

Throughout the years, Ford Motor Company has introduced and manufactured some of the automobile industries most powerful as well as reliable engines. From Henry Ford's 4-cylinder flat heads found in the original Model T's to the Ford modular V8 of the '90s, Ford has always been a leader in design technology. With contributions from such famous engine builders as Holman and Moody, Carol Shelby, Bill Strobe, Bob Glidden, Jack Rousch and Robert Yates, Ford has continued to be a serious contender in the never ending wars at race tracks all over the world.

In an attempt to inform our customers of some of the more important aspects of valvetrain assembly, with regards to Ford engines, we have assembled a brief Ford technical section. This section covers areas of concern to individuals modifying stock Ford valvetrains. For more in depth information, customers should acquire the Ford Motorsports SVO Performance Equipment catalog as it is an excellent source of information. For complete one-on-one tech talk, call Ford's performance hot line at 1.810.468.1356.

### Blocks

1985-95 302 Ford engines were equipped with hydraulic roller valvetrains. These blocks have taller lifter bores than 1962-84 blocks. It is possible to install hydraulic flat tappet, mechanical flat tappet or solid roller type camshafts in these engines as long as the proper matching components are used. With regards to solid roller camshafts and lifters, be aware that smaller base circle camshafts allow the roller lifter to set lower in the lifter bore. This may cause interference between the lifters link bar retaining button or rivet and the lifter boss in the block. Clearance the block to allow .060" minimum clearance between these components.

Early 289-302 Ford small block engines use what is termed as a short deck block. The 351 Windsor engine uses a tall deck block. Even though the camshafts are interchangeable, the pushrods are not.

### 289/302 Heads

To convert late 289/302 heads for use with mechanical tappets, all valves must be replaced with early (1963-66) type valves. Another option is to machine the valve stem keeper grooves to early dimensions. Rocker arms must be replaced with early Ford rockers (part no. C20Z-6564-A), or equivalent aftermarket roller tip rocker arms. For guide plates, part no. C90Z6A564B, and rocker arm studs, part no. C30Z-6A527-B, must be used to install guide plates. Late heads must have the guide boss machined .230" and tappet to accept the stud.

### 429/460 Engines

We have found a number of 429/460 engines with a 7° retarded crank sprocket. Be sure to check during cam installation that your engine does not have this sprocket. These engines also have no provision for adjusting the valves when a mechanical tappet camshaft is installed. The easiest method to provide adjustment is to use adjustable pushrods. It is possible to modify the heads to utilize the rocker arms and studs from the Super CJ engine.

### Rocker Studs

**Positive Stop Studs**—Positive stop studs are stock on 1969-76 302/351W and 1968-72 429 engines with hydraulic cams. These studs allow no preload adjustment. They work only on hydraulic cams with .519" lift or less. For high performance or racing applications, we highly recommend replacing positive stop studs with conventional screw-in studs and guide plates.

**Conventional Studs**—A few 289-302 engines and most engines with solid cams used this type of stud. A lock nut on the stud keeps the valve lash from changing.

### Rocker Arms

2 types of studs and 3 types of rockers are available on Ford engines:

**Rail Type Rockers**—Rail rockers were used on 1966-68 289 engines and 1968-76 302 and 351W engines. This type of rocker features a slot in the end of the rocker arm to maintain alignment on the valve tip. Rail rockers must be used with long stem valves.

### Fulcrum Rockers

These were installed on 351C, 351M, and 400 engines. They were also used on 429-460 engines that did not use guide plates. A fulcrum or "sled" and a bolt keep the rocker aligned. Models built before 1977 use a slotted pedestal to hold the fulcrum. Screw-in studs and guide plates are required when replacing fulcrum rockers. See page 81 for more information on Erson Cams studs and guide plates.

A flat pedestal and a U-shaped guide were used on 1977-later 302-351W engines to keep the fulcrum rocker aligned. Our screw-in studs allow you to easily convert to stud-type rockers. These engines are equipped with long valves. This allows easy installation of rail rockers.

### Shaft-Mounted Rockers

Shaft-mounted rockers were used on 352-428 engines. The stock rockers are

well suited for cams with a lift of .550" or less. However, there is not enough preload for proper lifter operation when using cams with a lift of more than .550". You must replace the stock rockers with adjustable rockers to use solid or hydraulic lifters with the higher lift cam. See page 87 for Erson Cams adjustable rockers.

### Valve Locks

Some Ford engines (351C and 351M-400) use multi-groove valve locks. Erson Cams offers multi-groove heat-treated valve locks for maximum load carrying capacity and durability. These are ideal for moderate competition applications where ultra high spring pressures are not used and valve float is minimized.

### Valve Springs

Because Ford Motor Co. has so many different engine families and so many different horsepower ratings within each family, the issue of valve spring selection becomes complex. However, the basic rule is application and area of installation. Whether you are setting up a stock cylinder head or an all out competition Ford SVO cylinder head the rule applies at both ends of the spectrum. The following chart is comprised of common Ford installed heights.

ENGINE FAMILY	YEARS	INTAKE	EXHAUST
289 High Performance	All	1.770"	1.770"
Standard 289	1963-66½	1.780"	1.780"
	1966½-67½	1.640"	1.640"
	1967½-68	1.660"	1.660"
Boss 302	All	1.820"	1.850"
	1968-69½	1.660"	1.660"
Standard 302	1969½-72	1.690"	1.690"
	1973-78	1.690"	1.600"
	1979-95	1.780"	1.600"
	351W	1.780"	1.780"
351C, 351M, 400	1979-95	1.780"	1.600"
	All	1.820"	1.820"
	Boss 351C	All	1.900"
429-460 Production	All	1.810"	1.820"
429 CJ & SCJ	All	1.900"	1.900"

### Timing Chain Sets

In 289, 302, and 351W engines, Ford periodically redesigned the arrangement of the cam gear, cam spacer, fuel pump eccentric, and front cover clearance. Always check these items for interference problems. Erson Cams offers quality gear drives and timing chains.

### Dowel Pins

1972-earlier 289, 302, and 351W featured cams with dowel pins of two different lengths. Dowel pins measuring 1.375" extended through the 1-piece fuel pump eccentric. 1973-later engines featured a 2-piece fuel pump eccentric, which required the shorter 1.125" dowel pins.

If the fuel pump eccentric is removed from the engine, use a thicker-than-stock retaining washer to take up the space lost by the eccentric.

A common failure on Ford engines is the shearing of dowel pins. The bolt in the center of the cam sometimes comes loose and allows the dowel pin to be loaded in shear. To help prevent dowel pin shearing, use a suitable thread locker on the center bolt and torque to the manufacturer's recommended torque specification.

### Camshafts

Camshafts for 289-302 Ford small block engines are exactly the same dimensionally as the 302HO and 351W engines. This means one can be used in the other's block but the firing order between the two engines are different for performance as well as structural reasons. The Ford early 289 and 302 non-HO engines have a 1, 5, 4, 2, 6, 3, 7, 8 firing order and the late model 302HO and 351W engines have a 1, 3, 7, 2, 6, 5, 4, 8 firing order. The early Ford 289-302 engines are identified by our 210 prefix and the late model 302HO and 351W engines are identified by the 212 prefix.

It is possible to put a hydraulic roller camshaft in an early pre-1985 block. However, the following must be considered. This conversion requires the use of a small base circle camshaft which properly positions the taller hydraulic roller lifters in a non-hydraulic roller block. The block must be modified to accept stock Ford hydraulic roller lifter retention hardware and the use of an aluminum bronze distributor gear becomes mandatory. Due to the use of dissimilar alloys in this area longevity becomes a concern. These types of applications are special order items and can be ordered through Erson's Special Orders Department.

All camshafts produced by Erson Cams for the early 289-302 engine and the

# FORD TECHNICAL INFORMATION

## INTRODUCTION TO FORD

302HO and 351W engine will be manufactured and ground on standard OEM journal diameter cores. For camshaft cores with larger than stock diameters, i.e.: race blocks or roller bearing blocks, camshafts should be ordered from Erson's Special Orders Department and are subject to billet availability.

1958-63 Ford FE engines used a camshaft with a flanged front bearing and a spring loaded thrust button. The flanged camshaft billets are no longer available. 1963½ later camshaft cores will replace the earlier cams. For information regarding this conversion, contact Erson Cam's Technical Service Team at 775.882.1622.

### Hydraulic Roller Cams

You can use conventional hydraulic and solid lifter cams with Ford engines that come stock with hydraulic roller cams. However, you must also change the lifters, pushrods, valve springs, and rocker arms to accommodate the cam change.

### Essential Information for "FE" Engines

1958 through mid 1963 engines used a cam with a flanged front bearing and a spring loaded thrust button. The flanged cam billets are no longer available. 1963½ and later type cams will replace the earlier cams. If you have the early engine, you must remove the soft plugs from the oil galleries on either side of the front cam bearing and tap the holes to 7/16 NC. Purchase cam bolt 304815-S and 2 washers, 34808-S and 44730-S8, and pump eccentric C3AZ6287A. The timing chain, crank, and cam sprockets must be changed to the lat type. Some cam sprockets are manufactured with an integral spacer, purchase Ford spacer C3AZ6265A.

Do not, under any circumstances, use a common hardware bolt to hold the sprocket on the cam. Use only a Ford bolt. Use Loctite on the cam bolt and thrust plate bolts and torque to proper specs. When the cam is properly installed, it will rotate freely and will have approximately .010" end play. If any parts are omitted or substitutions made, the cam bolt may come loose or excessive end play may result. This could cause severe damage to the cam, tappets, and engine.

**NOTE**—Most American production engines cannot accept more than .500" lift without modifying the valve guides. When installing a cam with more than .500" lift, it is absolutely essential that clearance between the valve spring retainer and guide be checked. Do not attempt to operate an engine with less than .150" retainer-to-guide clearance. If you are using valve seals, check the clearance from the top of the seal rather than the top of the guide.

**Firing Order** — 289-302 engines: 1-5-4-2-6-3-7-8  
302 HO and 351W engines: 1-3-7-2-6-5-4-8

### Solid Lifters

Because mechanical cams require lash adjustment, many production Ford heads will require machine work to run these cams. Ford engines with non-adjustable valvetrains must be converted to adjustable valvetrains to run solid lifter or mechanical camshafts.

### Rocker Arm and Stud Combinations

Conventional stud mount adjustable rocker arms with pressed in studs were used on 1962-66½ 221, 260 CID engines and 289 high-performance engines. A slot in the head or a guide plate aligns the rocker arm over the valve stem in the absence of rail type rockers. Guide plates are required when using Erson's non-rail type rocker arms.

To convert early 1966½-68 standard 289, 1968-76 302-351W and 1968-72 429-460 engines equipped with positive stop stud non-adjustable rockers, the following steps must be taken. Convert by re-machining or replacing existing valve to valves equipped with .250" tip lengths, as opposed to OEM valves intended for use with rail type rockers using .395" valve tips. Remove the pressed in positive stop stud and machine the guide plate boss down .230". Drill and tap using the appropriate hardware to accommodate a 7/16 x 14 bottomed stud. Install, using a brand name thread locker, the new fully adjustable stud through the guide plate and torque to 50 ft./lbs. Now, you are ready to install any roller tipped or full roller rocker arm. This combination will handle any hydraulic, hydraulic roller, mechanical flat tappet or street roller type camshaft.

1970-82 351C, 351M and 400 CID engines as well as 1973-95 429-460 Ford engine were also equipped with non-adjustable valvetrains. These engines employed a non-adjustable rocker arm mounted on a slotted pedestal which slides on a "sled" fulcrum retained by a bolt as opposed to a stud. To convert to a fully adjustable valvetrain the same steps must be taken as in the previous paragraph. For milling instructions regarding these applications see accompanying illustration.

For 1972 and later 302 and 351W engines equipped with pedestal-mount fulcrum style stamped steel rockers, the same steps must be taken to install a fully adjustable stud. However, machining of the guide plate boss must begin at the top of the pedestal-mount (-) .230". See illustration.

For vehicles wishing to maintain pedestal-mount rockers, Erson offers full roller 1.6 and 1.7:1 billet rocker arms. Adjustment upwards is accomplished by shimming the stands to achieve the recommended .040" pre-load required for most hydraulic lifters. Adjustment downwards is accomplished by milling the stands or shorter pushrods.

**Note:** Pressed in studs of any type are not recommended for mechanical flat tappet camshafts with higher than 330 lbs. of pressure over the nose.

**Note:** Rail type rocker arms are intended for stock hydraulic camshafts only.

## NECESSARY MODIFICATIONS FOR CYLINDER HEADS EQUIPPED WITH PEDESTAL-MOUNT NON-ADJUSTABLE ROCKER ARMS TO CONVERT TO FULLY ADJUSTABLE ROCKER ARMS

### NECESSARY MODIFICATION TO FULLY ADJUSTABLE VALVETRAINS

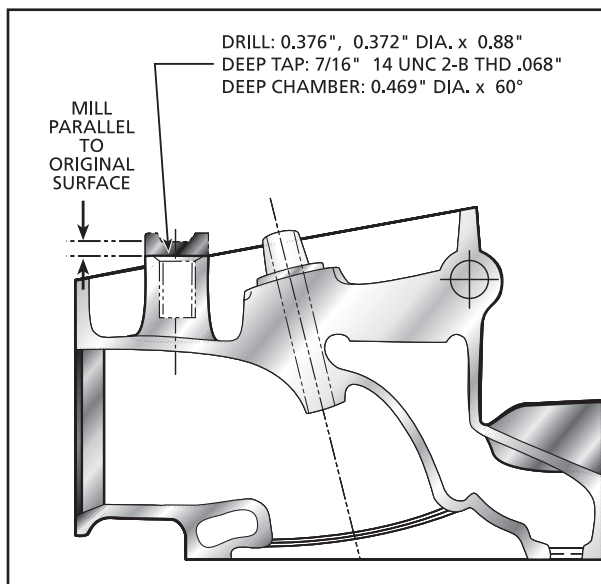


ILLUSTRATION DEPICTS TYPICAL FORD PEDESTAL-MOUNT NON-ADJUSTABLE CYLINDER HEAD. NUMBERS REPRESENT PROPER MILLING DIMENSIONS TO ACCOMMODATE SCREW-IN STUD AND GUIDE PLATE ASSEMBLY. ENGINES EQUIPPED WITH POSITIVE STOP STUDS MACHINE DOWN FROM THE TOP OF THE STUD BOSS PERPENDICULAR TO THE EXISTING HOLE.

