

Pioneering the Camshaft Industry Since 1945

2015



*Camshafts, Valvetrain, Pistons,
Connecting Rods, Crankshafts,
Rotating Assemblies, and More!*

HOWARDS c a m s

The Choice of Champions



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The First and Only No Worry Hydraulic Flat Tappet Cam & Lifter Sets

Confidence! That's what you get when you install a New Max Certified Cam and Lifter Set. A superior product with quality control goes far beyond, including batch testing and verification on an Adcole 911NT. The Adcole is the premier measurement equipment for camshafts in the world. So you know you're getting the finest camshaft for your application available. Each set includes a performance hydraulic camshaft, a set of matching hydraulic flat tappet lifters and a bottle of Max ZPM oil additive for break-in (Max ZPM must be added to every oil change). So what happens if you still have a cam damaging event?...You're Covered! We will replace your Max Certified Cam & Lifter Set at no charge for up to five years from date of original purchase. Just completely fill out the supplied warranty card and return along with your camshaft, lifters and the original receipt. No

worries that you may have overlooked something that damaged your new Max Certified camshaft. Didn't notice that retainer to seal clearance wasn't enough?...Covered! Valve spring coil bind...Covered! Have a problem with your oiling system that damages the cam?...Covered! While installing the cam, you drop it and it breaks in two?...Covered! So what are you waiting for? Isn't it time to make a real performance change to your engine? With Max Certified Cam & Lifter Sets you're covered! For extra insurance most kits available with Direct Lube lifters.

* Max Certified warranty applies to Max Certified Cam & Lifter Sets only. Max Certified 5 year warranty starts from the original date of purchase. Any and all replacements are covered for the remainder of the original warranty as long as any or all repairs or adjustments to end user's equipment, determined by Howards Cams, is completed. Max Certified warranty covers camshaft and lifter set only. Warranty does not cover removal/installation cost, damage to related components, cost incurred due to down time, towing or shipping. Warranty is non-transferable. Warranty card must be completed for credit to be applied.

Cam & Lifter Set Part No.	Cam & Direct Lube Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/OE Ratio Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Notes
AMERICAN MOTORS V8 • 290-401 1966-1991											
MC312481-11	NA	269 1200-5200	269 Good idle,	215 Street,	215 Off-Road,	.475 Good fuel	.475 efficiency.	111	107	Hyd. Hyd.	1
CHEVROLET SMALL BLOCK • 262-400 1955-1998											
MC112001-14	MC112001-14DL ⁴	255 600-4800	261 Smooth idle,	201 Strong low	207 end.	.410 High vacuum,	.420 good fuel	114	110	Hyd. Hyd.	
MC112011-11	MC112011-11DL ⁴	261 800-4800	261 Good idle,	207 Street,	207 Off-Road,	.420 Towing.	.420 Good torque.	111	107	Hyd. Hyd.	
MC110931-11	MC110931-11DL ⁴	267 1100-5200	267 Strong low	213 & mid-range	213 torque	.450 & horsepower.	.450	111	107	Hyd. Hyd.	
MC110991-08	MC110991-08DL ⁴	275 1700-5700	275 Good low	221 & mid-range	221 horsepower.	.470 Needs 4 barrel	.470 & headers.	108	104	Hyd. Hyd.	1
MC110951-10	MC110951-10DL ⁴	275 2000-6000	285 Street & Strip.	221 Needs 4 barrel,	231 headers	.470 & lower gears.	.470	110	106	Hyd. Hyd.	1
MC112431-08	MC112431-08DL ⁴	277 2200-6200	277 Hot Street	223 cam.	223 4 barrel	.450 & headers	.450 recommended.	108	104	Hyd. Hyd.	

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

4 Direct Lube Lifters Included in Cam & "Direct Lube" Lifter (DL) Sets.

Max Certified Cam & Lifter Sets continued on page 4



MAX CERTIFIED CAM & LIFTER SETS (cont.)

Cam & Lifter Set Part No.	Cam & Direct Lube Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/OE Ratio Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Notes
CHEVROLET SMALL BLOCK • 262-400 1955-1998 (cont.)								
MC110041-12	MC110041-12DL ⁴	279 289 1800-6000	225 235	.465 .488	112	108	Hyd. Hyd.	1
		Fair idle, Hot Street & mild Bracket Racing.						
MC110961-08	MC110961-08DL ⁴	285 285 2000-6200	231 231	.470 .470	108	104	Hyd. Hyd.	1
		Hot Street/Brackets, broad power range, strong top end.						
MC112031-08	MC112031-08DL ⁴	285 285 2800-6400	231 231	.480 .480	108	104	Hyd. Hyd.	1
		Fair idle. Broad power band. Works well in heavy vehicles.						
MC112141-10	MC112141-10DL ⁴	285 289 2000-6000	231 235	.480 .488	110	106	Hyd. Hyd.	1
		Lopey idle, Strong mid range. Good throttle response. 2400+ stall.						
MC110971-08	MC110971-08DL ⁴	289 289 2600-6400	235 235	.470 .470	108	104	Hyd. Hyd.	1
		Lopey idle. Pro-Street & Bracket Racing profile. 9.5:1+ CR, 2700+ stall.						

CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996

MC122501-12	MC122501-12DL ⁴	259 263 800-4000	205 209	.476 .476	112	108	Hyd. Hyd.	1
		Great low end torque replacement cam, good fuel economy.						
MC120021-12	MC120021-12DL ⁴	259 269 800-4000	205 215	.476 .516	112	108	Hyd. Hyd.	1
		Exceptional low end torque. Good in PUs, 4x4s & RVs.						
MC120931-12	MC120931-12DL ⁴	267 267 1500-5000	213 213	.510 .510	112	108	Hyd. Hyd.	1
		Good idle, Street, Off-Road, Towing. Good fuel efficiency.						
MC120031-12	MC120031-12DL ⁴	269 279 1600-5200	215 225	.516 .527	112	108	Hyd. Hyd.	1
		Great low & mid-range torque. OK in heavy vehicle.						
MC122521-15	MC122521-15DL ⁴	275 289 1800-5400	221 235	.504 .504	115	111	Hyd. Hyd.	1
		Fair idle. Excellent in Performance & Marine applications.						
MC120941-11	MC120941-11DL ⁴	279 279 1800-5400	225 225	.527 .527	111	107	Hyd. Hyd.	1
		Fair idle. Strong mid-range. Needs 4 barrel & headers.						

CHRYSLER BIG BLOCK B/RB • 383-440 1959-1980

MC720931-11	NA	267 267 1000-5000	213 213	.450 .450	111	107	Hyd. Hyd.	1
		Super low & mid-range performance. Good idle.						
MC720031-12	NA	269 277 1400-5200	215 223	.445 .465	112	108	Hyd. Hyd.	1
		Good idle & throttle response. Needs 4 barrel & good exhaust.						
MC722241-08	NA	289 289 2600-6400	235 235	.488 .488	108	104	Hyd. Hyd.	1
		Runs strong 3,500 & up. 9.5+ comp., auto OK with gears.						

FORD SMALL BLOCK • 221-302 1963-1995 (EXCEPT 302 H.O.)

MC210021-12	MC210021-12DL ⁴	259 267 1000-4500	205 215	.448 .480	112	108	Hyd. Hyd.	1
		Great low & mid-range. Smooth idle. Good in PUs & RVs.						
MC210031-12	MC210031-12DL ⁴	267 277 1500-5400	213 223	.475 .496	112	108	Hyd. Hyd.	1
		Broad power band. Excellent in Hot Street & Marine.						
MC210931-10	MC210931-10DL ⁴	269 269 1500-5200	215 215	.475 .475	110	106	Hyd. Hyd.	1
		Strong low & mid-range, fuel efficiency & driveability.						
MC210951-10	MC210951-10DL ⁴	275 285 2000-6000	221 231	.501 .501	110	106	Hyd. Hyd.	1
		Street & Strip. Needs 4 barrel, headers & low gears.						
MC210041-12	MC210041-12DL ⁴	279 285 2500-6200	225 231	.496 .512	112	108	Hyd. Hyd.	1
		Strong mid-range. Great E.T. Bracket cam. OK w/NOS.						
MC210961-08	MC210961-08DL ⁴	285 285 2600-6300	231 231	.501 .501	108	104	Hyd. Hyd.	1
		Broad power range, extra performance in smaller engine.						

Cam Notes: master note list on page 260

¹ Stock (O.E.) valve springs cannot be used.⁴ Direct Lube Lifters Included in Cam & "Direct Lube" Lifter (DL) Sets.

Some items are not legal for sale or use on any pollution controlled motor vehicle

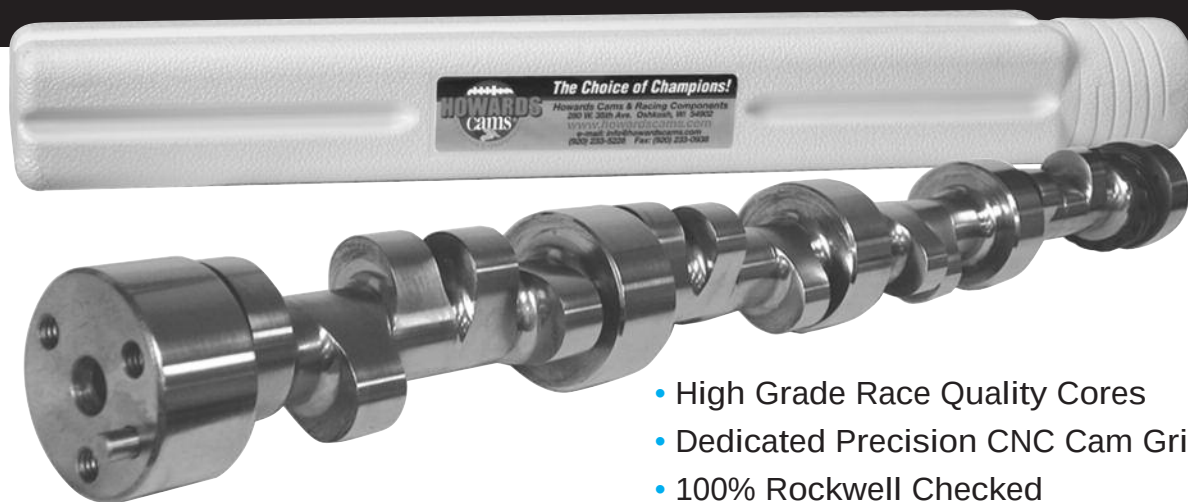


MAX CERTIFIED CAM & LIFTER SETS (cont.)

Cam & Lifter Set Part No.	Cam & Direct Lube Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/OE Ratio Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Notes
FORD SMALL BLOCK • 351W 1969-1996								
MC220021-12	MC220021-12DL ⁴	259 1000-5000	267	205 213	.448 .480	112	108	Hyd. Hyd. 1 Great low & mid-range. Smooth idle. Good in PUs & RVs.
MC220931-10	MC220931-10DL ⁴	269 1400-5200	269	215 215	.475 .475	110	106	Hyd. Hyd. 1 Lopey idle. Excellent Street Performance cam.
MC220041-12	MC220041-12DL ⁴	275 1200-5400	275	221 221	.475 .475	112	108	Hyd. Hyd. 1 Good idle & throttle response. Ok with small blower.
MC220951-10	MC220951-10DL ⁴	275 2000-6000	285	221 231	.501 .501	110	106	Hyd. Hyd. 1 Street & Strip. Needs 4 barrel, headers & low gears.
MC220051-12	MC220051-12DL ⁴	277 2400-6600	289	223 235	.496 .520	112	108	Hyd. Hyd. 1 Strong mid-range. Great E.T. Bracket cam. OK w/NOS.
MC220961-08	MC220961-08DL ⁴	285 2600-6800	285	231 231	.501 .501	108	104	Hyd. Hyd. 1 Broad power range, extra performance in smaller engine.
FORD CLEVELAND/M • 351C-351M-400 1970-1983								
MC231031-10	MC231031-10DL ⁴	267 1600-5000	267	213 213	.496 .496	110	106	Hyd. Hyd. 1 Fair idle, good low & mid-range torque. Needs 4 bbl. & headers.
MC230041-12	MC230041-12DL ⁴	279 2400-6400	289	225 235	.536 .542	112	108	Hyd. Hyd. 1 Lopey idle, moderate performance. Higher CR is recommended.
FORD FE • 352-428 1963-1977								
MC250021-11	NA	263 1000-4400	263	209 209	.490 .490	111	107	Hyd. Hyd. 1 Smooth idle, increased low end torque. Great in PUs or other heavy vehicles.
MC250031-12	NA	267 1400-5200	277	213 223	.525 .525	112	108	Hyd. Hyd. 1 Good idle. Excellent Street Performance dual pattern cam.
FORD BIG BLOCK • 429-460 1968-1995								
MC240931-11	MC240931-11DL ⁴	269 1600-5000	269	215 215	.514 .514	111	107	Hyd. Hyd. 1 Good idle & throttle response with 4bbl & good exhaust.
MC242201-10	MC242201-10DL ⁴	273 1500-5400	273	219 219	.496 .496	110	106	Hyd. Hyd. 1 Good idle, strong bottom end. Great daily usage cam.
MC240041-12	MC240041-12DL ⁴	279 1800-5600	289	225 235	.536 .562	112	107	Hyd. Hyd. 1 Strong mid-range. Needs 4bbl., headers & medium stall.
OLDSMOBILE 39° V8 • 260-455 1967-1990								
MC510931-11	NA	267 1200-5500	267	213 213	.480 .480	111	107	Hyd. Hyd. 1 Good low end & mid-range. Will work well in jet boats.
MC510991-08	NA	275 1500-5800	275	221 221	.501 .501	108	104	Hyd. Hyd. 1 Good low & mid-range horsepower. Needs 4 barrel & headers.
PONTIAC V8 • 265-455 1955-1981								
MC410931-11	NA	267 1500-5500	267	213 213	.450 .450	111	107	Hyd. Hyd. 1 Good idle, Strong low & mid-range torque.
MC410021-12	NA	267 1500-5800	277	213 223	.450 .450	112	108	Hyd. Hyd. 1 Super low & mid-range torque. Excellent driveability.
MC410961-08	NA	285 2200-6200	285	231 231	.480 .480	108	104	Hyd. Hyd. 1 Hot Street, improved mid-range. Best with 9.5:1+ comp., 4-barrel.

Cam Notes: master note list on page 260

¹ Stock (O.E.) valve springs cannot be used.⁴ Direct Lube Lifters Included in Cam & "Direct Lube" Lifter (DL) Sets.



- High Grade Race Quality Cores
- Dedicated Precision CNC Cam Grinders
- 100% Rockwell Checked
- Most Shipped in Hard Protective Packaging

All Howards™ Cams use the highest-grade race quality cores available. All hydraulic and mechanical flat tappet camshafts are 100% Rockwell checked and Parkerized to ensure the highest quality control standards available anywhere. Howards™ Cams are manufactured on dedicated high precision CNC cam grinding machines. Most Howards™ Cams are packaged and shipped in our unique, hard, high impact plastic reusable cases. This ensures that the high quality camshaft that went into the case comes out in the same condition, when delivered, as when it was packed.



CAM & LIFTER SETS

More performance, less money! Whether your goal is to boost low-end torque, increase fuel economy, street, strip or all out competition, you'll find the ideal answer right here. Computer designed. Each kit includes a Howards™ performance camshaft and a matching set of Howards™ premium lifters. Cam and lifter sets are listed with a "CL" prefix.

- Hydraulic Flat Tappet Cam & Lifter Sets
- Hydraulic Retro-Fit Roller Cam & Lifter Sets
- Mechanical Flat Tappet Cam & Lifter Sets
- Mechanical Flat Tappet Cam & Direct Lube™ Lifter Sets



Max Certified™ *Camshaft & Lifter Sets with 5-Year “No Fault” Warranty*

The only hydraulic flat tappet Cam and Lifter sets to offer a 5 year “No Fault” warranty. An industry first and only. So what happens if you still have a cam damaging event?...You’re Covered! We will replace your Max Certified Cam & Lifter Set at no charge for up to five years from date of original purchase. No worries that you may have overlooked something that damaged your new Max Certified camshaft. For more information see page 3.



American Muscle™ *Hydraulic and Mechanical Flat Tappet Camshafts*

Near duplicates of some of the most iconic original equipment camshaft grinds from the ‘60s to the early ‘70s. We took these fantastic grinds and made slight changes to the ramp speeds and minor duration changes to give you better reliability and horsepower. You still get the same throttle response and of course the original style exhaust rumble. Great cams for restoration projects and perfect for the street machines. Grinds available for Chevrolet, Chrysler, Ford, Oldsmobile and Pontiac.



Street Force™ *Hydraulic Flat Tappet Camshafts*

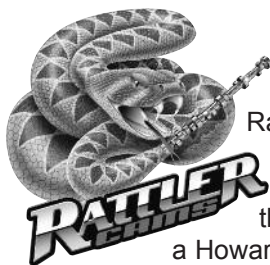
Designed for the street performance enthusiast. They feature true street performance with little or no added maintenance. These grinds feature lobes designed to be easy on the valvetrain, and add useable torque, horsepower and throttle response. They also have 112° lobe separations to help maintain vacuum. **Note:** some applications may require a vacuum canister or pump.

Street Force™ 1 cams are great for engines with minor or no additional improvements. A good dual plane intake and dual exhaust is great for additional performance.

Street Force™ 2 are designed for engines with improved intake and exhaust. Ignition improvements along with 1600-1800 torque converter really wakes this combo up.

Street Force™ 3 needs a street 2200-2500 stall converter, improved intake and dual exhaust. 3.20 to 3.90 gear ratio and a good ignition system will give you additional performance.

Street Force™ 4 requires an improved intake and exhaust. A good street 2800-3200 converter is also needed. The addition of small tube headers, a good ignition and lower gears makes this combination a lot of fun.



Rattler Cams™ *Hydraulic Flat Tappet and Hydraulic Roller Camshafts*

Rattler cams are for street enthusiasts who want the classic exhaust sound but also want true performance to go with it. These camshafts offer performance that just doesn’t thump around. They give you the performance and throttle response you expect from a performance cam. Don’t let the others fool you, sound is not everything. If you want both sound and performance, you need a Howards Cams Rattler™. The best of both worlds. **Note:** To get the best exhaust note, you should use a good dual exhaust system *without* a cross-over. A cross-over will add minor performance, but mellow the exhaust tone.

Rattler™ Choppy idle. Great for high performance street, stock converter ok, best with 1800+ converter and gears.

Big Mama Rattler™ Lopecy idle. Performance street or street/strip applications. Needs 9.0:1 compression, 2500+ stall, good intake and exhaust. Best with lower gears.

Big Daddy Rattler™ Rough idle. Pro street or street/strip. Needs 9.5:1 compression, 2800+ stall, good intake, gears and exhaust.



Big Bottle™ *Cams for Nitrous Oxide Applications*

Designed specifically for nitrous oxide applications. These camshafts have camshaft lobes matched to the application to give you the best performance and horsepower. Most applications are designed for good power and throttle response without the nitrous, but give you big gains when the nitrous oxide is engaged. Grinds available for small plate systems to big multi-stage port injected systems.

CAMSHAFTS



AMERICAN MOTORS L6 • 199-258/4.0L 1964-1995

Street Force™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•5•3•6•2•4

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.60 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash		Cam Notes
		IN	EX	IN	EX	IN	EX			IN	EX	
330111-10	CL330111-10	257	263	203	209	.443	.448	110	106	Hyd.	Hyd.	
1000-4400 Street Force™ 1, Mild Street performance, strong low end torque. Not for Fuel Injection.												



AMERICAN MOTORS L6 • 199-258/4.0L 1964-1995

Hydraulic Flat Tappet Camshafts

Firing Order: 1•5•3•6•2•4

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.60 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash		Cam Notes
		IN	EX	IN	EX	IN	EX			IN	EX	
331021-12	CL331021-12	269	269	215	215	.475	.475	112	108	Hyd.	Hyd.	1
1400-5000 Moderate Street with headers and better carb/intake. Not for Fuel Injection.												
330991-08	CL330991-08	275	275	221	221	.501	.501	108	104	Hyd.	Hyd.	1
1800-5600 Fair idle, Hot Street, aftermarket induction & headers a must. Not for Fuel Injection.												
339991	NA	Custom Grind Camshaft								Hyd.	Hyd.	1
Hydraulic Flat Tappet Special Order Camshaft.												



AMERICAN MOTORS L6 • 4.0L FI 1996-2006

Street Force™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•5•3•6•2•4

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.60 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash		Cam Notes
		IN	EX	IN	EX	IN	EX			IN	EX	
320111-12	CL320111-12	257	263	203	209	.443	.448	112	108	Hyd.	Hyd.	
1000-4400 Street Force™ 1, Good idle, Mild Street performance, strong low end torque.												



AMERICAN MOTORS L6 • 4.0L FI 1996-2006

Hydraulic Flat Tappet Camshafts

Firing Order: 1•5•3•6•2•4

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.60 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash	Cam Notes		
		IN	EX	IN	EX	IN	EX			IN	EX		
329991	NA	Custom Grind Camshaft									Hyd.	Hyd.	1
Hydraulic Flat Tappet Special Order Camshaft.													

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

Some items are not legal for sale or use on any pollution controlled motor vehicle

AMERICAN MOTORS L6 • 199-258/4.0L 1964-1995

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91711-12 ³	NA	NA	98511-12 ²⁵	97110-12	NA	93045-12	93321 ²⁵	NA	NA	NA	NA	NA	NA

AMERICAN MOTORS L6 • 199-258/4.0L 1964-1995

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91711-12 ³	NA	NA	98511-12 ²⁵	97110-12	NA	93045-12	93321 ²⁵	NA	NA	NA	NA	NA	NA
91711-12 ³	NA	NA	98511-12 ²⁵	97110-12	NA	93045-12	93321 ²⁵	NA	NA	NA	NA	NA	NA
91711-12	NA	--	--	--	--	--	--	NA	NA	NA	NA	NA	NA

AMERICAN MOTORS L6 • 4.0L FI 1996-2006

Street Force™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91711-12 ³	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

AMERICAN MOTORS L6 • 4.0L FI 1996-2006

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91711-12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

²⁵ Machining Required.

CAMSHAFTS



AMERICAN MOTORS V8 • 290-401 1966-1991

Max Certified™ Hydraulic Flat Tappet Cam & Lifter Sets - 5 Year No Fault Warranty (see page 3 for details)

Cam & Lifter Set Part No.	Cam & Direct Lube Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.60 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash		Cam Notes
		IN	EX	IN	EX	IN	EX			IN	EX	
MC312481-11	NA	269	269	215	215	.475	.475	111	107	Hyd.	Hyd.	1
		1200-5200	Good idle, Street, Off-Road, Towing. Good fuel efficiency.									



AMERICAN MOTORS V8 • 290-401 1966-1991

Street Force™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.60 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash		Cam Notes
		IN	EX	IN	EX	IN	EX			IN	EX	
310101-12	CL310101-12	259	269	205	215	.448	.474	112	108	Hyd.	Hyd.	
		800-4800	Street Force™ 1, Good idle, Mild Street performance, strong low end torque.									
311101-12	CL311101-12	269	279	215	225	.474	.496	112	108	Hyd.	Hyd.	1
		1200-5200	Street Force™ 2, Good idle & throttle response. Needs 4 barrel & good exhaust.									



AMERICAN MOTORS V8 • 290-401 1966-1991

Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.60 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash		Cam Notes
		IN	EX	IN	EX	IN	EX			IN	EX	
310011-10	CL310011-10	257	269	203	215	.443	.475	110	106	Hyd.	Hyd.	
		800-4800	Smooth idle, improved low end. High vacuum, good fuel economy.									
312481-11	CL312481-11	269	269	215	215	.475	.475	111	107	Hyd.	Hyd.	1
		1200-5200	Good idle, Street, Off-Road, Towing. Good fuel efficiency.									
314131-10	CL314131-10	261	267	214	220	.527	.540	110	106	Hyd.	Hyd.	1,15
		1400-5400	Good idle, Strong Street performance.									
311451-08	CL311451-08	267	267	220	220	.540	.540	108	104	Hyd.	Hyd.	1,15
		1800-5800	Classic performance idle, strong mid range torque & power.									
310021-14	CL310021-14	277	277	223	223	.480	.480	114	110	Hyd.	Hyd.	1
		1500-5500	Strong low & mid-range torque & horsepower.									
310031-12	CL310031-12	289	297	235	243	.520	.541	112	107	Hyd.	Hyd.	1
		2200-6200	Strong low & mid-range torque & horsepower. Manual or auto with stall.									
315011-08	CL315011-08	291	299	244	252	.604	.629	108	104	Hyd.	Hyd.	1,15
		2600-5400	Rough idle, better with 390 & larger ci. Needs 2000+ stall & gears.									
319991	NA	Custom Grind Camshaft									Hyd. Hyd.	1
		Hydraulic Flat Tappet Special Order Camshaft.										

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

15 Lobes designed to take maximum advantage of .904" dia. lifter.

Some items are not legal for sale or use on any pollution controlled motor vehicle

AMERICAN MOTORS V8 • 290-401 1966-1991

Max Certified™ Hydraulic Flat Tappet Cam & Lifter Set Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91711 ³	NA	NA	98445 ²⁵	97110	NA	93045	93321 ²⁵	NA	NA	95205	NA	NA	NA

AMERICAN MOTORS V8 • 290-401 1966-1991

Street Force™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91711 ³ 91712	NA	NA	98445 ²⁵	97110	NA	93045	93321 ²⁵	NA	NA	95205	NA	NA	NA
91711 ³ 91712	NA	NA	98445 ²⁵	97110	NA	93045	93321 ²⁵	NA	NA	95205	NA	NA	NA

AMERICAN MOTORS V8 • 290-401 1966-1991

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91711 ³ 91712	NA	NA	98445 ²⁵	97110	NA	93045	93321 ²⁵	NA	NA	95205	NA	NA	NA
91711 ³ 91712	NA	NA	98445 ²⁵	97110	NA	93045	93321 ²⁵	NA	NA	95205	NA	NA	NA
91711 ³ 91712	NA	NA	98445 ²⁵	97110	NA	93045	93321 ²⁵	NA	NA	95205	NA	NA	NA
91711 ³ 91712	NA	NA	98445 ²⁵	97110	NA	93045	93321 ²⁵	NA	NA	95205	NA	NA	NA
91711 ³ 91712	NA	NA	98445 ²⁵	97110	NA	93045	93321 ²⁵	NA	NA	95205	NA	NA	NA
91711 ³ 91712	NA	NA	98445 ²⁵	97110	NA	93045	93321 ²⁵	NA	NA	95205	NA	NA	NA
91711 ³ 91712	NA	NA	98445 ²⁵	97110	NA	93045	93321 ²⁵	NA	NA	95205	NA	NA	NA
91711 91712	NA	--	--	--	--	--	--	NA	NA	NA	NA	NA	NA

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

²⁵ Machining Required.

CAMSHAFTS



AMERICAN MOTORS V8 • 290-401 1966-1991

Mechanical Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.60 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash		Cam Notes
		IN	EX	IN	EX	IN	EX			IN	EX	
312012-08	CL312012-08	277	281	242	246	.544	.549	108	104	.022	.022	1
		2800-6200	Street/Strip. Needs 10.0+ CR, 2500+ stall & gears.									
310812-08	CL310812-08	276	280	248	252	.571	.576	108	104	.016	.016	1,34
		3000-6500	Hot Street/Bracket, powerful through entire rpm range. 10.0:1+ CR, 3000+ Stall.									
310342-08	CL310342-08	289	295	254	260	.587	.592	108	104	.022	.022	1
		3500-7000	Rough idle, Great mid-range & top end performer. 3200+ stall & gears needed.									
319992	NA	Custom Grind Camshaft										1
		Mechanical Flat Tappet Special Order Camshaft.										



BUICK V6 EVEN FIRE • 181-252 1977-1989

Hydraulic Flat Tappet Camshafts

Firing Order: 1•6•5•4•3•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.55 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash		Cam Notes
		IN	EX	IN	EX	IN	EX			IN	EX	
569991	NA	Custom Grind Camshaft								Hyd.	Hyd.	1
		Hydraulic Flat Tappet Special Order Camshaft.										



BUICK/OLDSMOBILE • 215-300-340 1961-1967 ROVER • 215-240-256 1968-1994

Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.60 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash		Cam Notes
		IN	EX	IN	EX	IN	EX			IN	EX	
530011-10	NA	257	269	203	215	.443	.475	110	106	Hyd.	Hyd.	1
		1000-4000	Smooth idle, Strong low end performance.									
531911-12	NA	269	269	215	215	.475	.475	112	108	Hyd.	Hyd.	1
		1400-4400	Good idle, Improved low & mid range power. Great all around performance.									
530561-08	NA	269	275	215	221	.475	.501	108	104	Hyd.	Hyd.	1
		1500-4600	Good idle, Strong low & mid-range torque & horsepower.									
530991-08	NA	275	275	221	221	.501	.501	108	104	Hyd.	Hyd.	1
		2000-5000	Fair idle, strong mid-range performance.									
539991	NA	Custom Grind Camshaft								Hyd.	Hyd.	1
		Hydraulic Flat Tappet Special Order Camshaft.										

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

34 Provisions for increased oiling recommended.

Some items are not legal for sale or use on any pollution controlled motor vehicle

AMERICAN MOTORS V8 • 290-401 1966-1991

Mechanical Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91715 ³ 91718	NA	NA	98445 ²⁵	97128 ¹⁰	97126 ¹⁰	93080 ¹⁰	93321 ²⁵	NA	NA	95013	NA	NA	NA
91715 ³ 91718	NA	NA	98445 ²⁵	97128 ¹⁰	97126 ¹⁰	93080 ¹⁰	93321 ²⁵	NA	NA	95013	NA	NA	NA
91715 ³ 91718	NA	NA	98445 ²⁵	97128 ¹⁰	97126 ¹⁰	93080 ¹⁰	93321 ²⁵	NA	NA	95013	NA	NA	NA
91715 91718	NA	--	--	--	--	--	--	NA	NA	--	NA	NA	NA

BUICK V6 EVEN FIRE • 181-252 1977-1989

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91312-12	NA	--	98111-12	97112-12	NA	93040-12	--	NA	NA	NA	NA	NA	NA

BUICK/OLDSMOBILE • 215-300-340 1961-1967 ROVER • 215-240-256 1968-1994

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91311	NA	NA	98341 ²⁵	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91311	NA	NA	98341 ²⁵	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91311	NA	NA	98341 ²⁵	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91311	NA	NA	98341 ²⁵	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91311	NA	--	--	--	--	--	--	NA	NA	--	NA	NA	NA

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

CAMSHAFTS



BUICK/OLDSMOBILE • 215-300-340 1961-1967 ROVER • 215-240-256 1968-1994

Mechanical Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.60 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash		Cam Notes	
		IN	EX	IN	EX	IN	EX			IN	EX		
539992	NA	Custom Grind Camshaft									Hyd.	Hyd.	1
Mechanical Flat Tappet Special Order Camshaft.													



BUICK • 350 1968-1980

Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.60 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash		Cam Notes
		IN	EX	IN	EX	IN	EX			IN	EX	
540011-12	CL540011-12	257	269	203	215	.443	.475	112	108	Hyd.	Hyd.	
800-4800 Smooth idle, Street, strong low end torque. Good fuel economy												
540931-10	CL540931-10	269	269	215	215	.475	.475	110	106	Hyd.	Hyd.	1
1100-5000 Good idle, Performance Street with modified intake & exhaust.												
540731-12	CL540731-12	275	277	221	223	.501	.496	112	108	Hyd.	Hyd.	1
1800-5500 Hot Street with high compression, aftermarket intake & headers.												
549991	NA	Custom Grind Camshaft								Hyd.	Hyd.	1
Hydraulic Flat Tappet Special Order Camshaft.												



BUICK • 350 1968-1980

Mechanical Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.60 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash		Cam Notes
		IN	EX	IN	EX	IN	EX			IN	EX	
549992	NA	Custom Grind Camshaft										1
Mechanical Flat Tappet Special Order Camshaft.												



BUICK • 400-430-455 1967-1976

Street Force™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.60 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash		Cam Notes
IN	EX	IN	EX	IN	EX	IN	EX			IN	EX	
550101-12	CL550101-12	259	269	205	215	.448	.474	112	108	Hyd.	Hyd.	1
		1000-5000 Street Force™ 1, Good idle, Mild Street performance, strong low end torque.										
550121-12	CL550121-12	269	279	215	225	.474	.496	112	108	Hyd.	Hyd.	1
		1200-5200 Street Force™ 2, Good idle & throttle response. Needs 4 barrel & good exhaust.										

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

Some items are not legal for sale or use on any pollution controlled motor vehicle

BUICK/OLDSMOBILE • 215-300-340 1961-1967 ROVER • 215-240-256 1968-1994

Mechanical Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91415	NA	--	--	--	--	--	--	NA	NA	NA	NA	NA	NA

BUICK • 350 1968-1980

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91311 ³	NA	NA	98411	NA	NA	NA	93321 ²⁵	NA	NA	NA	NA	NA	NA
91311 ³	NA	NA	98411	NA	NA	NA	93321 ²⁵	NA	NA	NA	NA	NA	NA
91311 ³	NA	NA	98411	NA	NA	NA	93321 ²⁵	NA	NA	NA	NA	NA	NA
91311	NA	--	--	--	--	--	--	NA	NA	NA	NA	NA	NA

BUICK • 350 1968-1980

Mechanical Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91415	NA	--	--	--	--	--	--	NA	NA	NA	NA	NA	NA

BUICK • 400-430-455 1967-1976

Street Force™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91311 ³	NA	NA	98412	NA	NA	NA	93321 ²⁵	NA	NA	NA	NA	NA	NA
91311 ³	NA	NA	98412	NA	NA	NA	93321 ²⁵	NA	NA	NA	NA	NA	NA

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

²⁵ Machining Required.

CAMSHAFTS



BUICK • 400-430-455 1967-1976

Rattler Cams™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
558021-09	CL558021-09	281 289	227 235	.501 .501	109	103	Hyd. Hyd.	1
1800-5600 Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.								
558061-09	CL558061-09	289 297	235 243	.501 .480	109	103	Hyd. Hyd.	1
2000-5900 Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.								
558101-09	CL558101-09	297 305	243 251	.512 .528	109	103	Hyd. Hyd.	1
2400-6200 Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.								



BUICK • 400-430-455 1967-1976

Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
550931-12	CL550931-12	269 1000-5000	269 <i>Good idle, Mild Street performance, strong low end torque.</i>	215 215	.475 .475	112 108	Hyd. Hyd.	1
550991-08	CL550991-08	275 1200-5200	275 <i>Fair idle, Performance Street, Strong torque curve.</i>	221 221	.501 .501	108 104	Hyd. Hyd.	1
550241-10	CL550241-10	279 1500-5500	285 <i>Fair idle, Hot Street, needs modified intake & exhaust.</i>	225 231	.496 .501	110 106	Hyd. Hyd.	1
550441-10	CL550441-10	289 2000-6000	295 <i>Nice idle, Street/Strip for 430+ ci., monster torque.</i>	235 241	.520 .501	110 106	Hyd. Hyd.	1
550451-08	CL550451-08	294 2400-6400	301 <i>Rough idle, Street/Strip, needs 2500+ stall, aftermarket intake & headers.</i>	241 247	.536 .544	108 104	Hyd. Hyd.	1
559991	NA	Custom Grind Camshaft					Hyd. Hyd.	1
<i>Hydraulic Flat Tappet Special Order Camshaft.</i>								



BUICK • 400-430-455 1967-1976

Mechanical Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.60 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash		Cam Notes
		IN	EX	IN	EX	IN	EX			IN	EX	
559992	NA	Custom Grind Camshaft										1
Mechanical Flat Tappet Special Order Camshaft.												

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

Some items are not legal for sale or use on any pollution controlled motor vehicle

BUICK • 400-430-455 1967-1976

Rattler Cams™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91311 ³	NA	NA	98438 ²⁵	NA	NA	NA	93321 ²⁵	NA	NA	NA	NA	NA	NA
91311 ³	NA	NA	98438 ²⁵	NA	NA	NA	93321 ²⁵	NA	NA	NA	NA	NA	NA
91311 ³	NA	NA	98438 ²⁵	NA	NA	NA	93321 ²⁵	NA	NA	NA	NA	NA	NA

BUICK • 400-430-455 1967-1976

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91311 ³	NA	NA	98412	NA	NA	NA	93321 ²⁵	NA	NA	NA	NA	NA	NA
91311 ³	NA	NA	98438 ²⁵	NA	NA	NA	93321 ²⁵	NA	NA	NA	NA	NA	NA
91311 ³	NA	NA	98438 ²⁵	NA	NA	NA	93321 ²⁵	NA	NA	NA	NA	NA	NA
91311 ³	NA	NA	98438 ²⁵	NA	NA	NA	93321 ²⁵	NA	NA	NA	NA	NA	NA
91311 ³	NA	NA	98438 ²⁵	NA	NA	NA	93321 ²⁵	NA	NA	NA	NA	NA	NA
91311	NA	--	--	--	--	--	--	NA	NA	NA	NA	NA	NA

BUICK • 400-430-455 1967-1976

Mechanical Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91415	NA	--	--	--	--	--	--	NA	NA	NA	NA	NA	NA

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

²⁵ Machining Required.

CAMSHAFTS



CADILLAC • 365-390 1956-1962

Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
529996	NA	Custom Grind Camshaft					Hyd. Hyd.	1
Hydraulic Flat Tappet Special Order Camshaft.								



CADILLAC • 390-429 1963-1967

Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•7•2•6•5•4•3

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
529998	NA	Custom Grind Camshaft					Hyd. Hyd.	1
Hydraulic Flat Tappet Special Order Camshaft.								



CADILLAC • 368-425-472-500 1968-1984

Street Force™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•5•6•3•4•2•7•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.65 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
520101-12	CL520101-12	269 279	215 225	.490 .512	112	108	Hyd. Hyd.	1
1000-5000 Street Force™ 2, Good idle & throttle response. Needs 4 barrel & good exhaust.								
522121-12	CL520041-12	279 289	225 235	.512 .517	112	108	Hyd. Hyd.	1
1200-5200 Street Force™ 3, Noticeable idle, Hot Street & mild Bracket Racing.								



CADILLAC • 368-425-472-500 1968-1984

Rattler Cams™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•5•6•3•4•2•7•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.65 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
528021-09	CL528021-09	281 289	227 235	.517 .517	109	103	Hyd. Hyd.	1
1800-5600 Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.								
528061-09	CL528061-09	289 297	235 243	.517 .495	109	103	Hyd. Hyd.	1
2000-5900 Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.								
528101-09	CL528101-09	297 305	243 251	.528 .545	109	103	Hyd. Hyd.	1
2400-6200 Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.								

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CADILLAC • 365-390 1956-1962

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91311	NA	--	--	--	--	--	--	NA	NA	NA	NA	NA	NA

CADILLAC • 390-429 1963-1967

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91311	NA	--	--	--	--	--	--	NA	NA	NA	NA	NA	NA

CADILLAC • 368-425-472-500 1968-1984

Street Force™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91311 ³	NA	98214-K11 ²⁵	98214 ²⁵	97112	NA	93005	93316 ²⁵	NA	NA	NA	NA	NA	NA
91311 ³	NA	98214-K11 ²⁵	98214 ²⁵	97112	NA	93005	93316 ²⁵	NA	NA	NA	NA	NA	NA

CADILLAC • 368-425-472-500 1968-1984

Rattler Cams™ Hydraulic Flat Tappet Camshaft Components

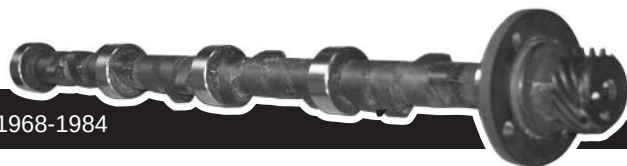
Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91311 ³	NA	98214-K11 ²⁵	98214 ²⁵	97112	NA	93005	93316 ²⁵	NA	NA	NA	NA	NA	NA
91311 ³	NA	98214-K11 ²⁵	98214 ²⁵	97112	NA	93005	93316 ²⁵	NA	NA	NA	NA	NA	NA
91311 ³	NA	98214-K11 ²⁵	98214 ²⁵	97112	NA	93005	93316 ²⁵	NA	NA	NA	NA	NA	NA

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

²⁵ Machining Required.

CAMSHAFTS



CADILLAC • 368-425-472-500 1968-1984

Hydraulic Flat Tappet Camshafts

Firing Order: 1•5•6•3•4•2•7•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.65 Rockers		Lobe Separation	Intake	Valve Lash	Cam Notes		
		IN	EX	IN	EX	IN	EX	Angle	Centerline	IN	EX		
520021-12	CL520021-12	263	263	209	209	.462	.462	112	108	Hyd.	Hyd.	1	
		1000-4200		Smooth idle, builds good low end torque & power.									
520031-12	CL520031-12	269	269	215	215	.500	.500	112	108	Hyd.	Hyd.	1	
		1200-4800		Good idle, strong low end torque & horsepower.									
520991-10	CL520991-10	275	275	221	221	.517	.517	110	106	Hyd.	Hyd.	1	
		1500-4800		Fair idle, Strong low & mid range performance.									
520051-12	CL520051-12	275	285	221	231	.490	.517	112	108	Hyd.	Hyd.	1	
		1800-5000		Good low end torque & mid-range horsepower.									
520291-08	CL520291-08	279	285	225	231	.512	.517	108	104	Hyd.	Hyd.	1	
		2000-5200		Noticeable idle, Strong mid range torque & power.									
520071-12	CL520071-12	285	295	231	241	.528	.517	112	108	Hyd.	Hyd.	1	
		2400-5600		Lopey idle, great mid-range torque & top end power. Needs stall.									
521261-10	CL521261-10	291	299	237	245	.536	.561	110	106	Hyd.	Hyd.	1	
		2600-6000		Rough idle, good mid-range power. Needs 3200+ stall.									
529991	NA	Custom Grind Camshaft									Hyd.	Hyd.	1
		Hydraulic Flat Tappet Special Order Camshaft.											



CADILLAC • 368-425-472-500 1968-1984

Rattler Cams™ Retro-Fit Hydraulic Roller Camshafts

Firing Order: 1•5•6•3•4•2•7•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.65 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
528025-09	CL528025-09	280 288 1800-5600	227 235	.539 .539	109	103	Hyd. Hyd.	1
Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.								
528045-09	CL528045-09	288 296 2000-5900	235 243	.583 .583	109	103	Hyd. Hyd.	1
Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.								
528085-09	CL528085-09	296 304 2400-6200	243 251	.583 .567	109	103	Hyd. Hyd.	1
Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.								

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

Some items are not legal for sale or use on any pollution controlled motor vehicle

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91311 ³	NA	98214-K11 ²⁵	98214 ²⁵	97112	NA	93005	93316 ²⁵	NA	NA	NA	NA	NA	NA
91311 ³	NA	98214-K11 ²⁵	98214 ²⁵	97112	NA	93005	93316 ²⁵	NA	NA	NA	NA	NA	NA
91311 ³	NA	98214-K11 ²⁵	98214 ²⁵	97112	NA	93005	93316 ²⁵	NA	NA	NA	NA	NA	NA
91311 ³	NA	98214-K11 ²⁵	98214 ²⁵	97112	NA	93005	93316 ²⁵	NA	NA	NA	NA	NA	NA
91311 ³	NA	98214-K11 ²⁵	98214 ²⁵	97112	NA	93005	93316 ²⁵	NA	NA	NA	NA	NA	NA
91311 ³	NA	98214-K11 ²⁵	98214 ²⁵	97112	NA	93005	93316 ²⁵	NA	NA	NA	NA	NA	NA
91311 ³	NA	98214-K11 ²⁵	98214 ²⁵	97112	NA	93005	93316 ²⁵	NA	NA	NA	NA	NA	NA
91311	NA	--	--	--	--	--	--	NA	NA	NA	NA	NA	NA

Rattler Cams™ Retro-Fit Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91462 ³	NA	98438-K12 ¹⁰	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91462 ³	NA	98438-K12 ¹⁰	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91462 ³	NA	98438-K12 ¹⁰	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

CAMSHAFTS

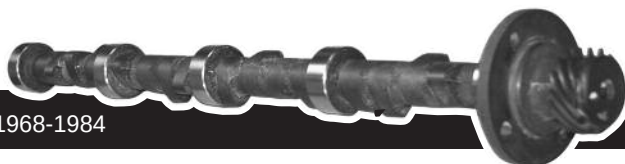


CADILLAC • 368-425-472-500 1968-1984

Retro-Fit Hydraulic Roller Camshafts

Firing Order: 1•5•6•3•4•2•7•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.65 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash		Cam Notes
		IN	EX	IN	EX	IN	EX			IN	EX	
520055-12	CL520055-12	272	278	219	225	.495	.495	112	108	Hyd.	Hyd.	1
1800-5500 Good idle, broad power range with strong mid-range performance.												
521125-10	CL521125-10	280	286	227	233	.539	.539	110	106	Hyd.	Hyd.	1
2000-5400 Fair idle, Performance usage. Mid-range torque & horsepower.												
522105-10	CL522105-10	286	294	233	241	.583	.583	110	106	Hyd.	Hyd.	1
2500-6000 Rough idle, strong mid-range torque & horsepower.												
529995	NA	Custom Grind Camshaft								Hyd.	Hyd.	1
Retro-Fit Hydraulic Roller Special Order Camshaft.												



CADILLAC • 368-425-472-500 1968-1984

Mechanical Flat Tappet Camshafts

Firing Order: 1•5•6•3•4•2•7•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.65 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash		Cam Notes
		IN	EX	IN	EX	IN	EX			IN	EX	
529992	NA	Custom Grind Camshaft										1
Mechanical Flat Tappet Special Order Camshaft.												



CHEVROLET L6 • 194-230-250 1962-1984

Street Force™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•5•3•6•2•4

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.75 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash		Cam Notes
IN	EX	IN	EX	IN	EX	IN	EX			IN	EX	
160131-12	CL160131-12	257	263	203	209	.438	.484	112	108	Hyd.	Hyd.	
1000-4000 Street Force™ 1, Good idle, Mild Street performance, strong low end torque.												

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CADILLAC • 368-425-472-500 1968-1984

Retro-Fit Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91462 ³	NA	98438-K12 ¹⁰	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91462 ³	NA	98438-K12 ¹⁰	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91462 ³	NA	98438-K12 ¹⁰	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91462	NA	98438-K12 ¹⁰	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA

CADILLAC • 368-425-472-500 1968-1984

Mechanical Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91415 91418	NA	--	--	--	--	--	--	NA	NA	NA	NA	NA	NA

CHEVROLET L6 • 194-230-250 1962-1984

Street Force™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91111-12 ³ 91112-12	NA	NA	98214-12	97112-12	NA	93005-12	93316 ²⁵	NA	NA	NA	NA	NA	NA

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

CAMSHAFTS



CHEVROLET L6 • 194-230-250 1962-1984

Hydraulic Flat Tappet Camshafts

Firing Order: 1•5•3•6•2•4

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.75 Rockers		Lobe Separation	Intake	Valve	Lash	Cam Notes	
		IN	EX	IN	EX	IN	EX	Angle	Centerline	IN	EX		
162011-09	CL162011-09	261	261	207	207	.490	.490	109	105	Hyd.	Hyd.		
1000-4000 Smooth idle, strong low end. Good vacuum, good fuel economy.													
161021-10	CL161021-10	267	267	213	213	.502	.502	110	106	Hyd.	Hyd.	1	
1500-4400 Good idle, Street, Off-Road, Towing. Good fuel efficiency.													
160041-08	CL160041-08	275	275	221	221	.519	.519	108	104	Hyd.	Hyd.	1	
2000-4800 Nice idle, good low & mid range horsepower. Requires stall converter.													
160911-08	CL160911-08	277	285	223	231	.525	.548	108	104	Hyd.	Hyd.	1	
2500-5400 Fair idle, Hot Street performance. Strong mid range. 2500+ stall.													
169991	NA	Custom Grind Camshaft									Hyd.	Hyd.	1
Hydraulic Flat Tappet Special Order Camshaft.													



CHEVROLET L6 • 194-230-250 1962-1984

Mechanical Flat Tappet Camshafts

Firing Order: 1•5•3•6•2•4

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.75 Rockers		Lobe Separation	Intake	Valve Lash	Cam Notes		
		IN	EX	IN	EX	IN	EX	Angle	Centerline	IN	EX		
160892-06	CL160892-06	265	265	230	230	.508	.508	106	102	.022	.022	1	
		1800-5600 Rough idle, Hot Street, multi carb & headers. Best with 2500+ stall.											
160892-08	CL160892-08	265	265	230	230	.508	.508	108	104	.022	.022	1	
		1800-5600 Fair idle, Hot Street, multi carb & headers. Best with 2500+ stall.											
161672-06	CL161672-06	265	265	240	240	.589	.589	106	102	.022	.022	1	
		2800-6200 Rough idle, Circle Track, Drag Race. A major favorite at the track.											
161672-10	CL161672-10	265	265	240	240	.589	.589	110	106	.022	.022	1	
		3000-6500 Fair idle, big cubic inch with 10.0:1+ CR. Drag or Circle Track.											
169992	NA	Custom Grind Camshaft											1
		Mechanical Flat Tappet Special Order Camshaft.											



CHEVROLET L6 • 216-235-261 1957-1963

Hydraulic Flat Tappet Camshafts

Firing Order: 1•5•3•6•2•4

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
179991	NA	Custom Grind Camshaft					Hyd. Hyd.	1
Hydraulic Flat Tappet Special Order Camshaft.								

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHEVROLET L6 • 194-230-250 1962-1984

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91111-12 ³ 91112-12	NA	NA	98111-12	97112-12	NA	93005-12	93316 ²⁵	NA	NA	NA	NA	NA	NA
91111-12 ³ 91112-12	NA	NA	98111-12	97112-12	NA	93005-12	93316 ²⁵	NA	NA	NA	NA	NA	NA
91111-12 ³ 91112-12	NA	NA	98212-12	97112-12	NA	93005-12	93316 ²⁵	NA	NA	NA	NA	NA	NA
91111-12 ³ 91112-12	NA	NA	98212-12	97112-12	NA	93005-12	93316 ²⁵	NA	NA	NA	NA	NA	NA
91111-12 91112-12	NA	--	--	--	--	--	--	NA	NA	NA	NA	NA	NA

CHEVROLET L6 • 194-230-250 1962-1984

Mechanical Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91115-12 ³ 91118-12	NA	NA	98438-12 ²⁵	97112-12	NA	93005-12	93316 ²⁵	NA	NA	NA	NA	NA	NA
91115-12 ³ 91118-12	NA	NA	98438-12 ²⁵	97112-12	NA	93005-12	93316 ²⁵	NA	NA	NA	NA	NA	NA
91115-12 ³ 91118-12	NA	NA	98438-12 ²⁵	97112-12	NA	93005-12	93316 ²⁵	NA	NA	NA	NA	NA	NA
91115-12 ³ 91118-12	NA	NA	98438-12 ²⁵	97112-12	NA	93005-12	93316 ²⁵	NA	NA	NA	NA	NA	NA
91115-12 91118-12	NA	--	--	--	--	--	--	NA	NA	NA	NA	NA	NA

CHEVROLET L6 • 216-235-261 1957-1963

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91111-12 91112-12	NA	--	--	--	--	--	--	NA	NA	NA	NA	NA	NA

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

²⁵ Machining Required.

CAMSHAFTS



CHEVROLET L6 • 216-235-261 1957-1963

Mechanical Flat Tappet Camshafts

Firing Order: 1•5•3•6•2•4

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
179992	NA	Custom Grind Camshaft Mechanical Flat Tappet Special Order Camshaft.						1



CHEVROLET L6 • 292 1963-1990

Street Force™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•5•3•6•2•4

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.75 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
150011-12	CL150011-12	259 267 1200-4200	205 213	.490 .501	112	108	Hyd. Hyd.	1 Street Force™ 1, Good idle, Mild Street performance, strong low end torque.



CHEVROLET L6 • 292 1963-1990

Hydraulic Flat Tappet Camshafts

Firing Order: 1•5•3•6•2•4

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.75 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
151021-10	CL151021-10	267 267 1200-4200	213 213	.502 .502	110	106	Hyd. Hyd.	1 Good idle, Street, Off-Road, Towing. Good fuel efficiency.
150041-08	CL150041-08	275 275 1600-4500	221 221	.519 .519	108	104	Hyd. Hyd.	1 Nice idle, good low & mid range horsepower. Requires stall converter.
150911-08	CL150911-08	277 285 2000-5000	223 231	.525 .548	108	104	Hyd. Hyd.	1 Fair idle, Hot Street performance. Strong mid range. 2500+ stall.
151481-10	CL151481-10	291 295 2500-5500	237 241	.525 .548	110	106	Hyd. Hyd.	1 Lopey idle, good mid-range power. Needs 3200+ stall.
159991	NA	Custom Grind Camshaft Hydraulic Flat Tappet Special Order Camshaft.						1

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHEVROLET L6 • 216-235-261 1957-1963

Mechanical Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91115-12	NA	--	--	--	--	--	--	NA	NA	NA	NA	NA	NA

CHEVROLET L6 • 292 1963-1990

Street Force™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91111-12 ³ 91112-12	NA	NA	98111-12	97112-12	NA	93005-12	93316 ²⁵	NA	NA	NA	NA	NA	NA

CHEVROLET L6 • 292 1963-1990

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91111-12 ³ 91112-12	NA	NA	98111-12	97112-12	NA	93005-12	93316 ²⁵	NA	NA	NA	NA	NA	NA
91111-12 ³ 91112-12	NA	NA	98111-12	97112-12	NA	93005-12	93316 ²⁵	NA	NA	NA	NA	NA	NA
91111-12 ³ 91112-12	NA	NA	98212-12	97112-12	NA	93005-12	93316 ²⁵	NA	NA	NA	NA	NA	NA
91111-12 ³ 91112-12	NA	NA	98212-12	97112-12	NA	93005-12	93316 ²⁵	NA	NA	NA	NA	NA	NA
91111-12 91112-12	NA	--	--	--	--	--	--	NA	NA	NA	NA	NA	NA

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

²⁵ Machining Required.

CAMSHAFTS



CHEVROLET L6 • 292 1963-1990

Mechanical Flat Tappet Camshafts

Firing Order: 1•5•3•6•2•4

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.75 Rockers		Lobe Separation	Intake Centerline	Valve Lash		Cam Notes
IN	EX	IN	EX	IN	EX	IN	EX	Angle		IN	EX	
150892-08	CL150892-08	265	265	230	230	.508	.508	108	104	.022	.022	1
1600-5400 Fair idle, Hot Street, multi carb & headers. Best with 2200+ stall.												
151672-06	CL151672-06	265	265	240	240	.589	.589	106	102	.022	.022	1
2600-6000 Rough idle, Circle Track, Drag Race. A major favorite at the track.												
151672-10	CL151672-10	265	265	240	240	.589	.589	110	106	.022	.022	1
2800-6200 Fair idle, big cubic inch with 10.0:1+ CR. Drag or Circle Track.												
159992	NA	Custom Grind Camshaft										1
Mechanical Flat Tappet Special Order Camshaft.												



CHEVROLET V6 ODD FIRE • 200-229 1978-1984

Hydraulic Flat Tappet Camshafts

Firing Order: 1•6•5•4•3•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
149998	NA	Custom Grind Camshaft					Hyd. Hyd.	1
Hydraulic Flat Tappet Special Order Camshaft.								



CHEVROLET 60° V6 • 2.8L/3.1L/3.4L 1980-1991

Hydraulic Flat Tappet Camshafts

Firing Order: 1•2•3•4•5•6

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.50 Rockers		Lobe Separation	Intake	Valve Lash	Cam Notes		
		IN	EX	IN	EX	IN	EX	Angle	Centerline	IN	EX		
149996	NA	Custom Grind Camshaft									Hyd.	Hyd.	1
Hydraulic Flat Tappet Special Order Camshaft.													

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHEVROLET L6 • 292 1963-1990

Mechanical Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91115-12 ³ 91118-12	NA	NA	98438-12 ²⁵	97112-12	NA	93005-12	93316 ²⁵	NA	NA	NA	NA	NA	NA
91115-12 ³ 91118-12	NA	NA	98438-12 ²⁵	97112-12	NA	93005-12	93316 ²⁵	NA	NA	NA	NA	NA	NA
91115-12 ³ 91118-12	NA	NA	98438-12 ²⁵	97112-12	NA	93005-12	93316 ²⁵	NA	NA	NA	NA	NA	NA
91115-12 91118-12	NA	--	--	--	--	--	--	NA	NA	NA	NA	NA	NA

CHEVROLET 90° V6 ODD FIRE • 200-229-262 1978-1986

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91111-12 91112-12	NA	--	--	--	--	--	--	NA	NA	NA	NA	NA	94200 94300

CHEVROLET 60° V6 • 2.8L/3.1L/3.4L 1980-1991

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91111-12 91112-12	NA	--	--	--	--	--	--	NA	NA	NA	NA	NA	NA

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

²⁵ Machining Required.

CAMSHAFTS



CHEVROLET SMALL BLOCK • 262-400 1955-1998

Max Certified™ Hydraulic Flat Tappet Cam & Lifter Sets - 5 Year No Fault Warranty (see page 3 for details)

Cam & Lifter Set Part No.	Cam & Direct Lube Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
MC112001-14	MC112001-14DL ⁴	255 261 600-4800	201 207	.410 .420	114	110	Hyd. Hyd.	
Smooth idle, Strong low end. High vacuum, good fuel economy.								
MC112011-11	MC112011-11DL ⁴	261 261 800-4800	207 207	.420 .420	111	107	Hyd. Hyd.	
Good idle, Street, Off-Road, Towing. Good torque.								
MC110931-11	MC110931-11DL ⁴	267 267 1100-5200	213 213	.450 .450	111	107	Hyd. Hyd.	
Strong low & mid-range torque & horsepower.								
MC110991-08	MC110991-08DL ⁴	275 275 1700-5700	221 221	.470 .470	108	104	Hyd. Hyd.	1
Good low & mid-range horsepower. Needs 4 barrel & headers.								
MC110951-10	MC110951-10DL ⁴	275 285 2000-6000	221 231	.470 .470	110	106	Hyd. Hyd.	1
Street & Strip. Needs 4 barrel, headers & lower gears.								
MC112431-08	MC112431-08DL ⁴	277 277 2200-6200	223 223	.450 .450	108	104	Hyd. Hyd.	
Hot Street cam. 4 barrel & headers recommended.								
MC110041-12	MC110041-12DL ⁴	279 289 1800-6000	225 235	.465 .488	112	108	Hyd. Hyd.	1
Fair idle, Hot Street & mild Bracket Racing.								
MC110961-08	MC110961-08DL ⁴	285 285 2000-6200	231 231	.470 .470	108	104	Hyd. Hyd.	1
Hot Street/Brackets, broad power range, strong top end.								
MC112031-08	MC112031-08DL ⁴	285 285 2800-6400	231 231	.480 .480	108	104	Hyd. Hyd.	1
Fair idle. Broad power band. Works well in heavy vehicles.								
MC112141-10	MC112141-10DL ⁴	285 289 2000-6000	231 235	.480 .488	110	106	Hyd. Hyd.	1
Lopey idle, Strong mid range. Good throttle response. 2400+ stall.								
MC110971-08	MC110971-08DL ⁴	289 289 2600-6400	235 235	.470 .470	108	104	Hyd. Hyd.	1
Lopey idle. Pro-Street & Bracket Racing profile. 9.5:1+ CR, 2700+ stall.								



CHEVROLET SMALL BLOCK • 262-400 1955-1998



American Muscle™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
117071-12	CL117071-12	256 262 600-4800	194 203	.390 .410	112	108	Hyd. Hyd.	
Smooth idle, near duplicate of the Chev L75 300HP/327 cam (GM #3733431/3896929).								
110031-14	CL110031-14	290 290 1800-5800	223 223	.447 .447	114	110	Hyd. Hyd.	
Nice idle, near duplicate of the Chev 325HP/327 cam (GM #3863151).								
117091-14	CL117091-14	292 288 2000-6000	224 224	.450 .460	114	114	Hyd. Hyd.	1
Nice idle, near duplicate of the Chev L46 350HP/350 cam (GM #3896962).								

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

4 Direct Lube Lifters Included in Cam & "Direct Lube" Lifter (DL) Sets.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHEVROLET SMALL BLOCK • 262-400 1955-1998

Max Certified™ Hydraulic Flat Tappet Cam & Lifter Set Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91111 ³ 91116 ⁴	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91116 ⁴	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91116 ⁴	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91116 ⁴	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91116 ⁴	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91116 ⁴	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91116 ⁴	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91116 ⁴	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91116 ⁴	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91116 ⁴	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300

CHEVROLET SMALL BLOCK • 262-400 1955-1998

American Muscle™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91111 ³ 91116	NA	98111-K11	98111	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91116	NA	98111-K11	98111	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91116	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

⁴ Direct Lube Lifters Included in Cam & "Direct Lube" Lifter (DL) Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

CAMSHAFTS



CHEVROLET SMALL BLOCK • 262-400 1955-1998

Street Force™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
112561-12	CL112561-12	259 269	205 215	.420 .455	112	108	Hyd. Hyd.	1
1000-5000 Street Force™ 1, Good idle, Mild Street performance, strong low end torque.								
112561-12S	CL112561-12S	259 269	205 215	.420 .455	112	108	Hyd. Hyd.	1
1000-5000 Small Base Circle, Street Force™ 1, Mild Street performance, strong low end torque.								
112571-12	CL112571-12	269 279	215 225	.455 .465	112	108	Hyd. Hyd.	1
1200-5500 Street Force™ 2, Good idle & throttle response. Needs 4 barrel & good exhaust.								
112571-12S	CL112571-12S	269 279	215 225	.455 .465	112	108	Hyd. Hyd.	1
1200-5500 Small Base Circle, Street Force™ 2, Good idle & throttle response. Needs good exhaust.								
110041-12	CL110041-12	279 289	225 235	.465 .488	112	108	Hyd. Hyd.	1
1800-6000 Street Force™ 3, Noticeable idle, Hot Street & mild Bracket Racing.								
112601-12	CL112601-12	289 294	235 241	.488 .503	112	108	Hyd. Hyd.	1
2200-6400 Street Force™ 4, Lopey idle, good mid-range power. Needs 3200+ stall.								
112601-12S	CL112601-12S	289 294	235 241	.488 .503	112	108	Hyd. Hyd.	1
2200-6400 Small Base Circle, Street Force™ 4, Lopey idle, good mid-range power. Needs 3200+ stall.								



CHEVROLET SMALL BLOCK • 262-400 1955-1998

Rattler Cams™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
118001-09	CL118001-09	281 289	227 235	.480 .488	109	103	Hyd. Hyd.	1
1800-5600 Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.								
118041-09	CL118041-09	289 297	235 243	.488 .480	109	103	Hyd. Hyd.	1
2000-5900 Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.								
118081-09	CL118081-09	297 305	243 251	.507 .495	109	103	Hyd. Hyd.	1
2400-6200 Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.								

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHEVROLET SMALL BLOCK • 262-400 1955-1998

Street Force™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91111 ³ 91116	NA	98111-K11	98111	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91116	NA	98111-K11	98111	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91116	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91116	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91116	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91116	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91116	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300

CHEVROLET SMALL BLOCK • 262-400 1955-1998

Rattler Cams™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.



Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
112001-14	CL112001-14	255 261 600-4800	201 207	.410 .420	114	110	Hyd. Hyd.	
		Smooth idle, Strong low end. High vacuum, good fuel economy.						
112011-11	CL112011-11	261 261 800-4800	207 207	.420 .420	111	107	Hyd. Hyd.	
		Good idle, Street, Off-Road, Towing. Good torque.						
111021-11	CL111021-11	267 267 1200-5000	213 213	.430 .430	111	107	Hyd. Hyd.	
		Good idle, Street, Off-Road, Towing. Good fuel efficiency.						
110931-11	CL110931-11	267 267 1100-5200	213 213	.450 .450	111	107	Hyd. Hyd.	
		Strong low & mid-range torque & horsepower.						
112571-10	CL112571-10	269 279 1200-5500	215 225	.455 .465	110	106	Hyd. Hyd.	1
		Good idle, Strong low & mid-range torque & horsepower.						
111221-10	CL111221-10	275 275 1500-5600	221 221	.445 .445	110	106	Hyd. Hyd.	
		Nice idle, Good low & mid range horsepower.						
110991-08	CL110991-08	275 275 1700-5700	221 221	.470 .470	108	104	Hyd. Hyd.	1
		Good low & mid-range horsepower. Needs 4 barrel & headers.						
110951-08	CL110951-08	275 285 1800-5800	221 231	.470 .470	108	104	Hyd. Hyd.	1
		Lopey idle, Strong Street performance. Needs 4 barrel, headers & lower gears.						
110951-10	CL110951-10	275 285 2000-6000	221 231	.470 .470	110	106	Hyd. Hyd.	1
		Street & Strip. Needs 4 barrel, headers & lower gears.						
110951-12	CL110951-12	275 285 2000-6200	221 231	.470 .470	112	108	Hyd. Hyd.	1
		Hot Street, Improved carburetion, exhaust & lower gears needed.						
112431-06	CL112431-06	277 277 2200-6200	223 223	.450 .450	106	102	Hyd. Hyd.	
		Lopey idle, Good low end & mid-range horsepower & torque.						
112431-08	CL112431-08	277 277 2200-6200	223 223	.450 .450	108	104	Hyd. Hyd.	
		Hot Street cam. 4 barrel & headers recommended.						
112431-10	CL112431-10	277 277 2000-6200	223 223	.450 .450	110	106	Hyd. Hyd.	
		Hot Street cam. Nice mid range torque. 4 barrel & headers recommended.						
112431-12	CL112431-12	277 277 2000-6200	223 223	.450 .450	112	108	Hyd. Hyd.	
		Hot Street cam. Nice mid range torque. 4 barrel & headers recommended.						
110031-12	CL110031-12	290 290 2000-6200	223 223	.447 .447	112	108	Hyd. Hyd.	
		Good idle, Good mid range torque & horsepower. Needs 2400+ stall.						
110031-14	CL110031-14	290 290 2000-6200	223 223	.447 .447	114	110	Hyd. Hyd.	
		OK idle, Good mid range torque & horsepower. Needs 2400+ stall.						
110941-11	CL110941-11	279 279 1500-5600	225 225	.465 .465	111	107	Hyd. Hyd.	1
		Fair idle, Strong mid-range performance.						
110041-10	CL110041-10	279 289 1800-6000	225 235	.465 .488	110	106	Hyd. Hyd.	1
		Fair idle, Hot Street & mild Bracket Racing.						
112581-08	CL112581-08	279 289 1800-5800	225 235	.465 .470	108	104	Hyd. Hyd.	1
		Hot Street performance in 383-406. 9.5:1, 2400 stall suggested.						
112581-08S	CL112581-08S	279 289 1800-5800	225 235	.465 .470	108	104	Hyd. Hyd.	1
		Small Base Circle, Hot Street performance in 383-406. 9.5:1, 2400 stall suggested.						
112581-10	CL112581-10	279 289 1800-6000	225 235	.465 .470	110	106	Hyd. Hyd.	1
		Hot Street, 4-barrel & headers required.						
112581-10S	CL112581-10S	279 289 1600-6000	225 235	.465 .470	110	106	Hyd. Hyd.	1
		Small Base Circle, Hot Street, 4-barrel & headers required.						
112581-12	CL112581-12	279 289 1600-6000	225 235	.465 .470	112	108	Hyd. Hyd.	1
		Hot Street, 4-barrel & headers required.						
112581-12S	CL112581-12S	279 289 1600-6000	225 235	.465 .470	112	108	Hyd. Hyd.	1
		Small Base Circle, Hot Street, 4-barrel & headers required.						

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

CHEVROLET SMALL BLOCK • 262-400 1955-1998

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91111 ³ 91112	NA	98111-K11	98111	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98111-K11	98111	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98111-K11	98111	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.



Hydraulic Flat Tappet Camshafts (cont.)

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
110961-08	CL110961-08	285 285 2000-6200	231 231	.470 .470	108	104	Hyd. Hyd.	1
		Hot Street/Brackets, broad power range, strong top end.						
110961-10	CL110961-10	285 285 2000-6000	231 231	.470 .470	110	106	Hyd. Hyd.	1
		Fair idle, Street Machines with headers, gears & 2500+ stall.						
112031-06	CL112031-06	285 285 2800-6400	231 231	.480 .480	106	104	Hyd. Hyd.	1
		Rough idle, Broad power band. Works well in heavy vehicles. Needs 3200+ stall.						
112031-08	CL112031-08	285 285 2800-6400	231 231	.480 .480	108	106	Hyd. Hyd.	1
		Fair idle. Broad power band. Works well in heavy vehicles.						
112031-10	CL112031-10	285 285 2600-6400	231 231	.480 .480	110	106	Hyd. Hyd.	1
		Fair idle, Hot Street/Strip performance. Needs headers, gears & 2500+ stall.						
112141-08	CL112141-08	285 289 2200-6200	231 235	.480 .488	108	104	Hyd. Hyd.	1
		Lopey idle, broad power band, strong top end power.						
112141-08S	CL112141-08S	285 289 2200-6200	231 235	.480 .488	108	104	Hyd. Hyd.	1
		Small Base Circle, Lopey idle, broad power band, strong top end power.						
112141-10	CL112141-10	285 289 2000-6000	231 235	.480 .488	110	106	Hyd. Hyd.	1
		Lopey idle, Strong mid range. Good throttle response. 2400+ stall.						
112141-10S	CL112141-10S	285 289 2000-6000	231 235	.480 .488	110	106	Hyd. Hyd.	1
		Small Base Circle, Lopey idle, Strong mid range. Good throttle response. 2400+ stall.						
112141-12	CL112141-12	285 289 1800-6200	231 235	.480 .488	112	108	Hyd. Hyd.	1
		Fair idle, Strong mid range. Good throttle response. 2400+ stall.						
112141-12S	CL112141-12S	285 289 1800-6200	231 235	.480 .488	112	108	Hyd. Hyd.	1
		Small Base Circle, Fair idle, Strong mid range. Good throttle response. 2400+ stall.						
112591-08	CL112591-08	285 295 2000-6400	231 241	.470 .470	108	104	Hyd. Hyd.	1
		Lopey idle, Hot Street/Brackets. 2500+ stall, 9.0:1+ CR.						
112591-08S	CL112591-08S	285 295 2000-6400	231 241	.470 .470	108	104	Hyd. Hyd.	1
		Small Base Circle, lopey idle, Hot Street/Brackets. 2500+ stall, 9.0:1+ CR.						
112591-10	CL112591-10	285 295 1800-6200	231 241	.470 .470	110	106	Hyd. Hyd.	1
		Nice idle, Hot Street/Strip, Excellent mid range performance.						
112591-10S	CL112591-10S	285 295 1800-6200	231 241	.470 .470	110	106	Hyd. Hyd.	1
		Small Base Circle, Nice idle, Hot Street/Strip, Excellent mid range performance.						
112591-12	CL112591-12	285 295 1800-6000	231 241	.470 .470	112	108	Hyd. Hyd.	1
		Hot Street & mild Bracket Racing. Broad mid range.						
112591-12S	CL112591-12S	285 295 1800-6000	231 241	.470 .470	112	108	Hyd. Hyd.	1
		Small Base Circle, Hot Street & mild Bracket Racing.						
110971-08	CL110971-08	289 289 2600-6400	235 235	.470 .470	108	104	Hyd. Hyd.	1
		Lopey idle. Pro-Street & Bracket Racing profile.						
112681-06	CL112681-06	289 291 3000-6800	235 237	.488 .488	106	102	Hyd. Hyd.	1
		Lopey idle, strong low to mid-range torque & horsepower.						
112681-06S	CL112681-06S	289 291 3000-6800	235 237	.488 .488	106	102	Hyd. Hyd.	1
		Small Base Circle, choppy idle, strong low to mid-range torque & horsepower.						
112681-08	CL112681-08	289 291 3000-6700	235 237	.488 .488	108	104	Hyd. Hyd.	1
		Fair idle, Street/Strip, strong mid-range torque & horsepower.						
112681-08S	CL112681-08S	289 291 3000-6700	235 237	.488 .488	108	104	Hyd. Hyd.	1
		Small Base Circle, Fair idle, Street/Strip, strong mid-range torque & horsepower.						
112681-12	CL112681-12	289 291 2800-6800	235 237	.488 .488	112	108	Hyd. Hyd.	1
		Fair idle, strong mid to upper range performance.						
112681-12S	CL112681-12S	289 291 2800-6800	235 237	.488 .488	112	108	Hyd. Hyd.	1
		Small Base Circle, fair idle, strong mid to upper range performance.						

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.



Hydraulic Flat Tappet Camshafts (cont.)

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN	EX	Duration @ .050" IN	EX	Valve Lift w/1.50 Rockers IN	EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN	EX	Cam Notes
112601-06	CL112601-06	289 3000-6400	294 Bracket or 1/4 to 3/8 mile 4bbl.	235 1/4 to 3/8 mile 4bbl.	241 Limited Sportsman.	.488 Limited Sportsman.	.503 Proven winner for .500" Lift Rule.	106	102	Hyd.	Hyd.	1
112601-06S	CL112601-06S	289 3000-6400	294 Small Base Circle,	235 Bracket or 1/4 to 3/8 mile 4bbl.	241 Limited Sportsman.	.488	.503	106	102	Hyd.	Hyd.	1
112601-08	CL112601-08	289 3000-6400	294 Lopey idle, good mid-range power.	235	241	.488	.503	108	104	Hyd.	Hyd.	1
112601-08S	CL112601-08S	289 3000-6400	294 Small Base Circle, lopey idle, good mid-range power.	235	241	.488	.503	108	104	Hyd.	Hyd.	1
110051-08	CL110051-08	289 2800-6200	297 Lopey idle, Serious Street/Strip.	235	243	.488	.508	108	104	Hyd.	Hyd.	1
110051-08S	CL110051-08S	289 2800-6200	297 Small Base Circle, Lopey idle, serious Street/Strip.	235	243	.488	.508	108	104	Hyd.	Hyd.	1
110051-10	CL110051-10	289 2800-6200	297 Lopey idle, Serious Street/Strip.	235	243	.488	.508	110	106	Hyd.	Hyd.	1
110051-12	CL110051-12	289 2600-6400	297 Lopey idle, Street/Strip or nostalgia.	235	243	.488	.508	112	108	Hyd.	Hyd.	1
110051-12S	CL110051-12S	289 2600-6400	297 Small Base Circle, Lopey idle, Street/Strip or nostalgia.	235	243	.488	.508	112	108	Hyd.	Hyd.	1
110981-08	CL110981-08	295 2800-6400	295 Rough idle, runs strong 4,000 rpm up, needs compression.	241	241	.470	.470	108	104	Hyd.	Hyd.	1
111671-08	CL111671-08	297 2800-6800	297 Lopey idle, needs low gears, headers & compression.	243	243	.508	.508	108	104	Hyd.	Hyd.	1
110061-08	CL110061-08	297 2800-6800	307 Pro Street/Brackets, Strong mid & upper end power.	243	253	.508	.530	108	104	Hyd.	Hyd.	1
110061-08S	CL110061-08S	297 2800-6800	307 Small Base Circle, Pro Street/Brackets, Strong mid & upper end power.	243	253	.508	.530	108	104	Hyd.	Hyd.	1
110061-12	CL110061-12	297 2800-6600	307 Performance/Competition.	243	253	.508	.530	112	108	Hyd.	Hyd.	1
110061-12S	CL110061-12S	297 2800-6600	307 Small Base Circle, Performance/Competition.	243	253	.508	.530	112	108	Hyd.	Hyd.	1
112041-09	CL112041-09	299 3400-6700	299 Hot Street/Brackets.	245	245	.510	.510	109	105	Hyd.	Hyd.	1
112041-09S	CL112041-09S	299 3400-6700	299 Small Base Circle, E.T. Brackets.	245	245	.510	.510	109	105	Hyd.	Hyd.	1
112401-10	CL112401-10	301 3200-6800	301 E.T. Brackets.	247	247	.510	.510	110	106	Hyd.	Hyd.	1
119991	NA	Custom Grind Camshaft Hydraulic Flat Tappet Special Order Camshaft.								Hyd.	Hyd.	1
119991-S	NA	Custom Grind Camshaft, Small Base Circle Hydraulic Flat Tappet Special Order Camshaft.								Hyd.	Hyd.	1
119991-P55	NA	Custom Grind Camshaft, Special Core Hydraulic Flat Tappet Special Order Camshaft.								Hyd.	Hyd.	1
114991	NA	Custom Grind Camshaft 4/7 Swap Hydraulic Flat Tappet Special Order Camshaft.										1,22
114991-S	NA	Custom Grind Camshaft, Small Base Circle 4/7 Swap Hydraulic Flat Tappet Special Order Camshaft.										1,22

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

22 Ignition firing order must be changed to 1-8-7-3-6-5-4-2.

Hydraulic Flat Tappet Camshaft Components

	Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90					

Components Notes: master note list on page 260

3 Included in Cam & Lifter Sets.

10 10° Valve lock Angle, must use matching retainers/locks.

25 Machining Required.



4/7 Swap Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•7•3•6•5•4•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
114681-06	CL114681-06	289 291 2800-6800	235 237	.488 .488	106	102	Hyd. Hyd.	1,22 <i>Lopey idle, strong low to mid-range torque & horsepower.</i>
114681-06S	CL114681-06S	289 291 2800-6800	235 237	.488 .488	106	102	Hyd. Hyd.	1,22 <i>Small Base Circle, choppy idle, strong low to mid-range torque & horsepower.</i>
114681-08	CL114681-08	289 291 2800-6800	235 237	.488 .488	108	104	Hyd. Hyd.	1,22 <i>Lopey idle, strong low to mid-range torque & horsepower.</i>
114681-08S	CL114681-08S	289 291 2800-6800	235 237	.488 .488	108	104	Hyd. Hyd.	1,22 <i>Small Base Circle, choppy idle, strong low to mid-range torque & horsepower.</i>
114681-12	CL114681-12	289 291 2800-6800	235 237	.488 .488	112	108	Hyd. Hyd.	1,22 <i>Fair idle, strong mid to upper range performance.</i>
114681-12S	CL114681-12S	289 291 2800-6800	235 237	.488 .488	112	108	Hyd. Hyd.	1,22 <i>Small Base Circle, fair idle, strong mid to upper range performance.</i>
114601-06	CL114601-06	289 294 3000-6400	235 241	.488 .503	106	102	Hyd. Hyd.	1,22 <i>Bracket or 1/4 to 3/8 mile 4bbl. Limited Sportsman. Proven winner for .500" Lift Rule.</i>
114601-06S	CL114601-06S	289 294 3000-6400	235 241	.488 .503	106	102	Hyd. Hyd.	1,22 <i>Small Base Circle, Bracket or 1/4 to 3/8 mile 4bbl. Limited Sportsman.</i>
114601-08	CL114601-08	289 294 3000-6400	235 241	.488 .503	108	104	Hyd. Hyd.	1,22 <i>Lopey idle, good mid-range power. Needs 3200+ stall.</i>
114601-08S	CL114601-08S	289 294 3000-6400	235 241	.488 .503	108	104	Hyd. Hyd.	1,22 <i>Small Base Circle, lopey idle, good mid-range power. Needs 3200+ stall.</i>
114601-12	CL114601-12	289 294 3000-6400	235 241	.488 .503	112	108	Hyd. Hyd.	1,22 <i>Lopey idle, good mid-range power. Needs 3200+ stall.</i>
114601-12S	CL114601-12S	289 294 3400-6800	235 241	.488 .503	112	108	Hyd. Hyd.	1,22 <i>Small Base Circle, Bracket Racing, strong mid & upper rpm.</i>
114061-08	CL114061-08	297 307 2600-6600	243 253	.508 .530	108	104	Hyd. Hyd.	1,22 <i>Performance/Competition. Works well with small blower or NOS.</i>
114061-08S	CL114061-08S	297 307 2600-6600	243 253	.508 .530	108	104	Hyd. Hyd.	1,22 <i>Small Base Circle, Performance/Competition. Works well with small blower or NOS.</i>
114061-12	CL114061-12	297 307 2600-6600	243 253	.508 .530	112	108	Hyd. Hyd.	1,22 <i>Performance/Competition. Works well with small blower or NOS.</i>
114061-12S	CL114061-12S	297 307 2600-6600	243 253	.507 .530	112	108	Hyd. Hyd.	1,22 <i>Small Base Circle, Performance/Competition. Works well with small blower or NOS.</i>
114991	NA	Custom Grind Camshaft 4/7 Swap Hydraulic Flat Tappet Special Order Camshaft.						1,22
114991-S	NA	Custom Grind Camshaft, Small Base Circle 4/7 Swap Hydraulic Flat Tappet Special Order Camshaft.						1,22

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

22 Ignition firing order must be changed to 1-8-7-3-6-5-4-2.

4/7 Swap Hydraulic Flat Tappet Camshaft Components

	Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90					

Components Notes: master note list on page 260

3 Included in Cam & Lifter Sets.

10 10° Valve lock Angle, must use matching retainers/locks.

25 Machining Required.

Oval Track Lift Rule *Hydraulic Flat Tappet Camshafts*

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
112811-06	CL112811-06	280 3200-6000	284 231	227 231	.390 .410	106 102	Hyd. Hyd.	
Stock Lift Rule. Best on 1/4 to short 3/8 mile tracks. Good torque.								
112811-08	CL112811-08	280 3200-6000	284 231	227 231	.390 .410	108 104	Hyd. Hyd.	
Stock Lift Rule. Best on 1/4 to 3/8 mile tracks. Strong lower mid-range power.								
112701-06	CL112701-06	280 3000-6200	288 235	227 235	.390 .410	106 102	Hyd. Hyd.	
Stock Lift Rule. Best on 1/4 to 3/8 mile tracks. Strong lower mid-range power.								
112701-08	CL112701-08	280 2800-6400	288 235	227 235	.390 .410	108 104	Hyd. Hyd.	
Stock Lift Rule. Best on 1/4 to 3/8 mile tracks. Good mid-range horsepower.								
112701-12	CL112701-12	280 2600-6400	288 235	227 235	.390 .410	112 108	Hyd. Hyd.	14
Stock Lift Rule & Vacuum Rule. Broad power band.								
112711-06	CL112711-06	288 3500-6400	294 241	235 241	.390 .410	106 102	Hyd. Hyd.	
Stock Lift Rule, 3/8 & longer banked tracks. Good torque off corners. Strong mid-range.								
112711-08	CL112711-08	288 3500-6200	294 241	235 241	.390 .410	108 104	Hyd. Hyd.	
Stock Lift Rule. 3/8 to 1/2 mile banked tracks. Good upper mid-range.								
112711-12	CL112711-12	288 3400-6300	294 241	235 241	.390 .410	112 108	Hyd. Hyd.	
Stock Lift Rule. 3/8 to 1/2 mile banked tracks. Good top-end power.								
112711-14	CL112711-14	288 3200-6400	294 241	235 241	.390 .410	114 110	Hyd. Hyd.	14
Stock Lift Rule & Vacuum Rule. Banked 3/8 & longer tracks.								
112901-06	CL112901-06	294 3800-6600	300 247	241 247	.390 .410	106 102	Hyd. Hyd.	
Stock Lift Rule, Fast 3/8 mile banked tracks. Strong mid-range.								
112901-12	CL112901-12	294 3400-6200	300 247	241 247	.390 .410	112 108	Hyd. Hyd.	14
Stock Lift Rule with Vacuum Rule, Fast 3/8 mile banked tracks. Strong mid-range.								
112981-06	CL112981-06	300 4000-7000	306 253	247 253	.390 .410	106 102	Hyd. Hyd.	
Stock Lift Rule, Fast 3/8 to 1/2 mile banked tracks. Good top-end power.								
112981-12	CL112981-12	300 3800-7000	306 253	247 253	.390 .410	112 108	Hyd. Hyd.	14
Stock Lift Rule with Vacuum Rule, fast 3/8 to 1/2 mile banked tracks.								
112731-06	CL112731-06	298 3000-6800	304 251	245 251	.400 .400	106 102	Hyd. Hyd.	
Stock Lift Rule, fast 3/8-1/2 mile tracks. Nice mid-range power.								
112731-08	CL112731-08	298 3000-6800	304 251	245 251	.400 .400	108 104	Hyd. Hyd.	
Stock Lift Rule, medium to high banked 3/8-1/2 mile tracks.								
110071-06	CL110071-06	274 2500-6000	274 221	221 221	.410 .410	106 102	Hyd. Hyd.	
.420" Lift Rule cam, 1/4-3/8 mile, low to medium banked. 2bbl. & good exhaust.								
112921-06	CL112921-06	274 2000-6200	278 225	221 225	.410 .410	106 102	Hyd. Hyd.	
.420" Lift Rule cam, low banked 1/4-3/8 mile. Great with 4bbl. & headers.								
112921-10	CL112921-10	274 2300-6200	278 225	221 225	.410 .410	110 106	Hyd. Hyd.	14
.420" Lift Rule with Vacuum Rule, low banked 1/4-3/8 mile.								
112921-12	CL112921-12	274 2400-6200	278 225	221 225	.410 .410	112 108	Hyd. Hyd.	14
.420" Lift Rule with Vacuum Rule, low banked 1/4-3/8 mile.								
112851-06	CL112851-06	278 2800-6400	282 229	225 229	.410 .410	106 102	Hyd. Hyd.	
.420" Lift Rule cam, medium banked 1/4-3/8 mile tracks.								
112851-12	CL112851-12	278 2600-6400	282 229	225 229	.410 .410	112 108	Hyd. Hyd.	14
.420" Lift Rule with Vacuum Rule, medium banked 1/4-3/8 mile tracks.								
110081-06	CL110081-06	282 3000-6200	282 229	229 229	.410 .410	106 102	Hyd. Hyd.	
.420" Lift Rule cam. Good low & mid-range power. 1/4 to 3/8 mile banked tracks.								
112911-06	CL112911-06	286 3400-6400	292 239	233 239	.410 .410	106 102	Hyd. Hyd.	
.420" Lift Rule cam, banked 3/8-1/2 mile. Strong mid-range.								
112911-12	CL112911-12	286 3200-6400	292 239	233 239	.410 .410	112 108	Hyd. Hyd.	14
.420" Lift Rule with Vacuum Rule, banked 3/8-1/2 mile. Strong mid-range.								

Cam Notes: master note list on page 260

14 No specific vacuum rating is guaranteed.

Oval Track Lift Rule Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer, & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

¹¹ Sets of 8, Requires 2 sets per engine.

²⁵ Machining Required.


Oval Track Lift Rule Hydraulic Flat Tappet Camshafts (cont.) Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
110091-06	CL110091-06	294 294 3000-6400	241 241 .420" Lift Rule cam.	.410 .410	106	102	Hyd. Hyd.	3/8 to 1/2 mile banked tracks. Good mid-range.
112951-06	CL112951-06	276 282 3000-6000	223 229 .420" Lift Rule, flat to low banked 1/4 mile tracks.	.420 .420	106	102	Hyd. Hyd.	
112951-12	CL112951-12	276 282 3000-6400	223 229 .420" Lift Rule with Vacuum Rule, flat to low banked 1/4 mile tracks.	.420 .420	112	108	Hyd. Hyd.	14
112841-06	CL112841-06	280 280 3200-6200	227 227 .420" Lift Rule, low banked 1/4-3/8 mile tracks.	.420 .420	106	102	Hyd. Hyd.	Good low to mid range power.
112841-08	CL112841-08	280 280 3200-6400	227 227 .420" Lift Rule, medium banked 1/4-3/8 mile tracks.	.420 .420	108	104	Hyd. Hyd.	2bbl. & good exhaust.
112841-12	CL112841-12	280 280 3200-6600	227 227 .420" Lift with Vacuum Rule, Medium banked 1/4-3/8 mile tracks.	.420 .420	112	108	Hyd. Hyd.	14 2bbl. & good exhaust.
112871-06	CL112871-06	280 286 3200-6400	233 233 .420" Lift Rule, low banked 1/4-3/8 mile tracks.	.420 .420	106	102	Hyd. Hyd.	Good torque off of corners.
112871-08	CL112871-08	280 286 3200-6800	233 233 .420" Lift Rule, medium banked 1/4-3/8 mile tracks.	.420 .420	108	104	Hyd. Hyd.	4bbl. & headers.
112871-12	CL112871-12	280 286 3400-6800	233 233 .420" Lift with Vacuum Rule, Medium banked 1/4-3/8 mile tracks.	.420 .420	112	108	Hyd. Hyd.	14 4bbl. & headers.
112961-06	CL112961-06	288 292 3600-6400	235 239 .420" Lift Rule, medium banked 3/8 mile tracks.	.420 .420	106	102	Hyd. Hyd.	
112961-08	CL112961-08	288 292 3600-6800	235 239 .420" Lift Rule, 3/8 mile tracks with fast corners.	.420 .420	108	104	Hyd. Hyd.	4bbl. & good exhaust.
112961-12	CL112961-12	288 292 3600-6800	235 239 .420" Lift Rule with Vacuum Rule, banked 3/8 mile tracks.	.420 .420	112	108	Hyd. Hyd.	14
112761-06	CL112761-06	290 294 3600-6400	237 241 .420" Lift Rule. 3/8 & longer banked tracks.	.420 .420	106	102	Hyd. Hyd.	Strong mid-range.
112761-08	CL112761-08	290 294 3600-6600	237 241 .420" Lift Rule. 3/8 to 1/2 mile banked tracks.	.420 .420	108	104	Hyd. Hyd.	Good upper mid-range.
112761-12	CL112761-12	290 294 3800-6800	237 241 .420" Lift Rule. Fast 3/8 to 1/2 mile banked tracks.	.420 .420	112	108	Hyd. Hyd.	Good top end power.
112891-06	CL112891-06	294 298 3800-6600	241 245 .420" Lift Rule. Fast 3/8 to 1/2 mile tracks.	.420 .420	106	102	Hyd. Hyd.	Broad torque range.
112781-06	CL112781-06	296 296 3800-6600	243 243 .420" Lift Rule cam.	.420 .420	106	102	Hyd. Hyd.	Good upper mid-range torque. High banked 3/8 to 1/2 mile.
112971-06	CL112971-06	296 302 3800-6800	243 249 .420" Lift Rule cam.	.420 .420	106	102	Hyd. Hyd.	2bbl. or 4bbl., heavy car with manifolds. Good throttle response.
112971-10	CL112971-10	296 302 4000-7000	243 249 .420" Lift Rule cam.	.420 .420	110	106	Hyd. Hyd.	2bbl. or 4bbl., heavy car with manifolds. 3/8-1/2 mile banked.
112971-12	CL112971-12	296 302 4000-7000	243 249 .420" Lift with Vacuum Rule, 2bbl. or 4bbl., heavy car with manifolds.	.420 .420	112	108	Hyd. Hyd.	14 3/8-1/2 banked.
112741-06	CL112741-06	302 306 3800-7000	249 253 .420" Lift Rule, high banked 1/2 mile tracks.	.420 .420	106	102	Hyd. Hyd.	
112741-08	CL112741-08	302 306 3800-7000	249 253 .420" Lift Rule, fast high banked 1/2 mile tracks.	.420 .420	108	104	Hyd. Hyd.	
112741-12	CL112741-12	302 306 3800-7200	249 253 .420" Lift Rule, fast high banked 1/2 mile tracks with fast corners.	.420 .420	112	108	Hyd. Hyd.	
112431-06	CL112431-06	277 277 2600-6400	223 223 .450" Lift Rule, flat to low banked 1/4-3/8 mile tracks.	.450 .450	106	102	Hyd. Hyd.	

Cam Notes: master note list on page 260

14 No specific vacuum rating is guaranteed.

Oval Track Lift Rule Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

¹¹ Sets of 8, Requires 2 sets per engine.

²⁵ Machining Required.


Oval Track Lift Rule Hydraulic Flat Tappet Camshafts (cont.) Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
112431-10	CL112431-10	277 277 2600-6600	223 223 .450° Lift Rule, fast tight banked 1/4 mile tracks.	.450 .450	110	106	Hyd. Hyd.	
112431-12	CL112431-12	277 277 2600-6500	223 223 .450° Lift Rule with Vacuum Rule, flat to low banked 1/4 mile tracks.	.450 .450	112	108	Hyd. Hyd.	14
112931-06	CL112931-06	276 280 2600-6600	227 227 .450° Lift Rule, low banked 1/4-3/8 mile tracks. Good throttle response.	.450 .450	106	102	Hyd. Hyd.	
112931-12	CL112931-12	276 280 2600-6600	227 227 .450° Lift Rule, low banked 3/8-1/2 mile tracks. Good mid & top end power.	.450 .450	112	108	Hyd. Hyd.	14
111241-06	CL111241-06	276 284 2600-6800	231 231 .450° Lift Rule cam, great on 3/8 mile tracks. Good low end response.	.450 .450	106	102	Hyd. Hyd.	
111241-12	CL111241-12	276 284 2400-6400	231 231 .450° Lift Vacuum Rule cam. Great on 1/4-3/8 mile mild to medium bank tracks.	.450 .450	112	108	Hyd. Hyd.	14
111241-12S	CL111241-12S	276 284 2400-6400	231 231 Small Base Circle, Vacuum Rule cam. Great on 1/4-3/8 mile mild to medium bank tracks.	.450 .450	112	108	Hyd. Hyd.	14
112691-06	CL112691-06	284 284 2500-6600	231 231 .450° Lift Rule cam. Strong low & mid-range power. Banked 1/4-3/8 mile tracks.	.450 .450	106	102	Hyd. Hyd.	
112691-10	CL112691-10	284 284 2400-6800	231 231 .450° Lift Rule cam. Strong mid-range horsepower.	.450 .450	110	106	Hyd. Hyd.	
112691-12	CL112691-12	284 284 2400-6800	231 231 .450° Lift Rule cam. Strong mid-range horsepower.	.450 .450	112	108	Hyd. Hyd.	14
112791-06	CL112791-06	288 292 2800-6400	239 239 .450° Lift Rule, medium banked 3/8 mile tracks.	.450 .450	106	102	Hyd. Hyd.	
112791-12	CL112791-12	288 292 3000-6600	239 239 .450° Lift Rule with Vacuum Rule, banked 3/8 mile tracks.	.450 .450	112	108	Hyd. Hyd.	14
112821-06	CL112821-06	290 290 3200-6600	237 237 .450° Lift Rule, medium banked 3/8-1/2 mile tracks. Good throttle response.	.450 .450	106	102	Hyd. Hyd.	
112821-08	CL112821-08	290 290 3200-6600	237 237 .450° Lift Rule, medium banked 3/8-1/2 mile tracks. Strong mid-range power.	.450 .450	108	104	Hyd. Hyd.	
112941-06	CL112941-06	294 298 3400-6600	245 245 .450° Lift Rule, high banked 3/8-1/2 mile tracks. Strong mid to top end.	.450 .450	106	102	Hyd. Hyd.	
112941-12	CL112941-12	294 298 3400-6800	245 245 .450° Lift Rule with Vacuum Rule, high banked 1/2 mile tracks. Good mid to top end.	.450 .450	112	108	Hyd. Hyd.	14
112831-06	CL112831-06	294 302 3400-7000	249 249 .450° Lift Rule, fast high banked 3/8-1/2 mile tracks. Strong mid to top end.	.450 .450	106	102	Hyd. Hyd.	
112831-12	CL112831-12	294 302 3600-7000	249 249 .450° Lift Rule with Vacuum Rule, high banked 1/2 mile tracks. Strong mid to top end.	.450 .450	112	108	Hyd. Hyd.	14
112721-06	CL112721-06	296 296 2600-6400	243 243 .450° Lift Rule cam. Good upper mid-range torque. High banked 3/8 to 1/2 mile.	.450 .450	106	102	Hyd. Hyd.	
112751-06	CL112751-06	296 308 2600-6400	255 255 .450° Lift Rule cam. Good upper mid-range torque. High banked 3/8 to 1/2 mile.	.450 .450	106	102	Hyd. Hyd.	
119991	NA	Custom Grind Camshaft Hydraulic Flat Tappet Special Order Camshaft.					Hyd. Hyd.	1
119991-S	NA	Custom Grind Camshaft, Small Base Circle Hydraulic Flat Tappet Special Order Camshaft.					Hyd. Hyd.	1
119991-P55	NA	Custom Grind Camshaft, Special Core Hydraulic Flat Tappet Special Order Camshaft.					Hyd. Hyd.	1
114991	NA	Custom Grind Camshaft 4/7 Swap Hydraulic Flat Tappet Special Order Camshaft.						1,22

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

14 No specific vacuum rating is guaranteed.

22 Ignition firing order must be changed to 1-8-7-3-6-5-4-2.

Some items are not legal for sale or use on any pollution controlled motor vehicle

Oval Track Lift Rule Hydraulic Flat Tappet Camshaft Components

	Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA	98214-K11	98214	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90045-8 ¹¹	90100	95205 95010	92150 94475	94402	94200 94300
	91111 ³ 91112	NA												

Components Notes: master note list on page 260

3 Included in Cam & Lifter Sets.

10 10° Valve lock Angle, must use matching retainers/locks.

11 Sets of 8, Requires 2 sets per engine.

25 Machining Required.

CAMSHAFTS



CHEVROLET SMALL BLOCK • 262-400 1955-1998

Rattler Cams™ Retro-Fit Hydraulic Roller Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
118005-09	CL118005-09	280 288 1800-5600	227 235	.525 .530	109	103	Hyd. Hyd.	1,2 Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.
118045-09	CL118045-09	288 296 2000-5900	235 243	.530 .530	109	103	Hyd. Hyd.	1,2 Big Mama Rattler™, Lopecy idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.
118085-09	CL118085-09	296 304 2400-6200	243 251	.530 .515	109	103	Hyd. Hyd.	1,2 Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.



CHEVROLET SMALL BLOCK • 262-400 1955-1998

Retro-Fit Hydraulic Roller Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
110225-10	CL110225-10	260 266 800-4200	207 213	.450 .465	110	106	Hyd. Hyd.	1,2 Great daily usage, smooth idle, great fuel economy.
110225-10S	CL110225-10S	260 266 800-4200	207 213	.450 .465	110	106	Hyd. Hyd.	1,2 Small Base Circle, Great daily usage, smooth idle, great fuel economy.
110225-12	CL110225-12	260 266 800-4200	207 213	.450 .465	112	108	Hyd. Hyd.	1,2 Great daily usage, smooth idle, great fuel economy.
110315-10	CL110315-10	262 268 1000-4400	209 215	.465 .470	110	106	Hyd. Hyd.	1,2 Improved throttle response & low end torque.
110235-10	CL110235-10	266 270 1000-4800	213 217	.485 .495	110	106	Hyd. Hyd.	1,2 Fair idle, good low & mid-range performance increase.
110235-10S	CL110235-10S	266 270 1000-4800	213 217	.485 .495	110	106	Hyd. Hyd.	1,2 Small Base Circle, Fair idle, good low & mid-range performance increase.
110235-12	CL110235-12	266 270 1000-5000	213 217	.485 .495	112	108	Hyd. Hyd.	1,2 Good idle, Off-Road & Street Performance. 9.0:1 CR advised.
110235-14	CL110235-14	266 270 1000-5000	213 217	.485 .495	114	110	Hyd. Hyd.	1,2 Good idle, broad power range with strong mid-range performance.
113215-08	CL113215-08	270 278 1200-5400	217 225	.495 .500	108	104	Hyd. Hyd.	1,2 Noticeable idle, broad low to mid range power band. Needs 2000+ stall.
113215-10	CL113215-10	270 278 1300-5500	217 225	.495 .500	110	106	Hyd. Hyd.	1,2 Good idle, Street Performance. Strong lower mid range. Stock converter OK.
111145-10	CL111145-10	272 278 1500-5600	219 225	.525 .525	110	106	Hyd. Hyd.	1,2 Fair idle, Performance Street, Nice streetable mid range power. 1800+ stall suggested.
111145-12	CL111145-12	272 278 1500-5600	219 225	.525 .525	112	108	Hyd. Hyd.	1,2 Fair idle, good all around performance. Good vacuum. Computer compatible with chip.
110885-08	CL110885-08	278 278 2000-5800	225 225	.525 .525	108	104	Hyd. Hyd.	1,2 Mild choppy idle, strong torque curve. Likes good intake & exhaust, 2500+ stall.
110885-10	CL110885-10	278 278 2000-5800	225 225	.525 .525	110	106	Hyd. Hyd.	1,2 Fair idle, Street high performance. 2200+ stall, aftermarket intake, headers.
110245-10	CL110245-10	278 284 1600-5400	225 231	.500 .510	110	106	Hyd. Hyd.	1,2 Fair idle, Street/Strip. Auto OK with 2500+ stall.
110245-12	CL110245-12	278 284 1800-5400	225 231	.500 .510	112	108	Hyd. Hyd.	1,2 Fair idle, Street & mild Performance usage. Crisp throttle.

Cam Notes: master note list on page 260

- 1 Stock (O.E.) valve springs cannot be used.
- 2 Requires Thrust Button.

Some items are not legal for sale or use on any pollution controlled motor vehicle



Retro-Fit Hydraulic Roller Camshafts (cont.)

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
110245-12S	CL110245-12S	278 284 1800-5400	225 231	.500 .510	112	108	Hyd. Hyd.	1,2 <i>Small Base Circle, Fair idle, Street & mild Performance usage. Crisp throttle.</i>
110245-14	CL110245-14	278 284 1800-5600	225 231	.500 .510	114	110	Hyd. Hyd.	1,2 <i>Mild idle, Street Performance, great with small blower or NOS.</i>
110325-08	CL110325-08	278 286 2000-5400	225 233	.525 .530	108	104	Hyd. Hyd.	1,2 <i>Choppy idle, Street performance usage. 2500+ stall.</i>
110325-10	CL110325-10	278 286 2200-5800	225 233	.525 .530	110	106	Hyd. Hyd.	1,2 <i>Rough idle, Street/Strip performance. Strong mid-range. 2500+ stall.</i>
110325-10S	CL110325-10S	278 286 2200-5800	225 233	.525 .530	110	106	Hyd. Hyd.	1,2 <i>Small Base Circle, Rough idle, Street/Strip performance. Strong mid-range. 2500+ stall.</i>
110525-10	CL110525-10	280 286 2300-6100	227 233	.560 .560	110	106	Hyd. Hyd.	1,2 <i>Choppy idle, Saturday nite special, Street/Strip. Needs good intake, headers & 2500+.</i>
110525-12	CL110525-12	280 286 2300-6200	227 233	.560 .560	112	108	Hyd. Hyd.	1,2 <i>Good idle & vacuum. Good all around mid range performance. 2500+ stall.</i>
110305-08	CL110305-08	282 282 2000-5500	229 229	.480 .480	108	104	Hyd. Hyd.	1,2 <i>Choppy idle, strong low & mid range performance. 2500+ stall.</i>
110255-10	CL110255-10	284 288 2200-5800	231 235	.510 .530	110	106	Hyd. Hyd.	1,2 <i>Rough idle, Street/Strip performance. Great low to mid-range torque & power.</i>
110255-12	CL110255-12	284 288 2000-5600	231 235	.510 .530	112	108	Hyd. Hyd.	1,2 <i>Fair idle, performance usage. Great mid-range torque & horsepower.</i>
110255-12S	CL110255-12S	284 288 2000-5600	231 235	.510 .530	112	108	Hyd. Hyd.	1,2 <i>Small Base Circle, Fair idle, performance usage. Great mid-range torque & horsepower.</i>
110265-10	CL110265-10	286 294 2400-5800	233 241	.530 .545	110	106	Hyd. Hyd.	1,2 <i>Rough idle, Hot Street & Bracket Racing. 10.0:1-up CR advised. 2800+ stall.</i>
110265-10S	CL110265-10S	286 294 2400-5800	233 241	.530 .545	110	106	Hyd. Hyd.	1,2 <i>Small Base Circle, Rough idle, Hot Street & Bracket Racing. 10.0:1-up CR. 2800+ stall.</i>
110265-12	CL110265-12	286 294 2400-6000	233 241	.530 .545	112	108	Hyd. Hyd.	1,2 <i>Loppy idle, Hot Street & Bracket Racing. 10.0:1-up CR advised.</i>
110265-12S	CL110265-12S	286 294 2400-6000	233 241	.530 .545	112	108	Hyd. Hyd.	1,2 <i>Small Base Circle, Loppy idle, Hot Street & Bracket Racing. 10.0:1-up CR advised.</i>
110265-14	CL110265-14	286 294 2400-6200	233 241	.530 .545	114	110	Hyd. Hyd.	1,2 <i>Good idle, great mid range performance. 10.0:1+ CR, 2600+ stall & 3.73 or lower gears.</i>
110635-10	CL110635-10	290 290 2400-6400	237 237	.560 .560	110	106	Hyd. Hyd.	1,2 <i>Rough idle, Street/Strip, strong mid range. 10.0:1 CR, 2500+ stall.</i>
111815-10	CL111815-10	290 298 2400-6400	237 245	.560 .560	110	106	Hyd. Hyd.	1,2 <i>Rough idle, Street/Strip applications. 10.0:1 CR, good exhaust, 3000+ stall.</i>
111815-12	CL111815-12	290 298 2400-6500	237 245	.560 .560	112	108	Hyd. Hyd.	1,2 <i>Loppy idle, Hot Street & Bracket Racing, great mid range. 10.0:1+ CR, 3000+ stall.</i>
110275-10	CL110275-10	294 300 2600-6400	241 247	.545 .565	110	106	Hyd. Hyd.	1,2 <i>Rough idle, Hot Street & Bracket Racing. 10.5:1-up CR advised.</i>
110275-12	CL110275-12	294 300 2600-6500	241 247	.545 .565	112	108	Hyd. Hyd.	1,2 <i>Rough idle, Bracket Race with excellent mid & upper end horsepower.</i>
110275-12S	CL110275-12S	294 300 2600-6500	241 247	.545 .565	112	108	Hyd. Hyd.	1,2 <i>Small Base Circle, Rough idle, Bracket Race with excellent mid & upper end HP.</i>
111655-10	CL111655-10	296 302 2800-6500	243 249	.600 .600	110	106	Hyd. Hyd.	1,2 <i>Rough idle, Hot Street/Strip, good mid-range torque.</i>
111655-12	CL111655-10	296 302 2800-6600	243 249	.600 .600	112	108	Hyd. Hyd.	1,2 <i>Rough idle, Hot Street/Strip, great with aftermarket EFI systems.</i>

Cam Notes: master note list on page 260

- 1 Stock (O.E.) valve springs cannot be used.
- 2 Requires Thrust Button.

