First Fuelie Found!

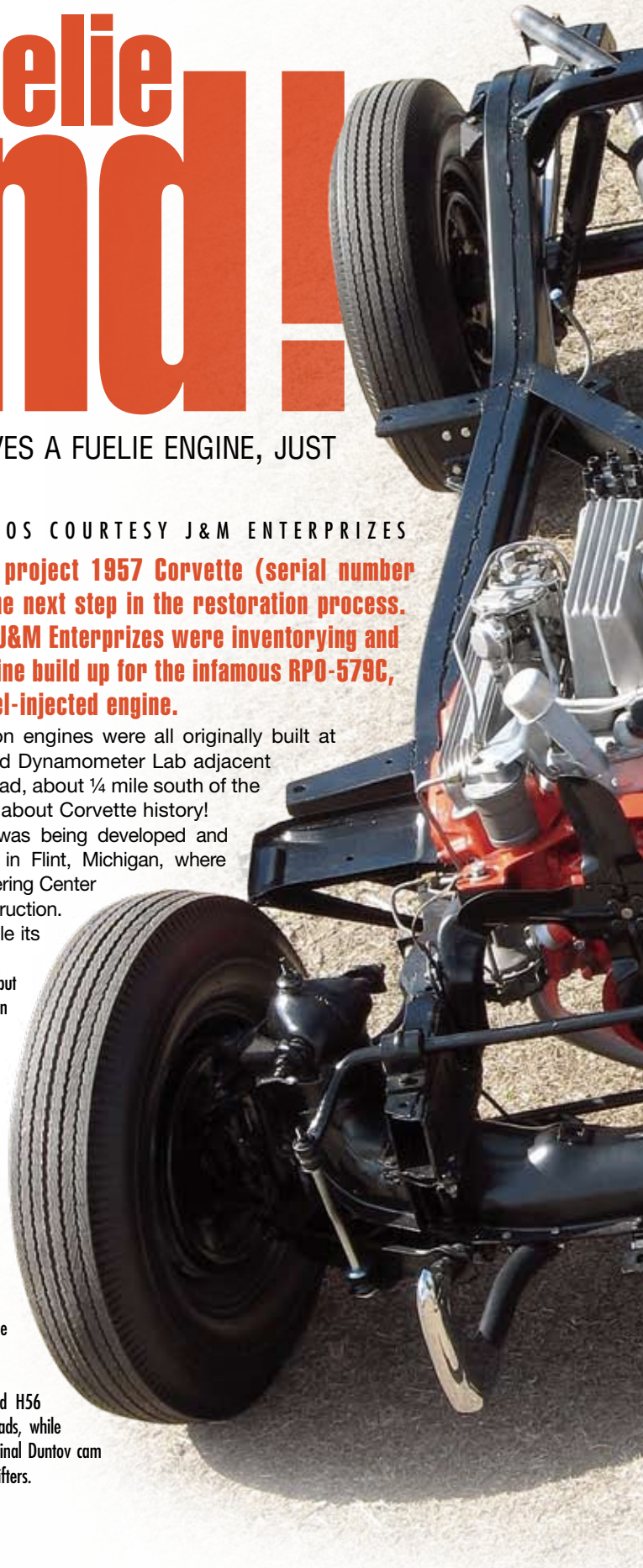
Our First Fuelie project car receives a fuelie engine, just the way Chevy Engineering did it.

BY ANDY BOLIG AND KEN KAYSER \ PHOTOS COURTESY J&M ENTERPRIZES

With our chassis near completion on our 2009 project 1957 Corvette (serial number E57S1000010), we were anxious to move on to the next step in the restoration process. With the help of Ken Kayser, Tim and John Ames at J&M Enterprizes were inventorying and investigating the correct parts to complete the engine build up for the infamous RPO-579C, "One horsepower per cubic inch displacement" fuel-injected engine.

The 1957 Chevrolet 283cid V-8 prototype fuel-injection engines were all originally built at Chevrolet Engineering's satellite Flint V-8 Engineering and Dynamometer Lab adjacent to the Chevrolet Flint V-8 Assembly Plant on Van Slyke Road, about ¼ mile south of the building where the 1953 Corvettes were assembled. Talk about Corvette history!

