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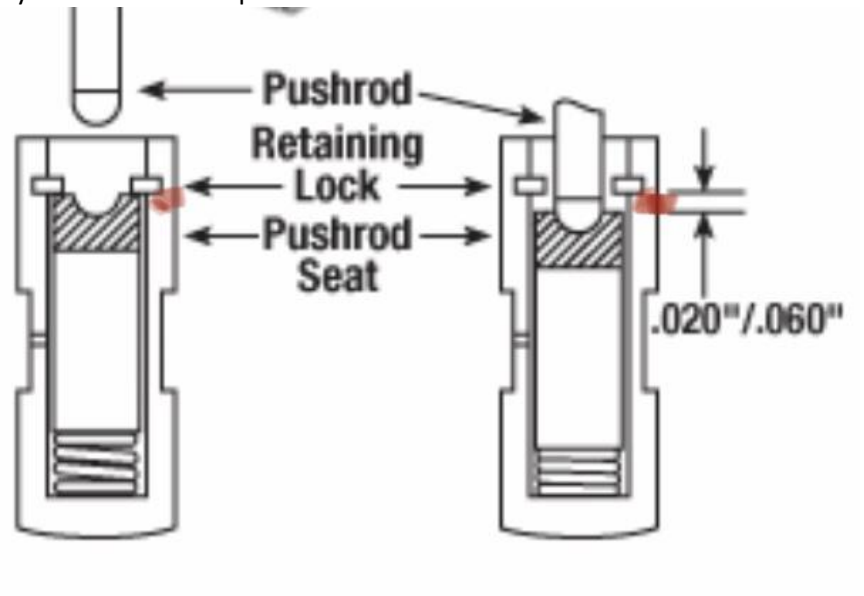
Turbo Buick Valvetrain Notes
6.23.2019.

Lash vs. Preload

Lash is a term used for solid roller cams. Lash is defined as the opening or clearance between valve tip and the rocker arm. Greater lash= less pre load.

Preload is a term used when dealing with hydraulic lifters. Hydraulic lifter preload is the distance the pushrod plunger is depressed below the retaining lock on the lifter. We want to focus on preload for our hydraulic roller setups.



Johnson lifters

Standard Travel Lifters
.035 +/-.010–> .140 total travel
Reduced Travel Lifters
.035 +/-.010–> .093 total lifter travel
Short Travel Lifters
.030 +/-.005–> .058 total travel

<u>Basic expansion rates to allow for when adjusting:</u>
Iron block with Iron head .008
Iron block with Alum Head .010 - .012
Alum Block with Alum Heads .012 - .015

So basically, if you have an iron head/iron block combo, and only put a quarter turn preload on the lifters, you could very well only have .004 - .005 preload on the lifters once everything heats up, which would cause the engine to be very noisy and lose control at high rpm like my heads did at steele drag strip. That's why Joe Lewis recommends putting .030 - .035 on the lifters at the cold setting. ***Lifter must be fully pumped up***

Adjusting the Lifters

Grand National Harland Sharp and Scorpion Rockers thread pitch 7/16-**20**. So, to get the distance of one thread, we want to take the thread count and divide it by 1.
20 threads per inch. So 1/20=.050 give or take .005 variances= .0555

Amount of Turns	Low end .050	High End .0555
1/4	.0125	.0138
2/4	.025	.02775
3/4	.0375	.0414
4/4	.050	.0555

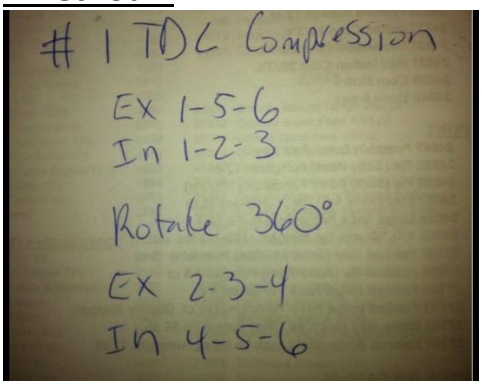
Or you get even more critical and measure the distance of turn per flat side on the nut.
Take TPI(Threads Per Inch) 7/16-**20,** then divide by 6. (1/20)/6= distance per flat.

