WEIAND SUPERCHARGER TECHNICAL INFORMATION

Supercharger Basics

There are currently three basic types of superchargers being sold in the performance market today: the Roots type (all Weiand Superchargers are Roots blowers), centrifugal, and "screw" type. (Note that throughout this tech manual the terms "supercharger" and "blower" are used interchangeably since they mean exactly the same thing.)

The centrifugal supercharger is very similar to a turbocharger, except the centrifugal supercharger is driven by a belt off the engine, while the turbocharger is driven by the force of exhaust gases. These type of superchargers (or turbos) run at extremely high speeds. To achieve these high speeds in the centrifugal supercharger, there is an additional internal step-up drive inside the blower. Due to the design of these units, the faster the impeller spins, the more boost the blower makes. As a result, these units typically do not produce much power at low engine speeds because the impeller is not spinning fast enough to make much boost. If it were even possible to gear the blower so that it would spin fast at low engine speeds, it would then make too much boost at higher engine speeds. Turbos employ a device called a "wastegate," which bypasses exhaust gas past the turbo when a certain boost limit is reached. Turbos also have a "lag" at low RPMs.

The screw type blower appears somewhat similar to a Roots type blower from the outside, but the internal rotors are quite different. In a screw type blower, the rotors interleave one another and as the outside air is drawn into the blower the rotors progressively compress the air inside the blower as it passes along the rotors. These rotors require an extremely high degree of tolerance and, as a result, the screw type supercharger is more expensive than a Roots.

The Roots blower is the simplest of all blowers and therefore is also the least expensive. A Roots blower does not compress the air inside the supercharger. It is actually an air pump. The compression of the inlet charge (creation of boost) actually takes place in the cylinders and the manifold.

Centrifugal superchargers and screw type superchargers are called "internal compression" blowers because the air compression takes place inside the supercharger. Roots superchargers are "external compression" blowers because the air compression takes place outside of the supercharger.

Roots type superchargers first appeared in automotive applications as far back as the 1930s. The basic design of a Roots supercharger has been developed over many years and has resulted in a highly refined product offered by Holley under the Weiand brand.

Roots blowers have been used on GMC diesel engines for many years. In the late 1950s, Phil Weiand was in the forefront of the development and adaptation of these superchargers for racing and performance applications. The company was active in producing manifolds and drive systems for adapting GMC diesel superchargers, such as the 4-71 and 6-71, followed by the development of its own superchargers that are completely manufactured by Weiand (including 8-71 models).

What a Supercharger Does

An internal combustion gasoline engine draws in air which is mixed with gasoline. This "fuel / air charge" is drawn into the cylinders as a result of the vacuum created when the piston travels down the cylinder. When the piston goes back up, this fuel / air charge is compressed to a fraction of its original volume. If an engine has a 9:1 compression ratio, the fuel / air charge will be compressed to 1 / 9th of its original volume. When the spark plug ignites this compressed fuel / air charge, the resulting combustion causes an expansion of the charge which forces the piston down.

As you pack more fuel and air into the cylinder, the combustion charge becomes more powerful and the engine produces more power and torque.

In an unblown engine, when the piston goes down on the intake stroke, atmospheric pressure tries to fill the void now present in the cylinder. If the cylinder filled completely with air, the engine would have a volumetric efficiency of 100%. Due to the restrictions in any engine created by the air cleaner, cylinder head and cam timing, all of the air that should get into the cylinder can't, so the typical engine's volumetric efficiency is less than 100%. By removing these restrictions, or at least reducing them by improving the cylinder heads and cam timing and using a larger carburetor, the volumetric efficiency of an unblown engine can be improved.

With a supercharger, the amount of air and fuel that can be packed into the cylinders greatly exceeds the 100% volumetric efficiency of a highly refined unblown engine. Since the air is now being forced into the engine, you can put a substantially denser fuel / air charge into the cylinders. On most street type blown applications running 6 to 7 pounds of boost, approximately 40 to 50% more fuel and air can be packed into the cylinders than in a comparable unblown engine. The reason that larger displacement engines make more power and torque than smaller ones is that more fuel and air are available for combustion. As a result of supercharging, a small displacement supercharged engine can produce similar horsepower and torque to a naturally aspirated larger displacement engine.

With a Roots blower, the carburetor functions basically the same as it would on an unblown engine, except it now sits on top of the supercharger. Although this is somewhat of a simplification, you can think of a roots supercharger installation as removing the carb and intake manifold from the engine and reinstalling the blower and blower manifold in its place and then bolting the carb on top of the blower. Then a belt is attached to pulleys on the blower and the crankshaft to turn the supercharger.

Explaining Boost

Boost is the amount of air pressure created by the supercharger. Supercharger boost is largely misunderstood, even by some experienced performance enthusiasts.

One important thing to keep in mind with respect to Weiand roots superchargers is that throughout the RPM range, the air ratio of the supercharger is consistent with the engine displacement. Supercharger boost, however, is not totally constant.

This is because at lower blower speeds, the clearances between the blower case and the rotors allows for air "leakage" with some loss of boost efficiency. If your engine is not as free-breathing as it could be (because it has a stock or low performance cam, small valves, restricted ports, etc.) you will typically see the boost readings go up in the higher rpm ranges. This is because the boost the blower is making cannot fully get into the cylinders due to these restrictions, and the boost pressure starts building up in the manifold, which is typically where the boost readings are taken, therefore, artificially high readings will be observed. Interestingly, this means a supercharged engine can make more power with lower reading on the boost gauge.

Boost is a function of three things: the displacement of the engine, the displacement of the blower, and the speed that the blower is turned in relationship to the engine speed. There are a few basics to remember. Assuming a constant speed ratio between the engine and the blower, a larger blower will make more boost than a smaller one on the same size engine. As engine size goes up, boost goes down if the blower speed and blower size remain constant. Conversely, as engine size goes down, boost goes up. On a given size blower and a given size engine, boost can be increased by running the blower faster in relation to the engine's speed (overdriving) or it can be decreased by running it slower (underdriving).

