The Pontiac Motor Division was an all-star in General Motors' starting lineup of auto manufacturers. Introduced in 1926 so that the Oakland Motor Division had a vehicle priced competitively with Chevrolet's, the Pontiac's popularity was such that in 1932 GM actually dropped the Oakland and renamed it "Pontiac Motor Division." Known for conservative styling and mechanical reliability, its aging inline 6- and 8-cylinder engines were losing out to the V8s introduced by competitors during the early-1950s. Brand excitement was renewed in 1955 with a simple and powerful V8 and it proved the first step in Pontiac positioning itself as GM's performance Division of the 1960s and 1970s.

Pontiac's Ram Air and H.O. engines developed during the muscle car era for its exciting GTOs and Firebirds were among the most competitive to come from the Detroit. A powerful V8 and youthful styling made it hip to drive a Pontiac and the Division maintained that reputation right up to that fateful day in the April 2009 when GM announced its was dropping the brand. Today's Pontiac hobby seems vehemently divided when discussing the Division's death. Loyalists hold firm that it occurred in December 2009 when the last new Pontiac was officially produced while purists argue that Pontiac ceased to exist after March 1981 when the last true Pontiac V8 was assembled and installed into a Pontiac vehicle.

No matter how you perceive Pontiac's discontinuance, there's no denying that vintage Pontiac V8 performance is alive and well. Achieving 600 streetable horsepower has never been easier for the average hobbyist and the wide array of high-performance aftermarket components available today gives buyers countless options to create an package ideal for. The 400 and 455 remain the most popular foundations for modern Pontiac builds, but the Division produced several different castings during the 1960s and 1970s. That begs the question, what should I look for when buying a block? We took that up with the professionals at Butler Performance and here's what they had to say.

Pontiac V8 History

To gain a better understanding of Pontiac's V8, let's step back to the early-1950s. Chevrolet was developing its 265-inch V8 for 1955, and since Pontiac was a wrung higher on the corporate ladder, corporate management decided that Pontiac needed to offer a similar level of technology to substantiate its higher cost. Pontiac began developing an all-new 287-inch V8 also slated for 1955. The block was beefy to maintain the reputation of reliability while also allowing future displacement increases without requiring major retooling. The cylinder head intake ports were siamesed for compact packaging and port volume was kept small to maintain velocity for snappy

throttle response and strong low-speed performance to enhance its feel during typical driving conditions on the street.

Beginning at 287 in 1955, displacement increased in each of the succeeding years. The basic architecture of the V8 remained, but total displacement grew to 316.6 ci for 1956 and then to 347 ci, 370 ci, and finally to 389 by 1959 where its 4.06-inch bore and 3.75-inch stoke-length stayed for the next several years. Available with two-barrel, four-barrel, and Tri-Power carburetion, a heavy-duty 389 with four-bolt main caps to increase bulkhead durability for Super Duty applications was also available through dealership Parts departments along with a host of other go-fast goodies.

To satisfy the need for the consumer demanding maximum engine output and to remain competitive with the growing engine sizes from other makes, Pontiac introduced its 421 ci in late 1961. The oversized block was created by taking the heavy-duty 389 and increasing the diameter of the cylinders to 4.09-inches. The main journal bore grew by 0.25-inch to accommodate the 3.25-inch dimeter main journals of the new crankshaft with a 4-inch long stroke.

The Super Duty 421 was Pontiac's most powerful offering for 1962 and 1963. It was factory-installed into a handful of Pontiacs in each of those model years where it was feared by competitors at every level before General Motors pulled the plug on factory-backed racing involvement in January 1963. The basic 421 became a regular production option in 1962 and the 421 H.O. with Tri-Power induction was Pontiac's hottest street engine.

Pontiac's 389 and 421 V8s were steadfastly popular and powerful. A small displacement 326-ci V8 was added in 1963 for Pontiac's compact Tempest model line. To proactively promote a safety-conscious image during the mid-1960s, General Motors prevented the use of multiple carburetors on all 1967 vehicles with the Corvette as the only exception. The decision marked the end of the line for Pontiac's highly-touted Tri-Power engines, and a single carburetor was forced to provide maximum engine performance.