All 302/351W	.230"
All 351C/351M/400	.300"
1973-95 429/460	.300"
1968-72 429/460	.230"

**DO NOT MILL PARALLEL TO THE BOTTOM OF THE HEAD**

## PROFERAL BILLET

2000cc/2.0L OHC, 4 CYLINDER ENGINES

## HIGH PERFORMANCE MECHANICAL CAMSHAFT

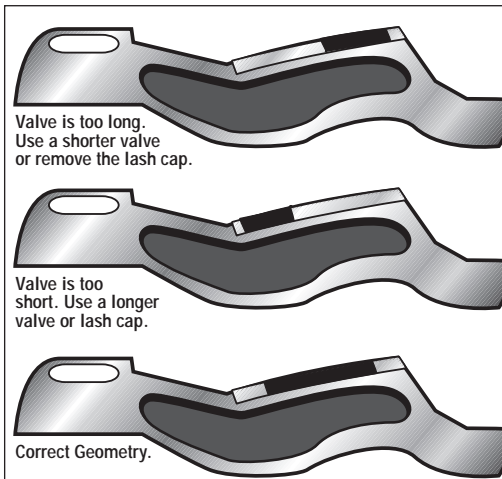
APPLICATIONS/CHARACTERISTICS	BASIC RPM RANGE	PART NO. GRIND NO.	DURATION ADVERTISED	DURATION @ .050"	GROSS LIFT	LOBE CENTER	ADVANCE	VALVE LASH
Strong street performer. Strong bottom end and mid-range, plus good increase in top end. OK for automatic. Good idle and fuel efficiency.	1,000-4,000	E259122 P-260-M	260° IN 260° EX	206° IN 206° EX	.408" IN .408" EX	110°	0°	.000" IN .000" EX
Broad power range. Street or competition. Stick shift or automatic with lower gears. Likes headers and good carburetion. Fair idle.	1,500-4,750	E259222 P-270-M	270° IN 270° EX	212° IN 212° EX	.432" IN .432" EX	110°	0°	.000" IN .000" EX
Mid-range and top end cam. Stick shift only. Hot street, drags, slaloms, etc. Needs headers and good carburetion. Lopey idle.	2,500-5,500	E259322 P-280-M	280° IN 280° EX	228° IN 228° EX	.494" IN .494" EX	110°	0°	.000" IN .000" EX
Strictly top end competition cam. RPM must be kept up at all times. Must have open exhaust.	3,500-6,500	E259422 P-310-M	310° IN 310° EX	260° IN 260° EX	.500" IN .500" EX	110°	0°	.000" IN .000" EX

## CAMSHAFT ACCESSORY KIT FOR FORD ENGINES EQUIPPED WITH MECHANICAL CAMSHAFTS

## E825010 KIT INCLUDES THESE COMPONENTS:

8 valve springs.....	E935282
8 chrome moly steel retainers.....	E961803
8 cam followers.....	E914808
1 tube Moly Lube, 1/4 oz.....	E911001

The springs in this kit are designed to fit stock heads. No machine work is required.



**NOTE** — Overhead cams are extremely sensitive to excessive camshaft and follower wear during the critical break-in period. Because the camshaft and followers are farthest from the oil pump, they are the last components in the engine to receive oil. This lack of oil combined with higher than stock spring pressures and improper valvetrain geometry are the most common causes of premature camshaft and follower failure.

To check for proper valvetrain geometry, coat the follower pad with machinist layout dye and assemble the valvetrain dry with a light spring. Rotate the engine twice to establish a wear pattern on the follower. Now compare the pattern on your followers to the followers illustrated. The correct pattern would be one which is centered on the followers pad.

## PROFERAL BILLET

2300cc/2.3L OHC, 4 CYLINDER ENGINES

## HIGH PERFORMANCE HYDRAULIC CAMSHAFTS

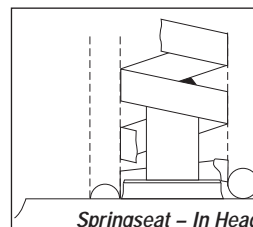
APPLICATIONS/CHARACTERISTICS	BASIC RPM RANGE	PART NO. GRIND NO.	DURATION ADVERTISED	DURATION @ .050"	GROSS LIFT	LOBE CENTER	ADVANCE	VALVE LASH
Erson's first choice over stock, can be used in stock or slightly modified engines seeking improved low end and mid-range performance.	1,000-4,000	E253222 264P	264° IN 264° EX	205° IN 205° EX	.418" IN .418" EX	110°	4°	.000" IN .000" EX
Better mid-range and stronger low end performance from 2,300 cc engines with improved intake and exhaust systems. Excellent add on for stock turbocharged cars.	1,500-4,500	E253322 274P	274° IN 274° EX	212° IN 212° EX	.450" IN .450" EX	110°	4°	.000" IN .000" EX
Recommended for serious turbocharged cars seeking sustained high boost and strong mid-range performance. Needs 4- or 5-speed transmission and mid-3 series gearing for best results.	1,500-5,500	E253522 276P	276° IN 274° EX	218° IN 212° EX	.456" IN .450" EX	110°	4°	.000" IN .000" EX
Strong street performer when used in modified 2,300 cc engines. 9.0-10.5:1 compression, 390 cfm 4-barrel, headers and mild head work with a 75 horsepower shot of nitrous brings this combo to life.	2,500-5,500	E253622 280P	280° IN 284° EX	222° IN 226° EX	.456" IN .455" EX	110°	4°	.000" IN .000" EX
Light street machines, kit cars and hot rods seeking improved mid-range torque and horsepower should have modified intake and exhaust system for best results. Also works on turbocharged cars.	3,000-6,000	E253722 284P	284° IN 284° EX	226° IN 226° EX	.455" IN .455" EX	110°	4°	.000" IN .000" EX
Hot street machines needing strong mid-range and top end power must have modified aftermarket intake and exhaust system to work best. Needs manual transmission and low gears. Noticeable idle.	3,500-7,000	E253422 288P	288° IN 288° EX	230° IN 230° EX	.500" IN .500" EX	110°	4°	.000" IN .000" EX

## CAMSHAFT ACCESSORY KIT FOR FORD ENGINES EQUIPPED WITH HYDRAULIC CAMSHAFTS

## E825013 KIT INCLUDES THESE COMPONENTS:

8 valve springs.....	E915274
8 H.T. steel retainers.....	E961043
8 cam followers.....	E914909
1 tube Moly Lube, 1/4 oz.....	E911001

The springs in this kit will not fit stock heads. Heads must be machined.



**NOTE** — When installing aftermarket valve springs during camshaft upgrades, it is important to check the spring seat register. Often, the manufacturer cuts the cylinder head to accommodate a specific spring. This register, if not removed, decreases spring travel and can cause premature coil bind on the inner spring, resulting in valvetrain failure.

# FORD 1962-83

1.5:1 STOCK ROCKER RATIO

144, 170, 200, 250 CID ENGINES

PROFERAL BILLET

## HIGH PERFORMANCE HYDRAULIC CAMSHAFTS

APPLICATIONS/CHARACTERISTICS	BASIC RPM RANGE	PART NO. GRIND NO.	DURATION ADVERTISED	DURATION @ .050"	GROSS LIFT	LOBE CENTER	ADVANCE	VALVE LASH
The "Commuter". More power through entire range. Stop and go traffic and expressway use. Good idle, throttle response, fuel efficiency.	1,000-4,000	E280111 RV5H	274° IN 280° EX	202° IN 208° EX	.410" IN .420" EX	110°	4°	.000" IN .000" EX
Smooth idle, broad torque range cam for passenger cars, station wagons, pickups and RVs.	1,250-4,300	E280101 RV10H	280° IN 280° EX	208° IN 208° EX	.420" IN .420" EX	111°	4°	.000" IN .000" EX
High torque, broad power range cam for on- or off-road. Good idle.	1,600-4,700	E280201 RV15H	288° IN 288° EX	214° IN 214° EX	.429" IN .449" EX	111°	4°	.000" IN .000" EX
Smooth, strong broad range cam in 200/250 engine. Mid-range cam in smaller engine. Fair idle.	2,000-5,000	E280121 TQ20H	292° IN 292° EX	214° IN 214° EX	.449" IN .449" EX	110°	4°	.000" IN .000" EX

### CAMSHAFT ACCESSORY KIT FOR FORD ENGINES EQUIPPED WITH HYDRAULIC CAMSHAFTS

**E828010 KIT INCLUDES THESE COMPONENTS:**

- 12 hydraulic tappets .....E914632      12 pair H.T. valve locks, 7° x 11/32.....E911172
- 12 valve springs, 1.680 x 1.430 .....E915022      1 tube Moly Lube, 1/4 oz .....E911001
- 12 H.T. steel retainers, 7° x 11/32 .....E961062

*The springs in this kit are designed to fit stock heads. No machine work is required.*

*This kit does not fit all Ford 144-250 CID cylinder heads.*

*Some Ford 6-cylinder engines came with 5/16 4-groove valves and special retainers.*

*Call our Technical Department for more information regarding these applications.*

**NOTE** — Between 1960-67, mechanical flat tappet camshafts were used in 144-170 CID 6 cylinder engines. Call Erson's Technical Service Team at 775.882.1622 for more information regarding these applications.

# FORD 1965-95

1.6:1 STOCK ROCKER RATIO

240-300 CID 6 CYLINDER ENGINES, GEAR DRIVEN

PROFERAL BILLET

## HIGH PERFORMANCE HYDRAULIC FLAT TAPPET CAMSHAFTS

APPLICATIONS/CHARACTERISTICS	BASIC RPM RANGE	PART NO. GRIND NO.	DURATION ADVERTISED	DURATION @ .050"	GROSS LIFT	LOBE CENTER	ADVANCE	VALVE LASH
Broad power range. City and expressway driving and towing. Cars, wagons, pickups and heavier rigs. Good idle, throttle response and fuel efficiency.	1,000-4,000	E270101 RV10H	280° IN 280° EX	208° IN 208° EX	.448" IN .448" EX	110°	4°	.000" IN .000" EX
The "Performer". Superior low- and mid-range power. Good idle, fuel efficiency and driveability. 4-barrel carburetor and headers recommended.	1,500-4,500	E270121 TQ20H	292° IN 292° EX	214° IN 214° EX	.478" IN .478" EX	111°	4°	.000" IN .000" EX
Works great in slightly modified engines with up to 9.5:1 compression. High-lift and short duration builds good torque and mid-range performance.	2,000-5,000	E270321 Hi Flow AH	284° IN 284° EX	220° IN 220° EX	.504" IN .504" EX	110°	4°	.000" IN .000" EX

### CAMSHAFT ACCESSORY KIT FOR FORD ENGINES EQUIPPED WITH HYDRAULIC TAPPET CAMSHAFTS

**E827010 KIT INCLUDES THESE COMPONENTS:**

- 12 hydraulic tappets .....E914602
- 12 valve springs, 1.680 x 1.430 .....E915022
- 12 H.T. steel retainers, 7° x 11/32 .....E961062
- 12 pair H.T. valve locks.....E911172
- 1 tube Moly Lube, 1/4 oz .....E911001

*The springs in this kit are designed to fit stock heads. No machine work is required.*

### OPTIONAL HIGH PERFORMANCE PARTS FOR FORD ENGINES EQUIPPED WITH HYDRAULIC TAPPET VALVETRAINS

- C.M. pushrods, 3/8 x 10.125.....E917302
- H.T. machined valve locks, 7° x 11/32 4130.....E911112
- P.C. seals, 11/32 .....E910244
- Lashcaps, 11/32 .....E911540
- Degree wheel.....E911004
- Moly Lube, 2 oz. tube.....E911002

*E917302 pushrods must be used with this kit.  
Stock pushrods will not fit when using our tappets.*

## PROFERAL BILLET

2600cc, 2800cc V6 ENGINES

### HIGH PERFORMANCE MECHANICAL FLAT TAPPET CAMSHAFTS

APPLICATIONS/CHARACTERISTICS	BASIC RPM RANGE	PART NO. GRIND NO.	DURATION ADVERTISED	DURATION @ .050"	GROSS LIFT	LOBE CENTER	ADVANCE	VALVE LASH
Low end power camshaft with good broad range. OK for automatic transmission. Smooth idle.	1,200-4,200	E254210 RV10M	254° IN 254° EX	210° IN 210° EX	.426" IN .426" EX	111°	4°	.022" IN .022" EX
Strong low- and mid-range power camshaft for street driven cars. OK with automatic with gears. Good idle.	2,000-5,000	E254221 270-F	270° IN 270° EX	220° IN 220° EX	.456" IN .456" EX	111°	0°	.022" IN .022" EX
Mid-range performance camshaft. Broad power range. Needs headers and 4-speed for best results.	3,000-6,000	E254321 280-F	286° IN 286° EX	242° IN 242° EX	.500" IN .500" EX	111°	0°	.022" IN .022" EX

### CAMSHAFT ACCESSORY KIT FOR FORD ENGINES EQUIPPED WITH MECHANICAL FLAT TAPPET CAMSHAFTS

#### E825111 KIT INCLUDES THESE COMPONENTS:

- 12 mechanical tappets .....E914162
- 12 pair interference springs .....E925272
- 16 chrome Moly steel retainers.....E961072
- 1 tube Moly Lube, 1/4 oz .....E911001

*The springs in this kit are designed to fit stock heads. No machine work is required.*

#### NOTE —

Camshafts for 1972-79 Ford 2,600-2,800cc V6 engines have smaller journal diameters than 1983-85 Ford V6 engines commonly found in Bronco IIs and light-duty Ford trucks. Therefore, these camshafts are not interchangeable. Call Erson's Technical Service Team at 775.882.1622 for profiles suitable for this application.

#### NOTE —

It is recommended that year, make and model be supplied to the salesperson when ordering these camshafts.

## 1.47:1 STOCK ROCKER RATIO

# FORD V8 "Y BLOCK"

## PROFERAL BILLET

272, 292, 312 ENGINES

### HIGH PERFORMANCE MECHANICAL FLAT TAPPET CAMSHAFTS

APPLICATIONS/CHARACTERISTICS	BASIC RPM RANGE	PART NO. GRIND NO.	DURATION ADVERTISED	DURATION @ .050"	GROSS LIFT	LOBE CENTER	ADVANCE	VALVE LASH
Strong low- and mid range power for passenger cars and pickups. Smooth idle.	1,250-4,250	E201121 RV10M	254° IN 254° EX	210° IN 210° EX	.426" IN .426" EX	111°	4°	.022" IN .022" EX
Broad power range cam. Fair idle. OK for automatic transmission with 3.78 or lower gears.	2,000-5,000	E201131 TQ20M	270° IN 270° EX	220° IN 220° EX	.456" IN .456" EX	112°	0°	.022" IN .022" EX
Broad power range. High-lift, short duration cam. Pulls hard from idle up. Good for automatic transmission with lower gears.	3,500-6,500	E201721 Hi Flow IM	286° IN 286° EX	242° IN 242° EX	.500" IN .500" EX	112°	0°	.022" IN .022" EX
Mid-range and top end power cam. Needs good intake system, heads and headers to work.	3,800-6,800	E201821 Hi Flow IIM	294° IN 294° EX	246° IN 246° EX	.500" IN .500" EX	112°	0°	.022" IN .022" EX

#### NOTE —

All valve lifts in this series are figured using 1.47:1 rocker ratios. The 1957 high-performance engines had 1.54:1 rocker arm ratio. If you have these rockers, the lift will be increased proportionately.

#### NOTE —

We offer an extensive selection of computer-designed camshaft lobes to complement your Ford "Y Block". For more extreme profiles, call Erson's Technical Service Team at 775.882.1622.

