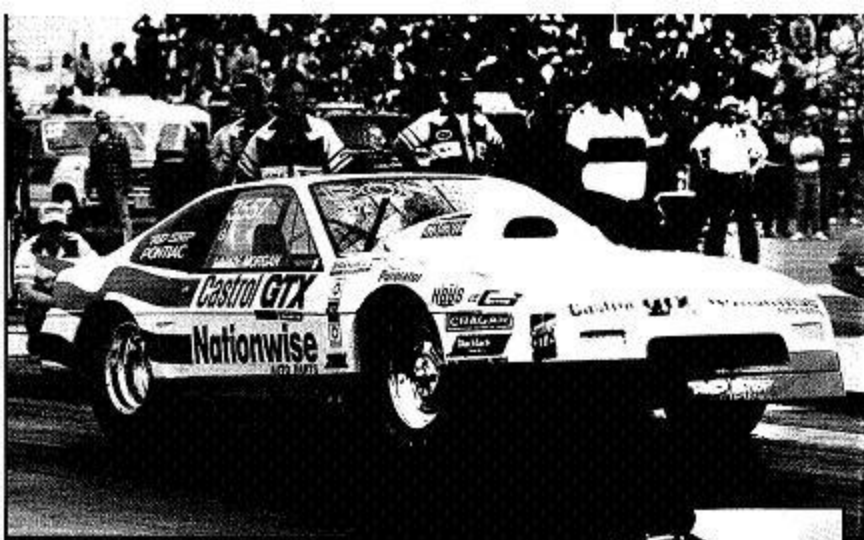


The Winningest 4-Cylinder Engines in America

By John Beechtel



Pontiac premier 4-cylinder drag racing entry is the Rod Shop's Q/A Fiero driven by Larry Morgan. It has already won two national events in NHRA's Competition Eliminator.

2.5 Pontiac

Pontiac's 151-cubic-inch 92-hp 4-cylinder production engine began in 1978 as the "Iron Duke." It was offered as the base engine in Pontiac Astras, Sunbirds, and other GM compacts like the Chevrolet Monza, Buick Skyhawk, and the Oldsmobile Starfire. Since then its application has been expanded to include base engine duty in late-model Camaros, Firebirds, Fieros, Grand Ams, S-10 pickup trucks, and even some non-GM applications like the Jeep Cherokee. Over the past several years it has been updated with a roller camshaft, electronic throttle body fuel-injection, and electronic engine management that earned it a new name: the Tech IV. In an age of overhead cam, four-valve-per-cylinder, high-tech powerplants, it is something of a throwback, but it has also proven its worth as a reliable, inexpensive engine with enormous hot rodding potential.

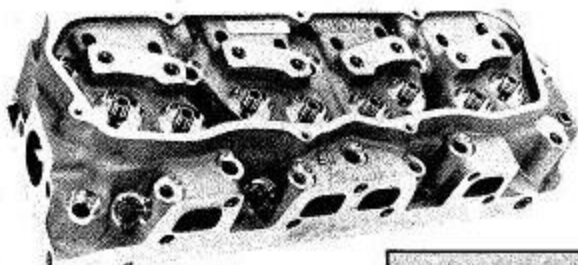
Most rodders still mistake Pontiac's 4-cylinder engine for the old 153-cubic-inch Chevy II engine that was last of-



The Charlotte/Daytona Dash series is a runaway Pontiac show with Super Duty engines powering more than 80 percent of the entries and Pontiac Sunbirds winning the championship three years running.

ford in 1970. There are similarities, but it is a completely different engine with no crossover parts. The old Chevy II engine was, in fact, a 230 cubic-inch straight six with two cylinders tipped off. It was a small bore, medium-stroke engine (3.075 x 3.25-inch). The Pontiac Iron Duke and subsequent Tech IV are large bore, short-stroke engines (4.00 x 3.00-inch) with much longer connecting rods. Early Iron Duke passenger car engines did not have a crossflow cylinder head, and they're not worth considering for performance applications. Crossflow heads were adopted in 1980, but they have virtually no performance potential compared to readily available Super Duty performance cylinder heads. The Iron Duke was designed to yield maximum fuel efficiency from an inexpensive, easy-to-produce powerplant, hence its major components are lightweight and not at all suited to high-performance applications. That's where Pontiac's remarkably complete performance parts program comes in.

