

Running on the Secondaries to Prevent Power Loss in the LT5

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The secondary intake port throttle system is rather unique to the LT5. As a result, our engines should receive some special care in-order to keep the lower secondary intake ports and the secondary fuel injectors free of fuel and carbon deposits.

When closed, the secondary throttle plates cause the area located below them to be in a pocket of dead air. Because of this, the area between the secondary intake valves and the throttle plates is highly susceptible to the formation of fuel gum and carbon deposits. This situation is in rather stark contrast to the primary ports. The primary ports are constantly flushed clean by the flow of air and especially, fuel.

When operating in the primary mode, the secondary intake valves open and they expose the area up to the throttle plate to residual combustion gases and carbon particles. The valve event timing, typical of a high speed engine, is such that the intake valves remain open after the piston has completed the intake stroke. To enhance cylinder filling at high speeds the valves do not close until some time after the piston has moved up in the compression stroke. For the LT5, this is 60 degrees After Bottom Center for the primary valves and 70 degrees ABC for the secondary valves. At low speeds, some of the intake mixture is normally driven back up the intake ports. The additional 10 degrees of duration before secondary valves close, especially contributes to secondary ports' contamination. When the secondary port throttles are closed, this mixture is trapped in the areas of the ports between the throttle plates and the secondary valves. The worst area of deposition is just above the valve seats. On a LT5 with 50K miles and plenty of secondary use, I have observed a 1/8" thick deposits ringing the valve seats. This cylinder head exhibited a 5% reduction in air flow on the secondary port as a result of the deposit.

If that was not bad enough, there is also a negative effect on the secondary fuel injectors. By design, the Multec fuel injectors are highly resistant to clogging. The diffuser plate is very thin and normal fuel flow constantly flushes the spray holes clean. However, the secondary injectors are completely defenseless when there is no fuel flow. I recently encountered a set of secondary injectors with partially plugged diffuser plate holes. In that case, I was also aware that the driver often drove his poor ZR-1 with the power key off.

This is a view down a Multec fuel injector base with light shining through the six spray holes in the diffuser plate. The plate is only about .020" thick in order to resist the formation of fuel and carbon deposits.



This sad story has a happy ending though. Much of the tendency for the secondary ports to build deposits can be eliminated by flushing them with fuel. This will occur if the engine is allowed to run on both sets of fuel injectors. I recommend always driving with the power key on. In addition, make an effort to engage the secondaries as much as possible.

The secondaries can operate much more than most drivers are aware of. The chart shows the trigger points for the stock calibration chips.

RPM	Secondary Opening Point			Secondary Closing Point	
	Throttle Position % 90 MY	Throttle Position % 91 - 92 MY's	Throttle Position % 93 - 95 MY's	RPM	Throttle Position % 90 - 95 MY's
0	99.6	99.6	99.6	0	4.7
500	99.6	89.8	94.9	500	4.7
1000	99.6	89.8	94.9	1000	4.7
1500	50.0	89.8	94.9	1500	4.7
2000	34.8	34.8	89.8	2000	4.7
2500	34.8	34.8	37.5	2500	4.7
3000	34.8	34.8	19.9	3000	4.7
3500	25.0	25.0	14.8	3500	4.7
4000	25.0	25.0	14.8	4000	4.7
4500	25.0	25.0	14.8	4500	4.7
5000	25.0	25.0	14.8	5000	4.7
5500	25.0	25.0	9.8	5500	4.7
6000	25.0	25.0	9.8	6000	4.7
6500	25.0	25.0	9.8	6500	4.7
7000	25.0	25.0	9.8	7000	4.7
7500	25.0	25.0	9.8	7500	4.7
8000	25.0	25.0	9.8	8000	4.7

As the shown by the chart, the secondaries can be activated at any engine speed just by applying the throttle. When operating on the secondaries, the required quantity of fuel is split 50-50 between the pair of injectors. The fuel and airflow will continue as long as the main throttle remains open more than 4.7%. During highway cruising, once the secondaries are triggered, they will continue to operate unless the main throttle is almost closed. With a little attention, the secondaries can be operated for long periods of time.

For good secondary intake port health, I recommend this procedure. While cruising in high gear, quickly dip the main throttle past the secondary trigger point and pay attention to avoid dropping the throttle nearly shut. If the main throttle should close to less than 4.7%, just dip the throttle again when the road conditions allow it.