RED SHIFT
PERFORMANCE CAMSHAFTS

Available for Twin Cam®, Evolution® Big Twin, Sportster®, XR1200® and Buell® Models

About Red Shift®

For over 30 years, Red Shift® Performance Camshafts have been the choice of high performance engine builders. Master engine developer and Red Shift® Performance Camshaft designer Dick Hilferty has always been at the forefront in all forms of racing and performance applications. Today, Dick Hilferty's designs are manufactured at Zipper's Performance Products with the most advanced engineering design processes built into every cam. Zipper's Performance Products has always believed that power gains should be achieved by improved dynamics and efficiency, not by compromising valve train component reliability. Let Red Shift® Cams create the power that you desire while protecting the investment that you have in your engine and valve train. Engineered and Manufactured in the U.S.A.

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Products shown not for sale or use on pollution controlled vehicles.

ZIPPER'S PERFORMANCE PRODUCTS

v.20160215

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Red Shift® Application Matrix for 1999-Up Twin Cam® Engines

		1999-2006				2007-UP					Big Inch Aftermarket			
Displacement		**88**	**95**	**103**	**107**	**96**	**103**	**106 107**	**110**	**117**	**120**	**120R**	**124**	**131**
Bore		3.750"	3.875"	3.875"	4.125"	3.750"	3.875"	3.927"	4.000"	4.125"	4.125"	4.060"	4.125"	4.312"
Stroke		4.000"	4.000"	4.375"	4.000"	4.375"	4.375"	4.375"	4.375"	4.375"	4.500"	4.625"	4.625"	4.500"
Factory Stock Engine, Unmodified Heads & Compression	**Early Torque**		527	527		525	525	527	587			657	657	657
	Balanced TQ/HP	557	557	575		527 575	527	575	587			627	627	627
Modified Street PUMP GAS, Modified Heads, & Increased Compression	**Early Torque**		527	575	575	527	527	575 576	575 576	577	657	657	657	657
	Balanced TQ/HP		577	577	657	575 576	575 576	577	657	657	627	627	627	627
	Big HP		657	657	647	577	577 627	627	657 687	627	647 687	647 687	647 687	647 687
Race Only Race Fuel & High Compression	**Balanced TQ/HP**		657	657	657		657		647	657	627	627	627	627
	Big HP		627, 647 or 727	627, 647 or 727	627, 647 or 727		627 647		687 727	627, 647 or 687	647, 687 or 727	647, 687 or 727	647, 687 or 727	647, 687 or 727

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Red Shift® Specs for 1999-Up Twin Cam® Engines

Cam Model	Valve	Intake Timing	Exhaust @0.053		Duration	TDC Lift @ Valve	Valve Lift	Model Year	Bolt-In?	Recommended Valve Spring
525TC	Intake	12	92	18	210	0.139	0.475	'07-Up	Yes*	Factory Beehive
	Exhaust	36	104	13	229	0.139	0.525			
527TC	Intake	18	100	36	234	0.170	0.525	'99-'04	No	538-111
	Exhaust	42	106	12	234	0.138	0.525	'05-Up	Yes*	Factory Beehive
557TC	Intake	20	100	42	242	0.180	0.557	'99-'04	No	538-111
	Exhaust	44	104	18	242	0.164	0.557	'05-Up	Yes*	Factory Beehive
575TC	Intake	25	97	41	246	0.200	0.575	'99-'04	Yes (CVO)	538-111
	Exhaust	49	105	17	246	0.157	0.575	'05-Up	Yes*	Factory Beehive
576TC	Intake	25	97	41	246	0.215	0.576	'07-Up	No	CVO110 or 538-111
	Exhaust	49	105	17	246	0.162	0.576			
577TC	Intake	25	100	47	252	0.214	0.577	'99-'06	No	538-111 or 528-972
	Exhaust	49	104	23	252	0.194	0.577	'07-Up	No	
587TC	Intake	19	98	35	234	0.186	0.590	'07-Up	No (Std TC) Yes (CVO)	CVO110 or 538-111
	Exhaust	43	106	11	234	0.136	0.590			
627TC	Intake	30	100	50	260	0.240	0.625	'99-'06	No	528-972
	Exhaust	61	107	27	268	0.207	0.600	'07-Up	No	
647TC	Intake	26	106	58	264	0.211	0.647	'99-'06	No	528-972
	Exhaust	58	106	26	264	0.211	0.647	'07-Up	No	
657TC	Intake	27	99	45	252	0.227	0.657	'99-'06	No	528-972
	Exhaust	52	104	27	259	0.214	0.650	'07-Up	No	
687TC	Intake	35	102	63	278	0.275	0.689	'07-Up	No	528-927
	Exhaust	67	110	31	278	0.233	0.689		No	
727TC	Intake	35	105	66	281	0.290	0.727	'99-'06	No	528-927
	Exhaust	67	112	34	281	0.269	0.727	'07-Up	No	

*Bolt-In for 2005-Up Engines (Beehive Valve Spring)

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Red Shift® Performance Cams for 2007-Up* Twin Cam® Engines

The 4.375 stroke in current H-D® engines has changed the cam dynamic from earlier model 88" engines. These Red Shift® grinds are developed as part of a system with the engine to produce the best results for your particular riding style. We recommend pressure testing cam plates for leaks, valving improvements, new cam bearings and performance tappets when upgrading cams in a Twin Cam® engine. For more advice for your application contact: zippers@zippersperformance.com

**These cams can also be used in 2006 FXD engines.*

525-HS: Extremely popular Early (High)-Torque for 96" and 103" Twin Cam® engines with stock, unmodified heads. Perfect for 96" and 103" 2007-Up Touring models, this cam was developed to deliver immediate passing power in 6th gear at any typical cruising speed. Power starts before 2000 RPM – Bolt-In, Can be used with stock or adjustable pushrods.

DESCRIPTION	CHAIN DRIVE	GEAR DRIVE
Red Shift 525-HS '07-Up	**#413-905S**	**N/A**

527-HS: High-Torque design developed as a bolt-in cam for 96" to 110" O.E. engines. Delivers smooth and impressive Torque and Horsepower increases over the factory installed cams. Designed to get your motorcycle moving quicker in the areas you ride the most. Power starts at 2250 RPM, for use with OEM "Non-Adjustable" pushrods, or adjustable pushrods.

DESCRIPTION	CHAIN DRIVE	GEAR DRIVE
Red Shift 527-HS '07-Up	**#413-907S**	**N/A**

557-HS: 96-103" Twin Cam® grind. Leans towards balanced power with earlier torque. Smooth quiet operation with excellent control. Strong torque curve works well for riders who want more focus on stronger low-mid range power in a 96" -103" big bore dressers with moderately raised compression. Bolt-in with O.E. conical springs Recommended compression range 9.0 - 10:1. Adjustable pushrods required.

DESCRIPTION	CHAIN DRIVE	GEAR DRIVE
Red Shift 557-HS '07-Up	**#413-911S**	**N/A**

575-HS: The power favorite with many engine builders, this cam develops a good balanced power curve with "severe" acceleration - A very popular grind for hopped up 103", 107" and 110" engines. Use with the stock conical valve springs, this cam is most impressive with added compression and/or increased air flow.

DESCRIPTION	CHAIN DRIVE	GEAR DRIVE
Red Shift 575-HS '07-Up	**#413-926S**	**N/A**

576-HS: This new grind is designed for engines with high flow heads, OS valves/ heaver springs needing an aggressive grind to maximize power. This new ramp design must be used with added spring pressure to assure proper performance. Not recommended as a bolt in for stock 103 engines, can be used as bolt in in CVO 110 yet we recommend added compression to optimize power for 110 engine is recommended.

DESCRIPTION	CHAIN DRIVE	GEAR DRIVE
Red Shift 576-HS '07-Up	**#413-929S**	**N/A**

577-HS: Popular grind for engines as small as a high compression 95" to a 103" and 107", and larger engines with good breathing heads and increased compression. This cam provides smooth useable power, broader timing for more upper mid-range, top-end drive. Performance springs - retainers strongly recommended.

