

LT5 Power Upgrades

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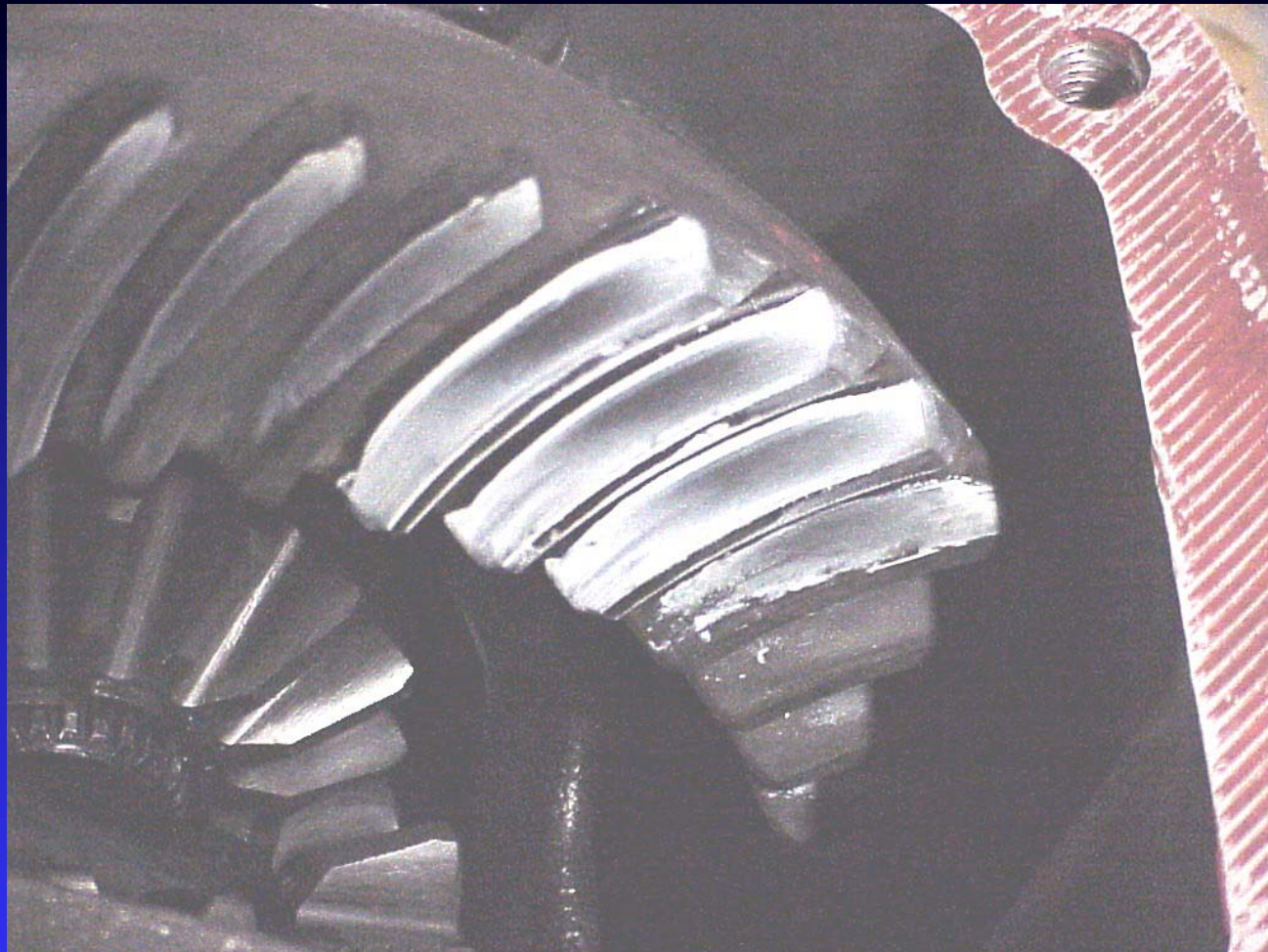
Haibeck Automotive Technology

Addison, Illinois

4.10 Gear Ratio

It's *like* an engine upgrade!

