1.6L KENT/1.6L/1.9L CVH/2.0L/2.3L OHC/2.3L/2.5L HSC

1.6L "KENT" ENGINE

This is a proven overhead valve design. The combustion face of the head is virtually flat. Most of the combustion chamber is in a dished piston. Camshafts are mechanical with solid tappets. Parts for this engine are identified as 1.6L Kent. You'll find it under the hood of many Ford models, including Pinto, Capri, Fiesta and the English built Cortina. A "GT" performance version is the basis for an amateur class of racing…Formula Ford. Only production-type parts are normally legal in "formula" competition. Check with your racing association for the latest rules.

1.6L "CVH" AND 1.9L "CVH" ENGINES

The 1.6L CVH engine was introduced in 1981 for the Escort, Lynx, EXP and LN7 car line. Parts for this engine are identified as 1.6L CVH. It has a canted valve head (CVH) with the valve angles to match the hemispherical combustion chambers. Reliefs are cut into it domed pistons to match valve and combustion chamber configuration. A hydraulic camshaft is used in production. A performance version was introduced in 1984 with electronic fuel injection and a turbocharger. A 1.9L CVH was introduced on 19851/2 models. It has a 4.250mm higher deck height to achieve a longer stroke. Some 1.6L/1.9L CVH parts are interchangeable.

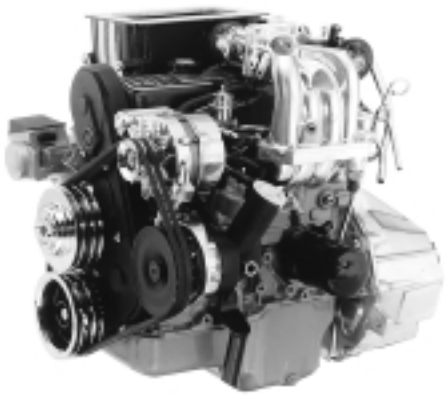
1.6L/1.8L/2.0L DOHC ENGINE

Ford currently offers four double overhead cam 4-cylinder engines. The 1.6L DOHC was introduced on 1991 Capri, the 1.8L DOHC on 1991 Escort GT/Tracer LTS, a 2.0L DOHC on 1993 Probe, and a second 2.0L DOHC design on the 1995 Contour/Mystique. These engines feature four valves per cylinder and a centrally located spark plug in a "pentroof" combustion chamber for efficient air flow and combustion. Ford Racing parts have not been developed for these production double overhead cam engines.

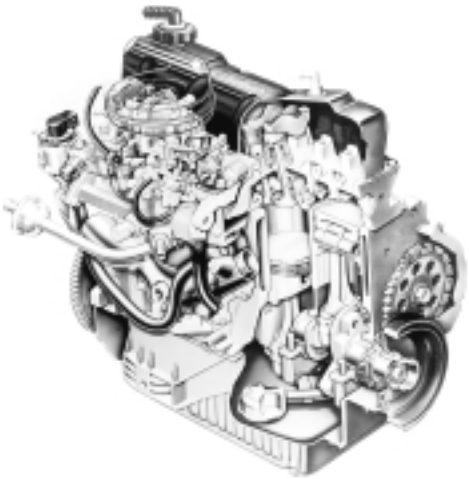
2.0L/2.3L/2.3L OHC ENGINES

Design-wise, these metric engines are very similar and have a belt-driven overhead camshaft. Dimensionally, however, they are very different in terms of bore, stroke, bore spacing, block deck height and crankshaft journal diameters. The European (EAO) 2.0L was produced in 1971-74 cars. The 2.3L OHC is widely found on 1974-95 models…including a high-tech version that powered the Thunderbird/Cougar Turbo Coupe. A two spark plug per cylinder design with distributorless ignition was introduced on 1989 Ranger and 1991 Mustang models. Parts for these engines are identified as 2.0L EAO and 2.3L OHC respectively. In 1983, a 2.0L version of the 2.3L OHC engine was introduced on Ranger and Aerostar trucks. The only basic difference is in bore diameter, as shown in the chart on page 143, thus most parts interchange. Parts shown for the 2.3L OHC can be used in the 2.0L truck engine, except those relating to bore diameter (pistons, etc.). In 1998 the Ranger engine grows to 2.5L with increased stroke.

