the screaming aftermarket

An Introduction to the World of High Performance

Autolite Ford

THE WORLD OF PERFORMANCE

The sight and sound of a mighty Mercury Cyclone or Ford Torino screaming around a track at 180 miles per hour is an effective sales pitch for Ford Motor Company and its products.

THE YOUTH-PERFORMANCE MARKET

Entering the world of performance means entering the world of youth—a market that is all-important to Ford because of its numbers and its potential for continuing business in the years ahead.

This year, capping a campaign that goes back to the mid-fifties, Autolite-Ford, Ford and Lincoln-Mercury Divisions are in a coordinated, all-out effort to crack the performance market wide open.

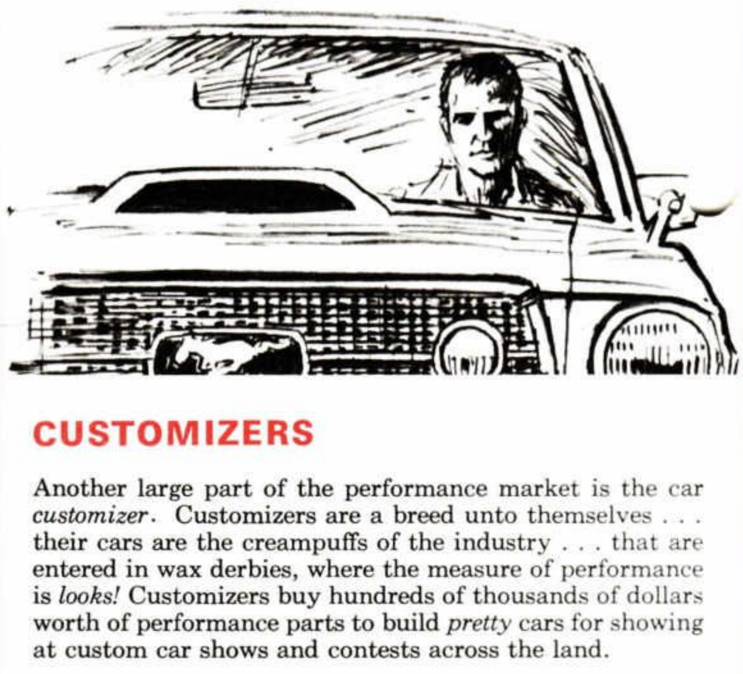
THE DEMAND FOR PERFORMANCE PARTS

There is today a significant demand in the aftermarket for performance equipment because the enthusiasm of the performance buff goes far beyond cheering a Lotus down the main straightaway at Indy or avidly devouring printed accounts of the action at Daytona, Le Mans or the West Wellington, Ohio motor speedway. A real performance enthusiast wants some of the action *himself*.

WHO IS AN ENTHUSIAST?

A performance enthusiast may be one of several breeds—a weekend dragstrip competitor—a road rally contestant or he may simply be a man who likes to feel the thrust of a high-torque engine pressing him into the seat—and wants the safety and convenience in traffic that comes of a well-tuned, performing engine in his car.

A true enthusiast is simply a person who feels respect for the power inherent in a high-performance automobile—or an ordinary automobile, for that matter. Performance parts get sold for installation on a lot of very ordinary-looking Mustangs, Comets and Fairlanes—for a lot of just ordinary people.



CUSTOMIZERS

Another large part of the performance market is the car *customizer*. Customizers are a breed unto themselves . . . their cars are the creampuffs of the industry . . . that are entered in wax derbies, where the measure of performance is *looks!* Customizers buy hundreds of thousands of dollars worth of performance parts to build *pretty* cars for showing at custom car shows and contests across the land.

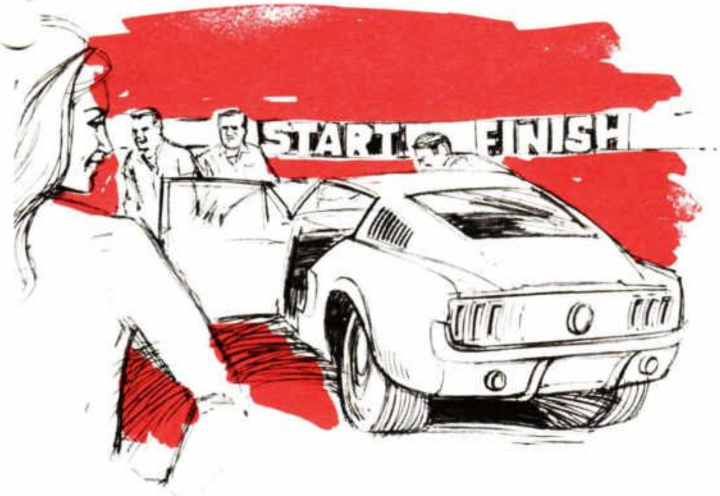
FACTORY RACE PARTICIPATION —AND THE "BAN"

In the mid-1950's, the big three auto manufacturers were [illegible]to racing right up to the Windsor knots on their engi[illegible]ers' four-in-hand ties. Millions of dollars were spent to win competitions like the Pike's Peak climb and the speed trials at Daytona. Who won what competitive event was blasted all over the world in every advertising medium available. Even stoneface Ed Sullivan almost smiled on national TV one night when he announced a Mercury win. And the effects of publicizing winners *did* show up in automobile showroom traffic and in sales of the hotter products coming out of Detroit. We were well on our way to establishing a solid performance market among amateur auto-enthusiasts when, in 1957, the Auto Manufacturers Association voted as a group to ban all factory activity in any sort of race competition.

The ban lasted about five years, and we cooled it . . . and thereby lost a lot of momentum among people who holler themselves hoarse at the track and go home repeating the names of the cars that won!

FORDS YOUTH CAMPAIGN

We began our comeback in the early 1960's by initiating a number of youth and performance programs—the "lively ones" advertising campaign; participating in rod and custom shows; college advertising programs; the unbelievably successful Mustang automobile; and the *most extensive race program ever put together by any manufacturer*. The strategy of these programs was to portray Ford products as performance winners in competitive arenas attractive to young people.



THE "WIN" IMAGE

You know the results: at Indianapolis; at LeMans; at Riverside; at Sebring—we've swept virtually every event we entered. In the world of performance, Ford has arrived! And in arriving we have created a market for performance products. Our performance products are being made fully available to the public; both as options on our cars in dealers' showrooms, and off the shelves of our dealers' parts departments and their wholesale customers.