1962-84 221, 260, 289, 302 CID ENGINES  
EXCEPT 1982-LATER 302 HO ENGINES

FIRING ORDER 1, 5, 4, 2, 6, 3, 7, 8  
PROFERAL BILLET

## HIGH PERFORMANCE HYDRAULIC FLAT TAPPET CAMSHAFTS

APPLICATIONS / CHARACTERISTICS	BASIC RPM RANGE	PART NO. GRIND NO.	DURATION ADVERTISED	DURATION @ .050"	GROSS LIFT	LOBE CENTER	ADVANCE	VALVE LASH
Erson's first choice over stock. Excellent replacement camshaft offering more low end performance. No modifications necessary. OK with stock carburetion, compression and converter. Good idle.	800-3,800	E210120 TQ10H	274° IN 274° EX	202° IN 202° EX	.437" IN .437° EX	108°	0°	.000" IN .000° EX
The "Commuter". More power through entire range. Stop and go traffic and expressway driving use. Good idle, throttle response and fuel efficiency.	1,000-4,000	E210111 RV5H	274° IN 280° EX	202° IN 208° EX	.437" IN .448° EX	110°	4°	.000" IN .000° EX
Broad power range. City and expressway driving or towing. Cars, wagons, pickups, heavier rigs. Good idle and throttle response, plus high-fuel efficiency.	1,200-4,200	E210201 RV10H	280° IN 280° EX	208° IN 208° EX	.448" IN .448° EX	111°	4°	.000" IN .000° EX
Early Broncos and Ford pickups seeking improved low end and mid-range performance. Good on- or off-road driveability with slightly modified engine. OK for towing light to moderate loads.	1,250-4,400	E210112 RV12H	280° IN 288° EX	208° IN 214° EX	.448" IN .458° EX	110°	4°	.000" IN .000° EX
Good idle and fuel efficiency. Excellent replacement camshaft for cars or trucks with campers towing moderate loads. May be used with small displacement centrifugal or roots type superchargers.	1,250-4,750	E211011 M/P1	280° IN 292° EX	208° IN 214° EX	.448" IN .478° EX	114°	6°	.000" IN .000° EX
The "Performer". Super low- and mid-range power. Good idle, fuel efficiency and driveability. 4-barrel and headers recommended.	1,500-4,500	E210121 TQ20H	292° IN 292° EX	214° IN 214° EX	.478" IN .478° EX	110°	4°	.000" IN .000° EX
Fair idle with reasonable fuel efficiency. Good low- and mid-range horsepower in lighter chassis. Street rods or street machines with up to 9.5:1 compression.	2,000-5,000	E210321 Hi Flow AH	284° IN 284° EX	220° IN 220° EX	.504" IN .504° EX	108°	0°	.000" IN .000° EX
High-lift. Dual pattern. Needs 4-barrel, headers, lower gears and medium stall speed converter if used with automatic. Extremely strong mid-range camshaft.	2,200-5,200	E210222 TQ40H	284° IN 296° EX	220° IN 228° EX	.504" IN .504° EX	110°	4°	.000" IN .000° EX
Recommended for centrifugal, vane or small B&M roots-type superchargers. Low to moderate boost levels; 5-12 lbs. Fair idle with strong low- and mid-range performance.	2,250-5,500	E210422 Hi Boost IH	284° IN 286° EX	220° IN 228° EX	.504" IN .504° EX	114°	6°	.000" IN .000° EX
Engines with 9.5-10.5:1 compression, aftermarket intake manifold, 600-650 cfm 4-barrel, mild head work and headers offer increased mid-range performance. Works best with 4-speed top loader and lower gears.	2,500-5,800	E210221 TQ30H	310° IN 310° EX	226° IN 226° EX	.493" IN .493° EX	110°	4°	.000" IN .000° EX
Broad power range. High-lift with short duration guarantees extra performance for the smaller engine. Good for automatic transmission in 289 or larger engines.	3,000-6,000	E210421 Hi Flow IH	296° IN 296° EX	228° IN 228° EX	.504" IN .504° EX	108°	0°	.000" IN .000° EX
Serious street machines/street rodders seeking more mid-range and top end performance. 289-306 CID engines with aftermarket cylinder heads and big valves, free flowing exhaust, single or 2x4 barrel carburetion. 8-15 lbs. boost.OK with nitrous oxide!	3,000-6,500	E210522 Hi Boost IIH	296° IN 316° EX	228° IN 240° EX	.504" IN .504° EX	114°	6°	.000" IN .000° EX
Super power range, high-lift camshaft. Strong from 3,500-7,500 in 289 or larger engine. Needs 4-speed, 4-barrel and headers.	3,500-6,500	E210521 Hi Flow IIH	306° IN 306° EX	235° IN 235° EX	.504" IN .504° EX	108°	0°	.000" IN .000° EX
Good mid-range and top end power. Needs all the good stuff to work best. E.T. Bracket winner. Should have no less than 100:1 compression.	3,600-6,600	E210621 Hi Flow IIH	316° IN 316° EX	240° IN 240° EX	.504" IN .504° EX	108°	0°	.000" IN .000° EX
Competition camshaft. 5,500-7,500 RPM. Needs good heads, lots of carburetor area and open exhaust to work its best.	3,800-6,800	E211121 500HLH	318° IN 318° EX	244° IN 244° EX	.538" IN .538° EX	108°	0°	.000" IN .000° EX
Hot Street/E.T. Brackets. 300(+) cubic inch engines with 10.5-11.5:1 compression, modified aftermarket cylinder heads, 750 cfm 4-barrel, 2.5"-3" exhaust, C-4 automatic with 4,000 RPM converter. OK with nitrous oxide.	4,000-7,000	E210921 Hi Flow IVH	312° IN 320° EX	248° IN 256° EX	.536" IN .552° EX	110°	4°	.000" IN .000° EX

### CAMSHAFT ACCESSORY KIT FOR FORD SMALL BLOCK ENGINES EQUIPPED WITH HYDRAULIC FLAT TAPPET CAMSHAFTS

**E821015 KIT INCLUDES THESE COMPONENTS:**

- 16 hydraulic tappets .....E914601
- 16 valve springs, 1.680 x 1.430 .....E915021
- 16 H.T. steel retainers, 7° X 11/32 .....E961061
- 16 pair H.T. valve locks .....E911171
- 1 tube Moly Lube, 1/4 oz .....E911001

### OPTIONAL HIGH PERFORMANCE PARTS FOR FORD SMALL BLOCK ENGINES EQUIPPED WITH HYDRAULIC FLAT TAPPET VALVETRAINS

- Valve spring set, 1.820 x 1.500 .....E915011
- Valve spring set, 1.780 x 1.450 .....E915310
- Valve spring retainers, 7° x 11/32 .....E961312
- H.T. machined valve locks 4130 .....E911111
- Gear drive set .....E992007
- Timing chain set .....E991901
- C.H. pushrods, 5/16 x 6.812 .....E917251
- C.H. pushrods, Boss 302 5/16 x 7.625 .....E917221
- C.H. pushrods, Boss 302 3/8 x 7.625 .....E917224
- Guide plates, 5/16 .....E913013
- Guide plates, 3/8 .....E913014
- Screw-in studs, 3/8 .....E912161
- Screw-in studs, 7/16 .....E912152
- Forged rockers, 1.6 x 7/16 .....E928026
- Billet rockers, 3/8 x 1.6 .....E928078
- Billet rockers, 7/16 x 1.6 .....E928079
- Billet rockers, 7/16 x 1.7 .....E928080
- Billet rockers, 3/8 x 1.7 .....E928081
- Pedestal-mount, 1.6 .....E928088
- Pedestal-mount, 1.7 .....E928089
- Bronze gear .....E911617
- Degree wheel .....E911004
- Moly Lube, 2 oz. tube .....E911002
- Screw-in studs, 3/8 x 24 .....E912111
- Lash caps .....E911541
- P.C. seals .....E910243
- Forged rockers, 1.6 x 3/8 .....E928025

## HYDRAULIC ROLLER TAPPET CAMSHAFTS WITH ON-BOARD FUEL MANAGEMENT

APPLICATIONS / CHARACTERISTICS	BASIC RPM RANGE	PART NO. GRIND NO.	DURATION ADVERTISED	DURATION @ .050"	GROSS LIFT	LOBE CENTER	ADVANCE	VALVE LASH
Erson's first choice over stock. Good idle and driveability with improved low end performance. Compatible with carburetion or fuel injection. OK for towing light to moderate loads.	1,250-4,500	E210835 RH-276-3	276° IN 276° EX	208° IN 208° EX	.512" IN .512" EX	112°	4°	.000" IN .000" EX
Stock to slightly modified 302 engines seeking strong low end and mid-range power. Works fine with A.O.D. automatics and stock converter or 4- or 5-speed manual transmission. OK for towing moderate loads in light duty pickups. May be used with low boost superchargers or small shot of nitrous oxide.	1,500-4,800	E210834 RH-276-1	276° IN 282° EX	208° IN 214° EX	.512" IN .512" EX	112°	4°	.000" IN .000" EX
Improved mid-range torque and horsepower. Works well with aftermarket intake and 600 cfm carburetion or speed density F.I. However, idle quality may improve with mass air flow style fuel injection, A.O.D. automatics with stock converter, or 4- or 5-speed manual transmission and mild gearing.	1,800-5,000	E210836 RH-282-1A	282° IN 282° EX	214° IN 214° EX	.512" IN .512" EX	112°	4°	.000" IN .000" EX
<b>Hot Street Machines.</b> Excellent mid-range and top end power in 302 cubic inch engines using aftermarket cylinder heads and intake manifold (i.e.: GT-40), modified mass air with larger throttle body, headers and large diameter, free flowing exhaust. Prefers 5-speed manual transmission and low gears.	2,000-5,500	E210831 RH-282-3	282° IN 282° EX	222° IN 222° EX	.512" IN .512" EX	112°	4°	.000" IN .000" EX

### CAMSHAFT ACCESSORY KIT FOR FORD SMALL BLOCK ENGINES EQUIPPED WITH HYDRAULIC TAPPET CAMSHAFTS

**E823014 KIT INCLUDES THESE COMPONENTS:**

16 hydraulic roller tappets.....	E919321
16 double springs, 1.750 x 1.450 .....	E915310
16 H.T. steel retainers, 7° x 11/32 .....	E961312
16 pair H.T. valve locks, 7° x 11/32.....	E911171
16 H.T. Pushrod.....	E917220
1 tube Moly Lube, 1/4 oz .....	E911001

*The springs in this kit are designed to fit stock heads. No machine work is required.*

**NOTE —**

Ford 1962-84; 221, 260, 289 and 302 CID engines are originally equipped with hydraulic, flat tappet camshafts. We offer retrofit hydraulic roller camshafts for this application. However, due to the small base circle required for proper lifter positioning, an alloy steel camshaft core is used. This mandates an aluminum-bronze distributor gear which requires frequent maintenance, therefore, this type of conversion should be well thought through before ordering. For information regarding profiles available for Pre-1984, Ford Small Block V8 engines, call Erson's Technical Service Team at 775.882.1622.

**NOTE —**

In addition to Ford 1962-84; 221, 260, 289, 302 CID non-HO engines, Ford 1969-93 351W and 1982-1984 302 HO engines were also equipped with hydraulic flat tappet camshafts. The same considerations apply to these engines as well, with regards to retrofit hydraulic roller camshafts.

### OPTIONAL HIGH PERFORMANCE PARTS FOR FORD SMALL BLOCK ENGINES ORIGINALLY EQUIPPED WITH HYDRAULIC ROLLER TAPPET VALVETRAINS

Hydraulic roller lifters, stock replacement .....	E919320
Valve springs, single with damper, 1.820 x 1.500 .....	E915011
Valve springs, single with damper, 1.680 x 1.430 .....	E915021
Valve springs, 1.700 x 1.450 .....	E915310
H.T. steel retainers, 7° (fits E915011) .....	E961091
H.T. steel retainers, 7° (fits E915310) .....	E961312
H.T. steel retainers, 7° (fits E915021) .....	E961061
H.T. locks, 11/32 x 7° .....	E911171
H.T. machined locks, 11/32 x 7° .....	E911111
Guide plates, 5/16.....	E913013
Timing chain set .....	E991901
Dual idler gear drive .....	E992007
Billet pedestal-mount, 1.6:1 .....	E928088
Billet pedestal-mount, 1.7:1 .....	E928089
Screw-in studs .....	E912161
P.C. seals, 11/32 .....	E910243
Lash caps, 11/32 .....	E911541
Degree wheel .....	E911004
C.H. pushrods, 5/16 x 6.250 .....	E917220
Moly Lube, 2 oz. tube .....	E911002

1962-84 221, 260, 289, 302 CID ENGINES  
EXCEPT 1982-LATER 302 HO ENGINES

FIRING ORDER 1, 5, 4, 2, 6, 3, 7, 8  
PROFERAL BILLET

## HIGH PERFORMANCE MECHANICAL FLAT TAPPET CAMSHAFTS

APPLICATIONS/CHARACTERISTICS	BASIC RPM RANGE	PART NO. GRIND NO.	DURATION ADVERTISED	DURATION @ .050"	GROSS LIFT	LOBE CENTER	ADVANCE	VALVE LASH
<b>Hot Street/E.T. Brackets.</b> 289-302 CID engines with 9.5-10.0:1 compression. Excellent low- and mid-range power in 3,200-3,600 lb. vehicles having 600-650 cfm. 4-barrel, headers, free flowing exhaust and 4- or 5-speed manual transmission.	3,000-6,000	<b>E210021</b> TQ30M	280° IN 280° EX	230° IN 230° EX	.496" IN .496" EX	110°	4°	.024" IN .024" EX
<b>Hot Street/E.T. Brackets.</b> Strong mid-range performance in 10.0-11.0:1 compression engines. Mildly ported stock heads or aftermarket heads with larger valves, single 4-barrel or low profile 2x4-barrel set-ups, 4-speed manual or C-4 automatics with 3,000-3,500 RPM converter.	3,500-6,500	<b>E210322</b> Hi Flow AM	286° IN 294° EX	242° IN 246° EX	.544" IN .544" EX	108°	0°	.022" IN .022" EX
<b>Hot Street/E.T. Brackets/Oval Track.</b> One of our most popular cams. Good mid-range and upper mid-range performance in 3,000-3,400 lb. early Mustangs, Comets, Mavericks, etc. No less than 10.5:1 compression. Fast 1/4-3/8 mile, dirt or asphalt tracks.	3,800-6,800	<b>E210301</b> F-282-2	282° IN 290° EX	246° IN 254° EX	.544" IN .544" EX	106°	0°	.026" IN .026" EX
<b>Pro Street/E.T. Brackets.</b> 289-302 engines with ported and polished aftermarket cylinder heads; large diameter, free flowing exhaust, 700-750 cfm 4-barrel and low gears. Excellent nitrous camshaft.	4,000-7,000	<b>E210306</b> F-288-1	288° IN 296° EX	250° IN 258° EX	.600" IN .600" EX	110°	4°	.028" IN .030" EX
<b>E.T. Brackets.</b> 2,800-3,200 lb. door-slammers with 11.5-12.5:1 compression engines. Good heads and intake, 750 cfm carburetion, 4-speed or C-4 automatic with trans brake and 4,000 RPM converter. 10" slick or 12" D.O.T. soft compound tire and low gears. OK with nitrous.	4,500-7,500	<b>E210307</b> F-296-1	296° IN 302° EX	258° IN 264° EX	.600" IN .600" EX	108°	2°	.028" IN .030" EX
<b>E.T. Brackets/Super Street.</b> Excellent mid-range and top end power in 2,600-3,000 lb. door-cars. 289-310 CID engines with 12.5-13.5:1 compression, single 4-barrel or tunnel ram on alcohol or gas. 2- or 3-speed automatics with 5,000 RPM converter and 5.13 gears. Use E915251 valve springs at 1.900" installed height.	5,000-8,000	<b>E210308</b> F-304-1A	304° IN 308° EX	266° IN 272° EX	.653" IN .653" EX	106°	4°	.020" IN .022" EX

