



FEULING

READER CAMSHAFT INSTRUCTIONS FOR EVO ENGINES

PART #'S:
1390, 1391, 1392, 1393



IMPORTANT NOTICE

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

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. 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.

Camshafts for Shovel engines should not be used in EV80 engines. The two engines have different lifter block tappet angles. Valve timing for Shovel cams installed EV80 engines will not be correct resulting in poor engine performance, possible piston/valve and valve/valve interference.

518 CAM / #1390 - Direct bolt in replacement for EVO engines, can be used with stock valve springs, pushrods and lifters. Will respond well with performance exhaust and air cleaner. This cam will also respond well with increased compression and cylinder head work. RPM range 1,650 - 5,500. Grind: 518

543 CAM / #1391 - Requires performance valve springs, see FEULING # 1120 or 1100, performance lifters recommended but not required. Will work with factory pushrods on engines with factory stack up, if deck height, cylinders or rocker boxes have been modified from stock then adjustable pushrods are required, see # 4091, 4077 or #4080. Increased compression, cylinder head work and performance exhaust recommended but not required, increased compression is required for bottom end performance. RPM range 2,200 - 5,950. Grind: 543

574 CAM / #1392 - Wicked power band for modified engines. This is a great all around camshaft for engines with increased compression ratio, produces solid low end performance and mind blowing mid and top end power. Extremely smooth cam lobe design creates smooth valve-train motion. Responds very well to modified cylinder heads & intake manifold. Increased compression ratio, high lift valvesprings, performance exhaust and intake systems are a must. Performance pushrods, lifters and clutch are recommended. RPM 2,350 - 6,300. Grind: 574

594 CAM / #1393 - Fierce performing camshaft for an array of engines sizes, larger displacement engines like 106, 111 & 124+ looking for a superior torque band with excellent horsepower gains in heavy bikes (RPM 2,500 - 6,400.) Smaller high revving displacement 85-96 style engines in lighter bikes looking to twist the throttle and tap into some horsepower (RPM 2,650 - 6,700). Large displacements respond well to increased compression ratio and smaller displacements will require it. 594 cams require high performance valve springs, pushrods, lifters, carburetor and or throttle body work, performance exhaust, intake and clutch. Requires performance valve springs, see FEULING # 1100 or 1200, performance lifters #4062, adjustable pushrods (see #4091, 4077 or 4080)

PART #'S	GRIND	VALVE LIFT	OPEN	CLOSE	DURATION @ .053"	LIFT @ TDC	LOBE CENTERLINE	OVERLAP
#1390	Intake	.518"	4°	42°	226°	.099"	109°	9
	Exhaust	.528"	51°	5°	236°	.112"	113°	
#1391	Intake	.543"	15°	43°	238°	.160"	104°	27
	Exhaust	.553"	56°	12°	248°	.140"	112°	
#1392	Intake	.574"	15°	45°	240°	.163"	105°	29
	Exhaust	.574"	61°	14°	255°	.143"	113.5°	
#1393	Intake	.594"	19°	56°	255°	.190"	108.5°	35
	Exhaust	.604"	64°	16°	260°	.167"	114°	



INSTRUCTIONS:

1. Refer to the proper factory service manual for your model and year of engine, for removal and installation of camshafts.
2. Clean and inspect each cam, Check new cams to make certain that it is the correct camshaft.
3. Remove fuel tank and engine rocker box top covers if re using the stock 1 piece pushrods. 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. Not all stock pushrods are the same length.
4. Remove ignition cover and stock cam. Measure installed length of stock cam and new cam. Cams for 1984-'87 engines should measure 3.025 inches from front face of gear to thrust shoulder surface. Cams for '88 and later EV engines need to be shimmed to 3.075 (+.050 longer) because of a factory design change in the length of all '88 and later camshafts. Proper end play for installed camshafts is .010 / .015 inches. EV engines use the same shims as shovels. Spacer shims are listed in EV-80.
5. Inspect inner cam lobe for rotating clearance on engine case.



6. To make sure that your new camshaft drive gear will operate quietly, the cam gear to pinion backlash must be correctly set up. Proper backlash is .0000/.0005 for a cold engine. We recommend that BOTH the new gear and the original gear be measured as described on the last page of these instructions. If both gears measure within .0005" of the same size, it should NOT be necessary to change gears. If a different size gear is required, Andrews Products has them (Call 847-759-0190) . Excess backlash will cause gear noise which sounds like loose lifters but will not hurt anything. Insufficient backlash will cause a distinct gear whine and should be corrected since gear tooth damage will result over a short time period.
7. Install new cam, then replace gear cover and ignition parts. When reinstalling rocker arms and adjustable pushrods, the engine should be positioned to TDC (first on front cylinder, then rear) with the intake and exhaust lobes at minimum lift (both valves closed). Engine will now be at the top of the compression stroke for that cylinder (where both pushrods can be adjusted correctly).
8. Now tighten the rocker arm screws evenly until they are firmly seated. If the valve unseats during this sequence, wait 10/15 minutes until the lifter bleeds down before tightening the other rocker arm. Following this procedure will eliminate any chance of valve/valve interference during installation.
9. Feuling offers adjustable pushrods, see: #4091 Fast Install, 4077 HP+ SERIES, 4080 RACE SERIES.