Now that we've explored the performance market briefly, let's get into the technical terminology of the performance enthusiast.

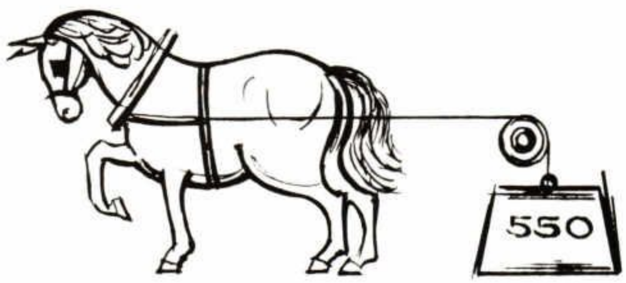
WHAT MAKES AN ENGINE "GO"

THE MEANING OF HORSEPOWER

More than 100 years ago, an inventor of sorts named James Watt parlayed his wife's teakettle and some old scrap iron into the world's first steam engine. Watt was anxious to find a basis for promoting his rotating steam whistle, and decided that advertising its horsepower was as good a way as any.

Whereupon, he soon added to his reputation for eccentricity by assembling a number of weights, ropes and horses, and measuring how much weight a horse could lift by pulling a rope threaded to a pulley tied to a treetop.

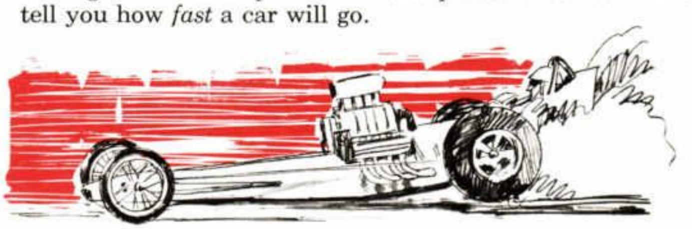
Now, obviously some horses perform better than others. But Watt discovered that the *average* horse could pull a 550 pound weight at one foot per second—and this became the basis for measuring power. One horsepower equals 550 foot pounds of work per second or its equivalent.



TORQUE AND R.P.M.—THE COMPONENTS OF POWER

There are two ways one horse can be more powerful than another—he is able to work faster—or he is able to work *harder*. The same is true of an engine. The ability to work harder is an engine's *torque;* and the ability to go faster is its *R.P.M.*

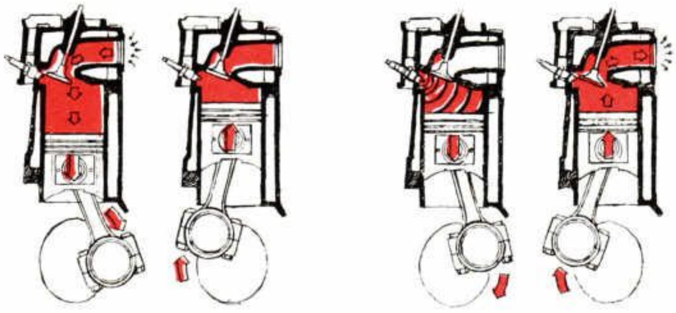
R.P.M. of course means *revolutions per minute*—and revolutions per minute is simply how fast the engine is turning. Engine speeds can range from the modest 500 R.P.M. idle of an old maid school teacher's cream puff to the 9,000 or 10,000 R.P.M. roar of a professional dragster ticking off 225 miles per hour in the quarter mile. R.P.M.'s tell you how *fast* a car will go.



Torque is the measure of how *hard* the engine can turn; its ability to dig in and scratch gravel. Torque is really nothing more than a measure of turning or *twisting* effort—and it's usually measured in foot pounds. More torque means better acceleration.

HOW AN ENGINE DEVELOPS POWER

Power is developed in the *cylinders* of a gasoline engine. Each cylinder is fitted with a *piston*, which is driven up and down by the *crankshaft* or crank for three of the four strokes of the combustion cycle . . . and in turn transmits power *to* the crank on one of the strokes.



The cycle begins with *intake* of the fuel. The crank, operating through the *connecting rod* pulls the piston down in the cylinder. The fuel mixture hurries in to fill the void. At the very bottom of the stroke, known as *bottom-dead-center*, the piston is reversed and pushed *up*, to *compress* the fuel mixture into the *combustion chamber*. The compressed gases are ignited by an electric spark and burn as the piston passes *top-dead-center*. Pressure created by the expansion of the burning gases pushes the piston back down on the *power* stroke. Finally, the momentum of the crank pushes the piston back up to force the burnt gases out on the *exhaust* stroke; and the cycle starts again.

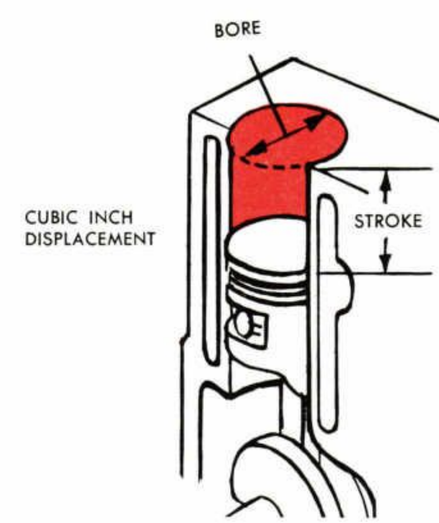
The piston, then, transmits force to the crank on the power stroke; and the crank converts this force to torque. How much torque? Depends on a number of factors we'll explore, starting right now with the *bore* and the *stroke*.

BORE AND STROKE

Now, the bore doesn't have anything to do with your brother-in-law. What it is, is simply the *diameter* of the cylinder. And the *stroke* is the distance the piston moves up and down from top-dead-center to the bottom-dead-center. Increasing the bore boosts the torque at higher R.P.M.'s while a longer stroke is effective in increasing torque at lower R.P.M.'s.

WOULD YOU BELIEVE SQUARES?

An engine with the bore and stroke *equal* is referred to in the performance trade as a *square* engine. A 4 x 4, for instance, is a square engine with a four-inch bore and a four-inch stroke. An *over-square* engine has a bore larger than its stroke, and is characterized by maximum torque at high R.P.M.'s. An *under-square* engine, then, has to have more stroke than bore, and develops its peak torque at lower R.P.M.'s.



