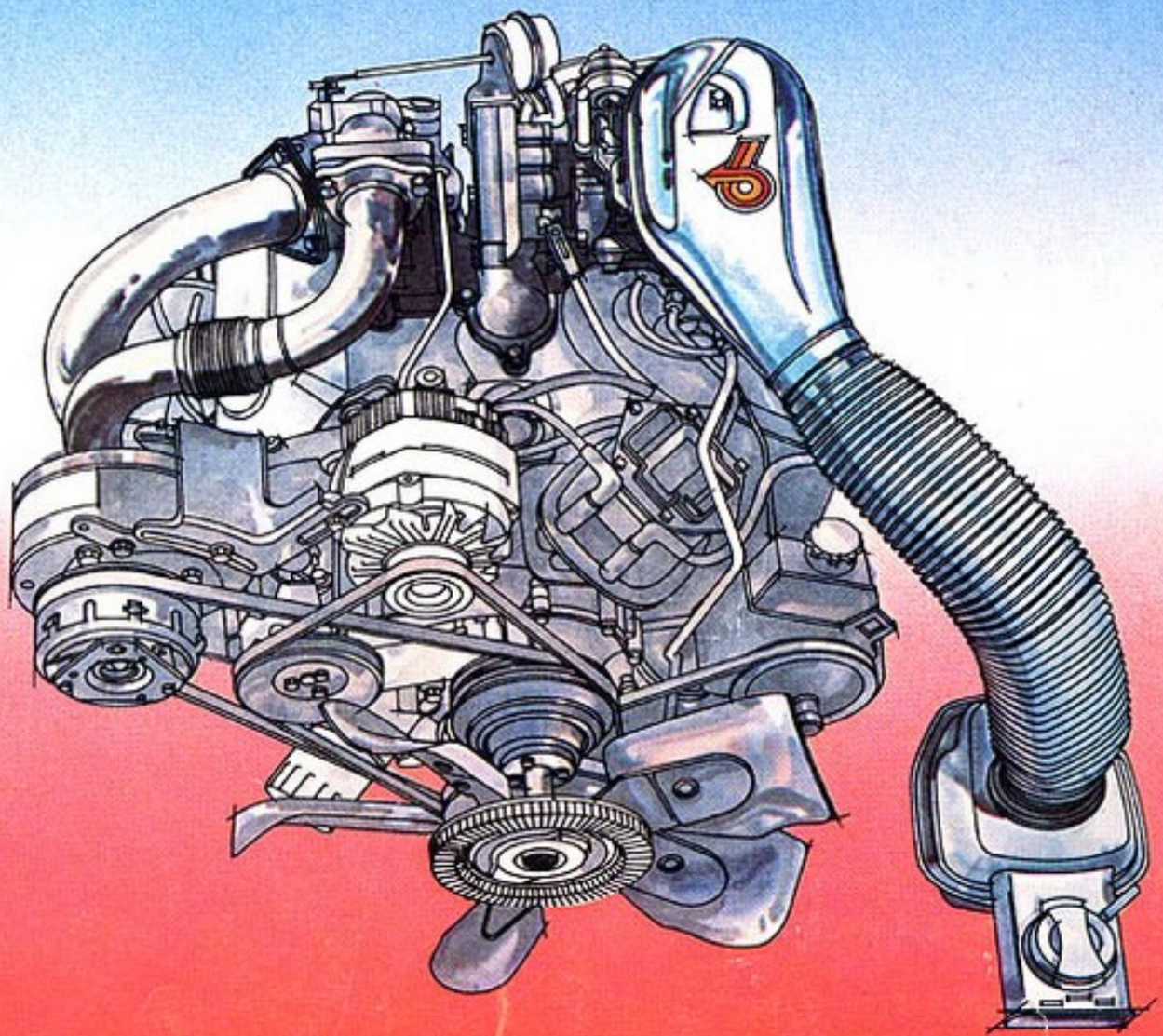
Turbocharging: A shot of adrenaline for the V-6.



Exotic power for two T TYPEs.

The Riviera T TYPE and Regal T TYPE feature the turbocharged V-6 offered by Buick. It's an engine that's been a part of selected Buicks since 1978, and judging by the way the rest of the automotive world is bringing out turbo models of its own, there must be something to it.

