HONDA ENGINE MODIFICATION

Honda Civic (1973)

DESCRIPTION

Throttle Opener System – When throttle is closed suddenly at high engine speeds, hydrocarbon emissions increase due to engine misfire caused by an incombustible mixture. The throttle opener is designed to prevent misfiring during deceleration by causing throttle valve to remain slightly open allowing better mixture control. System consists of a throttle opener unit and a throttle control valve.

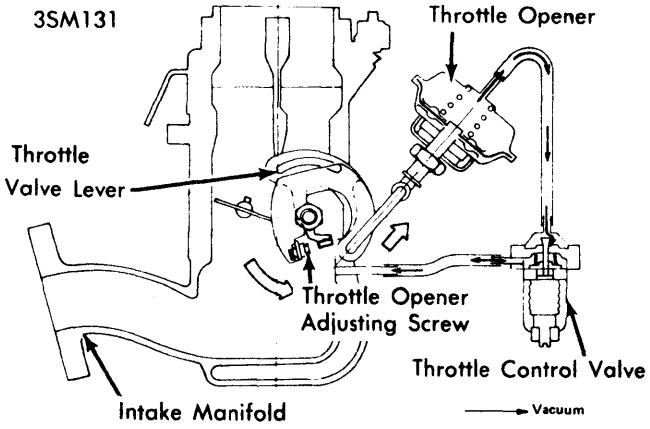
Ignition Timing Retard Unit – System consist of a retard vacuum diaphragm on distributor and a special retarder vacuum port in carburetor. This system causes retarded ignition timing at idle.

Transmission Controlled Spark (Man. Trans.) – System is designed to reduce NOx emissions during normal vehicle operation. System consists of a transmission gear sensor, a coolant temperature sensing switch, and a solenoid valve.

Temperature Controlled Spark Advance (Auto. Trans.) – This system is designed to reduce NOx emissions during normal engine operation by disconnecting spark advance unit. System consists of a coolant temperature sensing switch and a solenoid valve.

OPERATION

Throttle Opener System – Control valve is set to allow passage of vacuum to throttle opener diaphragm when engine vacuum is greater than 20.1-21.7 in. Hg. (510-550 mm Hg) during deceleration. Under running conditions, other than fully closed throttle deceleration, intake manifold vacuum is lower than preset value of throttle control valve; therefore, control valve will not be actuated. Vacuum remaining in system is bled off by passage in control valve.

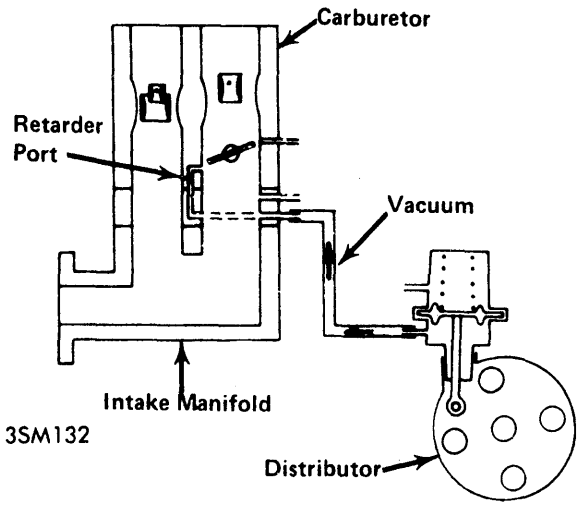


THROTTLE OPENER SYSTEM

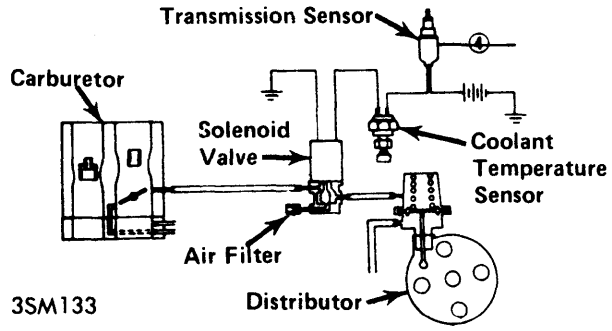
Ignition Timing Retard Unit – During engine idle, vacuum produced at carburetor retarder port is transmitted to spark retard unit which retards basic ignition timing 5°.

