

# **TWIN-TURBO POWER GUIDE**

Facts on Banks Twin-Turbo Engines,  
Systems & Components

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On the cover: Banks Twin-Turbo small-block Chevy engine  
shown with optional polishing and plating.



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# Twin-Turbo**Returns**

## **The Banks Twin-Turbo Small-Block Chevy V8 is Back!**

The Banks name is synonymous with high-performance turbocharging.

Since the late '60s, Banks has been engineering and producing leading-edge turbocharged engines that are known for their outstanding performance and endurance. Most of the early work was for marine applications and special automotive prototypes, but in 1978, Banks introduced its first Twin-Turbo small-block Chevrolet V8 systems, which were followed a few years later by the innovative Banks Twin-Turbo Camaro GT, Firebird GT, and Corvette GT. Ask any automotive performance enthusiast over the age of 35 about those revolutionary turbocharged Banks machines of the mid-'80s and you're likely to get the same response, something akin to, "Wow! Those cars were faaaast! Few were built, but they set the standard for high-performance street machines! They offered tons of power ahead of anything else on the road."

At the time, Banks was selling complete cars – modifying new Camaros, Firebirds and Corvettes with fully-built Twin-Turbo 350-cubic-inch small-block V8s and matching heavy-duty drive-train, suspension and brake systems. Less than two dozen of these incredible machines were actually built and delivered during the mid-'80s, but that was enough. They had no turbo lag. They were frighteningly fast. Several versions of the Banks Twin-Turbo package were offered in those exciting cars, varying

"Wow! Those cars were faaaast! Few were built, but they set the standard for high-performance street machines! They offered tons of power ahead of anything else on the road."



Awesome! Whether you're talking about its visual impact or its incredible performance potential, nothing compares to the new Banks Twin-Turbo engine. Shown here is the complete 6.0-liter Banks Twin-Turbo engine with all optional plating and polishing. From its CNC-machined, serpentine belt, aluminum front accessory drive assembly to its low-profile aluminum air plenum with Banks' exclusive shuttle valve technology, this Twin-Turbo engine is a work of art.

between 500 and 700 horsepower, depending on how much the buyer wanted to order. There was even one “super” Firebird that was built for a customer in South Africa that produced over 1100 hp. It was clocked at over 239 mph and held the South African passenger car speed record! The automotive magazine editors of the day couldn’t say enough good things about Banks’ ground-bound rockets that were as mild-mannered as the family sedan ... until you stepped on the loud pedal, that is. And those praises were coming from editors that had grown up in the high-powered muscle car era of the late ‘60s and early ‘70s! They were literally blown away by what a well-engineered turbocharged system could do. The Banks Twin-Turbo packages became legendary.

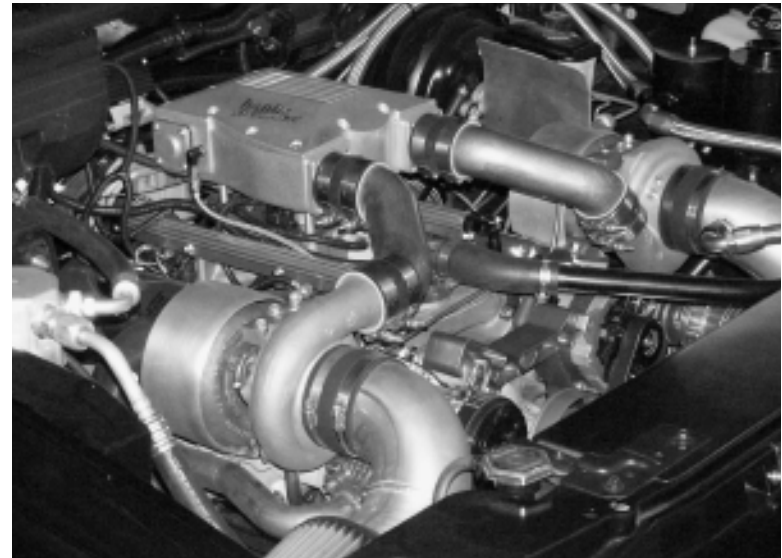
So much for days gone by. What’s exciting today is that Gale Banks Engineering has revived and updated the famous Twin-Turbo small-block Chevrolet V8 engine packages, and the new ones are better than ever before – a lot better! Today Banks offers performance engine packages so you can experience the thrill of a Banks Twin-Turbo system: You can order a complete turn-key Twin-Turbo engine, or you can buy everything you need to

assemble or upgrade your own Chevy small-block. The new packages are designed to work with state-of-the-art electronic fuel injection and computerized engine management. And continued research and refinement has

further improved airflow and durability. As delivered, these new packages are now capable of delivering up to 1100 hp.

So how much power is enough? Don’t be misled. An honest 500 hp is enough to provide a truly white-knuckle ride in most vehicles. That’s more power than even the big-block engines of the muscle car era produced, and a Banks Twin-Turbo engine will produce that kind of power instantly across a wide powerband and still be tame enough to drive the family to church on Sunday without a complaint. It’ll also deliver surprisingly good fuel economy under “normal” driving conditions. So if 500 hp is enough to slam you back in the seat

These new Twin-Turbo packages offer potential of up to 1100 hp.



Banks installed a low-boost pressure, non-intercooled, 640 hp Twin-Turbo engine in a SS454 Chevrolet pickup for pre-production testing on 91-octane gas. It’s incredibly quick! The engine is capable of over 800 hp on 100-octane.

and make your friends question your sanity, rest assured that even higher horsepower would reduce most passengers (and maybe the driver) to quivering plasma.

For anyone contemplating building a world-class performance machine, be it a street rod, an outlaw pickup truck, or a run-whatcha-brung racer, these new Banks Twin-Turbo engines are the ultimate power packages. The Twin-Turbo concept mated with Banks engineering excellence sets a new standard for performance, drivability and value in vehicles where only the best is good enough.

Let’s take a closer look.

Banks Twin-Turbo engines are the ultimate power packages.

# Twin-Turbo**Concept**

## Power, Drivability, Reliability, Style, Value

The underlying basic truth about engine performance is that power output is directly tied to the total amount of fuel that can be burned in the engine. However, it takes air to support the combustion of fuel to create usable power, so increasing power begins with increasing airflow. There are many ways to increase total engine airflow, such as simply building a bigger engine. The real trick is to design an engine system that provides the desired engine airflow and power upon demand — without doing work necessary to pump that extra air into and out of the engine (and the fuel that must be mixed with it) when there's not a demand for it. Ideally, this would be a small engine with huge power potential. Such an ideal design couples power with economy and efficiency — requirements that seem to be contradictory.

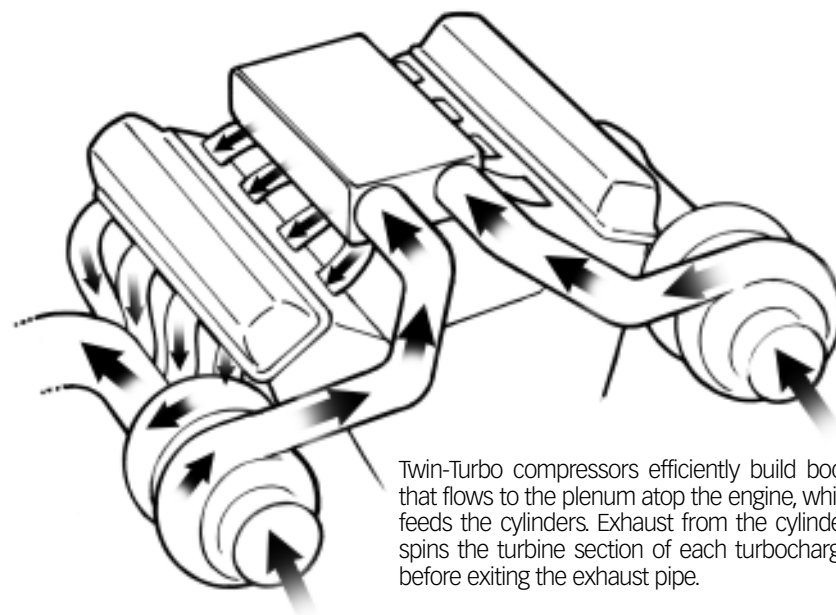
Fortunately, such a design solution is both possible and practical.

The answer to the above dilemma is turbocharging. A turbocharger is a device that uses energy in the engine's exhaust to drive a compressor that forces more air into the intake system of the engine only when it's needed. In non-turbocharged

...proper application of turbocharging requires sophisticated engineering.

engines, that exhaust energy is simply wasted out the exhaust pipes. On a turbocharged engine, when the throttle is opened for more power, the amount of energy in the

exhaust instantly goes up and the turbocharger responds, increasing the airflow to the engine. In other words, a turbocharged engine makes power by feeding on its own exhaust energy. It makes a small engine seem huge when you stand on the throttle. When power isn't needed, exhaust flow remains relatively low and the turbocharger just coasts along without any appreciable drag on the engine or its economy. It's



Twin-Turbo compressors efficiently build boost that flows to the plenum atop the engine, which feeds the cylinders. Exhaust from the cylinders spins the turbine section of each turbocharger before exiting the exhaust pipe.

an elegant solution — if it's done right.

