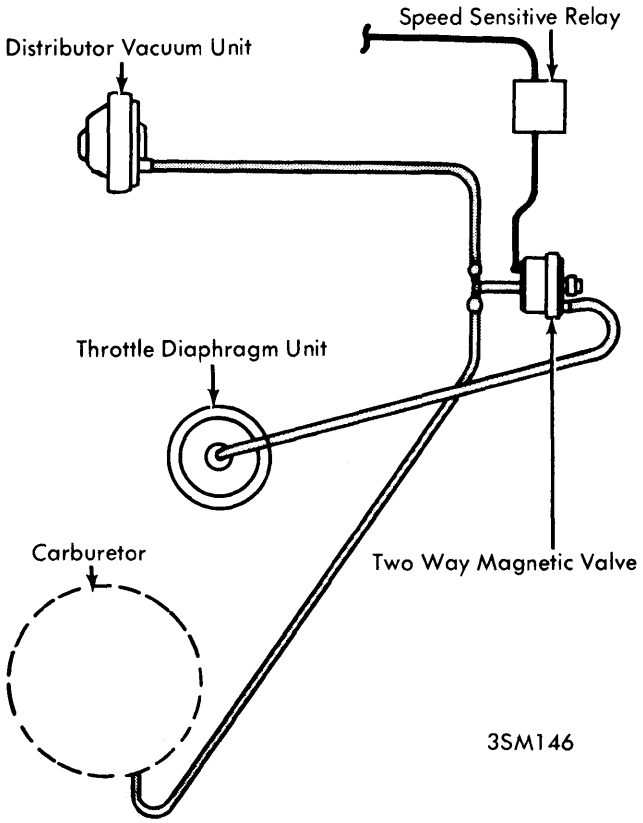
BMW 1973 ENGINE MODIFICATION

2002 (1973)
Bavaria (1973)
3.0 (1973)

NOTE – BMW 2002 Tii uses Kugelfischer fuel injection for exhaust emission control. For additional information, see appropriate story in CARBURETION Section.

DESCRIPTION

Exhaust emission control is accomplished by a specially desgined engine, intake manifold and carburetor. Four cylinder models also use a preheated intake manifold. A throttle closure delay diaphragm system is used to control emissions during decleration. This system consists of a throttle control vacuum diaphragm, a two way magnetic valve connected to intake manifold vacuum, and a speed sensitive relay which controls magnetic valve. On four cylinder models, an ignition retard unit is connected directly to intake manifold vacuum. On six cylinder models, vacuum retard is controlled by same two way valve and speed relay as used for throttle control system. All models also use exhaust gas recirculation for the control of NOx. *For additional information on EGR system, see appropraite story in EMISSION Section.*



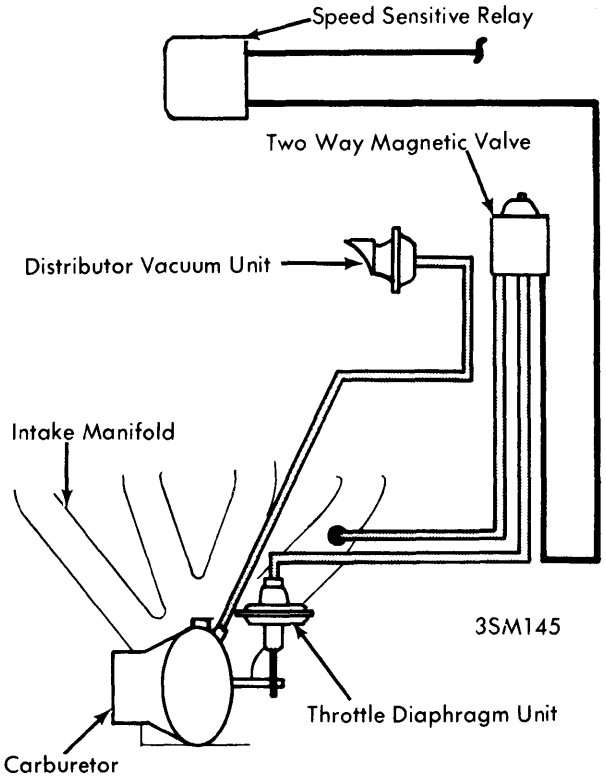
ENGINE MODIFICATION SYSTEM (6 CYL. MODELS)