Retro-Fit Hydraulic Roller Camshaft Components

	Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
	91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰									

Components Notes: master note list on page 260

3 Included in Cam & Lifter Sets.

10 10° Valve lock Angle, must use matching retainers/locks.

25 Machining Required.



CHEVROLET SMALL BLOCK • 262-400 1955-1998

Retro-Fit Hydraulic Roller Camshafts (cont.)

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN	EX	Duration @ .050" IN	EX	Valve Lift w/1.50 Rockers IN	EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN	EX	Cam Notes	
113365-10	CL113365-10	298 2600-6600	298 Rough idle,	245 Street/Strip,	245 Needs 3000+	.560	.560	110	106	Hyd.	Hyd.	1,2	
stall, headers & good intake.													
110335-10	CL110335-10	300 2800-6400	304 Rough idle,	247 Hot Street/Brackets.	251 Requires aftermarket	.550	.540	110	106	Hyd.	Hyd.	1,2	
stall.													
110335-10S	CL110335-10S	300 2800-6400	304 Small Base	247 Circle,	251 Hot Street/Brackets.	.550	.540	110	106	Hyd.	Hyd.	1,2	
Requires aftermarket heads, 3500+ stall.													
110345-08	CL110345-08	300 2800-6400	306 Rough idle,	247 needs good heads.	253 Good upper mid-range.	.565	.580	108	104	Hyd.	Hyd.	1,2	
Needs 3500+ stall.													
110345-10	CL110345-10	300 2800-6400	306 Rough idle,	247 needs good heads.	253 Good upper mid-range.	.565	.580	110	106	Hyd.	Hyd.	1,2	
Needs 3500+ stall.													
110345-12	CL110345-12	300 2800-6600	306 Lopey idle,	247 broad mid to upper	253 mid range power.	.565	.580	112	106	Hyd.	Hyd.	1,2	
3500+ stall.													
113155-10	CL113155-10	300 3000-6600	308 Hot Street/Brackets.	247 Requires aftermarket	255 heads, 3500+	.600	.600	110	106	Hyd.	Hyd.	1,2	
stall.													
113155-10S	CL113155-10S	300 3000-6600	308 Small Base	247 Circle,	255 Hot Street/Brackets.	.600	.600	110	106	Hyd.	Hyd.	1,2	
Requires aftermarket heads, 3500+ stall.													
113155-12	CL113155-12	300 3000-6800	308 Pro Street/Bracket,	247 good top end	255 horsepower.	.600	.600	112	108	Hyd.	Hyd.	1,2	
Needs compression & 3500+ stall.													
116755-10	CL116755-10	304 3000-6800	308 Rough idle,	251 upper mid-range &	255 top end power.	.600	.580	110	106	Hyd.	Hyd.	1,2	
Needs 11.0:1+ CR.													
110355-10	CL110355-10	304 3000-6800	310 Rough idle,	251 upper mid-range &	257 top end power.	.555	.555	110	106	Hyd.	Hyd.	1,2	
Needs 11.0:1+ CR.													
111335-10	CL111335-10	304 2800-6400	312 Rough idle,	251 best in large 420+	259 ci. engine.	.600	.600	110	106	Hyd.	Hyd.	1,2	
Great upper mid to top end performance.													
111335-12	CL111335-12	304 2800-6400	312 Rough idle,	251 Broad mid to top	259 end performance in	.600	.600	112	108	Hyd.	Hyd.	1,2	
420+ ci.													
116675-10	CL116675-10	312 3000-6800	320 Rough idle,	257 upper mid-range &	267 top end power.	.600	.600	110	106	Hyd.	Hyd.	1,2	
Needs 11.0:1+ CR.													
119995	NA	Custom Grind Camshaft									Hyd.	Hyd.	1,2
Retro-Fit Hydraulic Roller Special Order Camshaft.													
119999	NA	Custom Grind Camshaft, with Cast Distributor Gear									Hyd.	Hyd.	1,2
Retro-Fit Hydraulic Roller Special Order Camshaft. Std. or Small Base.													
--	NA	Custom Grind Camshaft, 4/7 Swap or "C" (LS) Firing Order									Hyd.	Hyd.	1,2



CHEVROLET SMALL BLOCK • 305/350 1987-1998 w/STEPPED NOSE (CARBURETED)



Rattler Cams™ Hydraulic Roller Camshafts for OE Roller Applications

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
188005-09	CL188005-09	280 288 1800-5600	227 235	.525 .530	109	103	Hyd. Hyd.	1
Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.								
188045-09	CL188045-09	288 296 2000-5900	235 243	.530 .530	109	103	Hyd. Hyd.	1
Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.								
188085-09	CL188085-09	296 304 2400-6200	243 251	.530 .515	109	103	Hyd. Hyd.	1
Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.								

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

2 Requires Thrust Button.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHEVROLET SMALL BLOCK • 262-400 1955-1998

Retro-Fit Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91160 ³	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
91164N ³ 91160	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
91160 ³	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
91160 ³	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
91160 ³	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
91160 ³	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
91160 ³	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
91160 ³	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
91160 ³	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
91160 ³	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
91160 ³	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
91160 ³	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
91160 ³	90132	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90005 90070	90100	95201 95022	92150 94475	94402	94200 94300
--	--	--	--	--	--	--	--	--	--	--	92150 94475	94402	94200 94300
--	--	--	--	--	--	--	--	--	--	--	92150 94475	94402	94200 94300
--	--	--	--	--	--	--	--	--	--	--	94475	94402	94300

CHEVROLET SMALL BLOCK • 305/350 1987-1998 W/STEPPED NOSE (CARBURETED)

Rattler Cams™ Retro-Fit Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91113 ³ 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 ³ 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 ³ 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.



CHEVROLET SMALL BLOCK • 305/350 1987-1998 w/STEPPED NOSE (CARBURETED)

Hydraulic Roller Camshafts for OE Roller Applications Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
180225-12	NA	260 800-4200	266 Great daily usage, smooth idle, great fuel economy.	207 213	.450 .465	112 108	Hyd. Hyd.	1
180315-10	NA	262 1000-4400	268 Improved throttle response & low end torque.	209 215	.465 .470	110 106	Hyd. Hyd.	1
180235-10	NA	266 1000-4800	270 Fair idle, good low & mid-range performance increase.	213 217	.485 .495	110 106	Hyd. Hyd.	1
180235-12	NA	266 1000-5000	270 Good idle, Off-Road & Street Performance. 9.0:1 CR advised.	213 217	.485 .495	112 108	Hyd. Hyd.	1
180235-14	NA	266 1000-5000	270 Good idle, broad power range with strong mid-range performance.	213 217	.485 .495	114 110	Hyd. Hyd.	1
183215-08	NA	270 1200-5400	278 Noticeable idle, broad low to mid range power band. Needs 2000+ stall.	217 225	.495 .500	108 104	Hyd. Hyd.	1
183215-10	NA	270 1300-5500	278 Good idle, Street Performance. Strong lower mid range. Stock converter OK.	217 225	.495 .500	110 106	Hyd. Hyd.	1
183215-14	NA	270 1300-5500	278 Good idle, Street Performance. Strong lower mid range. Stock converter OK.	217 225	.495 .500	114 110	Hyd. Hyd.	1
181145-10	NA	272 1500-5600	278 Fair idle, Performance Street, Nice streetable mid range power. 1800+ stall suggested.	219 225	.525 .525	110 106	Hyd. Hyd.	1
181145-12	NA	272 1500-5600	278 Fair idle, good all around performance. Good vacuum. Computer compatible with chip.	219 225	.525 .525	112 108	Hyd. Hyd.	1
180885-08	NA	278 2000-5800	278 Mild choppy idle, strong torque curve. Likes good intake & exhaust, 2500+ stall.	225 225	.525 .525	108 104	Hyd. Hyd.	1
180885-10	NA	278 2000-5800	278 Fair idle, Street high performance. 2200+ stall, aftermarket intake, headers.	225 225	.525 .525	110 106	Hyd. Hyd.	1
180245-10	NA	278 1600-5400	284 Fair idle, Street/Strip. Auto OK with 2500+ stall.	225 231	.500 .510	110 106	Hyd. Hyd.	1
180245-12	NA	278 1800-5400	284 Fair idle, Street & mild Performance usage. Crisp throttle.	225 231	.500 .510	112 108	Hyd. Hyd.	1
180245-14	NA	278 1800-5600	284 Mild idle, Street Performance, great with small blower or NOS.	225 231	.500 .510	114 110	Hyd. Hyd.	1
180325-08	NA	278 2000-5800	286 Choppy idle, Street performance usage. 2500+ stall.	225 233	.525 .530	108 104	Hyd. Hyd.	1
180325-10	NA	278 2200-5800	286 Rough idle, Street/Strip performance. Strong mid-range. 2500+ stall.	225 233	.525 .530	110 106	Hyd. Hyd.	1
180325-12	NA	278 2200-5800	286 Fair idle, Street/Strip performance. Strong mid-range. 2500+ stall.	225 233	.525 .530	112 108	Hyd. Hyd.	1
186685-14	NA	278 2800-6700	288 Upper mid-range & top end power. Needs 10.0:1+ CR.	225 235	.525 .530	114 110	Hyd. Hyd.	1
180525-10	NA	280 2300-6100	286 Choppy idle, Saturday nite special, Street/Strip. Needs good intake, headers & 2500+.	227 233	.560 .560	110 106	Hyd. Hyd.	1
180525-12	NA	280 2300-6200	286 Good idle & vacuum. Good all around mid range performance. 2500+ stall.	227 233	.560 .560	112 108	Hyd. Hyd.	1
180305-08	NA	282 2000-5500	282 Choppy idle, strong low & mid range performance. 2500+ stall.	229 229	.480 .480	108 104	Hyd. Hyd.	1
180255-10	NA	284 2200-5800	288 Rough idle, Street/Strip performance. Great low to mid-range torque & power.	231 235	.510 .530	110 106	Hyd. Hyd.	1
180255-12	NA	284 2000-5600	288 Fair idle, performance usage. Great mid-range torque & horsepower.	231 235	.510 .530	112 108	Hyd. Hyd.	1

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

CHEVROLET SMALL BLOCK • 305/350 1987-1998 w/STEPED NOSE (CARBURETED)

Hydraulic Roller Camshafts for OE Roller Application Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301

Components Notes: master note list on page 260

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.



CHEVROLET SMALL BLOCK • 305/350 1987-1998 w/STEPPED NOSE (CARBURETED)

Hydraulic Roller Camshafts for OE Roller Applications **Firing Order:** 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
180265-10	NA	286 294 2400-5800	233 241	.530 .545	110	106	Hyd. Hyd.	1
		Rough idle, Hot Street & Bracket Racing. 10.0:1-up CR advised. 2800+ stall						
180265-12	NA	286 294 2400-6000	233 241	.530 .545	112	108	Hyd. Hyd.	1
		Lopey idle, Hot Street & Bracket Racing. 10.0:1-up CR advised.						
180265-14	NA	286 294 2400-6200	233 241	.530 .545	114	110	Hyd. Hyd.	1
		Good idle, great mid range performance. 10.0:1+ CR, 2600+ stall & 3.73 or lower gears.						
180635-10	NA	290 290 2400-6400	237 237	.560 .560	110	106	Hyd. Hyd.	1
		Rough idle, Street/Strip, strong mid range. 10.0:1 CR, 2500+ stall.						
181815-10	NA	290 298 2400-6400	237 245	.560 .560	110	106	Hyd. Hyd.	1
		Rough idle, Street/Strip applications. 10.0:1 CR, good exhaust, 3000+ stall.						
181815-12	NA	290 298 2400-6500	237 245	.560 .560	112	108	Hyd. Hyd.	1
		Lopey idle, Hot Street & Bracket Racing, great mid range. 10.0:1+ CR, 3000+ stall.						
180275-10	NA	294 300 2600-6400	241 247	.545 .565	110	106	Hyd. Hyd.	1
		Rough idle, Hot Street & Bracket Racing. 10.5:1-up CR advised.						
180275-12	NA	294 300 2600-6500	241 247	.545 .565	112	108	Hyd. Hyd.	1
		Rough idle, Bracket Race with excellent mid & upper end horsepower.						
183365-10	NA	298 298 2600-6600	245 245	.560 .560	110	106	Hyd. Hyd.	1
		Rough idle, Street/Strip, Needs 3000+ stall, headers & good intake.						
180335-10	NA	300 304 2600-6400	247 251	.550 .540	110	106	Hyd. Hyd.	1
		Hot Street/Brackets. Requires aftermarket heads, 3500+ stall.						
180345-10	NA	300 306 2600-6400	247 253	.565 .580	110	106	Hyd. Hyd.	1
		2800-6600 Rough idle, needs good heads. Good upper mid-range. Needs 3500+ stall.						
180345-12	NA	300 306 2800-6600	247 253	.565 .580	112	108	Hyd. Hyd.	1
		Lopey idle, broad mid to upper mid range power. 3500+ stall.						
186755-10	NA	304 308 2800-6700	251 255	.600 .580	110	106	Hyd. Hyd.	1
		Upper mid-range & top end power. Needs 11.0:1+ CR.						
186755-12	NA	304 308 2800-6700	251 255	.600 .580	112	108	Hyd. Hyd.	1
		Upper mid-range & top end power. Needs 11.0:1+ CR.						
180355-10	NA	304 310 2800-6700	251 257	.555 .555	110	106	Hyd. Hyd.	1
		Upper mid-range & top end power. Needs 11.0:1+ CR.						
186675-10	NA	312 320 3000-6800	259 267	.600 .600	110	106	Hyd. Hyd.	1
		Rough idle, upper mid-range & top end power. Needs 11.0:1+ CR.						
189995	NA	Custom Grind Camshaft Hydraulic Roller Special Order Camshaft.					Hyd. Hyd.	1
189995-S	NA	Custom Grind Camshaft, Small Base Circle Hydraulic Roller Special Order Camshaft.					Hyd. Hyd.	1

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

CHEVROLET SMALL BLOCK • 305/350 1987-1998 w/STEPPED NOSE (CARBURETED)

Hydraulic Roller Camshafts for OE Roller Application Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	NA	98213-K12 ¹⁰ 98113-K12 ¹⁰	98213 98113	97132 ¹⁰ 97174 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵	90084	90100	95201 95022	92150 94475	94402	94301
91113 91113FB	--	--	--	--	--	--	--	--	--	--	--	94402	94301
91113 91113FB	--	--	--	--	--	--	--	--	--	--	--	94402	94301

Components Notes: master note list on page 260

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

CAMSHAFTS



CHEVROLET SMALL BLOCK • 262-400 1955-1998

American Muscle™ Mechanical Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
117492-10	CL117492-10 CL117492-10DL ⁴	287 287 2200-5800	227 229	.395 .400	110	108	.012 .018	34
117222-16	CL117222-16 CL117222-16DL ⁴	279 291 2800-6600	241 253	.460 .488	116	112	.020 .025	1
112192-14	CL112192-14 CL112192-14DL ⁴	294 294 3800-7000	254 254	.485 .485	114	110	.030 .030	1
117422-12	CL117422-12 CL117422-12DL ⁴	295 307 4200-7200	257 269	.495 .515	112	108	.022 .022	1
117692-12	CL117692-12 CL117692-12DL ⁴	299 311 4400-7800	261 273	.515 .535	112	108	.022 .022	1



CHEVROLET SMALL BLOCK • 262-400 1955-1998

Mechanical Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
116842-07	CL116842-07 CL116842-07DL ⁴	266 268 3000-6200	238 240	.510 .531	107	102	.016 .016	1
116822-07	CL116822-07 CL116822-07DL ⁴	268 272 3000-6200	240 244	.510 .531	107	102	.016 .016	1
110102-06	CL110102-06 CL110102-06DL ⁴	275 281 3000-6200	240 246	.505 .520	106	102	.022 .022	1
110102-08	CL110102-08 CL110102-08DL ⁴	275 281 3000-6200	240 246	.505 .520	108	104	.022 .022	1
110102-12	CL110102-12 CL110102-12DL ⁴	275 281 3000-6400	240 246	.505 .520	112	108	.022 .022	1
112062-06	CL112062-06 CL112062-06DL ⁴	275 285 3000-6400	240 250	.525 .525	106	104	.022 .022	1
112062-06S	CL112062-06S CL112062-06SDL ⁴	275 285 3000-6400	240 250	.525 .525	106	104	.022 .022	1
112062-10	CL112062-10 CL112062-10DL ⁴	275 285 3000-6200	240 250	.525 .525	110	106	.022 .022	1
111002-06	CL111002-06 CL111002-06DL ⁴	279 279 3200-6400	244 244	.510 .510	106	102	.022 .022	1
111002-08	CL111002-08 CL111002-08DL ⁴	279 279 3200-6200	244 244	.510 .510	108	104	.022 .022	1
112072-06	CL112072-06 CL112072-06DL ⁴	281 281 3200-6700	246 246	.515 .515	106	102	.022 .022	1
112072-08	CL112072-08 CL112072-08DL ⁴	281 281 2500-6200	246 246	.515 .515	108	104	.022 .022	1
112652-06	CL112652-06 CL112652-06DL ⁴	281 287 2600-6500	246 252	.520 .530	106	102	.022 .022	1

Cam Notes: master note list on page 260

¹ Stock (O.E.) valve springs cannot be used.

⁴ Direct Lube Lifters Included in Cam & "Direct Lube" Lifter (DL) Sets.

³⁴ Provisions for increased oiling recommended.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHEVROLET SMALL BLOCK • 262-400 1955-1998

American Muscle™ Mechanical Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91115 ³ 91118 ⁴	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300

CHEVROLET SMALL BLOCK • 262-400 1955-1998

Mechanical Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

⁴ Direct Lube Lifters Included in Cam & "Direct Lube" Lifter (DL) Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.



Mechanical Flat Tappet Camshafts (cont.)

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
111012-08	CL111012-08 CL111012-08DL ⁴	283 283 3000-6200	248 248	.510 .510	108	104	.022 .022	1
		Street/Strip, powerful through entire rpm range.						
110812-06	CL110812-06 CL110812-06DL ⁴	276 280 2500-6500	248 252	.535 .540	106	102	.016 .016	1,34
		Tight Lash Oval Track profile, great power coming off corners.						
110912-06S	CL110912-06S CL110912-06SDL ⁴	276 280 2500-6500	248 252	.535 .540	106	102	.016 .016	1,34
		Small Base Circle, Tight Lash Oval Track profile, great power coming off corners.						
112352-06	CL112352-06 CL112352-06DL ⁴	283 291 3000-7000	248 256	.510 .505	106	102	.022 .022	1
		1/4 to 3/8 mile tracks. Great all-around short track cam.						
112352-10	CL112352-10 CL112352-10DL ⁴	283 291 3000-7000	248 256	.510 .505	110	106	.022 .022	1
		383+ Street/Strip. Needs 10.0:1 CR, 2800+ stall.						
112672-06	CL112672-06 CL112672-06DL ⁴	285 285 2800-6500	250 250	.525 .525	106	102	.022 .022	1
		Best on 1/4 to 3/8 mile tight tracks. Big torque out of the corners. Needs headers.						
112312-08	CL112312-08 CL112312-08DL ⁴	287 291 2600-6600	252 256	.530 .535	108	104	.022 .022	1
		Hot Street/Strip, 10.0:1, 3000+ stall & single plane intake.						
112312-08S	CL112312-08S CL112312-08SDL ⁴	287 291 2600-6600	252 256	.530 .535	108	104	.022 .022	1
		Small Base Circle, Hot Street/Strip, 10.0:1, 3000+ stall & single plane intake.						
112312-10	CL112312-10 CL112312-10DL ⁴	287 291 2800-6800	252 256	.530 .535	110	106	.022 .022	1
		Hot Street/Strip, 383+ cubic inch, 10.0:1, 2800+ stall.						
112312-10S	CL112312-10S CL112312-10SDL ⁴	287 291 2800-6800	252 256	.530 .535	110	106	.022 .022	1
		Small Base Circle, Hot Street/Strip, 383+ cubic inch, 10.0:1, 2800+ stall.						
112452-04	CL112452-04 CL112452-04DL ⁴	287 295 2600-6800	252 260	.530 .555	104	100	.022 .022	1
		383+ Street/Strip. Needs 10.0:1 CR, 2800+ stall.						
110822-06	CL110822-06 CL110822-06DL ⁴	280 288 3000-7200	252 260	.540 .560	106	102	.016 .016	1,34
		Great mid & top end Oval Track tight lash cam. Good on dirt or asphalt.						
110922-06S	CL110922-06S CL110922-06SDL ⁴	280 288 3000-7200	252 260	.540 .560	106	102	.016 .016	1,34
		Small Base Circle, Great mid & top end OT tight lash cam. Good on dirt or asphalt.						
111752-06	CL111752-06 CL111752-06DL ⁴	287 299 3000-6800	252 261	.530 .525	106	102	.022 .022	1
		Best on 3/8 to 1/2 mile fast tracks. Super mid & upper RPM cam.						
111752-06S	CL111752-06S CL111752-06SDL ⁴	287 299 3000-6800	252 261	.530 .525	106	102	.022 .022	1
		Small Base Circle, Best on 3/8 to 1/2 mile fast tracks. Super mid & upper RPM cam.						
112662-06	CL112662-06 CL112662-06DL ⁴	287 299 3000-7000	252 264	.545 .555	106	102	.022 .022	1
		Best on fast 1/4 to 3/8 mile. Larger cubic inch 383+ recommended. 11.0:1+.						
111982-06	CL111982-06 CL111982-06DL ⁴	289 285 3200-7000	254 250	.550 .525	106	102	.022 .022	1
		Oval Track with 2bbl. carb. 1/4-3/8 banked track. Needs 9.5:1+ CR, good exhaust.						
112092-05	CL112092-05 CL112092-05DL ⁴	291 299 3000-7400	256 264	.535 .555	105	99	.022 .022	1
		Rough idle, works well in Pro-Street or heavy Bracket car.						
112082-05	CL112082-05 CL112082-05DL ⁴	291 301 2800-7000	256 266	.505 .505	105	99	.022 .022	1
		Great power, torque & throttle response. Great Sportsman cam.						
112542-06	CL112542-06 CL112542-06DL ⁴	295 289 3200-7200	260 254	.555 .550	106	102	.022 .022	1
		Rough idle, Oval Track. Banked 3/8 to 1/2 mile tracks. 11.5:1+ CR.						
112542-06S	CL112542-06S CL112542-06SDL ⁴	295 289 3200-7200	260 254	.555 .550	106	102	.022 .022	1
		Small Base Circle, Rough idle, Oval Track. Banked 3/8 to 1/2 mile tracks. 11.5:1+ CR.						
112532-06	CL112532-06 CL112532-06DL ⁴	295 299 3200-7200	260 264	.555 .555	106	102	.022 .022	1
		Bracket Race or 3/8 to 1/2 mile Oval Track with fast corners. 350-383.						
112322-08	CL112322-08 CL112322-08DL ⁴	295 303 3200-7400	260 268	.555 .574	108	104	.022 .022	1
		Bracket Race 350-383, or 3/8 to 1/2 mile 383-400. Needs 12.0:1+ CR.						
112102-12	CL112102-12 CL112102-12DL ⁴	297 309 3400-7400	262 274	.510 .535	112	108	.022 .022	1
		Hot Pro-Street & Bracket Racing. Works well with NOS.						

Cam Notes: master note list on page 260

¹ Stock (O.E.) valve springs cannot be used.⁴ Direct Lube Lifters Included in Cam & "Direct Lube" Lifter (DL) Sets.³⁴ Provisions for increased oiling recommended.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHEVROLET SMALL BLOCK • 262-400 1955-1998

Mechanical Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98218-K12 ¹⁰ 98445-K12 ²⁵	98218 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98218-K12 ¹⁰ 98445-K12 ²⁵	98218 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
91115 ³ 91118 ⁴	NA	98212-K12 ¹⁰ 98445-K12 ²⁵	98212 98445 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

⁴ Direct Lube Lifters Included in Cam & "Direct Lube" Lifter (DL) Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.



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Mechanical Flat Tappet Camshafts (cont.)

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
118302-06	CL118302-06 CL118302-06DL ⁴	292 296 3400-7200	264 268	.555 .550	106	102	.016 .016	1,34
		Oval track, Dirt or asphalt, 3/8 to 1/2 mile with fast corners						
118302-06S	CL118302-06S CL118302-06SDL ⁴	292 296 3400-7200	264 268	.555 .550	106	102	.016 .016	1,34
		Small Base Circle, Oval track, Dirt or asphalt, 3/8 to 1/2 mile with fast corners.						
112512-06	CL112512-06 CL112512-06DL ⁴	303 309 3200-7200	268 274	.550 .535	106	102	.022 .022	1
		Rough idle, Drag Race. Higher CR, stall speed & lower gears.						
112262-06	CL112262-06 CL112262-06DL ⁴	303 313 4000-7500	268 278	.574 .550	106	102	.022 .022	1
		Serious Competition only. Needs the best of everything.						
112332-08	CL112332-08 CL112332-08DL ⁴	303 313 3600-7400	268 278	.574 .574	108	104	.022 .022	1
		Bracket Racer special. Super strong mid-range & top end.						
112642-10	CL112642-10 CL112642-10DL ⁴	322 322 3500-7500	276 276	.591 .591	110	106	.022 .022	1
		Serious Competition 383-406, Requires 12.0:1+ CR, good single plane intake.						
112552-06	CL112552-06 CL112552-06DL ⁴	313 321 4200-7800	278 286	.550 .570	106	102	.022 .022	1
		Rough idle, Large 400+ Bracket/Class cam. Needs good heads & intake.						
112552-10	CL112552-10 CL112552-10DL ⁴	313 321 4200-8000	278 286	.550 .570	110	106	.022 .022	1
		Large 400+ Bracket, broad upper mid range & top end power. Needs good heads.						
119992	NA	Custom Grind Camshaft Mechanical Flat Tappet Special Order Camshaft.						1
119992-S	NA	Custom Grind Camshaft, Small Base Circle Mechanical Flat Tappet Special Order Camshaft.						1
119992-P55	NA	Custom Grind Camshaft, Special Core Mechanical Flat Tappet Special Order Camshaft.						1
119996	NA	Custom Grind Camshaft 4/7 Swap Mechanical Flat Tappet Special Order Camshaft.						1,22
119996-S	NA	Custom Grind Camshaft, Small Base Circle 4/7 Swap Mechanical Flat Tappet Special Order Camshaft.						1,22



CHEVROLET SMALL BLOCK • 262-400 1955-1998

Oval Track Lift Rule Mechanical Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
116772-06	CL116772-06 CL116772-06DL ⁴	264 270 2800-6200	236 242	.450 .450	106	102	.016 .016	1
		Oval Track, .450" Lift Rule, Best on tight short tracks. Stong off corner.						
111632-06	CL111632-06 CL111632-06DL ⁴	272 278 3200-6600	244 250	.500 .500	106	102	.016 .016	1
		Oval Track, .500" Lift Rule, Best on tight short tracks. Stong off corner. Low vacuum.						
110432-06	CL110432-06 CL110432-06DL ⁴	280 286 3400-7200	252 258	.515 .515	106	102	.016 .016	1,34
		Oval Track, .500" Lift Rule, 1/4 to 3/8 mile, also great open wheel with 1.8/1.7 rockers.						
110832-06	CL110832-06 CL110832-06DL ⁴	283 289 3200-7200	254 260	.515 .515	106	102	.016 .016	1,34
		Late Model Stock, .500" Lift Rule (.550" w/1.6 rocker) best on 3/8 to 1/2 mile with limited intake.						
110792-06	CL110792-06 CL110792-06DL ⁴	284 294 3000-7000	256 266	.515 .515	106	102	.016 .016	1,34
		Oval Track, .500" Lift Rule (.550" w/1.6 rocker), fast banked 1/4 to 3/8 mile.						

Cam Notes: master note list on page 260

¹ Stock (O.E.) valve springs cannot be used.⁴ Direct Lube Lifters Included in Cam & "Direct Lube" Lifter (DL) Sets.²² Ignition firing order must be changed to 1-8-7-3-6-5-4-2.³⁴ Provisions for increased oiling recommended.

Some items are not legal for sale or use on any pollution controlled motor vehicle

4/7 Swap *Mechanical Flat Tappet Camshafts*

Firing Order: 1•8•7•3•6•5•4•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
114032-06	CL114032-06 CL114032-06DL ⁴	283 287 3000-6800	248 252	.535 .530	106	102	.022 .022	1,22
		Oval Track, 2bbl. 1/4 to 3/8 tight, with good intake & exhaust.						
114032-06S	CL114032-06S CL114032-06SDL ⁴	283 287 3000-6800	248 252	.535 .530	106	102	.022 .022	1,22
		Small Base Circle, Oval Track, 2bbl. 1/4 to 3/8 tight, with good intake & exhaust.						
114042-06	CL114042-06 CL114042-06DL ⁴	287 295 3200-6800	252 260	.545 .535	106	102	.022 .022	1,22
		Oval Track, 4bbl. 1/4 to 3/8 tight, with good intake, exhaust, 12.0:1+ CR.						
114042-06S	CL114042-06S CL114042-06SDL ⁴	287 295 3200-6800	252 260	.545 .535	106	102	.022 .022	1,22
		Small Base Circle, Oval Track, 4bbl. 1/4 to 3/8 tight, with good intake, exhaust, 12.0:1+ .						
114822-06	CL114822-06 CL114822-06DL ⁴	280 288 3200-6800	252 260	.540 .560	106	102	.016 .016	1,22,34
		Oval Track, tight 1/4 to 3/8 mile. 12.0:1+ CR, single plane intake, headers.						
114822-06S	CL114822-06S CL114822-06SDL ⁴	280 288 3200-6800	252 260	.540 .560	106	102	.016 .016	1,22,34
		Small Base Circle, Oval Track, tight 1/4 to 3/8 mile. 12.0:1+ CR, headers.						
114012-06	CL114012-06 CL114012-06DL ⁴	291 301 3800-7200	256 266	.535 .555	106	102	.022 .022	1,22
		Drag Race with 4000+ stall, 11.0:1+ CR. Best with 1.6 intake rockers.						
114012-06S	CL114012-06S CL114012-06SDL ⁴	291 301 3800-7200	256 266	.535 .555	106	102	.022 .022	1,22
		Small Base Circle, Drag Race with 4000+ stall, 11.0:1+ CR. Best with 1.6 intake rockers.						
114532-06	CL114532-06 CL114532-06DL ⁴	295 299 3200-7200	260 264	.555 .555	106	102	.022 .022	1,22
		Bracket Race or 3/8 to 1/2 mile Oval Track with fast corners. 350-383.						
114532-06S	CL114532-06S CL114532-06SDL ⁴	295 299 3200-7200	260 264	.555 .555	106	102	.022 .022	1,22
		Small Base Circle, Bracket Race or 3/8 to 1/2 mile Oval Track with fast corners. 350-383.						
114052-06	CL114052-06 CL114052-06DL ⁴	295 301 3400-7200	260 266	.565 .555	106	102	.022 .022	1,22
		Oval Track, 360ci+, 1/4 to 3/8 tight, with good intake, exhaust, 12.0:1+ CR.						
114052-06S	CL114052-06S CL114052-06SDL ⁴	295 301 3400-7200	260 266	.565 .555	106	102	.022 .022	1,22
		Small Base Circle, Oval Track, 360ci+, 1/4 to 3/8 tight, with good intake, exhaust, 12.0:1+.						
114022-06	CL114022-06 CL114022-06DL ⁴	301 309 4200-7400	266 274	.555 .555	106	102	.022 .022	1,22
		Drag Race with 12.0:1+ CR, 4800+ stall. Needs good heads & intake.						
114022-06S	CL114022-06S CL114022-06SDL ⁴	301 309 4200-7400	266 274	.555 .555	106	102	.022 .022	1,22
		Small Base Circle, Drag Race with 12.0:1+ CR, 4800+ stall.						
114542-06	CL114542-06 CL114542-06DL ⁴	303 309 3200-7200	268 274	.550 .535	106	102	.022 .022	1,22
		Rough idle, Drag Race. Higher CR, stall speed & lower gears.						
114542-06S	CL114542-06S CL114542-06SDL ⁴	303 309 3200-7200	268 274	.550 .535	106	102	.022 .022	1,22
		Small Base Circle, Rough idle, Drag Race. Higher CR, stall speed & lower gears.						
114552-06	CL114552-06 CL114552-06DL ⁴	313 321 4500-8000	278 286	.550 .570	106	102	.022 .022	1,22
		Large 400+ Bracket/Class cam. Needs good heads & intake.						
114552-06S	CL114552-06S CL114552-06SDL ⁴	313 321 4500-8000	278 286	.550 .570	106	102	.022 .022	1,22
		Small Base Circle, Large 400+ Bracket/Class cam. Needs good heads & intake.						
119996	NA	Custom Grind Camshaft 4/7 Swap Mechanical Flat Tappet Special Order Camshaft.						1,22
119996-S	NA	Custom Grind Camshaft, Small Base Circle 4/7 Swap Mechanical Flat Tappet Special Order Camshaft.						1,22

Cam Notes: master note list on page 260

¹ Stock (O.E.) valve springs cannot be used.²² Ignition firing order must be changed to 1-8-7-3-6-5-4-2.³⁴ Provisions for increased oiling recommended.

Some items are not legal for sale or use on any pollution controlled motor vehicle

4/7 Swap *Mechanical Flat Tappet Camshaft Components*

	Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95010	92150 94475	94402	94200 94300
	91115 ³ 91118 ⁴	NA	98445-K12 ²⁵ 98632-K12 ²⁵	98445 ²⁵ 98632 ²⁵	97132 ¹⁰ 97128 ¹⁰	97165 ¹⁰ 97216 ¹⁰	93017 ¹⁰	93350 93316 ²⁵	90005 90070	90100	95205 95			

Components Notes: master note list on page 260

3 Included in Cam & Lifter Sets.

4 Direct Lube Lifters Included in Cam & "Direct Lube" Lifter (DL) Sets.

10° Valve lock Angle, must use matching retainers/locks.

25 Machining Required.



Steel Billet Mechanical Roller Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
111213-10	NA	261 269 2000-6000	229 237	.555 .555	110	106	.022 .022	1,2,5 Noticeable idle, good for Weekend Street Cruiser. Should have 9.0:1 CR, 2000+ stall.
111213-10S	NA	261 269 2000-6000	229 237	.555 .555	110	106	.022 .022	1,2,5 Small Base Circle, Noticeable idle, Weekend Street Cruiser. 9.0:1 CR, 2000+ stall.
111203-10	NA	269 269 2500-6500	237 237	.555 .555	110	106	.022 .022	1,2,5 Fair idle, Street Performance/mild Strip. Recommend 9.5:1 CR, 2500+ stall.
111203-10S	NA	269 269 2500-6500	237 237	.555 .555	110	106	.022 .022	1,2,5 Small Base Circle, Street Performance/mild Strip. Recommend 9.5:1, 2500+ stall.
110183-08	NA	269 275 2500-6500	237 243	.555 .555	108	104	.022 .022	1,2,5 Fair idle, Weekend Cruiser/mild Strip. 2500+ stall recommended.
110183-08S	NA	269 275 2500-6500	237 243	.555 .555	108	104	.022 .022	1,2,5 Small Base Circle, Fair idle, Weekend Cruiser/mild Strip. 2500+ stall recommended.
110183-10	NA	269 275 2500-6500	237 243	.555 .555	110	106	.022 .022	1,2,5 Fair idle, Weekend Cruiser/Power Tour favorite. 2500+ stall recommended.
110183-10S	NA	269 275 2500-6500	237 243	.555 .555	110	106	.022 .022	1,2,5 Small Base Circle, Fair idle, Weekend Cruiser/Power Tour favorite. 2500+ stall.
110173-08	NA	273 279 2800-6800	241 247	.570 .570	108	104	.022 .022	1,2,5 Fair idle, Street/Strip. Great mid-range. Should have 10.0:1 CR, 2500+ stall.
110173-08S	NA	273 279 2800-6800	241 247	.570 .570	108	104	.022 .022	1,2,5 Small Base Circle, Fair idle, Street/Strip. Great mid-range. 10.0:1 CR, 2500+ stall.
110173-10	NA	273 279 2800-7000	241 247	.570 .570	110	106	.022 .022	1,2,5 Fair idle, High performance Street/Mild Bracket. Should have 10.0:1 CR, 2800+ stall.
110173-10S	NA	273 279 2800-7000	241 247	.570 .570	110	106	.022 .022	1,2,5 Small Base Circle, Fair idle, High performance Street/Mild Bracket. 10.0:1 CR, 2800+.
110753-06	NA	277 287 3200-7400	245 255	.600 .600	106	102	.022 .022	1,2,5 Rough idle, Great mid-range torque & power. Needs good intake & exhaust.
110753-06S	NA	277 287 3200-7400	245 255	.600 .600	106	102	.022 .022	1,2,5 Small Base Circle, Rough idle, Great mid-range torque & power. Needs good intake.
110753-08S	NA	277 287 3200-7400	245 255	.600 .600	108	104	.022 .022	1,2,5 Small Base Circle, Rough idle, Great mid-range torque & power. Needs good intake.
110753-10	NA	277 287 3200-7400	245 255	.600 .600	110	106	.022 .022	1,2,5 Mid range torque with top end horsepower. Needs 10.0:1 CR, good intake & exhaust..
110753-10S	NA	277 287 3200-7400	245 255	.600 .600	110	106	.022 .022	1,2,5 Small Base Circle, Mid range torque with top end horsepower. 10.0:1 CR.
111313-06	NA	279 279 3000-7200	247 247	.585 .585	106	102	.022 .022	1,2,5 Fair idle, Street performance mild Oval Track use.
111313-06S	NA	279 279 3000-7200	247 247	.585 .585	106	102	.022 .022	1,2,5 Small Base Circle, Fair idle, Street performance mild Oval Track use.
111313-08	NA	279 279 3000-7400	247 247	.585 .585	108	104	.022 .022	1,2,5 Fair idle, Hot Street/Strip. Good mid-range power. 10.0:1 CR, 3400+ stall.
111313-08S	NA	279 279 3000-7400	247 247	.585 .585	108	104	.022 .022	1,2,5 Small Base Circle, fair idle, Hot Street/Strip. Good mid-range power. 10.0:1 CR, 3400+.
111313-10	NA	279 279 3000-7400	247 247	.585 .585	110	106	.022 .022	1,2,5 Fair idle, Pro-Street cam. Works well with small NOS system.
111313-10S	NA	279 279 3000-7400	247 247	.585 .585	110	106	.022 .022	1,2,5 Small Base Circle, fair idle, Pro-Street cam. Works well with small NOS system.
111313-12	NA	279 279 2800-7400	247 247	.585 .585	112	108	.022 .022	1,2,5 Fair idle, Pro-Street cam. Works well with small NOS system.

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

2 Requires Thrust Button.

5 Requires upgraded distributor gear/fuel pump pushrod.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHEVROLET SMALL BLOCK • 262-400 1955-1998

Steel Billet Mechanical Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91150	90132	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90070	90100	95010	92151	94400	94300
91152	90135							90072 ⁷	90101 ⁷		94475	94402	
91150	90132	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90070	90100	95010	92151	94400	94300
91152	90135							90072 ⁷	90101 ⁷		94475	94402	
91150	90132	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90070	90100	95010	92151	94400	94300
91152	90135							90072 ⁷	90101 ⁷		94475	94402	
91150	90132	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90070	90100	95010	92151	94400	94300
91152	90135							90072 ⁷	90101 ⁷		94475	94402	
91150	90132	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90070	90100	95010	92151	94400	94300
91152	90135							90072 ⁷	90101 ⁷		94475	94402	
91150	90132	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90070	90100	95010	92151	94400	94300
91152	90135							90072 ⁷	90101 ⁷		94475	94402	
91150	90132	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90070	90100	95010	92151	94400	94300
91152	90135							90072 ⁷	90101 ⁷		94475	94402	
91150	90132	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90070	90100	95010	92151	94400	94300
91152	90135							90072 ⁷	90101 ⁷		94475	94402	
91150	90132	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90070	90100	95010	92151	94400	94300
91152	90135							90072 ⁷	90101 ⁷		94475	94402	
91150	90132	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90070	90100	95010	92151	94400	94300
91152	90135							90072 ⁷	90101 ⁷		94475	94402	
91150	90132	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90070	90100	95010	92151	94400	94300
91152	90135							90072 ⁷	90101 ⁷		94475	94402	
91150	90132	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90070	90100	95010	92151	94400	94300
91152	90135							90072 ⁷	90101 ⁷		94475	94402	
91150	90132	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90070	90100	95010	92151	94400	94300
91152	90135							90072 ⁷	90101 ⁷		94475	94402	
91150	90132	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90070	90100	95010	92151	94400	94300
91152	90135							90072 ⁷	90101 ⁷		94475	94402	
91150	90132	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90070	90100	95010	92151	94400	94300
91152	90135							90072 ⁷	90101 ⁷		94475	94402	
91150	90132	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90070	90100	95010	92151	94400	94300
91152	90135							90072 ⁷	90101 ⁷		94475	94402	
91150	90132	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90070	90100	95010	92151	94400	94300
91152	90135							90072 ⁷	90101 ⁷		94475	94402	
91150	90132	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90070	90100	95010	92151	94400	94300
91152	90135							90072 ⁷	90101 ⁷		94475	94402	
91150	90132	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90070	90100	95010	92151	94400	94300
91152	90135							90072 ⁷	90101 ⁷		94475	94402	
91150	90132	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90070	90100	95010	92151	94400	94300
91152	90135							90072 ⁷	90101 ⁷		94475	94402	
91150	90132	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90070	90100	95010	92151	94400	94300
91152	90135							90072 ⁷	90101 ⁷		94475	94402	
91150	90132	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90070	90100	95010	92151	94400	94300
91152	90135							90072 ⁷	90101 ⁷		94475	94402	

Components Notes: master note list on page 260

⁷ Requires 7/16" rocker studs.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.



Steel Billet Mechanical Roller Camshafts (cont.)

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
111313-12S	NA	279 279 2800-7400	247 247	.585 .585	112	108	.022 .022	1,2,5 <i>Small Base Circle, fair idle, Pro-Street cam. Works well with small NOS system.</i>
111153-06	NA	279 281 3000-7400	247 249	.585 .585	106	102	.022 .022	1,2,5 <i>Lopey idle, great Oval Track & heavy Drag car.</i>
111153-06S	NA	279 281 3000-7400	247 249	.585 .585	106	102	.022 .022	1,2,5 <i>Small Base Circle, lopey idle, great Oval Track & heavy Drag car.</i>
111153-08	NA	279 281 3000-7400	247 249	.585 .585	108	104	.022 .022	1,2,5 <i>Choppy idle, Should have 10.0:1+ CR, single plane intake, 2800+ stall.</i>
111153-08S	NA	279 281 3000-7400	247 249	.585 .585	108	104	.022 .022	1,2,5 <i>Small Base Circle, choppy idle, Should have 10.0:1+ CR, single plane intake, 2800+ stall.</i>
111013-06	NA	283 289 3600-7600	251 257	.640 .640	106	102	.022 .022	1,2,5 <i>Strong mid-range torque, rough idle. Oval Track & Bracket cars.</i>
111013-06S	NA	283 289 3600-7600	251 257	.640 .640	106	102	.022 .022	1,2,5 <i>Small Base Circle, strong mid-range torque, rough idle. Oval Track & Bracket cars.</i>
111013-10	NA	283 289 3600-7600	251 257	.640 .640	110	106	.022 .022	1,2,5 <i>Strong mid-range horsepower, rough idle. Oval Track & Bracket cars.</i>
111163-06	NA	287 293 3800-7800	255 261	.600 .620	106	102	.022 .022	1,2,5 <i>Good mid-range horsepower, rough idle. Needs 11.0:1 CR-up.</i>
111163-06S	NA	287 293 3800-7800	255 261	.600 .620	106	102	.022 .022	1,2,5 <i>Small Base Circle, good mid-range horsepower, rough idle. Needs 11.0:1 CR-up.</i>
111163-08	NA	287 293 3800-7800	255 261	.600 .620	108	104	.022 .022	1,2,5 <i>Good mid-range power, rough idle. Needs 11.0:1 CR-up. Brackets.</i>
111163-08S	NA	287 293 3800-7800	255 261	.600 .620	108	104	.022 .022	1,2,5 <i>Small Base Circle, good mid-range HP, rough idle. Needs 11.0:1 CR-up. Brackets.</i>
111163-10	NA	287 293 3800-7800	255 261	.600 .620	110	106	.022 .022	1,2,5 <i>Good mid-range power, rough idle. Needs 11.0:1 CR-up. Brackets.</i>
111633-06	NA	289 295 4000-7800	257 263	.615 .615	106	102	.022 .022	1,2,5 <i>Oval Track/Mild Bracket, mid range torque & top end power. 10.5-11.0:1 CR.</i>
111633-06S	NA	289 295 4000-7800	257 263	.615 .615	106	102	.022 .022	1,2,5 <i>Small Base Circle, Oval Track/Mild Bracket, mid range torque & top end power.</i>
111633-08	NA	289 295 4000-7800	257 263	.615 .615	108	104	.022 .022	1,2,5 <i>Bracket/Oval Track, Broad mid-range power. Needs good intake & exhaust.</i>
111633-08S	NA	289 295 4000-7800	257 263	.615 .615	108	104	.022 .022	1,2,5 <i>Small Base Circle, Bracket/Oval Track, Broad mid-range power. Good intake & exhaust.</i>
110773-06	NA	289 295 4000-7800	257 263	.640 .640	106	102	.022 .022	1,2,5 <i>Strong mid-range torque & top end power. Needs 10.5-11.5:1 CR, good intake.</i>
110773-06S	NA	289 295 4000-7800	257 263	.640 .640	106	102	.022 .022	1,2,5 <i>Small Base Circle, Strong mid-range torque & top end power. Needs 10.5-11.5:1 CR.</i>
110773-08	NA	289 295 4000-7800	257 263	.640 .640	108	104	.022 .022	1,2,5 <i>Strong mid range. Needs good single plane intake, 10.5:1+ CR.</i>
110773-08S	NA	289 295 4000-7800	257 263	.640 .640	108	104	.022 .022	1,2,5 <i>Small Base Circle, Strong mid range. Needs good single plane intake, 10.5:1+ CR.</i>
111133-06	NA	289 299 4000-7800	257 267	.600 .600	106	102	.022 .022	1,2,5 <i>Strong mid & upper rpm, banked Oval Track & Brackets w/auto trans.</i>
111133-06S	NA	289 299 4000-7800	257 267	.600 .600	106	102	.022 .022	1,2,5 <i>Small Base Circle, strong mid & upper rpm, banked Oval Track & Brackets w/auto trans.</i>
111133-08	NA	289 299 4000-7800	257 267	.600 .600	108	104	.022 .022	1,2,5 <i>Mid & upper RPM torque, good in banked Oval Track & Bracket.</i>

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

2 Requires Thrust Button.

5 Requires upgraded distributor gear/fuel pump pushrod.

Some items are not legal for sale or use on any pollution controlled motor vehicle

Steel Billet Mechanical Roller Camshaft Components

	Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
	91150 91152	90132 90135	NA	98541 ²⁵ 98223	97128 ¹⁰ 97113	97220 ¹⁰ NA	93017 ¹⁰ 93005	93316 ²⁵ 90072 ⁷	90070 90072 ⁷	90100 90101 ⁷	95010	92151 94475	94400 94402	94300
	91150 91152	90132 90135	NA	98541 ²⁵ 98223	97128 ¹⁰ 97113	97220 ¹⁰ NA	93017 ¹⁰ 93005	93316 ²⁵ 90072 ⁷	90070 90072 ⁷	90100 90101 ⁷	95010	92151 94475	94400 94402	94300
	91150 91152	90132 90135	NA	98541 ²⁵ 98223	97128 ¹⁰ 97113	97220 ¹⁰ NA	93017 ¹⁰ 93005	93316 ²⁵ 90072 ⁷	90070 90072 ⁷	90100 90101 ⁷	95010	92151 94475	94400 94402	94300
	91150 91152	90132 90135	NA	98541 ²⁵ 98223	97128 ¹⁰ 97113	97220 ¹⁰ NA	93017 ¹⁰ 93005	93316 ²⁵ 90072 ⁷	90070 90072 ⁷	90100 90101 ⁷	95010	92151 94475	94400 94402	94300
	91150 91152	90132 90135	NA	98541 ²⁵ 98223	97128 ¹⁰ 97113	97220 ¹⁰ NA	93017 ¹⁰ 93005	93316 ²⁵ 90072 ⁷	90070 90072 ⁷	90100 90101 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰ 93017 ¹⁰	93316 ²⁵ 93316 ²⁵	90072 ⁷ 90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰ 97222 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017							

Components Notes: master note list on page 260

7 Requires 7/16" rocker studs.

10 10° Valve lock Angle, must use matching retainers/locks.

25 Machining Required.



Steel Billet Mechanical Roller Camshafts (cont.)

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
111133-08S	NA	289 299 4000-7800	257 267	.600 .600	108	104	.022 .022	1,2,5 <i>Small Base Circle, mid & upper RPM torque, good in banked Oval Track & Bracket.</i>
111133-10	NA	289 299 4000-7800	257 267	.600 .600	110	106	.022 .022	1,2,5 <i>Mid & upper RPM torque, OK w/NOS.</i>
111133-10S	NA	289 299 4000-7800	257 267	.600 .600	110	106	.022 .022	1,2,5 <i>Small Base Circle, mid & upper RPM torque, OK w/NOS up to 250HP.</i>
111133-12	NA	289 299 4000-8000	257 267	.600 .600	112	108	.022 .022	1,2,5 <i>Mid & upper RPM torque. Heavier car OK. Great w/NOS.</i>
111133-12S	NA	289 299 4000-8000	257 267	.600 .600	112	108	.022 .022	1,2,5 <i>Small Base Circle, mid & upper RPM torque. Heavier car OK. Great w/NOS.</i>
112323-06	NA	291 295 4200-8000	259 263	.640 .640	106	102	.022 .022	1,2,5 <i>Great mid to upper range torque. Requires good heads, intake & exhaust.</i>
112323-06S	NA	291 295 4200-8000	259 263	.640 .640	106	102	.022 .022	1,2,5 <i>Small Base Circle, Great mid to upper range torque. Requires good heads & intake.</i>
112323-08	NA	291 295 4200-8000	259 263	.640 .640	108	104	.022 .022	1,2,5 <i>Oval Track/Drag, mid range torque with top end power. Needs good heads.</i>
112323-08S	NA	291 295 4200-8000	259 263	.640 .640	108	104	.022 .022	1,2,5 <i>Small Base Circle, Oval Track/Drag, mid range torque & top end power.</i>
110713-06	NA	291 299 4200-8000	259 267	.675 .645	106	102	.022 .022	1,2,5 <i>360-383ci Sprint, Modified. Super fast tracks.</i>
110713-06S	NA	291 299 4200-8000	259 267	.675 .645	106	102	.022 .022	1,2,5 <i>Small Base Circle, 360-383ci Sprint, Modified. Super fast tracks.</i>
110713-08	NA	291 299 4200-8000	259 267	.675 .645	108	104	.022 .022	1,2,5 <i>410ci Sprint, Modified. Super fast tracks. Requires good heads & intake.</i>
110713-08S	NA	291 299 4200-8000	259 267	.675 .645	108	104	.022 .022	1,2,5 <i>Small Base Circle, 410ci Sprint, Modified. Super fast tracks. Requires good heads.</i>
112313-06	NA	293 297 4200-8000	261 265	.620 .620	106	102	.022 .022	1,2,5 <i>Circle Track, high torque. Great 360 Sprint on tacky tracks.</i>
112313-06S	NA	293 297 4200-8000	261 265	.620 .620	106	102	.022 .022	1,2,5 <i>Small Base Circle, Circle Track, high torque. Great 360 Sprint on tacky tracks.</i>
112313-08	NA	293 297 4200-8000	261 265	.620 .620	108	104	.022 .022	1,2,5 <i>Broad range power with mid to upper end torque. 360 Sprint dry slick or Bracket.</i>
112313-08S	NA	293 297 4200-8000	261 265	.620 .620	108	104	.022 .022	1,2,5 <i>Small Base Circle, Broad range power with mid to upper end torque.</i>
110013-06	NA	295 301 4000-7800	263 269	.630 .620	106	102	.022 .022	1,2,5 <i>355-383ci Drag, 1/8 or 1/4 mile, heavy car. 11.0:1+ CR, 4000+ stall.</i>
110013-06S	NA	295 301 4000-7800	263 269	.630 .620	106	102	.022 .022	1,2,5 <i>Small Base Circle, 355-383ci Drag, 1/8 or 1/4 mile, heavy car. 11.0:1+ CR, 4000+ stall.</i>
110013-08	NA	295 301 4000-8000	263 269	.630 .620	108	104	.022 .022	1,2,5 <i>410 Sprint or big inch Bracket. Strong upper mid-range.</i>
110013-08S	NA	295 301 4000-8000	263 269	.630 .620	108	104	.022 .022	1,2,5 <i>Small Base Circle, 410 Sprint or big inch Bracket. Strong upper mid-range.</i>
110013-10	NA	295 301 4000-8000	263 269	.630 .620	110	106	.022 .022	1,2,5 <i>410 Sprint or big inch Bracket. Upper mid-range & top end.</i>
110013-10S	NA	295 301 4000-8000	263 269	.630 .620	110	106	.022 .022	1,2,5 <i>Small Base Circle, 410 Sprint or big inch Bracket. Upper mid-range & top end.</i>
111223-06	NA	295 303 4200-8200	263 271	.675 .625	106	102	.022 .022	1,2,5 <i>Great in large cubic inch small block Oval Track late models.</i>

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

2 Requires Thrust Button.

5 Requires upgraded distributor gear/fuel pump pushrod.

Some items are not legal for sale or use on any pollution controlled motor vehicle

Steel Billet Mechanical Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	

Components Notes: master note list on page 260

⁷ Requires 7/16" rocker studs.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.



Steel Billet Mechanical Roller Camshafts (cont.)

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
111223-06S	NA	295 303 4200-8200	263 271	.675 .625	106	102	.022 .022	1,2,5 <i>Small Base Circle, great in large cubic inch small block Oval Track late models.</i>
111223-08	NA	295 303 4200-8200	263 271	.675 .625	108	104	.022 .022	1,2,5 <i>Great in large cubic inch small block Oval Track late models, Bracket.</i>
111113-06	NA	295 305 4200-8200	263 273	.640 .645	106	102	.022 .022	1,2,5 <i>Strong mid & upper end torque & power. Needs 12.5:1 CR-up.</i>
111113-06S	NA	295 305 4200-8200	263 273	.640 .645	106	102	.022 .022	1,2,5 <i>Small Base Circle, strong mid & upper end torque & HP. Needs 12.5:1 CR-up.</i>
111113-08	NA	295 305 4200-8200	263 273	.640 .645	108	104	.022 .022	1,2,5 <i>Great mid & upper end torque & horsepower. Needs 12.5:1 CR-up.</i>
111113-08S	NA	295 305 4200-8200	263 273	.640 .645	108	104	.022 .022	1,2,5 <i>Small Base Circle, great mid & upper end torque & HP. Needs 12.5:1 CR-up.</i>
111113-10	NA	295 305 4200-8200	263 273	.640 .645	110	106	.022 .022	1,2,5 <i>Great mid & upper end torque & horsepower. Needs 12.5:1 CR-up.</i>
111113-10S	NA	295 305 4200-8200	263 273	.640 .645	110	106	.022 .022	1,2,5 <i>Small Base Circle, great mid & upper end torque & HP. Needs 12.5:1 CR-up.</i>
111113-12	NA	295 305 4200-8200	263 273	.640 .645	112	108	.022 .022	1,2,5 <i>Good all around mid-range power. Needs 11.0:1+ CR, 4000+ stall. Good with NOS.</i>
111113-12S	NA	295 305 4200-8200	263 273	.640 .645	112	108	.022 .022	1,2,5 <i>Small Base Circle, good all around mid-range power. Needs 11.0:1+ CR, 4000+ stall.</i>
111103-06	NA	295 307 4200-8200	263 275	.640 .630	106	102	.022 .022	1,2,5 <i>Strong mid & upper end torque & HP. Needs 12.5:1 CR-up.</i>
111103-06S	NA	295 307 4200-8200	263 275	.640 .630	106	102	.022 .022	1,2,5 <i>Small Base Circle, strong mid & upper end torque & HP. Needs 12.5:1 CR-up.</i>
111103-08	NA	295 307 4200-8200	263 275	.640 .630	108	104	.022 .022	1,2,5 <i>Strong mid & upper end torque & horsepower. Needs 12.5:1 CR-up.</i>
111103-08S	NA	295 307 4200-8200	263 275	.640 .630	108	104	.022 .022	1,2,5 <i>Small Base Circle, strong mid & upper end torque & HP. Needs 12.5:1 CR-up.</i>
111123-06	NA	299 307 4400-8200	267 275	.645 .645	106	102	.022 .022	1,2,5 <i>Competition use, good mid & upper HP, medium to high bank Oval Track.</i>
111123-06S	NA	299 307 4400-8200	267 275	.645 .645	106	102	.022 .022	1,2,5 <i>Small Base Circle, Competition, mid & upper HP, medium to high bank Oval Track.</i>
111123-08	NA	299 307 4400-8200	267 275	.645 .645	108	104	.022 .022	1,2,5 <i>Competition use, good mid & upper power, medium to high bank Oval Track.</i>
111123-08S	NA	299 307 4400-8200	267 275	.645 .645	108	104	.022 .022	1,2,5 <i>Small Base Circle, Competition, mid & upper HP, medium to high bank Oval Track.</i>
111123-10	NA	299 307 4400-8400	267 275	.645 .645	110	106	.022 .022	1,2,5 <i>Competition use, good mid & upper power, bracket, OK w/NOS.</i>
111123-10S	NA	299 307 4400-8400	267 275	.645 .645	110	106	.022 .022	1,2,5 <i>Small Base Circle, Competition use, good mid & upper power, bracket, OK w/NOS.</i>
112183-06	NA	301 309 4400-8400	269 277	.650 .650	106	102	.022 .022	1,2,5 <i>Competition/Bracket E.T. Mid to upper rpm horsepower. Good heads, 12.5:1+ CR.</i>
112183-06S	NA	301 309 4400-8400	269 277	.650 .650	106	102	.022 .022	1,2,5 <i>Small Base Circle, Competition/Bracket E.T. Mid to upper rpm horsepower. 12.5:1+ CR.</i>
112183-08	NA	301 309 4400-8400	269 277	.650 .650	108	104	.022 .022	1,2,5 <i>Competition/Bracket E.T. Mid to upper end performance. 12.5:1+ CR, 4500+ stall.</i>
112183-08S	NA	301 309 4400-8400	269 277	.650 .650	108	104	.022 .022	1,2,5 <i>Small Base Circle, Competition/Bracket E.T. Mid to upper end performance. 12.5:1+ CR</i>

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

2 Requires Thrust Button.

5 Requires upgraded distributor gear/fuel pump pushrod.

Some items are not legal for sale or use on any pollution controlled motor vehicle

Steel Billet Mechanical Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	

Components Notes: master note list on page 260

⁷ Requires 7/16" rocker studs.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.



Steel Billet Mechanical Roller Camshafts (cont.)

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
111863-06	NA	301 309 4400-8400	269 277	.675 .650	106	102	.022 .022	1,2,5 <i>Competition/Bracket E.T. Mid to upper rpm horsepower. Good heads, 12.5:1+ CR.</i>
111863-06S	NA	301 309 4400-8400	269 277	.675 .650	106	102	.022 .022	1,2,5 <i>Small Base Circle, Competition/Bracket E.T. Mid to upper rpm horsepower. Good heads.</i>
111863-08	NA	301 309 4400-8400	269 277	.675 .650	108	104	.022 .022	1,2,5 <i>Competition/Bracket E.T. Mid to upper end performance. 12.5:1+ CR.</i>
111863-08S	NA	301 309 4400-8400	269 277	.675 .650	108	104	.022 .022	1,2,5 <i>Small Base Circle, Competition/Bracket E.T. Mid to upper end performance. 12.5:1+ CR.</i>
111863-10	NA	301 309 4400-8400	269 277	.675 .650	110	106	.022 .022	1,2,5 <i>Competition, Good mid to upper rpm. 12.5:1+ CR. Mild NOS OK.</i>
111863-10S	NA	301 309 4400-8400	269 277	.675 .650	110	106	.022 .022	1,2,5 <i>Small Base Circle, Competition, Good mid to upper rpm. 12.5:1+ CR. Mild NOS OK.</i>
110503-08	NA	305 311 4600-8400	273 279	.645 .640	108	104	.022 .022	1,2,5 <i>Competition, Upper mid to top end power. 12.5:1+ CR, good heads a must.</i>
110503-08S	NA	305 311 4600-8400	273 279	.645 .640	108	104	.022 .022	1,2,5 <i>Small Base Circle, Competition, Upper mid to top end power. 12.5:1+ CR, good heads.</i>
110503-10	NA	305 311 4600-8400	273 279	.645 .640	110	106	.022 .022	1,2,5 <i>Broad power range. Best in larger engine. 12.5:1+ CR a must.</i>
110503-10S	NA	305 311 4600-8400	273 279	.645 .640	110	106	.022 .022	1,2,5 <i>Small Base Circle, Broad power range. Best in larger engine. 12.5:1+ CR a must.</i>
110563-08	NA	305 311 4600-8400	273 279	.680 .640	108	104	.022 .022	1,2,5 <i>Competition, Upper mid to top end power. 12.5:1+ CR, good heads a must.</i>
110563-08S	NA	305 311 4600-8400	273 279	.680 .640	108	104	.022 .022	1,2,5 <i>Small Base Circle, Competition, Upper mid to top end power. 12.5:1+ CR, good heads.</i>
110563-10	NA	305 311 4600-8400	273 279	.680 .640	110	106	.022 .022	1,2,5 <i>Broad power range. Best in larger engine. 12.5:1+ CR, good heads a must.</i>
110563-10S	NA	305 311 4600-8400	273 279	.680 .640	110	106	.022 .022	1,2,5 <i>Small Base Circle, Broad power range. Best in larger engine. 12.5:1+ CR, good heads.</i>
111083-06	NA	307 317 5000-8800	275 285	.630 .630	106	102	.022 .022	1,2,5 <i>Competition profile, good top end power. Needs good parts.</i>
111083-06S	NA	307 317 5000-8800	275 285	.630 .630	106	102	.022 .022	1,2,5 <i>Small Base Circle, Competition profile, good top end power. Needs good parts.</i>
111083-08	NA	307 317 5000-8800	275 285	.630 .630	108	104	.022 .022	1,2,5 <i>Competition profile, good top end power. Needs good parts.</i>
111083-08S	NA	307 317 5000-8800	275 285	.630 .630	108	104	.022 .022	1,2,5 <i>Small Base Circle, Competition profile, good top end power. Needs good parts.</i>
111083-10	NA	307 317 5000-8800	275 285	.630 .630	110	106	.022 .022	1,2,5 <i>Competition profile, good top end power. Works good w/NOS.</i>
111083-10S	NA	307 317 5000-8800	275 285	.630 .630	110	106	.022 .022	1,2,5 <i>Small Base Circle, Competition profile, good top end power. Works good w/NOS.</i>
111083-12	NA	307 317 5000-8800	275 285	.630 .630	112	108	.022 .022	1,2,5 <i>Competition profile, good top end power. Works good w/NOS.</i>
111083-12S	NA	307 317 5000-8800	275 285	.630 .630	112	108	.022 .022	1,2,5 <i>Small Base Circle, Competition profile, good top end power. Works good w/NOS.</i>
111083-14	NA	307 317 5000-8800	275 285	.630 .630	114	110	.022 .022	1,2,5 <i>Competition profile, good top end power. Works good w/NOS.</i>
111083-14S	NA	307 317 5000-8800	275 285	.630 .630	114	110	.022 .022	1,2,5 <i>Small Base Circle, Competition profile, good top end power. Works good w/NOS.</i>

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

2 Requires Thrust Button.

5 Requires upgraded distributor gear/fuel pump pushrod.

Some items are not legal for sale or use on any pollution controlled motor vehicle

Steel Billet Mechanical Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	

Components Notes: master note list on page 260

⁷ Requires 7/16" rocker studs.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.



Steel Billet Mechanical Roller Camshafts (cont.)

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
111233-06	NA	309 317 5200-8800	277 285	.675 .645	106	102	.022 .022	1,2,5 <i>All out Competition big cylinder head & compression.</i>
111233-06S	NA	309 317 5200-8800	277 285	.675 .645	106	102	.022 .022	1,2,5 <i>Small Base Circle, all out Competition big cylinder head & compression.</i>
111233-10	NA	309 317 5200-8800	277 285	.675 .645	110	106	.022 .022	1,2,5 <i>Works great in big cubic inch small blocks. OK with NOS.</i>
111233-10S	NA	309 317 5200-8800	277 285	.675 .645	110	106	.022 .022	1,2,5 <i>Small Base Circle, works great in big cubic inch small blocks. OK with NOS.</i>
110393-14	NA	309 323 5200-8800	277 291	.675 .675	114	110	.022 .022	1,2,5 <i>Works great in big cubic inch small blocks. Works well with multi-stage NOS.</i>
110393-14S	NA	309 323 5200-8800	277 291	.675 .675	114	110	.022 .022	1,2,5 <i>Small Base Circle, Works great in big cubic inch small blocks. Works with multi-stage NOS.</i>
111093-06	NA	313 323 5600-9000	281 291	.675 .645	106	102	.022 .022	1,2,5 <i>All out Competition only. Best of everything.</i>
111093-06S	NA	313 323 5600-9000	281 291	.675 .645	106	102	.022 .022	1,2,5 <i>Small Base Circle, all out Competition only. Best of everything.</i>
111093-08	NA	313 323 5600-9000	281 291	.675 .645	108	104	.022 .022	1,2,5 <i>All out Competition only. Best of everything.</i>
119993	NA	Custom Grind Camshaft <i>Mechanical Roller Special Order Camshaft.</i>						1,2,5
119993-S	NA	Custom Grind Camshaft, Small Base Circle <i>Mechanical Roller Special Order Camshaft.</i>						1,2,5
119999	NA	Custom Grind Camshaft, with Cast Distributor Gear <i>Mechanical Roller Special Order Camshaft.</i>						1,2,5
119993-RD	NA	Custom Grind Camshaft, with Rear Drive <i>Mechanical Roller Special Order Camshaft.</i>						1,2,5
119997	NA	Custom Grind Camshaft, with 50-55mm Bearing <i>Mechanical Roller Special Order Camshaft.</i>						1,2,5
118997	NA	Custom Grind Camshaft, with 50-55mm Bearing, LS (C) Firing Order <i>Mechanical Roller Special Order Camshaft.</i>						1,2,5,24

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

2 Requires Thrust Button.

5 Requires upgraded distributor gear/fuel pump pushrod.

24 Ignition firing order must be changed to 1-8-7-2-6-5-4-3.

Some items are not legal for sale or use on any pollution controlled motor vehicle

Steel Billet Mechanical Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
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--	--	--	--	--	--	--	--	--	--	--	92151 94475	94400 94402	94300
--	--	--	--	--	--	--	--	--	--	--	92151 94475	94400 94402	94300
--	--	--	--	--	--	--	--	--	--	--	92151 94475	94400 94402	94300
--	--	--	--	--	--	--	--	--	--	--	92151 94475	94400 94402	94300
--	--	--	--	--	--	--	--	--	--	--	92151 94475	94400 94402	94300

Components Notes: master note list on page 260

⁷ Requires 7/16" rocker studs.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

CAMSHAFTS



CHEVROLET SMALL BLOCK • 262-400 1955-1998

Big Bottle Cams™ - Nitrous Oxide Mechanical Roller Cams Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
111133-12	NA	289 299 3400-7400	257 267	.600 .600	112	108	.022 .022	1,2,5 Mid & upper RPM torque, 150+ plate systems.
111133-12S	NA	289 299 3400-7400	257 267	.600 .600	112	108	.022 .022	1,2,5 Small Base Circle, mid & upper RPM torque, 150+ plate systems.
110613-12	NA	291 307 3600-7600	259 275	.640 .630	112	108	.022 .022	1,2,5 Mid & upper RPM horsepower, 250+ plate systems.
110613-12S	NA	291 307 3600-7600	259 275	.640 .630	112	108	.022 .022	1,2,5 Small Base Circle, Mid & upper RPM horsepower, 250+ plate systems.
111113-12	NA	295 305 3800-7800	263 273	.640 .645	112	108	.022 .022	1,2,5 Mid & upper end torque & horsepower. Needs 12.5:1 CR-up.
111113-12S	NA	295 305 3800-7800	263 273	.640 .645	112	108	.022 .022	1,2,5 Small Base Circle, mid & upper end torque & power. Needs 12.5:1 CR-up.
110673-12	NA	299 311 4000-8000	267 279	.645 .640	112	108	.022 .022	1,2,5 Competition, 383+ ci. Mid to upper end power. Multi-stage nitrous system.
110673-12S	NA	299 311 4000-8000	267 279	.645 .640	112	108	.022 .022	1,2,5 Small Base Circle, Competition, 383+ ci. Mid to upper end power. Multi-stage system.
110513-12	NA	305 319 4400-8200	273 287	.680 .650	112	108	.022 .022	1,2,5 Competition, 400+ ci. Mid to upper end power. Multi-stage nitrous system.
110513-12S	NA	305 319 4400-8200	273 287	.680 .650	112	108	.022 .022	1,2,5 Small Base Circle, Competition, 400+ ci. Mid to upper end power. Multi-stage system.
110513-14	NA	305 319 4400-8600	273 287	.680 .650	114	110	.022 .022	1,2,5 Competition, 400+ cubic inch with pro heads. Multi-stage system.
110513-14S	NA	305 319 4400-8600	273 287	.680 .650	114	110	.022 .022	1,2,5 Small Base Circle, Competition, 400+ cubic inch with pro heads. Multi-stage system.
111083-12	NA	307 317 4400-8600	275 285	.630 .630	112	108	.022 .022	1,2,5 Competition, 383+ cubic inch. Good top end. Multi-stage system.
111083-12S	NA	307 317 4400-8600	275 285	.630 .630	112	108	.022 .022	1,2,5 Small Base Circle, Competition, 383+ cubic inch. Good top end. Multi-stage system.
111083-14	NA	307 317 4400-8800	275 285	.630 .630	114	110	.022 .022	1,2,5 Competition profile, good top end power. Plate or plumbed.
111083-14S	NA	307 317 4400-8800	275 285	.630 .630	114	110	.022 .022	1,2,5 Small Base Circle, Competition profile, good top end power. Plate or plumbed.
110393-14	NA	309 323 4600-9000	277 291	.675 .675	114	110	.022 .022	1,2,5 Competition, 400+ cubic inch with big heads. Multi-stage system.
110393-14S	NA	309 323 4600-9000	277 291	.675 .675	114	110	.022 .022	1,2,5 Small Base Circle, Competition, 400+ cubic inch with big heads. Multi-stage system.
111073-14S	NA	313 327 5000-9000	281 295	.730 .715	114	110	.022 .022	1,2,5 Small Base Circle, all out Competition, Multi-stage nitrous systems.
119993	NA	Custom Grind Camshaft Mechanical Roller Special Order Camshaft.						1,2,5
119993-S	NA	Custom Grind Camshaft, Small Base Circle Mechanical Roller Special Order Camshaft.						1,2,5
119999	NA	Custom Grind Camshaft, with Cast Distributor Gear Mechanical Roller Special Order Camshaft.						1,2,5
119997	NA	Custom Grind Camshaft, with 50-55mm Bearing Mechanical Roller Special Order Camshaft.						1,2,5
118997	NA	Custom Grind Camshaft, with 50-55mm Bearing, LS (C) Firing Order Mechanical Roller Special Order Camshaft.						1,2,5,24

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

2 Requires Thrust Button.

5 Requires upgraded distributor gear/fuel pump pushrod.

24 Ignition firing order must be changed to 1-8-7-2-6-5-4-3.

Some items are not legal for sale or use on any pollution controlled motor vehicle

Big Bottle Cams™ - Nitrous Oxide Mechanical Roller Camshaft Components

	Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91117 91121	90135	NA	98637 ²⁵ 98543 ²⁵	97130 ¹⁰	97220 ¹⁰ 97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98738-A ²⁵ 98825 ²⁵	NA 97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93311 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	--	--	--	--	--	--	--	--	--	--	--	92151 94475	94400 94402	94300
	--	--	--	--	--	--	--	--	--	--	--	92151 94475	94400 94402	94300
	--	--	--	--	--	--	--	--	--	--	--	92151 94475	94400 94402	94300
	--	--	--	--	--	--	--	--	--	--	--	92151 94475	94400 94402	94300
	--	--	--	--	--	--	--	--	--	--	--	92151 94475	94400 94402	94300

Components Notes: master note list on page 260

7 Requires 7/16" rocker studs.

10 10° Valve lock Angle, must use matching retainers/locks.

25 Machining Required.

4/7 Swap *Steel Billet Mechanical Roller Camshafts*

Firing Order: 1•8•7•3•6•5•4•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
114013-06	NA	283 289 3600-7600	251 257	.640 .640	106	102	.022 .022	1,2,5,22 <i>Strong mid-range horsepower, rough idle. Oval Track & Bracket cars.</i>
114013-06S	NA	283 289 3600-7600	251 257	.640 .640	106	102	.022 .022	1,2,5,22 <i>Small Base Circle, strong mid-range HP, rough idle. Oval Track & Bracket cars.</i>
114163-06	NA	287 293 3800-7800	255 261	.600 .620	106	102	.022 .022	1,2,5,22 <i>Good mid-range horsepower, rough idle. Needs 11.0:1 CR-up.</i>
114163-06S	NA	287 293 3800-7800	255 261	.600 .620	106	102	.022 .022	1,2,5,22 <i>Small Base Circle, good mid-range horsepower, rough idle. Needs 11.0:1 CR-up.</i>
114633-06	NA	289 295 4000-7800	257 263	.615 .615	106	102	.022 .022	1,2,5,22 <i>Oval Track/Mild Bracket, mid range torque & top end power. 10.5-11.0:1 CR.</i>
114633-06S	NA	289 295 4000-7800	257 263	.615 .615	106	102	.022 .022	1,2,5,22 <i>Small Base Circle, Oval Track/Mild Bracket, mid range torque & top end power.</i>
114173-06	NA	289 295 4000-7800	257 263	.640 .640	106	102	.022 .022	1,2,5,22 <i>Strong mid-range torque & top end power. Needs 10.5-11.5:1 CR.</i>
114173-06S	NA	289 295 4000-7800	257 263	.640 .640	106	102	.022 .022	1,2,5,22 <i>Small Base Circle, Strong mid-range torque & top end power. Needs 10.5-11.5:1 CR.</i>
114173-08	NA	289 295 4000-7800	257 263	.640 .640	108	104	.022 .022	1,2,5,22 <i>Strong mid range. Needs good single plane intake, 10.5:1+ CR.</i>
114173-08S	NA	289 295 4000-7800	257 263	.640 .640	108	104	.022 .022	1,2,5,22 <i>Small Base Circle, Strong mid range. Needs good single plane intake, 10.5:1+ CR.</i>
114143-06	NA	289 299 4000-7800	257 267	.600 .600	106	102	.022 .022	1,2,5,22 <i>Strong mid & upper rpm, banked Oval Track & Brackets w/auto trans.</i>
114143-06S	NA	289 299 4000-7800	257 267	.600 .600	106	102	.022 .022	1,2,5,22 <i>Small Base Circle, strong mid & upper rpm, banked Oval Track & Brackets w/auto trans.</i>
114143-08	NA	289 299 4000-7800	257 267	.600 .600	108	104	.022 .022	1,2,5,22 <i>Mid & upper RPM torque, good in banked Oval Track & Bracket.</i>
114143-08S	NA	289 299 4000-7800	257 267	.600 .600	108	104	.022 .022	1,2,5,22 <i>Small Base Circle, mid & upper RPM torque, good in banked Oval Track & Bracket.</i>
114053-06	NA	291 295 4200-8000	259 263	.640 .630	106	102	.022 .022	1,2,5,22 <i>Strong Modified or Limited Sprint winner.</i>
114053-06S	NA	291 295 4200-8000	259 263	.640 .630	106	102	.022 .022	1,2,5,22 <i>Small Base Circle, Strong Modified or Limited Sprint winner.</i>
114323-08	NA	291 295 4200-8000	259 263	.640 .640	108	104	.022 .022	1,2,5,22 <i>Oval Track/Drag, mid range torque with top end power. Needs good heads.</i>
114323-08S	NA	291 295 4200-8000	259 263	.640 .640	108	104	.022 .022	1,2,5,22 <i>Small Base Circle, Oval Track/Drag, mid range torque & top end power.</i>
114713-06	NA	291 299 4200-8000	259 267	.675 .645	106	102	.022 .022	1,2,5,22 <i>360-383ci Sprint, Modified. Super fast tracks.</i>
114713-06S	NA	291 299 4200-8000	259 267	.675 .645	106	102	.022 .022	1,2,5,22 <i>Small Base Circle, 360-383ci Sprint, Modified. Super fast tracks.</i>
114023-06	NA	295 301 4000-8000	263 269	.640 .620	106	102	.022 .022	1,2,5,22 <i>1/4-3/8, Good heads. Dirt Late Model.</i>
114023-06S	NA	295 301 4000-8000	263 269	.640 .620	106	102	.022 .022	1,2,5,22 <i>Small Base Circle, 1/4-3/8, Good heads. Dirt Late Model.</i>
114913-08	NA	295 303 4000-8000	263 271	.630 .625	108	104	.022 .022	1,2,5,22 <i>410 Sprint or big inch Bracket. Strong upper mid-range.</i>
114913-08S	NA	295 303 4000-8000	263 271	.630 .625	108	104	.022 .022	1,2,5,22 <i>Small Base Circle, 410 Sprint or big inch Bracket. Strong upper mid-range.</i>

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

2 Requires Thrust Button.

5 Requires upgraded distributor gear/fuel pump pushrod.

22 Ignition firing order must be changed to 1-8-7-3-6-5-4-2.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHEVROLET SMALL BLOCK • 262-400 1955-1998

4/7 Swap *Steel Billet Mechanical Roller Camshaft Components*

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91117	90135	NA	98637 ²⁵	97130 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91121			98543 ²⁵		97222 ¹⁰				90105 ⁷		94475	94402	
91117	90135	NA	98637 ²⁵	97130 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91121			98543 ²⁵		97222 ¹⁰				90105 ⁷		94475	94402	
91117	90135	NA	98637 ²⁵	97130 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91121			98543 ²⁵		97222 ¹⁰				90105 ⁷		94475	94402	
91117	90135	NA	98637 ²⁵	97130 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91121			98543 ²⁵		97222 ¹⁰				90105 ⁷		94475	94402	
91117	90135	NA	98637 ²⁵	97130 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91121			98543 ²⁵		97222 ¹⁰				90105 ⁷		94475	94402	
91117	90135	NA	98637 ²⁵	97130 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91121			98543 ²⁵		97222 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	
91121	90135	NA	98543 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷	95010	92151	94400	94300
91134			98843 ²⁵		97220 ¹⁰				90105 ⁷		94475	94402	

Components Notes: master note list on page 260

⁷ Requires 7/16" rocker studs.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

4/7 Swap *Steel Billet Mechanical Roller Camshafts* (cont.) Firing Order: 1•8•7•3•6•5•4•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
114123-06	NA	299 307 4400-8200	267 275	.645 .645	106	102	.022 .022	1,2,5,22 <i>Competition use, good mid & upper HP, medium to high bank Oval Track.</i>
114123-06S	NA	299 307 4400-8200	267 275	.645 .645	106	102	.022 .022	1,2,5,22 <i>Small Base Circle, Competition, mid & upper HP, medium to high bank Oval Track.</i>
114123-08	NA	299 307 4400-8200	267 275	.645 .645	108	104	.022 .022	1,2,5,22 <i>Competition use, good mid & upper power, medium to high bank Oval Track.</i>
114123-08S	NA	299 307 4400-8200	267 275	.645 .645	108	104	.022 .022	1,2,5,22 <i>Small Base Circle, Competition, mid & upper HP, medium to high bank Oval Track.</i>
114983-06	NA	301 309 4400-8400	269 277	.650 .650	106	102	.022 .022	1,2,5,22 <i>Competition/Bracket E.T. Mid to upper rpm horsepower. Good heads, 12.5:1+ CR.</i>
114983-06S	NA	301 309 4400-8400	269 277	.650 .650	106	102	.022 .022	1,2,5,22 <i>Small Base Circle, Competition/Bracket E.T. Mid to upper rpm horsepower. 12.5:1+ CR.</i>
114863-06	NA	301 309 4400-8400	269 277	.675 .650	106	102	.022 .022	1,2,5,22 <i>Competition/Bracket E.T. Mid to upper rpm horsepower. Good heads, 12.5:1+ CR.</i>
114863-06S	NA	301 309 4400-8400	269 277	.675 .650	106	102	.022 .022	1,2,5,22 <i>Small Base Circle, Competition/Bracket E.T. Mid to upper rpm horsepower. Good heads.</i>
114863-08	NA	301 309 4400-8400	269 277	.675 .650	108	104	.022 .022	1,2,5,22 <i>Competition/Bracket E.T. Mid to upper end performance. 12.5:1+ CR.</i>
114863-08S	NA	301 309 4400-8400	269 277	.675 .650	108	104	.022 .022	1,2,5,22 <i>Small Base Circle, Competition/Bracket E.T. Mid to upper end performance. 12.5:1+ CR.</i>
114563-08	NA	305 311 4600-8400	273 279	.680 .640	108	104	.022 .022	1,2,5,22 <i>Competition, Upper mid to top end power. 12.5:1+ CR, good heads a must.</i>
114563-08S	NA	305 311 4600-8400	273 279	.680 .640	108	104	.022 .022	1,2,5,22 <i>Small Base Circle, Competition, Upper mid to top end power. 12.5:1+ CR, good heads.</i>
114033-06	NA	305 315 4800-8400	273 283	.645 .630	106	102	.022 .022	1,2,5,22 <i>377-400 O.D. 3/8-1/2. Good heads.</i>
114033-06S	NA	305 315 4800-8400	273 283	.645 .630	106	102	.022 .022	1,2,5,22 <i>Small Base Circle, 377-400 O.D. 3/8-1/2. Good heads.</i>
114083-08	NA	307 317 5000-8800	275 285	.630 .630	108	104	.022 .022	1,2,5,22 <i>Competition profile, good top end power. Needs good parts.</i>
114083-08S	NA	307 317 5000-8800	275 285	.630 .630	108	104	.022 .022	1,2,5,22 <i>Small Base Circle, Competition profile, good top end power. Needs good parts.</i>
114043-08	NA	309 315 5200-8600	277 283	.675 .645	108	104	.022 .022	1,2,5,22 <i>377+, lighter car. Fast track, Drag w/auto.</i>
114043-08S	NA	309 315 5200-8600	277 283	.675 .645	108	104	.022 .022	1,2,5,22 <i>Small Base Circle, 377+, lighter car. Fast track, Drag w/auto.</i>
114233-06	NA	309 317 5200-8800	277 285	.675 .645	106	102	.022 .022	1,2,5,22 <i>All out Competition big cylinder head & compression.</i>
114233-06S	NA	309 317 5200-8800	277 285	.675 .645	106	102	.022 .022	1,2,5,22 <i>Small Base Circle, all out Competition big cylinder head & compression.</i>
114073-14S	NA	313 327 5600-9000	281 295	.730 .715	114	110	.022 .022	1,2,5,22 <i>Small Base Circle, all out Competition only. Needs good valvetrain. Works good w/NOS.</i>
119994	NA	Custom Grind Camshaft 4/7 Swap Mechanical Roller Special Order Camshaft.						1,2,5,22
119994-S	NA	Custom Grind Camshaft, Small Base Circle 4/7 Swap Mechanical Roller Special Order Camshaft.						1,2,5,22

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

2 Requires Thrust Button.

5 Requires upgraded distributor gear/fuel pump pushrod.

22 Ignition firing order must be changed to 1-8-7-3-6-5-4-2.

Some items are not legal for sale or use on any pollution controlled motor vehicle

4/7 Swap *Steel Billet Mechanical Roller Camshaft Components*

	Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
	91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷ </				

Components Notes: master note list on page 260

7 Requires 7/16" rocker studs.

10 10° Valve lock Angle, must use matching retainers/locks.

25 Machining Required.

CAMSHAFTS

CHEVROLET SMALL BLOCK • 262-400 1955-1998



Big Bottle Cams™ - 4/7 Swap Mechanical Roller Cams

Firing Order: 1•8•7•3•6•5•4•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
114143-12	NA	289 299 4000-7800	257 267	.600 .600	112	108	.022 .022	1,2,5,22 Mid & upper RPM torque, great with 1.6 rockers. Best with plate systems.
114143-12S	NA	289 299 4000-7800	257 267	.600 .600	112	108	.022 .022	1,2,5,22 Small Base Circle, mid & upper RPM torque, great with 1.6 rockers. Best with plate systems.
114613-12	NA	291 307 3600-7600	259 275	.640 .630	112	108	.022 .022	1,2,5,22 Mid & upper RPM horsepower, 250+ plate systems.
114613-12S	NA	291 307 3600-7600	259 275	.640 .630	112	108	.022 .022	1,2,5,22 Small Base Circle, Mid & upper RPM horsepower, 250+ plate systems.
114673-12	NA	299 311 4000-8000	267 279	.645 .640	112	108	.022 .022	1,2,5,22 Competition, 383+ ci. Mid to upper end power. Multi-stage nitrous system.
114673-12S	NA	299 311 4000-8000	267 279	.645 .640	112	108	.022 .022	1,2,5,22 Small Base Circle, Competition, 383+ ci. Mid to upper end power. Multi-stage system.
114673-14	NA	299 311 4000-8000	267 279	.645 .640	114	110	.022 .022	1,2,5,22 Competition, 383+ ci. Mid to upper end power. Multi-stage nitrous system.
114673-14S	NA	299 311 4000-8000	267 279	.645 .640	114	110	.022 .022	1,2,5,22 Small Base Circle, Competition, 383+ ci. Mid to upper end power. Multi-stage system.
114513-12	NA	305 319 4400-8200	273 287	.680 .650	112	108	.022 .022	1,2,5,22 Competition, 400+ ci. Mid to upper end power. Multi-stage nitrous system.
114513-12S	NA	305 319 4400-8200	273 287	.680 .650	112	108	.022 .022	1,2,5,22 Small Base Circle, Competition, 400+ ci. Mid to upper end power. Multi-stage system.
114393-14	NA	309 323 4600-9000	277 291	.675 .675	114	110	.022 .022	1,2,5,22 Competition, 400+ cubic inch with big heads. Multi-stage system.
114393-14S	NA	309 323 5000-9000	277 291	.675 .675	114	110	.022 .022	1,2,5,22 Small Base Circle, all out Competition, Multi-stage nitrous systems.
114073-14S	NA	313 327 5000-7800	281 295	.730 .715	114	110	.022 .022	1,2,5,22 Small Base Circle, all out Competition, Multi-stage nitrous systems.
114113-14S	NA	313 329 5000-7800	281 297	.705 .716	114	110	.022 .022	1,2,5,22 Small Base Circle, Big cubic inch, all out Competition, Multi-stage nitrous systems.
119994	NA	Custom Grind Camshaft 4/7 Swap Mechanical Roller Special Order Camshaft.						1,2,5,22
119994-S	NA	Custom Grind Camshaft, Small Base Circle 4/7 Swap Mechanical Roller Special Order Camshaft.						1,2,5,22

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

2 Requires Thrust Button.

5 Requires upgraded distributor gear/fuel pump pushrod.

22 Ignition firing order must be changed to 1-8-7-3-6-5-4-2.

Some items are not legal for sale or use on any pollution controlled motor vehicle

Big Bottle Cams™ - 4/7 Swap Mechanical Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
91121 91134	90135	NA	98543 ²⁵ 98843 ²⁵	97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
91121 91134	90135	NA	98738-A ²⁵ 98825 ²⁵	-- 97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
91121 91134	90135	NA	98738-A ²⁵ 98825 ²⁵	-- 97130 ¹⁰	97222 ¹⁰ 97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90072 ⁷	90101 ⁷ 90105 ⁷	95010	92151 94475	94400 94402	94300
--	--	--	--	--	--	--	--	--	--	--	92151 94475	94400 94402	94300
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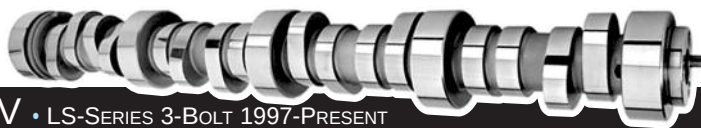
Components Notes: master note list on page 260

⁷ Requires 7/16" rocker studs.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

CAMSHAFTS



CHEVROLET GEN III / IV • LS-SERIES 3-BOLT 1997-PRESENT

American Muscle™ Hydraulic Roller Camshafts

Firing Order: 1•8•7•2•6•5•4•3

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.70 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
197245-12	NA	267 276 1700-6700	219 228	.525 .525	112	108	Hyd. Hyd.	12
Our version of the GM Hot cam. Advanced lobe design for increased performance.								
197715-10	NA	274 285 2000-7400	226 236	.525 .525	110	106	Hyd. Hyd.	12
Our version of the GM ASA cam. Advanced lobe design for increased performance.								
197715-13	NA	274 285 1900-7300	226 236	.525 .525	113	109	Hyd. Hyd.	12
Same as #197715-10 w/wider separation for easier tunability & smoother power band.								



CHEVROLET GEN III / IV • LS-SERIES 3-BOLT 1997-PRESENT

Rattler Cams™ Hydraulic Roller Camshafts

Firing Order: 1•8•7•2•6•5•4•3

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.70 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
198035-09	CL198035-09	275 282 2200-6500	226 234	.525 .525	109	103	Hyd. Hyd.	
Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.								
198075-09	CL198075-09	282 290 2500-6600	234 242	.625 .625	109	103	Hyd. Hyd.	1
Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.								
198135-09	CL198135-09	290 297 2400-6800	242 250	.625 .625	109	103	Hyd. Hyd.	1
Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.								

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

12 Requires custom programmer/tuning.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHEVROLET GEN III / IV • LS-SERIES 3-BOLT 1997-PRESENT

American Muscle™ Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91113 91166 ³³	NA	98113-K1 98116-K1	98113 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98113-K1 98116-K1	98113 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98113-K1 98116-K1	98113 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷

CHEVROLET GEN III / IV • LS-SERIES 3-BOLT 1997-PRESENT

Rattler Cams™ Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91113 ³ 91166 ³³	NA	98113-K1 98116-K1	98113 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 ³ 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 ³ 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

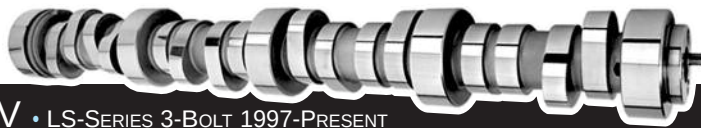
²⁶ LS-Series 3-Bolt '97-'05.

²⁷ LS-Series 3-Bolt '06-present.

³⁰ LS-Series Gen III.

³¹ LS-Series Gen IV.

³³ Tie bar style lifters.



CHEVROLET GEN III / IV • LS-SERIES 3-BOLT 1997-PRESENT

LS-SERIES 3-BOLT '97-PRESENT WITH CATHEDRAL PORT HEADS

LS1	5.7L	1997-2004	'97-'04 Corvette, '98-'02 Camaro/Trans Am, '04 Pontiac GTO
LS2	6.0L	2005-2009	'05-'07 Buick Rainer, '05-'06 Pontiac GTO, '06-'07 Cadillac CTS-V, '05-'07 Corvette, '05-'09 SSR, '06-'09 Trailblazer SS
LS6	5.7L	2001-2005	'01-'04 Corvette Z06, '04-'05 Cadillac CTS-V
LM4	4.8L	2003-2004	'03-'04 Trailblazer EXT, '04 Envoy XL, '03-'04 SSR, '04 Buick Rainer
LM7	5.3L	1999-2007	'99-'06 Tahoe/Yukon, '99-'06 Suburban/Yukon XL, '99-'07 Silverado/Sierra, '02-'05 Escalade 2WD '02-'06 Avalanche, '03-'07 Express, '03-'07 Savana
LR4	4.8L	1999-2007	'99-'06 Tahoe/Yukon, '99-'07 Silverado/Sierra, '03-'07 Express 2500-3500, '03-'07 Savana 2500-3500
LQ4	6.0L	1999-2007	'99-'01 Silverado/Sierra 2500-3500, '99-'01 Express, '99-'01 Savana, '99-'01 Suburban/Yukon XL, '03-'07 Hummer H2
LQ9	6.0L	2002-2007	'02-'06 Escalade, '02-'06 Escalade EXT & ESV, '03-'07 Silverado SS, '04-'05 Silverado/Sierra HO, '06-'07 Silverado/Sierra MAX Option
L33	5.3L	2005-2007	'05-'07 Silverado/Sierra 4WD
L59	5.3L	2002-2007	'02-'07 Silverado/Sierra, '02-'06 Tahoe/Yukon, '02-'06 Suburban/Yukon XL

Note: If using Rectangular Port heads (OE or aftermarket) on any of above engines, please use cams from LS-Series with Rectangular Port Heads.

Hydraulic Roller Camshafts (w/Cathedral Port Heads)

Firing Order: 1•8•7•2•6•5•4•3

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.70 Rockers		Lobe Separation Angle	Intake Centerline	Valve IN	Lash EX	Cam Notes
		IN	EX	IN	EX	IN	EX					
19xxx5-14	NA	250	256	204	210	.525	.525	114	110	Hyd.	Hyd.	
		800-5000	Good increase over stock in mid to upper end. May need programmer for best results.									
19xxx5-14	NA	255	261	208	214	.525	.525	114	110	Hyd.	Hyd.	12
		1000-5600	Big torque in 4.8L, 5.3L or 5.7L. Needs good intake and exhaust.									
190315-14	NA	260	264	210	214	.595	.598	114	110	Hyd.	Hyd.	1
		1000-5800	High lift short duration design, Great throttle response.									
19xxx5-12	NA	261	267	214	220	.525	.525	112	108	Hyd.	Hyd.	
		1400-6000	Great for Street Rod transplant with 5-3-5.7L. Good all around performance.									
190235-14	NA	269	278	216	224	.551	.551	114	110	Hyd.	Hyd.	1
		1200-6200	Aggressive Street/Strip, upper torque & horsepower.									
190275-17	NA	272	278	216	224	.553	.553	117	113	Hyd.	Hyd.	1
		1400-6400	Street/Strip, Great mid to upper end power. 9.5:1+ CR. Best with minor tune.									
190255-13	NA	270	270	218	218	.604	.604	113	109	Hyd.	Hyd.	1,12
		1500-6500	Good drivability with great mid range power. Also good in turbocharged applications.									
19xxx5-15	NA	264	277	218	230	.525	.525	115	111	Hyd.	Hyd.	12
		1600-6400	Best in Street Rod with 5.3 to 5.7L with Blower (10+ psi). Great mid range.									
190395-13	NA	270	274	218	224	.604	.612	113	109	Hyd.	Hyd.	1,12
		1600-6600	Great mid range performance with top end power.									
190295-12	NA	270	275	218	224	.604	.604	112	108	Hyd.	Hyd.	1,12
		1600-6600	Mid range to top end power & torque. Nice throttle response.									
190225-13	NA	272	272	222	222	.561	.561	113	109	Hyd.	Hyd.	1,12
		1800-6500	Street/Strip power. Great mid range with top end performance. OK with turbocharger.									
190245-12	NA	272	281	222	225	.561	.578	112	108	Hyd.	Hyd.	1,12
		1800-6600	Street/Strip applications, mid-range torque & horsepower.									
190285-13	NA	274	274	224	224	.612	.612	113	109	Hyd.	Hyd.	1,12
		1800-6800	Street/Strip performance, Good mid range power. Needs good heads.									
190285-15	NA	274	274	224	224	.612	.612	115	111	Hyd.	Hyd.	1,12
		1800-6800	Street/Strip performance, Good mid range power.									
190375-12	NA	274	280	224	230	.609	.604	112	108	Hyd.	Hyd.	1,12
		1800-6800	Broad power range. Best with Cathedral Port heads & aftermarket intake.									
190375-15	NA	274	280	224	230	.609	.604	115	111	Hyd.	Hyd.	1,12
		1800-6800	Broad power range. Best with Cathedral Port heads & aftermarket intake.									
190385-10	NA	274	286	224	234	.612	.638	110	106	Hyd.	Hyd.	1,12
		1800-7000	Aggressive Street/Strip, Good mid range horsepower.									
190385-12	NA	274	286	224	234	.612	.638	112	108	Hyd.	Hyd.	1,12
		1800-7000	Aggressive Street/Strip, also great with small blower or NOS.									

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

12 Requires custom programmer/tuning.

Some items are not legal for sale or use on any pollution controlled motor vehicle

Hydraulic Roller Camshaft (w/Cathedral Port Heads) Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98113-K1 98116-K1	98113 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98113-K1 98116-K1	98113 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷

Components Notes: master note list on page 260

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

²⁶ LS-Series 3-Bolt '97-'05.

²⁷ LS-Series 3-Bolt '06-present.

³⁰ LS-Series Gen III.

³¹ LS-Series Gen IV.

³³ Tie bar style lifters.



Hydraulic Roller Camshafts (w/Cathedral Port Heads) (cont.)

Firing Order: 1•8•7•2•6•5•4•3

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN	EX	Duration @ .050" IN	EX	Valve Lift w/1.70 Rockers IN	EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN	EX	Cam Notes
190385-15	NA	274	286	224	234	.612	.638	115	111	Hyd.	Hyd.	1,12
1800-7000 Aggressive Street/Strip, ideal for supercharged or NOS applications.												
190735-13	NA	274	274	226	226	.525	.525	113	109	Hyd.	Hyd.	12
1900-7100 Street/Strip, Good mid & upper range torque & performance. OK with turbocharger.												
190325-12	NA	281	284	226	232	.578	.587	112	108	Hyd.	Hyd.	1,12
2000-7200 Aggressive Street/Strip, upper torque & horsepower. Needs good heads.												
190325-15	NA	281	284	226	232	.578	.587	115	111	Hyd.	Hyd.	1,12
2000-7200 Aggressive Street/Strip, upper torque & horsepower.												
196765-12	NA	275	282	228	234	.604	.609	112	108	Hyd.	Hyd.	1,12
2400-7000 Hot Street applications. Needs aftermarket heads & intake, higher CR.												
190965-13	NA	278	280	230	232	.625	.625	113	109	Hyd.	Hyd.	1,12
2400-7200 Competition, Great mid range torque and power. Good heads, 2500+ stall.												
190335-13	NA	278	294	230	246	.625	.625	113	109	Hyd.	Hyd.	1,12
2000-7000 Hot Street/Strip. Great mid range performance. Best with aftermarket heads.												
196915-10	NA	283	287	232	236	.598	.604	110	106	Hyd.	Hyd.	1,12
2200-7000 Street/Strip performance, Good mid range power. Needs good heads.												
196915-12	NA	283	287	232	236	.598	.604	112	108	Hyd.	Hyd.	1,12
2300-7100 Street/Strip performance, Good mid range power. Needs good heads.												
190355-12	NA	280	284	232	236	.625	.625	112	108	Hyd.	Hyd.	1,12
2200-7200 Fair idle, Excellent mid range performance. 2500+ stall, 10.5:1 CR, 3.70-4.20 gear.												
190365-15	NA	282	278	234	230	.625	.625	115	111	Hyd.	Hyd.	1,12
2400-7200 Street/Strip performance, Good mid range power. Needs good heads. Great with turbo.												
190265-10	NA	287	290	236	242	.612	.604	110	106	Hyd.	Hyd.	1,12
2600-7200 Hot Street/Strip. Great mid range torque. 2800+ stall, 11.0:1+ CR, better heads/intake.												
190265-13	NA	287	290	236	242	.612	.604	113	109	Hyd.	Hyd.	1,12
2600-7200 Large cubic inch, Race only applications. Needs aftermarket heads & intake, higher CR.												
190265-15	NA	287	290	236	242	.612	.604	115	111	Hyd.	Hyd.	1,12
2600-7200 Large cubic inch, Race only applications. Needs aftermarket heads & intake, higher CR.												
190405-13	NA	288	295	240	248	.625	.625	113	109	Hyd.	Hyd.	1,12
2800-7200 Broad top end power. Needs aftermarket heads & intake, plus higher CR. Good w/turbo.												
190305-15	NA	290	290	242	242	.625	.625	115	111	Hyd.	Hyd.	1,12
2800-7400 Competition, large cubic inch. Needs aftermarket heads & intake, plus higher CR.												
199995	NA	Custom Grind Camshaft								Hyd.	Hyd.	1,12
Hydraulic Roller Special Order Camshaft.												

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

12 Requires custom programmer/tuning.

CHEVROLET GEN III / IV • LS-SERIES 3-BOLT 1997-PRESENT

Hydraulic Roller Camshaft (w/Cathedral Port Heads) Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98113-K1 98116-K1	98113 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98113-K1 98116-K1	98113 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98113-K1 98116-K1	98113 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	--	--	--	--	--	--	--	NA	--	NA	NA	94308 ²⁶ 94307 ²⁷

Components Notes: master note list on page 260

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

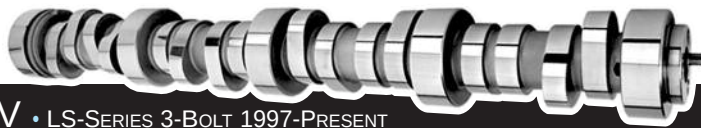
²⁶ LS-Series 3-Bolt '97-'05.

²⁷ LS-Series 3-Bolt '06-present.

³⁰ LS-Series Gen III.

³¹ LS-Series Gen IV.

³³ Tie bar style lifters.