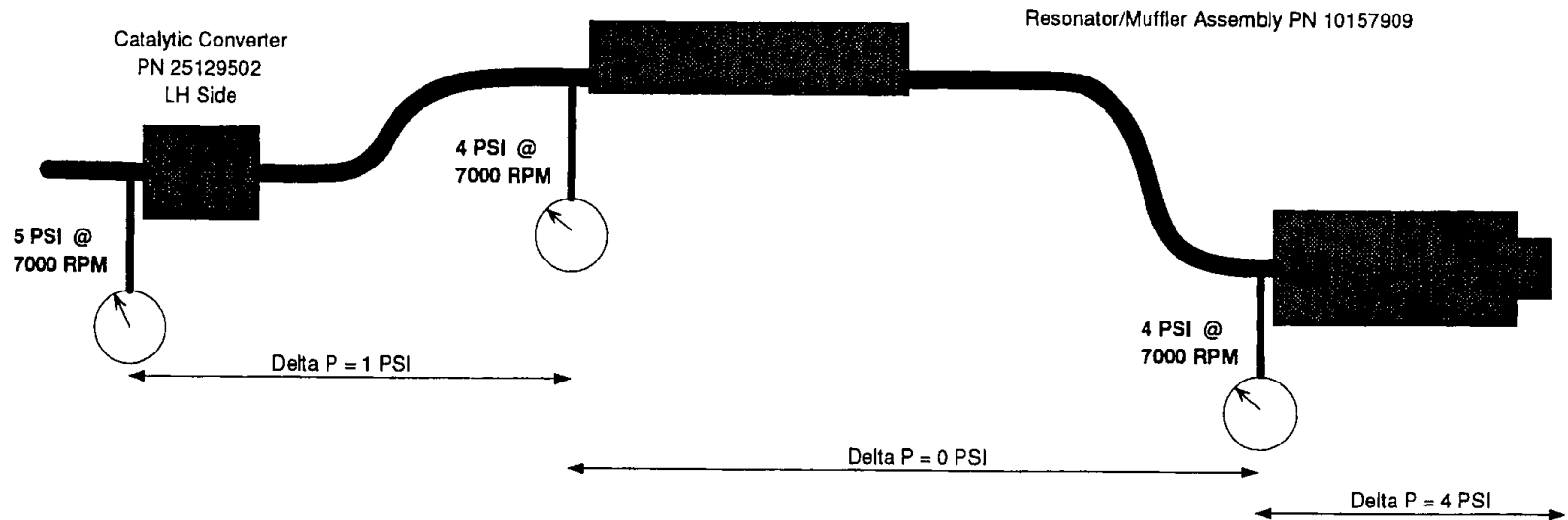
- Widens the useful power band of the engine by 1000 RPM. The really useful area begins at 3000 instead of 4000 RPM
- 18% more torque to the wheels. All of the time!
- Best performance gain for the dollar cost
- Excellent for drag racing. The car goes through the lights at about 6400 RPM in 4th gear.
- A good foundation for all future engine upgrades



Dana gear sets run quietly if the proper mesh pattern is obtained

Exhaust Systems

- The difference between a stock system on a '93 and straight pipes is about +18 HP