CHART FOR ADJUSTABLE PUSHRODS

THREADS PER INCH	DISTANCE PER 1 FULL TURN	FEULING FULL TRAVEL TURNS TO .100"	FEULING SHORT TRAVEL TURNS TO .065"
20	0.050"	2	1.3
24	0.0417"	2.39	1.55
28	0.0357"	2.80	1.82
32	0.0313"	3.19	2.07
36	0.0275"	3.63	2.36
40	0.0250"	4	2.6

***CORRECT ADJUSTMENT
REQUIRES STARTING WITH
FULLY PUMPED UP LIFTERS**

10. New lifters are recommended but not required. Feuling recommends the HP+ series lifters for the 518 grind and Race Series for the 543, 574 & 594 grind camshafts.
11. High lift camshaft installations may require relieving of the engine case bearing boss to create clearance for the rear intake cam lobe tip. (This is the lobe furthest away from the gear). Clearance can be checked by temporarily removing lifters, installing outer cam cover and SLOWLY rotating engine. If interference is felt or if the rear intake cam lobe tip appears to be touching the engine bearing boss, remove small amounts of aluminum from the bearing boss to relieve the interference. Don't ignore this step!
12. Stock 1990-up H/D cam drive gears have 2 grooves on gear face while 1977-89 gears have only one. FEULING drive gears have 1 groove on cam gear.

13. A.) Service manuals for 1990 and later engines show different gear tooth measurements for 1990 and later camshaft drive gears than for camshaft drive gears for earlier years. Feuling standard size cam gears will be correct for most 1990 and later engines. For a small number of engines having cam gears color coded green or black, an oversize cam gear will be needed (See Andrews part #212077).

B.) There are 2 basic differences relating to 1990 and later cam gear sizes:

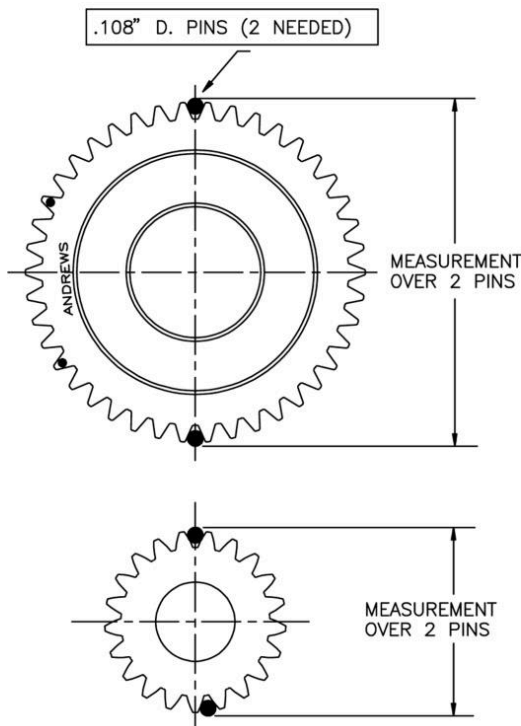
- The size range of gears from the largest to the smallest has been reduced from .006" to .003". The largest gears are the same size for '77-'89 and 1990-up (green and black color codes).
- For gear sizes that have been listed for .105" pins instead of .108" pins. Measurements with .108" pins are approximately .011" larger than with .105" pins (for the same gear).

Check valve to piston clearance, know that the valves clear pistons with the new camshaft specs.

Cam / Pinion Gear Color Code Chart			
Color Codes	HD Part #(1)	Pinion Gear Size(2)	Cam Gear Size(2)
Orange	24040-93	1.4853-1.4850	2.7472-2.7476
White	24041-93	1.4849-1.4846	2.7477-2.7481
Yellow	24042-93	1.4845-1.4842	2.7482-2.7486
Red	24043-93	1.4841-1.4838	2.7487-2.7491
Blue	24044-93	1.4837-1.4834	2.7492-2.7496
Green	24045-93	1.4833-1.4830	2.7497-2.7501
Black	24046-93	1.4829-1.4826	2.7502-2.7506

NOTE:
Standard Cam gear measures
2.7485" - 2.7491"

- (1) HD part numbers are for matched sets and shown here for size comparisons.
 (2) All sizes listed for measurements with .108" gage pins.



If you need to compare relative sizes of cam or pinion gears for purposes of proper gear pitch sizing, the above table may be helpful. For quiet operation, new cam or pinion gear pitch measurements should be identical or +.0005 larger than old parts. (Assuming that old parts were operating without excess noise).

*** STANDARD 1 YEAR WARRANTY:**

- WARRANTY COVERS MANUFACTURE DEFECTS.
- DOES NOT COVER PARTS THAT HAVE FAILED DUE TO IMPROPER INSTALLATION, MAINTENANCE, EXCESSIVE CRANKSHAFT RUNOUT, OR MISUSE.
- DOES NOT COVER ANY CONSEQUENTIAL DAMAGE RESULTING FROM A FAILURE OF A FEULING PRODUCT.