As a very rough rule of thumb, you typically want to run larger blowers on larger engines. However, there is no reason you can't run a larger blower on a small engine, such as a 6-71 on a small block 327, as long as you adjust your drive pulleys to get the blower to run slow enough to keep the boost down to a level that is appropriate for the compression ratio you are running. Conversely, it is not practical to run a small blower on a big engine, because you would have to turn the blower so fast to make a reasonable amount of boost that the blower would become very inefficient, particularly at higher engine speeds. When Roots blowers are turned at very high speeds, they actually can heat up the inlet air to such an extent that the air expands substantially. This overheated expanded air loses so much density that even though your boost gauge says the blower is making boost, in reality you aren't putting any more air into the engine than an unblown engine would get.

Running the blower very slowly in relation to engine speed, such as would occur in our example above of a 6-71 on a 327, would result in inefficiencies at lower engine speeds. A slow turning blower, especially a larger one like a 6-71, would have a lot of low speed "leakage" of boost pressure past the clearances between the rotors and the blower case. This leakage reduces low speed boost pressure, with a resultant decrease in the amount of additional power produced. This is why it is important to have a blower that is sized in relationship to the engine displacement. In this instance, if the blower pulleys were selected to make decent boost at low engine speed, you would end up with excessive boost at higher engine speeds. Additionally, keep in mind that the larger the blower, the more potential for low speed boost "leakage" to occur because the total clearance path is much longer on a larger blower.

Many people assume a blower is making boost 100% of the time. In actuality, the blower normally only goes into boost when the throttle is opened substantially or when the vehicle is under load, such as going up a steep hill or pulling a trailer. In order to make boost, the blower must get air, and during most driving you will only have the throttle open a slight amount. Interestingly enough, even when not making boost, the spinning rotors improve the volumetric efficiency of the engine to the point where you can maintain high cruising speeds at lesser throttle openings, and in normal driving around town, you will notice that the vehicle is much livelier even when not making boost. This phenomenon can improve gas mileage under certain circumstances, although typically on an overall basis fuel economy will decrease about 3%. This isn't much of a factor. If your car was getting 20 mpg before the blower, that means you will be getting 19.4 mpg after the blower installation but with a 40 to 50% increase in horsepower.

Weiand Pro-Street 6-71 and 8-71 supercharger kits come with drive ratios that will typically produce 11to13 pounds of boost on a 350 cid engine and 5 to 7 pounds of boost on a 454 cid engine. See our additional drive ratio charts at the end of this section. If your engine is smaller than this, your boost will be higher. If your engine is larger, your boost will be lower.

We state that your boost will fall within a particular range, such as from 5 to 8 pounds, because a lot of factors can cause boost to vary. Depending upon how well your engine breathes, the amount of observed boost on a gauge can vary substantially. If you install a Weiand blower and your observed boost comes up on the low end of our estimated range, it means you have a really good breathing engine. Another factor that can contribute to low boost is a restricted air inlet or too small of a carburetor. Remember that at full throttle your engine is going to need about 50% more air than it did before the blower was installed. Are your air cleaner and carburetor capable of letting in 50% more air? If not, you won't make the boost that the blower is capable of.

The amount of boost that can safely be run is primarily determined by the compression ratio of your engine and the gas that you are using. As a basic rule of thumb, the 5 to 8 pound boost range that is provided by the standard pulleys supplied in Weiand's supercharger kits is suitable for compression ratios in the 8 to 9:1 range. Example: 8 pounds on a 9:1 engine would yield a 13:9:1 compression ratio. An 8:1 engine with 5-6 pounds of boost is safe with 92 octane pump gas. If your compression ratio is higher than this, you will have to run less boost. If it is lower than this, you can run more boost. The key to any supercharger installation is that detonation must be controlled. Detonation in a blown engine is more destructive than in an unblown engine, and damage to piston ring lands (or worse) will occur if you continue to drive a blown engine that is detonating.

Many enthusiasts will experiment with increasing the boost until detonation occurs and then back down to the last boost level achieved without detonation. This requires purchasing additional optional pulleys. Remember that rarely are any two modified engines similar in how they react to boost and compression ratio combinations, so don't expect to copy what someone else may have done and achieve a successful installation. Unfortunately, as in many aspects of dealing with modified engines, trial and error is about the only way to achieve your ideal combination.

Please consult the charts in this Technical Section and the replacement pulley section for help in determining the pulleys and blower sizes that will best suit your specific application. In most instances, this will provide you with enough information to provide a workable and safe combination that will provide substantial performance improvements. For those of you who would like to achieve the ultimate in performance from your particular setup, the data provided in our charts will give you an excellent starting point on which you may build to reach your goals.

Compression Ratio / Boost Pressure

The compression ratio of your engine has a direct relationship to how much boost you can run. If you have a high compression ratio, such 9.5:1 or 10:1, you will only be able to run a small amount of boost.

The compression ratio that is built into your engine is called "static compression." When you combine the boost you are running in conjunction with your compression ratio, the result is known as the "Effective Compression Ratio." Formulas have been developed that convert your static compression and supercharger boost to the effective compression ratio. Table 1 provides this information.

You can find your static compression ratio on the left side of the chart. Then read across to the right under the boost you want to run and the number in the box will be your "effective" compression ratio. Experience has shown that if you attempt to run more than about a 12:1 effective compression ratio on a street engine with 92 octane pump gas, you will have detonation problems. To some degree, this can be controlled with boost retard devices, but we do not recommend that you set up your engine and supercharger to provide more than a 12:1 effective compression ratio. Please note that all engines differ in their tolerance to detonation. You can build what appear to be two identical engines and one will detonate and the other one won't, so the numbers given in this chart are not absolute hard and fast figures. However, if you follow this chart, you will be close enough that if you do experience some detonation, you should have no trouble controlling it with one of the aftermarket boost retard ignition systems.

Table 1 shows that you obviously can't try to run 10 pounds of boost on a 9.0:1 compression ratio engine. This gives you an effective compression ratio of 15.1:1, way beyond our 12:1 figure. If you are building your engine from scratch, it is a good idea to try to build it with a relatively low compression ratio, such as 7.5 or 8.0:1.

