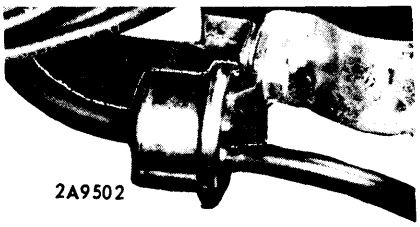
1971-73 AMERICAN MOTORS & JEEP TRANSMISSION CONTROLLED SPARK

DESCRIPTION & OPERATION

Systems purpose is to reduce the emissions of oxides of nitrogen by lowering peak combustion pressure and temperature during the power stroke. TCS system consists of a Solenoid Vacuum Valve inserted in vacuum line leading to vacuum advance control unit, a Temperature Override switch located at front upper crossmember (American Motors), on firewall (1971-72 Jeep), or behind grill near light assembly (1973 Jeep), and a Solenoid Control Switch located at the transmission (within speedometer cable on 1973 Jeep V8). In addition, a Coolant Temperature Override Switch is used on 1972-73 American Motors V8 engines with automatic transmissions and all 1972-73 Jeep V8 engines. All 1972-73 Jeep Wagoneers with 360" engines and standard cooling also incorporate a Thermal Vacuum Switch.

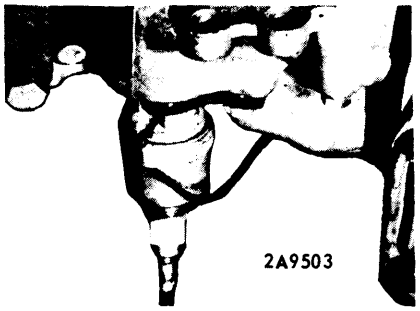
Solenoid Vacuum Valve – Attached to ignition coil bracket (American Motors V-8) or to a bracket at the rear of intake manifold (American Motors 6 cylinder and all Jeep engines). When valve is energized, carburetor ported vacuum is blocked and distributor vacuum line is vented to the atmosphere through a port in the valve, resulting in no vacuum advance. When valve is de-energized, ported vacuum is applied to distributor resulting in normal vacuum advance.



SOLENOID VACUUM VALVE

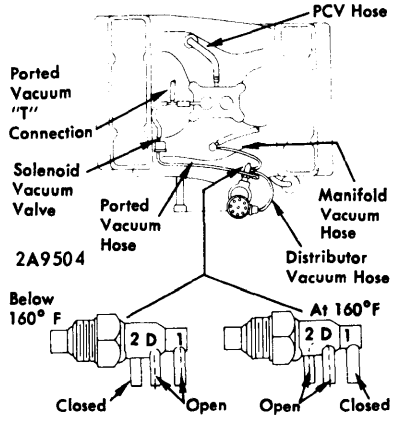
Temperature Override Switch – When ambient temperatures are above 63°F, override switch completes electrical circuit from battery to solenoid vacuum valve and valve is then controlled by the solenoid control switch.

Solenoid Control Switch – Switch, located at transmission, opens or closes in relation to car speed (Automatic Transmission) or gear range (Manual Transmission). At speeds above 34 MPH (American Motors Auto. Trans.); 25-30 MPH (Jeep Auto. Trans.) or in high gear (Man. Trans.) the switch opens and breaks ground circuit to solenoid vacuum valve. At speeds under 25 MPH (Auto. Trans.) or when in lower gear ranges (Man. Trans.) switch closes and completes ground circuit to solenoid vacuum valve. On Auto. Trans., switch is operated by speedometer gear speed (American Motors) or by transmission oil pressure (Jeep). On Man. Trans., switch is operated by shifter shaft.



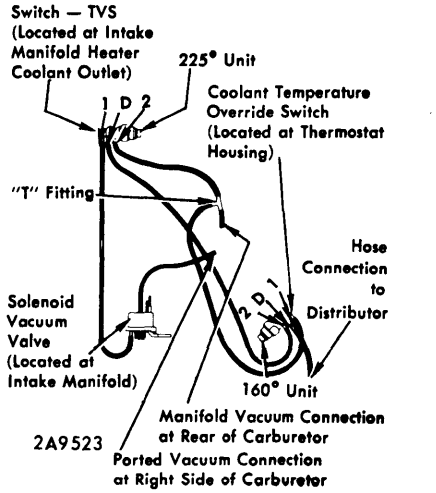
TYPICAL SOLENOID CONTROL SWITCH (AUTOMATIC TRANSMISSION)

Coolant Temperature Override Switch – Switch is threaded into thermostat housing and incorporates a thermal unit which reacts to coolant temperatures to route either intake manifold or carburetor ported vacuum to distributor vacuum advance diaphragm. *NOTE – Another Coolant Temperature Override Switch is located in intake manifold (V-8 engines) just behind thermostat housing. This switch is part of Exhaust Gas Recirculation (EGR) System.* When coolant temperature is below 160°F, ports "I" and "D" are open and port "2" is closed. This allows intake manifold vacuum to be applied through a hose connection to distributor advance diaphragm, resulting in full vacuum advance. When coolant temperature reaches 160°F, port "I" closes and ports "2" and "D" are open. Intake manifold vacuum is then blocked off and carburetor ported vacuum is applied through solenoid vacuum valve to distributor advance diaphragm, resulting in decreased vacuum advance. Coolant temperature override switch is used on some cars not equipped with a TCS system. In this case, port "2" is connected directly to carburetor ported vacuum connection.