DESCRIPTION	CHAIN DRIVE	GEAR DRIVE
Red Shift 577-HS '07-Up	**#413-921S**	**N/A**

587-HS: A grind designed specifically to bolt in any CVO 110 engine to dramatically improve torque and power over the stock cams.

DESCRIPTION	CHAIN DRIVE	GEAR DRIVE
Red Shift 587-HS '07-Up	**#413-933S**	**N/A**

627-HS: Aggressive design for high output 103", 107" and larger engine conversions. Compliments ported heads, high-flow throttle body, and exhaust. Static compression range 10.5 and up. Broad torque curve, strong pull to 6,000+ RPM, requires performance valve springs.

DESCRIPTION	CHAIN DRIVE	GEAR DRIVE
Red Shift 627-HS '07-Up	**#413-928S**	**N/A**

647-HS: For use with 117" and larger high compression engines. Good valve train dynamics for long life while providing power for severe duty use. Compliments high flow heads, intake and exhaust.

DESCRIPTION	CHAIN DRIVE	GEAR DRIVE
Red Shift 647-HS '07-Up	**#413-931S**	**N/A**

657-HS: Extremely popular grind for 110" and larger modified engines. Max early torque with balanced power for quick acceleration with a heavy payload. Narrower timing increases compression for more low-mid grunt, with excellent peak power. Excellent valve train dynamics for long life, works well with most bagger exhaust.

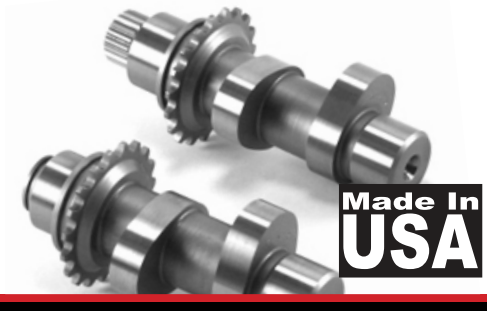
DESCRIPTION	CHAIN DRIVE	GEAR DRIVE
Red Shift 657-HS '07-Up	**#413-941S**	**N/A**

687-HS: This new grind was developed for special application high output engines. Less TDC lift than the RS727 cams for easier fitment with popular aftermarket heads. Requires special set ups with high compression, proper valve springs, and a heavy duty oil system. Available in chain or gear drive applications.

DESCRIPTION	CHAIN DRIVE	GEAR DRIVE
Red Shift 687-HS '07-Up	**#413-945S**	**#413-945G**

727-HS-GD: This is the highest output grind we make, intended for drag racing, LSR or other special high performance applications. Requires highly modified heads with special valve springs, and high compression engines. Extensive set up required for installation. Available in chain or gear drive applications.

DESCRIPTION	CHAIN DRIVE	GEAR DRIVE
Red Shift 727-HS-GD '07-Up	**#413-951S**	**#413-951G**



Red Shift® Performance Cams for 1999-2006* Twin Cam® Engines

Red Shift grinds are developed for use as a system with the engine to produce best results for your particular riding style. Available in standard splined chain drive or configured for use with S&S® Gear-Drive gear sets. We recommend pressure testing cam plates for leaks, valving improvements, new cam bearings and performance tappets with upgrading cams in a Twin Cam® engine. **1999-2006 cams require adjustable pushrods unless noted. These cams cannot be used in 2006 FXD engines.*

All 1999-2006 grinds, unless specifically noted, are not designed to be used with the 1999-2004 OE dual spring. Those engines must have a spring upgrade or use 2005-Up conical springs.

527TC: New High-Torque design for the 1999-2006 engines. Developed as a bolt-in cam for 88-95-98 CI engines for 2005-2006 engines (requires a valve spring change for 1999-2004 engines). Delivers smooth and impressive torque and horsepower increases over the factory installed cams. This High-Torque cam is designed to get the motorcycle accelerating quicker in the RPM area where most people ride. Can be used with stock or adjustable pushrods. Early sprocket, gear drive option coming soon.

DESCRIPTION	CHAIN DRIVE	GEAR DRIVE
Red Shift 527TC '99-'06	**#413-906S**	**N/A**

557TC: 95" Twin Cam® grind. Smooth quiet operation with excellent control. Strong torque curve works well for riders who like cruising at lower RPM's, like a 95" dressers with raised compression wanting balanced torque-power. Bolt-in with conical springs (2005-2006); small amount of case clearance required on some earlier year cases. Recommended compression range 9.5 - 10:1. Adjustable pushrods required.

DESCRIPTION	CHAIN DRIVE	GEAR DRIVE
Red Shift 557TC '99-'06	**#413-910S**	**#413-910G**

575TC: The power favorite with many engine builders, this cam should be used with the OE conical valve spring or lighter pressure dual springs. This cam is most impressive with added compression and or increased air flow. A very popular grind for hopped up 95"-98" and CVO 103" engines with added compression, develops a good balanced power curve with "severe" acceleration. Adjustable pushrods required.

DESCRIPTION	CHAIN DRIVE	GEAR DRIVE
Red Shift 575TC '99-'06	**#413-925S**	**#413-925G**

577TC: Performance cams for 95" and larger Twin Cam® engines. Nice, smooth power and big torque in engines with good flowing heads, increased compression (10.0+) performance ignition, exhaust and a larger carb or throttle body. Bolt-in with conical springs or CVO 103" heads; runs very quiet. Can produce 105-110 rear wheel horsepower and torque in 95" engines. Adjustable pushrods required.

DESCRIPTION	CHAIN DRIVE	GEAR DRIVE
Red Shift 577TC '99-'06	**#413-920S**	**#413-920G**

627TC: Aggressive design for high output 103" and larger engine conversions. Compliments ported heads, high-flow throttle body, and exhaust. Static compression range 10.5+. Broad torque curve, strong pull to 6,000+ RPM. Gear Drive only.

DESCRIPTION	CHAIN DRIVE	GEAR DRIVE
Red Shift 627TC '99-'06	**N/A**	**#413-922G**

657TC: Popular big lift cam, standard equipment in our 1999-2006 Muscle 107" kit. Designed for powerful torque applications; has produced over 120 rear wheel horsepower in a 107" engine with mild compression, mufflers and pump gas. Everything you expect from Red Shift® – broad power, great performance with excellent valve train dynamics.

DESCRIPTION	CHAIN DRIVE	GEAR DRIVE
Red Shift 657TC '99-'06	**#413-940S**	**#413-940G**

647TC: This cam is designed for true big engine performance enthusiasts who require a wide, usable power curve and strong top end charge with excellent valve control. Recommended engine size 116" and up; 10.5:1+ compression for pump gas; for additional power add 1.75 rockers and more compression.

DESCRIPTION	CHAIN DRIVE	GEAR DRIVE
Red Shift 647TC '99-'06	**#413-930S**	**#413-930G**

727TC: The hottest Twin Cam® cam grind we make, intended for drag racing, LSR or other special high performance applications. Requires highly modified heads with special valve springs, spacing and high compression engines. Extensive set up required for installation. Available in gear drive only.

DESCRIPTION	CHAIN DRIVE	GEAR DRIVE
Red Shift 727TC '99-'06	**N/A**	**#413-950G**

RED SHIFT
PERFORMANCE CAMSHAFTS

Top-End Gasket Kits

Choose a full top end gasket kit if you're doing headwork with cam install or a cam-change-only kit for bolt-in cams which do not require head removal (includes cam, tappet, rocker lid gaskets and pushrod o-rings). Quality gaskets from James Gaskets.

PART NO.	DESCRIPTION
#556-595	James TC top end kit w/3-7/8" head gaskets (95, 103")
#456-244	James TC cam change gasket kit

Cam-Related Extras for Twin Cams®

Red Shift® Quick-Change Cam Kits

Want to stay 96", or already 103" and just want to change cams? Zipper's Red Shift® Cam Kits are available with our most popular grinds: Red Shift® 525's, 527's, and 575's. The part numbers listed below include Red Shift® cams, Torrington® cam bearings, and a James cam change gasket set – *everything you need for a quick cam swap!* (575 Kit includes Pro-Taper pushrods)

Recommended: Use with Red Shift® Dual Piston Cam Chain Tensioners for improved cam chest component reliability, maximum throttle response, and reduced valve train noise.

