ENGINE - ENGINE MECHANICAL (c) Apply MP grease to a new oil seal lip. Page 416 EG2-139 ENGINE - ENGINE MECHANICAL (c) Apply MP grease to a new oil seal lip. Page 416 EG2-139 ENGINE - ENGINE MECHANICAL (c) Apply MP grease to a new oil seal lip. Page 416 EG2-139 ENGINE - ENGINE MECHANICAL (c) Apply MP grease to a new oil seal lip. Page 416 EG2-139 ENGINE - ENGINE MECHANICAL (c) Apply MP grease to a new oil seal lip. Page 416 EG2-139 ENGINE - ENGINE MECHANICAL (c) Apply MP grease to a new oil seal lip. Page 416 EG2-139 ENGINE - ENGINE MECHANICAL (c) Apply MP grease to a new oil seal lip. Page 416 EG2-139 ENGINE - ENGINE MECHANICAL (c) Apply MP grease to a new oil seal lip. Page 416 EG2-139 ENGINE - ENGINE MECHANICAL (c) Apply MP grease to a new oil seal lip. Page 416 EG2-139 ENGINE - ENGINE MECHANICAL (c) Apply MP grease to a new oil seal lip. Page 416 EG2-139 ENGINE - ENGINE MECHANICAL (c) Apply MP grease to a new oil seal lip. Page 416 EG2-139 ENGINE - ENGINE MECHANICAL (c) Apply MP grease to a new oil seal lip. Page 416 EG2-139 ENGINE - ENGINE MECHANICAL (c) Apply MP grease to a new oil seal lip. Page 416 EG2-139 ENGINE - ENGINE MECHANICAL (c) Apply MP grease to a new oil seal lip. Page 416 EG2-139 ENGINE - ENGINE MECHANICAL (c) Apply MP grease to a new oil seal lip. Page 416 EG2-139 ENGINE - ENGINE (c) Apply MP grease to a new oil seal lip. Page 416 EG2-139 ENGINE - ENGINE (c) Apply MP grease to a new oil seal lip. Page 416 EG2-139 ENGINE Cylinder head cover x Cylinder head Engine hanger x Cylinder head Oil dipstick guide x Cylinder head No.1 injection manifold x Exhaust Manifold PAIR reed valve x Cylinder head... (b) Apply a light coat of engine oil on the threads of the relief valve. Page 289 EG2-12 ENGINE - ENGINE - ENGINE - MFI SYSTEM EQUIPMENT Injector Clockwise and counter- clockwise, push it to the delivery pipe. REMOVE THROTTLE POSITION SENSOR Remove the two screws and sensor. Measure voltage between terminals VF1 and E1. Page 576 IG-8 IGNITION SYSTEM - (22R-E) If the air gap is not as specified, replace the housing distributor assembly 2. INSTALL OIL PAN (a) Remove any old packing (FIPG) material and be ear- eful not to drop any oil on the contact surfaces of the oil pan and baffle plate. SET NO.1 CYLINDER TO TDC/COMPRESSION (a) Turn the crankshaft pulley until the timing mark is aligned with the "0" mark on the No.1 timing belt cover. Standard diameter: Mark '1' 87.500 - 87.510 mm (3.4453 - 3.4453 in.) Mark "2" 87.510-87.520 mm (3.4453 - 3.4457 in.) Mark "3"... Page 345 EG2-68 ENGINE - ENGINE MECHANICAL (e) Check the surface of the valve stem tip for wear. SST 09843-18020 (k) Turn the ignition switch ON. Page 254 EG1-220 ENGINE - MFI SYSTEM SERVICE SPECIFICATIONS SERVICE DATA Fuel 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 body Throttle position Clearance between lever and stop screw... (b) Check the specific gravity of each cell. Standard specific gravity at 20°C (68°F): 1.25 -... REMOVE HOOD 2. Check operation of VTV (a) Set the DP setting speed in the same procedure as above; (a) to (c). Page 455 EG2-178 ENGINE - MFI SYSTEM DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN Purpose of the driving pattern. 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. REMOVE ENGINE UNDER COVER 2. CHECK VALVE TIMING (a) Slowly turn the crankshaft pulley two revolutions from TDC to TDC. Page 112 EG1-78 ENGINE MECHANICAL Tension and Tensioner head thickness Limit damper No. 1 damper wear Limit No. 2 damper wear Limit Camshaft Thrust clearance Limit Journal oil clearance Limit Journal oil clearance Limit Journal diameter Circle runout Limit Camshaft Thrust clearance Limit Intake Exhaust Cylinder block... ECM terminal W is grounded to the body? 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 valve fully open IG SW ON - ... REMOVE CAM SPROCKET Remove the cam sprocket and chain from the cam- shaft and leave on the vibration damper. Page 274 EG1-240 ENGINE - LUBRICATION SYSTEM If the clearance is greater than maximum, replace the gear and/or body. Page 433 EG2-156 ENGINE - MFI SYSTEM STD Voltage Condition Terminals Trouble Throttle valve open 9 - 14V Ignition 4.5 - 5.5 V No voltage switch ON Throttle valve fully dosed 0.3 - 0.8 V Throttle valve fully open 3.2 - 4.9 V IDL -... REMOVE REAR OIL SEAL RETAINER Remove the six bolts and retainer. 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. FINAL INSPECTION (a) Check operate properly Doors Close properly Boot locks securely when closed Doors Door locks securely in any positions... Page 25 MA-14 MAINTENANCE -MAINTENANCE OPERATIONS (c) Check the disc for runout. INSPECT VALVE STEMS AND GUIDE BUSHINGS (a) Using a caliper gauge, measure the inside diameter of the guide bushing. by means of an Engine Control Module (ECM, formerly the MFI computer) employing a microcomputer. Standard clearance: N o.1 0.025 - 0.052 mm (0.0010 0.0020 in.) U/S 0.25 and U/S 0.50 0.024 - 0.080 mm (0.0009 - 0.0031 in.) others 0.029 - 0.056 mm (0.0011 - 0.0022 in.) U/S 0.25 and U/S 0.50 0.028 -... 13. (b) Using SST, drive in the new oil seal. Page 357 EG2-80 ENGINE - ENGINE MECHANICAL 7. Page 502 EG2-225 ENGINE - MFI SYSTEM 2. Page 236 EG1-202 ENGINE - MFI SYSTEM THROTTLE BODY DISASSEMBLY 1. DRAIN ENGINE COOLANT 3. INSPECT VALVE SPRINGS (a) Using a steel square, measure the squareness of the valve spring. CONNECT CABLES, HOSES, CONNECTORS, STRAP AND WIRES (a) Connect the following cables: Accelerator cable (w/ Cruise Control System) Cruise control cable (b) Connect the following hoses: PS air hoses to gas filter and air pipe Brake booster hose (w/ Cruise Control System) Cruise contr There is no voltage between ECM terminals W and El. (idling) (2) Check that there is voltage between ECM terminal W and body ground. qts) R150 3.0 liters (3.2 US qts, 2.6 Imp. 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. REMOVE REAR OIL SEAL RETAINER Remove the five bolts, rear oil seal retainer and gasket. WATER PUMP INSPECTION 1. Page 120 EG1-86 ENGINE - EMISSION CONTROL SYSTEMS EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM To reduce HC emission evaporated fuel from the fuel tank is routed through the charcoal canister to the throttle body for combustion in the cylinders. Torque: 6.9 N-m (70 kgf-cm, 61 in. DISCONNECT HIGH-TENSION CORDS FROM DISTRIBUTOR CAP (a) Using a screwdriver, lift up the lock claw and dis- connect the holder from the distributor cap. Page 183 EG1-149 ENGINE - MFI SYSTEM STD- Voltage Condition Trouble Terminals Coolant temperature 80 C Ignition switch No voltage (176) (1) There is no voltage (176) (2) There is no voltage (176) (1) There is no voltage (176) (2) The EMISSION CONTROL SYSTEMS LAYOUT AND SCHEMATIC DRAWING (Calif.) Page 118 EG1-84 ENGINE - EMISSION CONTROL SYSTEMS. (IG SW ON) (2) Check that there is voltage between ECM terminals Vc and E2 (E21). (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. INSTALL OIL STRAINER Install a new gasket and the oil strainer with the two nuts and two bolts. qts, 8.6 Imp. (b) Install the No.2 frame crossmember to the side frame with the bolts. Maximum circle runout: 0.06 mm (0.0024 in.) If the circle runout is greater than maximum, replace the crankshaft.. EG1-33 ENGINE - ENGINE MECHANICAL (c) Install the EGR valve and pipes as- sembly and two gaskets. REMOVE OIL PUMP ASSEMBLY (a) Loosen the oil pump relief valve plug. 