COOLANT TEMPERATURE OVERRIDE SWITCH

Thermal Vacuum Switch (TVS) – Used only on Jeep Wagoneers equipped with 360" engine and standard cooling system. Switch is located at the intake manifold heater coolant outlet. When coolant temperature is below 225°F, carburetor ported vacuum is routed through ports "I" and "D" of the switch and distributor vacuum advance is controlled by TCS system and coolant temperature override switch. If coolant temperature reaches 225°F, port "I" closes and port "2" opens. This allows intake manifold vacuum to be routed through ports



JEEP THERMAL VACUUM SWITCH HOSE ROUTING

1971-73 AMERICAN MOTORS & JEEP TRANSMISSION CONTROLLED SPARK (Cont.)

"2" and "D". Port "D" is connected by a hose to port "2" of coolant temperature override switch, therefore, intake manifold vacuum is applied to distributor vacuum advance diaphragm resulting in full vacuum advance. This causes engine speed to increase approximately 200 RPM. When coolant temperature drops below 225°F, port "2" of TVS switch closes and carburetor ported vacuum is again routed through ports "I" and "D". Engine speed decreases due to reduced distributor vacuum advance.

MAINTENANCE

Periodic maintenance is not normally required; should any switch or valve fail to function properly it should be replaced.

NOTE — Later 1973 American Motors production models with automatic transmission have an adjustable TCS solenoid control switch. On six cylinder models, switch is located on right rear side of block. On V-8 models, switch is located on a bracket at rear of right valve cover. Test and adjust switch as follows:

1) Disconnect switch wire from terminal and connect a 12 volt test lamp in series between switch wire and terminal.

2) Raise and support vehicle so rear wheels are free to rotate, apply brakes and start engine. Test lamp should come ON.

3) Place transmission in D position, release brakes and gradually depress accelerator pedal. Observe speedometer and test lamp. At a speed of 33-37 MPH, switch should open and test lamp go OFF.

4) Adjust switch opening speed to 35 MPH if test lamp goes OFF at speed outside of 33-37 MPH. Turn Allen head adjusting screw, located in switch terminal, clockwise to increase speed and counterclockwise to decrease speed.

NOTE — If equipped with thermal vacuum switch (TVS), intake manifold vacuum is applied to distributor when engine coolant temperature reaches 225°F.

1971-73 AMERICAN MOTORS EMISSION CONTROLLED DISTRIBUTOR VACUUM APPLICATION

MANUAL TRANSMISSION (GEAR)		AUTOMATIC TRANSMISSION (CAR SPEED)	AMBIENT (AIR) TEMPERATURE	COOLANT TEMPERATURE	VACUUM APPLIED TO DISTRIBUTOR
3 SPEED	4 SPEED				
1-2	1-2-3	Under 34 MPH	Below 63° F	Below 160° F	Manifold
1-2	1-2-3	Under 34 MPH	Below 63° F	Above 160° F	Ported
1-2	1-2-3	Under 34 MPH	Above 63° F	Above 160° F	None
1-2	1-2-3	Under 34 MPH	Above 63° F	Below 160° F	Manifold
3	4	Over 34 MPH	Below 63° F	Below 160° F	Manifold
3	4	Over 34 MPH	Below 63° F	Above 160° F	Ported
3	4	Over 34 MPH	Above 63° F	Above 160° F	Ported
3	4	Over 34 MPH	Above 63° F	Below 160° F	Manifold

1972-73 JEEP EMISSION CONTROLLED DISTRIBUTOR VACUUM APPLICATION

MANUAL TRANSMISSION (GEAR)		AUTOMATIC TRANSMISSION (VEHICLE SPEED)	AMBIENT (AIR) TEMPERATURE	COOLANT TEMPERATURE	VACUUM APPLIED TO DISTRIBUTOR
3 SPEED	4 SPEED				
1-2	1-2-3	Under 25 MPH	Below 63° F	Below 160° F	Manifold
1-2	1-2-3	Under 25 MPH	Below 63° F	Above 160° F	Ported
1-2	1-2-3	Under 25 MPH	Above 63° F	Above 160° F	None
1-2	1-2-3	Under 25 MPH	Above 63° F	Below 160° F	Manifold
3	4	25-30 MPH	Below 63° F	Below 160° F	Manifold
3	4	25-30 MPH	Below 63° F	Above 160° F	Ported
3	4	25-30 MPH	Above 63° F	Above 160° F	Ported
3	4	25-30 MPH	Above 63° F	Below 160° F	Manifold