

Problem Solving with a 1966 Chevy 327



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VCCA Puget Sound Region

In The Beginning

1966 Corvette w/ 327CuIn/300HP
Power Steering, Brakes & Windows, A/C
Powerglide Automatic Transmission



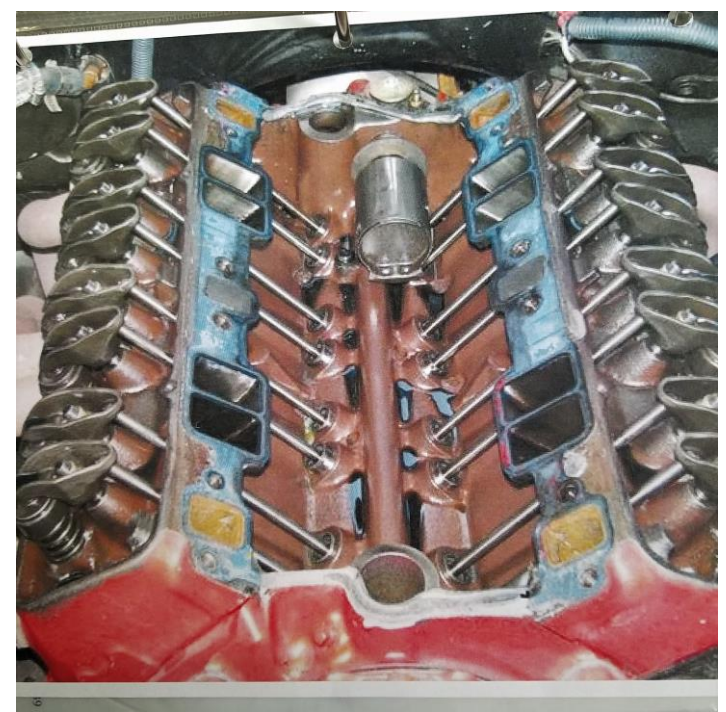
- Purchased on April 13, 2008 in Lynnwood, WA
- Freshly restored. Negotiated price 10% below asking.
- Used car lot owners were cheap – I had to put in \$40 gas on my way home.
- Have driven over 20,000 miles since then.

Problem – Oil Consumption



- Noticed a small amount of smoke out the exhaust when going downhill or idling for a long time
- Slightly faster than normal oil consumption

Diagnosis - Oil Consumption



- Did extensive engine analysis and diagnostic testing
- Checked timing, point gap, spark plug gap, etc
- Pressure checked cylinders at spark plug holes
- Suspected valve guides oil leakage as the cause
- Research found small-block Chevys used o-ring but as it aged, guide clearance increased allowing oil leakage

Solution - Oil Consumption

- Removed intake manifold.
- Found all valve O-ring seals were “flipped” into figure eight allowing oil leakage into cylinders
- Reinstalled new rings by holding valve compressor perfectly upright so as NOT to tilt the O-rings
- 16 rubber O-rings cost about \$4



Problem – Dome Light



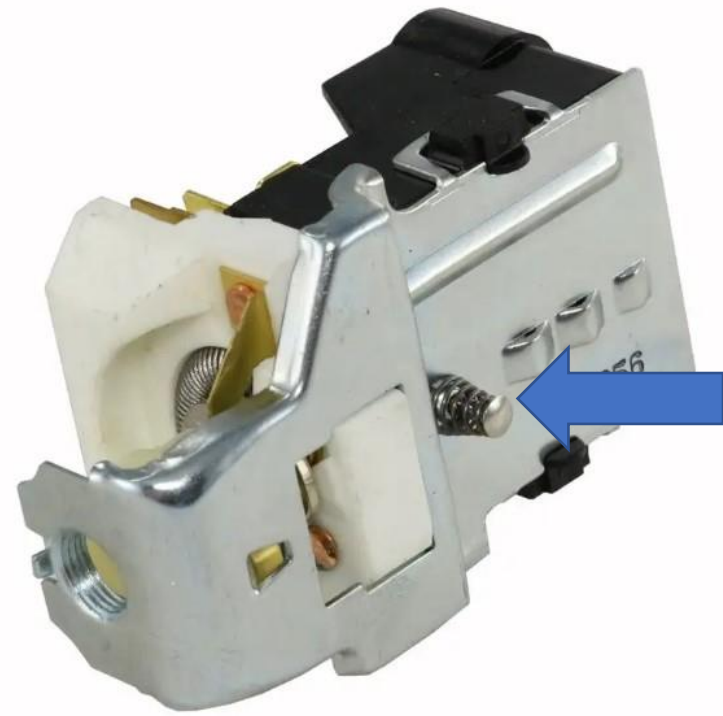
- Couldn't get interior lights to brighten or dim properly
- Once I found this, it became an even greater annoyance since I knew that it wasn't working properly