Amount of Turns	Low end .050	High End .0555
1/6	.008	.009
2/6	.017	.019
3/6	.025	.027
4/6	.033	.037
5/6	.042	.0463
6/6	.050	.0555

In order to reach .035 preload on the lifter I need about 5/8 turns. So go between 1/2 and 3/4 of a turn from 0 preload to get the recommended cold preload

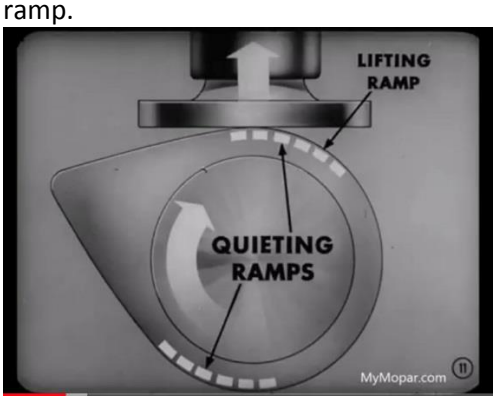
Here are two easy ways to set the preload:

#Method 1



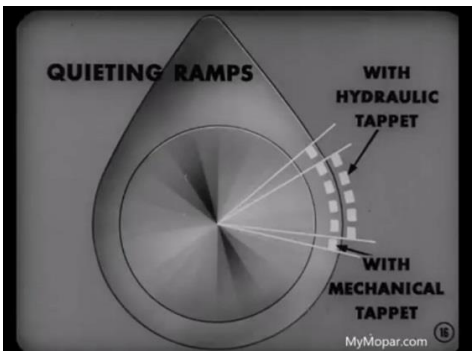
#Method 2

Starting with #1 cylinder, @ TDC compression stroke, use the E.O.I.C. method.
Exhaust Opening
(Adjust the intake valve on the very first and slightest down movement of the exhaust valve. This ensures that the intake valve is completely closed and offers the quickest ramp response). If it's too loud for your liking, redo intake side and wait until exhaust valve goes down halfway and adjust on quieting ramp.

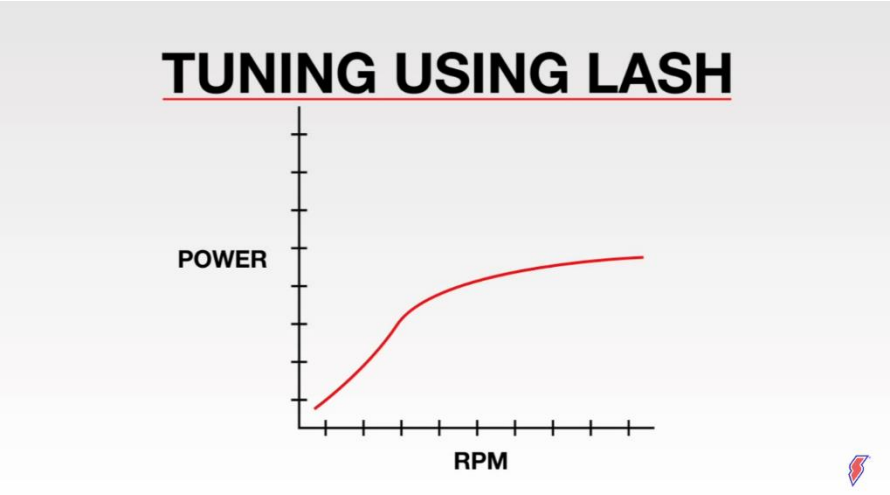


Intake Closing
(Adjust the exhaust valve when the intake goes all the way down and about half way up. This ensures that the exhaust valve is resting and completely closed, also this puts lifter on quieting ramp.) After setting preload, Torque lock nut per rocker instructions. 20-25ft/lb