### CAMSHAFT ACCESSORY KIT FOR FORD SMALL BLOCK ENGINES EQUIPPED WITH MECHANICAL FLAT TAPPET CAMSHAFTS

#### E821013 KIT INCLUDES THESE COMPONENTS:

16 mechanical tappets.....	E914111
16 double springs, 1.750 X 1.450.....	E915310
16 H.T. steel retainers, 7° x 11/32.....	E961312
16 H.T. valve locks, 7° x 11/32.....	E911171
1 tube Moly Lube, 1/4 oz.....	E911001

#### E821014 KIT INCLUDES THESE COMPONENTS:

16 mechanical tappets.....	E914111
16 double springs, 1.900 X 1.440.....	E915251
16 H.T. steel retainers, 7° x 11/32.....	E961051
16 pair H.T. valve locks, 7° x 11/32.....	E911171
1 tube Moly Lube, 1/4 oz.....	E911001

### OPTIONAL HIGH PERFORMANCE PARTS FOR FORD SMALL BLOCK ENGINES EQUIPPED WITH MECHANICAL FLAT TAPPET VALVETRAINS

Dual idler gear drive.....	E992007	Billet rockers, 3/8 x 1.7.....	E928081
Roller timing chain set.....	E991901	C.H. pushrods, 5/16 x 6.812.....	E917251
Valve springs.....	E915021	Screw-in studs, 3/8 x 24.....	E912161
H.T. steel retainers, 7° x 11/32.....	E961061	Screw-in studs, 3/8 x 24.....	E912111
H.T. machined valve locks, 7° x 11/32.....	E911111	Guide plates, 5/16.....	E913013
Forged rockers, 3/8 x 1.6.....	E928025	Guide plates, 3/8.....	E913014
Forged rockers, 7/16 x 1.6.....	E928026	P.C. seals, 11/32.....	E910243
Billet rockers, 3/8 x 1.6.....	E928078	Lash caps, 11/32.....	E911541
Billet rockers, 7/16 x 1.6.....	E928079	Degree wheel.....	E911004
Billet rockers, 7/16 x 1.7.....	E928080	Moly Lube, 2 oz. tube.....	E911002

**NOTE** — It is recommended that during the critical break-in period on any high-performance flat tappet mechanical valvetrain, strict attention be paid to proper set up. Always follow the manufacturer's recommended valve spring installation procedures. This may include modifications to the cylinder head and/or the use of longer valves or offset locks and retainers to accommodate these new dimensions. We also recommend you break-in the new camshaft and lifters on the outer spring only. This helps to insure against premature failure during the first few minutes of operation when loads are high and lubrication scarce.

## HIGH PERFORMANCE SOLID ROLLER TAPPET CAMSHAFTS

APPLICATIONS/CHARACTERISTICS	BASIC RPM RANGE	PART NO. GRIND NO.	DURATION ADVERTISED	DURATION @ .050"	GROSS LIFT	LOBE CENTER	ADVANCE	VALVE LASH
<b>Hot Street/E.T. Brackets.</b> 289-306 CID with 10.5-11.5:1 compression in 3,000-3,400 lb. vehicles. Mildly ported and polished aftermarket cylinder heads, open plenum style intake manifold with up to 750 cfm carburetion. 4-speed top loader or C-4 automatic with 3,500 RPM converter and low gears. OK with small supercharger or nitrous oxide.	3,800-6,800	E210900 R-286-1C	286° IN 294° EX	246° IN 254° EX	.592" IN .592" EX	110°	4°	.027" IN .027" EX
<b>Hot Street/E.T. Brackets.</b> Excellent mid range and top end power in 289-302 CID engines with 11.5-12.5:1 compression. Modified aftermarket cylinder heads with headers and large diameter, free flowing exhaust. 4-speed top loader or C-4 automatic with 4,000 RPM converter and 4.30 or lower gears. OK with nitrous!	4,200-7,200	E210901 R-282-1B	282° IN 292° EX	253° IN 263° EX	.640" IN .640" EX	106°	0°	.028" IN .030" EX
<b>E.T. Brackets/Super Street.</b> New competition lobe design offers more area under the curve for enhanced volumetric efficiency. Strong top end in 2,600-3,000 lb. door slammers using 302(+) CID engines with 12.5-13.5:1 compression. Good heads and intake recommended for best results. Automatic cars with 4,500 RPM converters, advance camshaft 4-6° for more bottom end.	4,500-7,800	E210902 R-292-1	292° IN 300° EX	266° IN 274° EX	.656" IN .656" EX	106°	0°	.030" IN .032" EX
<b>Pro Brackets/Super Stock.</b> 302-310 CID engines with 13.5:1 or higher compression in 2,200-2,600 lb. door-cars. Heavily ported cylinder heads with large valves, match ported open-plenum single or 2x4 barrel tunnel ram-style intake manifolds with modified 750 cfm or larger carburetion on alcohol or gas. 4-speed or automatic with 5,000 RPM converter and 5.38 or lower gears. Works well in 302 super stock automatic cars.	4,800-8,300	E210903 R-298-4	298° IN 304° EX	272° IN 278° EX	.720" IN .688" EX	104°	0°	.030" IN .032" EX

**CAMSHAFT ACCESSORY KIT FOR FORD SMALL BLOCK ENGINES EQUIPPED WITH SOLID ROLLER TAPPET CAMSHAFTS**

**E821017 KIT INCLUDES THESE COMPONENTS:**

16 solid roller tappets.....	E919310
16 valve springs, 1.900 x 1.535 .....	E915057
16 titanium retainers, 10° .....	E961408
16 valve locks, 10° x 11/32 .....	E911140
1 tube Moly Lube, 1/4 oz .....	E911001

**OPTIONAL HIGH PERFORMANCE PARTS FOR FORD SMALL BLOCK ENGINES EQUIPPED WITH SOLID ROLLER TAPPET VALVETRAINS**

Dual idler gear drive .....	E992007	Billet rockers, 7/16 x 1.7 .....	E928080
Roller timing chain set .....	E991901	Screw in studs, 7/16 .....	E912152
Aluminum bronze distributor gear .....	E911617	Solid roller tappets .....	E919310
P.C. seals, 11/32 .....	E910243	Vasco double with damper .....	E915150
Lash caps, 11/32 .....	E911541	Titanium retainers, 10° .....	E961406
H.T. steel retainers, 7° x 11/32 .....	E961091	Valve locks, 10° x 11/32 .....	E911140
H.T. machined valve locks, 7° x 11/32 .....	E911111	Tube engine assembly lube, 2 oz. ....	E911002
Billet rockers, 7/16 x 1.6 .....	E928079		

**NOTE** — Roller camshafts do not require break-in, but to avoid premature engine failure we advise you prime the engine's oil system prior to start-up.



1968-93 351W/5.8L ENGINES

FIRING ORDER 1, 3, 7, 2, 6, 5, 4, 8

1982-84 302/5.0L HO ENGINES

PROFERAL BILLET

## HIGH PERFORMANCE HYDRAULIC CAMSHAFTS

APPLICATIONS/CHARACTERISTICS	BASIC RPM RANGE	PART NO. GRIND NO.	DURATION ADVERTISED	DURATION @ .050"	GROSS LIFT	LOBE CENTER	ADVANCE	VALVE LASH
<b>The "Commuter".</b> More power through entire range. Stop and go traffic and expressway use. Good idle, throttle response and fuel efficiency.	1,000-4,000	E212111 RV5H	274° IN 280° EX	202° IN 208° EX	.437" IN .448" EX	110°	4°	.000" IN .000" EX
Broad power range. City and expressway driving or towing. Cars, wagons, pickups and heavier rigs. Good idle and throttle response, plus high fuel efficiency.	1,200-4,200	E212101 RV10H	280° IN 280° EX	208° IN 208° EX	.448" IN .448" EX	111°	4°	.000" IN .000" EX
Late model Broncos and Ford pickups seeking improved low end and mid-range performance. Good on- or off-road driveability with stock or slightly modified engines. OK for towing light to moderate loads.	1,250-4,400	E212112 RV12H	280° IN 288° EX	208° IN 214° EX	.448" IN .458" EX	110°	4°	.000" IN .000" EX
Good idle and fuel efficiency. Excellent replacement camshaft for cars or trucks with campers, towing moderate loads. May be used with small displacement centrifugal, vane or roots-type superchargers. Computer compatible.	1,250-4,750	E212011 M/P1	280° IN 292° EX	208° IN 214° EX	.448" IN .478" EX	114°	6°	.000" IN .000" EX
<b>"The Performer".</b> Super low- and mid-range power. Good idle, fuel efficiency and driveability. 4-barrel and headers recommended.	1,500-4,500	E212121 TQ20H	292° IN 292° EX	214° IN 214° EX	.478" IN .478" EX	110°	4°	.000" IN .000" EX
Good idle and throttle response in larger engines. Prefers 4-barrel, headers, 4- or 5-speed manual transmission and low gears for towing moderate to heavy loads. OK for small superchargers.	1,500-4,800	E212021 M/P2	292° IN 310° EX	214° IN 226° EX	.478" IN .493" EX	114°	4°	.000" IN .000" EX
Excellent choice for street rods or slightly modified street machines with up to 9.5:1 compression. Noticeable idle with reasonable fuel efficiency. Produces good low end and mid-range torque and horsepower in lighter chassis.	1,800-5,000	E212321 High Flow AH	284° IN 284° EX	220° IN 220° EX	.504" IN .504" EX	108°	0°	.000" IN .000" EX
High-lift, dual pattern. Needs 4-barrel, headers, lower gears and medium stall speed converter if used with automatic. Extremely strong mid-range camshaft.	2,000-5,200	E212222 TQ40H	284° IN 296° EX	220° IN 228° EX	.504" IN .504" EX	110°	0°	.000" IN .000" EX
Recommended for centrifugal, vane or small B&M roots-type superchargers with low to moderate boost levels, 5-12 lbs. Fair idle with strong low- and mid-range performance.	2,200-5,500	E212422 High Boost IH	284° IN 296° EX	220° IN 228° EX	.504" IN .504" EX	112°	4°	.000" IN .000" EX
For 351W engines with 9.5-10.5:1 compression seeking increased mid-range performance. Works best with aftermarket dual plane style intake, 600-650 cfm carburetion, mild head work and headers with free flowing dual exhaust. 4-speed top loader and lower gears in 3,200-3,600 lb. cars is highly recommended.	2,500-5,800	E212221 TQ30H	310° IN 310° EX	226° IN 226° EX	.493" IN .493" EX	110°	4°	.000" IN .000" EX
<b>Hot Street/E.T. Brackets.</b> High-lift, short duration. Delivers broad power range and strong top end. Fair idle. Needs 4-barrel, headers, compression and gears.	3,000-6,000	E212421 High Flow IH	296° IN 296° EX	228° IN 228° EX	.504" IN .504" EX	108°	0°	.000" IN .000" EX
High-lift, dual pattern. Needs 4-barrel, headers and lower gears. Works best with stick or high-stall automatic. Strong top end camshaft. Rough idle. Should have at least 9:1 compression.	3,200-6,300	E212223 TQ50H	296° IN 306° EX	228° IN 235° EX	.504" IN .504" EX	110°	0°	.000" IN .000" EX
Runs strong 3,500-7,000 RPM. Stick or automatic, with gears. Needs good intake and headers, 9.5:1 or more compression. Lopey idle.	3,500-7,000	E212521 High Flow IIIH	306° IN 306° EX	235° IN 235° EX	.504" IN .504" EX	108°	0°	.000" IN .000" EX
<b>Hot Street/E.T. Brackets.</b> 302-351 cubic inch engines with 10.5-11.5:1 compression using modified aftermarket cast iron or aluminum cylinder heads, 750 cfm 4-barrel and 2.5"-3" exhaust will produce good upper RPM horsepower. Automatic cars use with 4,000 RPM converter and low gears. OK with nitrous oxide!	3,800-6,800	E212921 High Flow IVH	312° IN 320° EX	248° IN 256° EX	.536" IN .552" EX	110°	4°	.000" IN .000" EX

### CAMSHAFT ACCESSORY KIT FOR FORD ENGINES EQUIPPED WITH HYDRAULIC CAMSHAFTS

**E823010 KIT INCLUDES THESE COMPONENTS:**

- 16 hydraulic tappets.....E914601
- 16 valve springs, 1.820 x 1.500.....E915011
- 16 H.T. steel retainers, 11/32.....E961312
- 16 pair H.T. valve locks, 11/32.....E911171
- 1 tube Moly Lube, 1/4 oz.....E911001

### OPTIONAL HIGH PERFORMANCE PARTS FOR FORD ENGINES EQUIPPED WITH HYDRAULIC VALVETRAINS

- Valve springs, 1.900 x 1.540.....E915051
- Valve springs, 1.680 x 1.430.....E915021
- Valve springs, 1.700 x 1.450.....E915310
- H.T. steel retainer, 11/32.....E961312
- H.T. steel retainer, 11/32.....E961061
- Machined valve locks, 11/32.....E911111
- Dual idler gear drive.....E992007
- Timing chain set.....E991901
- C.H. pushrods, 5/16 x 8.156.....E917241
- Guide plates, 5/16.....E913013
- Guide plates, 3/8.....E913014
- Forged roller rockers, 3/8 x 1.6.....E928025
- Forged roller rockers, 7/16 x 1.6.....E928026
- Billet roller rockers, 3/8 x 1.6.....E928078
- Billet roller rockers, 7/16 x 1.6.....E928079
- Billet roller rockers, 7/16 x 1.7.....E928080
- Billet roller rockers, 3/8 x 1.7.....E928081
- Billet pedestal mount, 1.6.....E928088
- Billet pedestal mount, 1.7.....E928089
- Lash caps, 11/32.....E911541
- P.C. seals, 11/32.....E910243
- Screw-in studs, 3/8.....E912161
- Screw-in studs, 7/16.....E912152
- Bronze gear.....E911618
- Degree wheel.....E911004
- Moly Lube, 2 oz. tube.....E911002