Transmission Controlled Spark (Man. Trans.) – When coolant temperature is 122°F or higher and transmission is in first, second or third gear, solenoid valve cuts off vacuum to spark advance unit which results in lower NOx levels. Vacuum advance is restored when fourth gear is selected.

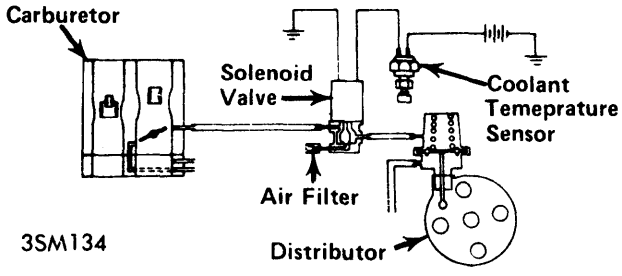
Temperature Controlled Spark Advance (Auto. Trans.) – When coolant temperature is 122°F or higher, solenoid valve is energized cutting off vacuum to advance unit.



IGNITION TIMING RETARD UNIT



TRANSMISSION CONTROLLED SPARK



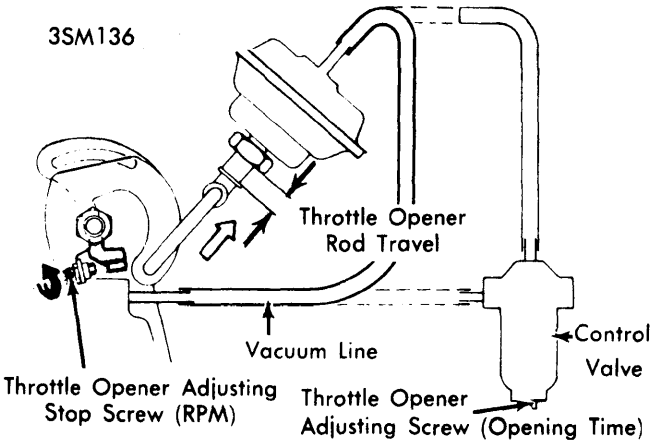
TEMPERATURE CONTROLLED SPARK ADVANCE

TESTING

Throttle Opener System – With engine at normal operating temperature, check for loose, disconnected or deteriorated vacuum hoses and replace as necessary. Check that engine is idling at 800 ± 50 RPM (Man. Trans.) or 750 ± 50 RPM (Auto. Trans. in gear) with headlights ON. Disconnect vacuum line from intake manifold at control valve and connect directly to

HONDA ENGINE MODIFICATION (Cont.)

throttle opener unit. Engine speed should increase to 1500-2000 RPM. If engine speed increases but not within range indicated, check throttle opener rod for full movement (approximately .2"). If full movement is available, adjust stop screw to obtain 1500-2000 RPM. If full movement is not available, check for vacuum. If no vacuum is present, clean vacuum port at intake manifold and recheck. If full movement is still not available, replace throttle opener and recheck. Reconnect hoses and if necessary adjust control valve to hold throttle opener rod fully retracted for one to three seconds when throttle is suddenly closed from an engine speed of 3500 RPM. Adjust by loosening set screw and turning adjusting screw.



TESTING THROTTLE OPENER

Ignition Timing Retard Unit – Check for loose, disconnected or deteriorated vacuum hoses and replace as necessary. Remove distributor cap and check that coupling rod is properly connected and that base-plate moves freely. Reinstall distributor cap. Connect a tachometer and timing light, start engine and check idle speed with engine at normal operating temperature and headlights ON. Disconnect vacuum hose from retard unit and connect a vacuum gauge to hose. Reading should be greater than 12 in. Hg. If reading is low, use compressed air to clear retarder port and recheck. If proper vacuum is still not available check engine tune-up condition. Set ignition timing to 5° ± 1° BTDC. Reconnect vacuum hose to retard unit and recheck ignition timing. Timing should be 0° ± 1°. If not, replace spark advance/retard unit and recheck.