It is fairly easy to change the boost to get the best combination of performance and power, but it is extremely difficult to change the compression ratio, especially if you want to lower it. Additionally, you will make more total power with a low compression, high boost engine than you will with a high compression, low boost engine.

Table1: Effective Compression Ratio Chart

Static Compression Ratio	Blower Boost pressure (psi)												
	2	4	6	8	10	12	14	16	18	20	22	24	26
6.0:1	6.8:1	7.6:1	8.4:1	9.3:1	10.1:1	10.9:1	11.7:1	12.5:1	13.3:1	14.2:1	15.0:1	15.8:1	16.6:1
6.5:1	7.4:1	8.3:1	9.2:1	10.0:1	10.9:1	11.8:1	12.7:1	13.6:1	14.5:1	15.3:1	16.2:1	17.1:1	18.0:1
7.0:1	8.0:1	8.9:1	9.9:1	10.8:1	11.8:1	12.7:1	13.7:1	14.6:1	15.6:1	16.5:1	17.5:1	18.4:1	19.4:1
7.5:1	8.5:1	9.5:1	10.6:1	11.6:1	12.6:1	13.6:1	14.6:1	15.7:1	16.7:1	17.7:1	18.7:1	19.7:1	20.8:1
8.0:1	9.1:1	10.2:1	11.3:1	12.4:1	13.4:1	14.5:1	15.6:1	16.7:1	17.8:1	18.9:1	20.0:1	21.1:1	22.1:1
8.5:1	9.7:1	10.8:1	12.0:1	13.1:1	14.3:1	15.4:1	16.6:1	17.8:1	18.9:1	20.1:1	21.2:1	22.4:1	23.5:1
9.0:1	10.2:1	11.4:1	12.7:1	13.9:1	15.1:1	16.3:1	17.6:1	18.8:1	20.0:1	21.2:1	22.5:1	23.7:1	24.9:1
9.5:1	10.8:1	12.1:1	13.4:1	14.7:1	16.0:1	17.3:1	18.5:1	19.8:1	21.1:1	22.4:1	23.7:1	25.0:1	26.3:1
10.0:1	11.4:1	12.7:1	14.1:1	15.4:1	16.8:1	18.2:1	19.5:1	20.9:1	22.2:1	23.6:1	25.0:1	26.3:1	27.7:1
10.5:1	11.9:1	13.4:1	14.8:1	16.2:1	17.6:1	19.1:1	20.5:1	21.9:1	23.4:1	24.8:1	26.2:1	27.6:1	29.1:1
11.0:1	12.5:1	14.0:1	15.5:1	17.0:1	18.5:1	20.0:1	21.5:1	23.0:1	24.5:1	26.0:1	27.5:1	29.0:1	30.5:1

The above chart shows the effective compression ratio of your engine, which combines the static compression ratio with the amount of supercharger boost. Note that for most street applications with 92 octane pump gas, you should keep your effective compression ratio below about 12.0:1

Weiand Supercharger Sizes

Weiand currently offers the following size blowers for four different types of engines:

Small Block Chevrolet V-8

Pro-Street 142
Pro-Street 177
Pro-Street 250
6-71 & 8-71 Street

Big Block Chevrolet

Pro-Street 177
Pro-Street 256
Pro-Street 250
6-71 Street & 8-71 Street

Chrysler Hemi

6-71 Street (392)
8-71 Street (426)

Small Block Ford V-8 289-302

Pro-Street 174

The numbers related to these blower sizes, such as 142, 177, and 256, relate to the amount of air in cubic inches that is pumped by the blower in one blower revolution. The 6-71 and 8-71 designations refer to the original GMC diesel engines. Table 2 shows the amount of air per blower revolution the Weiand blowers pump.

Table 2: Supercharger Volumes

Supercharger Type	Approximate CID of Air Per Revolution
Pro-Street 142	142
Pro-Street 177	177
Pro-Street 256	256
Pro-Street 250	250
Weiand 6-71	411
Weiand 8-71	436

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In selecting the proper supercharger for your application, you also need to take into consideration how you plan to drive your vehicle and the approximate boost level desired. How you plan to drive your vehicle is important because you can set up your blower to be more efficient at high engine speeds or more efficient at low engine speeds, or you can arrange for the best compromise for the full engine rpm range.

For example, if your vehicle typically will be driven at speeds under 4,500 rpm and will never, or infrequently, see high engine speeds, you may want to select one of Weiand's smaller blowers. A smaller blower can be driven at a higher speed, which will produce a substantial amount of boost, particularly at lower engine speeds. However, this high blower speed will be less effective at higher engine speeds due to the overheating of the inlet air as discussed earlier.

Conversely, if you choose a larger blower for this same application, in order to achieve the same boost level, the larger blower will have to be turned at a relatively slow speed. This combination will not produce the low end power that the faster turning small blower will, but will significantly outperform the small blower at high engine speeds. However, if you never drive your vehicle in the higher speed ranges, you may be giving up impressive improvements in the lower speed ranges. You may choose to do this anyway because you want the look of the larger blower and are willing to give up some bottom end performance.

To be more specific, the Pro-Street/ Marine 142 makes an excellent low to midrange blower for a 350 Chevy. The 6-71 is best for mid to high rpm ranges. The 8-71 is for all-out competition style engines that will see high rpm usage. The Pro-Street 177 is a good all-around compromise that will perform well across the board, but it still won't deliver as much power as the 6-71 or 8-71 at extreme engine speeds. These recommendations are based on setting up all three blowers at a similar boost output.

For big blocks, Weiand offers the Pro-Street 177 for good low to midrange power, the 6-71 for strong mid to high-range power, and the 8-71 or large displacement, high boost/rpm engines. The Pro-Street 256 is a good all around compromise.

Again, the 6-71 will outperform the smaller blowers in the high rpm ranges.

Supercharger Rotors

Weiand uses two types of supercharger rotors. The smaller superchargers use new (not remanufactured) CAD/CAM designed two lobe rotors. These rotors were designed to hold their tolerances 360º for maximum boost pressure efficiency. Two lobe rotors feature thick walls and a solid shaft, which prevent flexing at higher boost levels. The supercharger case is smaller because the two lobe rotor design takes up less area in the case. This allows for a more compact package for easier underhood installation in many applications.