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. (See page EG1-39) 1. INSTALL INTAKE MANIFOLD (a) Position a new gasket on the cylinder head. CONNECT FOLLOWING CABLES: (a) (A/T) Throttle cable (b) Accelerator cable... CYLINDER HEAD REMOVAL 1. (b) Pull out the fuel pump bracket. 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 125 EG1-91 ENGINE - EMISSION CONTROL SYSTEMS EGR VALVE INSPECTION 1. Idle speed: 50 rpm (c) Using a timing light, check the ignition timing. Page 378 EG2-101 ENGINE - ENGINE MECHANICAL Measure the Plastigage at its widest point. REMOVE FUEL PUMP FROM FUEL PUMP BRACKET (a) Pull off the lower side of the fuel pump from the pump bracket. Smooth out the edge. (c) Remove the union bolt, gasket, 0-ring, the oil cooler, bracket assembly and 0-ring. Page 362 EG2-85 ENGINE - MF. and 0-ring. Page 362 ENGINE - MF. and 0-ring. and SYSTEM THROTTLE BODY ON-VEHICLE INSPECTION 1. Page 366 EG2-89 ENGINE - ENGINE MECHANICAL 37. Page 41 EG1-7 ENGINE MECHANICAL 37. Page 366 EG2-89 ENGINE - ENGINE MECHANICAL 37. Page 41 EG1-7 ENGINE MECHANICAL 37. Page 41 EG1-7 ENGINE MECHANICAL 37. Page 41 EG1-7 ENGINE to this step and perform troubleshooting to the numbers in the table below. 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. Page 481 EG2-204 ENGINE - MFI SYSTEM (k) Measure the fuel pressure. Engine coolant temp.: below 80SC (176SF) When the idle speed adjusting screw is in, the engine speed should drop. 2 OIL COOLER HOSE FROM WATER PUMP 4. Page 155 EG1-121 ENGINE - MFI SYSTEM INSPECTION OF DIAGNOSIS CIRCUIT Does Malfunction Indicator Lamp come System Normal on when ignition switch is at ON? SST 09201-60011 (d) Using a caliper gauge, measure the bushing bore di- ameter of the cylinder head. (b) Raise the transmission slightly with a jack. 7. Page 559 EG2-282 ENGINE - LUBRICATION SYSTEM OIL PUMP INSPECTION 1. Engine not Running or Backfiring Normal Operation Idling or Decelerating Acceleration or Heavy Load... qts) Rear 2.2 liters 2.3 US qts, 1.9 Imp. ATTACH CLEAN HOSE TO PCV VALVE 3. INSTALL COLD START INJECTOR TUBE Using new gaskets, connect the cold start injector tube with the union bolts. EG2-108 ENGINE - ENGINE Hose to the throttle opener. Page 347 EG2-70 ENGINE - ENGINE MECHANICAL 10. (See MFI System on page EG2-252) (b) See the table below for possible causes if neces-... REMOVE OIL PAN (See steps 3 and 4 on page EG1-39) 2. INSPECT CYLINDER BLOCK WARPAGE Warpage limit: 0.5 mm (0.0020 in.) If warpage is greater than specified value, replace the cylinder block. DRAIN COOLANT 3. (e) Remove the four bolts and No.1 fan shroud. COLD START INJECTOR REMOVAL 1. Page 342 EG2-65 ENGINE - ENGINE AND COOLANT 3. (e) Remove the fuel pump, pressure regulator, check the fuel pump, pressure regulator. and/or injectors. ECM. SST 09818 - 30010 Torque: 15 N-m (150 kgf-cm, 11 ft-lbf) 9. Resistance: 2-4 If the resistance is not as specified, replace the cold start injector. (h) Remove the union bolt, two gaskets and cold start injector. (h) Remove the union bolt, two gaskets and cold start injector. clearance is greater than maximum, replace the bearings and/or grind the main journals. Standard thrust clearance: 0.150 -... Page 34 MA-23 MAINTENANCE - MAINTENANCE - MAINTENANCE - MAINTENANCE OPERATIONS Suspension system Fuel tank mounts, etc. INSTALL KNOCK SENSOR Using SST, install the knock sensor. Page 223 EG1-189 ENGINE - MFI SYSTEM (c) Install SST (Union) to the removed pressure regulator. Temperature Transmission Undersize Vacuum Control Valve Vacuum Transmission Undersize Vacuum Control Valve Vacuum Transmission Undersize Vacuum Control Valve Vacuum Control Vacu 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. SET TIMING BELT TENSIONER (a) Using a press, slowly press in the push rod using 981 -... Page 477 EG2-200 ENGINE - MFI SYSTEM (1) There is no voltage between ECM terminals 11F and E1. (b) Install new gasket and O-ring to the union bolt. Check that the battery cables are connected to the cor- rect terminals. To assist you in finding your way through the manual, the Section Title and major heading are given at the top of every page. Page 212 EG1-178 ENGINE - MFI SYSTEM ON-VEHICLE INSPECTION 1. Page 490 EG2-213 ENGINE - MFI SYSTEM 3. INSTALL FUEL PRESSURE REGULATOR (a) Fully loosen the lock nut of the fuel pressure regula- tor. Page 69 EG1-35 ENGINE - MFI SYSTEM Condition Terminals Throttle valve open Throttle valve open Throttle valve open Throttle valve open - 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 closed Measuring plate fully closed (Throttle opener must be cancelled first) Measuring plate fully closed (Throttle valve fully closed Measuring plate fully closed Measuring plate fully closed Measuring plate fully closed (Throttle valve fully closed Measuring plate fully closed Measuring plate fully closed Measuring plate fully closed (Throttle valve fully closed Measuring plate fully closed Measuring plate fully closed (Throttle valve fully closed Measuring plate fully closed Measuring plate fully closed Measuring plate fully closed (Throttle valve fully closed Measuring plate fully closed Measuring plate fully closed (Throttle valve fully closed Measuring plate fully closed (Throttle valve fully closed Measuring plate fully closed Measuring plate fully closed (Throttle valve fully closed Measuring plate fully closed Measuring plate fully closed (Throttle valve fully closed Measuring plate fully closed Measuring plate fully closed (Throttle valve fully closed Measuring plate fully closed Measuring plate fully closed (Throttle valve fully closed Measuring plate fully closed (Throttle valve fully closed Measuring plate fully closed Measuring plate fully closed (Throttle valve fully closed Measuring plate fully closed Measuring plate fully closed (Throttle valve fully closed Measuring plate fully closed Measuring plate fully closed Measuring plate fully closed (Throttle valve fully closed Measuring plate fully closed Measuring plate fully closed Measuring plate fully closed (Throttle valve fully closed Measuring plate fully closed Measuring plate fully closed Measuring plate fully closed (Throttle valve fully closed Measuring fully closed Measuring fully closed Measuring fully closed (Throttle valve fully closed Measuring fully closed Measuring fully closed Measuring fully closed (Throttle valve fully closed Measuring fully closed Measuring fully closed Measur crankshaft from damage. Torque: 37 N-m (380 kgf-cm, 27 ft-lbf) 7. (Coolant temp.: below 80SC/176SF) When the idle speed adjusting screw is in, the engine rpm should drop. Page 89 EG1-55 ENGINE - ENGINE MECHANICAL (i) Remove the main bearing caps. NOTICE: Never allow the tachometer terminal to touch ground as it could result in damage to the igniter... DISCONNECT VACUUM SENSING HOSE 6. Generator resistance (Cold): 185-2750 Generator resistance (Hot): 240-325W If the resistance (Hot): 240-325W If the resistance is not as specified, replace the dis-... Check fuel pressure. Page 196 EG1-162 ENGINE - MFI SYSTEM '+B (B+) -E1 (1) There is no voltage between ECM terminals +B (+B1) and E1. Page 482 EG2-205 ENGINE - MFI SYSTEM (t) Using two new gaskets, reconnect the No.3 fuel pipe to the delivery pipe. PUSH OUT PISTON AND CONNECTING ROD AS- SEMBLY (a) Remove all the carbon from top of the bore to the top of the cylinder. Check wiring between Does MIL come on when ECM terminal W Try another ECM terminal E1 and is grounded to the body? Replace all gaskets and oil seals with new ones. EG2-288 ENGINE - LUBRICATION SYSTEM OIL COOLER REMOVAL 1. INSPECT FLUID COUPLING Check the fluid coupling for damage and silicone oil leakage. INSTALL FUEL TANK NOTICE: Tighten the pipe and flare nut type hose to the specified torque. CONNECT TRANSMISSION TO ENGINE 3. Place connecting rod cap on connecti the cord. Page 170 EG1-136 ENGINE - MFI SYSTEM Terminal Trouble Condition STD Voltage Coolant temperature 80 C Ignition switch . (f) Disconnect the cold start injector connector. Page 164 EG1-130 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 (E12). (d) To loosen the pulley nut, turn SST A in the direction shown in the illustration. Page 10 IN-10 INTRODUCTION - ABBREVIATIONS USED IN THIS MANUAL ABBREVIATIONS USED Automatic Transmission Fluid Before Top Dead Center BTDC California Calif. HINT: Arrange the piston rings in correct order only. Petroleum substances inside the valve are harmful., Maximum warpage: 0.70 mm (0.0276 in.) If warpage is greater than maximum, replace the manifold. Refer to No. Page 163 EG1-129 ENGINE - MFI SYSTEM Trouble Condition STD Voltage . 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. 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. (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 47 EG1-13 ENGINE - ENGINE MECHANICAL TROUBLESHOOTING If the HC/CO concentration does not comply with regulations, perform troubleshooting in the order given below. INSPECT VOLTAGE OF ENGINE CONTROL MODULE (ECM) Check the voltage between each terminal of the wiring connectors. NOTICE Never allow the tachometer terminal to touch ground as it could result in damage to the igniter... (Idling) (2) Check that there is voltage between ECM terminal IGt and body ground. Remark: For inspection and repair of the MFI system, refer to the MFI section of this manual. Torque: 38 N-m (400 kgf-cm, 29 ft-lbf) (b) Install the exhaust manifold heat insulator with the bolt and nut. Page 199 EG1-165 ENGINE - MFI SYSTEM Trouble Condition STD Voltage Terminals Ignition switch Measuring plate fully open No voltage Idling Intake air temperature 20 Ignition switch Vc - E2 (E21) (1) There is no voltage between ECM terminals Vc and E2 (E21). (b) Disconnect the other wire from terminal 50. Page 349 EG2-72 ENGINE - ENGINE MECHANICAL (b) Using a micrometer, measure the lifter diameter. (b) Install the cross shaft to the body. switch wire (f) Engine coolant temp. HINT: Keep the bearings, connecting rod and cap to-... If low, check for leakage and add engine coolant up to the "FULL"... CLEAN THROTTLE BODY BEFORE INSPECTION (a) Wash and clean the cast parts with a soft brush in carburetor cleaner. Page 152 EG1-118 ENGINE - MFI SYSTEM DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN (Cont'd) Purpose of the driving pattern. CH-1 CHARGING SYSTEM - CHARGING SYSTEM... REMOVE OIL STRAINER Remove the two bolts, two nuts, oil strainer and gasket. CHECK ENGINE COOLANT LEVEL AT RESERVOIR TANK The engine coolant level should be between the "LOW" and "FULL" lines. Page 418 Regulates all engine conditions for reduction of Multiport fuel injection* exhaust emissions. No need to hunt down a separate Toyota repair manual or Toyota service manual. REMOVE DELIVERY PIPES AND INJECTORS (a) Remove the four nuts holding the delivery pipes to the intake manifold. qts) 10.0 liters (10.6 US qts, 8.8 Imp. Page 300 EG2-23 ENGINE - ENGINE MECHANICAL... NOTICE: Always turn the crankshaft pulley clockwise. REMOVE WATER PUMP Remove the seven bolts and water pump. 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. Page 501 EG2-224 ENGINE - MFI SYSTEM (b) Remove two bolts and engine wire. Page 603 ST-8 STARTING SYSTEM - Starter 2. Page 85 EG1-51 ENGINE - ENGINE - ENGINE - MFI SYSTEM... INSTALL SPARK PLUGS Using a 16 mm plug wrench, install the six spark plugs. Page 380 EG2-103 ENGINE - ENGINE MECHANICAL (b) Using a screwdriver, pry up the main bearing cap, lower main bearing cap, and remove the main bearing cap, lower main bearing cap, and remove the main bearing cap, and remove the main bearing cap, lower main bearing cap, and remove the main bearing cap, lower main bearing cap, and remove the main beari that the brush holder's cover doesn't slip to one side during installation. (b) Check that there is continuity between terminals +B and FC. (b) Remove the union bolt, two gaskets and cold start injector tube. Page 27 MA-16 MAINTENANCE - MAINTENANCE OPERATIONS 23. DISCONNECT NO. Page 488 EG2-211 ENGINE - MFI SYSTEM 2. Page 512 EG2-235 ENGINE - MFI SYSTEM VOLUME AIR FLOW METER INSTALLATION (See Components for Removal and Installation) 1. (Engine running at 2,000 rpm) (2) Check that there is voltage between ECM terminal + B (+ B1) and body ground. (b) Connect SST (hose and union) to the fuel tube. Page 232 EG1-198 ENGINE - MFI SYSTEM Clearance between Between Resistance lever and stop screw terminals 0 mm 10 in. INSTALL BEARINGS (a) Align the bearing claw with the groove of the con- necting rod or connecting cap. Torque: 3.9 N-m (40 kgfcm, 34 in.-lbf) 4. Page 546 EG2-269 ENGINE - COOLING SYSTEM RADIATOR RADIATOR RADIATOR CLEANING Using water or a steam cleaner, remove mud and dirt from the radiator core. (b) Visually inspect canister case. DISCONNECT RESONATOR BRACKET (a) Disconnect the air hose. Torque: 7.4 N-m (75 kgf-cm, 65 in.-lbf) 21. (c) Install the No.2 fan shroud with the two clips. 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... REMOVE SPARK PLUGS 3. Adhesive: Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent (b) Using SST, install the oil pressure sender gauge. 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. Page 235 EG1-201 ENGINE - MFI SYSTEM THROTTLE BODY INSPECTION 1. Page 43 Thermostat EG1-228 Drive Belt section Engine Coolant Temp. (b) Reverse the polarity of the tester probes. 32. 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. (f) Measure the Plastigage at its widest point. REMOVE VSV BRACKET AND VSV FROM PAIR REED VALVE 25. DISCONNECT WIRING FROM GENERATOR (a) Disconnect the connector from the generator. Page 98 EG1-64 ENGINE - ENGINE MECHANICAL (a) Grind the crank pins and/or main journals to the undersized finished diameter. Engine coolant Between terminals Resistance (W) temperature... 