Pontiac has hot rodded the Iron Duke/Tech IV to a point where it now ranks as one of the most potent and successful 4-cylinder performance en-



The Super Duty aluminum head features stellite valve seats to prevent seat recession due to unleaded fuel. Bronze valve guides are standard and heads will accept 1.94-inch to 2.08-inch intake valves and 1.600-inch to 1.625-inch exhaust valves.

gines produced in America. Super Duty engines, as they are properly called, have made a name for themselves in everything from championship IMSA GTP racing to powerboat racing, where a Super Duty Fiero engine powers the current American Powerboat Association national champion. In little more than three years since the program began, Pontiac Motorsports technical department, under the direction of manager John Callies, has advanced the Super Duty engine into the limelight in every racing series imaginable. No piece on the engine was left unexamined in their quest to make the Super Duty Pontiac the premier 4-cylinder performance powerplant, and Pontiac's enviable success record over the past few years speaks well of their efforts.

Super Duty engines virtually own the Charlotte/Daytona Dash series, where 36 out of 46 entries at this year's Daytona opener were Pontiac-powered. Pontiac has captured the championship three years running and advanced the series from dull, 120-mph foreign cars to sharp-looking, 160-mph domestic sedans with plenty of exciting racing. Three-time champion Mike Swaim ran 170-plus-mph laps at Daytona this year with a carbureted 2.5-liter 4-cylinder engine powering his Sunbird.

Super Duty engines are fast becoming the hot setup for Midget racing, where highly stressed, handmade Volkswagen derivatives and tiny Ford Cosworths are finding the upstart Pontiac more than capable. Another tremendous accomplishment has come in IMSA GT racing, where Pontiac Fieros have single-handedly been responsible for breaking the foreign domination of the GTU division. Super Duty-powered Fieros are now the most feared competitors in a field full of Mazda and Toyota-powered entries. The Mr. Goodwrench GTU Fiero prepared by Huffaker Engineering has set new records at virtually every race, and has a strong lock on the pole position. The GTU field now races for second place and hopes the Fiero will break. Stepping up

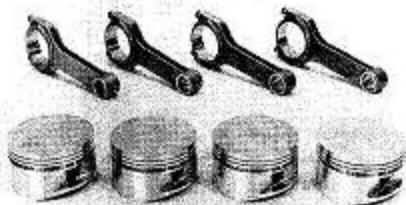
Pontiac Super Duty Engine Sizes

2.0L	122-cid	2,500 stroke
2.5L	151-cid	3,000 stroke
2.7L	165-cid	3,250 stroke
3.0L	182-cid	3,525 stroke
3.3L	198-cid	3,937.5 stroke

a few classes to the GTP Camel Light category, Pontiac's new GTP Light Fiero has sat on the pole in its first five races, set new track records, and won the last two races convincingly. It is powered by a 3.0-liter Super Duty engine rated at 330 hp. IMSA racing has also seen a competitive Pontiac entry in the Champion Spark Plug Challenge series for front-wheel-drive sedans with Joe Varde at the wheel of the Vanderley Engineering Pontiac Grand Am.

The Super Duty engine has successfully invaded a variety of dirt track categories and is coming on very strong in drag racing, where the Nationwide/Castrol Fiero driven by Larry Morgan has already won two national events in NHRA's Competition Eliminator. The Super Duty-powered, 1850-pound Fiero is capable of running 9.70 e.t.'s at more than 135 mph. This equates to 376 horsepower, which is possible only because of the existence of a solid performance parts program.