The concept is simple and reliable, but proper application of turbocharging requires sophisticated engineering. This is where Banks' vast turbocharging experience and engineering expertise comes into play. Turbocharger placement and proper matching of the turbocharger size to the exhaust flow and desired airflow of the engine is critical for maximum efficiency, peak power output, and instant throttle

response. To accomplish these goals, Banks uses not one, but two

turbochargers in its small-block Chevrolet V8 system. Utilizing two turbochargers assures that there won't be excessive exhaust restriction, and that intake boost pressure always exceeds exhaust backpressure — a common failing with many single turbocharger systems on gasoline V8 engines. Maintaining boost pressure above exhaust backpressure is one of the secrets to making big power. Additionally, two medium-sized turbos will respond quicker than one huge turbo, eliminating any perceptible lag when the throttle is depressed.

Another feature of the Banks system is that the turbochargers pressurize the fuel injection throttle body to

It's an elegant solution...



Using two turbos instead of one provides instant response with negligible exhaust restriction. These are shown with polished compressors and heat shields.

further speed throttle response. The system also incorporates Banks' exclusive shuttle valve technology in the aluminum plenum box atop the throttle body. The shuttle valve senses manifold vacuum when the throttle is closed, such as between shifts with a manual transmission, and vents excess turbocharger boost pressure (to atmosphere) to prevent stalling the turbos. When the throttle is opened again, the shuttle valve snaps shut to instantly provide boost since the turbos are still

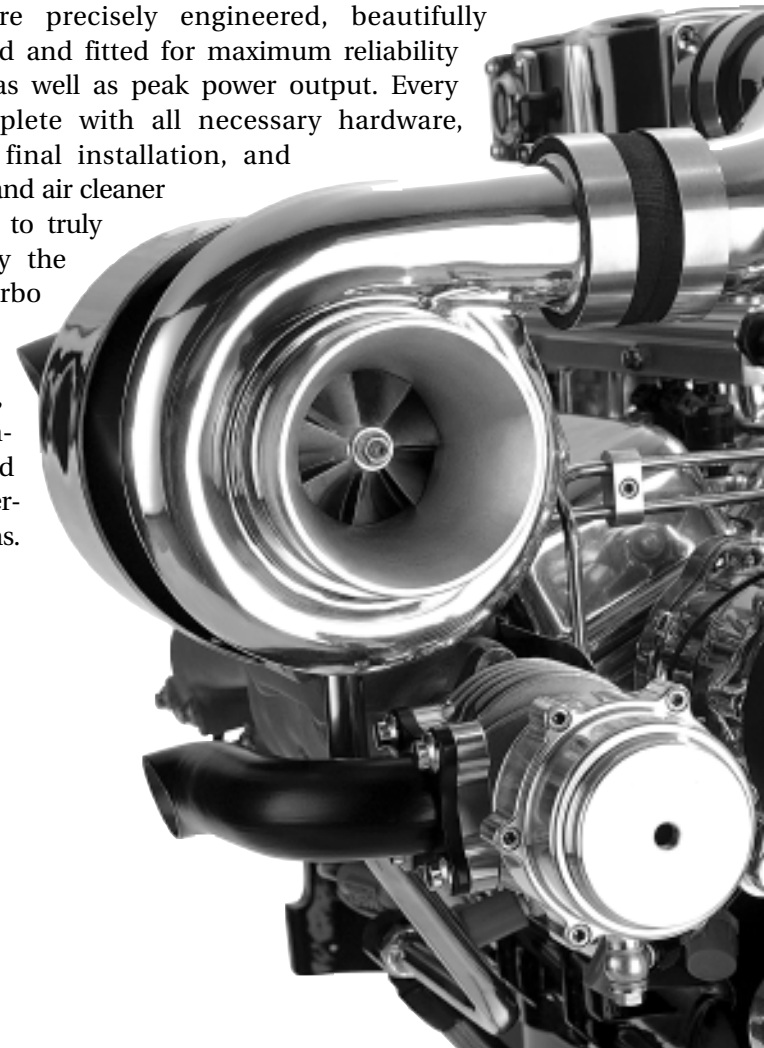
spooled up. This system design provides throttle response without any hesitation or lag often found with improperly engineered turbocharger systems. Most importantly, the twin turbos provide the total airflow capacity to produce incredible engine power without sacrificing response or creating significant exhaust system restriction.

...an eye-catching symmetric package that is both visually appealing and intimidating.

All of this would not be nearly as effective using a single turbocharger on a V8 engine.

Although it is largely a matter of form following function, the Banks Twin-Turbo package also offers a breathtaking element of style. Call it "Neat!", call it "Cool!", or call it just plain "Awesome!", using a separate turbocharger for each bank of cylinders on a V8 engine also results in an eye-catching symmetric package that is both visually appealing and intimidating — an important feature for street rods as well as other ultimate performance vehicles. After all, just *looking* fast is half the fun!

The Banks Twin-Turbo, whether it is a complete, dyno-tested turn-key engine, or a Twin-Turbo system for installation on an existing small-block Chevrolet V8 engine, represents one of the great performance values available today. Dollar for dollar, you can't find more power, drivability and reliability with any other performance-enhancing system. Everything is done with state-of-the-art engineering as the first consideration. Appearance and detailing are equally important. All of the components are precisely engineered, beautifully crafted, matched and fitted for maximum reliability and durability as well as peak power output. Every system is complete with all necessary hardware, requiring only final installation, and exhaust system and air cleaner connection. But to truly understand why the Banks Twin-Turbo packages are such an outstanding value, one needs to consider the pros and cons of other performance systems.



# Twin-Turbo**Superiority**

## Why Twin-Turbo Technology is Superior

As previously mentioned, it takes additional airflow to support the combustion of extra fuel to increase power. To be a little more technical, it takes additional *oxygen* to support the combustion of more fuel. There are ways to simulate increased airflow without actually doing it, but such tricks have their

shortcomings. For example, we can get that extra oxygen by introducing oxygen-bearing compounds to the air/fuel mixture entering the engine. Lets look at a couple of ways this is

commonly done, and why turbocharging is a better solution.

One common method of boosting power by increasing the oxygen available for combustion is to inject **nitrous oxide**, along with extra fuel, into the engine's intake system. When the nitrous oxide enters the engine's cylinders, compression heat causes the nitrous oxide to separate into nitrogen gas and oxygen. That oxygen supports the combustion of the extra fuel. A nitrous oxide injection system can offer a substantial increase in power while the nitrous oxide and fuel are being injected. Such systems are *initially* less expensive than more durable forms of power

Even when used only occasionally for short spurts, the [nitrous oxide] tank must be frequently refilled...

### Twin-Turbo vs. Nitrous Oxide

<b><u>BANKS TWIN-TURBO</u></b>	<b><u>NITROUS OXIDE</u></b>
<ul style="list-style-type: none"> <li>• Power gains anytime (unlimited amount)</li> <li>• Visually-appealing and intimidating engine</li> <li>• Single investment</li> </ul>	<ul style="list-style-type: none"> <li>• Power gains only when available (very limited amounts)</li> <li>• Requires separate high-pressure tank to carry compressed nitrous</li> <li>• On-going expense each time needed</li> </ul>

enhancement such as turbocharging, but there are some big disadvantages. Most notably, the power gain only occurs while the nitrous oxide and extra fuel are being injected, and it takes quite a substantial amount of nitrous oxide to produce significant power gains. This compressed nitrous oxide must be carried aboard the vehicle in a separate high-pressure tank. In most cases, it is impractical to carry more than 60 seconds worth of nitrous oxide aboard the vehicle. This means nitrous oxide injection is not practical for sustained power output. Even when used only occasionally for short spurts, the tank must be frequently refilled at a nitrous oxide supply station, such as a speed shop. This is both inconvenient and an on-going expense. Turbocharging has no on-going expenses.

...exotic fuels are definitely not a good alternative or value.

Another way of increasing available oxygen for combustion is to use an **oxygen-bearing fuel**, such as nitromethane, propylene oxide, or some other exotic fuel blend. Such oxygen-bearing fuels can produce notable power on demand, but they are dangerous to handle, often require special fuel injection plumbing, do not provide good fuel efficiency or economy, they tend to damage parts, and they are very expensive. Many exotic fuels are also unstable or corrosive, which means they can't be left in the vehicle between uses. Exotic fuels are not readily available either, which usually limits the distance a vehicle can be driven to the fuel carried onboard. If you need the convenience, safety, and economy of pump gasoline, such exotic

### Twin-Turbo vs. Oxygen-bearing Fuels

<b><u>BANKS TWIN-TURBO</u></b>	<b><u>OXYGEN-BEARING FUELS</u></b>
<ul style="list-style-type: none"> <li>• Uses 91- or 100-octane premium gasoline</li> <li>• Fuel efficient and economical</li> <li>• Huge power gains whenever needed</li> </ul>	<ul style="list-style-type: none"> <li>• Dangerous to handle</li> <li>• Can't be left in vehicle</li> <li>• Not readily available</li> <li>• Require special fuel-inj. plumbing</li> <li>• Do not provide good fuel efficiency or economy</li> <li>• Exotic fuels alone do not produce huge increases in power</li> </ul>

