SUPER STOCKING FORD'S 427

Let the experts show you how to add a batch of horsepower to the big wedge • by John Thawley

OK, you big-block Ford lovers, here's the "straight skinny" from Ford and Bill Stroppe's engine shop on getting more ponies from the 427. Nothing is held back. Parts numbers, clearances and critical torque limits are all here. The rest is up to you. Just don't "drop the bananas" on your way to the starting line.

As a bit of background, it seems Stroppe's engine shop down at Signal Hill, California, had built a super le gerra 427 to be used at last year's NHRA World Finals. The engine was never uncrated and wound up getting a round trip plane ride to Tulsa and back to California. Wally Cartwright (a member of Stroppe's shop crew) consented to spend the day unbuckling the engine for us and giving us all the "speed secrets."

Like so: Start with one 427 block, new or used. If used, boil it out and have it Magnafluxed. Take a very close look at the webbing, the main caps, main cap bolts and the cylinder head area around the head bolts. You are looking for stress cracks. Look carefully, or use one of the types of spray-on crack finders. If the block is new, you can skip the boiling operation but not the Magnafluxing. Since the block is probably in a machine shop at this stage anyway, have the block checked for being true in the bottom end. If a check indicates the need for line boring, have it done. This is a race engine, and a little bit of a problem now can mean a lot of problems later on.

The stock Ford piston (C5AZ-6108-A or B) used with the C5AZ-6049-C head assembly is designed to yield a static pressure ratio of 12.5:1. Cylinder block deck height should read .025-inch to produce 90cc head volume per cylinder. This combination is acceptable for strip and street. For the drag race engine only, the static pressure may be raised to 14.0:1 with piston #C8AX-6110-A. In this case, cylinder head volume is 80cc per cylinder with a cylinder block deck height of .012-inch. Any way you cut it, 14.0:1 is a bunch of pressure in a cylinder. Think about this more than once before this road is taken, even if the engine is being built for all-out competition. On a cold morning in Utah, the starter might need every battery in Widow's Gap just to crank that big mill.

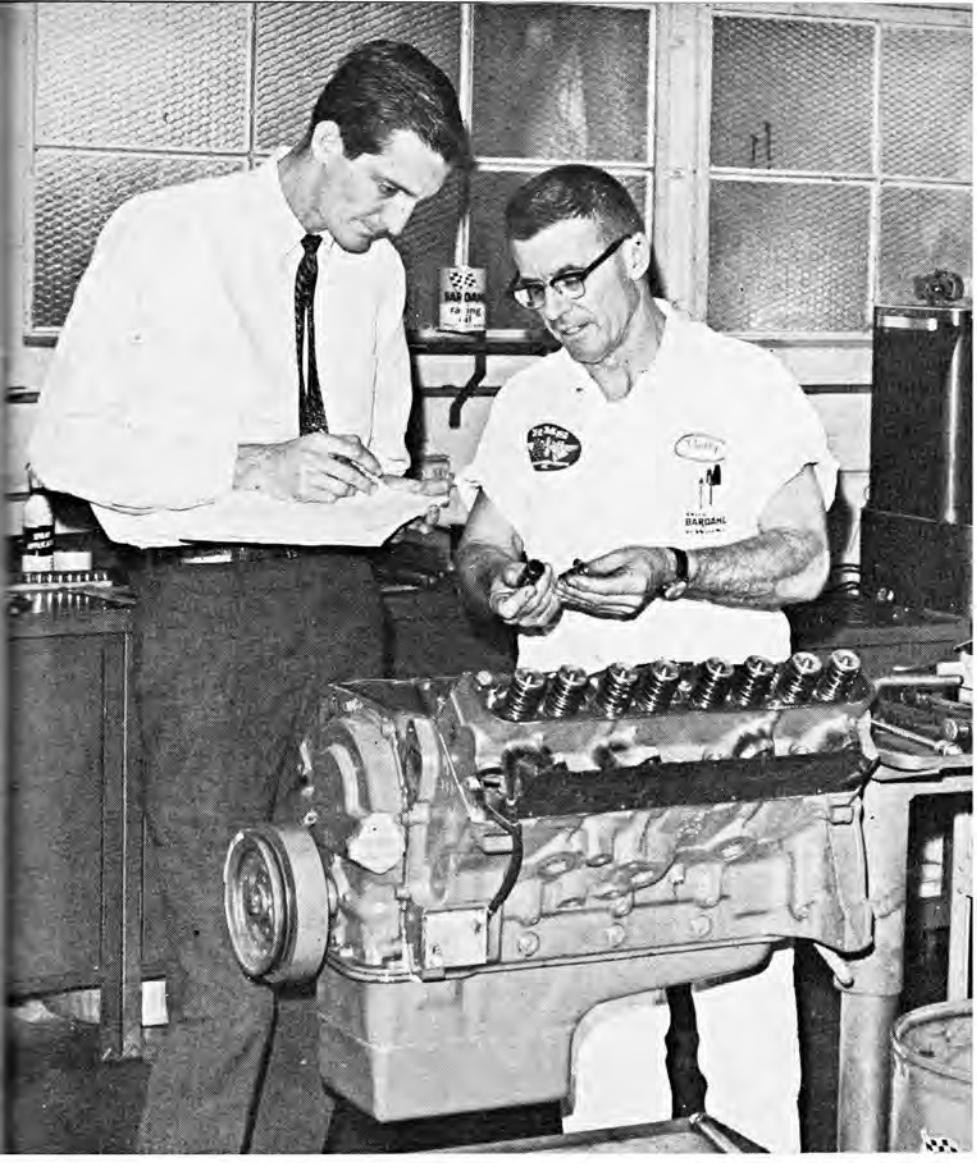
Piston skirt clearance should be .007-inch, measured even with the pin boss and perpendicular to the pin itself. With each piston stamped with the cylinder number it was fitted for, have a machine shop fit the piston pins to the connecting rods with a clearance of .0007- to .0009-inch. Use the stock Ford pin retainer.

