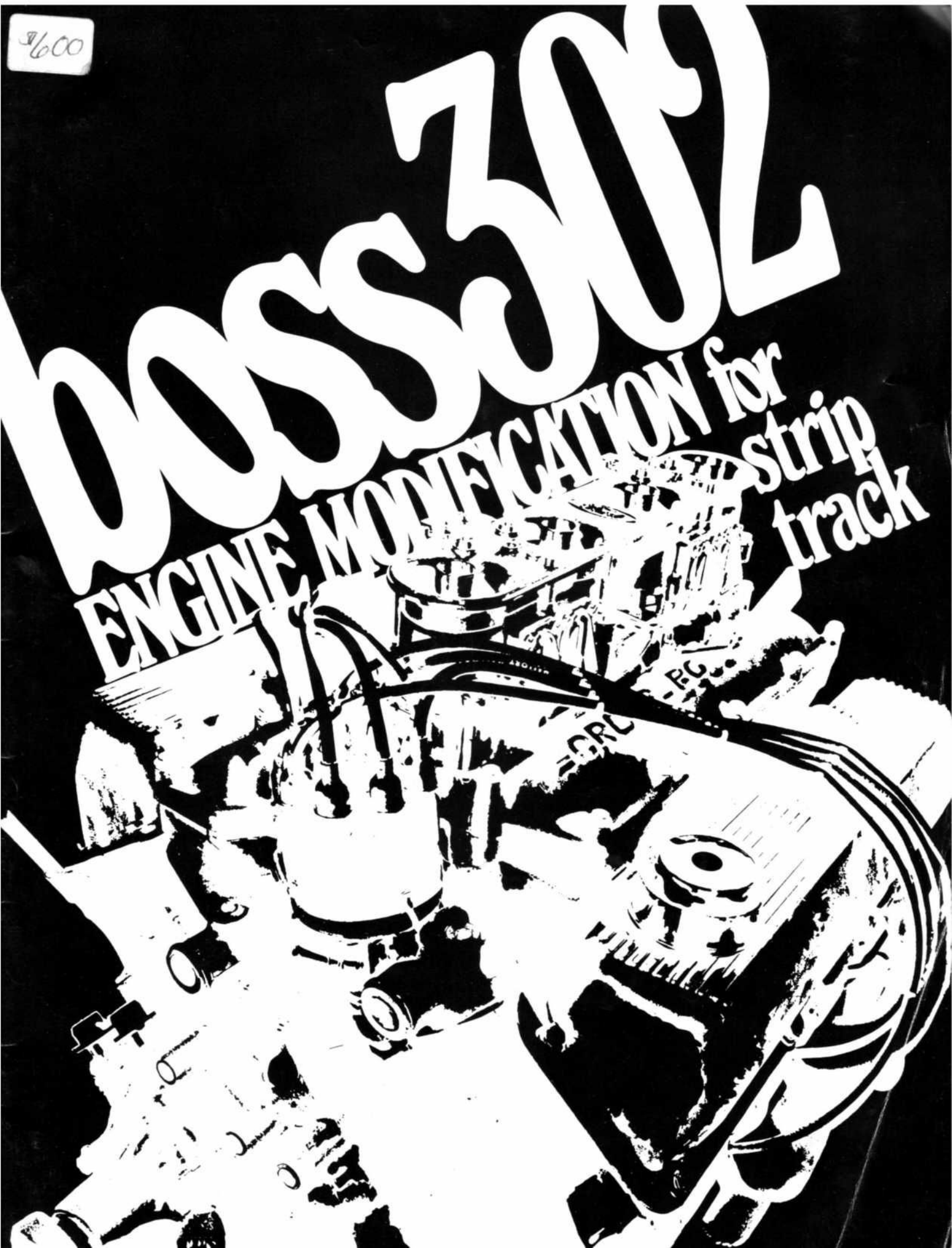
$600

289 302

ENGINE MODIFICATION for strip track



INDEX

BOSS 302...READY, WILLING, ABLE

Your stock Boss 302 engine has been engineered from the pan up as a full-fledged high performance engine.

Its canted-valve head design, extremely large valves and ports, 4-bolt bearing caps and mechanical lifters spell race-bred in any man's language.

And race-bred it is.

Boss 302's have earned the title of the strongest of the strong on the tough Trans Am racing circuit ... proving they have both the power to beat the competition ... and the inherent strength to handle this extreme form of punishment.

The nation's dragstrips have also offered ample evidence of the Boss 302's ability to rev high and hang together.

So your Boss 302 is ready, willing and able to provide you with the degree of performance you desire. It is an engine that proudly reflects its racing heritage ... a heritage that includes such names as LeMans, Indianapolis, Sebring, Bridgehampton and Daytona. It represents one of the latest endeavors by Ford and Lincoln-Mercury engineers to offer the performance-minded buyer a production engine which truly encompasses the lessons learned in world competition.

RACE ENGINES...AN ENGINEERING ART

This booklet has been prepared to help you prepare your Boss 302 engine to compete in road racing and drag strip events. In it, you will find the techniques used by Ford high performance engineers as well as some of the tricks and trade secrets of leading independent Ford race engine builders.

Building an all-out race engine borders on being a form of engineering art. As a result, each engine builder does things a bit differently. We will endeavor to show you not only how we at Ford do things ... but also how other engine builders prepare Boss 302 engines.

The techniques shown are those which we **know** have produced winners. Many of them are simple, basic procedures known to all ... and in use for years. They are presented here because they **are** basic ... and because **painstaking preparation wins races.**

A WORD ABOUT WARRANTY

Your stock boss 302 engine is protected under the terms of the Ford and Lincoln-Mercury passenger car warranty. If you intend to modify it for competition use, neither Ford Motor Co. nor any of its operating divisions can continue to offer you the same protection afforded a vehicle used for normal, everyday transportation only. For this reason, your regular new car warranty does not apply to any vehicle used in a Competitive Event. Competitive Events are defined in the warranty as " ... formal or informal time trials, competition with any other vehicle, or any abnormal application of stress to the vehicle or components thereof in a competitive situation."

Federal law also prohibits the removal or adverse modification of any emission control system, or device installed pursuant to governmental requirement prior to the retail sale and delivery of a vehicle so equipped.

In addition, certain states prohibit highway operation of a car or truck unless it has properly installed and operating emission control systems. Check the law of your home state.

Certain of the high performance parts listed in later sections of this booklet also carry special warranty provisions or exclusions. Check carefully so that you fully understand what is covered and what isn't.

INSIDE THE STOCK BOSS 302

We said that your Boss 302 engine was race bred.

Let's take a look at just what that means.

A production Boss 302 engine has –

- A forged steel crankshaft
- Forged steel rods
- Heavy, 4 bolt nodular iron bearing caps
- Canted valves
- Advanced wedge or polyangular combustion chamber
- A 10.6 to 1 compression ratio
- Big 2.4" by 1.7" intake ports
- An aluminum high-riser intake manifold
- Large valves . . . 2.19" intake . . . 1.71 exhaust
- A high lift cam . . . .484" intake, .484" exhaust
- Solid lifters
- A Holley 4-barrel that flows 780 cfm
- A dual point distributor good for 6000 plus rpm
- Free-flow design exhaust manifolds
- Heavy-duty bearings, and clutch

Now that line-up suggests that a Boss 302 is hardly a run-of-the-mill production engine.

It isn't. The specifications are significantly different than the regular 302-c.i.d. engine.

This is an engine built to perform . . . and perform it does.

For street, strip use or weekend racing about all that is required is a set of tubular steel headers and minor carburetion and ignition changes. You'll find discussions of these changes in the carburetion and ignition sections of this book. For the most part, however, you'll find this book has been written for the serious racer. It details the steps . . . and gives the specifications . . . which have proven successful **on the track** . . . to those who intend to confine their driving exclusively to race tracks. We hope it will serve to help you build up a winning Boss 302 engine.

LET'S START WITH THE BASICS

If you plan to do any type of serious racing, the name of the game is "pull the engine and blueprint." This holds true if you are a serious competitor in stock drag classes . . . or if you are building up a Trans-Am racer. (Note: We will not attempt to cover the standard procedures used in removing a Boss 302 engine from the chassis . . . or any other similar standard servicing operations in this book. Should you desire information on such procedures, write: **Ford Service Publications, P.O. Box 7750; Detroit, Michigan 48207** for a Service Manual which will give you this information. The only procedures covered here are only those pertinent to special performance modification. In the back of this book, you will find part numbers and specifications for the race Boss 302 build-up).

With your Boss 302 engine out of the chassis, and disassembled down to the short block, check all mating surfaces between heads and block . . . and between intake manifold and heads to check for any signs of warpage or leaking. Look for patterns on the gaskets or metal surfaces which might indicate that a complete seal was not made . . . or that air, compression, or water leaks might have been present.

FIGURE 1. Checking deck height.

Next, check all deck height readings. You will usually observe minor variations between cylinders. It is desirable to make the deck heights of each cylinder as close to one another as possible. This can be done by juggling pistons and rods or by milling the block face, if necessary.

The simplest and least expensive way, of course, is to take the rod and piston from a "long" cylinder and swap it for a "shorter" one, making certain that other tolerances such as bore and crankshaft clearances stay within specs. This can be done when the engine is being reassembled.

When all deck height readings have been made, take readings on rod side clearance . . . crank end play . . . and rod and main bearing clearances. Side clearance should be checked with a dial indicator.

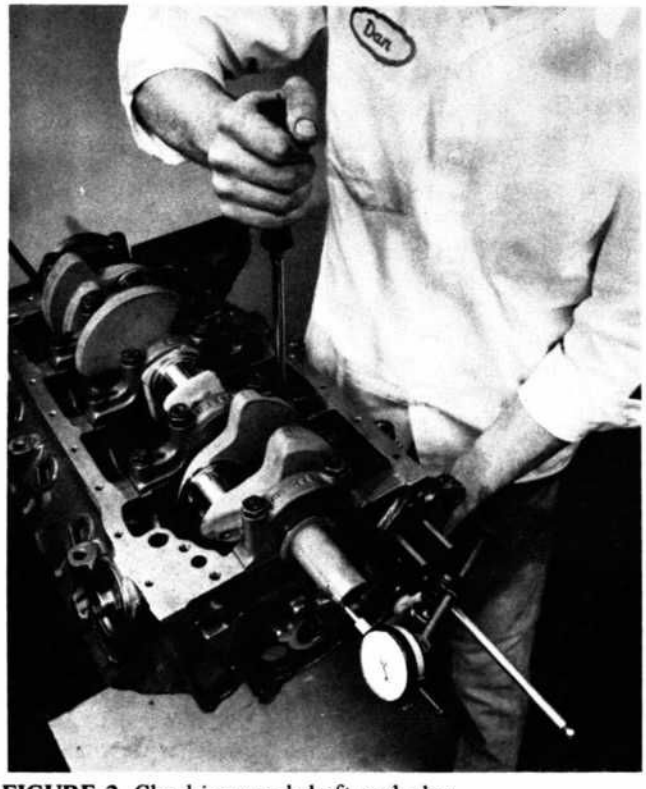


FIGURE 2. Checking crankshaft end play.

Tap the rods lightly to be certain they are fully to one side. Record the readings for each throw, noting those which may be out of the specification range.

If rod side clearance is too low, the inside, mating faces of the rods must be cut. To get the clearance desired, take half the amount off of each rod face.

Be certain you remove metal from the **inside facing surfaces** of the rods . . . not the fillet side.

This job is usually done with a surface grinder and we recommend you farm it out to a capable machine shop.

To check crankshaft end play, you will again need to use a dial indicating gauge. Position it so that the gauge finger rests lightly on the end of the crank . . . then take a heavy screwdriver and place it between the center main bearing cap or web and the adjacent crankshaft counter weight. Using the screwdriver for leverage, force the crankshaft to the limit of its travel toward the front of the block. Take several readings to be certain you are getting full travel, and record the end play reading. Should crank end play be on the tight side, it will be necessary to remove equal amounts of metal from the two thrust faces of the crankshaft at the center main. This also should be done by a competent machine shop or speed shop specializing in crankshaft modification.

