1974-79 EXHAUST EMISSION SYSTEMS
Toyota High Altitude Compensation

1977-79 Models

DESCRIPTION

As altitude increases, the air/fuel mixture becomes richer due to loss of oxygen. This system insures proper air/fuel mixture by supplying additional air to the slow and/or high speed carburetor circuits when vehicle is equipped for high altitude operation (above 4000 feet). This minimizes hydrocarbon (HC) and carbon monoxide (CO) emissions and advances engine timing for improved performance. System typically consist of High Altitude Compensation (HAC) valve, check valve, and connecting vacuum hoses.

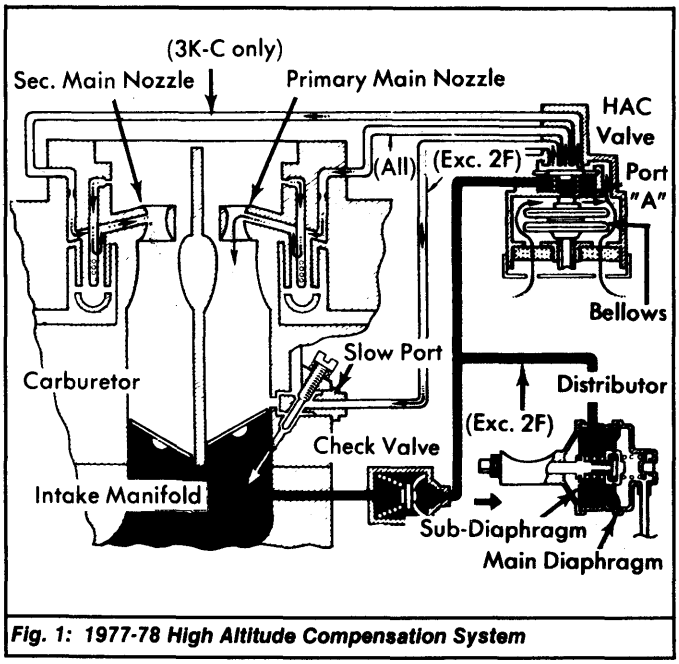


Fig. 1: 1977-78 High Altitude Compensation System

OPERATION

At altitudes above 4000 feet, the low atmospheric pressure allows bellows in High Altitude Compensation (HAC) valve to expand and close off port "A". *See Fig. 2.* Vacuum from intake manifold acts on HAC valve diaphragm and passages are opened between carburetor and atmosphere. Air flows through the HAC valve into the carburetor and leans out the air/fuel mixture. Sub-diaphragm on dual diaphragm distributor will control vacuum advance under these conditions.

At altitudes lower than 4000 feet, the higher atmospheric pressure opens port "A" in the HAC valve. Air passages from atmosphere to carburetor are now closed. Air/fuel mixture is not leaned out by HAC system under these conditions. Vacuum advance will now correspond to actions of the main distributor diaphragm.

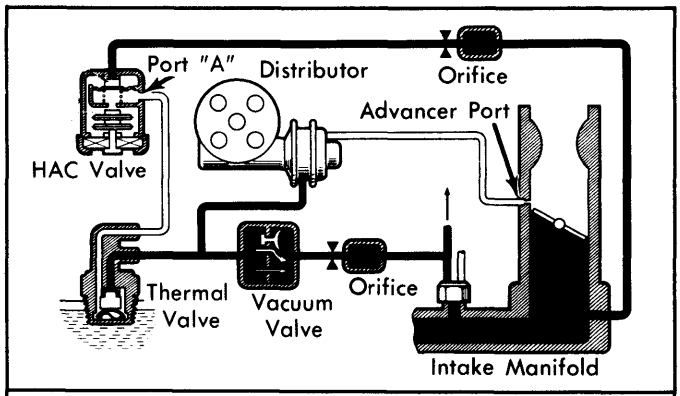


Fig. 2: 1979 High Altitude Compensation (3K-C Engine)

