Know The Code

Decoding all those casting symbols for your Corvette

BY JOHN HINCKLEY

Many Corvette enthusiasts eventually become interested in restoration of their cars – if not the "full body-off" variety, at least finding parts with the correct original configuration and dates that make sense with the car's final assembly date.

Although many parts were typically dated within two to six weeks ahead of the car's "birthday," NCRS judging guidelines generally allow a dating window of up to six months for full judging credit, recognizing that inventory controls were pretty lax in the '50s, '60s and '70s, and that "stuff happened" occasionally in the production system.

GM had a clearly defined protocol for identifying and dating castings produced in their foundries in those days, and that will be our focus. We'll also illustrate a situation where a previously undocumented change in the production system came to light as a result of unusual gaps in casting dates and unconventional methods of casting identification.

HOW CASTINGS WERE MADE: Without getting into a lot of gory detail, iron castings were made by packing foundry sand around a pattern, which defined the shape and outer surface of the casting, to create a sand mold, which was split horizontally into an upper and lower mold, and the pattern was removed, leaving the exterior shape it defined in the mold. If the casting was hollow and contained internal passages, like an intake manifold, cylinder head, or block, specially coated refractory sand "cores" that defined the shape of those internal cavities were precisely placed in the mold cavity before the mold was closed. The accuracy of placing those cores in the mold cavity was what determined what engine builders call the amount of "core shift" in a casting, which affected such things as the uniformity of cylinder-wall thicknesses.

After joining the upper and lower halves, molten iron was poured in through holes in the upper half of the mold, filling the cavity formed by the pattern and surrounding the cores placed in the cavity. After cooling, the mold was opened, exposing the raw casting, which then went on a "shake-out" table, where it was vibrated to shake loose the sand cores that had formed the internal passages for intake runners, block water jackets, etc., and to allow the core sand to exit the casting. This is the real reason for what are commonly called "freeze plug holes" in block castings. Those holes have nothing to do with freeze protection – they're to provide holes to get the core sand out of the raw casting on the shake-out table.

IDENTIFYING THE CASTINGS: GM identified most of their castings with four

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1 A typical casting number on a cylinder head, along with its date. E 23 7 denotes May 23, 1967.

2 The casting date of the water pump in the lead photo for this article. D 6 7 is April 6, 1967. That lead photo also shows the casting number and pattern number.

3 The "GM3" pattern number is visible below the casting number on this intake manifold; many identical patterns were required for high-volume castings, and each was numbered.

4 A typical casting clock, showing this casting was poured during the first hour of the shift. Note the "0" for the first hour.

cast-in pieces of information – the casting number, casting date, pattern number, and usually a "casting clock" on larger castings.

CASTING NUMBER: Each unique casting carried a raised "casting number," which related to a detailed Engineering drawing that defined its as-cast configuration. It was not uncommon to have one casting configuration end up as several different finished part numbers, depending on how it was machined. Cylinder heads machined for different valve sizes, exhaust manifolds machined with and without provisions for A.I.R. tube fittings, and engine blocks machined for either 2-bolt or 4-bolt main bearing caps are examples of single casting numbers that could end up with different finished part numbers due to machining differences.

CASTING DATE: Each casting carried a raised casting date code that showed the month, day, and year it was poured, usually in that format; for instance, a casting date of "C 18 6" decodes as March 18 of a year ending in 6. The first letter (for the month) ran from "A" for January to "L" for December. The single-character year number was used for all Saginaw castings used for small-block engines at Flint Engine, which was the exclusive supplier of small-block engines to the St. Louis Corvette plant. Similar small-block castings produced at the Tonawanda Foundry for use in non-Corvette small-block engines produced at the Tonawanda Engine Plant generally used a two-digit year code ("66" for 1966, for example). Most Tonawanda big-block castings used the single-digit year character, and many Tonawanda castings carried a raised "T" adjacent to the casting number.

The shape of the screw heads on the ends of the casting date tag indicated the shift during which the casting was poured. Two flat-head screws was the first shift, one flat- and one round-head screw was second shift, and two round-head screws was the very rare third shift.

PATTERN NUMBER: Remember the pattern we discussed earlier that was used to form the cavity in the sand mold? These patterns were either cast iron or stainless steel, and many identical patterns were required for high-volume castings. Each individual pattern carried its own identifying number for traceability reasons. If a problem surfaced later in a completed casting, the raised number identified the pattern that formed the mold the casting was poured in, so that pattern and other castings produced from it could be identified and checked for accuracy. Pattern numbers typically were in a format like "GM1," "GM2," "GM3," etc.

THE CASTING CLOCK: Typically found on larger castings like blocks and heads, the casting clock identified the hour of the shift during which that casting was poured. The location of the two dots on the clock indicated the start of a shift, and the "hand" on the clock pointed to the progressive hours during that shift. The shape of the screw head in the center of the pointer may have indicated the shift – a flat head for first shift, and a round head for second shift, although this has not been conclusively proven.

OTHER MARKINGS: Depending on the size of the casting and customer-requested features, other raised markings

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5 Another casting clock, using two pins for the first hour. Also note the day shift pointer and adjacent May 14, 1965 casting date.