Pontiac didn't sit back and take GM's directive lightly, however. To maintain its image as a performance leader, it increased the bore diameter of its 389- and 421-inch V8s by .030-inch, which boosted displacement to 400 and 428-inches, respectively. In the process, Pontiac improved cylinder head airflow by decreasing valve angle from 20 degrees to 14 and adding larger intake and exhaust valves. A new cast-iron intake manifold derived from the highly-successful single four-barrel that made the Super Duty 421

such a competitor on the NASCAR tracks was created and it was topped by Rochester's new wonder carburetor, the four-barrel Quadrajet. The net result were 1967 four-barrel engines capable of generating power equal to that of the Tri-Power engines from 1966, and the potential for so much more.

The basic 400 continued through the 1978 model year, and the 428 grew into the 455 for 1970 when .21-inch stroke length was added to its crankshaft. The 455 went away after 1976 and Pontiac went to work developing an entirely new small-displacement V8 whose total design was aimed at maximizing fuel economy. The 301 was developed during the mid-1970s and released in 1977 where it was installed into a number of Pontiacs and picked up by other Divisions as corporate power became commonplace. The 301 was left as Pontiac's only V8 for 1979 and it was joined by an even smaller 265 for 1980, before Pontiac V8 production ceased entirely in March 1981 after more than 14 million total V8s had produced over the years.

Pontiac 400 Block

The 400 was Pontiac's most popular V8 during the glory years and a number of different block castings were produced in that time. The wide array of casting numbers can be confusing but a brief overview that summarizes them is all that's needed to help you find a suitable candidate for your project.

The 9786133 400 block was introduced for 1967. The casting featured two-bolt main caps and was the basic foundation for all two- and four-barrel applications. Even Pontiac's highest performance V8—the 400 Ram Air—utilized the 9786133 casting for much of the 1967 model year before the four-bolt PN 9792506 casting took its place in approximately May 1967.

The 9792506 was carried over into 1968 for Ram Air applications while Pontiac created the 9790071 casting for two-bolt applications. By year's end, Pontiac determined that two separate block castings were unnecessary and it began drilling and tapping the 9790071 casting to accept four-bolt main caps as required for Ram Air applications. The 9790071 was carried over for 1969, also using the same practice of for attaining two- and four-bolt blocks.

The 1970 model year saw the introduction of yet another 400-inch casting. It differed in that it was equipped with all of the appropriate mounting bosses to fit the new-for-1970 Firebird chassis. Despite being drilled and tapped for four-bolt caps, Pontiac installed two-bolt caps on PN 9799914 for typical applications while a second casting, number 9799915 was limited to four-bolt Ram Air applications. The 9799915 was actually

created by grinding away the "4" of the 9799914 part number and hand-stamping a "5" into place. The need for Pontiac to require two identically-machined blocks remains unclear, and in rare instances we find where Pontiac used the 9799914 or 9799915 interchangeably.

The four-bolt 400 went away for 1971 and the new 481988 was equipped with two-bolt caps only. The casting went on virtually unmodified until mid-year 1975, when it was replaced by an entirely new 400. Like all manufacturers during the mid-1970s, Pontiac was seeking to improve its vehicles' fuel economy and shedding total weight was among the easiest ways. Virtually every component used to produce a vehicle went under the microscope to locate mass in non-critical areas—and the 400 was no exception.

Pontiac's engineers determined that removing material from the deck surface, cylinder walls, and main journal bulkheads would reduce weight while maintaining sufficient durability for the low-performance, smog-laden engines of the day. Other ancillary components like the crankshaft and harmonic balancer were also reviewed. The revised 400 block was ushered into production in approximately February 1975, and the new 500557 casting went on to become the foundation of every 400-inch application through 1977.

With economy and emissions the primary focus of all engineering development within General Motors, performance was deemphasized and Pontiac knew that its large 455 was being phased out. In the interest of providing performance-minded Firebird buyers with an up-level 400 boasting of additional output, Pontiac's engineers created the T/A 6.6 for 1977. Its 200 hp rating matched that of the outgoing 455 while it offering greater fuel economy in the process. A new camshaft and low-restriction exhaust system added 20 more horsepower for 1978, and the increase had a noticeable effect on vehicle acceleration.

Pontiac recognized that performance-starved enthusiasts buying Firebirds with T/A 6.6 engines would likely push them to the limits and modify them like hot-rodders of the era were accustomed to. To improve the T/A 6.6's durability, Pontiac resurrected the 481988 block casting for 1978 and so workers could immediately differentiate the 481988 block from the 500557 on the assembly line, Pontiac added a large "XX" in several locations. The 500557 remained the foundation for every other 1978 400, including the standard engine in the Trans Am while the XX481988 was limited to the T/A 6.6 only.