ENGINE DISPLACEMENT

In the world of performance, the term "cubes" refers to the displacement of an engine in cubic inches. Displacement is equal to the stroke length multiplied by the cross-sectional area of the cylinder—or in other words the volume displaced by the piston as it moves between top-dead-center and bottom-dead-center. In an eight cylinder 4 x 4 engine, each cylinder has a displacement of just over 50 cubic inches; or a total engine displacement of something more than 400 "cubes". You'll also hear displacement expressed in liters, the European measure volume. A liter is equivalent to 1,000 cubic *centimeters* (C.C.'s).

Displacement is increased when the bore or stroke or both are increased; thus a big displacement engine, generally speaking, develops more power than a small displacement engine.

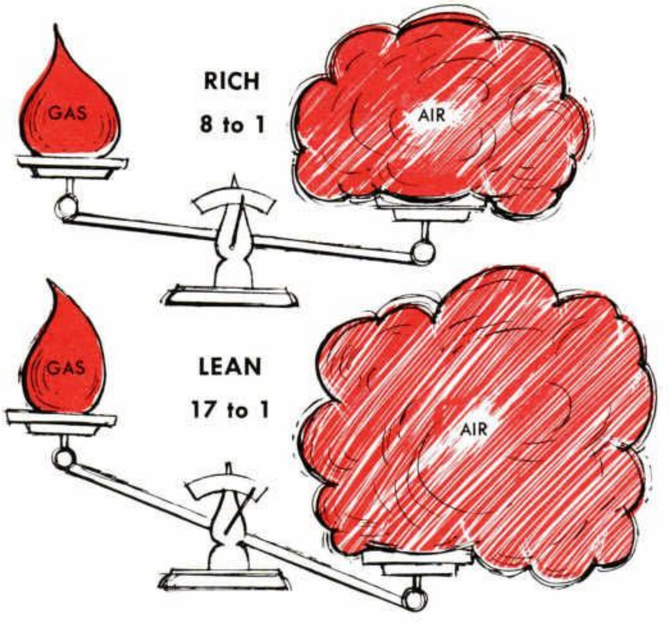
COMPRESSION RATIO

Compression is nothing more than how *tightly* the fuel and air mixture is compacted before it is ignited. The tighter it's packed in, the more pressure we get on the piston when the mixture burns. Therefore, increasing compression is another way to squeeze more power out of the engine.

Compression ratio is how much volume there is in the cylinder with the piston all the way down at bottom-dead-center; compared with the volume at top-dead-center. If you start with *nine* cubic inches and squeeze it down to one cubic inch, your compression ratio is 9-to-1. Street engines usually operate at compression ratios less than 9-to-1 . . . with performance engines running as much as 12-to-1 . . . or even higher.

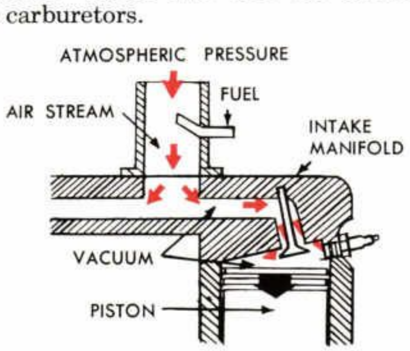
FUEL MIXTURE

Then we have the question of how *much fuel mixture* we can pack into the cylinder and how *rich* the mixture is. Richness refers to the proportions of air and gasoline in the mixture. Most engines will operate on a very rich mixture of eight parts air to one part gasoline through a very *lean* mixture of 17 parts air to one part gasoline. *In general*, a richer mixture, or a larger volume of mixture, means more power.



THE INDUCTION SYSTEM

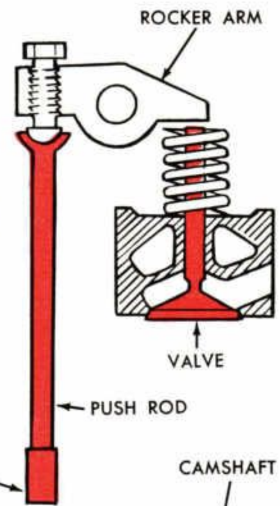
We get the fuel into the cylinder through the *induction system*, which consists of the carburetor, intake manifold and intake valves. The carburetor has the job of mixing the fuel and air in its venturi or venturis; the venturi being a sort of bottle-neck in the carburetor barrel which speeds up the flow of air and reduces pressure to siphon the fuel into the airstream and help it vaporize. A 2-V or two-venturi carburetor has two barrels; a 4-V carburetor has four barrels. An 8-V induction system has a total of eight barrels—either two four-vee carburetors or four two-vee carburetors.

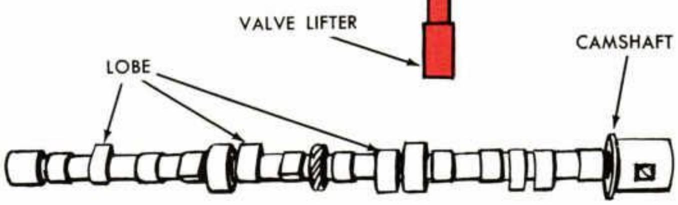


The *intake manifold* is a cast chunk of ductwork used to get the mixture from the carburetor to the intake ports in the cylinder head. There, the mixture is allowed to flow into the individual combustion chamber when the *intake valve* opens. The burnt gases are pushed out or scavenged through the *exhaust valve* on the exhaust stroke of the piston.

CAMSHAFT TIMES THE VALVES

The opening and closing of the intake and exhaust valves is precisely timed by the arrangement of lobes on the *camshaft* which is driven by chain sprockets or gears from the crankshaft. Camshaft being a two-syllable word is usually shortened to *cam* in performance language.