Weiand's 8-71 superchargers use three lobe helix rotors. The helix style rotor was developed by General Motors for larger GMC superchargers. They are more efficient than a two lobe rotor because they use less horsepower to supply a greater volume of cooler air charge to the cylinders. Helix rotors also resist flex under extremely high boost situations. These superchargers use larger cases, allowing for a greater volume of air displacement per rotor revolution.

There is also a version of the three lobe helix rotor used in racing called the "hihelix" rotor. This design has even more "twist" imparted into the blower rotor and does provide more power. These blowers were developed for Alcohol Dragster and Funny Car racing and are extremely expensive, making them impractical for anything but professional racing. The increase in performance is not justified by the increase in cost for street applications.

Expected Performance Increases

Installing a blower is one of the easiest ways to substantially improve a vehicle's overall performance. With one of Weiand's superchargers, here are some of the improvements you can expect:

1. Improved starting. A properly set up blown engine typically will fire instantly, usually before the engine has even made one revolution. This is because the blower immediately is pushing the inlet charge right into the cylinder, rather than waiting for the engine vacuum to draw the charge into the cylinder.

2. Substantial increases in bottom-end performance. While this is true with all Weiand blowers, it is particularly attributable to the smaller ones.

3. Substantial horsepower increases. Bolting one of Weiand's Pro-Street Superchargers on an otherwise stock small block Chevy will result in an increase of approximately 100 to 120 hp. Usually with a mild blower cam and a larger carburetor you can expect a typical small block to produce anywhere from 360 to 400 streetable horsepower. The addition of a set of good heads can boost this into the 440 to 470 hp range. Torque on an engine of this type typically will be in the 400 to 440 lb.-ft. range. All of these figures are based on a blower that is producing about 6 or 7 pounds of boost. A larger blower, such as Weiand's 6-71, on a similar engine to the one described above could push the top power output well over 500 hp.

NOTE: It is important to understand that for all practical purposes, an engine does not know what size supercharger is bolted to it. The amount of boost that is being produced by the blower is the critical factor. So our power output estimates above are somewhat typical of any of Weiand's blowers, with the following exceptions: At very low engine speeds, the smaller blowers will typically produce more torque than the bigger blowers. At very high engine speeds, the larger blowers will produce substantially more power than the smaller blowers.

Other Engine Modifications

One of the big advantages of a supercharger is that it can overcome many induction deficiencies in an engine, especially in the low to mid-range rpm area. Weiand Pro-Street and 6-71 superchargers can be installed on a stock engine, as long as the static compression ratio is 9:1 or less and engine speed is limited to 6,000 rpm. Most stock engines are equipped with cast pistons, cast crankshaft, two bolt main caps, and a small camshaft, requiring you to run very low boost pressure of 3 to 5 pounds maximum. Higher boost levels will cause detonation and engine failure.

To run boost levels from 6 to 10 pounds we recommend the following:

- Forged blower pistons with a static compression ratio of 7.5:1
- Steel crankshaft
- Four bolt main caps
- Steel harmonic dampener
- Stainless steel valves
- Three angle valve job
- More aggressive camshaft
- Roller rockers
- Ported and polished heads
- Steel rods with good rod bolts
- Chromoly push rods
- High output ignition
- Weiand high flow water pump (cast iron or aluminum available - see our complete catalog for applications)
- Minimum of a 2-1/2" diameter dual exhaust with headers. Recommended primary tube diameters and collector sizes are:
  Small Blocks: 1-5/8" to 1-3/4" with 3" collectors
  Big Blocks: 1-7/8" to 2' with 3-1/2" collectors

For maximum boost and horsepower applications (12 pounds or more), we recommend the following engine specifications:

- High quality forged or billet double keyed crankshaft
- Four bolt main caps with quality bolts or studs
- Steel double keyed harmonic balancer or crank hub
- High quality steel rods (H or I beam)
- Forged blower pistons
- O-ringing the block (mandatory)
- Severe duty stainless steel valves or iconel
- Fully ported and polished heads
- Solid or roller cam designed for high boost
- Roller rockers
- Chromoly push rods
- High output ignition management system or magneto
- Blueprinted carburetors or fuel injection
- High octane race fuel (112+ rating)
- Minimum of a 3" diameter dual exhaust with free flowing street/race mufflers and large tube headers.
- Recommended primary tube diameters and collector sizes are:
  Small Blocks: 1-7/8" to 2" with 3-1/2" collectors Big Blocks: 2-1/8" to 2-1/4", with 4" collectors
- Maximum effective compression ratio on gas not to exceed 24:1

It's important to realize that there are no hard and fast rules and the suggestions made here are general in nature.

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Carburetion with a Blower

Choosing a carburetor is a very important step in building a blower motor. Under boost, the engine could need up to 40 to 50% more fuel and air, so it's key to pick a carburetor that is up to the task. If your carburetor can't provide enough fuel and air, you can't take full advantage of your supercharger and you won't be able to make maximum boost.

In addition to providing fuel for the motor, the carburetor also is the restriction through which air must pass to get into the blower and the motor. Running too small a carburetor therefore means that you can't flow enough air to produce maximum boost.

It's very simple: If a supercharger can't draw the air and fuel into it, you can't get horsepower out.