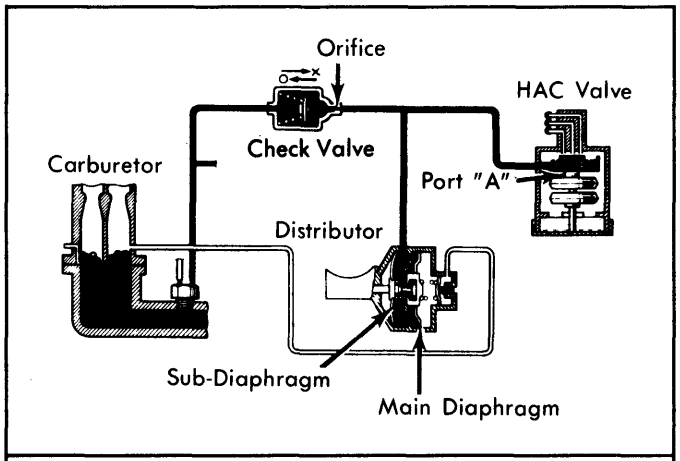


Fig. 3: 1979 High Altitude Compensation (2T-C Engine)

TESTING

HIGH ALTITUDE COMPENSATION

NOTE: Prior to testing system at an altitude near 4000 feet, determine exact position of HAC valve by blowing into any one of the 3 ports on top of HAC valve with engine running. If passage allows air through, the HAC valve is in the high altitude position. If it is closed, it is in the low altitude position.

1977 Models - See applicable High Altitude Compensation (HAC) system diagnostic chart and perform test as outlined. *See Fig. 1.*

1978 Models - **1)** On 20R and 2T-C engines, check ignition timing at idle and adjust if necessary. Disconnect vacuum hose from distributor sub-diaphragm. Timing should move about half-way toward TDC. Reconnect vacuum hose.

2) Disconnect vacuum hose from Black side of delay valve and pinch hose. Ignition timing should remain at initial timing position for more than one minute. Reconnect hose and stop engine.

3) On all engines, disconnect top hoses from HAC valve and blow into hoses one at a time. Check that air flows into carburetor. If not, check hoses and carburetor fittings for obstructions.

4) Remove check valve from system. Blow into White side of check valve. Air should flow out. Blow into Black side of check valve. No air should flow. If valve does not operate as indicated, replace check valve.

1979 Models - **1)** Check ignition timing at idle and adjust if necessary. Disconnect vacuum hose from distributor sub-diaphragm. Timing should advance 10 degrees toward TDC on all models. Reconnect vacuum hose.

2) Disconnect vacuum hose from Black side of delay valve and pinch hose. Ignition timing should remain at initial timing position for more than one minute. Reconnect hose and stop engine.

3) Disconnect top hoses from HAC valve and blow into hoses one at a time. Check that air flows into carburetor. If not, check hoses and carburetor fittings for obstructions.

4) Remove check valve from system. Blow into White side of check valve. Air should flow out. Blow into Black side of check valve. No air should flow. If valve does not operate as indicated, replace check valve.

1974-79 EXHAUST EMISSION SYSTEMS
Toyota High Altitude Compensation (Cont.)