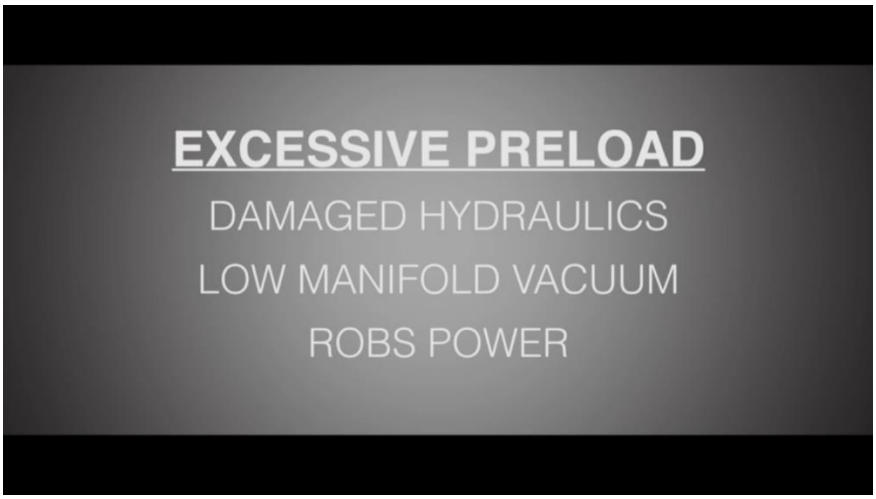
Set exhaust valve here:



Pro of having More preload/tighter lash: gives an engine more bottom end or torque.

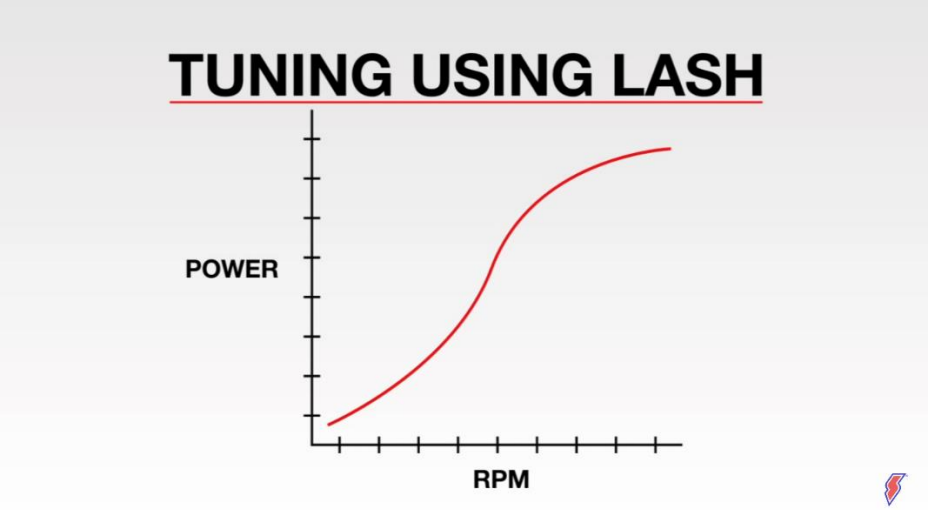


Con of having more preload/tighter lash: too much can hang open valve and smack piston. Loss of horsepower on top end.



Pro of having less preload/greater lash

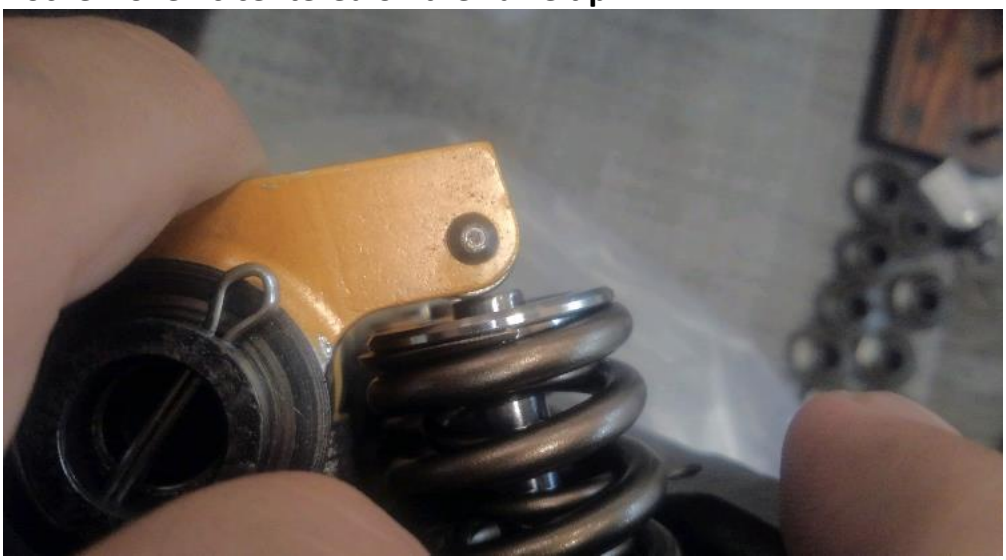
: gives more horsepower and top end higher rpm range.