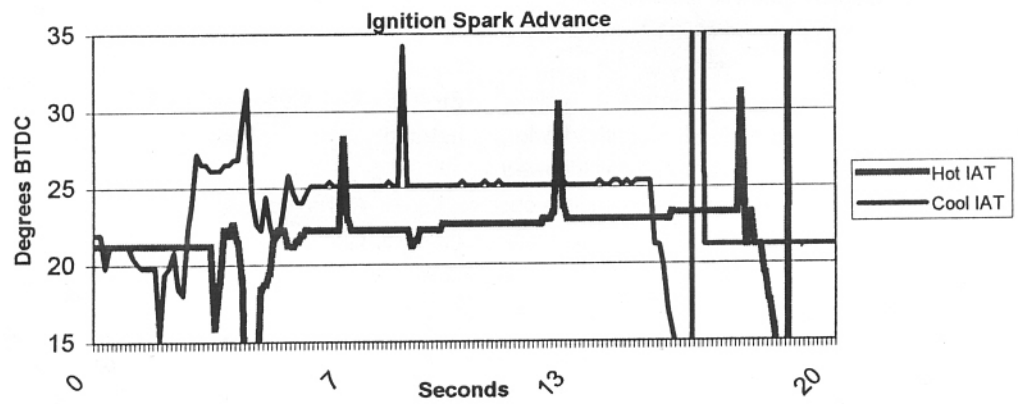
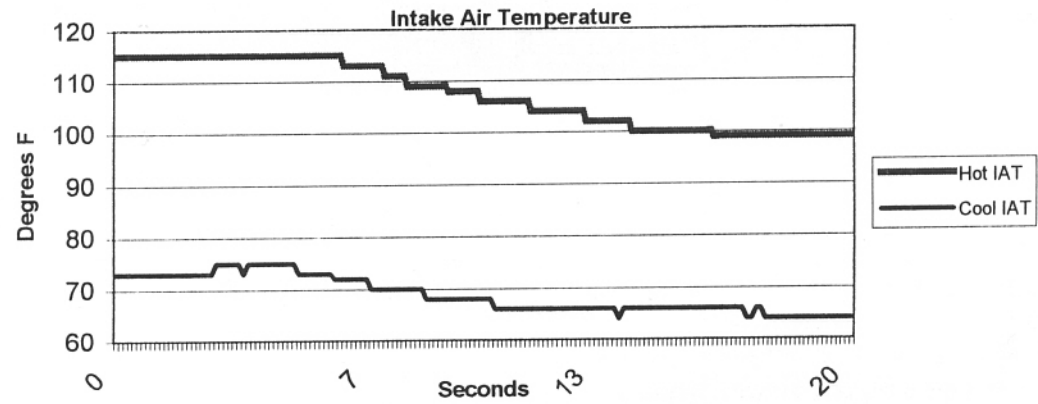
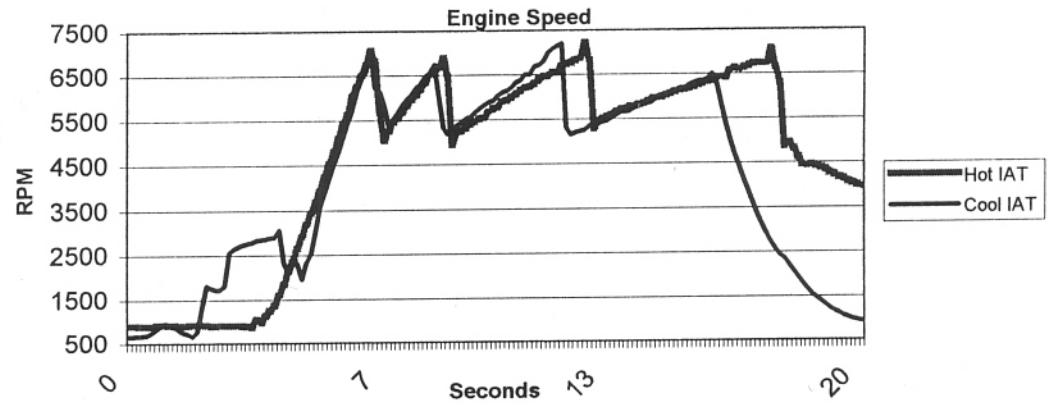
- 18HP / 5 PSI = About 3.5 HP/PSI of back pressure reduction
- A case in point. The back pressure on a Borla 2.5 inch system is 1.5 psi at peak power.
 $5 \text{ PSI} - 1.5 \text{ PSI} = 3.5 \text{ PSI} \times 3.5 \text{ HP/PSI} = +12 \text{ HP}$
- The bottom line is that there is not too much of a power difference between aftermarket exhaust systems.
- There is however, a big difference between how they sound. Let your ears be your guide.

External Temperature Sensor

- Prevents a power loss
- The stock temperature sensor location is influenced too much by the engine compartment temperature. This has little to do with the intake air temperature at WOT.
- The temperature at the air filter is the same as the ambient temperature at speeds over 15 MPH
- Eliminates most of the sluggishness that besets LT5's after a heat soak
- Very important for drag racers



External in its truest sense



Ambient temperature = 60 degrees F

Calibration

- Stock calibrations run about 25 degrees of ignition spark advance. Most stock engines like 28 degrees of spark advance at WOT.
- The stock calibrations are about half of a point rich, with the AFR at about 12.3 : 1. 12.8 works well. Fueling is less sensitive than ignition spark advance.
- The stock calibration tunes the engine well at WOT. Adjusting to 28 degrees of spark advance and 12.8 AFR might net 10 Ft. Lbs. of torque and 10 HP.
- At light loads, 10 Ft. Lbs. of torque can also be added by increasing the ignition spark advance

The factory fueling is good up to about 450 HP. This is because the fueling is about .6 AFR rich.