There is. This exotic powerplant uses an exhaust-driven impeller to force extra fuel/air mixture into the engine at higher engine rpm. The result is like a shot of adrenaline. Smoothly, powerfully, the engine develops significantly more horsepower than its naturally aspirated counterpart; 180 of them at 4,000 rpm, in fact.

By comparison, the 3.8 liter cubic-inch turbocharged V-6 develops 64% more horsepower than its non-turbo 3.8 liter brother; 44% more horsepower than the larger 4.1 liter V-6, and 29% more horsepower than a 5.0 liter V-8. The chart on page 5 gives you a dramatic comparison.

Yet, in normal driving, without calling for the turbo boost, this 3.8 liter V-6 behaves like a normal engine.

The concept of turbocharging is by no means new; it is a regular fixture on most Indy 500 engines. Turbocharging has been used for years in aircraft, unlimited class hydroplanes, and even for the more prosaic task of increasing efficiency in diesel-engine trucks.

Turbocharging differs significantly from mechanical supercharging. The latter is driven from belts or gears on the engine, while turbocharging uses the natural heat and force of the engine exhaust to do its work.

In fact, the secret to success is the way Buick engineers have maintained a high degree of exhaust heat conversion efficiency to spin the turbo's impeller. Part of this high efficiency comes from lightweight stainless steel exhaust manifolds. They take less heat out of the exhaust, saving this energy for the turbo.

Since Buick began offering the turbocharged V-6 in its 1978 production cars, engineers have refined the unit.

In 1979, Buick introduced "hotter" spark plugs to its turbocharged V-6 engines and narrowed the gap to make them less susceptible to fouling. Another improvement was the introduction of "free breathing" cylinder heads.

In 1980, an aluminum intake manifold was added along with a recalibrated thermal vacuum valve to the choke for improved cold starts and driveability. This same year, an early version of Computer Command Control was added. For the first time in the turbocharged V-6, electronics were used to carefully monitor engine performance and emissions.

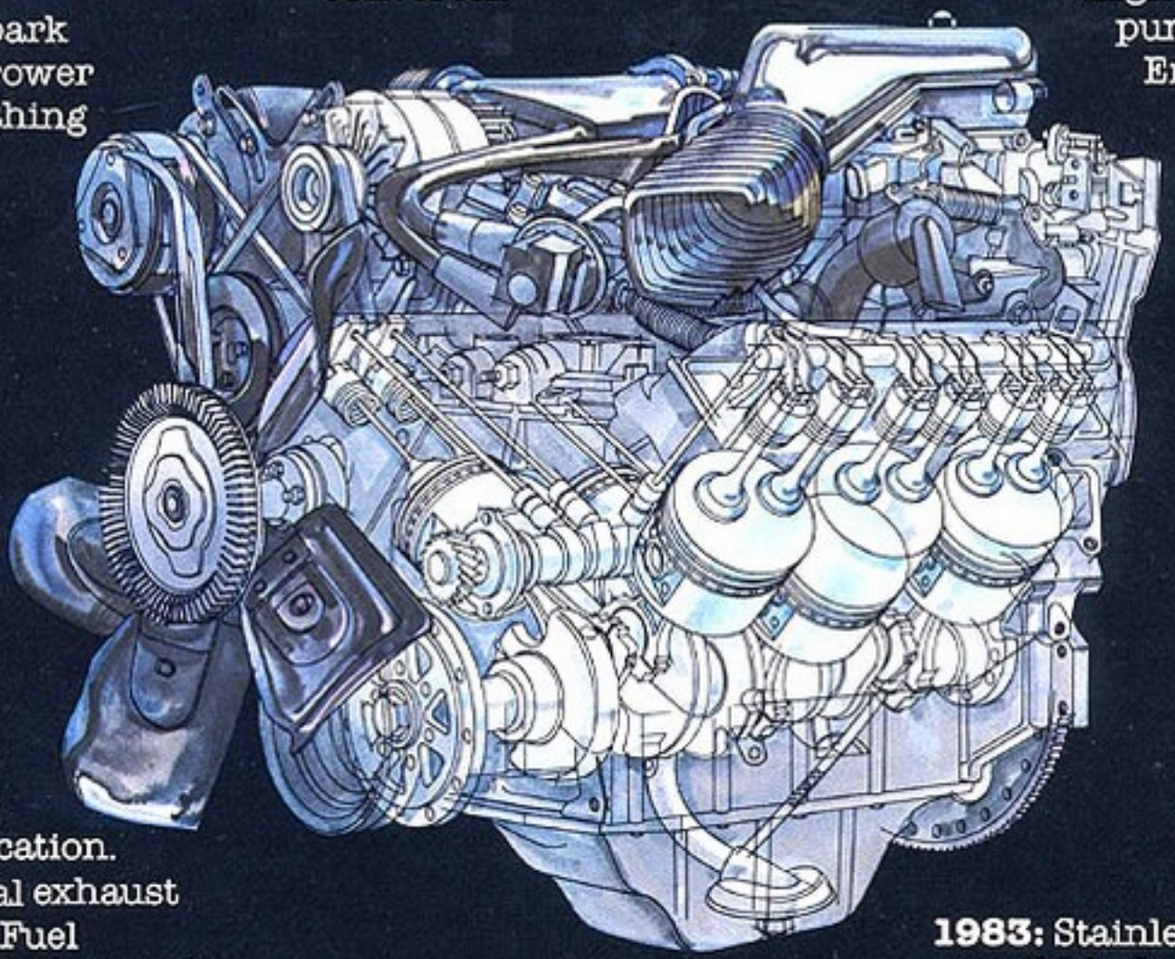
1981's changes, which included electric Early Fuel Evaporation, an available dual exhaust system to lower backpressure, and a high-performance 3.08 axle ratio, improved the driveability and performance. A higher pressure oil pump improved lubrication. Emission control progressed with air gap exhaust pipes and a simplified evaporative control system. The electronics were revised to incorporate Signal