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. Page 174 EG1-140 ENGINE - MFI SYSTEM (California Vehicles only) (1) There is no voltage between ECM terminals THG and E2 (E21). Page 588 IG-20 IGNITION SYSTEM - (3VZ-E) (b) Align the spline of the distributor (ignition coil) with the spline of the holder, and push in the cord. Page 218 EG1-184 ENGINE - MFI SYSTEM COLD START INJECTOR HINT: The engine should be cold. (d) Hand-lap the valve and valve seat with abrasive compound. Torque: (A) 25 N-m (250 kgf-cm, 18 ft-Ibf) (B) 19 N-m (195 kgf-cm, 14 ft-Ibf) (C) 13 N-m (130 kgf-cm, 9 ft-Ibf) (d) Torque the relief valve plug. (IG SW START) Check wiring between . Torque: 10 N-m (105 kgf-cm, 8 ft-Ibf) 3. Page 485 EG2-208 ENGINE - MFI SYSTEM COLD START INJECTOR (a) Disconnect the cold start injector connector. INSTALL HEATER WATER OUTLET PIPE Connect the heater water outlet pipe to the timing chain cover with the two bolts. (p) Remove the two bolts. Control (ISC) Idle Air Control Intake or Inlet Air Temperature I AT Ignition Control Module Indirect Fuel Injection Indirect Fuel Injectificati Fuel Injection Indirect Fuel Injectificati Fuel Inject (1) There is no voltage between ECM terminals STP and E1. gts) 4. REMOVE AIR CLEANER CAP WITH VOLUME AIR FLOW METER (a) Disconnect the volume air flow meter connector. Page 575 IG-7 IGNITION SYSTEM - (22R-E) IGNITION COIL INSPECTION NOTICE: "Cold" and 'Hot" in the following sentences ex- press the temperature of the coils themselves. (a) Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts. gts) 8.0 in. (m) Connect the cold start injector connector. (IG SW ON) (2) Check that there is voltage between ECM terminal No. 10 and/or No. Page 168 EG1-134 ENGINE - MFI SYSTEM Terminals Trouble Condition STD Voltage IGt -E1 No voltage Idling 0.7 - 1.0 v (1) There is no voltage between ECM terminals IGt and E1. Standard exposed length: 1.5 mm (0.413 in.) Minimum exposed length is less than minimum, replace the brushes. REMOVE COLD START INJECTOR (a) Put a suitable container or shop towel under the cold start injector tube. INSTALL PLUG PATE Install a new gasket and plug plate with the two bolts. Page 393 EG2-116 ENGINE - ENGINE MECHANICAL PISTONS AND CONNECTING RODS ASSEMBLY 1. Using a voltmeter with high impedance (110 kW/V minimum), measure the voltage at each terminal of the wiring connectors. INSTALL EXHAUST MANIFOLD (a) Position a new gasket on the cylinder head. (c) Apply a light coat of engine oil on the O-ring. Page 381 EG2-104 ENGINE – ENGINE MECHANICAL (j) Measure the Plastigage at its widest point. (b) Disconnect the high-tension cord at the grommet. (3) Check wiring between ECM terminal E1 and body ground, Try another ECM. Page 431 EG2-154 ENGINE - EMISSION CONTROL SYSTEMS VSV INSPECTION 1. PREPARATION SST (SPECIAL SERVICE TOOLS) 09843-18024 Diagnosis Check Wire RECOMMENDED TOOLS 09082-00015 TOYOTA Electrical Tester EQUIPMENT Heater Thermometer Tachometer Torque wrench Vacuum gauge SSM (SPECIAL SERVICE MATERIALS) 08833-00070 Adhesive 1324,... Page 532 EG2-255 ENGINE - MFI SYSTEM Engine Control Module (ECM) Wiring Connectors Voltage Terminals Condition SW ON (Throttle valve open Throttle valve fully closed Ignition SW ON Measuring plate fully closed Measuring plate fully open Idling... Page 580 IG-12 IGNITION SYSTEM - (22R- E) SERVICE SPECIFICATIONS SERVICE DATA Spark plug Type High-tension Resistance (Cold) Primary coil resistance (Cold) Secondary coil resistance (Hot) Distributor Air gap Pickup coil resistance (Cold) Pickup coil resistance (Hot) TORQUE SPECIFICATIONS Part tightened... (b) Check that the converter is cool. If necessary, replace the oil cooler. Bushing inside diameter: 8.010-8.030mm(0.3154-0.3161 in.) (b) Using a micrometer, measure the diameter of the value stem. Set the groove on the pulley at the "0" mark position of the chain cover. Page 129 EG1-95 ENGINE - EMISSION CONTROL SYSTEMS 2. REMOVE CONVERTER (a) Jack up the vehicle. Page 296 EG2-19 ENGINE - ENGINE MECHANICAL 6. 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 Catalyst (TWC) Three-Way + Oxidation Catalytic Converter TWC+OC + CCo Volume Air Flow... Minimum disc runout: Ex. C & C 0.09 mm (0.0047 in.) 18. Page 190 EG1-156 ENGINE - MFI SYSTEM (1) There is no voltage between ECM terminals VF and E1. (2WD) CHECK OIL LEVEL IN MANUAL TRANSMISSION, AUTOMATIC TRANSMISSION AND DIFFERENTIAL Remove the filler plug and feel inside the hole with your finger. 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. (c) See if spark occurs while engine is being cranked. Page 601 ST-6 STARTING SYSTEM - Starter 4. (g) Place the four spacers on the stud bolts. Page 241 EG1-207 ENGINE - MFI SYSTEM CIRCUIT OPENING RELAY INSPECTION 1. (v) Start the engine and check for fuel leakage. FILL WITH ENGINE OIL 11. Page 159 EG1-

125 ENGINE - MFI SYSTEM STD Voltage Terminals Trouble Condition No voltage Ignition switch ON BATT - E 1 (1) There is no voltage between ECM terminals BATT and E1. CONNECTORS, HOSES AND CABLES (a) Disconnect the following strap, wires and connectors: Ground strap from LH fender apron Generator connector and wire Igniter connector Oil pressure sender gauge connector... Page 49 EG1-15 ENGINE - ENGINE MECHANICAL CYLINDER HEAD COMPONENTS... DISCONNECT EXHAUST MANIFOLD (a) Remove the exhaust pipe clamp. If rear oil seal retainer is removed from cylinder block: (a) Using a screwdriver and hammer, tap out the oil seal Do not pull on the curds. 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. 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. DISCONNECT FUEL HOSE (a) Put a suitable container or shop towel under the pressure regulator. INSPECT UNDERCUT DEPTH OF SEGMENT Check that the undercut depth is clean and free of foreign material. Place main bearing cap and lower thrust washers on cylinder block (a) Install the thrust washers on the No.2 journal position of the bearing cap with the grooves facing outward. NOTICE: If using a high-pressure type cleaner, be car- eful not to deform the fins of the radiator core. Uniformly tighten the bolts in several passes. MEASURE CONNECTING ROD THRUST CLEAR- ANCE Using a dial gauge, measure the thrust clearance. CONNECT VACUUM SENSING HOSE 5. 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. Page 11 IN-11 INTRODUCTION - ABBREVIATIONS USED IN THIS MANUAL Toyota Computer Controlled System TCCS Top Dead Center TEMP. Handle all MFI parts carefully especially the ECM. (d) Lightly tighten the hold-down bolt. 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. SELECT OVERSIZED PISTON O/S pistons with pins are available in the sizes listed. Page 66 EG1-32 ENGINE - ENGINE MECHANICAL 6 REMOVE NO. INSTALL NO.1 WATER BY-PASS PIPE (a) Remove any old packing (FIPG) material and be car-... (b) Apply seal packing to the cylinder head as shown in the illustration. (4WD) REMOVE OIL COOLER (a) Remove the No.1 and No.2 oil cooler hoses. CHECK EGR VALVE (a) Apply vacuum directly to the EGR valve with the engine idling CONNECT COLD START INJECTOR CONNECT COLD START INJECTOR CONNECT COLD START INJECTOR CONNEC- 3. (b) Using the removed bearing cap bolts, pry the bearing cap check that air flows without resistance from the other pipes. REMOVE PAIR REED VALVE AND NO.1 AIR INJECTION MANIFOLD Remove the two bolts, two nuts, the PAIR reed valve, injection manifold assembly and gasket. Page 244 ENGINE - MFI SYSTEM CIRCUIT OPENING RELAY INSPECTION 1. Page 244 EG1-210 ENGINE - MFI SYSTEM FUEL PRESSURE CONTROL SYSTEM VSV INSPECTION 1. (c) Remove the two bolts and pipe bracket. REMOVE HOLD - DOWN BOLT AND PULL OUT DISTRIBUTOR DISTRIBUTOR DISTRIBUTOR DISTRIBUTOR DISTRIBUTOR INSTALLATION 