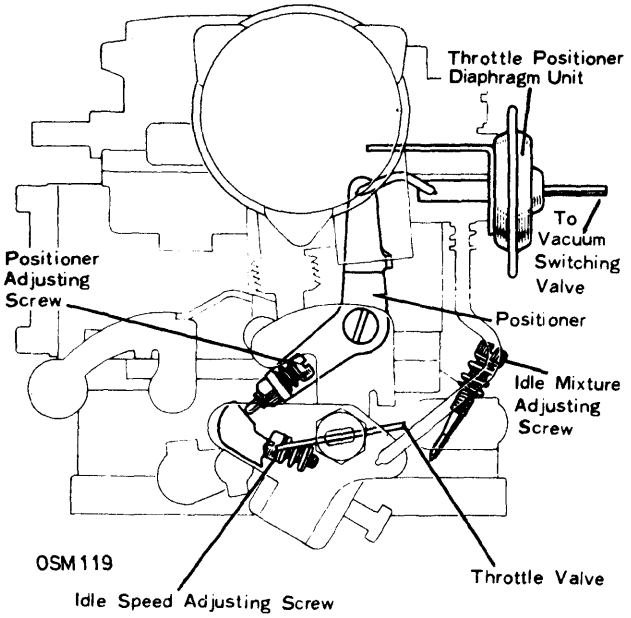
TOYOTA IMPROVED COMBUSTION SYSTEM (WITHOUT TRANSMISSION CONTROLLED SPARK)

8R-C Engine
Corona (1971)
Corona Mk II (1970-71)
Hi-Lux (1970-71)
F Engine
Land Cruiser (1970-71)

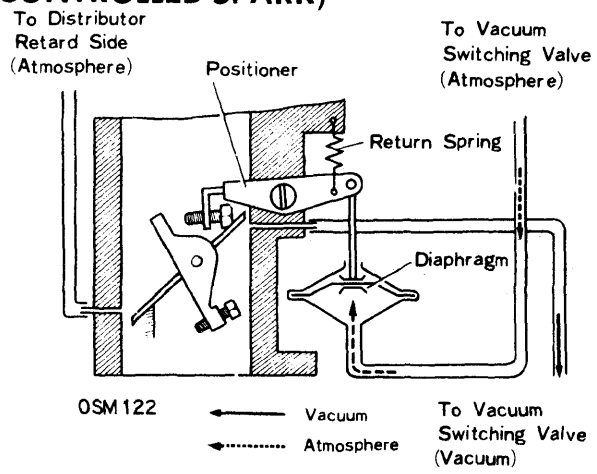
DESCRIPTION

System consists of a modified carburetor with throttle positioner, a modified distributor with a combination vacuum retard and advance diaphragm, a speed detector, speed marker and a vacuum switching valve.

Carburetor – Carburetor has modifications to improve combustion of lean mixtures and reduce emissions of unburned hydrocarbons and carbon monoxide. Jet specifications are not changed. Throttle linkage has been modified for installation of throttle positioner on carburetor to control throttle opening during deceleration.



MODIFIED CARBURETOR WITH THROTTLE POSITIONER



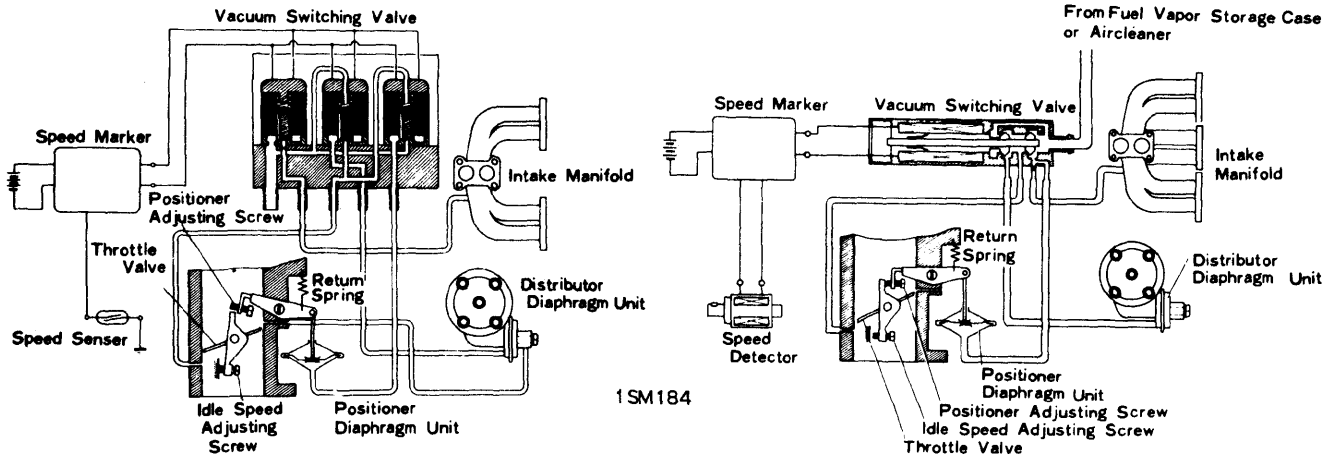
THROTTLE POSITIONER SECTIONAL VIEW

Throttle Positioner – Diaphragm type vacuum actuator is linked to carburetor throttle lever and controlled by vacuum switching valve to prevent throttle from closing completely during periods of deceleration.