Con of having less preload/greater lash: decreases duration of cam, and in essences makes the cam smaller. Also, can cause engine to be noisy and loose control of valve train. Overall, it's harder on the engine.

What does a good job look like?

Rocker roller is centered on the valve tip.



If you put the correct amount of preload on the lifter, but the rocker isn't centered, then your pushrod is too long or short. This goes for any style rocker.

2-3 threads are showing at the bottom of rocker for oil clearances.

Same as above, If you put the correct amount of preload on the lifter, but you aren't achieving the correct thread level on the bottom of rocker, then your pushrod is too long or short. Harland Sharp rockers must have 2min-3max threads showing at the bottom for proper oil passages.

Cam Lift and Duration

LIFT: The cam's basic function is to open the valves. More lift can increase power. Increased lift, without changing the cam duration, increases power without affecting the point of peak power on the rpm band.

DURATION: Duration is how long the cam holds the valves open. It's expressed in degrees of crankshaft rotation (remember, the cam rotates at half the speed of the crank). A 280-degree-duration cam holds the valves open longer than a 260-degree-duration cam. Holding the valves open longer allows more air and fuel into the engine and also allows more to get out through the exhaust. Longer duration (higher number) improves top-end power but almost always sacrifices low-end torque. Lower duration improves low-end torque and makes the car idle better, but it limits top-end power, and you can get only so much valve lift with a short duration cam due to the rate-of-lift limitations of the lifter.

You want high lift, and short duration. That way the valve comes all the way open, but does it for a short period of time to increase bottom end power

LOBE SEPARATION ANGLE: This is the relationship between the centerlines of the intake and exhaust lobes. My cam has 110-degree lobe separation angle, which means that the peak opening points of the intake and exhaust lobes are 110 degrees apart.

A cam with 106 degrees of lobe separation angle will have more overlap and a rougher idle than one with 112 degrees, but the 106 usually make more midrange power.

DUAL-PATTERN CAMS: A dual-pattern cam is one that has different duration and/or lift specs for the intake and exhaust. Usually, the exhaust lobes have more duration and lift than the intakes. Depending on the engine, this can be beneficial for engines with poor exhaust-port flow or otherwise-restricted exhaust systems. An iron head car may benefit from a cam that has a higher intake lobe.

Overlap (lots of duration and tight lobe-separation angles) decreases cylinder pressure, especially at low rpm, which allows an engine to run a higher compression ratio and still work on pump gas. High cylinder pressure, which is caused partly by a high compression ratio, is what makes an engine detonate on pump gas. Decreasing the cylinder pressure by adding duration is just like taking compression out of the engine, but mostly only at low rpm.

12.19.2019 Update-Test Conclusion:

I put 5/8th of a turn on my reduced travel lifters which equated to about .03125 -.03468 preload. Car idles smoot. Iinitally, everything was fresh and I had about 12 inches of vacuum. After running for about 6 months I haven't had any valve train issues. The valve springs have broken in, and the lifters have broken in with about 3k miles on them. I now have about 16-18 inches of vacuum at hot idle, and the car runs damn good! I would conclude this as a successful valve train setup.

References:

https://youtu.be/3gMYWLMAzao
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