OPERATION

Throttle Closure Delay System – To control emissions during deceleration, throttle plate is held slightly opened by means of a vacuum operated diaphragm unit. At a speed of over 1750 ± 100 RPM (4 cyl. models) or 1920 ± 100 RPM (6 cyl. models), speed sensing relay actuates two way valve to vent vacuum diaphragm unit to atmosphere. A spring, in vacuum unit, then causes carburetor linkage to open throttle 3-4°. As engine speed drops below 1650 ± 100 RPM (4 cyl. models) or 1800 ± 100 RPM (6 cyl. models), relay interrupts flow of current to valve. This allows intake manifold vacuum to retract plunger of vacuum unit and return throttle to idle position.

Ignition Retard (4 Cyl. Models) – Ignition timing retard is controlled by intake manifold vacuum. As a result, when throttle is closed, manifold vacuum will be high and ignition timing will be retarded.

Ignition Retard (6 Cyl. Models) – Retard unit on distributor is controlled by same two way valve and speed sensitive relay used in throttle closure delay system. At a speed of over 1920 ± 100 RPM, vacuum is vented to atmosphere and no ignition retard occurs. As speed drops below 1800 ± 100 RPM, vacuum is applied to retard unit of distributor and ignition timing will be retarded.



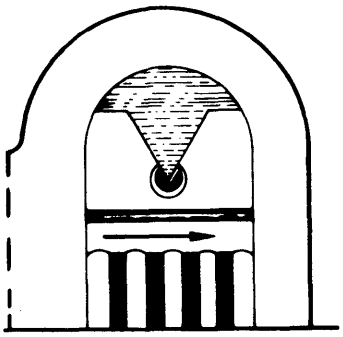
ENGINE MODIFICATION SYSTEM (4 CYL. MODELS)

ADJUSTMENTS

Ignition Timing (4 Cyl. Models) – Adjust dwell angle to 59-65°. Disconnect distributor vacuum hose and adjust idle speed to 1500 RPM by turning throttle diaphragm unit. *NOTE – Do NOT set idle speed by turning throttle stop screw. This screw is preset at factory.* Rotate distributor until steel ball in flywheel is aligned with pointer on clutch housing. Tighten distributor and recheck timing. Adjust throttle diaphragm unit as described below. Check vacuum retard by disconnecting vacuum hose, idle speed should increase considerably.

BMW 1973 ENGINE MODIFICATION (Cont.)

Ignition Timing (6 Cyl. Models) – Adjust dwell angle to 35-41°. Disconnect both vacuum hoses from distributor. Adjust idle speed to 1700 RPM by means of idle speed adjusting screw. Rotate distributor until steel ball in flywheel is aligned with pointer on clutch housing. Tighten distributor and recheck timing. Reconnect both vacuum hoses and adjust idle speed to 900-1000 RPM, check that ignition timing is between "OT" mark and 5° ATDC. Check vacuum retard by disconnecting retard hose from distributor, idle speed should increase considerably.