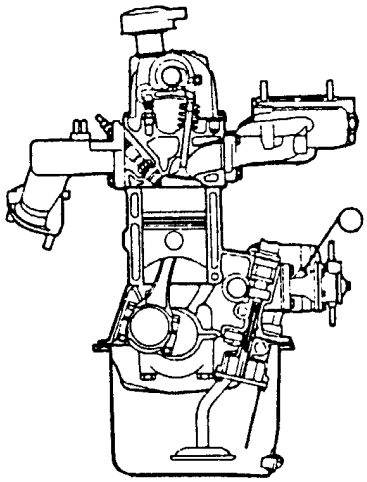
1.6L/1.9L CVH



2.3L OHC (Turbo-Intercooled)



2.3L/2.5L HSC



2.0L OHC

Ford Racing offers parts for five different 4-cylinder engines. Each is a unique design, and none of the major components can be interchanged between engines. Be sure to correctly identify your engine before ordering parts.

2.2L PROBE ENGINE

Ford introduced a new fuel injected 2.2L engine (in naturally aspirated and turbo versions) for 1989 Probe models. It's an overhead camshaft design with shaft-mounted rocker arms and three valves per cylinder (2 intake, 1 exhaust). The cylinder head is cast from aluminum and features dome shaped combustion chambers with dual squish areas and centrally located spark plug for fast burn combustion. Parts are not interchangeable with other 4-cylinder engines. Ford Racing parts have not yet been developed for the 2.2L engine.

2.3L/2.5L "HSC" ENGINES

The 2.3L HSC was introduced in 1984 Tempo/Topaz models. Except for displacement, it bears no resemblance to the 2.3L OHC. The 2.3L HSC is a conventional cam-in-block in-line design — much like a 6-cylinder with two bores chopped off. HSC refers to its swirl combustion chamber that's achieved by shrouding the valves and other minor head work. In 1986, a larger displacement (8mm longer stroke) 2.5L HSC was introduced, with electronic fuel injection.

*Not legal for sale or use on pollution-controlled motor vehicles. **Direct replacement part.

289/302/351W/351C/351M/400

SIX WAYS TO BUILD A WINNER

Ford has manufactured millions of small block V-8's over the past 30 years, and Ford Racing parts are available for many of them. You have a choice of six engines to modify (eight, if you count two high performance BOSS versions). So you've got great flexibility working for you, whether you begin with a complete engine assembly or a bare block. All have four-inch bores, but there are differences that affect parts interchange. For example, the water passages described on page 154. Here's a brief description of Ford small blocks.

289/302

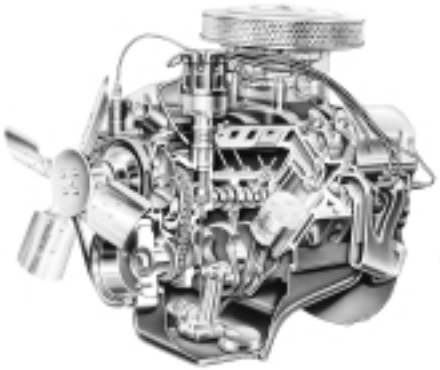
The 289 was produced from 1963 through 1968, and the 302 from 1968 to the current model year. They're very similar, except for stroke. Of special interest is the 289-4V Hi-Performance engine (1963-67) with mechanical camshaft, threaded rocker arm stud (adjustable) and a recessed spring seat. Most other 289/302 (1968-76) engines use a press-in stud. 1978 and later 302 engines use a modified pedestal as shown on page 158. Many 289/302 parts fit earlier 221/260 engines (which had smaller bores). They also had less metal around the bores, so you can't overbore to come up with a 289. 1985 model Mustang GT introduced a new high output 302 with roller tappet camshaft. Electronic fuel injection was added in 1986.