The amount your carburetor needs to flow depends on engine characteristics and on the amount of boost your blower will be making. There's a formula for determining the required carburetor cfm:

$$\text{Maximum CFM Required} = \frac{\text{Engine CID} \times \text{Maximum Engine RPM}}{356} \times \left[\frac{\text{Maximum Blower Boost}}{14.7} + 1\right]$$

For those of you who don't want to do the math, Table 3 is a chart with guidelines for carburetor usage depending on the application:

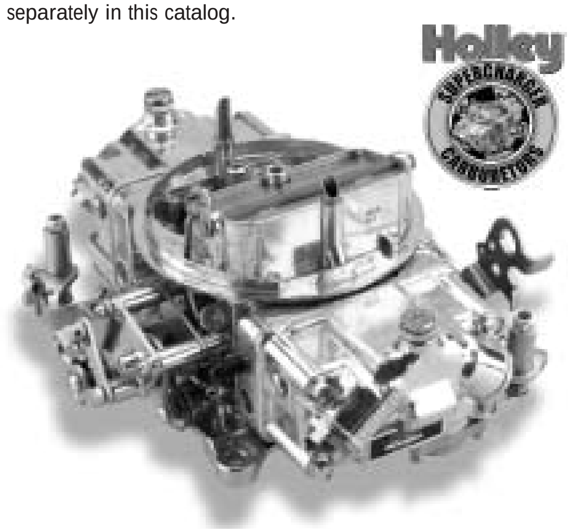
Table 3: Supercharger Carburetor Selection

Blower Size	Engine	Approximate Required CFM*	Holley Carb(s) P/N	Holley HP Carb(s) P/N
142	Chevrolet Small Block 350	700	0-80572S	0-80576
174	Ford Small Block 302	750	0-80573S	0-80576
177	Chevrolet Big Block 454	800		0-80576
256	Chevrolet Big Block 454	(2) 750	0-80573S	0-80576
420	Chevrolet Small Block 350	(2) 600	0-80592S	0-80575
420	Chevrolet Big Block 454	(2) 750	0-80573S	0-80576
6-71	Chevrolet Small Block 350	(2) 600	0-80592S	0-80575
6-71	Chevrolet Big Block 454	(2) 750	0-80573S	0-80576
6-71	Chrysler HEMI 392	(2) 750	0-80573S	0-80576
8-71	Chevrolet Small Block 350	(2) 750	0-80573S	0-80576
8-71	Chevrolet Big Block 454	(2) 800		0-80576
8-71	Chrysler HEMI 426	(2) 750	0-80573S	0-80576

If your carburetor is too lean, it will cause detonation, which can destroy your motor. How do you know if it's too lean? You'll have several obvious indications, like glowing red headers, audible "lean pop," or engine surging. Even if you don't experience these conditions, you should still read your spark plugs for proper color. You want to see a medium to dark tan color.

If you run one or more Holley carburetors, be aware that they contain power valves. Power valves provide additional fuel when there is no vacuum at the base of the carburetor. However, in a blower application, there will always be some vacuum, so the power valves will not function properly. You will need carburetors that have a "boost referenced" power valve circuit. Holley "Supercharger Carburetors" are specifically designed with this feature. In addition, they also are 100% wet-flowed, equipped, and calibrated for the special needs of a supercharged engine.

Weiand offers several components for use on carbureted applications, including a stainless steel fuel line kit for side-mounted Holleys and high performance carburetor linkage kits for Holleys. To complete your supercharger installation, use a Weiand air scoop (Hilborn or Enderle style). Several styles of chrome air cleaners also are available and are listed separately in this catalog.



Holley "Supercharger Carburetors" are specifically designed with a " boost referenced" power valve circuit. In addition, they also are 100% wet-flowed and calibrated for the special needs of a supercharged engine.

Ignition Systems with a Supercharger

Many street supercharger applications will work fine with the stock ignition system, because blown engines make so much low and mid-range power, it is not necessary to rev to high rpm's. High performance ignitions are primarily required to provide adequate spark at higher than normal rpm's. If most of your driving is going to be under 5,500 rpm, you probably won't need an aftermarket ignition. For optimum performance at higher engine rpm's, select an aftermarket performance ignition system.

It is usually a good idea to run spark plugs that are one to two ranges colder than normal with a blower. The more boost, the colder the plug required. Colder plugs will foul easier than hotter plugs, so in this instance a "hot" ignition may be advisable.

The main thing that needs to be addressed with a blower is to make sure that detonation is controlled. A handy device to have is "boost retard control". With the use of this unit, you can run normal timing settings which will allow for easy starting and reasonable fuel economy under normal driving situations. However, when you step on the gas and the engine goes into boost, this timing setting may cause detonation. With the "boost retard control," the driver can dial in ignition retard with a dash-mounted knob. These devices usually operate on a "degrees of retard per pound of boost" and are typically adjustable from 1º to 3º of retard per pound of boost. As an example, if the unit is set to deliver 1º per pound of boost, that means that when your blower is putting out 4 pounds of boost the distributor will be automatically be retarded by 4º. When you reach 7 pounds of boost, it will be retarded by 7º. Best results are achieved by driving the vehicle under boost and adjusting the unit until any detonation is eliminated.

NOTE: We do not recommend using these devices in marine applications. Retarding the timing under boost increases the combustion temperatures. On a street vehicle, this typically occurs for short periods of time. In marine applications the engine is usually in full boost all of the time. As a result, these prolonged high combustion temperatures can burn pistons or valves.

Most blown engines operate best on 28 to 34º of total timing. Running more total advance will not provide any performance increase.

Your distributor should have a centrifugal advance mechanism that has been set up so that all of the advance is in by 2,500 rpm. The best way to set your timing is to put a permanent mark on your harmonic damper that represents 34º total advance. If your damper doesn't go this far, you can measure the timing marks on your damper and then, using your measuring tape, calculate where 34º would be. 34º is a very safe figure and should provide close to optimum performance.

After you mark off 34º, start your engine and rev it up to a speed where all the distributor's mechanical advance will be in. This should be somewhere over 2,500 rpm. Then read the new 34º mark like you would read TDC at idle speed. Adjust the distributor so that the new mark on the damper lines up with the "0" on your timing tab. This would provide 34º of total timing or if you wanted 32º of total timing, you could line up the mark on the damper with the 2º ATDC mark on the timing tab instead of "0."

Supercharger Engine Camshafts

The choice of camshaft can make or break a blower motor. A legend in the industry, Lunati offers several camshafts specifically designed to work with Weiand blower kits. In addition, the following are a few basic guidelines for selecting the proper cam for your motor.

Obviously, the amount of boost your supercharger produces is going to be a factor in choosing a camshaft. Weiand offers three different levels of superchargers, and each requires a different type of cam.