To check main bearing and rod bearing crankshaft journal clearances, use a micrometer. If air-type gauging equipment is available, by all means use it.

Should you find your stock clearances on the tight side, you will have to have the crankshaft bearing surfaces polished to remove the desired amount of metal. Journal roundness and taper must be within .0003 in. "Hour glassing" must be avoided.

Be sure you carefully mark the number of thousandths to come off of each throw or main to bring it up to your specifications.

With these clearances checked and noted, you are now ready to complete the engine teardown job. **Be certain that you mark each piston, rod and bearing with the cylinder number or bearing number so that you know the position of each part removed.** Before pushing the pistons and rods out of the bores, be sure to cover the exposed threads on the rod bolts with rubber spark plug insulator caps or pieces of rubber tubing. If you should scratch a cylinder wall you'll have an oil and compression leak and a potential source of failure. It is also easy to scratch a crankshaft throw if you aren't careful and don't cover the rod bolt threads.

With the pistons removed from the bores, check the bores for roundness, taper or "barrel" and check piston to wall clearances. The best approach to this is to use an inside and outside micrometer. Record the readings for each cylinder.

If you find your clearances are tight, hone the cylinders to get the desired clearance. (Ford recommends honing be done with a 45 degree cross-pattern and a #150-180 grit stone. Cylinders are to be free of tool marks and should be completely honed throughout their length. Honing ridges and other surface imperfections are not acceptable. Maximum out-of-round should be .001", maximum taper .001", and maximum barrel or hourglass .0005".) When you have measured and recorded your piston-to-wall clearances, the last block check should be the crankshaft bore. You want to be certain that all crankshaft bores and bearings are in as close to perfect alignment as you can make them and the only way to check it is by having a professional crankshaft house run a line bore check for you. They have the equipment to check and correct any possible misalignment.

At this point, you are usually finished with your tear-down and tolerance checks. Now is the time for any machine work that may be needed such as milling the faces to correct a deck height problem ... or for cutting O-Ring grooves if you plan to use this approach. Some builders recommend the use of O-Ring seals around bores. Ford race experience to date has shown good results can be obtained without it.

CLEANING AND DEBURRING THE BLOCK

Before your block is ready for the cleaning tank, you will want to remove all threaded plugs and press-fit plugs or caps so that all passages are as unrestricted as possible.

(Note: Some hot tank solutions are caustic and will attack the metal in the camshaft bearings. Always check cam bearings after hot tank cleaning.)

With a clean block you are ready to start the deburring process. The essence of deburring is to remove every sharp edge and to smooth down every lumpy spot or bit of casting flash that you can reach. Cracks and fractures always begin at a sharp edge or at a surface defect of some kind. This is why the better the job you do of deburring, the better your chances of preventing a block failure under race conditions.

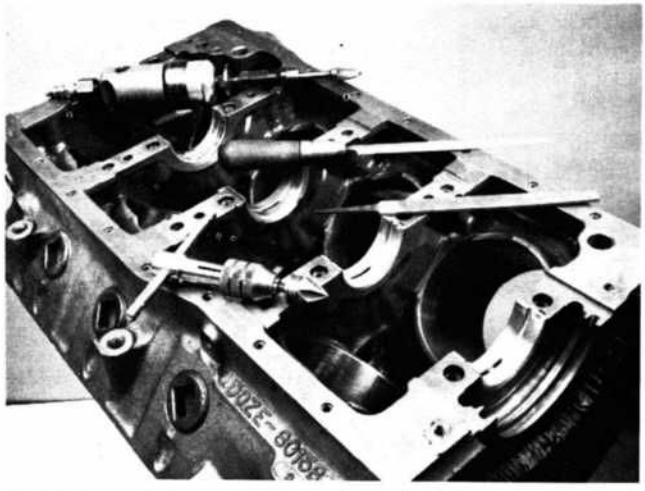


FIGURE 3. Deburred block with tools used for deburring.

Figure 3 shows a deburred block and the usual tools used to do the job. Notice the slight chamfers around each stud hole ... the smoothed-off corners on every edge ... the cleaned-up surface of the casting, free of any flash or sharp edges. A well-deburred block is one that you can run your hand around without worrying about getting cut or nicked by **any** surface, top to bottom. It **feels** smooth ... and it **is** smooth. You don't, of course, use a file or tool on any finished surface or bore area ... only on the sharp edges, and then with great care.

Following the deburring process, clean the block again to be certain that all filings and metal particles are flushed away. Once your block is deburred and spic and span again, it can be painted, if you choose to go this route. Some builders feel that painting the rough cast surfaces, inside and out, seals the pores of the casting and traps any particles that might work loose. If you decide to paint, use a flat primer-type paint that is oil and gas resistant. Paint is to be applied, with a small brush, to all rough casting surfaces both inside and out. You do **not** paint any machined or mating surfaces ... and you must be careful not to drip paint in the bores or into a tapped hole.

GETTING YOUR CRANKSHAFT READY TO RACE

Boss 302 crankshafts seldom need much help to prepare them for race use. They are forged steel and can handle high rpm without difficulty. The usual procedure is simply to run a micrometer check on each journal to check for roundness ... in addition to the bearing clearance checks previously made. If you should find a slightly out-of-round journal, it again is a job for the professional shop.

Some builders prefer to have cranks magnafluxed and Tuftrided. This can be done, if desired, although the Tuftriding process (a process which puts a super-hard finish on the metal surfaces) may cause a crank to "grow" or change dimensionally, thus requiring straightening and/or re-machining.

If your crankshaft checks out ok, then you need only clean it thoroughly and have it balanced.

(Note: All 1969 and some early 1970 Boss 302 cranks are cross-drilled for oil flow. Later 1970 model cranks are not cross-drilled. Current testing has shown that the non-cross-drilled crank is adequate for competition use. When cleaning a cross-drilled crank, it is a must to remove the oil line plugs on each side of every throw. In this way you can be certain that no foreign matter is trapped within the crank oil passages. (New plugs and snap rings will have to be installed after cleaning.)

Balancing a Boss 302 crank must be done **with the flywheel and front damper in place.** (When used with the DOZX 6108-B piston and pin set and DOZX 6200-A rod assembly, the nominal total bobweight with flywheel, sprocket and damper in place is 2133 grams.) **Should a flywheel change ever be made, you must rebalance the complete unit once again.** Crankshaft balancing, of course, is another job for the professional shop equipped to handle it.

The stock Boss 302 main bearings have proven themselves capable of handling race applications. Some independent builders prefer to use a fully grooved bearing set. Should you desire to do this, have your bearings grooved by a capable shop. Federal Mogul, Clevite, TRW and others can supply competition bearings for the Boss 302.

FIGURE 4. Fully grooved main bearing set.

READYING YOUR RODS

For full race applications, Ford engineers recommend that stock rods be magnafluxed, the "I" beams polished, and rods shot peened ... **and it should be done in this order.** The following areas must be shot-peened (1) entire outside section of "I" beam, excluding fillet and seating surface at bolt head. (2) Outside surface of cap particularly in the small fillet between the nut seating surface and each cap rail. The shot must be small enough to get into a fillet of .060R and must induce approximately 20,000 psi compressive surface stress.

FIGURE 5. Boss 302 rods with stock rod on right. Center rod has been magnafluxed, polished and shot peened. Competition only rod (DOZX 6200-A) is on left.

Figure 5 shows the three types of rods used in Boss 302's. On the right is the stock rod. The center rod is a magnafluxed, polished and shot peened stock rod. The rod on the left is a competition- only part available through Ford and Lincoln-Mercury dealers. (Part #DOZX 6200-A)

You should select your rod modifications according to your needs and the allowable modifications in your racing category. The reworked production rod has given good results up to 7500 rpm, however for maximum durability, the DOZX 6200-A rod is recommended in full race applications such as Trans-Am, NASCAR GT and drag strip racing.

The big end of all rods should be checked for roundness before they are installed. This is best done on professional equipment such as a Sunnen-type rod machine.

(Note: The competition only rod DOZX 6200-A requires a special socket. This socket is available from the Allen Manufacturing Corp. Order Department, Drawer 750, Hartford, Conn. 06101. Phone: 203-242-8511. Rod nut torque should be 50-55 Ft.-Lbs. with engine oil on threads and a moly-type lubricant under the nut seating surface. Pin end of the rod must be heated before installing the pin.)

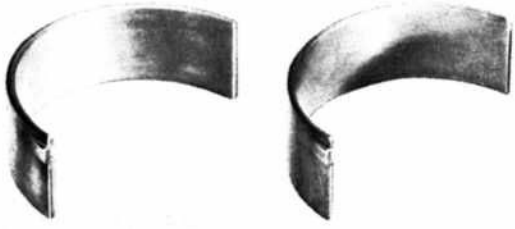


FIGURE 6. Boss 302 rod bearings showing stock bearing on right and competition only bearing (DOZX 6211-A or B) on left.

The stock rod bearings in your Boss 302 engine are a heavy duty-type that will do a good job in most race applications. Figure 6 shows the stock bearing on the right. The competition only bearing (DOZX 6211-A or B), which must be used with the DOZX 6200-A rod, is shown on the left. This is a heavy-walled, premium-type bearing which is made expressly for this rod. It will not fit a stock rod as the wall thickness and locating tangs are different. This bearing and rod combination will provide the ultimate strength and durability for the most demanding race applications. Use two red color coded bearing shells, or two blue color coded bearing shells, or one red and one blue shell, to obtain blue print clearance. A red bearing shell is .0004 thinner, providing .0004 more clearance than a blue shell.

MODIFYING PISTONS

Stock pistons for the Boss 302 engine give a good account of themselves and need only minor modification to put them in racing trim. For stock-type racing with stock cams, the only suggested modifications are increased wall clearance, a careful deburring, and a close visual check. Check the skirt area carefully, as this part of the piston is most susceptible to cracking.

Piston diameter should be measured across the skirted sides . . . and taken at a point level with the centerline of the piston pin.

With most cam changes, it is necessary to notch or fly-cut the piston top for increased valve clearance.

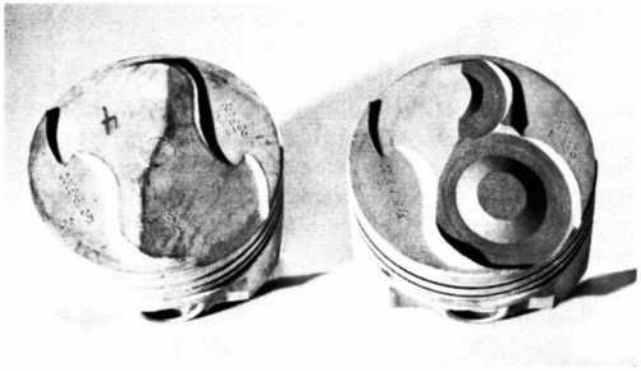


FIGURE 7. Stock piston shown on left, flycut stock piston on right.

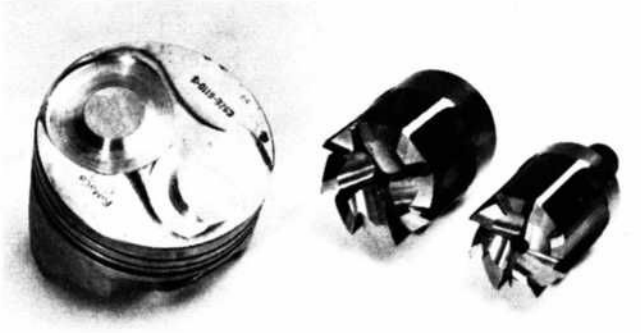


FIGURE 8. Cutters used to flycut piston.