**HIGH PERFORMANCE HYDRAULIC ROLLER CAMSHAFTS**

APPLICATIONS/CHARACTERISTICS	BASIC RPM RANGE	PART NO. GRIND NO.	DURATION ADVERTISED	DURATION @ .050"	GROSS LIFT	LOBE CENTER	ADVANCE	VALVE LASH
Improved low end and mid-range power in 302-351 CID engines with 8.5-9.5:1 compression. Works well with stock 4-barrel carburetion or speed density style fuel injection. However, idle quality may improve with mass air flow style fuel injection. Compatible with stock transmissions, converters and gearing. Light duty trucks and Broncos, towing moderate loads.	1,800-4,800	<b>E212836</b> RH-282-1A	282° IN 282° EX	214° IN 214° EX	.512" IN .512" EX	112°	4°	.000" IN .000" EX
Improved mid-range performance in 302-351 CID engines with 9.0-9.5:1 compression ratios. Works well with aftermarket intake and 4-barrel carburetion or mass air flow fuel injection. Can be used with 1.7:1 rockers, clearance permitting. Prefers 5-speed manual, however, will work fine with automatic transmission.	2,000-5,200	<b>E212832</b> RH-288-1	288° IN 288° EX	219° IN 219° EX	.512" IN .512" EX	110°	0°	.000" IN .000" EX
Dual pattern, high-lift, short duration intake offers big mid-range torque, while longer exhaust duration lets your engine breathe. Will work with stock or slightly modified aftermarket cylinder heads and intake with up to 650 cfm carburetion or mass air flow fuel injection. Recommended for engines with no less than 9.5:1 compression, headers and free flowing dual exhaust. OK with nitrous oxide!	2,300-5,800	<b>E212837</b> RH-286-1	286° IN 294° EX	218° IN 226° EX	.544" IN .544" EX	112°	4°	.000" IN .000" EX
High-lift, short duration, single pattern camshaft pulls hard through the mid-range without sacrificing top end power in 302-351 CID engines using 9.5:1 compression. Works fine with single, 4-barrel or mass air flow fuel injection and headers with 2.5"-3" free flowing exhaust. Prefers 5-speed manual and mid-3 series gearing.	2,500-6,500	<b>E212833</b> RH-290-1	290° IN 290° EX	222° IN 222° EX	.544" IN .544" EX	112°	4°	.000" IN .000" EX
New computerized lobe design incorporates faster ramps for improved timing events. More mid-range and upper mid-range power without compromising low speed driveability. 4-barrel carburetion or mass air flow fuel injection with 65-70 mm throttle body and heavier injectors, enhance performance. Recommended with 5-speed transmission. Can use 1.7 rockers!	2,500-6,500	<b>E212838</b> RH-282-4A	282° IN 286° EX	222° IN 226° EX	.512" IN .512" EX	112°	4°	.000" IN .000" EX
<b>Hot Street.</b> 302-351 CID engines with 9.5-10.0:1 compression. Aftermarket cast-iron or aluminum cylinder heads (i.e.: GT-40, Dart, TFS, etc.) with minor modifications. Gasket-matched Victor Jr. style intake or extrude honed GT-40 or Cobra style fuel injected manifolds with modified mass air flow fuel injection. Intended for 5-speed cars with low gears. Can be used with 1.7 rockers!	2,800-6,500	<b>E212839</b> RH-294-3	294° IN 294° EX	226° IN 226° EX	.512" IN .512" EX	112°	4°	.000" IN .000" EX
Non-computer controlled, naturally aspirated street machines with 9.5-10.5:1 compression in 302 CID engines, will find strong mid-range torque and top end horsepower with this camshaft. Popular with ported, aftermarket, aluminum cylinder heads, matched Victor Jr. style intake and 750 cfm carburetion. 4- or 5-speed manual or C-4 automatic with 3,000 RPM converter and low gears. Good choice for nitrous oxide.	3,000-6,700	<b>E212840</b> RH-294-2A	294° IN 302° EX	226° IN 234° EX	.544" IN .544" EX	110°	4°	.000" IN .000" EX

**CAMSHAFT ACCESSORY KIT FOR 1985-LATER 302/5.0L HO ENGINES EQUIPPED WITH HYDRAULIC TAPPET CAMSHAFTS**

**E823014 KIT INCLUDES THESE COMPONENTS:**

- 16 hydraulic roller tappets.....E919321
- 16 double springs, 1.750 x 1.450.....E915310
- 16 H.T. steel retainers, 7° x 11/32.....E961312
- 16 pair H.T. valve locks, 7° x 11/32.....E911171
- 16 H.T. Pushrod.....E917220
- 1 tube Moly Lube, 1/4 oz.....E911001

*The springs in this kit are designed to fit stock heads. No machine work is required.*

**OPTIONAL HIGH PERFORMANCE PARTS FOR FORD SMALL BLOCK ENGINES ORIGINALLY EQUIPPED WITH HYDRAULIC ROLLER VALVETRAINS**

- Valve springs, 1.820 ..... E915011
- Valve springs, 1.775 ..... E915310
- Valve springs, 1.680 ..... E915021
- H.T. steel retainers, 7° x 11/32 ..... E961091
- H.T. steel retainers, 7° x 11/32 ..... E961312
- H.T. steel retainers, 7° x 11/32 ..... E961061
- H.T. locks, 7° x 11/32 ..... E911171
- H.T. machined locks, 7° x 11/32 ..... E911111
- Dual idler gear drive. .... E992007
- Roller timing chain set. .... E991901
- Billet pedestal, 1.6 rockers. .... E928088
- Billet pedestal, 1.7 rockers. .... E928089
- Billet rockers, 3/8 x 1.6. .... E928078
- Billet rockers, 3/8 x 1.7. .... E928081
- Forged rockers, 3/8 x 1.6 ..... E928025
- Screw-in studs, 3/8 x 24. .... E912161
- Guide plates, 5/16. .... E913013
- P.C. seals, 11/32. .... E910243
- Lash caps, 11/32 ..... E911541
- Degree wheel. .... E911004
- Moly Lube, 2 oz. tube ..... E911002

1969-83 351W/5.8L ENGINES

FIRING ORDER: 1, 3, 7, 2, 6, 5, 4, 8

1982-84 302/5.0L ENGINES

PROFERAL BILLET

## HIGH PERFORMANCE MECHANICAL FLAT TAPPET CAMSHAFTS

APPLICATIONS/CHARACTERISTICS	BASIC RPM RANGE	PART NO. GRIND NO.	DURATION ADVERTISED	DURATION @ .050"	GROSS LIFT	LOBE CENTER	ADVANCE	VALVE LASH
<b>Mild Street/Slalom Racer.</b> Street rods and daily drivers seeking super low end power from 302-351 cubic inch engines with 9.5-10.0:1 compression. Works well in 3,200-3,600 lb. vehicles with 600-650 cfm. 4-barrel, headers, free flowing exhaust and 4- or 5-speed manual transmission.	2,800-6,000	E212030 TQ30M	280° IN 280° EX	230° IN 230° EX	.496" IN .496" EX	110°	4°	.024" IN .024" EX
<b>Hot Street/E.T. Brackets.</b> Strong mid-range performance in 10.0-11.0:1 compression engines. Vehicles using mildly-ported, stock heads or aftermarket heads with larger valves, single 4-barrel or 2x4 barrel set ups, 4-speed manual or C-4 automatics with 3,000-3,500 RPM convertor.	3,200-6,500	E212322 Hi Flow AM	286° IN 294° EX	242° IN 226° EX	.544" IN .544" EX	108°	0°	.022" IN .022" EX
<b>Hot Street/E.T. Brackets/Oval Track.</b> One of Erson's most popular camshafts. Good mid-range and upper mid-range performance in 3,000-3,400 lb. early Mustangs, Comets, Mavericks, etc. Recommended for engines with no less than 10.5:1 compression. Oval track applications running fast 1/4-3/8 mile dirt or asphalt tracks.	3,500-6,800	E212301 F-282-2	282° IN 290° EX	246° IN 254° EX	.544" IN .544" EX	106°	0°	.026" IN .026" EX
<b>Pro Street/E.T. Brackets.</b> 302-351 cubic inch engines using ported and polished aftermarket cylinder heads; large diameter, free flowing exhaust. 700-750 cfm 4-barrel and low gears. OK with 1.7:1 rockers and/or nitrous oxide. We recommend 10.5-11.5:1 compression for best results.	3,800-7,200	E212302 F-286-3	286° IN 294° EX	250° IN 258° EX	.544" IN .544" EX	110°	4°	.026" IN .026" EX
<b>E.T. Brackets/Oval Track.</b> Excellent mid-range torque and horsepower from 351-358 CID engines with 11.5-12.5:1 compression using modified aftermarket Windsor or Cleveland style cylinder heads. Proven winner in late model sportsman cars on 3/8-1/2 mile tracks. OK with single 750 cfm 4-barrel on alcohol or gas!	4,200-7,400	E212303 F-296-1A	296° IN 302° EX	258° IN 264° EX	.600" IN .600" EX	106°	4°	.028" IN .030" EX
<b>E.T. Brackets/Oval Track.</b> A favorite with Wednesday night E.T. Bracket racers or Oval Track racers on 1/2 mile dirt or asphalt tracks. Must have good heads and intake, free flowing, large diameter exhaust system. 4-speed manual or C-4 automatic with 4,000 RPM converter to work best.	4,500-7,600	E212304 F-298-4	298° IN 306° EX	260° IN 268° EX	.600" IN .600" EX	108°	0°	.028" IN .030" EX
<b>E.T. Brackets/Super Street.</b> New lobe technology designed specifically for .875" diameter flat tappets, allows for a faster, yet more dynamically stable valvetrain. 2,600-3,000 lb. door-slammers with 351-380 cubic inch engines sporting 12.5-13.5:1 compression, produces big, top end power. Use E915251 spring at 1.900" installed.	4,800-8,200	E212305 F-304-1A	304° IN 308° EX	266° IN 272° EX	.653" IN .653" EX	106°	4°	.020" IN .022" EX

### CAMSHAFT ACCESSORY KIT FOR FORD SMALL BLOCK ENGINES EQUIPPED WITH MECHANICAL FLAT TAPPET CAMSHAFTS

**E823012 KIT INCLUDES THESE COMPONENTS:**

- 16 mechanical flat tappets.....E914111
- 16 outer valve springs.....E915051
- 16 chrome moly steel retainers, 11/32 ....E961091
- 16 pair H.T. valve locks, 7° x 11/32.....E911171
- 1 tube Moly Lube, 1/4 oz .....E911001

**E823013 KIT INCLUDES THESE COMPONENTS:**

- 16 mechanical flat tappets.....E914111
- 16 dual valve springs .....E915261
- 16 chrome moly steel retainers, 11/32 ....E961091
- 16 pair H.T. valve locks, 7° x 11/32.....E911171
- 1 tube Moly Lube, 1/4 oz .....E911001

**NOTE —**

Due to the many different cylinder head options available from Ford as well as the aftermarket industry, it is important to measure the installed height of both the intake spring and exhaust spring as they may be different, requiring an entirely different spring from one side to the other. Call Erson's Technical Service Team at 775.882.1622 for more information regarding our selection of valve springs applying to your application.

### OPTIONAL HIGH PERFORMANCE PARTS FOR FORD SMALL BLOCK ENGINES EQUIPPED WITH MECHANICAL FLAT TAPPET VALVETRAINS

- |   |  |
|---|--|
| Dual idler gear drive .....E992007                | Screw-in studs, 7/16 x 20 .....E912152   |
| Roller timing chain .....E991901                  | Forged rockers, 3/8 x 1.6 .....E928025   |
| Valve springs, 1.900 x 1.540 .....E915051         | Forged rockers, 7/16 x 1.6 .....E928026  |
| Valve springs, 1.780 x 1.500 .....E915011         | Billet rockers, 3/8 x 1.6 .....E928078   |
| H.T. steel retainers, 7° x 11/32 .....E961061     | Billet rockers, 7/16 x 1.6 .....E928079  |
| H.T. machined valve locks, 7° x 11/32 ....E911111 | Billet rockers, 7/16 x 1.7 .....E928080  |
| Lash caps, 11/32 .....E911541                     | Billet rockers, 3/8 x 1.7 .....E928081   |
| P.C. seals, 11/32 .....E910243                    | C.H. pushrods, 8.156 x 5/16 .....E917241 |
| Screw-in studs, 3/8 x 24 .....E912111             | Guide plates, 5/16 .....E913013          |
| Screw-in studs, 3/8 x 24 .....E912161             | Guide plates, 3/8 .....E913014           |

**TECH TIP —**

Do like the pros do! When installing any aftermarket cam, particularly mechanical flat tappet cams, strict attention must be paid to the break-in procedure. In most cases, it is necessary to run the cam and lifters in on the outer spring only, when using double springs, for the first 30 minutes of operation. This procedure will often help to reduce the premature valvetrain to cam and lifter failure. The alternative, rebuilding your engine, is much more costly and time consuming.

FIRING ORDER: 1, 3, 7, 2, 6, 5, 4, 8  
 ALLOY STEEL BILLET

1969-93 351W/5.8L ENGINES  
 1982-84 302/5.0L ENGINES

**HIGH PERFORMANCE SOLID ROLLER CAMSHAFTS**

APPLICATIONS/CHARACTERISTICS	BASIC RPM RANGE	PART NO. GRIND NO.	DURATION ADVERTISED	DURATION @ .050"	GROSS LIFT	LOBE CENTER	ADVANCE	VALVE LASH
<b>E.T. Brackets/Hot Street.</b> Street rods or street machines seeking strong low end and mid-range performance. 351-358 CID with 10.0-11.0:1 compression engines using aftermarket or mildly ported stock cylinder heads. OK with nitrous oxide or small displacement supercharger.	3,000-6,500	<b>E212991</b> R-278-2	278° IN 286° EX	238° IN 246° EX	.592" IN .592" EX	112°	4°	.027" IN .027" EX
<b>Oval Track.</b> Designed for alcohol burning 358-430 CID engines in late model sportsman, modified or outlaw sprint cars on fast 1/2-5/8 mile tracks. Figures represent 1.7:1 intake and 1.6:1 exhaust rockers as suggested for best results.	4,500-7,600	<b>E212992</b> R-292-2	292° IN 300° EX	266° IN 274° EX	.697" IN .688" EX	106°	4°	.030" IN .032" EX
<b>Superstock/Super Gas.</b> Extremely powerful, pulls hard in 358-380 cubic inch super gas roadsters with 13.0-14.5:1 compression. Requires heavily ported, aftermarket, aluminum cylinder heads, match ported, open plenum intake and 830 cfm annular discharge 4-barrel on alcohol or gas. Also works well in SS/GT automatic cars with 5,000(+) RPM converter when advanced 4°.	5,000-8,300	<b>E212993</b> R-302-6	302° IN 308° EX	276° IN 282° EX	.720" IN .688" EX	106°	0°	.030" IN .032" EX

**CAMSHAFT ACCESSORY KIT FOR FORD SMALL BLOCK ENGINES EQUIPPED WITH SOLID ROLLER TAPPET CAMSHAFTS**

**E821017 KIT INCLUDES THESE COMPONENTS:**

- 16 solid roller tappets.....E919310
- 16 valve springs, 1.900 x 1.535 .....E915057
- 16 titanium retainers, 10° .....E961408
- 16 valve locks, 10° x 11/32 .....E911140
- 1 tube Moly Lube, 1/4 oz .....E911001

Kit E821017 for less than .680 valve lift.

**NOTE —**

The use of solid roller camshafts may not be possible in 1985-later 302s and 1994-later 351W hydraulic roller blocks. Due to the combination of tall lifter bore bosses in these engines and smaller base circle camshafts resulting from taller, more aggressive lobes, interference may occur at the roller lifter button, which attaches the cross bar to the lifter body, and the point in the block where the lifter slides into the lifter bore. This interference will prevent the lifter from making contact with the camshaft at the base circle. It is possible to run a hydraulic flat tappet camshaft or a mechanical flat tappet camshaft in hydraulic roller block providing matched components are used.