Diagnosis – Dome Light



- Determined that it was probably the light switch itself that was causing this
- This is also the headlight switch
- Couldn't fix the switch until I removed it from dash

Solution – Dome Light



- In order to do this, “pull shaft” must be separated
- Once discovered, a simple press of button allowed switch to separate and then be removed from dash
- Found rheostat spring was burnt inside switch
- New replacement switch has lights working perfectly

Problem – Headlights Drain Battery



- Sometimes when I parked my car, I'd forget that the headlights or parking lights were still on.
- If I didn't realize this soon enough, the battery would go bad, fairly quickly.

Diagnosis – Headlights Drain Battery



- After mentioning this to one of my f**d buddies, he suggested that I look at GM part 999373.
- In his defense, he used to own a Corvette back in the '60's, so I cut him some slack.

Solution – Headlights Drain Battery

- I found a “Headlight Warning Package” GM 999373 on eBay for \$15.
- Installed it in about 10 minutes.
- Now when the parking or head lights are on with the ignition turned off, a low buzzer sounds. Perfect.
- I’ve never accidentally left my lights on since then.



Problem – Gas Smell



- After driving the car for any distance, and parking it in the garage, the smell of gas is overwhelming.
- I needed to find a fix that is cheaper than a divorce attorney.

Diagnosis - Gas Smell

- Looking at the manifold showed signs of leaking gas from the carburetor.
- Called an old-timer who restores them and he said that “the only guaranteed fix to prevent leaking is to weld the shafts to the carb body”. Ha ha (*Sick man*)



Solution - Gas Smell



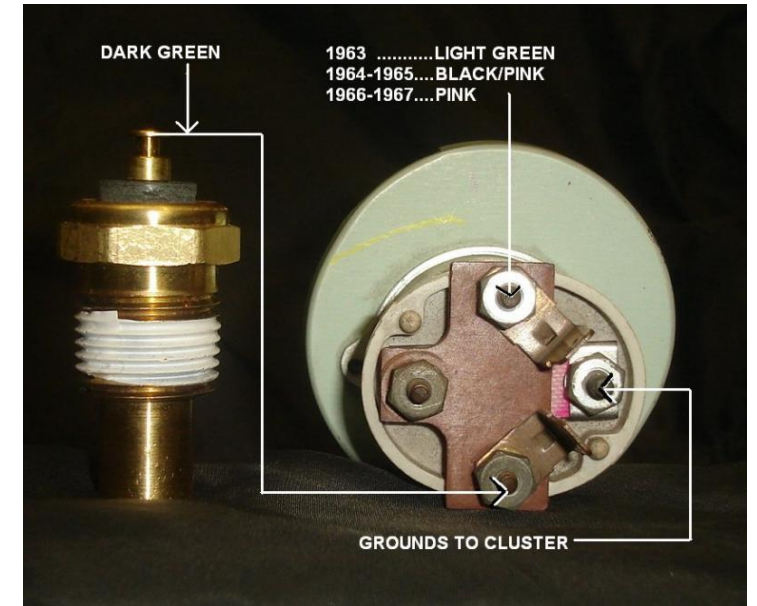
- Bought a new Holley carburetor and installed it.
- No more leak from shafts.
- Problem solved. No more smell.
- No more potential legal expenses.

Problem – Temperature Gauge



- On Route 66 the car ran perfect at freeway speeds. But on city streets it choked and occasionally died. Then it wouldn't start for ~45 minutes.
- Assumed engine was overheating due to hot water and engine heat.
- Temperature gauge never reads above 100 degrees.

Diagnosis – Temperature Gauge



- Steve Kassis kept asking me on the walkie talkie - *"What temperature is it?"* My answer was always *"One hundred degrees."*
- Later at home, I researched and discovered that water temp sensors go bad, especially on Corvettes.

