



INSTALLATION INSTRUCTIONS FEULING® REAPER® SERIES CAMSHAFTS FOR XL'S



PART # 1370 505"/515" Bolt-in REAPER® cams for XL's producing a wide power band in stock engines, a great way to take a Sporty to a hot new level of performance. Split lift camshaft with .505" lift on the intake and .515" lift on the exhaust produce a solid power band with top fuel sound. Can be used with stock pushrods and valve-springs on factory 883 and 1200 engines, FEULING® recommends matching new camshafts with new lifters but not required.

Fits: '00-'19 XL and '00-'02 Buell as a direct bolt-in replacement for 'fine' pitch pinion gear, cam set also fits '91-'99 but requires pinion gear swap using HD # 24047-00 to convert the '91-'99 'wide' pitch pinion gear to a 'fine' pitch setup.

| | <u>Valve Lift</u> | <u>Open</u> | <u>Close</u> | <u>Duration @ 53"</u> | <u>lift @ TDC</u> | <u>Lobe Centerline</u> |
|----------------------------------|-------------------|-------------------|--------------|-----------------------|-------------------|------------------------|
| Intake | .505 | 11 | 48 | 239 | .137 | 108.5 |
| Exhaust | .515 | 53 | 15 | 248 | .150 | 109 |
| RPM range: 2,100 - 6,800+ | | Grind: 515 | | Overlap: 26 | | |

PART # 1377 580" REAPER® high lift cams for XL's are designed for the rider who is looking for more horsepower with a higher RPM power band. Camshafts have .580" lift on both intake and exhaust, require high lift valve springs see FEULING® BEEHIVE® ECONO, ENDURANCE® or HIGH LOAD® valve springs(1120, 1121, 1100, 1105, 1200, 1205, higher compression recommended with performance pushrods and lifters. High flow intake and performance exhaust required.

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| | <u>Valve Lift</u> | <u>Open</u> | <u>Close</u> | <u>Duration @ 53"</u> | <u>lift @ TDC</u> | <u>Lobe Centerline</u> |
|----------------------------------|-------------------|-------------------|--------------|-----------------------|-------------------|------------------------|
| Intake | .580 | 21 | 57 | 258 | .191 | 108 |
| Exhaust | .580 | 67 | 21 | 268 | .187 | 113 |
| RPM range: 2,400 - 6,900+ | | Grind: 580 | | Overlap: 42 | | |

IMPORTANT NOTICE

This installation should be done by an experienced mechanic who has access to a factory service manual and all required tools.

CAUTION

Incorrect installation can cause engine damage not covered under warranty. Failure to install components correctly can cause engine seizure. Engine seizure may result in serious injury to motorcycle, operator, passenger, and/or others.

IMPORTANT NOTICE

Measure flywheel pinion shaft run out. Excessive pinion shaft run out will cause damage and or failure. Excessive pinion shaft run out will void manufacturer's warranty.

CAUTION

Removal of the rocker arms and or pushrods with the valve train loaded can damage rocker arms, push rods, bushings and or camplate. Rotate engine to TDC of compression stroke on the servicing cylinder.

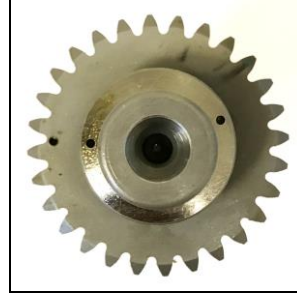
1. Refer to the proper factory service manual for your model and year of engine, for removal and installation of camshafts.
2. FEULING REAPER camshafts for XL engines fit: '00-'19 XL and '00-'02 Buell as a direct bolt-in replacement for 'fine' pitch pinion gear, cam sets also fit '91-'99 but requires pinion gear swap using HD # 24047-00 to convert the '91-'99 'wide' pitch pinion gear to a 'fine' pitch setup.
3. Clean and inspect each cam, Check all 4 new cams to make certain that your set includes a #1, #2, #3 and a #4 cam.