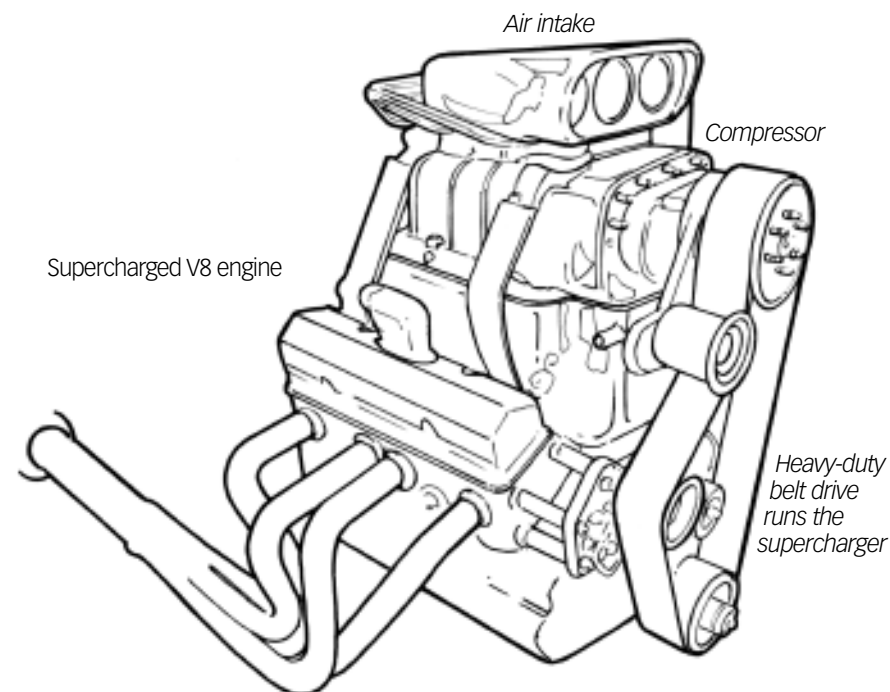
fuels are definitely not a good alternative or value. Nor can exotic fuels alone generate huge increases in power output.

The only viable solution remaining is to dramatically increase total engine airflow to get the extra oxygen required to support the combustion of more fuel for additional power. Other than building a much bigger engine, which has the disadvantage of size, weight, expense, and poor economy, the options really come down to two choices: turbocharging or **supercharging**.

A supercharger...  
is not very efficient.

Both are forms of forced air induction to an engine. The difference between the two systems is how and when the compressor used to increase airflow is driven by the engine. Noise, efficiency, and economy of operation are also considerations.

A supercharger uses a compressor that is mechanically driven directly off the crankshaft of the engine, usually by a heavy-duty belt and pulley system. In other words, it uses part of the engine's available power just to turn the compressor. The more air the supercharger supplies, the more power it requires. A supercharger works because it produces more power than it consumes, but it is not very efficient. In fact, because a supercharger uses part of the power it produces, it actually puts higher loads on the engine than a turbocharger does to achieve the same power gains to the rear wheels. It also uses additional



fuel to produce that extra power, killing fuel economy. Fuel goes in, but power doesn't come out. And because it is mechanically driven, a supercharger compressor runs all the time, compressing and heating the incoming air regardless of throttle position, whether it's needed or not. That extra work and friction hurts overall engine efficiency and economy. It also hurts reliability. Turbochargers are simply more reliable.

Another problem with superchargers is that they operate at a fixed speed ratio to crankshaft speed. At low engine speeds, superchargers produce little or no boost, and in fact, centrifugal superchargers have notable supercharger lag, or slow throttle response, at low engine speeds. Such superchargers must accelerate up to high blower speed before the centrifugal impellor reaches its efficiency range. In other words, it takes engine speed to get blower speed. A turbocharger, by comparison, does not operate at a fixed speed ratio and can

A turbocharger doesn't rob power from the engine's crankshaft.

## Twin-Turbo vs. Supercharging

### **BANKS TWIN-TURBO**

- Doesn't take power from engine
- Compresses intake air only when needed
- Virtually silent
- No interference with accessory drives
- Designed to fit beneath stock hood lines and between stock fenderwells of most vehicles

### **SUPERCHARGING**

- Uses part of engine's available power to turn compressor
- Compressor runs all the time, whether needed or not
- Noise from supercharger drive
- Belt drive on front of engine may interfere with vehicle's accessories
- Hood modification and/or radiator relocation may be required to clear supercharger and drive assembly

spool up instantly. This allows turbos to have a more manageable boost curve.

How much drag the supercharger places on the engine depends on the speed at which the compressor is driven in relation to engine speed, and the design of the supercharger. Additional disadvantages typically include noise from the supercharger drive, and complication of the belt drive on the front of the engine for accessories such as the water pump, alternator, power steering pump and air conditioning compressor, if the vehicle is so equipped.

We've already discussed the basic operation of a turbocharger in the Twin-Turbo Concept section, but essentially,

...you simply can't  
beat turbocharging.

the advantages of a turbocharger system are that it doesn't rob power from the engine's crankshaft, and compresses the intake air only when needed. In other

words, all of the power added by turbocharging is available to help power the vehicle, and when the extra power isn't needed, the system imposes no significant penalties. Turbocharging also leaves the front of the engine unencumbered for accessory drives. An added benefit is that turbochargers are virtually silent during most driving circumstances.

Mounting a supercharger can be difficult. Roots-type superchargers are typically mounted atop the engine, adding height and often requiring hood modification. By comparison, the packaging of the Banks Twin-Turbo system is designed to fit beneath most stock hood lines, depending on the intake manifold used. The exclusive Banks turbocharger exhaust manifolds are also designed to keep the overall engine package width as narrow as possible to allow installation between the stock fenderwells of most vehicles. Nor does the Banks Twin-Turbo system add to the overall length of the engine. Additionally, the available Banks front accessory drive assembly (standard on Banks complete 6-liter Twin-Turbo engines) is designed to minimize total engine length.

For maximum sustained power, reliability, and efficiency without bothersome inconveniences, you simply can't beat turbocharging.

# Twin-Turbo**Products**

## Twin-Turbo Complete Engine Package

The Banks Twin-Turbo complete engine represents the ultimate fully-engineered turbocharged engine package. For those performance enthusiasts who want a ready-to-run, turn-key Banks Twin-Turbo engine built with heavy-duty high-performance parts and matched components engineered to deliver incredible performance and durability, Banks offers complete 6.0 liter (366-cubic-inch) Chevy small-block engines.

These engines are fully assembled, balanced, and blueprinted to optimum performance tolerances. Each Banks Twin-Turbo engine receives thorough testing in the Banks engine dyno cell following a proven automated

break-in procedure. After valve lash checks, and leak-down and compression tests are taken, the engine is given a number of full throttle power runs to verify performance. This assures that each engine is performing to the high standards of excellence set by Gale Banks Engineering.

These engines are fully assembled, balanced, and blueprinted to optimum performance tolerances.

## ENGINE FEATURES

The Banks complete turn-key engine features an exclusive Banks/Dart high-nickel iron block with billet splayed 4-bolt main caps and 4.125-inch bores, a Banks non-twisted 4340 forged steel crankshaft with a 3.425-inch stroke, Banks H-beam 4340 forged steel 6.125-inch connecting rods with 7/16-inch ARP rod bolts, Banks Blower 8.4:1 low-compression-ratio forged reverse-deflector design pistons, and exclusive Banks/Dart aluminum cylinder heads. These unique head castings are made especially for Banks and feature a special combustion chamber and exhaust port, CNC machining, large 2.08-inch intake and

1.65-inch exhaust stainless steel valves, and 1.550-inch double valve springs with 10° chrome moly valve retainers. The entire valvetrain, including the camshaft, and Jesel shaft-mounted rocker arm assembly, is engineered for the Twin-Turbo application. The oiling system features a high-volume high-performance oil pump and a 7-quart oil pan.

Along with the complete Twin-Turbo induction system, complete engines feature an Accel Pro-Ram aluminum intake manifold that has ports to match the Banks/Dart 23° aluminum cylinder heads. The sequential fuel injection and spark management is provided by an Accel DFI (direct fuel injection) system calibrated for superior idle quality, drivability, mileage, and wide-open throttle performance. The specific calibration will be tailored to the octane level of gasoline specified by the customer. The octane rating of the gasoline to be used will also determine the peak boost setting of the wastegates that come on the engine. Maximum power output on commonly available 91-octane premium pump gasoline is typically 640 hp with 9-psi

boost (non-intercooled), while 800 hp is achieved on 100-octane gasoline at 14 psi of boost pressure (non-intercooled). Both power

...more than 1100 HP and  
905 lb-ft of torque at 6800!

ratings are at a peak of 6800 rpm. Torque output is a staggering 545 lb-ft at 5800 rpm and 655 lb-ft at 5800 rpm for the two boost levels, respectively. With proper intercooling, those power figures rise to 825 hp/695 lb-ft on 91-octane gasoline and 1100 hp/905 lb-ft on 100-octane gasoline. That is definitely enough power to make the wheels go 'round in a hurry!

Complete engines come assembled with a compact and attractive CNC-machined billet aluminum front accessory drive package. This space-saving assembly aids the installation of the complete engine in many vehicles by providing more space between the radiator and the accessory drive assembly. It also adds incredible sex appeal to the looks of a Twin-Turbo engine. A single serpentine belt drives a state-of-the-art single wire high-output alternator, a compact high-efficiency air conditioning compressor, a high-volume aluminum water



Shown is the 6-liter complete engine as delivered. The plenum and turbine heat shields come fully polished and the boost tubes are chrome plated.