Inside the Turbocharged V-6. How it's been improved.

1980: Aluminum intake manifold. Thermal vacuum valve. Computer Command Control. Dual bed catalytic converter.

1981: Electric Early Fuel Evaporative system added. High-pressure oil pump. Signal Noise Enhancement Filter.

1979: Hotter spark plugs with narrower gaps. Free-breathing cylinder heads.



1982: Exhaust-heated plenum. Improved lubrication. 5-qt. oil pan. Dual exhaust standard. Early Fuel Evaporation now electronically-controlled. Normally closed waste gate. Revised turbine housing.

1983: Stainless steel exhaust manifolds. Lower restriction exhaust crossover.

Noise Enhancement Filter (SNEF). It makes detonation detection more precise. A converter clutch in the automatic transmission locks up the torque converter at higher speeds, eliminating slippage.

In 1982, Buick engineers redesigned the turbocharger, reducing the size of the exhaust gas passage, increasing exhaust gas speed, and generating higher turbo rpm. The result was to get even more fuel/air mixture into the engine than before. They also increased the size of the exhaust system to get exhaust gasses out faster. The combination permitted the increase in power. By 1982, the turbocharged V-6 was rated at 170 hp.

The engine also got a new camshaft, valve springs and valve spring dampers to permit the higher engine rpm. Even the intake plenum chamber and intake manifold were revised to aid performance and give better control over the Exhaust Gas Recirculation (EGR) system.

There were improvements to aid cold-engine warmup, and additional control by the sophisticated on-board electronics over spark and detonation. The oil pan contained five quarts instead of four; there were additional lubricating improvements which extended the oil change interval to 7,500 miles, the same as for other Buicks.

There were other, non-engine changes which helped improve Riviera and Regal performance, too. A new torque converter, with a higher stall speed, permitted faster turbocharger response. The automatic's converter clutch was computer-controlled. The result: improved performance at wide open throttle, and improved economy during cruising.

All 1982 turbo engines were 100% inspected before they were installed. And each turbocharged Regal and Riviera was road tested for performance.

1983 turbocharged engines, now rated 180 hp, have been given the following tweaks to improve performance. You'll notice that the turbocharger has a new finned housing to help keep its bearings cooler. A new, lower restriction exhaust crossover along with tubular exhaust manifolds are made from stainless steel.

This construction, along with a new stainless steel exhaust sealing ring, helps improve durability.

A revised Early Fuel Evaporation (EFE) grid in a revised intake manifold on Riviera T TYPE contacts more fuel/air mixture for more thorough vaporization during warmup.