Figure 7 shows the difference between the stock Boss 302 piston and the relieved, fly-cut piston. Figure 8 shows the cutters used by one engine builder. This particular tool makes a contoured cut which matches the contoured valves being used. In this way, no more metal is cut from the piston than necessary to provide valve clearance and the compression ratio doesn't suffer as much. (The competition only DOZX 6507-A intake and DOZX 6505-A exhaust valves have flat heads which require a flat-bottomed notch.)

When fly-cutting the piston, **take only the minimum amount of metal required. Never reduce dome thickness below .150".** The minimum safe clearance between piston and valves is .100" intake . . . .100" exhaust.

After any cam change, it is vital that the valve to piston clearance be checked. The procedure is usually done by placing flattened modeling clay atop the piston area where the valves operate. Install the head gasket, head, valve train, etc., set tappet clearance at zero and torque all bolts to specifications. Turn the engine over manually two revolutions and then remove the heads. The modeling clay will be compressed, showing the indentations caused by the valves. Carefully slice through each indented section, at the point of greatest compression, with a sharp knife or blade. With a machinist's scale, measure the thickness of the clay. This will tell you your clearance between valve and piston.

An alternate method for checking piston-to-valve clearance is by using a dial indicator on top of the valve spring retainer. The usual procedure is to place the valve in position in the head, using an extremely light, flexible spring to hold it in place. Install the head gasket, head, valve train, etc., set tappet clearance at zero and torque all bolts to specifications. With the cylinder on the overlap cycle, start the piston moving upward. At about 40° before TDC, start checking the valve clearance by depressing the valve manually until the valve bottoms on the piston. Check your gauge reading and record clearance. Do this every five degrees until you have reached 40° ATDC. This procedure will tell you the minimum clearance point in the overlap cycle . . . and you will then be able to tell how much to relieve your pistons.

It is recommended that you check #1 and #6 cylinder to be sure that minimum clearance is met. It only takes one bent or broken valve to put you out of action, so be certain you have at least .100" clearance.

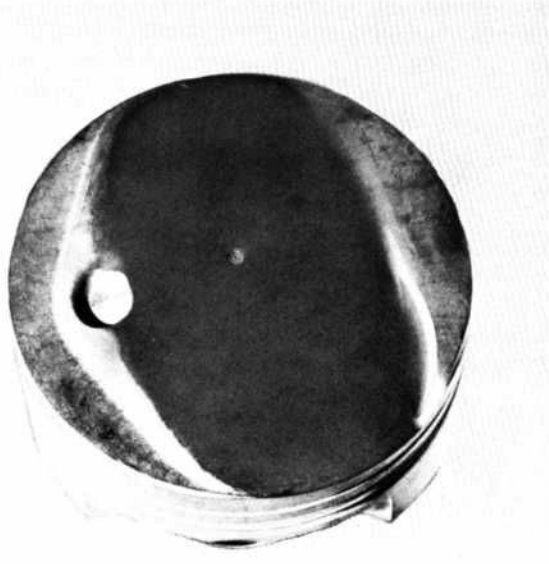


FIGURE 9. Boss 302 competition only piston (DOZX 6108-A Piston and Pin set).

Figure 9 shows the competition only piston and pin set DOZX 6108-B, which is available for the Boss 302. This piston is similar to the production forged aluminum design, but has a "pop-up" head for higher compression. It also has a specially contoured crown which prevents most valve clearance problems, although it is wise to check, even with this piston. (Note: This piston can only be utilized with the DOZX 6200-A connecting rod.) Higher compression pistons to fit the stock rods can be obtained from Mickey Thompson, Jahns, Venolia and others.

The rings recommended for use on Boss 302's are dependent upon your choice of pistons. The stock piston uses 5/64" compression rings and 3/16" oil rings. Stock Boss 302 rings have performed well in race use. The competition only piston requires 1/16" compression rings and 1/8" oil rings. These rings are available under Ford Part #C90Z 6148-A, from your Lincoln-Mercury or Ford dealer.

CHOOSING AND INSTALLING A CAM

There are a variety of cams available for the Boss 302 engine. The selection of the right grind depends, naturally, on the use you have in mind for your car. Since all Boss 302's use mechanical lifters, rpm potential is good with all types of cams.

Ford race research has developed several cams which have proved to be excellent performers. The new DOZX 6250-B (competition only) cam and tappet kit is highly recommended for all types of racing. This cam has .600" lift and 324° duration and has proven to be the best performer. The cam is sold only in kit form with a set of special 80" radius, phosphate-coated tappets. **No other tappets can be used with this cam nor should these tappets be run with any other cam.** The kit also contains a can of Ford Oil Conditioner for proper run-in.

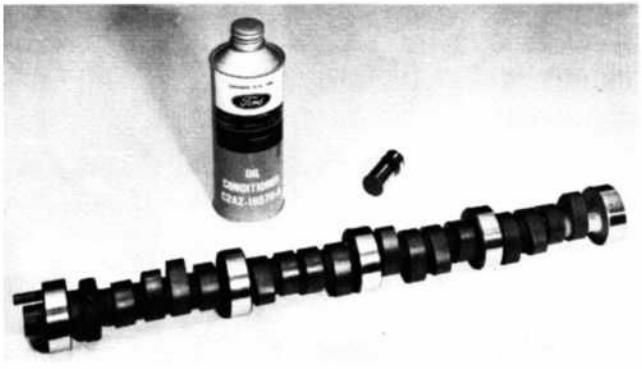


FIGURE 10. Cam, tappet and oil conditioner from competition only camshaft kit (DOZX 6250-B).

When installing a new cam in your Boss 302, there are several precautions which you **must** take. The first few minutes of run-in for a new cam are the most critical moments of its life. ***Proper initial lubrication is absolutely vital.** You **must** use a can of Ford Oil Conditioner (Part #C2AZ 19579-A) to completely cover **all** cam bearings, lobe surfaces, and tappet faces, prior to installation. Figure 10 shows a typical Boss 302 cam and tappet and the Ford Oil Conditioner.

If you are planning to use your Boss 302 for serious competition, you may want to check out the timing of your cam to be certain it falls within specifications.

Figure 11 shows how this may be done. The cam and timing chain have been installed and a degree wheel put on the crankshaft. A pointer has been affixed above it.

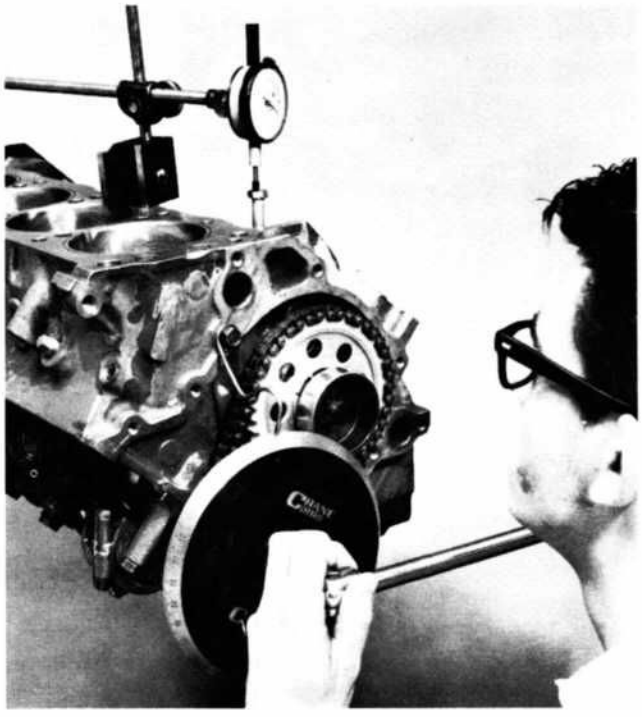


FIGURE 11. Checking cam timing with bolt extension attached to tappet.

Turn the engine over **very** carefully (in the direction of normal rotation) until your dial indicator tells you the number one piston reached exact TDC, and set your degree wheel at zero. Place the dial indicator to read the movement of one tappet. (Photo shows special tappet with long bolt affixed). Continue barring the engine over slowly in the direction of rotation, until your dial indicator tells you that your tappet is starting to lift. Stop when you have reached the lift specified for measurement. (Most cams are supplied with a specification card which will tell you the amount of cam lift at which the valve opens and closes. Ford specifications normally call for .100" tappet lift.) Now read your degree wheel. It should agree with the cam specifications within 2 degrees. If for any reason your cam is off more than this . . . or if you wish to run your cam with a different amount of advance or retard . . . you can alter the setting by using an advance-retard bushing kit available from specialty manufacturers such as Mr. Gasket, Iskendarian, Crane, etc.

PREPARING THE HEADS

To ready your heads for racing, the first step will be a complete disassembly and cleaning . . . followed by a deburring treatment just as was done on the block. How far you go with head modifications, of course, will again depend on your intended use. For class racing, such as NHRA stock, the only permissible modifications are CC'ing the heads to specifications and a performance-type valve job.

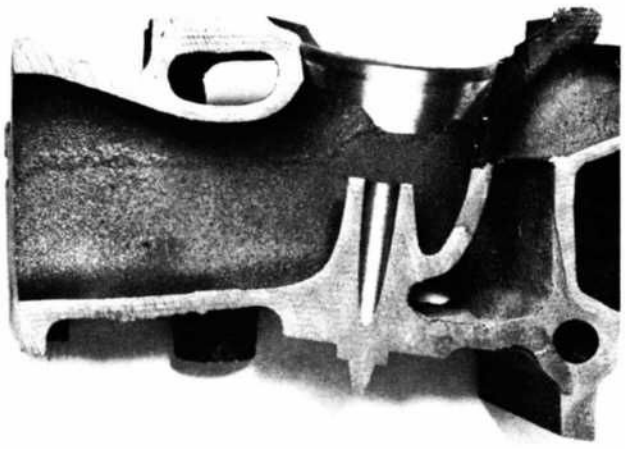


FIGURE 12.

Figure 12 shows a cross section of a stock intake port. The valve seat is ground at a 45 degree angle and is sixty to eighty thousandths in width. The cut above the seat area is ground at approximately a 60 degree angle.

FIGURE 13.

Figure 13 shows a cross section of a typical progressive-cut performance valve job. Three cuts are made . . . the first at 70 degrees . . . the seat at 45 degrees . . . and the undercut at 30 degrees. Seat width is narrowed to about 50 thousandths for street-strip use . . . 35 to 40 thousandths for serious drag strip competition. Narrowing the seat width gives better mixture flow, but it also reduces both the sealing area and the head dissipation properties which can shorten valve and seat life. This is especially true if the seat has any run-out. Seat and valve life will be much longer, when a narrowed seat is used, if run-out is held to a minimum of .001".

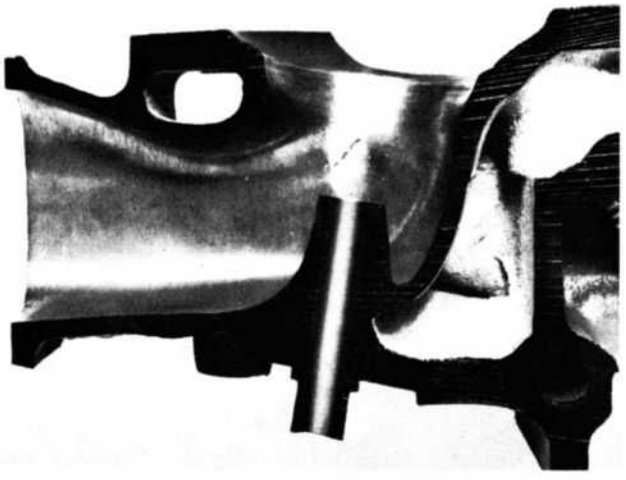


FIGURE 14.

Figure 14 shows a polished, full-race intake port. The valve seat has been cut progressively but with the addition of the polishing, the areas above and below the seat have been faired into the cuts, providing the smoothest transition and, therefore, the greatest mixture flow.