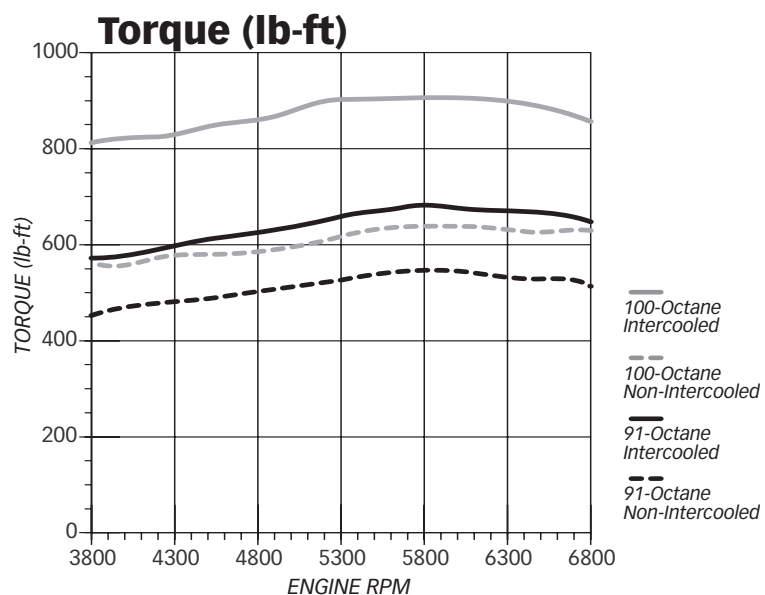
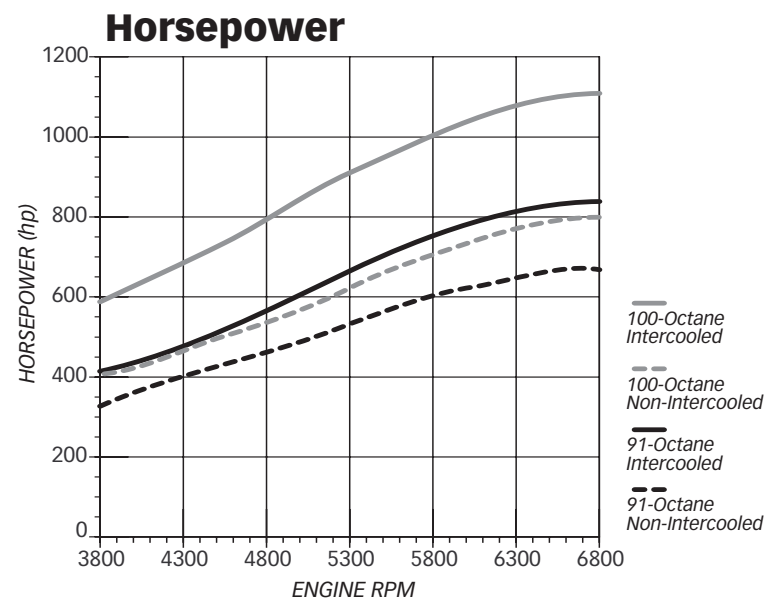
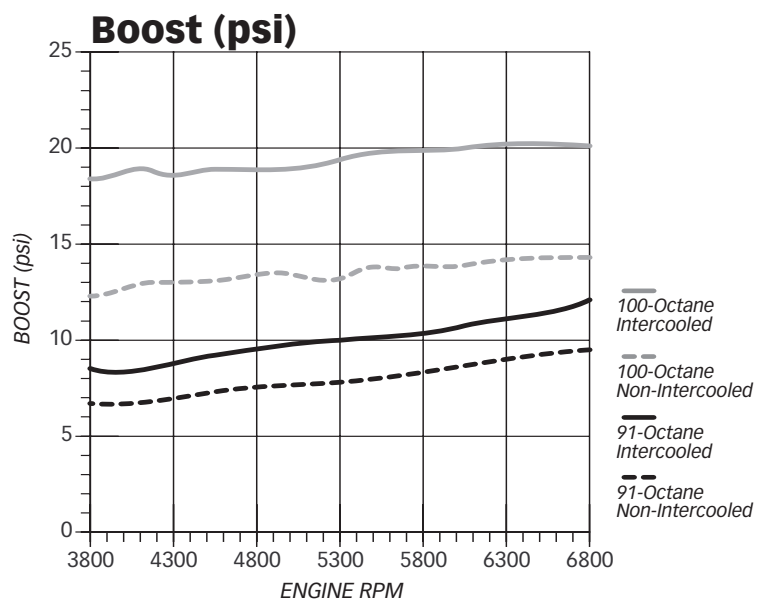
pump and a compact power steering pump. Billet pulleys complement the high-tech look of this assembly. Complete engines feature Banks aluminum valve covers, too. Banks will work with you to create the perfect look for your application: Polishing, chrome plating, anodizing, color coordination and block painting can all be worked out to create the desired finished product.

In addition to an engine wiring harness which users can customize to their application, Banks Twin-Turbo engine includes exhaust flanges, wastegate flanges, fuel pressure regulator, fuel pump, distributor, plug wires, and spark plugs. An owner's manual, installation instructions, and dyno sheets are also supplied with each complete engine.

Now, if you are a gearhead who likes to build your own engine, or if you already have a suitable high-performance engine, Banks has alternative Twin-Turbo solutions for you. Read on!

### Engine Dyno Test Results

The accompanying graphs show the results of dyno tests on a 6-liter prototype Twin-Turbo engine. The tests were conducted with and without intercooling on 91- and 100-octane gasoline. As the tests show, you can run higher boost when proper intercooling is installed, thus achieving higher horsepower and torque.



**BANKS TWIN-TURBO 6-LITER COMPLETE ENGINE**

- Fully Assembled, Ready to Install
- Dyno-Tested to Requested Horsepower
- Available with High- or Low-Pressure Wastegates

**Includes:****Short Block**

Banks/Dart Block  
Banks 4340 Crankshaft  
H-Beam Connecting Rods  
Banks Blower Pistons  
Billet Timing Pointer  
Fluidampr Harmonic Balancer  
SFI-Approved Flexplate  
Clevite Bearings  
Childs & Albert Piston Rings  
Melling HVHP Oil Pump  
Milodon Oil Pump Pickup  
Oil Pump Drive  
Banks/Milodon Oil Pan  
Cast Aluminum Timing Cover

**Valve Train**

Banks/Comp Cams Camshaft  
Solid Roller Comp Cams Lifters  
Double-Roller Timing Chain  
and Billet Gears  
5/16 Custom Pushrods  
Jesol Rocker Arms  
Isky Cam Button

**Cylinder Heads**

Banks/Dart Alum. Heads  
2.080 Intake Valves  
1.650 Exhaust Valves  
Isky Spring Locators  
Posi Valve Seals  
Isky Valve Springs  
Isky Valve Retainers  
Isky Valve Keepers  
Banks Valve Covers

**Fasteners**

ARP Head Bolts  
Dart Main Bolts  
ARP Oil Pump Stud  
ARP Intake Manifold Bolts  
ARP Oil Pan Bolts  
ARP Timing Cover Bolts  
ARP Cam Bolts  
ARP Flywheel Bolts  
ARP Valve Cover Studs  
ARP Exhaust Manifold Bolts

**Gaskets**

Fel Pro Stainless Wire Head  
Gaskets  
Fel Pro Intake Manifold Gasket  
Set  
Fel Pro Timing Cover Gasket Set  
Fel Pro Oil Pan Gasket Set  
Fel Pro Valve Cover  
Fel Pro FelPro Rear Main Seal

**Ignition**

Accel Dual-Sync Distributor  
MSD Blaster Coil  
MSD 7AL Ignition Box  
MSD Spark Plug Wires  
Champion Spark Plugs  
MSD Distributor Hold Down Kit

**Induction**

Banks Pressure Chamber Assy  
Banks Right Compressor Duct  
Banks Left Compressor Duct  
Banks Turbochargers  
Silicone Connector Hoses  
Stainless Steel Hose Clamps  
Billet Throttle Body

**Exhaust**

Banks Exhaust manifold Kit  
Banks Wastegate Kit

**Fuel System**

Aeromotive Electric Fuel Pump  
Aeromotive Fuel Pressure  
Regulator  
Aeromotive Fuel Filter

**Engine Management**

Accel Gen VII DFI Electronic Fuel  
Injection  
Accel DFI 3 BAR Map Sensor

**Front Drive System**

Billet Front Drive System  
G.M. Power Steering Pump  
A/C Compressor  
High Torque Alternator  
Stewart Stage II Aluminum  
Water Pump

**Plumbing**

XRP Fittings & Hoses

**Twin-Turbo System**

(listed on pp. 30-31)

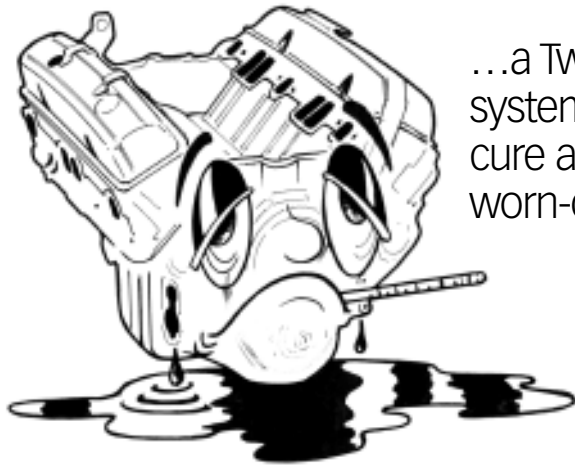
*Note: This listing includes primary components only. For a full bill-of-materials, please contact your Banks Power Consultant.*

**Twin-Turbo Systems for Existing Engines**

Banks recognizes that many enthusiasts may already have an engine suitable for installation of the Twin-Turbo System, so Banks has put everything needed together in a complete package so that they can do it themselves. Included are the turbochargers, wastegates, boost tubes, plenum assembly with Banks' exclusive shuttle valve, manifolds, heat shields, wastegate actuation kit, turbo oiling and drainback plumbing, along with all the clamps and hardware. Enthusiasts who enjoy doing things one step at a time can purchase the Twin-Turbo System in stages as sub-systems. Ask your Banks power consultant about such a plan.