302 BOSS

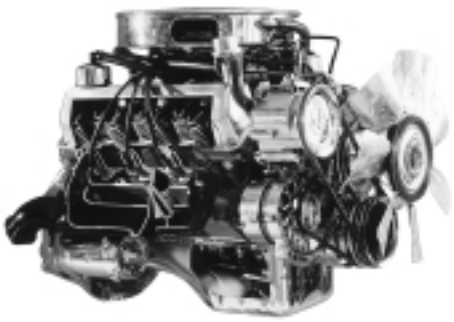
This is certainly one of Ford's all-time super engines. The 302 BOSS (1969-70) proved to be very competitive in 5 liter TransAm racing. It featured big breathing heads with canted valves, mechanical cam, stamped rocker arms with a threaded adjustable stud, push rod guide plates, forged crankshaft, 4-bolt main caps (#2, #3 and #4 journals), beefy con rod with spot-face for .375" bolt and forged pistons.

351W (WINDSOR)

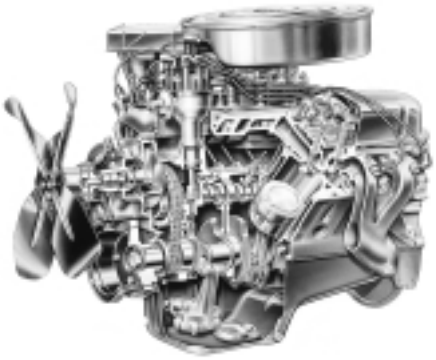
The Windsor engine plant builds this engine; hence the name. Normally, this isn't important. But another engine, the 351C (for Cleveland engine plant), has the same displacement. That's about all they have in common. So, it's always important to differentiate between the two. The 351W is a beefier block than the 289/302, but has the same bore spacing (4.38") and bore diameter (4.00"), so heads retrofit. A higher deck height requires a unique intake manifold. Main journals (3.00") are larger than the 289/302 (2.25"). Camshafts interchange, but the 351W has a different firing order: (1-3-7-2-6-5-4-8) vs. (1-5-4-2-6-3-7-8) for the 289/302, except 1982 and later 302 HO which use the 351W firing order. The 351W has been used from 1969 to the current year.



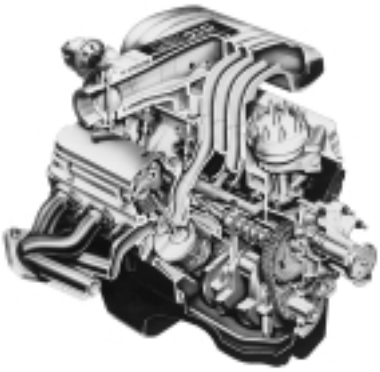
289 Hi-Per



302 BOSS



351W



5.0L H.O. (SEFI)

MODULAR V-8 ENGINES

4.6L SOHC, 4.6L DOHC, 5.4L SOHC

In 1991, Ford unleashed a new era of muscle, one that is propelling us into the future. The Modular engine focuses on low friction, excellent sealing, and increased block stiffness. The design results in an extremely smooth running engine using aluminum heads and having all accessories rigidly mounted to the engine. Both the engine block and head are machined to close tolerances to produce a very precise assembly. The head bolts of modular engines actually extend past the cylinder bores into the bearing webs, eliminating bore distortion and providing a better head gasket seal. The sophisticated overhead cam design uses roller finger followers to lower friction and increase the RPM potential of the engine. On the bottom end, the deep skirt engine block and cross-bolted main caps contribute to a highly rigid assembly. Two engine plants manufacture Modular engines; Romeo produces all passenger car versions and Windsor produces the Modular Truck engines. Here's a brief description of Modular V-8 engines.