Stock engines are plentiful in the scrap yards, but their suitability for serious performance modifications is limited. Pontiac's Super Duty engine system is virtually bulletproof and there-

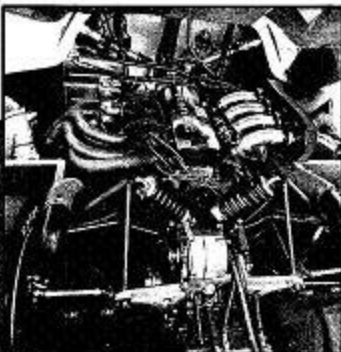


Cosworth rods and pistons seem exotic, but in reality they are the best choice. They are lighter and stronger than the previously recommended GM connecting rods and aftermarket pistons. They come in serialized, matched sets that are pre-balanced and machined to fit. All you do is wash them and install them.

fore much more desirable from a true performance standpoint.

The 4-cylinder Iron Duke/Tech IV engine that comes in your new Fiero or Firebird is not a performance engine, and its performance potential is severely limited by the strength of its internal components. The lightweight crankshaft becomes structurally unstable above 5000 rpm and may fail under repeated abuse. Fragile connecting rods and pistons designed for low-speed operation are also prone to failure at high engine speeds, and the stock cylinder block doesn't have the rigidity or strength to withstand substantial power increases. Nevertheless, some enthusiasts will no doubt want to upgrade the performance of their stock engines. You can approach our target of 180 hp with a normally aspirated, modified engine, but its durability at this power level is questionable.

Hence, there are two basic methods of hopping up your Pontiac 4-cylinder: one involves the use of selected bolt-



Pontiac's most sophisticated 4-cylinder entry is this IMSA GTP Camel Light Fiero powered by a 330-hp, 3.0L Super Duty engine. The car sat on the pole in every race it entered this year and has already won two races in less than three weeks.

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140-HP STOCK BLOCK ENGINE HOP-UP

2.5L, 151-cid, 9.5:1 CR

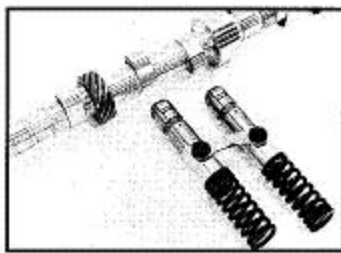
Part No.	Part	Manufacturer
10031322	Cast-iron Head (without EGR)	Pontiac
10031323	Cast-iron Head (with EGR)	Pontiac
2982	4-V Manifold	Edelbrock
272-4-B	Camshaft	Ultradyn
282-4R-8	Camshaft	Ultradyn (flat tappet, 1984-'85 models)
		Ultradyn (1986 roller lift model)
Spec'd	PROM Chip	Systems 3



on parts to upgrade the stock engine to a more reasonable 140-hp range; the other is based on the construction of a complete Super Duty engine that will put you over 200 hp.

A few performance parts are available for those who wish to modify their existing engines. This year Holley Carburetor developed a performance package consisting of a new aluminum intake manifold, a larger fuel-injection throttle body, and a performance air cleaner. Combined with a Hooker header, this package would jump the stock engine up to the 110-hp range. Holley is now studying the possibility of offering a completely assembled cast-iron Super Duty cylinder head to complement the manifold and throttle body package. This system would require a calibration change made with a new computer chip (PROM) that will be available from Systems 3 (8144 Corri-son, Grand Ledge, MI 48837, 517/626-2325). Systems 3 has also expressed interest in supplying the header for this combination, all of which should become available in the latter part of '86.

As part of their research effort, Pontiac Motorsports assembled a similar setup with a camshaft change that put a stock-block engine into the 140-hp range. It used the cast-iron Super Duty head with heavy-duty valvesprings, the throttle body injector on a modified Super Duty 4-barrel aluminum intake manifold, a header, and an Ultradyn hy-



Ultradyn roller cam is compatible with '86 production roller lifters. The 205-horsepower version uses a more powerful grind with Isky roller lifters and Crane rev kit springs.

draulic roller camshaft compatible with the '86 production roller lifters. Systems 3 has a chip calibrated for this setup and Ultradyn has a mechanical camshaft with similar specs for 1984-'85 engines (see chart). These modifications will make your stock 2.5-liter 4-cylinder competitive with the 2.8-liter V6 found in the Fiero GT, Firebirds, and S-10 pickups, but you should run a rev limiter set to 5000 rpm.

