

TOYOTA AIR INJECTION

- K-C Engine**
Corolla (1969-70)
- 3K-C Engine**
Corolla (1970-71)
- 3R-C Engine**
Corona (1968-70)
Hi-Lux (1970)
- 2M Engine**
Crown (1968-71)
- 2M-B Engine**
2000 GT (1970)
- 4M Engine**
Crown (1972-73)
Corona Mk II (1973)
- F Engine**
Land Cruiser (1968-69 & 1973)

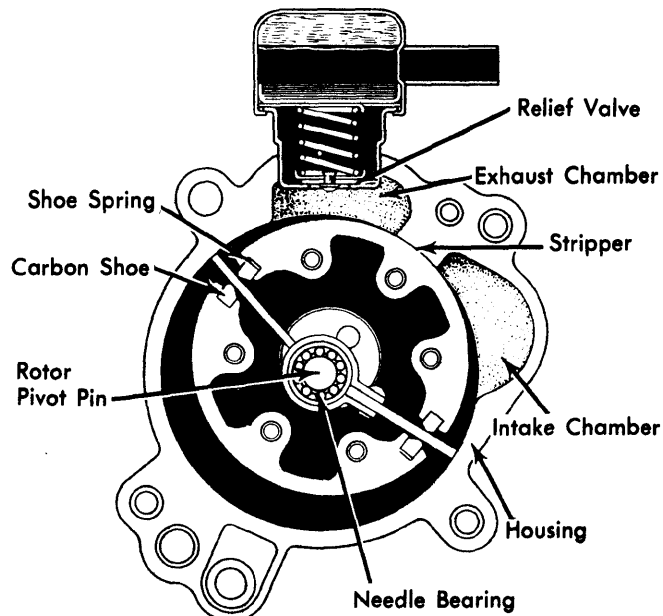
DESCRIPTION

Toyota Manifold Air Injection System consists of an air pump, air injection manifold, an air injection nozzle for each cylinder exhaust port, a check valve and various combinations of an anti-backfire valve, air control valve and air by-pass valve. All models also incorporate special distributors and carburetors. A throttle positioner is also used on models with 2M-B engines.

OPERATION

Air under pressure from air pump flows through a check valve to air distribution manifold where it enters the exhaust manifold through air injection nozzles. A check valve is used to prevent a back flow of exhaust gas from entering air pump when exhaust pressure exceeds air pump delivery pressure. During periods of engine deceleration, air is diverted to atmosphere through by-pass valve to prevent engine popping. Operation of individual components is as follows:

Air Pump — Pump consists of a pulley, housing, rotor sub-assembly, two vane assemblies, four carbon shoes, two shoe springs, front and rear carbon seals, rear rotor ring, ring bear-

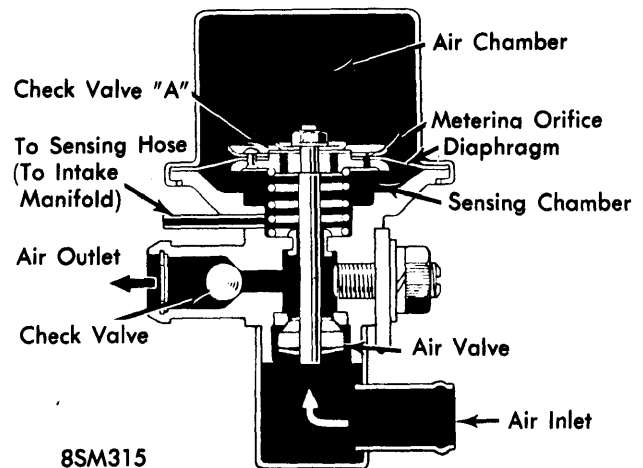


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AIR PUMP

ing and housing cover sub-assembly. Pump is driven by crankshaft pulley by a V-belt. One end of vane is pivoted to a needle bearing case which is supported on the pivot shaft. Opposite end of vane protrudes from an opening in the rotor into air chamber. Space enclosed by rotor, vanes, and housing changes as rotor rotates. Air intake volume increases as rotor rotates. This air is then compressed into the exhaust chamber. A relief valve installed on pump relieves excess air pressure created in pump, preventing damage to system.