Speed Detector (F Engine) – Speed detector is a small AC generator installed at speedometer cable connection on transmission case which is driven at speedometer cable speed and generates a voltage proportional to vehicle speed. Voltage is 6.1 bolts at 37.5 MPH and is fed into the speed marker (a solid state unit) which then actuates the speed marker.

Speed Sensor (8R-C Engine) – Speed sensor consists of a magnet driven by speedometer cable and an on-off reed switch which is actuated by magnetic field of the magnet. Reed switch produces six pulses for each revolution of speedometer cable. At 60 MPH, 6,000 pulses are produced and fed into speed marker (a solid state unit) which then actuates the speed marker.

Speed Marker – Controlled by either speed detector (F engine) or speed sensor (8R-C engine), speed marker is a solid unit which actuates vacuum switching valve.

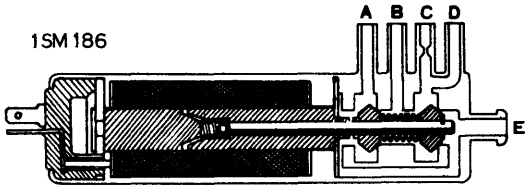


8R-C ENGINE F ENGINE

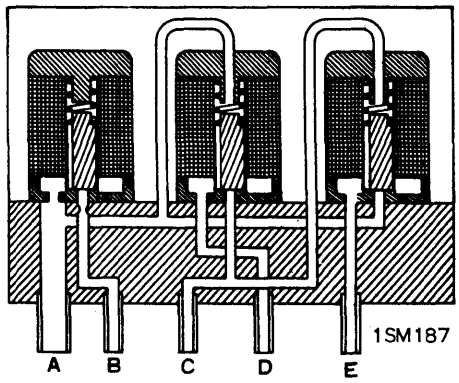
TOYOTA IMPROVED COMBUSTION SYSTEM SCHEMATIC

TOYOTA IMPROVED COMBUSTION SYSTEM (Cont.) (WITHOUT TRANSMISSION CONTROLLED SPARK)

Vacuum Switching Valve – This is a solenoid operated vacuum valve which controls operation of throttle positioner and distributor vacuum unit. It is controlled by speed marker and switches vacuum circuits at 25 MPH (8R-C engine) or 14 MPH (F engine).



VACUUM SWITCHING VALVE SECTIONAL VIEW (F ENGINE)



VACUUM SWITCHING VALVE SECTIONAL VIEW (8R-C ENGINE)

OPERATION

1) At speeds below 11 MPH (8R-C engine) or 14 MPH (F engine), vacuum switching valve solenoid will be de-energized and valve will be in "OFF" position, directing manifold vacuum to throttle positioner diaphragm. Actuating lever and positioner adjusting screw will be withdrawn from throttle valve lever and throttle valve will close to normal position. Vacuum line to distributor vacuum unit retard position will be closed and distributor vacuum unit will advance in normal manner.

2) At speeds above 25 MPH (8R-C engine) or 14 MPH (F engine), vacuum switching valve solenoid will be energized and valve will be in "ON" position so that manifold vacuum is not directed to throttle positioner diaphragm. Throttle positioner arm and adjusting screw will be extended but will not have any effect since throttle valve will be open beyond this point. Distributor vacuum unit retard line will be connected to carburetor vacuum port below throttle valve but effective vacuum will not exist at this port due to throttle valve opening, distributor vacuum unit will advance in normal manner. Port on end of vacuum switching valve will be connected to intake manifold so that case storage system (evaporation emission control) will direct fuel vapors to engine.

3) During periods of deceleration when speed exceeds 11 MPH (8R-C engine) or 12 MPH (F engine), throttle positioner will prevent throttle closing completely and at the same time manifold vacuum will be effective in distributor vacuum unit retard line and ignition timing will be retarded. Further deceleration to below 11 MPH (8R-C engine) or 14 MPH (F engine) will cause vacuum switching valve to de-energize. Vacuum is then directed to throttle positioner diaphragm and throttle positioner arm will be retracted to allow throttle to close to normal idling position. This action of vacuum switching valve also opens retard chamber of distributor vacuum unit to atmospheric pressure and distributor will then advance in normal manner.