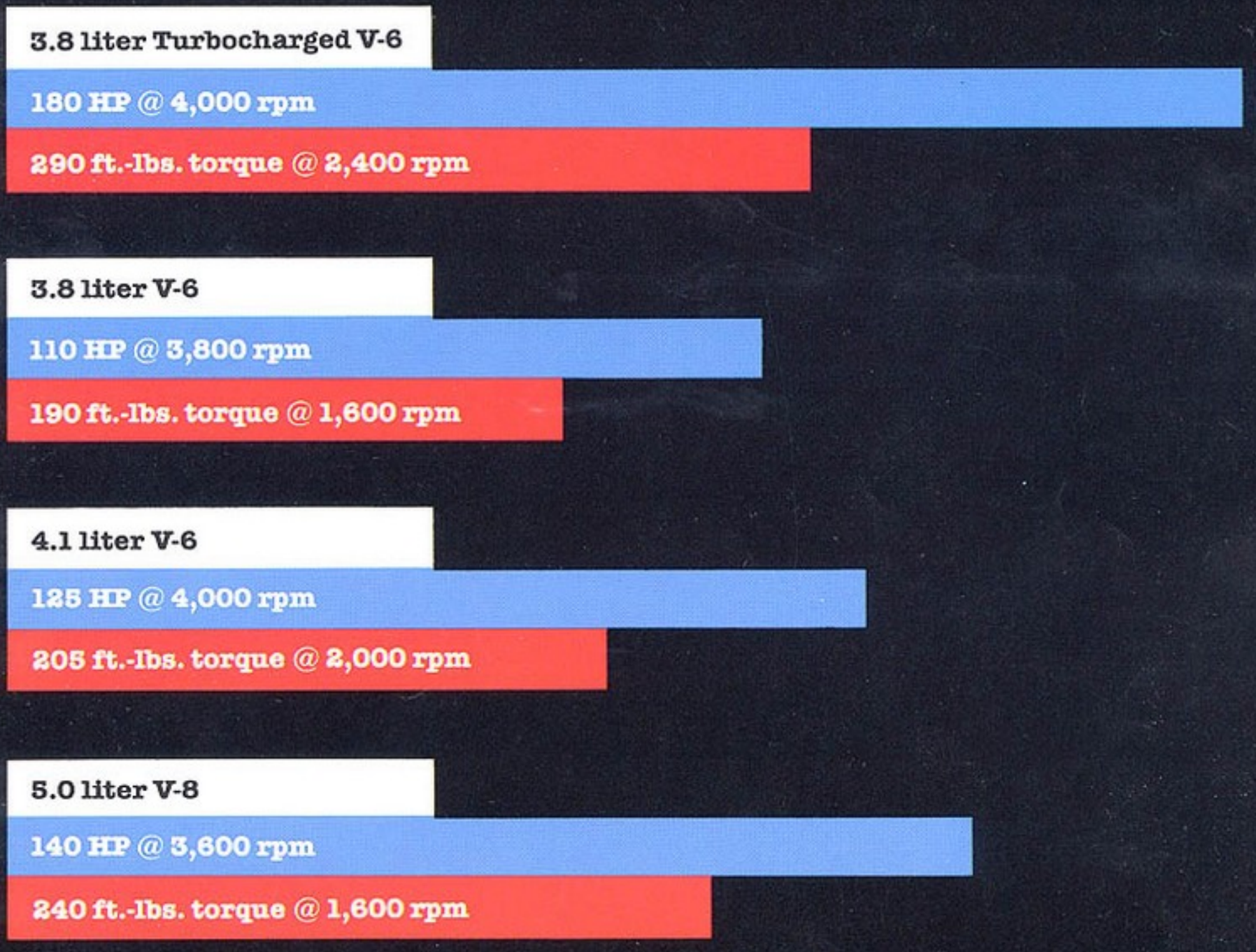
1983 Regal T TYPEs will have a new 3.42 axle ratio for better acceleration and, for the first time, an automatic transmission with overdrive.

A piezo element replaces the accelerometer as a knock sensor, and generates a better signal to the electronic spark control system.

The exotic turbocharged Riviera T TYPE and Regal T TYPE. Outstanding, yet socially responsible, performance. And they're a ball to drive.