CHEVROLET GEN III / IV • LS-SERIES 3-BOLT 1997-PRESENT

LS-SERIES 3-BOLT '97-PRESENT WITH RECTANGULAR PORT HEADS

LS7	7.0L	2006-Present	'06-Present Corvette Z06
LS9	6.2L	2009	'09 Corvette ZR1

Hydraulic Roller Camshafts (w/Rectangular Port Heads)

Firing Order: 1•8•7•2•6•5•4•3

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.70 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
190385-12	NA	274 286 1800-7000	224 234	.612 .638	112	108	Hyd. Hyd.	1,12 Aggressive Street/Strip, also great with small blower or NOS.
190385-15	NA	274 286 1800-7000	224 234	.612 .638	115	111	Hyd. Hyd.	1,12 Aggressive Street/Strip, ideal for supercharged or NOS applications.
190735-13	NA	274 274 1900-7100	226 226	.525 .525	113	109	Hyd. Hyd.	12 Street/Strip, Good mid & mid range torque & performance. Ok with turbocharger.
190325-12	NA	281 284 2000-7200	226 232	.578 .587	112	108	Hyd. Hyd.	1,12 Aggressive Street/Strip, mid torque & horsepower. Needs good heads.
190325-15	NA	281 284 2000-7200	226 232	.578 .587	115	111	Hyd. Hyd.	1,12 Aggressive Street/Strip, upper torque & horsepower.
192865-13	NA	275 291 2200-6800	227 243	.607 .618	113	109	Hyd. Hyd.	1,12 Street/Strip, broad power & torque range. Good heads a plus.
196765-12	NA	275 282 2600-7200	228 234	.604 .609	112	108	Hyd. Hyd.	1,12 Street/Strip performance. Needs aftermarket heads & intake, higher CR.
190345-13	NA	278 297 2200-7200	230 250	.625 .625	113	109	Hyd. Hyd.	1,12 Hot Street/Strip with blower or large NOS system. Big mid range power.
196915-10	NA	283 287 2400-7200	232 236	.598 .604	110	106	Hyd. Hyd.	1,12 Hot Street/Strip performance, Good mid range power. Needs good heads & gears.
196915-12	NA	283 287 2400-7200	232 236	.598 .604	112	108	Hyd. Hyd.	1,12 Hot Street/Strip performance, Good mid range power. Needs good heads & gears.
190365-15	NA	282 278 2400-7000	234 230	.625 .625	115	111	Hyd. Hyd.	1,12 Street/Strip performance, Good mid range power. Needs good heads. Turbo applications OK.
190905-12	NA	287 290 2400-7400	236 238	.612 .604	112	108	Hyd. Hyd.	1,12 Large cubic inch, Race only applications. Needs aftermarket intake, 2500+ stall.
190805-12	NA	284 297 2600-7200	236 250	.625 .625	112	108	Hyd. Hyd.	1,12 Large cubic inch, Race only applications. Needs aftermarket heads & intake, higher CR.
190805-15	NA	284 297 2600-7200	236 250	.625 .625	115	111	Hyd. Hyd.	1,12 Large cubic inch, Race only applications. Needs aftermarket heads. Great with NOS.
190865-13	NA	288 304 2600-7200	240 256	.625 .625	113	109	Hyd. Hyd.	1,12 Large cubic inch, Race only applications. Needs aftermarket heads & intake, higher CR.
190305-15	NA	290 290 2800-7400	242 242	.625 .625	115	111	Hyd. Hyd.	1,12 Competition, large cubic inch. Needs aftermarket heads & intake, plus higher CR. Turbo OK.
199995	NA	Custom Grind Camshaft Hydraulic Roller Special Order Camshaft.					Hyd. Hyd.	1,12

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

12 Requires custom programmer/tuning.

Hydraulic Roller Camshaft (w/Rectangular Port Heads) Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98113-K1 98116-K1	98113 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98113-K1 98116-K1	98113 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷

Components Notes: master note list on page 260

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

²⁶ LS-Series 3-Bolt '97-'05.

²⁷ LS-Series 3-Bolt '06-present.

³⁰ LS-Series Gen III.

³¹ LS-Series Gen IV.

³³ Tie bar style lifters.

CAMSHAFTS



CHEVROLET GEN III / IV • LS-SERIES 3-BOLT 1997-PRESENT

Hydraulic Roller Camshafts For Carbureted Applications

Firing Order: 1•8•7•2•6•5•4•3

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.70 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
190315-08	NA	260 264	210 214	.595 .598	108	104	Hyd. Hyd.	1
		1000-5800	High lift short duration design, Great throttle response.					
190395-10	NA	270 274	218 224	.604 .612	110	106	Hyd. Hyd.	1,12
		1600-6600	Great mid range performance with top end power.					
190375-10	NA	274 280	224 230	.609 .604	110	106	Hyd. Hyd.	1,12
		1800-6800	Broad power range. Best with Cathedral Port heads.					
190325-10	NA	281 284	226 232	.578 .587	110	106	Hyd. Hyd.	1,12
		2000-7200	Aggressive Street/Strip, upper torque & horsepower. Needs good heads.					
192435-10	NA	280 290	230 238	.604 .604	110	106	Hyd. Hyd.	1,12
		2200-7200	Street/Strip performance, Good mid range power. Needs good heads.					
193865-10	NA	284 292	236 244	.625 .625	110	106	Hyd. Hyd.	1,12
		2600-7200	Large cubic inch. Needs aftermarket heads & intake, higher CR.					
192965-10	NA	292 300	244 252	.651 .625	110	106	Hyd. Hyd.	1,12
		2600-7200	Large cubic inch, Race only applications. Needs aftermarket heads & intake, higher CR.					
199995	NA	Custom Grind Camshaft					Hyd. Hyd.	1,12
		Hydraulic Roller Special Order Camshaft.						



CHEVROLET GEN III / IV • LS-SERIES 3-BOLT 1997-PRESENT

Mechanical Roller Camshafts

Firing Order: 1•8•7•2•6•5•4•3

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.70 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
199993	NA	Custom Grind Camshaft						1,12
		Mechanical Roller Special Order Camshaft.						

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

12 Requires custom programmer/tuning.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHEVROLET GEN III / IV • LS-SERIES 3-BOLT 1997-PRESENT

Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90097 ³⁰ 90095 ³¹	NA	95018	NA	NA	94308 ²⁶ 94307 ²⁷
91113 91166 ³³	NA	--	--	--	--	--	--	--	NA	--	NA	NA	94308 ²⁶ 94307 ²⁷

CHEVROLET GEN III / IV • LS-SERIES 3-BOLT 1997-PRESENT

Mechanical Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91177 91179	NA	--	--	--	--	--	--	--	NA	--	NA	NA	94308 ²⁶ 94307 ²⁷

Components Notes: master note list on page 260

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

²⁶ LS-Series 3-Bolt '97-'05.

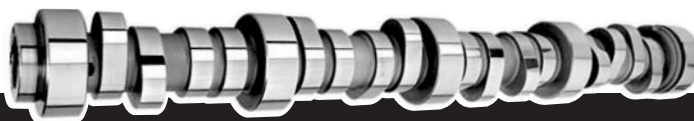
²⁷ LS-Series 3-Bolt '06-present.

³⁰ LS-Series Gen III.

³¹ LS-Series Gen IV.

³³ Tie bar style lifters.

CAMSHAFTS



CHEVROLET GEN IV • LS-SERIES SINGLE-BOLT 2005-PRESENT WITHOUT VVT

Hydraulic Roller Camshafts

Firing Order: 1•8•7•2•6•5•4•3

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN	EX	Duration @ .050" IN	EX	Valve Lift w/1.70 Rockers IN	EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN	EX	Cam Notes
190976-12	NA	272	284	222	232	.561	.587	112	108	Hyd.	Hyd.	1,12
		1800-6800	Street/Strip applications, mid-range torque & horsepower.									
190536-16	NA	275	274	228	224	.625	.612	116	112	Hyd.	Hyd.	1,12
		2000-6800	Street, Street/Strip Turbo'd (remote) applications. Strong mid range torque. 2000+ stall.									
190496-12	NA	279	289	228	238	.588	.604	112	108	Hyd.	Hyd.	1,12
		2200-7000	Street/Mild Race, Broad torque range. Great mid range performance.									
197096-12	NA	278	290	230	242	.625	.625	112	108	Hyd.	Hyd.	1,12
		2000-7000	Street/Strip performance, Good mid range power. Needs good heads.									
190916-16	NA	284	280	236	232	.625	.625	116	114	Hyd.	Hyd.	1,12
		2600-7200	Street/Strip Turbo'd (remote) applications. Strong mid & upper rpm performance.									
190806-12	NA	284	297	236	250	.625	.625	112	108	Hyd.	Hyd.	1,12
		2400-7200	Aggressive Street/Competition, Good mid to upper end horsepower. 2500+ stall.									
190866-13	NA	288	304	240	256	.625	.625	113	109	Hyd.	Hyd.	1,12
		2600-7200	Competition, Great top end power. 2800+ stall, aftermarket intake & better heads.									
190926-13	NA	292	307	244	260	.625	.625	113	109	Hyd.	Hyd.	1,12
		2800-7400	Competition, large cubic inch. Great high rpm power. 3000+ stall.									
199996	NA	Custom Grind Camshaft										1,12
		Hydraulic Roller Special Order Camshaft.										



CHEVROLET GEN IV • LS-SERIES SINGLE-BOLT 2005-PRESENT WITHOUT VVT

Mechanical Roller Camshafts

Firing Order: 1•8•7•2•6•5•4•3

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.70 Rockers		Lobe Separation	Intake	Valve Lash	Cam Notes	
		IN	EX	IN	EX	IN	EX	Angle	Centerline	IN	EX	
199996	NA	Custom Grind Camshaft										1,12
Mechanical Roller Special Order Camshaft.												

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

12 Requires custom programmer/tuning.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHEVROLET GEN III / IV • LS-SERIES 3-BOLT 1997-PRESENT

Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90095	NA	95018	NA	NA	94304 ²⁸ 94306 ²⁹
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90095	NA	95018	NA	NA	94304 ²⁸ 94306 ²⁹
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90095	NA	95018	NA	NA	94304 ²⁸ 94306 ²⁹
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90095	NA	95018	NA	NA	94304 ²⁸ 94306 ²⁹
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90095	NA	95018	NA	NA	94304 ²⁸ 94306 ²⁹
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90095	NA	95018	NA	NA	94304 ²⁸ 94306 ²⁹
91113 91166 ³³	NA	98112-K1 98116-K1	98112 98116	97161 97162	-- 97212 ¹⁰	93001 93092 ¹⁰	93385 ²⁵	90095	NA	95018	NA	NA	94304 ²⁸ 94306 ²⁹
91113 91166 ³³	NA	--	--	--	--	--	--	--	NA	--	NA	NA	94304 ²⁸ 94306 ²⁹

CHEVROLET GEN III • LS-SERIES 3-BOLT 1997-PRESENT

Mechanical Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91177 91179	NA	--	--	--	--	--	--	--	NA	--	NA	NA	94304 ²⁸ 94306 ²⁹

Components Notes: master note list on page 260

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

²⁸ LS-Series Single-Bolt 05-present, LS2/LSR/LR4.

²⁹ LS-Series Single-Bolt 07-10 LS3 6.0L, 08-10 6.2L.

³³ Tie bar style lifters.

CAMSHAFTS



CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996

Max Certified™ Hydraulic Flat Tappet Cam & Lifter Sets - 5 Year No Fault Warranty (see page 3 for details)

Cam & Lifter Set Part No.	Cam & Direct Lube Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.70 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
MC122501-12	MC122501-12DL ⁴	259 263 800-4000	205 209	.476 .476	112	108	Hyd. Hyd.	1
Great low end torque replacement cam, good fuel economy.								
MC120021-12	MC120021-12DL ⁴	259 269 800-4000	205 215	.476 .516	112	108	Hyd. Hyd.	1
Exceptional low end torque. Good in PUs, 4x4s & RVs.								
MC120931-12	MC120931-12DL ⁴	267 267 1500-5000	213 213	.510 .510	112	108	Hyd. Hyd.	1
Good idle, Street, Off-Road, Towing. Good fuel efficiency.								
MC120031-12	MC120031-12DL ⁴	269 279 1600-5200	215 225	.516 .527	112	108	Hyd. Hyd.	1
Great low & mid-range torque. OK in heavy vehicle.								
MC122521-15	MC122521-15DL ⁴	275 289 1800-5400	221 235	.504 .504	115	111	Hyd. Hyd.	1
Fair idle. Excellent in Performance & Marine applications.								
MC120941-11	MC120941-11DL ⁴	279 279 1800-5400	225 225	.527 .527	111	107	Hyd. Hyd.	1
Fair idle. Strong mid-range. Needs 4 barrel & headers.								



CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996



American Muscle™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.70 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
127641-14	CL127641-14	286 286 1000-4500	196 196	.412 .412	114	110	Hyd. Hyd.	
Smooth idle, near duplicate of the Chev LS1 335HP/427 cam (GM #3874872).								
127061-13	CL127061-13	346 348 1200-4600	210 213	.473 .473	113	109	Hyd. Hyd.	1
Near duplicate of the Chev L78 425HP/427 cam (GM #3883986).								



CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996



Street Force™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.70 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
120021-12	CL120021-12	259 269 800-4000	205 215	.476 .516	112	108	Hyd. Hyd.	1
Street Force™ 1, Good idle, Mild Street performance, strong low end torque.								
120031-12	CL120031-12	269 279 1200-5200	215 225	.516 .527	112	108	Hyd. Hyd.	1
Street Force™ 2, Good idle & throttle response. Needs 4 barrel & good exhaust.								
122121-12	CL122121-12	279 289 1600-6000	225 235	.527 .533	112	108	Hyd. Hyd.	1
Street Force™ 3, Noticeable idle, Hot Street & mild Bracket Racing.								
122441-12	CL122441-12	289 295 2400-6600	235 241	.553 .533	112	108	Hyd. Hyd.	1
Street Force™ 4, Lopey idle, good mid-range power. Needs 2800+ stall.								

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

4 Direct Lube Lifters Included in Cam & "Direct Lube" Lifter (DL) Sets.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996

Max Certified™ Hydraulic Flat Tappet Cam & Lifter Set Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91111 ³ 91116 ⁴	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91116 ⁴	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91116 ⁴	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91116 ⁴	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91116 ⁴	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91116 ⁴	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305

CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996

American Muscle™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91111 ³ 91116	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91116	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305

CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996

Street Force™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91111 ³ 91116	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91116	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91116	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91116	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

⁴ Direct Lube Lifters Included in Cam & "Direct Lube" Lifter (DL) Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

CAMSHAFTS



CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996

Rattler Cams™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.70 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
128001-09	CL128001-09	281 289 1800-5600	227 235	.545 .553	109	103	Hyd. Hyd.	1
Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.								
128041-09	CL128041-09	289 297 2000-5900	235 243	.553 .545	109	103	Hyd. Hyd.	1
Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.								
128101-09	CL128101-09	297 305 2400-6200	243 251	.545 .561	109	103	Hyd. Hyd.	1
Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.								



CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996

Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.70 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
122501-12	CL122501-12	259 263 800-4000	205 209	.476 .476	112	108	Hyd. Hyd.	1
Great low end torque replacement cam, good fuel economy.								
122511-11	CL122511-11	263 263 800-4200	209 209	.476 .476	111	107	Hyd. Hyd.	1
Low end performer, smooth idle. Good fuel efficiency.								
120931-12	CL120931-12	267 267 1200-5000	213 213	.510 .510	112	108	Hyd. Hyd.	1
Good idle, Street, Off-Road, Towing. Good fuel efficiency.								
120991-10	CL120991-10	275 275 1400-5600	221 221	.533 .533	110	106	Hyd. Hyd.	1
Good low & mid-range horsepower. Needs 4 barrel & headers.								
120951-10	CL120951-10	275 285 1500-5800	221 231	.533 .533	110	106	Hyd. Hyd.	1
Street & Strip. Needs 4 barrel, headers & lower gears.								
120951-12	CL120951-12	275 285 1500-5800	221 231	.533 .533	112	108	Hyd. Hyd.	1
Hot Street, Improved carburetion, exhaust & lower gears needed.								
122521-15	CL122521-15	275 289 1600-5600	221 235	.504 .504	115	111	Hyd. Hyd.	1
Fair idle. Excellent in Performance & Marine applications.								
120941-11	CL120941-11	279 279 1500-5800	225 225	.527 .527	111	107	Hyd. Hyd.	1
Fair idle. Strong mid-range. Needs 4 barrel & headers.								
120241-09	CL120241-09	279 285 1600-5800	225 231	.527 .533	109	105	Hyd. Hyd.	1
Fair idle, Nice mid range torque. 4bbl., headers & 2500+ stall suggested.								
122121-10	CL122121-10	279 289 1600-6000	225 235	.527 .533	110	106	Hyd. Hyd.	1
Hot Marine, Performance MerCruisers. Fair idle.								
122121-14	CL122121-14	279 289 1600-6000	225 235	.527 .533	114	110	Hyd. Hyd.	1
Hot Marine, Performance MerCruisers. Fair idle.								
120051-10	CL120051-10	285 285 2000-6400	231 231	.510 .510	110	106	Hyd. Hyd.	1
Noticeable idle, great with oval port heads.								
120961-11	CL120961-11	285 285 2000-6400	231 231	.533 .533	111	107	Hyd. Hyd.	1
Street/Strip, lots of torque. Auto OK with 3.55+ gears.								
120761-10	CL120761-10	285 289 2000-6500	231 235	.544 .553	110	106	Hyd. Hyd.	1
Lopey idle, Strong mid range. Good throttle response. 2400+ stall.								
122441-08	CL122441-08	289 295 2400-6400	235 241	.553 .533	108	104	Hyd. Hyd.	1
Lopey idle. Moderate Performance & Bracket Racing.								

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996

Rattler Cams™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91111 ³ 91112	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305

CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91111 ³ 91112	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.



Hydraulic Flat Tappet Camshafts (cont.)

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.70 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
122441-10	CL122441-10	289 295 2400-6500	235 241	.553 .533	110	106	Hyd. Hyd.	1
		Lopey idle. Moderate Performance & Bracket Racing.						
121181-08	CL121181-08	291 291 2400-6500	237 237	.553 .553	108	104	Hyd. Hyd.	1
		Lopey idle, Street/Bracket, Strong mid to upper end performance.						
121181-10	CL121181-10	291 291 2400-6600	237 237	.553 .553	110	106	Hyd. Hyd.	1
		Mild rough idle, Hot Street, good mid range. 9.5:1+ CR, 2800+ stall & headers.						
121181-12	CL121181-12	291 291 2400-6800	237 237	.553 .553	112	108	Hyd. Hyd.	1
		Good idle, Street/Strip. Broad mid range to upper end performance. 9.5:1+ CR.						
121721-08	CL121721-08	294 301 2500-6500	247 247	.570 .578	108	104	Hyd. Hyd.	1
		Rough idle, Hot Street/Strip, big mid range torque. 11.0:1 CR, 3000+ stall.						
121721-10	CL121721-10	294 301 2500-6600	247 247	.570 .578	110	106	Hyd. Hyd.	1
		Rough idle, Street/Strip, strong mid range power. 9.5:1+ CR, 2800+ stall.						
121721-12	CL121721-12	294 301 2500-6800	247 247	.570 .578	112	108	Hyd. Hyd.	1
		Good idle, Street/Strip. Broad mid range to upper end performance. 9.5:1+ CR.						
122531-10	CL122531-10	297 307 2800-6800	253 253	.575 .595	110	105	Hyd. Hyd.	1
		Super mid-range & top end horsepower. Minimum 11.0:1 CR.						
120061-10	CL120061-10	299 299 2800-6900	245 245	.578 .578	110	106	Hyd. Hyd.	1
		Hot Street & Bracket Racing. Big torque. 10.0:1+ CR, 3000+ stall, lower gears.						
120741-10	CL120741-10	299 303 2800-6800	249 249	.578 .578	110	106	Hyd. Hyd.	1
		Rough idle, Hot Street/Strip. Strong mid range torque. 10.0:1+ CR, 3000+ stall.						
120741-12	CL120741-12	299 303 2800-7000	249 249	.578 .578	112	108	Hyd. Hyd.	1
		Fair idle, Hot Street/Strip. Big mid range torque. 10.0:1+ CR, 3000+ stall.						
121271-10	CL121271-10	303 309 3000-7000	255 255	.595 .595	110	106	Hyd. Hyd.	1
		Rough idle, Pro Street/Bracket, strong mid to top end. 10.5:1+ CR, 3200+ stall.						
121271-12	CL121271-12	303 309 3000-7200	255 255	.595 .595	112	108	Hyd. Hyd.	1
		Fair idle, Pro Street/Bracket. Strong mid range with good upper end power.						
121861-10	CL121861-10	305 313 3200-7400	259 259	.612 .595	110	106	Hyd. Hyd.	1
		Rough idle, Very aggressive Street/Bracket. Strong upper mid range. 11.0:1+ CR.						
121861-12	CL121861-12	305 313 3200-7400	259 259	.612 .595	112	108	Hyd. Hyd.	1
		Performance/Bracket for 500+. 10.5-12.0:1 CR. Also good with large roots blower.						
129991	NA	Custom Grind Camshaft					Hyd. Hyd.	1
		Hydraulic Flat Tappet Special Order Camshaft.						
129997	NA	Custom Grind Camshaft						1,22
		4/7 Swap Hydraulic Flat Tappet Special Order Camshaft.						

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

22 Ignition firing order must be changed to 1-8-7-3-6-5-4-2.

Some items are not legal for sale or use on any pollution controlled motor vehicle

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91111 ³ 91112	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	98529-K31 98636-K31	98529 98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	98636-K31	98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	98636-K31	98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	98636-K31	98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	98636-K31	98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	98636-K31	98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	98636-K31	98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	98636-K31	98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	98636-K31	98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	98636-K31	98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	98636-K31	98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	98636-K31	98636	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91111 ³ 91112	NA	--	--	--	--	--	--	--	--	--	92150 94475	94402	94205 94305
91111 ³ 91112	NA	--	--	--	--	--	--	--	--	--	92150 94475	94402	94205 94305

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

CAMSHAFTS



CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996

Rattler Cams™ Retro-Fit Hydraulic Roller Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.70 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
128025-09	CL128025-09	280 288 1800-5600	227 235	.555 .555	109	103	Hyd. Hyd.	1,2 Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.
128045-09	CL128045-09	288 296 2000-5900	235 243	.600 .600	109	103	Hyd. Hyd.	1,2 Big Mama Rattler™, Lopecy idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.
128085-09	CL128085-09	296 304 2400-6200	243 251	.600 .583	109	103	Hyd. Hyd.	1,2 Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.



CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996

Retro-Fit Hydraulic Roller Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.70 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
120225-12	CL120225-12	262 266 1200-4400	209 213	.510 .527	112	108	Hyd. Hyd.	1,2 Great daily usage, smooth idle, great fuel economy.
120235-12	CL120235-12	266 274 1400-4600	213 221	.510 .538	112	108	Hyd. Hyd.	1,2 Good idle, Off-Road & Street Performance. 9.0:1 CR advised.
123515-10	CL123515-10	272 280 1600-5000	219 227	.555 .555	110	106	Hyd. Hyd.	1,2 Good idle, Performance Street, great low to mid range. Headers suggested.
120245-10	CL120245-10	278 284 1800-5400	225 231	.567 .578	110	106	Hyd. Hyd.	1,2 Noticeable idle, Street Performance. Should have 2000+ stall, 9.5:1+ CR.
120245-12	CL120245-12	278 284 1800-5400	225 231	.567 .578	112	108	Hyd. Hyd.	1,2 Fair idle, Street & mild Performance usage. Crisp throttle.
122115-12	CL122115-12	278 288 1800-5600	225 235	.595 .601	112	108	Hyd. Hyd.	1,2 Mild idle, Street Performance, Great mid range torque. Headers suggested
122115-14	CL122115-14	278 288 1800-5600	225 235	.595 .601	114	110	Hyd. Hyd.	1,2 Fair idle, excellent mid range power. 2500+ stall. Also good w/roots blower, 10psi max.
123315-08	CL123315-08	280 280 2000-5600	227 227	.555 .555	108	104	Hyd. Hyd.	1,2 Mild rough idle, Hot Street. Should have good exhaust, 2500+ stall & 9.5:1 CR.
123315-10	CL123315-10	280 280 2000-5600	227 227	.555 .555	110	106	Hyd. Hyd.	1,2 Mild rough idle, Hot Street. Should have good exhaust, 2500+ stall & 9.5:1 CR.
120325-08	CL120325-08	282 288 2000-5700	229 235	.589 .601	108	104	Hyd. Hyd.	1,2 Street/Strip, 10.0:1+ CR, aftermarket dual plane intake recommended.
120325-10	CL120325-10	282 288 2000-5800	229 235	.589 .601	110	106	Hyd. Hyd.	1,2 Fair idle, Performance usage. Mid-range torque & horsepower.
120325-12	CL120325-12	282 288 2000-5800	229 235	.589 .601	112	108	Hyd. Hyd.	1,2 Fair idle, Moderate Street/Mild Bracket. Good mid range. 10.0-11.5:1, 2500+ stall.
120255-08	CL120255-08	284 288 2400-6000	231 235	.578 .618	108	104	Hyd. Hyd.	1,2 Fair idle, Performance usage. Great mid-range torque & power.
120255-12	CL120255-12	284 288 2400-6000	231 235	.578 .618	112	108	Hyd. Hyd.	1,2 Fair idle, Performance usage. Great mid-range torque & power.
121905-08	CL121905-08	286 286 2500-6100	233 233	.601 .601	108	104	Hyd. Hyd.	1,2 Rough idle, Performance Street/Mild Strip. Nice mid range. 9.5:1+ CR, 2500+ stall.

Cam Notes: master note list on page 260

- 1 Stock (O.E.) valve springs cannot be used.
- 2 Requires Thrust Button.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996

Rattler Cams™ Retro-Fit Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305

CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996

Retro-Fit Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.



Retro-Fit Hydraulic Roller Camshafts (cont.)

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.70 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
121905-11	CL121905-11	286 286 2500-6200	233 233	.601 .601	111	107	Hyd. Hyd.	1,2 <i>Rough idle, Hot Street. Good usable mid range power band. 9.5:1+ CR, 2500+ stall.</i>
120605-12	CL120605-12	286 300 2500-6200	233 247	.601 .612	112	108	Hyd. Hyd.	1,2 <i>Mild idle, Hot Street. Great mid range performance. 9.5:1+ CR, 2500+ stall.</i>
120605-14	CL120605-14	286 300 2500-6500	233 247	.601 .612	114	110	Hyd. Hyd.	1,2 <i>Mild idle, Hot Street. Great mid range performance. Small blower or NOS OK.</i>
120205-12	CL120205-12	286 298 2500-6300	233 245	.635 .635	112	108	Hyd. Hyd.	1,2 <i>Fair idle, Aggressive Street. Big mid range torque. 9.5:1+ CR, 2500+ stall.</i>
120205-14	CL120205-14	286 298 2500-6300	233 245	.635 .635	114	110	Hyd. Hyd.	1,2 <i>Fair idle, Aggressive Street. Big mid range torque. Good with 150+ NOS or blower.</i>
120405-08	CL120405-08	288 294 2600-6400	235 241	.618 .618	108	104	Hyd. Hyd.	1,2 <i>Rough idle, Hot Street/Strip. Great mid range. Needs good heads, 10.0:1+ CR.</i>
120405-10	CL120405-10	288 294 2600-6400	235 241	.618 .618	110	106	Hyd. Hyd.	1,2 <i>Fair idle, Street/Strip, best in 496-540ci. Nice mid range power. 2600+ stall.</i>
120405-12	CL120405-12	288 294 2600-6400	235 241	.618 .618	112	108	Hyd. Hyd.	1,2 <i>Rough idle, strong mid-range torque & horsepower.</i>
120265-10	CL120265-10	290 296 2600-6500	237 243	.635 .640	110	106	Hyd. Hyd.	1,2 <i>Decent idle, Performance Street. Needs 10.0:1+ CR, 2800+ stall.</i>
120265-12	CL120265-12	290 296 2600-6500	237 243	.635 .640	112	108	Hyd. Hyd.	1,2 <i>Lopey idle, Hot Street & Bracket Racing. 10.0:1+ CR advised.</i>
120265-14	CL120265-14	290 296 2600-6500	237 243	.635 .640	114	110	Hyd. Hyd.	1,2 <i>Lopey idle, Hot Street & Bracket Racing. 10.0:1+ CR advised.</i>
120275-10	CL120275-10	294 294 2800-6500	241 241	.618 .618	110	106	Hyd. Hyd.	1,2 <i>Rough idle, Bracket Race with excellent mid & upper end horsepower.</i>
120665-10	CL120665-10	296 302 2900-6500	243 249	.640 .640	110	106	Hyd. Hyd.	1,2 <i>Rough idle, Street/Strip, great upper mid range power. 10.0:1+ CR, 3000+ stall.</i>
120665-12	CL120665-12	296 302 3000-6500	243 249	.640 .640	112	108	Hyd. Hyd.	1,2 <i>Lopey idle, broad mid range power. 10.0:1 CR, 3000+ stall.</i>
121615-12	CL121615-12	296 308 3000-6600	243 255	.640 .640	112	108	Hyd. Hyd.	1,2 <i>Lopey idle, Excellent mid to top end power. 10.0:1+ CR, 3200+ stall.</i>
121615-14	CL121615-14	296 308 3000-6600	243 255	.640 .640	114	110	Hyd. Hyd.	1,2 <i>Fair idle. Good mid range with top end power. Good with blower or NOS.</i>
123505-10	CL123505-10	300 308 3200-6600	247 255	.680 .680	110	106	Hyd. Hyd.	1,2 <i>Rough lopey idle, Pro Street/Bracket. 3500+ stall, 10.5:1+ CR, good intake & exhaust.</i>
123505-12	CL123505-12	300 308 3000-6600	247 255	.680 .680	112	108	Hyd. Hyd.	1,2 <i>Rough idle, Pro Street/Strip. Best in larger cubic inch, broad power. 10.5:1+ CR.</i>
120145-10	CL120145-10	302 302 3400-6700	249 249	.640 .640	110	106	Hyd. Hyd.	1,2 <i>Rough idle, Hot Street/Bracket. Needs 10.5:1 CR, 3500+ stall, headers, good intake.</i>
120345-08	CL120345-08	302 308 3400-6800	249 255	.640 .640	108	104	Hyd. Hyd.	1,2 <i>Lopey idle, Pro Street/Bracket. 10.5:1+ CR advised. OK with 100-200 NOS.</i>
120345-10	CL120345-10	302 308 3400-6800	249 255	.640 .640	110	106	Hyd. Hyd.	1,2 <i>Lopey idle, Pro Street/Bracket. 10.5:1+ CR advised. OK with NOS.</i>
120345-14	CL120345-14	302 308 3400-6800	249 255	.640 .640	114	110	Hyd. Hyd.	1,2 <i>Lopey idle, Pro-Street/Bracket. 10.5:1+ CR advised. OK with NOS.</i>
120335-10	CL120335-10	304 308 3500-6800	251 255	.612 .612	110	106	Hyd. Hyd.	1,2 <i>Lopey idle, Pro Street/Bracket. Single plane intake, 10.5:1+ CR advised.</i>
120335-12	CL120335-12	304 308 3500-6800	251 255	.612 .612	112	108	Hyd. Hyd.	1,2 <i>Lopey idle, broad power band. Single plane intake, 10.5:1+ CR advised.</i>

Cam Notes: master note list on page 260

- 1 Stock (O.E.) valve springs cannot be used.
- 2 Requires Thrust Button.

CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996

Retro-Fit Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91161 ³	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91161 ³	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91161 ³	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
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91161 ³	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91161 ³	NA	98636-K32 ¹⁰	98512	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91161 ³	NA	98636-K32 ¹⁰	98512	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91161 ³	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91167 ³ 91161	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.



Retro-Fit Hydraulic Roller Camshafts (cont.)

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.70 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
120355-10	CL120355-10	304 310 3500-6800	251 257 Lopey idle, Hot Street/Bracket.	.629 .629	110	106	Hyd. Hyd.	1,2
120285-12	CL120285-12	306 308 3600-6900	253 255 Lopey idle, Hot Street/Bracket.	.640 .640	112	108	Hyd. Hyd.	1,2
123335-10	CL123335-10	306 312 3600-6900	253 259 Lopey idle, Hot Street/Bracket in larger cubic inch.	.657 .640	110	106	Hyd. Hyd.	1,2
123335-12	CL123335-12	306 312 3600-6900	253 259 Lopey idle, Best in large cubic inch.	.657 .640	112	108	Hyd. Hyd.	1,2
122455-10	CL122455-10	306 312 3600-6900	253 259 Strip/Bracket. 540+ cubic inch with good heads.	.680 .680	110	106	Hyd. Hyd.	1,2
122455-12	CL122455-12	306 312 3600-6900	253 259 Strip/Bracket. 540+ cubic inch with good heads.	.680 .680	112	108	Hyd. Hyd.	1,2
122455-14	CL122455-14	306 312 3600-6900	253 259 HP/Bracket, best for 540+. Good upper rpm torque.	.680 .680	114	110	Hyd. Hyd.	1,2
128525-12	CL128525-12	312 322 3800-7000	259 269 HP/Bracket, best for 540+. Good upper rpm torque.	.680 .680	112	108	Hyd. Hyd.	1,2
128525-14	CL128525-14	312 322 3800-7000	259 269 HP/Bracket, best for 540+. Good upper rpm torque.	.680 .680	114	110	Hyd. Hyd.	1,2
129995	NA	Custom Grind Camshaft Retro-Fit Hydraulic Roller Special Order Camshaft.					Hyd. Hyd.	1,2
129999	NA	Custom Grind Camshaft, with Cast Distributor Gear Retro-Fit Hydraulic Roller Special Order Camshaft.					Hyd. Hyd.	1,2
124995	NA	Custom Grind Camshaft, 4/7 Swap Retro-Fit Hydraulic Roller Special Order Camshaft.					Hyd. Hyd.	1,2
124998	NA	Custom Grind Camshaft, LS (C) Firing Order Retro-Fit Hydraulic Roller Special Order Camshaft.					Hyd. Hyd.	1,2

Cam Notes: master note list on page 260

- 1 Stock (O.E.) valve springs cannot be used.
- 2 Requires Thrust Button.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996

Retro-Fit Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91161 ³	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91161 ³	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
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91161 ³	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91161 ³	NA	98636-K32 ¹⁰	98512	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91161 ³	NA	98636-K32 ¹⁰	98512	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91161 ³	NA	98636-K32 ¹⁰	98512	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91161 ³	NA	98636-K32 ¹⁰	98512	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
91161 ³	NA	98636-K32 ¹⁰	98512	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	92150 94475	94402	94205 94305
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--	--	--	--	--	--	--	--	--	--	--	--	94402	94205 94305

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

CAMSHAFTS



CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996

American Muscle™ Mechanical Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.70 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
127192-14	CL127192-14 CL127192-14DL ⁴	336 316 1800-6500	242 242	.539 .539	114	108	.022 .025	Smooth idle, near duplicate of the Chev LS6 465HP/454 cam (GM #3904362).
127522-12	CL127522-12 CL127522-12DL ⁴	342 333 2800-6800	264 270	.579 .600	112	108	.022 .026	Near duplicate of the Chev L88 430HP/427 cam (GM #3928911).



CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996

Mechanical Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.70 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
121052-10	CL121052-10 CL121052-10DL ⁴	283 283 2500-6400	248 248	.578 .578	110	106	.022 .022	1 Rough idle, Street/Strip, best with 10.0+ CR, 3000+ stall.
121742-08	CL121742-08 CL121742-08DL ⁴	283 289 2600-6500	248 254	.578 .623	108	104	.022 .022	1 Lopey idle, Street High Performance/Strip. Best with 3200 stall, 10.5:1 CR & 800+ cfm..
122312-10	CL122312-10 CL122312-10DL ⁴	285 291 2800-6600	250 256	.595 .606	110	106	.022 .022	1 Increased mid-range torque & horsepower. Can be used with NOS.
122142-12	CL122142-12 CL122142-12DL ⁴	285 295 3000-6800	250 260	.595 .629	112	108	.022 .022	1 Fair idle, excellent Bracket cam. Increased CR required.
120902-08	CL120902-08 CL120902-08DL ⁴	287 295 3000-6800	252 260	.618 .640	108	104	.022 .022	1 Rough idle, Hot Street/Bracket/Short Track Oval, high torque grind. 3000+ stall.
120902-10	CL120902-10 CL120902-10DL ⁴	287 295 3000-6800	252 260	.618 .640	110	106	.022 .022	1 Rough idle, good mid to upper range performance. 3000+ stall, 11.5:1+ CR.
120902-12	CL120902-12 CL120902-12DL ⁴	287 295 3000-7000	252 260	.618 .640	112	108	.022 .022	1 Fair idle, good mid range power. 11.5-12.5:1 CR, 3000+ stall. Roots blower 8.0:1 max.
121932-08	CL121932-08 CL121932-08DL ⁴	289 295 3200-7000	254 260	.623 .629	108	104	.022 .022	1 Rough idle, Bracket/Oval Track, great high torque, good mid range power.
121932-10	CL121932-10 CL121932-10DL ⁴	289 295 3200-7000	254 260	.623 .629	110	106	.022 .022	1 Fair idle, Bracket E.T. Nice mid range torque & power. 11.5:1+ CR, 3400+ stall.
122322-08	CL122322-08 CL122322-08DL ⁴	295 303 3600-7200	260 268	.629 .623	108	104	.022 .022	1 Rough idle, good mid-range torque & power. Needs good heads & intake.
122132-08	CL122132-08 CL122132-08DL ⁴	299 305 3500-7000	264 270	.561 .580	108	104	.022 .022	1 Rough idle, Drag Race. Higher CR, stall speed & lower gears.
122132-12	CL122132-12 CL122132-12DL ⁴	299 305 3600-7200	264 270	.561 .580	112	108	.022 .022	1 Increased mid-range torque & horsepower. Can be used with NOS.
122152-12	CL122152-12 CL122152-12DL ⁴	303 311 4000-7400	268 276	.650 .670	112	108	.022 .022	1 Competition use, great mid & upper RPM horsepower. 12.5-1-up needed.
122332-08	CL122332-08 CL122332-08DL ⁴	303 313 4000-7600	268 278	.623 .650	108	104	.022 .022	1 Moderate competition, excellent mid & upper RPM power. 12.0-1 CR.
120802-10	CL120802-10 CL120802-10DL ⁴	309 317 4400-7800	274 282	.680 .680	110	106	.022 .022	1 Drag or Modified. Best in big cubic inch. Aggressive upper rpm. 12.5:1+ CR.
129992	NA	Custom Grind Camshaft Mechanical Flat Tappet Special Order Camshaft.						1

Cam Notes: master note list on page 260

¹ Stock (O.E.) valve springs cannot be used.

⁴ Direct Lube Lifters Included in Cam & "Direct Lube" Lifter (DL) Sets.

Some items are not legal for sale or use on any pollution controlled motor vehicle



CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996

4/7 Swap *Mechanical Flat Tappet Camshafts*

Firing Order: 1•8•7•3•6•5•4•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.70 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash		Cam Notes	
		IN	EX	IN	EX	IN	EX			IN	EX		
124902-08	CL124902-08 CL124902-08DL ⁴	287	295	252	260	.618	.640	108	104	.022	.022	1,2,2	
		3000-6800 Rough idle, good mid to upper range performance. 3000+ stall, 11.5:1+ CR.											
124902-10	CL124902-10 CL124902-10DL ⁴	287	295	252	260	.618	.640	110	106	.022	.022	1,2,2	
		3000-6800 Rough idle, good mid to upper range performance. 3000+ stall, 11.5:1+ CR.											
124902-12	CL124902-12 CL124902-12DL ⁴	287	295	252	260	.618	.640	112	108	.022	.022	1,2,2	
		3000-6800 Lopey idle, good mid to upper range performance. 3000+ stall, 11.5:1+ CR.											
124322-08	CL124322-08 CL124322-08DL ⁴	295	303	260	268	.629	.623	108	104	.022	.022	1,2,2	
		3200-7000 Rough idle, good mid-range torque & power. Needs good heads & intake.											
124332-08	CL124332-08 CL124332-08DL ⁴	303	313	268	278	.623	.650	108	104	.022	.022	1,2,2	
		3800-7600 Moderate competition, excellent mid & upper RPM power. 12.0-1 CR.											
129997	NA	Custom Grind Camshaft											1,2,2
		4/7 Swap Mechanical Flat Tappet Special Order Camshaft.											



CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996

Steel Billet Mechanical Roller Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.70 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
121213-08	NA	261 269 2000-6200	229 237	.629 .629	108	104	.022 .022	1,2,5
Lopey idle, great for Power Touring. Easy on parts. Needs 2000+ stall.								
121213-10	NA	261 269 2000-6200	229 237	.629 .629	110	106	.022 .022	1,2,5
Lopey idle, great for Power Touring. Easy on parts. Needs 2000+ stall.								
121203-08	NA	269 269 2600-6800	237 237	.629 .629	108	104	.022 .022	1,2,5
Rough idle, Street/Mild Strip. Low to mid range torque & power. 9.5:1+ CR								
121203-10	NA	269 269 2600-6800	237 237	.629 .629	110	106	.022 .022	1,2,5
Rough idle, Street Performance/Mild Strip. Recommend 9.5:1 CR, 2500+ stall.								
120183-08	NA	269 275 2600-6600	237 243	.629 .629	108	104	.022 .022	1,2,5
Fair idle, Weekend Cruiser/mild Strip. 2500+ stall recommended.								
120183-10	NA	269 275 2600-6600	237 243	.629 .629	110	106	.022 .022	1,2,5
Mild rough idle, Street Performance/Power Touring. Reliable low to mid range power.								
120183-12	NA	269 275 2600-6700	237 243	.629 .629	112	108	.022 .022	1,2,5
Nice idle, Street Performance/Mild Strip. Low to mid range performance. NOS OK.								
120173-08	NA	273 279 2800-6800	241 247	.646 .646	108	104	.022 .022	1,2,5
Lopey idle, Street/Mild Bracket. Good lower mid range. 10.0:1+ CR, 2800+ stall.								
120173-10	NA	273 279 2800-6800	241 247	.646 .646	110	106	.022 .022	1,2,5
Fair idle, High performance Street/Mild Bracket. Should have 10.0:1 CR, 2800+ stall.								
120173-12	NA	273 279 2800-6900	241 247	.646 .646	112	108	.022 .022	1,2,5
Fair idle, Street/Strip, strong mid range torque. 10.0:1 CR, 2800+ stall.								
121313-10	NA	281 281 3000-7000	249 249	.663 .663	110	106	.022 .022	1,2,5
Lopey idle, Pro-Street cam. Works well with small NOS system.								
121313-12	NA	281 281 3000-7000	249 249	.663 .663	112	108	.022 .022	1,2,5
Hot street, Marine. Good low end performance.								
121153-10	NA	281 287 3000-7000	249 255	.663 .680	110	106	.022 .022	1,2,5
Good mid-range horsepower, rough idle. Needs 11.0:1 CR-up.								

Cam Notes: master note list on page 260

¹ Stock (O.E.) valve springs cannot be used.² Requires Thrust Button.⁴ Direct Lube Lifters Included in Cam & "Direct Lube" Lifter (DL) Sets.⁵ Requires upgraded distributor gear/fuel pump pushrod.²² Ignition firing order must be changed to 1-8-7-3-6-5-4-2.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996

4/7 Swap *Mechanical Flat Tappet Camshaft Components*

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91115 ³ 91118 ⁴	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91115 ³ 91118 ⁴	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91115 ³ 91118 ⁴	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91115 ³ 91118 ⁴	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91115 ³ 91118 ⁴	NA	98636-K32 ¹⁰	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95222 95110/95115	92150 94475	94402	94205 94305
91115 91118	--	--	--	--	--	--	--	--	--	--	92150 94475	94402	94205 94305

CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996

Steel Billet Mechanical Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91151 91158	NA	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91151 91158	NA	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91151 91158	NA	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91151 91158	NA	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91151 91158	NA	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91151 91158	NA	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91151 91158	NA	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91151 91158	NA	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91151 91158	NA	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

⁴ Direct Lube Lifters Included in Cam & "Direct Lube" Lifter (DL) Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.



Steel Billet Mechanical Roller Camshafts (cont.)

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.70 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
120043-08	NA	285 291	253 259	.680 .663	108	104	.022 .022	1,2,5
		3200-7000	Lopey idle, Pro Street/Bracket.	Great mid range torque.	10.5-12.0:1 CR, 3400+ stall.			
120043-10	NA	285 291	253 259	.680 .663	110	106	.022 .022	1,2,5
		3200-7000	Bracket/Pro, good mid range torque & horsepower.	10.5-12.0:1 CR, 3500+ stall.				
120893-08	NA	287 293	255 261	.680 .703	108	104	.022 .022	1,2,5
		3300-7200	Lopey idle, Pro/Street/Bracket.	High torque mid range power.	Needs 11.0:1+ CR.			
120893-10	NA	287 293	255 261	.680 .703	110	106	.022 .022	1,2,5
		3300-7200	Good mid-range power, rough idle.	Needs 11.0:1+ CR. Brackets.				
121633-08	NA	289 295	257 263	.725 .725	108	104	.022 .022	1,2,5
		3400-7300	Lopey idle, Bracket E.T., high torque mid range power.	3500+ stall, 11.5:1+ CR.				
121633-10	NA	289 295	257 263	.725 .725	110	106	.022 .022	1,2,5
		3400-7300	Moderate idle, Pro Street/Strip.	Good mid range power.	3500+ stall, 11.5:1+ CR.			
121163-08	NA	291 299	259 267	.663 .680	108	104	.022 .022	1,2,5
		3400-7200	Lopey idle, Bracket E.T.	Good mid range torque.	Needs 11.5:1+ CR.			
121163-10	NA	291 299	259 267	.663 .680	110	106	.022 .022	1,2,5
		3400-7200	Lopey idle, Bracket E.T.	Mid range torque & power.	11.5:1+ CR, 3500+ stall.			
120473-08	NA	291 301	259 269	.765 .765	108	104	.022 .022	1,2,5
		3400-7400	Rough idle, Bracket Race.	Best in 454ci or smaller.	4000+ stall, 11.5:1 CR.			
120473-10	NA	291 301	259 269	.765 .765	110	106	.022 .022	1,2,5
		3400-7500	Bracket/Pro/Super Pro, good mid to upper rpm torque/power.	12.0:1+ CR.				
121133-08	NA	293 301	261 269	.680 .680	108	104	.022 .022	1,2,5
		3400-7200	Nice Bracket cam, lopey idle, needs higher stall & lower gear.					
121133-10	NA	293 301	261 269	.680 .680	110	106	.022 .022	1,2,5
		3400-7300	Nice Bracket cam, lopey idle, needs higher stall & lower gear.					
121133-12	NA	293 301	261 269	.680 .680	112	108	.022 .022	1,2,5
		3400-7400	Nice Bracket cam, lopey idle, needs higher stall.	NOS OK.				
121133-14	NA	293 301	261 269	.680 .680	114	110	.022 .022	1,2,5
		3400-7500	Pro-Street, great blower cam.	Multiple carb suggested.				
121173-08	NA	293 303	261 271	.703 .708	108	104	.022 .022	1,2,5
		3500-7500	Good mid-range torque & horsepower.	12.0:1 minimum.				
121173-10	NA	293 303	261 271	.703 .708	110	106	.022 .022	1,2,5
		3500-7600	Good mid-range torque & horsepower.	12.0:1 minimum.				
121663-08	NA	297 309	265 277	.703 .703	108	104	.022 .022	1,2,5
		3800-7600	Rough idle.	Good upper rpm horsepower.	Auto w/4000 stall.	11.0:1+.		
121663-10	NA	297 309	265 277	.703 .703	110	106	.022 .022	1,2,5
		3800-7700	Rough idle.	Good upper rpm horsepower.	Auto w/4000 stall.	11.0:1+.		
121663-12	NA	297 309	265 277	.703 .703	112	108	.022 .022	1,2,5
		3800-7800	Rough idle.	Good upper rpm horsepower.	Auto w/4000 stall.	11.0:1+.	OK with NOS.	
121053-08	NA	299 309	267 277	.731 .737	108	104	.022 .022	1,2,5
		3800-7600	Good mid to upper rpm torque & horsepower.	Minimum 4500-stall.				
121253-08	NA	301 307	269 275	.765 .714	108	104	.022 .022	1,2,5
		4000-7800	Good mid-range to upper rpm torque & power.	Heavy cars OK.				
121253-10	NA	301 307	269 275	.765 .714	110	106	.022 .022	1,2,5
		4000-7900	Competition use, good mid & upper power, bracket.	11.0:1+ CR.				
121143-08	NA	301 309	269 277	.680 .680	108	104	.022 .022	1,2,5
		4000-8000	Moderate Competition.	Super mid & upper rpm torque & power.				
121143-10	NA	301 309	269 277	.680 .680	110	106	.022 .022	1,2,5
		4000-8000	Bracket/Super Pro, good upper rpm torque & power.	12.5:1 CR & race converter.				

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

2 Requires Thrust Button.

5 Requires upgraded distributor gear/fuel pump pushrod.

Some items are not legal for sale or use on any pollution controlled motor vehicle

Steel Billet Mechanical Roller Camshaft Components

	Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305

Components Notes: master note list on page 260

10 10° Valve lock Angle, must use matching retainers/locks.

25 Machining Required.



CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996

Steel Billet Mechanical Roller Camshafts (cont.)

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.70 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
121143-12	NA	301 309 4000-8000	269 277	.680 .680	112	108	.022 .022	1,2,5 <i>Competition, good mid & upper horsepower, bracket cars, OK w/NOS.</i>
121123-08	NA	301 309 4000-8000	269 277	.703 .703	108	104	.022 .022	1,2,5 <i>Competition use, good mid & upper horsepower, bracket cars.</i>
121123-10	NA	301 309 4000-8000	269 277	.703 .703	110	106	.022 .022	1,2,5 <i>Competition, good mid & upper horsepower, bracket cars, OK w/NOS.</i>
121123-12	NA	301 309 4000-8000	269 277	.703 .703	112	108	.022 .022	1,2,5 <i>Competition, good mid & upper horsepower, bracket cars, OK w/ small NOS.</i>
121123-14	NA	301 309 4000-8000	269 277	.703 .703	114	110	.022 .022	1,2,5 <i>Competition use, good mid & upper horsepower, Multi-Stage NOS.</i>
121673-08	NA	305 309 4200-8000	273 277	.731 .737	108	104	.022 .022	1,2,5 <i>Competition use. 13.0:1 minimum. Good mid & upper range power.</i>
121673-10	NA	305 309 4200-8000	273 277	.731 .737	110	106	.022 .022	1,2,5 <i>Super Gas, Great mid range. Needs good intake, 13.0:1+, 4500 stall.</i>
121023-08	NA	309 315 4400-8200	277 283	.765 .714	108	104	.022 .022	1,2,5 <i>Competition use, good mid & upper horsepower.</i>
121023-10	NA	309 315 4400-8200	277 283	.765 .714	110	106	.022 .022	1,2,5 <i>Competition use, good mid & upper horsepower.</i>
121693-08	NA	309 317 4300-8000	277 285	.737 .714	108	104	.022 .022	1,2,5 <i>Bracket/ Super Gas, heavier car. Needs race converter.</i>
121083-08	NA	309 317 4300-8000	277 285	.714 .714	108	104	.022 .022	1,2,5 <i>Great Super-Comp. cam. 468+CID with 12.5:1 CR-up.</i>
121083-10	NA	309 317 4300-8000	277 285	.714 .714	110	106	.022 .022	1,2,5 <i>Great Super-Comp. cam. 468+ with 12.5:1 CR-up, OK with NOS.</i>
121083-14	NA	309 317 4300-8000	277 285	.714 .714	114	110	.022 .022	1,2,5 <i>Great Super-Comp. cam. 468+ with 12.5:1 CR-up, OK with NOS.</i>
121233-08	NA	309 319 4400-8000	277 287	.737 .737	108	104	.022 .022	1,2,5 <i>Good upper RPM cam in big cubic inch engine with 13.0:1+ CR.</i>
121233-10	NA	309 319 4200-7800	277 287	.737 .737	110	106	.022 .022	1,2,5 <i>Works great in 496+CID with high stall. Will work with NOS.</i>
121233-12	NA	309 319 4000-7600	277 287	.737 .737	112	108	.022 .022	1,2,5 <i>Great Super Class cam. Best in 540+ cubic inch. Easy on valvetrain.</i>
121233-14	NA	309 319 4000-7600	277 287	.737 .737	114	110	.022 .022	1,2,5 <i>Great Super Class cam. Best in 540+ cubic inch. Easy on valvetrain.</i>
121043-12	NA	309 323 4400-7800	277 291	.810 .810	112	108	.022 .022	1,2,5 <i>509-540 ci with good heads. Works good with plate style NOS systems.</i>
121043-14	NA	309 323 4200-8000	277 291	.810 .810	114	110	.022 .022	1,2,5 <i>509-540 ci with good heads. Works good 250+ HP NOS.</i>
121683-08	NA	311 319 4400-8000	279 287	.771 .737	108	104	.022 .022	1,2,5 <i>Competition only, needs cubic inch, high CR, stall & gears.</i>
121683-10	NA	311 319 4500-8000	279 287	.771 .737	110	106	.022 .022	1,2,5 <i>Works great in 496+CID with high stall. Will work with NOS.</i>
121623-08	NA	315 319 4600-8200	283 287	.765 .737	108	104	.022 .022	1,2,5 <i>Competition only, needs cubic inch, high CR, stall & gears.</i>
121623-10	NA	315 319 4500-8200	283 287	.765 .737	110	106	.022 .022	1,2,5 <i>Competition only in 500+CID, needs high CR, stall & gears.</i>
121623-12	NA	315 319 4400-8200	283 287	.765 .737	112	108	.022 .022	1,2,5 <i>Competition only in 500+CID, needs high CR, stall & gears.</i>

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

2 Requires Thrust Button.

5 Requires upgraded distributor gear/fuel pump pushrod.

Some items are not legal for sale or use on any pollution controlled motor vehicle

Steel Billet Mechanical Roller Camshaft Components

	Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91135 91198	NA	NA	98825 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91135 91198	NA	NA	98825 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91135 91198	NA	NA	98825 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91135 91198	NA	NA	98825 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91135 91198	NA	NA	98825 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91135 91198	NA	NA	98825 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91135 91198	NA	NA	98825 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91135 91198	NA	NA	98825 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91135 91198	NA	NA	98825 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91135 91198	NA	NA	98825 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91135 91198	NA	NA	98738- A ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91135 91198	NA	NA	98738- A ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91135 91198	NA	NA	98825 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91135 91198	NA	NA	98825 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91135 91198	NA	NA	98825 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91135 91198	NA	NA	98825 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91135 91198	NA	NA	98825 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305

Components Notes: master note list on page 260

10 10° Valve lock Angle, must use matching retainers/locks.

25 Machining Required.

CAMSHAFTS



CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996

Steel Billet Mechanical Roller Camshafts (cont.)

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.70 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
121623-14	NA	315 319 4800-8000	283 287	.765 .737	114	110	.022 .022	1,2,5 <i>Competition only in 500+CID, needs high CR, stall & gears. Good with NOS.</i>
121093-08	NA	315 327 4800-8500	283 295	.765 .725	108	104	.022 .022	1,2,5 <i>540+ ci Bracket. Needs good heads, 13.0:1+ CR & high stall.</i>
121093-10	NA	315 327 4800-8400	283 295	.765 .725	110	106	.022 .022	1,2,5 <i>All out Competition in big inch engine. Needs the best parts.</i>
121093-14	NA	315 327 4800-8500	283 295	.765 .725	114	110	.022 .022	1,2,5 <i>All out Competition in big inch engine. Needs the best parts.</i>
121033-12	NA	317 327 5200-8200	285 295	.810 .765	112	108	.022 .022	1,2,5 <i>550+ ci Competition with big heads & intake.</i>
121803-14	NA	317 343 5000-8000	285 311	.850 .810	114	110	.022 .022	1,2,5 <i>550+ ci with Big Chief style heads. Needs high compression & big carburetion.</i>
121803-16	NA	317 343 5000-8200	285 311	.850 .810	116	112	.022 .022	1,2,5 <i>550+ ci with Big Chief style heads. Great with big NOS systems.</i>
129993	NA	Custom Grind Camshaft <i>Mechanical Roller Special Order Camshaft.</i>						1,2,5
129998	NA	Custom Grind Camshaft, with 50-55mm Bearing <i>Mechanical Roller Special Order Camshaft.</i>						1,2,5
128997	NA	Custom Grind Camshaft, with 50-55mm Bearing, LS (C) Firing Order <i>Mechanical Roller Special Order Camshaft.</i>						1,2,5,24



CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996



Big Bottle Cams™ - Nitrous Oxide Mechanical Roller Cams

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.70 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
121663-12	NA	297 309 4000-7000	265 277	.703 .703	112	108	.022 .022	1,2,5 <i>Rough idle. Good upper rpm horsepower. Auto w/4000 stall. 11.0:1+.</i>
120453-12	NA	299 311 4000-7000	267 279	.714 .725	112	108	.022 .022	1,2,5 <i>Rough idle, aggressive upper rpm performance. 250+ plate systems, 11.0:1+ CR.</i>
120823-12	NA	307 317 4300-7200	275 285	.714 .714	112	108	.022 .022	1,2,5 <i>Good upper mid to top end for 500+. Use with large manifold systems.</i>
120973-12	NA	309 323 4500-7500	277 291	.737 .731	112	108	.022 .022	1,2,5 <i>Rough idle, great upper mid to top end performer. Needs good heads, 250+ systems.</i>
121043-12	NA	309 323 4600-7800	277 291	.810 .810	112	108	.022 .022	1,2,5 <i>13.0:1+ compression. Good Heads, 5000+ stall. Good with large manifold systems.</i>
121043-14	NA	309 323 4600-8000	277 291	.810 .810	114	110	.022 .022	1,2,5 <i>13.0:1+ compression. Good Heads, 5000+ stall. Multi stage systems.</i>
121093-14	NA	315 327 4800-8500	283 295	.765 .725	114	110	.022 .022	1,2,5 <i>Very large cubic inch with big multi-stage nitrous.</i>
129993	NA	Custom Grind Camshaft <i>Mechanical Roller Special Order Camshaft.</i>						1,2,5

Cam Notes: master note list on page 260

- 1 Stock (O.E.) valve springs cannot be used.
- 2 Requires Thrust Button.
- 5 Requires upgraded distributor gear/fuel pump pushrod.
- 24 Ignition firing order must be changed to 1-8-7-2-6-5-4-3.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996

Steel Billet Mechanical Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91135 91198	NA	NA	98738-A ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91135 91198	NA	NA	98738-A ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91135 91198	NA	NA	98738-A ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91135 91198	NA	NA	98738-A ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91135 91198	NA	NA	98738-A ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91135 91198	NA	NA	98738-A ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
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--	--	--	--	--	--	--	--	--	--	--	92151 94475	94400 94402	94305
--	--	--	--	--	--	--	--	--	--	--	92151 94475	94400 94402	94305

CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996

Big Bottle Cams™ - Nitrous Oxide Mechanical Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91158 91135	NA	NA	98824 ²⁵	NA	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91158 91135	NA	NA	98824 ²⁵	NA	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91158 91135	NA	NA	98824 ²⁵	NA	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
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Components Notes: master note list on page 260

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

4/7 Swap *Steel Billet Roller Camshafts*

Firing Order: 1•8•7•3•6•5•4•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.70 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
124193-08	NA	293 299 3800-7000	261 267	.703 .714	108	104	.022 .022	1,2,5,22 <i>Good mid-range torque & horsepower. Great for brackets.</i>
124133-08	NA	293 301 3400-7200	261 269	.680 .680	108	104	.022 .022	1,2,5,22 <i>Nice Bracket cam, lopey idle, needs higher stall & lower gear.</i>
124133-10	NA	293 301 3800-7300	261 269	.680 .680	110	106	.022 .022	1,2,5,22 <i>Nice Bracket cam, lopey idle, needs higher stall & lower gear.</i>
124203-08	NA	299 305 3800-7400	267 273	.731 .731	108	104	.022 .022	1,2,5,22 <i>Good mid-range torque & horsepower. 11.0:1+ CR.</i>
124203-10	NA	299 305 3800-7600	267 273	.731 .731	110	106	.022 .022	1,2,5,22 <i>Competition use, good mid & upper power, bracket. 11.0:1+ CR.</i>
124123-08	NA	301 309 4000-8000	269 277	.703 .703	108	104	.022 .022	1,2,5,22 <i>Good Bracket Race cam. 11.0:1+ compression.</i>
124123-10	NA	301 309 4000-8000	269 277	.703 .703	110	106	.022 .022	1,2,5,22 <i>Good Bracket Race cam. 11.0:1+ compression.</i>
124213-08	NA	301 309 3800-7800	269 277	.765 .737	108	104	.022 .022	1,2,5,22 <i>Good Bracket Race cam. 11.0:1+ compression.</i>
124223-08	NA	305 309 4200-7800	273 277	.771 .737	108	104	.022 .022	1,2,5,22 <i>Competition use. 12.0:1 minimum.</i>
124013-10	NA	309 315 4400-8000	277 283	.703 .714	110	106	.022 .022	1,2,5,22 <i>468+ CID. 12.0:1+ Strong mid-range.</i>
124023-08	NA	309 315 4400-8200	277 283	.765 .714	108	104	.022 .022	1,2,5,22 <i>11.0:1+ CR, 4500+ Stall. Good in 427-496.</i>
124023-10	NA	309 315 4400-8200	277 283	.765 .714	110	106	.022 .022	1,2,5,22 <i>11.0:1+ CR, 4500+ Stall. Good in super gas.</i>
124243-10	NA	309 315 4500-8200	277 283	.810 .765	110	106	.022 .022	1,2,5,22 <i>13.0:1+ CR, Good heads. Strong mid & top end.</i>
124183-08	NA	309 317 4300-8000	277 285	.703 .714	108	104	.022 .022	1,2,5,22 <i>Good upper rpm torque & horsepower. 12.5:1+ CR. 5000+ stall.</i>
124183-10	NA	309 317 4300-8000	277 285	.703 .714	110	106	.022 .022	1,2,5,22 <i>Great Super-Comp. cam. 468+ with 12.5:1 CR-up, OK with NOS.</i>
124583-08	NA	311 317 4500-7800	279 285	.771 .731	108	104	.022 .022	1,2,5,22 <i>540 Bracket special. 13.0:1 CR, 5000+ stall.</i>
124043-12	NA	309 323 4600-7800	277 291	.810 .810	112	108	.022 .022	1,2,5,22 <i>Good in Super Gas. Up to 14.5:1 compression. 5000+ stall.</i>
124043-14	NA	309 323 4200-8000	277 291	.810 .810	114	110	.022 .022	1,2,5,22 <i>Quick 16. Needs good heads.</i>
124263-10	NA	313 319 4400-8000	281 287	.799 .765	110	106	.022 .022	1,2,5,22 <i>540+, Strong torque. Also good tractor pull.</i>
124053-14	NA	313 327 4600-8200	281 295	.873 .810	114	110	.022 .022	1,2,5,22 <i>540+ cubic inch. 12.5:1 minimum. Race converter & NOS.</i>
124623-10	NA	315 319 4400-8200	283 287	.765 .737	110	106	.022 .022	1,2,5,22 <i>Quick 16. Needs good heads. Needs 13.0:1+ CR.</i>
124623-12	NA	315 319 4400-8200	283 287	.765 .737	112	108	.022 .022	1,2,5,22 <i>Quick 16. Needs good heads. Needs 13.0:1+ CR.</i>
124803-14	NA	317 343 5000-8000	285 311	.850 .810	114	110	.022 .022	1,2,5,22 <i>550+ ci with Big Chief style heads. Needs high compression & big carburetion.</i>
124803-16	NA	317 343 5000-8200	285 311	.850 .810	116	112	.022 .022	1,2,5,22 <i>550+ ci with Big Chief style heads. Great with big NOS systems.</i>

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

2 Requires Thrust Button.

5 Requires upgraded distributor gear/fuel pump pushrod.

22 Ignition firing order must be changed to 1-8-7-3-6-5-4-2.

Some items are not legal for sale or use on any pollution controlled motor vehicle

4/7 Swap *Steel Billet Mechanical Roller Camshaft Components*

	Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91135 91198	NA	NA	98738-A ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91135 91198	NA	NA	98738-A ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91135 91198	NA	NA	98738-A ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91135 91198	NA	NA	98738-A ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91135 91198	NA	NA	98738-A ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91135 91198	NA	NA	98738-A ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
	91135 91198	NA	NA	98738-A ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305

Components Notes: master note list on page 260

10 10° Valve lock Angle, must use matching retainers/locks.

25 Machining Required.

CAMSHAFTS



CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996

4/7 Swap Steel Billet Roller Camshafts (cont.)

Firing Order: 1•8•7•3•6•5•4•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.70 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
124303-08	NA	317 327 5400-8000	285 295	.731 .725	108	104	.022 .022	1,2,5,22 <i>Super Gas/Super Comp. Needs good heads.</i>
124303-12	NA	317 327 5200-8000	285 295	.731 .725	112	108	.022 .022	1,2,5,22 <i>Good upper mid to top end for 540+, Strongly suggest 13.0:1+ CR & good race converter.</i>
124033-12	NA	317 327 5500-8200	285 295	.810 .765	112	108	.022 .022	1,2,5,22 <i>480+. Good heads 13.0:1+ CR. Some nitrous OK.</i>
124313-10	NA	319 327 5000-8000	287 295	.765 .725	110	106	.022 .022	1,2,5,22 <i>Big cubic inch Super-Bracket.</i>
124063-14	NA	317 331 5200-8200	285 299	.873 .810	114	110	.022 .022	1,2,5,22 <i>540+. Comp. & Quick 16.</i>
124093-16	NA	323 351 4800-8000	291 319	.873 .867	116	112	.022 .022	1,2,5,22 <i>Big cubic inch only. Requires huge heads.</i>
124093-18	NA	323 351 4600-8000	291 319	.873 .867	118	114	.022 .022	1,2,5,22 <i>Very large cubic inch with multi-stage nitrous.</i>
129994	NA	Custom Grind Camshaft 4/7 Swap Mechanical Roller Special Order Camshaft.						1,2,5,22



CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996



Big Bottle Cams™ - 4/7 Swap Mechanical Roller Cams

Firing Order: 1•8•7•3•6•5•4•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.70 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
124453-12	NA	299 311 4000-7000	267 279	.714 .725	112	108	.022 .022	1,2,5,22 <i>Rough idle, aggressive upper rpm performance. 250+ plate systems, 11.0:1+ CR.</i>
124823-12	NA	307 317 4300-7200	275 285	.714 .714	112	108	.022 .022	1,2,5,22 <i>Good upper mid to top end for 500+. Use with large manifold systems.</i>
124043-12	NA	309 323 4600-7800	277 291	.810 .810	112	108	.022 .022	1,2,5,22 <i>Quick 16. Needs good heads. Multi-stage systems.</i>
124043-14	NA	309 323 4600-8000	277 291	.810 .810	114	110	.022 .022	1,2,5,22 <i>13.0:1+ compression. Good Heads, 5000+ stall. Multi stage systems.</i>
124073-15	NA	313 331 4600-8800	281 299	.873 .810	115	111	.022 .022	1,2,5,22 <i>Large cubic inch w/multi-stage nitrous. Needs good heads & CR.</i>
124803-16	NA	317 343 5400-8600	285 311	.850 .810	116	112	.022 .022	1,2,5,22 <i>500+ cubic inch, high compression. Multi stage systems.</i>
124793-12	NA	319 331 5000-8200	287 299	.765 .731	112	108	.022 .022	1,2,5,22 <i>Competition only, strong upper range for 540+. Good with large manifold systems.</i>
124093-18	NA	323 351 4800-8500	291 319	.873 .867	118	114	.022 .022	1,2,5,22 <i>Very large cubic inch with big multi-stage nitrous.</i>
129994	NA	Custom Grind Camshaft 4/7 Swap Mechanical Roller Special Order Camshaft.						1,2,5,22

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

2 Requires Thrust Button.

5 Requires upgraded distributor gear/fuel pump pushrod.

22 Ignition firing order must be changed to 1-8-7-3-6-5-4-2.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996

4/7 Swap *Steel Billet Mechanical Roller Camshaft Components*

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91135 91198	NA	NA	98738-A ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91135 91198	NA	NA	98738-A ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91135 91198	NA	NA	98738-A ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91158 91135	NA	NA	98824 ²⁵	NA	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91158 91135	NA	NA	98824 ²⁵	NA	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91158 91135	NA	NA	98824 ²⁵	NA	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
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CHEVROLET BIG BLOCK MARK IV • 396-502 1965-1996

Big Bottle Cams™ - 4/7 Swap *Mechanical Roller Camshaft Components*

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91158 91135	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91158 91135	NA	NA	98824 ²⁵	NA	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91158 91135	NA	NA	98824 ²⁵	NA	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
91158 91135	NA	NA	98824 ²⁵	NA	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	92151 94475	94400 94402	94305
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Components Notes: master note list on page 260

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

CAMSHAFTS



CHEVROLET BIG BLOCK GEN 6 • 454-502 1996-1999

Rattler Cams™ Hydraulic Roller Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.70 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
128026-09	CL128026-09	280 288 1800-5600	227 235	.555 .555	109	103	Hyd. Hyd.	1 Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.
128046-09	CL128046-09	288 296 2000-5900	235 243	.600 .600	109	103	Hyd. Hyd.	1 Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.
128086-09	CL128086-09	296 304 2400-6200	243 251	.600 .583	109	103	Hyd. Hyd.	1 Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.



CHEVROLET BIG BLOCK GEN 6 • 454-502 1996-1999

Hydraulic Roller Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.70 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
120226-12	NA	262 266 1200-4400	209 213	.510 .527	112	108	Hyd. Hyd.	1 Great daily usage, smooth idle, great fuel economy.
120236-12	NA	266 274 1400-4600	213 221	.510 .538	112	108	Hyd. Hyd.	1 Good idle, Off-Road & Street Performance. 9.0:1 CR advised.
123516-10	NA	272 280 1600-5000	219 227	.555 .555	110	106	Hyd. Hyd.	1 Good idle, Performance Street, great low to mid range. Headers suggested.
120246-10	NA	278 284 1800-5400	225 231	.567 .578	110	106	Hyd. Hyd.	1 Noticeable idle, Street Performance. Should have 2000+ stall, 9.5:1 CR.
120246-12	NA	278 284 1800-5400	225 231	.567 .578	112	108	Hyd. Hyd.	1 Fair idle, Street & mild Performance usage. Crisp throttle.
122116-12	NA	278 288 1800-5600	225 235	.595 .601	112	108	Hyd. Hyd.	1 Mild idle, Street Performance, Great mid range torque. Headers suggested
122116-14	NA	278 288 1800-5600	225 235	.595 .601	114	110	Hyd. Hyd.	1 Fair idle, excellent mid range power. 2500+ stall. Also good w/roots blower, 10psi max.
123316-10	NA	280 280 2000-5600	227 227	.555 .555	110	106	Hyd. Hyd.	1 Mild rough idle, Hot Street. Should have good exhaust, 2500+ stall & 9.5:1 CR.
120326-08	NA	282 288 2000-5700	229 235	.589 .601	108	104	Hyd. Hyd.	1 Street/Strip, 10.0:1+ CR, aftermarket dual plane intake recommended.
120326-10	NA	282 288 2000-5800	229 235	.589 .601	110	106	Hyd. Hyd.	1 Fair idle, Performance usage. Mid-range torque & horsepower.
120326-12	NA	282 288 2000-5800	229 235	.589 .601	112	108	Hyd. Hyd.	1 Fair idle, Moderate Street/Mild Bracket. Good mid range. 10.0-11.5:1, 2500+ stall.
120256-08	NA	284 288 2400-6000	231 235	.578 .618	108	104	Hyd. Hyd.	1 Fair idle, Performance usage. Great mid-range torque & power.
120256-12	NA	284 288 2400-6000	231 235	.578 .618	112	108	Hyd. Hyd.	1 Fair idle, Performance usage. Great mid-range torque & power.
121906-08	NA	286 286 2500-6100	233 233	.601 .601	108	104	Hyd. Hyd.	1 Rough idle, Performance Street/Mild Strip. Nice mid range. 9.5:1+ CR, 2500+ stall.
121906-11	NA	286 286 2500-6200	233 233	.601 .601	111	107	Hyd. Hyd.	1 Rough idle, Hot Street. Good usable mid range power band. 9.5:1+ CR, 2500+ stall.

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHEVROLET BIG BLOCK GEN 6 • 454-502 1996-1999

Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91123 ³ 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309
91123 ³ 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309
91123 ³ 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309

CHEVROLET BIG BLOCK GEN 6 • 454-502 1996-1999

Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91123 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309
91123 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309
91123 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309
91123 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309
91123 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309
91123 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309
91123 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309
91123 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309
91123 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309
91123 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309
91123 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309
91123 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309
91123 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309
91123 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309
91123 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

³³ Tie bar style lifters.



CHEVROLET BIG BLOCK GEN 6 • 454-502 1996-1999

Hydraulic Roller Camshafts (cont.)

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.70 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
120606-12	NA	286 300 2500-6200	233 247	.601 .612	112	108	Hyd. Hyd.	1
		Mild idle, Hot Street. Great mid range performance. 9.5:1+ CR, 2500+ stall.						
120606-14	NA	286 300 2500-6500	233 247	.601 .612	114	110	Hyd. Hyd.	1
		Mild idle, Hot Street. Great mid range performance. Small blower or NOS OK.						
120206-12	NA	286 298 2500-6300	233 245	.635 .635	112	108	Hyd. Hyd.	1
		Fair idle, Aggressive Street. Big mid range torque. 9.5:1+ CR, 2500+ stall.						
120206-14	NA	286 298 2500-6300	233 245	.635 .635	114	110	Hyd. Hyd.	1
		Fair idle, Aggressive Street. Big mid range torque. Good with 150+ NOS or blower.						
120406-08	NA	288 294 2600-6400	235 241	.618 .618	108	104	Hyd. Hyd.	1
		Rough idle, Hot Street/Strip. Great mid range. Needs good heads, 10.0:1+ CR.						
120406-10	NA	288 294 2600-6400	235 241	.618 .618	110	106	Hyd. Hyd.	1
		Fair idle, Street/Strip, best in 496-540ci. Nice mid range power. 2600+ stall.						
120406-12	NA	288 294 2600-6400	235 241	.618 .618	112	108	Hyd. Hyd.	1
		Rough idle, strong mid-range torque & horsepower.						
120266-10	NA	290 296 2600-6500	237 243	.635 .640	110	106	Hyd. Hyd.	1
		Decent idle, Performance Street. Needs 10.0:1+.						
120266-12	NA	290 296 2600-6500	237 243	.635 .640	112	108	Hyd. Hyd.	1
		Lopey idle, Hot Street & Bracket Racing. 10.0:1-up CR advised.						
120666-10	NA	296 302 2800-6200	243 249	.640 .640	110	106	Hyd. Hyd.	1
		Rough idle, Street/Strip, great upper mid range power. 10.0:1 CR, 3000+ stall.						
120666-12	NA	296 302 2800-6300	243 249	.640 .640	112	108	Hyd. Hyd.	1
		Lopey idle, broad mid range power. 10.0:1 CR, 3000+ stall.						
121616-12	NA	296 308 3000-6600	243 255	.640 .640	112	108	Hyd. Hyd.	1
		Lopey idle, Excellent mid to top end power. 10.0:1+ CR, 3200+ stall.						
121616-14	NA	296 308 3000-6600	243 255	.640 .640	114	110	Hyd. Hyd.	1
		Rough idle, Bracket/Marine Performance. 540+, 12.5:1+ CR. Auto w/3500+. Blower OK.						
126736-10	NA	300 308 3000-6600	247 255	.612 .612	110	106	Hyd. Hyd.	1
		Rough idle, Bracket 540+ with 12.5:1 minimum. Auto w/3500+ stahl.						
129996	NA	Custom Grind Camshaft					Hyd. Hyd.	1
		Hydraulic Roller Special Order Camshaft.						



CHEVROLET BIG BLOCK GEN 6 • 454-502 1996-1999

Mechanical Roller Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.70 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Notes
121166-12	NA	291 299 3400-7200	259 267	.663 .680	112	108	.022 .022	1
		Lopey idle, Bracket E.T. Mid range torque & power. 11.5:1+ CR, 3500+ stall.						
121126-10	NA	301 309 4000-8000	269 277	.703 .703	110	106	.022 .022	1
		Competition, good mid & upper horsepower, bracket cars, OK w/NOS.						
129996	NA	Custom Grind Camshaft						1
		Hydraulic Roller Special Order Camshaft.						

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHEVROLET BIG BLOCK GEN 6 • 454-502 1996-1999

Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91123 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309
91123 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309
91123 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309
91123 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309
91123 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309
91123 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309
91123 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309
91123 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309
91123 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309
91123 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309
91123 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309
91123 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309
91123 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309
91123 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309
91123 91167 ³³	NA	98636-K32	98636	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95220 95108/95121	NA	94402	94309
--	--	--	--	--	--	--	--	--	--	--	NA	94402	94309

CHEVROLET BIG BLOCK GEN 6 • 454-502 1996-1999

Mechanical Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91167 ³³ 91135 ³³	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	NA	94402	94309
91167 ³³ 91135 ³³	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	90120	95110/95115	NA	94402	94309
--	--	--	--	--	--	--	--	--	--	--	NA	94402	94309

Components Notes: master note list on page 260

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

³³ Tie bar style lifters.

CAMSHAFTS



CHEVROLET W-SERIES • 348-409 1958-1965

American Muscle™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.75 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash		Cam Notes
IN	EX	IN	EX	IN	EX	IN	EX			IN	EX	
137651-13	CL137651-13	266	274	190	198	.401	.411	113	110	Hyd.	Hyd.	1
		800-4400 Near duplicate of the Chev 340HP/409 cam (GM #3744901).										



CHEVROLET W-SERIES • 348-409 1958-1965

Street Force™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.75 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash		Cam Notes
IN	EX	IN	EX	IN	EX	IN	EX			IN	EX	
130101-12	CL130101-12	259	269	205	215	.490	.519	112	108	Hyd.	Hyd.	1
		1000-5000 Street Force™ 1, Good idle, Mild Street performance, strong low end torque.										
131101-12	CL131101-12	269	279	215	225	.519	.543	112	108	Hyd.	Hyd.	1
		1400-5400 Street Force™ 2, Good idle & throttle response. Needs 4 barrel & good exhaust.										
132121-12	CL132121-12	279	289	225	235	.543	.548	112	108	Hyd.	Hyd.	1
		1500-5800 Street Force™ 3, Noticeable idle, Hot Street & mild Bracket Racing.										



CHEVROLET W-SERIES • 348-409 1958-1965

Rattler Cams™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.75 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash		Cam Notes
IN	EX	IN	EX	IN	EX	IN	EX			IN	EX	
138021-09	CL138001-09	281	289	227	235	.548	.548	109	103	Hyd.	Hyd.	1
		1500-5400 Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.										
138051-09	CL138051-09	289	297	235	243	.548	.548	109	103	Hyd.	Hyd.	1
		1800-5600 Big Mama Rattler™, Loopy idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.										
138111-09	CL138111-09	297	305	243	251	.548	.548	109	103	Hyd.	Hyd.	1
		2400-6000 Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.										

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHEVROLET W-SERIES • 348-409 1958-1965

American Muscle™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91111 ³ 91116	NA	98511-K31 ²⁵	98511 ²⁵	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	NA	NA	NA	NA	NA

CHEVROLET W-SERIES • 348-409 1958-1965

Street Force™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91111 ³ 91116	NA	98511-K31 ²⁵	98511 ²⁵	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	NA	NA	NA	NA	NA
91111 ³ 91116	NA	98511-K31 ²⁵	98511 ²⁵	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	NA	NA	NA	NA	NA
91111 ³ 91116	NA	98511-K31 ²⁵	98511 ²⁵	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	NA	NA	NA	NA	NA

CHEVROLET W-SERIES • 348-409 1958-1965

Rattler Cams™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91111 ³ 91112	NA	98511-K31 ²⁵	98511 ²⁵	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	NA	NA	NA	NA	NA
91111 ³ 91112	NA	98511-K31 ²⁵	98511 ²⁵	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	NA	NA	NA	NA	NA
91111 ³ 91112	NA	98511-K31 ²⁵	98511 ²⁵	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	NA	NA	NA	NA	NA

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

CAMSHAFTS



CHEVROLET W-SERIES • 348-409 1958-1965

Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.75 Rockers		Lobe Separation	Intake	Valve Lash	Cam Notes	
		IN	EX	IN	EX	IN	EX	Angle	Centerline	IN	EX	
130821-10	CL130821-10	267	267	213	213	.502	.502	110	106	Hyd.	Hyd.	1
1600-5200 Good idle, Strong low & mid-range torque & horsepower.												
130991-10	CL130991-10	275	275	221	221	.548	.548	110	106	Hyd.	Hyd.	1
1800-5600 Nice idle, Great mid range with good throttle response.												
130501-12	CL130501-12	277	289	223	235	.543	.519	112	108	Hyd.	Hyd.	1
2000-5800 Fair idle, Hot Street & mild Bracket Racing. Good mid range torque. 9.5-11.0: CR.												
130331-10	CL130331-10	291	297	237	243	.525	.525	110	106	Hyd.	Hyd.	1
2800-6200 Lopey idle, Street/Strip or nostalgia. Likes headers & gears.												
139991	NA	Custom Grind Camshaft								Hyd.	Hyd.	1
Hydraulic Flat Tappet Special Order Camshaft.												



CHEVROLET W-SERIES • 348-409 1958-1965

Rattler Cams™ Retro-Fit Hydraulic Roller Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.75 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
138025-09	CL138025-09	280 288 1500-5400	227 235	.571 .571	109	103	Hyd. Hyd.	1
Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.								
138045-09	CL138045-09	288 296 1800-5600	235 243	.618 .618	109	103	Hyd. Hyd.	1
Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.								
138085-09	CL138085-09	296 304 2400-6000	243 251	.618 .600	109	103	Hyd. Hyd.	1
Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.								



CHEVROLET W-SERIES • 348-409 1958-1965

Retro-Fit Hydraulic Roller Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.75 Rockers		Lobe Separation	Intake	Valve Lash			
		IN	EX	IN	EX	IN	EX	Angle	Centerline	IN	EX	Cam Notes	
130445-12	CL130445-12	266	278	213	225	.525	.525	112	108	Hyd.	Hyd.	1	
1400-5600 Good idle, Street Performance/Daily Driver. 9.0:1+ CR.													
131125-10	CL131125-10	282	286	229	233	.560	.572	110	106	Hyd.	Hyd.	1	
1800-6000 Nice idle, Performance Street. Best with improved intake & exhaust, 2000+ stall.													
133305-12	CL133305-12	286	294	233	241	.601	.618	112	108	Hyd.	Hyd.	1	
2000-6400 Fair idle, Hot Street Rod/Strip. 10.0:1+, good intake & exhaust, 2400+ stall.													
139995	NA	Custom Grind Camshaft									Hyd.	Hyd.	1
Retro-Fit Hydraulic Roller Special Order Camshaft.													

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHEVROLET W-SERIES • 348-409 1958-1965

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91111 ³ 91112	NA	98511-K31 ²⁵	98511 ²⁵	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	NA	NA	NA	NA	NA
91111 ³ 91112	NA	98511-K31 ²⁵	98511 ²⁵	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	NA	NA	NA	NA	NA
91111 ³ 91112	NA	98511-K31 ²⁵	98511 ²⁵	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	NA	NA	NA	NA	NA
91111 ³ 91112	NA	98511-K31 ²⁵	98511 ²⁵	97110 97128 ¹⁰	-- 97216 ¹⁰	93015 93018 ¹⁰	93321 ²⁵	90075	NA	NA	NA	NA	NA
91111 91112	NA	--	--	--	--	--	--	90075	NA	--	NA	NA	NA

CHEVROLET W-SERIES • 348-409 1958-1965

Rattler Cams™ Retro-Fit Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91364 ³ 91360	NA	NA	98511 ²⁵	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	NA	NA	NA	NA	NA
91364 ³ 91360	NA	NA	98511 ²⁵	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	NA	NA	NA	NA	NA
91364 ³ 91360	NA	NA	98511 ²⁵	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	NA	NA	NA	NA	NA

CHEVROLET W-SERIES • 348-409 1958-1965

Retro-Fit Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91364 ³ 91360	NA	NA	98511 ²⁵	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	NA	NA	NA	NA	NA
91364 ³ 91360	NA	NA	98511 ²⁵	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	NA	NA	NA	NA	NA
91364 ³ 91360	NA	NA	98511 ²⁵	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	NA	NA	NA	NA	NA
91364 91360	NA	--	--	--	--	--	--	90075	NA	--	NA	NA	NA

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

CAMSHAFTS



CHEVROLET W-SERIES • 348-409 1958-1965

Mechanical Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.75 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
131672-10	CL131672-10 CL131672-10DL ⁴	275 275	240 240	.589 .589	110	106	.022 .022	1
		2800-6400	Fair idle, Street/Strip. Nice mid range torque & performance.					
131742-10	CL131742-10 CL131742-10DL ⁴	283 289	248 254	.624 .642	110	106	.022 .022	1
		3200-6800	Rough idle, Serious Street Rod/Bracket. Need good intake & exhaust.					
132322-10	CL132322-10 CL132322-10DL ⁴	295 303	260 268	.648 .642	110	106	.022 .022	1
		3800-7200	Rough idle, Great for stroker combinations. Best in light car, 11.5:1+ CR.					
139992	NA	Custom Grind Camshaft Mechanical Flat Tappet Special Order Camshaft.						1



CHEVROLET W-SERIES • 348-409 1958-1965

Mechanical Roller Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.75 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
139993	NA	Custom Grind Camshaft Mechanical Roller Special Order Camshaft.						1,5



CHRYSLER SLANT 6 • 170-225 1960-1987

Mechanical Flat Tappet Camshafts

Firing Order: 1•5•3•6•2•4

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
751082-12	CL751082-12	249 249	214 214	.450 .450	112	108	.022 .022	1
		1200-5000	Smooth idle, High torque, low rpm power band.					
752002-10	CL752002-10	255 255	220 220	.473 .473	110	106	.022 .022	1
		1800-5600	Smooth idle, good low to mid range torque & power. Excellent for trucks & towing.					
759992	NA	Custom Grind Camshaft Mechanical Flat Tappet Special Order Camshaft.						1

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

5 Requires upgraded distributor gear/fuel pump pushrod.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHEVROLET W-SERIES • 348-409 1958-1965

Mechanical Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91115 ³ 91118 ⁴	NA	NA	98511 ²⁵	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	NA	NA	NA	NA	NA
91115 ³ 91118 ⁴	NA	NA	98511 ²⁵	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	NA	NA	NA	NA	NA
91115 ³ 91118 ⁴	NA	NA	98511 ²⁵	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90075	NA	NA	NA	NA	NA
91115 91118	NA	--	--	--	--	--	--	90075	NA	--	NA	NA	NA

CHEVROLET W-SERIES • 348-409 1958-1965

Mechanical Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
--	NA	--	--	--	--	--	--	90075	NA	--	NA	NA	NA

CHRYSLER SLANT 6 • 170-225 1960-1987

Mechanical Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91711-12 ³	NA	NA	98341-12 ²⁵	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91711-12 ³	NA	NA	98341-12 ²⁵	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91711-12	NA	NA	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

CAMSHAFTS



CHRYSLER SMALL BLOCK LA • 273, 340, 360 1964-2003 • 318 1967-1991

Street Force™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
710011-12	CL710011-12	259 267 1200-4600	205 213	.420 .430	112	108	Hyd. Hyd.	Street Force™ 1, Good idle, Mild Street performance, strong low end torque.
710031-12	CL710031-12	267 277 1500-5000	213 223	.450 .465	112	108	Hyd. Hyd.	Street Force™ 2, Good idle & throttle response. Needs 4 barrel & good exhaust. 1
712121-12	CL712121-12	279 289 1600-5800	225 235	.465 .470	112	108	Hyd. Hyd.	Street Force™ 3, Noticeable idle, Hot Street & mild Bracket Racing. 1



CHRYSLER SMALL BLOCK LA • 273, 340, 360 1964-2003 • 318 1967-1991

Rattler Cams™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
718001-09	CL718001-09	281 289 2000-5800	227 235	.480 .488	109	103	Hyd. Hyd.	Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears. 1
718041-09	CL718041-09	289 297 2300-6000	235 243	.488 .480	109	103	Hyd. Hyd.	Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall. 1
718081-09	CL718081-09	297 305 2500-6400	243 251	.507 .495	109	103	Hyd. Hyd.	Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+. 1



CHRYSLER SMALL BLOCK LA • 273, 340, 360 1964-2003 • 318 1967-1991

Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
710021-11	CL710021-11	263 263 1200-4600	209 209	.420 .420	111	107	Hyd. Hyd.	Fair idle. Great for Street Performance. Car or truck, good torque.
711381-10	CL711381-10	255 261 1400-4800	208 214	.479 .494	110	106	Hyd. Hyd.	Fair idle, very strong torque. Best in 273-318. 1,15
711021-10	CL711021-10	267 267 1500-4800	213 213	.450 .450	110	106	Hyd. Hyd.	Strong mid-range torque. Needs 4 barrel & good flowing exhaust. 1800+ stall.
710931-12	CL710931-12	269 269 1500-5200	215 215	.455 .455	112	108	Hyd. Hyd.	Great cam for use in Performance Street cars & PUs.
711651-10	CL711651-10	265 273 1800-5600	218 226	.502 .525	110	106	Hyd. Hyd.	Mild idle, Street/Street Performance. Excellent throttle response. 1,15
711451-08	CL711451-08	267 267 1800-5800	220 220	.506 .506	108	104	Hyd. Hyd.	Good low & mid-range horsepower. Needs 4 barrel & headers. 1,15
710991-08	CL710991-08	275 275 1800-5800	221 221	.470 .470	108	104	Hyd. Hyd.	Good low & mid-range horsepower. Needs 4 barrel & headers. 1

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

15 Lobes designed to take maximum advantage of .904" dia. lifter.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHRYSLER SMALL BLOCK LA • 273, 340, 360 1964-2003 • 318 1967-1991

Street Force™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91711 ³ 91712	NA	-- 98438-K34 ²⁵	98412 98438 ²⁵	-- 97110	NA	93066	93321 ²⁵	NA	NA	NA	NA	NA	94330
91711 ³ 91712	NA	-- 98438-K34 ²⁵	98412 98438 ²⁵	-- 97110	NA	93066	93321 ²⁵	NA	NA	NA	NA	NA	94330
91711 ³ 91712	NA	-- 98438-K34 ²⁵	98412 98438 ²⁵	-- 97110	NA	93066	93321 ²⁵	NA	NA	NA	NA	NA	94330

CHRYSLER SMALL BLOCK LA • 273, 340, 360 1964-2003 • 318 1967-1991

Rattler Cams™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91711 ³ 91712	NA	98438-K34 ²⁵	98438 ²⁵	97110	NA	93066	93321 ²⁵	NA	NA	NA	NA	NA	94330
91711 ³ 91712	NA	98438-K34 ²⁵	98438 ²⁵	97110	NA	93066	93321 ²⁵	NA	NA	NA	NA	NA	94330
91711 ³ 91712	NA	98438-K34 ²⁵	98438 ²⁵	97110	NA	93066	93321 ²⁵	NA	NA	NA	NA	NA	94330

CHRYSLER SMALL BLOCK LA • 273, 340, 360 1964-2003 • 318 1967-1991

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91711 ³ 91712	NA	-- 98438-K34 ²⁵	98412 98438 ²⁵	-- 97110	NA	93066	93321 ²⁵	NA	NA	NA	NA	NA	94330
91711 ³ 91712	NA	98438-K34 ²⁵	98438 ²⁵	97110	NA	93066	93321 ²⁵	NA	NA	NA	NA	NA	94330
91711 ³ 91712	NA	-- 98438-K34 ²⁵	98412 98438 ²⁵	-- 97110	NA	93066	93321 ²⁵	NA	NA	NA	NA	NA	94330
91711 ³ 91712	NA	-- 98438-K34 ²⁵	98412 98438 ²⁵	-- 97110	NA	93066	93321 ²⁵	NA	NA	NA	NA	NA	94330
91711 ³ 91712	NA	98438-K34 ²⁵	98438 ²⁵	97110	NA	93066	93321 ²⁵	NA	NA	NA	NA	NA	94330
91711 ³ 91712	NA	98438-K34 ²⁵	98438 ²⁵	97110	NA	93066	93321 ²⁵	NA	NA	NA	NA	NA	94330
91711 ³ 91712	NA	98438-K34 ²⁵	98438 ²⁵	97110	NA	93066	93321 ²⁵	NA	NA	NA	NA	NA	94330

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

²⁵ Machining Required.

CAMSHAFTS



CHRYSLER SMALL BLOCK LA • 273, 340, 360 1964-2003 • 318 1967-1991

Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.50 Rockers		Lobe Separation	Intake	Valve Lash	Cam Notes	
		IN	EX	IN	EX	IN	EX	Angle	Centerline	IN	EX	
712221-08	CL712221-08	279	279	225	225	.465	.465	108	104	Hyd.	Hyd.	1
2200-5500 Mid-range & top end horsepower & torque. Needs 4bbl., gears, headers.												
710461-10	CL710461-10	273	277	226	230	.525	.531	110	106	Hyd.	Hyd.	1,15
2200-6000 Fair idle, Hot Street & mild Bracket Racing.												
710581-10	CL710581-10	277	283	230	236	.531	.547	108	104	Hyd.	Hyd.	1,15
2600-6200 Lopey idle, Strong mid range. Good throttle response. 2400+ stall.												
712231-09	CL712231-09	285	285	231	231	.480	.480	109	105	Hyd.	Hyd.	1
2600-6000 Runs strong 3,500 & up. 9.5+ comp., auto OK with gears.												
711791-08	CL711791-08	283	287	236	240	.547	.559	108	104	Hyd.	Hyd.	1,15
2800-6400 Lopey idle, good mid-range power. Needs 3200+ stall.												
712901-12	CL712901-12	294	300	241	247	.390	.410	112	108	Hyd.	Hyd.	
2300-6500 Fair idle, Circle Track Lift Rule Only. Strong mid-range.												
710831-08	CL710831-08	289	289	242	242	.562	.562	108	104	Hyd.	Hyd.	1,15
2800-6400 Fair idle, Street/Strip. Nice mid range power. Needs at least 9.5:1 CR, 3200+ stall.												
711351-08	CL711351-08	291	295	244	248	.566	.578	108	104	Hyd.	Hyd.	1,15
2800-6500 Hot Street/Bracket, strong mid range performance.												
716771-08	CL716771-08	301	301	247	247	.510	.510	108	104	Hyd.	Hyd.	1,15
3000-6500 Rough idle. Hot Street/Strip, strong mid range performance.												
710881-08	CL710881-08	295	301	248	254	.578	.590	108	104	Hyd.	Hyd.	1,15
4200-7000 Rough idle, Pro Street/Brackets, Strong mid & upper end power. 10.0:1+ CR.												
719991	NA	Custom Grind Camshaft								Hyd.	Hyd.	1
Hydraulic Flat Tappet Special Order Camshaft.												



CHRYSLER SMALL BLOCK LA • 273, 340, 360 1964-2003 • 318 1967-1991

Rattler Cams™ Retro-Fit Hydraulic Roller Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
718005-09	CL718005-09	280 288 1800-5500	227 235	.525 .530	109	103	Hyd. Hyd.	1
Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.								
718045-09	CL718045-09	288 296 2000-5700	235 243	.530 .530	109	103	Hyd. Hyd.	1
Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.								
718085-09	CL718085-09	296 304 2400-6000	243 251	.530 .515	109	103	Hyd. Hyd.	1
Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.								

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

15 Lobes designed to take maximum advantage of .904" dia. lifter.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHRYSLER SMALL BLOCK LA • 273, 340, 360 1964-2003 • 318 1967-1991

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91711 ³ 91712	NA	--	98412 98438-K34 ²⁵	-- 98438 ²⁵	NA	93066	93321 ²⁵	NA	NA	NA	NA	NA	94330
91711 ³ 91712	NA	98438-K34 ²⁵	98438 ²⁵	97110	NA	93066	93321 ²⁵	NA	NA	NA	NA	NA	94330
91711 ³ 91712	NA	98438-K34 ²⁵	98438 ²⁵	97110	NA	93066	93321 ²⁵	NA	NA	NA	NA	NA	94330
91711 ³ 91712	NA	98438-K34 ²⁵	98438 ²⁵	97110	NA	93066	93321 ²⁵	NA	NA	NA	NA	NA	94330
91711 ³ 91712	NA	98438-K34 ²⁵	98438 ²⁵	97110	NA	93066	93321 ²⁵	NA	NA	NA	NA	NA	94330
91711 ³ 91712	NA	98438-K34 ²⁵	98438 ²⁵	97110	NA	93066	93321 ²⁵	NA	NA	NA	NA	NA	94330
91711 ³ 91712	NA	98438-K34 ²⁵	98438 ²⁵	97110	NA	93066	93321 ²⁵	NA	NA	NA	NA	NA	94330
91711 ³ 91712	NA	98438-K34 ²⁵	98438 ²⁵	97110	NA	93066	93321 ²⁵	NA	NA	NA	NA	NA	94330
91711 ³ 91712	NA	98438-K34 ²⁵	98438 ²⁵	97110	NA	93066	93321 ²⁵	NA	NA	NA	NA	NA	94330
91711 ³ 91712	NA	--	--	--	--	--	--	NA	NA	--	NA	NA	94330

CHRYSLER SMALL BLOCK LA • 273, 340, 360 1964-2003 • 318 1967-1991

Rattler Cams™ Retro-Fit Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91764 ³	NA	98438-K34 ²⁵	98438 ²⁵	97110	NA	93066	93321 ²⁵	NA	NA	NA	NA	NA	94330
91764 ³	NA	98438-K34 ²⁵	98438 ²⁵	97110	NA	93066	93321 ²⁵	NA	NA	NA	NA	NA	94330
91764 ³	NA	98438-K34 ²⁵	98438 ²⁵	97110	NA	93066	93321 ²⁵	NA	NA	NA	NA	NA	94330

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

²⁵ Machining Required.

CAMSHAFTS



CHRYSLER SMALL BLOCK LA • 273, 340, 360 1964-2003 • 318 1967-1991

Retro-Fit Hydraulic Roller Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.50 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash		Cam Notes	
		IN	EX	IN	EX	IN	EX			IN	EX		
713175-10	CL713175-10	272	278	219	225	.525	.525	110	106	Hyd.	Hyd.	1	
		1600-5600	Good idle, Performance Street, good low to mid range torque.						9.0:1+	CR, 2200+ stall.			
711915-12	CL711915-12	274	278	221	225	.475	.500	112	108	Hyd.	Hyd.	1	
		1200-5700	Mild idle, Street Performance, big low end torque.						Should have 9.0:1+	CR, 1800+ stall.			
710525-10	CL710525-10	282	286	229	233	.520	.515	110	106	Hyd.	Hyd.	1	
		2000-6000	Lopey idle, Hot Street, great mid range acceleration & torque.						9.5:1	CR, 2500+ stall.			
712105-10	CL712105-10	288	294	235	241	.530	.530	110	106	Hyd.	Hyd.	1	
		2400-6300	Rough idle, Street/Strip, great mid range.						9.5:1+	CR, 2800+ stall & good intake.			
710665-10	CL710665-10	294	300	241	247	.545	.550	110	106	Hyd.	Hyd.	1	
		2800-6500	Rough idle, Pro Street/Strip.						Needs 10.0:1+	CR, 2800+ stall & at least 4.10 gears.			
719995	NA	Custom Grind Camshaft									Hyd.	Hyd.	1
		Retro-Fit Hydraulic Roller Special Order Camshaft.											



CHRYSLER SMALL BLOCK LA • 273, 340, 360 1964-2003 • 318 1967-1991

Mechanical Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.50 Rockers		Lobe Separation	Intake	Valve Lash	Cam Notes	
		IN	EX	IN	EX	IN	EX	Angle	Centerline	IN	EX	
710862-08	CL710862-08	266	266	238	238	.558	.558	108	104	.018	.018	1,15,34
	CL710862-08DL ⁴	2400-6200	Street/Strip & mild Bracket. Strong low to mid range. 9.5:1 CR, 2500+ stall.									
711262-08	CL711262-08	281	281	246	246	.536	.536	108	104	.022	.022	1
	CL711262-08DL ⁴	3000-6600	Rough idle, Pro Street/Bracket, strong mid range power. 3000+ stall, 9.5:1 CR.									
712382-08	CL712382-08	281	285	246	250	.520	.525	108	104	.022	.022	1
	CL712382-08DL ⁴	3000-6800	Street/Strip, good Oval Track cam for limited induction systems.									
712392-06	CL712392-06	285	291	250	256	.525	.535	106	102	.022	.022	1
	CL712392-06DL ⁴	3200-7000	Street/Strip, good Oval Track cam for limited induction systems.									
712362-08	CL712362-08	289	295	254	260	.550	.555	108	104	.022	.022	1
	CL712362-08DL ⁴	3400-7400	Lopey idle. Oval Track, Street/Strip with 10.0:1+ CR. Auto needs 3500+ stall.									
712712-08	CL712712-08	282	288	254	260	.599	.616	108	104	.022	.022	1,15
	CL712712-08DL ⁴	3400-7400	Lopey idle. Oval Track, Street/Strip with 10.0:1+ CR. Auto needs 3500+ stall.									
712532-06	CL712532-06	295	299	260	264	.565	.565	106	102	.022	.022	1
	CL712532-06DL ⁴	3600-7400	Strong mid range & upper end power. Needs good intake & exhaust.									
712322-08	CL712322-08	295	305	260	270	.555	.566	108	104	.022	.022	1
	CL712322-08DL ⁴	3600-7600	Hot Street/Bracket. Must have 11.0:1 CR & 4000+ stall.									
710782-06	CL710782-06	296	302	268	274	.632	.643	106	102	.018	.018	1,15,34
	CL710782-06DL ⁴	4000-7600	Bracket/Super Street, Nice top end power. Should have 12.0:1 CR, 4500+ stall.									
710782-08	CL710782-08	296	302	268	274	.632	.643	108	104	.018	.018	1,15,34
	CL710782-08DL ⁴	4000-7600	Bracket/Super Street, Nice top end power. Should have 12.0:1 CR, 4500+ stall.									
719992	NA	Custom Grind Camshaft										1
		Mechanical Flat Tappet Special Order Camshaft.										

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

15 Lobes designed to take maximum advantage of .904" dia. lifter.

34 Provisions for increased oiling recommended.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHRYSLER SMALL BLOCK LA • 273, 340, 360 1964-2003 • 318 1967-1991

Retro-Fit Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91764 ³	NA	98438-K34 ²⁵	98438 ²⁵	97110	NA	93066	93321 ²⁵	NA	NA	NA	NA	NA	94330
91764 ³	NA	98438-K34 ²⁵	98438 ²⁵	97110	NA	93066	93321 ²⁵	NA	NA	NA	NA	NA	94330
91764 ³	NA	98438-K34 ²⁵	98438 ²⁵	97110	NA	93066	93321 ²⁵	NA	NA	NA	NA	NA	94330
91764 ³	NA	98438-K34 ²⁵	98438 ²⁵	97110	NA	93066	93321 ²⁵	NA	NA	NA	NA	NA	94330
91764 ³	NA	98438-K34 ²⁵	98438 ²⁵	97110	NA	93066	93321 ²⁵	NA	NA	NA	NA	NA	94330
91764	NA	--	--	--	--	--	--	NA	NA	--	NA	NA	94330

CHRYSLER SMALL BLOCK LA • 273, 340, 360 1964-2003 • 318 1967-1991

Mechanical Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91715 ³ 91718 ⁴	NA	NA	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	NA	NA	94330
91715 ³ 91718 ⁴	NA	NA	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	NA	NA	94330
91715 ³ 91718 ⁴	NA	NA	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	NA	NA	94330
91715 ³ 91718 ⁴	NA	NA	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	NA	NA	94330
91715 ³ 91718 ⁴	NA	NA	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	NA	NA	94330
91715 ³ 91718 ⁴	NA	NA	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	NA	NA	94330
91715 ³ 91718 ⁴	NA	NA	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	NA	NA	94330
91715 ³ 91718 ⁴	NA	NA	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	NA	NA	94330
91715 ³ 91718 ⁴	NA	NA	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	NA	NA	94330
91715 91718	NA	--	--	--	--	--	--	NA	NA	--	NA	NA	94330

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

³⁵ 10° Multi-Groove for OE style valves not available (93018 single-groove).