**OPTIONAL HIGH PERFORMANCE PARTS FOR FORD ENGINES EQUIPPED WITH SOLID ROLLER VALVETRAINS**

- Dual idler gear drive .....E992007
- Roller timing chain .....E991901
- Valve springs, 1.900 x 1.550 .....E915057
- H.T. steel retainers, 7° x 11/32 .....E961091
- Titanium retainer, 10° .....E961408
- Valve springs, 1.900 x 1.625 .....E915150
- Titanium retainer, 10° .....E961406
- Solid roller tappets .....E919310
- Guide plates, 7/16 .....E913014
- Screw in studs, 7/16 x 20 .....E912152
- P.C. seals, 11/32 .....E910243
- Lash caps, 11/32 .....E911541
- H.T. machined valve locks, 7° x 11/32 .....E911111
- H.T. valve locks, 7° x 11/32 .....E911171



## HIGH PERFORMANCE HYDRAULIC FLAT TAPPET CAMSHAFTS

APPLICATIONS/CHARACTERISTICS	BASIC RPM RANGE	PART NO. GRIND NO.	DURATION ADVERTISED	DURATION @ .050"	GROSS LIFT	LOBE CENTER	ADVANCE	VALVE LASH
Broad power range. City and expressway driving, towing. Cars, wagons, pickups, heavier rigs. Good idle and throttle response, plus high-fuel efficiency.	1,000-4,000	E220101 RV10H	280° IN 280° EX	208° IN 208° EX	.484" IN .484" EX	112°	4°	.000" IN .000" EX
Light Ford trucks and passenger cars seeking improved low end performance and driveability. May be used with stock components or in slightly modified engines. Recommended for towing light to moderate loads.	1,250-4,750	E220112 RV12H	280° IN 288° EX	208° IN 214° EX	.484" IN .495" EX	110°	4°	.000" IN .000" EX
Good idle and fuel efficiency. Excellent replacement camshaft for passenger cars or light trucks with campers, towing moderate loads. May be used with small displacement centrifugal or vane type superchargers. Computer compatible!	1,500-4,500	E220021 M/P1	280° IN 292° EX	208° IN 214° EX	.484" IN .517" EX	114°	4°	.000" IN .000" EX
The "Performer". Super low- and mid-range power. Good idle, fuel efficiency and driveability. 4-barrel and headers recommended.	1,800-4,800	E220121 TQ20H	292° IN 292° EX	214° IN 214° EX	.517" IN .517" EX	110°	4°	.000" IN .000" EX
Good idle and throttle response in large engines. Prefers stock or aftermarket dual plane intake manifold, 4-barrel carburetion, headers and 4- or 5-speed manual transmission with low gears for towing moderate to heavy loads. OK with small superchargers!	2,000-5,000	E221021 M/P2	292° IN 310° EX	214° IN 226° EX	.517" IN .533" EX	114°	4°	.000" IN .000" EX
Excellent choice for street rods or slightly modified street machines with up to 9.5:1 compression. Noticeable idle with reasonable fuel efficiency. Produces good low end torque and mid-range horsepower in 3,200-3,600 lb. vehicles.	2,250-5,500	E220321 Hi Flow AH	284° IN 284° EX	220° IN 220° EX	.545" IN .545" EX	112°	4°	.000" IN .000" EX
High-lift, dual pattern. Needs 4-barrel, headers, lower gears and medium speed converter if used with automatic. Extremely strong mid-range camshaft.	2,500-5,500	E220222 TQ40H	284° IN 296° EX	220° IN 228° EX	.545" IN .545" EX	110°	0°	.000" IN .000" EX
For 351-400 cubic inch engines with 9.5-10.5:1 compression, seeking increased mid-range performance. Works best with aftermarket dual plane style intake, 600-650 cfm carburetion, mild head work and headers with free flowing, dual exhaust. Highly recommend 4-speed top loader or 3-speed automatic with mild converter and low gears.	2,800-5,800	E220221 TQ30H	310° IN 310° EX	226° IN 226° EX	.533" IN .533" EX	110°	4°	.000" IN .000" EX
Hot Street/E.T. Brackets. High-lift, short duration. Delivers broad power range and strong top end. Fair idle. Needs 4-barrel, headers, compression and gears.	3,000-6,000	E220421 Hi Flow IH	296° IN 296° EX	228° IN 228° EX	.545" IN .545" EX	108°	0°	.000" IN .000" EX
High-lift, dual pattern. Needs 4-barrel, headers and lower gears. Works best with stick or high-stall automatic. Strong top end camshaft. Rough idle. Should have at least 9:1 compression.	3,200-6,300	E220223 TQ50H	296° IN 306° EX	228° IN 235° EX	.545" IN .545" EX	110°	0°	.000" IN .000" EX
Runs strong 3,500-7,000 RPM. Stick or automatic with gears. Needs good intake and headers. 9.5:1 or more compression. Lopey idle.	3,500-6,500	E220521 Hi Flow IIH	306° IN 306° EX	235° IN 235° EX	.545" IN .545" EX	108°	0°	.000" IN .000" EX
Runs strong 4,000-7,500 RPM. Needs lower gears, 4-barrel, headers and compression for maximum performance. Rough idle.	3,800-6,800	E220621 Hi Flow IIIH	316° IN 316° EX	240° IN 240° EX	.545" IN .545" EX	108°	0°	.000" IN .000" EX
Hot Street/E.T. Brackets. 351 cubic inch Cleveland engines with 10.5-11.5:1 compression using modified 2V or 4V cylinder heads, large valves, Victor Jr. style intake, 750 cfm 4-barrel, and 3" diameter, free flowing exhaust produce good top end power. Automatic cars use 4,000 RPM converter and low gears. OK with nitrous oxide!	4,000-7,000	E220921 Hi Flow IVH	312° IN 320° EX	248° IN 256° EX	.579" IN .596" EX	110°	4°	.000" IN .000" EX

### CAMSHAFT ACCESSORY KIT FOR FORD ENGINES EQUIPPED WITH HYDRAULIC FLAT TAPPET CAMSHAFTS

**E823010 KIT INCLUDES THESE COMPONENTS:**

- 16 hydraulic tappets.....E914601
- 16 valve springs, 1.820 x 1.500.....E915011
- 16 steel retainers, 7° x 11/32.....E961312
- 16 4 groove locks, 11/32.....E911241
- 1 tube Moly Lube, 1/4 oz. ....E911001

*This kit is for use with Pre-1977 351 and 400C/M engines with 4-groove valves.*

### OPTIONAL HIGH PERFORMANCE PARTS FOR FORD ENGINES EQUIPPED WITH HYDRAULIC FLAT TAPPET VALVETRAINS

- Valve springs, 1.900 x 1.540.....E915051
- Roller timing chain set .....E991909
- Guide plates, 5/16 .....E913007
- Screw-in studs, 5/16 x 20 .....E912151
- Lash caps, 11/32 .....E911541
- P.C. seals, 11/32 .....E910243
- C.H. pushrods, 5/16 x 8.400 .....E917931
- C.H. pushrods, 5/16 x 8.500 .....E917222
- C.H. pushrods, 5/16 x 9.500 .....E917941
- Degree wheel .....E911004
- Moly Lube, 2 oz. tube.....E911002
- Forged roller rockers, 7/16 x 1.7 .....E928029
- Billet roller rockers, 7/16 x 1.7 .....E928082

PROFERAL BILLET

BOSS 351C, 351C/M, 400M ENGINES

HIGH PERFORMANCE MECHANICAL FLAT TAPPET CAMSHAFTS

APPLICATIONS/CHARACTERISTICS	BASIC RPM RANGE	PART NO. GRIND NO.	DURATION ADVERTISED	DURATION @ .050"	GROSS LIFT	LOBE CENTER	ADVANCE	VALVE LASH
Street rods or street machines seeking super low end and mid-range power. Recommended for 351 cubic inch engines with 9.5-10.5:1 compression, 2V or 4V cylinder heads, single 4-barrel, headers and free flowing dual exhaust. Works fine with 4-speed top loader or automatic with mild converter.	2,800-6,000	E220030 TQ30M	280° IN 280° EX	230° IN 230° EX	.536" IN .536" EX	110°	0°	.025" IN .025" EX
<b>Hot Street/E.T. Brackets.</b> Strong mid-range performance in 10.0-11.0:1 compression engines using mildly-ported 2V or 4V cylinder heads, single or 2x4 barrel carburetion, 4-speed manual or 3-speed automatic with 3,000-3,500 RPM converter and low gears. OK with small shot of nitrous oxide!	3,500-6,500	E227242 Hi Flow AM	286° IN 294° EX	242° IN 246° EX	.588" IN .588" EX	110°	4°	.026" IN .026" EX
<b>Hot Street/E.T. Brackets.</b> More mid-range torque and horsepower can be expected from 351-362 cubic inch engines with 10.5-11.5:1 compression using this camshaft. Needs dual plane or Victor Jr. style intake, 750 cfm 4-barrel, headers and 3" free flowing exhaust. 4-speed or automatic with 3,500-4,000 RPM converter, low gears and sticky D.O.T. tires.	3,750-7,200	E220306 F-286-2	286° IN 294° EX	250° IN 258° EX	.588" IN .588" EX	108°	0°	.027" IN .027" EX
<b>Oval Track.</b> Proven winner! Excellent choice for Thunderbird bodied, late model sportsman cars with no less than 12.5:1 compression. Works best with large valved, ported and polished 2V cylinder heads, in cars with no restrictions on fast 3/8-1/2 mile dirt or asphalt tracks.	4,000-7,500	E220307 F-296-1A	296° IN 302° EX	258° IN 264° EX	.648" IN .648" EX	106°	4°	.027" IN .027" EX
<b>E.T. Brackets.</b> Super upper, mid-range and top end power from 2,800-3,200 lb. Mustangs, Comets, Mavericks, etc., with 351 or larger cubic inch engines. Suggest good heads and intake, 750 cfm 4-barrel carburetion, open headers or large diameter, free flowing exhaust. Automatic cars use 4,000-4,500 RPM converter, with no less than 12.0:1 compression.	4,500-7,800	E220308 F-306-1A	306° IN 314° EX	268° IN 276° EX	.648" IN .648" EX	108°	0°	.027" IN .027" EX
<b>E.T. Brackets/Super Street.</b> 2,400-2,800 lb. door cars using 351-390 cubic inch engines with 12.5-13.5:1 compression will produce excellent upper RPM range power. Needs heavily modified, 4V style cylinder heads, matched open plenum intake and 850 cfm blueprinted carburetion on alcohol or gas. Automatic cars use 4,500-5,000 RPM, 8" converter.	4,800-8,000	E220309 F-310-1	310° IN 310° EX	272° IN 272° EX	.648" IN .648" EX	106°	0°	.027" IN .027" EX

CAMSHAFT ACCESSORY KIT FOR FORD SMALL BLOCK ENGINES EQUIPPED WITH MECHANICAL FLAT TAPPET CAMSHAFTS

E823012 KIT INCLUDES THESE COMPONENTS:

- 16 mechanical flat tappets. . . . . E914111
- 16 outer valve springs. . . . . E915051
- 16 chrome moly steel retainers, 11/32 . . . . E961091
- 16 pair H.T. valve locks, 7° x 11/32. . . . . E911171
- 1 tube Moly Lube, 1/4 oz . . . . . E911001

E823013 KIT INCLUDES THESE COMPONENTS:

- 16 mechanical flat tappets. . . . . E914111
- 16 dual valve springs . . . . . E915261
- 16 chrome moly steel retainers, 11/32 . . . . E961091
- 16 pair H.T. valve locks, 7° x 11/32. . . . . E911171
- 1 tube Moly Lube, 1/4 oz . . . . . E911001

TECH TIP —

For camshaft kits using the E915051 spring, installed height should be changed to 1.850" for 144 lbs. closed.

OPTIONAL HIGH PERFORMANCE PARTS FOR FORD SMALL BLOCK ENGINES EQUIPPED WITH MECHANICAL FLAT TAPPET VALVETRAINS

- Roller timing chain set.....E991909
- Forged roller rockers, 7/16 X 1.7.....E928029
- Billet roller rockers, 7/16 X 1.7.....E928082
- Screw-in studs, 7/16 x 20.....E912151
- Guide plates, 5/16.....E913007
- Guide plates, 3/8.....E913008
- C.H. pushrods, 5/16 x 8.400.....E917931
- C.H. pushrods, 5/16 x 8.500.....E917222
- C.H. pushrods, 5/16 x 9.500.....E917941
- C.H. pushrods, 3/8 x 8.400.....E917226
- C.H. pushrods, 3/8 x 8.500.....E917225
- C.H. pushrods, 3/8 x 9.500.....E917227
- Degree wheel.....E911004
- Moly Lube, 2 oz. tube.....E911002

## 351 CLEVELAND ENGINES

1970-82 351C, BOSS 351C, 351M, 400M ENGINES

PROFERAL BILLET

### HIGH PERFORMANCE SOLID ROLLER TAPPET CAMSHAFTS

APPLICATIONS/CHARACTERISTICS	BASIC RPM RANGE	PART NO. GRIND NO.	DURATION ADVERTISED	DURATION @ .050"	GROSS LIFT	LOBE CENTER	ADVANCE	VALVE LASH
<b>Hot Street/E.T. Brackets.</b> High-performance street machines needing that extra edge. Recommended for 10.5-11.5:1 351-362 cubic inch engines with slightly modified 2V or 4V cylinder heads, single 750 cfm 4-barrel, headers and 3" diameter, free flowing exhaust. Works best in 4-speed cars with small shot of nitrous oxide.	3,000-6,500	<b>E229618</b> R-278-2	278° IN 286° EX	238° IN 246° EX	.640" IN .640" EX	112°	4°	.030" IN .030" EX
<b>Saturday Night Special/E.T. Brackets.</b> Good mid-range torque and top end horsepower from 351(+) cubic inch engines with 11.5-12.5:1 compression. Works best with modified cylinder heads, 3 angle valve job, gasket-matched intake, 750-850 cfm 4-barrel, 1.750" headers and 3" exhaust with 2 chamber Flow-Masters®. Automatic cars require 4,000 RPM converter and low gearing.	4,000-7,000	<b>E229619</b> R-282-1B	282° IN 292° EX	253° IN 263° EX	.692" IN .692" EX	106°	0°	.032" IN .032" EX
<b>Super Gas/Super Stock.</b> Expect more power from 351-390 cubic inch super gassers and E.T. bracket cars with 13.0-14.5:1 compression in 2,200-2,600 lb. chassis. Requires large valved, heavily modified 4V cylinder heads; single plane, open plenum style intake with 850-1,050 cfm 4-barrel on alcohol or gas. 2-speed automatic cars use 5,000 RPM converter. Also works well in SS/GT automatic cars.	5,000-8,000	<b>E229620</b> R-302-4A	302° IN 310° EX	276° IN 284° EX	.744" IN .709" EX	104°	0°	.034" IN .034" EX

### CAMSHAFT ACCESSORY KIT FOR FORD ENGINES EQUIPPED WITH SOLID ROLLER TAPPET CAMSHAFTS

#### E822045 KIT INCLUDES THESE COMPONENTS:

16 roller tappets.....	E919300
16 double springs, 1.900 X 1.550.....	E915057
16 chrome moly steel retainers, 11/32.....	E961091
16 pair machined valve locks, 11/32.....	E911111
1 tube Moly Lube, 1/4 oz.....	E911001

*This kit is for Boss 351 or converted 351C/M engines only.*

### OPTIONAL HIGH PERFORMANCE PARTS FOR FORD ENGINES EQUIPPED WITH SOLID ROLLER TAPPET VALVETRAINS

Valve springs, 1.900 x 1.625.....	E915150	Screw-in studs, 7/16 x 20.....	E912151
Valve springs, 2.000 x 1.625.....	E915160	Guide plates, 3/8.....	E913008
Titanium retainers, 10°.....	E961408	P.C. seals, 11/32.....	E910243
Titanium retainers, 10°.....	E961406	Lash caps, 11/32.....	E911541
Valve locks, 10° x 11/32.....	E911140	Roller timing chain set.....	E991909
Solid roller tappets.....	E919300	Aluminum bronze gear.....	E911619
C.H. pushrods, 3/8 x 8.500.....	E917225	Forged rockers, 7/16 X 1.7.....	E928029
C.H. pushrods, 3/8 x 8.400.....	E917226	Billet rockers, 7/16 X 1.7.....	E928082
C.H. pushrods, 3/8 x 9.500.....	E917227	Billet rockers, 7/16 X 1.8.....	E928083