PERIODIC SERVICE

Periodic inspection and service as detailed below is required to maintain satisfactory engine performance and to reduce exhaust emission pollutants to designed limits. *For all specifications, refer to Foreign Car Tune-Up Chart.*

ENGINE TUNE-UP

Carburetor Idle Speed and Mixture Adjustment – Check and adjust after first 1,000 miles and at 3,000 mile intervals. Connect vacuum gauge and tachometer. With engine at normal operating temperature, adjust as follows:

1) Adjust idle speed to specified RPM by turning idle speed adjusting screw.

2) Turn idle mixture adjusting screw to obtain maximum vacuum gauge reading.

3) Repeat idle speed and mixture adjustments (steps **1 & 2**) as required to obtain specified settings.

4) For final step, turn idle mixture adjusting screw to obtain lean best idle setting.

Distributor – Check points and adjust gap after 1,000 miles and then at 3,000 mile intervals.

Ignition Timing – Check and adjust after first 1,000 miles and then at 3,000 mile intervals.

Spark Plugs – Check and adjust after first 1,000 miles then at 6,000 mile intervals. Replace every 12,000 miles.

Valve Clearance – Check and adjust after first 1,000 miles and then at 6,000 mile intervals.

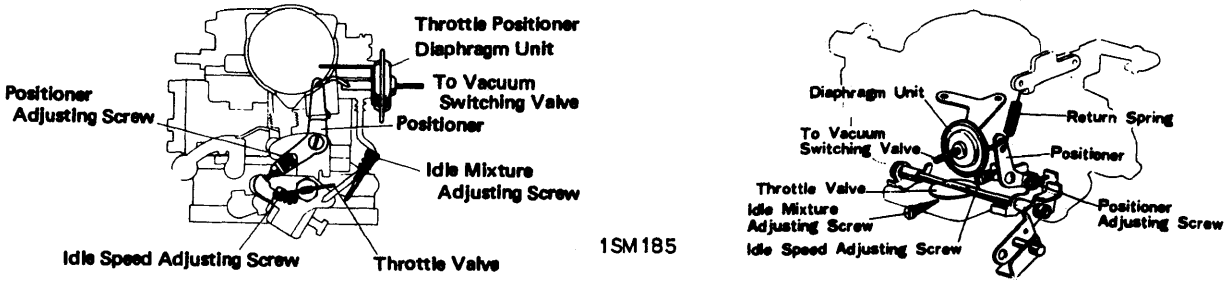
EMISSION CONTROL UNITS

Check all components for proper operation after first 1,000 miles and then at 12,000 mile intervals. Also check condition of all lines and hoses, make certain connections are tight.

MAINTENANCE

Throttle Positioner – With engine idle speed adjusted to specifications and engine at normal operating temperature, disconnect vacuum hose from positioner diaphragm and plug hose. Raise engine RPM slightly, by depressing accelerator pedal, to set throttle positioner in place. Then adjust positioner adjusting screw to obtain 1400 RPM in neutral (8R-C engine) or 1000 RPM (F engine). Connect hose to positioner diaphragm. Throttle lever should become free from throttle positioner as soon as hose has been connected, engine should idle at specified idle RPM. If operation is not correct, inspect throttle positioner linkage, diaphragm, vacuum switching valve

TOYOTA IMPROVED COMBUSTION SYSTEM (Cont.)
(WITHOUT TRANSMISSION CONTROLLED SPARK)



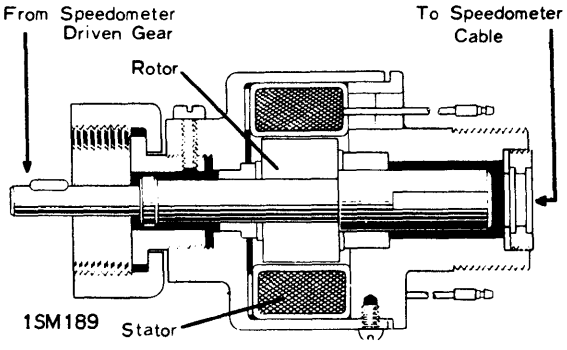
8R-C ENGINE — F ENGINE

THROTTLE POSITIONER INSTALLATION

and speed marker operation. Also check vacuum hoses and connections for leaks.

Distributor Vacuum Retard & Advance Unit – Connect tachometer, with engine at normal operating temperature, and adjust idle speed to specifications. Disconnect and plug hose leading from vacuum switching valve to adapter on intake manifold. Disconnect hose connecting vacuum switching valve with retard chamber of distributor unit at switching valve and connect it with intake manifold adapter. Engine RPM should decrease due to retard action. If no change in engine RPM is noted, replace distributor assembly.