CAMSHAFTS



CHRYSLER SMALL BLOCK LA • 273, 340, 360 1964-2003 • 318 1967-1991

Steel Billet Mechanical Roller Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
711213-10	NA	261 269 2400-6000	229 237	.555 .555	110	106	.022 .022	1,5 <i>Fair idle, Street Performance/Mild Bracket. 2500+ stall, 9.5:1 CR.</i>
711313-08	NA	277 277 2800-6200	245 245	.585 .585	108	104	.022 .022	1,5 <i>Fair idle, Street/Strip, good mid range torque. 10.0:1 stall, 3500+ stall & good intake.</i>
711153-06	NA	277 281 2800-6400	245 249	.585 .585	106	102	.022 .022	1,5 <i>Loppy idle, great oval track & heavy drag car.</i>
712113-08	NA	277 285 2800-6800	245 253	.600 .600	108	104	.022 .022	1,5 <i>340-360 ci. Hot Street & mild Bracket.</i>
711013-06	NA	283 289 3000-6800	251 257	.640 .640	106	102	.022 .022	1,5 <i>Good mid & upper horsepower, Great for Brackets.</i>
711133-08	NA	289 299 3400-7000	257 267	.640 .645	108	104	.022 .022	1,5 <i>Strong mid-range & upper end horsepower, 12.0:1+ CR.</i>
712123-06	NA	291 299 3800-7600	259 267	.640 .645	106	102	.022 .022	1,5 <i>11.5:1+ Comp. Good heads. Strong mid & upper horsepower.</i>
711113-08	NA	295 305 4000-7800	263 273	.640 .645	108	104	.022 .022	1,5 <i>12.5:1+ Comp. Good heads. Strong mid to top end.</i>
710563-06	NA	305 311 4200-8000	273 279	.680 .640	106	102	.022 .022	1,5 <i>Rough idle, Bracket/Super Gas. Needs high compression & 5000+ stall.</i>
710563-08	NA	305 311 4200-8000	273 279	.680 .640	108	104	.022 .022	1,5 <i>Rough idle, Bracket/Super Gas. Needs high compression & 5000+ stall.</i>
719993	NA	Custom Grind Camshaft <i>Mechanical Roller Special Order Camshaft.</i>						1,5
719994	NA	Custom Grind Camshaft, "R" Block <i>Mechanical Roller Special Order Camshaft.</i>						1,5



CHRYSLER 5.2L • 5.9L MAGNUM • 1992-2002

Hydraulic Roller Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
770225-14	CL770225-14	254 262 800-5000	201 209	.480 .480	114	110	Hyd. Hyd.	1 <i>Good idle, Performance Street, good low to mid range torque. 8.5:1+ CR.</i>
770055-12	CL770055-12	262 270 1000-5200	209 217	.496 .496	112	108	Hyd. Hyd.	1 <i>Good idle, Performance Street, good low to mid range torque. 9.0:1+ CR.</i>
771915-12	CL771915-12	274 278 1200-5700	221 225	.507 .533	112	108	Hyd. Hyd.	1 <i>Mild idle, Street Performance, big low end torque. Should have 9.0:1+ CR, 1800+ stall.</i>
770525-10	CL770525-10	282 286 2000-6000	229 233	.555 .549	110	106	Hyd. Hyd.	1 <i>Loppy idle, Hot Street, great mid range acceleration & torque. 9.5:1 CR, 2500+ stall.</i>
772105-10	CL772105-10	288 294 2400-6300	235 241	.565 .565	110	106	Hyd. Hyd.	1 <i>Rough idle, Street/Strip, great mid range. 9.5:1+ CR, 2800+ stall & good intake.</i>
770665-10	CL770665-10	294 300 2800-6500	241 247	.581 .587	110	106	Hyd. Hyd.	1 <i>Rough idle, Pro Street/Strip. Needs 10.0:1+ CR, 2800+ stall & at least 4.10 gears.</i>
779995	NA	Custom Grind Camshaft <i>Retro-Fit Hydraulic Roller Special Order Camshaft.</i>						Hyd. Hyd. 1

Cam Notes: master note list on page 260

- 1 Stock (O.E.) valve springs cannot be used.
- 5 Requires upgraded distributor gear/fuel pump pushrod.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHRYSLER SMALL BLOCK LA • 273, 340, 360 1964-2003 • 318 1967-1991

Steel Billet Mechanical Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91750 91717 ³³	NA	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	NA	94415	94330
91750 91717 ³³	NA	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	NA	94415	94330
91750 91717 ³³	NA	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	NA	94415	94330
91750 91717 ³³	NA	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	NA	94415	94330
91717 91734	NA	NA	98637 ²⁵	NA	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	NA	94415	94330
91717 91734	NA	NA	98543 ²⁵	97130 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	NA	94415	94330
91717 91734	NA	NA	98543 ²⁵	97130 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	NA	94415	94330
91717 91734	NA	NA	98543 ²⁵	97130 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	NA	94415	94330
91717 91734	NA	NA	98543 ²⁵	97130 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	NA	94415	94330
91717 91734	NA	NA	98543 ²⁵	97130 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	NA	94415	94330
--	NA	--	--	--	--	--	--	NA	NA	--	NA	NA	94330
--	NA	--	--	--	--	--	--	NA	NA	--	NA	NA	94330

CHRYSLER 5.2L • 5.9L MAGNUM • 273, 340, 360 1964-2003 • 318 1967-1991

Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91764 ^{3,33}	NA	NA	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	NA	NA	94330
91764 ^{3,33}	NA	NA	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	NA	NA	94330
91764 ^{3,33}	NA	NA	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	NA	NA	94330
91764 ^{3,33}	NA	NA	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	NA	NA	94330
91764 ^{3,33}	NA	NA	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	NA	NA	94330
91764 ^{3,33}	NA	NA	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	NA	NA	94330
91764 ³³	NA	--	--	--	--	--	--	NA	NA	--	NA	NA	94330

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

³³ Tie bar style lifters.

³⁵ 10° Multi-Groove for OE style valves not available (93018 single-groove).

CAMSHAFTS



CHRYSLER BIG BLOCK B/RB • 383-440 1959-1980

Max Certified™ Hydraulic Flat Tappet Cam & Lifter Sets - 5 Year No Fault Warranty (see page 3 for details)

Cam & Lifter Set Part No.	Cam & Direct Lube Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.50 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash		Cam Notes
		IN	EX	IN	EX	IN	EX			IN	EX	
MC720931-11	NA	267	267	213	213	.450	.450	111	107	Hyd.	Hyd.	1
		1000-5000	Super low & mid-range performance. Good idle.									
MC720031-12	NA	269	277	215	223	.445	.465	112	108	Hyd.	Hyd.	1
		1400-5200	Good idle & throttle response. Needs 4 barrel & good exhaust.									
MC722241-08	NA	289	289	235	235	.488	.488	108	104	Hyd.	Hyd.	1
		2600-6400	Runs strong 3,500 & up. 9.5+ comp., auto OK with gears.									



CHRYSLER BIG BLOCK B/RB • 383-440 1959-1980



American Muscle™ Hydraulic Flat Tappet Camshafts (Single Bolt)

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.50 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash		Cam Notes
		IN	EX	IN	EX	IN	EX			IN	EX	
727511-13	CL727511-13	260	268	206	208	.434	.434	113	110	Hyd.	Hyd.	1
		1400-5000	Near duplicate of the Chrysler 365HP/440 cam (#2532190).									



CHRYSLER BIG BLOCK B/RB • 383-440 1959-1980



Street Force™ Hydraulic Flat Tappet Camshafts (Single Bolt) Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.50 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash		Cam Notes
		IN	EX	IN	EX	IN	EX			IN	EX	
720031-12	CL720031-12	269	277	215	223	.445	.465	112	108	Hyd.	Hyd.	1
		1400-5200	Street Force™ 2, Good idle & throttle response. Needs 4 barrel & good exhaust.									
720141-12	CL720141-12	279	289	225	235	.490	.488	112	108	Hyd.	Hyd.	1
		1600-5600	Street Force™ 3, Noticeable idle, Hot Street & mild Bracket Racing.									
721161-12	CL721161-12	289	299	235	245	.488	.488	112	108	Hyd.	Hyd.	1
		2600-6400	Street Force™ 4, Lopey idle, good mid-range power. Needs 2800+ stall.									

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHRYSLER BIG BLOCK B/RB • 383-440 1959-1980

Max Certified™ Hydraulic Flat Tappet Cam & Lifter Set Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91711 ³ 91712	NA	98515-K33	98515	97110	--	93065	93321 ²⁵	NA	NA	NA	92152	NA	94335
91711 ³ 91712	NA	98515-K33	98515	97110	--	93065	93321 ²⁵	NA	NA	NA	92152	NA	94335
91711 ³ 91712	NA	98515-K33	98515	97110	--	93065	93321 ²⁵	NA	NA	NA	92152	NA	94335

CHRYSLER BIG BLOCK B/RB • 383-440 1959-1980

American Muscle™ Hydraulic Flat Tappet Cam & Lifter Set Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91711 ³ 91712	NA	98515-K33	98515	97110	--	93065	93321 ²⁵	NA	NA	NA	92152	NA	94335

CHRYSLER BIG BLOCK B/RB • 383-440 1959-1980

Street Force™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91711 ³ 91712	NA	98515-K33	98515	97110	--	93065	93321 ²⁵	NA	NA	NA	92152	NA	94335
91711 ³ 91712	NA	98515-K33	98515	97110	--	93065	93321 ²⁵	NA	NA	NA	92152	NA	94335
91711 ³ 91712	NA	98515-K33	98515	97110	--	93065	93321 ²⁵	NA	NA	NA	92152	NA	94335

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

²⁵ Machining Required.

CAMSHAFTS



CHRYSLER BIG BLOCK B/RB • 383-440 1959-1980

Rattler Cams™ Hydraulic Flat Tappet Camshafts (Single Bolt) Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
728001-09	CL728001-09	281 289 1800-5600	227 235	.480 .488	109	103	Hyd. Hyd.	1 Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.
728041-09	CL728041-09	289 297 2000-6000	235 243	.488 .480	109	103	Hyd. Hyd.	1 Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.
728081-09	CL728081-09	297 305 2400-6400	243 251	.507 .495	109	103	Hyd. Hyd.	1 Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.



CHRYSLER BIG BLOCK B/RB • 383-440 1959-1980

Hydraulic Flat Tappet Camshafts (Single Bolt) Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
720021-11	CL720021-11	263 263 800-4800	209 209	.420 .420	111	107	Hyd. Hyd.	
720931-11	CL720931-11	267 267 1000-5000	213 213	.450 .450	111	107	Hyd. Hyd.	1 Smooth idle, strong low end. High vacuum, good fuel economy.
721141-08	CL721141-08	267 267 1600-5400	220 220	.506 .506	108	104	Hyd. Hyd.	1,15 Super low & mid-range performance. Good idle.
721941-12	CL721941-12	271 281 1800-5400	224 234	.518 .543	112	108	Hyd. Hyd.	1,15 Good low & mid-range horsepower. Needs 4 barrel & headers.
720581-10	CL720581-10	277 283 2400-6200	230 236	.531 .547	110	106	Hyd. Hyd.	1,15 Fair idle, Hot Street & mild Bracket Racing. Strong mid range.
722241-08	CL722241-08	289 289 2600-6400	235 235	.488 .488	108	104	Hyd. Hyd.	1 Lopey idle, Strong mid range. Good throttle response. 2400+ stall.
721201-08	CL721201-08	285 289 2800-6600	238 242	.555 .562	108	104	Hyd. Hyd.	1,15 Runs strong 3,500 & up. 9.5+ comp., auto OK with gears.
722251-09	CL722251-09	297 305 3000-6800	243 251	.519 .540	109	105	Hyd. Hyd.	1 Lopey idle, Hot Street/Bracket. Good mid range power band.
720881-08	CL720881-08	295 301 3400-7200	248 254	.578 .590	108	104	Hyd. Hyd.	1,15 Hot Pro-Street/Bracket. Strong mid-range, needs 11.0-1 CR-up.
729991	NA	Custom Grind Camshaft (Single-Bolt) Hydraulic Flat Tappet Special Order Camshaft.					Hyd. Hyd.	1 Rough idle, Hot Street/Bracket, strong mid & top end performance.
729994	NA	Custom Grind Camshaft (3-Bolt) Hydraulic Flat Tappet Special Order Camshaft.					Hyd. Hyd.	1

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

15 Lobes designed to take maximum advantage of .904" dia. lifter.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHRYSLER BIG BLOCK B/RB • 383-440 1959-1980

Rattler Cams™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91711 ³ 91712	NA	98529-K33	98529	97110	--	93065	93321 ²⁵	NA	NA	NA	92152	NA	94335
91711 ³ 91712	NA	98529-K33	98529	97110	--	93065	93321 ²⁵	NA	NA	NA	92152	NA	94335
91711 ³ 91712	NA	98529-K33	98529	97110	--	93065	93321 ²⁵	NA	NA	NA	92152	NA	94335

CHRYSLER BIG BLOCK B/RB • 383-440 1959-1980

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91711 ³ 91712	NA	98515-K33	98515	97110	--	93065	93321 ²⁵	NA	NA	NA	92152	NA	94335
91711 ³ 91712	NA	98515-K33	98515	97110	--	93065	93321 ²⁵	NA	NA	NA	92152	NA	94335
91711 ³ 91712	NA	98515-K33	98515	97110	--	93065	93321 ²⁵	NA	NA	NA	92152	NA	94335
91711 ³ 91712	NA	98529-K33	98529	97110	--	93065	93321 ²⁵	NA	NA	NA	92152	NA	94335
91711 ³ 91712	NA	98529-K33	98529	97110	--	93065	93321 ²⁵	NA	NA	NA	92152	NA	94335
91711 ³ 91712	NA	98529-K33	98529	97110	--	93065	93321 ²⁵	NA	NA	NA	92152	NA	94335
91711 ³ 91712	NA	98529-K33	98529	97110	--	93065	93321 ²⁵	NA	NA	NA	92152	NA	94335
91711 ³ 91712	NA	98529-K33	98529	97110	--	93065	93321 ²⁵	NA	NA	NA	92152	NA	94335
91711 ³ 91712	NA	98529-K33	98529	97110	--	93065	93321 ²⁵	NA	NA	NA	92152	NA	94335
91711 ³ 91712	NA	--	--	--	--	--	--	NA	NA	--	92152	NA	94330
91711 ³ 91712	NA	--	--	--	--	--	--	NA	NA	--	92152	NA	94330

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

²⁵ Machining Required.

CAMSHAFTS



CHRYSLER BIG BLOCK B/RB • 383-440 1959-1980

Rattler Cams™ Retro-Fit Hydraulic Roller Camshafts (3 Bolt) Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
728005-09	CL728005-09	280 288 1800-5400	227 235	.525 .530	109	103	Hyd. Hyd.	1
Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.								
728045-09	CL728045-09	288 296 2000-5600	235 243	.530 .530	109	103	Hyd. Hyd.	1
Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.								
728085-09	CL728085-09	296 304 2400-6200	243 251	.530 .515	109	103	Hyd. Hyd.	1
Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.								



CHRYSLER BIG BLOCK B/RB • 383-440 1959-1980

Retro-Fit Hydraulic Roller Camshafts (3 Bolt)

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN	EX	Duration @ .050" IN	EX	Valve Lift w/1.50 Rockers IN	EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN	EX	Cam Notes
723515-12	CL723515-12	272 1600-5600	278 Fair idle, Street/Mild Bracket, good low to mid range.	219	225	.510	.500	112	108	Hyd.	Hyd.	1
720555-10	CL720555-10	282 2000-6000	288 Fair idle, Street Performance/Mild Bracket.	229	235	.520	.530	110	106	Hyd.	Hyd.	1
720555-12	CL720555-12	282 2000-6200	288 Mild lopey idle, Street/Mild Bracket, good low to mid range performance.	229	235	.520	.530	112	108	Hyd.	Hyd.	1
723445-08	CL723445-08	288 2500-6300	294 Rough idle, Street/Strip, good mid-range power.	235	241	.545	.545	108	104	Hyd.	Hyd.	1
723445-10	CL723445-10	288 2500-6400	294 Lopey idle, Street/Strip, good mid-range performance.	235	241	.545	.545	110	106	Hyd.	Hyd.	1
723235-08	CL723235-08	296 2800-6600	300 Rough idle, Pro Street/Bracket, strong mid range.	243	247	.600	.600	108	104	Hyd.	Hyd.	1
729995	NA	Custom Grind Camshaft Retro-Fit Hydraulic Roller Special Order Camshaft.								Hyd.	Hyd.	1

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHRYSLER BIG BLOCK B/RB • 383-440 1959-1980

Rattler Cams™ *Retro-Fit Hydraulic Roller Camshaft Components*

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91767 ³ 91774	NA	98445-K33	98445 ²⁵	97110	NA	93065	93321 ²⁵	NA	NA	NA	92152	NA	94340
91767 ³ 91774	NA	98445-K33	98445 ²⁵	97110	NA	93065	93321 ²⁵	NA	NA	NA	92152	NA	94340
91767 ³ 91774	NA	98445-K33	98445 ²⁵	97110	NA	93065	93321 ²⁵	NA	NA	NA	92152	NA	94340

CHRYSLER BIG BLOCK B/RB • 383-440 1959-1980

Retro-Fit Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91767 ³ 91774	NA	98445-K33	98445 ²⁵	97110	NA	93065	93321 ²⁵	NA	NA	NA	92152	NA	94340
91767 ³ 91774	NA	98445-K33	98445 ²⁵	97110	NA	93065	93321 ²⁵	NA	NA	NA	92152	NA	94340
91767 ³ 91774	NA	98445-K33	98445 ²⁵	97110	NA	93065	93321 ²⁵	NA	NA	NA	92152	NA	94340
91767 ³ 91774	NA	98445-K33	98445 ²⁵	97110	NA	93065	93321 ²⁵	NA	NA	NA	92152	NA	94340
91767 ³ 91774	NA	98445-K33	98445 ²⁵	97110	NA	93065	93321 ²⁵	NA	NA	NA	92152	NA	94340
91767 ³ 91774	NA	98445-K33	98445 ²⁵	97110	NA	93065	93321 ²⁵	NA	NA	NA	92152	NA	94340
91767 ³ 91774	NA	--	--	--	--	--	--	NA	NA	--	92152	NA	94330

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

²⁵ Machining Required.



CHRYSLER BIG BLOCK B/RB • 383-440 1959-1980

Mechanical Flat Tappet Camshafts (3 Bolt)

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
720862-08	CL720862-08 CL720862-08DL ⁴	266 266	238 238	.558 .558	108	104	.018 .018	1,6,15,34
		2200-5600	Hot Street/Bracket. Needs 10.0+ CR, 3200+ stall & gears.					
721262-08	CL721262-08 CL721262-08DL ⁴	274 274	246 246	.576 .576	108	104	.018 .018	1,6,15,34
		2500-5800	Fair idle, super mid-range performance. Needs 11.0:1 CR-up.					
722402-10	CL722402-10 CL722402-10DL ⁴	281 287	246 252	.515 .530	110	106	.022 .022	1,6
		2500-6200	Good Street Machine cam. Best with 3000+ stall.					
722362-08	CL722362-08 CL722362-08DL ⁴	289 295	254 260	.550 .555	108	104	.022 .022	1,6
		3000-6500	Rough idle, Street/Strip. Should have 10.5:1+ CR & 3500+ stall.					
721602-08	CL721602-08 CL721602-08DL ⁴	288 288	260 260	.616 .616	108	104	.018 .018	1,6,15,34
		3400-7200	Rough idle, Hot Street/Strip, good mid range power. 10.5:1+ CR, 3500+ stall & headers.					
720152-08	CL720152-08 CL720152-08DL ⁴	288 292	260 264	.616 .620	108	104	.018 .018	1,6,15,34
		3400-7400	Good throttle response, nice mid range. Needs 10.5:1+ CR, 3500+ stall.					
722322-08	CL722322-08 CL722322-08DL ⁴	295 303	260 268	.555 .574	108	104	.022 .022	1,6
		3600-7600	Hot Street/Bracket. Needs 10.5:1+ CR, good heads & intake.					
722422-08	CL722422-08 CL722422-08DL ⁴	292 300	264 272	.620 .639	108	104	.018 .018	1,6,15,34
		4000-7600	Pro-Street/Bracket. Needs 11.0:1+ CR, 4000+ stall.					
720782-08	CL720782-08 CL720782-08DL ⁴	292 302	264 274	.620 .643	108	104	.018 .018	1,6,15,34
		4400-7800	Rough idle, Drag Race. Higher CR, stall speed & lower gears.					
722412-08	CL722412-08 CL722412-08DL ⁴	300 300	272 272	.639 .639	108	104	.018 .018	1,6,15,34
		4600-7800	Lopey idle, 440+ ci Bracket cam. 4200+ stall advised.					
720212-08	CL720212-08 CL720212-08DL ⁴	302 308	274 280	.643 .659	108	104	.018 .018	1,6,15,34
		4600-8200	Bracket Racer special. Super strong mid-range & top end.					
720162-08	CL720162-08 CL720162-08DL ⁴	308 312	280 284	.659 .667	108	104	.018 .018	1,6,15,34
		4800-8400	Serious Competition, Requires good heads, 12.0:1+ CR, good single plane intake.					
729992	NA	Custom Grind Camshaft Mechanical Flat Tappet Special Order Camshaft.						1,6

Cam Notes: master note list on page 260

¹ Stock (O.E.) valve springs cannot be used.⁶ Requires 3-bolt timing Set.¹⁵ Lobes designed to take maximum advantage of .904" dia. lifter.³⁴ Provisions for increased oiling recommended.

Some items are not legal for sale or use on any pollution controlled motor vehicle



	Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
	91715 ³ 91718 ⁴	NA	NA	98512	97110	NA	93065	93321 ²⁵	NA	NA	NA	92152	NA	94340
	91715 ³ 91718 ⁴	NA	NA	98512	97110	NA	93065	93321 ²⁵	NA	NA	NA	92152	NA	94340
	91715 ³ 91718 ⁴	NA	NA	98512	97110	NA	93065	93321 ²⁵	NA	NA	NA	92152	NA	94340
	91715 ³ 91718 ⁴	NA	NA	98512	97110	NA	93065	93321 ²⁵	NA	NA	NA	92152	NA	94340
	91715 ³ 91718 ⁴	NA	NA	98632	97128 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92152	NA	94340
	91715 ³ 91718 ⁴	NA	NA	98632	97128 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92152	NA	94340
	91715 ³ 91718 ⁴	NA	NA	98632	97128 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92152	NA	94340
	91715 ³ 91718 ⁴	NA	NA	98632	97128 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92152	NA	94340
	91715 ³ 91718 ⁴	NA	NA	98632	97128 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92152	NA	94340
	91715 ³ 91718 ⁴	NA	NA	98632	97128 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92152	NA	94340
	91715 ³ 91718 ⁴	NA	NA	98632	97128 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92152	NA	94340
	91715 ³ 91718 ⁴	NA	NA	98632	97128 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92152	NA	94340
	91715 ³ 91718 ⁴	NA	NA	98632	97128 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92152	NA	94340
	91715 ³ 91718 ⁴	NA	NA	98632	97128 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92152	NA	94340
	91715 ³ 91718 ⁴	NA	NA	98632	97128 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92152	NA	94340
	91715 ³ 91718 ⁴	NA	NA	98632	97128 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92152	NA	94340
	91715 ³ 91718 ⁴	NA	NA	98632	97128 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92152	NA	94340
	91715 ³ 91718 ⁴	NA	NA	98632	97128 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92152	NA	94340
	91715 ³ 91718 ⁴	NA	NA	98632	97128 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92152	NA	94340
	91715 ³ 91718 ⁴	NA	NA	98632	97128 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92152	NA	94340
	91715 ³ 91718 ⁴	NA	NA	98632	97128 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92152	NA	94340
	91715 ³ 91718 ⁴	NA	NA	98632	97128 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92152	NA	94340
	91715 ³ 91718 ⁴	NA	NA	98632	97128 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92152	NA	94340
	91715 ³ 91718 ⁴	NA	NA	98632	97128 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92152	NA	94340
	91715 ^{3</}													

3 Included in Cam & Lifter Sets.
10 10° Valve lock Angle, must use matching retainers/locks.
25 Machining Required.
35 10° Multi-Groove for OE style valves not available (93018 single-groove).



Steel Billet Mechanical Roller Camshafts (3 Bolt)

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
721203-10	NA	269 269 2400-6000	237 237	.555 .555	110	106	.022 .022	1,5,6 <i>Fair idle, Street/Strip, strong useable low end torque. 10.5:1, 3500+ stall suggested.</i>
721313-08	NA	277 277 2800-6200	245 245	.585 .585	108	104	.022 .022	1,5,6 <i>Hot Street/Strip, excellent mid range torque. Needs 3500+ stall, good exhaust, 800+ cfm.</i>
722113-08	NA	277 285 2800-6300	253 253	.600 .600	108	104	.022 .022	1,5,6 <i>Lopey idle, Hot Street/Strip, Serious mid range performance. 3200+ stall, 10.0:1 CR.</i>
721743-08	NA	285 291 3000-6400	259 259	.600 .585	108	104	.022 .022	1,5,6 <i>Rough idle, Hot Street/Bracket. Strong mid-range horsepower.</i>
722133-08	NA	289 299 3000-6700	267 267	.600 .600	108	104	.022 .022	1,5,6 <i>Good Bracket cam. Good mid range torque. Needs 3500+ stall & good intake.</i>
722323-08	NA	291 295 3200-6800	263 263	.640 .640	108	104	.022 .022	1,5,6 <i>Rough idle, Pro Street/Bracket, strong mid range. 11.0:1+ CR, 3500+ stall & good intake.</i>
721883-08	NA	295 301 3600-7000	269 269	.675 .650	108	104	.022 .022	1,5,6 <i>Rough idle, Bracket/Super Street, light to mid weight car. 4500+ stall, 11.5:1 CR.</i>
722103-08	NA	295 307 3600-7200	275 275	.640 .630	108	104	.022 .022	1,5,6 <i>Strong mid & upper end torque & horsepower. Needs 12.5:1 CR-up.</i>
721293-08	NA	303 307 3800-7400	275 275	.625 .630	108	104	.022 .022	1,5,6 <i>Good mid to upper end power. Needs 12.0:1+ CR, 4500+ stall.</i>
722773-06	NA	307 307 4000-7600	275 275	.630 .630	106	102	.022 .022	1,5,6 <i>440 CID. Bracket special. Strong mid-range. 12.0:1+ CR, 4500+ stall.</i>
722773-08	NA	307 307 4000-7600	275 275	.630 .630	108	104	.022 .022	1,5,6 <i>Super Gas/Super Street in 383ci. Strong mid-range. 12.5:1+ CR, 4500+ stall.</i>
720253-08	NA	313 315 4200-7800	283 283	.675 .645	108	104	.022 .022	1,5,6 <i>Super Gas/Super Comp. Needs 4500+ stall, 12.5:1+ CR., good intake.</i>
722793-06	NA	315 315 4600-8200	283 283	.645 .645	106	102	.022 .022	1,5,6 <i>11:1+ upper mid-range & top end power. 440+CID.</i>
722783-08	NA	315 315 4600-8000	283 283	.675 .675	108	104	.022 .022	1,5,6 <i>11:1+ upper mid-range & top end power. 440+CID.</i>
729993	NA	Custom Grind Camshaft Mechanical Roller Special Order Camshaft.						1,5,6

Cam Notes: master note list on page 260

- 1 Stock (O.E.) valve springs cannot be used.
- 5 Requires upgraded distributor gear/fuel pump pushrod.
- 6 Requires 3-bolt timing Set.

Some items are not legal for sale or use on any pollution controlled motor vehicle

Mechanical Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91751 91727 ³²	NA	NA	98630 ²⁵	97128 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92153	94420	94340
91751 91727 ³²	NA	NA	98630 ²⁵	97128 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92153	94420	94340
91751 91727 ³²	NA	NA	98630 ²⁵	97128 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92153	94420	94340
91751 91727 ³²	NA	NA	98630 ²⁵	97128 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92153	94420	94340
91727 91735	NA	NA	98543 ²⁵	97130 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92153	94420	94340
91727 91735	NA	NA	98543 ²⁵	97130 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92153	94420	94340
91735 91798	NA	NA	98543 ²⁵	97130 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92153	94420	94340
91735 91798	NA	NA	98543 ²⁵	97130 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92153	94420	94340
91735 91798	NA	NA	98543 ²⁵	97130 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92153	94420	94340
91735 91798	NA	NA	98543 ²⁵	97130 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92153	94420	94340
91735 91798	NA	NA	98543 ²⁵	97130 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92153	94420	94340
91735 91798	NA	NA	98543 ²⁵	97130 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92153	94420	94340
91735 91798	NA	NA	98543 ²⁵	97130 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92153	94420	94340
91735 91798	NA	NA	98543 ²⁵	97130 ¹⁰	97220 ¹⁰	NA ³⁵	93321 ²⁵	NA	NA	NA	92153	94420	94340
--	NA	--	--	--	--	--	--	NA	NA	--	92153	94420	94330

Components Notes: master note list on page 260

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

³² These lifters are not recommended for street use.

³⁵ 10° Multi-Groove for OE style valves not available (93018 single-groove).

CAMSHAFTS



CHRYSLER HEMI • 5.7L-6.1L 2003-2010 (WITHOUT VARIABLE CAM TIMING)

Hydraulic Roller Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.70 Rockers		Lobe Separation	Intake	Valve Lash	Cam Notes	
		IN	EX	IN	EX	IN	EX	Angle	Centerline	IN	EX	
786845-14	NA	264	268	211	215	.520	.520	114	110	Hyd.	Hyd.	1
1000-5000 Street Performance, Designed for 5.7L with MDS. Nice low to mid range performance.												
786155-14	NA	266	272	213	219	.575	.575	114	110	Hyd.	Hyd.	1
1200-5200 Street Performance, Best in 6.1L. Great all-around torque & horsepower.												
786875-12	NA	269	277	219	227	.600	.575	112	108	Hyd.	Hyd.	1,12
1600-5600 Hot Street, Best in 6.1L with modified heads. Very nice low to mid range.												
786045-14	NA	277	283	227	233	.600	.600	114	110	Hyd.	Hyd.	1,12,21
2200-6200 Hot Street, Strong mid range. Needs better exhaust. Best with modified heads.												
786965-13	NA	281	287	231	237	.626	.600	113	109	Hyd.	Hyd.	1,12,21
2400-6400 Hot Street, A favorite in 426 stroker combinations. Awesome power band.												
789995	NA	Custom Grind Camshaft										1,12
Hydraulic Roller Tappet Special Order Camshaft.												



CHRYSLER HEMI • 331-354 1951-1956

Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
769991	NA	Custom Grind Camshaft						1
Hydraulic Flat Tappet Special Order Camshaft.								



CHRYSLER HEMI • 331-354 1951-1956

Mechanical Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes	
769992	NA	Custom Grind Camshaft							1
Mechanical Flat Tappet Special Order Camshaft.									

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

12 Requires custom programmer/tuning.

21 Requires custom programmer/tuning.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHRYSLER HEMI • 5.7L-6.1L 2003-2010 (WITHOUT VARIABLE CAM TIMING)

Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
NA	NA	NA	98110	NA	NA	NA	NA	NA	NA	95081	NA	NA	94332
NA	NA	NA	98110	NA	NA	NA	NA	NA	NA	95081	NA	NA	94332
NA	NA	NA	98110	NA	NA	NA	NA	NA	NA	95081	NA	NA	94332
NA	NA	NA	98110	NA	NA	NA	NA	NA	NA	95081	NA	NA	94332
NA	NA	NA	98110	NA	NA	NA	NA	NA	NA	95081	NA	NA	94332
NA	NA	--	--	--	--	--	--	NA	NA	--	NA	NA	94332

CHRYSLER HEMI • 331-354 1951-1956

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91731	NA	--	--	--	--	--	--	NA	NA	--	NA	NA	94330

CHRYSLER HEMI • 331-354 1951-1956

Mechanical Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91725-16	NA	--	--	--	--	--	--	NA	NA	--	NA	NA	94330

Components Notes: master note list on page 260

CAMSHAFTS



CHRYSLER HEMI • 392 1957-1958

Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.50 Rockers		Lobe Separation	Intake	Valve Lash	Cam Notes	
		IN	EX	IN	EX	IN	EX	Angle	Centerline	IN	EX	
737511-10	CL737511-10	252	255	206	208	.475	.479	110	106	Hyd.	Hyd.	1,15
800-4800 Good idle, Strong low end torque & power.												
731231-08	CL731231-08	257	257	210	210	.483	.483	108	104	Hyd.	Hyd.	1,15
1000-5000 Good idle, Super low & mid-range performance.												
731141-10	CL731141-10	267	267	220	220	.506	.506	110	106	Hyd.	Hyd.	1,15
1600-5400 Fair idle, Strong mid-range power. Needs headers.												
730991-10	CL730991-10	275	275	221	221	.470	.470	110	106	Hyd.	Hyd.	1,15
1800-5600 Fair idle, Strong mid-range power. Needs headers.												
730831-10	CL730831-10	289	289	242	242	.562	.562	110	106	Hyd.	Hyd.	1,15
2600-6000 Rough idle, Street/Strip. Nice mid range power. 10.5:1 CR, headers, good intake.												
739991	NA	Custom Grind Camshaft								Hyd.	Hyd.	1
Hydraulic Flat Tappet Special Order Camshaft.												



CHRYSLER HEMI • 392 1957-1958

Hydraulic Roller Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
739995	NA	Custom Grind Camshaft					Hyd. Hyd.	1
Hydraulic Roller Tappet Special Order Camshaft.								



CHRYSLER HEMI • 392 1957-1958

Mechanical Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
739992	NA	Custom Grind Camshaft					Hyd. Hyd.	1
Mechanical Flat Tappet Special Order Camshaft.								

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

15 Lobes designed to take maximum advantage of .904" dia. lifter.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHRYSLER HEMI • 392 1957-1958

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91731 ³	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	94330
91731 ³	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	94330
91731 ³	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	94330
91731 ³	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	94330
91731 ³	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	94330
91731	NA	--	--	--	--	--	--	NA	NA	--	NA	NA	94330

CHRYSLER HEMI • 392 1957-1958

Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91767 91774	NA	--	--	--	--	--	--	NA	NA	--	NA	NA	94330

CHRYSLER HEMI • 392 1957-1958

Mechanical Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91725-16	NA	--	--	--	--	--	--	NA	NA	--	NA	NA	94330

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

CAMSHAFTS



CHRYSLER HEMI • 392 1957-1958

Steel Billet Mechanical Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
739993	NA	Custom Grind Camshaft					Hyd. Hyd.	1
Mechanical Roller Special Order Camshaft.								



CHRYSLER HEMI • 426 1966-1971

Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.57/1.52 Rockers		Lobe Separation	Intake	Valve	Lash	Cam Notes	
		IN	EX	IN	EX	IN	EX	Angle	Centerline	IN	EX		
748291-10	CL748291-10	277	277	230	230	.556	.538	110	106	Hyd.	Hyd.	1,15	
		2200-5800 Fair idle, Street machines with headers, gears & 2500+ stall.											
740001-10	CL740001-10	285	285	231	231	.502	.486	110	106	Hyd.	Hyd.	1	
		2000-5200 Fair idle, Lower lift version of 740001-10, best with headers, gears & 2500+ stall.											
740841-08	CL740841-08	291	291	237	237	.529	.512	108	104	Hyd.	Hyd.	1	
		2400-5800 Lopey idle. Pro-Street & Bracket Racing profile.											
743471-08	CL743471-08	285	285	238	238	.580	.562	108	104	Hyd.	Hyd.	1,15	
		2500-5800 Lopey idle. Pro-Street & Bracket Racing profile.											
749641-08	CL749641-08	295	295	248	248	.604	.585	108	104	Hyd.	Hyd.	1,15	
		3000-6400 Hot Street/Brackets. Needs 10.0:1+ CR, good heads & exhaust. 3500+ stall.											
742401-08	CL742401-08	303	303	249	249	.534	.517	108	104	Hyd.	Hyd.	1	
		3000-6200 Hot Street/Brackets. Needs 10.0:1+ CR, good heads & exhaust. 3500+ stall.											
749991	NA	Custom Grind Camshaft									Hyd.	Hyd.	1
		Hydraulic Flat Tappet Special Order Camshaft.											



CHRYSLER HEMI • 426 1966-1971

Steel Billet Mechanical Roller Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.57/1.52 Rockers		Lobe Separation	Intake	Valve	Lash	Cam Notes	
		IN	EX	IN	EX	IN	EX	Angle	Centerline	IN	EX		
740223-10	NA	303	303	271	271	.654	.633	110	106	.022	.022	1,5	
		4200-7800 Strong Bracket in full body car. Best with single 4bbl., 12.0:1+ CR, 4000+ stall.											
740743-08	NA	313	313	281	281	.764	.740	108	104	.022	.022	1,5	
		4800-8200 Rough idle, Bracket & Quick 16, Altered/Dragster. Needs good heads, 12.5:1 CR.											
729319-16	NA	327	327	295	295	.749	.725	116	112	.022	.022	1,5	
		6000-9600 Blown Alcohol or Pro Mod 500+ ci., with high boost. 2.125" 48° bank angle.											
749993	NA	Custom Grind Camshaft											1,5
		Mechanical Roller Special Order Camshaft.											
729999	NA	Custom Grind Camshaft, Aftermarket Block											1,5
		2.125" Journal 9310 Mechanical Roller Special Order Camshaft.											

Cam Notes: master note list on page 260

- 1 Stock (O.E.) valve springs cannot be used.
- 5 Requires upgraded distributor gear/fuel pump pushrod.
- 15 Lobes designed to take maximum advantage of .904" dia. lifter.

Some items are not legal for sale or use on any pollution controlled motor vehicle

CHRYSLER HEMI • 392 1957-1958

Steel Billet Mechanical Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
--	NA	--	--	--	--	--	--	NA	NA	--	NA	NA	94330

CHRYSLER HEMI • 426 1966-1971

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91711 ³ 91712	NA	NA	98445	97128 ¹⁰	97216 ¹⁰	93070 ¹⁰	NA	NA	NA	NA	92152	NA	94340
91711 ³ 91712	NA	NA	98445	97128 ¹⁰	97216 ¹⁰	93070 ¹⁰	NA	NA	NA	NA	92152	NA	94340
91711 ³ 91712	NA	NA	98445	97128 ¹⁰	97216 ¹⁰	93070 ¹⁰	NA	NA	NA	NA	92152	NA	94340
91711 ³ 91712	NA	NA	98445	97128 ¹⁰	97216 ¹⁰	93070 ¹⁰	NA	NA	NA	NA	92152	NA	94340
91711 ³ 91712	NA	NA	98445	97128 ¹⁰	97216 ¹⁰	93070 ¹⁰	NA	NA	NA	NA	92152	NA	94340
91711 ³ 91712	NA	NA	98445	97128 ¹⁰	97216 ¹⁰	93070 ¹⁰	NA	NA	NA	NA	92152	NA	94340
91711 ³ 91712	NA	--	--	--	--	--	NA	NA	NA	NA	92152	NA	94340

CHRYSLER HEMI • 426 1966-1971

Steel Billet Mechanical Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91735 91798	NA	NA	98738-A ²⁵	NA	97222	93075	NA	NA	NA	NA	92153	94420	94340
91798	NA	NA	98048 ²⁵ 98049 ²⁵	NA	97224	93075	NA	NA	NA	NA	92153	94420	94340
91744	NA	NA	98048 ²⁵ 98049 ²⁵	NA	97224	93075	NA	NA	NA	NA	92153	94420	94340
--	NA	--	--	--	--	--	NA	NA	NA	NA	92152	NA	94340
--	NA	--	--	--	--	--	NA	NA	NA	NA	92152	NA	94340

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

CAMSHAFTS



FORD STRAIGHT 6 • 140-250 1963-1983 (7.808" DECK)

Street Force™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•5•3•6•2•4

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.50 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash IN	Valve Lash EX	Cam Notes
280108-12	CL280108-12	259	269	205	215	.420	.445	112	108	Hyd.	Hyd.	
		600-4500 Street Force™ 1, Good idle, Mild Street performance, strong low end torque.										



FORD STRAIGHT 6 • 140-250 1963-1983 (7.808" DECK)

Hydraulic Flat Tappet Camshafts

Firing Order: 1•5•3•6•2•4

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.50 Rockers		Lobe Separation Angle	Intake Centerline	Valve IN	Lash EX	Cam Notes	
280028-08	CL280028-08	263	263	209	209	.420	.420	108	104	Hyd.	Hyd.		
1200-4800 Good idle, Street, Off-Road, Towing. Good torque.													
280938-10	CL280938-10	267	267	213	213	.450	.450	110	106	Hyd.	Hyd.	1	
1600-5000 Strong low & mid-range torque & horsepower.													
280998-10	CL280998-10	275	275	221	221	.470	.470	110	106	Hyd.	Hyd.	1	
2000-5600 Nice idle, good low & mid range horsepower. Needs good exhaust.													
289998	NA	Custom Grind Camshaft									Hyd.	Hyd.	1
Hydraulic Flat Tappet Special Order Camshaft.													



FORD STRAIGHT 6 • 240-300 1964-1996 (10.0" DECK)

Street Force™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•5•3•6•2•4

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.60 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash IN	Valve Lash EX	Cam Notes
280106-12	CL280106-12	259	269	205	215	.448	.475	112	108	Hyd.	Hyd.	1
		600-4500 Street Force™ 1, Good idle, Mild Street performance, strong low end torque.										

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

Some items are not legal for sale or use on any pollution controlled motor vehicle

FORD STRAIGHT 6 • 140-250 1963-1983 (7.808" DECK)

Street Force™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91251-12 ³	NA	NA	98341-12	97118-12	NA	93040	93316 ²⁵	NA	NA	NA	NA	NA	NA

FORD STRAIGHT 6 • 140-250 1963-1983 (7.808" DECK)

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91251-12 ³	NA	NA	98341-12	97118-12	NA	93040	93316 ²⁵	NA	NA	NA	NA	NA	NA
91251-12 ³	NA	NA	98341-12	97118-12	NA	93040	93316 ²⁵	NA	NA	NA	NA	NA	NA
91251-12 ³	NA	NA	98341-12	97118-12	NA	93040	93316 ²⁵	NA	NA	NA	NA	NA	NA
91251-12	NA	--	--	--	--	--	--	NA	NA	--	NA	NA	NA

FORD STRAIGHT 6 • 240-300 1964-1996 (10.0" DECK)

Street Force™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91211-12 ³ 91212-12	NA	NA	98411-12	97118-12	NA	93040	93316 ²⁵	NA	NA	NA	NA	NA	NA

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

²⁵ Machining Required.

CAMSHAFTS



FORD STRAIGHT 6 • 240-300 1964-1996 (10.0" DECK)

Hydraulic Flat Tappet Camshafts

Firing Order: 1•5•3•6•2•4

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.60 Rockers		Lobe Separation	Intake	Valve Lash	Cam Notes	
		IN	EX	IN	EX	IN	EX	Angle	Centerline	IN	EX	
280026-08	CL280026-08	263	263	209	209	.448	.448	108	104	Hyd.	Hyd.	
1200-4800 Good idle, Street, Off-Road, Towing. Good torque.												
280936-10	CL280936-10	267	267	213	213	.480	.480	110	106	Hyd.	Hyd.	1
1600-5000 Strong low & mid-range torque & horsepower.												
280996-10	CL280996-10	275	275	221	221	.501	.501	110	106	Hyd.	Hyd.	1
2000-5800 Nice idle, good low & mid range horsepower. Needs good exhaust.												
289996	NA	Custom Grind Camshaft								Hyd.	Hyd.	1
Hydraulic Flat Tappet Special Order Camshaft.												



FORD MODULAR V8 • 4.6L-5.4L SOHC 2-VALVE 1991-2005 WITH PERF. IMPROVEMENT HEADS

Hydraulic Roller Camshafts

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN	EX	Duration @ .050" IN	EX	Valve Lift w/1.825 Rockers IN	EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN	EX	Cam Notes
276063-16	NA	260	265	220	224	.548	.548	116	112	Hyd.	Hyd.	1,8,12
800-4800 Everyday Street, good all around performance with increase in power.												
276823-14	NA	265	268	224	228	.548	.548	114	110	Hyd.	Hyd.	1,8,12
1200-5200 Street performance, Increase in low to mid range torque and more power.												
276363-16	NA	273	280	232	240	.548	.548	116	112	Hyd.	Hyd.	1,8,12
1500-5500 Street/Strip with supercharger. Need good parts all around. 2500+ Stall.												
276393-14	NA	275	275	234	234	.548	.548	114	110	Hyd.	Hyd.	1,8,12
1600-5600 High Performance Street, good low to mid range torque. Needs 1800+ stall & gears.												
276623-14	NA	275	278	234	236	.593	.593	114	110	Hyd.	Hyd.	1,8,12
1800-6600 Nice idle, Hot Street, nice increase in mid range performance. Needs 2000+ stall & gears.												
276263-13	NA	277	280	236	240	.548	.548	113	109	Hyd.	Hyd.	1,8,12
2000-6200 Fair idle, Street/Strip, Nice mid range. 2200+ stall, better intake & exhaust.												
276203-14	NA	278	283	238	242	.593	.593	114	110	Hyd.	Hyd.	1,8,12
2000-6600 Fair idle, Street/Strip, Good mid range. 2200+ stall, better intake & exhaust.												
276883-14	NA	283	288	242	246	.593	.593	114	110	Hyd.	Hyd.	1,8,12
2200-6800 Rough idle Hot Street/Strip, Needs better intake, exhaust, 2500+ stall & gears.												
276733-14	NA	288	288	246	246	.593	.593	114	110	Hyd.	Hyd.	1,8,12
2400-7000 Rough idle Pro Street/Brackets, Needs better intake, exhaust, 2800+ stall & gears.												
279993	NA	Custom Grind Camshaft								Hyd.	Hyd.	1,8,12
Hydraulic Roller Special Order Camshaft.												

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

8 Includes 2 camshafts.

12 Requires custom programmer/tuning.

Some items are not legal for sale or use on any pollution controlled motor vehicle

FORD STRAIGHT 6 • 240-300 1964-1996 (10.0" DECK)

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91211-12 ³ 91212-12	NA	NA	98411-12	97118-12	NA	93040	93316 ²⁵	NA	NA	NA	NA	NA	NA
91211-12 ³ 91212-12	NA	NA	98411-12	97118-12	NA	93040	93316 ²⁵	NA	NA	NA	NA	NA	NA
91211-12 ³ 91212-12	NA	NA	98411-12	97118-12	NA	93040	93316 ²⁵	NA	NA	NA	NA	NA	NA
91211-12 91212-12	NA	--	--	--	--	--	--	NA	NA	--	NA	NA	NA

FORD MODULAR V8 • 4.6L-5.4L SOHC 2-VALVE 1991-2005 WITH PERF. IMPROVEMENT HEADS

Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

²⁵ Machining Required.

CAMSHAFTS



FORD MODULAR V8 • 4.6L DOHC 4-VALVE 1993-PRESENT

Hydraulic Roller Camshafts

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.825 Rockers		Lobe Separation	Intake	Valve Lash	Cam Notes		
		IN	EX	IN	EX	IN	EX	Angle	Centerline	IN	EX		
276244-14	NA	247	254	210	216	.450	.450	114	112	Hyd.	Hyd.	1,9,12	
800-6400 Smooth idle, High low end torque. Can use stock converter.													
276584-14	NA	259	259	222	222	.450	.450	114	112	Hyd.	Hyd.	1,9,12	
1200-6600 Mild idle, Street Performance, Excellent low to mid range torque.													
276414-14	NA	265	265	228	228	.475	.475	114	112	Hyd.	Hyd.	1,9,12	
1500-6800 Lopey idle, Hot Street, Strong mid range with top end increase. 2000+ stall & gears.													
276074-14	NA	265	270	236	234	.475	.475	114	112	Hyd.	Hyd.	1,9,12	
1800-7000 Rough idle, Street/Strip. Needs 2400+ stall, larger throttle body & better exhaust.													
276814-14	NA	274	281	236	242	.475	.475	114	112	Hyd.	Hyd.	1,9,12	
2000-7000 Pro Street/Strip with supercharger. Need good parts all around. 2500+ Stall.													
279994	NA	Custom Grind Camshaft									Hyd.	Hyd.	1,9,12
Hydraulic Roller Special Order Camshaft.													



FORD MODULAR V8 • 4.6L-5.4L SOHC 3-VALVE 1995-PRESENT

Hydraulic Roller Camshafts

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.825 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes					
276745-14	NA	269 2200-5400	282 Street Performance.	216 Good power gains over stock.	228 Good mid range torque.	.450 Good mid range torque.	.450	114	100	Hyd.	Hyd.	8,12	
276095-14	NA	269 2200-5600	285 Hot Street, Great mid range torque.	216 Supercharger/NOS OK.	232	.475 Supercharger/NOS OK.	.475	114	100	Hyd.	Hyd.	1,8,12	
276935-14	NA	273 2400-5800	289 High Performance Street, good power gains above 4500 rpm.	220 Best with 2500+ stall.	236	.450 Best with 2500+ stall.	.450	114	100	Hyd.	Hyd.	8,12	
276175-14	NA	273 2400-5800	289 High Performance Street, good power gains above 4500 rpm.	220 Best with 2500+ stall.	236	.475 Best with 2500+ stall.	.475	114	100	Hyd.	Hyd.	1,8,12	
276855-14	NA	275 2500-6000	289 Mild idle, Hot Street, good all around performance with power gains over 4800 rpm.	222	236	.490 Mild idle, Hot Street, good all around performance with power gains over 4800 rpm.	.490	114	100	Hyd.	Hyd.	1,8,12	
276475-15	NA	275 2500-6200	301 Street/Strip, good mid to top end power.	222 2500+ stall recommended.	248	.475 2500+ stall recommended.	.475	115	101	Hyd.	Hyd.	1,8,12	
279995	NA	Custom Grind Camshaft Hydraulic Roller Special Order Camshaft.									Hyd.	Hyd.	1,8,12

Cam Notes: master note list on page 260

- 1 Stock (O.E.) valve springs cannot be used.
- 8 Includes 2 camshafts.
- 9 Includes 4 camshafts.
- 12 Requires custom programmer/tuning.

Some items are not legal for sale or use on any pollution controlled motor vehicle

FORD MODULAR V8 • 4.6L DOHC 4-VALVE 1993-PRESENT

Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
NA	NA	NA	98105	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	98105	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	98105	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	98105	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	98105	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

FORD MODULAR V8 • 4.6L-5.4L SOHC 3-VALVE 1995-PRESENT

Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Components Notes: master note list on page 260

CAMSHAFTS



FORD SMALL BLOCK • 221-302 1963-1995 (EXCEPT 302 H.O.)

Max Certified™ Hydraulic Flat Tappet Cam & Lifter Sets - 5 Year No Fault Warranty (see page 3 for details)

Cam & Lifter Set Part No.	Cam & Direct Lube Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
MC210021-12	MC210021-12DL ⁴	259 267 1000-4500	205 215	.448 .480	112	108	Hyd. Hyd.	1
Great low & mid-range. Smooth idle. Good in PUs & RVs.								
MC210031-12	MC210031-12DL ⁴	267 277 1500-5400	213 223	.475 .496	112	108	Hyd. Hyd.	1
Broad power band. Excellent in Hot Street & Marine.								
MC210931-10	MC210931-10DL ⁴	269 269 1500-5200	215 215	.475 .475	110	106	Hyd. Hyd.	1
Strong low & mid-range, fuel efficiency & driveability.								
MC210951-10	MC210951-10DL ⁴	275 285 2000-6000	221 231	.501 .501	110	106	Hyd. Hyd.	1
Street & Strip. Needs 4 barrel, headers & low gears.								
MC210041-12	MC210041-12DL ⁴	279 285 2500-6200	225 231	.496 .512	112	108	Hyd. Hyd.	1
Strong mid-range. Great E.T. Bracket cam. OK w/NOS.								
MC210961-08	MC210961-08DL ⁴	285 285 2600-6300	231 231	.501 .501	108	104	Hyd. Hyd.	1
Broad power range, extra performance in smaller engine.								



FORD SMALL BLOCK • 221-302 1963-1995 (EXCEPT 302 H.O.)



American Muscle™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•5•4•2•6•3•7•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
217751-08	CL217751-08	252 252 800-4200	187 187	.381 .381	108	103	Hyd. Hyd.	
Near duplicate of the Ford 210HP/289 cam (FMC #C3OZ-6250-B).								
217311-09	CL217311-09	270 298 800-4300	184 189	.368 .381	109	104	Hyd. Hyd.	
Near duplicate of the Ford 230HP/302 cam (FMC #C3AZ-6250-V).								
217081-13	CL217081-13	288 288 1600-5200	218 218	.461 .461	113	107	Hyd. Hyd.	1
Near duplicate of the Ford Cobra Kit cam (FMC #C9OZ-6250-C).								



FORD SMALL BLOCK • 221-302 1963-1995 (EXCEPT 302 H.O.)



Street Force™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•5•4•2•6•3•7•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
210021-12	CL210021-12	259 267 1000-4500	205 215	.448 .480	112	108	Hyd. Hyd.	1
Street Force™ 1, Good idle, Mild Street performance, strong low end torque.								
210031-12	CL210031-12	269 277 1500-5400	215 223	.475 .496	112	108	Hyd. Hyd.	1
Street Force™ 2, Good idle & throttle response. Needs 4 barrel & good exhaust.								

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

4 Direct Lube Lifters Included in Cam & "Direct Lube" Lifter (DL) Sets.

Some items are not legal for sale or use on any pollution controlled motor vehicle

FORD SMALL BLOCK • 221-302 1963-1995 (EXCEPT 302 H.O.)

Max Certified™ Hydraulic Flat Tappet Cam & Lifter Set Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91211 ³ 91216 ⁴	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91216 ⁴	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91216 ⁴	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91216 ⁴	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91216 ⁴	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91216 ⁴	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹

FORD SMALL BLOCK • 221-302 1963-1995 (EXCEPT 302 H.O.)

American Muscle™ Hydraulic Flat Tappet Cam & Lifter Set Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91211 ³ 91216	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91216	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91216	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹

FORD SMALL BLOCK • 221-302 1963-1995 (EXCEPT 302 H.O.)

Street Force™ Hydraulic Flat Tappet Cam & Lifter Set Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91211 ³ 91216	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91216	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

⁴ Direct Lube Lifters Included in Cam & "Direct Lube" Lifter (DL) Sets.

⁷ Requires 7/16" rocker studs.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

¹⁹ Fits factory 1-pc eccentric. For 2-pc eccentric use 94212 or 94312.

²⁵ Machining Required.

CAMSHAFTS



FORD SMALL BLOCK • 221-302 1963-1995 (EXCEPT 302 H.O.)

Rattler Cams™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•5•4•2•6•3•7•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
218021-09	CL218021-09	281 289 1800-5600	227 235	.501 .501	109	103	Hyd. Hyd.	1
Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.								
218061-09	CL218061-09	289 297 2000-5900	235 243	.501 .480	109	103	Hyd. Hyd.	1
Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.								
218101-09	CL218101-09	297 305 2400-6400	243 251	.512 .528	109	103	Hyd. Hyd.	1
Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.								



FORD SMALL BLOCK • 221-302 1963-1995 (EXCEPT 302 H.O.)

Hydraulic Flat Tappet Camshafts

Firing Order: 1•5•4•2•6•3•7•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
212001-14	CL212001-14	255 261 600-4800	201 207	.437 .448	114	110	Hyd. Hyd.	
Smooth idle, strong low end. High vacuum, good fuel economy.								
212161-11	CL212161-11	263 263 800-4400	209 209	.448 .448	111	107	Hyd. Hyd.	
Smooth idle, strong low end. High vacuum, good fuel economy.								
211031-11	CL211031-11	267 267 1200-4700	213 213	.459 .459	111	107	Hyd. Hyd.	1
Good idle, Street, Off-Road, Towing. Good fuel efficiency.								
210931-10	CL210931-10	269 269 1500-5200	215 215	.475 .475	110	106	Hyd. Hyd.	1
Strong low & mid-range, fuel efficiency & driveability.								
210991-08	CL210991-08	267 267 1700-5700	220 220	.543 .543	108	104	Hyd. Hyd.	1,16
Good low & mid-range horsepower. Needs 4 barrel & headers.								
212021-08	CL212021-08	267 277 1600-5800	220 230	.543 .563	108	104	Hyd. Hyd.	1,16
High lift, dual pattern. Need 4 barrel, low gears & 2500+ stall.								
210951-10	CL210951-10	275 285 2000-6000	221 231	.501 .501	110	106	Hyd. Hyd.	1
Street & Strip. Needs 4 barrel, headers & low gears.								
212431-06	CL212431-06	272 272 2500-6400	224 224	.551 .551	106	102	Hyd. Hyd.	1,16
Lopey idle, good low end & mid-range horsepower & torque.								
212431-08	CL212431-08	272 272 2400-6600	224 224	.551 .551	108	104	Hyd. Hyd.	1,16
Hot Street cam. 4 barrel & headers recommended.								
212431-12	CL212431-12	272 272 2400-6600	224 224	.551 .551	112	108	Hyd. Hyd.	1,16
Good idle, good mid range torque & horsepower. Needs 2400+ stall.								
210941-10	CL210941-10	279 279 2400-5700	225 225	.496 .496	110	106	Hyd. Hyd.	1
Needs good intake, 4bbl. & headers. Best with 9.5+ CR.								
210041-08	CL210041-08	279 285 2000-6400	225 231	.496 .512	108	104	Hyd. Hyd.	1
Hot Street performance in 385-418. 9.5:1, 2400 stall suggested.								
210041-12	CL210041-12	279 285 2500-6200	225 231	.496 .512	112	107	Hyd. Hyd.	1
Strong mid-range. Great E.T. Bracket cam. OK w/NOS.								
212141-08	CL212141-08	277 282 2600-6500	230 234	.563 .572	108	104	Hyd. Hyd.	1,16
Lopey idle, broad power band, strong top end power.								
212141-10	CL212141-10	277 282 2600-6600	230 234	.563 .572	110	106	Hyd. Hyd.	1,16
Lopey idle, Strong mid range. Good throttle response. 2400+ stall.								

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

16 Lobes designed to take maximum advantage of .875" dia. lifter.

Some items are not legal for sale or use on any pollution controlled motor vehicle

FORD SMALL BLOCK • 221-302 1963-1995 (EXCEPT 302 H.O.)

Rattler Cams™ Hydraulic Flat Tappet Cam & Lifter Set Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91211 ³ 91212	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91212	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91212	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹

FORD SMALL BLOCK • 221-302 1963-1995 (EXCEPT 302 H.O.)

Hydraulic Flat Tappet Cam & Lifter Set Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91211 ³ 91212	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91212	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91212	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91212	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91212	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91212	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91212	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

⁷ Requires 7/16" rocker studs.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

¹⁹ Fits factory 1-pc eccentric. For 2-pc eccentric use 94212 or 94312.

²⁵ Machining Required.



FORD SMALL BLOCK • 221-302 1963-1995 (EXCEPT 302 H.O.)

Hydraulic Flat Tappet Camshafts (cont.)

Firing Order: 1•5•4•2•6•3•7•8

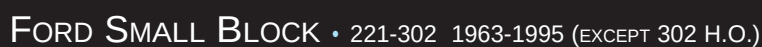
Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
212591-08	CL212591-08	277 287 2800-6200	230 240	.563 .592	108	104	Hyd. Hyd.	1,16
		Lopey idle, Hot Street/Brackets. 2500+ stall, 9.0:1+ CR.						
212591-12	CL212591-12	277 287 2800-6400	230 240	.563 .592	112	108	Hyd. Hyd.	1,16
		Hot Street & mild Bracket Racing.						
210961-08	CL210961-08	285 285 2600-6300	231 231	.501 .501	108	104	Hyd. Hyd.	1
		Broad power range, extra performance in smaller engine.						
210051-08	CL210051-08	285 285 3000-6500	231 231	.512 .512	108	104	Hyd. Hyd.	1
		Fair idle, Broad power band. Works well in heavy vehicles.						
210051-10	CL210051-10	285 285 3000-6600	231 231	.512 .512	110	106	Hyd. Hyd.	1
		Strong power range from 3,500 up. Needs 4bbl., header & stall.						
211701-08	CL211701-08	282 291 3000-6800	234 244	.572 .596	108	104	Hyd. Hyd.	1,16
		Rough idle, Hot Street/Strip, Big mid range torque and acceleration.						
211701-12	CL211701-12	282 291 3000-6000	234 244	.572 .596	112	108	Hyd. Hyd.	1,16
		Lopey idle, Street/Strip or nostalgia. Likes headers & gears.						
212601-06	CL212601-06	282 287 3000-6400	234 240	.572 .592	106	102	Hyd. Hyd.	1,16
		Bracket or 1/4 to 3/8 mile 4bbl. Oval Track. Proven winner.						
212601-08	CL212601-08	282 287 3000-6400	234 240	.572 .592	108	104	Hyd. Hyd.	1,16
		Lopey idle, good mid-range power. Needs 3200+ stall.						
210971-08	CL210971-08	283 283 3000-6600	236 236	.583 .583	108	104	Hyd. Hyd.	1,16
		Lopey idle, Pro-Street & Bracket Racing profile.						
210891-08	CL210891-08	287 293 3000-6600	240 246	.592 .601	108	104	Hyd. Hyd.	1,16
		Rough idle, Hot Street/Bracket, great mid range & top end power. 3500+ stall.						
210891-10	CL210891-10	287 293 3000-6600	240 246	.592 .601	110	106	Hyd. Hyd.	1,16
		Rough idle, Street/Strip, good mid range performance. 3200+ stall, good intake.						
210891-12	CL210891-12	287 293 2800-6400	240 246	.592 .601	112	108	Hyd. Hyd.	1,16
		Fair idle, Hot Street/Bracket, broad mid range performance. 3000+ stall.						
210061-08	CL210061-08	291 301 3000-6600	244 254	.596 .625	108	104	Hyd. Hyd.	1,16
		Pro Street/Brackets, Strong mid & upper end power. 10.0:1+ CR.						
210061-12	CL210061-12	291 301 3000-6600	244 254	.596 .625	112	107	Hyd. Hyd.	1,16
		Performance/Competition. Works well with small blower or NOS.						
212041-08	CL212041-08	293 293 3200-6800	246 246	.601 .601	108	104	Hyd. Hyd.	1,16
		Hot Street/Brackets. Needs 10.0:1+ CR, good heads & exhaust. 3500+ stall.						
212401-10	CL212401-10	295 295 3200-6800	248 248	.605 .605	110	106	Hyd. Hyd.	1,16
		E.T. Brackets. Strong mid & upper end power range.						
211541-08	CL211541-08	295 301 3400-7000	248 254	.605 .625	108	104	Hyd. Hyd.	1,16
		Rough idle, Pro Street/Strip. Strong upper end power. Needs good heads, 3500+ stall.						
211541-10	CL211541-10	295 301 3400-7000	248 254	.605 .625	110	106	Hyd. Hyd.	1,16
		Rough idle, Pro Street/Bracket. Broad upper end power. Needs good heads, 3500+.						
219991	NA	Custom Grind Camshaft					Hyd. Hyd.	1
		Hydraulic Flat Tappet Special Order Camshaft.						

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

16 Lobes designed to take maximum advantage of .875" dia. lifter.

Some items are not legal for sale or use on any pollution controlled motor vehicle



	Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	98436-K11	98436	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017							

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CAMSHAFTS



FORD SMALL BLOCK • 221-302 1963-1995 (EXCEPT 302 H.O.)

Rattler Cams™ Retro-Fit Hydraulic Roller Camshafts

Small Base - for Use With OE Style Hydraulic Roller Lifters & Spider

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
228005-09S	CL228005-09S	280 288 1800-5500	227 235	.560 .565	109	103	Hyd. Hyd.	1,23 Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.
228045-09S	CL228045-09S	288 296 2000-5500	235 243	.565 .565	109	103	Hyd. Hyd.	1,23 Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.
228085-09S	CL228085-09S	296 304 2400-6100	243 251	.565 .549	109	103	Hyd. Hyd.	1,23 Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.



FORD SMALL BLOCK • 221-302 1963-1995 (EXCEPT 302 H.O.)

Retro-Fit Hydraulic Roller Camshafts

Firing Order: 1•3•7•2•6•5•4•8

Small Base - for Use With OE Style Hydraulic Roller Lifters & Spider

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
220225-12S	CL220225-12S	260 266 800-4200	207 213	.480 .496	112	108	Hyd. Hyd.	1,23 Great daily usage, smooth idle, great fuel economy.
220315-10S	CL220315-10S	262 266 1000-4400	209 213	.496 .496	110	106	Hyd. Hyd.	1,23 Improved throttle response & low end torque.
220235-10S	CL220235-10S	266 270 1000-4800	213 217	.517 .528	110	106	Hyd. Hyd.	1,23 Fair idle, good low & mid-range performance increase.
220235-12S	CL220235-12S	266 270 1000-5000	213 217	.517 .528	112	108	Hyd. Hyd.	1,23 Good idle, Off-Road & Street Performance. 9.0:1 CR advised.
222765-13S	CL222765-13S	270 270 1500-5500	217 217	.496 .496	113	109	Hyd. Hyd.	1,23 Good idle, strong low end & mid-range performance. Needs 2800+ stall.
221275-08S	CL221275-08S	270 278 1200-5600	217 225	.528 .533	108	104	Hyd. Hyd.	1,23 Good rough idle. Good torque & power. 1800+ stall.
221275-10S	CL221275-10S	270 278 1200-5600	217 225	.528 .533	110	106	Hyd. Hyd.	1,23 Good rough idle. Good torque & power. 1800+ stall.
221275-12S	CL221275-12S	270 278 1200-5600	217 225	.528 .533	112	108	Hyd. Hyd.	1,23 Good rough idle. Good torque & power. 1800+ stall.
222725-10S	CL222725-10S	272 272 1800-5800	219 219	.544 .544	110	106	Hyd. Hyd.	1,23 Fair idle, strong Street Performance. Requires 9.0+ CR, 5-speed or 2800+ stall.
221145-10S	CL221145-10S	272 278 2000-6000	219 225	.544 .533	110	106	Hyd. Hyd.	1,23 Performance Street, best used with aftermarket heads. 2500+ stall, better intake/exhaust.
221145-12S	CL221145-12S	272 278 2000-6000	219 225	.544 .533	112	108	Hyd. Hyd.	1,23 Good idle, good mid range power. Good vacuum. 9.5-10.5:1 CR, 2500+ stall.
222745-12S	CL222745-12S	278 278 2000-6000	225 225	.533 .533	112	108	Hyd. Hyd.	1,23 Best with 5-speed or 2200-2500 stall.
220245-10S	CL220245-10S	278 282 2000-6100	225 229	.533 .512	110	106	Hyd. Hyd.	1,23 Fair idle, Street/Strip. Auto OK with 2500+ stall.
220245-12S	CL220245-12S	278 282 2000-6100	225 229	.533 .512	112	108	Hyd. Hyd.	1,23 Fair idle, Street & mild Performance usage. Crisp throttle.

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

23 Ignition firing order must be changed to 1-3-7-2-6-5-4-8.

Some items are not legal for sale or use on any pollution controlled motor vehicle

FORD SMALL BLOCK • 221-302 1963-1995 (EXCEPT 302 H.O.)

Rattler Cams™ Retro-Fit Hydraulic Roller Small Base Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹

FORD SMALL BLOCK • 221-302 1963-1995 (EXCEPT 302 H.O.)

Retro-Fit Hydraulic Roller Small Base Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

⁷ Requires 7/16" rocker studs.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

¹⁹ Fits factory 1-pc eccentric. For 2-pc eccentric use 94212 or 94312.

²⁵ Machining Required.



FORD SMALL BLOCK • 221-302 1963-1995 (EXCEPT 302 H.O.)

Retro-Fit Hydraulic Roller Camshafts

Firing Order: 1•3•7•2•6•5•4•8

Small Base - for Use With OE Style Hydraulic Roller Lifters & Spider

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
222755-08S	CL222755-08S	278 284 2000-6200	225 231	.533 .544	108	104	Hyd. Hyd.	1,23
		Fair idle, Street & Mild Performance usage. Crisp throttle.						
222755-12S	CL222755-12S	278 284 2000-6200	225 231	.533 .544	112	108	Hyd. Hyd.	1,23
		Fair idle, Street & Mild Performance usage. Crisp throttle.						
220325-08S	CL220325-08S	278 286 1800-6200	225 233	.560 .565	108	104	Hyd. Hyd.	1,23
		Choppy idle, Street performance usage. 2500+ stall.						
220325-10S	CL220325-10S	278 286 2000-6200	225 233	.560 .565	110	106	Hyd. Hyd.	1,23
		Rough idle, Street/Strip performance. Strong mid-range. 2500+ stall.						
220525-10S	CL220525-10S	280 286 2200-6400	227 233	.597 .597	110	106	Hyd. Hyd.	1,23
		Rough idle, Hot Street/Strip, excellent mid range performance. 2500+ stall, gears, intake.						
220525-12S	CL220525-12S	280 286 2200-6400	227 233	.597 .597	112	108	Hyd. Hyd.	1,23
		Good idle, good all around performance. Good vacuum. 9.5:1+ CR, 2500+ stall & gears.						
220305-08S	CL220255-08S	284 284 2400-6000	231 231	.544 .544	108	104	Hyd. Hyd.	1,23
		Choppy idle, strong low & mid range performance. 2500+ stall.						
220255-10S	CL220255-10S	284 288 2200-6000	231 235	.544 .565	110	106	Hyd. Hyd.	1,23
		Rough idle, Street/Strip performance. Great low to mid-range torque & power.						
220255-12S	CL220255-12S	284 288 2200-6200	231 235	.544 .565	112	108	Hyd. Hyd.	1,23
		Fair idle, performance usage. Great mid-range torque & horsepower.						
222735-10S	CL222735-10S	288 294 2400-6400	235 241	.581 .581	110	106	Hyd. Hyd.	1,23
		Lopey idle, Hot Street & Bracket Racing. 10.0:1-up CR advised.						
222735-12S	CL222735-12S	288 294 2400-6400	235 241	.581 .581	112	108	Hyd. Hyd.	1,23
		Lopey idle, Hot Street & Bracket Racing. 10.0:1-up CR advised.						
221815-10S	CL221815-10S	290 298 2500-6500	237 245	.597 .597	110	106	Hyd. Hyd.	1,23
		Lopey idle, Hot Street/Bracket, good mid range. 9.5-10.5:1 CR, 2800+ stall.						
220275-10S	CL220275-10S	294 300 2600-6600	241 247	.581 .603	110	106	Hyd. Hyd.	1,23
		Rough idle, Hot Street & Bracket Racing. 10.5:1-up CR advised.						
220275-12S	CL220275-12S	294 300 2600-6600	241 247	.581 .603	112	108	Hyd. Hyd.	1,23
		Rough idle, Hot Street & Bracket Racing. 10.5:1-up CR advised.						
223365-10S	CL223365-10S	300 300 2600-6600	247 247	.603 .603	110	106	Hyd. Hyd.	1,23
		Rough idle, Street/Strip, good mid range performance. 3200+ stall, good intake.						
220335-10S	CL220335-10S	300 304 2800-6700	247 251	.576 .576	110	106	Hyd. Hyd.	1,23
		Hot Street/Brackets. Requires aftermarket heads, 3500+ stall.						
220335-12S	CL220335-12S	300 304 2800-6700	247 251	.576 .576	112	108	Hyd. Hyd.	1,23
		Lopey idle, Hot Street & Bracket Racing. 10.5:1-up CR advised.						
220355-10S	CL220355-10S	304 310 3000-7000	251 257	.592 .592	110	106	Hyd. Hyd.	1,23
		Upper mid-range & top end power. Needs 11.0:1+ CR.						
220355-12S	CL220355-12S	304 310 3000-7000	251 257	.592 .592	112	108	Hyd. Hyd.	1,23
		Upper mid-range & top end power. Needs 11.0:1+ CR.						
224455-12S	CL224455-12S	306 312 3200-7200	253 259	.640 .640	112	108	Hyd. Hyd.	1,23
		Best with big cubic inch. Needs 11.0:1+ CR. good heads.						
229994	NA	Custom Grind Camshaft, Small Base Circle					Hyd. Hyd.	1,23
		Retro-Fit Hydraulic Roller Special Order Camshaft.						

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

23 Ignition firing order must be changed to 1-3-7-2-6-5-4-8.

Some items are not legal for sale or use on any pollution controlled motor vehicle

Retro-Fit Hydraulic Roller Small Base Camshaft Components

	Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
	91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95004	NA	94427	9421

Components Notes: master note list on page 260

3 Included in Cam & Lifter Sets.

7 Requires 7/16" rocker studs.

10 10° Valve lock Angle, must use matching retainers/locks.

19 Fits factory 1-pc eccentric. For 2-pc eccentric use 94212 or 94312.

25 Machining Required.

CAMSHAFTS



FORD SMALL BLOCK • 221-302 1963-1995 (EXCEPT 302 H.O.)

Rattler Cams™ Retro-Fit Hydraulic Roller Camshafts for Use With Tie-Bar Style Hydraulic Roller Lifters

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
228005-09	CL228005-09	280 288 1800-5600	227 235	.560 .565	109	103	Hyd. Hyd.	1,23 Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.
228045-09	CL228045-09	288 296 2000-5900	235 243	.565 .565	109	103	Hyd. Hyd.	1,23 Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.
228085-09	CL228085-09	296 304 2400-6200	243 251	.565 .549	109	103	Hyd. Hyd.	1,23 Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.



FORD SMALL BLOCK • 221-302 1963-1995 (EXCEPT 302 H.O.)

Retro-Fit Hydraulic Roller Camshafts for Use With Tie-Bar Style Hydraulic Roller Lifters

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
220225-12	CL220225-12	260 266 800-4200	207 213	.480 .496	112	108	Hyd. Hyd.	1,23 Great daily usage, smooth idle, great fuel economy.
220315-10	CL220315-10	262 266 1000-4400	209 213	.496 .496	110	106	Hyd. Hyd.	1,23 Improved throttle response & low end torque.
220235-10	CL220235-10	266 270 1000-4800	213 217	.517 .528	110	106	Hyd. Hyd.	1,23 Fair idle, good low & mid-range performance increase.
220235-12	CL220235-12	266 270 1000-5000	213 217	.517 .528	112	108	Hyd. Hyd.	1,23 Good idle, Off-Road & Street Performance. 9.0:1 CR advised.
222765-13	CL222765-13	270 270 1500-5500	217 217	.496 .496	113	109	Hyd. Hyd.	1,23 Good idle, strong low end & mid-range performance. Needs 2800+ stall.
221275-08	CL221275-08	270 278 1200-5600	217 225	.528 .533	108	104	Hyd. Hyd.	1,23 Good rough idle. Good torque & power. 1800+ stall.
221275-10	CL221275-10	270 278 1200-5600	217 225	.528 .533	110	106	Hyd. Hyd.	1,23 Good rough idle. Good torque & power. 1800+ stall.
221275-12	CL221275-12	270 278 1200-5600	217 225	.528 .533	112	108	Hyd. Hyd.	1,23 Good rough idle. Good torque & power. 1800+ stall.
222725-10	CL222725-10	272 272 1800-5800	219 219	.544 .544	110	106	Hyd. Hyd.	1,23 Fair idle, strong Street Performance. Requires 9.0+ CR, 5-speed or 2800+ stall.
221145-10	CL221145-10	272 278 2000-6000	219 225	.544 .533	110	106	Hyd. Hyd.	1,23 Performance Street, best used with aftermarket heads. 2500+ stall, better intake/exhaust.
221145-12	CL221145-12	272 278 2000-6000	219 225	.544 .533	112	108	Hyd. Hyd.	1,23 Good idle, good mid range power. Good vacuum. 9.5-10.5:1 CR, 2500+ stall.
222745-12	CL222745-12	278 278 2000-6000	225 225	.533 .533	112	108	Hyd. Hyd.	1,23 Best with 5-speed or 2200-2500 stall.
220245-10	CL220245-10	278 282 2000-6100	225 229	.533 .512	110	106	Hyd. Hyd.	1,23 Fair idle, Street/Strip. Auto OK with 2500+ stall.
220245-12	CL220245-12	278 282 2000-6100	225 229	.533 .512	112	108	Hyd. Hyd.	1,23 Fair idle, Street & mild Performance usage. Crisp throttle.

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

23 Ignition firing order must be changed to 1-3-7-2-6-5-4-8.

Some items are not legal for sale or use on any pollution controlled motor vehicle

FORD SMALL BLOCK • 221-302 1963-1995 (EXCEPT 302 H.O.)

Rattler Cams™ Retro-Fit Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹

FORD SMALL BLOCK • 221-302 1963-1995 (EXCEPT 302 H.O.)

Retro-Fit Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

⁷ Requires 7/16" rocker studs.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

¹⁹ Fits factory 1-pc eccentric. For 2-pc eccentric use 94212 or 94312.

²⁵ Machining Required.



Retro-Fit Hydraulic Roller Camshafts

for Use With Tie-Bar Style Hydraulic Roller Lifters

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
222755-08	CL222755-08	278 284 2000-6200	225 231	.533 .544	108	104	Hyd. Hyd.	1,23 Lopey idle, Street & Mild Performance usage. Crisp throttle.
222755-12	CL222755-12	278 284 2000-6200	225 231	.533 .544	112	108	Hyd. Hyd.	1,23 Fair idle, Street & Mild Performance usage. Crisp throttle.
220325-08	CL220325-08	278 286 1800-6200	225 233	.560 .565	108	104	Hyd. Hyd.	1,23 Choppy idle, Street performance usage. 2500+ stall.
220325-10	CL220325-10	278 286 2000-6200	225 233	.560 .565	110	106	Hyd. Hyd.	1,23 Rough idle, Street/Strip performance. Strong mid-range. 2500+ stall.
220525-10	CL220525-10	280 286 2200-6400	227 233	.597 .597	110	106	Hyd. Hyd.	1,23 Rough idle, Hot Street/Strip, excellent mid range performance. 2500+ stall, gears, intake.
220525-12	CL220525-12	280 286 2200-6400	227 233	.597 .597	112	108	Hyd. Hyd.	1,23 Good idle, good all around performance. Good vacuum. 9.5:1+ CR, 2500+ stall & gears.
220305-08	CL220255-08	284 284 2400-6000	231 231	.544 .544	108	104	Hyd. Hyd.	1,23 Choppy idle, strong low & mid range performance. 2500+ stall.
220255-10	CL220255-10	284 288 2200-6000	231 235	.544 .565	110	106	Hyd. Hyd.	1,23 Rough idle, Street/Strip performance. Great low to mid-range torque & power.
220255-12	CL220255-12	284 288 2200-6200	231 235	.544 .565	112	108	Hyd. Hyd.	1,23 Fair idle, performance usage. Great mid-range torque & horsepower.
222735-10	CL222735-10	288 294 2400-6400	235 241	.581 .581	110	106	Hyd. Hyd.	1,23 Lopey idle, Hot Street & Bracket Racing. 10.0:1-up CR advised.
222735-12	CL222735-12	288 294 2400-6400	235 241	.581 .581	112	108	Hyd. Hyd.	1,23 Lopey idle, Hot Street & Bracket Racing. 10.0:1-up CR advised.
221815-10	CL221815-10	290 298 2500-6500	237 245	.597 .597	110	106	Hyd. Hyd.	1,23 Lopey idle, Hot Street/Bracket, good mid range. 9.5-10.5:1 CR, 2800+ stall.
220275-10	CL220275-10	294 300 2600-6600	241 247	.581 .603	110	106	Hyd. Hyd.	1,23 Rough idle, Hot Street & Bracket Racing. 10.5:1-up CR advised.
220275-12	CL220275-12	294 300 2600-6600	241 247	.581 .603	112	108	Hyd. Hyd.	1,23 Rough idle, Hot Street & Bracket Racing. 10.5:1-up CR advised.
223365-10	CL223365-10	300 300 2600-6600	247 247	.603 .603	110	106	Hyd. Hyd.	1,23 Rough idle, Street/Strip, good mid range performance. 3200+ stall, good intake.
220335-10	CL220335-10	300 304 2800-6700	247 251	.576 .576	110	106	Hyd. Hyd.	1,23 Hot Street/Brackets. Requires aftermarket heads, 3500+ stall.
220335-12	CL220335-12	300 304 2800-6700	247 251	.576 .576	112	108	Hyd. Hyd.	1,23 Lopey idle, Hot Street & Bracket Racing. 10.5:1-up CR advised.
220355-10	CL220355-10	304 310 3000-7000	251 257	.592 .592	110	106	Hyd. Hyd.	1,23 Upper mid-range & top end power. Needs 11.0:1+ CR.
220355-12	CL220335-12	304 310 3000-7000	251 257	.592 .592	112	108	Hyd. Hyd.	1,23 Upper mid-range & top end power. Needs 11.0:1+ CR.
224455-12	CL224455-12	306 312 3200-7200	253 259	.640 .640	112	108	Hyd. Hyd.	1,23 Best with big cubic inch. Needs 11.0:1+ CR. good heads.
229995	NA	Custom Grind Camshaft					Hyd. Hyd.	1,23
Retro-Fit Hydraulic Roller Special Order Camshaft.								

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

23 Ignition firing order must be changed to 1-3-7-2-6-5-4-8.

Some items are not legal for sale or use on any pollution controlled motor vehicle

FORD SMALL BLOCK • 221-302 1963-1995 (EXCEPT 302 H.O.)

Retro-Fit Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91260 ³	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91260 ³	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91260 ³	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91260 ³	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91260 ³	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91260 ³	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91260 ³	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91260 ³	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91260 ³	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91260 ³	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91260 ³	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91260 ³	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95003	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 91260	NA	--	--	--	--	--	--	--	--	--	NA	94427	94210 ¹⁹ 94310 ¹⁹

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

⁷ Requires 7/16" rocker studs.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

¹⁹ Fits factory 1-pc eccentric. For 2-pc eccentric use 94212 or 94312.

²⁵ Machining Required.

CAMSHAFTS



FORD SMALL BLOCK • 5.0L/302 H.O. 1985-2002

Rattler Cams™ Hydraulic Roller Camshafts for OE Roller Applications

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
228005-09	CL228005-09E ⁽¹⁷⁾ CL228005-09 ⁽¹⁸⁾	280 288 1800-5500	227 235	.560 .565	109	103	Hyd. Hyd.	1,17,18 Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.
228045-09	CL228045-09E ⁽¹⁷⁾ CL228045-09 ⁽¹⁸⁾	288 296 2000-5700	235 243	.565 .565	109	103	Hyd. Hyd.	1,17,18 Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.
228085-09	CL228085-09E ⁽¹⁷⁾ CL228085-09 ⁽¹⁸⁾	296 304 2400-6100	243 251	.565 .549	109	103	Hyd. Hyd.	1,17,18 Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.



FORD SMALL BLOCK • 5.0L/302 H.O. 1985-2002

Hydraulic Roller Camshafts for OE Roller Applications

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
220225-12	CL220225-12E ⁽¹⁷⁾ CL220225-12 ⁽¹⁸⁾	260 266 800-4200	207 213	.480 .496	112	108	Hyd. Hyd.	1,17,18 Great daily usage, smooth idle, great fuel economy.
220315-10	CL220315-10E ⁽¹⁷⁾ CL220315-10 ⁽¹⁸⁾	262 266 1000-4400	209 213	.496 .496	110	106	Hyd. Hyd.	1,17,18 Improved throttle response & low end torque.
220235-10	CL220235-10E ⁽¹⁷⁾ CL220235-10 ⁽¹⁸⁾	266 270 1200-4800	213 217	.517 .528	110	106	Hyd. Hyd.	1,17,18 Fair idle, good low & mid-range performance increase.
220235-12	CL220235-12E ⁽¹⁷⁾ CL220235-12 ⁽¹⁸⁾	266 270 1200-5000	213 217	.517 .528	112	108	Hyd. Hyd.	1,17,18 Good idle, Off-Road & Street Performance. 9.0:1 CR advised.
222765-13	CL222765-13E ⁽¹⁷⁾ CL222765-13 ⁽¹⁸⁾	270 270 1500-5500	217 217	.496 .496	113	109	Hyd. Hyd.	1,17,18 Good idle, strong low end & mid-range performance. Needs 2800+ stall.
221275-08	CL221275-08E ⁽¹⁷⁾ CL221275-08 ⁽¹⁸⁾	270 278 1600-5600	217 225	.528 .533	108	104	Hyd. Hyd.	1,17,18 Lopey to fair idle. Good torque & power. 1800+ stall.
221275-10	CL221275-12E ⁽¹⁷⁾ CL221275-10 ⁽¹⁸⁾	270 278 1600-5600	217 225	.528 .533	110	106	Hyd. Hyd.	1,17,18 Good rough idle. Good torque & power. 1800+ stall.
221275-12	CL221275-12E ⁽¹⁷⁾ CL221275-12 ⁽¹⁸⁾	270 278 1600-5600	217 225	.528 .533	112	108	Hyd. Hyd.	1,17,18 Good rough idle. Good torque & power. 1800+ stall.
222725-10	CL222725-12E ⁽¹⁷⁾ CL222725-12 ⁽¹⁸⁾	272 272 1800-5800	219 219	.544 .544	110	106	Hyd. Hyd.	1,17,18 Fair idle, strong Street Performance. Requires 9.0+ CR, 5-speed or 2800+ stall.
221145-10	CL221145-10E ⁽¹⁷⁾ CL221145-10 ⁽¹⁸⁾	272 278 1800-6000	219 225	.544 .533	110	106	Hyd. Hyd.	1,17,18 Performance Street, best used with aftermarket heads. 2500+ stall, better intake/exhaust.
221145-12	CL221145-12E ⁽¹⁷⁾ CL221145-12 ⁽¹⁸⁾	272 278 1800-6000	219 225	.544 .533	112	108	Hyd. Hyd.	1,17,18 Good idle, good mid range power. Good vacuum. 9.5-10.5:1 CR, 2500+ stall.
222745-12	CL222745-12E ⁽¹⁷⁾ CL222745-12 ⁽¹⁸⁾	278 278 2000-6000	225 225	.533 .533	112	108	Hyd. Hyd.	1,17,18 Best with 5-speed or 2200-2500 stall.
220245-10	CL220245-10E ⁽¹⁷⁾ CL220245-10 ⁽¹⁸⁾	278 282 2000-6100	225 229	.533 .512	110	106	Hyd. Hyd.	1,17,18 Fair idle, Street/Strip. Auto OK with 2500+ stall.
220245-12	CL220245-12E ⁽¹⁷⁾ CL220245-12 ⁽¹⁸⁾	278 282 2000-6100	225 229	.533 .512	112	108	Hyd. Hyd.	1,17,18 Fair idle, Street & mild Performance usage. Crisp throttle.
222755-08	CL222755-08E ⁽¹⁷⁾ CL222755-08 ⁽¹⁸⁾	278 284 2000-6200	225 231	.533 .544	108	104	Hyd. Hyd.	1,17,18 Fair idle, Street & Mild Performance usage. Crisp throttle.

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

17 Cam & Lifter Sets with "E" suffix feature OE style (91213) lifters.

18 Cam & Lifter Sets without suffix feature tie bar lifters.

Some items are not legal for sale or use on any pollution controlled motor vehicle

FORD SMALL BLOCK • 5.0L/302 H.O. 1985-2002

Rattler Cams™ Hydraulic Roller Camshafts for OE Roller Applications Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹

FORD SMALL BLOCK • 5.0L/302 H.O. 1985-2002

Hydraulic Roller Camshafts for OE Roller Applications Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

⁷ Requires 7/16" rocker studs.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

¹⁹ Fits factory 1-pc eccentric. For 2-pc eccentric use 94212 or 94312.

²⁵ Machining Required.

³³ Tie bar style lifters.



Hydraulic Roller Camshafts for OE Roller Applications (cont.) Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
222755-12	CL222755-12E ⁽¹⁷⁾ CL222755-12 ⁽¹⁸⁾	278 284 2000-6200	225 231	.533 .544	112	108	Hyd. Hyd.	1,17,18
		Fair idle, Street & Mild Performance usage. Crisp throttle.						
220325-08	CL220325-08E ⁽¹⁷⁾ CL220325-08 ⁽¹⁸⁾	278 286 1800-6200	225 233	.560 .565	108	104	Hyd. Hyd.	1,17,18
		Choppy idle, Street performance usage. 2500+ stall.						
220325-10	CL220325-12E ⁽¹⁷⁾ CL220325-12 ⁽¹⁸⁾	278 286 2000-6200	225 233	.560 .565	110	106	Hyd. Hyd.	1,17,18
		Rough idle, Street/Strip performance. Strong mid-range. 2500+ stall.						
220525-10	CL220525-10E ⁽¹⁷⁾ CL220525-10 ⁽¹⁸⁾	280 286 2200-6400	227 233	.597 .597	110	106	Hyd. Hyd.	1,17,18
		Rough idle, Hot Street/Strip, excellent mid range performance. 2500+ stall, gears, intake.						
220525-12	CL220525-12E ⁽¹⁷⁾ CL220525-12 ⁽¹⁸⁾	280 286 2200-6400	227 233	.597 .597	112	108	Hyd. Hyd.	1,17,18
		Good idle, good all around performance. Good vacuum. 9.5:1+ CR, 2500+ stall & gears.						
220305-08	CL220305-08E ⁽¹⁷⁾ CL220305-08 ⁽¹⁸⁾	284 284 2400-6000	231 231	.544 .544	108	104	Hyd. Hyd.	1,17,18
		Choppy idle, strong low & mid range performance. 2500+ stall.						
220255-10	CL220255-10E ⁽¹⁷⁾ CL220255-10 ⁽¹⁸⁾	284 288 2200-6000	231 235	.544 .565	110	106	Hyd. Hyd.	1,17,18
		Rough idle, Street/Strip performance. Great low to mid-range torque & power.						
220255-12	CL220255-12E ⁽¹⁷⁾ CL220255-12 ⁽¹⁸⁾	284 288 2200-6200	231 235	.544 .565	112	108	Hyd. Hyd.	1,17,18
		Fair idle, performance usage. Great mid-range torque & horsepower.						
222735-10	CL222735-10E ⁽¹⁷⁾ CL222735-10 ⁽¹⁸⁾	288 294 2400-6400	235 241	.581 .581	110	106	Hyd. Hyd.	1,17,18
		Lopey idle, Hot Street & Bracket Racing. 10.0:1-up CR advised.						
222735-12	CL222735-12E ⁽¹⁷⁾ CL222735-12 ⁽¹⁸⁾	288 294 2400-6400	235 241	.581 .581	112	108	Hyd. Hyd.	1,17,18
		Lopey idle, Hot Street & Bracket Racing. 10.0:1-up CR advised.						
221815-10	CL221815-10E ⁽¹⁷⁾ CL221815-10 ⁽¹⁸⁾	290 298 2500-6500	237 245	.597 .597	110	106	Hyd. Hyd.	1,17,18
		Lopey idle, Hot Street/Bracket, good mid range. 9.5-10.5:1 CR, 2800+ stall.						
220275-10	CL220275-10E ⁽¹⁷⁾ CL220275-10 ⁽¹⁸⁾	294 300 2600-6600	241 247	.581 .603	110	106	Hyd. Hyd.	1,17,18
		Rough idle, Hot Street & Bracket Racing. 10.5:1-up CR advised.						
220275-12	CL220275-12E ⁽¹⁷⁾ CL220275-12 ⁽¹⁸⁾	294 300 2600-6600	241 247	.581 .603	112	108	Hyd. Hyd.	1,17,18
		Rough idle, Hot Street & Bracket Racing. 10.5:1-up CR advised.						
223365-10	CL223365-10E ⁽¹⁷⁾ CL223365-10 ⁽¹⁸⁾	300 300 2600-6600	247 247	.603 .603	110	106	Hyd. Hyd.	1,17,18
		Rough idle, Street/Strip, good mid range performance. 3200+ stall, good intake.						
220335-10	CL220335-10E ⁽¹⁷⁾ CL220335-10 ⁽¹⁸⁾	300 304 2800-6700	247 251	.576 .576	110	106	Hyd. Hyd.	1,17,18
		Hot Street/Brackets. Requires aftermarket heads, 3500+ stall.						
220335-12	CL220335-12E ⁽¹⁷⁾ CL220335-12 ⁽¹⁸⁾	300 304 2800-6800	247 251	.576 .576	112	108	Hyd. Hyd.	1,17,18
		Lopey idle, Hot Street & Bracket Racing. 10.5:1-up CR advised.						
220355-10	CL220355-10E ⁽¹⁷⁾ CL220355-10 ⁽¹⁸⁾	304 310 3200-7000	251 257	.592 .592	110	106	Hyd. Hyd.	1,17,18
		Upper mid-range & top end power. Needs 11.0:1+ CR.						
220355-12	CL220355-12E ⁽¹⁷⁾ CL220355-12 ⁽¹⁸⁾	304 310 3200-7000	251 257	.592 .592	112	108	Hyd. Hyd.	1,17,18
		Upper mid-range & top end power. Needs 11.0:1+ CR.						
224455-12	CL224455-12E ⁽¹⁷⁾ CL224455-12 ⁽¹⁸⁾	306 312 3400-7200	253 259	.640 .640	112	108	Hyd. Hyd.	1,17,18
		Best with big cubic inch. Needs 11.0:1+ CR. good heads.						
229995	NA	Custom Grind Camshaft					Hyd. Hyd.	1
		Retro-Fit Hydraulic Roller Special Order Camshaft.						

Cam Notes: master note list on page 260

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Hydraulic Roller Camshafts for OE Roller Applications Components

	Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95302-16	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12											

Components Notes: master note list on page 260

3 Included in Cam & Lifter Sets.

7 Requires 7/16" rocker studs.

10 10° Valve lock Angle, must use matching retainers/locks.

19 Fits factory 1-pc eccentric. For 2-pc eccentric use 94212 or 94312.

25 Machining Required.

33 Tie bar style lifters.

CAMSHAFTS



FORD SMALL BLOCK • 221-302 1963-1995 (EXCEPT 302 H.O.)

American Muscle™ Mechanical Flat Tappet Camshafts

Firing Order: 1•5•4•2•6•3•7•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
217322-14	CL217322-14 CL217322-14DL ⁴	310 310 1800-5800	227 227	.477 .477	114	108	.018 .018	1,34
Near duplicate of the Ford 271HP/289 (FMC #C3OZ-6250-C) & 290HP/302 (C9ZZ-6250-A).								
217272-07	CL217272-07 CL217272-07DL ⁴	318 320 3000-7000	251 252	.528 .528	107	102	.020 .020	1
Near duplicate of the Ford LeMans cam (FMC #C7FE-6250-A).								



FORD SMALL BLOCK • 221-302 1963-1995 (EXCEPT 302 H.O.)

Mechanical Flat Tappet Camshafts

Firing Order: 1•5•4•2•6•3•7•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
212342-10	CL212342-10 CL212342-10DL ⁴	265 265 2000-5800	230 230	.512 .512	110	106	.022 .022	1
Good Street cam, broad power range. 2200+ stall recommended.								
210542-08	CL210542-08 CL210542-08DL ⁴	258 264 1800-5600	230 236	.561 .574	108	104	.018 .018	1,16,34
Hot Street/Mild Strip. Good mid range torque & power. 2000+ stall.								
211332-08	CL211332-08 CL211332-08DL ⁴	264 268 2200-6000	236 240	.574 .590	108	104	.018 .018	1,16,34
Street/Strip, high torque with mid range & top end power. 2500+ stall.								
210102-06	CL210102-06 CL210102-06DL ⁴	275 281 2400-6400	240 246	.539 .555	106	102	.022 .022	1
Hot Street/Brackets. Lopey idle. Needs higher CR & gears.								
210102-08	CL210102-08 CL210102-08DL ⁴	275 281 2400-6400	240 246	.539 .555	108	104	.022 .022	1
Hot Street/Bracket. Needs 10.0+ CR, 3200+ stall & gears.								
210102-12	CL210102-12 CL210102-12DL ⁴	275 281 2400-6500	240 246	.539 .555	112	108	.022 .022	1
Fair idle, Moderate Street/Bracket, good low & mid range torque. 10.5-11.5:1, 3000+ stall.								
211002-08	CL211002-08 CL211002-08DL ⁴	279 279 2600-6500	244 244	.544 .544	108	104	.022 .022	1
Rough idle, super mid-range performance. Needs 11.0:1 CR-up.								
212352-06	CL212352-06 CL212352-06DL ⁴	281 287 2800-6800	246 252	.549 .565	106	102	.022 .022	1
Fair idle, Street/Strip in light car. 10.0:1 CR, 4.10 or lower gears.								
211052-08	CL211052-08 CL211052-08DL ⁴	294 294 2800-7000	248 248	.544 .544	108	104	.022 .022	1
Street/Strip, powerful through entire rpm range.								
212372-08	CL212372-08 CL212372-08DL ⁴	285 291 3000-7200	250 256	.560 .571	108	104	.022 .022	1
Rough idle, needs good induction system. Good Oval Track cam.								
212362-08	CL212362-08 CL212362-08DL ⁴	289 295 3400-7400	254 260	.587 .592	108	104	.022 .022	1
Rough idle, Bracket cam. Best with 11.0:1+ CR & 4000+ stall.								
212532-06	CL212532-06 CL212532-06DL ⁴	295 299 3600-7600	260 264	.592 .592	106	102	.022 .022	1
Bracket Race or 3/8 to 1/2 mile Oval Track with fast corners. 331-363.								
212322-08	CL212322-08 CL212322-08DL ⁴	295 303 3600-7800	260 268	.592 .587	108	104	.022 .022	1
Rough idle, Bracket favorite. Needs 11.0:1 CR & 4000+ stall.								
219992	NA	Custom Grind Camshaft Mechanical Flat Tappet Special Order Camshaft.						1

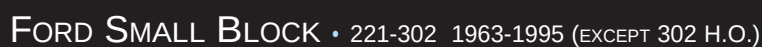
Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

16 Lobes designed to take maximum advantage of .875" dia. lifter.

34 Provisions for increased oiling recommended.

Some items are not legal for sale or use on any pollution controlled motor vehicle



Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91215 ³ 91218 ⁴	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91215 ³ 91218 ⁴	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰								

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Steel Billet Mechanical Roller Camshafts

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
221213-08	NA	261 269 2000-6000	229 237	.592 .592	108	104	.022 .022	1,5,23 <i>Noticeable idle, Street Rod Cruiser. Should have 9.0:1 CR, 2000+ stall.</i>
221213-10	NA	261 269 2000-6000	229 237	.592 .592	110	106	.022 .022	1,5,23 <i>Noticeable idle, good for Weekend Street Cruiser. Should have 9.0:1 CR, 2000+ stall.</i>
221203-08	NA	269 269 2200-6400	237 237	.592 .592	108	104	.022 .022	1,5,23 <i>Rough idle, Street/mild Strip. Good lower mid range. 9.5:1 CR, 2500+ stall.</i>
221203-10	NA	269 269 2200-6400	237 237	.592 .592	110	106	.022 .022	1,5,23 <i>Rough idle, Street Performance/mild Strip. Recommend 9.5:1 CR, 2500+ stall.</i>
220183-08	NA	269 275 2200-6200	237 243	.592 .592	108	104	.022 .022	1,5,23 <i>Mild rough idle, Weekend Cruiser/mild Strip. 2500+ stall recommended.</i>
220183-10	NA	269 275 2200-6200	237 243	.592 .592	110	106	.022 .022	1,5,23 <i>Mild rough idle, Weekend Cruiser/Power Tour favorite. 2500+ stall recommended.</i>
220173-06	NA	275 281 2400-6500	243 249	.592 .600	106	102	.022 .022	1,5,23 <i>Lopey idle, Strong low to mid range torque. 10.0:1+ CR, 2500+ stall.</i>
220173-08	NA	275 281 2400-6400	243 249	.592 .600	108	104	.022 .022	1,5,23 <i>Rough idle, Strong low to mid range power band. 10.0:1+ CR, 2500+ stall.</i>
221313-10	NA	277 277 2600-6200	245 245	.624 .624	110	106	.022 .022	1,5,23 <i>Nice idle. Strong low & mid-range.</i>
221113-08	NA	277 285 2600-6500	245 253	.624 .624	108	104	.022 .022	1,5,23 <i>Lopey idle. Strong mid-range. 10.0:1+ CR.</i>
221013-06	NA	285 291 2800-6600	253 259	.624 .624	106	102	.022 .022	1,5,23 <i>Heavy Bracket or 1/4-3/8 mile Oval Track, Good mid range torque. 11.0-12.5:1 CR.</i>
221013-08	NA	285 291 2800-6600	253 259	.624 .624	108	104	.022 .022	1,5,23 <i>Lopey idle. Strong mid-range with top end increase.</i>
220593-06	NA	285 291 2800-6600	253 259	.683 .683	106	102	.022 .022	1,5,23 <i>Good mid-range horsepower, rough idle. Needs 11.0:1 CR-up.</i>
221133-06	NA	287 299 2900-6800	255 267	.640 .640	106	102	.022 .022	1,5,23 <i>Strong mid & upper rpm, banked Oval Track & Brackets w/auto trans.</i>
221133-08	NA	287 299 2900-6800	255 267	.640 .640	108	104	.022 .022	1,5,23 <i>Mid to upper range horsepower & torque. 11.0:1+ Good heads.</i>
222313-06	NA	291 295 3400-7200	259 263	.624 .656	106	102	.022 .022	1,5,23 <i>Oval Track 1/4-3/8 mile. Good mid to upper torque & power. 2bbl. or 4bbl. carb.</i>
222313-08	NA	291 295 3400-7200	259 263	.624 .656	108	104	.022 .022	1,5,23 <i>Rough idle, Bracket E.T., good mid range. 11.5:1+ CR, 3500+ stall.</i>
222123-06	NA	291 299 3400-7400	259 267	.683 .672	106	102	.022 .022	1,5,23 <i>Oval Track 3/8-1/2 mile. Good mid to upper torque & power. Best with 4bbl. carb.</i>
222123-08	NA	291 299 3400-7400	259 267	.683 .672	108	104	.022 .022	1,5,23 <i>Bracket/Pro/Super Pro, good mid to upper range power. 12.0:1+, 3800+ stall.</i>
221173-06	NA	295 299 3800-7600	263 267	.683 .672	106	102	.022 .022	1,5,23 <i>Strong mid & upper range horsepower. 11.0:1+ Good heads.</i>
221613-06	NA	299 303 4200-7800	267 271	.672 .667	106	102	.022 .022	1,5,23 <i>Competition use, good mid & upper HP, needs good heads & compression.</i>
221613-08	NA	299 303 4200-7800	267 271	.672 .667	108	104	.022 .022	1,5,23 <i>Long Oval Track or Bracket E.T. Drag, good upper rpm horsepower. 12.5:1 CR.</i>
221223-08	NA	301 305 4200-8000	269 273	.720 .688	108	104	.022 .022	1,5,23 <i>Competition use, good mid & upper power.</i>
221223-10	NA	301 305 4200-8000	269 273	.720 .688	110	106	.022 .022	1,5,23 <i>Bracket/Competition, good upper end torque & power. 12.0:1+ CR, race converter.</i>

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

5 Requires upgraded distributor gear.

23 Ignition firing order must be changed to 1-3-7-2-6-5-4-8.

Some items are not legal for sale or use on any pollution controlled motor vehicle

Steel Billet Mechanical Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91250 91217 ³²	NA	NA	98630 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91250 91217 ³²	NA	NA	98630 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91250 91217 ³²	NA	NA	98630 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91250 91217 ³²	NA	NA	98630 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91250 91217 ³²	NA	NA	98630 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91250 91217 ³²	NA	NA	98630 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91217 91234	NA	NA	98630 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91217 91234	NA	NA	98630 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91217 91234	NA	NA	98732 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91217 91234	NA	NA	98732 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91217 91234	NA	NA	98732 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91217 91234	NA	NA	98732 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹

Components Notes: master note list on page 260

⁷ Requires 7/16" rocker studs.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

¹⁹ Fits factory 1-pc eccentric. For 2-pc eccentric use 94212 or 94312.

²⁵ Machining Required.

³² These lifters are not recommended for street use.

CAMSHAFTS



FORD SMALL BLOCK • 221-302 1963-1995

Steel Billet Mechanical Roller Camshafts (cont.)