Back in 1952-54, when the Chevy small-block engine was being developed and engineered, all of Chevrolet Engineering was still located in Flint, Michigan, where Chevrolet began operations in 1914. Chevrolet's new Engineering Center at the Tech Center in Warren, Michigan, was still under construction. Concurrently, Chevrolet Motor Division was planning to double its



1 There are many areas where modern replacements would have been sufficient, but J&M wanted to stay as close to original as possible. That meant locating NOS parts when possible. This set of NOS pistons (PN3746289) and rings (PN3738901) were found on the Internet and purchased for this build. They, along with the small cc factory heads, give the 283cid – 283hp engine a compression ratio of 10.5:1. Note the "pop-up dome" and the S4 (GM Service Parts number) marking on the piston.

2 The forged-steel crankshaft (PN3735236) was forged at the Chevrolet Tonawanda Forge Plant on a 6,000 ton press. These Chevy small-block forged cranks are bullet proof, and it was re-used for this engine.

3 This is the original Chevrolet cylinder-case #3731548 that Flint V-8 Engineering and Dyno Lab started with in August 1956. The rotating crank, rods, pistons and Duntov-spec camshaft have been re-installed. The block had been sleeved back to the standard bore which a previous owner had done. The engine has not been run since the machining was done.

4 This is one of the original Chevrolet cylinder-heads #3731539 that are dated H56 and H206. J&M was able to locate NOS swirl-polished intake valves for the heads, while new aftermarket exhaust valves were used. A Comp Cams reproduction of the original Duntov cam specifications was used deep within the engine, along with matching solid flat tappet lifters.

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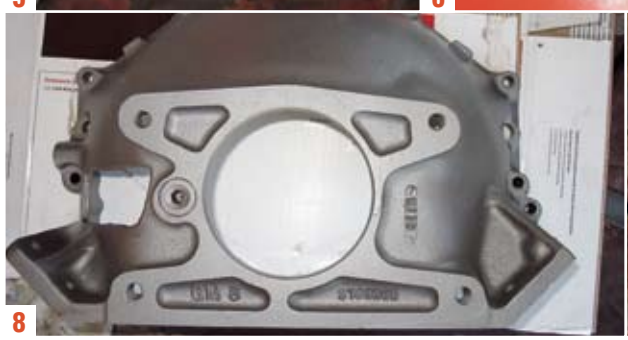
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5 On the top side of the heads, note the yellow paint stripe designating a set of NOS valve springs and damper that were located and installed.

6 The special vintage NOS intake china wall gaskets with the tell-tale "GM" tab were used only on Corvette engines so that Chevrolet dealers could detect engines brought in for service that had been modified by the owner.

7 Note the correct "WB1C" intake bolts used on the early fuel-injection units prior to the factory change to studs.

8 The bellhousing 3733365 carries the date code H116 for Aug 11th, 1956

9 The original exhaust manifolds disappeared over the years, and a correct original pair (cast H22 for August 22nd, 1956) were located at Paragon-Vintage (www.corvette-paragon.com). They are unique to very early 1957 production and have cast-in-place exhaust gas deflectors in the center ports, casting number 3733975 (LH) and 3733976 (RH).

annual vehicle capacity for 1955 with the introduction of an all-new passenger car and an all-new mid-year 1955 truck, both available with the all-new 265cid V-8 engine. To accomplish this ambitious plan, the new Chevrolet Flint V-8 Assembly Plant started production in July 1954, and a separate building on the site housed all the engineers necessary to put the new engine into production with a state-of-the-art dynamometer laboratory to ensure the engine's design integrity and longevity.

When Chevrolet's top brass, a.k.a. Ed Cole, wanted a few representative 1957 fuel-injected Corvettes for the upcoming Long Lead press previews in late September, they once again called on the Flint V-8 Dyno Lab to deliver. Chevrolet requested three fuel-injected Corvettes in each of the following configurations;