Solution – Temperature Gauge

- So after I got home, I bought a new temperature sensor for ~\$20.
- It took about 5 minutes to install it!?!?
- Now the temp gauge works perfectly.
- And “Yes” my engine is still overheating frequently, but now I can see it on the dash gauge!!

Finished Product



WILLCOX
CORVETTE

Problem:

– Bumpy Ride

- Also on our 5,310 Route 66 trip (17 days), we noticed a slight “bump” when driving at slower speeds.
- Since it wasn’t noticeable at freeway speeds, which is what we normally traveled, we ignored it.
- Finally I ran my hands along the tires (OUCH) and discovered that the steel cords were actually exposed.



Diagnosis:

– Bumpy Ride

- Finally, after we were home for a while, I took the car in for new tires.
- It wasn't just the cords that were the problem.

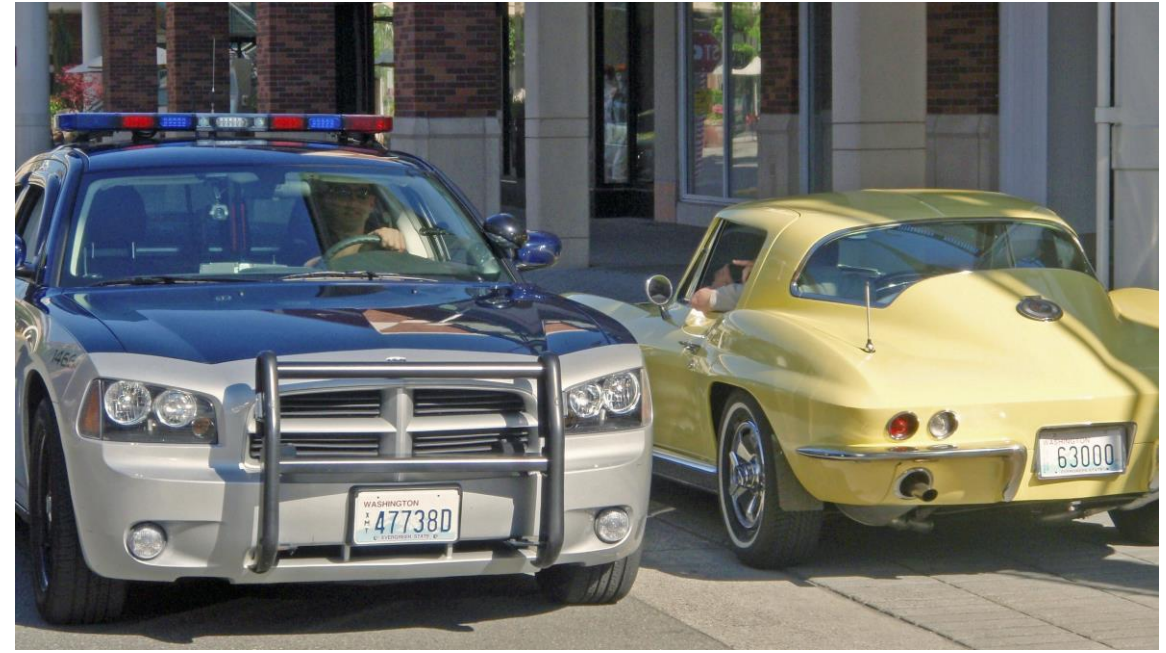


Solution – Bumpy Ride



- A new set of tires is a wonderful feeling.

Problem – Freeway Breakdown



- Leaving Santa Monica Pier at 7 pm, the car stalled on the *very* busy freeway. After cooling off (about 8:30 pm) it started and ran well enough to get back to the motel. (Helgy's '64 died too and he had to be towed!! A loose wiring harness plug was his issue.)
- Next morning my car wouldn't start at all.

Diagnosis – Freeway Breakdown

- The spark plugs weren't getting any "spark"
- The distributor didn't have any "spark"
- Looked at electronic ignition installation booklet for ideas.
- Blinking light on new electronic ignition translated to "CPU is now toast". Install new unit.
- Not willing to pay \$200+, I re-installed the original points and capacitor which were contained in my "Just In Case" bag.