Part No.	CAM ZIP KITS FOR 2007-UP TWIN CAM® ENGINES
#517-305	Red Shift® 525 Zip Kit: Includes Cams, Gaskets, Cam Bearings
#517-307	Red Shift® 527 Zip Kit: Includes Cams, Gaskets, Cam Bearings
#517-310	Red Shift® 575 Zip Kit: Includes Cams, Gaskets, Pushrods, Cam Bearings

S&S® Cam Gear Drive Kit

S&S's Gear Drive kit for Twin Cam® engines replaces the factory cam chain drive with inner and outer gear sets. Decreases drag and torsional load on the camshaft bearings, and eliminates chains, tensioners and guides that will eventually wear out over time. Because the factory chain drive has some slack inherent in its design, there are variations in cam timing that can lead to power losses, especially when high lift cams and performance valve springs are installed. Requires camshafts specifically designed for gear drives (sold separately). Over- and under-size gears are available for custom fitment of gear lash if desired.

'99-'06*	'07-UP	DESCRIPTION
#416-908	**#416-308**	4-pc inner/outer drive gears w/hardware
N/A	**#416-691**	Gear drive installation/oil port blocking kit
**2006 FXD Engines Use '07-Up Gears*		
#416-903	**#416-303**	2-pc outer drive gears only w/hardware
#416-905	**#416-305**	2-pc inner drive gears only w/keys
#416-906	**#416-306**	Undersize rear cam inner drive gear only
#416-907	**#416-307**	Oversize rear cam inner drive gear only
#416-901	**#416-901**	Undersize pinion (crankshaft) drive gear only
#416-902	**#416-902**	Oversize pinion (crankshaft) drive gear only
#416-909	**#416-909**	Replacement key set for gear drive gears

#416-323

Cam Drive Gears for TC Engines

#416-323 Andrews 17T 4° offset cam drive sprocket for 2007-up TC engines. Alters cam timing plus or minus 4°, depending on installation orientation.

Torrington® Cam Bearings

New cam bearings should be installed with any camshaft change. These convenient kits include Torrington® brand, full compliment inner bearings. For '99-'06 engines, choose inner bearings only or inner/outer kits with cam snap ring.

PART NO.	DESCRIPTION
#417-460	'07-up (&'06 FXD) TC inner Torrington® bearing set
#630-974	'99-'06 TC (exc.'06 FXD) inner Torrington® bearing set
#417-450	'99-'06 TC (exc.'06 FXD) bearing I/O kit/chain drive cams
#417-455	'99-'06 TC (exc.'06 FXD) bearing I/O kit/gear drive cams
#758-993	JIMS® inner cam bearing puller for TC '07-up & '06 FXD
#758-279	JIMS® inner cam bearing puller for '99-'06 (exc. '06 FXD)
#758-787	JIMS® inner cam bearing installer for All Year TC
#758-277	JIMS® cam remover/installler,'99-'06 TC (exc. '06 FXD)
#758-280	JIMS® outer cam bearing puller. '99-'06 (exc. '06 FXD)

#498-212

S&S Cam Bearing Retainer

#498-212 Heavy-duty cam bearing retainer plate for '99-'06 TC engines. *(OE #35060-00)*

Twin Cam® Primary Cam Sprocket Spacers

Use sprocket spacers to align the primary cam sprocket with the pinion shaft sprocket when installing new cams in a Twin Cam®.

'07-UP CAM SPROCKET SPACERS, EACH					
.100"	**#450-729**	.110"	**#450-731**	.120"	**#450-734**
.130"	**#450-736**	.140"	**#450-737**	.150"	**#450-738**

#450-726 ''07-up Cam Sprocket Spacers, Set of 5 (.110" - .150")

'99-'06 CAM SPROCKET SPACERS, EACH					
.287"	**#450-722**	.297"	**#450-723**	.307"	**#450-721**
.317"	**#450-719**	.327"	**#450-717**		

#450-700 '99-'06 Cam Sprocket Spacers, Set of 5 (.287" - .327)

Red Shift® Cam Chain Tensioners

Red Shift® Dual Piston Tensioners feature design and manufacturing improvements for superior performance over the stock tensioners. Red Shift® Cam Chain Tensioners are a direct-replacement product designed to improve cam timing accuracy and valve train control at two critical key areas - the drive and driven cam chains on all 2007-up engines. Red Shift® Cam Chain Tensioners are designed for shoe and hydraulic stability, eliminating harmful air leaks in the cam chain tensioning system while dramatically improving overall valve train control and durability.

Red Shift® Tensioners are the finest tensioners on the market, engineered with superior manufacturing and design. Red Shift® Tensioners are manufactured in the U.S.A., from billet aluminum, wear-resistant plastic and automotive grade hydraulic tensioning bodies.

PART NO.	DESCRIPTION
#413-901	Fits all '07-Up Big Twin engines, '06 FXD engines, and all '99-'06 TC® engines converted to hydraulic tensioner systems
#413-902	Red Shift® Cam Chain Tensioners w/Axtell Oil Bypass Valve Kit #620-103 for all H-D® & S.E.® Cam Plates

Axtell Oil Bypass Valve

This is a new product designed and developed by the Axtell Mountain Motor team. This bypass valve consists of a precision-machined "needle and seat" that inserts in place of the factory oil pressure relief valve located within the Twin Cam® cam plate. With the factory OEM oiling system configuration, when oil pressure becomes excessive, it is bypassed from the high pressure side of the feed gerotor back to the low pressure side, "looping" the oil in the feed gerotor gears. This causes the introduction of air into the pressurized oil (aeration) - aerated oil is foamy and spongy, and results in lower oil pressure and volume. When this occurs, the entire oiling system if affected - engine heat and noise builds, piston oilers shut down sooner than designed, valve train and top end life is shortened. This system blocks the factory port back to the feed side of the pump and directs the bypassed oil into the cam chest. The scavenge side of the oil pump returns the excess oil to the oil tank and eliminates the oil "looping" and its negative effects.

Cam Plate Cutaway with #620-103 Bypass Valve
Fluted Design of Needle Allows Oil Flow Through Valve

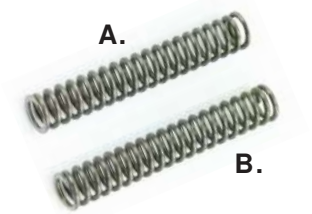
With the Axtell valve you can expect higher, more stable oil pressure at all engine rpms, longer oil life due to reduced oil shear, lower oil and engine temperature, improved valve train control and reduced noise. Zipper's recommends this for use with our Red Shift® Dual Piston Cam Chain Tensioners. Fits all factory H-D® and Screamin' Eagle® cam plates.
Patent Pending #61/693,612

PART NO.	DESCRIPTION
#620-103	Axtell Bypass Valve for All Harley-Davidson® and Screamin' Eagle® Brand Twin Cam® Cam Plates
#413-902	Red Shift® Cam Chain Tensioners w/Axtell Oil Bypass Valve Kit #620-103 for all H-D® & S.E.® Cam Plates

Baisley Precision-Ground Bypass Plunger

#626-010 The factory-installed plunger valve does not have a concentric taper where the valve seats on the cam plate bypass passage and is known to leak pressure at lower engine rpm's. Baisley's Precision-Ground Oil Pressure Relief Valve has a concentric taper that is designed to improve sealing and oil pressure below the blow-off point, enhancing and stabilizing oil pressure to critical engine components. Fits all Twin Cam® engines

#626-010



Oil Pressure Relief Valve Springs

A. Baisley Hi-Performance LMR-2: 6.2 lbs of Seat Force, 14.2 lbs fully compressed
Baisley springs offer increased seat pressure and overall spring force. Baisley springs operate in a progressive manner, and are precision ground to exact lengths. **#626-002**

B. Baisley Hi-Performance LMR-4: 7.0 lbs of Seat Force, 16.7 lbs fully compressed
Baisley Hi-Performance springs operate in a progressive manner, and are precision ground to exact lengths. LMR-4 is best for use in large displacement engines with upgraded oil pumps and aggressive cams. **#626-004**

Zipper's '99-'06 Twin Cam® Oil Bypass Shim

The TC engine features an oil pressure bypass passage within the cam support plate that is controlled by a spring-loaded plunger. Inconsistencies in 1999-2006 spring length and passage machining can cause the plunger to open prematurely and/or not fully close the passage, resulting in a loss of critical oil pressure and volume at lower RPM's. This shim assures proper spring pre-load, improving oil pressure and volume.