The complete Twin-Turbo System comes with everything necessary for installation including exhaust manifolds, dual turbochargers (assembled), dual wastegates, fully polished intake plenum and shuttle valve assembly, turbo oiling and oil drainback plumbing, polished stainless steel heat shields, chrome plated boost tubes, all required mounting and connection hardware, and complete installation and operating instructions. Turbocharger compressors and wastegate heads are only polished, as shown here, as an optional service.



...a Twin-Turbo system...will not cure a sick or worn-out engine...

#### START WITH A HEALTHY ENGINE

Because the Banks Twin-Turbo systems produce such incredible power and performance, the additional load imposed on the engine and its internal parts mandates a certain level of engine strength, along with an acceptable compression ratio and lubrication system. Equally important, the engine must be in good condition with no mechanical defects such as damaged pistons, leaking piston rings or leaking valves, poor oil control or excessive tolerances. It is important to point out that a Twin-Turbo system will significantly boost power output, but it will not cure a sick or worn-out engine, and in fact, the higher loads imposed by the system are likely to make any pre-existing problems more evident.

The Banks Twin-Turbo system is engineered to work properly on small-block Chevrolet V8 engines with a minimum displacement of 302 cubic inches (5 liters) and a maximum displacement of 410 cubic inches (6.7 liters). The static compression ratio of the engine should be between 7.5:1 and 8.5:1, depending on the cylinder heads being used. Engines with iron cylinder heads should have a maximum of 8.0:1 since they retain more heat in the combustion chamber. Engines with aluminum heads can run as high as 8.5:1. Compression ratios higher than those specified here may result in engine damaging detonation during peak boost situations. To get to that compression ratio, the Banks Blower reverse-deflector pistons

are recommended. To withstand the extra power output generated by the Twin-Turbo system, a forged steel crankshaft, four-bolt main bearing caps, forged steel connecting rods, premium bearings, forged pistons, a high-volume oil pump, and stainless steel valves are *highly* recommended. Premium head bolts or studs, and premium head gaskets are also suggested.

#### SUGGESTED ENGINE PARAMETERS

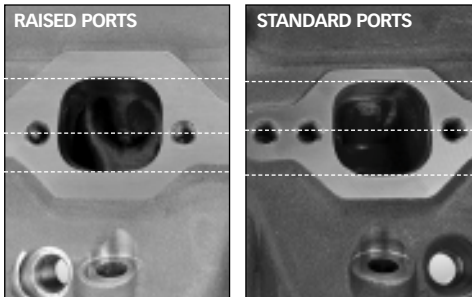
If in doubt as to which Twin-Turbo package to order, Banks always recommends beginning with the lower power version, which can be updated at a later date by replacing the wastegate springs and changing the electronic fuel injection calibration, if so desired. But remember, running higher boost typically requires 100-octane gasoline and the more durable engine parts. All Banks Twin-Turbo setups are essentially identical. Only the wastegate springs, fuel injectors, and engine management calibration changes. Tuners wishing to pursue extreme power levels over 700 hp are encouraged to begin with the Banks professionally-built complete engine or its equivalent.

The Banks Twin-Turbo system is designed to fit properly on most small-block Chevy-configuration V8 engines utilizing a standard deck height block, an Accel Pro Ram intake manifold and the Accel DFI engine management system. The Twin-Turbo system can be adapted to engine configurations using high-deck blocks or alternative intake manifolds and different electronic fuel injection systems, however, the boost tubes running between the turbocharger compressors and the aluminum plenum box may require modification by the installer. Similarly, proper calibration of alternative fuel injection systems will need

<b>Displacement</b> .....	302 to 410 ci. SB Chevy
<b>Compression Ratio</b> .....	7.5 to 8.5:1
<b>Cylinder Head</b> .....	Stock or Raised Exhaust Port 23°
<b>Valve Material</b> .....	Stainless Steel Valves
<b>Crankshaft</b> .....	Forged Steel Crankshaft
<b>Connecting Rods</b> .....	Forged Steel Connecting Rods
<b>Pistons</b> .....	Forged Pistons
<b>Camshaft</b> .....	Any type / low overlap
<b>Engine Management</b> .....	Aftermarket Fuel and Spark
<b>Maximum RPM Range</b> .....	6000 to 7500 RPM
<b>Suggested Gauges</b> .....	Exh. Pyrometer, Boost, Air/Fuel Ratio

to be coordinated with the injection system manufacturer or an experienced engine tuner with proper air/fuel metering instrumentation. Correct air/fuel and spark timing calibration is extremely important to avoid engine damage under boost conditions.

It should also be mentioned that the new Banks Twin-Turbo system is **not intended for use with carburetors**. Banks cannot provide any tech support for installers attempting to adapt the system to carburetion.



To differentiate between standard (stock) and raised (aftermarket) exhaust ports, check port alignment with bolt holes. The centerline on a standard exhaust port will line up with the bolt holes, while the raised port is shifted upward.

## TWIN-TURBO PACKAGE OPTIONS

Banks has provisions for several variations in engine configuration, which need to be specified when ordering the Twin-Turbo system. First, the buyer must specify whether the cylinder heads have standard exhaust ports or raised exhaust ports. This will determine which Banks ductile iron exhaust

manifolds are included in the kit. Similarly, the buyer must specify whether the engine uses a stock Chevrolet block or an

Banks exclusive ductile iron manifolds mount the turbos and wastegates, and won't crack or leak.



aftermarket block. Kits for stock Chevrolet blocks include a turbocharger oiling system that is fed from a port immediately above the oil filter pad. Aftermarket blocks are supplied with an oiling kit that feeds from a 1/2-inch pipe port located on the block bellhousing flange behind the intake manifold.

## BOOST OPTIONS

Banks offers its Twin-Turbo kits in two boost levels configurations. The first package has the turbocharger wastegates preset for a maximum of 9 psi of boost pressure. This configuration is ideal for high-performance stock engines or high-performance crate engines where 91-octane pump gasoline will be used. The second package has the wastegates set for a maximum of 14 psi. The higher boost version should only be used with engines that have all of the heavy-duty components recommended on page 27. The higher boost level also mandates the use of 100-octane racing gasoline. Peak power output will vary with engine size and maximum rpm, but it should be proportional to that previously listed for the Banks 6-liter engine.

The Banks Twin-Turbo is a system that can grow if your power needs increase.



Banks Big-Head wastegates accurately control peak boost. Maximum boost can be changed by replacing the internal springs. Replacement 4-, 6-, 9-, 12-, 14-, 16-, 20-, and 22-psi boost springs are available.

## BANKS TWIN-TURBO SYSTEM

- For Installation on Small-block Chevy V8 Engines
- Available for Stock- or Aftermarket-block Engines
- Available with High- or Low-Pressure Wastegates
- Available for Standard or Raised Exhaust Ports

Can also be purchased in stages.  
Contact your Banks Power Consultant.

### Includes:

#### Pressure Chamber Kit

- 1 Pressure chamber (plenum)
- 4 Spacer, TBI unit, pressure chamber
- 1 Cover, pressure chamber
- 1 Shuttle valve piston
- 1 Spring, shuttle valve
- 1 Cap, shuttle valve
- 1 Spring guide
- 2 Hose nipple, 2 1/2"
- 1 Fastener kit
- 8 Washer, AN, S/S, 5/16"
- 4 Nut, Nylock, 5/16"-24
- 4 Nut, Hex, Zinc, 5/16"-18
- 4 Nut, Hex, Zinc, 5/16"-24
- 4 Stud, pressure chamber, 5/16" X 7 1/2" grade-5 zinc
- 8 Screw, socket head cap, 1/4"-20 X 1 1/2"
- 8 Screw, button head, socket, 1/4"-20 X 3/4"
- 11 Screw, socket head, button, 5/16"-18 X 3/4"
- 1 Fitting kit
- 1 Fitting, 1/2" NPT X -10 hose, 45° elbow
- 1 Fitting, 1/2" NPT X -10 hose, 90° elbow
- 1 Bushing, 3/8" NPT X 1/4" NPT, pressure chamber
- 1 Plug, 1/8" NPT, hex countersunk
- 1 Plug, 1/4" NPT, hex countersunk
- 1 Plug, 3/8" NPT, aluminum, hex countersunk
- 2 Hose end, -10 straight
- 1 Hose end, -10 X 90° elbow
- 1 Gasket & seal kit
- 1 Gasket, pressure chamber
- 1 Gasket, piston stop
- 4 O-ring, 1/4" X 3/8" X 1/16"
- 2 O-ring, hose nipple
- 1 Hose, #10 S/S brd X 10" long