1. (b) Remove the two bolts and pipe bracket. hand-lapping, clean the valve and valve seat. Page 350 EG2-73 ENGINE - ENGINE MECHANICAL 14. Page 63 EG1-29 ENGINE - ENGINE MECHANICAL HINT (Use new cylinder block): Use a piston with the same number mark as the cylinder diameter marked on the cylinder block. CHECK PAIR SYSTEM WITH COLD ENGINE (a) The engine coolant temperature should be below 25 S C (77 SF). (t) After checking fuel pressure, disconnect the battery ground strap and carefully remove the SST to prevent gasoline from splashing. Page 410 EG2-133 ENGINE - ENGINE MECHANICAL 25. Page 471 EG2-194 ENGINE - MFI SYSTEM Terminals Trouble Condition STD Voltage between ECM terminals # 10 and/or # 20 and E01 and/or E02. WARM UP ENGINE 2. (e) Remove the bearing caps. ADJUST VALVE CLEARANCE (a) Set the No. 1 cylinder to TDC/compression. Page 148 EG1-114 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. (b) Install the intake manifold with the delivery pipe and injectors and No. 1 air pipe. REMOVE CAMSHAFT TIMING PULLEYS Using SST, remove the pulley bolt, timing pulley and knock pin. 17. Page 278 EG2-1 ENGINE - 3VZ-E 251 ENGINE - MFI SYSTEM EGR GAS TEMPERATURE SENSOR (California and C & C) EGR GAS TEMP. qts) Front Standard differential 1.6 liters (1.7 US qts, 1.4 Imp. INSPECT EXHAUST PIPES AND MOUNTINGS Visually inspect the pipes, hangers and connections for severe corrosion, leaks or damage. Resistance: California 2WD only 4.5 - 6.0 Ω at 23SC (73SF) Others 5.1 -... 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. Torque: Bolt (A) 18 N-m (185 kgf-cm. 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, 28 ft-lbf) Leaf spring U -... Page 231 EG1-197 ENGINE - MFI SYSTEM THROTTLE BODY ON-VEHICLE INSPECTION 1. Torque: 40 N-m (410 kgf-cm, 28 ft-lbf) Leaf spring U -... Page 231 EG1-197 ENGINE - MFI SYSTEM THROTTLE BODY ON-VEHICLE INSPECTION 1. Torque: 40 N-m (410 kgf-cm, 28 ft-lbf) Leaf spring U -... Page 231 EG1-197 ENGINE - MFI SYSTEM THROTTLE BODY ON-VEHICLE INSPECTION 1. Torque: 40 N-m (410 kgf-cm, 28 ft-lbf) Leaf spring U -... Page 231 EG1-197 ENGINE - MFI SYSTEM THROTTLE BODY ON-VEHICLE INSPECTION 1. Torque: 40 N-m (410 kgf-cm, 28 ft-lbf) Leaf spring U -... Page 231 EG1-197 ENGINE - MFI SYSTEM THROTTLE BODY ON-VEHICLE INSPECTION 1. Torque: 40 N-m (410 kgf-cm, 28 ft-lbf) Leaf spring U -... Page 231 EG1-197 ENGINE - MFI SYSTEM THROTTLE BODY ON-VEHICLE INSPECTION 1. Torque: 40 N-m (410 kgf-cm, 28 ft-lbf) Leaf spring U -... Page 231 EG1-197 ENGINE - MFI SYSTEM THROTTLE BODY ON-VEHICLE INSPECTION 1. Torque: 40 N-m (410 kgf-cm, 28 ft-lbf) Leaf spring U -... Page 231 EG1-197 ENGINE - MFI SYSTEM THROTTLE BODY ON-VEHICLE INSPECTION 1. Torque: 40 N-m (410 kgf-cm, 38 ft-lbf) Leaf spring U -... Page 231 EG1-197 ENGINE - MFI SYSTEM THROTTLE BODY ON-VEHICLE INSPECTION 1. Torque: 40 N-m (410 kgf-cm, 410 kgf-cm, 4 cm, 30 ft-lbf) (k) Connect the cold start injector tube with two new gasket and the union bolt. Page 583 IG-15 IGNITION SYSTEM - (3VZ-E) PRECAUTIONS IG051-02 1. (b) If you have no sound scope, you can check the in-... After replacing the drive belt, check that it fits properly in the ribbed grooves, especially in the places difficult to see. DISCONNECT WATER BY-PASS PIPE FROM RH CYLINDER HEAD Remove the bolt, and disconnect the test probes of the SST to the battery and check that the fuel injection is as shown. WARM UP ENGINE Allow the engine to warm up to normal operating temperature. FILL WITH ,COOLANT 5. (a) With the engine running or cranking, use a sound scope to check that there is normal operating noise in proportion to engine rpm. Page 443 EG2-166 ENGINE - MFI SYSTEM IF VEHICLE IS EQUIPPED WITH MOBILE RADIO SYSTEM (HAM, CB, ETC) The ECM has been designed so that it will not be affected by outside interference. Page 201 EG1-167 ENGINE - MFI SYSTEM STD Voltage Condition Trouble Terminals Coolant temperature 80_C Ignition switch No voltage (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. (IG SW ON) (2) Check that there is voltage between ECM terminal +B (+B1) and body ground.* (IG SW ON) Refer to No. Page 184 EG1-150 ENGINE - MFI SYSTEM Terminals Trouble Condition STD Voltage No voltage Ignition switch START position (1) There is no voltage between ECM terminals STA and E1. PREPARATION Disconnect the vacuum hose from the EGR valve and using a three-way union, connect a vacuum gauge to 3. (c) Place the head cover on the cylinder head and install the four seals and nuts. (b) Install the No.1 fan shroud with the four bolts. IF NECESSARY, REPLACE VALVE GUIDE BUSH- INGS (a) Using a brass bar and hammer, break the valve -guide bushing. (b) Slide the sprocket over the key on the crankshaft. NOTICE: Check that the holder is correctly installed to the grommet and distributor cap as shown in the illus- tration. (e) Disconnect the oil cooler hoses. Page 216 EG1-182 ENGINE - MFI SYSTEM Tighten the pipe and flare nut type hose to the specified torque. CHECK VACUUM CIRCUIT CONTINUITY IN VSV BY BLOWING AIR INTO PIPE (a) Connect the VSV terminals to the battery terminals as illustrated. Page 32 MA-21 MAINTENANCE - MAINTENANCE change 2WD 4.0 liters (4.2 US qts, 3.5 Imp. DISCONNECT STRAP, WIRES, CONNECTORS. (u) Using new gaskets, reconnect the cold start injector. (IG SW ON) (2) Check that there is voltage between ECM terminal + B (+ B1) and body ground. Page 352 EG2-75 ENGINE – ENGINE MECHANICAL (d) Using a plastic-faced hammer, lightly tap the valve stem tip to assure proper fit. Page 586 IG-18 IGNITION SYSTEM - (3VZ-E) ON-VEHICLE INSPECTION SPARK TEST CHECK THAT SPARK OCCURS (a) Disconnect high-tension cord from the distributor. 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. CONNECT FUEL INLET AND OUTLET HOSES 21. (b) Using SST and a hammer, tap in a new oil seal until its surface is flush with the rear oil seal retainer edge. Page 59 EG1-25 ENGINE - ENGINE MECHANICAL (f) Gradually heat the cylinder head to approx. If necessary, repair or replace the cap. Page 9 IN-9 INTRODUCTION - VEHICLE LIFT AND SUPPORT LOCATIONS... CHECK AND CLEAN FILTER !N EGR VACUUM MODULATOR (a) Check the filter for contamination or damage. CONNECT ACCELERATOR CABLE 5. Page 465 EG2-188 ENGINE - MFI SYSTEM STD Voltage Condition Trouble Terminals IDl. and E2 (E21). Page 332 EG2-55 ENGINE - ENGINE MECHANICAL (n) Remove the nut, bolt and PS pump bracket. (c) Remove the PS pump. (c) Using SST and a 'hammer, tap out the guide bushing. DISCONNECT TWO WIRES FROM STARTER (a) Remove the PS pump. (c) Using SST and a 'hammer, tap out the guide bushing. No.3 TIMING BELT COVER Remove the six bolts and timing belt cover. REMOVE FUEL PUMP (a) Remove the two nuts and disconnect the wires from the fuel pump. In ad- dition, used engine oil contains potentially harmful contaminants which may cause skin cancer. DRAIN ENGINE OIL (See step 1 on page EG1-236) 6. (IG SW ON) Check throttle position sensor. (c) Remove the head cover. If low, check for leaks and add coolant up to the "FULL"... Page 237 EG1-203 ENGINE - MFI SYSTEM 2. Page 235 EG2-58 ENGINE - MFI SYSTEM 7. Page 235 EG2-58 ENGINE - MFI SYSTEM 2. Page 235 EG2-58 ENGINE - ENGINE - ENGINE - MFI SYSTEM 7. Page 235 EG2-58 ENGINE - MFI SYSTEM 