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
221123-08	NA	299 307 4200-8000	267 275	.672 .661	108	104	.022 .022	1,5,23 <i>Strong upper horsepower. 11.5:1+ Good heads & induction, 4500+ stall.</i>
221813-06	NA	301 309 4400-8400	269 277	.693 .661	106	102	.022 .022	1,5,23 <i>Rough idle, Competition, Great upper rpm torque. 12.0:1+ CR, 4500+ stall.</i>
221813-08	NA	301 309 4400-8600	269 277	.693 .661	108	104	.022 .022	1,5,23 <i>Competition, good upper rpm torque & horsepower. 12.0:1+ CR & race converter.</i>
221863-06	NA	301 309 4400-8400	269 277	.720 .693	106	102	.022 .022	1,5,23 <i>Competition, good upper mid to top end torque. 12.0:1+ CR & race converter.</i>
221863-08	NA	301 309 4400-8600	269 277	.720 .693	108	104	.022 .022	1,5,23 <i>Super Pro/Bracket, good upper rpm torque & horsepower. 12.0:1+ CR & race converter.</i>
221863-10	NA	301 309 4500-8800	269 277	.720 .693	110	106	.022 .022	1,5,23 <i>Good mid range power with top end pull. 12.0:1+ CR & race converter.</i>
221083-08	NA	307 315 4800-8600	275 283	.688 .672	108	104	.022 .022	1,5,23 <i>Strong upper horsepower. 11.5:1+ Good heads.</i>
221083-10	NA	307 315 4800-8600	275 283	.688 .672	110	106	.022 .022	1,5,23 <i>Competition profile, good top end power. Needs good parts.</i>
221093-12	NA	313 331 5000-8400	281 299	.779 .763	112	108	.022 .022	1,5,23 <i>Large cubic inch, all out Competition. Best of everything. Works good w/NOS.</i>
229993	NA	Custom Grind Camshaft <i>Mechanical Roller Special Order Camshaft.</i>						1,5,23



FORD SMALL BLOCK • 221-302 1963-1995



Big Bottle Cams™ - Nitrous Oxide Mechanical Roller Cams

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
221133-12	NA	287 299 3000-6800	255 267	.640 .640	112	108	.022 .022	1,5,23 <i>Fair idle, Performance/Strip with plate system. Great mid range. 11.5:1+ CR, 3500+ stall.</i>
220373-12	NA	295 305 3800-7200	263 273	.672 .688	112	108	.022 .022	1,5,23 <i>Rough idle, Street/Bracket with manifold system. Good upper rpm. 11.5:1+ CR, 4000+.</i>
220673-12	NA	299 309 4200-8000	267 277	.688 .693	112	108	.022 .022	1,5,23 <i>Competition with large plate system. Good mid to upper range. 12.0:1+ CR.</i>
220793-12	NA	305 319 4400-8400	273 287	.725 .693	112	108	.022 .022	1,5,23 <i>Best with larger cubic inch, large plate or plumbed system. 12.0:1+ CR, 4500+ stall.</i>
220793-14	NA	305 319 4400-8400	273 287	.725 .693	114	110	.022 .022	1,5,23 <i>Large stroker with multi stage system. 12.0:1+ CR, 4500+ stall.</i>
220393-14	NA	309 323 4600-8600	277 291	.720 .720	114	110	.022 .022	1,5,23 <i>Great with big stroke combinations. Large multi stage system. 12.5:1+ CR.</i>
221073-14	NA	313 327 4600-8600	281 295	.779 .763	114	110	.022 .022	1,5,23 <i>Big stroker, big heads, big multi stage system.</i>
221093-12	NA	313 331 5000-8400	281 299	.779 .763	112	108	.022 .022	1,5,23 <i>Large cubic inch, all out Competition. Best of everything. Works good w/NOS.</i>
229993	NA	Custom Grind Camshaft <i>Mechanical Roller Special Order Camshaft.</i>						1,5,23

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

5 Requires upgraded distributor gear.

23 Ignition firing order must be changed to 1-3-7-2-6-5-4-8.

Some items are not legal for sale or use on any pollution controlled motor vehicle

FORD SMALL BLOCK • 221-302 1963-1995

Steel Billet Mechanical Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91234 91288	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91288 91240	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
--	NA	--	--	--	--	--	--	--	--	--	NA	94427	94310 ¹⁹

FORD SMALL BLOCK • 221-302 1963-1995

Steel Billet Mechanical Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91234 91288	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91288 91240	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91288 91240	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
--	NA	--	--	--	--	--	--	--	--	--	NA	94427	94310 ¹⁹

Components Notes: master note list on page 260

⁷ Requires 7/16" rocker studs.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

¹⁹ Fits factory 1-pc eccentric. For 2-pc eccentric use 94212 or 94312.

²⁵ Machining Required.

CAMSHAFTS



FORD SMALL BLOCK • 351W 1969-1996

Max Certified™ Hydraulic Flat Tappet Cam & Lifter Sets - 5 Year No Fault Warranty (see page 3 for details)

Cam & Lifter Set Part No.	Cam & Direct Lube Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
MC220021-12	MC220021-12DL ⁴	259 267 1000-5000	205 213	.448 .480	112	108	Hyd. Hyd.	1
Great low & mid-range. Smooth idle. Good in PUs & RVs.								
MC220931-10	MC220931-10DL ⁴	269 269 1400-5200	215 215	.475 .475	110	106	Hyd. Hyd.	1
Lopey idle. Excellent Street Performance cam.								
MC220041-12	MC220041-12DL ⁴	275 275 1200-5400	221 221	.475 .475	112	108	Hyd. Hyd.	1
Good idle & throttle response. Ok with small blower.								
MC220951-10	MC220951-10DL ⁴	275 285 2000-6000	231 231	.501 .501	110	106	Hyd. Hyd.	1
Street & Strip. Needs 4 barrel, headers & low gears.								
MC220051-12	MC220051-12DL ⁴	277 289 2400-6600	235 235	.496 .520	112	108	Hyd. Hyd.	1
Strong mid-range. Great E.T. Bracket cam. OK w/NOS.								
MC220961-08	MC220961-08DL ⁴	285 285 2600-6800	231 231	.501 .501	108	104	Hyd. Hyd.	1
Broad power range, extra performance in smaller engine.								



FORD SMALL BLOCK • 351W 1969-1996



American Muscle™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•5•4•2•6•3•7•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
227571-14	CL227571-14	260 270 800-4500	198 208	.416 .445	114	115	Hyd. Hyd.	1
Near duplicate of the Ford 290HP/351W cam (FMC #C9OZ-6250-A).								



FORD SMALL BLOCK • 351W 1969-1996



Street Force™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•5•4•2•6•3•7•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
220021-12	CL220021-12	259 267 1000-5000	205 213	.448 .480	112	108	Hyd. Hyd.	1
Street Force™ 1, Good idle, Mild Street performance, strong low end torque.								
220031-12	CL220031-12	269 277 1500-5400	223 223	.475 .496	112	108	Hyd. Hyd.	1
Street Force™ 2, Good idle & throttle response. Needs 4 barrel & good exhaust.								
222121-12	CL222121-12	279 289 1600-5800	235 235	.496 .501	112	108	Hyd. Hyd.	1
Street Force™ 3, Noticeable idle, Hot Street & mild Bracket Racing.								

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

4 Direct Lube Lifters Included in Cam & "Direct Lube" Lifter (DL) Sets.

Some items are not legal for sale or use on any pollution controlled motor vehicle

FORD SMALL BLOCK • 351W 1969-1996

Max Certified™ Hydraulic Flat Tappet Cam & Lifter Set Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91211 ³ 91216 ⁴	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91216 ⁴	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91216 ⁴	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91216 ⁴	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91216 ⁴	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91216 ⁴	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹

FORD SMALL BLOCK • 351W 1969-1996

American Muscle™ Hydraulic Flat Tappet Cam & Lifter Set Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91211 ³ 91216	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹

FORD SMALL BLOCK • 351W 1969-1996

Street Force™ Hydraulic Flat Tappet Cam & Lifter Set Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91211 ³ 91216	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91216	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91216	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

⁴ Direct Lube Lifters Included in Cam & "Direct Lube" Lifter (DL) Sets.

⁷ Requires 7/16" rocker studs.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

¹⁹ Fits factory 1-pc eccentric. For 2-pc eccentric use 94212 or 94312.

²⁵ Machining Required.

CAMSHAFTS



FORD SMALL BLOCK • 351W 1969-1996

Rattler Cams™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
228021-09	CL228021-09	281 289 1800-5500	227 235	.501 .501	109	103	Hyd. Hyd.	1 <i>Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.</i>
228061-09	CL228061-09	289 297 2000-5700	235 243	.501 .480	109	103	Hyd. Hyd.	1 <i>Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.</i>
228101-09	CL228101-09	297 305 2400-6100	243 251	.512 .528	109	103	Hyd. Hyd.	1 <i>Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.</i>



FORD SMALL BLOCK • 351W 1969-1996

Hydraulic Flat Tappet Camshafts

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
220011-14	CL220011-14	255 263 800-4500	201 209	.437 .448	114	110	Hyd. Hyd.	<i>Smooth idle, strong low end. High vacuum, good fuel economy.</i>
220931-10	CL220931-10	269 269 1400-5200	215 215	.475 .475	110	106	Hyd. Hyd.	1 <i>Lopey idle. Excellent Street Performance cam.</i>
220991-08	CL220991-08	267 267 1700-5700	220 220	.543 .543	108	104	Hyd. Hyd.	1,16 <i>Good low & mid-range horsepower. Needs 4 barrel & headers.</i>
222021-08	CL222021-08	267 277 2200-6000	220 230	.543 .563	108	104	Hyd. Hyd.	1,16 <i>High lift, dual pattern. Need 4 barrel, low gears & 2500+ stall.</i>
220041-08	CL220041-08	275 275 1700-5700	221 221	.475 .475	108	104	Hyd. Hyd.	1 <i>Good low & mid-range horsepower. Needs 4 barrel & headers.</i>
220041-10	CL220041-10	275 275 1700-5800	221 221	.475 .475	110	106	Hyd. Hyd.	1 <i>Good low & mid-range horsepower. Needs 4 barrel & headers.</i>
220041-12	CL220041-12	275 275 1200-5400	221 221	.475 .475	112	108	Hyd. Hyd.	1 <i>Good idle & throttle response. Ok with small blower.</i>
220951-10	CL220951-10	275 285 2000-6000	221 231	.501 .501	110	106	Hyd. Hyd.	1 <i>Street & Strip. Needs 4 barrel, headers & low gears.</i>
220051-08	CL220051-08	277 289 2400-6600	223 235	.496 .520	108	104	Hyd. Hyd.	1 <i>Hot Street performance in 385-418. 9.5:1, 2400 stall suggested.</i>
220051-10	CL220051-10	277 289 2400-6600	223 235	.496 .520	110	106	Hyd. Hyd.	1 <i>Good idle, Street/Strip Good mid range torque. 9.5:1, 2400 stall suggested.</i>
220051-12	CL220051-12	277 289 2400-6600	223 235	.496 .520	112	108	Hyd. Hyd.	1 <i>Strong mid-range. Great E.T. Bracket cam. OK w/NOS.</i>
222431-06	CL222431-06	272 272 2400-6400	224 224	.551 .551	106	102	Hyd. Hyd.	1,16 <i>Lopey idle, good low end & mid-range horsepower & torque.</i>
222431-08	CL222431-08	272 272 2400-6600	224 224	.551 .551	108	104	Hyd. Hyd.	1,16 <i>Hot Street cam. 4 barrel & headers recommended.</i>
222431-12	CL222431-12	272 272 2400-6600	224 224	.551 .551	112	108	Hyd. Hyd.	1,16 <i>Good idle, good mid range torque & horsepower. Needs 2400+ stall.</i>
222051-08	CL222051-08	277 277 2800-7000	230 230	.563 .563	108	104	Hyd. Hyd.	1,16 <i>Fair idle, Broad power band. Works well in heavy vehicles.</i>

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

16 Lobes designed to take maximum advantage of .875" dia. lifter.

Some items are not legal for sale or use on any pollution controlled motor vehicle

FORD SMALL BLOCK • 351W 1969-1996

Rattler Cams™ Hydraulic Flat Tappet Cam & Lifter Set Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91211 ³ 91212	NA	98436-K11	98436	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91212	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91212	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹

FORD SMALL BLOCK • 351W 1969-1996

Hydraulic Flat Tappet Cam & Lifter Set Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91211 ³ 91212	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91212	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91212	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91212	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91212	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91212	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91212	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91212	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91212	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

⁷ Requires 7/16" rocker studs.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

¹⁹ Fits factory 1-pc eccentric. For 2-pc eccentric use 94212 or 94312.

²⁵ Machining Required.



Hydraulic Flat Tappet Camshafts

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
222051-10	CL222051-10	277 277 2800-7000	230 230	.563 .563	110	106	Hyd. Hyd.	1,16 <i>Strong power range from 3,500 up. Needs 4bbl., header & stall.</i>
222141-08	CL222141-08	277 282 2500-6800	230 234	.563 .572	108	104	Hyd. Hyd.	1,16 <i>Lopey idle, broad power band, strong top end power.</i>
222141-10	CL222141-10	277 282 2500-6800	230 234	.563 .572	110	106	Hyd. Hyd.	1,16 <i>Lopey idle, Strong mid range. Good throttle response. 2400+ stall.</i>
222591-08	CL222591-08	277 287 2500-6800	230 240	.563 .592	108	104	Hyd. Hyd.	1,16 <i>Lopey idle, Hot Street/Brackets. 2500+ stall, 9.0:1+ CR.</i>
222591-12	CL222591-12	277 287 2600-6800	230 240	.563 .592	112	108	Hyd. Hyd.	1,16 <i>Hot Street & mild Bracket Racing.</i>
220961-08	CL220961-08	285 285 2600-6800	231 231	.501 .501	108	104	Hyd. Hyd.	1 <i>Broad power range, extra performance in smaller engine.</i>
221701-08	CL221701-08	282 291 3000-7000	234 244	.572 .596	108	104	Hyd. Hyd.	1,16 <i>Rough idle, Hot Street/Strip, Big mid range torque and acceleration.</i>
221701-12	CL221701-12	282 291 3000-7000	234 244	.572 .596	112	108	Hyd. Hyd.	1,16 <i>Lopey idle, Street/Strip or nostalgia. Likes headers & gears.</i>
220971-08	CL220971-08	283 283 3000-6800	236 236	.583 .583	108	104	Hyd. Hyd.	1,16 <i>Lopey idle, Pro-Street & Bracket Racing profile. Needs 3200+ stall, good exhaust.</i>
222601-06	CL222601-06	283 287 3000-6800	236 240	.583 .592	106	102	Hyd. Hyd.	1,16 <i>Bracket or 1/4 to 3/8 mile 4bbl. Oval Track. Proven winner.</i>
222601-08	CL222601-08	283 287 3000-6800	236 240	.583 .592	108	104	Hyd. Hyd.	1,16 <i>Lopey idle, good mid-range power. Needs 3200+ stall.</i>
220891-08	CL220891-08	287 293 3200-7000	240 246	.592 .601	108	104	Hyd. Hyd.	1,16 <i>Rough idle, Hot Street/Bracket, great mid range & top end power. 3500+ stall.</i>
220891-10	CL220891-10	287 293 3200-7000	240 246	.592 .601	110	106	Hyd. Hyd.	1,16 <i>Lopey idle, Hot Street/Bracket, good mid range. 10.0-11.5:1 CR, 3500+ stall.</i>
220891-12	CL220891-12	287 293 3200-7000	240 246	.592 .601	112	108	Hyd. Hyd.	1,16 <i>Hot Street/Brackets. Needs 10.0:1+ CR, good heads & exhaust. 3500+ stall.</i>
222901-12	CL222901-12	294 300 2300-6500	241 247	.416 .437	112	108	Hyd. Hyd.	1 <i>Fair idle, Circle Track Lift Rule Only. Strong mid-range.</i>
220061-08	CL220061-08	291 301 3200-7200	244 254	.596 .625	108	104	Hyd. Hyd.	1,16 <i>Pro Street/Brackets, Strong mid & upper end power. 10.0:1+ CR.</i>
220061-12	CL220061-12	291 301 2600-6600	244 254	.596 .625	112	108	Hyd. Hyd.	1,16 <i>Performance/Competition. Works well with small blower or NOS.</i>
222041-08	CL222041-08	293 293 3400-6700	246 246	.601 .601	108	104	Hyd. Hyd.	1,16 <i>Hot Street/Brackets. Needs 10.0:1+ CR, good heads & exhaust. 3500+ stall.</i>
222401-10	CL222401-10	295 295 3200-6800	248 248	.605 .605	110	106	Hyd. Hyd.	1,16 <i>E.T. Brackets. Strong mid & upper end power range.</i>
221541-08	CL221541-08	295 301 3400-7000	248 254	.605 .625	108	104	Hyd. Hyd.	1,16 <i>Rough idle, Serious Street/Strip. 10.5:1+ CR, good heads & exhaust. 3500+ stall.</i>
221541-10	CL221541-10	295 301 3400-7200	248 254	.605 .625	110	106	Hyd. Hyd.	1,16 <i>Serious Street/Strip. A favorite for 408+ ci. strokers. 10.5:1+ CR, 3500+ stall.</i>
229991	NA	Custom Grind Camshaft Hydraulic Flat Tappet Special Order Camshaft.					Hyd. Hyd.	1

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

16 Lobes designed to take maximum advantage of .875" dia. lifter.

Hydraulic Flat Tappet Cam & Lifter Set Components

	Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91211 ³ 91212	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95198 95007	NA	94427	94210 ¹⁹ 94310 ¹⁹

Components Notes: master note list on page 260

3 Included in Cam & Lifter Sets.

7 Requires 7/16" rocker studs.

10 10° Valve lock Angle, must use matching retainers/locks.

19 Fits factory 1-pc eccentric. For 2-pc eccentric use 94212 or 94312.

25 Machining Required.

CAMSHAFTS



FORD SMALL BLOCK • 351W 1969-1996

Rattler Cams™ *Retro-Fit Hydraulic Roller Camshafts* Small Base - for Use With OE Style Hydraulic Roller Lifters & Spider

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
228005-09S	CL228005-09S	280 288 1800-5500	227 235	.560 .565	109	103	Hyd. Hyd.	1 <i>Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.</i>
228045-09S	CL228045-09S	288 296 2000-5700	235 243	.565 .565	109	103	Hyd. Hyd.	1 <i>Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.</i>
228085-09S	CL228085-09S	296 304 2400-6100	243 251	.565 .549	109	103	Hyd. Hyd.	1 <i>Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.</i>



FORD SMALL BLOCK • 351W 1969-1996

Retro-Fit Hydraulic Roller Camshafts Small Base - for Use With OE Style Hydraulic Roller Lifters & Spider

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
220225-12S	CL220225-12S	260 266 800-4200	207 213	.480 .496	112	108	Hyd. Hyd.	1 <i>Great daily usage, smooth idle, great fuel economy.</i>
220315-10S	CL220315-10S	262 266 1000-4400	209 213	.496 .496	110	106	Hyd. Hyd.	1 <i>Improved throttle response & low end torque.</i>
220235-10S	CL220235-10S	266 270 1000-4800	213 217	.517 .528	110	106	Hyd. Hyd.	1 <i>Fair idle, good low & mid-range performance increase.</i>
220235-12S	CL220235-12S	266 270 1000-5000	213 217	.517 .528	112	108	Hyd. Hyd.	1 <i>Good idle, Off-Road & Street Performance. 9.0:1 CR advised.</i>
222765-13S	CL222765-13S	270 270 1500-5500	217 217	.496 .496	113	109	Hyd. Hyd.	1 <i>Good idle, strong low end & mid-range performance. Needs 2800+ stall.</i>
221275-08S	CL221275-08S	270 278 1200-5600	217 225	.528 .533	108	104	Hyd. Hyd.	1 <i>Good rough idle. Good torque & power. 1800+ stall.</i>
221275-10S	CL221275-10S	270 278 1200-5600	217 225	.528 .533	110	106	Hyd. Hyd.	1 <i>Good rough idle. Good torque & power. 1800+ stall.</i>
221275-12S	CL221275-12S	270 278 1200-5600	217 225	.528 .533	112	108	Hyd. Hyd.	1 <i>Good rough idle. Good torque & power. 1800+ stall.</i>
222725-10S	CL222725-10S	272 272 1800-5800	219 219	.544 .544	110	106	Hyd. Hyd.	1 <i>Fair idle, strong Street Performance. Requires 9.0+ CR, 5-speed or 2800+ stall.</i>
221145-10S	CL221145-10S	272 278 2000-6000	219 225	.544 .533	110	106	Hyd. Hyd.	1 <i>Performance Street, best used with aftermarket heads. 2500+ stall, better intake/exhaust.</i>
221145-12S	CL221145-12S	272 278 2000-6000	219 225	.544 .533	112	108	Hyd. Hyd.	1 <i>Good idle, good mid range power. Good vacuum. 9.5-10.5:1 CR, 2500+ stall.</i>
222745-12S	CL222745-12S	278 278 2000-6000	225 225	.533 .533	112	108	Hyd. Hyd.	1 <i>Best with 5-speed or 2200-2500 stall.</i>
220245-10S	CL220245-10S	278 282 2000-6100	225 229	.533 .512	110	106	Hyd. Hyd.	1 <i>Fair idle, Street/Strip. Auto OK with 2500+ stall.</i>
220245-12S	CL220245-12S	278 282 2000-6100	225 229	.533 .512	112	108	Hyd. Hyd.	1 <i>Fair idle, Street & mild Performance usage. Crisp throttle.</i>

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

Some items are not legal for sale or use on any pollution controlled motor vehicle

FORD SMALL BLOCK • 351W 1969-1996

Rattler Cams™ Retro-Fit Hydraulic Roller Small Base Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹

FORD SMALL BLOCK • 351W 1969-1996

Retro-Fit Hydraulic Roller Small Base Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

⁷ Requires 7/16" rocker studs.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

¹⁹ Fits factory 1-pc eccentric. For 2-pc eccentric use 94212 or 94312.

²⁵ Machining Required.



Retro-Fit Hydraulic Roller Camshafts

Firing Order: 1•3•7•2•6•5•4•8

Small Base - for Use With OE Style Hydraulic Roller Lifters

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
222755-08S	CL222755-08S	278 284	225 231	.533 .544	108	104	Hyd. Hyd.	1
		2000-6200	Noticeable idle, Street & Mild Performance usage. Crisp throttle.					
222755-12S	CL222755-12S	278 284	225 231	.533 .544	112	108	Hyd. Hyd.	1
		2000-6200	Fair idle, High Performance Street. Good throttle response.					
220325-08S	CL220325-08S	278 286	225 233	.560 .565	108	104	Hyd. Hyd.	1
		1800-6200	Choppy idle, Street performance usage. 2500+ stall.					
220325-10S	CL220325-10S	278 286	225 233	.560 .565	110	106	Hyd. Hyd.	1
		2000-6200	Rough idle, Street/Strip performance. Strong mid-range. 2500+ stall.					
220525-10S	CL220525-10S	280 286	227 233	.597 .597	110	106	Hyd. Hyd.	1
		2200-6400	Rough idle, Hot Street/Strip, excellent mid range performance. 2500+ stall, gears, intake.					
220525-12S	CL220525-12S	280 286	227 233	.597 .597	112	108	Hyd. Hyd.	1
		2200-6400	Good idle, good all around performance. Good vacuum. 9.5:1+ CR, 2500+ stall & gears.					
220305-08S	CL220255-08S	284 284	231 231	.544 .544	108	104	Hyd. Hyd.	1
		2400-6000	Choppy idle, strong low & mid range performance. 2500+ stall.					
220255-10S	CL220255-10S	284 288	231 235	.544 .565	110	106	Hyd. Hyd.	1
		2200-6000	Rough idle, Street/Strip performance. Great low to mid-range torque & power.					
220255-12S	CL220255-12S	284 288	231 235	.544 .565	112	108	Hyd. Hyd.	1
		2200-6200	Fair idle, performance usage. Great mid-range torque & horsepower.					
222735-10S	CL222735-10S	288 294	235 241	.581 .581	110	106	Hyd. Hyd.	1
		2000-6400	Lopey idle, Hot Street/Strip & Bracket Racing. 10.0:1-up CR advised.					
222735-12S	CL222735-12S	288 294	235 241	.581 .581	112	108	Hyd. Hyd.	1
		2400-6400	Lopey idle, Hot Street & Bracket Racing. 10.0:1-up CR advised.					
221815-10S	CL221815-10S	290 298	237 245	.597 .597	110	106	Hyd. Hyd.	1
		2500-6500	Lopey idle, Hot Street/Bracket, good mid range. 9.5-10.5:1 CR, 2800+ stall.					
220275-10S	CL220275-10S	294 300	241 247	.581 .603	110	106	Hyd. Hyd.	1
		2600-6600	Rough idle, Hot Street & Bracket Racing. 10.5:1-up CR advised.					
220275-12S	CL220275-12S	294 300	241 247	.581 .603	112	108	Hyd. Hyd.	1
		2600-6600	Rough idle, Hot Street & Bracket Racing. 10.5:1-up CR advised.					
223365-10S	CL223365-10S	300 300	247 247	.603 .603	110	106	Hyd. Hyd.	1
		2600-6600	Rough idle, Street/Strip, good mid range performance. 3200+ stall, good intake.					
220335-10S	CL220335-10S	300 304	247 251	.576 .576	110	106	Hyd. Hyd.	1
		2800-6700	Hot Street/Brackets. Requires aftermarket heads, 3500+ stall.					
220335-12S	CL220335-12S	300 304	247 251	.576 .576	112	108	Hyd. Hyd.	1
		2800-6800	Lopey idle, Hot Street & Bracket Racing. 10.5:1-up CR advised.					
220355-10S	CL220355-10S	304 310	251 257	.592 .592	110	106	Hyd. Hyd.	1
		3000-7000	Upper mid-range & top end power. Needs 11.0:1+ CR.					
220355-12S	CL220355-12S	304 310	251 257	.592 .592	112	108	Hyd. Hyd.	1
		3000-7000	Upper mid-range & top end power. Needs 11.0:1+ CR.					
224455-12S	CL224455-12S	306 312	253 259	.640 .640	112	108	Hyd. Hyd.	1
		3200-7200	Best with big cubic inch. Needs 11.0:1+ CR. good heads.					
229994	NA	Custom Grind Camshaft, Small Base Circle						Hyd. Hyd. 1
		Retro-Fit Hydraulic Roller Special Order Camshaft.						

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

Retro-Fit Hydraulic Roller Small Base Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91213FB	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
--	NA	--	--	--	--	--	--	--	--	--	NA	94427	94210 ¹⁹ 94310 ¹⁹

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

⁷ Requires 7/16" rocker studs.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

¹⁹ Fits factory 1-pc eccentric. For 2-pc eccentric use 94212 or 94312.

²⁵ Machining Required.

CAMSHAFTS



FORD SMALL BLOCK • 351W 1969-1996

Rattler Cams™ Retro-Fit Hydraulic Roller Camshafts for Use With Tie-Bar Style Hydraulic Roller Lifters

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
228005-09	CL228005-09	280 288 1800-5500	227 235	.560 .565	109	103	Hyd. Hyd.	1 Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.
228045-09	CL228045-09	288 296 2000-5700	235 243	.565 .565	109	103	Hyd. Hyd.	1 Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.
228085-09	CL228085-09	296 304 2400-6100	243 251	.565 .549	109	103	Hyd. Hyd.	1 Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.



FORD SMALL BLOCK • 351W 1969-1996

Retro-Fit Hydraulic Roller Camshafts for Use With Tie-Bar Style Hydraulic Roller Lifters

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
220225-12	CL220225-12	260 266 800-4200	207 213	.480 .496	112	108	Hyd. Hyd.	1 Great daily usage, smooth idle, great fuel economy.
220315-10	CL220315-10	262 266 1000-4400	209 213	.496 .496	110	106	Hyd. Hyd.	1 Improved throttle response & low end torque.
220235-10	CL220235-10	266 270 1000-4800	213 217	.517 .528	110	106	Hyd. Hyd.	1 Fair idle, good low & mid-range performance increase.
220235-12	CL220235-12	266 270 1000-5000	213 217	.517 .528	112	108	Hyd. Hyd.	1 Good idle, Off-Road & Street Performance. 9.0:1 CR advised.
222765-13	CL222765-13	270 270 1500-5500	217 217	.496 .496	113	109	Hyd. Hyd.	1 Good idle, strong low end & mid-range performance. Needs 2800+ stall.
221275-08	CL221275-08	270 278 1200-5600	217 225	.528 .533	108	104	Hyd. Hyd.	1 Good rough idle. Good torque & power. 1800+ stall.
221275-10	CL221275-10	270 278 1200-5600	217 225	.528 .533	110	106	Hyd. Hyd.	1 Good rough idle. Good torque & power. 1800+ stall.
221275-12	CL221275-12	270 278 1200-5600	217 225	.528 .533	112	108	Hyd. Hyd.	1 Good rough idle. Good torque & power. 1800+ stall.
222725-10	CL222725-10	272 272 1800-5800	219 219	.544 .544	110	106	Hyd. Hyd.	1 Fair idle, strong Street Performance. Requires 9.0+ CR, 5-speed or 2800+ stall.
221145-10	CL221145-10	272 278 2000-6000	219 225	.544 .533	110	106	Hyd. Hyd.	1 Performance Street, best used with aftermarket heads. 2500+ stall, better intake/exhaust.
221145-12	CL221145-12	272 278 2000-6000	219 225	.544 .533	112	108	Hyd. Hyd.	1 Good idle, good mid range power. Good vacuum. 9.5-10.5:1 CR, 2500+ stall.
222745-12	CL222745-12	278 278 2000-6000	225 225	.533 .533	112	108	Hyd. Hyd.	1 Best with 5-speed or 2200-2500 stall.
220245-10	CL220245-10	278 282 2000-6100	225 229	.533 .512	110	106	Hyd. Hyd.	1 Fair idle, Street/Strip. Auto OK with 2500+ stall.
220245-12	CL220245-12	278 282 2000-6100	225 229	.533 .512	112	108	Hyd. Hyd.	1 Fair idle, Street & mild Performance usage. Crisp throttle.

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

Some items are not legal for sale or use on any pollution controlled motor vehicle

FORD SMALL BLOCK • 351W 1969-1996

Rattler Cams™ Retro-Fit Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹

FORD SMALL BLOCK • 351W 1969-1996

Retro-Fit Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

⁷ Requires 7/16" rocker studs.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

¹⁹ Fits factory 1-pc eccentric. For 2-pc eccentric use 94212 or 94312.

²⁵ Machining Required.



Retro-Fit Hydraulic Roller Camshafts

for Use With Tie-Bar Style Hydraulic Roller Lifters

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
222755-08	CL222755-08	278 284 2000-6200	225 231	.533 .544	108	104	Hyd. Hyd.	1
		Noticeable idle, Street & Mild Performance usage. Crisp throttle.						
222755-12	CL222755-12	278 284 2000-6200	225 231	.533 .544	112	108	Hyd. Hyd.	1
		Fair idle, High Performance Street. Good throttle response.						
220325-08	CL220325-08	278 286 1800-6200	225 233	.560 .565	108	104	Hyd. Hyd.	1
		Choppy idle, Street performance usage. 2500+ stall.						
220325-10	CL220325-10	278 286 2000-6200	225 233	.560 .565	110	106	Hyd. Hyd.	1
		Rough idle, Street/Strip performance. Strong mid-range. 2500+ stall.						
220525-10	CL220525-10	280 286 2200-6400	227 233	.597 .597	110	106	Hyd. Hyd.	1
		Rough idle, Hot Street/Strip, excellent mid range performance. 2500+ stall, gears, intake.						
220525-12	CL220525-12	280 286 2200-6400	227 233	.597 .597	112	108	Hyd. Hyd.	1
		Good idle, good all around performance. Good vacuum. 9.5:1+ CR, 2500+ stall & gears.						
220305-08	CL220255-08	284 284 2400-6000	231 231	.544 .544	108	104	Hyd. Hyd.	1
		Choppy idle, strong low & mid range performance. 2500+ stall.						
220255-10	CL220255-10	284 288 2200-6000	231 235	.544 .565	110	106	Hyd. Hyd.	1
		Rough idle, Street/Strip performance. Great low to mid-range torque & power.						
220255-12	CL220255-12	284 288 2200-6200	231 235	.544 .565	112	108	Hyd. Hyd.	1
		Fair idle, performance usage. Great mid-range torque & horsepower.						
222735-10	CL222735-10	288 294 2200-6400	235 241	.581 .581	110	106	Hyd. Hyd.	1
		Loppy idle, Hot Street & Bracket Racing. 10.0:1-up CR advised.						
222735-12	CL222735-12	288 294 2400-6400	235 241	.581 .581	112	108	Hyd. Hyd.	1
		Loppy idle, Hot Street & Bracket Racing. 10.0:1-up CR advised.						
221815-10	CL221815-10	290 298 2500-6500	237 245	.597 .597	110	106	Hyd. Hyd.	1
		Loppy idle, Hot Street/Bracket, good mid range. 9.5-10.5:1 CR, 2800+ stall.						
220275-10	CL220275-10	294 300 2600-6600	241 247	.581 .603	110	106	Hyd. Hyd.	1
		Rough idle, Hot Street & Bracket Racing. 10.5:1-up CR advised.						
220275-12	CL220275-12	294 300 2600-6600	241 247	.581 .603	112	108	Hyd. Hyd.	1
		Rough idle, Hot Street & Bracket Racing. 10.5:1-up CR advised.						
223365-10	CL223365-10	300 300 2600-6600	247 247	.603 .603	110	106	Hyd. Hyd.	1
		Rough idle, Street/Strip, good mid range performance. 3200+ stall, good intake.						
220335-10	CL220335-10	300 304 2800-6700	247 251	.576 .576	110	106	Hyd. Hyd.	1
		Hot Street/Brackets. Requires aftermarket heads, 3500+ stall.						
220335-12	CL220335-12	300 304 2800-6800	247 251	.576 .576	112	108	Hyd. Hyd.	1
		Loppy idle, Hot Street & Bracket Racing. 10.0:1-up CR advised.						
220355-10	CL220355-10	304 310 3000-7000	251 257	.592 .592	110	106	Hyd. Hyd.	1
		Upper mid-range & top end power. Needs 11.0:1+ CR.						
220355-12	CL220335-12	304 310 3000-7000	251 257	.592 .592	112	108	Hyd. Hyd.	1
		Upper mid-range & top end power. Needs 11.0:1+ CR.						
224455-12	CL224455-12	306 312 3200-7200	253 259	.640 .640	112	108	Hyd. Hyd.	1
		Best with big cubic inch. Needs 11.0:1+ CR. good heads.						
229995	NA	Custom Grind Camshaft					Hyd. Hyd.	1
		Retro-Fit Hydraulic Roller Special Order Camshaft.						

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

FORD SMALL BLOCK • 351W 1969-1996

Retro-Fit Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91260 ³	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91260 ³	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91168 ³ 91260	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91260 ³	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91260 ³	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91260 ³	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91260 ³	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91260 ³	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91260 ³	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91260 ³	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91260 ³	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91260 ³	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
91260 ³	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95205 95010	NA	94427	94210 ¹⁹ 94310 ¹⁹
--	NA	--	--	--	--	--	--	--	--	--	NA	94427	94210 ¹⁹ 94310 ¹⁹

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

⁷ Requires 7/16" rocker studs.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

¹⁹ Fits factory 1-pc eccentric. For 2-pc eccentric use 94212 or 94312.

²⁵ Machining Required.

CAMSHAFTS



FORD SMALL BLOCK • 351W 1985-1996

Rattler Cams™ Hydraulic Roller Camshafts for OE Roller Applications

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
228005-09	CL228005-09E ⁽¹⁷⁾ CL228005-09 ⁽¹⁸⁾	280 288 1800-5500	227 235	.560 .565	109	103	Hyd. Hyd.	1,17,18 Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.
228045-09	CL228045-09E ⁽¹⁷⁾ CL228045-09 ⁽¹⁸⁾	288 296 2000-5700	235 243	.565 .565	109	103	Hyd. Hyd.	1,17,18 Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.
228085-09	CL228085-09E ⁽¹⁷⁾ CL228085-09 ⁽¹⁸⁾	296 304 2400-6100	243 251	.565 .549	109	103	Hyd. Hyd.	1,17,18 Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.



FORD SMALL BLOCK • 351W 1985-1996

Hydraulic Roller Camshafts for OE Roller Applications

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
220225-12	CL220225-12E ⁽¹⁷⁾ CL220225-12 ⁽¹⁸⁾	260 266 800-4200	207 213	.480 .496	112	108	Hyd. Hyd.	1,17,18 Great daily usage, smooth idle, great fuel economy.
220315-10	CL220315-10E ⁽¹⁷⁾ CL220315-10 ⁽¹⁸⁾	262 266 1000-4400	209 213	.496 .496	110	106	Hyd. Hyd.	1,17,18 Improved throttle response & low end torque.
220235-10	CL220235-10E ⁽¹⁷⁾ CL220235-10 ⁽¹⁸⁾	266 270 1000-4800	213 217	.517 .528	110	106	Hyd. Hyd.	1,17,18 Fair idle, good low & mid-range performance increase.
220235-12	CL220235-12E ⁽¹⁷⁾ CL220235-12 ⁽¹⁸⁾	266 270 1000-5000	213 217	.517 .528	112	108	Hyd. Hyd.	1,17,18 Good idle, Off-Road & Street Performance. 9.0:1 CR advised.
222765-13	CL222765-13E ⁽¹⁷⁾ CL222765-13 ⁽¹⁸⁾	270 270 1500-5500	217 217	.496 .496	113	109	Hyd. Hyd.	1,17,18 Good idle, strong low end & mid-range performance. Needs 2800+ stall.
221275-08	CL221275-08E ⁽¹⁷⁾ CL221275-08 ⁽¹⁸⁾	270 278 1500-5600	217 225	.528 .533	108	104	Hyd. Hyd.	1,17,18 Good rough idle. Good torque & power. 1800+ stall.
221275-10	CL221275-10E ⁽¹⁷⁾ CL221275-10 ⁽¹⁸⁾	270 278 1200-5600	217 225	.528 .533	110	106	Hyd. Hyd.	1,17,18 Good rough idle. Good torque & power. 1800+ stall.
221275-12	CL221275-12E ⁽¹⁷⁾ CL221275-12 ⁽¹⁸⁾	270 278 1200-5600	217 225	.528 .533	112	108	Hyd. Hyd.	1,17,18 Good rough idle. Good torque & power. 1800+ stall.
222725-10	CL222725-10E ⁽¹⁷⁾ CL222725-10 ⁽¹⁸⁾	272 272 1800-5800	219 219	.544 .544	110	106	Hyd. Hyd.	1,17,18 Fair idle, strong Street Performance. Requires 9.0+ CR, 5-speed or 2800+ stall.
221145-10	CL221145-10E ⁽¹⁷⁾ CL221145-10 ⁽¹⁸⁾	272 278 2000-6000	219 225	.544 .533	110	106	Hyd. Hyd.	1,17,18 Performance Street, best used with aftermarket heads. 2500+ stall, better intake/exhaust.
221145-12	CL221145-12E ⁽¹⁷⁾ CL221145-12 ⁽¹⁸⁾	272 278 2000-6000	219 225	.544 .533	112	108	Hyd. Hyd.	1,17,18 Good idle, good mid range power. Good vacuum. 9.5-10.5:1 CR, 2500+ stall.
222745-12	CL222745-12E ⁽¹⁷⁾ CL222745-12 ⁽¹⁸⁾	278 278 2000-6000	225 225	.533 .533	112	108	Hyd. Hyd.	1,17,18 Best with 5-speed or 2200-2500 stall.
220245-10	CL220245-10E ⁽¹⁷⁾ CL220245-10 ⁽¹⁸⁾	278 282 2000-6100	225 229	.533 .512	110	106	Hyd. Hyd.	1,17,18 Fair idle, Street/Strip. Auto OK with 2500+ stall.
220245-12	CL220245-12E ⁽¹⁷⁾ CL220245-12 ⁽¹⁸⁾	278 282 2000-6100	225 229	.533 .512	112	108	Hyd. Hyd.	1,17,18 Fair idle, Street & mild Performance usage. Crisp throttle.
222755-08	CL222755-08E ⁽¹⁷⁾ CL222755-08 ⁽¹⁸⁾	278 284 2000-6200	225 231	.533 .544	108	104	Hyd. Hyd.	1,17,18 Noticeable idle, Street & Mild Performance usage. Crisp throttle.

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

17 Cam & Lifter Sets with "E" suffix feature OE style (91213) lifters.

18 Cam & Lifter Sets without suffix feature tie bar lifters.

Some items are not legal for sale or use on any pollution controlled motor vehicle

FORD SMALL BLOCK • 351W 1985-1996

Rattler Cams™ Hydraulic Roller Camshafts for OE Roller Applications Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹

FORD SMALL BLOCK • 351W 1985-1996

Hydraulic Roller Camshafts for OE Roller Applications Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
91213 ³ 91168 ^{3,33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

⁷ Requires 7/16" rocker studs.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

¹⁹ Fits factory 1-pc eccentric. For 2-pc eccentric use 94212 or 94312.

²⁵ Machining Required.

³³ Tie bar style lifters.



Hydraulic Roller Camshafts for OE Roller Applications (cont.) Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
222755-12	CL222755-12E ⁽¹⁷⁾ CL222755-12 ⁽¹⁸⁾	278 284	225 231	.533 .544	112	108	Hyd. Hyd.	1,17,18
		2000-6200	Fair idle, Street & Mild Performance usage. Crisp throttle.					
220325-08	CL220325-08E ⁽¹⁷⁾ CL220325-08 ⁽¹⁸⁾	278 286	225 233	.560 .565	108	104	Hyd. Hyd.	1,17,18
		1800-6200	Choppy idle, Street performance usage. 2500+ stall.					
220325-10	CL220325-10E ⁽¹⁷⁾ CL220325-10 ⁽¹⁸⁾	278 286	225 233	.560 .565	110	106	Hyd. Hyd.	1,17,18
		2000-6200	Rough idle, Street/Strip performance. Strong mid-range. 2500+ stall.					
220525-10	CL220525-10E ⁽¹⁷⁾ CL220525-10 ⁽¹⁸⁾	280 286	227 233	.597 .597	110	106	Hyd. Hyd.	1,17,18
		2200-6400	Rough idle, Hot Street/Strip, excellent mid range performance. 2500+ stall, gears, intake.					
220525-12	CL220525-12E ⁽¹⁷⁾ CL220525-12 ⁽¹⁸⁾	280 286	227 233	.597 .597	112	108	Hyd. Hyd.	1,17,18
		2200-6400	Good idle, good all around performance. Good vacuum. 9.5:1+ CR, 2500+ stall & gears.					
220305-08	CL220305-08E ⁽¹⁷⁾ CL220305-08 ⁽¹⁸⁾	284 284	231 231	.544 .544	108	104	Hyd. Hyd.	1,17,18
		2400-6000	Choppy idle, strong low & mid range performance. 2500+ stall.					
220255-10	CL220255-10E ⁽¹⁷⁾ CL220255-10 ⁽¹⁸⁾	284 288	231 235	.544 .565	110	106	Hyd. Hyd.	1,17,18
		2200-6000	Rough idle, Street/Strip performance. Great low to mid-range torque & power.					
220255-12	CL220255-12E ⁽¹⁷⁾ CL220255-12 ⁽¹⁸⁾	284 288	231 235	.544 .565	112	108	Hyd. Hyd.	1,17,18
		2200-6200	Fair idle, performance usage. Great mid-range torque & horsepower.					
222735-10	CL222735-10E ⁽¹⁷⁾ CL222735-10 ⁽¹⁸⁾	288 294	235 241	.581 .581	110	106	Hyd. Hyd.	1,17,18
		2200-6400	Lopey idle, Hot Street & Bracket Racing. 10.0:1-up CR advised.					
222735-12	CL222735-12E ⁽¹⁷⁾ CL222735-12 ⁽¹⁸⁾	288 294	235 241	.581 .581	112	108	Hyd. Hyd.	1,17,18
		2400-6400	Lopey idle, Hot Street & Bracket Racing. 10.0:1-up CR advised.					
221815-10	CL221815-10E ⁽¹⁷⁾ CL221815-10 ⁽¹⁸⁾	290 298	237 245	.597 .597	110	106	Hyd. Hyd.	1,17,18
		2500-6500	Lopey idle, Hot Street/Bracket, good mid range. 9.5-10.5:1 CR, 2800+ stall.					
220275-10	CL220275-10E ⁽¹⁷⁾ CL220275-10 ⁽¹⁸⁾	294 300	241 247	.581 .603	110	106	Hyd. Hyd.	1,17,18
		2600-6600	Rough idle, Hot Street & Bracket Racing. 10.5:1-up CR advised.					
220275-12	CL220275-12E ⁽¹⁷⁾ CL220275-12 ⁽¹⁸⁾	294 300	241 247	.581 .603	112	108	Hyd. Hyd.	1,17,18
		2600-6600	Rough idle, Hot Street & Bracket Racing. 10.5:1-up CR advised.					
223365-10	CL223365-10E ⁽¹⁷⁾ CL223365-10 ⁽¹⁸⁾	300 300	247 247	.603 .603	110	106	Hyd. Hyd.	1,17,18
		2600-6600	Rough idle, Street/Strip, good mid range performance. 3200+ stall, good intake.					
220335-10	CL220335-10E ⁽¹⁷⁾ CL220335-10 ⁽¹⁸⁾	300 304	247 251	.576 .576	110	106	Hyd. Hyd.	1,17,18
		2800-6700	Hot Street/Brackets. Requires aftermarket heads, 3500+ stall.					
220335-12	CL220335-12E ⁽¹⁷⁾ CL220335-12 ⁽¹⁸⁾	300 304	247 251	.576 .576	112	108	Hyd. Hyd.	1,17,18
		2800-6800	Lopey idle, Hot Street & Bracket Racing. 10.0:1-up CR advised.					
220355-10	CL220355-10E ⁽¹⁷⁾ CL220355-10 ⁽¹⁸⁾	304 310	251 257	.592 .592	110	106	Hyd. Hyd.	1,17,18
		3000-7000	Upper mid-range & top end power. Needs 11.0:1+ CR.					
220355-12	CL220355-12E ⁽¹⁷⁾ CL220355-12 ⁽¹⁸⁾	304 310	251 257	.592 .592	112	108	Hyd. Hyd.	1,17,18
		3000-7000	Upper mid-range & top end power. Needs 11.0:1+ CR.					
224455-12	CL224455-12E ⁽¹⁷⁾ CL224455-12 ⁽¹⁸⁾	306 312	253 259	.640 .640	112	108	Hyd. Hyd.	1,17,18
		3200-7200	Best with big cubic inch. Needs 11.0:1+ CR. good heads.					
229995	NA	Custom Grind Camshaft					Hyd. Hyd.	1
		Retro-Fit Hydraulic Roller Special Order Camshaft.						

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

17 Cam & Lifter Sets with "E" suffix feature OE style (91213) lifters.

18 Cam & Lifter Sets without suffix feature tie bar lifters.

Some items are not legal for sale or use on any pollution controlled motor vehicle

Hydraulic Roller Camshafts for OE Roller Applications Components

	Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95203 95008	NA	94427	94210 ¹⁹ 94310 ¹⁹
	91213 ³ 91168 ^{3.33}	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	9008					

Components Notes: master note list on page 260

3 Included in Cam & Lifter Sets.

7 Requires 7/16" rocker studs.

10 10° Valve lock Angle, must use matching retainers/locks.

19 Fits factory 1-pc eccentric. For 2-pc eccentric use 94212 or 94312.

25 Machining Required.

33 Tie bar style lifters.



Mechanical Flat Tappet Camshafts

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
222342-10	CL222342-10 CL222342-10DL ⁴	265 265 2200-5800	230 230	.512 .512	110	106	.022 .022	1
		Good Street cam, broad power range. 2200+ stall recommended.						
220542-08	CL220542-08 CL220542-08DL ⁴	258 264 2000-5600	236 236	.561 .574	108	104	.018 .018	1,16,34
		Fair idle, good low to mid range performance. 9.5:1+ CR, 2500+ stall.						
221332-08	CL221332-08 CL221332-08DL ⁴	264 268 2400-6000	240 240	.574 .590	108	104	.018 .018	1,16,34
		Street/Strip, high torque with mid range & top end power. 2500+ stall.						
220102-06	CL220102-06 CL220102-06DL ⁴	275 281 2600-6200	246 246	.539 .555	106	102	.022 .022	1
		Hot Street/Brackets. Lopey idle. Needs higher CR & gears.						
220102-08	CL220102-08 CL220102-08DL ⁴	275 281 2600-6200	246 246	.539 .555	108	104	.022 .022	1
		Hot Street/Bracket. Needs 10.0+ CR, 3200+ stall & gears.						
220102-12	CL220102-12 CL220102-12DL ⁴	275 281 2500-6300	246 246	.539 .555	112	108	.022 .022	1
		Fair idle, Bracket E.T., good mid range torque & power. 11.0:1+ CR, 3500+ stall.						
221002-08	CL221002-08 CL221002-08DL ⁴	279 279 2600-6400	244 244	.544 .544	108	104	.022 .022	1
		Rough idle, super mid-range performance. Needs 11.0:1 CR-up.						
221362-06	CL221362-06 CL221362-06DL ⁴	272 280 2800-6800	252 252	.501 .501	106	102	.016 .016	1,34
		Oval Track, .500" Lift Rule, Best on tight short tracks. Low vacuum.						
222352-06	CL222352-06 CL222352-06DL ⁴	281 287 2800-6800	252 252	.549 .565	106	102	.022 .022	1
		Fair idle, Street/Strip in light car. 10.0:1 CR, 4.10 or lower gears.						
221052-08	CL221052-08 CL221052-08DL ⁴	283 283 3000-7000	248 248	.544 .544	108	104	.022 .022	1
		Street/Strip, powerful through entire rpm range.						
220642-06	CL220642-06 CL220642-06DL ⁴	278 284 3200-7200	256 256	.501 .501	106	102	.016 .016	1,16,34
		Oval Track, .500" Lift Rule, 1/4 to 3/8 mile.						
220642-08	CL220642-08 CL220642-08DL ⁴	278 284 3200-7200	256 256	.501 .501	108	104	.016 .016	1,16,34
		Oval Track, .500" Lift Rule, 1/4-3/8 mile 4bbl. Good mid range torque. 11.0-12.5:1 CR.						
222372-08	CL222372-08 CL222372-08DL ⁴	285 291 3400-7400	256 256	.560 .571	108	104	.022 .022	1
		Rough idle, needs good induction system. Good Oval Track cam.						
222372-10	CL222372-10 CL222372-10DL ⁴	285 291 3600-7600	256 256	.560 .571	110	106	.022 .022	1
		Rough idle, excellent mid-range. Needs 11.0:1+ CR, 2500+ stall & good heads.						
222362-08	CL222362-08 CL222362-08DL ⁴	289 295 3600-7400	260 260	.587 .592	108	104	.022 .022	1
		Rough idle, Bracket cam. Best with 11.0:1+ CR & 4000+ stall.						
221792-06	CL221792-06 CL221792-06DL ⁴	284 292 3800-7600	264 264	.501 .501	106	102	.016 .016	1,34
		Oval Track, .500" Lift Rule, fast banked 1/4 to 3/8 mile.						
222532-06	CL222532-06 CL222532-06DL ⁴	295 299 4000-7800	264 264	.592 .592	106	102	.022 .022	1
		Bracket Race or 3/8 to 1/2 mile Oval Track with fast corners.						
222322-08	CL222322-08 CL222322-08DL ⁴	295 303 4000-8000	268 268	.592 .587	108	104	.022 .022	1
		Rough idle, Bracket favorite. Needs 11.0:1 CR & 4000+ stall.						
222332-10	CL222332-10 CL222332-10DL ⁴	303 313 4400-8200	278 278	.587 .612	110	106	.022 .022	1
		Bracket Racer special. Super strong mid-range & top end. Great in big cubic inch.						
229992	NA	Custom Grind Camshaft Mechanical Flat Tappet Special Order Camshaft.						1

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

16 Lobes designed to take maximum advantage of .875" dia. lifter.

34 Provisions for increased oiling recommended.

Some items are not legal for sale or use on any pollution controlled motor vehicle

FORD SMALL BLOCK • 351W 1985-1996

Mechanical Flat Tappet Camshafts Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91215 ³ 91218 ⁴	NA	98436-K11	98436	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98437-K12	98437	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98437-K12	98437	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98437-K12	98437	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98437-K12	98437	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98437-K12	98437	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98437-K12	98437	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98437-K12	98437	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98437-K12	98437	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98437-K12	98437	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98437-K12	98437	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98437-K12	98437	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98437-K12	98437	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98445-K12	98445	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98437-K12	98437	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98445-K12	98445	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98445-K12	98445	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 ³ 91218 ⁴	NA	98445-K12	98445	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95015	NA	94427	94210 ¹⁹ 94310 ¹⁹
91215 91218	NA	--	--	--	--	--	--	--	--	--	NA	94427	94210 ¹⁹ 94310 ¹⁹

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

⁷ Requires 7/16" rocker studs.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

¹⁹ Fits factory 1-pc eccentric. For 2-pc eccentric use 94212 or 94312.

²⁵ Machining Required.



Steel Billet Mechanical Roller Camshafts

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
221213-08	NA	261 269 2000-6000	229 237	.592 .592	108	104	.022 .022	1,5 Noticeable idle, Street Rod Cruiser. Should have 9.0:1 CR, 2000+ stall.
221213-10	NA	261 269 2000-6000	229 237	.592 .592	110	106	.022 .022	1,5 Noticeable idle, good for Weekend Street Cruiser. Should have 9.0:1 CR, 2000+ stall.
221203-08	NA	269 269 2200-6400	237 237	.592 .592	108	104	.022 .022	1,5 Rough idle, Street/mild Strip. Good lower mid range. 9.5:1 CR, 2500+ stall.
221203-10	NA	269 269 2200-6400	237 237	.592 .592	110	106	.022 .022	1,5 Rough idle, Street Performance/mild Strip. Recommend 9.5:1 CR, 2500+ stall.
220183-08	NA	269 275 2200-6200	237 243	.592 .592	108	104	.022 .022	1,5 Mild rough idle, Weekend Cruiser/mild Strip. 2500+ stall recommended.
220183-10	NA	269 275 2200-6200	237 243	.592 .592	110	106	.022 .022	1,5 Mild rough idle, Weekend Cruiser/Power Tour favorite. 2500+ stall recommended.
220173-06	NA	275 281 2400-6500	243 249	.592 .600	106	102	.022 .022	1,5 Lopey idle, Strong low to mid range torque. 10.0:1+ CR, 2500+ stall.
220173-08	NA	275 281 2400-6400	243 249	.592 .600	108	104	.022 .022	1,5 Rough idle, Strong low to mid range power band. 10.0:1+ CR, 2500+ stall.
221313-10	NA	277 277 2600-6200	245 245	.624 .624	110	106	.022 .022	1,5 Nice idle. Strong low & mid-range.
221113-08	NA	277 285 2600-6500	245 253	.624 .624	108	104	.022 .022	1,5 Lopey idle. Strong mid-range. 10.0:1+ CR.
221013-06	NA	285 291 2800-6600	253 259	.624 .624	106	102	.022 .022	1,5 Heavy Bracket or 1/4-3/8 mile Oval Track, Good mid range torque. 11.0-12.5:1 CR.
221013-08	NA	285 291 2800-6600	253 259	.624 .624	108	104	.022 .022	1,5 Lopey idle. Strong mid-range with top end increase.
220593-06	NA	285 291 2800-6600	253 259	.683 .683	106	102	.022 .022	1,5 Good mid-range horsepower, rough idle. Needs 11.0:1 CR-up.
221133-06	NA	287 299 2900-6800	255 267	.640 .640	106	102	.022 .022	1,5 Strong mid & upper rpm, banked Oval Track & Brackets w/auto trans.
221133-08	NA	287 299 2900-6800	255 267	.640 .640	108	104	.022 .022	1,5 Mid to upper range horsepower & torque. 11.0:1+ Good heads.
222313-06	NA	291 295 3400-7200	259 263	.624 .656	106	102	.022 .022	1,5 Oval Track 1/4-3/8 mile. Good mid to upper torque & power. 2bbl. or 4bbl. carb.
222313-08	NA	291 295 3400-7200	259 263	.624 .656	108	104	.022 .022	1,5 Rough idle, Bracket E.T., good mid range. 11.5:1+ CR, 3500+ stall.
222123-06	NA	291 299 3400-7400	259 267	.683 .672	106	102	.022 .022	1,5 Oval Track 3/8-1/2 mile. Good mid to upper torque & power. Best with 4bbl. carb.
222123-08	NA	291 299 3400-7400	259 267	.683 .672	108	104	.022 .022	1,5 Bracket/Pro/Super Pro, good mid to upper range power. 12.0:1+, 3800+ stall.
221173-06	NA	295 299 3800-7600	263 267	.683 .672	106	102	.022 .022	1,5 Strong mid & upper range horsepower. 11.0:1+ Good heads.
221613-06	NA	299 303 4200-7800	267 271	.672 .667	106	102	.022 .022	1,5 Competition use, good mid & upper HP, needs good heads & compression.
221613-08	NA	299 303 4200-7800	267 271	.672 .667	108	104	.022 .022	1,5 Long Oval Track or Bracket E.T. Drag, good upper rpm horsepower. 12.5:1 CR.
221223-08	NA	301 305 4200-8000	269 273	.720 .688	108	104	.022 .022	1,5 Competition use, good mid & upper power.
221223-10	NA	301 305 4200-8000	269 273	.720 .688	110	106	.022 .022	1,5 Bracket/Competition, good upper end torque & power. 12.0:1+ CR, race converter.

Cam Notes: master note list on page 260

- 1 Stock (O.E.) valve springs cannot be used.
- 5 Requires upgraded distributor gear.

Some items are not legal for sale or use on any pollution controlled motor vehicle

FORD SMALL BLOCK • 351W 1985-1996

Steel Billet Mechanical Roller Camshafts Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91250 91217 ³²	NA	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91250 91217 ³²	NA	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91250 91217 ³²	NA	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91250 91217 ³²	NA	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91250 91217 ³²	NA	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91250 91217 ³²	NA	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91250 91217 ³²	NA	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91217 91234	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91217 91234	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91217 91234	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91217 91234	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91217 91234	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91217 91234	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91217 91234	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹

Components Notes: master note list on page 260

⁷ Requires 7/16" rocker studs.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

¹⁹ Fits factory 1-pc eccentric. For 2-pc eccentric use 94212 or 94312.

²⁵ Machining Required.

³² These lifters are not recommended for street use.

CAMSHAFTS



FORD SMALL BLOCK • 351W 1969-1996

Steel Billet Mechanical Roller Camshafts (cont.)

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
221123-08	NA	299 307 4200-8000	267 275	.672 .661	108	104	.022 .022	1,5 <i>Strong upper horsepower. 11.5:1+ Good heads & induction, 4500+ stall.</i>
221813-06	NA	301 309 4400-8400	269 277	.693 .661	106	102	.022 .022	1,5 <i>Rough idle, Competition, Great upper rpm torque. 12.0:1+ CR, 4500+ stall.</i>
221813-08	NA	301 309 4400-8600	269 277	.693 .661	108	104	.022 .022	1,5 <i>Competition, good upper rpm torque & horsepower. 12.0:1+ CR & race converter.</i>
221863-06	NA	301 309 4400-8400	269 277	.720 .693	106	102	.022 .022	1,5 <i>Competition, good upper mid to top end torque. 12.0:1+ CR & race converter.</i>
221863-08	NA	301 309 4400-8600	269 277	.720 .693	108	104	.022 .022	1,5 <i>Super Pro/Bracket, good upper rpm torque & horsepower. 12.0:1+ CR & race converter.</i>
221863-10	NA	301 309 4500-8800	269 277	.720 .693	110	106	.022 .022	1,5 <i>Good mid range power with top end pull. 12.0:1+ CR & race converter.</i>
221083-08	NA	307 315 4800-8600	275 283	.688 .672	108	104	.022 .022	1,5 <i>Strong upper horsepower. 11.5:1+ Good heads.</i>
221083-10	NA	307 315 4800-8600	275 283	.688 .672	110	106	.022 .022	1,5 <i>Competition profile, good top end power. Needs good parts.</i>
221093-12	NA	313 331 5000-8400	281 299	.779 .763	112	108	.022 .022	1,5 <i>Large cubic inch, all out Competition. Best of everything. Works good w/NOS.</i>
229993	NA	Custom Grind Camshaft <i>Mechanical Roller Special Order Camshaft.</i>						1,5



FORD SMALL BLOCK • 351W 1969-1996



Big Bottle Cams™ - Nitrous Oxide Mechanical Roller Cams

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
221133-12	NA	287 299 3000-6800	255 267	.640 .640	112	108	.022 .022	1,5 <i>Fair idle, Performance/Strip with plate system. Great mid range. 11.5:1+ CR, 3500+ stall.</i>
220373-12	NA	295 305 3800-7200	263 273	.672 .688	112	108	.022 .022	1,5 <i>Rough idle, Street/Bracket with manifold system. Good upper rpm. 11.5:1+ CR, 4000+.</i>
220673-12	NA	299 309 4200-8000	267 277	.688 .693	112	108	.022 .022	1,5 <i>Competition with large plate system. Good mid to upper range. 12.0:1+ CR.</i>
220793-12	NA	305 319 4400-8400	273 287	.725 .693	112	108	.022 .022	1,5 <i>Best with larger cubic inch, large plate or plumbed system. 12.0:1+ CR, 4500+ stall.</i>
220793-14	NA	305 319 4400-8400	273 287	.725 .693	114	110	.022 .022	1,5 <i>Large stroker with multi stage system. 12.0:1+ CR, 4500+ stall.</i>
220393-14	NA	309 323 4600-8600	277 291	.720 .720	114	110	.022 .022	1,5 <i>Great with big stroke combinations. Large multi stage system. 12.5:1+ CR.</i>
221073-14	NA	313 327 4600-8600	281 295	.779 .763	114	110	.022 .022	1,5 <i>Big stroker, big heads, big multi stage system.</i>
221093-12	NA	313 331 5000-8400	281 299	.779 .763	112	108	.022 .022	1,5 <i>Large cubic inch, all out Competition. Best of everything. Works good w/NOS.</i>
229993	NA	Custom Grind Camshaft <i>Mechanical Roller Special Order Camshaft.</i>						1,5

Cam Notes: master note list on page 260

- 1 Stock (O.E.) valve springs cannot be used.
- 5 Requires upgraded distributor gear.

Some items are not legal for sale or use on any pollution controlled motor vehicle

FORD SMALL BLOCK • 351W 1985-1996

Steel Billet Mechanical Roller Camshafts Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91217 91234	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91288 91240	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
--	NA	--	--	--	--	--	--	--	--	--	NA	94425 94427	94310 ¹⁹

FORD SMALL BLOCK • 351W 1985-1996

Steel Billet Mechanical Roller Camshafts Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91217 91234	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91217 91234	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91234 91288	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91288 91240	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91288 91240	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91288 91240	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91288 91240	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
91288 91240	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90080 90081 ⁷	90200 90201 ⁷	95007	NA	94425 94427	94310 ¹⁹
--	NA	--	--	--	--	--	--	--	--	--	NA	94425 94427	94310 ¹⁹

Components Notes: master note list on page 260

⁷ Requires 7/16" rocker studs.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

¹⁹ Fits factory 1-pc eccentric. For 2-pc eccentric use 94212 or 94312.

²⁵ Machining Required.

CAMSHAFTS



FORD SMALL BLOCK CLEVOR • 351W WITH CLEVELAND HEADS 1969-1996

Steel Billet Mechanical Roller Camshafts

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.73 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
223133-08	NA	289 299 3000-7200	257 267	.692 .692	108	104	.022 .022	1,5
Rough idle, good mid range to upper rpm. 10.0:1+ CR, 3500+ stall.								
223403-10	NA	295 303 3600-7400	263 271	.727 .721	110	106	.022 .022	1,5
Rough idle, good upper rpm. 11.5:1+ CR, 4000+ stall.								
223123-08	NA	299 307 3800-7600	267 275	.727 .715	108	104	.022 .022	1,5
Rough idle, good mid range to upper rpm. 11.0:1+ CR, 4500+ stall.								
223283-10	NA	307 315 4200-8000	275 283	.744 .727	110	106	.022 .022	1,5
Rough idle, strong upper mid range to top end power. 12.5:1+ CR, good exhaust.								
223283-12	NA	307 315 4200-8000	275 283	.744 .727	112	108	.022 .022	1,5
Rough idle, best in large cubic inch, great top end. 12.0:1+ CR, good exhaust.								
229993	NA	Custom Grind Camshaft Mechanical Roller Special Order Camshaft.						1,5



FORD CLEVELAND/M • 351C-351M-400 1970-1983

Max Certified™ Hydraulic Flat Tappet Cam & Lifter Sets - 5 Year No Fault Warranty (see page 3 for details)

Cam & Lifter Set Part No.	Cam & Direct Lube Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.73 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
MC231031-10	MC231031-10DL ⁴	267 267 1600-5000	213 213	.496 .496	110	106	Hyd. Hyd.	1
Fair idle, good low & mid-range torque. Needs 4 bbl. & headers.								
MC230041-12	MC230041-12DL ⁴	279 289 2400-6400	225 235	.536 .542	112	108	Hyd. Hyd.	1
Loppy idle, moderate performance. Higher CR is recommended.								



FORD CLEVELAND/M • 351C-351M-400 1970-1983

American Muscle™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.73 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
237211-15	CL237211-15	270 290 1000-4800	206 221	.481 .490	115	120	Hyd. Hyd.	1
Near duplicate of the Ford 300HP/351C cam (FMC #D2ZZ-6250-B).								

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

4 Direct Lube Lifters Included in Cam & "Direct Lube" Lifter (DL) Sets.

5 Requires upgraded distributor gear.

Some items are not legal for sale or use on any pollution controlled motor vehicle

FORD SMALL BLOCK CLEVOR • 351W WITH CLEVELAND HEADS 1969-1996

Steel Billet Mechanical Roller Camshafts Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91217 91234	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90083	NA	NA	NA	NA	94310 ¹⁹
91234 91288	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90083	NA	NA	NA	NA	94310 ¹⁹
91234 91288	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90083	NA	NA	NA	NA	94310 ¹⁹
91234 91288	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90083	NA	NA	NA	NA	94310 ¹⁹
91234 91288	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90083	NA	NA	NA	NA	94310 ¹⁹
--	NA	--	--	--	--	--	--	--	--	--	NA	94425 94427	94310 ¹⁹

FORD CLEVELAND/M • 351C-351M-400 1970-1983

Max Certified™ Hydraulic Flat Tappet Cam & Lifter Set Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91211 ³ 91216 ⁴	NA	98515-K11	98515	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91211 ³ 91216 ⁴	NA	98515-K11	98515	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320

FORD CLEVELAND/M • 351C-351M-400 1970-1983

American Muscle™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91211 ³ 91216	NA	98515-K11	98515	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

⁴ Direct Lube Lifters Included in Cam & "Direct Lube" Lifter (DL) Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

¹⁹ Fits factory 1-pc eccentric. For 2-pc eccentric use 94212 or 94312.

²⁵ Machining Required.

CAMSHAFTS



FORD CLEVELAND/M • 351C-351M-400 1970-1983

Street Force™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.73 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
230011-12	CL230011-12	259 269 1200-4600	205 215	.484 .513	112	108	Hyd. Hyd.	1
Street Force™ 1, Good idle, Mild Street performance, strong low end torque.								
230021-12	CL230021-12	269 279 1600-5400	215 225	.513 .536	112	106	Hyd. Hyd.	1
Street Force™ 2, Good idle & throttle response. Needs 4 barrel & good exhaust.								
230041-12	CL230041-12	279 289 2200-5800	225 235	.536 .542	112	108	Hyd. Hyd.	1
Street Force™ 3, Noticeable idle, Hot Street & mild Bracket Racing.								



FORD CLEVELAND/M • 351C-351M-400 1970-1983

Rattler Cams™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.73 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
238001-09	CL238001-09	281 289 1800-5600	227 235	.554 .562	109	103	Hyd. Hyd.	1
Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.								
238041-09	CL238041-09	289 297 2000-5900	235 243	.562 .554	109	103	Hyd. Hyd.	1
Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.								
238101-09	CL238101-09	297 305 2400-6200	243 251	.553 .571	109	103	Hyd. Hyd.	1
Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.								



FORD CLEVELAND/M • 351C-351M-400 1970-1983

Hydraulic Flat Tappet Camshafts

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.73 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
232171-11	CL232171-11	263 263 1400-4800	209 209	.484 .484	111	107	Hyd. Hyd.	1
Smooth idle, good fuel economy. Great RV & Towing cam.								
231031-10	CL231031-10	267 267 1600-5000	213 213	.496 .496	110	106	Hyd. Hyd.	1
Fair idle, good low & mid-range torque. Needs 4 bbl. & headers.								
230931-10	CL230931-10	269 269 1800-5200	215 215	.513 .513	110	105	Hyd. Hyd.	1
Strong low & mid-range, fuel efficiency & driveability.								
230991-08	CL230991-08	267 267 2000-5600	220 220	.587 .587	108	104	Hyd. Hyd.	1,16
Good low & mid-range horsepower. Needs 4 barrel & headers.								
230961-08	CL230961-08	281 281 2400-6000	227 227	.542 .542	108	104	Hyd. Hyd.	1
Fair idle, strong mid-range, works best w/aftermarket dual plane.								
232141-10	CL232141-10	285 289 2600-6200	231 235	.554 .542	110	106	Hyd. Hyd.	1
Lopey idle, strong mid range. Good throttle response. 2400+ stall.								
232601-08	CL232601-08	283 287 2800-6400	236 240	.631 .640	108	104	Hyd. Hyd.	1,16
Lopey idle, good mid-range power. Needs 3200+ stall.								

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

16 Lobes designed to take maximum advantage of .875" dia. lifter.

Some items are not legal for sale or use on any pollution controlled motor vehicle

FORD CLEVELAND/M • 351C-351M-400 1970-1983

Street Force™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91211 ³ 91216	NA	98515-K11	98515	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91211 ³ 91216	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91211 ³ 91216	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320

FORD CLEVELAND/M • 351C-351M-400 1970-1983

Rattler Cams™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91211 ³ 91212	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91211 ³ 91212	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91211 ³ 91212	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320

FORD CLEVELAND/M • 351C-351M-400 1970-1983

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91211 ³ 91212	NA	98515-K11	98515	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91211 ³ 91212	NA	98515-K11	98515	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91211 ³ 91212	NA	98515-K11	98515	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91211 ³ 91212	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91211 ³ 91212	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91211 ³ 91212	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91211 ³ 91212	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

CAMSHAFTS



FORD CLEVELAND/M • 351C-351M-400 1970-1983

Hydraulic Flat Tappet Camshafts (cont.)

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.73 Rockers		Lobe Separation	Intake	Valve Lash	Cam Notes		
		IN	EX	IN	EX	IN	EX	Angle	Centerline	IN	EX		
231721-08	CL231721-08	287	293	240	246	.640	.649	108	104	Hyd.	Hyd.	1,16	
		3000-6600 Hot Street/Mild Brackets. Needs 10.0:1+ CR, headers & 3000+ stall.											
231721-10	CL231721-10	287	293	240	246	.640	.649	110	106	Hyd.	Hyd.	1,16	
		3000-6600 Lopey idle, Street/Strip, broad mid range power. 9.5:1+ CR, 2800+ stall, headers & gears.											
232531-08	CL232531-08	297	307	243	253	.585	.606	108	104	Hyd.	Hyd.	1	
		3200-6800 Pro Street/Brackets, Strong mid & upper end power. 10.0:1+ CR, 3200+ stall.											
232531-10	CL232531-10	297	307	243	253	.585	.606	110	106	Hyd.	Hyd.	1	
		3200-6800 Hot Street/Brackets, Strong mid & upper end power. 10.0:1+ CR, 3200+ stall.											
231541-08	CL231541-08	295	301	248	254	.655	.675	108	104	Hyd.	Hyd.	1,16	
		3400-7000 Rough idle, great mid range acceleration and power. 3500+ CR, 10.5:1 CR.											
231541-10	CL231541-10	295	301	248	254	.655	.675	110	106	Hyd.	Hyd.	1,16	
		3400-7000 Lopey idle, Hot Street/Strip, strong mid range & top end torque & horsepower.											
239991	NA	Custom Grind Camshaft									Hyd.	Hyd.	1
		Hydraulic Flat Tappet Special Order Camshaft.											



FORD CLEVELAND/M • 351C-351M-400 1970-1983



Rattler Cams™ Retro-Fit Hydraulic Roller Camshafts

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.73 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
238025-09	CL238025-09	280 288 1800-5600	227 235	.565 .565	109	103	Hyd. Hyd.	1
Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.								
238045-09	CL238045-09	288 296 2000-5900	235 243	.611 .611	109	103	Hyd. Hyd.	1
Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.								
238085-09	CL238085-09	296 304 2400-6200	243 251	.611 .594	109	103	Hyd. Hyd.	1
Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.								

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

16 Lobes designed to take maximum advantage of .875" dia. lifter.

Some items are not legal for sale or use on any pollution controlled motor vehicle

FORD CLEVELAND/M • 351C-351M-400 1970-1983

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91211 ³ 91212	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91211 ³ 91212	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91211 ³ 91212	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91211 ³ 91212	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91211 ³ 91212	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91211 ³ 91212	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91211 91212	NA	--	--	--	--	--	--	--	--	--	NA	NA	94320

FORD CLEVELAND/M • 351C-351M-400 1970-1983

Rattler Cams™ Retro-Fit Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91168 ³ 91260	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95205	NA	NA	94320
91168 ³ 91260	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95205	NA	NA	94320
91168 ³ 91260	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95205	NA	NA	94320

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

CAMSHAFTS



FORD CLEVELAND/M • 351C-351M-400 1970-1983

Retro-Fit Hydraulic Roller Camshafts

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.73 Rockers		Lobe Separation	Intake	Valve Lash	Cam Notes	
		IN	EX	IN	EX	IN	EX	Angle	Centerline	IN	EX	
233215-10	CL233215-10	270	278	217	225	.571	.577	110	106	Hyd.	Hyd.	1
1600-5600 Mild idle, great all around Street, good low end torque & horsepower.												
230245-10	CL230245-10	278	282	225	229	.576	.600	110	106	Hyd.	Hyd.	1
2000-6000 Mild lopey idle, Street/Mild Bracket, good low to mid range power. 9.5:1+ CR.												
230245-12	CL230245-12	278	282	225	229	.576	.600	112	108	Hyd.	Hyd.	1
2000-6000 Fair idle, Street High Performance, good low to mid range torque. 9.5:1+ CR, 2000+ stall.												
231175-10	CL231175-10	286	294	233	241	.594	.611	110	106	Hyd.	Hyd.	1
2800-6400 Fair idle, Street/Strip, great power range. 3000+ stall, 10.0:1+ CR.												
231175-12	CL231175-12	286	294	233	241	.594	.611	112	108	Hyd.	Hyd.	1
2800-6400 Rough idle, Street/Bracket, good mid range torque & upper end horsepower. 3200+ stall.												
230335-10	CL230335-10	300	304	247	251	.623	.623	110	106	Hyd.	Hyd.	1
3400-7000 Fair idle, Street/Strip, good mid range power. 11.5:1+ CR, 3500+ stall												
239995	NA	Custom Grind Camshaft								Hyd.	Hyd.	1
Retro-Fit Hydraulic Roller Special Order Camshaft.												



FORD CLEVELAND/M • 351C-351M-400 1970-1983

Mechanical Flat Tappet Camshafts

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.73 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
232342-08	CL232342-08 CL232342-08DL ⁴	265 265 2000-6000	230 230	.554 .554	108	104	.022 .022	1
Fair idle, Street/Strip, excellent mid range performance. 3000+ stall.								
232342-10	CL232342-10 CL232342-10DL ⁴	265 265 2000-6200	230 230	.554 .554	110	106	.022 .022	1
Good Street cam, broad power range. 2200+ stall recommended.								
231332-08	CL231332-08 CL231332-08DL ⁴	264 268 2400-6400	236 240	.621 .638	108	104	.022 .022	1,16
Mild lopey idle, Street/Strip, great mid range. 9.5:1+ CR, 2800+ stall & headers.								
232182-06	CL232182-06 CL232182-06DL ⁴	279 287 2800-6800	244 252	.588 .611	106	104	.022 .022	1
Rough idle, super mid-range performance. Needs 10.5:1+ CR.								
232372-10	CL232372-10 CL232372-10DL ⁴	285 291 3200-7200	250 256	.606 .617	110	106	.022 .022	1
Pro Street/Bracket cam. Requires 3500+ stall, 10.5:1+ CR.								
232362-08	CL232362-08 CL232362-08DL ⁴	287 295 3400-7500	252 260	.629 .640	108	104	.022 .022	1
Rough idle, strong mid-range performance.								
232192-08	CL232192-08 CL232192-08DL ⁴	295 295 3600-7600	260 260	.640 .640	108	104	.022 .022	1
Pro Street/Bracket, strong top end, 3500+ stall, 11.0:1+ CR.								
232322-08	CL232322-08 CL232322-08DL ⁴	295 303 3800-7800	260 268	.640 .634	108	104	.022 .022	1
Lopey idle, Pro Street/Bracket, 4000+ stall, 11.0:1+ CR.								
232332-10	CL232332-10 CL232332-10DL ⁴	303 313 4400-8000	268 278	.634 .661	110	106	.022 .022	1
Rough idle, E.T. Brackets, strong mid to top end. 4500+ stall.								
239992	NA	Custom Grind Camshaft						1
Mechanical Flat Tappet Special Order Camshaft.								

Cam Notes: master note list on page 260

¹ Stock (O.E.) valve springs cannot be used.

¹⁶ Lobes designed to take maximum advantage of .875" dia. lifter.

Some items are not legal for sale or use on any pollution controlled motor vehicle

FORD CLEVELAND/M • 351C-351M-400 1970-1983

Retro-Fit Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91168 ³ 91260	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95205	NA	NA	94320
91168 ³ 91260	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95205	NA	NA	94320
91168 ³ 91260	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95205	NA	NA	94320
91168 ³ 91260	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95205	NA	NA	94320
91168 ³ 91260	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95205	NA	NA	94320
91168 ³ 91260	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95205	NA	NA	94320
--	NA	--	--	--	--	--	--	--	--	--	NA	NA	94320

FORD CLEVELAND/M • 351C-351M-400 1970-1983

Mechanical Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91215 ³ 91218 ⁴	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91215 ³ 91218 ⁴	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91215 ³ 91218 ⁴	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91215 ³ 91218 ⁴	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91215 ³ 91218 ⁴	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91215 ³ 91218 ⁴	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91215 ³ 91218 ⁴	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91215 ³ 91218 ⁴	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91215 ³ 91218 ⁴	NA	98636-K11	98636	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91215 91218	NA	--	--	--	--	--	--	--	NA	--	NA	NA	94320

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

CAMSHAFTS



FORD CLEVELAND/M • 351C-351M-400 1970-1983

Mechanical Roller Camshafts

Firing Order: 1•3•7•2•6•5•4•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.73 Rockers		Lobe Separation	Intake	Valve Lash	Cam Notes	
		IN	EX	IN	EX	IN	EX	Angle	Centerline	IN	EX	
230173-08	NA	275	279	243	247	.640	.657	108	104	.022	.022	1,5
		2600-6600	Mild rough idle, Street/Strip, low to mid range performance. 3000+ stall.									
231313-08	NA	277	277	245	245	.675	.675	108	104	.022	.022	1,5
		2800-6700	Lopey idle. Excellent mid range power band. Needs low gears, 3200+ stall.									
231733-08	NA	281	289	249	257	.675	.692	108	104	.022	.022	1,5
		3000-6800	Rough idle, Hot Street/Bracket, good mid range torque & horsepower. 3500+ stall.									
231133-08	NA	289	299	257	267	.692	.692	108	104	.022	.022	1,5
		3400-7000	Rough idle, Mid to upper range horsepower & torque. 11.0:1+ Good heads.									
230073-08	NA	295	295	263	263	.709	.709	108	104	.022	.022	1,5
		3800-7400	Rough idle, E.T. Brackets, strong mid to top end. 4000+ stall, headers & good intake.									
231123-08	NA	299	307	267	275	.727	.715	108	104	.022	.022	1,5
		4000-7800	Rough idle, Good mid to upper range horsepower. 4000+ stall, headers & good intake.									
231193-06	NA	305	315	273	283	.744	.727	106	102	.022	.022	1,5
		4200-8000	Rough idle, Super Gas, Great top end. 12.0:1+ CR, 4500+ stall & good exhaust.									
239993	NA	Custom Grind Camshaft										1,5
		Mechanical Roller Special Order Camshaft.										



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Max Certified™ Hydraulic Flat Tappet Cam & Lifter Sets - 5 Year No Fault Warranty (see page 3 for details)

Cam & Lifter Set Part No.	Cam & Direct Lube Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.75 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
MC250021-11	NA	263 263 1000-4400	209 209	.490 .490	111	107	Hyd. Hyd.	1 Smooth idle, increased low end torque. Great in PUs or other heavy vehicles.
MC250031-12	NA	267 277 1400-5200	213 223	.525 .525	112	108	Hyd. Hyd.	1 Good idle. Excellent Street Performance dual pattern cam.



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American Muscle™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•5•4•2•6•3•7•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.75 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
257951-10	CL257951-10	270 270 800-4000	186 186	.406 .406	110	108	Hyd. Hyd.	1 Near duplicate of the Ford 300HP/390 cam (FMC #C0AZ-6250-A).
257611-10	CL257611-10	256 256 1000-4400	200 200	.438 .438	110	108	Hyd. Hyd.	1 Near duplicate of the Ford 345HP/428 cam (FMC #C6AZ-6250-A).
257711-15	CL257711-15	288 308 1100-4800	206 220	.487 .496	115	105	Hyd. Hyd.	1 Near duplicate of the Ford 390 GT 335HP/390 cam (FMC #C6OZ-6250-B).

Cam Notes: master note list on page 260

- 1 Stock (O.E.) valve springs cannot be used.
- 5 Requires upgraded distributor gear.

Some items are not legal for sale or use on any pollution controlled motor vehicle

FORD CLEVELAND/M • 351C-351M-400 1970-1983

Mechanical Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91250 91219	NA	NA	98732 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91219 91234	NA	NA	98732 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91219 91234	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91219 91234	NA	NA	98732 ²⁵ 98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91234 91278	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91234 91278	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
91278 91245	NA	NA	98844 ²⁵	97130 ¹⁰	97222 ¹⁰	93017 ¹⁰	93316 ²⁵	90083	NA	95016	NA	NA	94320
--	NA	--	--	--	--	--	--	--	NA	--	NA	NA	94320

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Max Certified™ Hydraulic Flat Tappet Cam & Lifter Set Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91251 ³	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	NA	NA	NA	NA	NA	94325
91251 ³	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	NA	NA	NA	NA	NA	94325

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American Muscle™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91251 ³	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	NA	NA	NA	NA	NA	94325
91251 ³	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	NA	NA	NA	NA	NA	94325
91251 ³	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	NA	NA	NA	NA	NA	94325

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

CAMSHAFTS



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Street Force™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•5•4•2•6•3•7•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.75 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
250011-12	CL250011-12	259 269 1000-4400	205 215	.490 .519	112	107	Hyd. Hyd.	1
Street Force™ 1, Good idle, Mild Street performance, strong low end torque.								
252461-12	CL252461-12	269 279 1600-5400	215 225	.519 .543	112	108	Hyd. Hyd.	1,13
Street Force™ 2, Good idle & throttle response. Needs 4 barrel & good exhaust.								
250041-12	CL250041-12	277 289 2000-5400	223 235	.543 .548	112	108	Hyd. Hyd.	1,13
Street Force™ 3, Noticeable idle, Hot Street & mild Bracket Racing.								



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Rattler Cams™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•5•4•2•6•3•7•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.75 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
258021-09	CL258001-09	281 289 1800-5200	227 235	.548 .548	109	103	Hyd. Hyd.	1,13
Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.								
258051-09	CL258051-09	289 297 2000-5400	235 243	.548 .548	109	103	Hyd. Hyd.	1,13
Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.								
258111-09	CL258111-09	297 305 2400-5600	243 251	.548 .548	109	103	Hyd. Hyd.	1,13
Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.								



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Hydraulic Flat Tappet Camshafts

Firing Order: 1•5•4•2•6•3•7•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.75 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
250021-11	CL250021-11	263 263 1200-4600	209 209	.490 .490	111	107	Hyd. Hyd.	1
Smooth idle, increased low end torque. Great in PUs.								
251021-11	CL251021-11	267 267 1400-4600	213 213	.502 .502	111	107	Hyd. Hyd.	1
Fair idle, good all-around performance. Good torque.								
250931-10	CL250931-10	269 269 1400-5000	215 215	.519 .519	110	106	Hyd. Hyd.	1,13
Good idle, increased torque. Great all around performance.								
250031-12	CL250031-12	267 277 1400-5200	213 223	.525 .525	112	108	Hyd. Hyd.	1
Good idle. Excellent Street Performance dual pattern cam.								
252201-10	CL252201-10	273 273 1800-5200	219 219	.502 .502	110	106	Hyd. Hyd.	1
Good low & mid-range horsepower. Needs 4 barrel & headers.								
250051-10	CL250051-10	289 289 2400-6000	235 235	.548 .548	110	106	Hyd. Hyd.	1,13
Rough idle, Hot Street/Bracket. Big mid-range torque. Needs 2500+ stall.								
252441-10	CL252441-10	291 295 2600-6200	237 241	.569 .548	110	106	Hyd. Hyd.	1,13
Dual purpose Street/Strip, strong mid range to top end torque & horsepower.								

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

13 Requires adjustable valvetrain.

Some items are not legal for sale or use on any pollution controlled motor vehicle

FORD FE • 352-428 1963-1977

Street Force™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91251 ³	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	NA	NA	NA	NA	NA	94325
91251 ³	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	NA	NA	NA	NA	NA	94325
91251 ³	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	NA	NA	NA	NA	NA	94325

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Rattler Cams™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91251 ³	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	NA	NA	NA	NA	NA	94325
91251 ³	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	NA	NA	NA	NA	NA	94325
91251 ³	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	NA	NA	NA	NA	NA	94325

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Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91251 ³	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	NA	NA	NA	NA	NA	94325
91251 ³	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	NA	NA	NA	NA	NA	94325
91251 ³	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	NA	NA	NA	NA	NA	94325
91251 ³	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	NA	NA	NA	NA	NA	94325
91251 ³	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	NA	NA	NA	NA	NA	94325
91251 ³	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	NA	NA	NA	NA	NA	94325

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

²⁵ Machining Required.

CAMSHAFTS



FORD FE • 352-428 1963-1977

Hydraulic Flat Tappet Camshafts (cont.)

Firing Order: 1•5•4•2•6•3•7•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.75 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
252441-12	CL252441-12	291 295 2600-6200	237 241	.569 .548	112	108	Hyd. Hyd.	1,13 <i>Fair idle, Street Performance, good mid range horsepower. 10.0-11.5:1 suggested.</i>
250981-10	CL250981-10	295 295 3000-6400	241 241	.548 .548	110	106	Hyd. Hyd.	1,13 <i>Rough idle, runs strong 3,500 rpm up, needs compression. Needs headers.</i>
252531-10	CL252531-10	297 307 3400-6600	243 253	.592 .618	110	106	Hyd. Hyd.	1,13 <i>Lopey idle, good mid-range power. Needs 3200+ stall.</i>
250061-10	CL250061-10	301 301 3400-6700	247 247	.595 .595	110	106	Hyd. Hyd.	1,13 <i>Pro Street/Brackets, Strong mid & upper end power. 10.0:1+ CR.</i>
259991	NA	Custom Grind Camshaft <i>Hydraulic Flat Tappet Special Order Camshaft.</i>					Hyd. Hyd.	1,13



FORD FE • 352-428 1963-1977

Rattler Cams™ Retro-Fit Hydraulic Roller Camshafts

Firing Order: 1•5•4•2•6•3•7•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.75 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
258025-09	CL258025-09	280 288 1800-5200	227 235	.572 .572	109	103	Hyd. Hyd.	1 <i>Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.</i>
258045-09	CL258045-09	288 296 2000-5400	235 243	.618 .618	109	103	Hyd. Hyd.	1 <i>Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.</i>
258085-09	CL258085-09	296 304 2400-5600	243 251	.618 .601	109	103	Hyd. Hyd.	1 <i>Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.</i>



FORD FE • 352-428 1963-1977

Retro-Fit Hydraulic Roller Camshafts

Firing Order: 1•5•4•2•6•3•7•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.75 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
250705-10	CL250705-10	272 278 1800-5400	219 225	.525 .525	110	106	Hyd. Hyd.	1,13 <i>Fair idle, High Performance Street, good mid range torque.</i>
253745-10	CL253745-10	280 286 2000-5600	227 233	.525 .525	110	106	Hyd. Hyd.	1,13 <i>Mild lopey idle, Street/Strip, strong mid range horsepower.</i>
253385-10	CL253385-10	288 294 2400-5800	235 241	.560 .560	110	106	Hyd. Hyd.	1,13 <i>Rough idle, Excellent mid range & upper end power. Best with good heads, 2500+ stall.</i>
253655-10	CL253655-10	299 299 2800-6000	245 245	.586 .586	110	106	Hyd. Hyd.	1,13 <i>Lopey idle, Street/Strip, good mid range horsepower. Best with 3000+ stall.</i>
253545-10	CL253545-10	300 304 3000-6400	247 251	.630 .630	110	106	Hyd. Hyd.	1,13 <i>Rough idle, Hot Street/Bracket, good torque & upper mid range. 11.5:1+, 3400+ stall.</i>
259995	NA	Custom Grind Camshaft <i>Retro-Fit Hydraulic Roller Special Order Camshaft.</i>					Hyd. Hyd.	1,13

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

13 Requires adjustable valvetrain.

Some items are not legal for sale or use on any pollution controlled motor vehicle

FORD FE • 352-428 1963-1977

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91251 ³	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	NA	NA	NA	NA	NA	94325
91251 ³	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	NA	NA	NA	NA	NA	94325
91251 ³	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	NA	NA	NA	NA	NA	94325
91251 ³	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	NA	NA	NA	NA	NA	94325
91251	NA	--	--	--	--	--	--	NA	NA	NA	NA	NA	94325

FORD FE • 352-428 1963-1977

Rattler Cams™ Retro-Fit Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91169 ³ 91261	NA	98611-K31 ²⁵	98611 ²⁵	97110	NA	93015	93321 ²⁵	NA	NA	NA	NA	NA	94325
91169 ³ 91261	NA	98611-K31 ²⁵	98611 ²⁵	97110	NA	93015	93321 ²⁵	NA	NA	NA	NA	NA	94325
91169 ³ 91261	NA	98611-K31 ²⁵	98611 ²⁵	97110	NA	93015	93321 ²⁵	NA	NA	NA	NA	NA	94325

FORD FE • 352-428 1963-1977

Retro-Fit Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91169 ³ 91261	NA	98611-K31 ²⁵	98611 ²⁵	97110	NA	93015	93321 ²⁵	NA	NA	NA	NA	NA	94325
91169 ³ 91261	NA	98611-K31 ²⁵	98611 ²⁵	97110	NA	93015	93321 ²⁵	NA	NA	NA	NA	NA	94325
91169 ³ 91261	NA	98611-K31 ²⁵	98611 ²⁵	97110	NA	93015	93321 ²⁵	NA	NA	NA	NA	NA	94325
91169 ³ 91261	NA	98611-K31 ²⁵	98611 ²⁵	97110	NA	93015	93321 ²⁵	NA	NA	NA	NA	NA	94325
91169 ³ 91261	NA	98611-K31 ²⁵	98611 ²⁵	97110	NA	93015	93321 ²⁵	NA	NA	NA	NA	NA	94325
91169 ³ 91261	NA	--	--	--	--	--	--	NA	NA	NA	NA	NA	94325

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

²⁵ Machining Required.

CAMSHAFTS



FORD FE • 352-428 1963-1977

Mechanical Flat Tappet Camshafts

Firing Order: 1•5•4•2•6•3•7•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.75 Rockers		Lobe Separation	Intake	Valve Lash	Cam Notes	
		IN	EX	IN	EX	IN	EX	Angle	Centerline	IN	EX	
252342-10	CL252342-10	265	265	230	230	.560	.560	110	106	.022	.022	1,13
		1800-5800 Good Street cam, broad power range. 2200+ stall recommended.										
251672-08	CL251672-08	275	275	240	240	.589	.589	108	104	.022	.022	1,13
		2000-6000 Lopey idle, strong mid range power & torque. 10.5:1 CR, 2500+ stall & 3.70-4.30 gear.										
251262-08	CL251262-08	281	281	246	246	.607	.607	108	104	.022	.022	1,13
		2400-6400 Hot Street/Bracket, good mid-range performance. 10.5-12.0:1 recommended.										
251882-10	CL251882-10	287	295	252	260	.618	.624	110	106	.022	.022	1,13
		2800-6800 Hot Street/Bracket, good mid & upper rpm torque & power. 11.5:1 CR, 3500+ stall.										
252192-08	CL252192-08	295	295	260	260	.648	.648	108	104	.022	.022	1,13
		3000-7000 Pro Street/Bracket, strong top end, 3500+ stall, 11.0:1+ CR.										
259992	NA	Custom Grind Camshaft										1,13
		Mechanical Flat Tappet Special Order Camshaft.										



FORD FE • 352-428 1963-1977

Mechanical Roller Camshafts

Firing Order: 1•5•4•2•6•3•7•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.75 Rockers		Lobe Separation	Intake	Valve Lash	Cam Notes	
		IN	EX	IN	EX	IN	EX	Angle	Centerline	IN	EX	
252193-08	NA	281	287	249	255	.656	.656	108	104	.022	.022	1,5,13
		3200-6800 Rough idle, Pro Street/Bracket, good mid range torque. 11.0:1+ CR, 3500+ stall.										
252243-08	NA	291	295	259	263	.648	.648	108	104	.022	.022	1,5,13
		3600-7200 Rough idle, Bracket E.T., good mid range horsepower. 12.0:1+ CR, 3800+ stall.										
252363-10	NA	299	299	267	267	.700	.700	110	106	.022	.022	1,5,13
		4000-7600 Rough idle, good mid range performance. 12.0:1+ CR, 4000+ stall.										
259993	NA	Custom Grind Camshaft										1,5,13
		Mechanical Roller Special Order Camshaft.										



FORD BIG BLOCK • 429-460 1968-1995

Max Certified™ Hydraulic Flat Tappet Cam & Lifter Sets - 5 Year No Fault Warranty (see page 3 for details)

Cam & Lifter Set Part No.	Cam & Direct Lube Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.75 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
MC240931-11	MC240931-11DL ⁴	269 269 1600-5000	215 215	.514 .514	111	107	Hyd. Hyd.	1
Good idle & throttle response with 4bbl & good exhaust.								
MC242201-10	MC242201-10DL ⁴	273 273 1500-5400	219 219	.496 .496	110	106	Hyd. Hyd.	1
Good idle, strong bottom end. Great daily usage cam.								
MC240041-12	MC240041-12DL ⁴	279 289 1800-5600	225 235	.536 .562	112	107	Hyd. Hyd.	1
Strong mid-range. Needs 4bbl., headers & medium stall.								

Cam Notes: master note list on page 260

¹ Stock (O.E.) valve springs cannot be used.

⁴ Direct Lube Lifters Included in Cam & "Direct Lube" Lifter (DL) Sets.

⁵ Requires upgraded distributor gear.

¹³ Requires adjustable valvetrain.

Some items are not legal for sale or use on any pollution controlled motor vehicle

FORD FE • 352-428 1963-1977

Mechanical Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91255 ³	NA	98445-K32 ¹⁰	98445 ²⁵	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	NA	NA	NA	NA	NA	94325
91255 ³	NA	98445-K32 ¹⁰	98445 ²⁵	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	NA	NA	NA	NA	NA	94325
91255 ³	NA	98445-K32 ¹⁰	98445 ²⁵	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	NA	NA	NA	NA	NA	94325
91255 ³	NA	98445-K32 ¹⁰	98445 ²⁵	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	NA	NA	NA	NA	NA	94325
91255 ³	NA	98445-K32 ¹⁰	98445 ²⁵	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	NA	NA	NA	NA	NA	94325
91255	NA	--	--	--	--	--	--	NA	NA	NA	NA	NA	94325

FORD FE • 352-428 1963-1977

Mechanical Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91254 91234	NA	NA	98650 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	NA	NA	NA	NA	94450	94325
91234	NA	NA	98650 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	NA	NA	NA	NA	94450	94325
91234	NA	NA	98650 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	NA	NA	NA	NA	94450	94325
--	NA	--	--	--	--	--	--	NA	NA	NA	NA	NA	94325

FORD BIG BLOCK • 429-460 1968-1995

Max Certified™ Hydraulic Flat Tappet Cam & Lifter Set Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91211 ³ 91216 ⁴	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	90083	NA	95017	NA	NA	94315
91211 ³ 91216 ⁴	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	90083	NA	95017	NA	NA	94315
91211 ³ 91216 ⁴	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	90083	NA	95017	NA	NA	94315

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

⁴ Direct Lube Lifters Included in Cam & "Direct Lube" Lifter (DL) Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

CAMSHAFTS



FORD BIG BLOCK • 429-460 1968-1995

American Muscle™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•5•4•2•6•3•7•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.73 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
247161-13	CL247161-13	256 270 800-4400	192 206	.442 .487	113	110	Hyd. Hyd.	1
Near duplicate of the Ford 360HP/429 cam (FMC #C8SZ-6250-A).								



FORD BIG BLOCK • 429-460 1968-1995

Street Force™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•5•4•2•6•3•7•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.73 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
241101-12	CL241101-12	269 279 1000-5200	215 225	.513 .536	112	108	Hyd. Hyd.	1
Street Force™ 2, Good idle & throttle response. Needs 4 barrel & good exhaust.								
240041-12	CL240041-12	279 289 1500-5400	225 235	.536 .541	112	108	Hyd. Hyd.	1
Street Force™ 3, Noticeable idle, Hot Street & mild Bracket Racing.								
241301-12	CL241301-12	289 299 2000-5600	235 245	.542 .554	112	108	Hyd. Hyd.	1
Street Force™ 4, Lopey idle, good mid-range power. Needs 3200+ stall.								



FORD BIG BLOCK • 429-460 1968-1995

Rattler Cams™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•5•4•2•6•3•7•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.73 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
248001-09	CL248001-09	281 289 1800-5200	227 235	.554 .562	109	103	Hyd. Hyd.	1
Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.								
248041-09	CL248041-09	289 297 2000-5400	235 243	.562 .554	109	103	Hyd. Hyd.	1
Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.								
248101-09	CL248101-09	297 305 2400-5600	243 251	.554 .571	109	103	Hyd. Hyd.	1
Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.								

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

Some items are not legal for sale or use on any pollution controlled motor vehicle

FORD BIG BLOCK • 429-460 1968-1995

American Muscle™ Hydraulic Flat Tappet Cam & Lifter Set Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91211 ³ 91216	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	90083	NA	95017	NA	NA	94315

FORD BIG BLOCK • 429-460 1968-1995

Street Force™ Hydraulic Flat Tappet Cam & Lifter Set Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91211 ³ 91216	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	90083	NA	95017	NA	NA	94315
91211 ³ 91216	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	90083	NA	95017	NA	NA	94315
91211 ³ 91216	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	90083	NA	95017	NA	NA	94315

FORD BIG BLOCK • 429-460 1968-1995

Rattler Cams™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91211 ³ 91212	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	90083	NA	95017	NA	NA	94315
91211 ³ 91212	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	90083	NA	95017	NA	NA	94315
91211 ³ 91212	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	90083	NA	95017	NA	NA	94315

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

²⁵ Machining Required.

CAMSHAFTS



FORD BIG BLOCK • 429-460 1968-1995

Hydraulic Flat Tappet Camshafts

Firing Order: 1•5•4•2•6•3•7•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN	EX	Duration @ .050" IN	EX	Valve Lift w/1.73 Rockers IN	EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN	EX	Cam Notes
240021-11	CL240021-11	263	263	209	209	.484	.484	111	107	Hyd.	Hyd.	1
1000-4200 Smooth idle, increased torque. Good for economy, Towing.												
241021-11	CL241021-11	267	267	213	213	.497	.497	111	107	Hyd.	Hyd.	1
1000-4400 Smooth idle. Great for Off-Road & Towing. Good fuel economy.												
240931-11	CL240931-11	269	269	215	215	.514	.514	111	107	Hyd.	Hyd.	1
1600-5000 Good idle & throttle response with 4bbl & good exhaust.												
240031-12	CL240031-12	269	277	215	223	.513	.519	112	108	Hyd.	Hyd.	1
1500-4800 Fair idle, Hot Performance Street & Marine.												
242201-10	CL242201-10	273	273	219	219	.496	.496	110	106	Hyd.	Hyd.	1
1500-5400 Good idle, strong bottom end. Great daily usage cam.												
240991-08	CL240991-08	267	267	220	220	.587	.587	108	104	Hyd.	Hyd.	1,16
1800-5600 Good low & mid-range horsepower. Needs 4 barrel & headers.												
240961-10	CL240961-10	277	277	230	230	.609	.609	110	106	Hyd.	Hyd.	1,16
2000-6000 Hot Street/Brackets, broad power range, strong top end.												
241491-10	CL241491-10	279	285	232	238	.614	.635	110	106	Hyd.	Hyd.	1,16
2400-6200 Fair idle, Street/Bracket, good mid range. 3000+ stall, 10.0-11.5:1 suggested.												
241731-10	CL241731-10	285	291	238	244	.635	.645	110	106	Hyd.	Hyd.	1,16
2800-6600 Fair idle, Street/Strip, strong mid-range torque & horsepower.												
241541-10	CL241541-10	303	309	249	255	.606	.606	110	106	Hyd.	Hyd.	1
3400-7000 Rough idle, Hot Street/Strip, great mid range to top end performance. 10.5:1+ CR, 3500+.												
249991	NA	Custom Grind Camshaft								Hyd.	Hyd.	1
Hydraulic Flat Tappet Special Order Camshaft.												



FORD BIG BLOCK • 429-460 1968-1995

Rattler Cams™ Retro-Fit Hydraulic Roller Camshafts

Firing Order: 1•5•4•2•6•3•7•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.73 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
248025-09	CL248025-09	280 288 1800-5200	227 235	.565 .565	109	103	Hyd. Hyd.	1
Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.								
248045-09	CL248045-09	288 296 2000-5400	235 243	.611 .611	109	103	Hyd. Hyd.	1
Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.								
248085-09	CL248085-09	296 304 2400-5600	243 251	.611 .594	109	103	Hyd. Hyd.	1
Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.								

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

16 Lobes designed to take maximum advantage of .875" dia. lifter.

Some items are not legal for sale or use on any pollution controlled motor vehicle

FORD BIG BLOCK • 429-460 1968-1995

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91211 ³ 91212	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	90083	NA	95017	NA	NA	94315
91211 ³ 91212	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	90083	NA	95017	NA	NA	94315
91211 ³ 91212	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	90083	NA	95017	NA	NA	94315
91211 ³ 91212	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	90083	NA	95017	NA	NA	94315
91211 ³ 91212	NA	98511-K31	98511	97110	NA	93015	93321 ²⁵	90083	NA	95017	NA	NA	94315
91211 ³ 91212	NA	98445-K31 ²⁵	98445 ²⁵	97110	NA	93015	93321 ²⁵	90083	NA	95017	NA	NA	94315
91211 ³ 91212	NA	98445-K31 ²⁵	98445 ²⁵	97110	NA	93015	93321 ²⁵	90083	NA	95017	NA	NA	94315
91211 ³ 91212	NA	98445-K31 ²⁵	98445 ²⁵	97110	NA	93015	93321 ²⁵	90083	NA	95017	NA	NA	94315
91211 ³ 91212	NA	98445-K31 ²⁵	98445 ²⁵	97110	NA	93015	93321 ²⁵	90083	NA	95017	NA	NA	94315
91211 ³ 91212	NA	98445-K31 ²⁵	98445 ²⁵	97110	NA	93015	93321 ²⁵	90083	NA	95017	NA	NA	94315
91211 ³ 91212	NA	--	--	--	--	--	--	NA	NA	NA	NA	NA	94325

FORD BIG BLOCK • 429-460 1968-1995

Rattler Cams™ Retro-Fit Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91169 ³ 91261	NA	98445-K31 ²⁵	98445 ²⁵	97110	NA	93015	93321 ²⁵	90083	NA	95205 95010	NA	NA	94315
91169 ³ 91261	NA	98445-K31 ²⁵	98445 ²⁵	97110	NA	93015	93321 ²⁵	90083	NA	95205 95010	NA	NA	94315
91169 ³ 91261	NA	98445-K31 ²⁵	98445 ²⁵	97110	NA	93015	93321 ²⁵	90083	NA	95205 95010	NA	NA	94315

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

²⁵ Machining Required.

CAMSHAFTS



FORD BIG BLOCK • 429-460 1968-1995

Retro-Fit Hydraulic Roller Camshafts

Firing Order: 1•5•4•2•6•3•7•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.73 Rockers		Lobe Separation	Intake	Valve Lash	Cam Notes	
		IN	EX	IN	EX	IN	EX	Angle	Centerline	IN	EX	
240705-10	CL240705-10	272	278	219	225	.588	.577	110	106	Hyd.	Hyd.	1
1600-5600 Mild idle, Street Performance, good low to mid range torque & power.												
243745-10	CL243745-10	282	286	229	233	.600	.594	110	106	Hyd.	Hyd.	1
2200-6200 Choppy idle, High Performance Street. Needs good intake, headers 9.0:1 CR & 2200+.												
243385-10	CL243385-10	288	294	235	241	.611	.611	110	106	Hyd.	Hyd.	1
2400-6400 Good idle, great mid range performance. 9.0:1+ CR, 2400+ stall & 3.73 or lower gears.												
243655-10	CL243655-10	300	300	247	247	.623	.623	110	106	Hyd.	Hyd.	1
3000-6800 Lopey idle, Street/Strip, good mid range horsepower. Best with 3500+ stall.												
243545-10	CL243545-10	302	308	249	255	.652	.652	110	106	Hyd.	Hyd.	1
3200-7000 Rough idle, Hot Street/Bracket, good torque & upper mid range. 11.5:1+, 3800+ stall.												
249995	NA	Custom Grind Camshaft								Hyd.	Hyd.	1
Retro-Fit Hydraulic Roller Special Order Camshaft.												