#### Turbocharger Kit

- 2 Turbocharger, Banks high-flow
- 2 Flange, oil inlet
- 2 Heatshield, turbine housing
- 2 Spacer, turbine inlet to manifold
- 2 Flange, turbine outlet pipe, 4-bolt
- 4 Bolt, M8 X 1.25 X 15, 12 PT flng hd
- 8 Manifold bolt, 12 PT, black, 3/8"-16 X 1"
- 4 Gasket, turbine outlet
- 2 Gasket, turbo inlet
- 2 O-ring, oil feed flange

#### Turbo Oil Supply Kit, Stock Block

- 1 Tube assembly, oil feed, left
- 1 Tube assembly, oil feed, right
- 2 Fitting, 1/4" X -4 AN male, 90° elbow
- 1 Fitting, 1/4" X -4 AN male tee
- 1 Fitting, -6 AN X 1/4" NPT elbow
- 1 Fitting, 1/4" X -6 AN male
- 2 Hose end, -6 straight
- 4 Nuts, -4
- 4 Sleeves, -4
- 3 Hose, #6 braided

#### Oil Drain Kit

- 1 Oil drain, left
- 1 Oil drain, right
- 1 Washer, circle lock, 5/16"
- 4 Hex bolt, gold zinc, 8mm-1.25 X 20mm
- 2 Fitting, 1/2" NPT X -10 hose, 45° elbow
- 2 Weld bung, 1/2" NPT
- 2 Hose end, -10 straight
- 2 Hose end, -10 X 90° elbow
- 2 Gasket, oil drain
- 2 Hose, 10# braided, 5" long

#### Wastegate Kit, Low-pressure (6 PSI)

- 1 BigHead wastegate, 6 PSI, left
- 1 BigHead wastegate, 6 PSI, right
- 4 Washer, AN, S/S, 5/16"
- 4 Nut, collet nut, S/S, 5/16"-24
- 4 Stud, 5/16" X 1 1/2", grade-5 zinc, wastegate mounting
- 2 Fitting, 1/8" X -4 AN male, 90° elbow

#### Wastegate Actuation Kit

- 1 Tube assembly, boost ref, 20"
- 1 Tube assembly, wastegate feed, left
- 1 Tube assembly, wastegate feed, right
- 6 Nuts, -4
- 6 Sleeves, -4
- 1 Fitting, 1/4" X -4 AN male, 90° elbow
- 1 Fitting, -4 tee

#### Boost Tube Kit

- 1 Boost tube, left, 2 1/2"
- 1 Boost tube, right, 2 1/2"
- 8 Hose clamp, 2 1/2"
- 4 Hose, 2.5" X 2.5", black

#### Exhaust Manifold Kit, Standard Exhaust Port Heads

- 1 Heatshield, exhaust manifold, left
- 1 Heatshield, exhaust manifold, right
- 1 Exhaust manifold, left
- 1 Exhaust manifold, right
- 1 Liquid Teflon, 1 oz.
- 1 Anti seize, 5 grams
- 8 Washer, AN, S/S, 3/8"
- 24 Washer, circle locks, S/S, 3/8"
- 8 Nut, collet lock, S/S, 3/8"-24
- 2 Stud, 3/8" X 1 1/2"
- 6 Stud, 3/8" X 2"
- 12 Manifold bolt, 12 PT wshr HD, S/S, 3/8"-16 X 3 1/4"
- 2 Gasket, turbo inlet

#### Owners Manual

## Banks High-Performance Engine Kit

Banks understands that not everyone will already have an engine suitable for a Banks Twin-Turbo system, nor do they want to opt for a complete Banks-built engine. To meet the needs of the enthusiast who enjoys wrenching and wants to build a moderately priced high-performance engine, Banks has created a heavy-duty engine kit designed for Twin-Turbo applications. This 5.7-liter (355-cubic-inch) small-block V8 kit features proven components that are both durable and affordable. It is suitable for power levels up to 825 hp. The kit features the Banks/Dart high-nickel iron block with 4.030-inch bores and nodular iron four-bolt main caps, a 3.48-

inch stroke forged steel crankshaft and forged steel H-beam connecting rods, Federal-Mogul main, rod and cam bearings, Banks

Blower 8.0:1 forged reverse-deflector pistons, Speed Pro piston rings, and a Scat harmonic damper. The rotating assembly for each engine is supplied fully balanced. Completing the short block is a Banks/Crower camshaft designed for the Twin-Turbo application, flat-tappet hydraulic lifters, a Comp Cams timing set, a high-volume oil pump and 7-quart oil pan, Fel Pro pan and timing cover gaskets, and an ARP oil pump drive. Everything is pre-machined, ready for assembly. Of course, assembly of an engine and installation of the Banks Twin-Turbo system assumes a reasonable degree of mechanical proficiency and engine building experience, along with the necessary tools.

The remainder of the Banks 5.7L engine kit includes Dart Iron Eagle assembled cylinder heads with 72cc combustion chambers and 2.050-inch intake and 1.60-inch exhaust stainless steel valves, high-performance valve springs, Fel Pro head gaskets, ARP head bolts, Comp Cams pushrods and stainless steel 1.6:1 rocker arms, Banks aluminum valve covers, and Fel Pro valve cover gaskets.

...not everyone will already have an engine suitable for a Banks Twin-Turbo system...



The Banks 5.7-liter engine kit includes heavy-duty parts selected for Twin-Turbo performance such as a high-nickel iron block, a forged steel crankshaft, forged steel H-beam connecting rods, Banks Blower forged pistons, and Dart Iron Eagle cylinder heads. All components are pre-machined and ready for assembly.

### **BANKS 5.7-LITER HIGH-PERFORMANCE D.I.Y. ENGINE KIT**

- Heavy-Duty Parts for Twin-Turbo Applications up to 825 hp
- Fully Machined and Balanced
- Ready for Final Assembly
- Assembled Cylinder Heads

*(Note: Does not include manifolds, fuel injection, ignition, flywheel, water pump or Twin-Turbo system)*

#### **Includes:**

##### **Short Block Kit**

Banks/Dart Engine Block  
Forged 4340 Crankshaft  
H-Beam Connecting Rods  
Banks Blower Pistons  
Speed Pro Rings  
Clevite Main Bearings  
Clevite Rod Bearings  
Clevite Cam Bearings  
Banks/Wyco Oil Pan  
HVHP Oil Pump  
ARP Pump Drive  
ARP Oil Pump Stud  
Banks/Crower Cam  
Comp Cams Lifters  
Wyco Timing Cover  
Scat Harmonic Damper  
ARP Damper Bolt  
ARP Engine Bolt Kit  
Balanced Rotating Assy  
Fel Pro Gaskets

##### **Top End Kit**

Dart Iron Eagle Heads  
Fel Pro Gaskets  
ARP Head Bolts  
Comp Cams Pushrods  
Comp Cams 1.6 Rocker Arms  
Banks Valve Covers

*Note: This listing includes primary components only. For a full bill-of-materials, please contact your Banks Power Consultant.*

### **BANKS/ACCEL PRO RAM INTAKE MANIFOLD and DFI ENGINE MANAGEMENT SYSTEM**

- Controls Air/Fuel Ratio
- Controls Spark Timing
- Limits Peak RPM

#### **Includes:**

Accel Gen VII Engine Management (ECU)  
Wiring Harness  
Accel Pro Ram Intake Manifold  
Fuel Injectors and Fuel Rail Rails  
Fuel Pressure Regulator  
Fuel Pump  
Fuel Lines  
3 BAR MAP, MAT, CLI, TPS, and MST Sensors  
Accel Dual-Sync Distributor and Harness  
Throttle Body  
Gaskets and Fasteners  
Twin-Turbo Calibration Disk

### **BANKS/ACCEL PRO RAM INTAKE MANIFOLD and DFI ENGINE MANAGEMENT SYSTEM**

The selection of the intake manifold and fuel injection system is left to the discretion of the customer, but the Accel Pro Ram intake manifold and the Accel DFI engine management system are recommended to simplify installation of the Banks Twin-Turbo kit. The Accel intake manifold and DFI engine management system for use with the Twin-Turbo package can also be purchased from Banks. The Banks/Accel DFI sequential fuel injection system comes with an Accel Dual-Sync distributor. A disk with the proper DFI Twin-Turbo calibration will be supplied with the system.



The Accel Pro Ram intake manifold and the Banks/Accel DFI fuel injection and engine management system, including the Accel Dual-Sync distributor, are available directly from Banks. Banks will also supply a calibration disk to match your application.

**BANKS CNC-MACHINED FRONT DRIVE ASSY.**

- Adds Visual Appeal
- Minimizes Total Engine Length

**Includes:**

Main Truss Bracket  
Tensioner with Bracket  
Power Steering Bracket  
Power Steering Pump  
Hardware and Spacer Kit  
Stewart Aluminum Water Pump  
Crankshaft Pulley  
Water Pump Pulley  
Power Steering Pulley  
Alternator and Pulley  
A/C Compressor and Pulley  
Serpentine Drive Belt

**CNC-MACHINED FRONT ACCESSORY DRIVE**

The CNC-machined aluminum billet front accessory drive package is another great add-on for do-it-yourselfers. This assembly not only looks great, it also minimizes the overall length of the engine. This is especially helpful if you want to add intercooling.