A valve job, properly done, will allow you to CC your heads by simply putting a thin coating of petroleum jelly on the valve faces and dropping them in place. See page 13 of this book for approximate thousandths to be removed for each CC milled from the Boss 302 head. Don't push your luck by milling down to the lowest legal specifications.

Head modifications, other than the progressive seat grinding already mentioned, are usually concerned with porting and polishing. The Boss 302 head has extremely large ports in stock form. Because of this, mixture flow is very good even without porting or polishing. However, for maximum power output, a fully re-worked head is strongly recommended.

Figure 15 shows a Boss 302 head being readied for combustion chamber clean-up. The edges of the chambers have been painted with machinist's bluing and scribe marks drawn, using a head gasket for a template, to form the desired finished shape of the chamber. (Hold the gasket in place with cylinder head dowels.) With the lines for a guide,

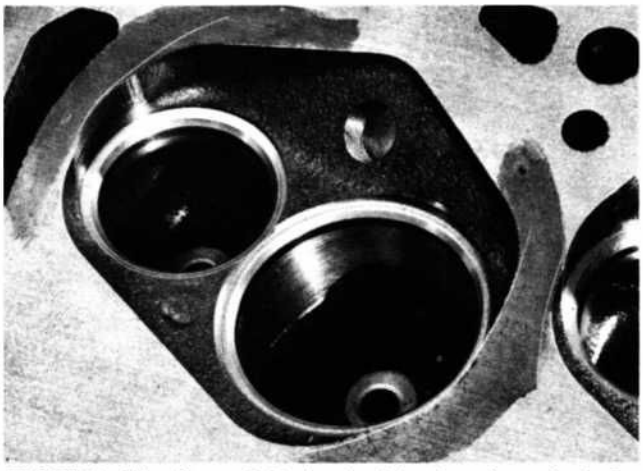


FIGURE 15. Boss 302 head, blued and scribed for cleanup.

the two outside edges of the chamber are then ground with a power grinder to fair the edges smoothly into the new contour. This helps to open up the area between the edge of the valves and the chamber wall, improving flow and reducing valve shrouding. Care must be taken to avoid hitting the valve seats with the grinder.

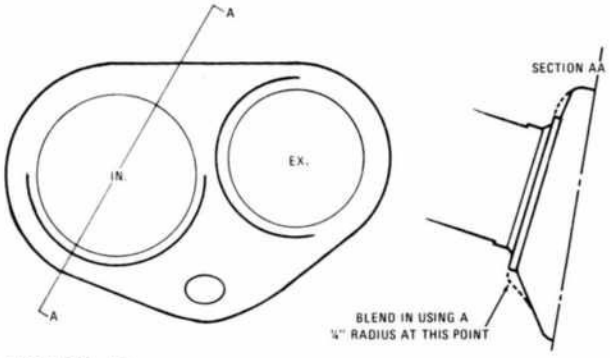


FIGURE 16.

Figure 16 shows the areas of the combustion chamber which are most critical for maximum air flow. The stock Boss 302 chamber has recessed valve seats which produce a sharp machined edge around the circumference of the seat. Sufficient material should be removed from the areas shown in Figure 16 to fair these edges in, making a smooth transition to the chamber roof.

Figure 17 shows how the valve pocket should be treated. Stock heads have a partially machined pocket which leaves a sharp edge around the runner throat. Retaining the same diameter as the stock machined cut, the throat should be left straight for the first ½" from the seat, before the radius is developed into the curved area. The machined portion should be gradually blended into the "as-cast" pocket, utilizing a generous radius at the points of transition.

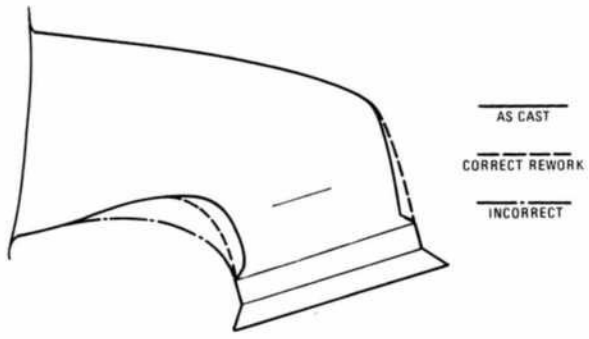


FIGURE 17. Boss 302 valve pocket modification.

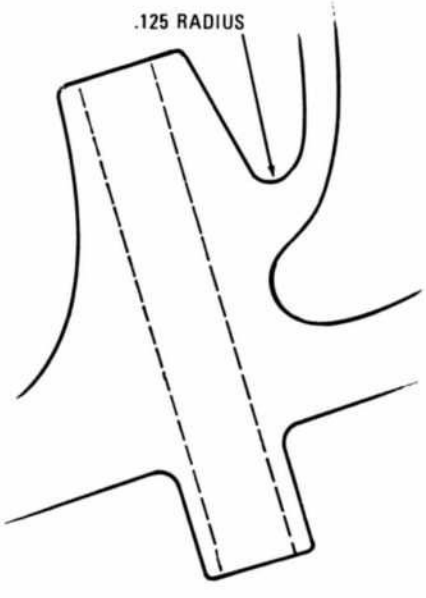


FIGURE 18. Valve guide modification.

Valve guides require very little modification. The recommended treatment, shown in Figure 18, is to reduce the outside diameter of the guide, equally, by .100". The base of the guide should be blended into the roof of the pocket with a .125" radius and the sharp edge removed from the end of the guide by grinding a small radius.

The intake port runner should be polished to remove any casting irregularities or protrusions. Take only the minimum amount of metal required to produce a smooth finish and keep each runner the same dimension and contour to assure equal mixture flow.

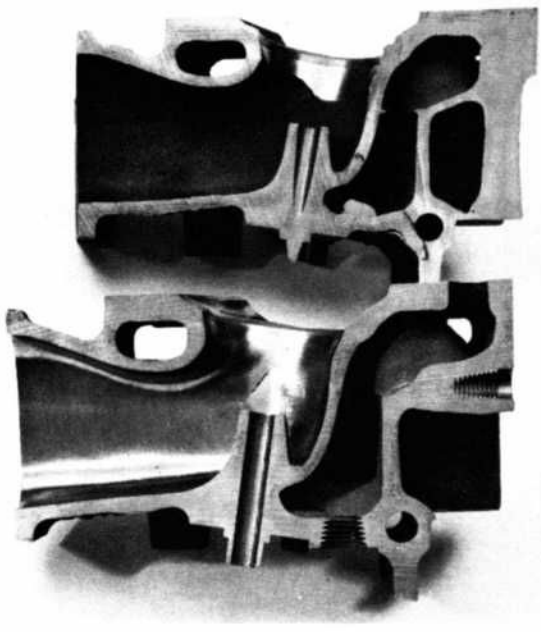


FIGURE 19. Stock intake runner (top) and fully polished runner (bottom.)

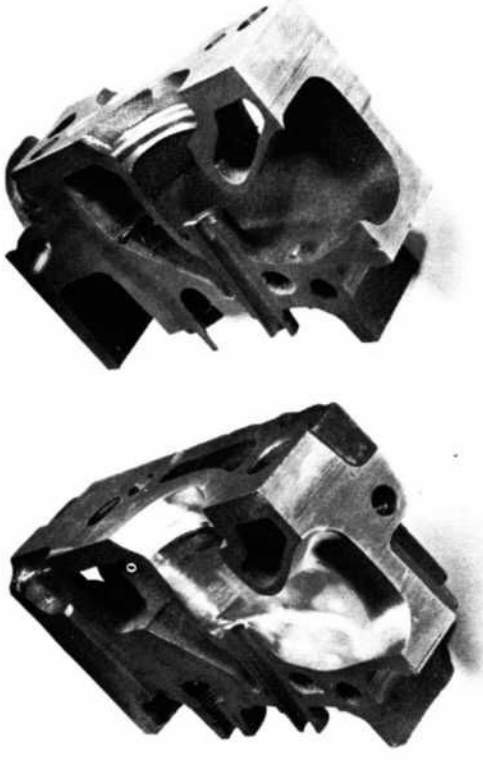


FIGURE 20. Stock exhaust runner (top) and polished runner (bottom.)

Figure 19 shows a completely polished full-race intake runner, along with the stock runner. All surfaces have been ground to a high polish. Figure 20 shows a typical polished exhaust runner, and a comparison with a stock exhaust runner.

Head clean-up also should include matching the intake ports. This is done by using an intake manifold gasket as a template and then bluing and scribing the surfaces of both the manifold and the head. The ports are then ground out to the scribe marks on both the intake manifold and head.

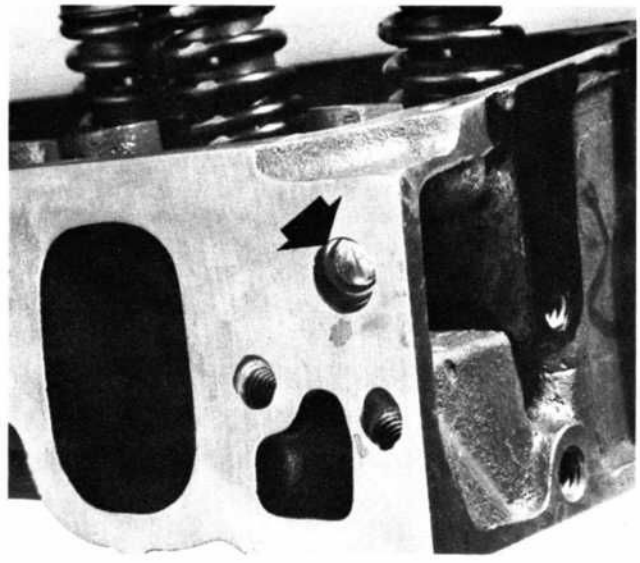


FIGURE 21. Blocked Thermactor passage (upper right).

Another area of head modification required for full-race applications is the blocking of the Thermactor air passage in the head. Figure 21 shows how this can be done. The Thermactor passage is drilled out to ½", and a press-fit plug tapped in. This prevents the back-passage of exhaust gases from the air outlets in the exhaust ports. As previously noted, Federal law prohibits the removal or rendering inoperative of a device or elements of design installed, in compliance with governmental regulations, in or on a vehicle designed for transporting persons or property on a street or highway prior to its sale and delivery. In addition, it is illegal in many states to remove or modify such devices or elements of design subsequent to sale and delivery if the vehicle is used on a street or highway. Therefore, make sure you know the law of your state **before** removing, altering or otherwise modifying any emission control system or device.

One other area of head modification used by some engine builders is the installation of Perfect Circle-type oil seals on the valve stems. Seals of this type provide tighter oil control for race usage, but are not recommended for street use. (Note: This type of seal must be used when installing the DOZX 6A511–A "Super Spring" assembly shown on page 15 , as the stock seal will not fit inside the inner spring.

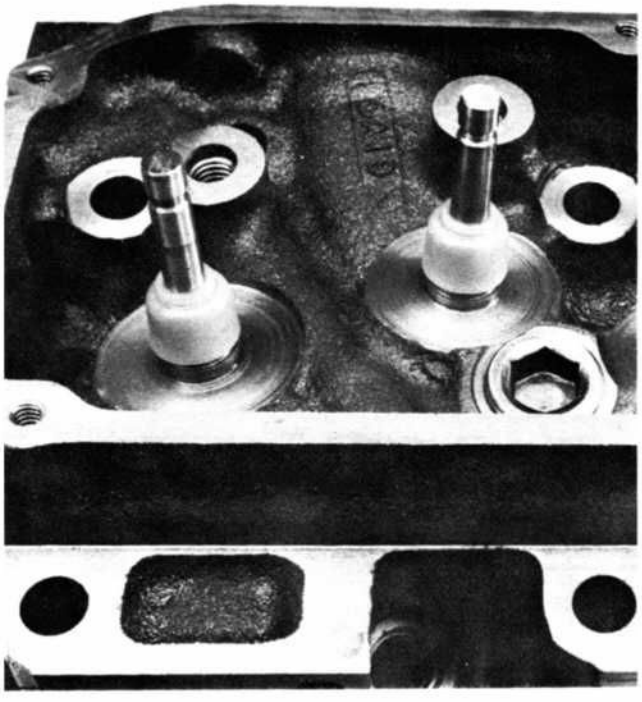


FIGURE 22. Stock Boss 302 oil seal.