For really serious street rod or street machine projects, a Super Duty engine—as recommended in the accompanying engine buildup chart—is the way to go. The performance gain is substantial and the reliability of the components is beyond question. This approach is expensive, but not as much as you might expect, since you're only buying four cylinders' worth of parts. In any performance application using a V8, you would still be paying for a block and a crank, eight rods and pistons, two cylinder heads, and assorted performance components. The Super Duty block, crank, and aluminum cylinder head are reasonably priced and offer premium results. Using the same basic 230-hp components that powered Pontiac's record-setting 145-mph Indy Pace Car Fiero, this Super Duty engine buildup will yield a bulletproof, normally aspirated 205 horsepower (195 ft.-lbs. of torque) that will easily stand up to additional power augmentation systems like nitrous oxide. With a basic nitrous kit you could have a reliable 350-hp 4-cylinder Fiero,

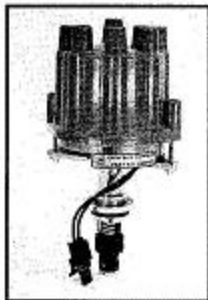
Mr. Goodwrench's Huffaker-prepared Fiero is probably the winningest 4-cylinder-powered car in road racing. It has established a dominant position in IMSA's GTU division where it competes with a 2.7L Super Duty engine. The car has won more than 50 percent of the races it entered.



Latest Super Duty aluminum cylinder head features raised and revised ports. From bottom to top: current SD aluminum head (a very good piece for street use), second-generation prototype head with raised ports and raised rocker cover rails that make the head look thicker, and finally the soon-to-be-released revised version, which features center ports moved closer together for a straighter shot at the valve. This head will require a new intake manifold.

Firebird, or street rod.

If you look into it further, you'll find that Pontiac has the most extensive 4-cylinder parts program available. And Pontiac is very good about working with aftermarket manufacturers to ensure compatibility of parts. Hence, the Super Duty engine has much broader coverage in terms of aftermarket performance parts. At stock displacement, the Super Duty engine is already the largest 4-cylinder available and stroke lengths are available to permit the construction of engines as large as 198 cubic inches. Pontiac's Super Duty engine has become the 4-cylinder equivalent of the small-block Chevy. Every component is available in heavy-duty form, and they're all race-proven. With the formidable success record established by Super Duty engines, you can be assured of a winning combination for your 4-cylinder-powered hot rod.



Pontiac's high-performance distributor for the Super Duty engine is set up with proper advance curve for racing applications.

Street applications will use the electronically managed stock distributor, with special aftermarket PROM chip calibrating the shots. It must be augmented by the special SD amplifier.

2.5 PONTIAC

205-HP SUPER DUTY ENGINE PARTS GUIDE

2.7L, 165-cid, 9.5:1 CR

Part No.	Part	Manufacturer
10027633	Cylinder Block	Pontiac
10027779	Crankshaft	Pontiac
10038433	Cylinder Head	Pontiac
10031399	Intake Valve	Pontiac
10031325	Exhaust Valve	Pontiac
10031329	Engine Build Pkg	Pontiac
10038952	Head Gasket	Pontiac
10038470	Intake Manifold	Pontiac
10039904	Intake Gasket	Pontiac
10031327	SD Rocker Cover	Pontiac
1007770	Rocker Cover Gasket	Pontiac
10037884	Cam & Crank Gear	Pontiac
10004073	SD Water Pump	Pontiac
10031329	SD Oil Pump	Pontiac
10004031	Flywheel	Pontiac
10039434	Clutch Cover	Pontiac
FA0885/1	Piston	Cosworth
23-3056	Connecting Rod	Cosworth
R-9771	Ring Set	Speed Pro
4703	Header	Hooker
91184	Oil Pan Gasket	Fel-Pro
2704	Race Gasket Set	Fel-Pro
RMS-17	Main Cap Studs	ARP
RHS-35	Head Studs	ARP
37710	Cam Gear Rat. Pin	Moroso
SD4	Shaft Rocker System	Jesal
203HG	Pushrod	Isky
288-HR10	Camshaft	Ultradyn
1241XL	Roller Lifter	Isky
88864-5	Flex Kit Springs	Crane
3739	Throttle Body Unit	Holley
Special	FRDM Chip	Systems 3