A single serpentine belt drives an aluminum water pump, a single-wire alternator, an air conditioning compressor, and a compact power steering pump. All pulleys and hardware are included.



The CNC-machined aluminum front accessory drive assembly is both attractive and compact, minimizing overall engine length. A single serpentine belt drives all the accessories. It is also available fully polished.

# Twin-Turbo**Concerns**

**About Gasoline and Boost**

In the foregoing information, there have been several references to the octane level of the gasoline that is recommended for use with the Banks Twin-Turbo engines or systems. The availability and cost of suitable gasoline should always be considered when selecting a Banks Twin-Turbo system. If 100-octane fuel isn't readily available, the low-pressure wastegates should be selected. In essence, the octane level of the gasoline limits the maximum amount of boost pressure that can be run without

encountering engine-damaging detonation. As a general rule, commonly available 91-octane unleaded premium pump gasoline is adequate for up to 9 psi of boost pressure with a Banks system, assuming a static

compression ratio in the engine as high as 8.5:1 and no intercooling. Up to 12-psi boost can be run on 91-octane gasoline with proper intercooling. Using higher octane gasoline, such as 100-octane racing gasoline, will not automatically raise the boost level or power output of a Banks Twin-Turbo system with low-pressure wastegates. However, a low-pressure system can be upgraded to take advantage of 100-octane gasoline and higher boost pressures for more power. Such an upgrade will also require recalibrating the engine management system.

By comparison, Banks Twin-Turbo systems or Banks professionally-built Twin-Turbo engines with high-pressure (14-psi) wastegates, always require 100-octane racing gasoline to prevent detonation under full-throttle operation without intercooling. These higher boost systems can be detuned to use 91-octane gasoline by substituting low-pressure wastegate springs if access to 100-octane gasoline should ever become a

"...the octane level of the gasoline limits the maximum amount of boost that can be run..."

problem, but maximum power output will also be reduced by approximately 150-200 horsepower at the lower boost level. If the wastegate springs are changed to reset the boost level for 91-octane gasoline, the fuel injection unit should always be recalibrated to match the new fuel octane. This is one of the great things about the Banks Twin-Turbo system. It is adjustable to your needs, whether it is for increased — or decreased — power to match your vehicle or performance demands. You don't get such broad flexibility with other forms of performance-enhancing modifications. Even at the reduced power levels, the performance of the Banks Twin-Turbo system is still absolutely incredible.

## Intercooling

Throughout this booklet, there are references to Twin-Turbo combinations both with and without intercooling. The Banks system is so efficient that the intake air remains relatively cool at the low boost settings, negating the need for intercooling. However, whenever intercooling is added, a Twin-Turbo engine will produce more power than it will non-intercooled at the same boost level.

Intercooling is always recommended whenever space for adequate intercooling is available. Intercoolers also need sufficient airflow to be effective. Intercooling reduces the temperature of the air leaving the turbochargers before it enters the engine. This increases the density of the boost air for even greater oxygen content. Higher density air will support the combustion of more fuel for greater power output. Significantly reducing the boost air temperature will also suppress detonation, which *may* reduce the minimum octane requirement of the gasoline necessary for a specific engine combination, depending on the maximum wastegate boost setting. For example, Banks has run properly intercooled Twin-Turbo setups on 91-octane gasoline at up to 12-psi boost on an engine with aluminum cylinder heads and 8.4:1 compression.

As a general rule for Twin-Turbo setups, for power levels

above 700 hp, *either* 100-octane gasoline or proper intercooling is required. For power levels above 825 hp, *both* 100-octane gasoline and proper intercooling are required. Banks offers intercoolers in a variety of sizes adaptable to most installations. Consult your Banks Power Consultant for a specific recommendation.

## Fuel Delivery Requirements

Adequate fuel delivery to the fuel injection system on a Banks Twin-Turbo engine is critical. The electric fuel injection pump supplied by Banks with the Accel DFI system for your specific application will be up to the job.

If a different fuel injection system or pump will be used, the pump must be capable of supplying the engine a minimum of 1/2-pound of gasoline per horsepower per hour at maximum power output or wide-open throttle. For example, if the engine is producing 800 horsepower at peak boost and wide-open throttle, it will need 400 *pounds* of gasoline per hour. As a rule of thumb, gasoline weighs about 6.5 pounds per gallon, so for our example engine, dividing 400 pounds by 6.5 pounds per gallon reveals that a fuel pump capable of supplying a *minimum* of approximately 62 gallons of fuel per hour is necessary.

Selecting a pump with a little extra capacity would be good insurance for any turbocharged engine.

It is necessary to go through these mathematical gymnastics because most fuel pumps are rated in gallons per hour rather than pounds per hour. Selecting a pump with a little extra capacity would be good insurance for any turbocharged engine. If the fuel delivery system cannot supply all the fuel the engine requires, the air-fuel mixture can lean out creating detonation that could severely damage the engine under wide-open throttle conditions.

One more important thing, the pump must be able to supply the required number of gallons *at the necessary fuel pressure*

required by the fuel injection and Twin-Turbo systems. For turbocharged engines, the necessary pressure will be that required by the fuel injection system plus boost pressure. For example, if the fuel injection system requires 40 psi and you'll be running 20-psi boost, *the pump must be able to supply the necessary volume of gasoline at 60 psi.* Consequently, a boost pressure reference line must be run to the system's fuel pressure regulator. This is covered in the installation instructions that come with every Twin-Turbo system.

If in doubt about your fuel delivery system, check with the pump or fuel injection system manufacturer before using an unknown pump with the Banks Twin-Turbo system. And don't forget that the electrical system must be capable of supplying adequate sustained amperage to the pump to assure it operates at full rated capacity. Along with adequate fuel injection pump operation, the fuel tank pickup size, and the fuel line size to the engine must be capable of flowing the required volume of gasoline too.

## Ignition System Requirements

Like the fuel delivery system, the ignition system must be adequate during high boost operation. Select a high-energy multiple-spark or CD ignition system, and check that the triggering system is compatible with whatever kind of engine management system you are using to control the ignition and fuel injection systems. For example, the Accel DFI system is a sequential fuel injection system and requires the Accel Dual-Sync distributor for the proper referencing signals.

The rest of the ignition system, including the distributor cap, rotor, and plug wires must all be in top condition to prevent mis-firing under boost conditions. Spiral core, low-resistance plug wire is recommended for use with most electronic ignition systems. Turbocharged engines typically run spark plugs that are one to three heat ranges colder than normally-aspirated engines. Projected nose spark plugs should not be used.

## Air Cleaner Recommendations

Low-restriction, high-flow air cleaners are essential to prevent debris from entering the turbochargers or the engine intake system. Although it is possible to attach air cleaner elements directly to the turbocharger compressor inlets, this is not recommended. Whenever possible, it is always preferable to induct cool air from the front of the vehicle. This improves air density and reduces the likelihood of detonation. Avoid inducting air that has passed through the vehicle's radiator, intercooler, or air conditioning condenser, as such air may be 100°F. hotter than air taken from the front of the vehicle. It is also a good idea to avoid ingesting rainwater into the air intakes.

...it is always preferable to induct cool air from the front of the vehicle.

## Exhaust System Requirements

Another area of concern is the overall exhaust system that is used. The Banks Twin-Turbo systems come with exhaust pipe flanges and wastegate dump flanges for connection to the vehicle's exhaust system – a job that is easily handled by any competent muffler shop or fabricator.

Turbochargers respond quicker and will produce more boost with minimum exhaust backpressure. Use a 3-inch diameter outlet pipe for each turbocharger. A 3-inch exhaust system is usually adequate for low-boost setups. High-output or racing systems should use even larger exhaust pipes. In such cases, a minimum of 3½-inch diameter pipe should be selected. The pipe diameter should remain the same size throughout the exhaust system, including muffler inlet and outlet sizes, to keep the system as free-flowing as possible.

