


27 IN-VEHICLE ENGINE SERVICE


Figure 27-6 Many aftermarket replacement intake manifolds have a different appearance from the original manifold.



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Figure 27-7 A single overhead camshaft engine with a timing belt that also rotates the water pump.



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Figure 27-8 A Toyota/Lexus hybrid electric vehicle has a ready light. If the ready light is on, the engine can start at anytime without warning.



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Figure 27-9 Always use the viscosity of oil as specified on the oil fill cap.



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VALVE ADJUSTMENT 1 Before starting the process of adjusting the valves, look up the specifications and exact procedures. The technician is checking this information from a computer CD-ROM-based information system.



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VALVE ADJUSTMENT 2 The tools necessary to adjust the valves on an engine with adjustable rocker arms include basic hand tools, feeler gauge, and a torque wrench.



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VALVE ADJUSTMENT 3 An overall view of the 4-cylinder engine that is due for a scheduled valve adjustment according to the vehicle manufacturer's recommendations.



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VALVE ADJUSTMENT 4 Start the valve adjustment procedure by first disconnecting and labeling, if necessary, all vacuum lines that need to be removed to gain access to the valve cover.



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VALVE ADJUSTMENT 5 The air intake tube is being removed from the throttle body.



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VALVE ADJUSTMENT 6 With all vacuum lines and the intake tube removed, the valve cover can be removed after removing all retaining bolts.



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VALVE ADJUSTMENT 7 Notice how clean the engine appears. This is a testament of proper maintenance and regular oil changes by the owner.



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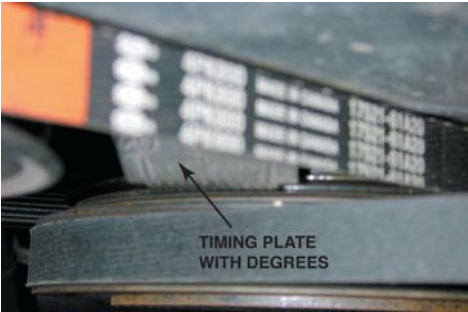
VALVE ADJUSTMENT 8 To help locate how far the engine is being rotated, the technician is removing the distributor cap to be able to observe the position of the rotor.



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VALVE ADJUSTMENT 9 The engine is rotated until the timing marks on the front of the crankshaft line up with zero degrees—top dead center (TDC)—with both valves closed on #1 cylinder.




TIMING PLATE WITH DEGREES

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VALVE ADJUSTMENT 10 With the rocker arms contacting the base circle of the cam, insert a feeler gauge of the specified thickness between the camshaft and the rocker arm. There should be a slight drag on the feeler gauge.



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VALVE ADJUSTMENT 11 If the valve clearance (lash) is not correct, loosen the retaining nut and turn the valve adjusting screw with a screwdriver to achieve the proper clearance.



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VALVE ADJUSTMENT 12 After adjusting the valves that are closed, rotate the engine one full rotation until the engine timing marks again align.



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VALVE ADJUSTMENT 13 The engine is rotated until the timing marks again align indicating that the companion cylinder will now be in position for valve clearance measurement.



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VALVE ADJUSTMENT 14 On some engines, it is necessary to watch the direction the rotor is pointing to help determine how far to rotate the engine. Always follow the vehicle manufacturer's recommended procedure.



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VALVE ADJUSTMENT 15 The technician is using a feeler gauge that is one-thousandth of an inch thinner and another onethousandth of an inch thicker than the specified clearance as a double-check that the clearance is correct.



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VALVE ADJUSTMENT 16 Adjusting a valve takes both hands—one to hold the wrench to loosen and tighten the lock nut and one to turn the adjusting screw. Always double check the clearance after an adjustment is made.



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VALVE ADJUSTMENT 17 After all valves have been properly measured and adjusted as necessary, start the reassembly process by replacing all gaskets and seals as specified by the vehicle manufacturer.



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VALVE ADJUSTMENT 18 Reinstall the valve cover being careful not to pinch a wire or vacuum hose between the cover and the cylinder head.



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VALVE ADJUSTMENT 19 Use a torque wrench and torque the valve cover retaining bolts to factory specifications.



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VALVE ADJUSTMENT 20 Reinstall the distributor cap.



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VALVE ADJUSTMENT 21 Reinstall the spark plug wires and all brackets that were removed to gain access to the valve cover.



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VALVE ADJUSTMENT 22 Reconnect all vacuum and air hoses and tubes. Replace any vacuum hoses that are brittle or swollen with new ones.



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VALVE ADJUSTMENT 23 Be sure that the clips are properly installed. Start the engine and check for proper operation.



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VALVE ADJUSTMENT 24 Double-check for any oil or vacuum leaks after starting the engine.



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