FORD BIG BLOCK • 429-460 1968-1995

Mechanical Flat Tappet Camshafts

Firing Order: 1•5•4•2•6•3•7•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.73 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
242212-12	CL242212-12 CL242212-12DL ⁴	279 287 3600-7000	244 252	.588 .611	112	107	.022 .022	1
Rough idle, excellent Bracket cam. Increased CR required.								
241262-08	CL241262-08 CL241262-08DL ⁴	274 274 3400-7400	246 246	.659 .659	108	104	.018 .018	1,16,34
Hot Street/Bracket, good mid-range performance.								
242372-10	CL242372-10 CL242372-10DL ⁴	285 291 3800-7800	250 256	.606 .617	110	106	.022 .022	1
Rough idle, Street/Strip. Best with 10.0:1+ CR, 3000+ stall.								
242362-08	CL242362-08 CL242362-08DL ⁴	289 295 4000-7800	254 260	.635 .640	108	104	.022 .022	1
Rough idle, Hot Street/Bracket. Needs 10.5:1+ CR & 3200+ stall.								
242322-08	CL242322-08 CL242322-08DL ⁴	295 303 4200-7800	260 268	.640 .635	108	104	.022 .022	1
Pro-Street/Strip, radical idle. Needs good aftermarket heads & intake.								
240782-08	CL240782-08 CL240782-08DL ⁴	296 302 4400-8000	268 274	.717 .731	108	104	.022 .022	1,16
Bracket Racer special. Super strong mid-range & top end.								
249992	NA	Custom Grind Camshaft						1
Mechanical Flat Tappet Special Order Camshaft.								

Cam Notes: master note list on page 260

¹ Stock (O.E.) valve springs cannot be used.

¹⁶ Lobes designed to take maximum advantage of .875" dia. lifter.

³⁴ Provisions for increased oiling recommended.

Some items are not legal for sale or use on any pollution controlled motor vehicle

FORD BIG BLOCK • 429-460 1968-1995

Retro-Fit Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91169 ³ 91261	NA	98445-K31 ²⁵	98445 ²⁵	97110	NA	93015	93321 ²⁵	90083	NA	95205 95010	NA	NA	94315
91169 ³ 91261	NA	98445-K31 ²⁵	98445 ²⁵	97110	NA	93015	93321 ²⁵	90083	NA	95205 95010	NA	NA	94315
91169 ³ 91261	NA	98445-K31 ²⁵	98445 ²⁵	97110	NA	93015	93321 ²⁵	90083	NA	95205 95010	NA	NA	94315
91169 ³ 91261	NA	98445-K31 ²⁵	98445 ²⁵	97110	NA	93015	93321 ²⁵	90083	NA	95205 95010	NA	NA	94315
91169 ³ 91261	NA	98445-K31 ²⁵	98445 ²⁵	97110	NA	93015	93321 ²⁵	90083	NA	95205 95010	NA	NA	94315
--	NA	--	--	--	--	--	--	--	NA	--	NA	NA	94315

FORD BIG BLOCK • 429-460 1968-1995

Mechanical Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91215 ³ 91218 ⁴	NA	98445-K32 ²⁵	98445 ²⁵	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90083	NA	95017	NA	NA	94315
91215 ³ 91218 ⁴	NA	98445-K32 ²⁵	98445 ²⁵	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90083	NA	95017	NA	NA	94315
91215 ³ 91218 ⁴	NA	98445-K32 ²⁵	98445 ²⁵	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90083	NA	95017	NA	NA	94315
91215 ³ 91218 ⁴	NA	98445-K32 ²⁵	98445 ²⁵	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90083	NA	95017	NA	NA	94315
91215 ³ 91218 ⁴	NA	98445-K32 ²⁵	98445 ²⁵	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90083	NA	95017	NA	NA	94315
91215 ³ 91218 ⁴	NA	98445-K32 ²⁵	98445 ²⁵	97128 ¹⁰	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90083	NA	95017	NA	NA	94315
91215 91218	NA	--	--	--	--	--	--	--	NA	--	NA	NA	94315

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

²⁵ Machining Required.

Camshafts



FORD BIG BLOCK • 429-460 1968-1995

Steel Billet Mechanical Roller Cams

Firing Order: 1•5•4•2•6•3•7•8

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.73 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash		Cam Notes
IN	EX	IN	EX	IN	EX	IN	EX			IN	EX	
241593-08	NA	281	287	249	255	.649	.649	108	104	.022	.022	1,5
		2800-6800	Choppy idle, Street/Strip, high torque with great mid range. Best with 3000+ stall.									
241593-12	NA	281	287	249	255	.649	.649	112	108	.022	.022	1,5
		3000-6800	Good idle, Broad mid-range power. Small supercharger or NOS kit OK.									
240283-08	NA	285	291	253	259	.738	.738	108	104	.022	.022	1,5
		3200-7000	Lopey idle, Street/Strip, good low to mid range torque & power. 3500+ stall.									
241133-08	NA	289	299	257	267	.692	.692	108	104	.022	.022	1,5
		3400-7200	Moderate idle. Good in strong Street or Bracket car.									
241133-10	NA	289	299	257	267	.692	.692	110	106	.022	.022	1,5
		3400-7400	Good in strong Street or Bracket car. OK w/NOS.									
241263-08	NA	293	297	261	265	.715	.715	108	104	.022	.022	1,5
		3600-7600	Rough idle, Bracket E.T., strong mid range design. 12.0:1 CR, 4000+ stall.									
240203-08	NA	299	305	267	273	.744	.744	108	104	.022	.022	1,5
		3800-7800	Rough idle, Bracket killer for big inch (500+). 12.5:1+ CR, 4000+ stall.									
240203-10	NA	299	305	267	273	.744	.744	110	106	.022	.022	1,5
		3800-7600	Rough idle, good mid range performance. 12.5:1+ CR, 4000+ stall.									
241123-10	NA	301	303	269	271	.714	.721	110	106	.022	.022	1,5
		3800-7600	460+CID. 11.0:1 Comp. Strong mid range horsepower.									
241713-08	NA	301	309	269	277	.715	.715	108	104	.022	.022	1,5
		4000-7800	460+CID. 12.0:1 Comp. Strong mid to upper horsepower.									
241693-08	NA	305	311	273	279	.744	.739	108	104	.022	.022	1,5
		4200-7800	460+ ci, Great mid-range & upper end. Needs 5000+ stall, 12.5:1 CR.									
241693-10	NA	305	311	273	279	.744	.739	110	106	.022	.022	1,5
		4200-8000	460+ ci, Great mid-range & top end. Needs 5000+ stall.									
241083-10	NA	309	317	277	285	.714	.727	110	106	.022	.022	1,5
		4400-8200	460+ ci. 12.0:1 Comp. Strong mid-upper horsepower.									
241723-10	NA	311	315	279	283	.784	.727	110	106	.022	.022	1,5
		4800-8600	12.0:1 min. Modified heads. Strong upper rpm.									
241363-10	NA	315	323	283	291	.779	.744	110	106	.022	.022	1,5
		5200-7500	Big cubic inch 500+ motors. Best with 13.5:1+. Needs true race converter.									
249993	NA	Custom Grind Camshaft										1,5
		Mechanical Roller Special Order Camshaft.										

Cam Notes: master note list on page 260

- 1 Stock (O.E.) valve springs cannot be used.
- 5 Requires upgraded distributor gear.

Some items are not legal for sale or use on any pollution controlled motor vehicle

FORD BIG BLOCK • 429-460 1968-1995

Mechanical Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91254 91247 ³²	NA	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	90083	NA	95017	NA	94435	94315
91254 91247 ³²	NA	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	90083	NA	95017	NA	94435	94315
91234 91288	NA	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	90083	NA	95017	NA	94435	94315
91247 91234	NA	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	90083	NA	95017	NA	94435	94315
91247 91234	NA	NA	98541 ²⁵	97128 ¹⁰	97220 ¹⁰	93018 ¹⁰	93321 ²⁵	90083	NA	95017	NA	94435	94315
91234 91288	NA	NA	98738A ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90083	NA	95017	NA	94435	94315
91234 91288	NA	NA	98738A ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90083	NA	95017	NA	94435	94315
91234 91288	NA	NA	98738A ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90083	NA	95017	NA	94435	94315
91234 91288	NA	NA	98738A ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90083	NA	95017	NA	94435	94315
91234 91288	NA	NA	98738A ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90083	NA	95017	NA	94435	94315
91234 91288	NA	NA	98738A ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90083	NA	95017	NA	94435	94315
91234 91288	NA	NA	98738A ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90083	NA	95017	NA	94435	94315
91234 91288	NA	NA	98738A ²⁵	97130 ¹⁰	97222 ¹⁰	93018 ¹⁰	93321 ²⁵	90083	NA	95017	NA	94435	94315
91234 91288	NA	NA	98825 ²⁵	NA	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90083	NA	95017	NA	94435	94315
91234 91288	NA	NA	98825 ²⁵	NA	97216 ¹⁰	93018 ¹⁰	93321 ²⁵	90083	NA	95017	NA	94435	94315
--	NA	--	--	--	--	--	--	--	NA	--	NA	NA	94315

Components Notes: master note list on page 260

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

³² These lifters are not recommended for street use.

Camshafts



FORD FLAT HEAD • 239-255 (SINGLE-GEAR) 1938-1948

Mechanical Flat Tappet Camshafts

Firing Order: 1•5•4•8•6•3•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes	
263356-12	NA	264 264 1000-4800	210 210	.335 .335	112	110	.012 .012	1,20	
Good idle, 239-276 or larger ci. Great in heavy car. Stock heads & auto trans OK.									
263656-09	NA	280 280 1500-5200	226 226	.365 .365	109	105	.012 .012	1,20	
Good idle, good low to mid range power. Needs valve clearance or aftermarket heads.									
263726-16	NA	284 284 1500-5800	230 230	.372 .372	116	112	.012 .012	1,20	
Good idle, Supercharged Street applications. Needs valve clearance or aftermarket heads.									
263056-11	NA	297 304 2300-6000	244 250	.405 .415	111	109	.012 .012	1,20	
Rougher loping idle, upper mid & top end power. 296+ ci. Modified or aftermarket heads.									
269996	NA	Custom Grind Camshaft Mechanical Flat Tappet Special Order Camshaft.							1



FORD FLAT HEAD • 239-255 (2-GEAR) 1949-1953

Mechanical Flat Tappet Camshafts

Firing Order: 1•5•4•8•6•3•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift		Lobe Separation	Intake	Valve Lash		Cam Notes
		IN	EX	IN	EX	IN	EX	Angle	Centerline	IN	EX	
263352-12	NA	264	264	210	210	.335	.335	112	110	.012	.012	1,20
1000-4800 Good idle, 239-276 or larger ci. Great in heavy car. Stock heads & auto trans OK.												
263652-09	NA	280	280	226	226	.365	.365	109	105	.012	.012	1,20
1500-5200 Good idle, good low to mid range power. Needs valve clearance or aftermarket heads.												
263722-16	NA	284	284	230	230	.372	.372	116	115	.012	.012	1,20
1500-5800 Good idle, Supercharged Street applications. Needs valve clearance or aftermarket heads.												
263952-11	NA	293	297	240	244	.395	.405	111	109	.012	.012	1,20
2000-5800 Rough idle, good mid range power. 276-296+ ci. Needs high CR, 2000+ stall.												
263052-11	NA	297	304	244	250	.405	.415	111	109	.012	.012	1,20
2300-6000 Rougher loping idle, upper mid & top end power. 296+ ci. Modified or aftermarket heads.												
269992	NA	Custom Grind Camshaft Mechanical Flat Tappet Special Order Camshaft.										1



FORD Y-BLOCK • 292-312 1955-1962

Mechanical Flat Tappet Camshafts

Firing Order: 1•5•4•8•6•3•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.47 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes	
292002-10	NA	255 255 1800-5000	220 220	.463 .463	110	106	.022 .022	1	
Street Performance, good power range. Suggest improved carburetion & exhaust.									
290862-10	NA	265 265 2800-5400	238 238	.515 .515	110	106	.022 .022	1	
Hot Street/Strip, Best for 312+ cubic inch. Needs 10.0:1+ CR, good carb, exhaust.									
290262-10	NA	276 276 3200-6000	248 248	.544 .544	110	106	.018 .018	1	
Bracket/Nostalgia Race. Great power range. Requires improved induction & exhaust.									
299992	NA	Custom Grind Camshaft Mechanical Flat Tappet Special Order Camshaft.							1

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

20 Advertising duration read @.010".

Some items are not legal for sale or use on any pollution controlled motor vehicle

FORD FLAT HEAD • 239-255 (SINGLE-GEAR) 1938-1948

Mechanical Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91265	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91265	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91265	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91265	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91265	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

FORD FLAT HEAD • 239-255 (2-GEAR) 1949-1953

Mechanical Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91265	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91265	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91265	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91265	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91265	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91265	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

FORD Y-BLOCK • 292-312 1955-1962

Mechanical Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91214	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91214	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91214	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91214	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Components Notes: master note list on page 260

Camshafts



HOLDEN V8 • 252-308 1970-1988

Rattler Cams™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•2•7•8•4•5•6•3

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
668021-09	CL668021-09	281 289 2000-5700	227 235	.501 .501	109	103	Hyd. Hyd.	1 Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.
668061-09	CL668061-09	289 297 2200-5900	235 243	.501 .480	109	103	Hyd. Hyd.	1 Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.
668101-09	CL668101-09	297 305 2600-6200	243 251	.512 .528	109	103	Hyd. Hyd.	1 Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.



HOLDEN V8 • 252-308 1970-1988

Hydraulic Flat Tappet Camshafts

Firing Order: 1•2•7•8•4•5•6•3

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
660931-10	CL660931-10	267 267 2000-4800	213 213	.480 .480	110	106	Hyd. Hyd.	1 Smooth idle, Street Performance, Towing, fuel economy.
661211-12	CL661211-12	269 275 2000-5000	215 221	.485 .475	112	108	Hyd. Hyd.	1 Strong low & mid-range torque & horsepower.
660991-08	CL660991-08	275 275 2200-5600	221 221	.501 .501	108	104	Hyd. Hyd.	1 Mild idle, Good low & mid-range horsepower. 9.5:1 CR, good exhaust & intake.
660651-10	CL660651-10	277 285 2600-5700	223 231	.496 .501	110	106	Hyd. Hyd.	1 Fair idle, Strong mid range & top end. 9.5-10.5:1, 2800+ stall & gears.
660011-10	CL660011-10	279 279 2600-5800	225 225	.496 .496	110	106	Hyd. Hyd.	1 Fair idle, Nice single pattern cam. Hot Street/Strip performance.
660961-10	CL660961-10	285 285 2800-5800	231 231	.501 .501	110	106	Hyd. Hyd.	1 Fair idle, Street/Strip, strong mid-range torque & horsepower.
661751-08	CL661751-08	289 299 2800-6000	235 245	.520 .544	108	104	Hyd. Hyd.	1 Lopey idle, Serious Street/Strip. Needs 3200+ stall, header & gears.
660971-10	CL660971-10	289 289 3000-6100	235 235	.501 .501	110	106	Hyd. Hyd.	1 Lopey idle, Hot Street/Strip, strong mid-range torque & horsepower. 3200+ stall.
660841-10	CL660841-10	291 291 3000-6400	237 237	.520 .520	110	106	Hyd. Hyd.	1 Rough idle, Street/Strip, strong mid range & top end power. 3500+ stall, 10.0:1+ CR.
661731-08	CL661731-08	291 297 3000-6600	237 243	.520 .541	108	104	Hyd. Hyd.	1 Rough idle, Hot Street/Strip. Good mid range & top end performance. 10.5:1+ CR.
661811-08	CL661811-08	297 297 3400-6700	243 243	.541 .541	108	104	Hyd. Hyd.	1 Rough idle, Hot Street/Bracket, Nice upper mid range & top end.
661951-08	CL661951-08	307 307 3600-6800	253 253	.565 .565	108	104	Hyd. Hyd.	1 Rough idle, Hot Street/Strip, great mid range to top end performance. 11.0:1+ CR, 3500+.
669991	NA	Custom Grind Camshaft					Hyd. Hyd.	1 Hydraulic Flat Tappet Special Order Camshaft.

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

Some items are not legal for sale or use on any pollution controlled motor vehicle

HOLDEN V8 • 252-308 1970-1988

Rattler Cams™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90090	NA	95028	NA	NA	NA
91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90090	NA	95028	NA	NA	NA
91111 ³ 91112	NA	98212-K11 98438-K12 ¹⁰	98212 98438 ²⁵	97112 97128 ¹⁰	97214 97216 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90090	NA	95028	NA	NA	NA

HOLDEN V8 • 252-308 1970-1988

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90090	NA	95028	NA	NA	NA
91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90090	NA	95028	NA	NA	NA
91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90090	NA	95028	NA	NA	NA
91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90090	NA	95028	NA	NA	NA
91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90090	NA	95028	NA	NA	NA
91111 ³ 91112	NA	98212-K11 98438-K12 ¹⁰	98212 98438 ²⁵	97112 97128 ¹⁰	97214 97216 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90090	NA	95028	NA	NA	NA
91111 ³ 91112	NA	98212-K11 98438-K12 ¹⁰	98212 98438 ²⁵	97112 97128 ¹⁰	97214 97216 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90090	NA	95028	NA	NA	NA
91111 ³ 91112	NA	98212-K11 98438-K12 ¹⁰	98212 98438 ²⁵	97112 97128 ¹⁰	97214 97216 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90090	NA	95028	NA	NA	NA
91111 ³ 91112	NA	98438-K12 ¹⁰	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90090	NA	95028	NA	NA	NA
91111 ³ 91112	NA	98438-K12 ¹⁰	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90090	NA	95028	NA	NA	NA
91111 ³ 91112	NA	98438-K12 ¹⁰	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90090	NA	95028	NA	NA	NA
91111 ³ 91112	NA	--	--	--	--	--	--	--	NA	--	NA	NA	NA

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

Camshafts



HOLDEN V8 • 252-308 1970-1988

Mechanical Flat Tappet Camshafts

Firing Order: 1•2•7•8•4•5•6•3

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.60 Rockers		Lobe Separation	Intake	Valve Lash	Cam Notes	
		IN	EX	IN	EX	IN	EX	Angle	Centerline	IN	EX	
661442-10	CL661442-10	272	280	236	244	.512	.512	110	106	.022	.022	1
		2600-5600 Mild lopey idle, Street Performance, broad mid range power band. 3200+ stall, 9.5:1 CR.										
660102-09	CL660102-09	275	281	240	246	.539	.549	109	105	.022	.022	1
		2800-5800 Hot Street/Bracket. Needs 10.0+ CR, 3200+ stall & gears.										
662352-08	CL662352-08	281	287	246	252	.555	.565	108	104	.022	.022	1
		3200-6100 Hot Street/Bracket, good mid-range performance.										
660822-06	CL660822-06	287	295	252	260	.581	.592	106	102	.022	.022	1
		3400-6500 Rough idle, Pro Street/Strip. Great mid range torque & power. 10.0:1+ CR.										
660822-08	CL660822-08	287	295	252	260	.581	.592	108	104	.022	.022	1
		3400-6600 Rough idle, Street/Strip, good mid range with strong top end performance. 10.0:1+ CR.										
661772-06	CL661772-06	295	301	260	266	.603	.592	106	102	.022	.022	1
		3800-7000 Pro Street/Serious Competition. Great mid range to top end power.										
661772-08	CL661772-08	295	301	260	266	.603	.592	108	104	.022	.022	1
		3800-7000 Pro Street/Competition. Good mid & upper end performance. 4000+ stall.										
669992	NA	Custom Grind Camshaft										1
		Mechanical Flat Tappet Special Order Camshaft.										



HOLDEN V8 PFI • 304-345 1988-1997 NON ROLLER CAM ENGINES

Rattler Cams™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•2•7•8•4•5•6•3

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
678021-09	CL678021-09	281 289 2000-5700	227 235	.501 .501	109	103	Hyd. Hyd.	1 <i>Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.</i>
678061-09	CL678061-09	289 297 2200-5900	235 243	.501 .480	109	103	Hyd. Hyd.	1 <i>Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.</i>
678101-09	CL678101-09	297 305 2600-6200	243 251	.512 .528	109	103	Hyd. Hyd.	1 <i>Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.</i>

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

Some items are not legal for sale or use on any pollution controlled motor vehicle

HOLDEN V8 • 252-308 1970-1988

Mechanical Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91615 ³	NA	98445-K12 ¹⁰	98445 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹	93316 ²⁵	90090	NA	95028	NA	NA	NA
91615 ³	NA	98445-K12 ¹⁰	98445 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹	93316 ²⁵	90090	NA	95028	NA	NA	NA
91615 ³	NA	98445-K12 ¹⁰	98445 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹	93316 ²⁵	90090	NA	95028	NA	NA	NA
91615 ³	NA	98445-K12 ¹⁰	98445 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹	93316 ²⁵	90090	NA	95028	NA	NA	NA
91615 ³	NA	98445-K12 ¹⁰	98445 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹	93316 ²⁵	90090	NA	95028	NA	NA	NA
91615 ³	NA	98445-K12 ¹⁰	98445 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹	93316 ²⁵	90090	NA	95028	NA	NA	NA
91615 ³	NA	98445-K12 ¹⁰	98445 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹	93316 ²⁵	90090	NA	95028	NA	NA	NA
91615	NA	--	--	--	--	--	--	--	NA	--	NA	NA	NA

HOLDEN V8 PFI • 304-345 1988-1997 NON ROLLER CAM ENGINES

Rattler Cams™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91111 ³	NA	98212-K11	98212	97112	97214	93005	93350	90090	NA	95028	NA	NA	NA
91112		98212-K12 ¹⁰		97132 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵						
91111 ³	NA	98212-K11	98212	97112	97214	93005	93350	90090	NA	95028	NA	NA	NA
91112		98212-K12 ¹⁰		97132 ¹⁰	97165 ¹⁰	93017 ¹⁰	93316 ²⁵						
91111 ³	NA	98212-K11	98212	97112	97214	93005	93350	90090	NA	95028	NA	NA	NA
91112		98438-K12 ¹⁰	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵						

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

CAMSHAFTS



HOLDEN V8 PFI • 304-345 1988-1997 NON ROLLER CAM ENGINES

Hydraulic Flat Tappet Camshafts

Firing Order: 1•2•7•8•4•5•6•3

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.60 Rockers		Lobe Separation	Intake	Valve Lash			
		IN	EX	IN	EX	IN	EX	Angle	Centerline	IN	EX	Cam Notes	
672011-12	CL672011-12	261	261	207	207	.448	.448	112	108	Hyd.	Hyd.	1	
		1200-4200	Smooth idle, Street, Off-Road, Towing. Good torque.										
670931-10	CL670931-10	267	267	213	213	.480	.480	110	106	Hyd.	Hyd.	1	
		1600-4600	Slight idle, Street Performance, Towing, fuel economy. Excellent low to mid range.										
672301-12	CL672301-12	267	277	213	223	.480	.480	112	108	Hyd.	Hyd.	1	
		1600-4600	Good idle, strong low & mid-range torque & horsepower.										
671581-12	CL671581-12	277	289	223	235	.496	.501	112	108	Hyd.	Hyd.	1	
		2400-4800	Fair idle, Hot Street & Mild Bracket Racing. Good mid range performance.										
670011-10	CL670011-10	279	279	225	225	.496	.496	110	106	Hyd.	Hyd.	1	
		2400-5000	Single pattern cam for EFI applications. Hot Street/Strip performance.										
670961-10	CL670961-10	285	285	231	231	.512	.512	110	106	Hyd.	Hyd.	1	
		2600-5400	Fair idle, Street/Strip, strong mid-range torque & horsepower. 9.5-10.5:1 CR, 3000+ stall.										
670971-10	CL670971-10	289	289	235	235	.501	.501	110	106	Hyd.	Hyd.	1	
		3000-6000	Rough idle, Hot Street/Strip, strong mid-range torque & horsepower. 3200+ stall.										
671161-08	CL671161-08	289	299	235	245	.520	.520	108	104	Hyd.	Hyd.	1	
		2800-5600	Lopey idle, Serious Street/Strip. Needs 3200+ stall, header & gears.										
679991	NA	Custom Grind Camshaft									Hyd.	Hyd.	1
		Hydraulic Flat Tappet Special Order Camshaft.											



HOLDEN V8 PFI • 304-345 1988-1997 NON ROLLER CAM ENGINES



Rattler Cams™ Retro-Fit Hydraulic Roller Camshafts

Firing Order: 1•2•7•8•4•5•6•3

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
678005-09	CL678005-09	280 288 1800-5200	227 235	.560 .565	109	103	Hyd. Hyd.	1
Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.								
678045-09	CL678045-09	288 296 2000-5400	235 243	.565 .565	109	103	Hyd. Hyd.	1
Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.								
678085-09	CL678085-09	296 304 2400-5600	243 251	.565 .549	109	103	Hyd. Hyd.	1
Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.								

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

Some items are not legal for sale or use on any pollution controlled motor vehicle

HOLDEN V8 PFI • 304-345 1988-1997 NON ROLLER CAM ENGINES

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90090	NA	95028	NA	NA	NA
91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90090	NA	95028	NA	NA	NA
91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90090	NA	95028	NA	NA	NA
91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90090	NA	95028	NA	NA	NA
91111 ³ 91112	NA	98212-K11 98212-K12 ¹⁰	98212	97112 97132 ¹⁰	97214 97165 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90090	NA	95028	NA	NA	NA
91111 ³ 91112	NA	98212-K11 98438-K12 ¹⁰	98212 98438 ²⁵	97112 97128 ¹⁰	97214 97216 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90090	NA	95028	NA	NA	NA
91111 ³ 91112	NA	98212-K11 98438-K12 ¹⁰	98212 98438 ²⁵	97112 97128 ¹⁰	97214 97216 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90090	NA	95028	NA	NA	NA
91111 ³ 91112	NA	98212-K11 98438-K12 ¹⁰	98212 98438 ²⁵	97112 97128 ¹⁰	97214 97216 ¹⁰	93005 93017 ¹⁰	93350 93316 ²⁵	90090	NA	95028	NA	NA	NA
91111 91112	NA	--	--	--	--	--	--	--	NA	--	NA	NA	NA

HOLDEN V8 PFI • 304-345 1988-1997 NON ROLLER CAM ENGINES

Rattler Cams™ Retro-Fit Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91466H ³	NA	98438-K12 ¹⁰	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90090	NA	NA	NA	NA	NA
91466H ³	NA	98438-K12 ¹⁰	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90090	NA	NA	NA	NA	NA
91466H ³	NA	98438-K12 ¹⁰	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90090	NA	NA	NA	NA	NA

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

CAMSHAFTS



HOLDEN V8 PFI • 304-345 1988-1997 NON ROLLER CAM ENGINES

Retro-Fit Hydraulic Roller Camshafts

Firing Order: 1•2•7•8•4•5•6•3

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN	EX	Duration @ .050" IN	EX	Valve Lift w/1.60 Rockers IN	EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN	EX	Cam Notes
677125-10	CL677125-10	266	272	213	219	.480	.480	110	106	Hyd.	Hyd.	1
1400-5200 Fair idle, Mild Street performance, strong low end torque.												
675685-12	CL675685-12	272	278	219	225	.544	.533	112	108	Hyd.	Hyd.	1
1800-5600 Fair idle, Performance Street, Strong torque curve.												
676545-14	CL676545-14	280	280	227	227	.560	.560	114	110	Hyd.	Hyd.	1
2400-6000 Fair idle, Turbocharged Performance Street, Strong torque curve.												
677625-10	CL677625-10	280	286	227	233	.560	.549	110	106	Hyd.	Hyd.	1
2800-6200 Fair idle, Hot Street, needs modified intake & exhaust. Needs 2800+ conv.												
676955-10	CL676955-10	286	290	233	237	.597	.597	110	106	Hyd.	Hyd.	1
3000-6800 Lopey idle, Hot Street, needs modified intake & exhaust. Needs 3000+ conv.												
675825-10	CL675825-10	290	296	237	245	.597	.597	110	106	Hyd.	Hyd.	1
3200-7000 Rough idle, Hot Street, needs modified intake & exhaust. Needs 3500+ conv.												
679995	NA	Custom Grind Camshaft										1
Mechanical Roller Special Order Camshaft.												



HOLDEN V8 PFI • 304-345 1988-1997 NON ROLLER CAM ENGINES

Mechanical Flat Tappet Camshafts

Firing Order: 1•2•7•8•4•5•6•3

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.60 Rockers		Lobe Separation	Intake	Valve Lash	Cam Notes	
		IN	EX	IN	EX	IN	EX	Angle	Centerline	IN	EX	
670102-09	CL670102-09	275	281	240	246	.539	.549	109	105	.022	.022	1
2800-5800 Fair idle, Hot Street/Bracket. Needs 10.0:1+ CR, 3200+ stall & gears.												
671372-08	CL671372-08	283	289	248	254	.571	.587	108	104	.022	.022	1
3000-6000 Rough idle, Hot Street/Strip. Good mid range to top end. 10.0:1+ CR., 3200+ stall.												
670822-08	CL670822-08	280	288	252	260	.576	.597	108	104	.016	.016	1,34
3200-6400 Rough idle, Street/Strip, good mid range & top end. 10.0:1 CR & high stall.												
679992	NA	Custom Grind Camshaft										1
Mechanical Flat Tappet Special Order Camshaft.												



HOLDEN V8 PFI • 304-345 1988-1997 NON ROLLER CAM ENGINES

Mechanical Roller Camshafts

Firing Order: 1•2•7•8•4•5•6•3

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.60 Rockers		Lobe Separation	Intake	Valve Lash	Cam Notes	
		IN	EX	IN	EX	IN	EX	Angle	Centerline	IN	EX	
679993	NA	Custom Grind Camshaft										1,5
Mechanical Roller Special Order Camshaft.												

Cam Notes: master note list on page 260

- 1 Stock (O.E.) valve springs cannot be used.
- 5 Requires upgraded distributor gear/fuel pump pushrod.
- 34 Provisions for increased oiling recommended.

Some items are not legal for sale or use on any pollution controlled motor vehicle

HOLDEN V8 PFI • 304-345 1988-1997 NON ROLLER CAM ENGINES

Retro-Fit Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91466H ³	NA	98438-K12 ¹⁰	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90090	NA	NA	NA	NA	NA
91466H ³	NA	98438-K12 ¹⁰	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90090	NA	NA	NA	NA	NA
91466H ³	NA	98438-K12 ¹⁰	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90090	NA	NA	NA	NA	NA
91466H ³	NA	98438-K12 ¹⁰	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90090	NA	NA	NA	NA	NA
91466H ³	NA	98438-K12 ¹⁰	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90090	NA	NA	NA	NA	NA
91466H ³	NA	98438-K12 ¹⁰	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90090	NA	NA	NA	NA	NA
91466H	NA	--	--	--	--	--	--	--	NA	--	NA	NA	NA

HOLDEN V8 PFI • 304-345 1988-1997 NON ROLLER CAM ENGINES

Mechanical Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91615 ³	NA	98445-K12 ¹⁰	98445 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹	93316 ²⁵	90090	NA	95028	NA	NA	NA
91615 ³	NA	98445-K12 ¹⁰	98445 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹	93316 ²⁵	90090	NA	95028	NA	NA	NA
91615 ³	NA	98445-K12 ¹⁰	98445 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹	93316 ²⁵	90090	NA	95028	NA	NA	NA
91615	NA	--	--	--	--	--	--	--	NA	--	NA	NA	NA

HOLDEN V8 PFI • 304-345 1988-1997 NON ROLLER CAM ENGINES

Mechanical Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
--	NA	--	--	--	--	--	--	--	NA	--	NA	NA	NA

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

CAMSHAFTS



OLDSMOBILE 39° V8 • 260-455 1967-1990

Max Certified™ Hydraulic Flat Tappet Cam & Lifter Sets - 5 Year No Fault Warranty (see page 3 for details)

Cam & Lifter Set Part No.	Cam & Direct Lube Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.60 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash IN	Valve Lash EX	Cam Notes
MC510931-11	NA	267	267	213	213	.480	.480	111	107	Hyd.	Hyd.	1
		1200-5500	Good low end & mid-range. Will work well in jet boats.									
MC510991-08	NA	275	275	221	221	.501	.501	108	104	Hyd.	Hyd.	1
		1500-5800	Good low & mid-range horsepower. Needs 4 barrel & headers.									



OLDSMOBILE 39° V8 • 260-455 1967-1990



American Muscle™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.60 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash IN	Valve Lash EX	Cam Notes
517771-09	CL517771-09	250	256	187	200	.400	.400	109	106	Hyd.	Hyd.	1
		800-4200	Near duplicate of the Olds 310HP/350 cam (GM #400084).									
517441-10	CL517441-10	272	294	196	208	.413	.414	110	111	Hyd.	Hyd.	1
		1000-4400	Near duplicate of the Hurst/Olds 375HP/455 cam (GM #400117).									
517241-13	CL517241-13	308	308	232	232	.474	.474	113	112	Hyd.	Hyd.	1
		2400-6000	Near duplicate of the Olds W-31 325HP/350 cam (GM #402194).									



OLDSMOBILE 39° V8 • 260-455 1967-1990



Street Force™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.60 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash IN	Valve Lash EX	Cam Notes
510011-12	CL510011-12	259	269	205	215	.448	.475	112	108	Hyd.	Hyd.	1
		800-4800	Street Force™ 1, Good idle, Mild Street performance, strong low end torque.									
510021-12	CL510021-12	267	277	213	223	.480	.480	112	108	Hyd.	Hyd.	1
		1200-5800	Street Force™ 2, Good idle & throttle response. Needs 4 barrel & good exhaust.									
512121-12	CL512121-12	279	289	225	235	.496	.501	112	108	Hyd.	Hyd.	1
		1800-6000	Street Force™ 3, Noticeable idle, Hot Street & mild Bracket Racing.									
510041-12	CL510041-12	289	299	235	245	.520	.544	112	108	Hyd.	Hyd.	1
		2400-6400	Street Force™ 4, Lopey idle, good mid-range power. Needs 2800+ stall.									

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

Some items are not legal for sale or use on any pollution controlled motor vehicle

OLDSMOBILE 39° V8 • 260-455 1967-1990

Max Certified™ Hydraulic Flat Tappet Cam & Lifter Set Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91411 ³	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411 ³	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA

OLDSMOBILE 39° V8 • 260-455 1967-1990

American Muscle™ Hydraulic Flat Tappet Cam & Lifter Set Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91411 ³	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411 ³	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411 ³	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA

OLDSMOBILE 39° V8 • 260-455 1967-1990

Street Force™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91411 ³	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411 ³	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411 ³	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411 ³	NA	98436-K11 ²⁵	98436 ²⁵	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

CAMSHAFTS



OLDSMOBILE 39° V8 • 260-455 1967-1990

Rattler Cams™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
518021-09	CL518021-09	281 289 1800-5200	227 235	.501 .501	109	103	Hyd. Hyd.	1
Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.								
518061-09	CL518061-09	289 297 2000-5400	235 243	.501 .480	109	103	Hyd. Hyd.	1
Big Mama Rattler™, Looney idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.								
518101-09	CL518101-09	297 305 2400-5600	243 251	.512 .528	109	103	Hyd. Hyd.	1
Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.								



OLDSMOBILE 39° V8 • 260-455 1967-1990

Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.60 Rockers		Lobe Separation Angle	Intake Centerline	Valve Lash		Cam Notes	
		IN	EX	IN	EX	IN	EX			IN	EX		
510931-11	CL510931-11	267	267	213	213	.480	.480	111	107	Hyd.	Hyd.	1	
		1200-5500 Good low end & mid-range. Will work well in jet boats.											
510991-08	CL510991-08	275	275	221	221	.501	.501	108	104	Hyd.	Hyd.	1	
		1500-5800 Good low & mid-range horsepower. Needs 4 barrel & headers.											
511431-10	CL511431-10	281	287	227	233	.512	.512	110	106	Hyd.	Hyd.	1	
		2400-6000 Lopey idle, Strong mid range. Good throttle response. 2400+ stall.											
511431-12	CL511431-12	281	287	227	233	.512	.512	112	108	Hyd.	Hyd.	1	
		2400-6200 Fair idle, Street/Strip, broad mid range power. Needs 4 barrel & headers.											
510041-10	CL510041-10	289	299	235	245	.520	.544	110	106	Hyd.	Hyd.	1	
		2600-6400 Lopey idle, Street/Strip or nostalgia. Likes headers & gears.											
511251-08	CL511251-08	299	307	245	253	.544	.560	108	104	Hyd.	Hyd.	1	
		3200-6800 Pro Street/Brackets, Strong mid & upper end power. 10.0:1+ CR.											
519991	NA	Custom Grind Camshaft									Hyd.	Hyd.	1
		Hydraulic Flat Tappet Special Order Camshaft.											

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

Some items are not legal for sale or use on any pollution controlled motor vehicle

OLDSMOBILE 39° V8 • 260-455 1967-1990

Rattler Cams™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91411 ³	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411 ³	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411 ³	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA

OLDSMOBILE 39° V8 • 260-455 1967-1990

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91411 ³	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411 ³	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411 ³	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411 ³	NA	98412-K11	98412	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411 ³	NA	-- 98438-K12 ²⁵	98438 ²⁵ 97128 ¹⁰	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411	NA	--	--	--	--	--	--	NA	NA	--	NA	NA	NA

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

CAMSHAFTS



OLDSMOBILE 39° V8 • 260-455 1967-1990



Rattler Cams™ Retro-Fit Hydraulic Roller Camshafts

Firing Order: 1•8•7•3•6•5•4•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
518005-09	CL518005-09	280 288	227 235	.560 .565	109	103	Hyd. Hyd.	1,22
		1800-5200 Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.						
518045-09	CL518045-09	288 296	235 243	.565 .565	109	103	Hyd. Hyd.	1,22
		2000-5400 Big Mama Rattler™, Lopecy idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.						
518085-09	CL518085-09	296 304	243 251	.565 .549	109	103	Hyd. Hyd.	1,22
		2400-5600 Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.						



OLDSMOBILE 39° V8 • 260-455 1967-1990

4/7 Swap Retro-Fit Hydraulic Roller Camshafts

Firing Order: 1•8•7•3•6•5•4•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
514245-10	CL514245-10	272 282	219 229	.523 .512	110	106	Hyd. Hyd.	1,22
		1600-5400 Good idle, Street, broad low to mid range performance.						
514825-10	CL514825-10	278 282	225 229	.560 .555	110	106	Hyd. Hyd.	1,22
		1800-5600 Fair idle, Performance Street, broad usable power range.						
514155-10	CL514155-10	286 286	233 233	.549 .549	110	106	Hyd. Hyd.	1,22
		2000-5800 Choppy idle, strong low & mid range performance. 2500+ stall.						
514635-10	CL514635-10	288 294	235 241	.581 .581	110	106	Hyd. Hyd.	1,22
		2200-6600 Rough idle, strong mid-range torque & horsepower.						
519995	NA	Custom Grind Camshaft					Hyd. Hyd.	1,22
		Retro-Fit Hydraulic Roller Special Order Camshaft.						



OLDSMOBILE 39° V8 • 260-455 1967-1990

Mechanical Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.60 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
519992	NA	Custom Grind Camshaft						1
		Mechanical Flat Tappet Special Order Camshaft.						

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

22 Ignition firing order must be changed to 1-8-7-3-6-5-4-2.

Some items are not legal for sale or use on any pollution controlled motor vehicle

OLDSMOBILE 39° V8 • 260-455 1967-1990

Rattler Cams™ *Retro-Fit Hydraulic Roller Camshaft Components*

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91464 ³	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91464 ³	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91464 ³	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA

OLDSMOBILE 39° V8 • 260-455 1967-1990

4/7 Swap *Retro-Fit Hydraulic Roller Camshaft Components*

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91464 ³	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91464 ³	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91464 ³	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91464 ³	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91464	NA	--	--	--	--	--	--	NA	NA	--	NA	NA	NA

OLDSMOBILE 39° V8 • 260-455 1967-1990

Mechanical Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91415 91418	NA	--	--	--	--	--	--	NA	NA	--	NA	NA	NA

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

CAMSHAFTS



PONTIAC V8 • 265-455 1955-1981

Max Certified™ Hydraulic Flat Tappet Cam & Lifter Sets - 5 Year No Fault Warranty (see page 3 for details)

Cam & Lifter Set Part No.	Cam & Direct Lube Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
MC410931-11	NA	267 267 1500-5500	213 213 Good idle, Strong low & mid-range torque.	.450 .450	111	107	Hyd. Hyd.	1
MC410021-12	NA	267 277 1500-5800	213 223 Super low & mid-range torque. Excellent driveability.	.450 .450	112	108	Hyd. Hyd.	1
MC410961-08	NA	285 285 2200-6200	231 231 Hot Street, improved mid-range. Best with 9.5:1+ comp., 4-barrel.	.480 .480	108	104	Hyd. Hyd.	1



PONTIAC V8 • 265-455 1955-1981

American Muscle™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
417561-11	CL417561-11	273 282 1600-5000	198 207 Near duplicate of the Pontiac 325HP/389 cam (GM #9779066).	.405 .410	111	106	Hyd. Hyd.	1
417701-11	CL417701-11	271 280 1600-5000	198 208 Near duplicate of the Pontiac Ram Air I/II 375HP/400 cam (GM #9779067).	.404 .408	111	98	Hyd. Hyd.	1
417131-11	CL417131-11	273 282 1700-5200	200 210 Near duplicate of the Pontiac Tri-Power 318HP/389 cam (GM #529472).	.407 .411	111	106	Hyd. Hyd.	1
417591-15	CL417591-15	288 302 1800-5200	212 225 Near duplicate of the Pontiac 390HP/428 cam (GM #9779068).	.408 .408	115	113	Hyd. Hyd.	1
417251-15	CL417251-15	301 313 1800-5400	224 236 Near duplicate of the Pontiac Ram Air III 366HP/400 cam (GM #9785744).	.407 .407	115	112	Hyd. Hyd.	1



PONTIAC V8 • 265-455 1955-1981

Street Force™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
410011-12	CL410011-12	259 269 800-4800	205 215 Street Force™ 1, Good idle, Mild Street performance, strong low end torque.	.420 .445	112	108	Hyd. Hyd.	1
410021-12	CL410021-12	267 277 1500-5800	213 223 Street Force™ 2, Good idle & throttle response. Needs 4 barrel & good exhaust.	.450 .450	112	108	Hyd. Hyd.	1
410141-12	CL410141-12	279 289 1800-6000	225 235 Street Force™ 3, Noticeable idle, Hot Street & mild Bracket Racing.	.490 .488	112	108	Hyd. Hyd.	1

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

Some items are not legal for sale or use on any pollution controlled motor vehicle

PONTIAC V8 • 265-455 1955-1981

Max Certified™ Hydraulic Flat Tappet Cam & Lifter Set Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91411 ³	NA	98412-K11 ²⁵	98412 ²⁵	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411 ³	NA	98412-K11 ²⁵	98412 ²⁵	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411 ³	NA	98412-K11 ²⁵	98412 ²⁵	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA

PONTIAC V8 • 265-455 1955-1981

American Muscle™ Hydraulic Flat Tappet Cam & Lifter Set Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91411 ³	NA	98412-K11 ²⁵	98412 ²⁵	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411 ³	NA	98412-K11 ²⁵	98412 ²⁵	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411 ³	NA	98412-K11 ²⁵	98412 ²⁵	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411 ³	NA	98412-K11 ²⁵	98412 ²⁵	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411 ³	NA	98412-K11 ²⁵	98412 ²⁵	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA

PONTIAC V8 • 265-455 1955-1981

Street Force™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91411 ³	NA	98412-K11 ²⁵	98412 ²⁵	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411 ³	NA	98412-K11 ²⁵	98412 ²⁵	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411 ³	NA	98412-K11 ²⁵	98412 ²⁵	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

CAMSHAFTS

PONTIAC V8 • 265-455 1955-1981



Rattler Cams™ Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
418001-09	CL518001-09	281 289 1800-5200	227 235	.480 .488	109	103	Hyd. Hyd.	1
Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.								
418041-09	CL518041-09	289 297 2000-5400	235 243	.488 .480	109	103	Hyd. Hyd.	1
Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.								
418081-09	CL518081-09	297 305 2400-5600	243 251	.507 .495	109	103	Hyd. Hyd.	1
Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.								



PONTIAC V8 • 265-455 1955-1981

Hydraulic Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
410931-11	CL410931-11	267 267 1500-5500	213 213	.450 .450	111	107	Hyd. Hyd.	1 Good idle, Strong low & mid-range torque.
411421-08	CL411421-08	275 275 1800-5800	221 221	.470 .470	108	104	Hyd. Hyd.	1 Fair idle, Street performance, good low end & mid range torque.
410991-10	CL410991-10	277 277 2000-6000	223 223	.465 .465	110	106	Hyd. Hyd.	1 Nice single pattern cam for Hot Street/Strip performance.
411161-10	CL411161-10	277 289 2000-6000	223 235	.465 .470	110	106	Hyd. Hyd.	1 Mild rough idle, Street/Strip, Strong mid range performance.
410961-08	CL410961-08	285 285 2200-6200	231 231	.480 .480	108	104	Hyd. Hyd.	1 Hot Street, improved mid-range. Best with 9.5:1+ comp., 4-barrel.
410961-10	CL410961-10	285 285 2400-6200	231 231	.480 .480	110	106	Hyd. Hyd.	1 Exceptional mid-range & top end with 389 or larger.
410051-08	CL410051-08	285 295 2400-6000	231 241	.480 .470	108	104	Hyd. Hyd.	1 Lopey idle, Hot Street/Brackets, very strong mid range. 2500+ stall, 9.0:1 CR.
410051-14	CL410051-14	285 295 2600-6400	231 241	.480 .470	114	110	Hyd. Hyd.	1 Excellent RAM Air IV replacement. Will work well with NOS.
410361-08	CL410361-08	289 294 2700-6500	235 241	.488 .503	108	104	Hyd. Hyd.	1 Rough idle, Street/Strip. Needs 9.0:1+ CR, 2500+ stall, good intake, gears & headers.
411391-08	CL411391-08	294 301 3000-6800	241 247	.503 .510	108	104	Hyd. Hyd.	1 Rough idle, Hot Street/Bracket, Nice upper mid range & top end.
419991	NA	Custom Grind Camshaft					Hyd. Hyd.	1
Hydraulic Flat Tappet Special Order Camshaft.								

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

Some items are not legal for sale or use on any pollution controlled motor vehicle

PONTIAC V8 • 265-455 1955-1981

Rattler Cams™ Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91411 ³	NA	98412-K11 ²⁵	98412 ²⁵	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411 ³	NA	98412-K11 ²⁵	98412 ²⁵	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411 ³	NA	98412-K11 ²⁵	98412 ²⁵	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA

PONTIAC V8 • 265-455 1955-1981

Hydraulic Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91411 ³	NA	98412-K11 ²⁵	98412 ²⁵	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411 ³	NA	98412-K11 ²⁵	98412 ²⁵	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411 ³	NA	98412-K11 ²⁵	98412 ²⁵	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411 ³	NA	98412-K11 ²⁵	98412 ²⁵	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411 ³	NA	98412-K11 ²⁵	98412 ²⁵	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411 ³	NA	98412-K11 ²⁵	98412 ²⁵	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411 ³	NA	98412-K11 ²⁵	98412 ²⁵	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411 ³	NA	98412-K11 ²⁵	98412 ²⁵	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411 ³	NA	98412-K11 ²⁵	98412 ²⁵	97118	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	NA	NA	NA	NA	NA	NA
91411	NA	--	--	--	--	--	--	NA	NA	--	NA	NA	NA

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.

CAMSHAFTS



PONTIAC V8 • 265-455 1955-1981



Rattler Cams™ Retro-Fit Hydraulic Roller Camshafts

Firing Order: 1•8•7•3•6•5•4•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
418005-09	CL418005-09	280 288 1800-5200	227 235	.525 .530	109	103	Hyd. Hyd.	1
Rattler™, Choppy idle. High Performance Street, stock converter ok, best with 1800+ and gears.								
418045-09	CL418045-09	288 296 2000-5400	235 243	.530 .530	109	103	Hyd. Hyd.	1
Big Mama Rattler™, Lopey idle. Street or Street/Strip. Needs 9.0:1 compression, 2500+ stall.								
418085-09	CL418085-09	296 304 2400-5600	243 251	.530 .515	109	103	Hyd. Hyd.	1
Big Daddy Rattler™, Rough idle. Pro Street or Street/Strip. Needs 9.5:1 compression, 2800+.								



PONTIAC V8 • 265-455 1955-1981

4/7 Swap Retro-Fit Hydraulic Roller Camshafts

Firing Order: 1•8•7•3•6•5•4•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
414645-10	CL414645-10	266 274 1400-5600	213 221	.485 .475	110	106	Hyd. Hyd.	1,22 Noticeable idle, broad low to mid range power band. Needs 2000+ stall.
414145-10	CL414145-10	272 282 1800-6000	219 229	.525 .520	110	106	Hyd. Hyd.	1,22 Mild idle, Street Performance, good low to mid range torque & power.
414345-10	CL414345-10	280 290 2000-6200	227 237	.560 .560	110	106	Hyd. Hyd.	1,22 Choppy idle, Saturday nite special, Street/Strip. Needs good intake, headers & 2500+.
414495-08	CL414495-08	290 296 2500-6500	237 243	.560 .565	110	106	Hyd. Hyd.	1,22 Good idle, great mid range performance. 10.0:1+ CR, 2600+ stall & 3.73 or lower gears.
414655-08	CL414655-08	296 302 3000-6800	243 249	.600 .600	108	104	Hyd. Hyd.	1,22 Rough idle, Hot Street/Strip, good mid range torque & power.
414455-08	CL414455-08	306 312 3200-7000	253 259	.600 .600	108	104	Hyd. Hyd.	1,22 Hot Street/Bracket, major mid range & top end performance. 11.0:1+ CR, 3500+ stall.
419995	NA	Custom Grind Camshaft					Hyd. Hyd.	1,22
Retro-Fit Hydraulic Roller Special Order Camshaft.								



PONTIAC V8 • 265-455 1955-1981

Mechanical Flat Tappet Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised		Duration @ .050"		Valve Lift w/1.50 Rockers		Lobe Separation	Intake	Valve Lash	Cam Notes		
		IN	EX	IN	EX	IN	EX	Angle	Centerline	IN	EX		
411742-06	CL411742-06	283	289	248	254	.535	.550	106	102	.022	.022	1	
	CL411742-06DL ⁴	2500-6500 Street/Strip, powerful through entire rpm range.											
410202-08	CL410202-08DL ⁴	295	299	260	264	.565	.555	108	104	.022	.022	1	
		3000-6800 Hot Pro-Street & Bracket Racing. Great mid-range & top end performer.											
419992	NA	Custom Grind Camshaft											1
		Mechanical Flat Tappet Special Order Camshaft.											

Cam Notes: master note list on page 260

1 Stock (O.E.) valve springs cannot be used.

22 Ignition firing order must be changed to 1-8-7-3-6-5-4-2.

Some items are not legal for sale or use on any pollution controlled motor vehicle

PONTIAC V8 • 265-455 1955-1981

Rattler Cams™ Retro-Fit Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91466 ³	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90090	NA	NA	NA	NA	94345
91466 ³	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90090	NA	NA	NA	NA	94345
91466 ³	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90090	NA	NA	NA	NA	94345

PONTIAC V8 • 265-455 1955-1981

Rattler Cams™ Retro-Fit Hydraulic Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91466 ³	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90090	NA	NA	NA	NA	94345
91466 ³	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90090	NA	NA	NA	NA	94345
91466 ³	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90090	NA	NA	NA	NA	94345
91466 ³	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90090	NA	NA	NA	NA	94345
91466 ³	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90090	NA	NA	NA	NA	94345
91466 ³	NA	-- 98438-K12 ²⁵	98438 ²⁵	97118 97128 ¹⁰	-- 97216 ¹⁰	93005 93017 ¹⁰	93316 ²⁵	90090	NA	NA	NA	NA	94345
91466	NA	--	--	--	--	--	--	NA	NA	--	NA	NA	NA

PONTIAC V8 • 265-455 1955-1981

Mechanical Flat Tappet Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91415 ³ 91418 ⁴	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90090	NA	--	NA	NA	94345
91415 ³ 91418 ⁴	NA	98438-K12 ²⁵	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90090	NA	--	NA	NA	94345
91415 91418	NA	NA	98438 ²⁵	97128 ¹⁰	97216 ¹⁰	93017 ¹⁰	93316 ²⁵	90090	NA	--	NA	NA	94345

Components Notes: master note list on page 260

³ Included in Cam & Lifter Sets.

¹⁰ 10° Valve lock Angle, must use matching retainers/locks.

²⁵ Machining Required.



PONTIAC V8 • 265-455 1955-1981

Mechanical Roller Camshafts

Firing Order: 1•8•4•3•6•5•7•2

Cam Part No.	Cam & Lifter Set Part No.	Duration Advertised IN EX	Duration @ .050" IN EX	Valve Lift w/1.50 Rockers IN EX	Lobe Separation Angle	Intake Centerline	Valve Lash IN EX	Cam Notes
411123-08	NA	293 301 3500-6500	261 269 400-455. Hot street & bracket race.	.620 .620	108	104	.022 .022	1,5
411133-08	NA	307 317 4000-6600	275 285 450+CID. 12:1. Good heads. Best with 1.65 rockers.	.630 .630	108	104	.022 .022	1,5
419993	NA	Custom Grind Camshaft Mechanical Roller Special Order Camshaft.						1,5

Cam Notes: master note list on page 260

CUSTOM ORDER • SPECIAL GRIND CAMSHAFTS

AMC L6

199-258/4.0L, '64-'95	Hydraulic Flat Tappet	339991
4.0L FI, '96-'06	Hydraulic Flat Tappet	329991
4.0L FI, '96-'06	Hydraulic Flat Tappet	329991

AMC V8

290-401, '66-'93	Hydraulic Flat Tappet	319991
290-401, '66-'93	Mechanical Flat Tappet	319992

BUICK V6

181-252 Even Fire, '77-'89	Hydraulic Flat Tappet	569991
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BUICK/OLDS Aluminum V8

Buick/Olds 215, 300, 340, '61-'67	Hydraulic Flat Tappet	539991
Buick/Olds 215, 300, 340, '61-'67	Mechanical Flat Tappet	539992

BUICK V8

350, '68-'80	Hydraulic Flat Tappet	549991
350, '68-'80	Mechanical Flat Tappet	549992
400, 430, 455, '67-'67	Hydraulic Flat Tappet	559991
400, 430, 455, '67-'67	Mechanical Flat Tappet	559992

CADILLAC V8

365-390, '56-'62	Hydraulic Flat Tappet	529996
390-429, '63-'67	Hydraulic Flat Tappet	529998
366, 425, 472, 500, '68-'84	Hydraulic Flat Tappet	529991
366, 425, 472, 500, '68-'84	Hydraulic Roller	529995
366, 425, 472, 500, '68-'84	Mechanical Flat Tappet	529992

CHEVROLET Straight 6

194, 230, 250, '62-'84	Hydraulic Flat Tappet	169991
194, 230, 250, '62-'84	Mechanical Flat Tappet	169992
216, 235, 261, '57-'63	Hydraulic Flat Tappet	179991
216, 235, 261, '57-'63	Mechanical Flat Tappet	179992
292 '63-'90	Hydraulic Flat Tappet	159991
292 '63-'90	Mechanical Flat Tappet	159992

CHEVROLET V6

200-229, '78-'84	Hydraulic Flat Tappet	149996
2.8L/3.1L/3.4L 60°, '80-'91	Hydraulic Flat Tappet	149998
4.3L, '85-'86 (non-OE hyd. roller)	Hydraulic Flat Tappet	149991
4.3L, '85-'86 (non-OE hyd. roller)	Mechanical Flat Tappet	149992

CHEVROLET SB

262-400, '57-'96 (non-OE hyd. roller)	Hydraulic Flat Tappet	119991
262-400, '57-'96 (non-OE hyd. roller)	Hydraulic Flat Tappet Small Base	119991-S
262-400, '57-'96 (non-OE hyd. roller)	Hydraulic Flat Tappet Special Core	119991-P55
262-400, '57-'96 (non-OE hyd. roller)	Hydraulic Flat Tappet 4/7 Swap	114991
262-400, '57-'96 (non-OE hyd. roller)	Hyd. Flat Tappet 4/7 Swap Sm. Base	114991-S
262-400, '57-'96 (non-OE hyd. roller)	Hydraulic Roller	119995
262-400, '57-'96 (non-OE hyd. roller)	Hydraulic Roller Small Base	119995-S
262-400, '57-'96 (non-OE hyd. roller)	Hyd./Mech. Roller w/Cast Dist. Gear	119999

CHEVROLET SB (continued)

262-400, '57-'96 (non-OE hyd. roller)	Hydraulic Roller 4/7 Swap	114995
262-400, '57-'96 (non-OE hyd. roller)	Hydraulic Roller 4/7 Swap Sm. Base	114995-S
262-400, '57-'96 (non-OE hyd. roller)	Hydraulic Roller LS (C) Firing Order	114998
262-400, '57-'96 (non-OE hyd. roller)	Hyd. Roller LS (C) Firing Order Sm. Base	114998-S
262-400, '57-'96 (non-OE hyd. roller)	Mechanical Flat Tappet	119992
262-400, '57-'96 (non-OE hyd. roller)	Mechanical Flat Tappet Small Base	119992-S
262-400, '57-'96 (non-OE hyd. roller)	Mech. Flat Tappet Special Core	119992-P55
262-400, '57-'96 (non-OE hyd. roller)	Mechanical Flat Tappet 4/7 Swap	119996
262-400, '57-'96 (non-OE hyd. roller)	Mech. Flat Tappet 4/7 Swap Sm. Base	119996-S
262-400, '57-'96 (non-OE hyd. roller)	Mechanical Roller	119993
262-400, '57-'96 (non-OE hyd. roller)	Mechanical Roller Small Base	119993-S
262-400, '57-'96 (non-OE hyd. roller)	Mechanical Roller 8620 1 pc Core	119990
262-400, '57-'96 (non-OE hyd. roller)	Mechanical Roller w/Rear Drive	119993-RD
262-400, '57-'96 (non-OE hyd. roller)	Mechanical Roller 4/7 Swap	119994
262-400, '57-'96 (non-OE hyd. roller)	Mech. Roller 4/7 Swap Sm. Base	119994-S
262-400, '57-'96 (non-OE hyd. roller)	Mechanical Roller 50-55mm Bearing	119997
262-400, '57-'96 (non-OE hyd. roller)	Mech. Roller 50-55mm, LS (C) Firing Order	118997
305-350, '87-'99 (OE hyd. roller)	Hydraulic Roller	189995
305-350, '87-'99 (OE hyd. roller)	Hydraulic Roller Small Base	189995-S
05-350, '87-'99 (OE hyd. roller)	Hyd./Mech. Roller w/Cast Dist. Gear	119999

CHEVROLET GEN III/IV (LS-Series) 3-Bolt

4.8/5.3/5.7/6.0/6.2/7.0L, '97-Present	Hydraulic Roller	199995
4.8/5.3/5.7/6.0/6.2/7.0L, '97-Present	Mechanical Roller	199993

CHEVROLET GEN IV (LS-Series) Single-Bolt w/o VVT

4.8/5.3/6.0/6.2L, '05-Present	Hydraulic Roller	199996
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CHEVROLET BB

396-502, '67-'95 (non-OE hyd. roller)	Hydraulic Flat Tappet	129991
396-502, '67-'95 (non-OE hyd. roller)	Hydraulic Roller	129995
396-502, '67-'95 (non-OE hyd. roller)	Hyd./Mech. Roller w/Cast Dist. Gear	129999
396-502, '67-'95 (non-OE hyd. roller)	Hydraulic Roller 4/7 Swap	124995
396-502, '67-'95 (non-OE hyd. roller)	Hydraulic Roller (C) Firing Order	124998
396-502, '67-'95 (non-OE hyd. roller)	Mechanical Flat Tappet	129992
396-502, '67-'95 (non-OE hyd. roller)	Mechanical Flat Tappet 4/7 Swap	129997
396-502, '67-'95 (non-OE hyd. roller)	Mechanical Roller	129993
396-502, '67-'95 (non-OE hyd. roller)	Mechanical Roller 8620 1 pc Core	129990
396-502, '67-'95 (non-OE hyd. roller)	Mechanical Roller 4/7 Swap	129994
396-502, '67-'95 (non-OE hyd. roller)	Mechanical Roller 50-55mm, 4/7 Swap	129998
396-502, '67-'95 (non-OE hyd. roller)	Mech. Roller 50-55mm, LS (C) Firing Order	128997

CHEVROLET BB GEN 6

454-502, '96-'00 (OE hyd. roller)	Hydraulic Roller	129996
8100/8.1L, '01-Present (OE hyd. roller)	Hydraulic Roller	109996

CHEVROLET W-Series 348/409

348/409, '58-'65	Hydraulic Flat Tappet	139991
348/409, '58-'65	Mechanical Flat Tappet	139992

Some items are not legal for sale or use on any pollution controlled motor vehicle

PONTIAC V8 • 265-455 1955-1981

Mechanical Roller Camshaft Components

Lifters	Rev Kit	Valve Spring, Retainer & Lock Kit	Valve Springs	Steel Retainers	Titanium Retainers	Valve Locks	Valve Seals	Rocker Arms	Stud Girdles	Pushrods	Fuel Pump Pushrod	Distributor Gear	Timing Set
91450 91457	NA	NA	98650 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90090	NA	--	NA	NA	94345
91450 91457	NA	NA	98650 ²⁵	97128 ¹⁰	97220 ¹⁰	93017 ¹⁰	93316 ²⁵	90090	NA	--	NA	NA	94345
--	NA	--	--	--	--	--	--	90090	NA	--	NA	NA	94345

Components Notes: master note list on page 260

CUSTOM ORDER • SPECIAL GRIND CAMSHAFTS

CHEVROLET W-Series 348/409 (continued)			
348/409, '58-'65	Hydraulic Roller		139995
348/409, '58-'65	Mechanical Roller		139993
CHRYSLER SLANT 6			
170, 198, 225, '60-'80	Hydraulic Flat Tappet		759991
170, 198, 225, '60-'80	Mechanical Flat Tappet		759992
CHRYSLER SB			
273-360, '65-'95 (318 - '67-'95)	Hydraulic Flat Tappet		719991
273-360, '65-'95 (318 - '67-'95)	Hydraulic Roller		719995
273-360, '65-'95 (318 - '67-'95)	Mechanical Flat Tappet		719992
273-360, '65-'95 (318 - '67-'95)	Mechanical Roller		719993
5.2L/5.9L Magnum, '92-'03	Hydraulic Roller		779995
"R" Block	Mechanical Roller		719994
CHRYSLER BB/RB			
361-440, '58-'79	Hydraulic Flat Tappet, Single Bolt		729991
361-440, '58-'79	Hydraulic Flat Tappet, 3-Bolt		729994
361-440, '58-'79	Hydraulic Roller		729995
361-440, '58-'79	Mechanical Flat Tappet		729992
361-440, '58-'79	Mechanical Roller		729993
CHRYSLER HEMI			
354 Hemi, '56-'57	Hydraulic Flat Tappet		769991
354 Hemi, '56-'57	Mechanical Flat Tappet		769992
392 Hemi, '57-'58	Hydraulic Flat Tappet		739991
392 Hemi, '57-'58	Hydraulic Roller		739995
392 Hemi, '57-'58	Mechanical Flat Tappet		739992
392 Hemi, '57-'58	Mechanical Roller		739993
426 Hemi, '66-'71	Hydraulic Flat Tappet		749991
426 Hemi, '66-'71	Mechanical Flat Tappet		749992
426 Hemi, '66-'71	Mechanical Roller		749993
5.7L/6.0L Hemi, '00-Present	Hydraulic Roller		789995
CHRYSLER AFTERMARKET HEMI			
(KB Stage VII)	Mechanical Roller, 48° Lifter Angle		749993-48
(2.125 Journal 9310)	Mechanical Roller		729999
FORD Straight 6			
144-250, '63-'83	Hydraulic Flat Tappet		289998
240-300, '64-'96	Hydraulic Flat Tappet		289996
FORD 4.6L/5.4L MODULAR V8			
4.6L/5.4L SOHC 2 Valve, '91-Present	Hydraulic Roller (2 Cams)		279993
4.6L/5.4L SOHC 3 Valve, '04-Present	Hydraulic Roller (2 Cams)		279995
4.6L DOHC 4 Valve, '93-Present	Hydraulic Roller (4 Cams)		279994
FORD SB 221-302/5.0L			
221-302/5.0L (except H.O.), '62-'95	Hydraulic Flat Tappet		219991
221-302/5.0L (except H.O.), '62-'95	Retrofit Hyd. Roller w/351W Firing Order		229995
221-302/5.0L (except H.O.), '62-'95	Mechanical Flat Tappet		219992
221-302/5.0L (except H.O.), '62-'95	Mechanical Roller w/351W Firing Order		229993

FORD SB 351W/5.0L H.O.			
351W/5.0L H.O., '69-'95	Hydraulic Flat Tappet		229991
351W, '69-'93	Retrofit Hydraulic Roller		229995
351W, '94-'95/5.0L H.O. '85-'95	Hydraulic Roller (Small Base)		229994
351W/5.0L H.O., '69-'95	Mechanical Flat Tappet		229992
351W/5.0L H.O., '69-'95	Mechanical Roller		229993
FORD 351C, 351M, 400			
351C, 351M, 400, '75-'82	Hydraulic Flat Tappet		239991
351C, 351M, 400, '72-'82	Hydraulic Roller		239995
351C, 351M, 400, '75-'82	Mechanical Flat Tappet		239992
351C, 351M, 400, '72-'82	Mechanical Roller		239993
FORD FE			
352-428, '63-'76	Hydraulic Flat Tappet		259991
352-428, '63-'76	Hydraulic Roller		259995
352-428, '63-'76	Mechanical Flat Tappet		259992
352-428, '63-'76	Mechanical Roller		259993
FORD 429-460			
429-460, '68-'97	Hydraulic Flat Tappet		249991
429-460, '68-'97	Hydraulic Roller		249995
429-460, '68-'97	Mechanical Flat Tappet		249992
429-460, '68-'97	Mechanical Roller		249993
FORD FLAT HEAD			
'38-'48	Mechanical Flat Tappet		269996
'49-'53	Mechanical Flat Tappet		269992
FORD Y-BLOCK			
272, 292, 312, '55-'62	Mechanical Flat Tappet		299992
HOLDEN V8			
252-308, '70-'88	Hydraulic Flat Tappet		669991
252-308, '70-'88	Mechanical Flat Tappet		669992
304 PFI, '88-'97	Hydraulic Flat Tappet		679991
304 PFI, '88-'97	Hydraulic Roller		679995
304 PFI, '88-'97	Mechanical Flat Tappet		679992
304 PFI, '88-'97	Mechanical Roller		679993
OLDSMOBILE V8 39°			
307-455, '66-'84	Hydraulic Flat Tappet		519991
307-455, '66-'84	Hydraulic Roller (4 & 7 Swap)		519995
307-455, '66-'84	Mechanical Flat Tappet		519992
OLDSMOBILE V8 45°			
300,400,425, '64-'67	Hydraulic Flat Tappet		579991
300,400,425, '64-'67	Mechanical Flat Tappet		579992
PONTIAC V8			
326-455, '55-'81	Hydraulic Flat Tappet		419991
326-455, '55-'81	Hydraulic Roller (4 & 7 Swap)		419995
326-455, '55-'81	Mechanical Flat Tappet		419992
326-455, '55-'81	Mechanical Roller		419993

CAMSHAFT & COMPONENTS NOTES MASTER LIST

Camshaft & Components Notes Master List

- 1 Stock (O.E.) valve springs cannot be used.
- 2 Requires Thrust Button.
- 3 Included in Cam & Lifter Sets.
- 4 Direct Lube Lifters Included in Cam & "Direct Lube" Lifter (DL) Sets.
- 5 Requires upgraded distributor gear/fuel pump pushrod.
- 6 Requires 3-bolt timing Set.
- 7 Requires 7/16" rocker studs.
- 8 Includes 2 camshafts.
- 9 Includes 4 camshafts.
- 10 10° Valve lock Angle, must use matching retainers/locks.
- 11 Sets of 8, Requires 2 sets per engine.
- 12 Requires custom programmer/tuning.
- 13 Requires adjustable valvetrain.
- 14 No specific vacuum rating is guaranteed.
- 15 Lobes designed to take maximum advantage of .904" dia. lifter.
- 16 Lobes designed to take maximum advantage of .875" dia. lifter.
- 17 Cam & Lifter Sets with "E" suffix feature OE style (91213) lifters.
- 18 Cam & Lifter Sets without suffix feature tie bar lifters.
- 19 Fits factory 1-pc eccentric. For factory 2-pc eccentric use 94212 or 94312.
- 20 Advertising duration read @.010".
- 21 Aftermarket pistons required.
- 22 Ignition firing order must be changed to 1-8-7-3-6-5-4-2.
- 23 Ignition firing order must be changed to 1-3-7-2-6-5-4-8.
- 24 Ignition firing order must be changed to 1-8-7-2-6-5-4-3.
- 25 Machining Required.
- 26 LS-Series 3-Bolt '97-'05.
- 27 LS-Series 3-Bolt '06-present.
- 28 LS-Series Single-Bolt 05-present, LS2/LSR/LR4.
- 29 LS-Series Single-Bolt 07-10 LS3 6.0L, 08-10 6.2L.
- 30 LS-Series Gen III.
- 31 LS-Series Gen IV.
- 32 These lifters are not recommended for street use.
- 33 Tie bar style lifters.
- 34 Provisions for increased oiling recommended. Please contact your tech representative.
- 35 10° Multi-Groove for OE style valves not available. For single groove use 93018.

CUSTOM CAMSHAFT RECOMMENDATION FORM

Choosing a Custom Grind Camshaft

All of the following variables have to be considered when picking a particular grind. It all boils down to picking a cam that will develop peak power within the rpm range where the engine needs to make it.

Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ Best Time: _____

Fax: _____

e-mail: _____

Type of Vehicle
☐ Car ☐ Truck ☐ Boat ☐ Tractor ☐ Other _____

Make: _____ Model: _____ Year: _____ Weight: _____

Drive Tire Type: ☐ Radial ☐ Slick ☐ Other: _____ Drive Tire Size: _____

Transmission: _____ Stall Speed of Torque Converter: _____

Drive Axle Gear Ratio: _____

Engine

Manufacturer: _____ Model: _____ Number of Cylinders: _____

Bore: _____ Stroke: _____ Rod Type: _____ Rod Size: _____

Piston Type: _____ Compression Ratio: _____ Firing Order: _____

*Cylinder Heads*Manufacturer: _____ Model: _____ Ported: ☐ Yes ☐ No

Chamber Size: _____ Runner Size: _____ Intake Valve Size: _____ Exhaust Valve Size: _____

If Ported Please Attach Known Flow Numbers

Induction System
☐ Carbureted ☐ EFI-Throttle Body ☐ EFI-Tune Port ☐ Mechanical FI
Carburetor/Throttle Body Size: _____ EFI Sensor Type: ☐ Speed Density ☐ Mass Air ☐ Other: _____

Intake Manifold Manufacturer: _____ Intake Manifold Series: _____

Intake Type: ☐ Dual Plane ☐ Single Plane ☐ Tunnel Ram ☐ Individual Runner ☐ Other: _____Computer Control: ☐ None ☐ OE ☐ OE with Chip or Programmer ☐ After Market: _____Turbocharged: ☐ Yes ☐ No Blower: ☐ Yes ☐ No Type: _____ Boost: _____Nitrous Oxide: ☐ Yes ☐ No ☐ Single Stage ☐ Multi Stage 1st Stage HP _____ Total NOS HP: _____

Fuel Type: _____ Octane Rating: _____

Continued on Next Page

Note: Your Custom Cam will only be as good as the information you supply! Please don't guess or "exaggerate" figures.

Cut Here



CUSTOM CAMSHAFT RECOMMENDATION FORM (CONT.)

Exhaust System

☐ OE Manifolds ☐ Headers Tube Diameter: _____ Length: _____

Mufflers: ☐ Yes ☐ No Brand/Type: _____ Exhaust Pipe Diameter: _____

Current Camshaft

☐ Hydraulic Flat Tappet ☐ Hydraulic Roller ☐ Mechanical Flat Tappet

☐ Mechanical Roller ☐ Other (specify): _____

Camshaft Manufacturer: _____ Part Number: _____

Valve Lift Intake: _____ Exhaust: _____ Rocker Ratio Intake: _____ Exhaust: _____

Duration @ .050" Intake: _____ Exhaust: _____ Adv. Duration Intake: _____ Exhaust: _____

Lobe Separation: _____ Intake Lobe Center Line: _____

What Type of Use?

☐ Towing ☐ Street Economy ☐ Street Performance ☐ Street and Strip

☐ Bracket Racing ☐ Drag Race-Class: _____ ☐ Oval Track-Class: _____

☐ Mud Racing ☐ Puller ☐ Sand Drag ☐ Marine ☐ Jet Drive ☐ Prop Drive-Class: _____

☐ Trans-Brake ☐ Throttle Stop Impeller Type: _____ Prop Size: _____

Track Type: _____ RPM Range: _____

What You Want for a New Cam

☐ Hydraulic Flat Tappet ☐ Hydraulic Roller ☐ Mechanical Flat Tappet

☐ Mechanical Roller ☐ Other (specify): _____

Cam Options

☐ Non-Standard Firing Order: _____ ☐ Small Base ☐ Rear Acc. Drive

☐ Oversized Bearing Diameter: _____ ☐ Roller Bearing ☐ Two-Piece (Cast Gear) Core

☐ Induction Hardened Core ☐ 8620 Carburized Billet Steel Core ☐ Other (specify): _____

Considering the performance of your current application, what are you trying to gain from a new cam purchase?

☐ More Low End Torque ☐ More Mid-Range Power ☐ Higher RPM Capability ☐ Overall Horsepower Increase

☐ Fuel Economy ☐ Other (specify): _____

Other Is there any other information that you believe should be considered for your application? _____

Note: Your Custom Cam will only be as good as the information you supply! Please don't guess or "exaggerate" figures.

Some items are not legal for sale or use on any pollution controlled motor vehicle



HYDRAULIC FLAT TAPPET

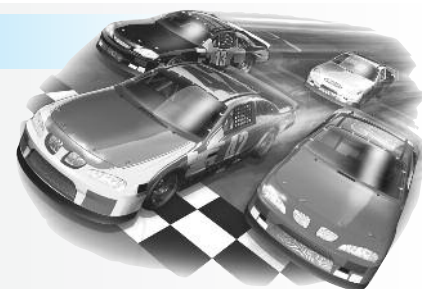
*PERFORMANCE HYDRAULIC LIFTERS*

Howards™ Cams hydraulic lifters are designed for maximum performance, offering precision oil control. Use as OE replacements as well as in high performance racing applications. Sets of 12 (6cyl.) or 16 (V8).

	Application	Body Diameter	Seat Height	Oil Band Height	Oil Band Width	Weight	
AMC	AMC 6cyl. 199-258/4.0L	.904"	1.892"	1.200"	.218"	109g	91711-12
	AMC V8 304-401	.904"	1.892"	1.200"	.218"	109g	91711
Buick	Buick V6 Even Fire 181-252	.842"	2.068"	.890"	.542"	96g	91311-12
	Buick V8 350 (68-up)	.842"	2.068"	.890"	.542"	96g	91311
Cadillac	Buick V8 400-455 (67-up)	.842"	2.068"	.890"	.542"	96g	91311
	Cadillac V8 365-390, 390-429	.842"	2.068"	.890"	.542"	96g	91311
Chevrolet	Cadillac V8 368, 425, 472, 500	.842"	2.068"	.890"	.542"	96g	91311
	Chevrolet L6 194-292	.842"	1.977"	.890"	.550"	96g	91111-12
Chrysler	Chevrolet V6 90° 200-262, 4.3L	.842"	1.977"	.890"	.550"	96g	91111-12
	Chevrolet V8 265-454	.842"	1.977"	.890"	.550"	96g	91111
Ford	Chevrolet V8 348-409	.842"	1.977"	.890"	.550"	96g	91111
	Chrysler A 273-340-360	.904"	1.892"	1.200"	.218"	109g	91711
Holden	Chrysler A 318 (67-up)	.904"	1.892"	1.200"	.218"	109g	91711
	Chrysler B 383-440	.904"	1.892"	1.200"	.218"	109g	91711
Oldsmobile	Chrysler 331-354-392 Hemi	.904"	1.814"	1.419"	.116"	109g	91731
	Chrysler 426 Hemi	.904"	1.892"	1.200"	.218"	109g	91711
Pontiac	Ford Straight 6 144-250	.874"	1.960"	1.000"	.540"	96g	91251-12
	Ford Straight 6 240-300	.874"	2.018"	1.000"	.540"	105g	91211-12
Pontiac	Ford V8 221-302, 351W	.874"	2.018"	1.000"	.540"	105g	91211
	Ford V8 351C-400M	.874"	2.018"	1.000"	.540"	105g	91211
Pontiac	Ford V8 429-460	.874"	2.018"	1.000"	.540"	105g	91211
	Ford "FE" 332-428	.874"	1.960"	1.000"	.540"	96g	91251
Pontiac	Holden V8 225-345	.842"	1.977"	.890"	.550"	96g	91111
	Oldsmobile V8 260-455	.842"	2.036"	1.170"	.400"	96g	91411
Pontiac	Pontiac V8 265-455	.842"	2.036"	1.170"	.400"	96g	91411

TECH TIP

Hydraulic lifters should never be pumped up with oil before installation. This will cause the valve lifter plunger to "top out" rather than it's normal operating height, giving you incorrect valve adjustment. This incorrect pre-load will cause excessive valve train noise, rough idle and can cause severe engine damage.



HYDRAULIC FLAT TAPPET

**MAX EFFORT HYDRAULIC LIFTERS**

Designed specifically for higher revving applications. Perfect for race applications which require a hydraulic lifter or high performance street applications that need an extra edge. These lifters can show a noticeable increase of power from 5,000 rpm and up. *Important:* pre-load must be set at .002"-.004" (warm) to achieve performance levels. Made in the USA! Sets of 12 (6cyl.) or 16 (V8).

	Application	Body Diameter	Seat Height	Oil Band Height	Oil Band Width	Weight	
AMC	AMC 6cyl. 199-258/4.0L	.904"	1.832"	1.200"	.218"	109g	91712-12
	AMC V8 304-401	.904"	1.832"	1.200"	.218"	109g	91712
Chevrolet	Chevrolet L6 194-292	.842"	1.917"	.890"	.550"	96g	91112-12
	Chevrolet V6 90° 200-262, 4.3L	.842"	1.917"	.890"	.550"	96g	91112-12
	Chevrolet V8 265-454	.842"	1.917"	.890"	.550"	96g	91112
	Chevrolet V8 348-409	.842"	1.917"	.890"	.550"	96g	91112
Chrysler	Chrysler A 273-340-360	.904"	1.832"	1.200"	.218"	109g	91712
	Chrysler A 318 (67-up)	.904"	1.832"	1.200"	.218"	109g	91712
	Chrysler B 383-440	.904"	1.832"	1.200"	.218"	109g	91712
	Chrysler 426 Hemi	.904"	1.832"	1.200"	.218"	109g	91712
Ford	Ford Straight 6 240-300	.874"	1.958"	1.000"	.540"	109g	91212-12
	Ford V8 221-302, 351W	.874"	1.958"	1.000"	.540"	109g	91212
	Ford V8 351C-400M	.874"	1.958"	1.000"	.540"	109g	91212
	Ford V8 429-460	.874"	1.958"	1.000"	.540"	109g	91212
Holden	Holden V8 225-345	.842"	1.917"	.890"	.550"	96g	91112

**VARIABLE DURATION HYDRAULIC LIFTERS**

All new design. Specifically made for race applications. Features high grade tappet shell and close tolerance valving. Great for all endurance applications including street. Maximum low end torque without sacrifice of mid or top end power. More vacuum (up to 3 in.). Effectively lowers cam duration by approximately 10 degrees, up to 3000 rpm. *Note:* These lifters produce a mild ticking sound (similar to mech. lifters). Pre-load settings for best performance .020"-.040". Made in the USA! Sets of 16.

	Application	Body Diameter	Seat Height	Oil Band Height	Oil Band Width	Weight	
Chevrolet	Chevrolet V8 265-454	.842"	1.917"	.890"	.550"	96g	91002
	Chevrolet V8 348-409	.842"	1.917"	.890"	.550"	96g	91002

DIRECT LUBE™ HYDRAULIC LIFTERS

Designed for today's more aggressive lobes. Increases oil supply to the cam lobes is critical. These lifters provide a constant oil supply to the cam lobe, more aggressive profiles and reduced lobe wear. Perfect for daily driven aggressive Street Machines, Street/Strip or hydraulic race applications. Made in the USA! Sets of 16.

	Application	Body Diameter	Seat Height	Oil Band Height	Oil Band Width	Weight	
Chevrolet Ford	Chevrolet V8 265-454	.842"	2.036"	.890"	.550"	96g	91116
	Ford V8 221-302, 351W	.874"	2.018"	1.000"	.540"	105g	91216
	Ford V8 351C-400M	.874"	2.018"	1.000"	.540"	105g	91216
	Ford V8 429-460	.874"	2.018"	1.000"	.540"	105g	91216



HYDRAULIC ROLLER (O.E. STYLE)



O.E. STYLE PERFORMANCE HYDRAULIC ROLLER LIFTERS

Performance stock replacement for use in OE hydraulic roller blocks. The best combination for the street. Reduce friction, increase torque and horsepower. A great performance upgrade to stock O.E. hydraulic roller lifters. Great for stock, RV and most street performance applications. Made in the USA! Sets of 16.

	Application	Body Diameter	Body Height	Intake Offset	Exhaust Offset	Wheel Diameter	Seat Height	Weight	
Chevrolet	Chevrolet V6 4.3L	.842"	Standard	Center	Center	.700"	2.676"	128g	91113-12
	Chevrolet V8 SB 305-350	.842"	Standard	Center	Center	.700"	2.676"	128g	91113
	Chevrolet/GM Gen III (LS-Series)	.842"	Standard	Center	Center	.700"	2.676"	128g	91113
	Chevrolet V8 BB (Gen 5/6 / Tall Body)	.842"	Standard	Center	Center	.750"	2.676"	139g	91123
Ford	Ford V8 5.0L	.875"	Standard	Center	Center	.700"	2.582"	128g	91213



O.E. STYLE VARIABLE DURATION HYDRAULIC ROLLER LIFTERS

Maximum low end torque without sacrifice of mid or top end power. More vacuum (up to 3 in.) and better fuel economy. Effectively lowers cam duration by approximately 10 degrees, up to 3000 rpm. For use in OE hydraulic roller blocks. *Note:* These lifter produce a mild ticking sound (similar to mech. lifters). Made in the USA! Sets of 16.

	Application	Body Diameter	Body Height	Intake Offset	Exhaust Offset	Wheel Diameter	Seat Height	Weight	
Chevrolet	Chevrolet V8 SB 305-350	.842"	Standard	Center	Center	.700"	2.596"	123g	91113FB
	Chevrolet/GM Gen III (LS-Series)	.842"	Standard	Center	Center	.700"	2.596"	123g	91113FB
Ford	Ford V8 5.0L	.875"	Standard	Center	Center	.700"	2.581"	128g	91213FB

MAXIMUM EFFORT O.E. STYLE HYDRAULIC ROLLER LIFTERS

A true high performance street lifter designed for use with O.E. guide bar system. These lifters are known for their ease of maintenance and reliability. Our number one selling hydraulic roller lifter the Gen III engines. CNC machined bodies fitted with a precision check ball internal valving to prevent lifter "pump up". Taller lifter bodies to handle lifts in excess of .650". Great for moderate to high lift street strip and marine applications. Made in the USA! Sets of 16.



	Application	Body Diameter	Body Height	Intake Offset	Exhaust Offset	Wheel Diameter	Seat Height	Weight (pr.)	
Chevrolet	Chevrolet/GM Gen III (LS-Series)	.842"	+.100"	Center	Center	.700"	2.598"	127	91174

HYDRAULIC ROLLER (RETRO-FIT)



STREET SERIES RETRO-FIT HYDRAULIC ROLLER LIFTERS

Designed for street performance enthusiast who want to upgrade to a hydraulic roller camshaft. Manufactured to fit early or late model blocks, including blocks with tall lifter bosses. Cold form technology shapes the body for durability. Carbonitride and tempered for hardness. The roller wheel is hardened and tempered steel alloy. Heat-treated stainless steel cross bars. High alloy steel tie bar buttons. *Note:* Specifically designed for street applications to 6500 rpm. Made in the USA! Sets of 8 pr.

	Application	Body Diameter	Body Height	Intake Offset	Exhaust Offset	Wheel Diameter	Seat Height	Weight (pr.)	
Buick	Buick V8 401-425-455	.842"	Standard	Center	Center	.700"	2.661"	314g	91460
	Cadillac V8 425-472-500	.842"	Standard	Center	Center	.700"	2.661"	309g	91462
Cadillac	Cadillac V8 425-472-500	.842"	Standard	Center	Center	.700"	2.661"	309g	91462
	Chevrolet V8 SB 265-400	.842"	+.300"	Center	Center	.700"	2.661"	309g	91164N
Chevrolet	Chevrolet/GM Gen III (LS-Series)	.842"	Standard	Center	Center	.700"	2.685"	309g	91166
	Chevrolet V8 BB (Mark IV, Gen 5/6)	.842"	+.300"	Center	Center	.700"	2.661"	314g	91167
Chevrolet	Chevrolet V8 348/409	.842"	Standard	Center	Center	.700"	2.661"	314g	91364
	Chrysler V8 SB LA/Magnum	.903"	Standard	Center	Center	.700"	2.661"	332g	91764
Chrysler	Chrysler V8 BB B/RB/392-426 Hemi	.903"	Standard	Center	Center	.700"	2.661"	332g	91767
	Ford V8 221-302, 351W	.875"	Standard	Center	Center	.700"	2.661"	332g	91168
Ford	Ford V8 351C-400M	.875"	Standard	Center	Center	.700"	2.661"	332g	91168
	Ford V8 FE 352-428	.875"	Standard	Center	Center	.700"	2.661"	332g	91169
Ford	Ford V8 429-460	.875"	Standard	Center	Center	.700"	2.661"	332g	91169
	Holden V8 252-308	.842"	Standard	Center	Center	.700"	2.661"	314g	91466H
Holden	Holden V8 252-308	.842"	Standard	Center	Center	.700"	2.661"	314g	91466H
	Oldsmobile V8 400-403-425-455	.842"	Standard	Center	Center	.700"	2.685"	305g	91464
Oldsmobile	Oldsmobile V8 400-403-425-455	.842"	Standard	Center	Center	.700"	2.685"	305g	91464
	Pontiac V8 265-455	.842"	Standard	Center	Center	.700"	2.685"	314g	91466
Pontiac	Pontiac V8 265-455	.842"	Standard	Center	Center	.700"	2.685"	314g	91466
	Pontiac V8 265-455	.842"	Standard	Center	Center	.700"	2.685"	314g	91466

MAXIMUM EFFORT RETRO-FIT HYDRAULIC ROLLER LIFTERS

A true high performance street lifter designed primarily for ease of maintenance and reliability. Our number one selling hydraulic roller lifter. CNC machined bodies fitted with a precision check ball internal valving to prevent lifter "pump up". Great for moderate high lift street strip and marine applications. Made in the USA! Sets of 8 pr.



	Application	Body Diameter	Body Height	Intake Offset	Exhaust Offset	Wheel Diameter	Seat Height	Weight (pr.)	
AMC	AMC V8 304-401	.903"	Standard	Center	Center	.700"	2.606"	313g	91774
	Chevrolet V8 SB 265-400	.842"	+.300"	Center	Center	.700"	2.618"	268g	91160
Chevrolet	Chevrolet V8 SB 265-400	.842"	+.300"	Center	Center	.700"	2.618"	268g	91160
	Chevrolet V8 BB (Mark IV, Gen 5/6)	.842"	+.300"	Center	Center	.700"	2.618"	273g	91161
Chevrolet	Chevrolet V8 348/409	.842"	Standard	Center	Center	.700"	2.618"	268g	91360
	Chrysler V8 BB B/RB/392-426 Hemi	.903"	Standard	Center	Center	.700"	2.606"	313g	91774
Chrysler	Chrysler V8 BB B/RB/392-426 Hemi	.903"	Standard	Center	Center	.700"	2.606"	313g	91774
	Ford V8 221-302, 351W	.875"	Standard	Center	Center	.700"	2.606"	286g	91260
Ford	Ford V8 351C-400M	.875"	Standard	Center	Center	.700"	2.606"	286g	91260
	Ford V8 FE 352-428	.875"	Standard	Center	Center	.700"	2.606"	288g	91261
Ford	Ford V8 429-460	.875"	Standard	Center	Center	.700"	2.606"	288g	91261
	Ford V8 429-460	.875"	Standard	Center	Center	.700"	2.606"	288g	91261

HYDRAULIC ROLLER (RETRO-FIT)



HIGH ENDURANCE VERTICAL BAR HYDRAULIC ROLLER LIFTERS

Made for all high endurance performance applications including marine. Proprietary hydraulic valving specifically designed for continuous operation to 6600 rpm. With ideal seat pressures between 140-180 lbs. The lifter body is fully machined from alloy steel bar stock and completely micro polished. The nose wheel is machined from 8620 material and case hardened for durability. Made in the USA! Sets of 8 pr.

	Application	Body Diameter	Body Height	Intake Offset	Exhaust Offset	Wheel Diameter	Seat Height	Weight (pr.)	
Chevrolet	Chevrolet V8 SB 265-400	.842"	+.300"	Center	Center	.750"	2.663"	314g	91163
	Chevrolet/GM Gen III (LS-Series)	.842"	Standard	Center	Center	.750"	2.663"	318g	91156
	Chevrolet V8 BB (Mark IV, Gen 5/6)	.842"	+.300"	Center	Center	.750"	2.663"	318g	91162



PROMAX HIGH RPM HYDRAULIC ROLLER LIFTERS

Designed to operate at rpm ranges over 7000 rpm. All new internal valving for increased rpm, torque and horsepower. The lifter body is fully machined from alloy steel bar stock. The nose wheel is machined from 8620 material and case hardened for durability. Note: spring pressure requirements for these lifters are 200-225 lbs. seat pressure, 500-575 lbs. open pressure. Specific lash adjustments are also required. Made in the USA! Sets of 8 pr.

	Application	Body Diameter	Body Height	Intake Offset	Exhaust Offset	Wheel Diameter	Seat Height	Weight (pr.)	
Chevrolet	Chevrolet V8 SB 265-400	.842"	+.300"	Center	Center	.750"	2.663"	318g	91170
	Chevrolet/GM Gen III (LS-Series)	.842"	Standard	Center	Center	.750"	2.663"	318g	91175
	Chevrolet V8 BB (Mark IV, Gen 5/6)	.842"	+.300"	Center	Center	.750"	2.663"	318g	91171
Ford	Ford V8 221-302, 351W	.875"	Standard	Center	Center	.750"	2.667"	325g	91270
	Ford V8 351C-400M	.875"	Standard	Center	Center	.750"	2.667"	325g	91270

NOTICE:

Not all lifters are created equal. Correct lifter selection depends on many factors. Valve spring pressures,RPM, type of usage, etc. Howards Cams is here to help you make the best selection.

NOTICE:

True performance hydraulic roller lifters can make a ticking noise. This is due to the tighter tolerances and high bleed rate in the lifter valving. All Howards Cams hydraulic roller lifters (except ProMax) should have a 1/2 to a full turn preload depending on application.

MECHANICAL FLAT TAPPET



PERFORMANCE MECHANICAL LIFTERS

Designed and manufactured to the closest tolerances in the performance industry. The precision ground crown face insures long life for both cam and lifter in the harsh competition environment. 100% rockwell tested. Made in the USA! Sets of 12 (6cyl.) or 16 (V8).

	Application	Body Diameter	Seat Height	Oil Band Height	Oil Band Width	Weight	
AMC	AMC V8 304-401	.904"	1.795"	1.075"	.343"	100g	91715
Buick	Buick V8 350 (68-up)	.842"	1.875"	.890"	.550"	86g	91415
	Buick V8 400-455 (67-up)	.842"	1.875"	.890"	.550"	86g	91415
Cadillac	Cadillac V8 368, 425, 472, 500	.842"	1.875"	.890"	.550"	86g	91415
Chevrolet	Chevrolet L6 194-292	.842"	1.875"	.890"	.550"	86g	91115-12
	Chevrolet L6 235-261	.989"	2.580"	1.120"	.661"	118g	91125
	Chevrolet V6 90° 200-262, 4.3L	.842"	1.875"	.890"	.550"	86g	91115-12
	Chevrolet V8 265-454	.842"	1.875"	.890"	.550"	86g	91115
	Chevrolet V8 348-409	.842"	1.875"	.890"	.550"	86g	91115
Chrysler	Chrysler A 273-340-360	.904"	1.795"	1.075"	.343"	100g	91715
	Chrysler A 318 (67-up)	.904"	1.795"	1.075"	.343"	100g	91715
	Chrysler B 383-440	.904"	1.795"	1.075"	.343"	100g	91715
	Chrysler 331-354-392 Hemi	.904"	1.613"	NA	NA	96g	91725-16
	Chrysler 426 Hemi	.904"	1.795"	1.075"	.343"	100g	91715
Ford	Ford V8 221-302, 351W	.874"	1.950"	1.000"	.543"	100g	91215
	Ford V8 351C-400M	.874"	1.950"	1.000"	.543"	100g	91215
	Ford "FE" 332-428	.874"	1.796"	.860"	.500"	100g	91255
	Ford V8 429-460	.874"	1.950"	1.000"	.543"	100g	91215
	Ford V8 Flat Head (32-54)	.999"	1.800"	.245"	.937"	105g	91265
	Ford V8 "Y" Block (54-64)	.499"	2.593"	NA	NA	68g	91214
Holden	Holden V8 225-345 (w/Edge Orifice Oiling)	.842"	1.875"	.900"	.537"	77g	91615
Oldsmobile	Oldsmobile V8 260-455	.842"	1.875"	.890"	.550"	86g	91415
Pontiac	Pontiac V8 265-455	.842"	1.875"	.890"	.550"	86g	91415

DIRECT LUBE™ EXTREME DUTY MECHANICAL FLAT TAPPET



"THE ORIGINAL" DIRECT LUBE™ EXTREME DUTY MECHANICAL LIFTERS

Today's cams have more aggressive lobes. Increasing oil supply to these lobes is critical. A precision "E.D.M." laser burns a .021" hole in the center of the face of the lifter. This allows a constant oil supply to the cam lobe, allowing higher valve spring pressures, more aggressive profiles and reduced lobe wear. Made in the USA! Sets of 16.

	Application	Body Diameter	Seat Height	Oil Band Height	Oil Band Width	Weight	
AMC	AMC V8 304-401	.904"	1.795"	1.075"	.343"	100g	91718
	Buick Buick V8 350 (68-up)	.842"	1.875"	.890"	.550"	86g	91418
Buick	Buick V8 400-455 (67-up)	.842"	1.875"	.890"	.550"	86g	91418
	Cadillac Cadillac V8 368, 425, 472, 500	.842"	1.875"	.890"	.550"	86g	91418
Cadillac	Chevrolet L6 194-292	.842"	1.875"	.890"	.550"	86g	91118-12
	Chevrolet V6 90° 200-262, 4.3L	.842"	1.875"	.890"	.550"	86g	91118-12
Chevrolet	Chevrolet V8 265-454	.842"	1.875"	.890"	.550"	86g	91118
	Chevrolet V8 348-409	.842"	1.875"	.890"	.550"	86g	91118
Chrysler	Chrysler A 273-340-360	.904"	1.795"	1.075"	.343"	100g	91718
	Chrysler A 318 (67-up)	.904"	1.795"	1.075"	.343"	100g	91718
Chrysler	Chrysler B 383-440	.904"	1.795"	1.075"	.343"	100g	91718
	Chrysler 331-354-392 Hemi	.904"	1.795"	1.075"	.343"	100g	91718
Chrysler	Chrysler 426 Hemi	.904"	1.795"	1.075"	.343"	100g	91718
	Ford Ford V8 221-302, 351W	.874"	1.950"	1.000"	.543"	100g	91218
Ford	Ford V8 351C-400M	.874"	1.950"	1.000"	.543"	100g	91218
	Ford V8 429-460	.874"	1.950"	1.000"	.543"	100g	91218
Oldsmobile	Oldsmobile V8 260-455	.842"	1.875"	.890"	.550"	86g	91418
Pontiac	Pontiac V8 265-455	.842"	1.875"	.890"	.550"	86g	91418



ULTRA-LITE DIRECT LUBE™ MECHANICAL LIFTERS Only 73 grams

All the features of Howards Cams famous Direct Lube™ lifters in a lite weight version. Only 73 grams total weight. Approximately 13 grams lighter per lifter than the original version (91118). Note: No chamfer to ensure maximum effective diameter. Made in the USA! Sets of 16.

	Application	Body Diameter	Seat Height	Oil Band Height	Oil Band Width	Weight	
Buick	Buick V8 350 (68-up)	.842"	1.869"	1.059"	.400"	73g	91410
	Buick V8 400-455 (67-up)	.842"	1.869"	1.059"	.400"	73g	91410
Cadillac	Cadillac V8 368, 425, 472, 500	.842"	1.869"	1.059"	.400"	73g	91410
	Chevrolet Chevrolet V8 265-454	.842"	1.869"	1.059"	.400"	73g	91110
Chevrolet	Chevrolet V8 348-409	.842"	1.869"	1.059"	.400"	73g	91110
	Oldsmobile Oldsmobile V8 260-455	.842"	1.869"	1.059"	.400"	73g	91410
Pontiac	Pontiac V8 265-455	.842"	1.869"	1.059"	.400"	73g	91410

TOOL STEEL MECHANICAL FLAT TAPPET



TOOL STEEL MECHANICAL LIFTERS

Intended for use on cast iron camshafts. Ideal for engines turning in excess of 7,000 rpm with higher valve spring pressures. Super fine surface finish of 1-2Ra and built from tool steel for durability and hardness (63-64RC). Lightweight (68+ grams) and are available with an optional "Direct Lube" EDM oil hole (.016in). Compatible with all OE and aftermarket engine blocks. Made in the USA! **Note:** Required for flat tappet applications in Dart SHP blocks. Sets of 16.

	Application	Body Diameter	Seat Height	Oil Band Height	Oil Band Width	Weight	
AMC	AMC V8 304-401	.904"	1.850"	.805"	.564"	91g	91705-16
	AMC V8 304-401 w/EDM Oil Hole	.904"	1.850"	.805"	.564"	91g	91708-16
Buick	Buick V8 350 (68-up)	.842"	1.861"	.890"	.525"	71g	91105-16
	Buick V8 350 (68-up) w/EDM Oil Hole	.842"	1.861"	.890"	.525"	71g	91108-16
	Buick V8 400-455 (67-up)	.842"	1.861"	.890"	.525"	71g	91105-16
	Buick V8 400-455 (67-up) w/EDM Oil Hole	.842"	1.861"	.890"	.525"	71g	91108-16
Cadillac	Cadillac V8 368, 425, 472, 500	.842"	1.861"	.890"	.525"	71g	91105-16
	Cadillac V8 368, 425, 472, 500 w/EDM Oil Hole	.842"	1.861"	.890"	.525"	71g	91108-16
Chevrolet	Chevrolet V8 265-454	.842"	1.861"	.890"	.525"	71g	91105-16
	Chevrolet V8 265-454 w/EDM Oil Hole	.842"	1.861"	.890"	.525"	71g	91108-16
	Chevrolet V8 348-409	.842"	1.861"	.890"	.525"	71g	91105-16
	Chevrolet V8 348-409 w/EDM Oil Hole	.842"	1.861"	.890"	.525"	71g	91108-16
Chrysler	Chrysler A 273-340-360	.904"	1.850"	.805"	.564"	91g	91705-16
	Chrysler A 273-340-360 w/EDM Oil Hole	.904"	1.850"	.805"	.564"	91g	91708-16
	Chrysler A 318 (67-up)	.904"	1.850"	.805"	.564"	91g	91705-16
	Chrysler A 318 (67-up) w/EDM Oil Hole	.904"	1.850"	.805"	.564"	91g	91708-16
	Chrysler B 383-440	.904"	1.850"	.805"	.564"	91g	91705-16
	Chrysler B 383-440 w/EDM Oil Hole	.904"	1.850"	.805"	.564"	91g	91708-16
	Chrysler 331-354-392 Hemi	.904"	1.850"	.805"	.564"	91g	91705-16
	Chrysler 331-354-392 Hemi w/EDM Oil Hole	.904"	1.850"	.805"	.564"	91g	91708-16
	Chrysler 426 Hemi	.904"	1.850"	.805"	.564"	91g	91705-16
	Chrysler 426 Hemi w/EDM Oil Hole	.904"	1.850"	.805"	.564"	91g	91708-16
	Ford V8 221-302, 351W	.875"	1.934"	1.003"	.512"	78g	91205-16
	Ford V8 221-302, 351W w/EDM Oil Hole	.875"	1.934"	1.003"	.512"	78g	91208-16
	Ford V8 351C-400M	.875"	1.934"	1.003"	.512"	78g	91205-16
	Ford V8 351C-400M w/EDM Oil Hole	.875"	1.934"	1.003"	.512"	78g	91208-16
	Ford V8 429-460	.875"	1.934"	1.003"	.512"	78g	91205-16
	Ford V8 429-460 w/EDM Oil Hole	.875"	1.934"	1.003"	.512"	78g	91208-16
Oldsmobile	Oldsmobile V8 260-455	.842"	1.861"	.890"	.525"	71g	91105-16
	Oldsmobile V8 260-455 w/EDM Oil Hole	.842"	1.861"	.890"	.525"	71g	91108-16
Pontiac	Pontiac V8 265-455	.842"	1.861"	.890"	.525"	71g	91105-16
	Pontiac V8 265-455 w/EDM Oil Hole	.842"	1.861"	.890"	.525"	71g	91108-16

MECHANICAL ROLLER



STREETMAX™
BY HOWARDS CAMS

MECHANICAL ROLLER LIFTERS

True street conditions call for on and off the throttle and long periods of idling. Those stop lights just keep getting longer. Most mechanical roller lifters were not designed for these conditions and will not last. Howards Cams StreetMax™ Mechanical Roller Lifters are specifically designed for this type of operation. Features CNC machined alloy bar stock bodies with case hardened 8620 rollers. **Note:** Designed for spring pressures up to 180 psi seat and 450 psi open. Made in the USA! Sets of 8 pr.

	Application	Body Diameter	Body Height	Intake Offset	Exhaust Offset	Wheel Diameter	Seat Height	Weight (pr.)	
Chevrolet	Chevrolet V8 SB 265-400	.842"	+.300"	Center	Center	.700"	2.569"	306g	91150
	Chevrolet V8 BB (Mark IV, Gen 5/6)	.842"	+.300"	Center	Center	.700"	2.569"	310g	91151
Chrysler	Chrysler SB 318-360 (except Magnum)	.903"	Standard	Center	Center	.700"	2.569"	329g	91750
	Chrysler BB 383-440	.903"	Standard	Center	Center	.700"	2.569"	333g	91751
Ford	Ford V8 221-302, 351W	.875"	Standard	Center	Center	.700"	2.569"	327g	91250
	Ford V8 351C-400M	.875"	Standard	Center	Center	.700"	2.569"	327g	91250
	Ford "FE" 332-428	.875"	Standard	Center	Center	.700"	2.569"	329g	91254
	Ford V8 429-460	.875"	Standard	Center	Center	.700"	2.569"	329g	91254
Pontiac	Pontiac V8 265-455	.842"	Standard	Center	Center	.700"	2.569"	312g	91450



SPORTMAX™

VERTICAL BAR MECHANICAL ROLLER LIFTERS

Designed for the entry level sportsman racer. Built with high grade materials. Priced with a budget racer in mind. These lifters start with 8620 heat-treated steel bodies. Black oxidized for protection. They are fitted with 9310 steel rollers and superior high strength bearings. Carefully assembled by hand and checked for fit prior to packaging. Made in the USA! Sets of 8 pr.