4.6L SOHC

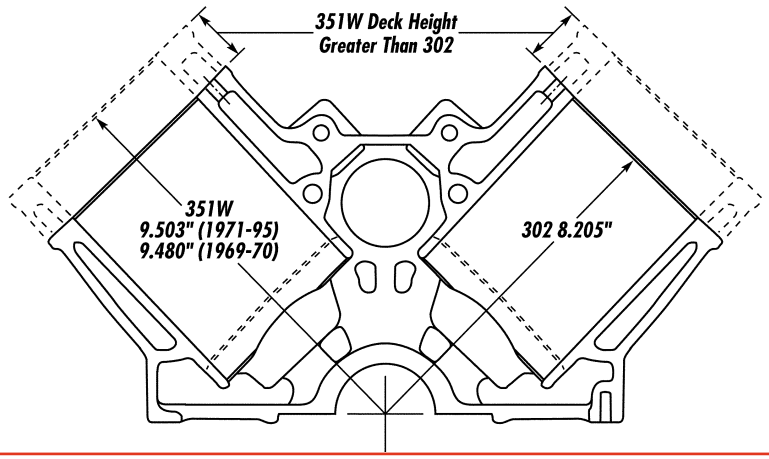
The 4.6L SOHC (2V) was first introduced in 1991. This engine is the basis for all modular engines and is used in passenger car as well as the trucks. The block is cast iron with a nodular crankshaft, while the heads are aluminum using an in-line valve design with 1 intake and 1 exhaust valve per cylinder. All passenger cars have press fit piston pins, while all truck engines have full floating piston pins to improve durability.

4.6L DOHC

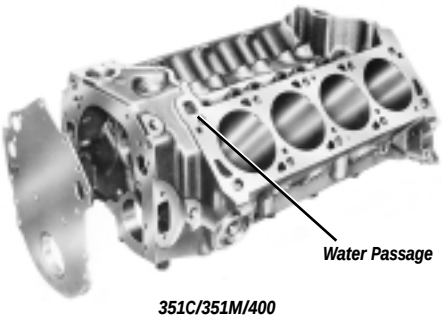
The 4.6L DOHC (4V) was first introduced in the Mark VIII; however, in 1996 a similar version of this engine found its calling the Mustang Cobra. The aluminum block and four valve head make for a powerful combination producing 305 HP @ 7000 RPM. Internally, the 4 bolt, cross-bolted main bearing caps provide the support necessary to easily handle the high RPM potential of the forged steel crankshaft. This engine uses hypereutectic pistons with full floating piston pins and upgraded connecting rod assemblies to improve durability.

5.4L SOHC

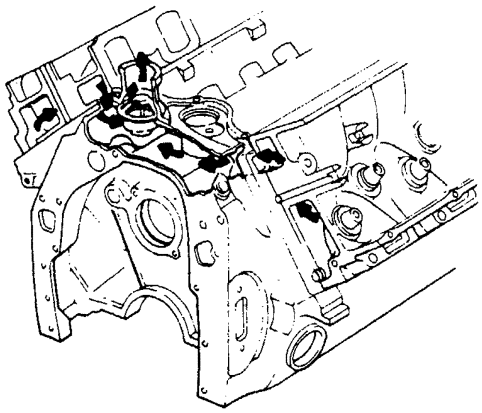
The 5.4L SOHC (2V) "Triton" engine released in trucks for 1997 is producing favorable reactions. This engine has a cast iron block, forged steel crankshaft, full floating piston pins and special 6000 RPM connecting rods. It is the 5.8L pushrod engine replacement.

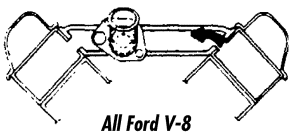


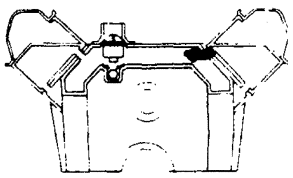

289/302/351W



351C/351M/400




All Ford V-8
Except 351C/351M/400


351C/351M/400

351C (CLEVELAND)

The 351C entered the scene in 1970 and was produced until 1974. It has canted valves with multi-groove keepers, hydraulic cam, pedestal-mounted rocker arms with "sled" fulcrum seats that are retained with cap bolts. Heads for 2V induction have open chambers with rounded ports, while 4V heads have "quench" combustion chambers with larger rounded intake and exhaust ports. A 351C Cobra Jet appeared in 1971 with 4-bolt main caps, which was carried over in 1972 as the 351C-4V with open chamber heads.

351C BOSS

The 351C BOSS also appeared in 1971. It had 4-bolt main caps and the 4V type quench chamber head with pedestals machined to accept a 302 BOSS type valve train and mechanical cam. The con rod featured a 180,000 psi .375" bolt. In 1972, open chamber heads were used with a flat-top piston, and the name changed to 351C HO.