DESCRIPTION	EACH	5-PACK	10-PACK
Zipper's '99-'06 TC88 Oil Bypass Shim	#617-602	#617-603	#617-604

Some products on this page are not for sale or use on pollution controlled vehicles.

How to Order Red Shift® Cams for Sportsters®

Red Shift Sportster® and Buell® cams can be ordered two ways. You can provide Zipper's your original cam gear set (A) from your engine, and we will remove the factory stock lobes (B) and replace them with new, hand-timed Red Shift lobes ground from 8620 steel billet (C). H-D® had gone to great pains to tighten gear lash on pre-2000 engines, using literally hundreds of cam gear sizes to match manufacturing differences during engine mass production. Installing the Red Shift lobes on the factory gear set retains this precise fitment.

If no cores are available or you do not want to wait (in-house production time is usually 2-3 weeks), you can order your cams installed on our new gear cores. Our cam gears feature a keyed drive to prevent gear slippage in severe applications, and are available with the #2 drive gear in the pre-2000 wide pitch design (D) or in the fine pitch used in 2000 and later engines (E).

Performance Notes: Any camshaft above .600" of lift on factory cores will require the press-fit #2 drive gear to be welded (F) to prevent rotation (Zipper's new gear cores use a keyway on the #2 drive gear (G) to prevent rotation and do not require welding). Red Shift Sportster® cams can be timed and shipped un-welded, giving the performance engine builder final control of desired cam timing. This is required for any aftermarket 4-cam cases and recommended for all-out competition engines, due to manufacturing variations in case and component production. Early XR-style intake and exhaust patterns can be easily adapted. Call or write with your special requests.

The one thing that the following cam grinds have in common is that they usually service engines that will be run hard! For these cams to be able to deliver maximum output reliably, consideration must be given to the entire valve train especially in the area of the lifters and valve springs. The lifters in 5-speed XL® engines use guide pins against a flat area on the lifter body to control lifter rotation within the bore; they are tricky to modify properly for high lift cams and are prone to rotation in the bore. The stock lifters in '91-'99 engines should be replaced with units that are designed for increased lift and improved cam following such as JIMS® PowerGlide II lifters. A Zipper's Tappet Pin kit must be used on 'L94-'99 engines. Engines that will see RPM above 6,000 require stiff pushrods and heavier valve springs with titanium collars to reduce valve train weight and maintain valve control. Once control is lost, performance suffers and expensive parts get beat up in a hurry. Before making your purchase, think of the cams as only part of your valve train system. Contact us if you need help selecting the other supporting components.

Red Shift® Application Matrix for 1986-Up Sportster® Engines

		1991-Up 5 Speed Evolution (XL, XB & XR1200)				1986-1990 4 Speed Evolution			
Displacement		**883cc**	**1200cc**	**88"**	**99"**	**1200cc**	**88"**	**99"**	**100"**
Bore		3.000"	3.500"	3.812"	3.812"	3.500"	3.812"	3.812"	4.000"
Stroke		3.812"	3.812"	3.812"	4.312"	3.812"	3.812"	4.312"	4.000"
Modified Street PUMP GAS, Modified Heads, & Increased Compression	**Balanced TQ/HP**		567 or 575	605/591 or 630/585	605/591 or 630/585	573	615	625	615
	Big HP		585	643	643	573	625	723	723
Race Only Race Fuel & High Compression	**Balanced TQ/HP**	567	585 or 643	605/591 or 630/585	605/591 or 630/585	615	625	625	625
	Big HP	585 or 643	643 or 729	643 or 729	643 or 729	625	723	723	723

Red Shift® Cams for 5 SP EV/ XB/ XR Sportsters®

*These engines have on-center tappets (tappet centerline in line with cam shaft centerline)*Most of our 5-speed XL cams require some clearance work to swing clearly in the engine case. This can be accomplished with our cam clearance tool (#713-908) for a very professional result. 2000 and later models require more extensive clearancing of the case and pinion bearing race. Most models will also require rocker box clearancing for the rocker arms on the pushrod side at full lift. Must be used with adjustable pushrods.

567V2: This extremely popular grind is used in our Super Hammer 1200 kit, produces the widest powerband available for the 5-speed 1200 engine! Narrow TDC lift for uncomplicated head set-up; excellent low end power and with great acceleration. RPM to 7200+ with proper set-up. Optimum performance with 9.8+:1 compression. Case clearancing required.

DESCRIPTION	ON YOUR CORES	ON NEW CORES
For '91-up XL engines	**#413-115**	**#413-115NC**
For '02-up XB engines	**#413-115XB**	**#413-115XBNC**
For '08-up XR engines	**#413-115XR**	**#413-115XRNC**

575V2: New design for hot rod 1200 XL-XR engines. More low end/mid range torque than 567 cams; max power to 6500. Bolts in late model XL-XR engines with factory conical springs (2005-up), however, spring and retainer upgrade is required for high rpm use. Case clearancing required.

DESCRIPTION	ON YOUR CORES	ON NEW CORES
For '91-up XL engines	**#413-117**	**#413-117NC**
For '02-up XB engines	**#413-117XB**	**#413-117XBNC**
For '08-up XR engines	**#413-117XR**	**#413-117XRNC**

585V2: Performance grind designed for 78"-88" engines. Good manners with great mid-range and top end power in big bore engines. Works very well in big bore Buells and S&S 79" Hot Set Up engines. Requires cam lobe to case clearancing, quality lifters and valve springs.

DESCRIPTION	ON YOUR CORES	ON NEW CORES
For '91-up XL engines	**#413-120**	**#413-120NC**
For '02-up XB engines	**#413-120XB**	**#413-120XBNC**
For '08-up XR engines	**#413-120XR**	**#413-120XRNC**

RED SHIFT
PERFORMANCE CAMSHAFTS

605/591V2: Combination grind for big torque output with great low speed street manners, for 79-88" engines. Strong power in the 3,000-6,500 RPM range. Engines should have between 9.5-10.5:1 compression, good flowing heads, and a high quality exhaust.

DESCRIPTION	ON YOUR CORES	ON NEW CORES
For '91-up XL engines	**#413-126**	**#413-126NC**
For '02-up XB engines	**#413-126XB**	**#413-126XBNC**
For '08-up XR engines	**#413-126XR**	**#413-1126XRNC**

630/585V2: Combination grind for high torque output in 79"- 88" engines. Really pulls down low to accelerate very quickly in the twistys. Strong power in the 2,200-6,000 RPM range. Engine should have 9.5-10:1 compression and good flowing heads.

DESCRIPTION	ON YOUR CORES	ON NEW CORES
For '91-up XL engines	**#413-127**	**#413-127NC**
For '02-up XB engines	**#413-127XB**	**#413-127XBNC**
For '08-up XR engines	**#413-127XR**	**#413-127XRNC**

643V2: High output cams for 79"-99" competition engines. 11:1 compression needed for best results. Will deliver 7000+ RPM power with high breathing heads. Lower TDC lifts to reduce chamber volume in heads for ease of installation. Requires cam lobe to case clearancing, quality lifters and high quality valve springs.

DESCRIPTION	ON YOUR CORES	ON NEW CORES
For '91-up XL engines	**#413-130**	**#413-130NC***
For '02-up XB engines	**#413-130XB**	**#413-130XBNC***
For '08-up XR engines	**#413-130XR**	**#413-130XRNC**

**2000 and later engines require the purchase of 1991-1999 pinion drive gear for these cams.*

729V2: Dragster cams for 5 speed XL engines, and aftermarket cases with on-center tappets, 88" and up. Designed for max output of torque and HP. Requires high compression (12:1 min), case clearancing, tappet modifications, Pro Geometry roller rockers in 1.62 or use 1.75 to 1.85 rockers for more lift.