12.3 AFR Typical factory calibration.

+ .1 For a low backpressure exhaust system

+ .2 For headers

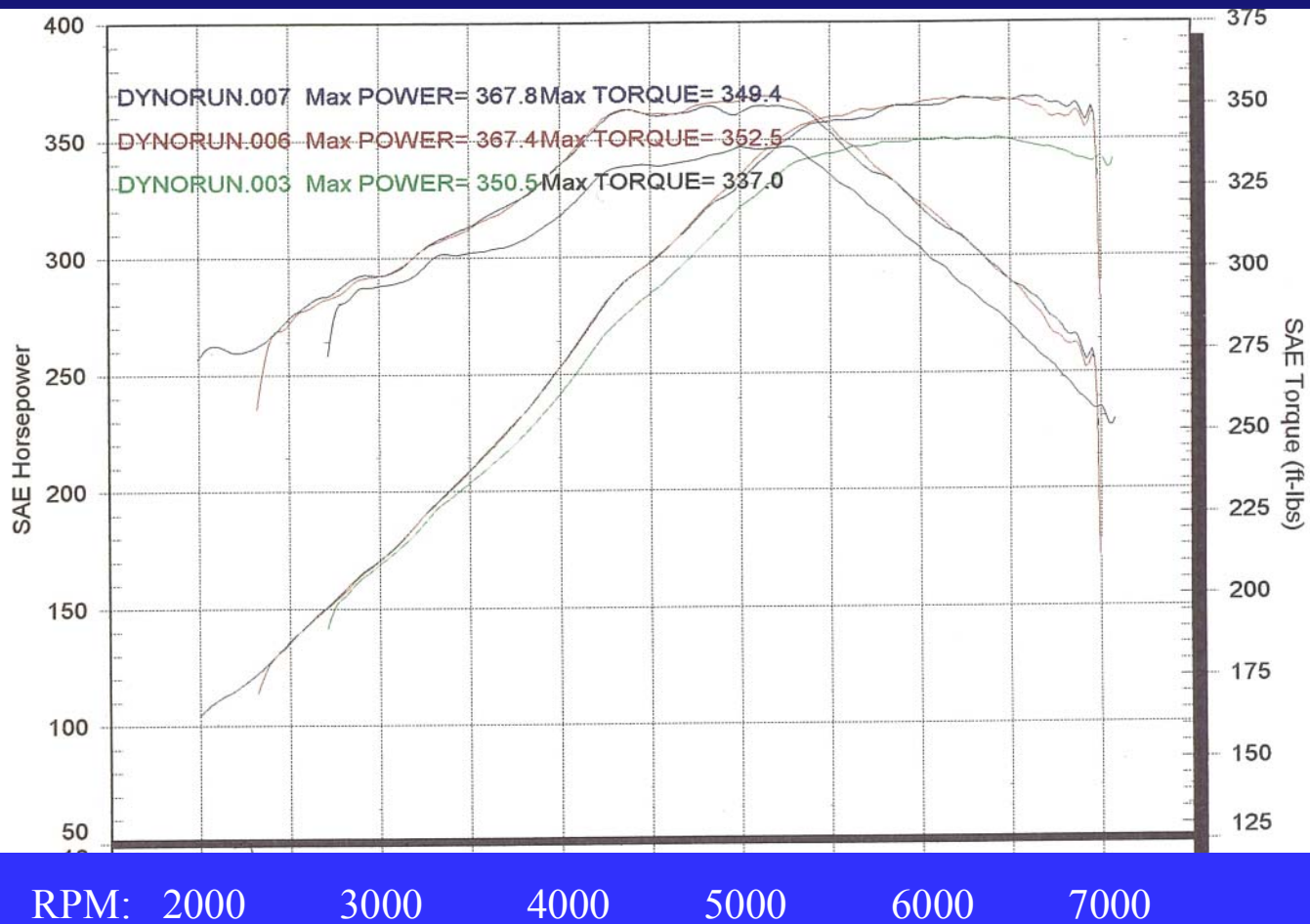
+ .3 For top end porting

12.8 About ideal for best power

For ported heads and or big cams, fuel needs to be added

Headers

■ + 20 HP + 15 Ft. lbs. Torque



'90 - '92 Exhaust Manifold



'93 - '95 Exhaust Manifold



Camshaft Timing

- The camshaft positioning could be out of specification if it was not set correctly at the factory or due to normal wear
- The factory adjustment procedure is subject to a few degrees of variation
- As the chain guides wear in, the camshaft timing can retard about 3 degrees

- Adjusting the cams is labor intensive. It might not payoff, because they may be found to be positioned correctly.