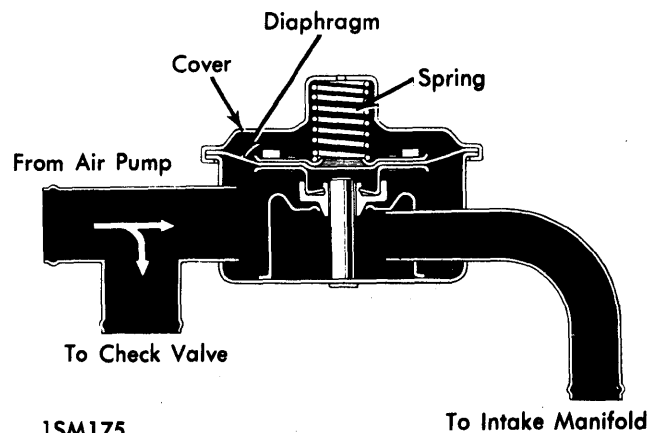
Anti-Afterburn Valve — Used on all 1968-71 models except for 1970 2M-B engine which uses an Air By-Pass Valve. When throttle is closed suddenly after hard acceleration, carburetor air is shut off instantly but fuel continues to flow momentarily which results in a rich mixture. To eliminate a backfire, anti-afterburn valve allows fresh air to be supplied to intake manifold which leans out over-rich fuel mixture and allows mixture to be burned normally in combustion chambers. Valve is controlled and operated by intake manifold vacuum.



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ANTI-AFTERBURN VALVE

Air Control Valve — Used on 3R-C engine with manual transmission, K-C and 3K-C engines. Valve is located between air pump and anti-afterburn valve. This valve eliminates rough idle on starts. Under certain conditions intake manifold vacuum causes anti-afterburn valve to open, allowing air to enter intake manifold causing a lean air/fuel mixture. Air control valve remains closed until air pump discharge pressure reaches approximately 1.6" Hg. This prevents air flow through anti-afterburn valve.



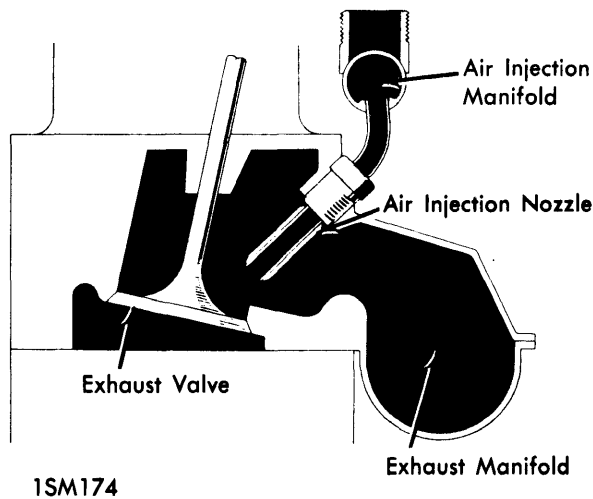
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AIR CONTROL VALVE

TOYOTA AIR INJECTION (Cont.)

Check Valve — Valve is provided in system to stop exhaust gases from flowing back into air pump. When pressure of air from air pump is greater than that of exhaust gas, it opens valve and air is injected into exhaust manifold. If exhaust gas pressure should exceed air pump pressure, valve closes preventing gas from entering air pump.

Air Injection Manifold & Nozzle — Manifold and nozzle assembly allows even distribution of air into exhaust port of each cylinder. Nozzle is fixed in place at each exhaust port and is connected to air injection manifold by a screw on each end of the manifold branches.



AIR INJECTION MANIFOLD & NOZZLE

Auxiliary Slow System — Used on K-C and 3K-C engines. No change is made to carburetor jet specifications, but position of vacuum port is changed and one more port is provided for vacuum retard of distributor. During idle or periods of deceleration, retarded side of dual diaphragm distributor will be actuated. This will retard ignition timing to improve combustion efficiency.

Air By-Pass Valve — By-Pass valve is provided to prevent afterburn in the system. At sudden deceleration, valve causes air delivered from air pump to escape into the atmosphere instead of being delivered to the air injection nozzles. By-pass valve is connected to intake manifold by a vacuum sensing hose, which supplies vacuum to operate valve.

ADJUSTMENTS

At 6 month or 6,000 mile intervals, entire system should be checked for proper operation, and any necessary cleaning or replacement of component parts should be done. Condition of engine tune-up should be checked whenever air injection system is not operating properly. Particular care should be taken in checking items that affect air/fuel mixture.