DESCRIPTION	ON YOUR CORES	ON NEW CORES
For '91-up XL engines	**#413-135**	**#413-135NC***
For '02-up XB engines	**#413-135XB**	**#413-135XBNC***

**2000 and later engines require the purchase of 1991-1999 pinion drive gear for these cams.*

Red Shift Cams for 5 Speed XL

All numbers are calculated using stock rocker arm ratios.
Re-calculate the figures if using higher ratio rocker arms.

Cam Model	Valve	Intake Timing	Exhaust @0.053		Duration	TDC Lift @ Valve	Valve Lift	Bolt-In?
567V2	Intake	24	101	49	253	0.211	0.567	Yes '04-Up No '91-'03
	Exhaust	54	108	19	253	0.172	0.567	
575V2	Intake	26	96	38	244	0.204	0.575	Yes '04-Up No '91-'03
	Exhaust	44	102	20	244	0.172	0.575	
585V2	Intake	22	108	59	261	0.183	0.583	No
	Exhaust	66	117	13	259	0.139	0.583	
605/ 591V2	Intake	30	100	50	260	0.228	0.605	No
	Exhaust	56	112	32	268	0.228	0.591	
630/ 585V2	Intake	26	95	40	246	0.224	0.630	No
	Exhaust	59	108	21	260	0.181	0.583	
643V2	Intake	28	104	62	270	0.235	0.643	No
	Exhaust	71	116	19	270	0.172	0.643	
729V2	Intake	34	104	65	279	0.279	0.729	No
	Exhaust	71	112	28	279	0.228	0.729	

1986-1990 EV XL and 4 Cam Offset Tappet Engines

These engines have off-center tappets (tappet centerline offset from cam shaft centerline).

573V2: Back by popular demand! Hard charging cams for high output 1200 engines with oversize valves, ported heads, increased compression and performance intake and exhaust. Can also be used for higher torque in 79-88" engines.

DESCRIPTION	ON YOUR CORES	ON NEW CORES
For '86-'90 XL engines	**#413-615**	**#413-615NC**

615V2: High lift and narrow lobe profile, for high output big bore engines. Run with 10.5-11:1 compression on pump gas. Excellent balance of torque and horsepower.

DESCRIPTION	ON YOUR CORES	ON NEW CORES
For '86-'90 XL engines	**#413-618**	**#413-618NC**

625V2: The best cam for 88" - 89" hot street engines is back! Works well in larger engines too. Broad power range with great dynamics. Widely used in hot street / strip applications.

DESCRIPTION	ON YOUR CORES	ON NEW CORES
For '86-'90 XL engines	**#413-620**	**#413-620NC**

723V2: Most popular design for Sportsman dragsters (88" and up), broad valve timing and big lift for maximum torque and high RPM horsepower. Excellent dynamics for valve control and longevity.

DESCRIPTION	ON YOUR CORES	ON NEW CORES
For '86-'90 XL engines	**#413-635**	**#413-635NC**

785V2: Offset tappet design - the original design of the venerable XL Pro-Stock-Top Gas Cams. This same profile has been used in many championship forms of racing. Net tappet lift is .485"; .785"@ valve with 1.62 rocker ratio. Increase rocker ratio for more valve lift.

DESCRIPTION	ON YOUR CORES	ON NEW CORES
For '86-'90 XL engines	**#413-642**	**#413-642NC**

786V2: This profile will allow tuning for increased power and torque over the previous 785 off-center design. Increased valve train stability of this design requires extra-stiff pushrods but allows substantial reduction in valve spring pressure compared to other cams in this class. Baisley Pro-Geometry rocker arms recommended (increase ratio for more lift).

DESCRIPTION	ON YOUR CORES	ON NEW CORES
For '86-'90 XL engines	**#413-640**	**#413-640NC**

RED SHIFT PERFORMANCE CAMSHAFTS

Red Shift Cams for 4 Speed XL

All numbers are calculated using stock rocker arm ratios.
Re-calculate the figures if using higher ratio rocker arms.

Cam Model	Valve	Intake Timing Exhaust @0.053	Duration	TDC Lift @ Valve	Valve Lift	Bolt-In?
573V2	Intake	25 105 55	260	0.215	0.575	No
	Exhaust	65 115 15	260	0.157	0.575	
615V2	Intake	28 103 58	266	0.225	0.615	No
	Exhaust	59 106 25	264	0.207	0.615	
625V2	Intake	32 103 58	270	0.250	0.625	No
	Exhaust	62 107 28	270	0.228	0.625	
723V2	Intake	39 105 62	281	0.284	0.723	No
	Exhaust	75 116 25	280	0.207	0.723	
785V2	Intake	27 112 71	278	0.237	0.786	No
	Exhaust	78 119 20	278	0.190	0.786	
785V2	Intake	28 111 72	280	0.219	0.787	No
	Exhaust	78 119 20	278	0.183	0.787	

1957-1985 Iron Sportsters® and 1983-1984 XR1000®

These engines have off-center tappets (tappet centerline offset from cam shaft centerline).

505XL/520XR: Performance cams for 61-74" Iron Sportster® engines (can also be configured for XR1000 engines). Compliments ported heads, increased compression, high flow carb and exhaust. Extra-wide powerband with great dynamics.

DESCRIPTION	ON YOUR CORES
505XL: For '57-'85 XL engines	**#413-710**
520XR: For XR1000 engine	**#413-310**

550XL/570XR: Street/strip cams for 74" and larger stroker Sportsters. Broad power in mid and upper range, very strong top end pull. Minimum case machine work required in '77 & later engines.

DESCRIPTION	ON YOUR CORES
550XL: For '57-'85 XL engines	**#413-715**
570XR: For XR1000 engine	**#413-315**

Red Shift Cams for Ironhead XL & XR1000

All numbers are calculated using stock rocker arm ratios.
Re-calculate the figures if using higher ratio rocker arms.

Cam Model	Valve	Intake Timing Exhaust @0.053	Duration	TDC Lift @ Valve	Valve Lift	Bolt-In?
505XL	Intake	25 105 55	260	0.188	0.505	No
	Exhaust	65 115 15	260	0.138	0.505	
550XL	Intake	32 103 58	270	0.220	0.550	No
	Exhaust	62 107 28	270	0.200	0.550	
520XR	Intake	25 105 55	260	0.194	0.520	No
	Exhaust	65 115 15	260	0.143	0.520	
570XR	Intake	32 103 58	270	0.228	0.570	No
	Exhaust	62 107 28	270	0.207	0.570	

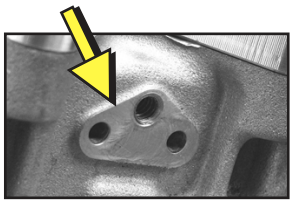
Cam-Related Extras for Sportsters®

Sportster® Cam Drive Gears

These gears can be used to convert 2000 and later, high-contact cam drive gears to the pre-2000, wide teeth stronger versions used from 1991-1999. #2 drive gear is un-keyed and requires timing to be set in an engine base with a degree wheel, then welded to the shaft to prevent rotation in severe-duty applications.

PART NO.	DESCRIPTION
#416-200	#2 Cam driven gear, '91-'99 style
#698-162	"Blue" '91-'99 pinion drive gear (smallest)
#698-163	"Red" '91-'99 pinion drive gear
#698-164	"White" '91-'99 pinion drive gear
#698-165	"Green" '91-'99 pinion drive gear
#698-166	"Yellow" '91-'99 pinion drive gear (largest)

5-Speed XL Tappet Pin Kit



Pre-2000 5 Speed XL engines use a tappet guide pin to control tappet rotation in the tappet bore. In earlier engines ('91 to around mid-94), the guide pins were fully supported on both sides of the tappet bore by a hole drilled in the case. In later engines, the case was machined differently; the guide pin hole was not drilled as deep and the pin did not fully cross the tappet, contacting only a part of the flat machined on the tappet designed to control tappet rotation. In high lift and/or high RPM applications, the tappet can be allowed to rotate as much as 5 degrees, resulting in premature tappet failure and cam damage. Our tappet pin kit includes 4 longer hardened pins and a drill bit to correct this problem. The engines in question can easily be identified by studying the photo shown. If the flat area under the cover plate is raised as shown (not recessed), you should perform this task.

PART NO.	DESCRIPTION
#413-091	Red Shift Tappet Pin Kit, 'L94-'99 5 speed XL's

Cam Shims

Installing a new cam generally requires re-setting the cam end play. These cam shims will help you get yours set right on the money!