351M (MODIFIED) AND 400

The 351M and 400 are similar in design to the 351C, but there are subtle differences. Both the 351M and 400 blocks are 1.100" taller and have larger main journal diameters. Engine mounts are unique. Bell housing pattern is the 429/460 design.

WINDSOR VS. CLEVELAND WATER PASSAGES

289/302/351W engines use a front cover and water exits the intake manifold face of the cylinder head through the intake manifold to radiator. 351C/351M/400 engines do not use a front cover. The block is extended and covered with a flat stamping. Water exits the combustion face of the head and into the block, and then to the radiator. Windsor and Cleveland heads physically interchange, but some modification is required to accommodate the differences in water passages. See page 153 and above for details.

FORD RACING 302/351 FORD RACING WATER PASSAGES

Several different water passage hole patterns have been used on 302 Ford Racing and 351 Ford Racing cylinder blocks and heads since their introduction. Engine assemblers should lay the head gasket on the block and the cylinder head (with front of the gasket toward the front of the engine) to make sure there is a path for coolant flow from the block into the head. In some cases, holes may have to be drilled in the block or head, or punched in the gasket. Current Ford Racing cylinder head gaskets are listed on page 64.

FORD RACING 302/351 "FORD RACING" ENGINE BLOCKS

Ford Racing has designed several "Ford Racing" blocks for maximum performance competition. They're designed for small block engine builders who want to use existing 302/351C or 351W components. 302/351 Ford Racing engines constructed with Ford Racing block and Ford Racing cylinder heads are not available as complete assemblies.

When ordering parts, consider these key points:

- 302 Ford Racing Block (M-6010-R302) – can be used with all 289/302/302 BOSS applications.
- 351 Ford Racing Blocks (M-6010-E351 thru M-6010-W351) – can be used with all production 351W applications, except those relating to crankshaft main bearing diameter. The 351 Ford Racing block is machined for the smaller 351C type bearings. Ford Racing crankshafts feature the smaller 351C main journals that are compatible with these blocks. The block is available in two deck heights (9.500" and 9.200"), so either Windsor or Cleveland components can be used topside. Requires 289/302/351W type camshaft.
- If 302/351 Ford Racing heads are used on 302/351 Ford Racing blocks, the Ford Racing type intake manifolds are required.

*Not legal for sale or use on pollution-controlled motor vehicles. **Direct replacement part.

429/429CJ/429SCJ/429 BOSS/460

During The Golden Age of Muscle, high performance versions of 429/460 engines flashed on the scene like a firefly. The glow was brief – from 1969 to 1971. The memory lingers on. All of those cubic inches! Never again available directly from the factory ready for competition. Luckily, engines and pieces are still around. There are several ways to go, depending on the performance level you want, be it simply a Bracket Drag Racer, or something more potent, like an offshore power boat, big torquing engine for truck pulls or a Pro Stock drag machine. Here's a brief description of production engines to give you an idea of part interchangeability and general performance level.

429/460

The 429 "Thunder Jet" was introduced in 1968. It's your basic passenger car "wedge" engine design with hydraulic cam, 2-bolt main caps, and either 2V or 4V carburetor. Cast iron "rail" rocker arms are mounted on non-adjustable, positive stop studs (1968-72). 1973 and later 429/460 engines use pedestal-mount rocker arms as described for 351C engines on page 158. The 460 is a stroked version of the 429. With modifications, these engines can be used for most competition, except offshore boats or with a supercharger.

429CJ (COBRA JET)

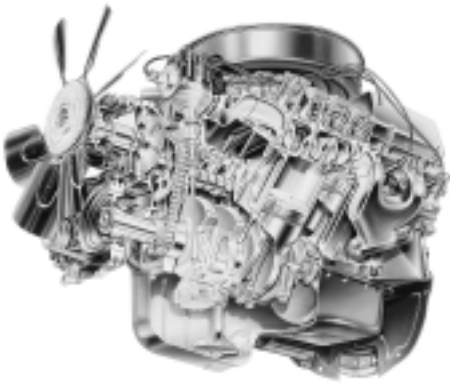
Take a base 429, then add a hotter hydraulic cam, larger CFM carburetor, heads with bigger ports and valves, plus a few other items and you have a 429CJ. 1970 engines had 2-bolt mains; 1971 models 4-bolts. Engines built before 11/1/69 use an adjustable, non-positive stop rocker arm stud, so a mechanical cam is easily installed.