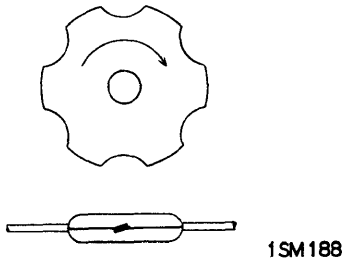
Speed Detector (F Engine) – Check for proper electrical connection. Check operation by connecting an AC voltmeter between output wires. Voltage reading should be 6.1 volts. If voltage is lower than 4.1 volts, replace speed detector. *NOTE – Speedometer accuracy can be checked with a speedometer tester which should read 37.5 MPH at 637 RPM of speedometer cable.*



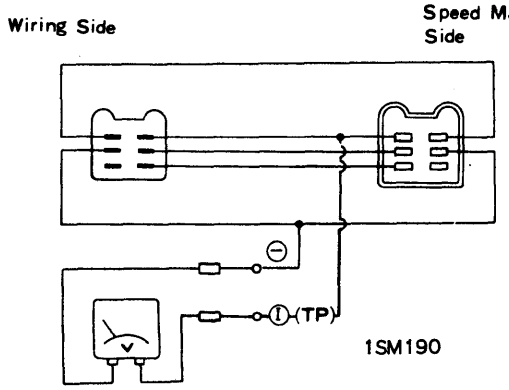
SPEED DETECTOR SECTIONAL VIEW (F ENGINE)

Speed Sensor (8R-C Engine) – To check with car stationary, disconnect speedometer cable from transmission. Using a circuit tester, ensure there are 6 on-off pulses for each speedometer cable rotation. Speed sensor can also be checked while driving. With vehicle moving at 10 MPH and using an oscilloscope, number of pulses should be 900-1150 per minute. If unable to obtain measured values, replace speedometer assembly.

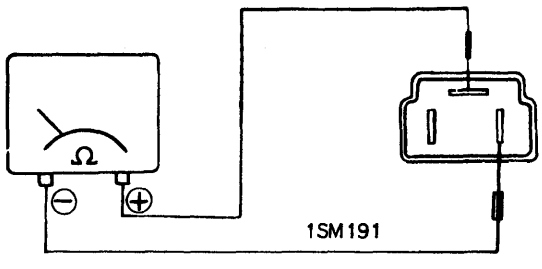
Speed Marker – On 8R-C engine, disconnect speed marker socket. Drive vehicle with a voltmeter connected as shown in illustration. When accelerating, voltage should drop from 12 to 0 volts at 25 MPH. When decelerating, voltage should increase from 0 to 12 volts at 11 MPH. On F engine, check wires for proper connection. Operate engine and check for vacuum switching valve operation at speedometer reading over 14 MPH. If vacuum switching valve does not operate, check for defects and replace if necessary. If all other units in system check out, replace speed marker.



SPEED SENSER (8R-C ENGINE)



TESTING SPEED MARKER (8R-C ENGINE)



TESTING VACUUM SWITCHING VALVE (8R-C ENGINE)

TOYOTA IMPROVED COMBUSTION SYSTEM (Cont.) (WITHOUT TRANSMISSION CONTROLLED SPARK)

Vacuum Switching Valve – *NOTE – Prior to testing valve operation on 8R-C engines, measure resistance of magnetic coil by disconnecting valve connector and connecting an ohmmeter as shown in illustration. Resistance should be 18.7 ohms.* Check switching valve operation as follows:

De-energized ("OFF") Position – Fitting "E" should be open to fitting "A" and fitting "B" should be open to either fitting "D" (8R-C engine) or to fittings "C" & "D" (F engine).

Energized ("ON") Position – With electrical connector disconnected, connect fully charged 12 volt battery (as necessary) to valve leads. Switching valve should actuate changing circuits. Fitting "E" is then open to fittings "C" & "D", and fitting "B" will be open to fitting "A".

Vacuum Hoses & Fittings – Check for leakage and proper connections. Remove all hoses and blow them out with air. Replace all hoses that cannot be cleaned with compressed air.

TROUBLE SHOOTING

Abnormal Idle Speed – Faulty carburetor, sticking carburetor linkage or choke valve. Throttle positioner faulty or positioner linkage sticking. Leaking diaphragm. Vacuum switching valve faulty. Vacuum hoses or tubes disconnected or clogged.

Rough Engine Idle – Idle speed, carburetor idle mixture, ignition timing or valve clearance improperly adjusted. Vacuum hoses or lines disconnected or leaking. Air or fuel leakage caused by loose manifold bolts or carburetor flange attaching nuts. Stuck ventilation valve. Vacuum switching valve faulty.

Insufficient Engine Braking Effect – Engine idle speed or throttle positioner improperly adjusted. Distributor retard and advance unit diaphragm faulty or leaking. Vacuum hoses or lines clogged or disconnected. Speed detector, speed marker or vacuum switching valve faulty.

Power Loss at High Speed – Faulty speed sensor or speed marker.