What about the crankshaft? Stock Ford, and the parts number is C5AZ-6303-C. Have it checked for being straight, then have it Magnafluxed and balanced. Snug it into the block on stock Ford C5AZ-6333-AA and C5AZ-6333-AB bearings. For street use, run .0025- to .003-inch on the main and rod bearings. For the strip, it should read .003-inch. To connect piston with crank, we'll need a rod: stock Ford, parts number C5AZ-6200-D. If you can come by a set of rods boxed up with a "J" in place of the "D" at the end of the number, latch on to them. The rods are the same, but the cap is a little heavier. In either case, polish the rods the full length of the shank and remove all sharp edges or small pits which might start a fracture when all of this starts moving under load. And we do mean moving. We're talking about an engine which the Ford Super Stock drivers are taking off the line as high as 7500 rpm! When the going gets rough, and the last round effort is do or die, you can occasionally see a driver grit his teeth and move his shift point on up to eight grand. As we said, polish the rods – first with a wheel, then with paper.

Fit the rods to the crank in order to determine rod side-clearance at the crank. A stock big-block Ford will have about .019-inch. Move this out to a minimum of .025-inch, then have the complete rod assembly balanced before fitting it to the balanced crank . . . which gets bolted to a balanced flywheel. This is all critical. The balance operation is not an "ought to do it" factor in building this engine. It's a "must do."

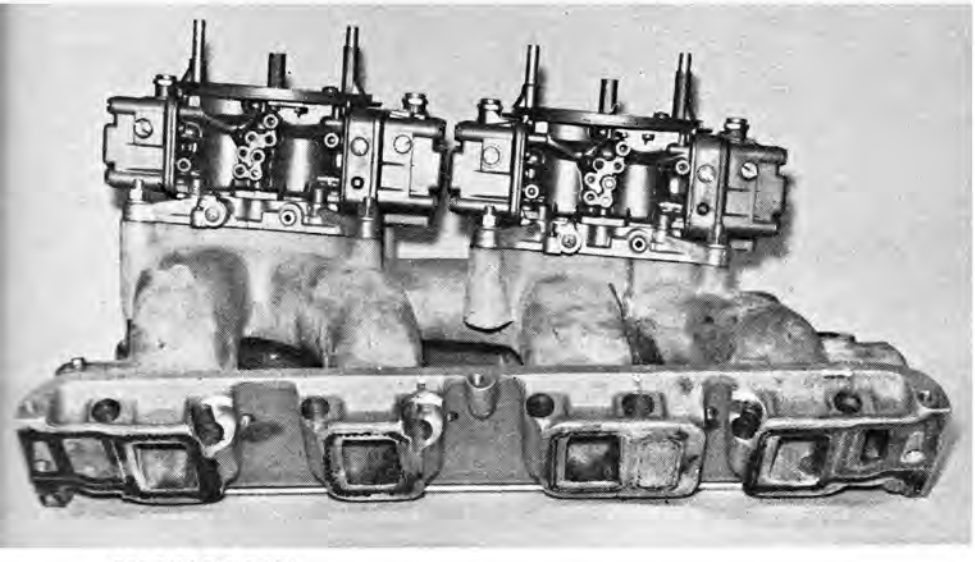
Stock Ford rod inserts (C5AZ-6211-G) are used. Torque the rods to 58 foot-pounds and bring the mains up to 105 foot-pounds. Main bearing cross bolts get snugged to 42 foot-pounds. If you do not have a tightening sequence for this engine, slip down to the local Ford agency and copy what the manual says about when to tighten what. Second, when working with the torque wrench, take all of the bolts up the scale ten pounds at a time. Take it slow and easy. If a bolt doesn't feel just right with the pressure on it, find out why. A slight bind could mean a burr on the bolt or in the hole. A bolt that suddenly feels greasy is suspect for major fatiguing. In a racing engine – Ford or any other brand – trouble is easy enough to come by, so you eliminate what you can with a little care and a lot of time when assembling the engine.