The "mildest" of Weiand's blowers are the Pro-Street superchargers, which are set to produce from 5 to 7 pounds of boost. The company recommends a hydraulic cam for these applications - where the engine will not be spun past 6,500 rpm and has several grinds available. All of these cams are ground on a 112 to 114º lobe center line, which helps maintain cylinder pressure to maximize horsepower at these lower boost levels. Keeping the cylinder pressure up also gives you excellent throttle response.

The milder cams that Weiand offers are great for street performance enthusiasts who want to gain about 100 to 120 streetable horsepower. The company also offers slightly "bigger" cams for the next performance level up.

For 6-71 and 8-71 blowers, Weiand again recommends running a hydraulic cam, as long as you keep the boost level below 10 PSI. Weiand also offers cams for these type of applications.

For your higher boost levels in gasoline burning engines, the company recommends running a flat tappet or roller cam with a 110º lobe center line. This cam design provides good overall power on pump gas and also aids in engine cooling. Plus, the 110º center line provides even sharper throttle response and helps lower initial cylinder pressure (you won't miss the cylinder pressure with these blowers, since they make plenty of boost).

In all supercharger applications, Weiand recommends running roller rockers and chromoly push rods.

Table 4 displays a listing of supercharger camshafts for the Chevrolet small-block (flat tappet hydraulic). For more information on Lunati's line of blower cams, consult the Lunati catalog, or call Lunati and speak with one of their cam experts at 901-365-0950.

Conclusion

Supercharging is an extremely effective way to reliably increase horsepower and torque, particularly in the low to mid rpm ranges where most street machines are operated.

Unfortunately, due to the wide use of superchargers in drag racing, many people think a supercharger is an exotic race component and is not truly suitable for the street.

Now that supercharging is becoming quite common on stock factory vehicles, more people are realizing that a supercharger is a safe, practical source of performance increases. Superchargers are currently available on several Ford models, as well as Buick and Pontiac cars. These are all Roots type superchargers and operate on the same basic principle as all of Weiand's superchargers.

If you have additional questions regarding Weiand Supercharger applications, please contact the Weiand / Holley Tech Department at 270-781-9741.

Table 4: Lunati Supercharger Cams for Chevrolet Small Block (Flat Tappet)

Description	RPM Range	Duration		Lift		Lope Sep	Opens / Closes	Camshaft Part	Cam & Lifters
		Adv In / Exh	@ .050" In / Exh	@ Valve In / Exh	@ Lobe In / Exh	Int C / L	@.050	Number	Part Number
CHEVROLET Small Block V8 (1957 - Present) with oem HYD flat tappet cams									
Weiand Supercharger cams									
New! HYDRAULIC, Excellent cam for a truck with stock engine mounting a supercharger.	2000 - 5500	290º 290º	223º 223º	.447" .447"	.298" .298"	114º Sep 111º Int C / L	01º BTC 43º ABC 49º BBC 06º ATC	**01005**	**01005LK**
HYDRAULIC, Good idle with strong low- and mid-range torque and power.	2000 - 5700	290º 290º	224º 224º	.460" .460"	.307" .307"	112º Sep 108º Int C / L	04º BTC 40º ABC 48º BBC 04º BTC	**00017**	**00017LK**
HYDRAULIC, Good idle. Good cam for every-day performance street car. Needs headers and gears.	2000 - 6000	285º 285º	230º 230º	.455" .455"	.303" .303"	114º Sep 109º Int C / L	06º BTC 44º ABC 54º BBC 04º BTC	**00011**	**00011LK**
New! HYDRAULIC, Decent idle. Great cam for street rod with well-built 350-400 CID motor.	2200 - 6000	303º 313º	234º 244º	.488" .509"	.325" .339"	112º Sep 107º Int C / L	10º BTC 44º ABC 59º BBC 05º ATC	**01006**	
New! HYDRAULIC, Lopey idle. Very good for a large engine running a lot of boost pressure.	2600 - 6500	313º 328º	244º 254º	.509" .533"	.339" .355"	112º Sep 107º Int C / L	15º BTC 49º BBC 64º BBC 10º ATC	**01007**	

Weiand 142 Drive Ratio & Estimated Boost Chart (PSI)

Drive Ratio (Overdriven)

Engine	2.44:1 144%	2.28:1 128%	2.15:1 115%	2.11:1 111%	2.00:1 100%	1.95:1 95%	1.87:1 87%	1.85:1 85%	1.71:1 71%	1.60:1 60%
327	12.4	10.6	9.2	8.7	7.5	7.0	6.1	5.9	4.3	3.1
350	10.6	9.0	7.6	7.2	6.1	5.5	4.7	4.5	3.0	
383	8.4	6.9	5.7	5.3	4.3	3.8	3.0			
400	7.5	6.0	4.8	4.5	3.5	3.0	2.3			

Weiand 177 Drive Ratio & Estimated Boost Chart (PSI)

Drive Ratio (Overdriven)

Engine	2.44:1 144%	2.28:1 128%	2.15:1 115%	2.11:1 111%	2.00:1 100%	1.95:1 95%	1.87:1 87%	1.85:1 85%	1.71:1 71%	1.60:1 60%	1.50:1 50%	1.41:1 41%
289	22.9	20.4	18.4	17.8	16.1	15.3	14.1	13.8	11.6	9.9	8.4	7.0
302	21.3	18.9	17.0	16.4	14.8	14.0	12.9	12.6	10.5	8.9	7.4	6.1
351	16.2	14.2	12.6	12.1	10.7	10.0	9.0	8.8	7.0	5.6	4.3	3.2

Weiand 177 Drive Ratio & Estimated Boost Chart (PSI)

Drive Ratio (Overdriven)