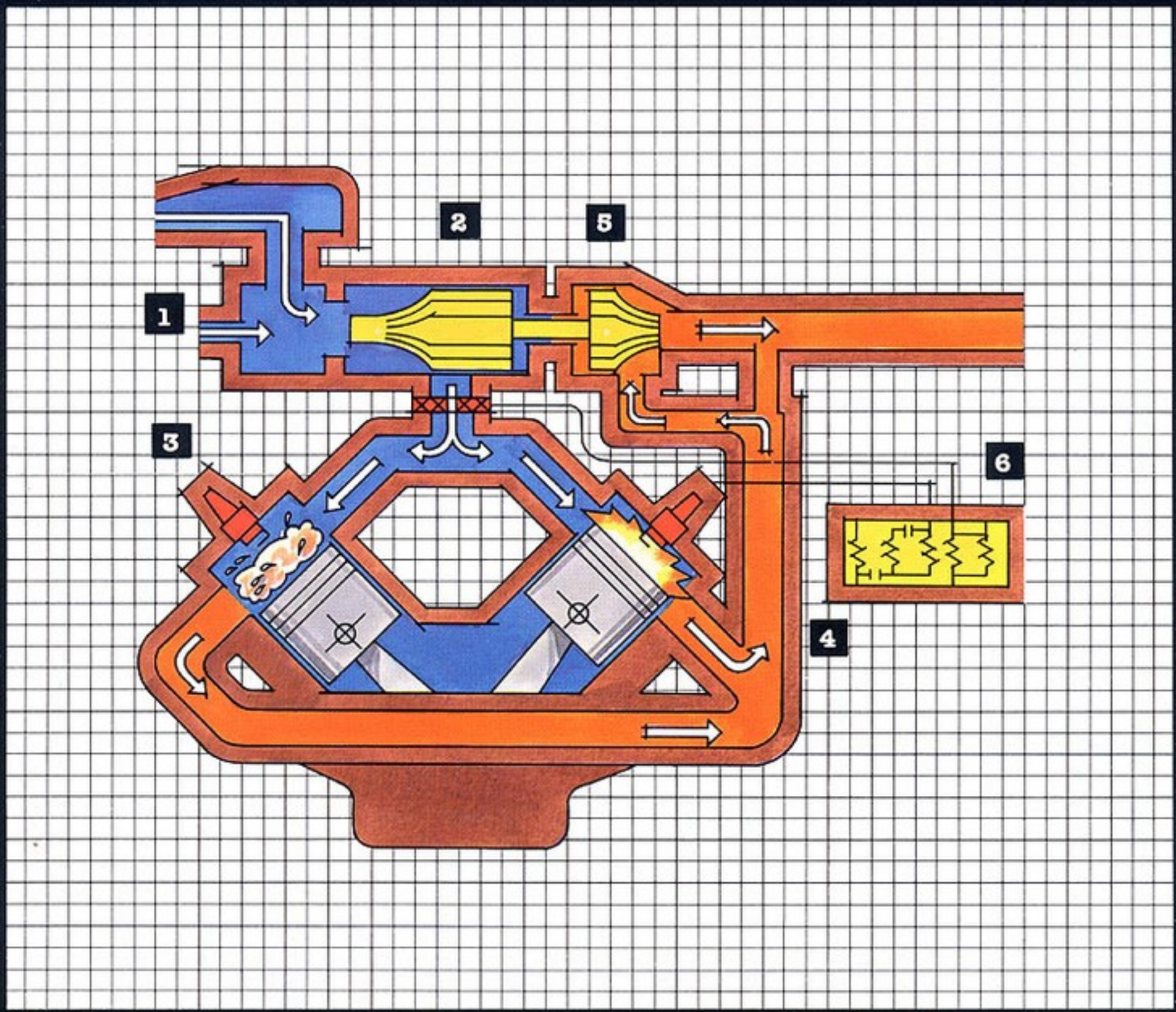
You will find this engine used exclusively on selected Buick offerings.

How it performs.



Here's a comparison of horsepower and torque ratings for the 3.8 liter Turbocharged V-6, the non-Turbocharged 3.8 liter V-6; the 4.1 liter V-6; and a 5.0 liter V-8.

How it works.



1. Under light throttle pressure, air and fuel are mixed in the normal manner in the carburetor and flow into the combustion chambers. Electric Early Fuel Evaporation (EFE) helps vaporize intake mixture.