2. Page 335 EG2-58 ENGINE - MFI SYSTEM 7. Page 237 EG1-203 ENGINE 12V (1) There is no voltage between ECM terminals STA and E1 (IG SW START) Check starter Check wiring between ECM and operation. Page 554 EG2-277 ENGINE - ENGINE MECHANICAL ENGINE OIL INSPECTION 1. INSTALL PS PUMP 26. Torque: 40 N-m (410 kgf-cm, 30 ft-lbf) 10. Page 283 EG2-6 ENGINE - ENGINE MECHANICAL RECOMMENDED TOOLS 09040-00010 Hexagon Wrench Set For suspending engine 09090-04010 Engine Sling Device 09200-00010 Hexagon Wrench Set For suspending engine 09090-04010 Engine Sling Device 09200-00010 Hexagon Wrench Set For suspending engine 09090-04010 Engine Sling Device 09200-00010 Hexagon Wrench Set For suspending engine 09090-04010 Engine Sling Device 09200-00010 Hexagon Wrench Set For suspending engine 09090-04010 Hexagon Wrench Set For suspending engine 09090 Set hose etc. If insufficient, refill with distilled (or purified) water. Page 572 IG-4 IGNITION SYSTEM - (22R-E) PREPARATION SST (SPECIAL SERVICE TOOLS) 09843-18020 Diagnosis Check Wire RECOMMENDED TOOLS 09082-00015 TOYOTA Electrical Tester 09200-00010 Engine Adjust Kit EQUIPMENT Megger insulation resistancenneter Insulation resistance meter Spark plug cleaner Tachometer Ignition timing Timing light SSM (SPECIAL SERVICE MATERIALS) 08826-00080 Seal packing or equivalent... Page 317 EG2-40 ENGINE - ENGINE MECHANICAL 3. If the level is low, add oil until it begins to run out of the filler hole. Page 329 EG2-52 ENGINE - ENGINE MECHANICAL 9. (IG SW ON) (Throttle valve open) (2) Check that there is voltage between ECM terminal + B (+ B1) and body ground. (b) Remove your finger from the hole and check that the engine returns to idle speed in approx. REMOVE FLUID COUPLING WITH FAN AND WATER PUMP PULLEY (See step 3 on page EG1-40) Page 261 EG1-227 ENGINE COOLING SYSTEM 5. (b) Check the vacuum at each port. DRAIN ENGINE COOLANT 4. 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. 27. Page 158 EG1-124 ENGINE - MFI SYSTEM Voltage at ECM Wiring Connectors (2WD) Condition STD voltage Terminals See page EG1-125 Ignition switch ON Throttle valve open Ignition switch ON EG1-127 Throttle valve fully closed EG1-127 Throttle valve fully closed Throttle valve fully closed EG1-127 Throttle valve fully closed EG1-127 Throttle valve fully closed EG1-127 Throttle valve fully closed Throttle valve fully closed EG1-127 Throttle valve fully closed EG1-1 block the wheels at the opposite end in order to ensure safety. Page 403 EG2-126 ENGINE - ENGINE MECHANICAL 8. Page 185 EG1-151 ENGINE - MFI SYSTEM STD Voltage (1) There is no voltage between ECM terminals No. 10 and/or No. 20 and E01, and/or E02- (IG SW ON) (2) Check that there is voltage between ECM terminal No. 10 and/or No. Page 186 EG1-152 ENGINE - MFI SYSTEM Terminals Trouble Condition STD Voltage between ECM terminals IGt and E1. (c) Check if spark occurs while engine is being cranked. Page 520 EG2-243 ENGINE - MFI SYSTEM THROTTLE BODY INSTALLATION (See Components for Removal and Installation) 1. CONNECT FUEL RETURN HOSE 4. Page 75 EG1-41 ENGINE - ENGINE MECHANICAL 5. (IG SW ON) (Throttle valve open) (2) Check that there is voltage between ECM terminal + 131 (+ B) and body ground. Turn the crankshaft with a wrench to align the timing marks at TDC. Seal packing: Part No. 08826-00080 or equivalent Install a nozzle that has been cut to a 3 - 4 m m A 12 -... INSTALL AIR INTAKE CHAMBER (a) Position a new gasket on the intake manifold. NOTICE: Do not use a wire brush. (h) Disconnect the vacuum hose from the gas filter. Page 592 IG-24 IGNITION SYSTEM - (3VZ- E) DISTRIBUTOR COMPONENTS DISTRIBUTOR REMOVAL 1. Page 504 EG2-227 ENGINE - MFI SYSTEM (e) Install a O-ring to the spacer. Page 1 IN-1 INTRODUCTION - INT pipes. Standard oil clearance: 0.005 - 0.011 mm (0.0002 - 0.0004 in.) (b) Check the pin fit at the normal room temperature. REMOVE HOOD 3. qts) Dry fill 5.3 liters (5.6 US qts, 4.7 Imp. ASSEMBLE PISTON AND CONNECTING ROD (a) Coat the piston pin and piston pin holes with engine oil. (b) Remove the three nuts and end cover. Page 142 EG1-108 ENGINE - MFI SYSTEM (b) Insert tester probe into the connector from the wiring side when checking the continuity, amperage or vol- tage. Page 215 EG1-181 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 Limit Relief valve operating pressure TORQUE SPECIFICATIONS Part tightened... CHECK INJECTOR OPERATION Check for operating sound from each injector. DISCONNECT CONNECT ING ROD FROM PISTON Using SST and a press, press out the piston pin from the engine runs rough or dies. (b) Pull off the fuel pump from the lower side of the bracket. 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. Page 375 EG2-98 ENGINE - ENGINE MECHANICAL 19. RECHECK ENGINE INSTALLATION 1. Page 375 EG2-98 ENGINE INSTALLATION 1. Page 375 EG2-98 ENGINE - ENGINE MECHANICAL 19. RECHECK ENGINE INSTALLATION 1. Page 375 EG2-98 ENGINE - ENGINE MECHANICAL 19. RECHECK ENGINE - ENGINE MECHANICAL 19. RECHECK ENGINE - ENGINE INSTALLATION 1. Page 375 EG2-98 ENGINE - ENGINE - ENGINE INSTALLATION 1. Page 375 EG2-98 ENGINE - ENGINE INSTALLATION 1. Pag installed load: 18 - 24 N (1.785 - 2.415 kgf, 3.9 - 5.3 1bf) Minimum installed load: 12 N (1.2 kgf, 2.6 Ibf) If the installed load is less than minimum, replace the brush... Ignition timing: 5 S BTDC @ idle (Transmission in neutral range) (d) Loosen the hold-down bolt, and adjust by turning the distributor. Page 104 EG1-70 ENGINE - ENGINE MECHANICAL (c) Apply a light coat of engine oil on the threads and under the rod nuts. Page 558 EG2-281 ENGINE - LUBRICATION SYSTEM 7. Page 284 EG2-7 ENGINE - LUBRICATION SYSTEM 7. Page 284 EG2-7 ENGINE - ENGINE - ENGINE - ENGINE - ENGINE - ENGINE - LUBRICATION SYSTEM 7. Page 284 EG2-7 ENGINE - ENGINE Vernier calipers COOLANT Item Capacity Classification Engine coolant 2WD (M/T) 9.9 liters (10.5 US qts, 8.7 Imp. It also has a hose attached through which excess engine coolant or steam can flow. (IG SW ON) (2) Check that there is voltage between ECM terminal + B (+ B1) an body ground. Page 180 EG1-146 ENGINE - MFI SYSTEM Vcc - E2 (E21) (1) There is no voltage between ECM terminals Vcc and E2 (E21). Page 122 EG1-88 ENGINE - EMISSION CONTROL SYSTEMS EXHAUST GAS RECIRCULATION (EGR) SYSTEM (Federal and Canada) Page 123 EG1-89 ENGINE - EMISSION CONTROL SYSTEMS EXHAUST GAS RECIRCULATION (EGR) SYSTEM INSPECTION 1. Thoroughly clean all components to remove all the loose material. (3VZ-E ENGINE) REPLACE TIMING BELT (a) Remove the timing belt. (22R-E ENGINE) ADJUST VALVE CLEARANCE (a) Warm up the engine to normal operating temperature. VISUALLY INSPECT LINES AND CONNECTIONS Look for loose connections, sharp bends or damage. Resistance: 5.1.