Engine	2.44:1 144%	2.28:1 128%	2.15:1 115%	2.11:1 111%	2.00:1 100%	1.95:1 95%	1.87:1 87%	1.85:1 85%	1.71:1 71%	1.60:1 60%	1.50:1 50%	1.41:1 41%
350	16.9	14.8	13.1	12.6	11.2	10.5	9.5	9.2	7.4	6.0	4.7	3.5
383	14.1	12.3	10.7	10.2	8.9	8.4	7.4	7.2	5.5	4.2	3.0	
400	12.9	11.1	9.6	9.2	7.9	7.4	6.5	6.2	4.7	3.4		
427	11.2	9.5	8.1	7.7	6.5	6.0	5.1	4.9	3.4			
454	9.6	8.0	6.7	6.3	5.2	4.7	3.9	3.7				
502	7.3	5.9	4.7	4.3	3.3							

Weiand 256 Drive Ratio & Estimated Boost Chart (PSI)

Drive Ratio (Overdriven)

Engine	2.12:1 112%	2.00:1 100%	1.86:1 86%	1.73:1 73%	1.63:1 63%	1.53:1 53%
427	17.8	16.0	13.8	11.8	10.3	8.8
454	15.9	14.1	12.1	10.3	8.8	7.4
502	13.0	11.4	9.6	7.9	6.6	5.3
540	11.0	9.6	7.9	6.3	5.1	3.9

Weiand 6-71 Drive Ratio & Estimated Boost Chart (PSI)

Drive Ratio (Overdriven)

Engine	1.30:1 30%	1.25:1 25%	1.20:1 20%	1.15:1 15%	1.10:1 10%	1.05:1 5%	1:1 0%	0.95:1 -5%	0.90:1 -10%	0.85:1 -15%	0.80:1 -20%	0.75:1 -25%	0.70:1 -30%
327	27.1	25.5	23.9	22.3	20.7	19.1	17.5	15.8	14.2	12.6	11.0	9.4	7.8
350	24.3	22.8	21.3	19.8	18.3	16.8	15.3	13.8	12.3	10.8	9.3	7.8	6.3
383	21.0	19.6	18.2	16.9	15.5	14.1	12.8	11.4	10.0	8.6	7.3	5.9	4.5
392	20.2	18.8	17.5	16.1	14.8	13.5	12.1	10.8	9.4	8.1	6.8	5.4	4.1
400	19.5	18.2	16.8	15.5	14.2	12.9	11.6	10.3	9.0	7.6	6.3	5.0	3.7
454	15.4	14.2	13.1	11.9	10.8	9.6	8.5	7.3	6.1	5.0	3.8		
502	12.5	11.5	10.4	9.4	8.3	7.3	6.2	5.2	4.1	3.1			
540	10.6	9.6	8.7	7.7	6.7	5.7	4.8	3.8					

WEIAND SUPERCHARGER TECHNICAL INFORMATION

Weiand 8-71 Drive Ratio & Estimated Boost Chart (PSI)

Drive Ratio (Overdriven)

	1.30:1	1.25:1	1.20:1	1.15:1	1.10:1	1.05:1	1:1	0.95:1	0.90:1	0.85:1	0.80:1	0.75:1	0.70:1
Engine	**30%**	**25%**	**20%**	**15%**	**10%**	**5%**	**0%**	**-5%**	**-10%**	**-15%**	**-20%**	**-25%**	**-30%**
327	29.6	27.9	26.2	24.5	22.8	21.1	19.4	17.7	16.0	14.3	12.6	10.9	9.2
350	26.7	25.1	23.5	21.9	20.4	18.8	17.2	15.6	14.0	12.4	10.8	9.2	7.6
383	23.2	21.7	20.2	18.8	17.3	15.9	14.4	13.0	11.5	10.1	8.6	7.1	5.7
400	21.5	20.2	18.8	17.4	16.0	14.6	13.2	11.8	10.4	9.0	7.6	6.2	4.8
426	19.3	18.0	16.7	15.4	14.1	12.8	11.5	10.2	8.9	7.6	6.2	4.9	3.6
454	17.2	16.0	14.8	13.6	12.3	11.1	9.9	8.6	7.4	6.2	5.0	3.7	
502	14.2	13.1	12.0	10.8	9.7	8.6	7.5	6.4	5.3	4.2	3.1		
540	12.1	11.1	10.1	9.1	8.0	7.0	6.0	4.9	3.9				

Weiand 10-71 Drive Ratio & Estimated Boost Chart (PSI)

Drive Ratio (Overdriven)

	1.30:1	1.25:1	1.20:1	1.15:1	1.10:1	1.05:1	1:1	0.95:1	0.90:1	0.85:1	0.80:1	0.75:1	0.70:1
Engine	**30%**	**25%**	**20%**	**15%**	**10%**	**5%**	**0%**	**-5%**	**-10%**	**-15%**	**-20%**	**-25%**	**-30%**
454	19.7	18.3	17.0	15.7	14.4	13.0	11.7	10.4	9.1	7.8	6.4	5.1	3.8
502	16.4	15.2	14.0	12.8	11.6	10.4	9.2	8.0	6.8	5.6	4.4	3.2	
540	14.2	13.1	12.0	10.8	9.7	8.6	7.5	6.4	5.3	4.2	3.1		
600	11.3	10.3	9.3	8.3	7.3	6.3	5.3	4.3	3.3				
650	9.3	8.4	7.4	6.5	5.6	4.7	3.8						

Weiand 12-71 Drive Ratio & Estimated Boost Chart (PSI)

Drive Ratio (Overdriven)

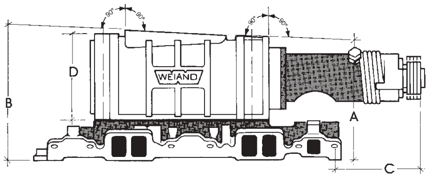
	1.30:1	1.25:1	1.20:1	1.15:1	1.10:1	1.05:1	1:1	0.95:1	0.90:1	0.85:1	0.80:1	0.75:1	0.70:1
Engine	**30%**	**25%**	**20%**	**15%**	**10%**	**5%**	**0%**	**-5%**	**-10%**	**-15%**	**-20%**	**-25%**	**-30%**
454	21.7	20.3	18.9	17.5	16.1	14.7	13.3	11.9	10.5	9.1	7.7	6.3	4.9
502	18.2	17.0	15.7	14.4	13.2	11.9	10.6	9.4	8.1	6.8	5.6	4.3	3.0
540	15.9	14.7	13.6	12.4	11.2	10.0	8.8	7.7	6.5	5.3	4.1	3.0	
600	12.8	11.8	10.7	9.7	8.6	7.5	6.5	5.4	4.4	3.3	2.3		
650	10.7	9.7	8.8	7.8	6.8	5.8	4.9	3.9					