PART NO.	DESCRIPTION
#448-770	XL #1,3,4 cam shims, pk/10, .005"
#448-769	XL #1,3,4 cam shims, pk/10, .007"
#448-771	XL #1,3,4 cam shims, pk/10, .015"

PART NO.	DESCRIPTION
#448-773	XL #2 cam shims, pk/10, .005"
#448-775	XL #2 cam shims, pk/10, .010"
#448-778	XL #2 cam shims, pk/10, .015"

Torrington® Cam Bearings for EVBT & XL® Engines

No cam should be changed without replacing the cam bearings. Failed inner cam bearings can lead to high repair costs! Replace them before they become a problem. These genuine Torrington® brand full-compliment (no inner cage) bearings are the best you can buy!

PART NO.	DESCRIPTION
#630-805	Each, Torrington® cam bearing, fits all Big Twins '58-'99
#630-400	Each, Torrington cam bearing, fits all XL's '57-'90 (each)

JIMS® Cam Bearing Puller

Use to remove inner cam bearings without splitting cases. Easily pulls bearing from the case; also keeps rollers from coming out during removal.

PART NO.	DESCRIPTION
#758-270	JIMS® cam bearing puller, fits all Big Twins '58-'99
#758-275	JIMS® cam bearing puller, fits all XL's '57-'90

Some products on this page are not for sale or use on pollution controlled vehicles.

Red Shift® for Evolution® Big Twins

For over 3 decades, Red Shift Cams have been the choice of high performance engine builders for aftermarket H-D® applications. Master engine developer and Red Shift camshaft designer Dick Hilferty has always been at the forefront of the most advanced designs in all forms of racing and performance applications. Today Dick's designs are manufactured at Zipper's with the most advanced engineering design processes built into every cam. Red Shift Cams will provide you with the most advanced components for power gains and unrivaled valve train dynamics. Maintaining valve train control should be every engine builder's first concern when choosing a camshaft. A lack of valve train control, or noise, simply shows a lack of dynamic sophistication and your engine will ultimately pay the price. Zipper's has always believed that power gains should be achieved by improved sophistication and efficiency, not by compromising component reliability. ***Let Red Shift create the power that you desire while protecting the investment that you have in your engine and valve train.***

RED SHIFT
PERFORMANCE CAMSHAFTS

559V2: Our most popular performance cam for 80-88" Evolution engines, used in our 80/80 kit. Big, broad power from 2,200 to 6,000 RPM, this cam delivers an extra-wide torque curve that tops out at over 90 ft lbs of torque, HP in the mid to upper 80's. Designed to be used with 9.5 to 10:1 compression. Uncomplicated head set-up for .560" lift, minor case clearancing required.

DESCRIPTION	PART NO.
Red Shift 559V2 '84-'99 EVBT Cam	**#413-413**

576V2: This cam is designed for high output 80-88" EV engines, 10.5:1 and up. Aggressive torque and horsepower; with good heads will produce 105+ hp. Minor case clearancing necessary due to the larger base circle used to reduce pressure angle.

DESCRIPTION	PART NO.
Red Shift 576V2 '84-'99 EVBT Cam	**#413-422**

626V2: Torque cam for big bore/stroker engines, shifts optimum power to lower RPM range (2,200-5,500). Excellent choice for larger displacement engines in heavier bikes that will be operated at moderate RPM's. Case clearancing required.

DESCRIPTION	PART NO.
Red Shift 626V2 '84-'99 EVBT Cam	**#413-427**

647V2: Big motor horsepower cam. New dynamics matched for today's cylinder head technology yields excellent power increase throughout rpm range. Works best with 10.2 + compression on 100"+ cubic inch engines. Case clearancing required.

DESCRIPTION	PART NO.
Red Shift 647V2 '84-'99 EVBT Cam	**#413-428**

656V2: This cam is designed for maximum torque, yet produces excellent top end power in 96"-125" street engines. Ideal for use in heavier machines; a real stump puller! Requires moderate compression and uncomplicated head set-up; moderate TDC lifts make installation of this cam easy. Works best with 9.8-10+:1 compression. Case clearancing required.

DESCRIPTION	PART NO.
Red Shift 656V2 '84-'99 EVBT Cam	**#413-442**

790V2: Pro Gas dragster cam for big inch EV engines. Improved output and valve control, .790" lift with 1.62 rockers (increase rocker ratio for more lift.) Sophisticated profile delivers big power. TDC lift requires professional set up of cylinders heads and valve gear. Use with solid lifters only.

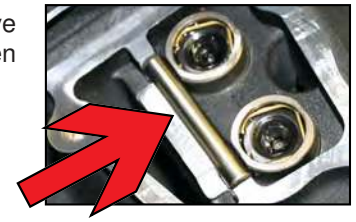
DESCRIPTION	PART NO.
Red Shift 790V2 '84-'99 EVBT Cam	**#413-451**

Red Shift Cams for Big Twin EVO

All numbers are calculated using stock rocker arm ratios.
Re-calculate the figures if using higher ratio rocker arms.

Cam Model	Valve	Intake Timing Exhaust @0.053			Duration	TDC Lift @ Valve	Valve Lift	Bolt-In?
559V2	Intake	16	104	46	242	0.159	0.555	No
	Exhaust	47	106	15	242	0.154	0.555	
576V2	Intake	26	99	46	252	0.219	0.576	No
	Exhaust	47	102	25	252	0.203	0.576	
626V2	Intake	28	102	52	260	0.241	0.625	No
	Exhaust	58	107	27	265	0.204	0.600	
647V2	Intake	26	106	58	264	0.211	0.647	No
	Exhaust	58	106	26	264	0.211	0.647	
656V2	Intake	28	100	50	258	0.233	0.648	No
	Exhaust	52	104	26	258	0.219	0.648	
790V2	Intake	36	104	66	282	0.282	0.791	No
	Exhaust	66	106	36	282	0.280	0.791	

Zipper's Oversize Tappet Guide Pins



These oversize tappet pins allow the builder to limit tappet rotation in the lifter bore; excessive rotation allows the lifter to side-load and cause operational issues. Red Shift recommends between .002" - .004" of clearance. Oversized pins are available in +.002" and +.006" sizes.

PART NO.	APPLICATION
#417-422	Set/2, +.002" Oversize Tappet Pins, Twin Cam®
#417-426	Set/2, +.006" Oversize Tappet Pins, Twin Cam®

Hy-Lift® Johnson 'Direct-Shot' Performance Lifters

#472-500 Designed for use in engines with performance cams, these lifters incorporate the Hy-Lift Johnson "direct shot" oiling system which places much needed oil directly onto the axle, roller needle bearings and cam lobe surface. Tighter tolerance I.D. grinding makes for a very slow leak down in performance applications that use higher spring pressures and more RPM capability. Sold in sets of 4, Made in the U.S.A.

Hy-Lift® Johnson 'Race Design' Lifters

#472-510 Designed for use in high lift, high RPM applications. These lifters leak down on the lower end of the scale, from 8 to 20 seconds. In true performance applications these lifters will actually "bleed" down and result in an effective loss of valve lift and duration at lower RPMs for increased torque. These are also referred to as "Variable Duration" lifters as the engine increases in RPM the bleed down effect is reduced, resulting in more duration and valve lift. Sold in sets of 4, Made in the U.S.A.

Feuling® HP+ Lifters

Feuling's® HP+ lifters are drop-in performance replacements for the stock lifters. Featuring optimized valving that improves oil flow to the top end while retaining true hydraulic operation, these lifters run quiet and are recommended for use with stock or Feuling's® Super Pump oil pump. Sold in sets of 4.