Solution – Freeway Breakdown



- Problem was that I didn't include the original screws and the screws for the electronic unit were too short.
- Drove downtown LA. None available at Auto Parts store!!?!? Saved by visit to a hardware store.
- Installed and car started and ran normally – until it overheated.... Again.

Diagnosis – Overheating

- With a bad temp gauge reading and occasional vapor locks, I concluded that the engine was overheating. duh
- One simple solution was to install a new thermostat.
- This is not something that I wanted to do at a motel, so I waited until I got back home.
- And I wanted to research this in case the Vette crowd had more information. Good thing that I did.



Solution – Overheating



- Not all temperature gauges are the same.
- The Corvette Forum described a replacement (Stant Superstat) with a larger opening, heavier construction and better quality which allowed a great volume flow from the engine to the radiator – thereby allowing slightly faster cool down to occur.
- Installed, but no noticeable difference to my issue.

Problem – Overheating

Note: Different references identified
This setting as 4 or 6 or 8 degrees ATDC.

1966	V8-350, 425 H.P.	43N	.035	④	28-32	Fig. E	6°	Fig. C	700
	8-327, 300 H.P.⑬	44	.035	④	28-32	Fig. E	6°	Fig. C	700
	8-327, 300 H.P.⑭	44	.035	④	28-32	Fig. E	4°⑮	Fig. C	700
	8-327, 350 H.P.	44	.035	④	28-32	Fig. E	10°	Fig. C	700
	8-327, 350 H.P.⑫	44	.035	④	28-32	Fig. E	10°	Fig. C	700
	8-427, 390 H.P.	43N	.035	...	...	Fig. E	4°	Fig. C	550
	8-427, 390 H.P.⑫	43N	.035	...	...	Fig. E	4°	Fig. C	600
	8-427, 425 H.P.	43N	.035	...	...	Fig. E	8°	Fig. C	800

①—BTDC: Before top dead center.

②—D: Drive. N: Neutral.

③—Plus or minus 20 lbs.

④—New points .019'', used .016''. On V8s, adjusting screw in (clockwise) until engine misfires; then back 1/2 turn.

⑤—First short vertical line clockwise from ball in flywheel.

⑥—New points .018'', used .015''.

⑦—Each set of points 28-30°, total both sets 33-35°.

⑧—New points .019'', used .016''.

⑨—Early production 750 R.P.M. Engine date stamped to 1118 QA or QB, 950-1000 R.P.M.

⑩—Transistorized ignition 6° BTDC.

⑪—If air conditioned, turn A/C switch to "Full On" position.

⑫—With Air Injection Reactor System.

⑬—Manual transmission and Air Injection Reactor System.

⑭—Automatic transmission and Air Injection Reactor System.

⑮—After top dead center.

