



Popular C4 ZR-1 Issues in 2010

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Motor Oil Has Evolved Away From The Needs Of Our Engine

- In my opinion Mobil 1 is no longer appropriate for the LT5.
- Flat valve lifters need extreme pressure protection.
- The EP wear protection is being removed from modern oils.
- GM specified API standard SG for the '90 to '93 engines. “SG or SH” was specified for the '94 and '95 engines.
- Motor oil uses zinc (ZnDDP) and phosphorus as EP (Extreme Pressure) anti-wear additives. Phosphorus is the more detrimental of the two, and is being progressively reduced to address the catalyst deactivation issue.

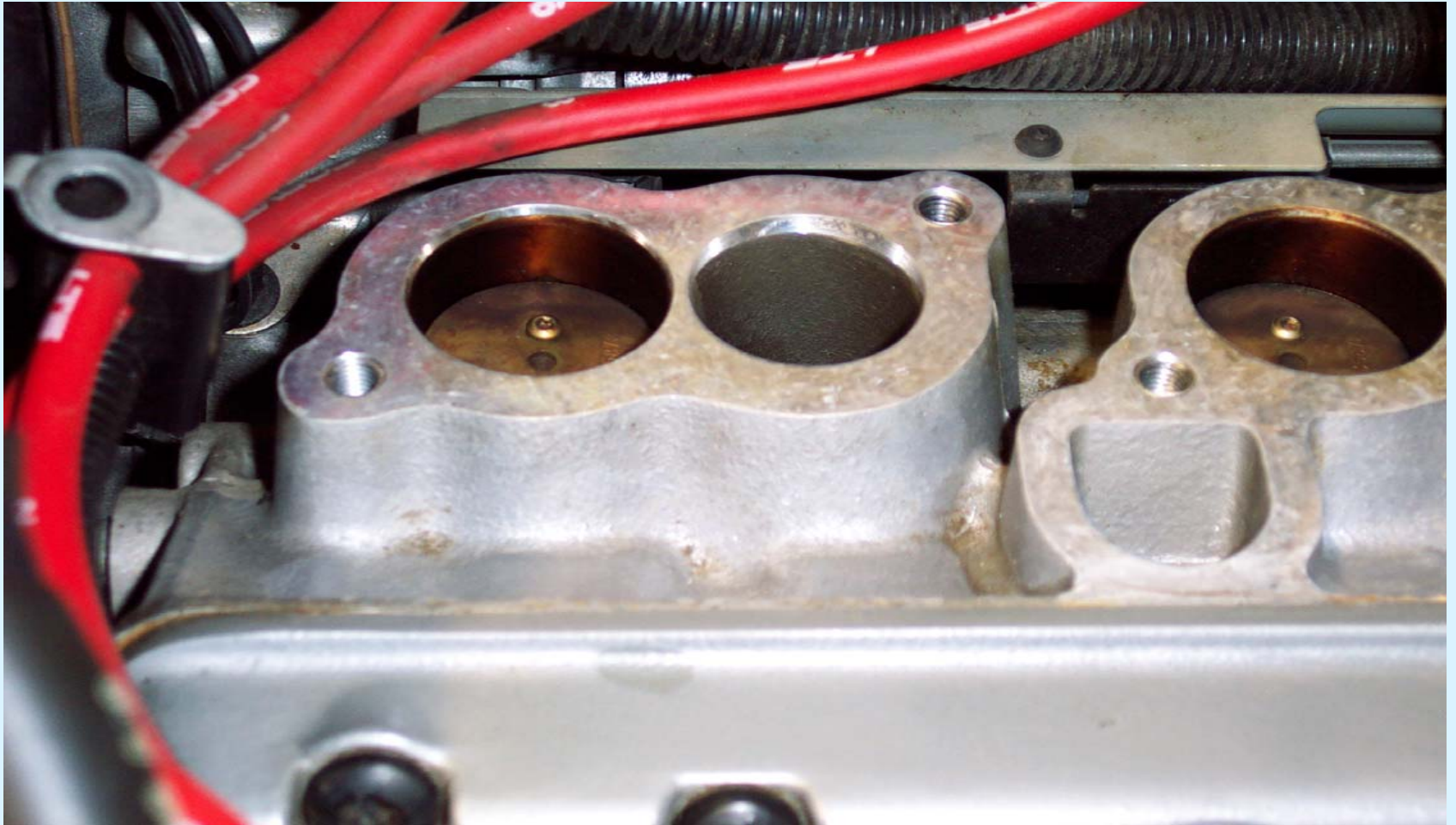
Maximum phosphorus per the API standard:

SG	.12%	minimum
SH	.12%	maximum
SJ	.10%	
SL	.10%	
SM	.08%	

- This problem gets worse as we go forward because the new car manufacturers are interested in reducing the current EP additive levels more as time goes on.

- Fortunately at this time, this is a minor problem. The LT5 valve spring load on the lifter is small compared to an overhead valve engine.
- The exact impact on the LT5 is unknown.
- I like to be on the safe side and recommend an oil with the same EP additive levels as the OE SG and SH specifications.
- I recommend oils that are designed to address this issue. Oil manufactures like Amsoil, Red Line, Royal Purple and others offer products that meet the SG/SH specification.
- The Amsoil AMO 10W-40 product meets the specification.

Myths and Mysteries of the Secondary Port Throttles



Secondary Port Throttle Opening Trigger Points

RPM	Throttle Opening % Trigger '90 - '92	Throttle Opening % Trigger '93 - '95
0	100	100
500	90	95
1000	90	95
1500	90	95
2000	35	90
2500	35	38
3000	35	20
3500	25	15
4000	25	15
4500	25	15
5000	25	15
5500	25	10
6000	25	10
6500	25	10
7000	25	10
7500	25	10
8000	25	10

They close at 5% throttle.