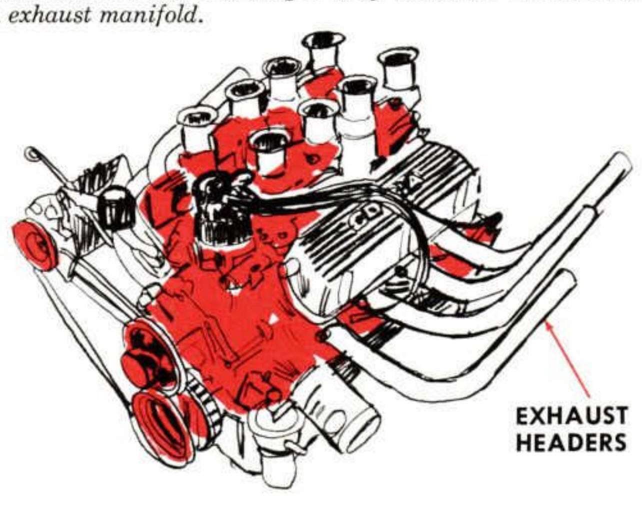




Today's engines all use *overhead* valves, meaning that the valves operate and seat in the cylinder heads rather than in the engine block. In an overhead valve engine, the cam operates the valves through a rather devious valve train consisting of the *lifters* or *tappets*, which actually ride on the cam lobes; the *push rods* which are shoved up and down as the lifters rise and fall; and the *rocker arms*, which transmit push rod motion to the stems of the valves. *Springs* are installed on each valve stem and bear against *retainers* or *keepers* to close the valves as the lifters track down to the low part of the cam lobes. The lifters or tappets can be (1) hydraulic, which use oil pressure to take up clearances in the valve train for quiet operation; or (2) *solid* or *mechanical* lifters, with adjustable rocker arms for more positive valve operation at extremely high R.P.M.'s.

EXHAUST HEADERS

To get the spent gases from the combustion chamber into the exhaust system—or the atmosphere—requires another duct from each cylinder exhaust port. The exhaust ducts on racing vehicles are usually tubing—referred to singly or in a group as *headers*. If the exhaust ducts are all contained in a cast housing it may be called a header or an *exhaust manifold*.



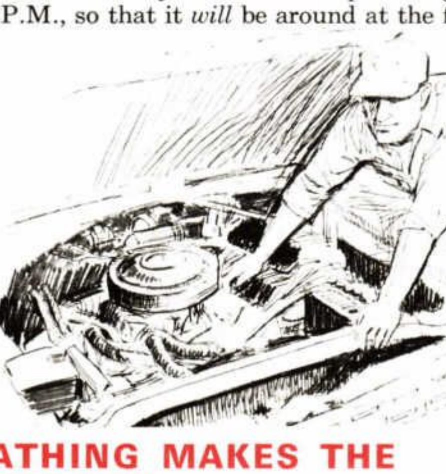
ENGINE BLUEPRINTING AND BREATHING

As good as our production engines are . . . and they are the world's best . . . the stock engine is *not* designed for the race circuit, and requires a considerable amount of refinement to convert to an all-out full-race engine.

BLUEPRINTING

Blueprinting, in effect, is taking an engine completely apart and rebuilding it. One of the activities involved is balancing all the moving parts to make the engine operate as smoothly as possible. The volume of all the combustion chambers is *equalized* by carefully measuring each and grinding them all out to the volume of the largest. The instrument used to make the measurement is a cubic centimeter glass, and the process is referred to as "C.C.-ing the combustion chambers." It assures that every cylinder will have the same amount of compression. Bearings and pistons are re-fitted, and the configuration of fuel ports in the manifolds, heads and headers may be modified for smoother flow of gases.

It's often been observed that no one ever won a race he didn't finish. Another purpose of blueprinting is to increase the engine's reliability in the terrific pounding it takes at high R.P.M., so that it *will* be around at the finish.

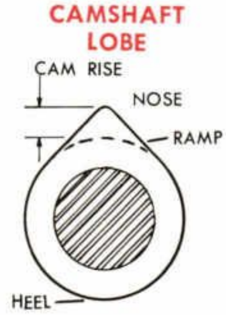


BREATHING MAKES THE DIFFERENCE

If two engines are identical in such characteristics as bore and stroke, compression ratio and the like, their difference in performance will depend on their *breathing* ability. Breathing refers essentially to the ability to get *quantities* of fuel mixture into the cylinders, and of course, to scavenge the exhaust gases after they've done their duty.

The heart of the induction system and the real key to engine performance is the *camshaft*. The amount of *rise* or *lift* of the camshaft lobes determines how far the valves open. Cam lift is usually expressed as how far the valve opens in thousandths of an inch. A 500-lift cam, for instance, moves the valve a full half-inch off its seat. "Wild" cams for all-out competition are in the 600-lift and up range.

TYPICAL CAMSHAFT LOBE



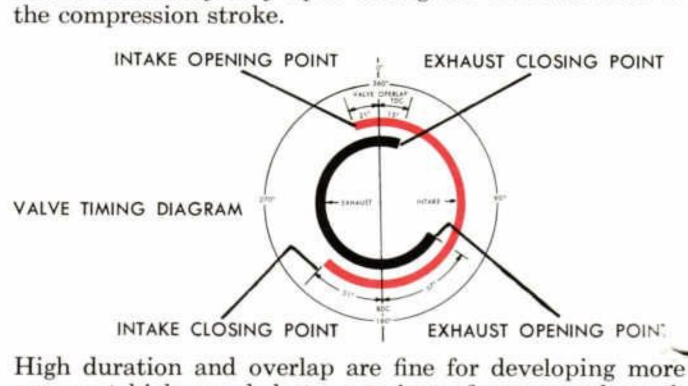
THE WILD ONES

A really wild cam designed to coax the most in R.P.M.'s out of the engine is great in drag racing where the car leaves the line with the engine turning four or five thou sand R.P.M. But, it is useless for street operation. T racing crowd would say it is not street-tractable, because it develops its torque at engine speeds that a street vehicle may never be operated at. Street vehicles, then, need a little less cam so they'll develop *low-end* torque; that is, more torque at a lower R.P.M. Automatics must have less cam than manual shifts. Also, a heavier car can't stand as much cam as a light car, because it needs more low-end torque to accelerate the extra weight.

We should note also that the cam must be matched to the rest of the induction system. Putting a wild cam in an engine with a stock two-barrel carburetor is like feeding a circus lion a diet of two snails three times a day. The fuel supply has to be there, or the beast won't perform; at least not according to the rules.

