



Automotive Engines: Diagnosis, Repair, Rebuilding

By Tim Gilles

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This complete textbook provides detailed content on the theory of operation, diagnosis, repair, and rebuilding of automotive engines. In addition to essential technical expertise, the text helps users develop the skills and knowledge they need for professional success, including critical thinking and awareness of key industry trends and practices. The text emphasizes universal repair techniques and case histories based on real-world scenarios to prepare users for careers in the field. Instructor resources include lesson plans, customizable lab sheets that address NATEF Standards, a customizable test bank with questions based on chapter content, presentations in PowerPoint, and more. Now updated with new, full-color images and information on the latest trends, tools, and technology--including hybrid engines and high-performance components--AUTOMOTIVE ENGINES: DIAGNOSIS, REPAIR, REBUILDING, Seventh Edition, is the ideal resource for automotive programs who want a complete teaching package for their Engines course.

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Editorial Review

Review

Part I: ENGINE CONSTRUCTION, DIAGNOSIS, DISASSEMBLY, AND INSPECTION. 1. Engine Operation. Simple Engine. Four-Stroke Engine Operation. Cylinder Arrangement. Valve Train. Cylinder Block. Front-Wheel Drive. Engine Classifications. Combustion Chamber Designs. Firing Order. Types of Cooling Systems. Ignition Types. Study Questions. ASE-Style Review Questions. 2. Engine Shop Safety. General Shop Health and Safety. Hazardous Materials. Safety Test. 3. Diagnosing Engine Problems. Diagnosing Problems Before an Overhaul. Oil Consumption. Fuel Mixture Problems. Compression Loss. Engine Noises. Oil Pressure Problems. Cooling System Problems. Electronic Failures/Engine Damage. Study Questions. ASE-Style Review Questions. 4. Engine Removal, Disassembly, Inspection, and In-Chassis Repairs. Shop Manuals. Engine Removal. Engine Disassembly. Ordering Parts. Major Engine Repair - Engine in the Vehicle. Study Questions. ASE-Style Review Questions. 5. Cleaning the Engine. Cleaning Methods. Cleaning the Inside of the Engine. Study Questions. ASE-Style Review Questions. 6. Measuring. Metric System. Measuring Tools. Precision Measuring Tools. Study Questions. ASE-Style Review Questions. Part II: THE BREATHING SYSTEM. 7. Cylinder Head: Parts and Service. Head Disassembly. Carbon Removal. Crack Inspection. Crack Repair. Valve Guide Inspection. Valve Guide Repair. Valve Guide Seals. Resurfacing Heads. Study Questions. ASE-Style Review Questions. 8. Cylinder Head: Springs, Valves, and Valve Seats. Valve Springs. Push Rods. Rocker Arms. Valves and Valve Service. Valve Seats and Service. Reassembling the Head. Study Questions. ASE-Style Review Questions. 9. Camshafts, Lifters, Timing Belts and Chains. Camshaft. Hydraulic Lifters and Lash Adjusters. Hydraulic Lifter Operation. Roller Cam and Lifters. Cam Drives. Timing Drive Maintenance. Timing the Cam to the Crank. Timing Belts. Timing Belt Replacement. Study Questions. ASE-Style Review Questions. Part III: CYLINDER BLOCK ASSEMBLY. 10. Cylinder Block - Inspection and Service. Cleaning the Block. Oil and Water Plugs. Main Bearing Caps. Main Bearing Bore Alignment. Decking the Block. Inspecting Cylinder Bores. Deglazing Cylinders. Reborning Cylinders. Honing Cylinders to Size. Chamfering the Cylinder. Cylinder Sleeves. Lifter Bores. Final Block Preparation. Study Questions. ASE-Style Review Questions. 11. Crankshaft, Bearings, and Engine Balancing. Crankshaft Design. Crank End Thrust. Checking Crank Condition. Bearing Inserts. Engine Balancing. Study Questions. ASE-Style Review Questions. 12. Piston, Rings, and Connecting Rod. Pistons. Piston Rings. Connecting Rods. Wrist Pins. Study Questions. ASE-Style Review Questions. 13. Lubrication System. The Lubrication System. Oil. Oil Pumps. Priming the System. Oil Filters. Filter Bypass System. Crankcase Ventilation. Study Questions. ASE-Style Review Questions. 14. Cooling System. The Cooling System. Cooling System Circulation. Water Pump. Belts. Thermostat. Thermostat Bypass. Radiators. Study Questions. ASE-Style Review Questions. Part IV: ENGINE REPAIR AND REASSEMBLY. 15. Engine Hardware: Fasteners, Thread Repair, and Gaskets. Characteristics of Fasteners. Bolt Stretch. Torque and Friction. Bolt Failures. Drill Bits. Taps and Threads. Repairing Broken Fasteners. Flared Lines. Gaskets. Gasket Sealer. Seals. Study Questions. ASE-Style Review Questions. 16. Reassembly and Starting. Warranty. Reassembly. Completion of Assembly. Engine Installation. Engine Starting and Initial Break-in of the Camshaft. Final Inspection and Cleaning. Study Questions. ASE-Style Review Questions. Part V: ENGINE POWER AND PERFORMANCE. 17. Engine Breathing: Intake and Exhaust Systems. Intake and Exhaust Manifolds. Engine Modifications to Improve Air Flow. High-Performance Valves and Valve Springs. Exhaust Manifolds and Headers. Mufflers. Study Questions. ASE-Style Review Questions. 18. Turbochargers and Superchargers. Supercharging and Engine Power. Turbochargers. Turbo Boost and Lag. Supercharger Pressure Control. Variable Geometry Turbochargers. Aftercooler/Intercooler. Turbocharger Troubleshooting. Turbocharger Damage Diagnosis. Belt-driven Superchargers/ Blowers. Pressure Relief Valves. Dynamic Superchargers. Blower Problems. Study Questions. ASE-Style Review Questions. 19. Producing Power: Valve Timing, Power and Torque

Measurement. Camshaft and Engine Performance. Checking Camshaft Timing. Camshaft Phasing, Lobe Centers, and Lobe Spread. Variable Valve Timing. Active Fuel Management/Displacement on Demand. Power and Torque. Measuring Torque and Horsepower. Dynamometer Safety Concerns. Study Questions. ASE-Style Review Questions.

About the Author

Tim Gilles has authored or co-authored several textbooks and has been active in professional associations for many years. He was president and a board member of the California Automotive Teachers (CAT), a board member and election committee chair of the North American Council of Automotive Teachers (NACAT), a member of the California Community College Chancellor's Trade and Industry Advisory Committee, and education committee chair for the Santa Barbara Chapter of the Independent Automotive Professionals Association. Mr. Gilles has also served several terms as a board member of the Santa Barbara Automotive Service Council and is active in industry associations such as AERA, The Automotive Repair Coalition, and IATN, including delivering presentations at numerous conferences. He was an automotive teacher for 38 years and is professor emeritus in the Automotive Technology Department at Santa Barbara City College. Mr. Gilles holds the industry certifications of ASE Master Automotive Technician and ASE Master Engine Machinist.

Users Review

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