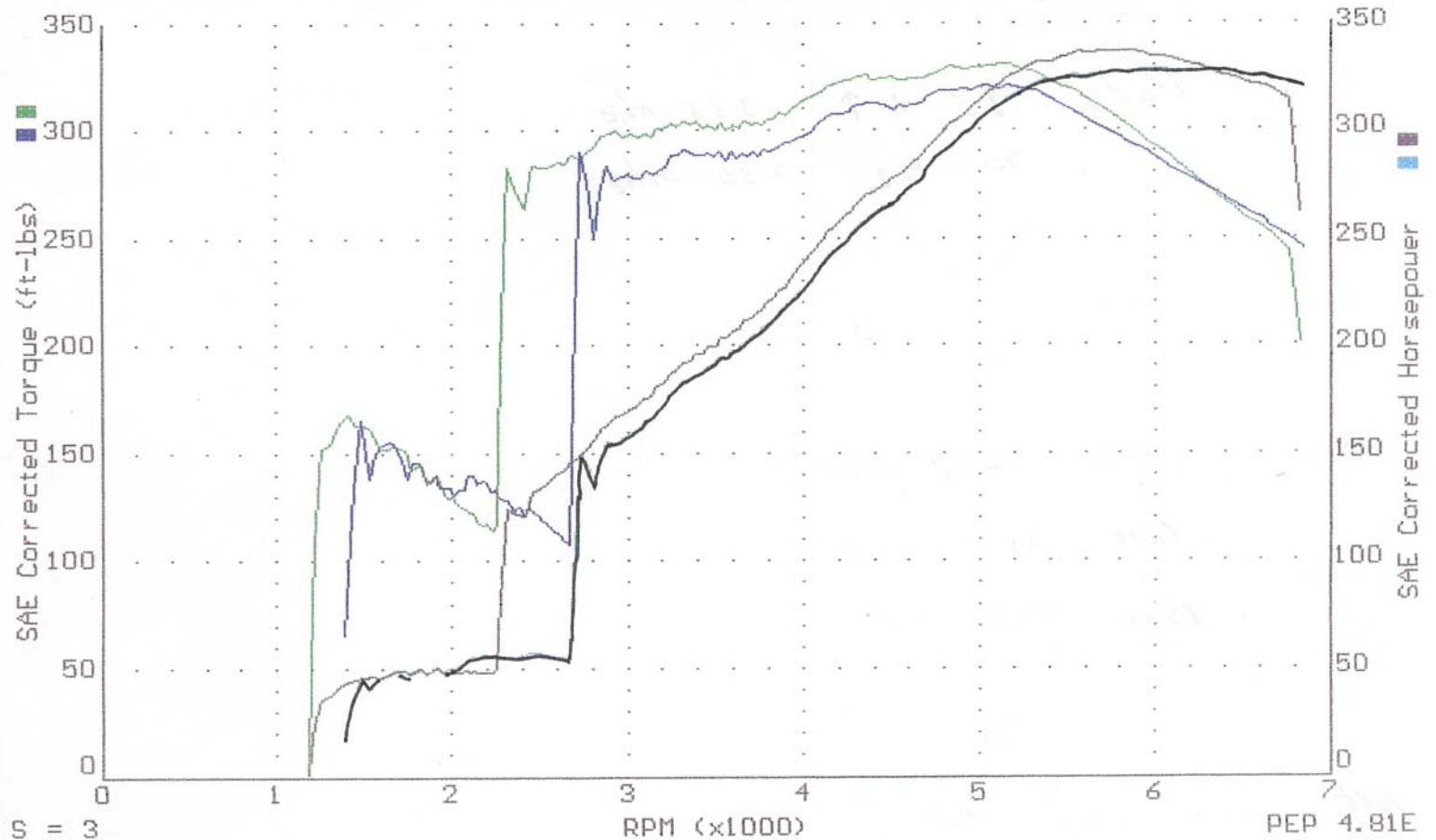
- At 30K miles, my cams were found to be set to:

Intakes: 110 degrees. Should be 114 degrees.

Right exhaust: 114 degrees. Should be 110 degrees.

Left exhaust: 110 degrees. Out of phase with the others.

This affected the output like this...



