TOYOTA HIGH ALTITUDE COMPENSATION (HAC) SYSTEM

Celica (Federal), Corolla (Federal), Corona (Federal), Land Cruiser, Pickup (Calif. 4-WD & Federal), Starlet, Tercel (Federal)

NOTE: The HAC system is optional on high altitude area vehicles. Not all vehicles will be equipped with this system.

DESCRIPTION

As altitude increases, air pressure decreases and the air/fuel mixture becomes richer. The HAC system supplies additional air to the primary low and high speed circuits on all models, and secondary high speed circuits on Celica, Corolla, Corona, and Pickup models. This helps to reduce emissions and improve driveability. Ignition timing is also advanced for better driveability.

The systems include a high altitude compensation valve, a vacuum advance sub-diaphragm, and a check valve. Starlet models use a thermostatic vacuum switching valve (TVSV) which serves to eliminate compensation while the engine is cold.

OPERATION

At altitudes over 4000 feet, the HAC valve opens and allows air to bleed through the valve into the carburetor. When the vehicle is at an altitude below 2600 feet, the valve is closed and no air can pass through. The valve may or may not be open between these altitudes.

TESTING

HAC VALVE

Before testing each system, remove hoses or caps from top of HAC valve. Blow into upper ports on valve (lower ports on Starlet models). If air passes through, valve is in the high altitude position. If not, valve is in the low altitude position. Replace valve if position does not correspond to test altitude.

SYSTEM TESTS

Celica, Corona & Pickup

1) Start engine and warm to normal operating temperature. Disconnect and plug hose at distributor sub-diaphragm. Ignition timing should be 8° BTDC. Reconnect hose. Timing should advance to 15° BTDC.

2) Stop engine. Disconnect 3 hoses from top of HAC valve. Blow air into each hose. Check that air flows into carburetor. Reconnect hoses.

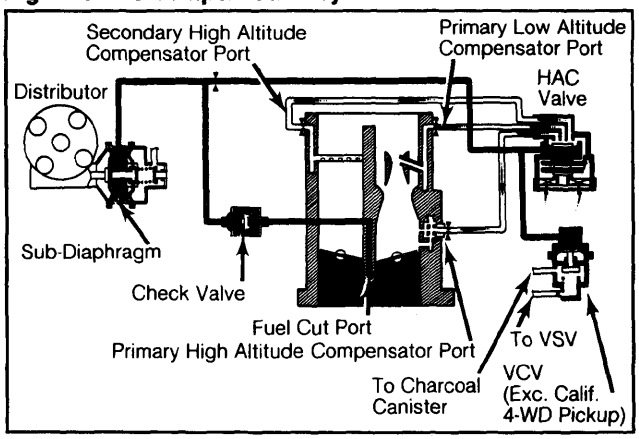
3) Remove check valve. Check that air flows from Orange pipe to Black pipe, but not in other direction.

4) Remove distributor cap and rotor. Apply vacuum to diaphragm. Check that vacuum advancer moves in accordance with applied vacuum. Reinstall the rotor and distributor cap. Start engine.

5) If at high altitude, disconnect vacuum hose between check valve and vacuum pipe at vacuum pipe side. Plug pipe end. Timing should not change for at least 1 minute. Stop engine and reconnect hose.

6) If at low altitude, disconnect and plug vacuum hose from lower port of the HAC valve. Disconnect vacuum hose between the check valve and vacuum pipe at vacuum pipe side. Plug pipe end. Timing should not change for at least 1 minute. Stop engine and reconnect hoses.

Fig. 1: Celica, Corona & Pickup High Altitude Compensation System



Corolla

1) Start engine and warm to normal operating temperature. Disconnect and plug hose at distributor sub-diaphragm. Ignition timing should be 7° BTDC. Reconnect hose. Timing should advance to 15° BTDC.

2) Stop engine. Disconnect 3 hoses from top of HAC valve. Blow air into each hose. Check that air flows into carburetor. Reconnect hoses.

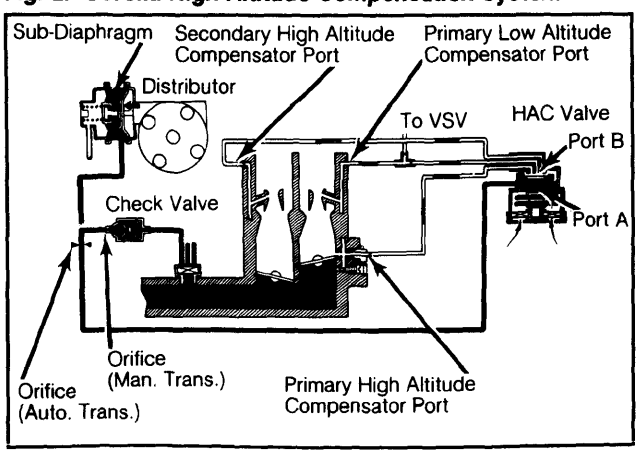
3) Remove check valve. Check that air flows from White or Orange pipe to Black pipe, but not in other direction.

4) Remove distributor cap and rotor. Apply vacuum to diaphragm. Check that vacuum advancer moves in accordance with applied vacuum. Reinstall the rotor and distributor cap. Start engine.

5) If at high altitude, disconnect vacuum hose between check valve and vacuum pipe at vacuum pipe side. Plug pipe end. Timing should not change for at least 1 minute. Stop engine and reconnect hose.

6) If at low altitude, disconnect and plug vacuum hose from lower port of the HAC valve. Disconnect vacuum hose between the check valve and vacuum pipe at check valve side. Plug pipe end. Timing should not change for at least 1 minute. Stop engine and reconnect hoses.