*** OPTIONAL 2 YEAR WARRANTY:**

- ADDITIONAL YEAR WARRANTY IS ONLY AVAILABLE IF PARTS ARE INSTALLED BY A PROFESSIONAL INSTALLER.
- THE ONLINE WARRANTY FORM MUST BE COMPLETED BY THE DEALER PRIOR TO BIKE DELIVERY.
- OIL TANK MUST BE DROPPED & CLEANED.
- CRANKSHAFT RUNOUT MUST BE BELOW 0.005"

NOTE: FOR FULL WARRANTY INFORMATION VISIT WWW.FEULINGPARTS.COM/WARRANTY

MILWAUKEE EIGHT CAM SPECS

PART #'S	GRIND	VALVE			DURATION @ .050"	LIFT @ TDC	LOBE		OVERLAP	DESCRIPTION	RPM RANGE
		LIFT	OPEN	CLOSE			CENTERLINE				
#1340 0925-1163	405	Intake Exhaust	.395" .405"	4° 36°	24° 11°	200° 205°	.068" .049"	103° 108°	7	Bolt in. A workhorse for 107 and 114 engines. Wide powerband throughout the entire RPM range when compared to stock. Will respond well with slip-on mufflers and a high flow air cleaner.	1750-5700
#1343 0925-1164	465	Intake Exhaust	.445" .465"	4° 50°	23° 6°	207° 236°	.100" .100"	99.5° 112°	10	Bolt-in. Best all around camshaft, Feuling's go to especially in 4 3/8 stroke. Solid bottom end with substantial gains above 2,800 RPM when compared to stock. Responds well to increased bore and or compression	1850-5950
#1350 0925-1325	472	Intake Exhaust	.468" .472"	8° 50.7°	25° 7.75°	213° 238°	.117" .110"	98.5° 111.5°	16	Bolt-in. Great all around camshaft, Feuling's go to for 4 1/2 stroke 114" & 117" looking for a little more than our 465 grind. Great bottom end with substantial gains above 2,800 RPM when compared to stock. Responds very well to increased bore and or compression	1900-5900
#1349 0925-1283	508	Intake Exhaust	.508" .511"	20.5° 44°	37° 17.5°	237° 241.5°	.180" .146"	98.5° 103.25°	38	Shines in 114 + cubic inch engines with added compression. The 508 revs up faster than the 521 grind, sounds nastier and pulls harder out of the hole. Requires high lift valve springs.	2250-5900
#1346 0925-1210	521	Intake Exhaust	.518" .521"	17° 51.5°	34° 11.5°	231° 243°	.162" .125"	98.5° 110°	28.5	Shines in 114 and larger engines with increased compression. Easier to tune, better street manners & revs up higher than the 508. Requires high lift valve springs.	2250-6250
#1351	538	Intake Exhaust	.538" .542"	20.5° 48°	38.5° 18°	239° 246°	.180" .157"	99° 105°	38	Shines in 124 + cubic inch engines with added compression. Cylinder head & intake work + high flow throttle body & performance exhaust recommended. Requires high lift valve springs.	2350-5975
#1348 0925-1265	592	Intake Exhaust	.578" .592"	20° 68°	34° 16°	234° 264°	.182" .146"	97° 116°	36	"The Big Nasty" Get serious with bore size, ported cylinder heads & throttle body. Aggressive camshaft requires performance pushrods, lifters, high flow air cleaner, stepped exhaust and high lift/high load valve springs (See #1207).	2750-6350+

TWIN CAM CAM SPECS

Grind	Valve Lift	Open	Close	Duration @ .053"	Lift @ TDC	Lobe		Overlap	Description
						Centerline			
525	Intake Exhaust	525" 535"	4° 51°	42° 5°	226° 236°	.099" .112"	109° 113°	9	A real workhorse. Bolt in for 88-103 engines. Producing strong low and mid range power. 1750-5500 RPM
543	Intake Exhaust	543" 553"	15° 56°	43° 12°	238° 248°	.160" .140"	104° 112°	27	"The Freeway Flyer". An Excellent compromise between the 525 and 574 achieving the best all around performance. Bolt in for 96 and 103 engines. 1900-6000 RPM
574	Intake Exhaust	574" 574"	15° 61°	45° 14°	240° 255°	.163" .143"	105° 113.5°	29	Wicked power band for 103 and larger engines. Responds well to head work and increased compression. Go to bolt in camshaft for 110 engines. 2100-6500 RPM
594	Intake Exhaust	594" 604"	19° 64°	56° 16°	255° 260°	.190" .167"	108.5° 114°	35	Freight train pulling power. Works best with larger displacement engines and added compression. Will respond well to ported heads and open intake. Requires high lift valve springs. 2200-6250 RPM
630	Intake Exhaust	630" 630"	20° 60°	58° 19°	258° 263°	.188" .171"	109° 112.5°	39	Eye blurring mid and top end power. Designed for worked 120" + engines. Requires high lift valve springs. 2500-6900+ RPM

NO BULLSHIT  **JUST PERFORMANCE**