Super Street Fiero fitted with a normally aspirated, 205-hp, 2.7-liter (165-cid) Super Duty engine runs mid-14's at close to 100 mph with a top speed of 133 mph.



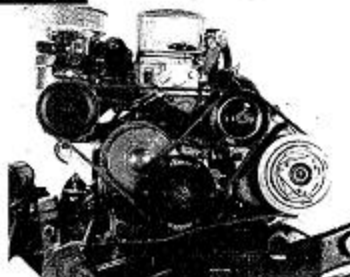
Super Duty aluminum 4-barrel intake manifold was designed to accept a Holley carburetor. It requires modification, as shown here, to accept the factory throttle body injection unit.

SUPER STREET FIERO PERFORMANCE TEST RESULTS

0 to 60	6.2 seconds
0 to 100	15.6 seconds
Quarter-mile	14.8 @ 96 mph
Top Speed	133 mph
Braking, 70 to 0	135 feet
Lateral Acceleration	.82g
Rated Horsepower	205 @ 6500 rpm



Basic components of the 205-hp Super Duty street engine include Pontiac's own Super Duty cylinder block, forged crankshaft, and aluminum cylinder head. Dedicated aftermarket components like Cosworth pistons and rods, Ultradyn camshaft, and Jesal shaft rocker arm system make it possible to build normally aspirated Super Duty engines with enormous power potential.



Front view shows all standard equipment in place, including air conditioning compressor, water pump pulley, and alternator drive. Note Moroso water manifold attached at front of head and Fischer Dynamics friction balancer installed on crankshaft snout.



Side view shows performance exhaust header and Super Duty aluminum valve cover with breather.

WHERE TO GET MORE INFORMATION

1. PONTIAC PERFORMANCE PLUS, the official performance handbook from Pontiac Motorsports. This 146-page manual contains a complete step-by-step guide to Super Duty engine assembly, plus full sections on Super Duty applications and features on various Super Duty-powered race cars. It is available for \$6.70 from Pontiac Performance Plus, publication No. 85-PPP-1, P.O. Box 07130, Detroit, MI 48207.
2. PONTIAC WINNER'S CIRCLE, the official monthly newsletter from Pontiac Motorsports. A six-page monthly report on Pontiac motorsports activities, up-to-date race results, new performance product information, and detailed explanations of recommended procedures for using Super Duty components. Available for \$12 per year from Pontiac Winner's Circle, P.O. Box 3213, Ontario, CA 91761.
3. GRIFFIN MOTOR COMPANY, a one-stop shopping center for Super Duty engine parts. All Super Duty parts are available at 10-percent over dealer cost with quick delivery. Griffin Motor Co., 2500 Roosevelt Blvd., Monroe, NC 28110.
Out of state (800) 438-3026
North Carolina ... (800) 672-2910
Local Number ... (704) 283-8594

SUPER DUTY ENGINE BUILDERS

Vanderley Engineering
316 Faenville Dr.
Blacks, MS 39631
(601) 435-1582

Huffaker Engineering
Seers Point Raceway
Hwy. 37 & 121
Sonoma, CA 95476
(707) 763-8842/7141

Shaver Specialties
20908 Earl St.
Torrance, CA 90503
(800) 624-8557

Cosworth Engineering
23205 Early Ave.
Torrance, CA 90605
(213) 534-1380

Falcon Racing Engines
109 Smith Lane
Archdale, NC 27263
(919) 434-3806