Fig. 2: Corolla High Altitude Compensation System



TOYOTA HIGH ALTITUDE COMPENSATION (HAC) SYSTEM (Cont.)

Land Cruiser

1) Disconnect 3 hoses from top of HAC valve. Blow air into each hose. Check that air flows into carburetor. Reconnect hoses.

2) Remove check valve. Check that air flows from White pipe to Black pipe, but not in other direction.

3) Remove distributor cap and rotor. Apply vacuum to diaphragms. Check that vacuum advancer moves in accordance with applied vacuum. Reinstall the rotor and distributor cap. Start engine and warm to normal operating temperature.

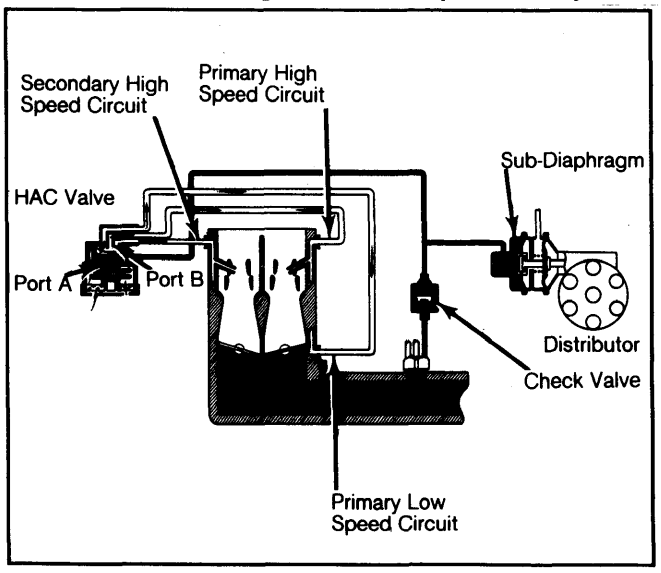
4) If at high altitude, disconnect and plug hose at distributor sub-diaphragm. Ignition timing should be 7° BTDC. Reconnect hose. Timing should advance to 13° BTDC.

5) Disconnect and plug hose from Black side of check valve. Timing should not change for at least 1 minute. Stop engine and reconnect hose.

6) If at low altitude, ignition timing should be 7° BTDC. Disconnect and plug hose at lower port of HAC valve. Timing should advance to 13° BTDC.

7) Disconnect and plug hose from Black side of check valve. Timing should not change for at least 1 minute. Stop engine and reconnect hoses.

Fig. 3: Land Cruiser High Altitude Compensation System



Starlet

1) Disconnect 2 hoses from top of HAC valve. Blow air into each hose. Check that air flows into carburetor. Reconnect hoses.

2) Remove check valve. Check that air flows from White pipe to Black pipe, but not in other direction.

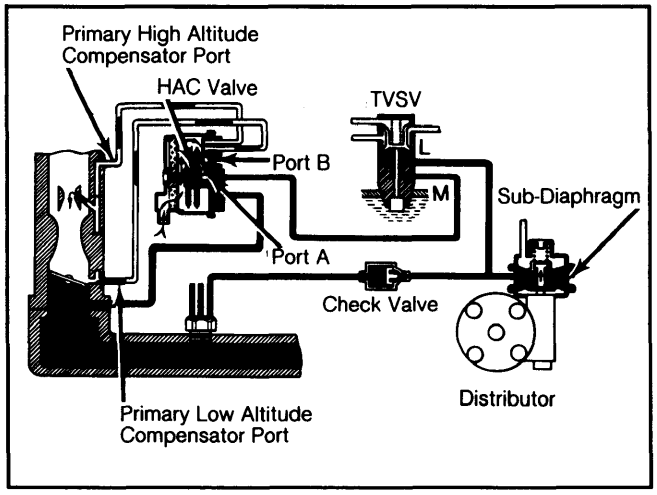
3) Remove distributor cap and rotor. Apply vacuum to diaphragm. Check that vacuum advancer moves in accordance with applied vacuum. Reinstall the rotor and distributor cap.

4) Connect a vacuum gauge to distributor sub-diaphragm hose. Start engine and warm to normal operating temperature.

5) If at high altitude, check that gauge indicates manifold vacuum and does not change when engine is accelerated.

6) If at low altitude, check that gauge indicates high manifold vacuum and fluctuates when engine is accelerated.

Fig. 4: Starlet High Altitude Compensation System



Tercel

1) Disconnect 2 hoses from top of HAC valve. Blow air into each hose. Check that air flows into carburetor. Reconnect hoses.

2) Remove check valve. Check that air flows from Orange pipe to Black pipe, but not in other direction.

3) Remove distributor cap and rotor. Apply vacuum to diaphragm. Check that vacuum advancer moves in accordance with applied vacuum. Reinstall the rotor and distributor cap. Start engine.

4) If at high altitude, disconnect and plug vacuum hose between sub-diaphragm and check valve. Ignition timing should be 5° BTDC. Reconnect hose. Timing should advance to 13° BTDC.

5) Disconnect and plug hose from Black side of check valve. Timing should not change for at least 1 minute. Stop engine and reconnect hose.

6) If at low altitude, disconnect and plug vacuum hose between HAC valve and bimetal vacuum switching valve at HAC valve side. Disconnect and plug vacuum hose between distributor sub-diaphragm and check valve at sub-diaphragm side.

7) Ignition timing should be 5° BTDC. Reconnect hose to sub-diaphragm. Timing should advance to 13° BTDC. Disconnect and plug hose from Black side of check valve. Timing should not change for at least 1 minute. Stop engine and reconnect hose.

Fig. 5: Tercel High Altitude Compensation System