As measured on DYNOJET'S MODEL 248C DYNAMOMETER

DYNORUN.006 63.6 °F 29.20-0.33 in.Hg. 0 ft. CF=1.00 RPM/MPH=56
 Max TORQUE = 330.8 Max POWER = 336.8

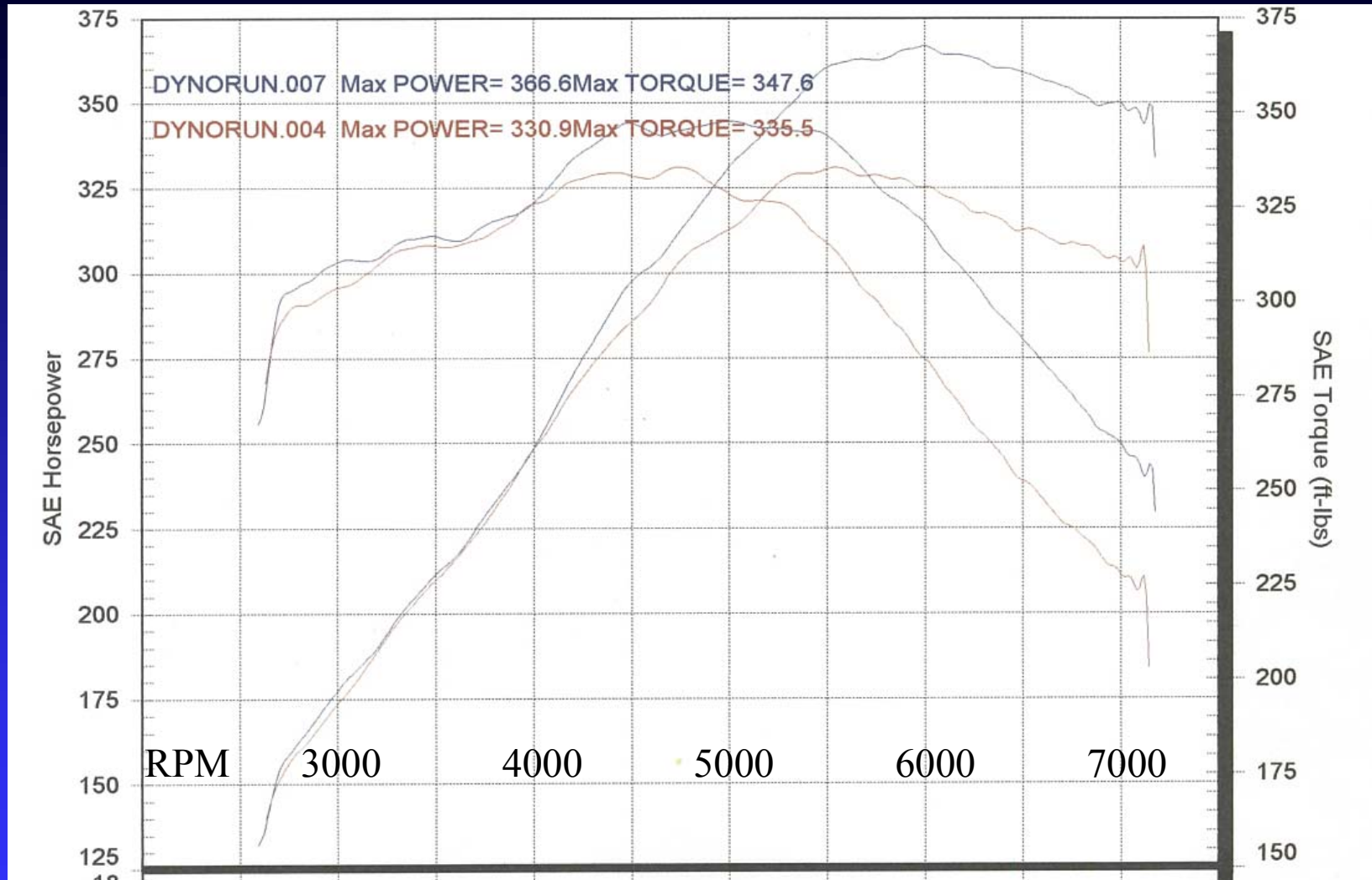
DYNORUN.003 60.1 °F 29.30-0.42 in.Hg. 0 ft. CF=1.00 RPM/MPH=56
 Max TORQUE = 321.0 Max POWER = 328.9

+ 10 Ft. Lbs. Torque, +8 HP

Top End Porting

- + 35 to 42 HP on '90 – '92 engines
- + 20 to 22 HP on '93 – '95 engines
- The injector housings, plenum, throttle body and air horn are opened up by 15% in area
- The stock 33 mm ports + 15% = 36 mm
- The throttle body bores are opened from 59 to 63 mm (15%)