Cam #1 Rear Exhaust



Cam #2 Rear Intake



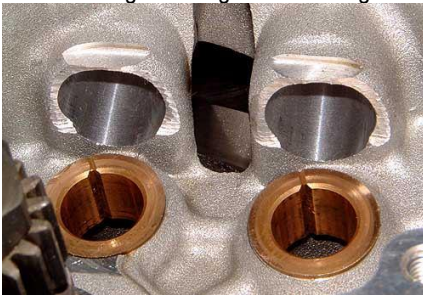
Cam #3 Front Intake



Cam #4 Front Exhaust

4. Remove fuel tank and engine rocker box top covers. Each rocker arm must be removed in order to remove the pushrod. If you intend to reuse stock pushrods, mark them for reinstallation in their original location.
5. Remove ignition parts, outer cam timing cover and stock cam gears. The outer cam timing cover will be used as a gauge to check the gear tooth fit for all four new cams. Checking gear tooth fitment of your new cam gears in your stock cover is important.
6. Cylinder heads for 2004 and later engines are different from earlier Sportsters. For 2004 and later engines, 505/515 cams are a bolt in. ALL OTHER GRINDS will require head modifications for installation.
7. Warning: When upgrading 883 engines to 1200cc, valve clearance pockets in new 1200 pistons may not match the valves in 883 heads! Valve clearances must be checked! Valves on 883 heads are closer together than 1200 heads and therefore require piston to valve clearance checking on all 883 to 1200 conversions.
8. CAM CASE CLEARANCE: Before installing the new cams Feuling recommends checking for proper clearance in the cam case. The best way to do this is by installing each cam one at a time and rotating them over, the #2 cam will be easier to rotate with the pinion gear removed. While rotating the cam verify there is at least 0.020" clearance between the cam lobe and the bottom of the lifter bosses. Clearance the case as needed.

On some of the newer XL model engine cases the #3 cam gear may come in contact with the case. If clearance issues are found the case can be relieved using a small grinder. Feuling recommends a minimum of 0.020" clearance.



Before



After

9. PINION RACE CLEARANCE: If running a set of high lift camshafts the #2 and #3 cam lobes may interfere with the pinion race. If interference is found there are two ways to correct the issue.

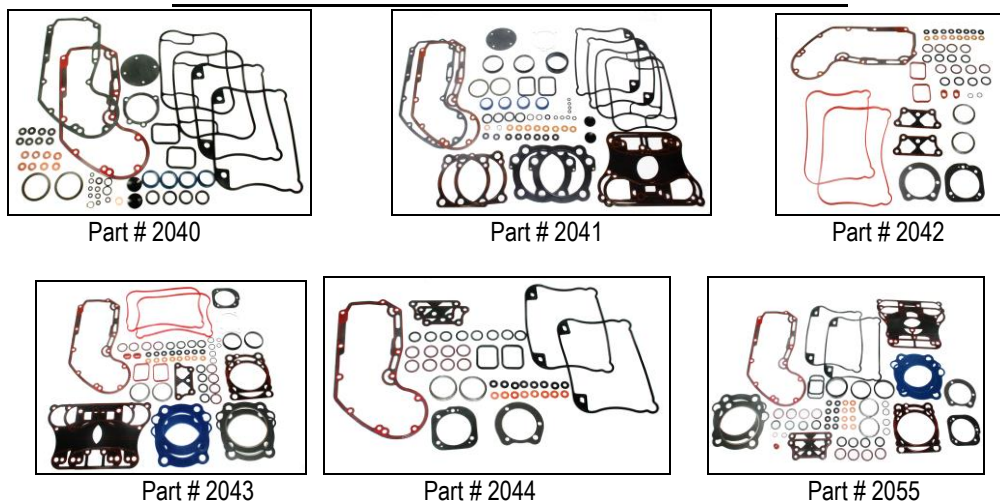
The effected cam can be chamfered at a 45 degree angle that protrudes onto the lobe no more than 0.100". This procedure should be done with caution to avoiding getting the cam too hot, over heating the cam can cause damage to the hardening surface. Once chamfered the cam should be deburred to ensure a smooth surface for the lifter roller to ride on.

The second option is to clearance the pinion race. This is best performed while the engine is disassembled. Feuling does not recommend this option while the engine is assembled due to the high risk of metal debris entering the engine and /or damaging other components.