CAM DURATION AND OVERLAP

Coaxing more R.P.M.'s with a high-lift cam creates a batch of other effects that must be compensated for. As R.P.M.'s increase, the gases don't start to flow immediately as the valves open; and the valves don't open instantaneously. Yet, there is *less* time available for the gases to enter and leave the cylinders. The only answer to this problem is to design the cam for longer *duration;* that is, to open the valves sooner and close them later. In fact, it is necessary to open and close the valves before the piston strokes are completed; resulting in both valves being open at the same time during the transition from exhaust to intake. We call this condition *valve overlap;* and it may occur for as much as 70 degrees of crankshaft rotation. In addition, the exhaust valve may begin to open in the final one-third of the power stroke and the intake valve may stay open during the first one-third of the compression stroke.



High duration and overlap are fine for developing more power at high speed, but cause loss of power and rough operation at low R.P.M.

FLOATING VALVES

At high R.P.M.'s, the effective weight of all the valve train components is increased greatly. A point can be reached, usually around 5,000 R.P.M., where the stock valves will float like an overstuffed dolphin in the Great Salt Lake causing a big drop in power

Float is simply a condition where the valve springs haven't got the stuff to push the valves closed; and engines are modified several ways to avoid it. One way is to stiffen the valve springs with shims; though it's more common to simply use stiffer springs or *dual* springs. Considerable care is given to exact spring forces and rates, because too much spring obviously will accelerate wear on the cam lobes. The spring *retainers* must be beefed up to handle the extra spring loads, so a performance cam kit often includes both springs and retainers with the cam. It may also include a fresh set of solid lifters, since stock hydraulic lifters have a tendency to "pump up" in such fast company and help the valves float in spite of beefier springs.

Additional modifications for better performance at high speed can be in a valve itself. Racing valves can be made of lighter materials; or ground down so they won't weigh so much. The *size* of the valves can be increased, which means reworking the cylinder heads. Sometimes the rocker arm mounts have to be beefed up. Port passages in the heads may be designed for better flow of fuel mixture. And so we find a number of cylinder head and valve kits available for high performance operation.

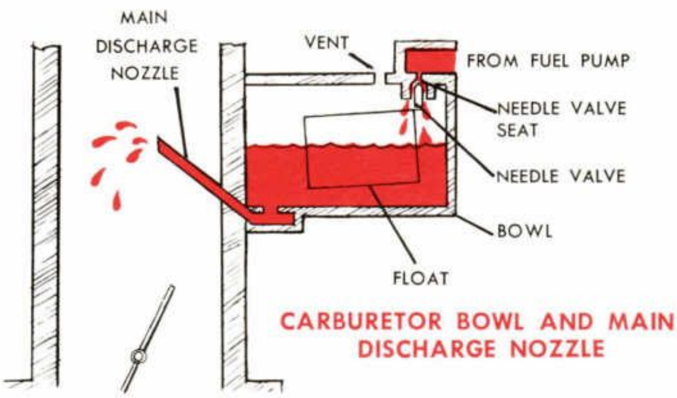
TUNED HEADERS

A *tuned* exhaust system has tubing headers of equal length terminating in a *collector;* and is designated to reduce back-pressure in the cylinder for optimum flow of gases during valve overlap. A tuned header can increase engine output up to 30 horsepower over the conventional stock exhaust manifold.

CARBURETION, COMPRESSION, IGNITION

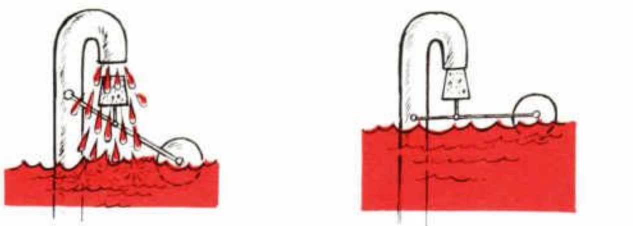
RICH BUT NOT MISERLY

In the days before four-barrel and eight-barrel induction systems were routinely available, there were still a number of ways of coaxing more fuel mixture or a richer fuel mixture into the cylinders. It isn't done at the factory, because it boosts fuel consumption to the detriment of winning gas economy runs. But the performance enthusiast isn't concerned with gas mileage—what he wants is go.



CARBURETOR BOWL AND MAIN DISCHARGE NOZZLE

One way to get a *richer* mixture to the cylinders is to bend a little tang on the inlet valve float in the carburetor so as to raise the level of fuel in the bowl.



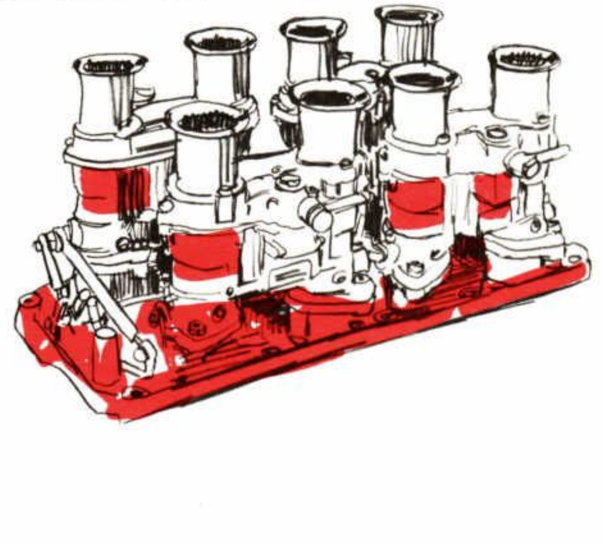
Two other tricks long known to a lot of amateur speed enthusiasts, are opening up the main metering jets to let the gasoline flow more easily, and boosting the pressure setting of the fuel pump.

FUEL PUMP MODIFICATION

Performance vehicles, incidently, seldom use production fuel pumps except in stock or super stock competition. Mechanical fuel pumps are available with more pumping capacity where more fuel is needed—and many competitive vehicles are equipped with high capacity electric fuel pumps.