RPO-579A 283cid 250hp with the base three-speed manual gearbox

RPO-579B 283cid 250hp with the optional extra cost Powerglide automatic

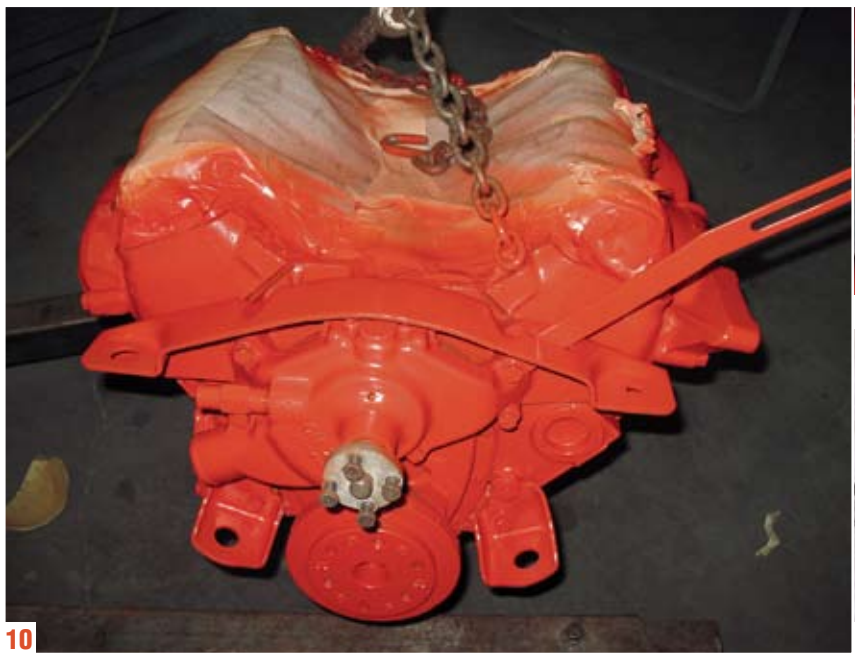
RPO-579C 283cid 283hp with the base three-speed manual gearbox

The Chevrolet Flint V-8 Dyno Lab meticulously hand assembled each of the three fuel-injection V-8 engines, the first to be fully representative of the production-approved components. The new-for-1957 engine identification numbers were hand stamped on the cylinder block pad. In the case of our RPO-579C engine, it was stamped F826EL, the first engine so designated as the 283hp with the unique suffix "EL." After assembly, the three engines were transported to the plant's V-8 engine "touch-up" spray booth where they were painted in the new 1957 shade of Chevrolet Red-Orange enamel paint, because the large spray paint system was still painting 1956 V-8 engines in the old red enamel paint. Then it was back to the dyno lab for full engine dress and break-in, in one of the dyno cells.

The Flint V-8 Dyno Lab used typical 1956 engine parts that were plentiful at Flint V-8, unless it was a specific new part for 1957, such as the fuel-injection system. For our First Fuelie project Corvette, the 3731548 cylinder block and 3731539 cylinder heads were new for the 283cid increase and they were specially handled and processed through their respective machining departments, as were the high-compression domed pistons. Other components that were carryover 1956 parts were the crankshaft, connecting rods, bearings, etc. The special Corvette five-quart oil pan would be new for 1957, but it was not deemed critical, so the 1956 oil pan was used instead.

Since neither the Flint V-8 Assembly Plant nor the Engineering Dyno Lab had a paint booth for black enamel paint (as did the St. Louis Corvette plant), all the bare-metal accessory parts normally painted black at St. Louis were also painted Chevy Engine Red-Orange. These components were the water pump and crankshaft pulleys, the generator brace and mounting bracket, and the road draft tube and retaining bracket.

When the time came for 1957 Corvette #010 to receive its heart transplant (think of the Heartbeat of America), it was most likely driven from the GM Proving Ground to the



10 After the engines were assembled at the Flint Dyno Lab, they were fully painted, including the exhaust manifolds and the front lower engine mount brackets for the lower engine supports. The engine supports would have then been pulled off just prior to installation into our Corvette #010, revealing the natural cast engine material where they were once installed. Likewise, the harmonic balancer was masked and unpainted. The hi-perf fuel-injection pulley was painted engine orange, whereas production cars have black pulleys. Again, this is because our engine was hand assembled at the Flint Dyno Lab.

11 The engine's original stamp pad correctly reads F826EL for Flint, August 26th 1956 and EL for the 283hp hi-perf fuel-injected engine.

12 A previous owner went so far as to locate a complete set of correct AC 43-5 spark plugs for this engine.

Flint V-8 Dyno Lab, which was the standard Chevrolet procedure well into the 1960s. Once there, experienced Chevrolet engineers oversaw the original RPO-469C, Duntov Cam, 270hp solid tappet, dual-quad engine removed and the brand new Ramjet fuel-injection V-8 spring to life!