	Application	Body Diameter	Body Height	Intake Offset	Exhaust Offset	Wheel Diameter	Seat Height	Weight (pr.)	
Chevrolet	Chevrolet V8 SB 265-400	.842"	Standard	Center	Center	.750"	2.019"	236g	91117
	Chevrolet V8 SB 265-400	.842"	+.300"	Center	Center	.750"	2.019"	241g	91122
	Chevrolet V8 BB (Mark IV)	.842"	Standard	Center	Center	.750"	2.021"	236g	91127
	Chevrolet V8 BB (Mark IV, Gen 5/6)	.842"	+.300"	Center	Center	.750"	2.021"	241g	91128
Chrysler	Chrysler SB 318-360 (except Magnum)	.904"	Standard	Center	Center	.750"	1.781"	255g	91717
	Chrysler BB 383-440, 392-426 Hemi	.904"	Standard	Center	Center	.750"	1.773"	250g	91727
Ford	Ford V8 221-302, 351W	.875"	Standard	Center	Center	.750"	2.078"	259g	91217
	Ford V8 429-460	.875"	Standard	Center	Center	.750"	2.080"	255g	91247
Pontiac	Pontiac V8 265-455	.842"	Standard	Center	Center	.750"	2.052"	250g	91417
Oldsmobile	Oldsmobile V8 260-455	.842"	Standard	Center	Center	.750"	2.052"	250g	91417

SportMax™ with Direct Lube™ Pin Oilers

Chevrolet	Chevrolet V8 SB 265-400	.842"	+.300"	Center	Center	.750"	2.019"	241g	91152
	Chevrolet V8 BB (Mark IV, Gen 5/6)	.842"	+.300"	Center	Center	.750"	2.019"	241g	91158
Pontiac	Pontiac V8 265-455	.842"	Standard	Center	Center	.750"	2.052"	259g	91457
Oldsmobile	Oldsmobile V8 260-455	.842"	Standard	Center	Center	.750"	2.052"	259g	91457

MECHANICAL ROLLER

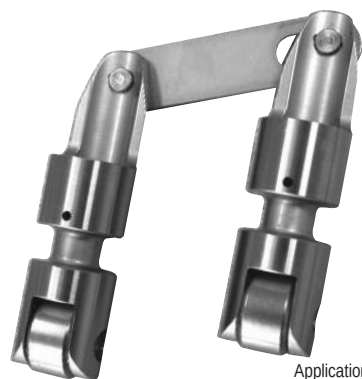
SPORT MAX™ LITE DIRECT LUBE™ MECHANICAL ROLLER LIFTERS

w/High Pressure Pin Oilers

Up to 20 grams a pair lighter (only 205g Chev SB) than competitor's lightweight vertical bar lifters. PLUS Direct Lube™ High Pressure Pin Oilers at no extra cost. The lightened bodies are still ultra strong because they are made from 8620 steel. They are fitted with 9310 steel rollers on precision sorted needle bearings for reliability. Stainless steel cross bars. Black oxide finish. Made in the USA! Sets of 8 pr.



	Application	Body Diameter	Body Height	Intake Offset	Exhaust Offset	Wheel Diameter	Seat Height	Weight (pr.)	
Chevrolet	Chevrolet V8 SB 265-400	.842"	Standard	Center	Center	.750"	1.922"	205g	91137
	Chevrolet V8 SB 265-400	.842"	+.300"	Center	Center	.750"	1.922"	209g	91132
	Chevrolet V8 BB (Mark IV)	.842"	Standard	Center	Center	.750"	1.915"	205g	91138
	Chevrolet V8 BB (Mark IV, Gen 5/6)	.842"	+.300"	Center	Center	.750"	1.915"	209g	91133



TRACK MAX™ MECHANICAL ROLLER LIFTERS

For the bracket and sportsman racer who wants a strong and reliable lifter. These lifters feature steel alloy bodies with a special enhanced finish. This smooth finish increases life to the lifter and the lifter bore. Heat-treated stainless steel link bars. Case hardened 8620 rollers fitted with the best bearings and pins. Fully rebuildable. 100% machined and hand assembled in the USA! Sets of 8 pr.

	Application	Body Diameter	Body Height	Intake Offset	Exhaust Offset	Wheel Diameter	Seat Height	Weight (pr.)	
Chevrolet	Chevrolet V8 SB 265-400	.842"	+.300"	Center	Center	.750"	1.890"	241g	91121
	Chevrolet/GM Gen III (LS-Series)	.842"	Standard	Center	Center	.750"	1.890"	241g	91177
	Chevrolet V8 BB (Mark IV, Gen 5/6)	.842"	+.300"	Center	Center	.750"	1.890"	241g	91126
	Ford V8 351C-400M	.875"	Standard	Center	Center	.750"	2.033"	268g	91219



TRACK MAX™ LIGHTWEIGHT HORIZONTAL BAR ROLLER LIFTERS

All new tooling. Lightweight, almost 20% lighter than most other mechanical roller lifters. Features CNC machined alloy bar stock bodies with case hardened 8620 rollers. Spring loaded, self lifting design for easy cam changes is what make these lifters so popular. Fully rebuildable. Made in the USA! Sets of 8 pr.



	Application	Body Diameter	Body Height	Intake Offset	Exhaust Offset	Wheel Diameter	Seat Height	Weight (pr.)	
Chevrolet	Chevrolet V8 SB 265-400	.842"	Standard	Center	Center	.750"	1.890"	191g	91119
	Chevrolet V8 BB (Mark IV, Gen 5)	.842"	Standard	Center	Center	.750"	1.890"	196g	91129

NOTICE:

Not all lifters are created equal. Correct lifter selection depends on many factors. Valve spring pressures, RPM, type of usage, etc. Howards Cams is here to help you make the best selection.

MECHANICAL ROLLER


RACE MAX™
BY HOWARDS CAMS

VERTICAL BAR MECHANICAL ROLLER LIFTERS

For the racer who wants a lifter they can rely on with added features. Heat-treated 8620 steel billet bodies. Bodies are CNC machined in one process to assure accuracy of all part features. Increased oil ban diameter for maximum rigidity. Precision ground for proper fit in O.E. and +.300" tall aftermarket lifter bores. Heat treated tool steel nitrided axles and precision fitted roller bearings. Pressure fed axle oiling insures longevity and best defense against pre-mature failure. Made in the USA! Sets of 8 pr.

	Application	Body Diameter	Body Height	Intake Offset	Exhaust Offset	Wheel Diameter	Seat Height	Weight (pr.)	
Chevrolet	Chevrolet V8 SB 265-400	.842"	+.300"	Center	Center	.750"	1.887"	235g	91134
	Chevrolet V8 SB 265-400	.842"	+.300"	.180" L/R	Center	.750"	1.887"	234g	91136
	Chevrolet V8 BB (Mark IV, Gen 5/6)	.842"	+.300"	Center	Center	.750"	1.889"	237g	91135
Chrysler	Chrysler SB 318-360 (except Magnum)	.904"	Standard	Center	Center	.750"	1.756"	270g	91734
	Chrysler BB 383-440, 392-426 Hemi	.904"	Standard	Center	Center	.750"	1.928"	269g	91735
Ford	Ford V8 221-302, 351W	.874"	Standard	Center	Center	.750"	2.033"	269g	91234
	Ford V8 351C-400M	.874"	Standard	Center	Center	.750"	2.033"	269g	91234
	Ford "FE" 332-428	.874"	Standard	Center	Center	.750"	2.033"	269g	91234
	Ford V8 429-460	.874"	Standard	Center	Center	.750"	2.033"	269g	91234
Pontiac	Pontiac V8 265-455	.842"	Standard	Center	Center	.750"	2.022"	259g	91434


PRO MAX™
BY HOWARDS CAMS
DIRECT LUBE™ MECHANICAL ROLLER LIFTERS
w/High Pressure Pin Oilers

The lifters Pro Racers use. "Full Time" high pressure oiling (most other oiling type lifters are timed based) to the roller bearing shafts. This continuous oiling offers higher rpm and high spring pressure capability. The Pro Max™ features lightened, steel alloy bodies with a special enhanced finish. Heat treated stainless steel link bars. Case hardened 8620 rollers fitted with the best alloy bearings and pins. These are the same materials and designs used on most Top Fuel lifters. .300" taller body allows lifter to fit early, late model and after market blocks. Fully Rebuildable. Made in the USA! Sets of 8 pr.

	Application	Body Diameter	Body Height	Intake Offset	Exhaust Offset	Wheel Diameter	Seat Height	Weight (pr.)	
Chevrolet	Chevrolet V8 SB 265-400	.842"	+.300"	Center	Center	.750"	1.890"	232g	91188
	Chevrolet V8 SB 265-400	.842"	+.300"	.180" L/R	Center	.750"	1.890"	223g	91189
	Chevrolet V8 SB 265-400	.903"	+.300"	.180" L/R	Center	.810"	1.890"	257g	91193
	Chevrolet V8 SB 265-400 (Buick Head)	.903"	+.300"	.200" L	Center	.810"	1.890"	261g	91181
	Chevrolet/GM Gen III (LS-Series)	.842"	+.300"	Center	Center	.750"	1.890"	232g	91179
	Chevrolet/GM Gen III (LS-Series)	.903"	+.300"	Center	Center	.810"	1.890"	261g	91178
	Chevrolet V8 BB (Mark IV, Gen 5/6)	.842"	+.300"	Center	Center	.750"	1.890"	232g	91198
	Chevrolet V8 BB (Mark IV, Gen 5/6)	.842"	+.300"	.180" L/R	Center	.750"	1.890"	227g	91199
	Chevrolet V8 BB (Mark IV, Gen 5/6)	.903"	+.300"	Center	Center	.810"	1.890"	264g	91190
	Chevrolet V8 BB (Mark IV, Gen 5/6)	.903"	+.300"	Center	Center	.810"	1.890"	256g	91192
	Chevrolet V8 BB (Mark IV, Gen 5/6)	.903"	+.300"	.180" L/R	Center	.810"	1.890"	259g	91191
	Chrysler BB 383-440	.903"	Standard	Center	Center	.810"	1.890"	261g	91798
	Ford V8 221-302, 351W	.875"	Standard	Center	Center	.750"	2.033"	264g	91288
	Ford V8 SB/SVO	.903"	Standard	Center	Center	.810"	1.890"	263g	91287
	Ford V8 351C-400M	.875"	Standard	Center	Center	.750"	2.033"	264g	91278
	Ford V8 429-460	.875"	Standard	Center	Center	.750"	2.033"	264g	91298

MECHANICAL ROLLER



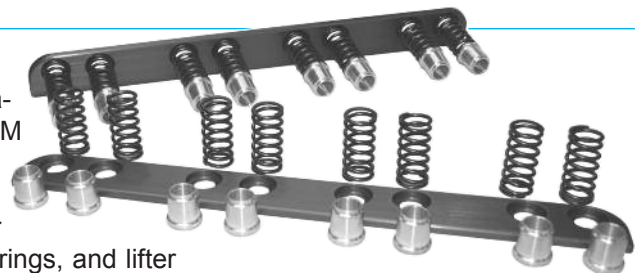
ULTRAMAX™ BUSHED MECHANICAL ROLLER LIFTERS with Direct Lube™ High Pressure Pin Oilers

We took the severe application ProMax™ lifters one step further to make the ultimate lifter for severe racing applications. We replaced the needle bearings in the roller tip with solid bushings. These lifters are made for ultra high spring pressures and the most aggressive cam lobes. They also feature "Full Time" high pressure oiling to the bearing axles. This continuous oiling in conjunction with the solid roller bushings offer the highest rpm and high spring pressure capability available. The UltraMax™ features lightened, steel alloy bodies with a special enhanced finish. Heat treated stainless steel link bars. Case hardened 8620 rollers. .300" taller body allows lifter to fit early, late model and after market blocks. Fully Rebuildable. Made in the USA! Sets of 8 pr.

	Application	Body Diameter	Body Height	Intake Offset	Exhaust Offset	Wheel Diameter	Seat Height	Weight (pr.)	
Chevrolet	Chevrolet V8 SB 265-400	.842"	+.300"	Center	Center	.750"	1.890"	230g	91140
	Chevrolet V8 SB 265-400	.842"	+.300"	.180" L/R	Center	.750"	1.890"	230g	91141
	Chevrolet V8 SB 265-400	.903"	+.300"	Center	Center	.810"	1.890"	260g	91142
	Chevrolet V8 SB 265-400	.903"	+.300"	.180" L/R	Center	.810"	1.890"	260g	91143
	Chevrolet/GM Gen III (LS-Series)	.842"	+.300"	Center	Center	.750"	1.890"	235g	91148
	Chevrolet/GM Gen III (LS-Series)	.903"	+.300"	Center	Center	.810"	1.890"	267g	91149
	Chevrolet V8 BB (Mark IV, Gen 5/6)	.842"	+.300"	Center	Center	.750"	1.890"	235g	91144
	Chevrolet V8 BB (Mark IV, Gen 5/6)	.842"	+.300"	.180" L/R	Center	.750"	1.890"	235g	91145
	Chevrolet V8 BB (Mark IV, Gen 5/6)	.903"	+.300"	Center	Center	.810"	1.890"	265g	91146
	Chevrolet V8 BB (Mark IV, Gen 5/6)	.903"	+.300"	.180" L/R	Center	.810"	1.890"	264g	91147
	Chevrolet V8 BB (Mark IV, Gen 5/6)	.936"	+.300"	Center	Center	.850"	1.890"	265g	91046
	Chevrolet V8 BB (Mark IV, Gen 5/6)	.936"	+.300"	.180" L/R	Center	.850"	1.890"	264g	91047
Chrysler	Chrysler BB 383-440	.903"	Standard	Center	Center	.810"	1.890"	265g	91744
Ford	Ford V8 221-302, 351W	.875"	Standard	Center	Center	.750"	2.033"	264g	91240
	Ford V8 221-302, 351W	.875"	Standard	.180" R	Center	.750"	2.033"	264g	91241
	Ford V8 221-302, 351W	.903"	Standard	Center	Center	.810"	1.890"	260g	91242
	Ford V8 221-302, 351W	.903"	Standard	.180" R	Center	.810"	1.890"	260g	91243
	Ford V8 351C-400M	.875"	Standard	Center	Center	.750"	2.033"	264g	91245
	Ford V8 429-460	.875"	Standard	Center	Center	.750"	2.033"	264g	91248
	Ford V8 429-460	.903"	Standard	Center	Center	.810"	2.033"	264g	91249

REV KITS

Designed for roller cam applications to increase valve train stability throughout the RPM range. In addition to increasing RPM capability, rev kits will also keep the lifter in the lifter bore in the event of valve train failure. The locator bars and lifter buttons are made of the highest quality aluminum and then anodized for protection. Each kit is complete with a pair of locator bars, springs, and lifter buttons. Made in the USA. *Note: Will not work on some Pro-Topline or RHS Chev small block cylinder heads.*



- [90130](#) Chevrolet SB 265-400, Mechanical Roller (Flat Top Lifters)
- [90135](#) Chevrolet SB 265-400, Mechanical Roller (Cutaway style lifter) (5/16" pushrods only)
- [90132](#) Chevrolet SB 265-400, Retrofit Hydraulic Roller use with 91164N Lifters & Mechanical Roller with 91150
- [90133](#) Chevrolet SB 265-400, Retrofit Hydraulic Roller use with 91163 Lifters
- [90131](#) Chevrolet SB 265-400, Retrofit Hydraulic Roller Most Other

MAXIMUM EFFORT™ ALUMINUM STUD GIRDLE KITS

Designed to increase the strength and rigidity of the rocker arm studs by eliminating flex and thereby assuring true rocker arm ratios. Howards™ stud girdles are made from the highest quality aluminum. They are spring-loaded for easy removal and are anodized purple. A must for all competition engines not using shaft rockers. Locking hex head adjusters are included. Made in the USA.



Chev SB

90100

Small Block Chevrolet
3/8" stud Standard Offset

Chev BB

90120

Big Block Chevrolet
7/16" stud Standard Offset

Ford SB

90200

Ford 289-351W
3/8" stud Standard Offset

90101

Small Block Chevrolet
7/16" stud Standard Offset

90121

Big Block Chevrolet
Dart, Brodix, AFR & RHS

90201

Ford 289-351W
7/16" stud Standard Offset

ROMAX™ STUD GIRDLE KITS w/Torsional Stands (Patent Pending)

The features of the best stud girdles available, plus girdle stands. These innovative stands eliminates girdle bar rocking and all associated flex. Dyno test have shown 300 plus rpms over standard stud girdles. 100% CNC machined from premium 3/4" aluminum bar. Purple anodized for protection. The accuracy of shaft rockers with out the additional cost. Locking hex head adjusters are included. Made in the USA.



90105 Small Block Chevrolet, 7/16" stud Standard Offset

REPLACEMENT STUD GIRDLE ADJUSTING NUTS

90125-1

Replacement Adjusting Nut
3/8"-24 Short, Each

90126-1

Replacement Adjusting Nut
7/16"-20 Short, Each

90127-1

Replacement Adjusting Nut
7/16"-20 Long, Each



E-Z ROCKER WRENCH

No more wishing that you had three hands to adjust your valves. Howards™ E-Z Wrench makes it a breeze to adjust roller rocker arms and steel rocker arms with poly locks.

92100

9/16" E-Z Wrench

92105

5/8" E-Z Wrench



LONG SLOT ROCKER ARMS

Howards™ Cams Long Slot Rocker Arms are excellent for stock engines or street performance. They are manufactured from the highest quality steel alloy, and then heat-treated. Rocker sets include anti-gall rocker balls, and locking nuts. Sets of 16. Made in the USA.

90005 Chev 265-400, V6 200-262, 3/8" stud, 1.5 Ratio

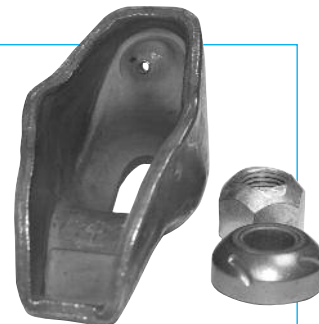
90007 Chev 265-400, V6 200-262, 7/16" stud, 1.5 Ratio

90006 Chev 265-400, V6 200-262, 3/8" stud, 1.6 Ratio

90008 Chev 265-400, V6 200-262, 7/16" stud, 1.6 Ratio

TRACK SMART™ NITRO-CARBIDED ROCKER ARMS

The ultimate race rockers for applications where stock-type rockers are required. Precision die formed for the most accurate ratios of any stamped steel rocker. Nitro-Carbided to give 3-5 times greater resistance to wear, fatigue and fracture in high stress areas. Eliminates pushrod cup and fulcrum failures. Long-slot design for higher lift cam applications. Includes oil-groove pivot balls and adjusting nuts. For all race applications where rules require stock type rockers. This includes oval track, plus NHRA and IHRA "Stock Class" categories where stock-type rockers are required. Made in the USA. Note: 2 sets required per engine.



90045-6 Chev V6 200-262, 3/8" stud, 1.5 Ratio, set of 6

90047-8 Chev 265-400, 7/16" stud, 1.5 Ratio, set of 8

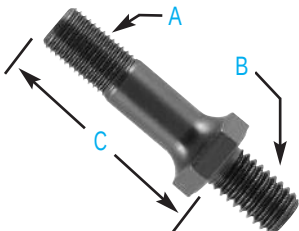
90045-8 Chev 265-400, 3/8" stud, 1.5 Ratio, set of 8

90046-6 Chev V6 200-262, 3/8" stud, 1.6 Ratio, set of 6

90046-8 Chev 265-400, 3/8" stud, 1.6 Ratio, set of 8

ROCKER ARM STUDS

Manufactured from tough 8740 steel, featuring a large ground radius fillet to provide increased support to the stud shank, effectively eliminating bending and subsequent breakage. All studs are precision machined with rolled threads and heat treated for tensile strength of 180,000 PSI then finished in black oxide. Each kit contains 16 studs.



		"A"	"B"	"C"
94650	Chev SB and other standard 3/8" applications	3/8"-24	7/16"-14	1.750"
94652	Chev SB 3/8" with Roller Rockers	3/8"-24	7/16"-14	1.895"
94651	Chev SB standard 7/16" applications	7/16"-20	7/16"-14	1.770"
94656	Chev SB 7/16" w/Roller Rockers & Girdles	7/16"-20	7/16"-14	1.900"
94657	Chev BB Mark IV	7/16"-20	7/16"-14	1.750"
94655	Chev BB 7/16" w/Roller Rockers & Girdles	7/16"-20	7/16"-14	1.900"
94650	Ford SB standard 3/8" applications	3/8"-24	7/16"-14	1.750"
94656	Ford SB, C/M standard 7/16" applications	7/16"-20	7/16"-14	1.900"

GUIDE PLATES

Pushrod guide plates reduce the unwanted sideways motion of the pushrod under load. This keeps the rocker arm stabilized, making the valve operation much smoother and more efficient. Made from heat-treated chrome moly steel to reduce wear.



94600 Chev SB, 5/16" Flat
94601 Chev SB, 5/16" Raised
94602 Chev SB, 3/8" Raised

94610 Chev BB, 3/8"
94611 Chev BB, 7/16"

94620 Ford SB, 5/16" Flat
94625 Ford 429-460, 5/16"

**LIFETIME
WARRANTY**



HOWARDS™ BILLET ALUMINUM ROCKERS "The Purple Rocker"

Unique full body design offers less flex and will withstand 900+ lbs. of spring pressure at over .900" lift. 100% CNC machined. Lightweight for maximum performance. Designed for more retainer and spring clearance than most other manufacturers. They feature needle bearing fulcrums and roller tips, centerless ground trunnions, centerless ground pins and rollers and include thick walled adjusting nuts. Micropolished surface finish for maximum durability. Purple anodized for additional protection. Available in most popular ratios. Unconditional Lifetime Warranty to the original purchaser (with proof of purchase) for life! Made in the USA. Sets of 16.

Chev SB 3/8" Stud

- 90068 Chev. SB, 3/8" 1.30 (break-in)
- 90070 Chev. SB, 3/8" 1.50
- 90071 Chev. SB, 3/8" 1.60
- 90074 Chev. SB, 3/8" 1.60/1.50

Chev SB 3/8" Self-Aligning

- 90084 Chev. SB (Self-Aligning), 3/8" 1.50
- 90085 Chev. SB (Self-Aligning), 3/8" 1.60

Chev SB 7/16" Stud

- 90069 Chev. SB, 7/16" 1.30 (break-in)
- 90072 Chev. SB, 7/16" 1.50
- 90077 Chev. SB, 7/16" 1.55
- 90073 Chev. SB, 7/16" 1.60
- 90087 Chev. SB, 7/16" 1.65
- 90076 Chev. SB, 7/16" 1.60/1.50
- 90088 Chev. SB, 7/16" 1.65/1.50
- 90078 Chev. SB, 7/16" 1.65/1.55

Chev BB 7/16" Stud

- 90075 Chev. BB, 7/16" 1.70
- 90079 Chev. BB, 7/16" 1.80
- 90086 Chev. BB, 7/16" 1.80/1.70

Ford SB 3/8" Stud

- 90080 Ford SB, 3/8 1.60

Ford SB 7/16" Stud

- 90081 Ford SB, 7/16" 1.60
- 90082 Ford SB, 7/16" 1.72

Ford 351C, 429-460 7/16" Stud

- 90083 Ford 351C/429-460, 7/16" 1.73

Pontiac/Holden 7/16" Stud

- 90090 Pontiac/Holden 7/16" 1.65

Replacement Adjusting Nuts

- 90034 Adjusting Nut, 3/8", each
- 90036 Adjusting Nut, 7/16", each



GM GEN III/IV DIRECT BOLT-ON ROLLER ROCKERS

These roller rocker kits are a direct bolt-on for the OE rocker arms on most GM Gen III engines. No need to changing of pushrods, guide plates or rocker studs. No need for valve cover spacers. They feature needle bearing fulcrums and roller tips, centerless ground trunnions, centerless ground pins and rollers. Purple anodized for additional protection. Available with stock 1.70 ratio or high lift 1.80. Lifetime Warranty to the original purchaser (with proof of purchase)! Made in the USA. Sets of 16.

Gen III

(LS1, LS2, LS6, LS364/400 & LQ9)

- 90097 GM Gen III 1.70
- 90098 GM Gen III 1.80

Gen IV

(LS3 & L92)

- 90095 GM Gen IV 1.70
- 90096 GM Gen IV 1.80



“EXTREME BLACK™” SEVERE APPLICATION VALVES

Engineered for high rpm and high horsepower applications. Extreme Black™ feature a gloss black nitride and are perfect for high temperatures (they run cooler which improves valve life), nitrous, turbo and supercharger applications. For naturally aspirated motors these valves will give you a much greater cylinder flow for good horsepower gains. They start as a one piece forged, high temperature, high nickel, stainless steel alloy. CNC finished to strict tolerances making these valves the choice for the most demanding race classes. The black nitride micro-hardness is higher than the stainless steel base material. No process can match it for surface hardness. Surface finish is smoother than with chromed stems, having less friction between stem and guide. The black nitride reduces power loss due to less valve-guide friction. Nitriding is not a coating, it is a process where it actually becomes part of the steel. Sold as each.

- High Nickel Stainless Alloy 1pc. Forgings
- Special Black Nitride Process
- Great for Naturally Aspirated Applications
- Great for Nitrous Applications
- Great for Turbo Applications
- Great for Supercharged Applications
- Designed for High Horsepower Applications
- Runs Cooler, Improves Valve Life
- Fully CNC Machined Finished
- Surface Finish is Smoother than Chrome
- Higher Micro-Hardness than Stainless
- Undercut Stems for Increased Flow

Type	Head Diameter	Stem Diameter	Installed Height	Overall Length	Tip Length	Underhead Angle / Radius	Margin	Seat Width	Top of Head	Weight (Grams)
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Chevrolet SB

19401N	Intake	1.940	11/32 (.3415)	Standard	4.911"	.250"	10° x .375"	.050	.100	6° Dish	111
20201N	Intake	2.020	11/32 (.3415)	Standard	4.911"	.250"	10° x .375"	.050	.100	6° Dish	116
20211N	Intake	2.020	11/32 (.3415)	+.100"	5.011"	.250"	10° x .375"	.050	.100	6° Dish	124
20501N	Intake	2.055	11/32 (.3415)	Standard	4.911"	.250"	10° x .375"	.050	.100	6° Dish	131
20511N	Intake	2.055	11/32 (.3415)	+.100"	5.011"	.250"	10° x .375"	.050	.100	6° Dish	119
20811N	Intake	2.080	11/32 (.3415)	+.100"	5.011"	.250"	10° x .375"	.050	.100	6° Dish	120
15001N	Exhaust	1.500	11/32 (.3415)	Standard	4.911"	.250"	12° x .375"	.060	.100	7° Dish	89
16001N	Exhaust	1.600	11/32 (.3415)	Standard	4.911"	.250"	12° x .375"	.060	.100	7° Dish	94
16011N	Exhaust	1.600	11/32 (.3415)	+.100"	5.011"	.250"	12° x .375"	.060	.100	7° Dish	95
16211N	Exhaust	1.625	11/32 (.3415)	+.100"	5.011"	.250"	12° x .375"	.060	.100	7° Dish	105

Chevrolet BB

22521N	Intake	2.250	11/32 (.3415)	+.250"	5.494"	.250"	12° x .375"	.065	.100	7° Dish	149
23021N	Intake	2.300	11/32 (.3415)	+.250"	5.494"	.250"	12° x .375"	.065	.100	7° Dish	155
23031N	Intake	2.300	11/32 (.3415)	+.350"	5.594"	.250"	12° x .375"	.065	.100	7° Dish	160
18801N	Exhaust	1.880	11/32 (.3415)	Standard	5.422"	.250"	10° x .375"	.075	.100	6° Dish	121
18811N	Exhaust	1.880	11/32 (.3415)	+.100"	5.522"	.250"	10° x .375"	.075	.100	6° Dish	125



LASH CAPS

Today's race engine technology and extreme cam profiles subject the tip of the valve stem to a tremendous amount of pounding. Designed to protect the valve stem under the most harsh conditions. Manufactured from premium quality chrome moly steel. Precision machined and ground perfectly flat to maintain accuracy. Provides a better wear surface for increased valve stem life. Lengthens valve .080" to correct rocker geometry. A must for high rpm engines. Sets of 16.

93200 5/16" x .250" Tip

93205 11/32" x .250" Tip

93210 3/8" x .250" Tip

UMBRELLA VALVE SEALS

High quality umbrella replaces "O" ring seals for better oil control. Not recommended for dual springs. Will fit inside stock springs. Sets of 16.

93350 11/32" Set of 16



ULTIMATE DUTY™ VALVE SEALS

The Best Seal Made, Period! Howards™ Premium PC type seals are made of a space age material which is tolerant to pump gas, alcohol, and nitromethane. Temperature tolerant to 350°. They are self-lubricating and offer controlled radial tension during changes in operating temperatures. Color Coded. Controls oil while lubricating the valve guide.

- **Space age DuPont® fluoropolymer material**
- **Alcohol, Nitromethane tolerant**
- **Controlled radial tension during changing temperatures**
- **Self lubricated material to 350°**
- **Design allows very small amount of oil for guide/stem lubrication**
- **Color coded • Installs with fingers**
- **Lifetime replacement warranty**

Due to valve guide cutter and manufacturing inconsistencies, Hylomar sealant should always be used.

93311 (red) Seal

11/32" Stem x .500" Guide
ID Guide .494"
ID Valve .337"
Outer Diameter .630"
Overall Height .460"
Inside Height .340"
Guide Contact .120"

93316 (orange) Seal

11/32" Stem x .531" Guide
ID Guide .524"
ID Valve .337"
Outer Diameter .630"
Overall Height .460"
Inside Height .340"
Guide Contact .120"

93321 (blue) Seal

3/8" Stem x .531" Guide
ID Guide .524"
ID Valve .369"
Outer Diameter .630"
Overall Height .460"
Inside Height .340"
Guide Contact .120"

93310-100 Pack of 100 (No Hylomar)
93310-1000 Box of 1000 (No Hylomar)

93315-100 Pack of 100 (No Hylomar)
93315-1000 Box of 1000 (No Hylomar)

93320-100 Pack of 100 (No Hylomar)
93320-1000 Box of 1000 (No Hylomar)

VITON VALVE SEALS

High temperature, high quality posi-stop seals. Stem contact controls oil flow to guide. No machining of guide required. For standard size valve stems only. Sets of 16.

93360 11/32" x .514-.540" Set of 16



SMALL O.D. VALVE SEALS

These high quality valve seals offer a small outside diameter for greater spring clearance. A must for triple springs. Fluoro elastomer hi-temp material. Rigid chimney, metal-clad. Sets of 16.

93370 11/32" x .500" (.550" O.D.) Set of 16
93375 11/32" x .531" (.575" O.D.) Set of 16

93380 8mm" x .500" (.600" O.D.) Set of 16
93385 8mm" x .531" (.675" O.D.) Set of 16



PERFORMANCE SERIES C1010 PUSHRODS

Manufactured from .060" wall C1010 material. Over 20% more column strength than OE. Advanced design eliminates ball breakage. Heat treated for use with guide plates. Designed for spring pressures up to 500 lbs.



5/16" C1010 Pushrods (sets of 16)

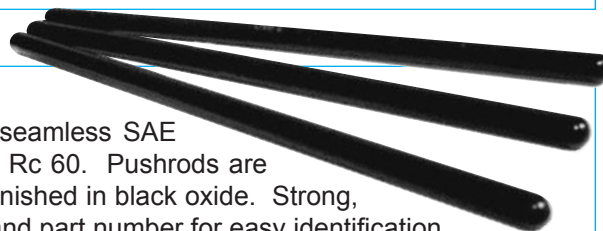
95198	6.804" (Ford 255-302 '62-'69)	95205	7.800" (Chev SB, std. length)
95212	6.886" (Ford 302 '69-'85 non-roller)	95206	7.850"
95200	7.144" (Chev SB HRC Retro-Fit)	95207	7.900" (Chev SB, +.100" length)
95201	7.205" (OE Hyd. Roller)	95208	7.950"
95203	7.700"	95209	8.000" (Ford 351W w/HRC 91260)
95204	7.750"	95210	8.050"

3/8" C1010 Pushrods (sets of 16)

95220	7.640/8.595" (Chev BB, HRC Retro-Fit)
95222	8.280/9.250" (Chev BB, std. length)

.080" WALL SWEDGED END PUSHRODS

Engineered for maximum strength and durability. Produced from seamless SAE 4130 chrome moly aircraft tubing. Each tube is case hardened to Rc 60. Pushrods are mirror polished to eliminate the possibility of stress fractures, and finished in black oxide. Strong, but light, well suited for roller applications. Laser etched with size and part number for easy identification.



5/16" Swedged End Pushrods (sets of 16)

95004	5/16", 6.350" (Ford 302 H.O.)
95003	5/16", 6.500" (Ford 221-302 Retro-Fit)
95081	5/16", 6.625"/7.850" (5.7/6.1L Hemi)
95005	5/16", 6.700" (Ford SB w/HRC 91260)
95007	5/16", 6.800" (Ford SB, std. length)
95020	5/16", 7.100" (Chev SB HRC Retro-Fit)
95021	5/16", 7.150"
95022	5/16", 7.200" (Chev SB OE Hyd. Roller)
95006	5/16", 7.250"
95023	5/16", 7.300"
95018	5/16", 7.400" (LS1, std. length)
95008	5/16", 7.700"
95009	5/16", 7.750"
95010	5/16", 7.800" (Chev SB, std. length/Ford 351C Hyd. Roller)
95011	5/16", 7.850"
95012	5/16", 7.900" (Chev SB, +.100" length)
95013	5/16", 7.950"
95014	5/16", 8.000" (Ford 351W w/HRC 91260)
95015	5/16", 8.150" (Ford 351W, std. length/Chev 348/409 Hyd. Roller)
95024	5/16", 8.250"
95016	5/16", 8.400" (Ford 351C, std. length)
95017	5/16", 8.550" (Ford 429-460, std. lgth)
95028	5/16", 8.670" (Holden V8, std. lgth)
95029	5/16", 8.700" (Ford 351M/400 Retro-Fit)
95099-1	5/16", Custom (6.000"-13.000"), each

3/8" Swedged End Pushrods (sets of 8)

95107	3/8", 7.550" (Chev BB, w/HRC 91161 exh.)
95108	3/8", 7.600" (Chev BB, HRC Retro-Fit exh.)
95109	3/8", 7.650"
95104	3/8", 7.700"
95103	3/8", 7.750"
95114	3/8", 7.800" (Chev SB, std. length)
95113	3/8", 7.900" (Chev SB, +.100" length)
95110	3/8", 8.280" (Chev BB, std. length int.)
95111	3/8", 8.380" (Chev BB, +.100" lgth int.)
95118	3/8", 8.500"
95119	3/8", 8.550" (Ford 429-460, std. length/Chev BB w/91161 int.)
95121	3/8", 8.600" (Chev BB, HRC Retro-Fit int.)
95128	3/8", 8.650"
95112	3/8", 8.680" (Chev BB, +.400" lgth int.)
95115	3/8", 9.250" (Chev BB, std. length exh.)
95116	3/8", 9.350" (Chev BB, +.100" lgth exh.)
95124	3/8", 9.400"
95117	3/8", 9.650" (Chev BB, +.400" lgth exh.)
95122-1	3/8", Custom (6.000"-13.000"), each



.105-.135" WALL SWEDGED END PUSHRODS

For engine builders wanting a stiffer pushrod. Single Piece seamless SAE 4130 chrome moly aircraft tubing. Each tube is case hardened to Rc 60. Pushrods are mirror polished to eliminate the possibility of stress fractures, and finished in black oxide. Available in .025" increments.

5/16" Swedged End Pushrods

95095-1 .105" Wall 5/16", Custom, each

95699-1 .125" Wall 5/16", Custom, each

3/8" Swedged End Pushrods

95123-1 .135" Wall 3/8", Custom, each

7/16" Swedged End Pushrods

95589-1 .125" Wall 7/16", Custom, each

210° TIP .080" WALL SWEDGED END PUSHRODS

A must for all high lift applications. The 210 degree tip gives extra radius clearance to the rocker pushrod cup area. Strongly recommended with all shaft style rocker systems. Formed from SAE 4130 .080" wall centerless ground tubing. Ends are precision swedged to exacting tolerances. Case hardened to Rc 60. Black oxide finish and laser etched with size and part number. Custom pushrods available in 6.000" to 13.000" lengths, in .025" increments. Precision pushrods at affordable shelf stock pricing.



5/16" 210° Tip Pushrods (sets of 16)

95302-16 5/16", 6.250"

95309-16 5/16", 7.750"

95310-16 5/16", 7.800"

95311-16 5/16", 7.850"

95312-16 5/16", 7.900"

95313-16 5/16", 7.950"

95314-16 5/16", 8.000"

95326-16 5/16", 8.050"

95315-16 5/16", 8.150"

95399-1 5/16", Custom (6.000"-13.000"), each

95799-1 .105" Wall, 5/16", Custom (6.000"-13.000"), each

3/8" 210° Tip Pushrods (sets of 8)

95427-8 3/8", 7.850"

95429-8 3/8", 8.400"

95418-8 3/8", 8.500"

95419-8 3/8", 8.550"

95421-8 3/8", 8.600"

95422-8 3/8", 8.700"

95432-8 3/8", 9.000"

95437-8 3/8", 9.200"

95499-1 3/8", Custom (6.000"-13.000"), each

95498-1 .135" Wall, 3/8", Custom (6.000"-13.000"), each



7/16" DUAL TAPER 210° TIP .165" WALL SWEDGED END PUSHRODS

7/16" diameter .165" wall for extra strength, high pressure applications. Double tapered and 5/16" 210° tips provide additional clearance to cylinder heads, lifter bores and lifters. Available in .025" increments.

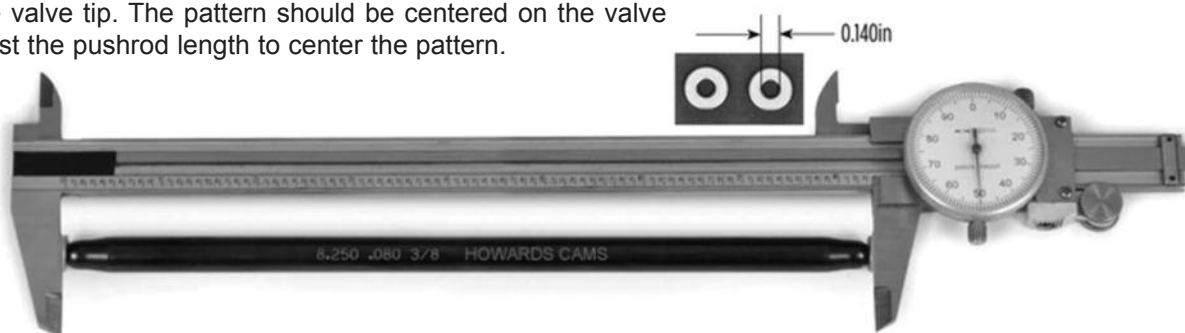
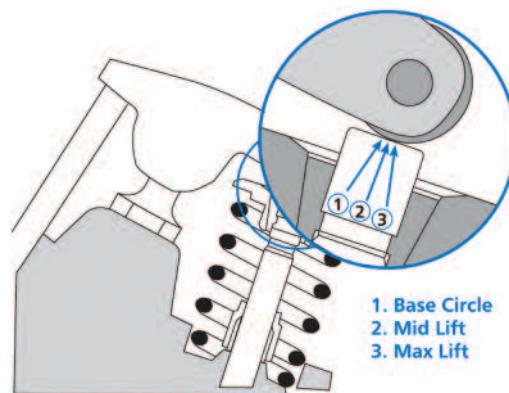
95599-1 7/16", Dual Taper Custom (6.000"-13.000")

PUSHROD MEASUREMENT

VALVE TRAIN GEOMETRY

Valve Train geometry is when the rocker arm tip moves from the intake side of the valve stem tip, across the center of the tip (at approximately mid lift), to the exhaust side of the valve stem tip (at full lift) and back. After you have estimated the required pushrod length using a Pushrod Length Checker, use this guide to check for proper alignment.

- 1) The first step is to install a solid lifter and an adjustable pushrod. Mark the tip of the valve with a machinist dye or ink.
- 2) Install your rocker arm and set it up with zero lash.
- 3) Rotate the crankshaft clockwise several times. Take off the rocker arm. The pattern of the rocker tip will be where the ink has been wiped away from the valve tip. The pattern should be centered on the valve tip. If not, adjust the pushrod length to center the pattern.



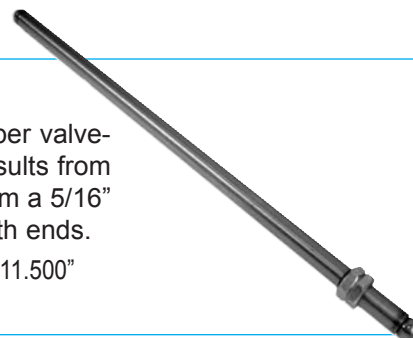
MEASURING PUSHRODS

Ball-ball pushrods: Because the radiused holes in the ends of pushrods vary in diameter from manufacturer to manufacturer, it is not advisable to measure pushrods by their overall lengths. Instead it is more dependable to measure them at their 0.140in gauge diameter. In other words, simply find two washers each with 0.140in hole, place one washer on each end of the pushrod and measure the overall distance. Finally, subtract the thickness of the washers to calculate the pushrod's correct length.

PUSHROD LENGTH CHECKERS

Easy and economical tool to layout and determine proper pushrod length for proper valve-train geometry. Proper valvetrain geometry is necessary to obtain the desired results from the cam and to ensure damage is not done to the rest of the valvetrain. Made from a 5/16" pushrod that is cut and threaded with over one inch of travel. 5/16" ball tip on both ends.

92129	6.500"-7.500"	92131	8.500"-9.800"	92133	10.200"-11.500"
92130	7.500"-8.700"	92132	9.700"-11.000"		

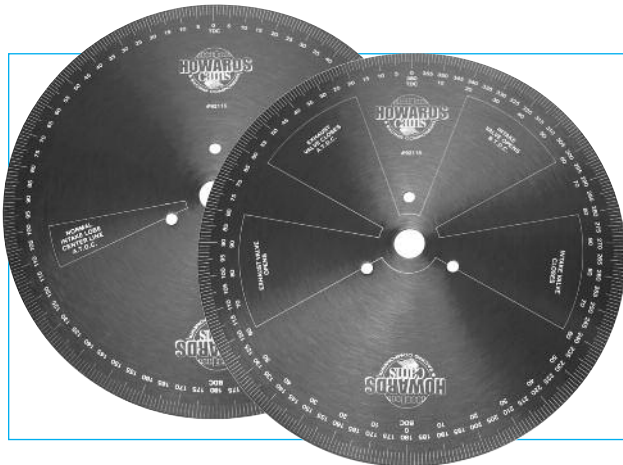


PUSHROD LENGTH CHECKING TOOLS

Proper pushrod length is absolutely critical for peak performance and horsepower. Using the correct pushrod can eliminate bent or broken pushrods, excessive valve stem/tip wear, valve guide wear, and energy wasting valve side-loading friction.

92137	Chev SB, 3/8" Stud	92138	Chev SB, 7/16" Stud	92139	Chev BB, 7/16" Stud
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DEGREE WHEELS



PROFESSIONAL 2-SIDED 14" DEGREE WHEELS

Not stamped, but CNC machined billet aluminum for accuracy. These oversized degree wheels are precisely etched on both sides with 1° increments. Features easy to read intake valve opens, intake valve closes, exhaust valve opens and exhaust valve closes on one side and intake lobe centerline and exhaust lobe centerline on the other. Purple anodized. Standard 1" center hole for use with most degree wheel sockets. Instructions and laminated reusable specification sheet are included.

92115 14" Professional 2-Sided Degree Wheel



Degree Wheel Mounting Sockets

Provides a great way to attach a degree wheel to the engine. A knurled retaining nut sandwiches the degree wheel and holds it in place. Simply slips on the end of a crankshaft. Works with any degree wheel with a 1" mounting hole. Designed to accept 1/2" drive ratchet or breaker bar. Allows you to easily rotate the engine assembly.

92122 Pro Turning Socket, Chev SB
 92127 Pro Turning Socket, Chev BB
 92124 Pro Turning Socket, Chrysler V8



ADVANCE AND RETARD CAM BUSHINGS

An easy way to advance or retard your cam timing. These offset bushings come in packs of 5 (4 offset & one 0°). Precision manufactured to offer precise timing of your cam. Color coded. Requires drilling a 13/32" hole in camshaft timing gear.

94505	Set of 5, Even (0°, 2°, 4°, 6°, 8°)	94510	Set of 5, Odd (0°, 1°, 3°, 5°, 7°)
94505:4505-0	Each, 0°, Natural	94505:4505-0	Each, 0°, Natural
94505:4505-2	Each, 2°, Black	94510:4510-1	Each, 1°, Gold
94505:4505-4	Each, 4°, Red	94510:4510-3	Each, 3°, Brown
94505:4505-6	Each, 6°, Green	94510:4510-5	Each, 5°, Blue
94505:4505-8	Each, 8°, Grey	94510:4510-7	Each, 7°, Purple



LIFTER VALLEY BREATHER TUBES

Allows crankcase pressure to rise unobstructed, allowing more speedy oil drain back to the oil pan. Sets of 8.

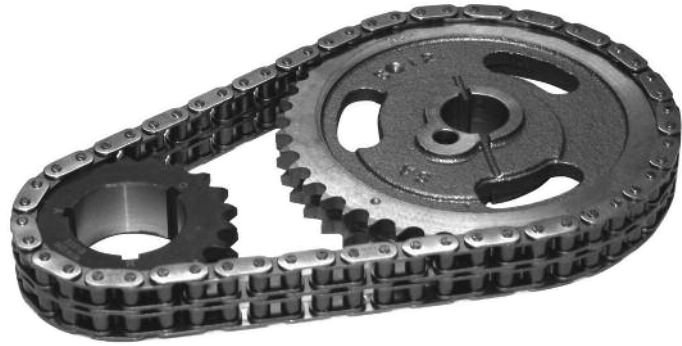
92145 Chev V8

DOUBLE ROLLER TIMING SETS

DOUBLE ROLLER TIMING SETS

These 3 piece timing sets are hand matched for quality and reliability. Features a premium double roller chain for extended life. Cast iron cam sprocket and a 3 keyway crank sprocket offers a +4°, 0°, -4° cam adjustment.

- **Hand Matched for Quality & Reliability**
- **Premium Double Roller Chain**
- **3-Keyway Crank Sprocket for adjustability**

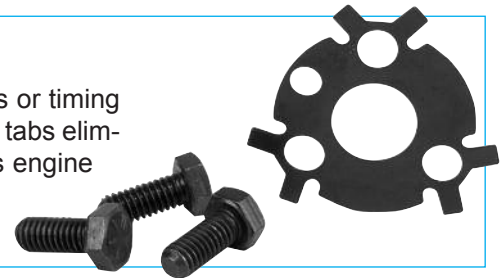


94200	Chevrolet SB 55-96, 265-400, except Factory Roller Cam, 3-Keyway
94205	Chevrolet BB Mark IV 65-98, 396-454, 3-Keyway
94210	Ford 289-302/351W 65-84 Factory 1pc eccentric, 3-Keyway
94212	Ford 302/351W 72-02 Factory 2pc eccentric, 3-Keyway

CAMSHAFT LOCKING PLATE AND BOLT KIT

Howards™ cam bolt lock plate is cheap insurance when changing camshafts or timing sets. The combination of super strength bolts and locking plate with bendable tabs eliminates the possibility of the cam bolts coming loose and possibility of serious engine damage.

94550 Includes Locking Plate and (3) Super Strength Bolts



CAM THRUST BUTTONS

Designed to control cam end play. Excessive cam play can cause inaccurate ignition timing and premature timing chain wear. Simply pushes into front of cam gear.

94582	Chev SB, .600" Long, Aluminum
94580	Chev SB, .800" Long, Aluminum
94560	Chev SB, .810" Long, Nylon

94585 Chev BB, .950" Long, Aluminum



ROLLER CAM THRUST BUTTONS

Full needle bearing design. Maintains proper cam end play that can cause inaccurate timing and premature timing chain stretch. A must for roller cam applications.

94570 Chev SB, .800" Long

94575 Chev BB, .950" Long

DOUBLE ROLLER BILLET STEEL TIMING SETS

DOUBLE ROLLER BILLET STEEL TIMING SETS

These pro billet competition timing sets are designed for accuracy and long life. Lightweight by design these sets feature a CNC machined billet steel cam sprocket with lightening holes, a heat-treated crank sprocket with 9-keyways and a black oxide coating. The chain is a large .250" diameter seamless roller. Most sets include a press fit roller thrust bearing. *Note: No machining required.*



94300	Chevrolet SB 55-96, 265-400, except Factory Roller Cam, with Roller Thrust Bearing, 9-Keyway
94300-5	Chevrolet SB 55-96, 265-400 .005" Undersize, with Roller Thrust Bearing, 9-Keyway
94300-10	Chevrolet SB 55-96, 265-400 .010" Undersize, with Roller Thrust Bearing, 9-Keyway
94301	Chevrolet SB 85-02, 305-350 w/Factory Roller Cam, with Roller Thrust Bearing, 9-Keyway
94303	Chevrolet SB with Big Block Crank Snout, with Roller Thrust Bearing, 9-Keyway
94302	Chevrolet SB Rocket Block/Dart Iron Eagle, with Roller Thrust Bearing, 9-Keyway
94308	Chevrolet Gen III 97-05, LS1/6 3-Bolt, with Roller Thrust Bearing, 9-Keyway
94304	Chevrolet Gen III 05-present, LS2/LSR/LR4 Single-Bolt, with Roller Thrust Bearing, 9-Keyway
94306	Chevrolet Gen III 07-10 LS3 6.0L, 08-10 6.2L Single-Bolt, with Roller Thrust Bearing, 9-Keyway
94307	Chevrolet Gen III 2006 LS3 6.0L, 2007 L92 6.2L 3-Bolt, with Roller Thrust Bearing, 9-Keyway
94305	Chevrolet BB Mark IV 65-98, 396-454, with Roller Thrust Bearing, 9-Keyway
94305-5	Chevrolet BB Mark IV 65-98, .005" Undersize, with Roller Thrust Bearing, 9-Keyway
94305-10	Chevrolet BB Mark IV 65-98, .010" Undersize, with Roller Thrust Bearing, 9-Keyway
94309 (A)	Chevrolet BB Gen 6 96-00, 454-502, with Roller Thrust Bearing, 9-Keyway
94330	Chrysler SB 56-91, 273-360, 9-Keyway
94330	Chrysler Hemi 57-58, 392, 9-Keyway
94332	Chrysler Hemi 03-10, 5.7/6.1L without VCT, with Roller Thrust Bearing, 9-Keyway, Steel Back Plate
94335	Chrysler BB 58-78, 383-440/426 Hemi, Single bolt, 9-Keyway
94340	Chrysler BB 58-78, 383-440/426 Hemi, Three bolt, with Roller Thrust Bearing, 9-Keyway
94310	Ford 289-302/351W 65-84 Factory 1pc eccentric, with Roller Thrust Bearing, 9-Keyway
94312	Ford 302/351W 72-02 Factory 2pc eccentric, with Roller Thrust Bearing, 9-Keyway
94312-5	Ford 302/351W 72-02 Factory 2pc eccentric, .005" Undersize, with Roller Thrust Bearing, 9-Keyway
94320	Ford Cleveland/M 70-82, 351C/M & 400, with Roller Thrust Bearing, 9-Keyway
94315	Ford BB 68-71, 429-460, with Roller Thrust Bearing, 9-Keyway
94325	Ford FE 63-73, 352-428, with Roller Thrust Bearing, 9-Keyway
94345	Pontiac V8 55-79, 326-455, with Bronze Thrust Bearing, 9-Keyway

(A) 94309 Fits under most stock timing covers.

Replacement Parts

94010	Replacement Thrust Bearing for 94300/94305
94012	Replacement Thrust Bearing for 94310/94312

94058

94060

94064

94068

Replacement Timing Chain, 58 Link
Replacement Timing Chain, 60 Link
Replacement Timing Chain, 64 Link
Replacement Timing Chain, 68 Link

MAX Z.P.M.™ CAMSHAFT BREAK-IN LUBE & OIL CHANGE ADDITIVE

The Highest Levels of ZDDP of All Popular Brands

Not only the most important product for proper camshaft break-in, but also extremely important at each oil change. Replaces the Zinc-Phosphates (ZDDP) removed from today's oils. Use with both hydraulic and mechanical flat tappet camshafts. Virtually eliminates cam and lifter wear at initial break-in. Don't pay for added mineral oil in some competitors bigger bottles. Max ZPM™ has the highest levels of Zinc-Phosphates (ZDDP) of all the popular brands tested, plus the addition of moly for extra protection. Compatible with all petroleum base and synthetic oils. Add to oil at every oil change to extend engine life and enhance performance. Just add one 4 ounce bottle for up to 6 quarts of oil.

99000 MAX Z.P.M. Camshaft Break-In Lube, 4oz. Bottle

99000-24 MAX Z.P.M. Camshaft Break-In Lube, Case of (24) 4oz. Bottles



PENN-GRADE 1® BREAK-IN OIL

Formulated specifically to meet the critical lubrication needs of new engines during break-in while allowing proper seating of rings and component 'run-in'. Enhanced levels of "zinc" (zinc dialkyl dithiophosphate a.k.a. ZDDP) and superior oil film strength offer complete anti-wear, anti-scutting protection for even the most demanding of applications such as those presented by break-in of engines with 'flat tappet' cams.

BPO30WTQT Break-In Oil, 30W, Quart

BPO30WT Break-In Oil, 30W, Case

PENN-GRADE 1® Racing Oil "The Green Oil"

Specially formulated to meet the stringent lubricating demands of high-performance, highly stressed, street and racing engines. They reduce internal friction allowing for increased horsepower output while maintaining their strong lubricating film protection even under the most demanding torque and extreme temperature conditions.

BPO10W-30QT Racing Oil, 10W-30, Quart

BPO50WQT Racing Oil, 50W, Quart

BPO10W-30 Racing Oil, 10W-30, Case

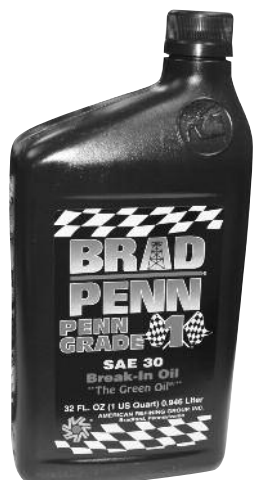
BPO50W Racing Oil, 50W, Case

BPO20W-50QT Racing Oil, 20W-50, Quart

BPONITRO70QT "Nitro" 70W, Quart

BPO20W-50 Racing Oil, 20W-50, Case

BPONITRO70 "Nitro" 70W, 50W, Case



Extreme Pressure Fastener Lube

This specialty fastener lubricant was developed to be more consistent, be more repeatable, be metal free, and to achieve the target preload on the first torque cycle. Prevents seizing and galling of threads.

99007 Extreme Pressure Lube, .5 oz.

99008 Extreme Pressure Lube, 4 oz.



ASSEMBLY GREASE

Clings to and protects surfaces during initial start-up, delivering protection you can count on. Apply to cams and lifters for break-in protection. Can also be used on distributor gears, rocker shafts, rocker tips, pushrod tips, wrist pins and valve guides. Dissolves completely in oil without clogging oil passageways or plugging oil filters.

99005 Assembly Grease, .625 oz.

VALVE SPRING, RETAINER & LOCK KITS

Need a complete Cam Kit? We made it easier. Just chose which Camshaft and Lifters or Cam and Lifter Set and add one of these Valve Spring, Retainer and Lock Kits. Each kit includes a set of Howards Cams performance Valve Springs, match Retainers and heat treated Valve Locks. These kits offer more combinations to suit your needs. Building a Mopar, but with performance single groove valves? Simple just change kits. Chevrolet big block, but with 11/32" valves instead of the stock 3/8"? Just use the correct kit.

- All you need to upgrade a Cam & Lifter Set into a Complete Cam Kit
- More combinations to suit your needs
- Includes a set of Performance Valve Springs
- Matching Chrome Moly Retainers (unless noted)
- Matching Heat-Treated Valve Locks



11/32" Valve Stem with 7° Locks (Single Groove)

98111-K11	1.240" Single w/Damper	90 @ 1.700	240 @ 1.250
98214-K11	1.250" Single w/Damper	115 @ 1.700	300 @ 1.250
98212-K11	1.265" Single w/Damper	115 @ 1.780	340 @ 1.250
98412-K11	1.445" Single w/Damper	120 @ 1.680	295 @ 1.175
98436-K11	1.435" Dual	105 @ 1.680	320 @ 1.180
98511-K11	1.485" Single w/Damper	105 @ 1.800	300 @ 1.250
98515-K11	1.510" Single w/Damper	100 @ 1.880	275 @ 1.380
98529-K11	1.525" Single w/Damper	125 @ 1.875	350 @ 1.375
98611-K11	1.550" Single w/Damper	145 @ 1.880	350 @ 1.250
98612-K11 ^P	1.550" Single w/Damper	145 @ 1.880	350 @ 1.250
98636-K11	1.514" Dual w/Damper	130 @ 1.875	330 @ 1.300
98656-K11 ^P	1.514" Dual w/Damper	130 @ 1.875	330 @ 1.300

11/32" Valve Stem with 10° Locks (Single Groove)

98113-K12	1.280" Beehive	108 @ 1.800	329 @ 1.265
98114-K12 ^P	1.280" Beehive	108 @ 1.800	329 @ 1.265
98212-K12	1.265" Single w/Damper	115 @ 1.780	340 @ 1.250
98213-K12	1.265" Single w/Damper	120 @ 1.800	350 @ 1.200
98215-K12 ^P	1.265" Single w/Damper	120 @ 1.800	350 @ 1.200
98438-K12	1.465" Dual	122 @ 1.650	353 @ 1.100
98437-K12	1.435" Dual w/Damper	135 @ 1.680	360 @ 1.190
98445-K12	1.470" Dual	150 @ 1.800	425 @ 1.110
98636-K12	1.514" Dual w/Damper	130 @ 1.875	330 @ 1.300
98656-K12 ^P	1.514" Dual w/Damper	130 @ 1.875	330 @ 1.300
98632-K12	1.539" Dual w/Damper	140 @ 1.940	425 @ 1.250
98652-K12 ^P	1.539" Dual w/Damper	140 @ 1.940	425 @ 1.250

3/8" Valve Stem with 7° Locks (Single Groove)

98511-K31	1.485" Single w/Damper	105 @ 1.800	300 @ 1.250
98445-K31	1.470" Dual	150 @ 1.800	425 @ 1.110
98515-K31	1.510" Single w/Damper	100 @ 1.880	275 @ 1.380
98529-K31	1.525" Single w/Damper	125 @ 1.875	350 @ 1.375
98611-K31	1.550" Single w/Damper	145 @ 1.880	350 @ 1.250
98612-K31 ^P	1.550" Single w/Damper	145 @ 1.880	350 @ 1.250
98636-K31	1.514" Dual w/Damper	130 @ 1.875	330 @ 1.300
98656-K31 ^P	1.514" Dual w/Damper	130 @ 1.875	330 @ 1.300

3/8" Valve Stem with 4-Groove (Chrysler) 7° Locks

98438-K34	1.465" Dual	122 @ 1.650	353 @ 1.100
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3/8" Valve Stem with 2 & 4-Groove (Chrysler) 7° Locks

98445-K33	1.470" Dual	150 @ 1.800	425 @ 1.110
98515-K33	1.510" Single w/Damper	100 @ 1.880	275 @ 1.380
98529-K33	1.525" Single w/Damper	125 @ 1.875	350 @ 1.375

3/8" Valve Stem with 10° Locks (Single Groove)

98438-K32	1.465" Dual	122 @ 1.650	353 @ 1.100
98445-K32	1.470" Dual	150 @ 1.800	425 @ 1.110
98636-K32	1.514" Dual w/Damper	130 @ 1.875	330 @ 1.300
98656-K32 ^P	1.514" Dual w/Damper	130 @ 1.875	330 @ 1.300

8mm (LS) Valve Stem with 7° Locks (Bead Lock)

98112-K1	1.207" Beehive	135 @ 1.800	348 @ 1.175
98113-K1	1.280" Beehive	108 @ 1.800	329 @ 1.265
98116-K1	1.305" Dual	145 @ 1.800	385 @ 1.150
98118-K1	1.305" Dual	152 @ 1.800	413 @ 1.150

8mm (LS) Valve Stem with Super 7 Locks/Titanium Retainers

98116-K5	1.305" Dual	145 @ 1.800	385 @ 1.150
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P = Features Electro-polished valve springs.

STOCK DIAMETER PERFORMANCE VALVE SPRINGS



98212

Delivers increased valve train stability and performance over OEM springs. Premium chrome silicone, coiled and heat-treated in the finest facilities available. Designed for most performance hydraulic and mild mechanical flat tappet applications. *Note:* Some have taller installed heights and may require either longer valves or retainers design for greater installed height. Sets of 16.

Spring Set	Spring, Retainer and Lock Set	Style	Outer O.D.	Outer I.D.	Inner O.D.	Inner I.D.	Damper
AMC V8							
98636	98636-K11,12,31,32	Dual with Damper	1.514	1.125	.937	.697	Y
Chevrolet SB							
98212	98212-K11,12	Single with Damper	1.265	.876	NA	NA	Y
GM Gen III (LS1/2/6)							
98115	NA	Inverted Conical Ovate	1.055/1.280	.670/.875	NA	NA	N
Chevrolet BB							
98636	98636-K11,12,31,32	Dual with Damper	1.514	1.125	.937	.697	Y
Chrysler SB							
98412	98412-K11	Single with Damper	1.445	1.040	NA	NA	Y
98432	NA	Dual with Damper	1.437	1.080	1.000	.760	Y
Chrysler BB							
98515	98515-K11,31,33	Single with Damper	1.510	1.110	NA	NA	Y
98611	98611-K11,31	Single with Damper	1.550	1.130	NA	NA	Y
98636	98636-K11,12,31,32	Dual with Damper	1.514	1.125	.937	.697	Y
Ford SB							
98412	98412-K11	Single with Damper	1.445	1.040	NA	NA	Y
98432	NA	Dual with Damper	1.437	1.080	1.000	.760	Y
Ford 351W/C/M/400							
98515	98515-K11,31,33	Single with Damper	1.510	1.110	NA	NA	Y
98636	98636-K11,12,31,32	Dual with Damper	1.514	1.125	.937	.697	Y
Ford FE							
98636	98636-K11,12,31,32	Dual with Damper	1.514	1.125	.937	.697	Y
Ford 429-460							
98636	98636-K11,12,31,32	Dual with Damper	1.514	1.125	.937	.697	Y
Oldsmobile V8							
98412	98412-K11	Single with Damper	1.445	1.040	NA	NA	Y
98432	NA	Dual with Damper	1.437	1.080	1.000	.760	Y
Pontiac V8							
98341	NA	Dual	1.385	1.060	1.060	.800	N
98432	NA	Dual with Damper	1.437	1.080	1.000	.760	Y

K11 = 11/32", 7° (single groove), K12 = 11/32", 10° (single groove), K31 = 3/8", 7° (single groove), K32 = 3/8", 10° (single groove), K33 = 3/8", 7° (2 & 4 groove)

Closed Pressure	Open Pressure	Rate	Max Lift	Coil Bind	Titanium Retainer	Steel Retainer	Seat Cup/Locator
130 @ 1.875	330 @ 1.300	348	.670	1.150	97216	97118, 97128	96015/96024
125 @ 1.750	340 @ 1.250	425	.550	1.150	97214	97112, 97132	--
110 @ 1.800	275 @ 1.200	270	.600	1.150	97165	97161	96023
130 @ 1.875	330 @ 1.300	348	.670	1.150	97216	97118, 97128	96015/96024
120 @ 1.680	295 @ 1.175	350	.530	1.100	97216	97118	96005/96034
135 @ 1.750	285 @ 1.250	300	.625	1.125	97216	97118, 97128	96005
100 @ 1.880	275 @ 1.380	350	.520	1.300	97216	97110, 97128	96015/96033
145 @ 1.880	350 @ 1.250	325	.670	1.150	97220	97110, 97130	--
130 @ 1.875	330 @ 1.300	348	.670	1.150	97216	97118, 97128	96015/96024
120 @ 1.680	295 @ 1.175	350	.530	1.100	97216	97118	96005/96034
135 @ 1.750	285 @ 1.250	300	.625	1.125	97216	97118, 97128	96005
100 @ 1.880	275 @ 1.380	350	.520	1.300	97216	97118, 97128	96015/96033
130 @ 1.875	330 @ 1.300	348	.670	1.150	97216	97118, 97128	96015/96024
130 @ 1.875	330 @ 1.300	348	.670	1.150	97216	97118, 97128	96015/96024
130 @ 1.875	330 @ 1.300	348	.670	1.150	97216	97118, 97128	96015/96024
120 @ 1.680	295 @ 1.175	350	.530	1.100	97216	97118	96005/96034
135 @ 1.750	285 @ 1.250	300	.625	1.125	97216	97118, 97128	96005
105 @ 1.625	230 @ 1.150	263	.655	.910	--	--	--
135 @ 1.750	285 @ 1.250	300	.625	1.125	97216	97118, 97128	96005

VALVE SPRINGS

BEEHIVE (INVERTED CONICAL) VALVE SPRINGS



The unique design of the Inverted conical valve springs offer increased harmonic resistance for greater spring stability. This design requires less spring pressure for better valve control. Test have shown more horsepower, high rpm's and longer life expectancy. This design is well known on GM Gen III (LS1/2/6) applications, but is also great for other applications including Chevrolet small blocks, Chrysler 5.7L Hemi, and many other performance applications. Sets of 16.

Spring Set	Spring, Retainer and Lock Set	Style	Outer O.D.	Outer I.D.	Inner O.D.	Inner I.D.	Damper
98112	98112-K1	Ovate Beehive	1.207	1.072	.885	.650	N
98113	98113-K1,12	Beehive	1.280	1.035	.900	.650	N
98115	NA	Ovate Beehive	1.289	1.055	.880	.660	N
98110	NA	Ovate Beehive	1.290	1.055	1.014	.859	N
98117	NA	Beehive	1.450	1.295	1.014	.859	N
98119	NA	Ovate Beehive	1.445	1.186	.990	.731	N
Ford 4.6L 4 Valve (Set of 32)							
98105	NA	Ovate Beehive	1.105	.742	.943	.580	N

K1 = 8mm, 7° (bead lock), K12 = 11/32", 10° (single Groove)

ELECTRO POLISHED BEEHIVE (INVERTED CONICAL) VALVE SPRINGS



The unique design of the Inverted conical valve springs offer increased harmonic resistance for greater spring stability. This design requires less spring pressure for better valve control. Manufactured of aircraft-grade chrome silicone, with advanced heat-treating. Springs then receive an advanced electro polished finish and stress relieved. This enhanced finish increases valve spring life and fatigue resistance, for lap after lap consistency. Designed for racing hydraulic and mechanical flat tappet as well as performance hydraulic roller camshafts. Sets of 16.

Spring Set	Spring, Retainer and Lock Set	Style	Outer O.D.	Outer I.D.	Inner O.D.	Inner I.D.	Damper
98114	98114-K12	Beehive	1.280	1.035	.900	.650	N
98114	98114-K12	Beehive	1.280	1.035	.900	.650	N

K12 = 11/32", 10° (single groove)

"NITRIDED" BEEHIVE (INVERTED CONICAL) VALVE SPRINGS



Offering an industry leading nitriding process that allow for the material to withstand the abusive wear and fatigue of the typical endurance engine environment. These springs come fully prepared for racing conditions with chamfering, polishing, and the latest surface enhancement technology available. Combined with the unique Beehive design equals better valve control, increased stability and longer life. The ultimate Beehive spring is here.

Spring Set	Spring, Retainer and Lock Set	Style	Outer O.D.	Outer I.D.	Inner O.D.	Inner I.D.	Damper
98012	NA	"Nitrided" Ovate Beehive	1.207	.885	1.072	.650	N
98010	NA	"Nitrided" Ovate Beehive	1.290	1.055	1.014	.859	N

Closed Pressure	Open Pressure	Rate	Max Lift	Coil Bind	Titanium Retainer	Steel Retainer	Seat Cup/Locator
135 @ 1.800	348 @ 1.175	340	.625	1.100	--	97161/97174	96021
115 @ 1.800	332 @ 1.265	412	.600	1.150	--	97161/97174	96021
110 @ 1.800	275 @ 1.200	270	.600	1.150	97165	97161/97174	96021
130 @ 1.800	318 @ 1.200	313	.600	1.140	--	97161	96021
118 @ 1.950	375 @ 1.380	457	.580	1.320	97214	97112/97132	--
160 @ 1.950	425 @ 1.300	408	.700	1.220	--	--	--
90 @ 1.470	252 @ .970	324	.500	.900	--	--	--

Closed Pressure	Open Pressure	Rate	Max Lift	Coil Bind	Titanium Retainer	Steel Retainer	Seat Cup/Locator
115 @ 1.800	332 @ 1.265	412	.600	1.150	--	97161/97174	96021
115 @ 1.800	354 @ 1.225	412	.600	1.150	--	97161/97174	96021

Closed Pressure	Open Pressure	Rate	Max Lift	Coil Bind	Titanium Retainer	Steel Retainer	Seat Cup/Locator
150 @ 1.800	360 @ 1.175	340	.625	1.100	--	97161/97174	96021
130 @ 1.800	318 @ 1.200	313	.600	1.140	--	97161	96021

GM GEN III (LS1/2/6) DUAL VALVE SPRINGS



98116

Specifically designed for GM Gen III LS1, LS2 and LS6 performance applications. Hi-tech winding, heat treat and finishing processes make these the ultimate late model performance spring. Use chrome moly steel retainers #97162. .640" max lift. Sets of 16.

Spring Set	Spring, Retainer and Lock Set	Style	Outer O.D.	Outer I.D.	Inner O.D.	Inner I.D.	Damper
98116	98116-K1,5	Dual	1.305	.955	.950	.676	N
98118	98118-K1	Dual	1.305	.935	.935	.665	N

K1 = 8mm, 7° (bead lock), K5 = 8mm, Super 7/Titanium retainers

PERFORMANCE HYDRAULIC FLAT TAPPET VALVE SPRINGS



98341

Howards research and development engineers are constantly updating materials and manufacturing techniques, to provide the best possible valve springs. Coiled and heat-treated in the finest facilities available. Each spring is coiled, stress relieved, deburred, shot-peened and heat treated to our own very specific standards. Sets of 16.

Spring Set	Spring, Retainer and Lock Set	Style	Outer O.D.	Outer I.D.	Inner O.D.	Inner I.D.	Damper
98111	98111-K11	Single with Damper	1.240	.860	NA	NA	Y
98214	98214-K11	Single with Damper	1.250	.870	NA	NA	Y
98212	98212-K11,12	Single with Damper	1.265	.876	NA	NA	Y
98216	NA	Dual	1.250	.910	.910	.684	N
98113	98113-K1,12	Beehive	1.280	1.035	.900	.650	N
98341	NA	Dual	1.384	1.060	1.060	.804	N
98412	98412-K11	Single with Damper	1.445	1.040	NA	NA	Y
98412	98412-K11	Single with Damper	1.445	1.040	NA	NA	Y
98436	98436-K11	Dual	1.435	1.055	1.055	.775	N
98438	98438-K12,32,34	Dual	1.465	1.091	1.090	.807	N
98411	NA	Single with Damper	1.437	1.080	NA	NA	Y
98511	98511-K11,31	Single with Damper	1.485	1.060	NA	NA	Y
98515	98515-K11,31,33	Single with Damper	1.510	1.110	NA	NA	Y
98529	98529-K11,31,33	Single with Damper	1.525	1.075	NA	NA	Y
98611	98611-K11,31	Single with Damper	1.550	1.130	NA	NA	Y

K11 = 11/32", 7° (single groove), K12 = 11/32", 10° (single groove), K31 = 3/8", 7° (single groove), K32 = 3/8", 10° (single groove), K33 = 3/8", 7° (2 & 4 groove), K33 = 3/8", 7° (4 groove)

Closed Pressure	Open Pressure	Rate	Max Lift	Coil Bind	Titanium Retainer	Steel Retainer	Seat Cup/Locator
145 @ 1.800	385 @ 1.150	375	.640	1.100	97212	97162	96023
152 @ 1.800	413 @ 1.150	405	.660	1.060	97212	--	96023

Closed Pressure	Open Pressure	Rate	Max Lift	Coil Bind	Titanium Retainer	Steel Retainer	Seat Cup/Locator
90 @ 1.700	230 @ 1.250	305	.520	1.125	97214	97112, 97132	--
115 @ 1.700	300 @ 1.250	411	.500	1.160	97214	97112, 97132	--
125 @ 1.750	340 @ 1.250	425	.550	1.150	97214	97112, 97132	--
110 @ 1.700	250 @ 1.200	265	.600	.950	--	--	96023
115 @ 1.800	332 @ 1.265	412	.600	1.150	--	97161	96021
105 @ 1.625	230 @ 1.150	263	.655	.910	97216	97118	96005/96034
120 @ 1.680	295 @ 1.175	350	.530	1.100	97216	97118	96005/96034
110 @ 1.700	295 @ 1.175	350	.550	1.100	97216	97118	96005/96034
105 @ 1.700	320 @ 1.180	415	.530	1.120	97216	97118	96005/96033
122 @ 1.650	353 @ 1.100	425	.690	.950	97216	97110, 97118, 97128	96005/96033
100 @ 1.750	235 @ 1.100	210	.640	1.050	97216	97118, 97128	96005/96035
115 @ 1.800	310 @ 1.250	355	.590	1.150	97216	97110, 97128	96005
100 @ 1.880	275 @ 1.380	360	.520	1.300	97216	97110, 97128	96015/96033
125 @ 1.875	350 @ 1.375	462	.600	1.200	97216	97110, 97128	--
145 @ 1.880	350 @ 1.250	325	.700	1.030	97220	97110, 97130	--

PERFORMANCE HYDRAULIC ROLLER VALVE SPRINGS



Coiled and heat-treated in the finest facilities available. Howards research and development teams are constantly updating materials and manufacturing techniques, to provide the best possible valve springs. Howards Cams pioneered many valve spring developments since the 1950's, and are still working with the best engineers and race teams to be on the cutting edge of valve spring technology. Sets of 16.

Spring Set	Spring, Retainer and Lock Set	Style	Outer O.D.	Outer I.D.	Inner O.D.	Inner I.D.	Damper
98213	98213-K12	Single with Damper	1.265	.875	NA	NA	Y
98218	NA	Single with Damper	1.265	.875	NA	NA	Y
98438	98438-K12,32,34	Dual	1.465	1.091	1.090	.807	N
98432	NA	Dual with Damper	1.437	1.080	1.000	.760	Y
98442	NA	Dual	1.437	1.080	1.080	.810	N
98443	NA	Dual	1.440	1.085	1.080	.796	N
98445	98445-K12,31,32,33	Dual	1.470	1.080	1.085	.800	N
98542	NA	Dual	1.470	1.095	1.090	.820	N
98512	NA	Dual	1.514	1.135	1.135	.795	N
98611	98611-K11,31	Single with Damper	1.550	1.130	NA	NA	Y
98632	98632-K12	Dual with Damper	1.539	1.125	1.000	.760	Y

K11 = 11/32", 7° (single groove), K12 = 11/32", 10° (single groove), K31 = 3/8", 7° (single groove), K32 = 3/8", 10° (single groove), K33 = 3/8", 7° (2 & 4 groove), K33 = 3/8", 7° (4 groove)

PERFORMANCE MECHANICAL FLAT TAPPET VALVE SPRINGS



Manufactured of aircraft chrome silicone material. Coiled and heat-treated in the finest facilities available. Each spring is coiled, stress relieved, deburred, shot-peened and heat treated to our own very specific standards. Howards research and development engineers are constantly updating materials and manufacturing techniques, to provide the best possible valve springs. Sets of 16.

Spring Set	Spring, Retainer and Lock Set	Style	Outer O.D.	Outer I.D.	Inner O.D.	Inner I.D.	Damper
98214	98214-K11	Single with Damper	1.250	.870	NA	NA	Y
98220	NA	"Pacaloy" Single with Damper	1.260	.860	NA	NA	Y
98223	NA	"Pacaloy" Dual	1.260	.860	NA	NA	N
98212	98212-K11,12	Single with Damper	1.265	.875	NA	NA	Y
98213	NA	Single with Damper	1.265	.875	NA	NA	Y
98218	NA	Single with Damper	1.265	.875	NA	NA	Y
98374	NA	"Pacaloy" Dual	1.374	1.000	NA	.716	Y
98437	98437-K12	Dual with Damper	1.435	1.035	.937	.697	Y
98438	98438-K12,32,34	Dual	1.465	1.091	1.090	.807	N
98432	NA	Dual with Damper	1.437	1.080	1.000	.760	Y
98442	NA	Dual	1.437	1.080	1.080	.810	N
98443	NA	Dual	1.440	1.085	1.080	.796	N
98445	98445-K12,31,32,33	Dual	1.470	1.080	1.085	.800	N
98445	98445-K12,31,32,33	Dual	1.470	1.080	1.085	.800	N
98511	98511-K11,31	Single with Damper	1.485	1.061	NA	NA	Y
98542	NA	Dual	1.470	1.095	1.090	.820	N
98515	98515-K11,31,33	Single with Damper	1.510	1.110	NA	NA	Y
98636	98636-K11,12,31,32	Dual with Damper	1.514	1.125	.937	.697	Y
98512	NA	Dual	1.514	1.135	1.135	.795	N
98611	98611-K11,31	Single with Damper	1.550	1.130	NA	NA	Y
98632	98632-K12	Dual with Damper	1.539	1.125	1.000	.760	Y

K11 = 11/32", 7° (single groove), K12 = 11/32", 10° (single groove), K31 = 3/8", 7° (single groove), K32 = 3/8", 10° (single groove), K33 = 3/8", 7° (2 & 4 groove), K33 = 3/8", 7° (4 groove)

Some items are not legal for sale or use on any pollution controlled motor vehicle

Closed Pressure	Open Pressure	Rate	Max Lift	Coil Bind	Titanium Retainer	Steel Retainer	Seat Cup/Locator
120 @ 1.800	350 @ 1.200	430	.640	1.100	97214	97112, 97132	--
125 @ 1.800	375 @ 1.200	415	.600	1.150	97214	97112, 97132	--
122 @ 1.650	353 @ 1.100	425	.690	.950	97216	97110, 97118, 97128	96005/96033
135 @ 1.750	285 @ 1.250	300	.625	1.125	97216	97118, 97128	96005
145 @ 1.750	315 @ 1.150	283	.665	1.025	97216	97118, 97128	96005/96035
145 @ 1.880	325 @ 1.250	286	.670	1.150	97216	97118, 97128	96005
120 @ 1.875	425 @ 1.110	399	.735	1.080	97216	97110, 97118, 97128	96005/96024
110 @ 1.880	350 @ 1.330	436	.550	1.270	97216	97118, 97128	96015/96033
145 @ 1.900	360 @ 1.300	360	.700	1.150	97220	97110, 97118, 97128	96015/96033
145 @ 1.880	350 @ 1.250	325	.700	1.030	97220	97110, 97118, 97130	--
140 @ 1.940	425 @ 1.250	413	.730	1.150	97220	97118, 97130	96015/96035

Closed Pressure	Open Pressure	Rate	Max Lift	Coil Bind	Titanium Retainer	Steel Retainer	Seat Cup/Locator
115 @ 1.700	300 @ 1.250	411	.500	1.160	97214	97112, 97132	--
140 @ 1.750	410 @ 1.200	540	.550	1.115	97220	97112, 97113, 97132	--
145 @ 1.800	511 @ 1.200	610	.550	1.115	97214	97112, 97113, 97132	96022
125 @ 1.750	340 @ 1.250	425	.550	1.150	97214	97112, 97132	--
120 @ 1.800	350 @ 1.200	430	.640	1.100	97214	97112, 97132	--
125 @ 1.800	375 @ 1.200	415	.600	1.150	97214	97112, 97132	--
150 @ 1.950	455 @ 1.250	436	.700	1.190	97220	97118, 97128	96015/96035
135 @ 1.680	390 @ 1.190	455	.575	1.055	97216	97118, 97128	96015/96024
122 @ 1.650	353 @ 1.100	425	.690	.950	97216	97110, 97118, 97128	96005/96033
135 @ 1.750	285 @ 1.250	300	.625	1.125	97216	97118, 97128	96005
145 @ 1.750	315 @ 1.150	283	.665	1.025	97216	97118, 97128	96005/96035
145 @ 1.880	325 @ 1.250	286	.670	1.150	97216	97118, 97128	96005
150 @ 1.800	425 @ 1.110	399	.665	1.080	97216	97110, 97118, 97128	96005
120 @ 1.875	425 @ 1.110	399	.735	1.080	97216	97118, 97128	96005
115 @ 1.800	310 @ 1.250	355	.590	1.150	97216	97110, 97118, 97128	96005
110 @ 1.880	350 @ 1.330	436	.550	1.270	97216	97118, 97128	96015/96033
100 @ 1.880	275 @ 1.380	350	.520	1.300	97216	97110, 97118, 97128	96015/96033
130 @ 1.875	330 @ 1.300	348	.670	1.150	97216	97118, 97128	96015/96024
145 @ 1.900	360 @ 1.300	360	.700	1.150	97220	97110, 97118, 97128	96015/96033
145 @ 1.880	350 @ 1.250	325	.700	1.030	97220	97110, 97118, 97130	--
140 @ 1.940	425 @ 1.250	413	.730	1.150	97220	97118, 97130	96015/96035

ELECTRO POLISHED PERFORMANCE VALVE SPRINGS



98215

Manufactured of aircraft-grade chrome silicone, with advanced heat-treating. Outers then receive an advanced electro polished finish and stress relieved. This enhanced finish increases valve spring life and fatigue resistance, for lap after lap consistency. Designed for racing hydraulic and mechanical flat tappet as well as performance hydraulic roller camshafts. Sets of 16.

Spring Set	Spring, Retainer and Lock Set	Style	Outer O.D.	Outer I.D.	Inner O.D.	Inner I.D.	Damper
98215	98215-K12	Single with Damper	1.265	.875	NA	NA	Y
98114	98114-K12	Beehive	1.280/1.035	.900/.650	NA	NA	N
98415	NA	Single with Damper	1.437	1.080	NA	NA	Y
98433	NA	Dual with Damper	1.437	1.080	1.000	.760	Y
98447	NA	Dual	1.437	1.080	1.080	.810	N
98656	98656-K11,12,31,32	Dual with Damper	1.514	1.125	.937	.697	Y
98513	NA	Dual	1.514	1.135	1.135	.795	N
98612	98612-K11,31	Single with Damper	1.550	1.125	NA	NA	Y
98652	98652-K12	Dual with Damper	1.539	1.125	1.000	.760	Y

K11 = 11/32", 7° (single groove), K12 = 11/32", 10° (single groove), K31 = 3/8", 7° (single groove), K32 = 3/8", 10° (single groove)

MAX EFFORT™ MECHANICAL ROLLER VALVE SPRINGS



98541

Howards™ Cams competition racing valve springs are CNC coiled and heat-treated in the finest facilities available. Using only the highest quality valve spring wire, all Howards™ valve springs are stress relieved, ground and shot-peened to offer our customers some of the very best valve springs on the market. Whether you're running a flat tappet or roller cam in your drag race, circle track, road course, performance marine or other extreme race application, Howards™ offers the perfect valve spring to suit your needs. Sets of 16.

Spring Set	Spring, Retainer and Lock Set	Style	Outer O.D.	Outer I.D.	Inner O.D.	Inner I.D.	Damper
98441	NA	Dual	1.437	1.080	1.080	.796	N
98431	NA	Dual with Damper	1.437	1.080	1.015	.731	Y
98541	NA	Dual	1.500	1.116	1.116	.800	N
98634	NA	Dual with Damper	1.540	1.143	1.000	.750	Y
98633	NA	Dual with Damper	1.557	1.143	1.015	.731	Y
98630	NA	Dual with Damper	1.539	1.125	1.015	.731	Y
98635	NA	Dual with Damper	1.557	1.143	1.033	.749	Y
98732	NA	Dual with Damper	1.625	1.185	1.065	.765	Y

ELECTRO POLISHED MAX EFFORT™ MECHANICAL ROLLER VALVE SPRINGS



98650

Manufactured of aircraft-grade chrome silicone, with advanced heat-treating. Outers then receive an advanced electro polished finish and stress relieved. This enhanced finish increases valve spring life and fatigue resistance, for lap after lap consistency. Designed for mechanical applications. Sets of 16.

Spring Set	Spring, Retainer and Lock Set	Style	Outer O.D.	Outer I.D.	Inner O.D.	Inner I.D.	Damper
98650	NA	Dual with Damper	1.539	1.125	1.015	.731	Y
98655	NA	Dual with Damper	1.557	1.143	1.033	.749	Y

Closed Pressure	Open Pressure	Rate	Max Lift	Coil Bind	Titanium Retainer	Steel Retainer	Seat Cup/Locator
120 @ 1.800	350 @ 1.200	430	.640	1.100	97214	97112, 97132	--
108 @ 1.800	329 @ 1.265	412	.600	1.150	--	97161	--
110 @ 1.750	270 @ 1.100	246	.640	1.050	97216	97118, 97128	96005/96035
135 @ 1.750	285 @ 1.250	300	.625	1.125	97216	97118, 97128	96005
145 @ 1.750	315 @ 1.150	283	.665	1.025	97216	97118, 97128	96005
130 @ 1.875	330 @ 1.300	348	.670	1.150	97216	97118, 97128	96015
145 @ 1.900	360 @ 1.300	360	.700	1.150	97220	97110, 97118, 97128	96015/96033
145 @ 1.880	350 @ 1.250	325	.670	1.150	97220	97110, 97130	--
140 @ 1.940	425 @ 1.250	413	.730	1.150	97220	97118, 97130	96015/96035

Closed Pressure	Open Pressure	Rate	Max Lift	Coil Bind	Titanium Retainer	Steel Retainer	Seat Cup/Locator
175 @ 1.750	400 @ 1.150	375	.625	1.050	97220	97128	96005/96033
185 @ 1.750	365 @ 1.250	335	.590	1.100	97220	97128	96005/96031
180 @ 1.800	465 @ 1.250	475	.700	1.040	97220	97118, 97128	96015/96033
175 @ 1.950	440 @ 1.250	380	.740	1.150	97220	97118, 97128	96010/96031
224 @ 1.900	540 @ 1.250	486	.690	1.150	97220	97118, 97128	96010/96031
194 @ 1.920	505 @ 1.200	430	.720	1.150	97220	97118, 97128	96015/96031
225 @ 1.950	555 @ 1.250	471	.740	1.150	97220	97118, 97128	96010/96031
205 @ 1.900	650 @ 1.200	635	.740	1.100	97222	97130	96020/96040

Closed Pressure	Open Pressure	Rate	Max Lift	Coil Bind	Titanium Retainer	Steel Retainer	Seat Cup/Locator
194 @ 1.920	505 @ 1.200	430	.720	1.150	97220	97118, 97128	96015/96031
225 @ 1.950	555 @ 1.250	471	.740	1.150	97220	97130	96010/96031

PRO-ALLOY MECHANICAL ROLLER VALVE SPRINGS



98738-A

Howards Cams™ Pro-Alloy material is specially developed low stress, high endurance material. Howards Cams research and development staff spent many years of development, experience and testing to create a spring you can count on. Low fatigue rate compared to most roller springs on the market. Cycle tested to 12 million cycles with no breakage. Each spring is coiled using the most advance CNC winders in the industry. Each spring is then parallel ground, stress relieved and deburred. They are then shot-peened and heat-treated to our own very specific standards. These high standards are what it takes for a longer spring life, even in rough racing environment. Sets of 16.

Spring Set	Spring, Retainer and Lock Set	Style	Outer O.D.	Outer I.D.	Middle O.D.	Middle I.D.	Inner O.D.	Inner I.D.	Damper
98643	NA	Dual	1.550	1.126			1.126	.815	N
98885	NA	Dual	1.575	1.150			1.145	.740	N
98737	NA	Dual with Damper	1.625	1.174			1.060	.770	Y
98738-A	NA	Dual	1.640	1.210			.875	.860	N
98048	NA	Triple	1.660	1.210	1.205	.885	.855	.635	N
98049	NA	Triple	1.660	1.215	1.190	.875	.875	.635	N

ELECTRO POLISHED PRO-ALLOY MECHANICAL ROLLER VALVE SPRINGS



98637

We took our state-of-the-art Pro-Alloy roller valve springs one step further. Each of these springs are electro polished, which enhances the material even further. By reducing localized stress areas, these springs offer even greater life expectancy. Each spring is coiled using the most advance CNC winders in the industry. Each spring is then parallel ground, stress relieved and deburred. They are then shot-peened and heat-treated to our own very specific standards. These high standards are what it takes for a longer spring life, even in rough racing environments. Unconditionally Guaranteed against breakage for one year! Just return the broken spring and we'll replace it, no questions asked. Sets of 16.

Spring Set	Spring, Retainer and Lock Set	Style	Outer O.D.	Outer I.D.	Middle O.D.	Middle I.D.	Inner O.D.	Inner I.D.	Damper
98644	NA	Dual	1.550	1.126			1.126	.815	N
98637	NA	Dual with Damper	1.540	1.115			1.025	.730	Y
98745	NA	Dual with Damper	1.625	1.174			1.060	.770	Y
98739	NA	Dual	1.640	1.210			.875	.860	N
98853	NA	Triple	1.750	1.225	1.205	.900	.890	.649	N

Closed Pressure	Open Pressure	Rate	Max Lift	Coil Bind	Titanium Retainer	Steel Retainer	Seat Cup/Locator
230 @ 1.880	550 @ 1.250	508	.750	1.080	97220	97118, 97128	96015/96034
245 @ 2.000	600 @ 1.300	485	.740	1.200	97220	--	96010/96031
240 @ 2.000	685 @ 1.250	593	.800	1.150	97222	97130	96020/96035
250 @ 2.000	800 @ 1.150	645	.880	1.070	97222	97130	96020/96034
350 @ 2.100	1020 @ 1.200	745	.895	1.145	97224	--	--
350 @ 2.200	1075 @ 1.200	725	.995	1.145	97224	--	--

Closed Pressure	Open Pressure	Rate	Max Lift	Coil Bind	Titanium Retainer	Steel Retainer	Seat Cup/Locator
230 @ 1.880	550 @ 1.250	508	.750	1.080	97220	--	96015/96034
205 @ 1.950	575 @ 1.230	510	.700	1.190	97220	--	96015/96031
240 @ 2.000	685 @ 1.250	593	.800	1.150	97222	--	96020/96040
250 @ 2.000	800 @ 1.150	645	.880	1.070	97222	--	96020/96034
370 @ 2.250	1110 @ 1.200	705	1.000	1.150	--	--	--

VALVE SPRINGS

PACALOY™ MECHANICAL ROLLER VALVE SPRINGS



Pacaloy™ is steel that offers outstanding cleanliness, extreme tensile strength, zero wear, and light weight designs. The Howards/PAC engineering team designs and maintains the manufacturing process for professional racers who see extreme amounts of wear in severe racing applications. Consistent run after run, lap after lap. Specifically designed to last under the toughest racing environments, including Drag Race, Oval Track and Endurance applications. Fully tested to rev higher, live longer and run harder. Sets of 16.

Spring Set	Spring, Retainer and Lock Set	Style	Outer O.D.	Outer I.D.	Middle O.D.	Middle I.D.	Inner O.D.	Inner I.D.	Damper
98543	NA	"Pacaloy" Dual	1.550	1.136				.812	N
98825	NA	"Pacaloy" Dual	1.550	1.100				.788	N
98844	NA	"Pacaloy" Dual	1.570	1.120				.780	N
98826	NA	"Pacaloy" Dual	1.570	1.120				.706	N
98824	NA	"Pacaloy" Dual	1.625	1.175				.851	N
98828	NA	"Pacaloy" Dual	1.625	1.175				.851	N
98846	NA	"Pacaloy" Triple	1.645	1.195		.871		.635	N
98847	NA	"Pacaloy" Triple	1.645	1.195		.871		.635	N
98848	NA	"Pacaloy" Triple	1.645	1.195		.871		.635	N

PACALOY™ WITH SPECIAL PROCESSING VALVE SPRINGS



When only the best will do. These Pacaloy™ springs are enhanced with a special Nano-Peen™ spring technology for durability and exotic heat treatment for minimal load loss. These are the favorites of many pro-sportsman and professionals racers. For round after round, race after race consistency, these are the springs pro builders rely on. The ultimate severe application valve spring. Sets of 16.

Spring Set	Spring, Retainer and Lock Set	Style	Outer O.D.	Outer I.D.	Middle O.D.	Middle I.D.	Inner O.D.	Inner I.D.	Damper
98840	NA	"Pacaloy" Dual	1.500	1.085				.790	N
98886	NA	"Pacaloy" Dual	1.500	1.050				.726	N
98857	NA	"Pacaloy" Dual	1.500	1.050				.726	N
98843	NA	"Pacaloy" Dual	1.550	1.136				.812	N
98815	NA	"Pacaloy" Dual	1.550	1.100				.780	N
98816	NA	"Pacaloy" Dual	1.550	1.100				.706	N
98884	NA	"Pacaloy" Dual	1.564	1.150				.744	N
98875	NA	"Pacaloy" Dual	1.574	1.150				.744	Y
98897	NA	"Pacaloy" Dual	1.625	1.175				.851	N
98893	NA	"Pacaloy" Triple	1.681	1.195		.871		.635	N
98894	NA	"Pacaloy" Triple	1.681	1.195		.871		.635	N
98866	NA	"Pacaloy" Triple	1.710	1.210		.871		.635	N

Closed Pressure	Open Pressure	Rate	Max Lift	Coil Bind	Titanium Retainer	Steel Retainer	Seat Cup/Locator
240 @ 1.900	625 @ 1.200	550	.700	1.100	97220	97130	96015/96034
250 @ 2.000	765 @ 1.200	644	.800	1.150	97220	97128	96015/96031
190 @ 1.950	710 @ 1.250	743	.800	1.035	97220	97130	96020
275 @ 2.000	805 @ 1.200	663	.800	1.150	97220	97130	96020
275 @ 2.000	810 @ 1.150	629	.850	1.100	97222	--	96020/96040
280 @ 2.100	847 @ 1.150	629	.900	1.100	97222	--	96020/96040
250 @ 2.050	800 @ 1.250	689	.800	1.130	97224	--	96020
304 @ 2.050	845 @ 1.250	682	.800	1.130	97224	--	96020
330 @ 2.100	950 @ 1.200	687	.900	1.130	97224	--	96020

Closed Pressure	Open Pressure	Rate	Max Lift	Coil Bind	Titanium Retainer	Steel Retainer	Seat Cup/Locator
250 @ 2.030	614 @ 1.250	467	.780	1.180	97216	97128	96033
300 @ 2.100	1002 @ 1.200	780	.900	1.130	97216	--	96030
375 @ 2.150	1116 @ 1.200	780	.950	1.130	97216	--	96030
240 @ 1.900	625 @ 1.200	550	.700	1.100	97220	97130	96015/96034
250 @ 2.000	765 @ 1.200	644	.800	1.150	97220	97128	96015
275 @ 2.000	805 @ 1.200	662	.800	1.150	97220	97128	96015
250 @ 2.000	670 @ 1.200	525	.800	1.140	97220	97130	96010/96031
265 @ 2.000	705 @ 1.200	550	.800	1.150	97220	97130	96031
275 @ 2.000	810 @ 1.150	629	.850	1.100	97222	--	96020
500 @ 2.200	1256 @ 1.300	840	.900	1.100	97224	--	--
525 @ 2.300	1365 @ 1.300	840	1.100	1.100	97224	--	--
380 @ 2.550	1545 @ 1.250	896	1.350	1.140	97224	--	--

PRO-SERIES H-11 TOOL STEEL VALVE SPRINGS

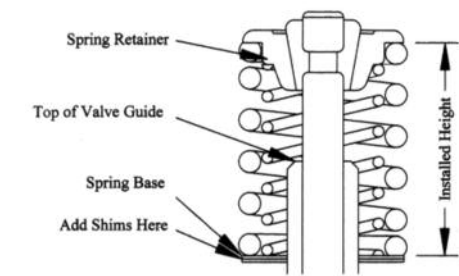


Pro-Series H-11 springs are designed for the serious racer. Manufactured with the latest in laser technology. Each spring is manufactured using the most advance CNC winders in the industry. Each spring is parallel ground, stress relieved and deburred. They are then shot-peened and heat-treated to very specific standards. Inspected and batched to zero tolerance for the ultimate precision valve spring. This is the next generation tool steel spring! Sets of 16.

Spring Set	Spring, Retainer and Lock Set	Style	Outer O.D.	Outer I.D.	Middle O.D.	Middle I.D.	Inner O.D.	Inner I.D.	Damper
98751	NA	Triple	1.625	1.190	1.185	.890	.880	.670	N

Valve Spring Tech Info

Installation Chart



To avoid coil binding of valve spring, measure your installed height (see chart). Subtract the valve lift. Subtract an additional .060” safety factor. This is measurement A. Install a retainer on your spring. Slowly compress spring until it coil binds. Measure the distance from under outer lip of retainer to bottom of valve spring. This is measurement B. Measurement A must not be less than measurement B.

Note: Valve spring life is greatly affected by many factors. Most problems are heat or coil bind related. If you use oil restrictors your spring life can be decreased by approximately 40%.

Coil bind is a critical factor. Break in new springs by running at low RPM’s until warm and then letting them cool back down before hard running. Any questions, call our tech line.

Valve Spring Run-In

Each set of Howards™ valve springs are hand-selected to keep load variations below +/- 10% of the next. However, it is important to “run-in” your new valve springs at low RPM using the following procedure:

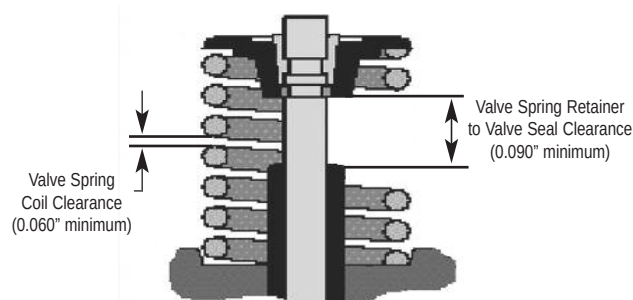
- 1. Start the engine and run the engine between 1500 and 2000 RPM until the engine reaches operating temperature.
- 2. Shut off the engine and allow the springs to cool.
- 3. After initial run-in, most springs will lose a slight amount of pressure. Re-check and shim up the valve springs if necessary. After the springs are “run-in”, spring pressure should remain constant until the point of replacement.

Closed Pressure	Open Pressure	Rate	Max Lift	Coil Bind	Titanium Retainer	Steel Retainer	Seat Cup/Locator
250 @ 2.000	680 @ 1.250	570	.850	1.100	97226	--	96020

Valve Spring Coil Clearance

Coil clearance is the distance between the valve spring coils when the valve is at maximum lift (fully open). A minimum of 0.060" must exist between the coils at maximum lift. Coil bind is when the valve spring is compressed fully-to the point that all the coils are "stacked up" on top of each other. .100" is recommended for high RPM applications. Coil bind is a catastrophic condition that will result in valve train failure. Disassemble each spring (if multiple springs are employed at each valve). Check all

the springs (both inner and outer springs). If there is not 0.060"-0.100" minimum clearance between the coils, the solutions are: the valve retainer, the valve locks, the valve, or the spring must be changed; the spring pocket must be machined. Keep in mind that these modifications will change the valve spring installed height.



VALVE SPRING RETAINERS

CHROME MOLY STEEL RETAINERS

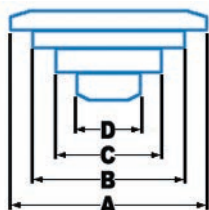
Specifically designed for superior strength and durability. 10° design to eliminate lock pull through. A must for high spring pressure applications. Machined from premium 4140 chrome moly bar stock. Heat-treated and black oxide finish. Sets of 16.

	Lock Angle	Valve Stem	Valve Spring	Dia. A	Dia. B	Dia. C
97161	7°	8mm	1.035-1.095" Beehive	1.040"	.610"	
97162	7°	8mm	1.290" Dual	1.155"	.950"	.675"
97112	7°	11/32"	1.240-1.265" Single/Dual	1.125"	.850"	.645"
97113	7°	11/32"	1.260-1.320" Single/Dual	1.200"	.850"	.600"
97110	7°	3/8"	1.437-1.525" Single/Dual	1.370"	1.065"	.685"
97118	7°	11/32"	1.437-1.540" Single/Dual	1.440"	1.050"	.700"
97173	Mini 8°	All	1.374" (98374)	1.360"	.985"	.690"
97174	10°	All	1.035-1.095" Beehive	1.050"	.640"	
97132	10°	All	1.240-1.265" Single	1.125"	.875"	.740"
97175	10°	All	1.374" (98374)	1.325"	.990"	.700"
97128	10°	All	1.437-1.550" Single/Dual	1.440"	1.070"	.700"
97126	10°	All	1.437-1.550" -.050" Install Hgt.	1.435"	1.070"	.700"
97130	10°	All	1.450-1.580" Single/Dual	1.500"	1.120"	.705"



AMERICAN MADE TITANIUM RETAINERS

The ultimate in lightweight and strength. When you upgrade from steel to titanium valve spring retainers you gain speed and power, because titanium retainers are lighter and stronger than steel. Manufactured to precise tolerances of special 6AL 4V titanium for maximum strength and durability. Up to 50% lighter than steel retainers. Lighter means less chance of valve float. Sets of 16.

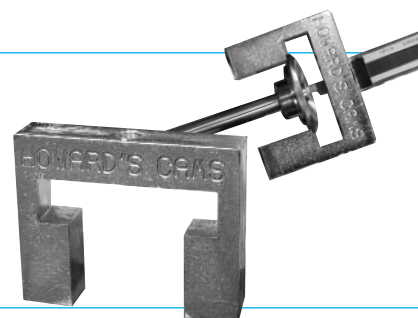


	Lock Angle	Valve Stem	Valve Spring	Dia. A	Dia. B	Dia. C	Dia. D
97165	Super 7	All	1.290" Dual	1.235"	.915"	.660"	
97214	7°	11/32"	1.235-1.290" Single	1.225"	.870"	.650"	
97212	10°	All	1.235-1.290" Single	1.225"	.870"	.650"	
97216	10°	All	1.437-1.550" Single/Dual	1.440"	1.050"	.700"	
97220	10°	All	1.500-1.580" Single/Dual	1.500"	1.105"	.710"	
97222	10°	All	1.500-1.650" Dual	1.500"	1.175"	.765"	
97224	10°	All	1.500-1.660" Triple	1.500"	1.185"	.860"	.620"
97225	10°	All	1.500-1.660" Triple	1.500"	1.135"	.840"	.635"
97226	10°	All	1.500-1.660" Triple	1.500"	1.185"	.768"	.640"

RETAINER HEIGHT TOOLS

Measures exact differences in retainers and locks for your combinations. Detect differences in same part numbers or different combinations, for your exact valve spring installed height. Simple to use with most calipers (not included).

- 92010 Height Tool, fits 1.250-1.360" Retainers
- 92020 Height Tool, fits 1.400-1.760" Retainers





7° HEAT-TREATED VALVE LOCKS

Stamped from alloy steel and heat-treated for superior wear resistance. Out performs O.E. style keepers. Sets of 32 (16 pair).

- 93001 8mm" Valve Stems, Bead Lock, GM LS, Black Oxide
- 93020 5/16" Valve Stems, Single Groove
- 93040 11/32" Valve Stems, Single Groove, Black Oxided
- 93045 3/8" Valve Stems, Single Groove, Black Oxided
- 93065 3/8" Valve Stems, Chrysler BB 2 & 4 Groove
- 93066 3/8" Valve Stems, Chrysler SB 4 Groove
- 93060 11/32" Valve Stems, Ford 4 Groove



MACHINED STEEL VALVE LOCKS

Precision machined from super-tough, fatigue resistant steel alloy material. Sets of 32 (16 pair).