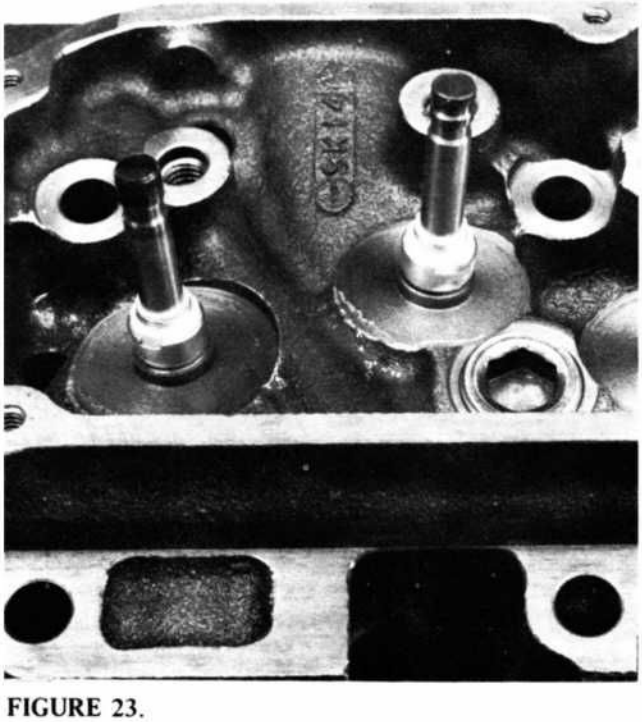


FIGURE 23.

Figure 23 shows the Perfect Circle seal installed. Notice the valve guide to the right in each photo. The Perfect Circle seal requires that the guides be cut with a special valve guide machining tool, as shown in Figure 24, to accept the seals. The photo also shows the tool required for installing the seals. These items are available from most speed equipment suppliers.

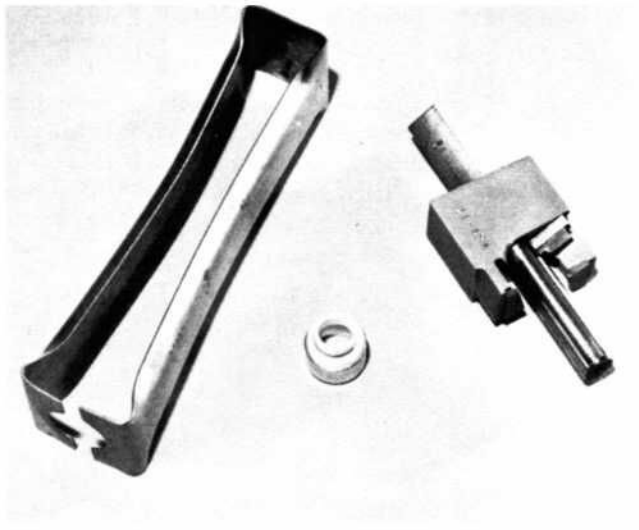


FIGURE 24. Special cutter and installation tool for Perfect Circle oil seals.

After reworking your heads, it is usually necessary to mill them to get the desired legal minimum CC volume in the chambers. Stock Boss 302 head chamber volume for 1969 engines is 61.3 to 64.3 CC's. The 1970 stock heads are 57.1 to 60.0 CC's. If no changes are made in the stock chamber area, each .006" removed will reduce chamber volume by 1 CC. **No more than .060" should be milled from a stock head. If you plan to use the competition only piston (DOZX 6108-A) with stock heads, be certain that you check carefully for a possible clearance problem, prior to milling. You must hold a minimum of .100" clearance between piston, head and valve surfaces.** Long reach spark plugs cannot be used with the DOZX 6108-A piston as they too can present a clearance problem. Always use either a standard or racing gap Autolite plug.

Stock head gaskets for Boss 302's have performed adequately in most types of racing. A new high performance gasket will be available soon for in endurance type racing where gaskets are subject to high pressures over a long period of time. Check with your Ford or Lincoln-Mercury dealer for this gasket (#D1ZZ 6051-B.)

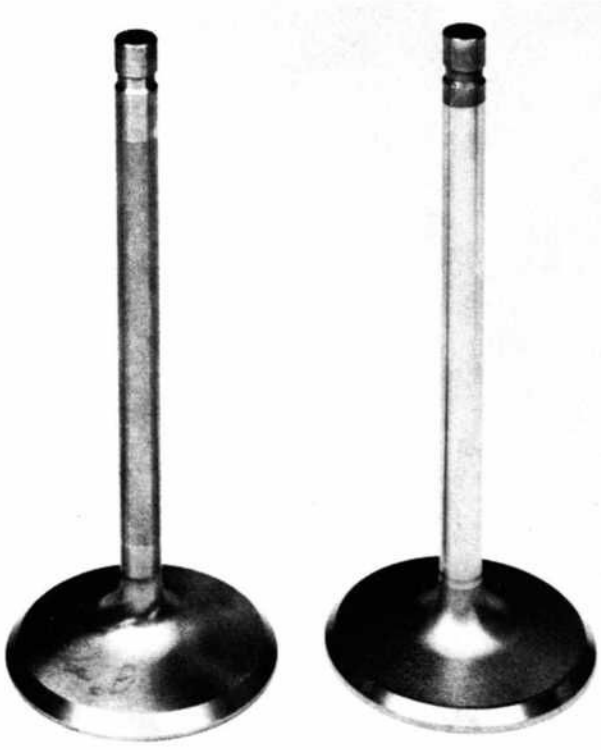


FIGURE 25. Boss 302 intake valves showing stock valve on right and competition titanium valve (DOZX 6507-A) on left.

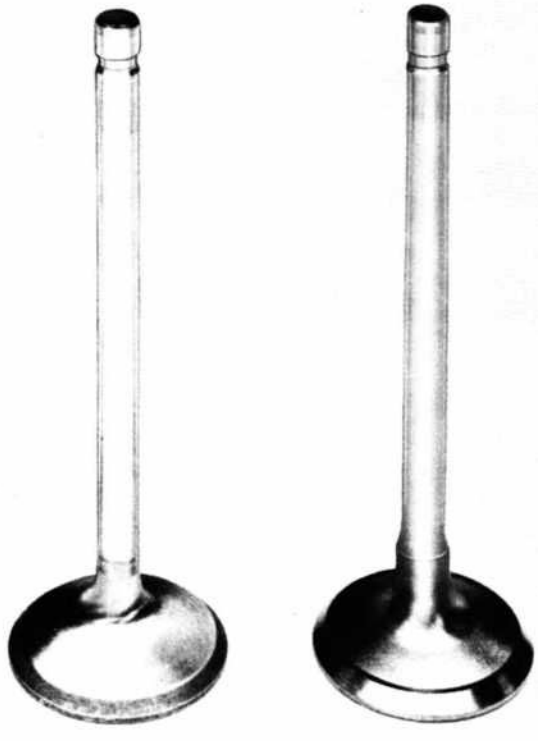


FIGURE 26. Exhaust valves for Boss 302. Stock valve on right, competition valve (DOZX 6505-A) on left.

VALVES, SPRINGS AND ROCKER ARMS

When your head modification work is done, it is time to turn your attention to the valves. Figure 25 shows two types of intake valves currently available for the Boss 302 engine. The stock valve is shown on the right . . . the competition valve on the left (DOZX 6507-A). Figure 26 shows the exhaust valves presently available. The stock valve is again on the right . . . the competition valve on the left (DOZX 6505-A).

Valve selection will again depend on the use intended for the engine. Stock valves will give good street performance and long life. The competition only valves are considerably lighter and the intake valve material is solid titanium with a moly metal coated stem. With their lower mass, they are capable of turning considerably higher rpm before valve float starts. These valves are recommended for any serious competition.

(Note: The DOZX 6507-A titanium intake valve cannot be ground on conventional grinding wheels. A Carborundum A–80–04–E10 wheel must be used. Do not lap this valve as the titanium does not tolerate lapping. Do not lap the DOZX 6505-A exhaust valve as the aluminized face coating will be destroyed.

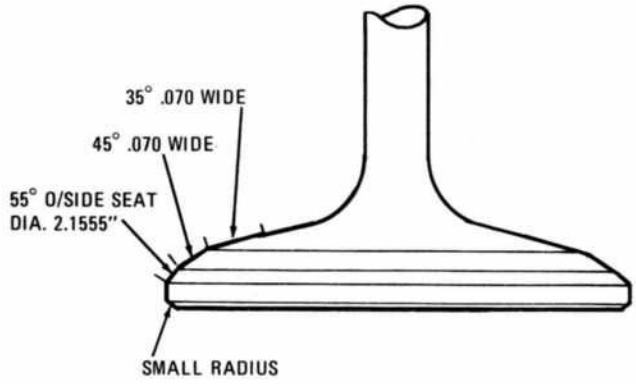


FIGURE 27. Competition grind for Boss 302 intake valve.

For maximum flow and good pressure recovery, intake valves should be ground to the head configuration shown in Figure 27. A 35° cut is made on the inside of the seat to hold seat width to .070". Seats are cut to 45° and a 55° cut is made on the outside of the seat to hold an outside seat diameter of 2.1555". It is also advisable to put a small radius on the underside of the valve head.

Figure 28 shows the stock Boss 302 valve spring set-up, along with the race-type set-up on the bottom. The stock spring is recommended for use only with the stock production cam or cams of comparable lift. With race-type high lift camshafts of over .500" lift, such as the recommended DOZX 6250-B, the DOZX 6A511-A competition

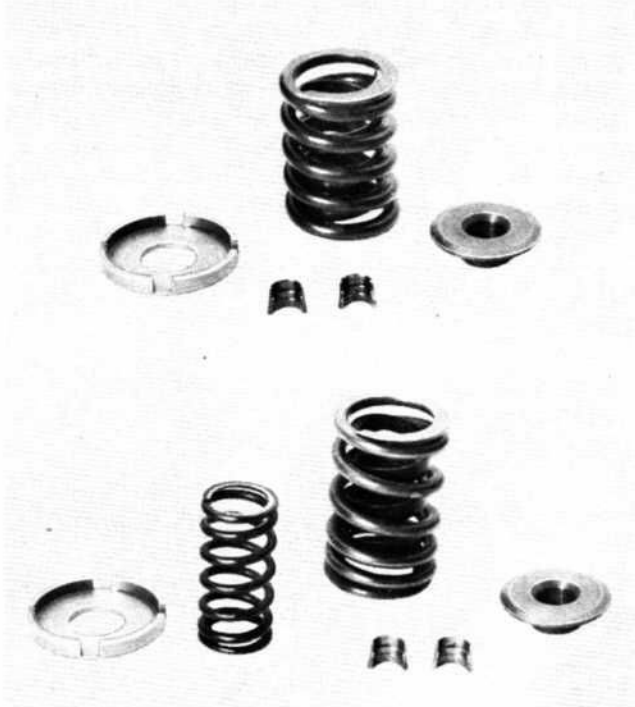


FIGURE 28. Valve spring setups for Boss 302, Stock spring on top, Super Spring Assembly (DOZX 6A511-A) on bottom.

only "Super Spring" assembly should be used. This assembly incorporates special aircraft quality outer and inner springs, and an interference fit damper. A stock retainer (or one similar with a .100" outer valve spring pilot) must be used to attain the proper installed height for the inner spring, as this spring is .100" shorter than the outer spring. A stock seat is used with this assembly.