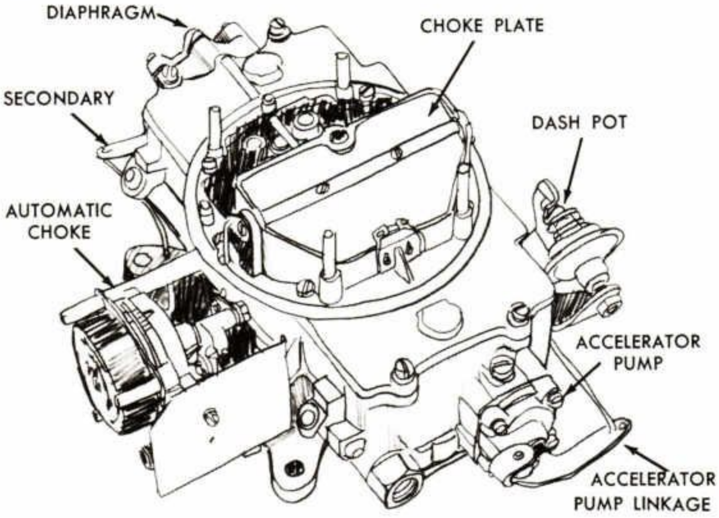
AIR FLOW MAKES IT GO

There is a definite limit to increasing power by enriching the mixture. In fact, the most important thing a performance enthusiast wants to know about a carburetor is the C.F.M.'s—that is, the capacity for air flow in *cubic feet* per *minute*—and that depends on the size of the barrel and venturi that the air flows through. However, a venturi can be opened only so far for more air . . . then there are "flat spots" where the fuel to air proportions are leaner going from low to high R.P.M.'s. To get around this drawback, we use *multiple* venturis—two or four barrels in stock V-8 engines and as many as eight barrels for higher performance.



PROGRESSIVE THROTTLE OPENING

The four-barrel carburetor, or *quad* as it is known in the performance world, makes a concession to economy by having *primary* and *secondary* venturis. The two primary venturis operate during normal driving with the throttles in the secondaries closed so there's no air flow through them. When full power is called for, the secondaries open to double the air capacity, and the ultimate in gas guzzling is achieved.



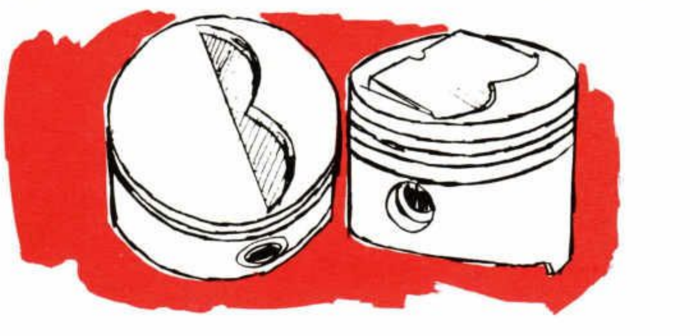
The end-all of carburetion, of course, is the eight-barrel induction kit—consisting of dual quads or of two four-barrel carburetors mounted on the intake manifold. A typical 8-Vee induction system has a capacity up to 1,200 cubic feet per minute . . . as compared to just over 500 C.F.M.'s for the production four-barrel carburetor.

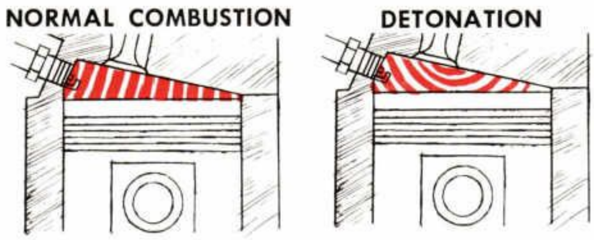
BLOWERS

There is a handy little device found on some induction systems called a *blower* or *supercharger*. This gadget compensates for the deficiencies of the atmosphere in shoving air down the carburetor throat by giving the air a boost from a fan. An engine equipped with such happiness is called a *blown* engine; though the term supercharged is equally descriptive and just as often used.

BOOSTING THE "SQUEEZE" FOR MORE POWER

Boosting compression is the poor man's road to boosting performance. In some cases, getting higher compression is no more difficult than installing a thinner head gasket, which effectively reduces the size of the combustion chamber. Another method is to install pistons with high *domes* which will reduce the available compression space. Then, if there happens to be a machine shop available, it's not too difficult to shave or *mill* some stock off the heads . . . and that also makes the combustion chamber smaller.





KNOCK-KNOCK IS A NO-NO

As compression increases, the tendency of the fuel to *detonate* also increases. In normal operation, combustion starts at the spark plug and the flame spreads rapidly and *smoothly* with the unburned fuel being heated and further compressed by the burning part. If compression is increased, this heat can get to be more than a little old blob of mixture can bear, and it blows its teakettle! The loud explosion it makes is muffled to a rattling knock or ping to the ear outside.

Detonation is prevented by increasing the *octane rating* of the fuel as compression goes up.

Regular gasoline today is in the 95-octane range and is suitable for compression ratios around 9-to-1. Premium gasoline may be around 100 octane and burn very nicely up to a 10-to-1 ratio. Beyond that, we need the 100-plus octane of super premium gasoline.

PERFORMANCE IGNITION COMPONENTS

Performance spark plugs are designed to resist the extra heat that's present in high speed operation, so that deposits won't build up and "keep 'em from sparking Conventional spark plug wires, which have a resistanc core to suppress static from fouling up nearby radios and boob-tubes, are replaced by solid copper-core wire for racing. This makes it pretty certain that the spark will get where it's going without any extra gaps to jump.

Racing distributors usually incorporate two sets of breaker points or *dual* points. With this arrangement the points don't have to open and close so fast at high speeds, and aren't so apt to "bounce" as a single set of points might.

Performance distributors also vary from stock in that the ignition advance is controlled purely by how fast the engine is turning; through rotating weights that move out from centrifugal force.

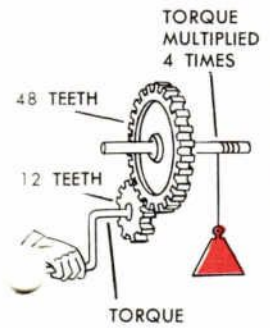
Ignition advance means that the spark is timed to make its mighty leap *ahead* of top-dead-center on the compression stroke. The spark *leads* the piston somewhat as you lead a bird with your 12-gauge shotgun; so that the gases a already starting to burn as the piston passes over center. The faster the engine goes, the more advance is needed, because there is a time lag between sparking and complete combustion.

HEAVY CLUTCHING

The clutch is the first component to handle engine torque on its way to the wheels. Its function is to couple the crankshaft to the transmission input shaft on a car with a stick shift . . . which most performance cars do have.