10. Install all 4 cam gears in cover for a trial fit. With your fingers, turn all four cam gears and verify that they roll freely. If there is no tightness, proceed to next step. Note: If you can't turn the gears with your fingers, they are too tight. If there is any tightness or binding, remove #4 cam, then #1, then #3, in that order so that the tight fitting part(s) may be identified and measured. Cam gears which bind should not be installed without further examination and inspection. Tight or binding gears can cause cam gear damage! Measure any cam gear which shows a tight fit using a micrometer and two .108" dia. pins. Next measure a stock cam gear. Note any differences in size. Andrews Products makes under or oversized cam gears for Sportster cams, please contact them for needed over/under sized gears. Contact Feuling if you need assistance.
11. Next, install the cover on the engine without pushrods and only the #2 cam gear. Verify that the engine turns without any binding, the gear backlash is correct if no binding and installation can proceed. If binding then the #2 cam gear is tight, a smaller #2 drive gear (Contact Andrews products) can be used or the #2 drive gear from your stock #2 cam can be used by pressing it off the stock gear and onto the new gear. If the stock #2 drive gear is reused, the timing relationship between the lobe tip and timing marks must be correct!
12. New cam gears can now be installed. Reinstall gear cover. Make sure that each cam gears have correct end play as per H/D service manual (.012-.020 inches). (Insufficient end play will result in cam overheating and failure of the part).
13. Stock '91-up engines use fixed length (non-adjustable) pushrods. Feuling makes one piece fixed length pushrods for the '91-'03 Sportsters part #4085. For '91 and later Sportster engines, the two shorter rods are intakes and the longer rods are exhausts. For '84-'89 engines all four pushrods are the same length.
14. If adjustable pushrods are to be installed, it will be necessary to set each pushrod length before installing the outer covers (since the outer covers do not collapse for pushrod adjustment). Or you can use an aftermarket cover kit which will telescope shorter to permit pushrod adjustment.
15. Check valve to piston clearance, know that the valves clear pistons with the new camshaft specs

FEULING® XL ENGINE CAMSHAFT INSTALLATION KITS



Camshaft installation kits for XL engines, available in Quick change and Quick change + Top end kits.

Quick Change kits include needed gaskets, O-rings and washers to install bolt-in camshafts, example Reaper grind 505/515 cams part #1370.

Quick change + Top end kits include needed components to install high lift camshafts which require removal of the cylinder heads for high lift valve springs, example Reaper 580 grind cams part #1377.

Fits: XL 1991-2003

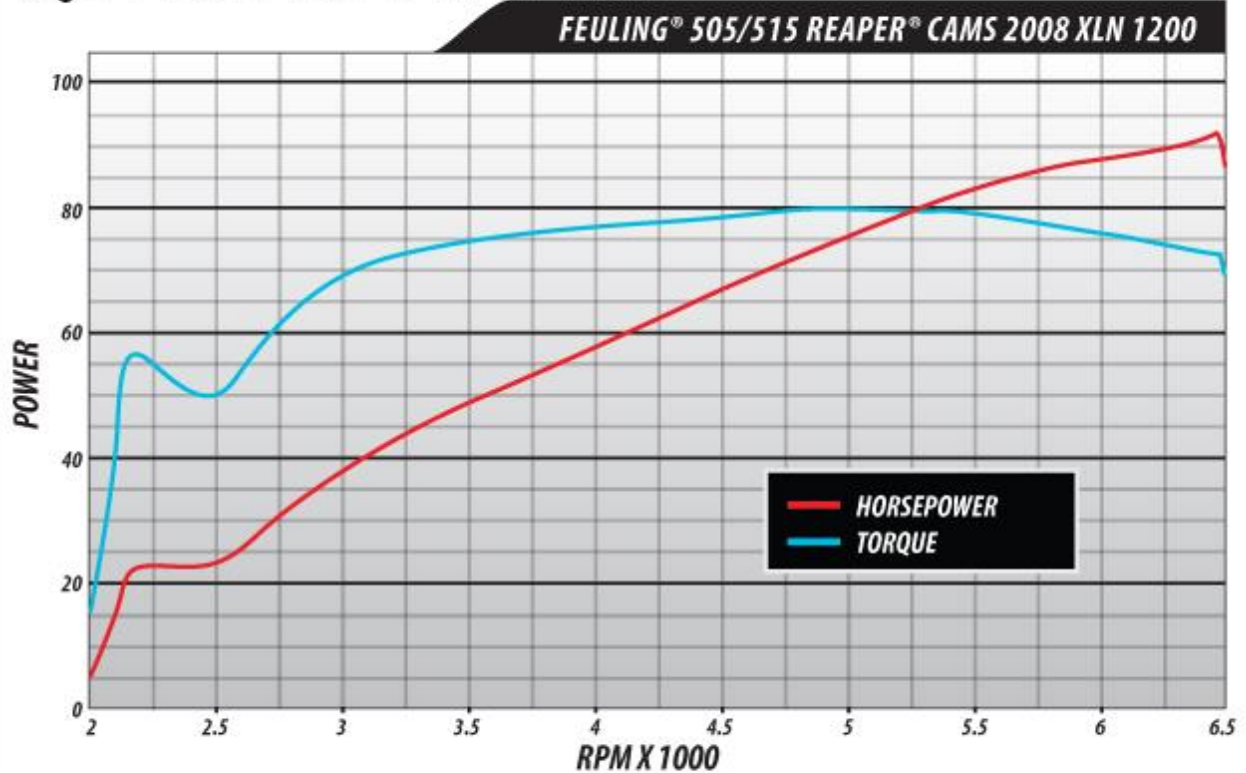
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|-------------|--|
| Part # 2040 | Quick Change camshaft installation kit. Fits: XL 1991-2003 |
| Part # 2041 | Quick Change + Top End camshaft installation kit. Fits: XL 1991-2003 |