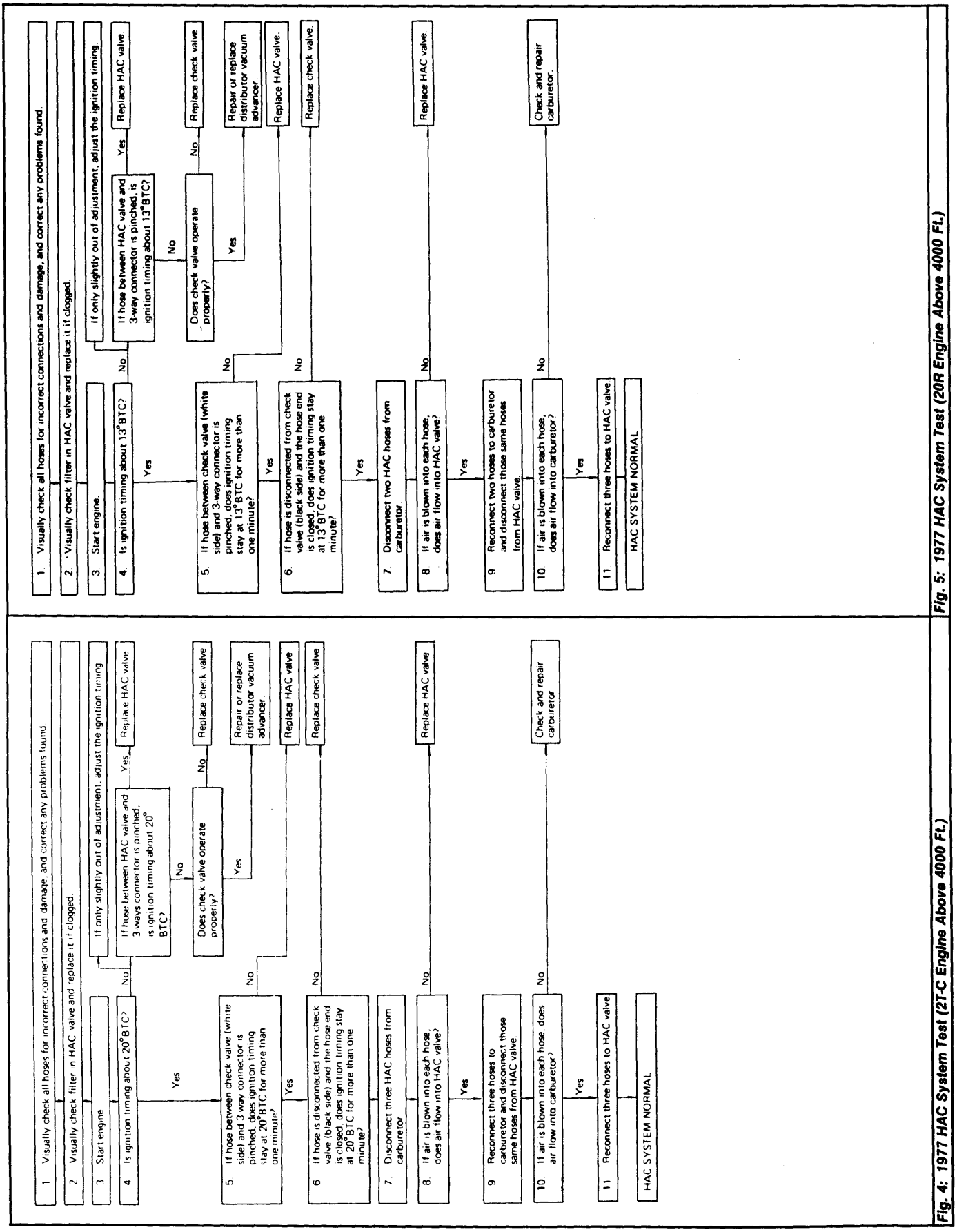
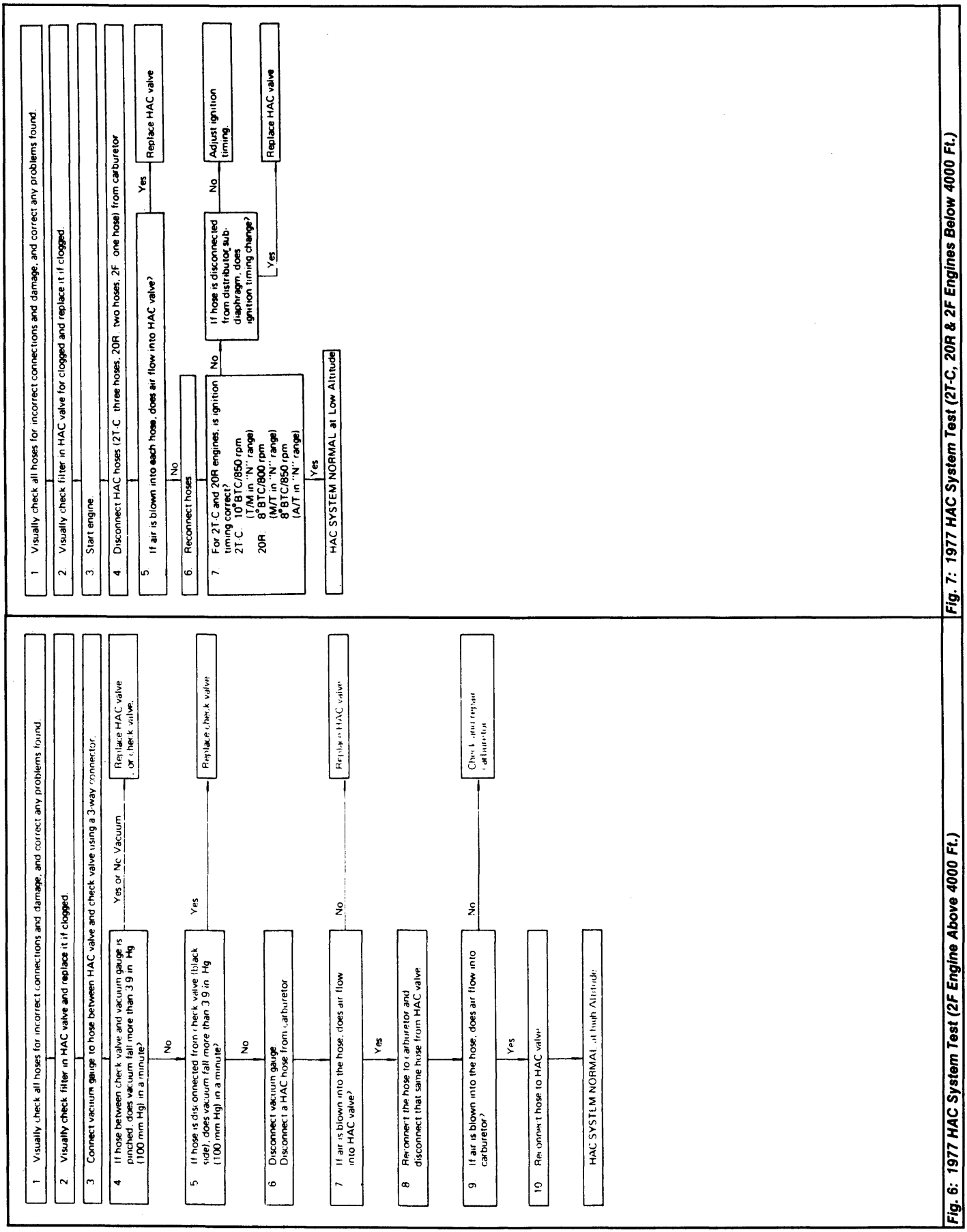