After producing about more than a million 400s since the 1967 model year, Pontiac's bread-and-butter engine was discontinued as the 1978 model year came to a close. It did, however, recognize the need for a high-performance V8 for special models of its 1979 Trans Am so the Division stockpiled and earmarked several thousand XX481988 blocks from the 1978 model year for use in 1979. That inventory was exhausted by May 1979 and the 400-powered Trans Am went away forever.

Pontiac 455 Block

As the overall size of General Motors' vehicles grew year over year during the late 1960s, so did the need for additional displacement to maintain sufficient acceleration. Pontiac's 421 had already gone to 428 with a bore diameter increase in 1967. That then grew to 455-ci for 1970 when a new crankshaft with a 4.21-inch stroke was introduced. The added stroke length simply increased to the copious amounts of low-speed torque the large-cube Pontiac was already notorious for, and with some simple bolt-ons in the following years, it made an excellent high performance engine too.

When the 455 was introduced for 1970, the basic 9799140 block was drilled and tapped for four-bolt main caps though most were fitted with two-bolt caps. The casting continued into 1971 before it was replaced by the 483677 for a short time, and then by the 485428 by midyear 1971. Functionally, these blocks are very much the same with only minor structural differences, and virtually all were drilled and tapped for four-bolt caps, though only the 1970 to 1972 455 H.O. engines were equipped with them.

The 485428 was replaced by the 500813 for 1975. Unlike the number-500557 400 block, which was lightened for improved economy, the 500813 455 was as robust as any earlier example. Unlike its predecessors, however, it was drilled and tapped for two-bolt caps only. It went on unchanged for 1976 and was quietly dropped at the end of that model year.

During the 455's run, Pontiac developed and created the Super Duty 455, which was a beefy mill designed for the rigors of continuous high RPM racing. The internals and bolt-on running gear was very different from standard fare, but the Super Duty 455 block was visually identical to the standard 455 block in physical measurement, but additional material was added to high-stress areas to increase durability. The 490132 was limited to the Super Duty 455 only, and all were fitted with four-bolt main caps.

Building a Pontiac V8

For years hobbyists and racers looking to build the largest and most powerful Pontiac V8 generally sought a 455 for the foundation because its standard-issue cast-Nodular iron crankshaft was equipped with the greatest amount of stroke length and the widest main journal diameter to accommodate it. You see, as Pontiac increased the stroke length of its cast crankshaft past 3.75-inch, it also increased the diameter of its main journal to ensure it retained sufficient (connecting rod and main) journal overlap to maintain planar strength and the stock 455 crank provided racers with displacement and durability.

For a time the 455 seemed a commodity and usable cores were quite valuable with asking prices of $1,500 or more not uncommon. Then affordable forged-steel crankshafts came along and it changed the game forever. Not only could hobbyists purchase a new forging in 455 dimensions, companies like Eagle Specialty Products began marketing long-stroke crankshafts with 3-inch main journal diameter to fit Pontiac's 400 too. The forging was strong enough that journal overlap could be reduced without compromising strength and hobbyists could take a typical 400 and transform it into a 467-inch fire-breathing Poncho with the single swipe of the credit card.

In modern times the 455 remains quite valuable, but not nearly as desirable as in the past. Hobbyists and racers are able to achieve equal amounts of power from a 400, whose availability is generally much greater and whose purchase price is generally several hundred dollars less than a similarly equipped 455. In fact, the 400 actually has a slight advantage over the 455 for maximum performance applications, because it's smaller diameter bearings offer less friction, and its smaller main journal bore leaves more material in the bulkhead.

With so many 400 and 455 blocks available, what should Car Craft readers search for when seeking a foundation for their big-cube Pontiac V8 build? We took the question to David Butler of Butler Performance in Leoma, Tennessee for his professional opinion. He advises, "With the exception of the mid-1970s 500557 casting, we consider all 1967-1978 Pontiac 400 blocks functionally identical. The 455 blocks from 1970 to 1976 are also functionally identical. Core shift can vary run to run, so we check every block casting individually before using it in any application, but we have found that no one 400 or 455 block is better than another."