-6.3 W at 20SC (68SF) If the resistance is not as specified, replace the oxygen sensor. If adding oil helps the compression, chances are that the piston rings and/or cylinder bore are worn or damage. Use fender, seat and floor covers to keep the vehicle clean and prevent damage. measure the surfaces contacting the cylinder block and the manifolds for warpage. (b) Using compressed air, clean the filter. INSTALL CRANKSHAFT PULLEY (a) Install the crankshaft pulley and bolt. Page 585 PREPARATION SST (SPECIAL SERVICE TOOLS) Air gaps of G 1 and G2 pickups 09240-00020 Wire Gauge Set 09843-18020 Diagnosis Check Wire RECOMMENDED TOOLS 09082-00015 TOYOTA Electrical Tester 09200-00010 Engine Adjust Kit EQUIPMENT Spark plug cleaner Tachometer Ignition timing Timing light... REMOVE AUXILIARY AIR VALVE Remove the four screws, air valve and O-ring. (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 269 EG1-235 ENGINE - LUBRICATION SYSTEM SSM (SPECIAL SERVICE MATERIALS) 08826-00080 Seal packing or equivalent Oil pan OIL PRESSURE CHECK 1. Page 405 EG2-128 ENGINE - ENGINE MECHANICAL (c) Install the water pump with the seven bolts. (b) Install the intake chamber with the six bolts and two nuts. Page 134 EG1-100 ENGINE - EMISSION CONTROL SYSTEMS HEAT INSULATOR INSPECTION 1. 90SC (14 SF) to 50 SC (104 SF) and "Hot' is from 50 SC (104 OF) to 100 SC (212 OF). CONNECT HEATER HOSES 20. Page 549 EG2-272 ENGINE -LUBRICATION SYSTEM LUBRICATION SYSTEM DESCRIPTION A fully pressurized, fully filtered lubrication system is used in this engine. REMOVE No.1 IDLER PULLEY Using a 10 mm hexagon wrench, remove the pivot bolt, idler pulley and plate washer. (c) Remove the four bolts holding the mounting bracket to the support member, and remove the mounting bracket. VISUALLY INSPECT SPARK PLUGS Check the spark plug for electrode wear, thread damage and insulator damage. 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. (n) Disconnect the No.1 air hose from the PAIR reed valve. 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. (b) Check that the timing marks of the camshaft timing pulleys and No.3 timing belt cover are aligned. Page 221 EG1-187 ENGINE - MFI SYSTEM INJECTOR ON-VEHICLE INSPECTION 1. SST 09608-20012 (09608-00030) (d) Install the bearing retainer with the four screws. REMOVE INTAKE AIR CONNECTOR 2. (b) Apply vacuum to the throttle opener. Page 233 EG1-199 ENGINE - MFI SYSTEM (e) If not as specified, adjust with the DP adjusting screws. MEASURE CRANKSHAFT OIL CLEARANCE (a) Gradually loosen and remove the bearing cap bolts in three passes and in numerical order shown. (b) Install the bearings in the connecting rod and conne- cting rod and conne- cting rod cap. 25 ft-lbf) (u) Reconnect the battery negative terminal. Page 411 EG2-134 ENGINE - ENGINE MECHANICAL EXHAUST SYSTEM... Page 391 EG2-114 ENGINE - ENGINE MECHANICAL CRANKSHAFT OIL SEALS REPLACEMENT HINT: There are two methods (A and B) to replace the oil seal which are as follows: 1. Page 484 EG2-207 ENGINE - MFI SYSTEM 3. 25. INSTALL TIMING BELT See steps 2, 7 to 16, 22 and 24 on pages EG2-41 26. (w/ PS) REMOVE PS BELT 3. (j) Measure the Plastigage at its widest point (with A/C) REMOVE A/C BELT 4. Page 615 CH-7 CHARGING SYSTEM - Generator REMOVAL OF GENERATOR (3VZ-E) 1. If the resistance is not as specified, replace the sensor. Page 521 EG2-244 ENGINE - MFI SYSTEM ELECTRONIC PARTS LOCATION... Page 19 MA-8 MAINTENANCE OPERATIONS 22 R - E w/o Oil filter change 3.8 liters (4.0 US qts, 3.3 Imp. INSPECT RELAY CONTINUITY (a) Using an ohmmeter, check that there is continuity between terminals 1 and 3. (f) Place the six spacers and insulators into the injector holes. (c) Cool the TVV to below 35SC (95SF) with cool water. Page 426 EG2-149 ENGINE - EMISSION CONTROL SYSTEMS EGR SYSTEM INSPECTION 1. (c) Place the timing chain on the sprocket with the single bright chain link aligned with the timing mark on the sprocket. Page 432 EG2-155 ENGINE - EMISSION CONTROL SYSTEMS THREE-WAY CATALYTIC CONVERTER (TWC) SYSTEM To reduce HC, CO and NOx emissions, they are oxidized, reduced and converted to nitroger (N 2), carbon dioxide (CO 2) and water (H 2) by the catalyst. Maximum circle runout: 0.06 mm (0.0024 in.) If the circle runout is greater than maximum, replace the cylinder head and/or camshaft. Ignition timing: 8 BTDC @ idle 5. INSTALL OIL PRESSURE SENDER GAUGE (a) Apply adhesive to two or three threads. REMOVE REAR END COVER (a) Remove the nut and terminal insulator. qts) Ethylene-glycol base 9.7 liters (10.3 US qts, 8.5 Imp. 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. (4WD) REMOVE NO.2 FRAME (a) Remove the four bolts from the engine rear mounting. From warranties on Toyota replacement parts to details on features, Toyota Owners manuals help you find everything you need to know about your vehicle, all in one place. Page 130 EG1-96 ENGINE - EMISSION CONTROL SYSTEMS PULSED SECONDARY AIR INJECTION (PAIR) SYSTEM To reduce HC and CO emissions, this system draws in air into exhaust ports to accelerate oxidation, using vacuum generated by the exhaust pulsation in the exhaust manifold. gts) 4WD 4.2 liters (4.4 US qts, 3.7 Imp. DLC1 Ignition switch Cold start injector... Page 340 EG2-63 ENGINE - ENGINE MECHANICAL CYLINDER HEAD COMPONENTS INSPECTION AND REPAIR 1. Page 8 IN-8 INTRODUCTION - 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. (c) Check for clogged filter and stuck check valve. (b) Using an ohmmeter, measure the resistance between each terminal. Check provides just the right amount of air for the engine operating condition. NOTICE: Be careful not to scratch the head gasket con- tact surface. qts) W56 2.9 liters (3.1 US qts, 2.5 Imp. TIMING CHAIN REMOVAL 1. Page 456 EG2-179 ENGINE - MFI SYSTEM DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN (Cont'd) Purpose of the driving pattern. Page 454 EG2-177 ENGINE - MFI SYSTEM DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN (Cont'd) Purpose of the driving pattern. Page 454 EG2-177 ENGINE - MFI SYSTEM DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN (Cont'd) Purpose of the driving pattern. 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(b) When placing a new O-ring on the injector, take care not to damage it in any way. DRAIN ENGINE COOLANT 6. 1 EGR PIPE 3. Torque: 37 N-m (380 kgf-cm, 22 ft-lbf) for bolt 29 N-m (380 kgf-cm, 22 ft-lbf) for bolt 29 N-m (380 kgf-cm, 22 ft-lbf) for nut... 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. (c) Pump it to 118 kPa (1.2 kgf/cm , 17.1 psi), and check that the pressure does not drop. CONNECT AIR CLEANER HOSE 6. Apply the proper torque to all parts tightened. Page 343 EG2–66 ENGINE – ENGINE MECHANICAL (b) Gradually heat the cylinder head to 80 – 100SC (176 – 2 12S F). 41. Torque: 15 N-m (150 kgf-cm, 13 ft-lbf) (n) Connect the cold start injector connector. REMOVE THERMOSTAT (a) Remove the two bolts and water outlet from the intake manifold. Page 110 EG1-76 ENGINE - ENGINE MECHANICAL EXHAUST SYSTEM COMPONENTS... The oil circuit is shown in the illustration at the top of the previous page The RH piston is marked with "R", the LH piston with "L". FILL WITH ENGINE COOLANT 4. Page 425 EG2-148 ENGINE - EMISSION CONTROL SYSTEMS EXHAUST GAS RECIRCULATION (EGR) SYSTEM To reduce NOx emissions, part of the exhaust gases are recirculated through the EGR valve to the intake manifold to lower the maximum combustion temperature. 