For ultra-heavy-duty applications, you might care to modify the oil pump to produce more volume. There are two routes to the solution. Several speed equipment manufacturers sell pumps which do the job, or you can make up your own. Start with a stock Ford 427 oil pump. Replace the rotor with one from a 534 Ford truck pump. The truck engine gear is thicker, but the same diameter as the gear from the 427. Press the truck shaft from the gear and push in the stock 427 shaft in order to provide correct fitting for the distributor intermediate driveshaft. In place in the pump body, the gear will now extend past the face of the pump body and the pump plate will not bolt. Using the plate as a pattern, a spacer of aluminum or steel must be machined to fit between pump body and plate. If you have access to a machine shop or have a buddy willing to turn a spacer out for you, fine. If not, you might be dollars and hours ahead of the game by buying a higher volume pump. By the time this gets into print, Holman-Moody & Stroppe may be making the spacers. Might be worth a check. But for street and drag use, the stock 427 oil pump is adequate.



Wally Cartwright of Holman-Moody & Stroppe uncoupled the 427 Super Stock engine down to the last lifter. Dual intake manifold is known as the tunnel wedge – bolts to stock heads – and helps a bunch. Holley jugs are reworked by Ford for better flow. Street-strip piston producing 12.5:1 static pressure is on the left. Make certain you know what piston is in the hole. Competition slug producing 14.0:1 compression ratio is on the right. This piston is not made for street use.

photography: Eric Rickman

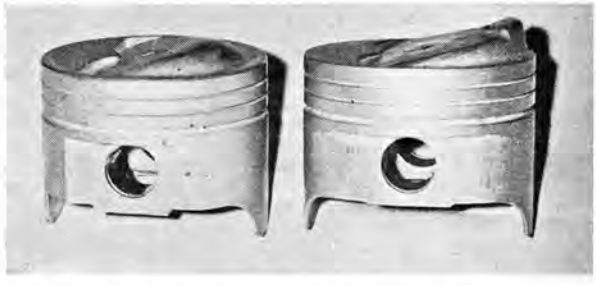


Ford can supply a reworked pickup (C5AE-6622-C) which reaches down into their deep-sump oil pan (C5AE-6675-N). The idea of all this is to get the oil away from the crank throws. The bonus of added capacity is just that – a bonus. With the Ford deep-sump pan, you should be able to run 9 quarts of oil with the filter. Ford also makes a low-restriction oil filter (C8AE-6714-B).

The recommended Ford flywheel is C5AZ-6375-P. This item tips the scales at 30 pounds. Remember the "P" at the end of the parts number, and don't get talked out of it if you want to stick with the stock Ford wheel. You did have the wheel balanced before installing it, didn't you? Again, this is a must.

The camshaft situation is a bit on the loose side, to say the least, since a preliminary check with Ford revealed no fewer than five cams available for the big engine. Chuck Foulger of the Stock Vehicle Department at Ford waded through all the specs and came up with two recommended cams. One is for street and strip and the other is for all-out competition. The competition cam is of the same classification as the 14.0:1 compression ratio; if the car lives on a trailer, the competition cam is the route to take. The competition cam bears Ford parts number C8AX-6250-D. The street-strip version can be found under parts number C4AE-6250-B. Check the chart for the necessary specs.

Cylinder head C5AZ-6049-C is to be assembled with intake valve C5AZ-6507-N and exhaust valve C5AZ-6505-N. For the intake valve, make sure the valve seat



and face angle is 30 degrees. The valve seat width should be .035-inch at the outer edge of the valve for drag strip racing only. For street use, pull the width out to .070-inch.

For drag racing, valve seat and face angle for the exhaust valve should read 45 degrees with a valve seat width of .050-inch at the outer edge of the valve; .080-inch takes care of the exhaust seat for driving on the street. Holman-Moody or Crane can supply the correct valve springs, lightweight pushrods, retainers and lifters. Check the cam chart for the specs on spring height and pressure.

After assembling pistons, rods, crank and heads (have the cam in place with timing chain, etc.), check the piston-to-valve clearance. This goes in the same

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FORD'S 427

Stock Ford connecting rods get checked for cracks – then polished and balanced for longer life and a few more revs. Valve train components come from Holman-Moody or Crane – lighter pushrods, dual springs – the good stuff.

category as balancing – a "must do" operation.