A high-torque engine has to have a heavy duty clutch behind it, which means bigger and beefier parts to keep it from slipping or coming unglued under a high torque load and at high R.P.M.'s. Race car drivers also insist on a heavy duty clutch housing or *scattershield* to protect the tender parts of the anatomy from shrapnel if the clutch blows up at high speed.

MULTIPLYING ENGINE TORQUE



The drive train, besides transmitting power to the driving wheels, also has to *multiply* engine torque. The first place that torque multiplication happens is in the transmission; and it happens the most in the lowest gear. How much is torque multiplied? Depends on the gear *ratio;* which is equal to the number of teeth in the driven gear divided by the number of teeth in the gear that does the driving.

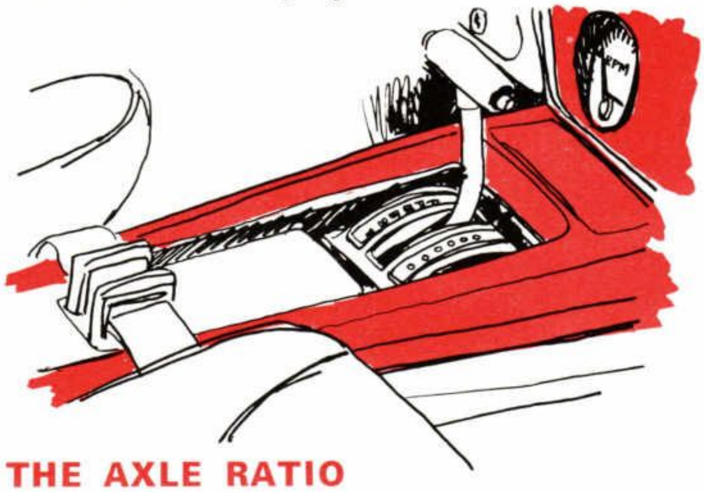
THE TACH SAYS "GO"

Every engine has a specific R.P.M. where it delivers the most power and this is the speed where the race driver likes to upshift to the next higher gear. He knows the engine is at that speed because he has one eyeball locked in on an instrument called a tachometer or "tach", which reads engine R.P.M.'s on a dial.

Each time the transmission is upshifted, R.P.M.'s drop off momentarily because the gear ratio is changed . . . so there's a brief reduction in power. If the ratios are close together, the power reduction is less than if they're far apart . . . which is why a four-speed box is preferred to a three-speed. It lets us have our gear ratios closer together without sacrificing the extra torque multiplication in low gear.

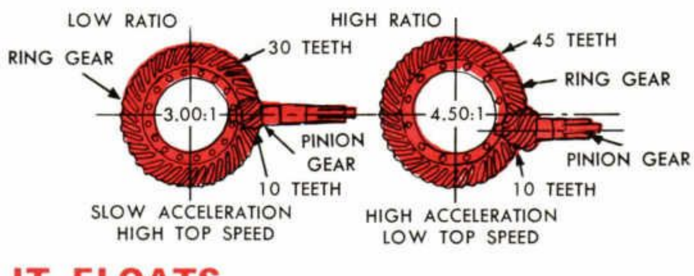
AUTOMATIC SHIFT

With an *automatic* transmission, the upshifts are controlled by a little computer called the valve body—if the selector is placed in the Drive position. Like most computers, though, the valve body is pretty limited. There hasn't been one yet smart enough to read a tachometer. To get around this, our engineers in recent years gave us a shift console that lets the driver upshift one-two-three manually when the tachometer says "go".



THE AXLE RATIO

From the transmission, engine torque is carried by the driveshaft to the driving axle or differential, where it goes through another multiplication before it gets to the wheels. Axle ratios run from about two-point-seven to one on street machines with automatic transmissions to as high as six-and-one-third to one on competition cars. A numerically high ratio means better acceleration; while a lower ratio lets the engine turn at lower R.P.M.'s and often gives a higher top speed in miles per hour.



IT FLOATS

In a conventional rear axle, the driving wheels are bolted to flanges on the axle shafts and are supported by the axle shaft bearings. This arrangement has been known to be less than adequate under the strains of high-speed cornering. Many racing cars, therefore are equipped with *full-floating* axles—where the wheels are supported by their own bearings on the axle housing.

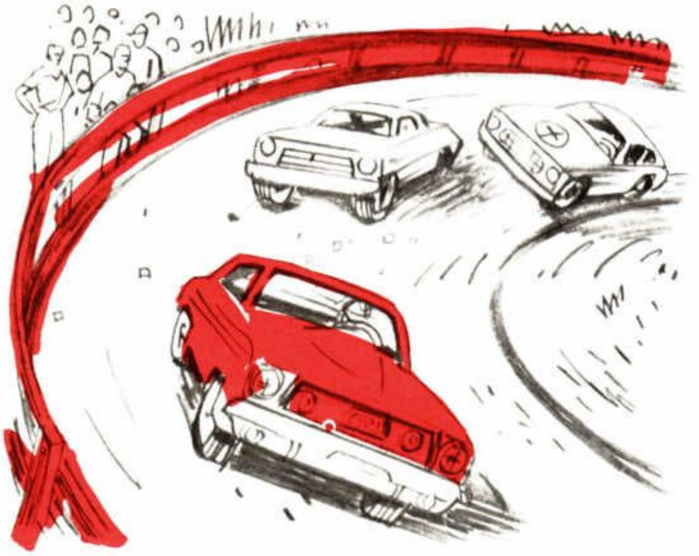
TRACTION-LOCK AXLES

Nearly every driving axle contains a *differential* unit, which allows the wheels to turn at different speeds while cornering. There are conditions where the differential encourages wheel-spinning—so we find that a Traction-Lock differential is often part of the package of goodies on a performance vehicle. A Traction-Lock differential incorporates a clutch in the rear axle carrier which in effect locks the two wheels together . . . so that a single wheel can have torque when the opposite member is suffering from a lack of traction.

"SLICKS" AND "GUMBALLS"

Traction is a science all in itself. A dragster gets maximum acceleration when both driving wheels are equally loaded and are delivering power *almost* to the point of spinning. In fact, many dragsters *smoke*, or in the language of yesteryear—*peel rubber*, slightly for the whole quarter-mile run.