429SCJ (SUPER COBRA JET)

Now, we're talking about an engine you can modify for serious competition. The 429SCJ has 4-bolt main caps (#2, #3, and #4 journals), mechanical cam, adjustable non-positive stop rocker arm studs, stamped rocker arms and push rod guide plates. The pistons are forged aluminum and con rod bolt seats are spot faced. As with the CJ, production ended in 1971.

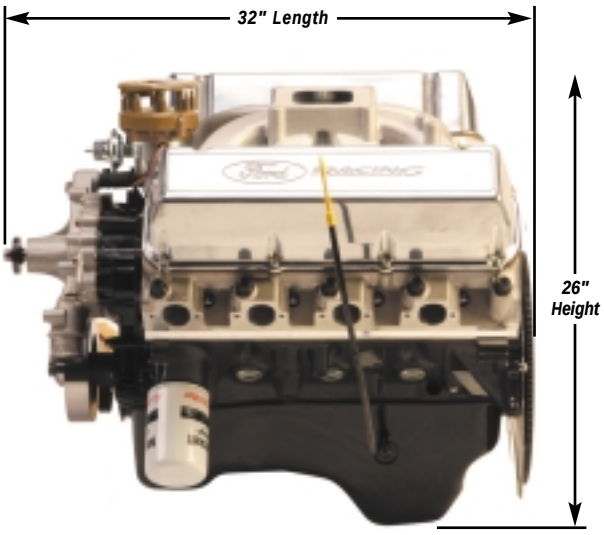
429 BOSS

This is an all-out competition design with aluminum heads and hemi combustion chambers (technically, they're "crescent-shaped"). The first few hundred in 1969 for NASCAR competition were called "S" engines; the later street version is a "T" engine. "T" engine con rods are spot faced for a .375" bolt and hex nut. "S" engine con rods are beefier, 0.056" shorter, have wider bearing journals and use a .5" bolt with 12-point nut.



ENGINE SWAP SIZE CHART (SEE ENGINE PAGES 6-21 FOR WEIGHTS)

460 ENGINE

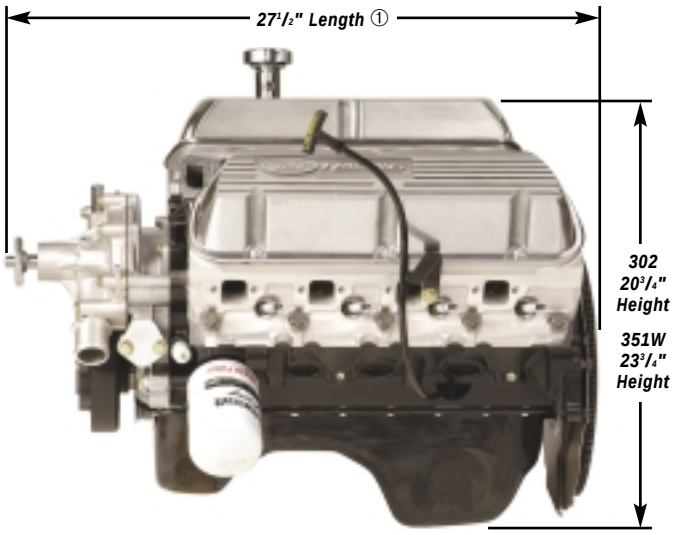


NOTE: 26: Width

4.6L MODULAR SIZE

	SOHC	DOHC
Width	25 5/8"	30"
Height	26"	29 7/8"
Length	28"	28"

302/351W ENGINE



NOTE: 302 – 18 3/4" Width / 351W - 21" Width.
NOTE: ① With short serpentine water pump M-8501-A50.