Fits: XL 2004 - 2006

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|-------------|--|
| Part # 2042 | Quick Change camshaft installation kit. Fits: XL 2004-2006 |
| Part # 2043 | Quick Change + Top End camshaft installation kit. Fits: XL 2004-2006 |

Fits: XL 2007 - 2019

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|-------------|--|
| Part # 2044 | Quick Change camshaft installation kit. Fits: XL 2007-2019 |
| Part # 2045 | Quick Change + Top End camshaft installation kit. Fits: XL 2007-2019 |



Stock 2008 XLN Sporster 1200, FEULING REAPER 505/515 camshafts, Bassani 2 into 1 exhaust system, K&N 90 degree air cleaner, TTS ignition tuner

WARRANTY NOTE

Feuling offers an additional 12 month warranty for a total of 2 years if product is installed by a professional V-Twin installer, oil tank is dropped and cleaned at time of install and the WARRANTY REGISTRATION form is filled out - form can be found on www.Feulingparts.com

WARRANTY:

All parts are guaranteed to the original purchaser to be free of manufacturing defects in materials and workmanship for a period of twelve (12) months from the date of purchase. Merchandise that fails to conform to these conditions will be repaired or replaced at FOP's option if the parts are returned to FOP by the purchaser within the (12) month warranty period. In the event warranty service is required, the original purchaser must notify FOP of the problem immediately. Some problems may be rectified by a telephone call and need no further action. A part that is suspect of being defective must not be replaced without prior authorization from FOP. If it is deemed necessary for FOP to make an evaluation to determine whether the part was defective, it must be packaged properly to avoid further damage, and be returned prepaid to FOP with a copy of the original invoice of purchase and a detailed letter outlining the nature of the problem, how the part was used and the circumstances at the time of failure. After an evaluation has been made by FOP and the part was found to be defective, repair, replacement or refund will be granted. Excessive flywheel pinion shaft run out will damage camplate and oil pump and or cause engine damage and or failure. Damage to Feuling oil pump corporation products from excessive pinion shaft run out will void manufacturer's warranty.

ADDITIONAL WARRANTY PROVISIONS:

FOP shall have no obligation in the event an FOP part is modified by any other person or organization, or if another manufacturer's part is substituted for one provided by FOP. FOP shall have no obligation if an FOP part becomes defective in whole or in part as a result of improper installation, improper break-in or maintenance, improper use, abnormal operation, or any other misuse or mistreatment. FOP shall not be liable for any consequential or incidental damages resulting from the failure of an FOP part, the breach of any warranties, the failure to deliver, delay in delivery, delivery in non-conforming condition, or any other breach of contract or duty between FOP and the customer. The installation of parts may void or otherwise adversely affect your factory warranty. In addition, such installation and use may violate certain federal, state and local laws, rules and ordinances as well as other laws when used on motor vehicles operated on public highways, especially in states where pollution laws may apply. Always check with federal, state, and local laws before modifying your motorcycle. It is the sole and exclusive responsibility of the user to determine the suitability of the product for his/her use, and the user shall assume all legal, personal injury risk and liability and all other obligations, duties and risks associated therewith. Our high performance parts, engines and motorcycles are intended for experienced riders only.

Feuling Oil Pump Corporation reserves the right to change prices and/or discounts without notice and to bill at the prevailing prices at the time of shipments. The words Harley®, Harley-Davidson® and H-D® and all H-D® part numbers and model designations are used in reference only. Feuling Oil Pump Corporation is in no way associated with, or authorized by Harley-Davidson Motor Co®. To manufacture and sell any of the engine parts described in this instruction sheet.