

SECONDARY BYPASS VALVE

Barrel Valve Spool Ramp

Since the engine makes less power at part throttle, it needs less fuel. The spool in the barrel valve is the main control for part throttle fuel delivery. At wide open throttle, the spool has a large notch cut into it's side to pass all the fuel to the nozzles unrestricted. As the throttles are closed, a tapered ramp ground into the side of the spool reduces the passage to restrict flow to the nozzles. When adjusting the hex-link to set the idle fuel rate, the spool is being re-positioned to make the passageway larger or smaller to the nozzles. If you remove the fitting from the top of the barrel valve, you can see this ramp. Because each engine's part throttle fuel requirement varies due to camshaft, manifold, and exhaust system selection, the fuel rate the ramp delivers at part throttle is seldom exactly what the engine needs, but the secondary can be used to tailor it.

How The Secondary Works

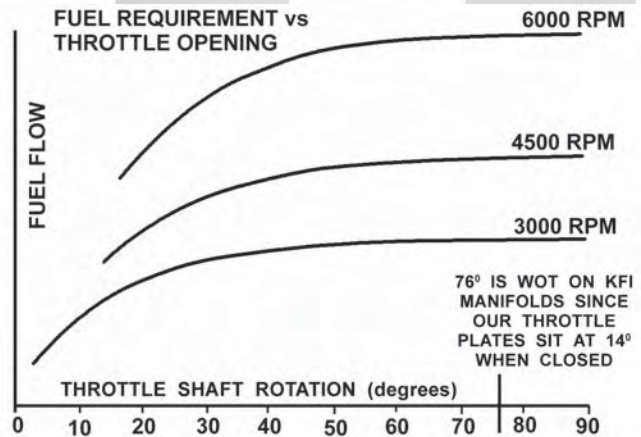
The flow to the secondary bypass is through a port in the top half of the barrel valve spool. The port is usually wide open to about 20 degrees of throttle opening, then it begins to close off. It is completely closed at approx. 40 degrees of throttle opening, or about half throttle, so it has no affect on wide open throttle metering. Depending on the exact spool positioning, the port may actually be slightly closed off at an idle. The secondary bypass normally has a higher pressure setting than the main bypass, so when the engine returns to idle speed, the secondary bypass poppet closes and allows the spring and poppet in the main jet can to regulate the idle fuel pressure.

Applications of the Valve

The valve will often improve the performance of the engine for any application: Drag Racing, Oval Track, Road Racing, Pulling Truck or Tractor, Street, Boat Racing, Hill-Climb, Mud or Sand Racing, etc.

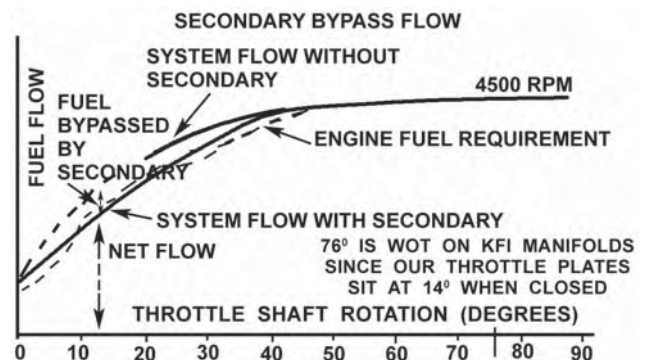
- A) Staging :** An engine at the starting line being held at high RPM has the throttle open only a few degrees, but the pump is putting out a lot of fuel. The fuel rate will often be too rich and tend to load up the engine... the secondary can be used to lean it out.
- B) Over-Run :** After going through the traps, or at the end of a straight-away, when the throttles are snapped closed, the pump is still at high RPM. The pressure in the system goes quite high, especially with a small main jet and a jet restricted high speed bypass (or NO high speed bypass). The secondary serves as a "dump-off" to reduce the high pressure, thus preventing an over-rich condition.
- C) Idle :** The secondary bypass pressure is usually set higher than the idle pressure, so the valve is normally NOT bypassing any fuel at an idle. In some special applications, like unblown nitro or highly supercharged engines, the secondary is adjusted to aid in controlling idle fuel pressure. In these systems the secondary bypass will be active at idle speeds and may also utilize a restrictor jet to limit or control the amount of flow that the circuit can bypass.
- D) Cornering :** If you run through the turns at part throttle and the engine loads up, or is sluggish coming out of them, install a lighter spring or reduce the shims in the secondary. If it lacks response or backfires out the intake when the throttle is depressed, install a heavier spring or more shims.
- E) When used in conjunction with a Kinsler Vapor Separator Tank System :** It may be necessary to reduce the pressure setting of the secondary bypass when installing a Vapor Separator Tank System. This is due to the down-stream pressure (Vapor Separator Tank pressure) acting against the secondary bypass outlet. Generally we find the secondary pressure will need to be reduced by 3 PSI; the typical pressure in the VST. We recommend installing a Kinsler "bubble tight" one way check valve on the outlet of the secondary bypass. This will ensure that engine flooding cannot occur by fuel backflowing through the secondary and out to the nozzles when the engine is not running.

Installation On a Kinsler, Hilborn, or Crower barrel valve, the secondary is plumbed to the barrel valve spool retaining fitting. Should the barrel valve fitting not have the provision for a secondary, it usually can be converted for it. On Enderle and Jackson units, the system MUST first be converted to an external bypass jet (see Kinsler section on Enderle barrel valve conversion, Page #114). Then the secondary bypass is connected to the "out" or "ret" fitting on the barrel valve.



FUEL REQUIREMENT versus THROTTLE OPENING

Past 40 degrees of throttle opening, the 3000 RPM curve requires little more fuel flow, because at that speed the engine is already getting all the air it can use. At 6000 RPM, the curve doesn't flatten until 60 degree throttle opening. Actual results vary due to throttle area and engine volumetric efficiency.



SECONDARY BYPASS tailors part throttle fuel flow. Beyond a 40 degree throttle opening, the barrel valve spool shuts off the passage to the secondary bypass.