(Lightweight aluminum spring retainers made by outside suppliers should only be used for short duration drag strip applications, as the damper spring tends to chafe the aluminum in endurance running.)

It is important that valve springs be adjusted to give spring loads which are adequate to control valve float, yet not so high that they cause rapid cam wear. Valve spring heights should be matched to give identical readings and shims added, if necessary, to bring springs up to specifications.

Note: **When using the competition only valve spring assembly DOZX 6A511-A with the DOZX 6250-B camshaft and tappet kit, install the springs at a height of 1.80" ±.010" and run-in at 2000-5000 rpm for 15 to 30 minutes under no engine load. After break-in readjust spring height to the specified 1.69" ±.010". Always prime tappets through the push rods with a high pressure oil can, before run-in.**

Carefully check the installed spring heights with a machinist's scale or micrometer. Nearly all valve springs are supplied with a set of specifications giving you the proper installed height of the springs. If you use shims to alter the spring height, place them between the spring seat and the cylinder head.

Caution: Never disassemble the inner and outer springs of the DOZX 6A511–A spring assembly. Since there is an interference fit between the inner and outer coils, it is possible to scratch the surface of the springs and create a potential source of spring failure.

FIGURE 29. Boss 302 rocker arm assemblies showing stock on left, Ford competition setup in center (DOZX 6A585-A), and aluminum roller-type (non-Ford part) on right.

Figure 29 illustrates the three types of rocker arms available for use in Boss 302 engines. The stock rocker fulcrum on the left will do a good job in many racing applications, but should not be used with any cams with over .500" valve lift. The stock rocker arm should be Tuftrided to pre-stress it for strength. The rocker arm set-up in the center uses the Ford needle bearing fulcrum assembly, DOZX 6A585-A, and the Tuftrided stock rocker arm. This is a competition only part and will perform well in high rpm usage where high lift cams are used. When installing these rockers and fulcrums, blue the valve stem pad of the rocker and check for a full contact pattern on the valve stem tip, through the lift cycle. If you do not get a full contact pattern, interchange fulcrum components with adjoining assemblies until you achieve a full pattern on all rocker pads. The Allen head set screw should be torqued to 15-20 lb.–ft.

The rocker arm shown on the right is an aluminum, roller-type rocker manufactured by a specialty supplier. This type of rocker arm can also be used in extreme rpm applications, such as drag strip use, and is available from such suppliers as Crane, Iskendarian, etc.

Valve lash settings for Boss 302 engines are .026"–.028" cold, .025" (intake and exhaust) hot.

PANS AND OIL PUMPS

The stock pan on Boss 302 engines incorporates a baffle in the sump which does a good job of keeping oil available to the pump intake. Your Boss 302, in stock form, also has a

windage tray bolted to the main caps which prevents oil frothing at high rpm. With stock hardware of this kind, it isn't necessary to go to modified pans unless you are engaged in serious Trans-Am, NASCAR GT or drag strip competition.

For those who are in this category, there are several items available and several modifications which can be made.

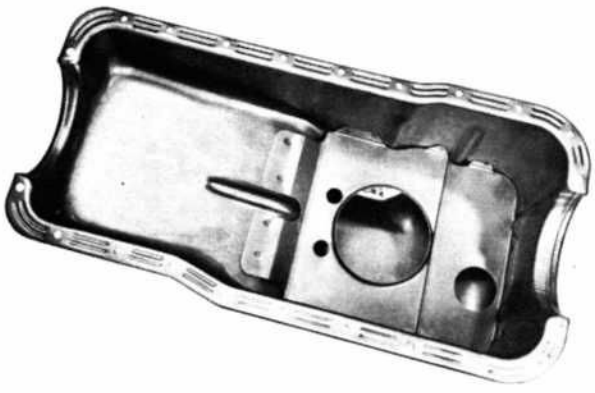


FIGURE 30. Stock Boss 302 oil pan.

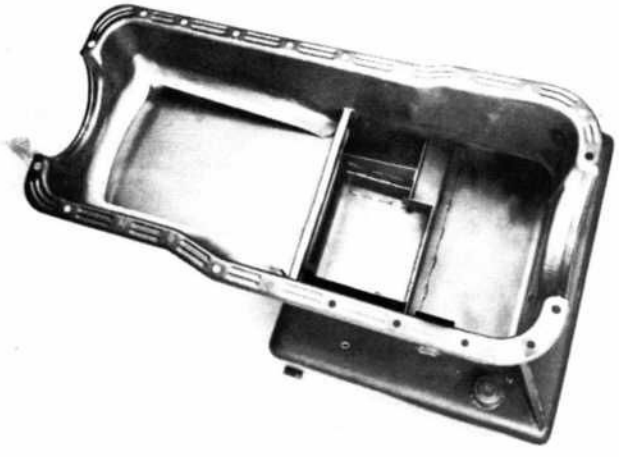


FIGURE 31. Special 9 qt. deep sump pan.

Figure 30 shows the stock Boss 302 pan. Figure 31 shows a special 9 quart deep sump pan with hinged baffling. Pans of this type can be fabricated or purchased from some outside sources. Such a pan will be offered by Ford in the near future. Check your dealer for availability.

Another modification often used for road racing is the addition of drain back tubes from the rocker covers to the pan.

Figure 32 shows how this should be done. Four tubes are run from the rocker covers to the pan. Tubes should be kept as vertical as possible throughout their length. Use a 5/8" I.D. steel-braided hose (Aeroquip® or equivalent) and route the hose to clear headers and any other points of interference. Connect the tubes to four fittings placed in the pan as far forward . . . and rearward . . . as possible.

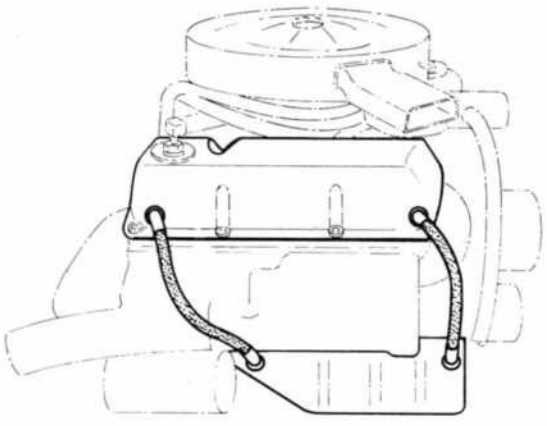


FIGURE 32. Oil drain back setup often used for road racing.

This set-up will provide for proper drain-back of oil which tends to get trapped in the rocker covers under the hard cornering of road racing.

An external oil cooler is also recommended for road racing. This required if oil temperatures exceed 250° F.

FIGURE 33. Oil cooler adaptor (C9ZZ 6881-A).

Figure 33 shows the adaptor which can be used for this purpose. This is Ford part #C9ZZ 6881-A which fits in place of the regular oil filter and provides standard fittings from which lines can be run to an externally mounted cooler. Oil coolers furnished with the Ford and Lincoln-Mercury Drag Pack options do a good job. See parts list for part numbers.

Oil pumps may also require changing or modification to provide higher oil pressure and greater flow. With the increased bearing clearances in a modified engine, it is wise to beef up the oil pump output. This can be done several ways. Perhaps the simplest way is to shim the relief spring in a stock Boss 302 to obtain 75 to 90 PSI normal operating pressure. The next step would be to go to a pump with a larger output, such as those made by Holman & Moody, TRW or Aviad . . . or to modify the Boss 302 pump with a larger rotor and spacer.

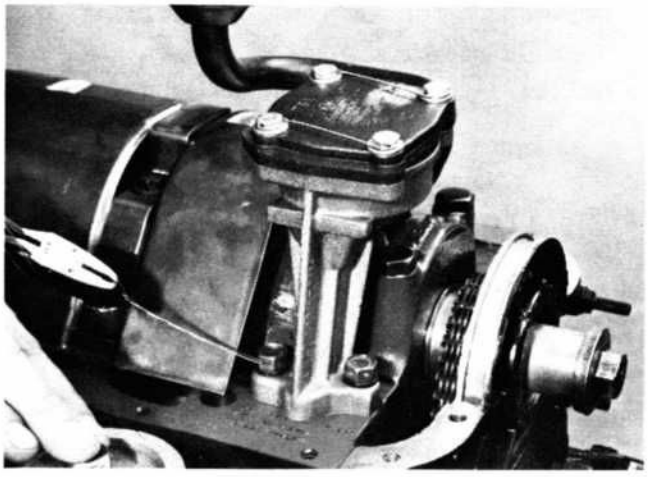


FIGURE 34. Safety wiring on Boss 302 oil pump.

Some builders prefer to safety wire the oil pump cover bolts on modified Bos 302's. Figure 34 shows an oil pump installation that has been safety wired. Some safety wire **every** bolt possible and use Loctite on those which can't be wired.

CHOOSING YOUR INTAKE MANIFOLD AND CARBURETION

The stock Boss 302 has an aluminum intake manifold and a Holley 780 cfm 4-barrel carburetor. This combination provides excellent all-around performance. For individuals who desire to run in pure stock classifications at the drag strip, the only modifications normally allowed are removal of the air cleaner and re-jetting of the carburetor. The stock metering jets in the Boss 302 Holley are #68 primary and #82 secondary. Noticeable improvement in performance can usually be achieved by going to slightly larger jets such as #70 primary and #84 secondary. Another modification found useful for both drag and road race application is a four pump "squirter" and mechanical secondary conversion kit. These are available from Mr. Gasket and others. Full "dual-squirter" mechanical secondary carburetors up to 850 cfm are available from Holley. The 830 cfm is the maximum allowable (1-11/16" throttle bores) for SCCA. Beyond these simple stocker modifications the job of selecting carburetion and manifolding again depends on the rules of your racing organization or your pocketbook.

There are a variety of intake manifolds available for race use. The most recent development from Ford race research

FIGURE 35. Cross Boss 4V inline intake manifold (DOZX 9425–A Base, DOZX 9C483–A Cover).

is the Cross Boss manifold shown in Figure 35. This cross-ram type manifold has shown exceptional breathing ability. It is designed for use with the new Autolite in-line

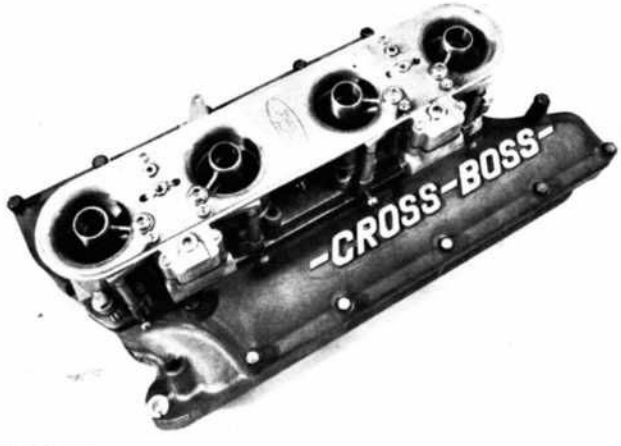


FIGURE 36. Autolite 4V inline carburetor (DOZX 9510-A or B).

4V carburetor shown in Figure 36. These parts are expected to be approved by SCCA for use in Trans-Am racing and are highly recommended. The Autolite 4V in-line is offered in two throttle bore sizes 1-11/16" (850 cfm) for Trans-Am and NASCAR and 2-1/4" (1400 cfm) for unlimited racing classes such as Formula A and modified drag. Order part nos. DOZX 9510-A (1-11/16") or DOZX 9510-B (2-1/4").