Fig. 5: 1977 HAC System Test (20R Engine Above 4000 Ft.)

Fig. 4: 1977 HAC System Test (2T-C Engine Above 4000 Ft.)

1974-79 EXHAUST EMISSION SYSTEMS
Toyota High Altitude Compensation (Cont.)



1974-79 EXHAUST EMISSION SYSTEMS
Toyota High Altitude Compensation (Cont.)

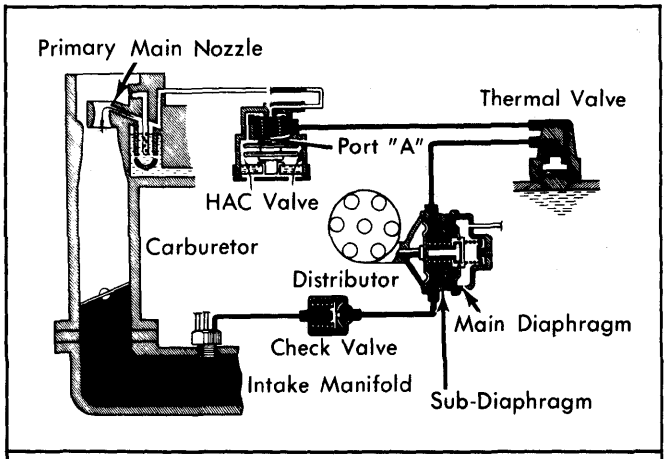


Fig. 8: 1979 High Altitude Compensation (4M Engine)

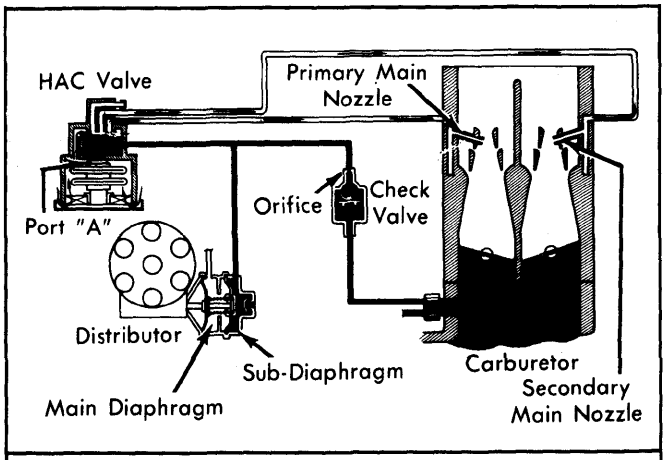


Fig. 9: 1979 High Altitude Compensation (2F Engine)