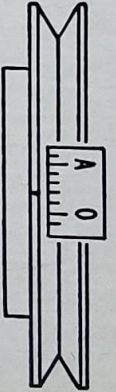


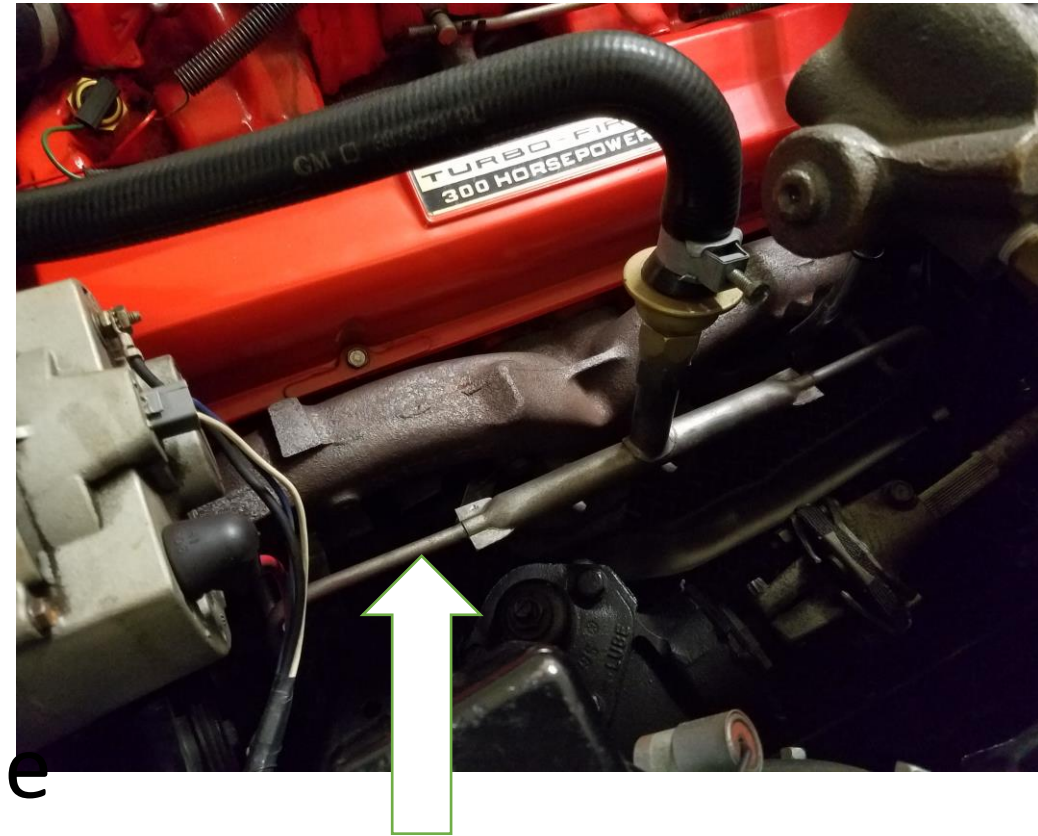
Fig. A

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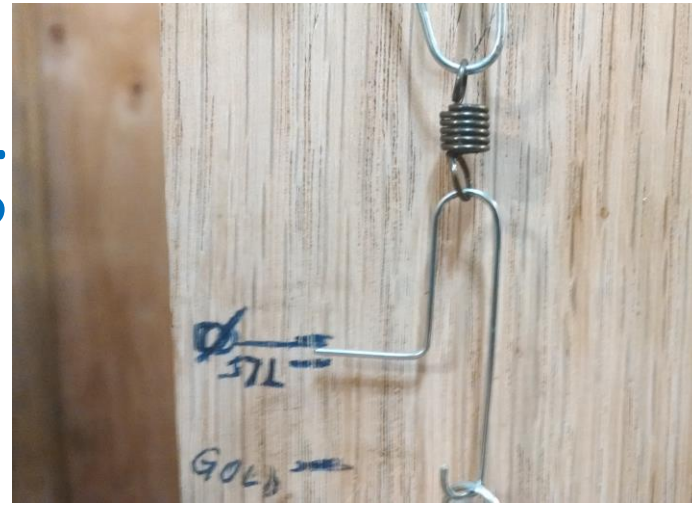
- My '66 327 Corvette was originally sold in San Jose California. Therefore it is a "California car". In 1966 it had the *very first emission controls* installed by Chevrolet on any car pending Congressional regs.
- For one year ONLY it changed timing to 4, 6 or 8 degrees AFTER TDC. All others were 8 or 10 degrees BEFORE TDC.