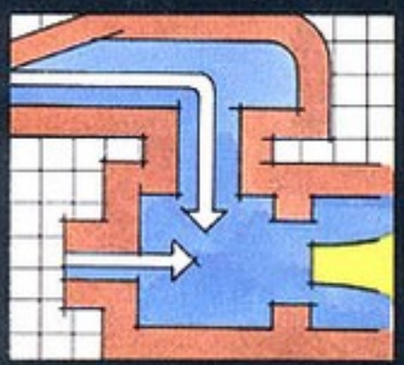
2. As engine load and speed are increased, the intake mixture is pressurized by the exhaust-driven compressor to increase or boost the amount of air/fuel mixture in the intake system.

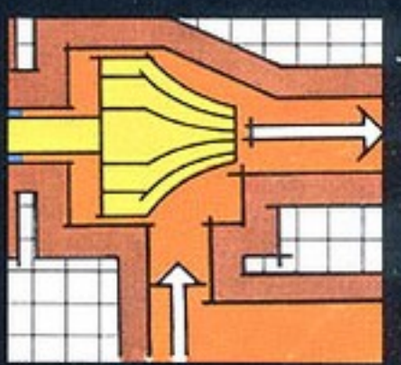
3. The denser charge increases cylinder pressures and results in a denser air/fuel mixture.

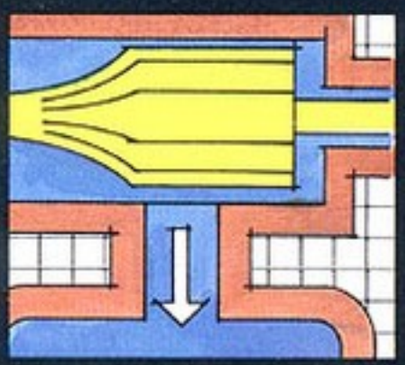
4. The boosted charge is ignited by the spark plug and produces more power per stroke of the piston than the same V-6 without turbocharging.

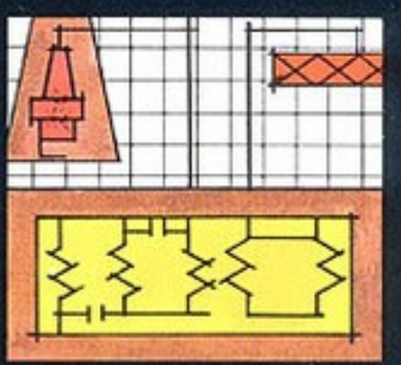
5. Exhaust gasses flow across the turbine wheel, rotating the turbine shaft which powers the compressor. A normally closed waste gate gives turbocharging response at lower engine rpm.

6. The Turbo Control Center is an electronic spark control plus an Electronic Control Module. It retards the spark advance, when necessary, controlling detonation; electronically controls EFE; and controls other engine functions.









Care and feeding.

Are there any tricks to driving a turbocharged V-6?
No, not at all. The turbocharged engine is started just as a normally aspirated engine would be: for cold starts, depress the accelerator fully and release it slowly. Then turn on the ignition. For warm starts, simply turn on the ignition and crank until the car is running.

As with any normal engine, the turbocharged engine should not be run at excessive rpm immediately upon starting or shut down abruptly after running at high speeds.

Don't attempt do-it-yourself fixes.
The turbocharger has but a handful of parts, but since it is precision-manufactured with some tolerances as fine as 1/10,000 of an inch, maintenance and repairs should be done by an authorized Buick dealer or any qualified service outlet which regularly does such service.

Catch trouble before it becomes major.
The turbocharger is an integral part of your engine and not an add-on device. If you spot an oil leak or hear an unusual sound coming from the turbocharger, take it in for service immediately. The trouble may be simple to correct, but if allowed to continue, may necessitate a more costly repair.

Normal scheduled maintenance, with one exception.
The recommended maintenance for the turbocharged V-6 engine is shown in the 1983 General Motors Maintenance Schedule found in the glove compartment of your Buick. Your turbocharged V-6 requires basically the same maintenance as a regular V-6, except that the oil filter should be changed with each oil change.

Engine oil change:
every 7,500 miles.
Oil filter change:
every 7,500 miles.

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Some Buicks are equipped with engines produced by other GM divisions, subsidiaries, or affiliated companies worldwide. See your dealer for details.

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Printed in U.S.A.

Official Car of the XXIIIrd Olympiad
Los Angeles 1984

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