Before and After Top End Porting on a '91



$$366.6 - 330.9 = +36 \text{ WHP} \quad 36\text{WHP}/.85 = + 42 \text{ CHP}$$

$$347.6 - 335.5 = +12 \text{ WTQ} \quad 12\text{WTQ}/.85 = +14 \text{ CTQ}$$

A Typical Upgrade Path

An Example of a '90 350 CI Engine

Stock with an upgraded exhaust system

and a good generic calibration

390 HP

Add headers, +20

410 HP

Add top end porting, +35

445 HP

Add ported cylinder heads, about +50

~495 HP

Add camshafts, about +30

~525 HP

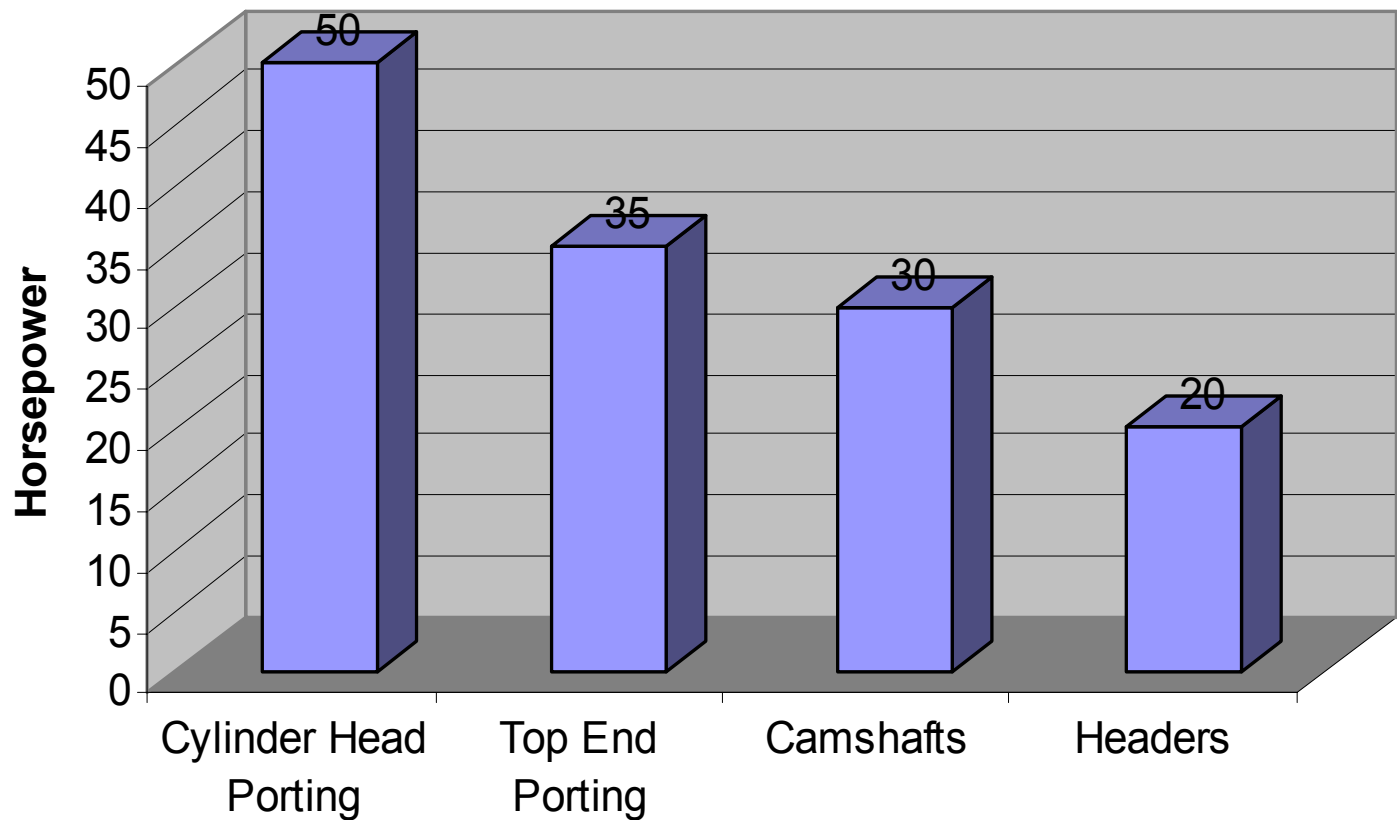