Ignition Timing — See *Tune-Up Chart for specifications*. Before making ignition timing adjustment, set engine idle to idle specifications listed in Tune-Up Chart.

Carburetor Idle Speed and Mixture Adjustment — See *Tune-Up Chart for idle speed specifications*. Connect vacuum gauge and tachometer. With engine at normal operating temperature and idle speed as specified, turn idle mixture adjusting screw to obtain maximum vacuum gauge reading. Reset idle speed and repeat mixture adjustment, then turn mixture adjusting screw to obtain lean best idle. On F engines, return idle adjusting screw one turn rich and readjust RPM and check that vacuum is more than 16.8" Hg. On 3K-C engines, return idle adjusting screw ¼ turn rich. On 4M engines idle CO should be 1-3%

Air Pump Drive Belt Adjustment — With 22 lbs. pressure applied midway between air pump pulley and crankshaft pulley or midway between air pump pulley and fan pulley (F engine), belt deflection should be as follows:

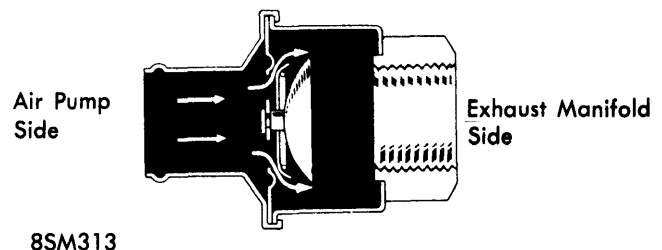
Drive Belt Deflection

Engine	Deflection
K-C & 3K-C.....	.5-.7"
3R-C.....	.6-.8"
2M.....	.4-.6"
4M.....	.7-.85"
F.....	.85-1"
2M-B.....	.5-.6"

TESTING

Air By-Pass Valve — Check by-pass valve for leakage at idle. Replace valve if leakage exists. Increase engine speed and close throttle suddenly. If air exhausts through valve at instant throttle is closed, valve is satisfactory.

Check Valve — Remove check valve by disconnecting air inlet hose from valve. Blow air into check valve from both sides. Flow should be in one direction only. If defective, replace valve.



CHECK VALVE (OPEN)

Air Pump — To test pump, disconnect air outlet hose and install air pump tester (09258-60010) into outlet. Check drive belt tension and adjust to specified value. Start engine and increase RPM to following specifications:

Air Pump Testing RPM

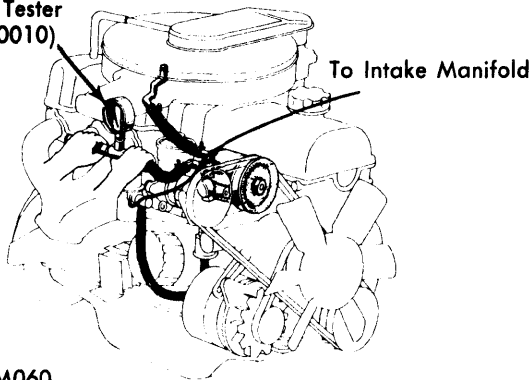
Engine	RPM
K-C.....	1650
3K-C.....	2200
3R-C.....	1250
2M, 4M & 2M-B.....	① 1250
F.....	1000

① — 1350 RPM for 1973 4M engine.

TOYOTA AIR INJECTION (Cont.)

Make sure there is no leak from outlet and tester connection. Observe indicator needle for movement, needle should be in green zone. If in red zone, check relief valve for leak. If leaking, relief valve is defective and must be replaced. If not, disassemble and check pump. If pump is excessively noisy, disassemble and repair.

Air Pump Tester
(09258-60010)



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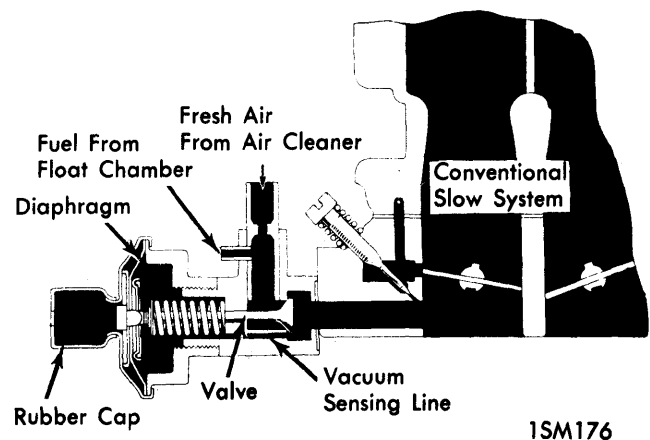
AIR PUMP TESTER

Anti-Afterburn Valve — Disconnect anti-afterburn valve inlet hose from valve and race engine rapidly. The moment accelerator pedal is released, some air should be drawn into anti-afterburn valve for a few seconds. If time of suction is more than five seconds, replace valve.