## Oiling System Requirements

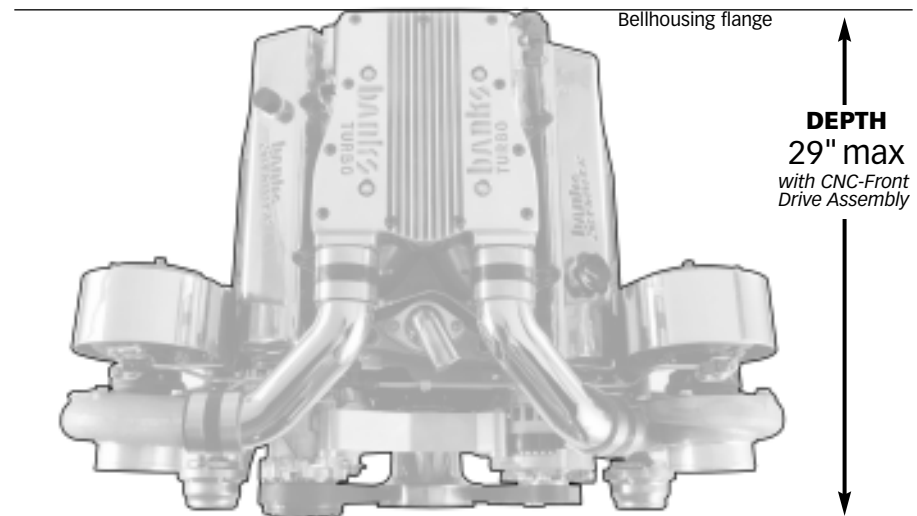
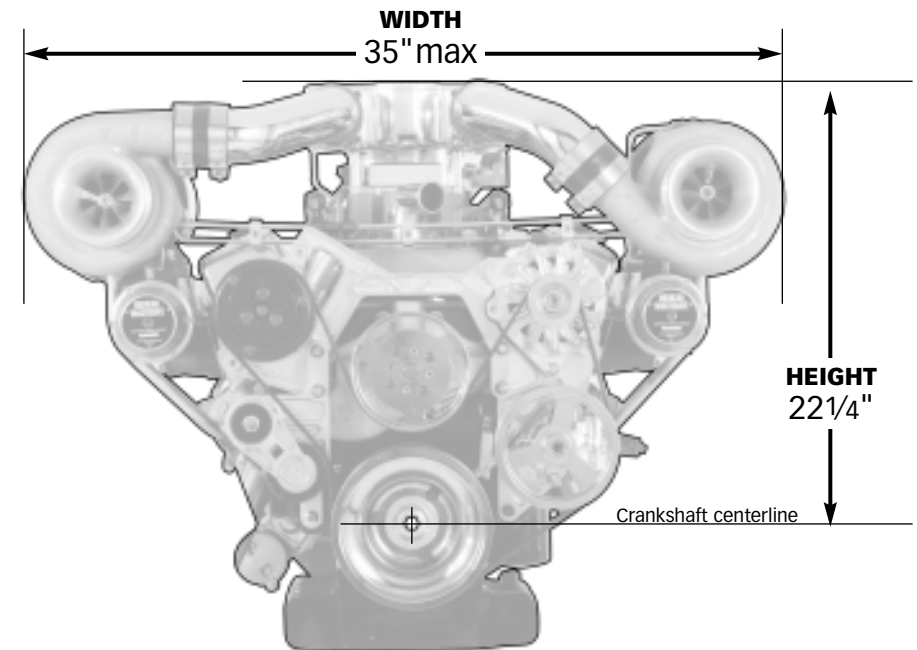
...a high-volume oil pump is highly recommended...

The oiling system of the engine deserves some mention, too. Oil drainback provisions for oil leaving the turbochargers must be welded into the engine's oil pan during the installation of the Banks Twin-Turbo system. Consequently, plan on removing and modifying the engine oil pan during the installation. If the engine isn't already fitted with a high-volume oil pump, it would also be an ideal time to upgrade the pump while the oil pan is removed. Because oil must be supplied to lubricate the turbocharger shaft bearings, a high-volume oil pump is highly recommended to handle the extra oil flow requirements. A high-volume pump will assure adequate oil supply to the engine, especially at lower engine speeds.

## Installation Considerations

The installation of a Banks Twin-Turbo system or complete engine will provide your vehicle with incredible power and performance. If the vehicle isn't already equipped with a high-performance drivetrain, suspension, and brakes, you may want to consider upgrading these components to match the performance of the engine. It should also be noted that these Twin-Turbo packages are intended for maximum performance applications, and may not be emissions compliant in all vehicles in all states.

All Banks Twin-Turbo Systems come with a detailed Owner's Manual, complete with illustrated, thorough installation instructions. However, if you run into difficulties, Banks Technical Support is available to answer your installation or operational questions. Installation of a Banks Twin-Turbo System, which can typically be completed in a weekend, requires basic hand tools, and mechanical and welding skills.



The Banks Twin-Turbo package is designed to fit beneath most stock hoods, but the twin turbos do add to total engine width. Dimensions shown are for a standard deck height block, an Accel Pro Ram intake manifold and a Banks/Accel DFI system. Overall length is with the CNC-machined aluminum accessory drive.

# Twin-Turbo**FAQs**

*Please note: At the time of publication, Banks Twin Turbo system is for installation on a Chevy small-block V8, and is not intended to be installed on engines such as a 5.7 LT1 or LS1. Some parts such as the exhaust manifolds and turbos can be used on these engines, but support parts are not available and certain components may not fit in the engine compartment.*

## **How much power will a Twin-Turbo System make on my engine?**

Because there are so many potential variables, such as engine size, exact compression ratio, camshaft specifications, maximum boost settings, the cylinder heads and intake manifold being used, and exhaust system restrictions, it is impossible to predict exact power output. Throughout this booklet you will find approximate power levels for specific combinations. Let those serve as a guide. The beauty of the Twin-Turbo System is that it is adjustable to your needs and engine capabilities by changing the wastegate maximum boost settings, engine management calibration, and if necessary, the gasoline octane level. Additional power gains can be achieved by adding intercooling.

## **What components are included in the Twin-Turbo system?**

The Twin-Turbo System is comprised of smaller base kits: turbocharger kit, plenum chamber kit, exhaust manifold kit, wastegate kit, turbocharger oil supply kit, turbocharger oil drainback kit, boost tube kit, and wastegate actuation kit. *See page 30 for complete parts list.*

## **Can parts in the system be purchased separately?**

Yes, in the sub-kits listed. *Talk to your Banks Power Consultant or see page 30 for more details.*

## **Are there going to be any kind of “downpipe” exhaust starter tubes, or something so that the customer can make his own exhaust connect to the Twin-Turbo System?**

Because the Twin-Turbo System can be installed in a wide variety of cars, pickups, street rods, etc., with an equally wide variety of exhaust system requirements, it is not feasible for Banks to offer exhaust system kits. Instead, every Twin-Turbo System or Twin-Turbo engine is supplied with exhaust pipe flanges and wastegate dump tube flanges. A good muffler shop or fabricator can easily make exhaust pipes to connect these flanges to the vehicle's exhaust system. *Exhaust system size recommendations are discussed on page 39.*

## **Are any engine components such as pistons, cylinder heads, intake manifolds, fuel injection system, etc., going to be available from Banks?**

Yes, most of the heavy-duty components for Twin-Turbo packages are available separately. *Talk to your Banks Power Consultant. See page 33.*

## **What are the minimum engine requirements necessary to support the power capabilities of a Twin-Turbo System?**

There are a number of requirements and recommendations, depending upon the desired power level. *These are discussed on pages 26-27.*

## **What compression ratio is necessary to run a Twin-Turbo System?**

Compression ratios between 7.5:1 and 8.5:1 are recommended, with optimum performance at 8.0:1 to 8.5:1. *See page 26.*

## **With twin turbochargers, is one turbo for low rpm boost and the other for high rpm power?**

No, both turbos are the same size and run in unison throughout the rpm range of the engine.

**Is the maximum boost level of the Twin-Turbo System adjustable by the driver?**

No. Peak boost is controlled by the dual wastegates, which are preset for a specific boost level. Maximum boost is determined by the octane of the gasoline to be used, and whether the system will be intercooled.

The wastegate settings can be changed by replacing the internal springs. The engine management calibration should also be changed if switching to a different octane gasoline. *See page 29.*

**Does Banks include an intercooler?**

No. The use of Banks Twin-Turbo is so efficient that intercooling isn't required for up to 825 hp if the recommended octane gasoline is used. Performance gains can be achieved by installing proper intercooling at power levels below 825 hp, however. For extreme power levels above 825 hp, intercooling is definitely required. *See pages 36-37.*

**What type of fuel must be used with a Banks Twin-Turbo System?**

For systems running up to 9-psi boost (non-intercooled), we recommend 91-octane premium pump gasoline. Above 9-psi boost (non-intercooled), 100-octane racing gas is required. Proper intercooling can reduce the octane requirement, especially at lower horsepower and boost levels. *See pages 22, 35-36.*

**What are the requirements for the fuel system with a Banks Twin-Turbo setup?**

The fuel system must be capable of supplying adequate fuel for the anticipated power output of the system.  
*Recommendations are discussed on page 37-38.*

**Does the turbocharger oil drain back to the oil pan or is a scavenging pump used?**

Turbocharger oil returns to the oil pan by gravity. Provisions for the oil drains must be welded to the oil pan. *See page 40.*

**Can the Twin-Turbo be used with a carburetor?**

While the Twin-Turbo air plenum will physically fit atop a carburetor for a "blow-through" configuration, Banks does not recommend it. The Twin-Turbo setups Banks offered 20 years ago used a carburetor, but everything in the system was matched to such a setup. Banks no longer supports carbureted installations, and offers no information regarding manifold, carburetor, fuel pump, or ignition timing modifications necessary for carbureted setups. It is recommended that you upgrade to electronic fuel injection and computerized engine management, such as the Accel DFI or its equivalent.

**Will Banks pay any speeding tickets I get with a Twin-Turbo setup?**

You're on your own there, but you'll have every hot rodder's understanding. A Banks Twin-Turbo will attract attention when you stand on it. Actually, the power output will require discretion and constraint in certain situations ... use your head instead of your foot before these unfortunate instances arise!

# Twin-Turbo**Difference**

## Experience the Banks Difference

There is simply nothing available today to equal the incredible performance and visual appeal of the Banks Twin-Turbo system.

You'll be blown away!

Engineering excellence, proper fit and finish, and trouble-free operation are hallmarks of Gale

Banks Engineering. These qualities make the Banks Twin-Turbo products an unmatched value in the performance world. Order yours today and experience the Banks difference. You'll be blown away!



Shown is Bill Gaylord's (of Gaylord's Kustom Trucks) beautiful '52 Chevy pickup equipped with a Banks Twin-Turbo small-block Chevy V8.

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