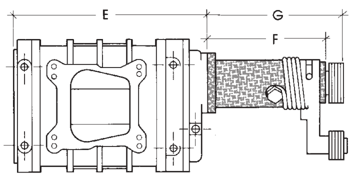
Weiand 14-71 Drive Ratio & Estimated Boost Chart (PSI)

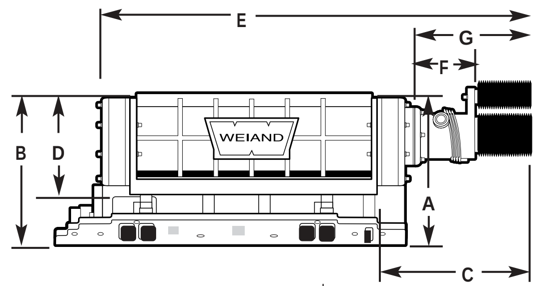
Drive Ratio (Overdriven)

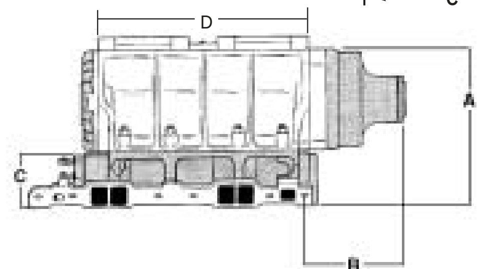
	1.30:1	1.25:1	1.20:1	1.15:1	1.10:1	1.05:1	1:1	0.95:1	0.90:1	0.85:1	0.80:1	0.75:1	0.70:1
Engine	**30%**	**25%**	**20%**	**15%**	**10%**	**5%**	**0%**	**-5%**	**-10%**	**-15%**	**-20%**	**-25%**	**-30%**
454	23.5	22.1	20.6	19.1	17.7	16.2	14.7	13.2	11.8	10.3	8.8	7.4	5.9
502	19.9	18.5	17.2	15.9	14.6	13.2	11.9	10.6	9.2	7.9	6.6	5.2	3.9
540	17.4	16.2	15.0	13.7	12.5	11.3	10.0	8.8	7.6	6.3	5.1	3.8	
600	14.2	13.1	12.0	10.9	9.8	8.7	7.6	6.4	5.3	4.2	3.1		
650	12.0	11.0	10.0	8.9	7.9	6.9	5.8	4.8	3.8				

SUPERCHARGER DIMENSIONS









142-177

SUPERCHARGER DIMENSIONS (see note)

SIZE	APPLICATION	A	B	C	D	E	F	G
142*	Chevy S/B, Long Nose, '86 only	7-5/8"	8-15/16"	9-1/4"	5-5/8"	12-15/16"	10-1/16"	11-1/8"
142*	Chevrolet S/B, Long Nose	7-5/8"	8-15/16"	8-1/4"	5-5/8"	12-15/16"	9-1/16"	10-1/8"
142*	Chevrolet S/B, Short Nose	7-5/8"	8-15/16"	7"	5-5/8"	12-15/16"	7-13/16"	8-7/8"
177	Chevrolet S/B, Long Nose	9-9/16"	10-15/16"	8-9/16"	5-15/16"	14-13/16"	7-1/16"	8-11/16"
177	Chevrolet S/B, Short Nose	9-9/16"	10-15/16"	7-5/16"	5-15/16"	14-13/16"	5-13/16"	7-7/16"
177*	Chevrolet B/B, Long Nose	9-1/4"	10-5/8"	7-7/8"	5-15/16"	14-13/16"	9-1/16"	10-1/8"
177*	Chevrolet B/B, Short Nose	9-1/4"	10-5/8"	6-5/8"	5-15/16"	14-13/16"	7-13/16"	8-7/8"
256	Chevrolet B/B, 256	10-1/2"	10-1/2"	9-1/4"	6-1/8"	19-1/2"	5"	7-1/2"
	Chevrolet S/B	11-3/16	8-3/8	3-11/16	15"			
6-71	Chevrolet B/B, std. deck	11-15/16	6-3/16	4-7/16	15"			
	`Chevrolet B/B, tall deck	12-5/16	6-3/16	4-13/16	15"			
	Chrysler 392 Hemi	11-1/4	10-3/16	3-11/16	15"			
	Chevrolet S/B	11-9/16	8-3/8	3-11/16	16"			
8-71	Chevrolet B/B, std. deck	12-1/8	7-3/16	4-7/16	16"			
	Chevrolet B/B, tall deck	12-1/2	7-3/16	4-13/16	16"			
	Chrysler 426 Hemi	12-5/16	12-1/4	4-1/2	16"			
10-71	Chevrolet B/B, std deck	12-1/8	8-3/16	4-7/16	17"			
	Chevrolet B/B, tall deck	12-1/2	8-3/16	4-13/16	17"			
12-71	Chevrolet B/B, std deck	12-1/8	9-3/16	4-7/16	18"			
	Chevrolet B/B, tall deck	12-1/2	9-3/16	4-13/16	18"			
14-71	Chevrolet B/B std deck	12-1/8	10-3/16	4-7/16	19"			
	Chevrolet B/B tall deck	12-1/2	10-3/16	4-13/16	19"			

(*) For 10-rib dimensions add .600" to dimension C & G.

NOTE: 142 and 177 BB dimensions are with 6-rib pulley; 177 SB dimensions are with 10-rib pulley; 256 dimensions are with 16-rib pulley.

Dimensions "A & B" listed for the 256 are less carburetor adapter. Add 1" to this dimension for carburetor adapter.

Dimension "A" for the 6-71-8-71 is less adapter. Add 1" for caburetor adapters with the exception of adapter part number 7164 which is 2-3/4".