## PROFERAL BILLET

## 352, 360, 390, 406, 410, 427, 428 CID ENGINES

## HIGH PERFORMANCE HYDRAULIC FLAT TAPPET CAMSHAFTS

APPLICATIONS/CHARACTERISTICS	BASIC RPM RANGE	PART NO. GRIND NO.	DURATION ADVERTISED	DURATION @ .050"	GROSS LIFT	LOBE CENTER	ADVANCE	VALVE LASH
Broad power range. City and expressway driving or towing. Cars, wagons, pickups, heavier rigs. Good idle and throttle response, plus high-fuel efficiency.	1,000-4,000	E240101 RV10H	280° IN 280° EX	208° IN 208° EX	.490" IN .490" EX	111°	4°	.000" IN .000" EX
Ford pickups, up to F-250 series and heavy passenger cars seeking improved low end power and driveability. Good choice for stock or slightly modified 360-390 cubic inch engines, towing light to moderate loads.	1,250-4,250	E240112 RV12H	280° IN 288° EX	208° IN 214° EX	.490" IN .500" EX	110°	4°	.000" IN .000" EX
Strong mid-range power. City, fast expressway and towing. Delivers maximum mid-range torque. Good idle and throttle response, plus fuel efficiency.	1,500-4,500	E240110 RV15H	288° IN 288° EX	214° IN 214° EX	.500" IN .500" EX	111°	4°	.000" IN .000" EX
The "Performer". Super low- and mid-range power. Good idle, fuel efficiency and driveability. 4-barrel and headers recommended.	1,800-4,800	E240121 TQ20H	292° IN 292° EX	214° IN 214° EX	.523" IN .523" EX	110°	4°	.000" IN .000" EX
Good idle and throttle response from 390-428 cubic inch engines, in 2-wheel drive or 4-wheel drive Ford pickups, towing moderate to heavy loads. Prefers stock or aftermarket dual plane intake, 600-650 cfm 4-barrel carburetion, headers and 4- or 5-speed manual transmission with low gears.	2,000-5,000	E241021 M/P2	292° IN 310° EX	214° IN 226° EX	.523" IN .539" EX	114°	4°	.000" IN .000" EX
Expect a fair idle and reasonable fuel efficiency from slightly modified 390-428 CID engines with 8.75-9.5:1 compression. Produces good low end torque and mid-range horsepower in heavier chassis (i.e.: Galaxies, Fairlanes and early Thunderbirds).	2,200-5,200	E240321 Hi Flow AH	284° IN 284° EX	220° IN 220° EX	.551" IN .551" EX	112°	4°	.000" IN .000" EX
High-lift, dual pattern. Needs 4-barrel, headers, lower gears and medium stall-speed converter if used with automatic. Extremely strong mid-range camshaft.	2,500-5,500	E240222 TQ40H	284° IN 296° EX	220° IN 228° EX	.551" IN .551" EX	110°	0°	.000" IN .000" EX
For 352-428 cubic inch engines with 9.5-10.5:1 compression seeking improved mid-range performance. Works best with aftermarket, aluminum dual plane style intake, 600-650 cfm 4-barrel, mild head work and headers with free flowing, dual exhaust. Needs 4-speed top loader or 3-speed automatic with mild converter and low gears for best results.	2,500-5,800	240221 TQ30H	310° IN 310° EX	226° IN 226° EX	.539" IN .539" EX	110°	4°	.000" IN .000" EX
Hot Street/E.T. Brackets. High-lift, short duration, broad power range and strong top end. Fair idle. Needs 4-barrel, headers, compression and gears.	3,000-6,000	E240421 Hi Flow IH	296° IN 296° EX	228° IN 228° EX	.551" IN .551" EX	108°	0°	.000" IN .000" EX
High-lift, dual pattern. Needs 4-barrel, headers and lower gears. Works best with stick or high-stall automatic. Strong top end camshaft. Rough idle. Should have at least 9:1 compression.	3,200-6,300	E240223 TQ50H	296° IN 306° EX	228° IN 235° EX	.551" IN .551" EX	110°	0°	.000" IN .000" EX
Runs strong 3,500-7,000 RPM. Stick or automatic, with gears. Needs good intake and headers, 9.5:1 or more compression. Lopey idle.	3,500-6,500	E240521 Hi Flow IIH	306° IN 306° EX	235° IN 235° EX	.551" IN .551" EX	108°	0°	.000" IN .000" EX
Runs strong 4,000-7,500 RPM. Needs lower gears, 4-barrel, headers and compression for maximum performance. Rough idle.	3,800-6,800	E240621 Hi Flow IIIH	316° IN 316° EX	240° IN 240° EX	.551" IN .551" EX	108°	0°	.000" IN .000" EX

## CAMSHAFT ACCESSORY KIT FOR FORD ENGINES EQUIPPED WITH HYDRAULIC FLAT TAPPET CAMSHAFTS

## E824010 KIT INCLUDES THESE COMPONENTS:

16 hydraulic tappets.....	E914631
16 valve springs, 1.820 X 1.500 .....	E915011
16 steel retainers, 7° x 3/8.....	E961311
16 pair H.T. valve locks, 7° x 3/8 .....	E911271
1 tube Moly Lube, 1/4 oz.....	E911001

## OPTIONAL HIGH PERFORMANCE PARTS FOR FORD ENGINES EQUIPPED WITH HYDRAULIC FLAT TAPPET VALVETRAINS

Roller timing chain set.....	E991903	P.C. seals, 3/8 .....	E910213
Valve springs, 1.900 X 1.540 .....	E915051	Lash caps, 3/8 .....	E911531
Ductile iron adjustable rockers .....	E918501	Degree wheel.....	E911004
C.H. pushrods, 3/8 x 9.465 .....	E917331	Moly Lube, 2 oz. tube.....	E911002
C.M. pushrods, 3/8 x 9.590.....	E917311		

## CAUTION —

1958-63 engines used a camshaft with a flanged front bearing and a spring loaded thrust button. The flanged camshaft billets are no longer available therefore 1963½ and later camshafts will be supplied in all cases. If you have the early camshaft type engine, you must remove the soft plugs from the oil galleries on either side of the front camshaft bearing and tap the holes to 7/16 N.C. Purchase camshaft bolt 304815-S and 2 washers, 34808-S and 44730-S8, and pump eccentric C3AZ6287A. The timing chain, crank and camshaft sprockets must be changed to the later type. Some camshaft sprockets are manufactured with an integral spacer, purchase Ford spacer C3AZ6265A. Under no circumstances should you use a common hardware bolt to hold the sprocket on the camshaft. Use only the Ford part. Use Loctite on camshaft bolt and thrust plate bolts and torque to proper specs. When camshaft is properly installed, it will rotate freely and have approximately .010" end play. If any parts are omitted or substitutions made, the camshaft bolt may come loose or excessive end play may result, causing severe damage to the camshaft, tappets and engine.

# FORD V8 FE 1963-76

1.75:1 STOCK ROCKER RATIO

352, 360, 390, 406, 427, 428 CID ENGINES

PROFERAL BILLET

## HIGH PERFORMANCE MECHANICAL FLAT TAPPET CAMSHAFTS

APPLICATIONS/CHARACTERISTICS	BASIC RPM RANGE	PART NO. GRIND NO.	DURATION ADVERTISED	DURATION @ .050"	GROSS LIFT	LOBE CENTER	ADVANCE	VALVE LASH
Super low end torque and mid-range power from 352-428 cubic inch Ford engines with 9.5-10.5:1 compression. Excellent choice for pickups or heavy passenger cars with slightly modified engines, 4-speed or automatic transmission and mid-3 series gearing.	2,500-5,500	E240025 TQ25M	270° IN 280° EX	220° IN 230° EX	.542" IN .542" EX	110°	4°	.025" IN .025" EX
Hot Street/E.T. Brackets. Strong mid-range performance from 10.0-11.0:1 engines using mildly ported or aftermarket cylinder heads, single or low-profile 2x4 barrel set-ups and headers with dual exhaust. Needs 4-speed top loader or 3-speed automatic with 3,000-3,500 RPM converter and 3.90 or lower gears.	3,200-6,200	E240322 Hi Flow AM	286° IN 294° EX	242° IN 246° EX	.595" IN .595" EX	110°	4°	.026" IN .026" EX
Hot Street/E.T. Brackets. More mid-range torque and horsepower can be expected from 390-428 cubic inch engines with 10.5-11.5:1 compression using this camshaft. Needs large, dual plane or open plenum style intake with 750-850 cfm 4-barrel headers and 3" diameter, free flowing exhaust. Use 3,500-4,000 RPM converter with 3-speed automatics and low gears in 3,200-3,600 lb. vehicles.	3,500-6,500	E240305 F-286-2	286° IN 294° EX	250° IN 258° EX	.595" IN .595" EX	108°	0°	.027" IN .027" EX
Super mid-range and top end power from 390-428 cubic inch engines with 11.0-12.0:1 compression. Works best with large valves, modified aftermarket or Cobra Jet style cylinder heads; single or 2x4 barrel carburetion and 4-speed top loader with low gears. OK with nitrous oxide!	3,800-6,800	E240306 F-292-1	292° IN 302° EX	254° IN 264° EX	.656" IN .656" EX	114°	4°	.027" IN .027" EX
Hot Street/E.T. Brackets. Excellent choice for high-performance street machines or AC Cobras equipped with 427-428 cubic inch engines having 11.5-12.5:1 compression. Requires modified cylinder heads, single or multiple carburetion and 4-speed transmission with low gears for peak performance.	4,000-7,000	E240931 1000 HLM	304° IN 304° EX	258° IN 258° EX	.620" IN .620" EX	110°	0°	.028" IN .029" EX
E.T. Brackets/Super Gas. 2,600-3,000 lb. early Mustangs using 390-428 cubic inch engines with 12.5-14.0:1 compression. Requires modified cylinder heads, 850-1,050 cfm carburetion, large tube headers, 3-speed automatic with 4,500 RPM converter, 32" tire and 4.56 gear for best results.	4,500-7,500	E240307 F-306-1	306° IN 314° EX	268° IN 276° EX	.656" IN .656" EX	108°	0°	.027" IN .027" EX

### CAMSHAFT ACCESSORY KIT FOR FORD ENGINES EQUIPPED WITH MECHANICAL FLAT TAPPET CAMSHAFTS

#### E824020 KIT INCLUDES THESE COMPONENTS:

16 mechanical tappets.....	E914161
16 valve springs, 1.850.....	E915051
16 H.T. steel retainers, 7° x 3/8.....	E961101
16 pair H.T. valve locks, 7° x 3/8.....	E911271
1 tube Moly Lube, 1/4 oz.....	E911001

*This kit is to be used with E240025, E240322, E240305 and E240931.*

#### E824014 KIT INCLUDES THESE COMPONENTS:

16 mechanical tappets.....	E914161
16 valve springs, 1.900.....	E915251
16 H.T. steel retainers, 7° x 3/8.....	E961011
16 pair H.T. valve locks, 7° x 3/8.....	E911271
32 valve spring shims.....	E911904
1 tube Moly Lube, 1/4 oz.....	E911001

*This kit is to be used with E240306 and E240307.*

### OPTIONAL PARTS

Roller timing chain set.....	E991903
Valve springs.....	E915261
Adjustable shaft-mount rockers, 1.75:1.....	E918501
H.T. steel retainers, 7° x 3/8.....	E961101
H.T. machined retainers, 7° x 3/8.....	E911121
C.H. pushrods, 3/8 x 9.465.....	E917331
P.C. seals, 3/8.....	E910213
Lash caps, 3/8.....	E911531
Degree wheel.....	E911004
Moly Lube, 2 oz. tube.....	E911002
Valve covers.....	E981408
Titanium retainers, 10°.....	E961408
Valve locks, 3/8 x 10°.....	E911160
Roller rocker.....	E918502

# FORD V8 FE 1963-76

1.75:1 STOCK ROCKER RATIO

352, 360, 390, 406, 427, 428 CID ENGINES

ALLOY STEEL BILLET

## HIGH PERFORMANCE SOLID STREET ROLLER CAMSHAFTS

APPLICATIONS/CHARACTERISTICS	BASIC RPM RANGE	PART NO. GRIND NO.	DURATION ADVERTISED	DURATION @ .050"	GROSS LIFT	LOBE CENTER	ADVANCE	VALVE LASH
Hot Street Machines. Strong low end and mid-range performance from Mustangs, Cobras, Fairlanes, etc., using 390-428 cubic inch engines with 10.5-11.5:1 compression. Works best with modified cylinder heads, aftermarket intake, 750 cfm 4-barrel and headers. Needs 4-speed top loader or 3-speed automatic with 3,000 RPM converter and low gears. OK with nitrous oxide!	3,000-6,500	E240901 R-278-2	278° IN 286° EX	238° IN 246° EX	.648" IN .648" EX	112°	4°	.030" IN .030" EX
Pro Street Machines. 2,800-3,200 lb. Door-Cars, back halved, tubbed and caged will produce serious mid-range torque and upper mid-range horsepower from 390-428 cubic inch engines with 11.5-12.5:1 compression. Should have modified Cobra Jet heads, low riser 2x4 barrel, back-to-back carburetion, headers and 3" diameter, free flowing exhaust for best results.	4,000-7,200	E240902 R-294-1	294° IN 302° EX	254° IN 260° EX	.648" IN .648" EX	108°	0°	.030" IN .030" EX

### CAUTION —

*Ductile iron adjustable shaft-mount rockers are not recommended for solid roller camshaft applications. See roller rockers on page 87.*