The Cross Boss intake manifold also can be used with a fabricated plate cover to convert it to dual-in-line 4V carburetor setup as shown in Figure 37. This

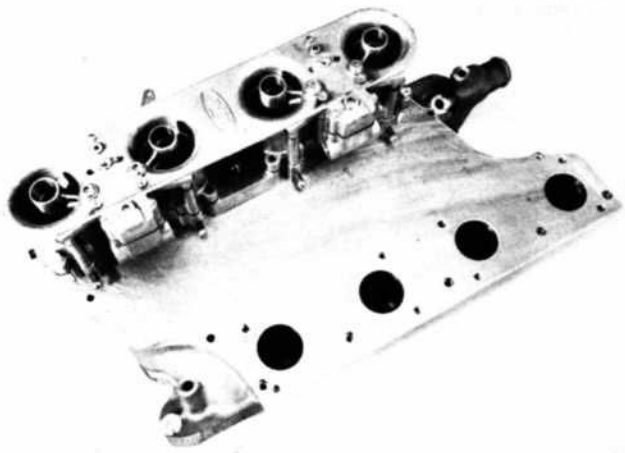


FIGURE 37. Cross Boss with 8V inline Cover.

configuration provides one barrel per bore, located directly above the intake passages. It is a very effective combination for racing applications where dual 4V's are allowable.

There are several other intake manifolds available from speed equipment suppliers. Shelby makes an 8V over-and-under type . . . and a tunnel-ram type manifold is available from Weiand and Offenhauser. Holley 4V carburetors in the 650 to 735 cfm range are recommended for use on these manifolds.

For Formula A applications, Weber carburetors can be used: for modified drag classes and other unrestricted applications, fuel injection is available. Falconer-Dunn offers a Weber induction system and Doug Nash Racing Enterprises an injection set-up for Algon or Hillborn injectors.

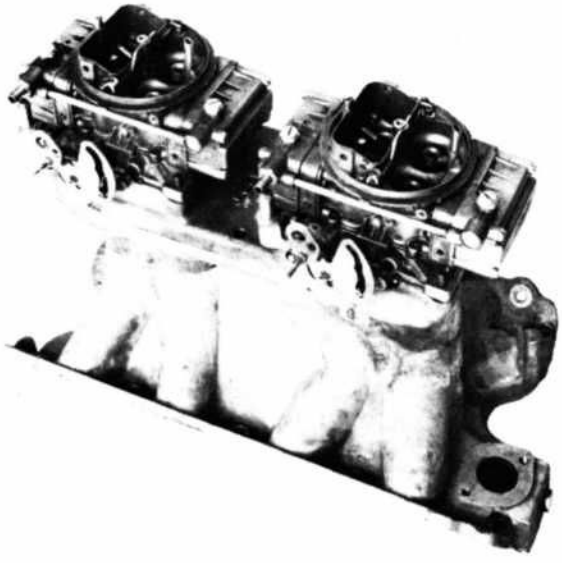


FIGURE 38 Weiand tunnel ram 8V manifold.

FIGURE 39. Doug Nash fuel injection setup for Boss 302.

Figure 39 shows the Doug Nash fuel injection unit . . . Figure 40, the Dunn manifold for Weber carburetion.

FIGURE 40. Falconer-Dunn manifold for Weber carburetion.

Nash's fuel injection manifold can also be adapted for use with the Autolite in-line carburetors.

IGNITION SYSTEMS

The stock Boss 302 distributor is a dual point unit adequate for the street and for weekend racing. It will function well up to about 6000 rpm, above which the speed limiter prevents additional rpm. The more demanding racer will require a Ford 289 Hi Per dual point distributor or will need to convert his stock unit. The 289 Hi Per distributor will handle up to 8000 rpm.

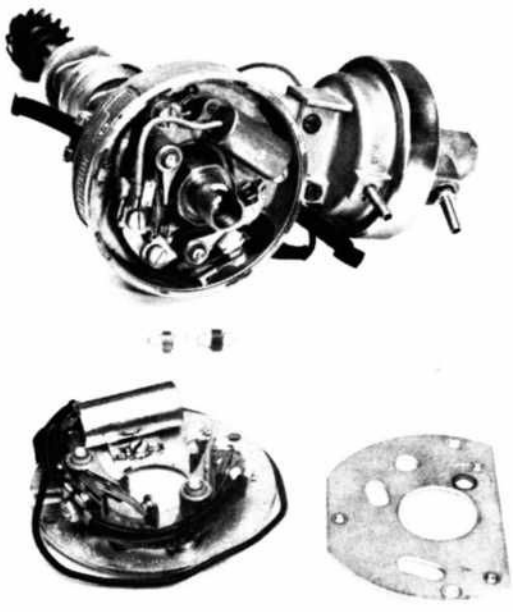


FIGURE 41. Stock Boss 302 distributor with 289 Hi-Per conversion parts.

Figure 41 shows the stock Boss 302 distributor. In the foreground are the parts from the 289 Hi Per distributor which can be used to convert the stock distributor for race usage. This includes the 289 Hi Per breaker plate, points, condenser, counterweight springs and spacers. The spacers are required because the location of the cam on the 289 Hi Per rotor shaft is lower than on the stock unit.

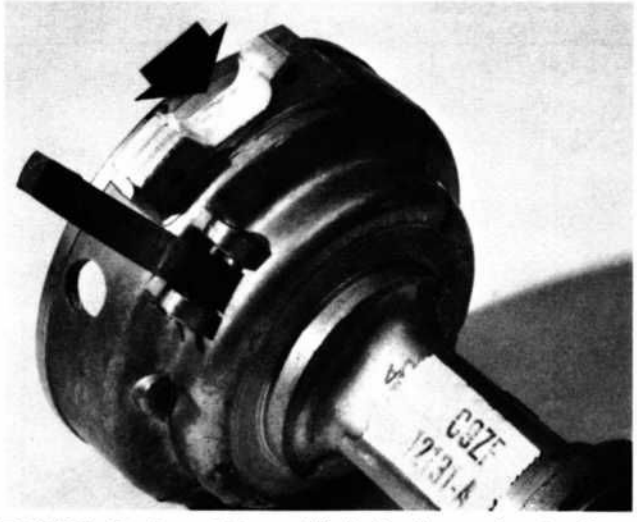


FIGURE 42. Boss 302 modified distributor showing Dow bathtub caulk in vacuum advance hole.

For race use, the speed limiter and vacuum advance mechanism should be discarded. Figure 42 shows how one engine builder plugs the vacuum advance opening with a silicone-based rubber sealer, such as Dow Bathtub Caulking.

Set up the 289 Hi Per or modified Boss 302 distributor for 16 degrees initial advance, 38 degrees total. Breaker point spring tension should be 28 to 32 ounces.

Magneto-type ignition is also available for Boss 302's from such manufacturers as Mallory, Vertex, Spaulding, etc., and Spaulding offers a race type transistorized ignition for the Boss.

HEADERS, CLUTCHES, FLYWHEELS AND RADIATORS

Boss 302 engines are extremely sensitive to exhaust tuning. A good set of headers, carefully tuned, are a must. For street-strip use, headers should have a 1-3/4" to 1-7/8" I.D. and a 36" primary tube length. For race applications, headers should have a 2" I.D. Drag strip racing requires 32" to 34" primary tubes with 10" collectors. The preferred road race setup is 38" to 40" primaries with 10" collectors. Headers are available for the Boss 302 from a number of suppliers such as Hooker, Doug Thorley, Jr. and others.

When it comes to clutches and bellhousings for race use, any of the high performance, explosion-proof types are an absolute must. When selecting a flywheel for the Boss 302, remember that it uses the large 13-3/4" diameter flywheel, rather than the 12-1/4" diameter flywheel. Clutches are available from such suppliers as Schiefer, Hayes and Weber. Bellhousings are offered by Lakewood, Rc industries and others. (See listings in back of book.)

For competition use, some builders prefer to use a race-type radiator. A 24" x 16" racing radiator is available from Robbins Radiator Works, Daytona Beach, Florida.

BOSS 302 SPECIFICATIONS

BOSS 302 SPECIFICATIONS
(INCHES)

	COMPETITION ONLY	BLUEPRINT	STOCK (1970)
Bore	4.00	4.00	4.00
Stroke	3.00	3.00	3.00
B/S	1.33	1.33	1.33
Connecting Rod Length	5.3165–5.3135	5.1565–5.1535	5.1565–5.1535
L/R	3.54	3.43	3.43
Compression Ratio	11.5	10.5–1	10.5–1
Piston to Top of Block	.000–.005	.000–.005	.013–.033
Cylinder Block			
℄ Crank to Head Face	8.201–8.211	8.201–8.211	8.201–8.211
Bore Centers	4.38	4.38	4.38
℄ Crank to Top of Blk.	8.93	8.93	8.93
Main Bearing Bore Dia.	2.4420–2.4412	2.4420–2.4412	2.4420–2.4412
Tappet Bore Diameter	.8752–.8767	.8752–.8767	.8752–.8767
Cylinder Head			
Combustion Chamber Vol. (CC)	57.1–60.1	57.1–60.1	57.1–60.1
Valve Guide Bore Dia. Int.	.3433–.3443	.3443–.3443	.3433–.3443
Valve Guide Bore Dia. Exh.	.3433–.3443	.3433–.3443	.3433–.3443
Valve Seat Width Intake	.060–.080	.060–.080	.060–.080
Valve Seat Width Exhaust	.060–.080	.060–.080	.060–.080
Valves – Exhaust			
O.D.	1.7145–1.7045	1.7145–1.7045	1.7145–1.7045
Stem Diameter	.3418–.3411	.3418–.3411	.3418–.3411
Length	4.94	4.94	4.94
Stem	Partial Hollow	Solid	Solid
Valves – Intake			
O.D.	2.195–2.185	2.195–2.185	2.195–2.185
Stem Diameter	.3423–.3416	.3423–.3416	.3423–.3416
Length	5.136	5.136	5.136
Stem	Solid	Solid	Solid
Valve Springs			
Installed Height	1.69	1.82	1.82
Installed Load (Ref.)	135#	92#	92#

BOSS 302 SPECIFICATIONS
(INCHES)

	COMPETITION ONLY	BLUEPRINT	STOCK (1970)
Piston			
Comp. Height	1.360	1.529	1.529
Piston Pin			
Diameter	.9122–.9125	.9122–.9125	.9122–.9125
Length	3.02–3.03	3.02–3.03	3.02–3.03
Crankshaft			
Main Bearing Journal Dia.	2.2482–2.2490	2.2482–2.2490	2.2482–2.2490
Con. Rod Journal Dia.	2.122–2.123	2.122–1.123	2.122–2.123
Rocker Arm			
Rocker Arm Ratio	1.73–1	1.73–1	1.73–1
Camshaft			
.100 Tappet Lift	I.O. 12° BTDC E.O. 42° BBDC I.C. 32° ABDC E.C. 2° ATDC	I.O. 4° ATDC E.O. 40° BBDC I.C. 30° ABDC E.C. 16° BTDC	I.O. 4° ATDC E.O. 40° BBDC I.C. 30° ABDC E.C. 16° BTDC

BALANCE AND WEIGHT INFORMATION
(GRAMS)

Bobweight (Estimated)	Req'd.	COMPETITION ONLY	BLUEPRINT	STOCK (1970)
Piston	1	530	514	514
Comp. Ring (Upper)	1	14.5	18.9	18.9
Comp. Ring (Lower)	1	15.5	18.9	18.9
Oil Ring	1	14	20.5	20.5
Piston Pin	1	14	146.5	146.5
Conn. Rod Assy. (Piston Pin End)	1	193	166	166
TOTAL RECIPROCATING		910.5	884.8	884.8
Conn. Rod Assy. (Crank End)	2	1116.	842.	842.
Conn. Rod Bearings	4	96.5	97.	97.
Oil in Crankpin*	1	15	15*	15*
TOTAL CENTRIFUGAL		1222.5	954	954
Total Bobweight		2133.0	1838.8	1838.8

*Cross drilled crank. Use 4 grams for non-cross drilled crank.