Coolant Temperature Sensor – Switch contacts should be open when engine is cold and closed when engine is hot.

Transmission Sensor Switch – Switch should be open with fourth gear selected and closed in all other gear positions.

Solenoid Valve – Disconnect vacuum advance line from distributor and connect to vacuum gauge. Start engine and raise idle to 1500-2000 RPM. Vacuum gauge should read normal vacuum while engine is cold. After temperature rises and before radiator fan starts, vacuum gauge should drop to zero. With engine cold, if no vacuum is available, stop engine and disconnect vacuum signal line from idle cut-off valve at charcoal canister and plug line. Restart engine and set to fast idle. If vacuum is not available, check idle cut-off valve (see appropriate story in Evaporation Emission Section). If vacuum is still not available, stop engine and disconnect vacuum line to manifold from solenoid valve and insert vacuum gauge. If vacuum is now available, solenoid valve is defective. Replace and recheck. If vacuum is not available, vacuum port is restricted. Clean port with compressed air.

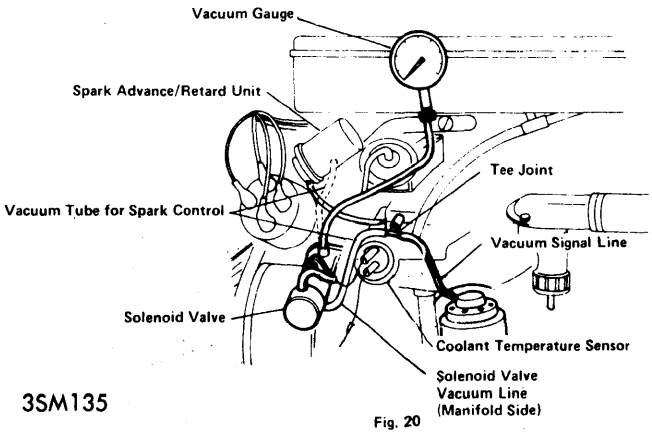


Fig. 20

TESTING SOLENOID VALVE

Transmission Controlled Spark – After performing above checks, if vacuum is available while in first, second or third gear with engine above 122°F, but below normal operating temperature at fast idle, stop engine. Check continuity between terminals of coolant temperature switch. If there is no continuity, switch is defective and must be replaced. If there is continuity, check that there is battery voltage at solenoid valve with engine running.

ADJUSTMENTS

Ignition Timing – With engine at normal idle speed, disconnect and plug idle retard vacuum line. Set timing to 5° BTDC.

IDLE SPEED & MIXTURE

NOTE – Breaker point gap, ignition timing and valve clearance must be correct and engine must be at normal operating temperature prior to setting of idle.

With CO Meter – 1) Warm-up and calibrate CO meter in accordance with manufacturer's instructions and insert exhaust probe into tail pipe at least two feet.

2) Adjust idle speed to 800 ± 50 RPM (Man. Trans.) or 750 ± 50 RPM (Auto. Trans. in gear) with headlights ON.

3) Adjust mixture screw to obtain 1-3% CO. If unable to obtain this reading with limiter cap in place, stop engine and remove cap. Remove mixture screw from carburetor and blow out passage with compressed air. Replace screw and restart engine.

4) Adjust mixture to obtain 2% CO and recheck idle speed. If reading is still 2%, replace limiter cap. If 2% CO cannot be obtained, check engine condition.

Idle Drop Method – 1) Adjust idle speed with headlights ON to 800 ± 50 RPM (Man. Trans.) or 750 ± 50 RPM (Auto. Trans. in gear).

2) Remove limiter cap and turn idle mixture screw counterclockwise until engine speed drops. Now turn screw clockwise until engine reaches highest RPM.

NOTE – If idle speed is now above specification, repeat steps 1) & 2).

3) Continue to turn mixture screw clockwise until idle speed drops 40 RPM (Man. Trans.) or 20 RPM (Auto. Trans.). Replace limiter cap.