Many restorers know that building simply a driveable engine is often much simpler and less costly than building a historic, period-accurate and numbers-matching "correct" engine. Many times, it's the little details that can be the most time consuming.

A previous restoration of the engine in Corvette #010 by the second owner's restorer, unfortunately changed out some of the original 1956 components with later 1957 parts, namely the exhaust manifolds. Even so, the team at J&M were not deterred and found several NOS late 1956 items that were still in their original packaging to replace the missing parts. Fortunately, the critical original parts: fuel injection, cylinder block, heads and oil pan survived the ravages of time and unfortunate judgment or circumstances!

One of the pitfalls of correctly restoring an engine, or an entire vehicle, is to over-restore it, simply put, making it better than the factory did back in the day. With all of the technology available to the restorer today (i.e. finishing equipment, processes, super paints, etc.), one can easily restore a car to better than new. While that may not be entirely bad, in this case, John and Tim desired to keep the car as original as possible in components and appearance to the way that Chevrolet did it. The odds of that happening are greatly improved through the help of Ken Kayser, a former Chevrolet & GM engineer who has been long considered one of the foremost experts on these early fuel-injected cars and their engines.

When asked about the process of locating and identifying all the various fasteners used on this engine, Tim Ames from J&M Enterprizes replied, "We used many people, cars and other tools trying to figure out the proper bolts for the proper locations. Ken helped make it easier with the Chevrolet documentation in his book and his forty years of manufacturing plant experience. Luckily, the engine still retained most of the original OEM bolts, but we had to resort to some reproduction bolts and screws for a couple of things. We also contacted Richard Fortier (R&F Corvettes 810-750-1472) to get some of the harder-to-find bolts such as the 'B&H' fuel pump canister bolts, correct 'WB1C' bolts for the F.I., and a couple of chassis bolts that aren't reproduced correctly. Also supplied by Paragon (www.corvette-paragon.com) were several key parts for the restoration including the rare, early exhaust manifolds with the exhaust gas deflectors and the correct three-speed shifter. The *Corvette Chassis Restoration Guide* was a big help with the frame bolts, their location, head marks, plating, size and thread of the bolts."

Ken educated us that not all of the bolts on one engine or on one chassis would always have identical head markings. Flint V-8 engine assemblers and St. Louis Corvette assemblers kept their apron pockets full with only the bolts they were required to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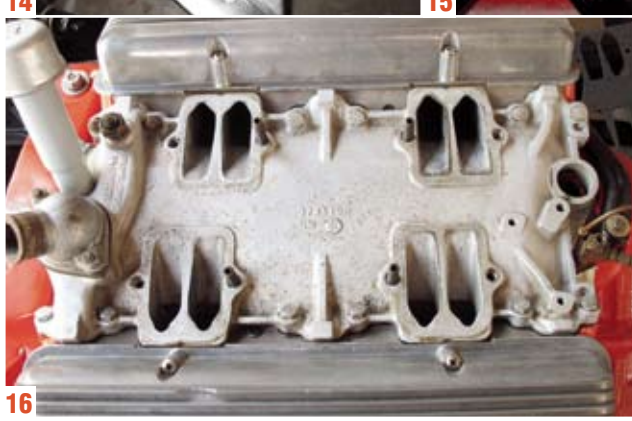
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13 The three-speed transmission for this car is a unique piece in several respects. The tailshaft 3722946 is unique to all 1955, 1956 and early 1957 Corvettes with the three-speed manual transmission (changed to 3743450 in December 1956). It is undated and does not have a vent. Venting was accomplished through the front bearing cover.

14 The 1955 through early 1957 three-speed shifter is unique and often confused with the later 1957 through 1963 shifter. Note the size of the opening between the earlier-style shifter (bolted to transmission) and the later-style shifter with the much wider opening for the shifter handle. Also note the strong external coil spring compared to the flimsy internal C-clip spring.

15 Here our engine and transmission are being "test fitted" in the chassis for the first time.

16 The early fuel-injection intake base plate installed to the block and heads to cover the lifter gallery has casting number 3741193. The Winter's Foundry Sno-flake is next to the part number on only the first 300 fuel-injected 1957 Corvettes.