Air By-Pass Valve — If air from air pump blows out from valve while engine is idling, valve seat is defective and valve must be replaced. If air from pump blows out continuously from by-pass valve while throttle is accelerated rapidly, the valve is normal. If air does not blow out at this time, diaphragm is defective and valve must be replaced.

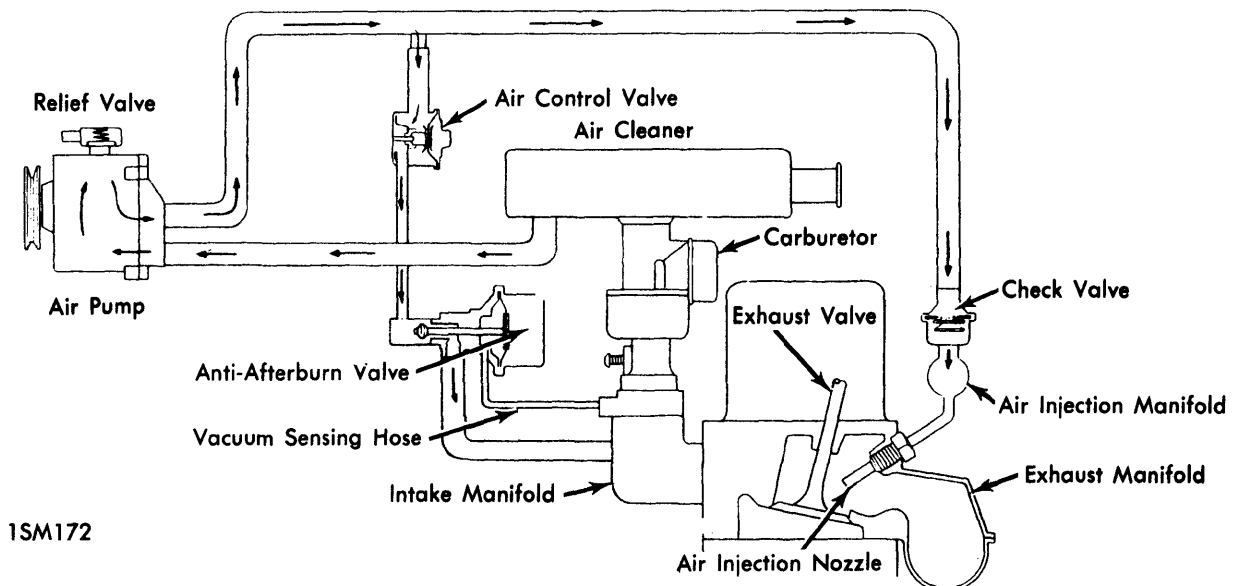
Air Control Valve — Disconnect hose between anti-afterburn valve and control valve. At idle there should be no air flow through control valve. Increase engine speed to 1,000 RPM. Air should flow through valve. If no air flows valve is stuck closed which could cause backfire on deceleration. If valve is inoperative, repair or replace.

Auxiliary Slow System — Remove rubber cap and check that there is no suction at idle speed due to a defective diaphragm. Close air inlet hose leading from air cleaner to auxiliary system at idle speed and check that there is no change in engine operation. Disconnect air inlet hose from air cleaner and race engine rapidly. Check that air is drawn in by system during deceleration. If an inspection indicates a defective system, replace assembly.



AUXILIARY SLOW SYSTEM

Pressure Relief Valve — Check air pump discharge pressure just as air starts to come out from relief valve discharge hole. Pressure should be .2-.35 kg/sq. cm (2.8-5.0 psi).