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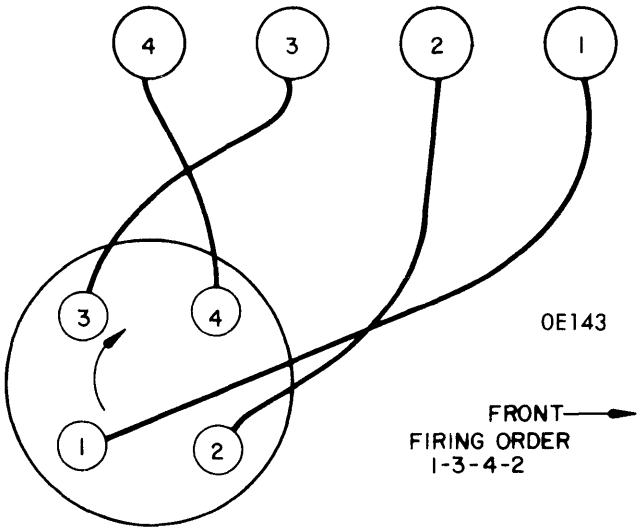
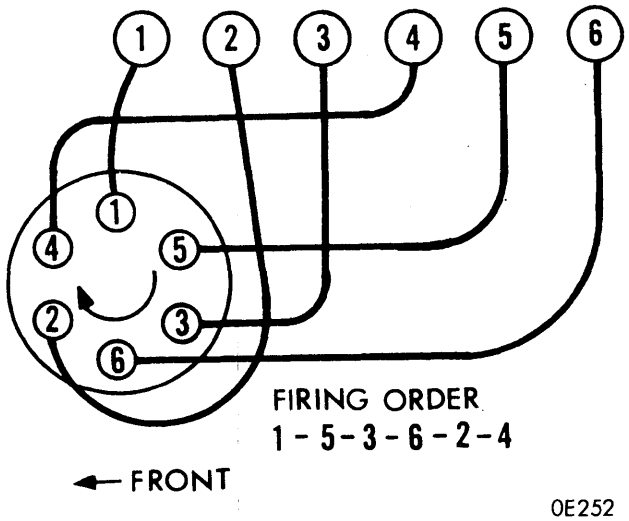
IGNITION TIMING MARK

Idle Speed & Mixture (4 Cyl. Models) – Turn idle air bypass control screw to obtain an idle speed of 900 ± 50 RPM. Adjust idle CO to .8-1.2% by means of idle mixture control screw to obtain optimum engine performance and low emissions.



FIRING ORDER (4 CYL. MODELS)

Idle Speed & Mixture (6 Cyl. Models) – Adjust CO to approximately 2%. Using a suitable carburetor balancing tool, obtain an idle speed of 900-950 RPM with flow rates through both carburetors equal, be sure that engine is at normal operating temperature. Each exhaust manifold has a connection for sampling of exhaust gases which is closed with a copper screw. Remove screws and insert special sample probes. Adjust idle mixture to approximately 1.5% CO at each exhaust manifold. Reinstall air cleaner assembly and adjust idle mixture to obtain a lean best idle setting with a maximum of 2% CO. Finally, recheck CO at tailpipe.



FIRING ORDER (6 CYL. MODELS)

Throttle Diaphragm Unit – Disconnect vacuum hose from unit. By means of throttle linkage, accelerate engine to 2500 RPM. Gradually decrease throttle opening until contacting set screw. Speed obtained should be 1600 ± 50 RPM (4 cyl. models) or 1800 ± 50 RPM (6 cyl. models). If adjustment is required, loosen diaphragm unit clamp and turn unit until proper speed is obtained. Recheck for proper adjustment.

TESTING

Throttle Closure Delay System – If system does not function correctly and throttle diaphragm unit is adjusted properly, disconnect vacuum line from throttle diaphragm unit and check for vacuum. If vacuum is present but plunger does not operate, replace throttle diaphragm unit. If no vacuum is present, check for leaky hoses and connections and make sure speed relay is properly grounded. Unplug lead to two way valve and connect voltmeter. With engine speed above 2000 RPM, if reading is 12 volts, replace valve. If reading is 0 volts, replace speed relay.

Ignition Retard System (6 Cyl. Models) – Disconnect vacuum advance hose from distributor and increase engine speed to 2500 ± 50 RPM. Check for vacuum at hose. If vacuum is present, system is operating correctly. If no vacuum is present, remove plug from two way valve and connect voltmeter. Start engine and increase speed. Reading must be 12 volts below 2200 ± 100 RPM. If reading is 0 volts, replace speed relay. If voltage reading was correct, but system still is malfunctioning, replace two way valve.