CLEARANCES & FITS

(INCHES)

	COMPETITION ONLY	BLUE PRINT	STOCK
Bearings			
Select Fit Main	.0020–.0025	.0025–.0030	.0005–.0015
Select Fit Rod	.0020–.0025	.0025–.0030	.0015–.0025
Camshaft	.0010–.0030	.0010–.0030	.0010–.0030
End Play			
Crankshaft End Play	.004–.008	.004–.008	.004–.008
Camshaft End Play	.002–.005	.002–.005	.0005–.0055
Conn. Rod End Play (2 Rods)	.022–.032	.022–.032	.010–.020
Dist. Shaft End Play	.004–.025	.004–.025	.004–.025
Piston			
Piston to Bore	.0055–.0065	.0055–.0065	.0018–.0026
Piston to Pin	.0007–.0009	.0007–.0009	.0006–.0008
Piston to Conn. Rod	.0007–.0024 Pr.	.0007–.0024 Pr.	.0007–.0024 Pr.
Piston Ring Gap			
No. 1 Comp	.010–.020	.010–.020	.010–.020
No. 2 Comp	.015–.030	.010–.020	.010–.020
Oil Ring	.015–.069	.015–.069	.015–.069
Piston Ring to Groove			
Comp Ring	.002–.004	.002–.004	.002–.004
Oil Ring	SNUG	SNUG	SNUG
Valves			
Valve Stem to Guide (Exh.)	.0015–.0020	.0015–.0020	.0015–.0032
Valve Stem to Guide (Int.)	.0015–.0020	.0015–.0020	.0010–.0027
Tappet Gap	.025 (HOT)	.025 (HOT)	.025 (HOT)
Distributor Gear Backlash	.003–.005	.001–.010	.003–.010
Tappet to Bore	.0007–.0027	.0007–.0027	.0007–.0027
Ignition Timing BTDC	40° @ 5000	40° @ 5000	38° @ 5000

BOLT & NUT TORQUE SPECIFICATIONS FT/LBS

Cylinder Head	Competition Only		Blueprint & Stock	
	Size	Torque	Size	Torque
1st Step	7/16–14	35–45	7/16–14	35–45
2nd Step		55–65		55–65
3rd Step		75–80		75–80
Main Bearing Caps	1/2–13	60–70	1/2–13	60–70
Main Bearing Caps	3/8–16	30–35	3/8–16	30–35
Bolt – Cam Sprocket to Camshaft	3/8–16	40–45	3/8–16	40–45
Spark Plug	14MM	15–25	14MM	10–15
Nut – Connecting Rod	7/16–20	50–55*	3/8–24	35–40

*With oil on thread and moly spray on nut face **only.**

AUTOLITE 14MM TAPERED SEAT SPARK PLUG HEAT RANGE CHART

TYPE	AUTOLITE NUMBER	HEAT RANGE
Standard Gap	AF3 AF2 AF1 AF901 AF701 AF501	Hot △ ▽ Cold
Power Tip	AF52 AF42 AF32 AF22 AF12	Hot △ ▽ Cold
Racing Gap	AF503 AF303 AF103	Hot △ ▽ Cold

BOSS 302 STOCK PARTS LIST *

*Does not include parts also used on regular 302 engine.

PART NUMBER	NO. PER ENGINE	PART NAME	APPLICATION '69	'70
DOZZ 6049–B	2	Cyl. Head	X	X
C9ZZ 6051–C	2	Cyl. Head Gasket	X	X
DOZZ 6108–A	8	Piston Assembly (Std. Red size)	X	X
DOZZ 6108–B	8	Piston Assembly (Std. Blue Size)	X	X
DOZZ 6108–C	8	Piston Assembly (.003" O/S)	X	X
C9ZZ 6135–E	8	Piston Pin	X	X
C9ZZ 6200–B	8	Connecting Rod	X	X
C30Z 6211–M	16	Bearing Connecting Rod (Std. size)	X	X
C9AZ 6212–B	16	Con. Rod Nut (3/8"–24)	X	X
C9ZZ 6214–B	16	Con. Rod Bolt (2–7/64" Long)	X	X
DOZZ 6250–A	1	Camshaft	X	X
C9ZZ 6307–A	8	Plug Crankshaft	X	
C9ZZ 6307–B	8	Retainer Crankshaft Plug	X	
DOAZ 6500–C	16	Mechanical Tappets	X	X
C9ZZ 6505–A	8	Exh. Valve (Std. size) (5.02" x 1.71" Dia.)	X	
DOZZ 6505–A	8	Exh. Valve (Std. size) (5.05" x 1.71" Dia.)		X
DOZZ 6507–A	8	Int. Valve (Std. size) (5.23" x 2.19")		X
C9ZZ 6507–A	8	Int. Valve (Std. size) (5.23" x 2.23")	X	
DOZZ 6513–A	16	Valve Spring (w/4 dark blue stripes)	X	X
C9ZZ 6514–A	16	Valve Retainer	X	X
C9ZZ 6518–A	32	Key – Valve Spring Retainer	X	X
C9ZZ 6A527–A	16	Rocker Arm Stud (7/16"–20 & 7/16"–14)	X	X

PART NUMBER	NO. PER ENGINE	PART NAME	APPLICATION '69	'70
C9ZZ 6A536–A	16	Valve Spring Seat	X	X
C9ZZ 6564–A	16	Rocker Arm	X	X
C9ZZ 6A564–A	8	Push Rod Guide	X	X
C9ZZ 6565–A	16	Push Rod (7.595" Long)	X	X
C9ZZ 6B633–A	1	Oil Cooler Bracket – Upper	X	X
C9ZZ 6B634–A	1	Oil Cooler Bracket – Lower	X	X
C9ZZ 6A636–A	1	Oil Filter Adapter to Block Gasket	X	X
C90Z 6A642–A	1	Oil Cooler Assy.	X	X
C9ZZ 6687–B	1	Baffle – Oil Crankshaft – Windage	X	X
C9ZZ 6A715–C	1	Oil Cooler Hose – Inlet	X	X
C9ZZ 6A715–D	1	Oil Cooler Hose – Outlet	X	X
C9ZZ 6881–A	1	Oil Filter Adapter (w/oil cooler)	X	X
B8A 6890–A	1	Oil Filter Adapter Mtg. Bolt Insert	X	X
C9AZ 6890–A	1	Insert – Oil Filter Adaptor – Mtg.	X	X
C4GY 6894–A	1	Oil Filter Adapter Mtg. Bolt Assy.	X	X
C9ZZ 9424–C	1	Intake Manifold	X	X
C5OZ 12127–E	1	Dual Point Distributor	X	X

Miscellaneous Cylinder Head Installation Materials – 1. Chlorothane (Degreaser) 2. Silicone Rubber Primer 3. Silicone Rubber Sealant

NOTE: Essentially, 1969 and 1970 302 BOSS engines are the same, as evidenced by the application column. The most important difference is in the size of the intake valve. 1969 engines have a 2.23" diameter head, compared to a slightly smaller 2.19" diameter in 1970 for better response during acceleration. This, of course, requires different cylinder heads. If necessary to replace a '69 cylinder head for repairs, a '70 cylinder head can be used if the corresponding intake valves are also installed.

BOSS 302 COMPETITION ONLY PARTS LIST

PART NUMBER	PART NAME
DIZZ 6051–B	Head Gasket
DOZX 6108–A	Piston & Pin Set
C9OZ 6148–A	Piston Rings (Kit for 2 pistons)
DOZX 6200–A	Connecting Rod
DOZX 6211–A	Connecting Rod Bearings (Red)
DOZX 6211–B	Connecting Rod Bearings (Blue)
DOZX 6250–B	Camshaft Kit (Includes cam, tappets, & break-in lube
DOZX 6505–A	Exhaust Valve
DOZX 6507–A	Intake Valve
DOZX 6A511–A	Valve Spring Assembly
DOZX 6A585–A	Fulcrum Assembly, Valve Rocker Arm

PART NUMBER	PART NAME
C9ZZ 6881–A	Oil Filter Adaptor for use with Oil Cooler
B8A 6890–A	Oil Filter Adaptor Mounting Bolt Insert
C9ZA 6890–A	Insert, Oil Filter Adaptor Mtg.
C4GY 6894–A	Oil Filter Adaptor Mounting Bolt Assembly
DOZX 9425–A	Intake Manifold/Base
DOZX 9C483–A	Intake Manifold Cover – 4V
DOZX 9C484–A	Intake manifold Gasket
DOZX 9510-A	Carburetor–In-Line–4V (1-11/16" Throttle Bore)
DOZX 9510-B	Carburetor–In-Line–4V (2-1/4" Throttle Bore)

COMPETITION CLUTCHES AND FLYWHEELS

HAYS

Part	Part #
Aluminum Flywheel	226–1/2
Steel Flywheel	626–1/2
Pressure Plate	NI 11L
Clutch Disc	118 BR

SCHIEFER

Part	Part #
Aluminum Flywheel	30–40068
Aluminum Pressure Plate	60–11450
Clutch Disc (1–1/16" Spline)	50–40125
Clutch Disc (1–3/8" Spline)	50–40128

WEBER

Part	Part #
Aluminum Flywheel	52112
Steel Flywheel	72112
Pressure Plate (Aluminum Flywheel)	1440SC
Pressure Plate (Steel Flywheel)	0350SC
Clutch Disc (Riveted Lining)	1009
Clutch Disc (Bonded Lining)	2009

SPECIAL COMPONENT SUPPLIERS

The following firms are manufacturers of special high performance parts mentioned in this publication, which are not offered by Ford Motor Company.

Aviaid Metal Products
14519 Blythe Street
Van Nuys, California 91402

Beeline Engineering (J.R.)
470 Knowles Road
North Adams, Michigan 49262

Clevite Corporation
17000 St. Clair
Cleveland, Ohio 44110

Doug Thorley Headers
5533 E. Whittier Blvd.
Los Angeles, California 90022

Federal-Mogul Corporation
26555 Northwestern Highway
Southfield, Michigan 48075

Hooker Headers, Inc.
1009 W. Brooks Street
Ontario, California 91762

Lakewood Industries
4800 Briar Road
Cleveland, Ohio 44135

Mondello's Porting Service
2240 Sepulveda Blvd.
Los Angeles, California 90064

Perfect Circle
Dana Corporation
Dept. 86
Toledo, Ohio 43601

R.C. Industries, Inc.
980 W. Lafayette Road
Medina, Ohio 44256

Robbins Radiator Works, Inc.
113 Taylor Avenue
Daytona Beach, Florida

Schiefer Mfg. Co.
508 & 1191 Monterey Pass Road
Monterey Park, California 91754

TRW Replacement Division
(TRW Thompson Products)
(TRW Toledo Products)
8001 E. Pleasant Valley Road
Cleveland, Ohio 44131

Valley Head Service
18422 Topham Street
Tarzana, California 91356

Weber's Speed Equipment
310 S. Center Street
Santa Ana, California

BOSS 302 ENGINE AND CHASSIS BUILDERS

The following list covers engine and chassis specialists in different geographical areas who are experienced in working with Boss 302's. The list is not meant to be all-inclusive but is merely offered for the convenience of the reader.

Doug Nash Racing Enterprises
36360 Ecorse Road
Romulus, Michigan
Engine

Falconer & Dunn Racing Engines
5660 Selmaraine Drive
Culver City, California 90230
Engine

Holman & Moody, Inc.
P.O. Box 27065
Municipal Airport Station
Charlotte, N.C. 28208
Engine & Chassis

Maier Racing Enterprises, Inc.
16966 Meekland Ave.
Hayward, California 94541
Engine & Chassis

Redline Engineering, Inc.
102 East Logan Street
Tecumseh, Michigan 49286
Chassis

Bud Moore Engineering
400 North Fairview
Spartanburg, N.Carolina
Engine & Chassis

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VOL. MP 1069 LITHO IN U.S.A.