The *absolute minimum* piston-to-valve clearance is .120-inch. Check the clearance by selecting a feeler gauge of .145-inch (this is the clearance of .120-inch plus the valve lash of .025-inch), insert the feeler gauge between the valve and rocker arm, and turn the engine over twice by hand. If the valve does not hit the piston, you have the proper *minimum* clearance. Check all eight cylinders this way. In some cases the valve relief portion of the piston will have to be flycut to provide adequate valve-to-piston clearance. If for some reason the valve spring retainer assemblies supplied by Holman-Moody or Crane are not used, .100-inch must be cut off the tops of the valve guides.

The 8V (2 4-bbl) single-plane intake manifold bears parts number C8AX-9424-A and gets topped off with two Holley 4-bbl carbs (C8OF-9510-AC and C8OF-9510-AD). The boys at Ford recommend that experimentation with jetting begin with Holley number 77's in the main metering (primary) jets and with 71's in the secondary jets. Although not a part of engine modifications, the Super Stock racers use two electric fuel pumps in addition to the stock pump to insure adequate volume of fuel to the carbs. Use the *highest* octane fuel available. Autolite BF-32, BF-22, BTF-1 or BF-12 will most likely take care of spark plug requirements. (BF-22 is the range most commonly used.)

Modify the distributor to produce the curve in the chart, bolt on the headers of your choice, and the engine is about ready.

Building an engine to exact dimensions and tolerances is not an overnight job, but then, running a 3400-pound car in the low 11's with consistency is not done by every guy on your block every weekend, either – unless you live on a block we don't want anything to do with. ■■

Parts Number	Parts Name
C8AX-9424-A	Single plane tunnel wedge intake manifold
C8AX-6110-A	Piston (high compression dome)
C8AX-6150-A1	Dyke piston ring (compression)
C5AZ-6507-N	Intake valve
C5AZ-6505-N	Exhaust valve
C5AZ-6049-C	Cylinder head
C5AZ-6303-C	Crankshaft
C6AZ-6010-D	Block
C5AZ-6333-AA	Lower main bearing
C5AZ-6333-AB	Upper main bearing
C5AZ-6211-G	Rod bearing
C5AZ-6337-AA	Lower center main
C5AZ-6337-AB	Upper center main
C5AZ-6200-D	Connecting rod
C5AZ-6375-D	Flywheel
C8AE-6714-B	Low restriction oil filter
C8OF-9510-AC	Holley carburetor (primary)
C8OF-9510-AD	Holley carburetor (secondary)
C4AE-6250-B	Camshaft (street and strip)
C8AX-6250-D	Camshaft (competition)

Critical Dimensions

Piston skirt clearance	.007"
Rod bearing clearance	.0025" – .003" (competition use high side)
Main bearing clearance	.0025" – .003"
Rod end clearance	.025"
Wrist pin clearance	.0007" – .0009"
Valve seat and face angle	intake 30° exhaust 45°
Valve seat width-intake	.035" at outer edge of valve (drag strip racing only, .70" for street use)
Valve seat width-exhaust	.050" at outer edge of valve (drag strip racing only, .080" for street use)

Distributor Curve

Distributor RPM	250	750	800	1250	2000
Distributor degrees	0°	0°	2½°	5°	9°

Maximum safe full advance – 38°. If preignition or detonation prevails, retard lead as necessary.

Critical Bolt Torques

Bolt-cylinder head	100 ft. lbs.
Bolt-intake manifold	28 ft. lbs.
Bolt-connecting rod	58 ft. lbs.
Cross bolt-main bearing cap	42 ft. lbs.
Vertical bolt-main bearing cap	105 ft. lbs.
Bolt-rocker shaft hold down	50 ft. lbs.

Balance

Critical static weights:	
Piston	660 to 666 gms.
Connecting rod	833 to 845 gms. – pin end 254-260 gms. crank end 579-585 gms.
Weight of oil in crankshaft end	15 gms.

Street/Strip Cam C4AE-6250-B

Checking clearance .100 cam lift
Overlap 112
Duration 324
Lift .500 @ valve
Valve lash (hot) .025

Springs
Valve closed (max.) 115-120 lbs.
Valve open (max.) 307 lbs.
Stack height 1.910-1.920 (includes spring seat)

Competition Cam C8AX-6250-D

Checking clearance .100 cam lift
Overlap 116
Duration 330
Lift .600 @ valve
Valve lash (hot) .025

Springs
Valve closed (max.) 115-120 lbs.
Valve open (max.) 345 lbs.
Stack height 1.910-1.920 (includes spring seat)