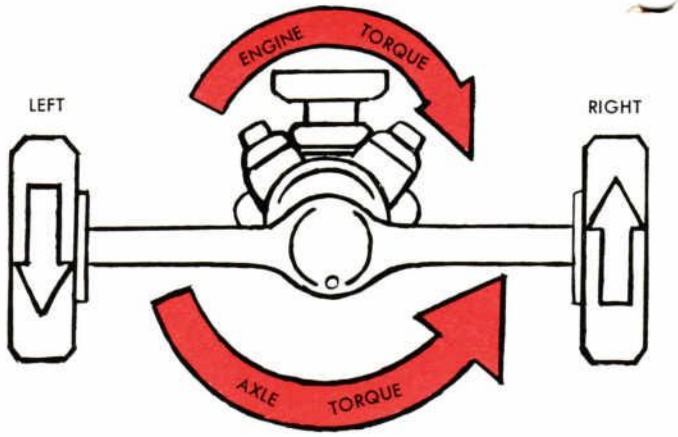
Special, extra-wide tires without treads cut in them are used on cars that compete in drag racing. These "cheaters" or "slicks" as they're called, are designed to increase traction by getting more rubber on the ground. Some are even treated to make them *stickier* and have thereby earned the name *gumballs*.



SPRINGS AND SHOCKS

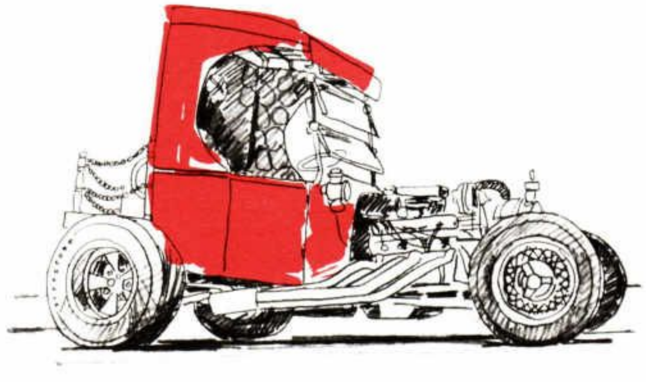
Alternately tying a driver's belly-button to his backbone with thrust and pulling all his guts off-center to starboard on turns also results in some load shifting in the car. This has to be compensated for in the suspension. Production cars are sprung to pamper the seat of the pants; but a performance car has to be suspended firmly enough to slither through a hairy turn on all fours and without scattering hardware over the track. That means stiff, heavy duty springs; shock absorbers built for more positive control; and sway bars to limit extraneous motions.

Over-the-road race cars are sprung like trucks—unless the course is bumpy enough that the springs have to be softened a little to avoid rattling the brain bucket. On the ovals, where all legal traffic is counter-clockwise, the wheels on the right side get firmer springs and shocks. In drag racing, the weight transfer is rearward, and both front and rear shocks are designed to counteract the effects of the weight transfer. Also, dragsters often are suspended on *air bags* in the rear, which by adjusting pressure between the two sides will overcome the tendency of engine torque to raise the right wheel—and therefore will equalize the wheel loads for better traction. Where leaf springs are used on drag cars, they may be clamped to stiffen them; and rear coil springs often are tied in Grand National racing, to reduce spring movement.



THE WAX DERBY

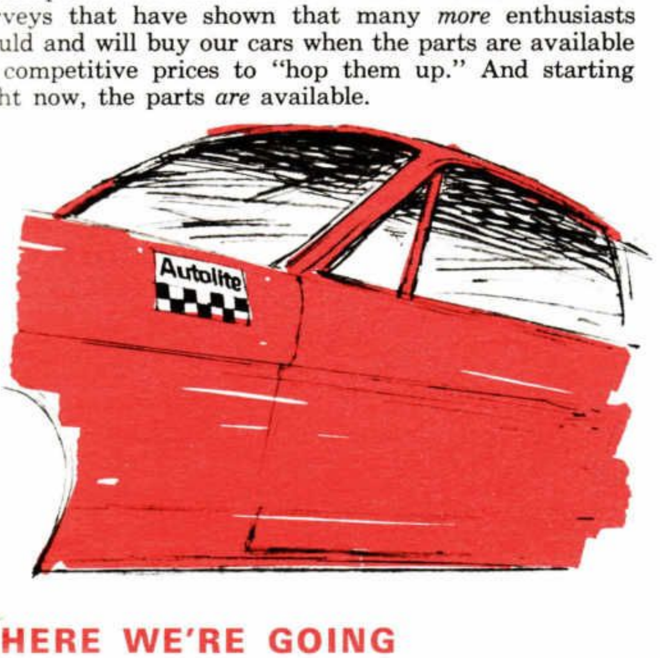
Customizers, to enter their pretty cars in "wax derbies" spend their bucks on such goodies as air scoops, which may or may not be functional; on racing stripe kits; on wire wheel covers; on "mag" wheels, which are built to look like lightweight magnesium race car wheels, from where they get their name; on chrome air cleaners and valve covers and other chrome dress-up accessories. And yes we do have a lot of these sorts of pretties for sale.



DEVELOPING PERFORMANCE BUSINESS

So now you know something about the exciting world performance and are able to understand some of i specialized language. This final section will return to the language you know best to describe how you fit into the performance field.

First, we have much larger percentage of Ford and Lincoln-Mercury vehicle ownership among people who participate in competitive events. The other reason is recent market surveys that have shown that many *more* enthusiasts would and will buy our cars when the parts are available at competitive prices to "hop them up." And starting right now, the parts *are* available.



HERE WE'RE GOING

Our marketing program will include continued heavy concentration on performance—racing competition, performance clinics in dealerships, auto show participation, various youth programs—in short, an all-out effort to make the Ford, Lincoln-Mercury and Autolite names dominant in the performance field.

THE PIECES ARE NOW

The handling of performance parts is being integrated right into the regular supply system. Accounts thus are assured of efficient handling, accessible catalog information, universal stock control and standard pricing.

We are offering a full line of high performance parts including complete engines, engine components, fuel systems, exhaust systems, distributors and spark plugs. We have high performance accessory equipment, suggested performance kits and customizing accessories such as wheel covers, chrome-plated engine parts and racing stripe kits.

TIME TO GO AND GROW

America's young people—and young-at-heart people—are restless and uptight. They want the action to start at an early age—and they don't ever seem to stop. The performance enthusiast represents a new market. Take your cue from him—let's make Ford number one in this exciting business.

Autolite Ford

VOL. 69-ST8A