Diagnosis 1 – Overheating

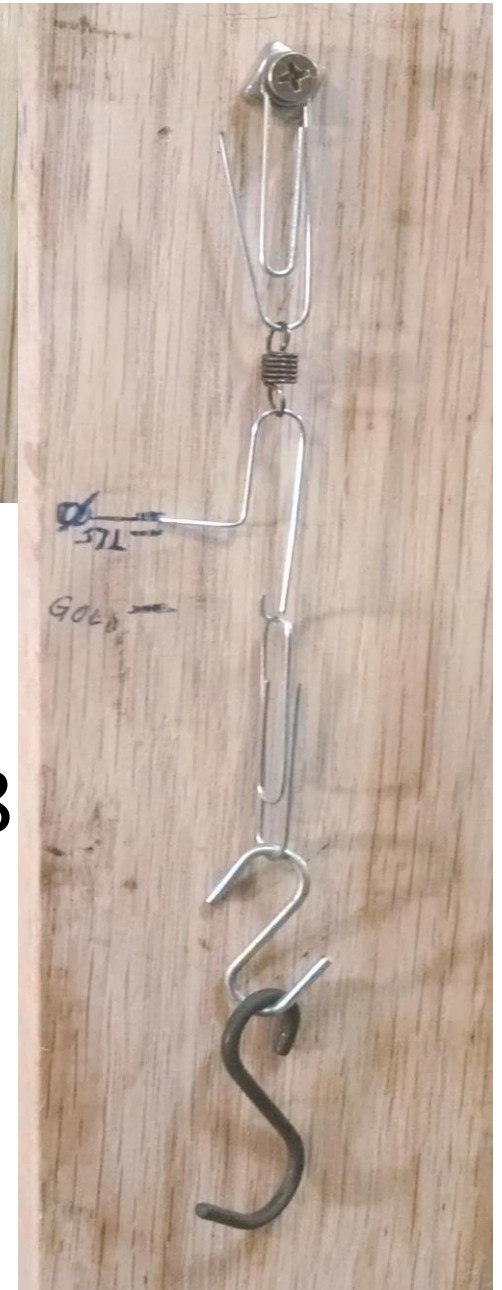
- This design had the spark plug firing AFTER the piston had passed the peak. This reduced power slightly, but it allowed GM to meet emissions with one of the worst designs ever.
- Extra unspent gas which did not ignite was fed into the exhaust manifold where it **IGNITED AGAIN!!**. This burned off remaining fuel fumes, but negatively the engine ran very hot.



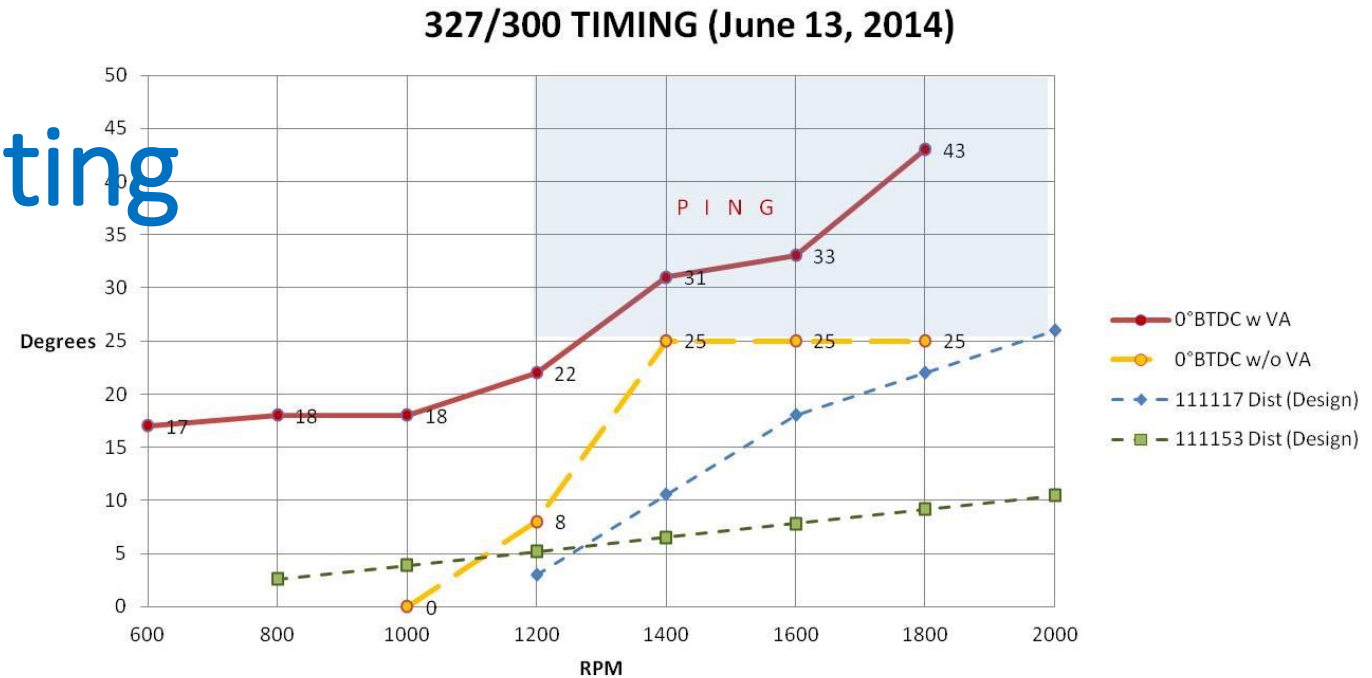
Diagnosis 2 – Overheating



- Discovered this design was only forced on '66 Corvettes with automatic transmissions.
- Bob Helgeson's '64 had same engine timed 8 degrees BEFORE TDC – *as God had intended*.
- Corvette Online Forum advised me to use lighter springs on the distributor, allowing quicker advance. Built spring tester.