Just how much horsepower a stock Pontiac 400 or 455 block can handle is a question that Butler has been asked countless times over the years, and he says it's without a straight answer. "In the 1990s before aftermarket Pontiac V8 blocks were available, we had to push the stock

Pontiac blocks a lot further than we do today. Many of them lived successfully at 1,000 hp or more back then, but there were a lot of failures too. Generally speaking in today's hobby, we start recommending an aftermarket block when horsepower surpasses the 700 hp mark. A stock block can certainly live beyond that, but the resources and prep required to do so make an aftermarket block a cost effective option at that point."

Typical preparation of a stock Pontiac block at Butler Performance is very straight forward. The casting is thoroughly cleaned and subjected to a magnetic particle inspection process to verify that it's crack free. The cylinder walls are sonic-tested to ensure a minimum wall thickness of .125-inch, but the minimum amount can vary with application. Once the block is deemed usable, ARP main studs are added and it's line honed, and the cylinders are then bored and honed with a torque plate installed. The deck surface is machined, all threads are chased with a tap, and the block is manually deburred of any casting flash.

Adds David, "All of our factory blocks are prepared similarly. The factory fasteners are pretty durable, but even the newest ones are pushing 40 years old. Part of our standard block preparation is to install ARP main studs prior to line-honing. Depending upon the application, we may also have to install lifter-bore bracing for radical camshafts. We also deburr the oil galleys and restrict oil feeds where necessary too."

Pontiac's stoutest 400 and 455s were factory-equipped with four-bolt main caps on the center three journals and we asked Butler for his opinion of them. "Pontiac's cast four-bolt caps were marginally stronger than their two-bolt units, but we don't recommend paying any more for a 400 or 455 simply because it was originally equipped with them. We prefer aftermarket billet caps over the factory caps because they definitely increase block rigidity. We recommend them when horsepower reaches 600 and feel they're required when horsepower reaches 650."

Pouring high-resin filler into the water jacket of a stock Pontiac block is a popular racer's trick that can increase bottom end rigidity. It can, however, have adverse side effects on the street. "Our recommendation when filling a block is very application dependent. We tend to recommend it only when horsepower approaches 750 hp. It helps reduce the amount of side-loading the cylinder walls see in long-rod applications, and we feel it's especially important when stepping up to an aftermarket crankshaft with 4.5-inch stroke. While our testing has shown no real issue with coolant temperature, the lack of coolant around the water jacket can cause oil temperature to climb during extended street use, and that can lead to bearing issues."

So what about hobbyists owning the mid-1970s 500557 block? What can it be used for? Assuming a given casting is in excellent reusable condition, the 500557 can be prepped similarly to any other 400 and should be quite suitable for a standard-type 400-inch rebuild, and even a bit more. "We feel the real key in successfully using a 500557 block is keeping peak horsepower to a moderate level and RPM down. We recommend limiting horsepower to about 450 and prefer keeping stroke length at a maximum of 4-inches with a 6.7-inch long connecting rod when possible."

We spoke of aftermarket Pontiac V8 blocks, and there are presently two companies producing them in cast iron and cast aluminum. Both are beefier than any stock Pontiac casting and will tolerate much larger bore and stroke combinations to achieve a total displacement of 541 or slightly more. The IA-II block from AllPontiac.com is available in cast-iron or -aluminum and Kauffman Racing Equipment sells its MR1 in cast-iron or -aluminum. Pricing for a cast-iron block from either company starts around $3,000 and many options are available. We briefly mention them here should your project take you in that direction, but they're an unneeded expense if the goal is less than 700 hp.

Conclusion

Around 40 years has passed since Pontiac assembled its last 400 and 455s. While the 455's are somewhat tough to find, 400s seemingly remain plentiful and the advent of affordable, long-stroke crankshaft kits has opened for the door to an entire generation of Pontiac hobbyists. Whether you're building a 350 hp daily-driver street engine or a 700 hp bracket engine, finding a 400 or 455 is as easy as verifying a casting number and negotiating a price that's livable for both buyer and seller. And being better educated on block choices should leave more green in your wallet for the cylinder heads and camshaft needed to achieve your performance goals!

9786133- 1967 two-bolt
9792506- 1967 and 1968 four-bolt
9790071- 1968 and 1969 two- and four-bolt
9799914- 1970 two-bolt
9799915- 1970 four-bolt
481988- 1971 to mid-1975 four-bolt
500557- mid-1975 to 1978
XX4881988 1978 T/A 6.6 (carried over for 1979 Trans Am)

9799140- 1970 to early 1971
483677- early to mid-1971

485428- mid 1971 to 1974
490132- 1973-1974 Super Duty 455
500813- 1975-1976