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6 A set of casting number, pattern number, and casting date brass tags from the Saginaw Foundry. The characters were individually soldered to the tags


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7 The June 13, 1966 casting date that started my research project on the 3872783 intake manifold.

are sometimes also seen, such as "D" for day shift, "N" for night shift, "T" for third shift. Some also had conveyor tags like "CONV3," which indicated the number of the molding line conveyor where they were poured.

HOW WERE THOSE RAISED NUMBERS CREATED? Back to the "pattern" discussion again – each iron or stainless steel pattern had recesses in it to accept screwed-in, pinned, or soldered-on brass tags for each of the three or four types of identification we just reviewed. The tags were made by hand, with each brass number or letter individually soldered to the tag, and the tags were then attached to the iron or stainless steel pattern. Those raised characters on the pattern created an impression in the sand mold, which then became raised characters in the casting when it was poured. The casting number and pattern number tags were either soldered or pinned to the pattern, and the date tag was attached with #6-32 screws so it could be changed daily. The casting clock was made by hand with individual brass escutcheon pins, a hand, and a screw. In later years, the casting clock was a mechanical insert which was pneumatically changed.

WHEN CASTING DATES DIDN'T MAKE SENSE: When I bought my all-original drivetrain '67 327/300hp Corvette four years ago, I noted that its 3872783 intake manifold was dated F 13 6 (June 13, 1966), just two weeks short of a year prior to the engine assembly date of June 1, 1967 and the car's final assembly date of June 8, 1967. This put the intake manifold date well outside the six-month window for judging credit, and didn't make sense, as all the rest of the drivetrain (engine, transmission, and rear end) were original, dated within a week to a month prior to the car's build date, and the engine and transmission had their original VIN derivative stampings.

Thinking that the manifold had been replaced at some point, I began calling suppliers who specialized in used intake manifolds and had hundreds of them in stock. I asked specifically for a 783 intake dated between January and June, 1967 (to fit in the six-month window for judging credit). Not only did none of the suppliers have one, but they all said they had never seen a 783 intake dated later than July, 1966.

After posting an informal survey on the NCRS Technical Discussion Board at www.ncrs.org and getting a number of responses from owners of '67 327/300hp engines built during the 1967 calendar year that had intakes cast between February and July, 1966 (also well outside the window), it was time for a formal research effort. I began a wider survey on other Corvette on-line discussion boards I visit regularly, and Eric Mortimer, editor of the NCRS *Driveline*, which goes to all 15,000 members, published my formal request for survey information. Results showed that 89 percent of the survey responses showed 1967 calendar year-built cars with intakes cast between February and July, 1966, which indicated a possible "banking" situation, since the 783 intake was used only on Corvettes in 1967, and only 7,000 of those intakes were made (a miniscule number for a GM casting), and it was the last year that intake was used for any production application.

Additionally, 42 percent of the intakes in the survey had an oddball pattern number, "GM3T," instead of the usual GM1, GM2 and GM3 pattern numbers used by the Saginaw foundry, which never used a "T" suffix on production pattern numbers. Furthermore, all of the "GM3T" pattern-numbered intakes were cast between June 10 and July 2, 1966, and only nine percent of all the intakes in the survey data were cast in 1967, all on February 7.

Fellow Michigan NCRS member Mark Gorney, who has spent his entire GM career at the Saginaw Foundry (now called Saginaw Metal Casting Operations, GM Powertrain Division) was then enlisted to help analyze the survey results, and his research in the Saginaw archives disclosed that there indeed was a "banking" program for this casting in 1966 in order to produce a year's worth of them ahead of time so its low-volume tooling could be pulled out of foundry production in advance of modernizing the molding lines for a new, higher-volume casting process. The unique GM3T mold number apparently identified the manifolds to be diverted for banking in storage instead of being sent into the normal production flow to Flint Engine.

The data also showed that cars built between April, 1967 and the end of the model year in mid-July also used intakes cast as early as June, 1966, with a few using intakes cast on the same day in February, 1967; this was apparently a one-day "make-up" run to cover a predicted shortfall against the original usage prediction made almost a year earlier. Additionally, the typical spread between manifold casting dates and car build dates in the survey data squared precisely with some of the data points gathered by Noland Adams in his earlier survey of original 1967 cars shown on page 393 of his Volume II book.

The results of the formal survey and conclusions from the analysis of the data were published in the NCRS *Driveline*, and the 4th Edition of the NCRS 1967 Corvette Technical Information Manual & Judging Guide was revised to allow full judging credit for 3872783 intake manifolds showing casting dates outside of the traditional six-month window of acceptability.

SUMMARY: Other than engine-block pad stampings, casting numbers and dates are perhaps the most visible and easiest identification markings to decode, and thus carry a lot of weight in Corvette originality judging. With a few references, casting numbers and dates can provide an interesting historical timeline relative to how your car's chassis components flowed through the Chevrolet production system to St. Louis, as all GM iron castings carry that information externally. The anomaly described above for the dating and usage of the '67 327/300hp intake manifold, however, is a rare example that shows how "stuff happened" in the production system that only came to light as a result of research into an issue that didn't make sense. That's how we learn more about our cars, and how the judging guides are revised to reflect new information.

Information about what casting numbers are correct for your Corvette can be found in the NCRS Technical Information Manual & Judging Guide for your year car, available at the online store at www.ncrs.org. ■