Is It a Good Idea To Remove The Secondary Throttles?

- The general answer is No.
- Normally they don't cause a problem.
- They are useful for an emissions test. Using one valve generates swirl which is good for low speed combustion.
- Except for these situations.

They are malfunctioning and defy repair.

Difficulty locating service parts.

If they are removed for service, time can be saved if they are not reinstalled.

If the engine calibration is modified, all of the secondary throttle parts can be removed including the vacuum pump.

Drag Racing Strategy

- When the throttle is closed to less than 5% the secondary port throttles close. There is a .3 second programmed delay after the secondary port throttles are triggered. If the throttle is dropped closed on shifts on a car with a 4.10 rear axle ratio, the secondaries will be off for $.3 \text{ second} \times 3 \text{ shifts} = .9 \text{ second}$.
- The delay is used to make the opening of the secondary ports smooth. When the secondary ports are triggered the fuel is immediately turned on but the ports are opened .3 second later.
- The racing strategy is to keep the throttle open more than 5% on the shifts. Then the secondary ports will not close.

Keeping the Secondary Ports Clean



- These valves are typical of what is found in most LT5 engines with 30k miles or more. The primary port valve has been kept clean by the detergent in the fuel. The secondary port valve has deposits because little fuel has been available to clean it.
- Never drive with the Power Key off.

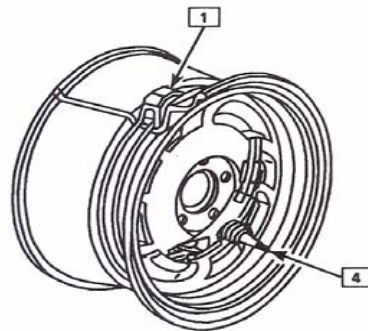
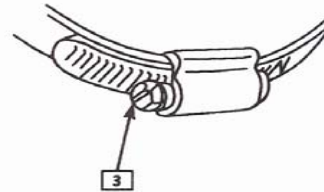
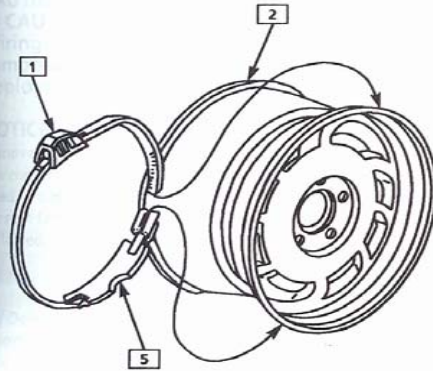
- Drive with the secondary ports open to clean the valves the ports and the fuel injectors.
- On the highway it is possible to run with the secondary ports open for hours.
- With the car in high gear for cruising, open the throttle 100% for a moment and then don't let it close to less than 5%. Secondary port, valve and fuel injector cleaning will be in progress.

The Tire Service Hazard

- Our piezo powered tire pressure sensors are the perfect application for cars that will be around for a long time.
- The new cars have battery powered sensors that last for about six years. Our sensors can last forever on a low mileage car.
- They are vulnerable to destruction from careless or clueless tire machine operators.
- The new car sensors are located on the wheel valve stem.
- Our sensors are located opposite from the valve stem.
- Machine operators are taught to avoid damaging the sensor by pushing the tire bead off on the side opposite from the valve stem.
- Guess what happens if this rule is followed on a C4 Corvette.

WARNING ➔

LOW TIRE PRESSURE SENSOR MOUNTED INSIDE TIRE. AVOID CONTACTING SENSOR WITH TIRE CHANGING EQUIPMENT, TOOLS OR TIRE BEADS. DAMAGE TO SENSOR VOIDS WARRANTY.



- 1** WHEEL SENSOR (MUST BE MOUNTED DIRECTLY ACROSS FROM VALVE STEM 4)
- 2** WHEEL ASM
- 3** BOLT/SCREW ENGAGED
6.8 N·m (60 lb. IN.)
- 4** VALVE STEM
- 5** HALF MOON NOTCH (MUST BE LINED UP WITH VALVE STEM)

WHEEL	PART NO.	COLOR CODE
17 INCH	RIGHT FRONT RIGHT REAR LEFT REAR LEFT FRONT	BLUE ORANGE YELLOW GREEN

Figure 20 - LTPWS Sensor Installation

- My advice is to explain this to the Service Writer. If you think that the service writer is not listening or might ignore your instructions, ask to meet the technician that will be dismounting your tires.
- Original wheels that are in good condition have a sensor location warning label on the rim.

The ZR-1 Performance Upgrade Path

- Most stock '90 – '92 cars have 400 hp.
- 3.45 to 4.10 axle gear ratio. 18% more torque to the wheels at all car and engine speeds.
- Headers. +25 hp.
- Top end porting. +30 hp.
- Head porting. +30 hp.
- Light weight flywheel. +15 hp when the engine speed is accelerating rapidly.
- $400 + 25 + 30 + 30 = 485$ hp. $+15 = 500$. **LS7 ZO6's beware!!**

- If 500 hp is not enough, 600 hp is easy to do simply by going to a 4.000” bore and a 4.125” stroke. This configuration has a smooth idle and more torque at 2000 rpm than a stock engine has at peak torque.
- With long duration camshafts 650 hp is developed. Note, 650 is greater than 638.

This presentation will be available on-line on 18-May.

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