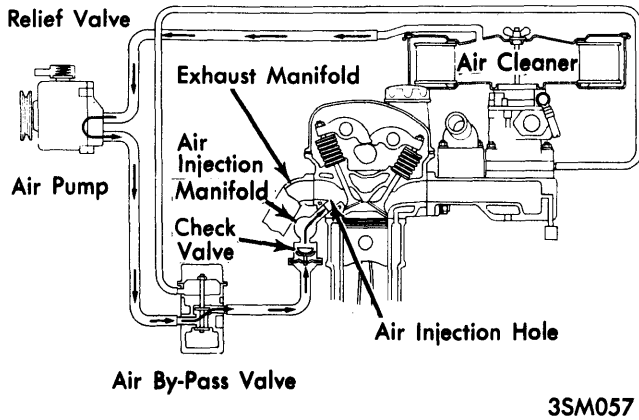


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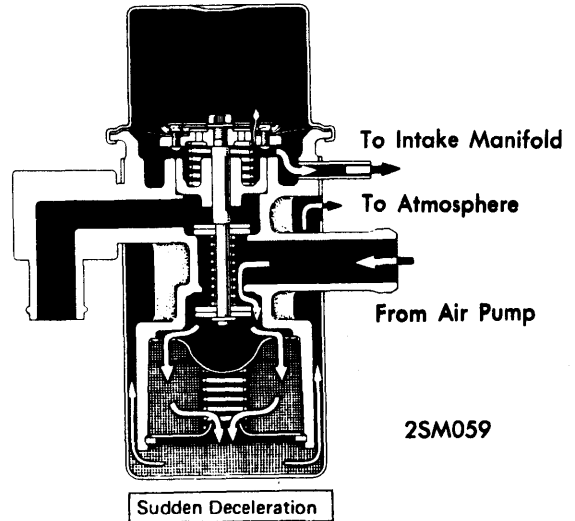
**AIR INJECTION SYSTEM SCHEMATIC
(WITH AIR CONTROL & ANTI-AFTERBURN VALVE)**

Exhaust Emission Systems

TOYOTA AIR INJECTION (Cont.)



AIR INJECTION SYSTEM SCHEMATIC (M ENGINES)



AIR BY-PASS VALVE

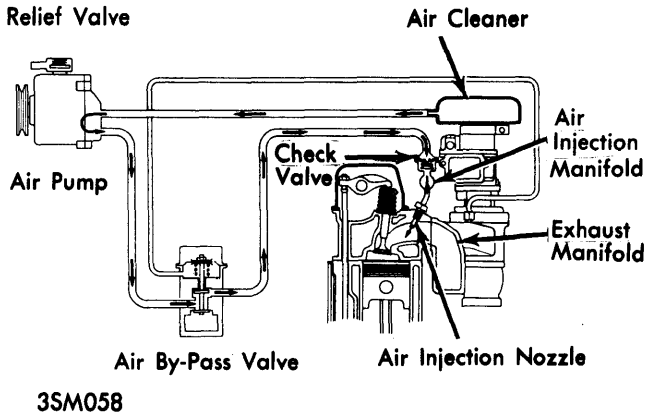
Excessive Backfire In Exhaust System - Anti-afterburn valve vacuum line plugged, disconnected or leaking. Leaky diaphragm in anti-afterburn valve. Insufficient air delivery from anti-afterburn valve to intake manifold or air delivery not timed to engine requirements. Malfunction of Auxiliary Slow System. By-Pass Valve or vacuum line plugged, disconnected or leaking. Improper idle setting.

Rough Engine Idle - Improper carburetor adjustment or valve clearance. By-pass valve defective or stuck open. Clogged or disconnected hoses. Defective anti-afterburn valve. Sticky valve in Auxiliary Slow System.

Insufficient Air - Loose drive belt. Leaky hoses. Disconnected hoses. Clogged or bent hoses. Defective air pump or relief valve.

Noisy Air Pump - Drive belt improperly adjusted. Leaky or disconnected hoses. Pump attaching bolts loose. Burned idler pulley bearing. Defective air pump.

Burned Hose Connected to Check Valve - Defective check valve.



AIR INJECTION SYSTEM SCHEMATIC (F ENGINE)

TROUBLE SHOOTING

Air By-Pass Valve - If air from air pump blows out from valve while engine is idling, valve seat is defective and valve must be replaced. If air from pump blows out continuously from by-pass valve while throttle is accelerated rapidly, the valve is normal. If air does not blow out at this time, diaphragm is defective and valve must be replaced.