PART NO.	APPLICATION
#472-400	Set/4 Feuling® HP+ lifters, '99-up TC, '00-up XL, Buell
#472-425	Set/4 Feuling® HP+ lifters, '91-'99 XL, Buell set of 4
#472-461	Set/4 Feuling® HP+ lifters, '84-'99 EV BT, '86-'90 XL, Buell

Feuling® Race Series Lifters

USA-made Feuling® Race Series hydraulic lifters are designed to meet the needs of large lift cams and higher spring pressures, while maintaining proper and critical oil flow to valves, springs and rockers. These lifters are CNC machined from cold headed 1018 steel, heat treated and precision ground; internals are held to tight tolerances and pressure tested for a slower bleed down rate. The Feuling® Race Lifters are designed to work in conjunction with the Feuling® or other high volume oil pumps. Available in oversized diameters ***– Case Savers!***

PART NO.	APPLICATION
#472-450	Set/4 std. TC / '00-up XL/Buell Feuling® Race Lifters
#472-451	Set/4 +.001" TC / '00-up XL/Buell Feuling® Race Lifters
#472-452	Set/4 +.0015" TC / '00-up XL/Buell Feuling® Race Lifters

S&S Hydraulic Tappets

S&S® tappets have optimized plungers and metering devises to better withstand pressures with high lift cams and heavier valve springs. EV lifters incorporate a traditional axle and inner race within the roller assembly. The larger inner bearing race permits the use of larger rollers to increase the load carrying surface area, increasing the life of the roller in high output applications. Available in sets of 4; EV applications can be ordered with or without S&S® Travel Limiters installed (adjustable pushrods required).

STD SET	SET W/T.L.	APPLICATION
#498-350	**N/A**	Set/4 TC / '00-up XL/Buell S&S tappets
#498-344	**#498-346**	Set/4 EV BT, '86-'90 XL S&S tappets

Zipper's TC 3/8" Diameter, .145" Wall Chrome Moly Pushrods

Strongest 3/8" straight-wall adjustable chrome moly pushrods we have! Unlike other 3/8" diameter pushrods, the pushrod and threaded adjuster section are machined from one piece of 145" thick-wall chrome moly. By not using an insert for the adjuster, the threaded portion remains a beefy 3/8" diameter, eliminating the chronic weak spot associated with ¼" diameter inserts. The large diameter adjustable base and locknut provide ultimate stiffness; combined with the 3/8" diameter rod, pushrod tube rubbing is eliminated. We recommend these pushrods for use in Twin Cam® engines with stock beehive valve springs and bolt-in cams for precise valve train control.

PART NO.	DESCRIPTION
#403-145	Set/4 Zipper's TC 3/8" diameter, .145" wall chrome moly pushrods

Zipper's Pro-Taper TC/XL Pushrods

There's Power in These Pushrods! Admittedly, the weakest link in a Harley® performance engine is the valve train stiffness, or rather the lack of it. These high performance adjustable pushrods add much needed stiffness to the valve train. They are constructed from .095" or .165" *(extreme duty)* wall chrome-moly that is 7/16" diameter at the bottom and middle of the pushrod, tapering to 3/8" at the top to eliminate any chance of rubbing the covers or head. The bottom side features heavy-duty adjusters and the tops have full-radius "Mae West" tips for smooth operation with the highest lift cams. Our testing shows consistent power gains, even with reduced valve spring pressure. ***When you control pushrod deflection, the valve stays under control for maximum available power!***

PART NO.	DESCRIPTION
#403-088	Pro-Taper pushrods, all Twin Cam®, '91-up XL/XR/XB engines (set/4 - .095" wall)
#403-165	Pro-Taper pushrods, all Twin Cam®, '91-up XL/XR/XB engines (set/4 - .165" wall, extreme duty)

Zipper's Pro-Taper EV BT Pushrods

Our Pro-Taper pushrods are also available for the professional Evolution® engine builder who wants the stiffest adjustable pushrods available. The weakest link in an adjustable pushrod is the adjuster itself; keeping the pushrod adjuster as short possible helps maintain the highest resistance to deflection. For this reason we offer the Pro-Taper pushrods, sold each, in the fully collapsed lengths listed below so you can order exactly the lengths you need to keep the adjuster extension at a minimum, for maximum rigidity. Pushrods are chrome moly, .095" wall, 7/16" diameter at the bottom tapering to 3/8" at the top with a full radius rocker ball tip. Adjuster thread is 5/16" x 1.250" length, 32 TPI.

PART NO.	COLLAPSED LENGTH
#403-105	Each, 10.500" Pro-Taper EV Pushrod
#403-106	Each, 10.625" Pro-Taper EV Pushrod
#403-107	Each, 10.750" Pro-Taper EV Pushrod
#403-108	Each, 10.875" Pro-Taper EV Pushrod
#403-110	Each, 11.000" Pro-Taper EV Pushrod
#403-111	Each, 11.125" Pro-Taper EV Pushrod

PART NO.	COLLAPSED LENGTH
#403-112	Each, 11.250" Pro-Taper EV Pushrod
#403-113	Each, 11.375" Pro-Taper EV Pushrod
#403-115	Each, 11.500" Pro-Taper EV Pushrod
#403-116	Each, 11.625" Pro-Taper EV Pushrod
#403-117	Each, 11.750" Pro-Taper EV Pushrod

Zipper's Cut-To-Fit Pushrods

Need custom length pushrods? These solid pushrods are made from heat treated .065" wall seamless 3/8" chrome moly tubing and are supplied with full radius "Mae West" tips (drilled for oil flow) for use with the highest lift cams. They are supplied extra-long with one end unfinished, to be custom fitted by the engine builder. Cut, drill end .250", ream 17/64", press in tip. Use with adjustable lifters or customize length for hydraulic lifter pre-load. Sold each!

Zip Tip: For the strongest valve train, when cutting pushrods to length for use with adjustable lifters, make them as long as possible.

PART NO.	DESCRIPTION
#413-210	Each, 11.5" max, fits TC, EV, Shovel
#413-213	Each, 13" max, fits TC, EV, Shovel

Zipper's Pushrod Measuring Tool

#713-901 Here's a simple way to determine the length pushrod you'll need when making custom length pushrods. Insert this telescoping dummy pushrod and expand it between the lifter and rocker arm seats, mark the length on the center stem and remove; set to the mark and measure for pushrod length required. *Quick and accurate!*

Zipper's Pushrod Covers & Cam Tools

Sportster® and Buell® Telescoping Pushrod Covers

Five speed Sportster® and Buell® engines require that you remove the cylinder heads and take off the one-piece pushrod covers to get to the pushrods, greatly complicating pushrod adjustments for tuning or maintenance when adjustable pushrods have been installed. These telescoping pushrod cover kits permit access to the pushrods without having to lift the heads. Pre-'04 XL and Buell XB kits include twin billet aluminum bases with special seals for the front and rear cylinders that replace the factory pushrod tube lower retainers. A full telescoping pushrod cover kit is included. The twin bases can be purchased separately if desired.

PART NO.	DESCRIPTION
#417-111	'04-up XL & XR1200 telescoping cover kit, stock length
#417-110	'91-'03 XL/Buell 1200 cover kit w/twin bases, stock length
#417-120	'91-'03 XL/Buell 1200 cover kit w/bases, w/long clips (strokers)
#417-115	'02-'10 Buell XB telescoping cover kit w/twin bases, stock length
#417-113	Buell Blast telescoping cover kit w/bases, stock length
#417-100	'91-'03 XL/Buell 1200 twin bases w/seals only
#417-105	O-ring and seal set for #417-100
#417-106	O-ring and seal set for #417-110, #417-120
#417-107	O-ring and seal set for #417-111
#417-108	O-ring and seal set for #417-115
#417-109	O-ring and seal set for #417-113

Zipper's Twin Cam® Pushrod Cover Set

#417-112 These telescoping pushrod covers have longer top clips and shorter lower tubes to allow more access to the adjusters on adjustable pushrods. You can adjust your pushrods using only two hands with these covers!

Zipper's TC Cam Relief Tool

Installing high lift cams in an early Twin Cam® engine means you'll have to do some clearance work to the case around the pinion bearing boss and lower tappet bores for cam lobe swing. *Our cam clearance tool makes this a quick and easy job!* Designed to bolt to the case and powered by a drill motor, this tool quickly machines the case for clearance. Available with single or twin cutting spindles.