7° Machined Steel

- 93072 11/32" Valve Stems, Single Groove

Mini 8 Machined Steel

- 93155 11/32" Valve Stems, Single Groove

10° Machined Steel

- 93092 8mm Valve Stems, Single Groove
- 93070 5/16" Valve Stems, Single Groove
- 93075 11/32" Valve Stems, Single Groove, w/Lash Cap Recess
- 93085 11/32" Valve Stems, Single Groove, No Recess, +.050" Hght.
- 93080 3/8" Valve Stems, Single Groove, w/Lash Cap Recess
- 93090 3/8" Valve Stems, Single Groove, No Recess, +.050" Hght.
- 93100 3/8" Valve Stems, Single Groove, Chrysler 2 Groove

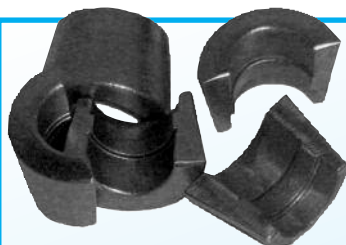


FORGED STEEL 7° VALVE LOCKS

THE FACTS! The strongest 7° valve lock on the market! Cold forged alloy steel, stronger and more accurate than machined steel locks. The only "true" +.050" 7 degree lock on the market today. At almost 1/2 the cost they obsolete machined locks. Sets of 32 (16 pair). *American Made!*



- 93005 11/32" Valve Stems, Single Groove, Std. Height
- 93015 3/8" Valve Stems, Single Groove, +.050 Hght.
- 93010 11/32" Valve Stems, Single Groove, +.050 Hght.



FORGED STEEL 10° VALVE LOCKS

The ULTIMATE 10° Valve Locks!

Forged in Milwaukee from Charter Wire™ material. These forgings are stronger, more precise than machined steel locks. They offer longer life, even under high pressure race environment. Because of being a true forged lock, install heights are accurate! Stronger ... More Consistent ... Longer Life... Why buy any other? Sets of 32 (16 pair). *American Made!*

- 93017 11/32" Valve Stems, Single Groove, +.035" Hgt
- 93018 3/8" Valve Stems, Single Groove, Std. Height
- 93017-100 Pack 100 pr., 11/32" Valve Stems, +.035" Hgt
- 93018-100 Pack 100 pr., 3/8" Valve Stems, Std. Hgt

VALVE SPRING CUPS

Howards™ valve spring cups are made from specially hardened chrome moly steel and finished in a rich black oxide for maximum durability. Spring cups will prevent unwanted valve spring movement and galling of the cylinder heads. Machining may be required. .060" thick. Sold in sets of 16.

	Max Spring O.D.	Cup O.D.	Cup I.D.	Wall Shoulder Height	Use Cutter Part Number
96005	1.475"	1.570"	.640"	.150"	92075
96010	1.565"	1.670"	.640"	.150"	92075
96015	1.550"	1.680"	.577"	.150"	92075
96020	1.650"	1.780"	.640"	.150"	NA



VALVE SPRING LOCATORS

Spring locators are similar to spring cups, but have the locating shoulder moved from the outside of the spring to the inside. This style requires less head machining than standard cups. Accurate and durable, .060" thick (except 96023 & 96029 .040"). Sold in sets of 16.

	Max Spring O.D.	Locator O.D.	Locator I.D.	Wall Shoulder Height	Shoulder Diameter	Use Cutter Part Number
96023	1.290"	1.270"	.505"	.145"	.675"	NA
96022	1.290"	1.270"	.520"	.130"	.680"	NA
96021	1.290"	1.270"	.570"	.130"	.875"	NA
96026	1.290"	1.285"	.810"	.130"	.875"	NA
96029	1.470"	1.450"	.570"	.130"	.700"	NA
96024	1.550"	1.550"	.570"	.140"	.715"	92070
96025	1.550"	1.540"	.640"	.180"	.720"	92070
96030	1.550"	1.535"	.570"	.140"	.720"	92070
96031	1.550"	1.550"	.570"	.140"	.730"	92070
96033	1.550"	1.550"	.570"	.140"	.790"	92070
96034	1.550"	1.550"	.570"	.140"	.810"	92070
96035	1.625"	1.625"	.620"	.175"	.760"	92075
96040	1.625"	1.625"	.570"	.175"	.765"	92075



EXHAUST ROTATOR ELIMINATORS

These .300" thick spacers are used to make up the difference when doing away with factory big block Chevy exhaust rotators. No more having to stack shims to take up the difference. These exhaust rotator eliminators also provide a step for the valve spring so it cannot walk around on the cylinder head. For springs up to 1.565" dia. Set of 8.

96045 Rotator Eliminator, Exhaust, Big Block Chevrolet

SPRING HEIGHT MICROMETER

The easiest way to measure valve spring installed height is with a height micrometer. This tool is used between the cylinder head spring seat and valve spring retainer. The tool is adjusted until all components are fully seated. The tool is read just like a micrometer and will provide accurate measurements every time it is used.

92155 Measures from 1.400" - 1.900"
92156 Measures from 1.600" - 2.100"

92157 Measures from 1.600" - 2.100" Beehive





VALVE SPRING SHIMS

Critical when setting up proper valve spring height and pressures. High quality heat-treated valve spring shims are designed to handle the immense pressures of today's racing valve springs. Must specify thickness. Available in .015", .030" and .060". Sets of 16.



96302-50	1.250" x .570" x .050"
96205-15	1.250" x .812" x .015"
96205-30	1.250" x .812" x .030"
96205-60	1.250" x .812" x .060"
96205-KIT	16 each, .015", .030" & .060"
96210-15	1.250" x .875" x .015"
96210-30	1.250" x .875" x .030"
96210-60	1.250" x .875" x .060"
96210-KIT	16 each, .015", .030" & .060"
96215-15	1.437" x .645" x .015"
96215-30	1.437" x .645" x .030"
96215-60	1.437" x .645" x .060"
96215-KIT	16 each, .015", .030" & .060"

96220-15	1.437" x .765" x .015"
96220-30	1.437" x .765" x .030"
96220-60	1.437" x .765" x .060"
96220-KIT	16 each, .015", .030" & .060"
96225-15	1.480" x .703" x .015"
96225-30	1.480" x .703" x .030"
96225-60	1.480" x .703" x .060"
96235-15	1.480" x .765" x .015"
96230-15	1.500" x 1.031" x .015"
96230-30	1.500" x 1.031" x .030"
96230-60	1.500" x 1.031" x .060"
96230-KIT	16 each, .015", .030" & .060"
96240-15	1.640" x .635" x .015"
96240-30	1.640" x .635" x .030"
96240-60	1.640" x .635" x .060"



VALVE SPRING SEAT CUTTERS

These America made tools from Howards™ will allow the engine builder to modify the cylinder heads to fit the desired valve springs to suit their application. Designed to enlarge the spring pocket for oversized valve springs. Valve guide arbor not included.

92065	1.440" Dia.
92070	1.550" Dia.

92075	1.680" Dia.
92080	1.740" Dia.

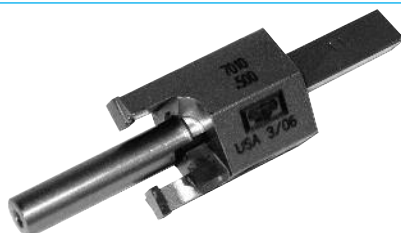
VALVE GUIDE ARBORS FOR VALVE SPRING SEAT CUTTERS

These America made tools from Howards™ will allow the engine builder to modify the cylinder heads to fit the desired valve springs to suit their application. Designed to enlarge the spring pocket for oversized valve springs.

92085	5/16"
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92090	11/32"
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92095	3/8"
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VALVE GUIDE CUTTERS

Designed to cut the valve guide to be used with Teflon, Viton or metal body type seals. Useable with hand tools. These American made tools allow you to do this machine work yourself. Includes cutter and valve guide arbor.

92035	11/32" x .500"
92040	11/32" x .531"

92045	3/8" x .531"
92049	.531" (Cutter Only, Requires Arbor)



"THE CAM TUBE"

- The most protective cam package available
- Great for storage and shipping
- Greatly improves cam survival if dropped
- High impact injected molded plastic

CAM TUBE Cam Tube (Max Journal Size 2.125"), Yellow or Grey



BRONZE DISTRIBUTOR GEARS

Our distributor gears are manufactured in the United States from a premium bronze alloy material machined to exacting tolerances. These gears feature a high-strength tooth design that resists wear even when used with high pressure oil pumps. A must with billet roller cams.

94400	Chev V8, 90° V6 for .491 Shaft (std./Mallory)	94435	Ford 351C/M/400 for .500 Shaft
94405	Chev V8, 90° V6 for .500 (MSD/etc.)	94440	Ford 351C/M/400 for .531 Shaft
94415	Chrysler SB 273-360, 5.2/5.9L for .484 Shaft	94450	Ford FE 332-428 for .467 Shaft
94420	Chrysler BB 350-440 for .484 Shaft	94435	Ford FE 332-428 for .500 Shaft
94420	Chrysler 426 Hemi/KB for .484 Shaft	94435	Ford 429-460 for .500 Shaft
94430	Ford 221-302/351W, 5.0L for .467 Shaft	94440	Ford 429-460 for .531 Shaft
94425	Ford 221-302/351W, 5.0L for .500 Shaft	94455	Oldsmobile V8 for .491 Shaft
94445	Ford 221-302/351W, 5.0L for .531 Shaft	94460	Pontiac V8 for .489 Shaft

COMPOSITE DISTRIBUTOR GEARS

Make bronze distributor gear wear a thing of the past! NASCAR-proven technology yields precise timing and extended durability. Precision manufactured carbon ultra fiber material. 300% more durability versus bronze distributor gears when used with steel camshafts. Can be used with cast or billet cams.

94402	Chev V8, 90° V6 for .491 Shaft (std.)	94427	Ford 221-302/351W, 5.0L for .531 Shaft
94407	Chev V8, 90° V6 for .500 (MSD/etc.)		



LIGHTWEIGHT FUEL PUMP PUSHRODS

Premium grade aerospace chrome moly material. Centerless ground after heat-treating. Hollow for light weight and fast response. Rated 170,000 psi tensile strength.

<i>Chev SB/BB (5.750" o.a.l.)</i>		<i>Chrysler BB/Hemi (3.220" o.a.l.)</i>	
92150	Steel Tip for Cast Cams	92152	Steel Tip for Cast Cams
92151	Bronze Tip for Billet Steel Cams	92153	Bronze Tip for Billet Steel Cams
<i>Chev BB Midwest Racing Block (6.000" o.a.l.)</i>			
92154	Bronze Tip for Billet Steel Cams		

ULTRA LITE BILLET COMPOSITE FUEL PUMP PUSHRODS

Designed for NASCAR, a necessity for any serious racer using a mechanical fuel pump. Proprietary blended carbon reinforced bearing grade polymer. Ultra light weight, only 0.9 ounces (27 grams) to eliminate fuel pump cavitation. Gentle on the cam lobe. Can be used with cast or billet cams. Self lubricating. Super strong. Super long life.

94475	Chev V8, All Application (Cast or Billet), 27 Grams
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HRC EXTREME BILLET MAIN CAPS

Precision CNC machined from superior quality low carbon 1020 billet material. Available as stock replacement (straight bolt) or with splayed outer bolt holes. The splayed caps feature 10 degree angled outer holes to positively reinforce and tie the block together. Main cap set consists of the center 3 caps. Front and rear caps are also available. Use together for ultimate in bottom end stress and flex management. Drill bushings included with caps requiring them. Side notches for easy removal. Proudly 100% manufactured in the U.S.A. Line boring required after installation.

Chev 350 Main (2.450" Journal)

H350R	4-Bolt Replacement, 3 pcs.
H350C	Converts 2-Bolt to 4-Bolt, 3 pcs.
H350S	Converts 2-Bolt to 4-Bolt, Splayed Outer Bolts, 3 pcs.
H350E	Flat Bottom, Splayed Outer Bolts, 3 pcs.
H350F	Front Cap (2-Bolt), 1 pc.
H350RDS	Rear Cap, Dry-Sump (2-Bolt), 1 pc.
H350RWS	Rear Cap, Wet-Sump (2-Bolt), 1 pc.

Chev 400 Main (2.650" Journal)

H400	Converts 2-Bolt to 4-Bolt, Splayed Outer Bolts, 3 pcs.
H400F	Front Cap (2-Bolt), 1 pc.
H400RWS	Rear Cap, Wet-Sump (2-Bolt), 1 pc.

Chev Gen III (LS-Series)

H57L	4-Bolt with 2-Bolt Cross Replacement, 5 pcs.
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Chev 454 Main (2.750" Journal)

H454	Converts 2-Bolt to 4-Bolt, 3 pcs.
H454RWS	Rear Cap, Wet-Sump (4-Bolt), 1 pc.

MAIN CAP SUPPORT STRAPS

Designed to support the front and rear OE style main caps for higher horsepower applications. The best thing to use next to billet replacement caps (see above). Milling top of the caps is necessary, but line bore is usually not affected.



H350FS	Front main cap strap, Chev. 350
H400FS	Front main cap strap, Chev. 400
H350RSDS	Rear main cap strap, dry sump, Chev. 350, 2-pc Seal
H350RWS	Rear main cap strap, wet sump, Chev. 350, 2-pc Seal



SUGGESTED MAIN CAP FASTENERS

Using Howards Billet Main caps will strengthen your block extremely. However, good quality fasteners must be used for full effect. We highly recommend the use of high quality bolt or stud kits with a rating of 180,000psi or higher. ARP's Pro Series fasteners (200,000psi) are a good match with our main cap kits. The following recommended part numbers are for use as a guide only. Certain applications may require different lengths, check with the manufacturer if you are not certain.

H350R or H350C Main Caps

Bolt Kits

134-5202	Hex Head (180,000)
234-5201	..12 pt. Pro Series (200,000)

Stud Kits (200,000psi)

134-5601	Hex Head w/o windage tray
234-5601	Hex Head w/windage tray

H350S Main Caps

Stud Kits (200,000psi)

234-5602	..Hex Head w/splayed bolts
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H400 Main Caps

Stud Kits (200,000psi)

234-5605	Hex Head w/windage tray
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Main Cap Support Straps

(w/HRC billet or OE center 3 straps)

Bolt Kits

234-5203	..12 pt. Pro Series (200,000)
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Stud Kits (200,000psi)

234-5603	..Hex Head w/straight bolt caps
234-5604	..Hex Head w/splayed caps



ProMAX™ 2618 RACE PISTONS



The forging design produces a stronger piston for the ultimate in performance. All Howards HRC Racing Pistons are forged from 2618 billet bar stock and then heat treated and aged to a T61 condition (2618-T61). This material has less than 1% silicon particulate content. High silicon content pistons (forged from 4032 or MS75) will not stand up to the most extreme stress placed on many racing pistons. Simply stated, adding sand to the aluminum only makes it more brittle. Another advantage of 2618-T61 over the high silicon pistons is the ability to keep its shape under extreme pressure and high RPM's. "Skirt Shrinking" is not a problem with Howards HRC Racing Pistons. All HRC pistons are machined on the most modern CNC equipment in the industry. The design of the CNC turned skirts allows these pistons to work properly under intense heat and severe side loads without scuffing or splitting the cylinder walls. Dome pistons are designed with radiused domes, eliminating sharp edges and "hot spots". The valve pockets are built to handle large cam profiles and oversized valves. Forced pin oilers, accumulator grooves and lock removal indents are standard. Sets include lightweight .150" wall, heat treated aircraft quality wrist pins. Double spirollox are standard.

	Bore Size	Cubic Inch	Stroke	Rod Length	Dome Volume	Compression Ratio	Comp. Distance	Deck Height	Avg. Weight Piston/Pin	Valve Relief Intake	Depth-Dia. Exhaust	Pin Size	Suggested Ring Set	Notes
Chevrolet SB 23° Inverted Dome (Dish)														
<i>Designed for: 1/16, 1/16, 3/16 Rings</i>														
						58cc	64cc	76cc						

840342128	4.030	383	3.750	5.700	-28.0cc	9.3	8.8	7.9	1.425	9.000	473/108	.310"-2.200"	.275"-1.800"	.927 x 2.300	HRC4860-4030-5	
840442128	4.040	385	3.750	5.700	-28.0cc	9.3	8.8	8.0	1.425	9.000	478/108	.310"-2.200"	.275"-1.800"	.927 x 2.300	HRC4860-4040-5	
840642128	4.060	388	3.750	5.700	-28.0cc	9.4	8.9	8.0	1.425	9.000	486/108	.310"-2.200"	.275"-1.800"	.927 x 2.300	HRC4860-4060-5	

Chevrolet SB 4-Valve Relief 23° Flat Top

Designed for: 1/16, 1/16, 3/16 Rings

840356405	4.030	355	3.480	5.700	-5.0cc	11.1	10.4	9.1	1.560	9.000	514/118	.215"-2.100"	.210"-1.700"	.927 x 2.500	HRC4860-4030-5	
840456405	4.040	357	3.480	5.700	-5.0cc	11.2	10.4	9.2	1.560	9.000	514/118	.215"-2.100"	.210"-1.700"	.927 x 2.500	HRC4860-4040-5	
840656405	4.060	361	3.480	5.700	-5.0cc	11.3	10.5	9.2	1.560	9.000	523/118	.215"-2.100"	.210"-1.700"	.927 x 2.500	HRC4860-4060-5	
840342405	4.030	383	3.750	5.700	-5.0cc	11.9	11.1	9.7	1.425	9.000	490/118	.215"-2.100"	.210"-1.700"	.927 x 2.500	HRC4860-4030-5	
840442405	4.040	385	3.750	5.700	-5.0cc	11.9	11.1	9.8	1.425	9.000	492/118	.215"-2.100"	.210"-1.700"	.927 x 2.500	HRC4860-4040-5	
840642405	4.060	388	3.750	5.700	-5.0cc	12.0	11.2	9.8	1.425	9.000	497/118	.215"-2.100"	.210"-1.700"	.927 x 2.500	HRC4860-4060-5	

Chevrolet SB 23° Flat Top (4.000"-4.060" Bore)

Designed for: 1/16, 1/16, 3/16 Rings

840355305	4.030	357	3.480/3.500	5.700	-5.0cc	11.1	10.4	9.1	1.550	9.000	510/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4030-5	A
840455305	4.040	359	3.480/3.500	5.700	-5.0cc	11.2	10.4	9.2	1.550	9.000	456/118	.320"-2.200"	.280"-1.800"	.927 x 2.500	HRC4860-4040-5	A
840655305	4.060	362	3.480/3.500	5.700	-5.0cc	11.3	10.5	9.2	1.550	9.000	464/118	.320"-2.200"	.280"-1.800"	.927 x 2.500	HRC4860-4060-5	A
840325305	4.030	357	3.480/3.500	6.000	-5.0cc	11.1	10.4	9.1	1.250	9.000	427/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4030-5	A
840425305	4.040	359	3.480/3.500	6.000	-5.0cc	11.2	10.4	9.2	1.250	9.000	430/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4040-5	A
840625305	4.060	362	3.480/3.500	6.000	-5.0cc	11.3	10.5	9.2	1.250	9.000	433/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4060-5	A
840322305	4.030	363	3.562	6.000	-5.0cc	11.3	10.5	9.3	1.220	9.001	425/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4030-5	
840422305	4.040	365	3.562	6.000	-5.0cc	11.4	10.6	9.3	1.220	9.001	427/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4040-5	
840312305	4.030	357	3.480/3.500	6.125	-5.0cc	11.1	10.4	9.1	1.125	9.000	405/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4030-5	A,B
840412305	4.040	359	3.480/3.500	6.125	-5.0cc	11.2	10.4	9.2	1.125	9.000	428/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4040-5	A,B
840612305	4.060	362	3.480/3.500	6.125	-5.0cc	11.3	10.5	9.2	1.125	9.000	413/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4060-5	A,B

	Bore Size	Cubic Inch	Stroke	Rod Length	Dome Volume	Compression Ratio			Comp. Distance	Deck Height	Avg. Weight Piston/Pin	Valve Relief Intake	Depth-Dia. Exhaust	Pin Size	Suggested Ring Set	Notes
Chevrolet SB 23° Flat Top (4.000"-4.060" Bore) (Continued)																
<i>Designed for: 1/16, 1/16, 3/16 Rings</i>																
						58cc	64cc	76cc								
840312305	4.030	383	3.750	6.000	-5.0cc	11.9	11.1	9.7	1.125	9.000	405/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4030-5	B
840412305	4.040	385	3.750	6.000	-5.0cc	11.9	11.1	9.8	1.125	9.000	428/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4040-5	B
840612305	4.060	388	3.750	6.000	-5.0cc	12.0	11.2	9.8	1.125	9.000	413/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4060-5	B
840306305	4.030	395	3.875	6.000	-5.0cc	12.3	11.4	10.0	1.062	9.000	392/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4030-5	B
840406305	4.040	397	3.875	6.000	-5.0cc	12.3	11.4	10.0	1.062	9.000	395/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4040-5	B

Chevrolet SB 23° Flat Top (4.000"-4.060" Bore)

Designed for: 1.5mm, 1.5mm, 3mm Rings

58cc 64cc 76cc

840355205	4.030	357	3.480/3.500	5.700	-5.0cc	11.1	10.4	9.1	1.550	9.000	510/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4850-4030-5	A
849355205	4.035	358	3.480/3.500	5.700	-5.0cc	11.2	10.4	9.1	1.550	9.000	513/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4850-4030-5	A
840455205	4.040	359	3.480/3.500	5.700	-5.0cc	11.2	10.4	9.2	1.550	9.000	456/118	.320"-2.200"	.280"-1.800"	.927 x 2.500	HRC4850-4040-5	A
849455205	4.045	360	3.480/3.500	5.700	-5.0cc	11.2	10.4	9.2	1.550	9.000	458/118	.320"-2.200"	.280"-1.800"	.927 x 2.500	HRC4850-4040-5	A
840325205	4.030	357	3.480/3.500	6.000	-5.0cc	11.1	10.4	9.1	1.250	9.000	427/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4850-4030-5	A
849325205	4.035	358	3.480/3.500	6.000	-5.0cc	11.2	10.4	9.1	1.250	9.000	429/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4850-4040-5	A
840425205	4.040	359	3.480/3.500	6.000	-5.0cc	11.2	10.4	9.2	1.250	9.000	430/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4850-4040-5	A
849425205	4.045	360	3.480/3.500	6.000	-5.0cc	11.2	10.4	9.2	1.250	9.000	432/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4850-4040-5	A
840312205	4.030	357	3.480/3.500	6.125	-5.0cc	11.1	10.4	9.1	1.125	9.000	405/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4850-4030-5	A,B
840412205	4.040	359	3.480/3.500	6.125	-5.0cc	11.2	10.4	9.2	1.125	9.000	428/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4850-4040-5	A,B
840312205	4.030	383	3.750	6.000	-5.0cc	11.9	11.1	9.7	1.125	9.000	405/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4850-4030-5	B
840412205	4.040	385	3.750	6.000	-5.0cc	11.9	11.1	9.8	1.125	9.000	428/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4850-4040-5	B

Chevrolet SB 23° Flat Top (4.125"-4.165" Bore)

Designed for: 1/16, 1/16, 3/16 Rings

58cc 64cc 76cc

841542306	4.155	407	3.750	5.700	-6.0cc	12.3	11.5	10.1	1.425	9.000	490/108	.320"-2.200"	.310"-1.800"	.927 x 2.300	HRC4860-4155-5	B
841642306	4.165	409	3.750	5.700	-6.0cc	12.4	11.5	10.1	1.425	9.000	492/108	.320"-2.200"	.310"-1.800"	.927 x 2.300	HRC4860-4155-5	B
841512306	4.155	380	3.480/3.500	6.125	-6.0cc	11.6	10.8	9.5	1.125	9.000	448/108	.320"-2.200"	.310"-1.800"	.927 x 2.300	HRC4860-4155-5	A,B
841612306	4.165	382	3.480/3.500	6.125	-6.0cc	11.6	10.8	9.5	1.125	9.000	452/108	.320"-2.200"	.310"-1.800"	.927 x 2.300	HRC4860-4165-5	A,B
841512306	4.155	407	3.750	6.000	-6.0cc	12.3	11.5	10.1	1.125	9.000	446/108	.320"-2.200"	.310"-1.800"	.927 x 2.300	HRC4860-4155-5	B
841612306	4.165	409	3.750	6.000	-6.0cc	12.4	11.5	10.1	1.125	9.000	452/108	.320"-2.200"	.310"-1.800"	.927 x 2.300	HRC4860-4165-5	B
841206306	4.125	414	3.875	6.000	-6.0cc	12.6	11.7	10.3	1.062	9.000	421/108	.320"-2.200"	.310"-1.800"	.927 x 2.300	HRC4860-4125-5	B
841506306	4.155	420	3.875	6.000	-6.0cc	12.7	11.8	10.4	1.062	9.000	434/108	.320"-2.200"	.310"-1.800"	.927 x 2.300	HRC4860-4155-5	B
841606306	4.165	422	3.875	6.000	-6.0cc	12.8	11.9	10.4	1.062	9.000	441/108	.320"-2.200"	.310"-1.800"	.927 x 2.300	HRC4860-4165-5	B
841200306	4.125	374	3.480/3.500	6.250	-6.0cc	11.4	10.7	9.4	1.000	9.000	415/108	.320"-2.200"	.310"-1.800"	.927 x 2.300	HRC4860-4125-5	A,B
841500306	4.155	380	3.480/3.500	6.250	-6.0cc	11.6	10.8	9.5	1.000	9.000	420/108	.320"-2.200"	.310"-1.800"	.927 x 2.300	HRC4860-4155-5	A,B
841600306	4.165	382	3.480/3.500	6.250	-6.0cc	11.6	10.8	9.5	1.000	9.000	428/108	.320"-2.200"	.310"-1.800"	.927 x 2.300	HRC4860-4165-5	A,B
841200306	4.125	401	3.750	6.125	-6.0cc	12.2	11.3	10.0	1.000	9.000	415/108	.320"-2.200"	.310"-1.800"	.927 x 2.300	HRC4860-4125-5	B
841500306	4.155	407	3.750	6.125	-6.0cc	12.3	11.5	10.1	1.000	9.000	420/108	.320"-2.200"	.310"-1.800"	.927 x 2.300	HRC4860-4155-5	B
841600306	4.165	409	3.750	6.125	-6.0cc	12.4	11.5	10.1	1.000	9.000	428/108	.320"-2.200"	.310"-1.800"	.927 x 2.300	HRC4860-4165-5	B
841200306	4.125	428	4.000	6.000	-6.0cc	12.9	12.0	10.6	1.000	9.000	415/108	.320"-2.200"	.310"-1.800"	.927 x 2.300	HRC4860-4125-5	B
841500306	4.155	434	4.000	6.000	-6.0cc	13.1	12.2	10.7	1.000	9.000	420/108	.320"-2.200"	.310"-1.800"	.927 x 2.300	HRC4860-4155-5	B
841600306	4.165	436	4.000	6.000	-6.0cc	13.1	12.2	10.8	1.000	9.000	428/108	.320"-2.200"	.310"-1.800"	.927 x 2.300	HRC4860-4165-5	B

Notes

Compression based at zero deck and .040" compressed head gasket.

(A) Fits 3.480" & 3.500" Strokes. Zero deck with 3.480" stroke is 8.990". Cubic inch & compression based on 3.500" stroke.

(B) Oil rail support included.

	Bore Size	Cubic Inch	Stroke	Rod Length	Dome Volume	Compression Ratio			Comp. Distance	Deck Height	Avg. Weight Piston/Pin	Valve Relief Intake	Depth-Dia. Exhaust	Pin Size	Suggested Ring Set	Notes
Chevrolet SB 23° Flat Top (4.125"-4.165" Bore)																
<i>Designed for: 1.5mm, 1.5mm, 3mm Rings</i>						58cc	64cc	76cc								
841512206	4.155	380	3.480/3.500	6.125	-6.0cc	11.6	10.8	9.5	1.125	9.000	448/108	.320"-2.200"	.310"-1.800"	.927 x 2.300	HRC4850-4155-5	A,B
841612206	4.165	382	3.480/3.500	6.125	-6.0cc	11.6	10.8	9.5	1.125	9.000	452/108	.320"-2.200"	.310"-1.800"	.927 x 2.300	HRC4850-4165-5	A,B
841512206	4.155	407	3.750	6.000	-6.0cc	12.3	11.5	10.1	1.125	9.000	446/108	.320"-2.200"	.310"-1.800"	.927 x 2.300	HRC4850-4155-5	B
841612206	4.165	409	3.750	6.000	-6.0cc	12.4	11.5	10.1	1.125	9.000	452/108	.320"-2.200"	.310"-1.800"	.927 x 2.300	HRC4850-4165-5	B

Chevrolet SB 23° Dome (4.000"-4.060" Bore)

Designed for: 1/16, 1/16, 3/16 Rings

58cc 64cc 76cc

840355613	4.030	357	3.480/3.500	5.700	13.0cc	14.6	13.2	11.2	1.550	9.000	480/118	.280"-2.200"	.260"-1.800"	.927 x 2.500	HRC4860-4030-5	A
840342608	4.030	383	3.750	5.700	8.0cc	14.3	13.1	11.2	1.425	9.000	472/108	.280"-2.200"	.260"-1.800"	.927 x 2.300	HRC4860-4030-5	
840325613	4.030	357	3.480/3.500	6.000	13.0cc	14.6	13.2	11.2	1.250	9.000	464/108	.280"-2.200"	.260"-1.800"	.927 x 2.300	HRC4860-4030-5	A
840425613	4.040	358	3.480/3.500	6.000	13.0cc	14.6	13.3	11.2	1.250	9.000	464/108	.280"-2.200"	.260"-1.800"	.927 x 2.300	HRC4860-4040-5	A
840625613	4.060	362	3.480/3.500	6.000	13.0cc	14.7	13.4	11.3	1.250	9.000	473/108	.280"-2.200"	.260"-1.800"	.927 x 2.300	HRC4860-4060-5	A
840312608	4.030	357	3.480/3.500	6.125	8.0cc	13.4	12.3	10.5	1.125	9.000	432/108	.280"-2.200"	.260"-1.800"	.927 x 2.300	HRC4860-4030-5	A,B
840412608	4.040	358	3.480/3.500	6.125	8.0cc	13.5	12.3	10.5	1.125	9.000	434/108	.280"-2.200"	.260"-1.800"	.927 x 2.300	HRC4860-4040-5	A,B
840612608	4.060	362	3.480/3.500	6.125	8.0cc	13.6	12.4	10.6	1.125	9.000	438/108	.280"-2.200"	.260"-1.800"	.927 x 2.300	HRC4860-4060-5	A,B
840312608	4.030	383	3.750	6.000	8.0cc	14.3	13.1	11.2	1.125	9.000	432/108	.280"-2.200"	.260"-1.800"	.927 x 2.300	HRC4860-4030-5	B
840412608	4.040	385	3.750	6.000	8.0cc	14.3	13.1	11.2	1.125	9.000	434/108	.280"-2.200"	.260"-1.800"	.927 x 2.300	HRC4860-4040-5	B
840612608	4.060	388	3.750	6.000	8.0cc	14.5	13.2	11.3	1.125	9.000	438/108	.280"-2.200"	.260"-1.800"	.927 x 2.300	HRC4860-4060-5	B

Chevrolet SB 23° Dome (4.125"-4.165" Bore)

Designed for: 1/16, 1/16, 3/16 Rings

58cc 64cc 76cc

841512608	4.155	380	3.480/3.500	6.125	8.0cc	14.1	12.9	11.0	1.125	9.000	472/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4155-5	A,B
841612608	4.165	382	3.480/3.500	6.125	8.0cc	14.1	12.9	11.0	1.125	9.000	476/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4165-5	A,B
841512608	4.155	380	3.750	6.000	8.0cc	15.0	13.7	11.7	1.125	9.000	472/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4155-5	B
841612608	4.165	382	3.750	6.000	8.0cc	15.1	13.8	11.8	1.125	9.000	476/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4165-5	B
841206603	4.125	414	3.875	6.000	3.0cc	14.2	13.1	11.3	1.062	9.000	436/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4125-5	B
841506603	4.155	420	3.875	6.000	3.0cc	14.3	13.2	11.4	1.062	9.000	448/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4155-5	B
841606603	4.165	422	3.875	6.000	3.0cc	14.4	13.3	11.5	1.062	9.000	441/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4165-5	B
841200603	4.125	374	3.480/3.500	6.250	3.0cc	12.9	11.9	10.3	1.000	9.000	428/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4125-5	A,B
841200608	4.125	374	3.480/3.500	6.250	8.0cc	13.9	12.7	10.9	1.000	9.000	437/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4125-5	A,B
841500603	4.155	380	3.480/3.500	6.250	3.0cc	13.1	12.0	10.4	1.000	9.000	448/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4155-5	A,B
841500608	4.155	380	3.480/3.500	6.250	8.0cc	14.1	12.9	11.0	1.000	9.000	448/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4155-5	A,B
841600608	4.165	382	3.480/3.500	6.250	8.0cc	14.1	12.9	11.1	1.000	9.000	452/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4165-5	A,B
841200603	4.125	401	3.750	6.125	3.0cc	13.8	12.7	11.0	1.000	9.000	428/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4125-5	B
841200608	4.125	401	3.750	6.125	8.0cc	14.8	13.6	11.6	1.000	9.000	437/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4125-5	B
841500603	4.155	407	3.750	6.125	3.0cc	13.9	12.8	11.1	1.000	9.000	448/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4155-5	B
841500608	4.155	407	3.750	6.125	8.0cc	15.0	13.7	11.7	1.000	9.000	448/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4155-5	B
841600608	4.165	409	3.750	6.125	8.0cc	15.1	13.8	11.8	1.000	9.000	452/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4165-5	B
841200603	4.125	428	4.000	6.000	3.0cc	14.6	13.4	11.6	1.000	9.000	428/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4125-5	B
841200608	4.125	428	4.000	6.000	8.0cc	15.8	14.4	12.3	1.000	9.000	437/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4125-5	B
841500603	4.155	434	4.000	6.000	3.0cc	14.8	13.6	11.8	1.000	9.000	448/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4155-5	B
841500608	4.155	434	4.000	6.000	8.0cc	15.9	14.6	12.5	1.000	9.000	448/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4155-5	B
841600608	4.165	436	4.000	6.000	8.0cc	16.0	14.6	12.5	1.000	9.000	452/108	.320"-2.200"	.280"-1.800"	.927 x 2.300	HRC4860-4165-5	B

	Bore Size	Cubic Inch	Stroke	Rod Length	Dome Volume	Compression Ratio			Comp. Distance	Deck Height	Avg. Weight Piston/Pin	Valve Relief Intake	Depth-Dia. Exhaust	Pin Size	Suggested Ring Set	Notes
<i>Chevrolet BB Open Chamber Small Dome - Standard Deck Block</i>																
<i>Designed for: 1/16, 1/16, 3/16 Rings</i>																

Chevrolet BB Open Chamber Dome - Standard Deck Block

Designed for: 1/16, 1/16, 3/16 Rings

110cc 119cc 124cc

853127643	4.310	496	4.250	6.385	43.0cc	14.2	12.8	12.1	1.270	9.780	625/141	.275"-2.300"	NA	.990 x 2.750	HRC4860-4310-5	
853527643	4.350	505	4.250	6.385	43.0cc	14.4	13.0	12.3	1.270	9.780	643/141	.275"-2.300"	NA	.990 x 2.750	HRC4860-4350-5	
855027638	4.500	540	4.250	6.385	38.0cc	14.3	13.0	12.4	1.270	9.780	589/141	.326"-2.420"	NA	.990 x 2.750	HRC4860-4500-5	
856027638	4.600	565	4.250	6.385	38.0cc	14.8	13.5	12.9	1.270	9.780	631/141	.326"-2.420"	NA	.990 x 2.750	HRC4860-4600-5	
856024638	4.600	532	4.000	6.535	38.0cc	14.0	12.8	12.2	1.245	9.780	629/141	.320"-2.420"	NA	.990 x 2.750	HRC4860-4600-5	
856012627	4.600	565	4.250	6.535	27.0cc	13.2	12.2	11.7	1.120	9.780	673/141	.320"-2.420"	NA	.990 x 2.750	HRC4860-4600-5	

Chevrolet BB Open Chamber Dome - Tall Deck Block

Designed for: 1/16, 1/16, 3/16 Rings

110cc 119cc 124cc

HRC4592	4.350	535	4.500	6.385	43.0cc	15.2	13.7	13.0	1.395	10.180	578/154	.308"-2.300"	NA	.990 x 2.930	HRC4860-4350-5	
856024638	4.600	598	4.500	6.700	38.0cc	15.7	14.2	13.6	1.245	10.195	629/141	.320"-2.420"	NA	.990 x 2.750	HRC4860-4600-5	
856012627	4.600	632	4.750	6.700	27.0cc	14.7	13.5	12.9	1.120	10.195	673/141	.320"-2.420"	NA	.990 x 2.750	HRC4860-4600-5	

Ford SB (302) Flat Top

Designed for: 1/16, 1/16, 3/16 Rings

58cc 60cc 64cc

860310305	4.030	347	3.400	5.400	-5.0cc	10.9	10.6	10.1	1.100	8.200	401/108	.260"-2.200"	.260"-1.800"	.927 x 2.300	HRC4860-4030-5	
860410305	4.040	348	3.400	5.400	-5.0cc	10.9	10.6	10.2	1.100	8.200	405/108	.260"-2.200"	.260"-1.800"	.927 x 2.300	HRC4860-4040-5	

Ford SB (351W) Inverted Dome (Dish)

Designed for: 1/16, 1/16, 3/16 Rings

58cc 60cc 64cc

860323128	4.030	408	4.000	6.250	-28.0cc	9.8	9.6	9.3	1.230	9.480	438/108	.260"-2.200"	.260"-1.800"	.927 x 2.300	HRC4860-4030-5	
860423128	4.040	410	4.000	6.250	-28.0cc	9.8	9.7	9.3	1.230	9.480	438/108	.260"-2.200"	.260"-1.800"	.927 x 2.300	HRC4860-4040-5	
860323128	4.030	418	4.100	6.200	-28.0cc	10.0	9.8	9.5	1.230	9.480	442/108	.260"-2.200"	.260"-1.800"	.927 x 2.300	HRC4860-4030-5	
860423128	4.040	420	4.100	6.200	-28.0cc	10.0	9.9	9.5	1.230	9.480	442/108	.260"-2.200"	.260"-1.800"	.927 x 2.300	HRC4860-4040-5	
861223128	4.125	428	4.000	6.250	-32.0cc	9.8	9.6	9.3	1.230	9.480	468/118	.260"-2.200"	.260"-1.800"	.927 x 2.500	HRC4860-4125-5	
861223128	4.125	438	4.100	6.200	-32.0cc	10.0	9.9	9.5	1.230	9.480	468//118	.260"-2.200"	.260"-1.800"	.927 x 2.500	HRC4860-4125-5	

Ford SB (351W) Dome

Designed for: 1/16, 1/16, 3/16 Rings

58cc 60cc 64cc

860323601	4.030	408	4.000	6.250	1.0cc	13.7	13.3	12.6	1.230	9.480	422/108	.260"-2.200"	.260"-1.800"	.927 x 2.300	HRC4860-4030-5	
860423601	4.040	410	4.000	6.250	1.0cc	13.7	13.4	12.7	1.230	9.480	427/108	.260"-2.200"	.260"-1.800"	.927 x 2.300	HRC4860-4040-5	
860323601	4.030	418	4.100	6.200	1.0cc	14.0	13.6	12.9	1.230	9.480	422/108	.260"-2.200"	.260"-1.800"	.927 x 2.300	HRC4860-4030-5	
860423601	4.040	420	4.100	6.200	1.0cc	14.0	13.7	13.0	1.230	9.480	427/108	.260"-2.200"	.260"-1.800"	.927 x 2.300	HRC4860-4040-5	
861223601	4.125	428	4.000	6.250	1.0cc	14.2	13.8	13.1	1.230	9.480	463/118	.260"-2.200"	.260"-1.800"	.927 x 2.500	HRC4860-4125-5	
861223601	4.125	438	4.100	6.200	1.0cc	14.5	14.1	13.4	1.230	9.480	463/118	.260"-2.200"	.260"-1.800"	.927 x 2.500	HRC4860-4125-5	

Engine Type	Piston Bore	Dome Type	Dome Size	Compression Height
84 = Chev SB	03 = 4.030" 31 = 4.310"	1 = Inverted Dome 2/3 = 2VR Flat Top 4 = 4VR Flat Top 6 = Dome	01 = 1cc 13 = 13cc	00 = 1.000" 24 = 1.245"
85 = Chev BB	04 = 4.040" 33 = 4.350"		03 = 3cc 27 = 27cc	06 = 1.062" 25 = 1.250"
86 = Ford SB	06 = 4.060" 50 = 4.500"		05 = 5cc 28 = 28cc	10 = 1.100" 27 = 1.270"
	12 = 4.125" 60 = 4.600"		06 = 6cc 38 = 38cc	12 = 1.120" 42 = 1.425"
	15 = 4.155" 93 = 4.035"		08 = 8cc 43 = 43cc	12 = 1.125" 55 = 1.550"
	16 = 4.165" 94 = 4.045"			22 = 1.220" 56 = 1.560"
				23 = 1.230" 64 = 1.645"

8 5 6 0 2 4 6 3 8

Notes

Compression based at zero deck and .040" compressed head gasket.

(A) Fits 3.480" & 3.500" Strokes. Zero deck with 3.480" stroke is 8.990". Cubic inch & compression based on 3.500" stroke.

(B) Oil rail support included.



TOOL STEEL WRIST PINS Features

- *Machined From
Solid H11
Bar Stock*
- *Heat Treated &
Triple Tempered*
- *Centerless Ground
to 0.0001"
Total Tolerance*
- *Best Strength
To Weight Ratio*
- *Inner Diameters
Honed to
Precise Size*



TOOL STEEL WRIST PINS

The most over looked upgrade to a competition engine. Precision machined from solid H-11 bar stock, heat treated and triple tempered, and centerless ground to 0.0001" total tolerance. Inner diameters are honed on Sunnen equipment to precise size and finish requirements, while the outside diameter features a slight O.D. edge break to maintain maximum bearing area. These pins will give you the best strength to weight ratio available. Sets of 8.

Ford SB .912" x 2.500"

HRC91250	.912"x 2.500", .090" Wall, 75g
HRC91252	.912"x 2.500", .120" Wall, 96g

Chev SB .927" x 2.500"

HRC92250	.927"x 2.500", .090" Wall, 76g
HRC92252	.927"x 2.500", .120" Wall, 98g
HRC92258*	.927"x 2.500", .115-.145" Wall, 118g

Chev SB .927" x 2.750"

HRC92272	.927"x 2.750", .120" Wall, 106g
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Chev SB .927" x 2.950"

HRC92292	.927"x 2.950", .120" Wall, 115g
HRC92298*	.927"x 2.950", .125-180" Wall, 143g

Chev BB .990" x 2.930"

HRC99292	.990"x 2.930", .120" Wall, 123g
HRC99293	.990"x 2.930", .130" Wall, 130g
HRC99295	.990"x 2.930", .150" Wall, 147g

**Taper Wall.*



SPIRAL LOCKS

High quality replacements for most popular performance pistons. Sold in sets of 32. Note: Spiral Locks are not designed to be reusable. You should always use a new set each time you remove and reassemble the piston and rods. 4 required per piston.

[HRC4500](#) for .896"-.945" Pins

[HRC4501](#) for .946"-1.005" Pins

TRUE SEAL™ PLASMA MOLY RING SETS

Race winning technology at an affordable price. Superior combustion control in today's extreme engines. Starting with a plasma moly ring that is barrel lapped for quick seating and long life. Second rings are cast iron reverse torsional twist. The oil ring features a stainless steel expander with chrome plated carbon steel rails. Manufactured in the most popular bore sizes. A true seal for more horsepower and longer life. All applications are file fit.



1/16", 1/16", 3/16" Standard Tension

HRC4860-4000-5	4.000" Bore +.005" (File Fit)
HRC4860-4020-5	4.020" Bore +.005" (File Fit)
HRC4860-4030-5	4.030" Bore +.005" (File Fit)
HRC4860-4040-5	4.040" Bore +.005" (File Fit)
HRC4860-4060-5	4.060" Bore +.005" (File Fit)
HRC4860-4125-5	4.125" Bore +.005" (File Fit)
HRC4860-4145-5	4.145" Bore +.005" (File Fit)
HRC4860-4155-5	4.155" Bore +.005" (File Fit)
HRC4860-4165-5	4.165" Bore +.005" (File Fit)
HRC4860-4250-5	4.250" Bore +.005" (File Fit)
HRC4860-4280-5	4.280" Bore +.005" (File Fit)
HRC4860-4310-5	4.310" Bore +.005" (File Fit)
HRC4860-4350-5	4.350" Bore +.005" (File Fit)
HRC4860-4500-5	4.500" Bore +.005" (File Fit)
HRC4860-4530-5	4.530" Bore +.005" (File Fit)
HRC4860-4560-5	4.560" Bore +.005" (File Fit)
HRC4860-4600-5	4.600" Bore +.005" (File Fit)

1/16", 1/16", 3/16" Low Tension

HRC4862-4030-5	4.030" Bore +.005" (File Fit)
HRC4862-4040-5	4.040" Bore +.005" (File Fit)
HRC4862-4125-5	4.125" Bore +.005" (File Fit)
HRC4862-4155-5	4.155" Bore +.005" (File Fit)
HRC4862-4165-5	4.165" Bore +.005" (File Fit)
HRC4862-4500-5	4.500" Bore +.005" (File Fit)
HRC4862-4600-5	4.600" Bore +.005" (File Fit)

1/16", 1/16", 1/8" Standard Tension

HRC4870-4030-5	4.030" Bore +.005" (File Fit)
HRC4870-4040-5	4.040" Bore +.005" (File Fit)
HRC4870-4155-5	4.155" Bore +.005" (File Fit)

1.5mm, 1.5mm, 3mm Standard Tension

HRC4850-4030-5	4.030" Bore +.005" (File Fit)
HRC4850-4040-5	4.040" Bore +.005" (File Fit)
HRC4850-4155-5	4.155" Bore +.005" (File Fit)
HRC4850-4165-5	4.165" Bore +.005" (File Fit)

TRUE SEAL™ PLASMA MOLY RINGS Features

- Plasma Moly
Top Ring

- Cast Iron
Reverse
Torsional Twist
Seconds

- Barrel Lapped

- Quick Seating

- Long Life



PISTON RING FILER

To get the most performance and horsepower, you need to set proper ring end gap. Files piston rings quickly and accurately. Simple hand crank design. A must for every engine builder.

92165 Manual Ring Filer



"The Best For Less!"

Buy American!

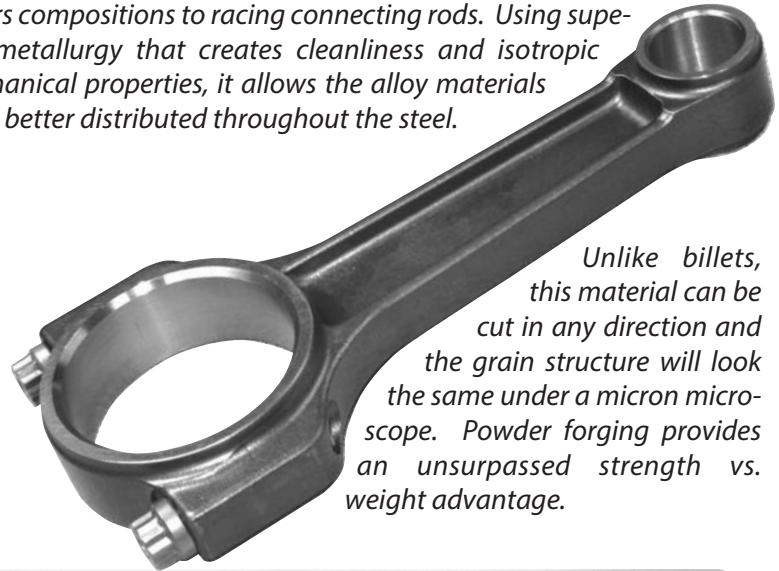


- Our #1 Selling Rod!
- 585 Grams (approx.)
- All Rods $\pm$ 2 Grams
- ASTM 4260 Super Steel (Rivals 300M)
- Proprietary Fracture Cap Technology
- ARP 2000 3/8" Capscrew Fasteners (for applications to 650HP)
- All Rods 100% Magnafluxed

PRECISION DENSE FORGED CONNECTING RODS

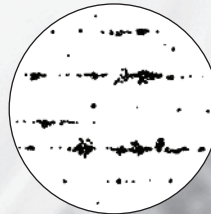
"THE NEXT GENERATION OF RACING RODS"

Howards and the king of powder forged technology, GKN, have teamed up to design and manufacture the most technically advanced and reliable performance rods on the planet! Forged powder metal technology features an extremely dense grain structure when compared to a billet or conventional forging. It uses task oriented steel materials that tailors compositions to racing connecting rods. Using superior metallurgy that creates cleanliness and isotropic mechanical properties, it allows the alloy materials to be better distributed throughout the steel.

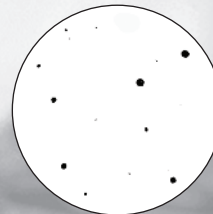


Unlike billets, this material can be cut in any direction and the grain structure will look the same under a micron microscope. Powder forging provides an unsurpassed strength vs. weight advantage.

Typical AISI
4340 Micron
Microscope
Enlargement
for forged and
billet rods



GKN P/F
4260 Micron
Microscope
Enlargement



Unbeatable Combination
PRICE • STRENGTH • WEIGHT

THE MANUFACTURING PROCESS



First, superior high-tech base powder is blended with selected alloying elements in a lab style environment. Melting, atomizing and annealing are controlled to exacting standards to then create super fine powders without impurities!



Next, the base powder, lubricants, additives and graphite elements are compacted under tremendous pressure. Sintering or heating to over 1500° alters and refines the structure of the metal. Hot forging with a 750-ton press finalizes the structure of the metal.



We use superior ASTM 4260 blend (see chart). We used CAD solids modeling for proof of concept and machined models from billet. We use Finite Element Analysis, a computer program that accurately simulates stress and reaction to stress, which allows redesigns for better strength and weight reduction in the correct places. This greatly reduces the design cycle time and accurately predicts strength and fatigue resistance before the rod is manufactured and sold to you.

Connecting Rod Material Performance Comparison				
	AISI 1141 (GM Pink Rod)	GKN P/F 11C60 (GM Gen II)	AISI 4340	GKN ASTM 4260
Ultimate Tensile Strength	660	900	1470	1620
Yield Strength	370	620	1365	1450
Elongation	15%	10%	10%	7%
Hardness (HRC)	20	28	42	42
Fatigue Endurance Limit	240	340	>600	>600

We use superior ASTM 4260 blend (see chart). We used CAD solids



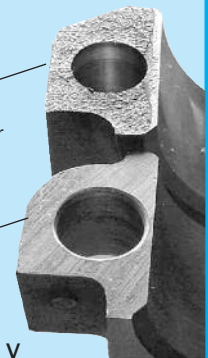
Before the rod reaches the market place, it's tested for stress reaction, endurance, tensile strength and grain structure. The final product is lighter, stronger and more reliable than anything on the market!

PPF6000.....Chev. SB 6.0 Large Journal (585g approx.)

Fractured Cap Technology

Fracture split surface eliminates fretting and offers superior alignment

Saw cut surface

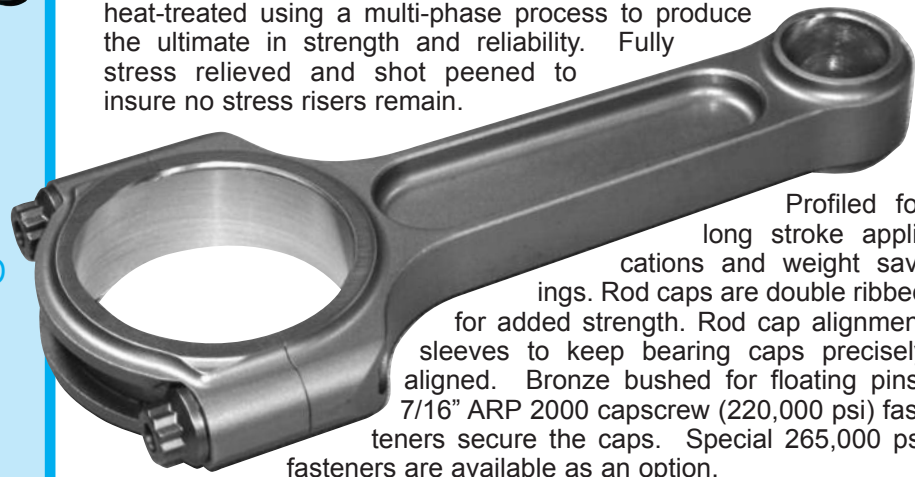


One of the secondary operations incorporates fractured cap technology. This procedure eliminates fretting which is undesirable cap movement and makes alignment sleeves unnecessary. A fractured cap also provides superior alignment of the cap to the body each and every time. This provides a much better crank bore roundness versus machine caps after assembly. We then use Ampco bushings and 3/8" ARP 2000 capscrews. The results are rods that are easily resizable by simply honing out the crank bore and using oversize o.d. bearings.



ULTIMATE DUTY™ FORGED BILLET ROD Features

- Certified High Nickel 4340 Aircraft Quality Steel
- 1000+ Horsepower Rating
- Multi-Phase Heat-Treating and Shot Peening Processes
- Ampco Bronze Bushings
- Precision Bearing Cap Alignment
- ARP 2000 Capscrews



Profiled for long stroke applications and weight savings. Rod caps are double ribbed for added strength. Rod cap alignment sleeves to keep bearing caps precisely aligned. Bronze bushed for floating pins. 7/16" ARP 2000 capscrew (220,000 psi) fasteners secure the caps. Special 265,000 psi fasteners are available as an option.

Chev SB

BR5850	Chev SB (LJ), 5.850" (664g approx.)
BR6125	Chev SB (LJ), 6.125" (674g approx.)
BR6250	Chev SB (LJ), 6.250" (680g approx.)
BR6300	Chev SB (LJ), 6.300" (670g approx.)
BR6400	Chev SB (LJ), 6.400" (678g approx.)
BR6500	Chev SB (LJ), 6.500" (687g approx.)

Chev/GM Gen III LS-1

BL6125-LS1	GM Gen III LS-1, 6.125" (625g approx.)
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Chev BB

BR6135	Chev BB, 6.135" (747g approx.)
BR6385	Chev BB, 6.385" (749g approx.)
BR6535	Chev BB, 6.535" (762g approx.)

Chrysler SB

BR6123	Chrysler SB, 6.123" (672g approx.)
BR6251-HEMI	Chrysler 5.7L Hemi, 6.250" (661g approx.)
BR6251-HEMI-927	5.7L Hemi w/.927" Pin, 6.250" (662g approx.)

Chrysler BB

BR6760-990	Chrysler BB w/.990" Pin, 6.760" (767g approx.)
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ULTIMATE DUTY™ FORGED BILLET RODS for Import Applications

Dodge Neon

BX5945SRT**	Neon SRT 420A 4cyl, 5.945" (668g approx.)
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**Ultimate X X-Beam Design, Features ARP 2000 7/16" Capscrews

Ford BA Turbo Typhoon (Aussie)

BR6060BA	Ford BA Turbo, 6.060" (640g approx.)
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Mitsubishi

BR6136MIT	Mitsubishi 4G63 4cyl (early/6 Bolt), 6.136" (640g approx.)
BR6136MITEVO*	Mitsubishi 4G63 4cyl (late), 6.136" (635g approx.)

*7 Bolt EVO Crank applications

Nissan

BR6001RB30	Nissan RB30 6cyl, 6.000" (610g approx.)
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PRO-I

Manufactured By



BILLET STEEL CONNECTING RODS

- Machined to Howards specs using CP-Carrillo's proprietary material.
- Dimensional Integrity is Comparable to None
- Perfect Balance of Weight VS Strength

Manufactured from oversized billet forgings using Carrillo's proprietary chrome, nickel, moly, vanadium alloy, which meets all VAR (vacuum arc re-melt ASTM standards). The oversized forging resulting in the proper grain flow as well as the surface removal of any potential inclusions or surface conversions generated by the forging process. The heat is validated, both by the supplier and an independent metallurgist whom confirm the desired physical and chemical properties of steel. All heat treat processes are via a mar-aged operation, resulting in UTS of 195,000 with a yield of 182,000 while maintaining the critical elements of low notch-sensitivity and ductility. All critical CNC machines at Carrillo are equipped with probing to accurately validate dimensional integrity. Carrillo's dimensional integrity is comparable to none. In the production process each part is magnafluxed at least twice, further each piece is Rockwell tested to validate the heat treat procedure. A final shotpeen operation completes the part. The rods are finished off with Amco 45 bronze bushings and 7/16" ARP 2000 bolts (220,000psi).

Chev SB

PR60002100.....Chev SB (LJ), 6.000" (629g approx.)

Chev/GM Gen III LS-1

PR612521LS.....GM Gen III LS-1, 6.125" (649g approx.)

Chev BB

PR63852200.....Chev BB, 6.385" (743g approx.)

PR65352200.....Chev BB, 6.535" (749g approx.)

PR67002200.....Chev BB, 6.700" (758g approx.)

Every Pro-I Rod Set leaves our facility with a specification card. This spec card displays a part number, critical dimensions, weights, bolt size and job number.

Ultimate X

X-Beam Billet Rods



GM DURAMAX 6.6L EXTREME DUTY X-BEAM FORGED BILLET RODS

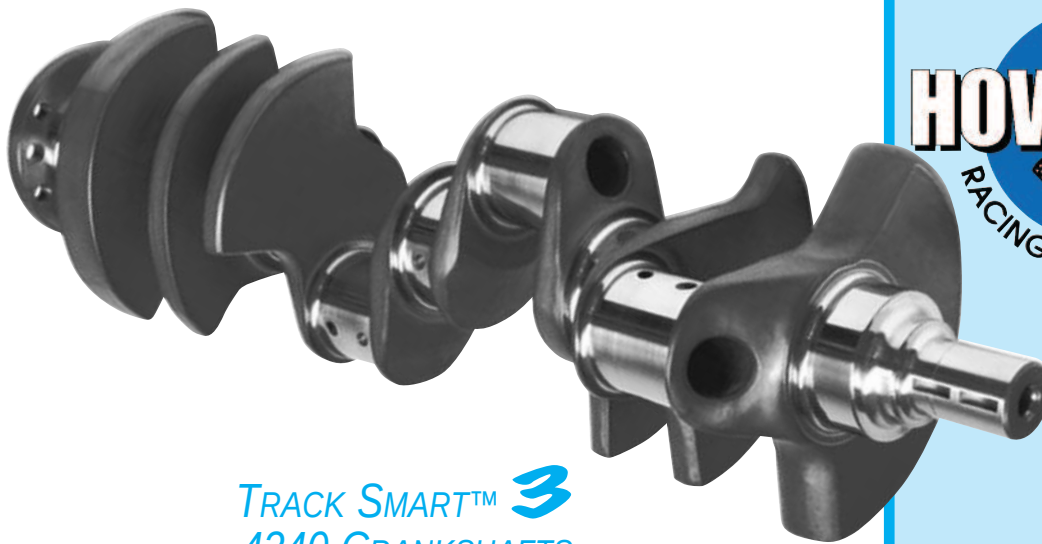
- New X-Beam Extreme Duty Design
- American 4340 Certified Aircraft Quality Steel
- American Multi-Phase Heat-Treating

X-beam design for the ultimate in strength and durability. These rods start with certified 4340 aircraft quality steel and are fully CNC machined on the newest generation of equipment to insure the removal of all surface imperfections. A precision "EDM" laser burns a hole from the top of the rod bearing journal to wrist pin bushing for an extra supply of oil to the piston pin. Fully stress relieved and shot peened to insure no stress risers remain. The beam is profiled for weight savings. The cap has been lightened for easier balancing. They are specially heat-treated using a multi-phase process to insure the ultimate in strength and reliability. Rod caps are double ribbed for added strength. Rod cap alignment dowels to keep bearing caps precisely aligned. Bronze bushed for floating pins. 7/16" ARP 2000 capscrew (220,000 psi) fasteners secure the caps. The Ultimate Duramax Rod!

BX6420.....GM Duramax 6.6L

99805.....Drilled Rod Bearing Set (required for wrist pin oiling)

Note: Standard rod bearings may be used but will not feed the wrist pin with oil unless drilled.



TRACK SMART™ 4340 CRANKSHAFTS

All new computer designed premium 4340 steel forgings. Properly placed counterweights that not only improve balance but reduce bearing loads. The forgings are rough machined in a process that includes double stress relief operations that make these crankshafts dimensionally stable. Hardened with a deep nitride for superior wear resistance, ideal for abusive track environments. All rod journals are drilled and counterweights are profiled for piston clearance. Large .125" radii on all journals (chamfered bearings required). Consistent grind and polish, along with precise stroke and index. The new standard in performance crankshafts.

Chev SB, 2-pc Seal, 2.100" (LJ) Rod Pin

H353485712T	350 Main, 3.480" Stroke, 5.700" Rod
H353756012T	350 Main, 3.750" Stroke, 6.000" Rod
H353876012T	350 Main, 3.875" Stroke, 6.000" Rod
H354006012T	350 Main, 4.000" Stroke, 6.000" Rod
H403756012T	400 Main, 3.750" Stroke, 6.000" Rod
H403876012T	400 Main, 3.875" Stroke, 6.000" Rod
H404006012T	400 Main, 4.000" Stroke, 6.000" Rod

Chev BB, 2-pc Seal, 2.200 Rod Pin

H454256322T	454 Main, 4.250" Stroke, 6.385" Rod
H454506522T	454 Main, 4.500" Stroke, 6.535" Rod

Chev BB, 1-pc Seal, 2.200 Rod Pin

H454256321T	454 Main, 4.250" Stroke, 6.385" Rod
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TRACK SMART™ Features

- 4340 Steel
Non-Twist Forgings
- CNC Machined
- Improved Counterweight
Placement
- Deep Nitride Hardened
- All Rod Throws Have
Lightening Holes
- Completely Finished
in the USA!
- 750+ HP

ProMax™ 4340 CRANKSHAFTS

American Made! Starting with the finest high purity 4340 aircraft quality high nickel alloy. Many manufacturers state they use 4340, but very few use the same quality. There is a difference! These forgings have high quantities of nickel and chromium, which insures strength and long service life.

CNC
Machined



"The Best For Less!"
Buy American!



Deep Case Hardened

These forgings are shipped to the leader in high performance crankshaft machining, Callies Performance Products. They are machined to the highest specifications, with roundness within 60 millionths and taper being held to within .0003" on all rod and main dimensions. All journals have .125" Tru-Form radii. 1" Angalite lightening holes in all rod throws. Callies "Deep Case" hardening produces a wear layer that remains intact even if reground .010" under (other cranks have a hardness depth as little as .003"). Journals are micro-finished to 5 microns or better. The *best* forgings, the *best* machining, and *best* hardening. Which crank will you run? Requires chamfered bearings.

Chev SB 350 Main

353457.....350 Main, 3.480" Stroke, 5.700" Rod, 53lbs. avg.
353557.....350 Main, 3.500" Stroke, 5.700" Rod, 53lbs. avg.
353660.....350 Main, 3.625" Stroke, 6.000" Rod, 55lbs. avg.
353757.....350 Main, 3.750" Stroke, 5.700" Rod, 53lbs. avg.
353760.....350 Main, 3.750" Stroke, 5.850" Rod, 55lbs. avg.

Chev SB 350 Main Gun Drilled

353860.....350 Main, 3.875" Stroke, 6.000" Rod, 55lbs. avg.
354060.....350 Main, 4.000" Stroke, 6.000" Rod, 55lbs. avg.

Chev SB 350 Main w/BB Snout (Double Keyways)

353557-4.....350 Main, 3.500" Stroke, 5.700" Rod, 54lbs. avg.
353760-4.....350 Main, 3.750" Stroke, 6.000" Rod, 56lbs. avg.
353860-4.....350 Main, 3.875" Stroke, 6.000" Rod, 56lbs. avg.
354060-4.....350 Main, 4.000" Stroke, 6.000" Rod, 56lbs. avg.

Chev SB 400 Main

403457.....400 Main, 3.480" Stroke, 5.700" Rod, 55lbs. avg.
403660.....400 Main, 3.625" Stroke, 6.000" Rod, 55lbs. avg.
403757.....400 Main, 3.750" Stroke, 5.700" Rod, 55lbs. avg.
403760.....400 Main, 3.750" Stroke, 6.000" Rod, 55lbs. avg.
403860.....400 Main, 3.875" Stroke, 6.000" Rod, 57lbs. avg.

Chev SB 400 Main Gun Drilled

404060.....400 Main, 4.000" Stroke, 6.000" Rod, 56lbs. avg.
404262.....400 Main, 4.250" Stroke, 6.200" Rod, 56lbs. avg.

Chev SB 400 Main w/BB Snout (Double Keyways)

403860-4.....400 Main, 3.875" Stroke, 6.000" Rod, 57lbs. avg.
404060-4.....400 Main, 4.000" Stroke, 6.000" Rod, 57lbs. avg.
404260-4.....400 Main, 4.250" Stroke, 6.000" Rod, 57lbs. avg.

Chev SB 400 Main Gun Drilled w/BB Snout (Double Keyways)

403860-6.....400 Main, 3.875" Stroke, 6.000" Rod, 52lbs. avg.
404060-6.....400 Main, 4.000" Stroke, 6.000" Rod, 53lbs. avg.

Chev BB (Added Feature: Double Keyways)

454263.....454 Main, 4.250" Stroke, 6.385" Rod, 75lbs. avg.
454565.....454 Main, 4.500" Stroke, 6.535" Rod, 76lbs. avg.
454767.....454 Main, 4.750" Stroke, 6.700" Rod, 76lbs. avg.

Ford SB (Cleveland/SVO Mains) Gun Drilled

313760.....351C Main, 3.750" Stroke, 6.000" Rod, 50lbs. avg.
314062.....351C Main, 4.000" Stroke, 6.200" Rod, 51lbs. avg.
314162.....351C Main, 4.100" Stroke, 6.200" Rod, 50lbs. avg.
314262.....351C Main, 4.250" Stroke, 6.200" Rod, 50lbs. avg.

Profiling and Lightening is available for Pro Max™ Cranks!



MAXIMUM EFFORT™ BALANCED RACE ASSEMBLIES

Features

- Precision
Race Balanced
- Track Smart 4340
Forged Steel Crank
- American ASTM 4260
Precision Dense
Forged Rods
- American 2618-T61
Maximum Effort
Forged Pistons
- Plasma Moly
File Fit Rings
- Pro Series
Rod & Main Bearings



HRC MAXIMUM EFFORT™ BALANCED RACE ASSEMBLIES

These "American" kits feature Howards HRC state-of-the-art Precision Dense Forged Racing Rods w/ARP 2000 capscrew fasteners, HRC Track Smart 4340 forged crank, HRC forged 2618 pistons and a set of HRC True Seal™ plasma moly rings. Howards finishes these kits with a set of race rod and main bearings. Internally race balanced.

- HRC Track Smart 4340 forged steel crankshaft
- HRC forged 2618 pistons
- HRC Precision Dense Forged connecting rods
- Pro-Series rod & main bearings
- HRC True Seal™ Plasma Moly file fit rings.
- Precision Race Balanced.

Chev SB w/Flat Top Pistons (10.4-11.7:1 w/64cc)

RATP355F	(355)	350 Main, 4.030 Bore, 3.480" Stroke
RATP356F	(356)	350 Main, 4.040 Bore, 3.480" Stroke
RATP383F	(383)	350 Main, 4.030 Bore, 3.750" Stroke
RATP385F	(385)	350 Main, 4.040 Bore, 3.750" Stroke
RATP406F	(406)	400 Main, 4.155 Bore, 3.750" Stroke
RATP408F	(408)	400 Main, 4.165 Bore, 3.750" Stroke

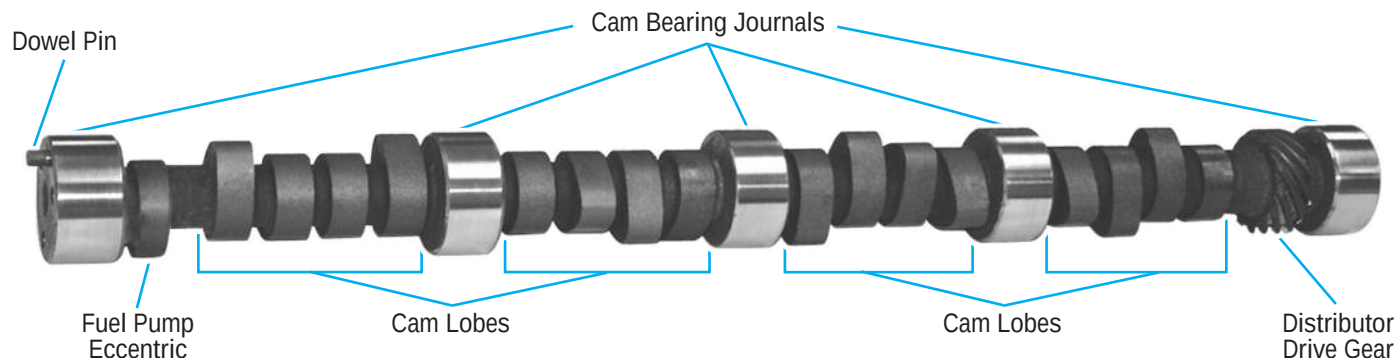
Chev SB w/Dome Pistons (12.6-13.2:1 w/64cc)

RATP355D	(355)	350 Main, 4.030 Bore, 3.480" Stroke
RATP356D	(356)	350 Main, 4.040 Bore, 3.480" Stroke
RATP383D	(383)	350 Main, 4.030 Bore, 3.750" Stroke
RATP385D	(385)	350 Main, 4.040 Bore, 3.750" Stroke
RATP406D	(406)	400 Main, 4.155 Bore, 3.750" Stroke

Options:

Rod bolt upgrade (recommended for over 650HP)
Clevite Bearings (H-Series)

How to Install a Performance Camshaft

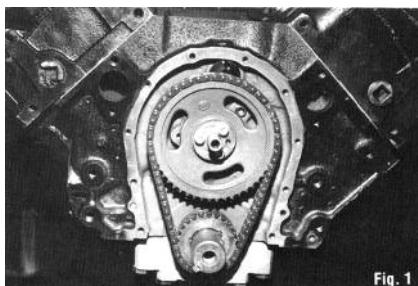


How to Install a Performance Camshaft

Installing a new cam is a relatively easy and straightforward operation that can be performed by anyone who is handy with tools, has a basic understanding of what's inside an engine, and who has the necessary tools and shop manual (Chilton, Motor's, etc.). The cam may be replaced with the engine in the car (by removing the radiator, grill, some braces, etc.), but the job is far easier if you obtain a hoist and remove the engine. Either way, take your time. You can probably do the job in a weekend without a hassle, but the more time and care you take, the better the result.

Following instructions in your shop manual, remove the carburetor/intake manifold, valve covers, radiator, water pump and other engine accessories that interfere (air conditioning, smog pump, etc.). You'll need a special puller to remove the crankshaft harmonic damper (available from most tool rental places). Then remove the timing chain cover. *HINT:* As you unbolt each piece, use a box or plastic bag to store the bolts and other hardware items, adding a note to identify where the pieces go to and anything tricky you'll want to remember during engine reassembly.

With the timing chain and camshaft sprocket and crankshaft sprockets exposed, locate the timing marks on the sprockets. Rotate the engine until these marks are aligned (Fig. 1), at which point the number one piston should be at top dead center (TDC). When installing the new cam, these marks must be aligned or serious engine damage may result.



With the timing marks aligned, remove the distributor cap and make a mark on the distributor body to indicate the position of the rotor; then make a mark on the distributor body and the engine to locate the position of the distributor in the engine. Then remove the distributor.

Remove the timing chain. Unless the engine has a very

low mileage (under 10,000 miles) discard the chain as a stretched chain affects cam and ignition timing.

Remove the rocker arms, pushrods and valve lifters. Discard the lifters. New lifters must be installed with a new camshaft. For a complete job and best performance, the cylinder heads can be removed and disassembled by removing the valve springs and valves (valves and valve seat surfaces may need refacing by a competent machine shop).

In order to obtain maximum potential performance from any camshaft, matching valve springs and special valve stem oil seals should be installed with your new cam.

Replacing The Cam

Remove the camshaft very slowly by pulling on the cam sprocket, being careful not to drag the cam lobes on the bearings inside the block. With the cam out inspect the bearing surfaces for any indication of wear. Corresponding cam bearings should then be replaced. Remove the sprocket from the cam and inspect it closely for worn or broken teeth and inspect the crank sprocket as well. Replace all worn parts as necessary.

Before beginning assembly, compare the part numbers of cam, springs, lifters and other newly purchased products with the listings in this catalog to be certain you have the proper parts. The cam and all components, except hydraulic lifters, should be washed in solvent and dried thoroughly. Coat the cam lobes and distributor drive gear with Camshaft and Engine Assembly Lube or similar molydisulfide assembly lube. Also coat the bearing surfaces on the cam and in the block with top grade engine oil. Bolt the cam sprocket to the cam, including any thrust plate. Check the thrust plate for proper end clearance.

Gently insert the cam into the engine, taking care not to damage the bearings and rotating the cam slowly as you slide it in. With the cam in place, check that the thrust surface of the sprocket touches the block. If the engine has a thrust plate, bolt the plate to the block. Rotate the cam by hand, it should spin freely without any binding. If there is resistance, cam bearings may need to be replaced.

Lifter Installation

Lifter installation is pretty much the same on all styles of lifters. Flat tappet and roller applications have the same basic installation.

First the camshaft must be fully installed before this procedure is started. Wipe lifters clean with a lint-free shop rag. Cleaning with solvents is not required. Coat lifters in clean motor oil. *Note:* Hydraulic lifters should never be pumped up with oil before installation. This will cause the valve lifter plunger to "top out" rather than it's normal operating height, giving you incorrect valve adjustment.

Install lifters in lifter bores. Roller lifters with tie bars, must have the tie bars and rivet heads installed toward the center of the engine. On big block Chevrolet, the widest distance between the bends on the bar must be up. On Chrysler LA engines, the rivet heads must face the block. Performance upgrade (O.E. style roller) lifters use stock anti-rotation systems and do not require orientation.

With all lifters in place, apply pressure against the cam sprocket making sure the thrust faces are in contact. Rotate the cam to make sure there is no resistance with all lifters in place. If there are hard spots or other rotation interference, check for proper alignment of cam lobes and lifters (Fig. 2).

Identify the intake versus exhaust lifter bores on each side of the engine. This can easily be done by rotating the engine by hand and watching the lifters as they rise and

fall. The exhaust lifter always rises before the intake lifter as the engine is rotated in its normal direction. If you are not sure, refer to your service manual.

After putting a light coating of assembly lube on both ball ends of the pushrods, install pushrods in lifters.

Install rocker arms and adjusting nuts/bolts, but do not tighten.

On one cylinder, rotate the engine in its normal direction of rotation until the exhaust lifter is just starting to rise. The intake lifter is now on the base circle.

On hydraulic cam applications, snug down adjuster on the intake rocker arm by hand just until a slight drag is felt on the pushrod as you try to rotate the pushrod by hand. This is zero lash. Tighten the adjuster 1/2 to 3/4 of a turn more (.030") and secure. This is the lifter preload. For performance O.E. style hydraulic roller applications, tighten the hold-down bolt and torque to factory specifications. Use a feeler gauge to check for clearance between the clip in the lifter and the pushrod socket. If pre-load is incorrect, use shims or other means to achieve the correct pre-load of .030". For some GM applications, a bleed down procedure is required. Refer to service manual.

Note: All hydraulic lifter applications require the proper lifter pre-load. While many valve trains are non-adjustable from the factory, it is imperative the correct pre-load is verified for proper operation and service life.

For mechanical cam applications, snug down adjuster on the intake rocker arm by hand just until a slight drag is felt on the pushrod as you try to rotate the pushrod by hand. This is zero lash. Loosen the adjuster until the proper feeler gauge (same size as lash) will fit between the valve and the rocker. Make sure there is only a slight drag on the feeler gauge, then secure.

Repeat the process on the exhaust lifter. Rotate the engine in its normal direction of rotation until the intake lifter just falls to its base circle. The exhaust lifter is now on the base circle. Then repeat the process listed above. Repeat this process with the remaining cylinders. Be sure all the pushrods are properly seated in all the rocker arms and the lifters.

Your lifters are now properly adjusted. Please note that as you are rotating the engine, previously adjusted lifters may collapse and recover as the lifter is under valve spring load. While the lifters come from the factory with leak-down fluid in them which was used to verify the bleed rate, some of this fluid may have leaked out during shipment. As soon as the engine is started, the lifters will pump up and the pre-load will self-adjust to the correct height.

Carefully remove the cam sprocket and reinstall with the timing chain. Be sure to use Loc-tite or equivalent on each sprocket bolt. Be sure timing marks on cam and crank sprockets are aligned. Proper torque on sprocket bolts is

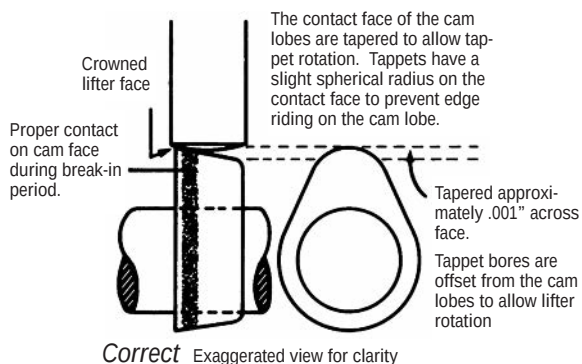
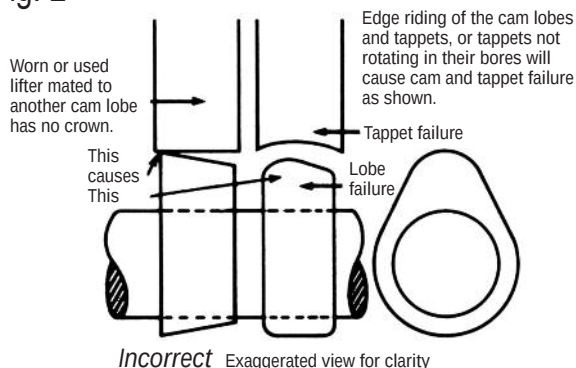


Fig. 2



critical; use a torque wrench and obtain tightening specs from your shop manual. After installation, again check for proper cam lobe/lifter alignment. On three-bolt cam sprockets, we suggest using a safety wire or camshaft lock plate (94550). If the sprocket should come loose, cam lobe and lifter damage will result.

Pushrod Length Procedure

You will need to obtain an adjustable length checking pushrod (92129-92133).

In order to verify the correct pushrod length, it is best to have the intake and exhaust valves of one cylinder fitted with light checking springs in place of the valves springs. This will allow the engine to be rotated by hand with the entire valve train of that cylinder installed without collapsing the hydraulic lifter mechanism.

Install a pair of lifters in the bores of the cylinder which has the light checking springs on the valves. The lifter tie bar (if roller) must be toward the center of the engine and logo on the tie bar must be right side up.

Verify the intake lifter is on the base circle of the cam lobe. To do this, rotate the engine in its normal direction of rotation until the exhaust lifter is just starting to rise. The intake lifter is now on the base circle.

Adjust the adjustable pushrod's length to the proper length for your engine application as a starting point.

Place a light coating of Prussian Blue or equivalent machinist's indicator paste on the tip of the intake valve. Place the adjustable checking pushrod in the lifter seat with the screw adjuster of the pushrod up.

Install the rocker arm and tighten the rocker arm adjuster until the rocker arm tip just barely touches the valve tip and there is no lash on the pushrod side. Do not over tighten the rocker arm adjuster as this will collapse the lifter.

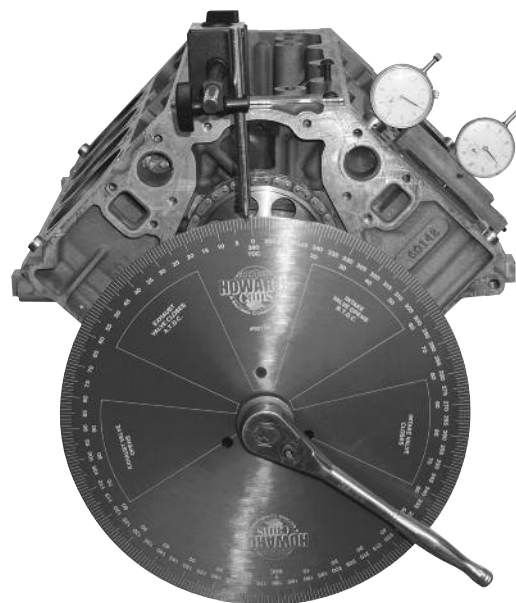
Rotate the engine by hand at least twice and verify there is no lash in the system.

Remove the rocker arm and observe the pattern of the machinist's indicator paste on the valve tip. The pattern should be centered on the valve tip.

If the pattern is too far away from the rocker arm stud, shorten the pushrod, re-adjust the rocker arm and try again. If the pattern is too far toward the rocker arm stud, lengthen the pushrod and try again. Repeat as necessary. Some engines may require the use of shims or other adjustment methods to achieve the correct valve tip pattern.

When you have the proper, centered pattern on the intake valve tip, measure the pushrod length, and repeat the process on the exhaust. To verify the exhaust valve is on the base circle of the cam lobe, rotate the engine in its normal direction of rotation until the intake lifter just falls to its base circle. The exhaust lifter is now on the base circle.

After the lengths have been verified, replace the checking



springs with the valve springs intended, obtain the pushrods, and proceed to the installation procedure.

Degreeing a Camshaft

Variables in the engine, including timing chain stretch, crankshaft sprocket keyway location, cam sprocket key or dowel location and other factors can affect timing. The manufacturing tolerances in these parts can accumulate or be self-canceling. The only way to know for certain...and to get maximum performance from your new cam...is to check the timing and phasing of the cam through a process called degreeing.

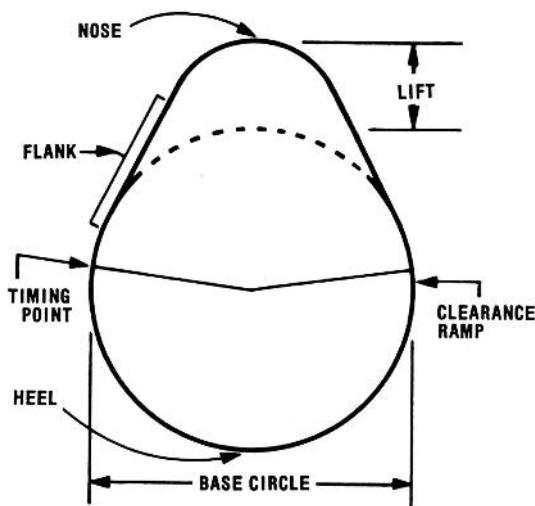
Equipment Needed

To degree your cam, you'll need three items: a degree wheel calibrated in one-degree increments and at least 6" in diameter, a pointer to be attached to the block aimed at the degree wheel, and a dial indicator with a minimum of 0.500" travel. You'll also need a method of attaching the dial indicator.

The engine must be sufficiently torn down to allow removal of pushrods and lifters and the cylinder head covering number one cylinder must be removed.

First, attach a degree wheel to the crankshaft. Next, install the pointer. This must be securely bolted to the engine block and must be rigid to assure accuracy of readings. The pointer's free end should almost touch the degree wheel. A wire pointer is commonly used, but one fashioned from sheet stock (aluminum will do) is best because it is more rigid.

Rotate the crankshaft until number one cylinder's piston is as close to top dead center as possible. (Top dead center is the highest point the piston reaches in number one cylinder). Adjust the degree wheel so the pointer is aimed at the TDC mark.



Cam Lobe Terminology

Finding TDC

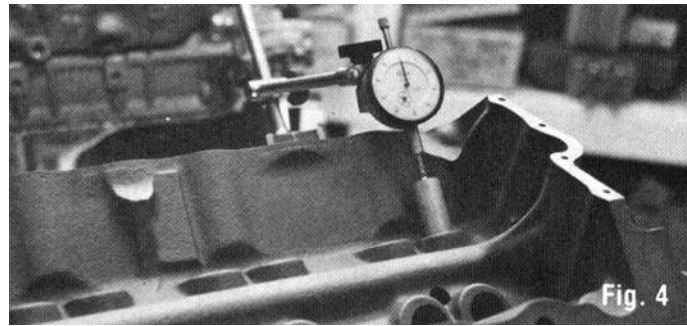
A dial indicator is used to determine top dead center. The key to accuracy is in the firmness of the mounting of the dial indicator over cylinder number one. The indicator must securely and positively mount to the head surface of the block.

Place the dial indicator over the cylinder and set the zero mark at roughly the piston's highest point. Rotate the engine counterclockwise to 0.100 inch down and then rotate the crank clockwise to where the piston is 0.050 inch down in the bore. Record the degree-wheel reading. Then continue to rotate the piston clockwise through TDC to 0.050 inch down on the dial indicator to the opposite side of TDC and read the degree wheel. Top dead center will be halfway between these two temporary marks.

For example, if your first mark was at 35° and the second mark was at 41° (on the other side of the degree wheel's indicated 0° or TDC), add the two figures together (35 plus 41 equal 76), and then divide by two to find true TDC. In this case, 76 divided by 2 equals 38. This true TDC will be obtained by rotating the crankshaft until the pointer is aligned with 38° on the degree wheel.

Without moving the crankshaft, loosen the degree wheel and rotate it until the pointer indicates the figure (in this case 38°). Rotate the crank slowly in the opposite direction from the last time until the noted dial indicator reading. The pointer should indicate the same reading (38° in our example), but on the other side of the 0° or TDC mark.

To check your accuracy, repeat the rotation and counter-rotation process outlined above. This time, the pointer should give the exact same reading each time, except on the opposite sides of the TDC/0° mark.



Finding The Cam Centerline

Depending on the mount you use and the length of the indicator's stem, you may need an extension to link the lifter and the indicator. Use the same type lifter for checking that will be used in the completed engine. You can not use a roller tappet on a flat-tappet cam nor can you use a flat-tappet lifter on a roller cam. Using a cam checking tool such as Proform 66838 with the correct tip is also suggested.

Rotate the crankshaft until the intake lifter for cylinder number one is riding on the base circle. Mount the dial indicator on this lifter. Do not place the tip of the dial indicator in the pushrod cup of the lifter to read lift. The lifter cup radius offers no flat area for repeatability. Instead, use the edge of the lifter or build a dedicated lifter with a flat that will accurately locate the dial-indicator plunger. Make sure the dial indicator travels roughly the same angle as the lifter. If the heads are bolted on the engine, you can use a pushrod to move the dial indicator. *Note:* All other lifters and all pushrods should be removed. The indicator should be located so that the stem is depressed 0.020" to 0.030" into the operating range, then set the dial to zero.

Rotate the engine slowly in the normal direction of rotation to several revolutions and make certain that the indicator always returns to zero when the lifter contacts the base circle of the lobe. If it doesn't, the lifter is sticking and must be freed prior to any checks being made. Watch any flexing in the indicator mount.

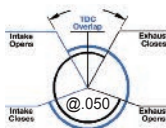
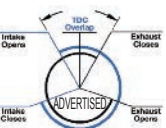
Begin by rotating the engine clockwise until the dial indicator reads max lift. Zero the dial indicator and rotate the engine counterclockwise until the dial indicator reads roughly 0.100 inch down from max lift. Slowly rotate the engine clockwise until the dial indicator reads 0.050 inch from max lift and record the number shown on the degree wheel. Next, continue to rotate the crankshaft clockwise until the dial indicator reads 0.050 inch on the closing side of the intake lobe from max lift and record the number shown on the degree wheel.

Back the engine up to 0.100 inch on the dial indicator before taking the reading at 0.050 on the opening side of

the lobe because traveling past the data point and then turning the engine clockwise to approach the 0.050-inch data point removes any slack that may be present in the timing chain that resulted from turning the engine backward. This is why you don't turn the engine counterclockwise to 0.050, but rather go past it and then turn clockwise up to the first checking point. It's a small point, but accuracy is our goal.

Adding these two numbers together and dividing by two will give you the intake centerline. For example, if your first mark was at 65° and the second mark was at 152°, then $65 + 152$ equals 217, divided by 2 equals 108.5 degrees ATDC.

Compare this number (in this case 108.5) with the lobe centerline listed on the timing card. Taking the lobe centerline from your timing card and subtracting the centerline you got from your measurements will give you the cam advance. For example, if the cam card reads 110° lobe center and your measurements give you 108.5°, then $110 - 108.5 = 1.5$. This is the advance at the crank. Remember for every time your cam rotates once your crankshaft rotates twice. So the advance at the cam gear is half (in this case .75°). This can be corrected with multiple keyway crank gears, offset crank keys or offset cam bushings.

This Data to be used for Degreeing Purposes only.	
 GROSS LIFT AT CAM Intake _____ Exhaust _____ DEGREE OF DURATION @ .050 Intake _____ Exhaust _____	 RUNNING CLEARANCE Intake _____ Exhaust _____ VALVE LIFT Intake _____ Exhaust _____
RECOMMENDED VALVE SPRING INFORMATION SPRING PART # _____ INSTALLED HT. _____ INS. = _____ LBS. _____ OPEN HT. _____ INS. = _____ LBS. _____	
DEGREES OF DURATION Intake _____ Exhaust _____ LOBE CENTER _____ PROFILE NUMBER _____ PART NUMBER _____	

Camshaft Tuning

There are two reasons for altering the phase relationship between the camshaft and the crankshaft. By advancing or retarding the cam in relation to the crankshaft you can:

- 1) Correct a valve timing error (as above). Minor variations from the cam's specs can be caused by a build-up of tolerances in the engine, which cannot be controlled by the camshaft manufacturer. Included are wear of gears, position of keyways.
- 2) Alter performance. Effective valve timing is a compromise between efficient performance at low and high engine speeds. One cam cannot give both with maximum efficiency. You know where you want your engine to give maximum performance and advancing or retarding the cam allows you to dial it in to suit your needs and your engine.

Advancing & Retarding

By advancing the cam in relations to the crank, the valves open and close earlier. Duration and overlap remain unchanged. Advancing raises the cylinder pressure (due to earlier valve closing) and improves low-and mid-range torque at the expense of some top-end power. The result is similar to using a shorter-duration cam since the intake valve closing point is more critical than its opening point.

Retarding the cam so valves open and close later has the opposite effect. This should increase top-end power at the expenses of low-and mid-range torque. Thus:

Advance Cam: More low-and mid-range torque.

Retard Cam: More top-end power.

Advancing and retarding are easily accomplished with off-set bushings or keys for the cam or crankshaft, depending on the engine. Remember that one crankshaft degree equals to camshaft degrees.

How Much is Enough?

Considerable trial and error is involved in advancing and retarding a cam to alter performance. However, two degrees isn't enough to feel and eight degrees may begin hurting overall performance. Four degrees will usually achieve the desired results and six is probably the maximum you'll need.

Our experience indicates that a cam advance of 2 to 6 should give the best overall performance. These settings have even helped top-end power in many engines.

Retarding the cam is usually restricted to all-out competition engines where low rpm use is not a consideration.

Before attempting to advance a retard or cam, you must know the actual valve timing, not the manufacturer's specifications. See the procedures covered earlier in "Degreeing a Camshaft".

Important notes: Advancing and retarding a cam will move one valve closer to the piston. Valve-to-piston clearance must be checked after advance or retard alterations to prevent possible engine damage. Also, changing the cam timing will also change ignition timing, which must then be reset.

Changing the Valve Lash

Altering valve lash with mechanical lifter cams is a trick used successfully by many racing mechanics. Because the cam lobe does not start to lift the valve until it rotates far enough to take up all valve lash, the greater the lash, the later the valve opens and the earlier it closes. That shortens duration (as does advancing the cam). Smaller lash opens the valves earlier and closes them later for longer duration.

Greater Lash: Increases low- and mid-range torque at the expense of top-end power.

Smaller Lash: Increase top-end power at the expense of low- and mid range torque. Increased rpm may also result.

A change of 0.001" in valve lash equates to approximately 3° in duration. Increasing lash above manufacturer's specifications should be approached with caution, particularly in high-rpm engines. In such cases, the valve might hit its seat upon closing, without being cushioned by lobe clearance ramp, causing high shock loads in the valve train. Lash should not be increased more than 0.004" above the specified lash. If greater lash produces much better performance you should consider advancing the cam. Decreasing valve lash below engine manufacturer's specs isn't as critical from the standpoint of mechanical problems. The only concern here would be valves running hot because they aren't on the seats long enough to transfer sufficient heat to the cylinder head. This isn't important on drag racing engines, but is on some endurance engines that operate for longer periods of time. Finally, be sure to change intake lash and exhaust lash by the same amount so wider settings can be used on the exhaust. You need extra clearance to allow for heat expansion on the exhaust side.

Valve Train Interference

It is critically important to check four main areas for possible valve train component interference, which can quickly damage a cam, lifters, pistons and other parts. You need to check valve to piston, coil bind, retainer to seal and/or guide, and retainer to rocker arm. When in doubt, check with an experienced mechanic.

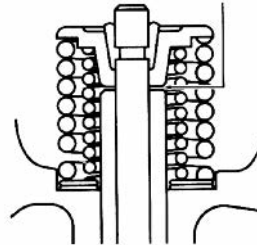
Valve to Piston

The high lift and long duration of a performance cam can cause interference between valves and pistons, quickly leading to bent valves and/or cracked pistons. Clearance between the two should be checked after the cam timing has been set and also after advancing or retarding a cam. To check for adequate clearance, place a 1/4" thick strip of modeling clay on any piston, covering the valve pocket area. Cover the clay and valve face with engine oil to prevent sticking. Install the head gasket and head, using standard torque specifications for the bolts surrounding the one cylinder where the check is being made.

Valve Spring Coil Clearance (Coil Bind)

Coil clearance is the distance between the valve spring coils when the valve is at maximum lift (fully open). A minimum of 0.060" must exist between the coils at maximum lift. Coil bind is when the valve spring is compressed fully to the point that all the coils are "stacked up" on top of each other. .100" is recommended for high RPM applications. Coil bind is a catastrophic condition that will result

ALLOW 1/4-INCH TO 3/8-INCH SAFETY MARGIN AT FULL VALVE LIFT SO THAT RETAINER CANNOT STRIKE GUIDE

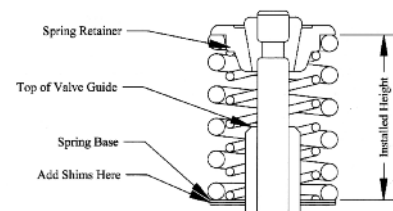


in valve train failure. Disassemble each spring (if multiple springs are employed at each valve). Check all the springs (both inner and outer springs). If there is not 0.060"-0.100" minimum clearance between the coils, the solutions are:

the valve retainer, the valve locks, the valve, or the spring must be changed; the spring pocket must be machined. Keep in mind that these modifications will change the valve spring installed height.

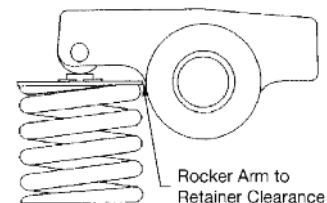
Spring Retainer to Valve Seal or Guide Clearance

The distance between the bottom of the valve spring retainer and the top of the valve guide/seal must be 0.090" larger than the valve lift of the camshaft. If not, you must machine the top of the guide for correct clearance.



Retainer to Rocker Arm Clearance

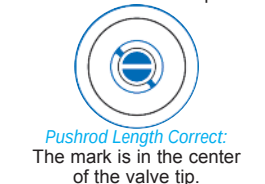
When installing the rocker arms, check to see that the bottom of the rocker arms clear the spring retainers. Many rocker arms have a cut to accommodate large valve spring retainers.



How to Check for Correct Rocker Geometry

After you have estimated the required pushrod length using a Pushrod Length Checker, use this guide to check for proper alignment.

- 1) The first step is to install a solid lifter and an adjustable pushrod. Mark the tip of the valve with a machinist dye or ink.
- 2) Install your rocker arm and set it up with zero lash.
- 3) Rotate the crankshaft clockwise several times. Take off the rocker arm. The pattern of the rocker tip will be where the ink has been wiped away from the valve tip. The pattern should be centered on the valve tip. If not, adjust the



pushrod length to center the pattern.

Camshaft Break-in

The first few minutes of engine operation after installing a new cam are critical. It takes time for the engine's oiling system to reach efficiency and while you're waiting for that to happen, metal-to-metal contact can occur. If it does, something is going to fail then or later. Especially critical is the lifter/cam lobe area. If metal touches metal here without benefit of solid lubrication, galling will occur and something (the lifter, the lobe or both) is going to fail. To prevent these and similar problems not covered by any warranty, please follow the steps outlined here:

1) New lifters must be installed with any new cam installation. The surface of a new lifter, which rides on the cam lobe, has a spherical shape with a 0.002" crown, which is almost impossible to detect. Used lifters won't have that crown and will quickly destroy cam lobes (see Fig. 2. "How to Install a Performance Camshaft"). *Note:* that if you later take your engine apart, lifters must be reinstalled in the bore from which they were removed. Each lifter wears in a way that mates it to a given cam lobe; switching lifters is the same as using old lifters with a new cam.

2) Install the valve train components (lifters, valves, springs, etc.) recommended by the cam manufacturer. These items have been tested and proven for compatibility with the cam.

3) Coat the cam lobes, distributor drive gear, lifter cam faces and other critical components with a moly-disulfide lube like our Camshaft and Engine Assembly Lube for protection against metal-to-metal contact during initial break-in.

4) Check the entire valve train for interference and adequate clearance during assembly. The four areas of major concern are covered in "How to Install a Performance Camshaft."

5) Fill the oil pan with top-quality MS-DG engine oil meeting the SAE or API specifications set by the engine manufacturer.

A Pennsylvania-based detergent oil is preferred. Use a straight viscosity of 20W or 30W for break-in; do not switch to a multi-viscosity oil until after the break-in period. **For flat tappet applications, a zinc-phosphorous additive must be added, such as MAX Z.P.M. (99000), to the engine oil during break-in.**

6) Before starting the engine be sure:

- The valves are correctly adjusted. Set solid lifters 0.003" to 0.005" tighter than specified.
- To prime the oil system by turning the oil pump manual-

ly until pressure is indicated on the oil gauge. Be sure crankcase is filled to proper (normal) level.

- To put gas in the carburetor float bowls, prime the accelerator pump and have gas in the tank.
- There's water in the radiator.
- The battery is charged.
- Nothing will get caught in the fan, fan belts, and alternator/generator belt or by the crankshaft. Check the entire engine compartment for loose tools or parts.
- Ignition timing is set accurately.

To avoid galling, the engine should start right away. Avoid a long grind on the starter and over cranking the engine before firing. Low oil pressure could damage camshaft and other components.

7) When the engine fires, immediately rev it to 1800-2400 rpm. Do not idle the engine for the first 20 minutes. Much of the oil for lubrication and cooling the camshaft comes from crankshaft splash. Below 1800 rpm, turbulence is probably not enough to lubricate the cam fully. The engine may be run on the road or in the shop, but the shop is best. If adjustments are required during the first 20 minutes, shut the engine off.

8) Vary rpm frequently during this initial break-in period to change oiling within the engine.

9) After completing the break-in period, change the engine oil and filter. Regularly change engine oil and filter and maintain proper valve lash adjustment on solid lifter engines.

Following these steps will extend the trouble-free life of your cam and assure you of an engine that delivers the maximum possible performance.



THE IMPORTANCE OF PROPER ROD
BOLT STRETCH/TORQUE...

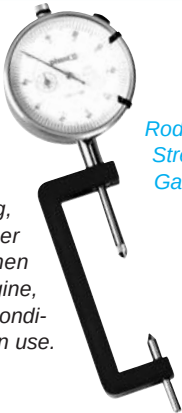
Whether measured by stretch or by torque, properly preloading a rod bolt is essential for trouble-free performance. If a bolt is installed without sufficient preload (or pre-stretch), every revolution of the crankshaft will cause a separation between the connecting rod and rod cap. This imposes additional stretch in the bolt. The stretch disappears when the load is removed on each revolution, or cycle. Over time, this cycle stretching and relaxing can cause the bolt to fail due to fatigue, just like a paper clip is bent back and forth by hand. To prevent this condition, the bolt's pre-load must be greater than the load caused by engine operation.

A properly installed bolt remains stretched by its preload and isn't exercised by the cyclic loads imposed on the connecting rod. A quality bolt will stay stretched this way for years without failing. The important thing is to prevent the bolt from failing due to fatigue by tightening it to a load greater than the demand of the engine. Protect your bolts and tighten them as recommended.

You can easily monitor the condition of the rod bolts through use of a stretch gauge. Prior to installing the rod, measure the length of the bolt in a "relaxed" (untorqued) state. Write this down. When you tear the engine down for maintenance, again measure the length of each rod bolt - being careful to keep everything in the proper order. If any of the rod bolts have taken a permanent set and have stretched by .001" or longer you should replace the fastener *IMMEDIATELY!* This stretching is a sure indicator that the bolt has been compromised and taken past its yield point.

In other types of bolted joints, this careful attention to tightening is not as important.

A rod bolt stretch gauge is one of the most important tools a serious engine builder can own. It's valuable in properly setting up a rod for resizing, obtaining the proper torque load when installed in the engine, and monitoring the condition of the bolt while in use.



Rod Bolt
Stretch
Gauge

For example, flywheel bolts need only be tightened enough to prevent them from working loose. Flywheel loads are carried either by shear pins or by side loads in the bolts; they don't cause cyclic tension loads in the bolts. Connecting rod bolts, on the other hand, support the primary tension loads caused by engine operation and must be protected from cyclic stretching. That's why proper tightening of connecting rod bolts is so important.

Friction is an extremely challenging problem because it is so variable and difficult to control. The best way to avoid the pitfalls of friction is by using the stretch method. This way preload is controlled and independent of friction. Each time the bolt is torqued and loosened, the friction factor gets smaller. Eventually, the friction levels out and becomes constant for all following repetitions. Therefore, when installing a new bolt where the stretch method cannot be used, the bolt should be tightened and loosened several times before final torque. The number of cycles depends on the lubricant. With moly, five loosening and tightening cycles are sufficient.

TORQUE SPECIFICATIONS		
Part # (Size)	Stretch +/- .0002"	Torque (w/extreme Pressure Lube)
MSAMSP05005 (5/16" x 1.450" 235,000)	.0080"	40 ft lbs
ARP4AJ1.500-1SU (3/8" x 1.500" 180,000)	.0047"	50 ft lbs
ARP4AJ1.500-2SU (3/8" x 1.500" 215,000)	.0057"	45 ft lbs
ARP4AJ1.500-6SU (3/8" x 1.500" 260,000) L-19	.0057"	50 ft lbs
ARP4AP1.550-2LU (7/16" x 1.550" 220,000)	.0058"	70 ft lbs
ARP4AP1.600-2LU (7/16" x 1.600" 220,000)	.0062"	70 ft lbs
MSAMSP07004 (7/16" x 1.600" 230,000)	.0088"	78 ft lbs



Apparel

HRCHAT	Hat Beige/Black	SHIRTB-S	T-Shirt Howards Cams Black, Small
SHIRT-S	T-Shirt Howards Cams White, Small	SHIRTB-M	T-Shirt Howards Cams Black, Medium
SHIRT-M	T-Shirt Howards Cams White, Medium	SHIRTB-L	T-Shirt Howards Cams Black, Large
SHIRT-L	T-Shirt Howards Cams White, Large	SHIRTB-XL	T-Shirt Howards Cams Black, X-Large
SHIRT-XL	T-Shirt Howards Cams White, X-Large	SHIRTB-XXL	T-Shirt Howards Cams Black, 2X-Large
SHIRT-2XL	T-Shirt Howards Cams White, 2X-Large	SHIRTB-XXXL	T-Shirt Howards Cams Black, 3X-Large
SHIRT-3XL	T-Shirt Howards Cams White, 3X-Large	SHIRT-RTL-R-S	T-Shirt Rattler Black, Small
SHIRT-4XL	T-Shirt Howards Cams White, 4X-Large	SHIRT-RTL-R-M	T-Shirt Rattler Black, Medium
SHIRT-RETRO-L	T-Shirt Retro Logo White, Large	SHIRT-RTL-R-L	T-Shirt Rattler Black, Large
SHIRT-RETRO-XL	T-Shirt Retro Logo White, X-Large	SHIRT-RTL-R-XL	T-Shirt Rattler Black, X-Large
SHIRT-RETRO-XXL	T-Shirt Retro Logo White, 2X-Large	SHIRT-RTL-R-2XL	T-Shirt Rattler Black, 2X-Large
SHIRT-RETRO-3XL	T-Shirt Retro Logo White, 3X-Large	SHIRT-RTL-R-3XL	T-Shirt Rattler Black, 3X-Large