Upgrade Paths

'90 - '95 Engines

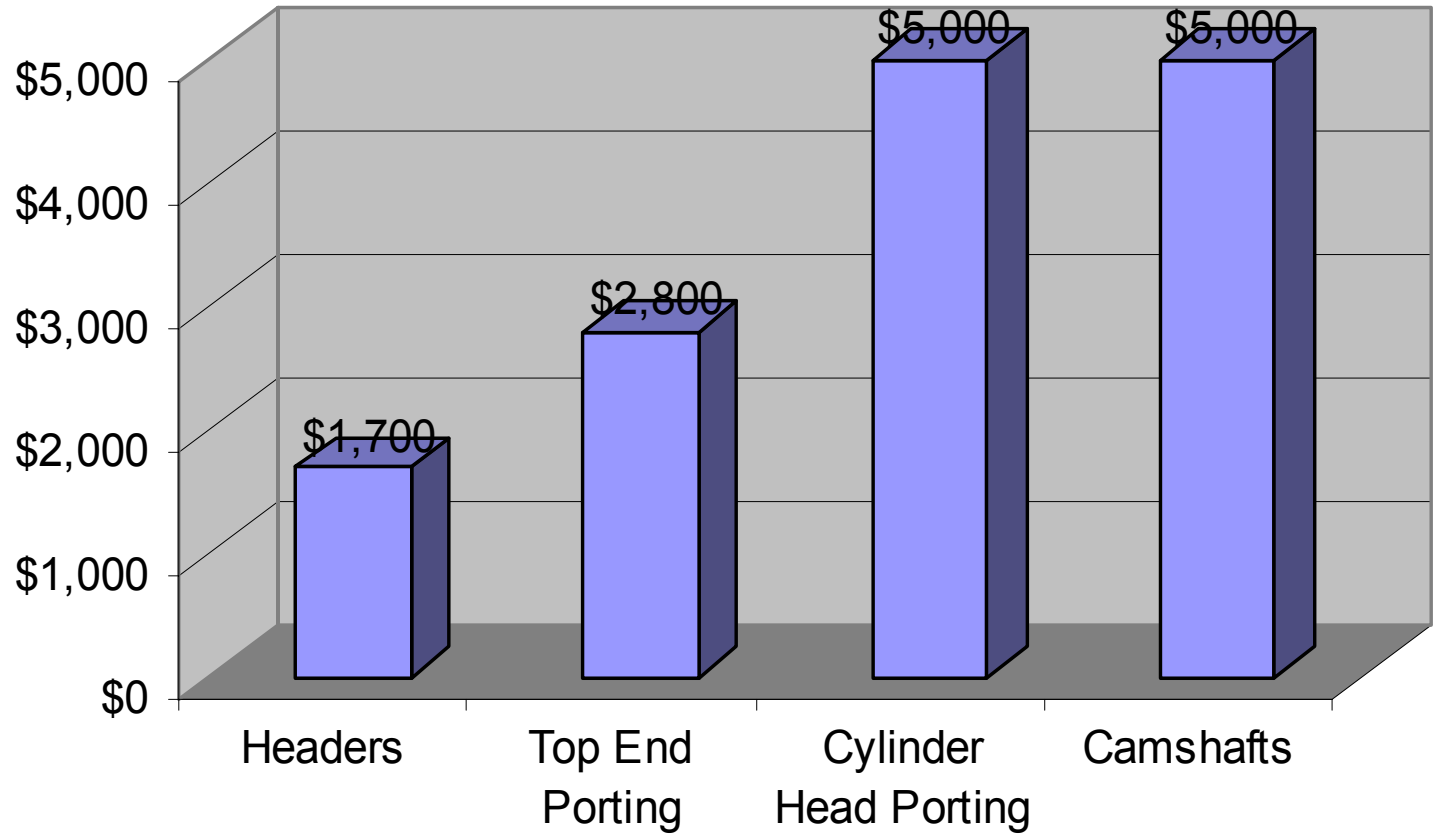
	'90 - '92	'93 - '95
Stock with an upgraded exhaust system and a good generic calibration	390 HP	415 HP
Add headers, +20	410 HP	435 HP
Add top end porting, +35/20	445 HP	455 HP
Add ported cylinder heads, about +50/40	~495 HP	~495 HP
Add camshafts, about +30	~525 HP	~525 HP

Upgrades Sorted by Power

'90 - '92 Engines



Upgrades Sorted By Cost



Individually Installed



www.zr1specialist.com

630-458-8427