**HIGH PERFORMANCE HYDRAULIC FLAT TAPPET CAMSHAFTS**

APPLICATIONS/CHARACTERISTICS	BASIC RPM RANGE	PART NO. GRIND NO.	DURATION ADVERTISED	DURATION @ .050"	GROSS LIFT	LOBE CENTER	ADVANCE	VALVE LASH
Broad power range. City and expressway driving or towing. Cars, wagons, pickups, heavier rigs. Good idle and throttle response, plus fuel efficiency.	1,000-4,000	E260101 RV10H	280° IN 280° EX	208° IN 208° EX	.484" IN .484" EX	111°	4°	.000" IN .000" EX
Strong mid-range power. City, fast expressway and towing. Delivers maximum, mid-range torque. Good idle, throttle response, plus fuel efficiency.	1,250-4,250	E260201 RV15H	288° IN 288° EX	214° IN 214° EX	.495" IN .495" EX	111°	4°	.000" IN .000" EX
The "Performer". Super low- and mid-range power. Good idle, fuel efficiency and driveability. 4-barrel and headers recommended.	1,500-4,500	E260121 TQ20H	292° IN 292° EX	214° IN 214° EX	.517" IN .517" EX	111°	4°	.000" IN .000" EX
Good idle and throttle response from larger engines. Prefers stock or aftermarket dual plane intake manifold, 4-barrel carburetion, headers and 4- or 5-speed manual transmission with low gears for towing moderate to heavy loads. OK for use with small superchargers.	1,500-4,750	E261021 MP/2	292° IN 310° EX	214° IN 226° EX	.517" IN .533" EX	114°	4°	.000" IN .000" EX
Excellent choice for slightly modified street machines or muscle trucks seeking improved low end torque and mid-range horsepower. 429-460 cubic inch engines with 8.75-9.5:1 compression. Runs best with aftermarket aluminum intake, 600-650 cfm carburetion, headers and free flowing, dual exhaust.	1,800-4,800	E260321 Hi-Flow AH	284° IN 284° EX	220° IN 220° EX	.545" IN .545" EX	112°	4°	.000" IN .000" EX
High-lift, dual pattern. Needs 4-barrel, headers, lower gears and medium stall speed converter if used with automatic. Extremely strong mid-range camshaft.	2,000-5,000	E260222 TQ40H	284° IN 296° EX	220° IN 228° EX	.545" IN .545" EX	110°	0°	.000" IN .000" EX
Expect a noticeable idle and strong mid-range performance from 429-460 cubic inch engines with 9.5-10.5:1 compression. Use gasket-matched cylinder heads and aftermarket dual plane intake with up to 750 cfm carburetion, headers and 3" diameter exhaust system, 4-speed top loader or 3-speed automatic with mild converter and low gears for best results.	2,250-5,400	E260221 TQ30H	310° IN 310° EX	226° IN 226° EX	.533" IN .533" EX	111°	4°	.000" IN .000" EX
Hot Street/E.T. Brackets. High-lift, short duration, broad power range and strong top end. Fair idle. Needs 4-barrel, headers, compression and gears.	2,500-5,500	E260421 Hi-Flow IH	296° IN 296° EX	228° IN 228° EX	.545" IN .545" EX	108°	0°	.000" IN .000" EX
High-lift, dual pattern. Needs 4-barrel, headers and lower gears. Works best with stick or high-stall automatic. Strong top end camshaft. Rough idle. Should have at least 9:1 compression ratio.	2,500-5,800	E260223 TQ50H	296° IN 306° EX	228° IN 235° EX	.545" IN .545" EX	110°	0°	.000" IN .000" EX
Special design camshaft for jet boat use. Best in otherwise stock 460 engine with tight impeller. Good idle.	2,500-5,750	E260621 JB100	296° IN 306° EX	228° IN 235° EX	.545" IN .545" EX	108°	0°	.000" IN .000" EX
Runs strong 3,500-7,000 RPM. Stick or automatic with gears. Needs good intake and headers with 9.5:1 or more compression. Lopey idle.	3,000-6,000	E260521 Hi-Flow IIIH	306° IN 306° EX	235° IN 235° EX	.545" IN .545" EX	108°	0°	.000" IN .000" EX
Designed for jet boats with a looser impeller and other engine modifications. Some lobe at idle.	3,400-6,400	E260721 JB200	306° IN 316° EX	235° IN 240° EX	.545" IN .545" EX	108°	0°	.000" IN .000" EX
Runs strong 4,000 to 7,500 RPM. Needs lower gears, 4-barrel, headers and compression for maximum performance. Rough idle.	3,800-6,800	E260526 Hi-Flow IIIH	316° IN 316° EX	240° IN 240° EX	.545" IN .545" EX	108°	0°	.000" IN .000" EX
Hot Street/E.T. Brackets. 429-460 cubic inch, big block Ford engines with 10.5-11.5:1 compression using modified stock or aftermarket aluminum Cobra Jet cylinder heads, Victor Jr. style single plane intake, 850 cfm 4-barrel with or without nitrous oxide, produces good top end power. 3,200-3,600 lb. automatic cars use 3,500-4,000 RPM converter with 4.10 or lower gears.	4,000-7,000	E260527 Hi-Flow IVH	312° IN 320° EX	248° IN 256° EX	.579" IN .597" EX	110°	4°	.000" IN .000" EX

**CAMSHAFT ACCESSORY KIT FOR FORD ENGINES EQUIPPED WITH HYDRAULIC FLAT TAPPET CAMSHAFTS**

**OPTIONAL HIGH PERFORMANCE PARTS FOR FORD ENGINES EQUIPPED WITH HYDRAULIC FLAT TAPPET VALVETRAINS**

**E823010 KIT INCLUDES THESE COMPONENTS:**

16 hydraulic tappets .....	E914601
16 valve springs, 1.820 x 1.500 .....	E915011
16 H.T. steel retainers, 7° x 11/32 .....	E961312
16 pair H.T. valve locks, 7° x 11/32 .....	E911171
1 tube Moly Lube, 1/4 oz. ....	E911001

**FOR HYDRAULIC VALVETRAINS:**

Valve springs, 1.900 x 1.540 .....	E915151	Lash caps, 11/32 .....	E911541
H.T. machined valve locks, 7° x 11/32 4130 .....	E911111	Forged rockers, 1.73:1 x 7/16 .....	E928029
Roller timing chain set .....	E991910	Billet rockers, 1.7:1 x 7/16 .....	E928082
Screw-in studs, 7/16 x 20 .....	E912151	C.H. pushrod, 3/8 x 8.550 .....	E917361
P.C. seals, 11/32 .....	E910243	Degree wheel .....	E911004
		Moly Lube, 2 oz. tube .....	E911002

**NOTE —**

Many 1968-72 Ford 429 CID engines came with positive stop style rocker arm studs. 1973-95 Ford 429-460 engines came with pedestal-mount, non-adjustable valvetrains. It is important to realize that when changing to an aftermarket camshaft, changes in lobe design warrant the need for an adjustable valvetrain. Converting to an adjustable valvetrain will insure proper lifter pre-load and a smooth and quiet operating engine. It should also be noted that this is mandatory when converting from a hydraulic camshaft to a mechanical camshaft.

### HIGH PERFORMANCE MECHANICAL FLAT TAPPET CAMSHAFTS

APPLICATIONS/CHARACTERISTICS	BASIC RPM RANGE	PART NO. GRIND NO.	DURATION ADVERTISED	DURATION @ .050"	GROSS LIFT	LOBE CENTER	ADVANCE	VALVE LASH
<b>Hot Street/Marine.</b> Super low end and mid-range performance from street machines or Lake Racers, with 429-460 cubic inch engines having 10.5-11.5:1 compression. Works best with open plenum style, single 4-barrel manifold and 750-850 cfm carburetion. Lots of summer fun in 18'-21' day cruisers or jets with blueprinted pump and A-Impeller.	3,500-6,500	<b>E260300</b> F-282-4	282° IN 290° EX	246° IN 254° EX	.588" IN .588" EX	112°	4°	.030" IN .030" EX
<b>E.T. Brackets.</b> Excellent choice for 2,800-3,200 lb. E.T. bracket racers in need of strong upper, mid-range and top end power without sacrificing reliability. 429-460 CID engines with 11.5-12.5:1 compression using modified Cobra Jet style cylinder heads, Victor Jr. intake, blueprinted 850 cfm carburetor and open headers or large diameter, free flowing exhaust. Automatic cars use 4,000-4,500 RPM converter.	4,000-7,200	<b>E264031</b> 1500X	306° IN 310° EX	266° IN 272° EX	.590" IN .615" EX	108°	0°	.028" IN .030" EX
<b>E.T. Brackets/Super Gas.</b> 460 cubic inch or larger engines with 12.5-13.5:1 compression in 2,200-2,600 lb. roadsters or alters. Needs good heads and intake, single or multiple carburetion on alcohol or gas. Also works well in unblown gas flats or hydros. 2-speed automatic cars use 4,500-5,000 RPM 8" converter, 4.30" rear gear and 14" x 32" slick.	4,500-7,600	<b>E260301</b> F-314-2	314° IN 322° EX	276° IN 284° EX	.648" IN .648" EX	108°	0°	.030" IN .030" EX
<b>Super Pro/Super Gas/Super Comp.</b> 500(+) cubic inch engines with 13.0-15.0:1 compression using heavily-modified, Super Cobra Jet or Ford SVO wedgie style cylinder heads, single 1,050 cfm carburetor on a matched, ported and flowed open plenum intake. Burning alcohol or high octane fuel builds reliable top end power. Recommend 2.250" primary tube, open headers for best results.	5,000-8,200	<b>E266431</b> 2500DP	314° IN 326° EX	285° IN 296° EX	.650" IN .650" EX	110°	2°	.028" IN .030" EX

### CAMSHAFT ACCESSORY KIT FOR FORD ENGINES EQUIPPED WITH MECHANICAL FLAT TAPPET CAMSHAFTS

#### E823012 KIT INCLUDES THESE COMPONENTS:

16 mechanical tappets.....	E914111
16 valve springs, 1.900 x 1.540.....	E915051
16 H.T. steel retainers, 7° x 11/32.....	E961091
16 pair H.T. valve locks, 7° x 11/32.....	E911171
1 tube Moly Lube, 1/4 oz.....	E911001

*This kit is for use with E260300 and E264031.*

#### E823013 KIT INCLUDES THESE COMPONENTS:

16 mechanical tappets.....	E914111
16 valve springs, 1.900 x 1.530.....	E915261
16 H.T. steel retainers, 7° x 11/32.....	E961091
16 pair H.T. valve locks, 7° x 11/32.....	E911171
1 tube Moly Lube, 1/4 oz.....	E911001

*This kit is for use with E260301 and E266431.*

### OPTIONAL HIGH PERFORMANCE PARTS FOR FORD ENGINES EQUIPPED WITH MECHANICAL FLAT TAPPET VALVETRAINS

Roller timing chain set.....	E991910
Valve springs, 1.900 x 1.530.....	E915261
H.T. steel retainers, 7° x 11/32.....	E961091
Titanium retainers, 10°.....	E961408
H.T. machined locks, 10° x 11/32 4130.....	E911140
Lash caps, 11/32.....	E911541
P.C. seals, 11/32.....	E910243
Screw-in studs, 7/16 x 20.....	E912151
Forged rockers, 1.73:1 x 7/16.....	E928029
Billet rockers, 1.7:1 x 7/16.....	E928082
C.H. pushrod, 3/8 x 8.550.....	E917361
Degree wheel.....	E911004
Moly Lube, 2 oz. tube.....	E911002

#### NOTE —

Many 1968-72 Ford 429 CID engines came with positive stop style rocker arm studs. 1973-95 Ford 429-460 engines came with pedestal-mount, non-adjustable valvetrains. It is important to realize that when changing to an aftermarket camshaft, changes in lobe design warrant the need for an adjustable valvetrain. Converting to an adjustable valvetrain will insure proper lifter pre-load and a smooth and quiet operating engine. It should also be noted that this is mandatory when converting from a hydraulic camshaft to a mechanical camshaft.

**HIGH PERFORMANCE SOLID ROLLER CAMSHAFTS**

APPLICATIONS/CHARACTERISTICS	BASIC RPM RANGE	PART NO. GRIND NO.	DURATION ADVERTISED	DURATION @ .050"	GROSS LIFT	LOBE CENTER	ADVANCE	VALVE LASH
<b>Hot Street/E.T. Brackets.</b> Super low end and mid-range performance from 429-460 CID engines with 10.5-11.5:1 compression. Prefers mildly ported 4V or Cobra Jet-style cylinder heads, single 750-850 cfm 4-barrel and free flowing, dual exhaust. 3,200-3,600 lb. vehicles, use 4-speed top loader or C-6 automatic with 3,000 RPM converter and 3.90 or lower gears.	3,500-6,700	<b>E260901</b> R-286-1C	286° IN 294° EX	246° IN 254° EX	.640" IN .640" EX	110°	4°	.030" IN .030" EX
<b>Pro Street/E.T. Brackets.</b> Excellent mid-range torque and upper mid-range power without sacrificing reliability from 429-472 CID engines with 11.0-12.5:1 compression. Works best with single or 2x4 barrel carburetion, modified cylinder heads with oversize valves and 2.0" diameter headers with large diameter, low restriction exhaust system. C-6 automatic cars, use 4,000 RPM converter and low gears.	4,000-7,200	<b>E260902</b> R-294-1	294° IN 302° EX	254° IN 260° EX	.640" IN .640" EX	108°	0°	.030" IN .030" EX
<b>E.T. Brackets.</b> 2,800-3,200 lb. fully modified, door-slamers with no less than 460 cubic inches and 12.0-13.5:1 compression will produce good mid-range and top end power from this camshaft. Needs good heads and intake with blueprinted 850 cfm carburetion, open headers and 8", 4,500 RPM converter for best results.	4,200-7,500	<b>E260903</b> R-292-1A	292° IN 300° EX	266° IN 274° EX	.709" IN .709" EX	108°	0°	.034" IN .034" EX
<b>Super Pro/Super Gas/Marine and Pullers.</b> Excellent choice for roadsters, altered, flat bottoms, monster trucks and pullers seeking all around, top end performance. Recommended for 460-500 cubic inch, Ford big blocks with 13.0-14.5:1 compression, heavily modified Super-Cobra Jet or aftermarket-aluminum SVO-type cylinder heads, 1,050 cfm carburetion or injected alcohol induction systems. Needs high stall, 2-speed automatic or Crower-glide with 2-speed Lenco and low gears in heavier chassis.	4,500-7,800	<b>E260904</b> R-302-4	302° IN 310° EX	276° IN 284° EX	.744" IN .744" EX	108°	0°	.034" IN .034" EX
<b>Super Gas/Super Comp./Super Pro.</b> Intended for 1,800-2,200 lb. dragsters, altered and roadsters seeking bone jarring, upper RPM range, torque and horsepower. 496-514 cubic inch Ford big blocks with no less than 14.5:1 compression, should have heavily modified or hand-fabricated cylinder heads and intake with single or multiple carburetion on gas or injected alcohol type induction systems. Also works well in unblown gas hydros.	5,000-8,000	<b>E260905</b> R-312-2	312° IN 318° EX	286° IN 292° EX	.778" IN .744" EX	110°	2°	.034" IN .034" EX

**CAMSHAFT ACCESSORY KIT FOR FORD ENGINES EQUIPPED WITH SOLID ROLLER CAMSHAFTS**

**E826020 KIT INCLUDES THESE COMPONENTS:**

- 8 pair solid roller lifters .....E919313
- 16 valve springs, 1.900 x 1.535 .....E915057
- 16 H.T. steel retainers, 7° x 11/32 .....E961091
- 16 pair H.T. machined locks, 7° x 11/32 4130.....E911171
- 1 tube Moly Lube, 1/4 oz. ....E911001

**OPTIONAL HIGH PERFORMANCE PARTS FOR FORD ENGINES EQUIPPED WITH SOLID ROLLER VALVETRAINS**

- Valve springs, 1.900 x 1.625 .....E915150
- Valve springs, 2.000 x 1.625 .....E915213
- Valve springs, 2.100 x 1.625 .....E915214
- Titanium retainer, 10° (fits triple 1.625 springs) .....E961407
- Titanium retainer, 10° (fits E915057 springs) .....E961408
- Lash caps, 11/32 .....E911541
- P.C. seals, 7/16 .....E910243
- Screw-in studs, 7/16 x 20 .....E912151
- Aluminum-bronze gear .....E911619
- Roller timing chain set .....E991910
- Degree wheel .....E911004
- Moly Lube, 2 oz. tube .....E911002
- Forged rockers, 1.73:1 x 7/16 .....E928029
- Billet rockers, 1.7:1 x 7/16 .....E928082
- Billet rockers, 1.8:1 x 7/16 .....E928083