PART NO.	APPLICATION
#713-905	Zipper's '99-'06 TC88 cam tool, single spindle
#713-906	Zipper's '99-'06 TC88 cam tool, dual spindle *(Works twice as fast!)*
#713-903	Replacement cutter bit

Zipper's Sportster® Cam Relief Tool

Installing high lift cams in 5 speed Sportster and Buell engines usually requires the removal of some case material at the base of the lifter bores and around the pinion bearing for lobe swing clearance. Doing the job correctly required splitting the cases and a milling machine; a lot of work! This tool cuts clearance quickly and can be used on an assembled engine.

PART NO.	DESCRIPTION
#713-908	Zipper's '91-up XL, Buell XB cam relief tool (not XR1200®)
#713-909	Replacement cutter bit

Zipper's EV Cam Relief Tool

This tool was developed to make quick work of case machining when installing a high lift cam in a Big Twin single cam case, 1970-1999. Bolts to the case, uses the inner cam bearing to support the cutter spindle, has adjustable cutter diameter and threaded depth feed for precise control of the cut. Can be used on an assembled engine and does a much cleaner, professional job than a die grinder. Power it with a half-inch drill, or use it on an unassembled case in a milling machine. Makes a job everyone hates a lot easier and cleaner.

PART NO.	DESCRIPTION
#713-902	Zippers cam relief tool, '70-'99 Big Twin
#713-903	Replacement cutter bit

Camshaft Installation Tools


#772-910

Feuling® Twin Cam® Bypass Valve Checking Tool

This pressure test tool is a must for any engine builder. Easily bench tests the cam plate bypass valve for proper sealing when closed, pop-off pressure PSI and re-seat pressure. Bypass valve sealing is critical for proper low RPM oil pressure and assures oil flow to critical high pressure components such as lifters, pushrod/ rocker arm seats and bushings and valve tips. **#772-910**


#772-015

Feuling® Crankshaft Runout Tool

#772-015 This tool attaches to the disassembled cam chest of any Twin Cam® engine and measures pinion shaft runout using an attached dial indicator.


#772-900

Feuling® Bypass Plunger Removal Tool

#772-900 This tool makes for easy removal and installation of the pressure relief spring, bypass valve and roll pin in the Twin Cam® cam plate. The tool is used to hold the relief spring down and away from the roll pin.

JIMS® Cam/Crank Sprocket Lock Tool

This precision tool allows the technician to lock the camshaft and crankshaft sprockets to properly remove, replace, and torque the sprocket bolts. The tool is made from non-marring Delrin.

'07-Up TC #758-994
'99-'06 TC #758-285

JIMS® Oil Pump Alignment Tools

These tapered tools thread into the oil pump and perfectly align the pump to the cam plate in TC engines. *Sold each, Order 2.*

All Years #758-443

JIMS® Inner Cam Bearing Remover

Removes the bearing easily without damage to the crankcase. This precision built tool will also keep the pin rollers from accidentally falling into the crankcase.

'07-Up TC #758-993
'99-'06 TC #758-279

JIMS® Camshaft Remover and Installer

This multi-function tool will remove and replace front and rear camshafts in the '99-'06 Twin Cam. It provides the precision alignment of the camshaft to ensure a smooth press in and out of the support plate.

'99-'06 TC #758-277

JIMS® Inner Cam Bearing Installer Tool

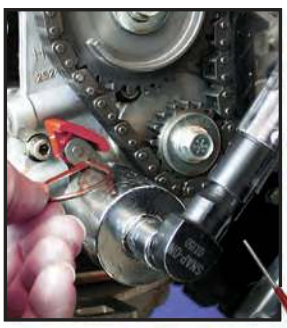
This tool will install the two inner cam needle bearings in the case. It perfectly aligns to the shaft bores for a precision press fit.

Twin Cam®, All Years #758-787

JIMS® Cam Assembly Stand '07-Up

#758-990 This tool holds the cams in non-marring material to ease cam timing, and includes guides for cam plate assembly.

JIMS® TC Cam Chain Tensioner Tool



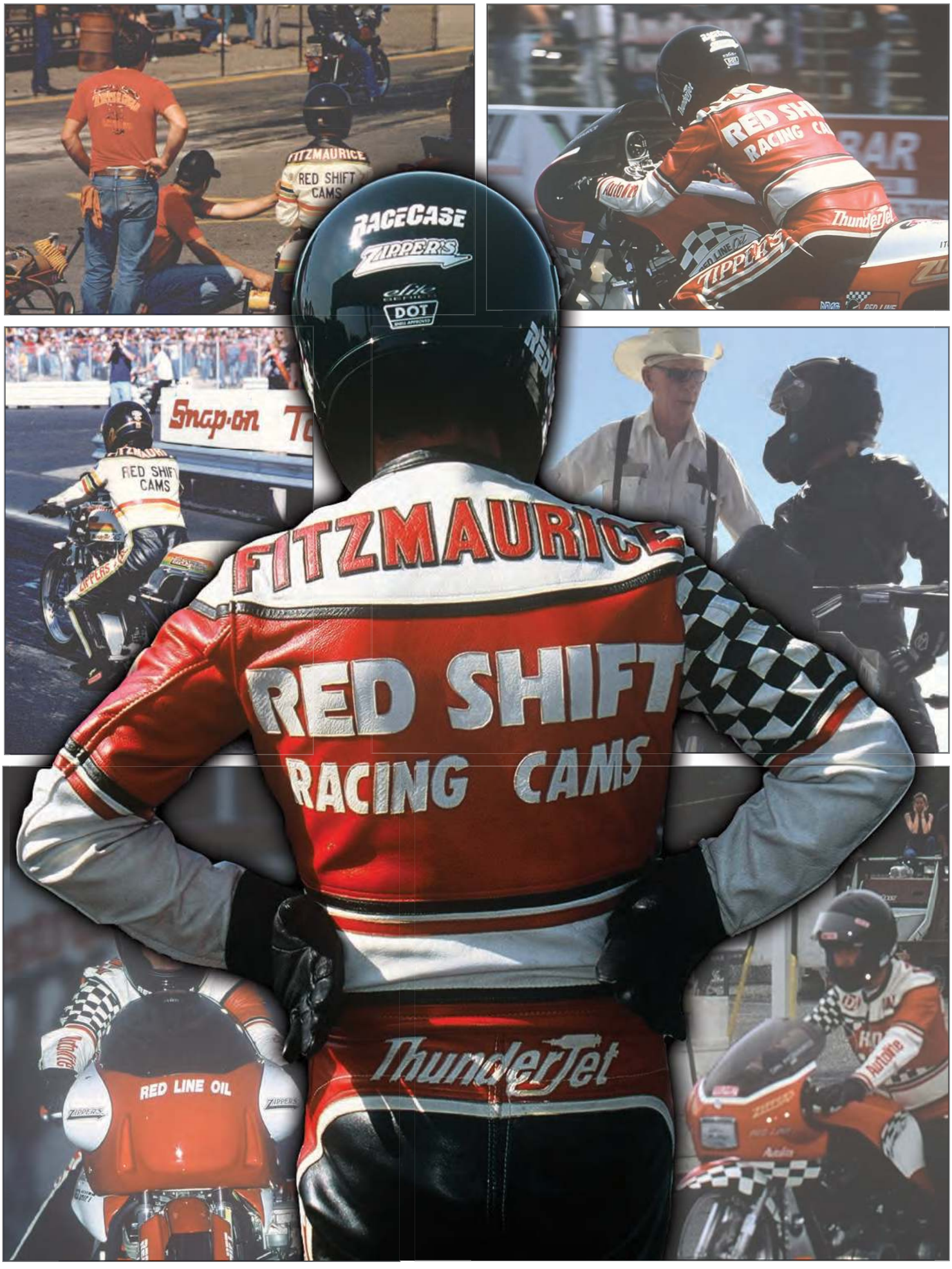
This tool will unload the spring pressure on the primary and secondary chain tensioners to assemble and disassemble cams.

For '99-'06 TC #758-283

JIMS® Cam Bearing Puller

Once the camshafts are removed from the support plate, this specialty tool will remove the bearing from the camshaft. Unlike a general-purpose puller this tool was designed to remove the bearing straight with no slipping or binding.

'99-'06 TC #758-280


FITZMAURICE
RED SHIFT
CAMS
RACECABE
ZIPPER'S
elite
DOT
RED SHIFT
RACING CAMS
ThunderJet
RED LINE OIL