17 After that, the plenum, pump housing and fuel meter get installed. The rough, sand-cast pump housing is correct for an early F.I. unit and carries numbers 7041362 1010.

install. Prior to running out of a bolt, the assemblers would periodically go to the restocking area trays to refill their pockets. The material handlers would periodically refill the trays with bolts from the wooden kegs of bolts located in the general stores area. Since purchasing did spot-buys on fasteners, the next order could easily and often be sourced to a different supplier. The refilling process at several locations in the supply chain caused routine mixed head markings! Where multiple like bolts were common, such as the oil pan, intake manifold and suspension fasteners, they could frequently have different head markings. Situations where bolts were different lengths (and thus, have different part numbers), such as for the bell housing, transmission mount and shifter mounting could also have different head markings. Another less-known fact is that the same bolt manufacturer had more than one bolt-making facility. The best example is the "TR" bolts, where each plant used a different size font so that defective bolts could be traced not only to the supplier, but to the supplier's individual plant location.

Ken said "In the very few locations where the OEM fasteners were missing, replaced or we were not certain, we used bolts that have appeared on other late 1956 and early VIN 1957 Corvettes. We asked some NCRS judges and other knowledgeable 1957 Corvette owners to go over the chassis and engine while it was displayed at the NCRS Regional meet in Kissimmee, Florida. Although there

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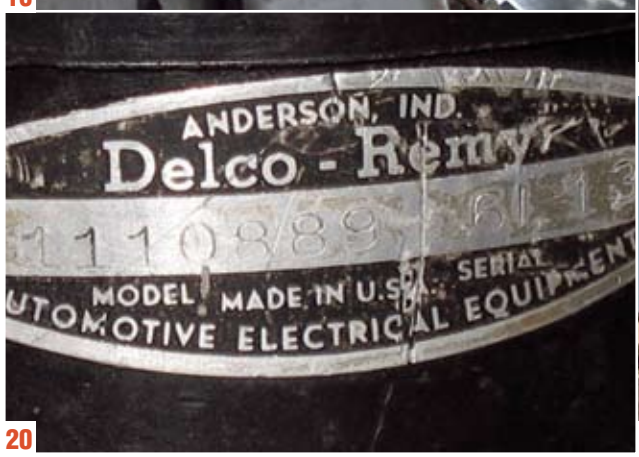

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18 The back of the plenum is stamped 1003, meaning this is only the third Rochester Ramjet F.I. model 7014360 assembled for the '57 production run. Mike Hunt documented that when Corvette #010 was sold by Ed Cole to the Chicago Chevrolet dealer that it was equipped with this unit.

19 The air meter assembly is stamped with its part number 7014361 and also 1007, which means it is the seventh air meter produced by Rochester products.

20 The Delco-Remy 1110889 ignition timer is a warranty replacement unit. It turns out that Delco-Remy had a broken or missing drill-bit with the original August through November 1956 units, resulting in no lower oil drain back hole. Oil was then forced through the shaft seal into the distributor cap, fouling the points. Our 1110889 is dated 6L13 for 1956, December 13th.

21 The Flint V-8 engine plant, located blocks away from the first Corvette Assembly Plant on Van Slyke Ave. where the 1953 Corvettes were assembled.

were many differences of opinions, in general, everyone was helpful in analyzing and brainstorming what the chassis and engine anomalies were trying to tell us fifty years after the fact! Again, the little things were bolt markings, the orientation of bolts, typical finishes and plating, etc."

Once all of the parts were collected and scrutinized, it was time to start the re-assembly in the same manner as was performed the first time, assembling the pilot vehicle at St. Louis in mid August 1956 and later installing the special fuel-injection V-8 in mid September at the Flint V-8 Dyno Lab. That specifically means that the process was as important as the parts used so that the correctly painted or bare spots would be evident on this engine as it would have been when it was first built by GM employees. This particular engine does have a few differences from a typical Flint-built small-block in that it was hand built, not assembled on a line, so the typical overspray or painted/non-painted areas don't necessarily apply with production-line engines. With Ken's help, we have followed in the footsteps of those who originally built the engine for this car, at least to the best of our knowledge. Follow along, and we'll show you some of the focal points of what it took to resurrect the famous First Fuelie. ■

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