Diagnosis 3 – Overheating



- Took many, many readings with many different configurations of weights, springs, timing, etc etc.
- Created charts to reduce confusion and to try to focus in the critical problem and the primary causes.

Solution 1 – Overheating

- Went down a rabbit hole buying and testing various vacuum advance canisters. Four months & \$\$ wasted.
- Also built a tool to find exact TDC.



- Compared distributor weights – significant difference in shape results in difference in speed vs. advance.



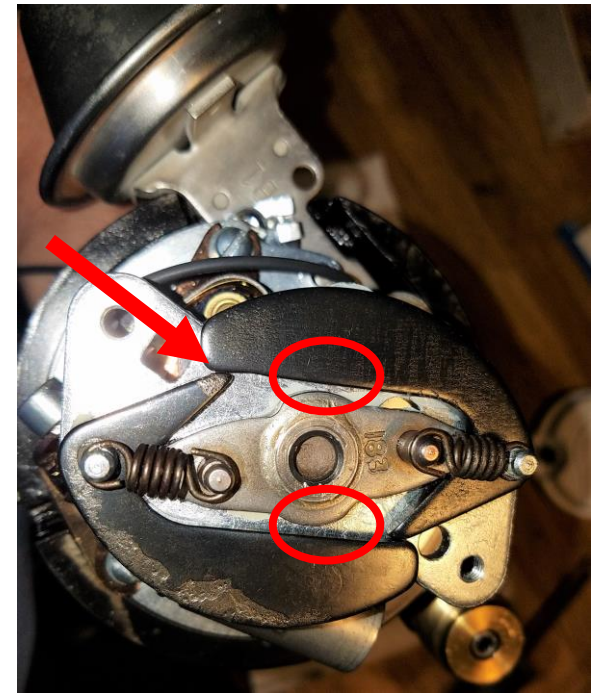
Solution 2 – Overheating



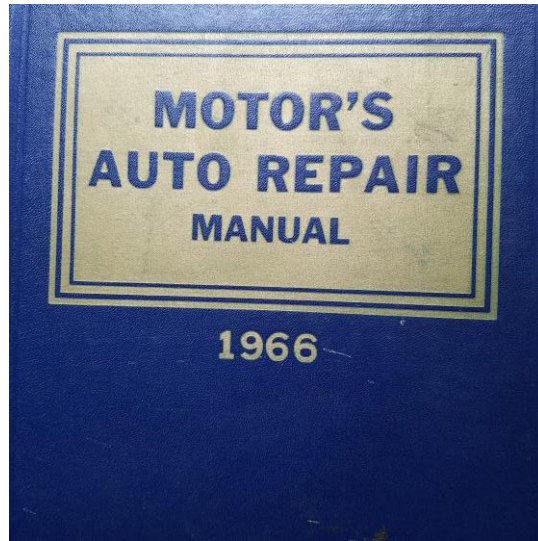
- *Finally* after almost 10 years, I bought a complete NEW distributor package (\$475) for '64-'67 cars w/ standard transmissions. Installed it the SAME DAY.
- Working MUCH better now *but something is still wrong.*

Solution 3 – Overheating

- A weary Cross-eyed examination late at night found the distributor weights were so long, that they bumped into each other and prevented the timing from **dropping as low as needed.**
- A minor machining task solved that problem.
- Set the timing to 8 degrees BEFORE TDC, and the engine purred!!
- **Now, four years later it has NEVER overheated.**



Problems & Solutions



- This lists some of the highlights in trying to fix my “fully restored” ‘66 Corvette that I purchased 14 years ago.
- Would I do it again? **YOU’RE DANG RIGHT I WOULD!!**
- I love driving this car. *And it’s a great chick-magnet.* 😊
- Now, four years later, it has NEVER overheated.

NOT The End