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. (b) Check that there is voltage between ECM terminal IGt an body ground. SST 09278-54012 (e) Check that the timing belt has tension between the crankshaft timing pulley and LH camshaft timing pulley. INSPECT TIMING BELT TENSIONER (a) Visually check tensioner for oil leakage. Page 80 EG1-46 ENGINE - ENGINE MECHANICAL CYLINDER BLOCK COMPONENTS... Torque: 18 N-m (185 kgf-cm, 13 ft-lbf) (c) Install the accelerator cable bracket with the two bolts. (IG SW ON) (2) Check that there is voltage between ECM terminal # 10 and/or # 20 and body ground. REMOVE OIL STRAINER Remove the four bolts, strainer and gasket. (2) Check that there is voltage between ECM terminal STP and body ground. when the brake pedal is depressed. Page 188 EG1-154 ENGINE - MFI SYSTEM Terminal Trouble Condition STD Voltage Coolant temperature 80 Ignition switch No voltage between ECM terminals STJ and E1 (IG SW ON) (2) Check that there is voltage between ECM terminal + B (+ B1) and body ground. REMOVE RADIATOR (a) Disconnect the reservoir hose. If a crack is found, replace the head. SENSOR INSPECTION MEASURE RESISTANCE OF EGR GAS TEMP. Page 16 IN-16 INTRODUCTION - STANDARD BOLT TORQUE SPECIFICATIONS SPECIFI inside dial indicator, measure the inside diameter of the rod bushing. Check cold start injector.* Repair or replace. Torque: 18 N-m (180 kgf-cm, 13 ft-lbf) 23. (k) (California and C & C) Connect the EGR gas temp. Always use new gaskets when replacing the fuel tank or component part. 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 in the valve in the valve quide bushing. INSPECT NEGATIVE SIDE RECTIFIER (a) Connect one tester probe to each rectifier terminal and the other to each rectifier terminal and the other to each rectifier negative terminal. (s) Connect the throttle position sensor connector. 12. INSPECT REAR BRAKE LININGS AND DRUMS (See BR section) (a) Check the lining - to - drum contact condition and lining wear. INSTALL GENERATOR Mount the generator on the generator cable bracket with pivot bolts. Using data provided by sensors which monitor various engine functions (RPM, intake air volume, engine coolant temperature, etc.), the microcomputer (ECM) triggers the spark at precisely the right instant. 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. Oil holes are made in the center of the crankshaft to supply oil to the connecting rods, bearing, pistons and other components. (b) Blow into pipe E and check that air comes out of air filter. Do not tighten the bolts. INSTALL WATER OUTLET (a) Remove any oil on the contact surfaces of the water outlet and the water outlet housing on the No.2 idler pulley. Page 227 EG1-193 ENGINE - MFI SYSTEM PRECAUTIONS 1. ADJUST IGNITION TIMING (a) Using SST, connect terminals TE1 and E1 of the DLC SST 09843-18020 (b) Check the idle speed. (b) Using SST, connect terminals Fp and +B of the DLC1. INSPECT LEAKAGE (a) Disconnect the test probes of SST from the battery and check fuel leakage from the injector. Page 574 IG-6 IGNITION SYSTEM - (22R- E) HIGH-TENSION CORD INSPECTION 1. CHECK COOLING SYSTEM FOR LEAKS (a) Fill the radiator with coolant and attach a radiator with coolant and attach a radiator cap tester. Torque: 19 N-m (195 kgf-cm, 14 ft-lbf) 3. w (c) Remove the two, bolts and pipe bracket. Page 93 EG1-59 ENGINE - ENGINE MECHANICAL (b) Using a groove cleaning tool or broken ring, clean the ring grooves. Page 386 EG2-109 ENGINE - ENGINE MECHANICAL (c) Using solvent and a brush, thoroughly clean the piston. (b) Remove the nut and disconnect the wire from the generator. CLEAN SPARK PLUGS Using a spark plug cleaner or wire brush, clean the spark plug. INSPECT EXPOSED BRUSH LENGTH Using a scale, measure the exposed brush length. Page 417 EG2-140 ENGINE - ENGINE MECHANICAL Rear engine mounting bracket x Mounting insulator (2WD) No.2 frame crossmember x Side frame (4WD) No.2 frame crossmember x Rear engine mounting insulator (4WD) RH engine mounting insulator x Body LH engine mounting insulator x Body Front exhaust pipe x Exhaust manifold Front exhaust pipe x Three -way catalytic converter... INSTALL PAIR REED VALVE AND NO.1 INJECTION MANIFOLD (a) Position a new gasket on the RH exhaust manifold. HINT: To prevent gasoline from being injected from injectors during this test, crank the engine for no more than 1 -... (b) Loosen the pipe clamp bolt. REMOVE THERMOSTAT 10. 20. INSPECT PISTON DIAMETER AND OIL CLEARANCE HINT: There are three sizes of the standard piston diameter, marked "'1", "2", and "3", accordingly. Page 367 EG2-90 ENGINE - ENGINE MECHANICAL CYLINDER BLOCK COMPONENTS... IF NECESSARY, ADJUST THROTTLE POSITION SENSOR (a) Loosen the two screws of the sensor. (g) Disconnect the vacuum hose from the gas filter. (b) Check that each pulley aligns with the timing marks as shown in the illustration. INSTALL OIL PUMP (a) Remove any old packing (FIPG) material and be car- eful not to drop any oil on the contact surfaces of the oil pump and cylinder block. Page 213 EG1-179 ENGINE - MFI SYSTEM (g) Install a gasket, SST, another gasket and union bolt to the delivery pipe as shown in the illustration. (b) Using an ohmmeter, measure the resistance between terminals. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY 2. SST 09286-46011 (b) Using SST and a press, press in a new bearing. The malfunction indicator lamp will come on when the ignition switch is placed at ON and the engine is not running. START ENGINE AND CHECK FOR LEAKS RADIATOR RADIATOR RADIATOR CLEANING Using water or a steam cleaner, remove mud and dirt from the radiator core. NOTICE: To prevent deterioration, do not clean the thr-... 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. (4W D) Remove the bolt, relief valve, gaskets and oil cooler. Page 595 IG-27 IGNITION SYSTEM - (3VZ- E) 6. Page 7 IN-7 INTRODUCTION - GENERAL REPAIR INSTRUCTIONS 11. Check idle speed and adjust, if necessary (See page EG2-27) Idle speed: 50 rpm C. (b) Remove the six nuts, exhaust manifold and gasket. Page 424 EG2-147 ENGINE - EMISSION CONTROL SYSTEMS TVV INSPECTION CHECK TVV BY BLOWING AIR INTO PIPE (a) Drain the coolant from the radiator into a suitable container. (c) Connect the No.1 and No.2 transfer shift linkage to the cross shaft. Page 547 EG2-270 ENGINE - COOLING SYSTEM RADIATOR REMOVAL 1. Standard ring end gap: N o.1 0.280 - 0.500 mm (0.0110 - 0.0197 in.) No.2 0.380 - 0.600 mm (0.0150 - 0.0236 in.) Oil (Side rail) 0.150 - ... 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. Page 109 EG1-75 ENGINE - ENGINE MECHANICAL 39. If the timing marks do not align, remove the timing belt and reinstall it. (j) Using SST, connect terminals Fp and +B of the DLC1. PERFORM PULL-IN TEST (a) Disconnect the field coil lead wire from terminal C. INSTALL OIL SEAL (a) Apply MP grease to a new oil seal lip. DRAIN COOLANT 2. Page 198 EG1-164 ENGINE - MFI SYSTEM Vcc - E2 (E21) (1) There is no voltage between ECM terminals Vcc and E2. INSPECT RESISTANCE OF ENGINE CONTROL MODULE (ECM) NOTICE: Do not touch the engine control module (ECM) ter- minals. Using data provided by sensors which monitor various engine temperature, etc.) the microcomputer (ECM) triggers the spark at precisely the right instant. CHECK VSV OPERATION (a) Connect the VSV terminals to the battery terminals as illustrated. Page 497 EG2-220 ENGINE - MFI SYSTEM INJECTOR COMPONENTS FOR REMOVAL AND INSTALLATION...

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