
ANDREWS
HIGH PERFORMANCE CAMS & GEARS

ANDREWS PRODUCTS, INC.

www.andrewsproducts.com
431 Kingston Court
Mount Prospect, IL 60056
Phone: 847-759-0190
Fax: 847-759-0848

INDEX

COMPANY HISTORY 3

POLARIS CAMS AND KITS
Polaris Victory Camshafts ('98-2001) 5
Polaris Freedom Camshafts (2002-up) 5

TWIN 88 CAMSHAFTS
Sprockets, Valve Springs, Collars, Pushrods 6
Chain Drive Camshafts 7
Twin 88 Gear Drive Camshafts 8
Twin 88 Gear Drive Installation Kits and Pushrods 9

EV 80 CAMSHAFTS AND KITS
EZinstall EV80 Pushrods 10
Springs, Collars 10
Standard EV80 Pushrods 10
Camshafts 11

IRON SPORTSTER CAMS AND KITS
Iron Sportster Cams 14
Iron Sportster Collars, Pushrods 14

EV SPORTSTER AND BUELL CAMS AND KITS
EV Sportster Cams (Upgrades for 2001) 15
EV Sportster Pushrods and Valve Gear 15

SHOVEL, PAN, KNUCKLE CAMS AND KITS
Buell Blast Cams and Pushrods 16
Knuckle Camshafts 16
Shovel and Pan Camshafts 17
Shovel Springs, Collars and Pushrods 18

TROCK CAM AND HEAD TOOLS
4 Lobe End Play Checkers 18
Valve Travel Checkers (EV80, T88, Pan Shovel, Sportster) 18

COMPETITION AND RACE CAMSHAFT KITS
Dragster Cams (EV80, EVXL, SHOVEL) 21

EV 80 Trans Gears (5 Speed)
5 Speed Gears 22
5 Speed Transmission Shafts 22
5 Speed (Complete gear sets) 22

EV 80 TRANSMISSION BELT SPROCKETS
Belt Drive Sprockets (29, 30, 34 Teeth) 23
Belt Drive Sprockets (31, 33 Teeth) 23
Belt Drive Sprocket (Belt ratios) 23
Sprockets (Installation notes) 23

BAKER 6 SPEED TRANSMISSIONS (w/PCR Gears)
Baker 6 Speed Transmission 24
Baker 6 Speed Builders Kits 24

OCTOBER 2003 SPEED RECORDS
Warner Riley/Carl Morrow - Maxant, North Carolina 25

TRANSMISSION GEARS 74 & 80 (4 SPEED)
Close Ratio / Stock Ratio (Gears and Shafts) .....26 & 27
74 & 80 (4 speed) (Complete Gear Sets) 27
4 Speed Parts Assembly Kits 27
4 Speed Transmission Shaft Lengths 27

TRANSMISSION GEARS: EV SPORTSTER (5 SPEED)
EV Sportster 5 Speed Gears and Shafts 28
EV Sportster 5 Speed (Complete Gear Sets) 28
Gear Ratios: (Sportster 5 speed) 28

TRANSMISSION GEARS: SPORTSTER (4 SPEED)
Sportster (4 Speed Gears and Shafts) 29
Sportster 4 Speed (Complete Gear Sets) 29
Gear Ratios: (Sportster 4 speed) 29

PHOTOS, TECH TOPICS and ENGINE TUNING
Choosing a Cam 4
Hydraulic Lifters 4
EV-80 Dynamometer Chart 10
Cam Gear Noise (EV80) 12
Measuring Static Compression Pressure 12
Valve Spring Height 13
Valve Clearance Measurements 13
Static Compression Ratio 13
Compression Ratios(head milling) 19
Cam Gear Noise (Evolution Sportster) 19
Cam and Gear Manufacturing Technology 20
Belt Drive Sprocket Ratios 21

BOOKS, IGNITION COILS, CARB PARTS
Big Twin High-Performance Guide 30
V-Twin Tuner's Handbooks; Vol 1 & 2 30
Replacement Ignition Coils 30
High Flow Accelerator Pumps (Keihin Carbs) 30

SALES POLICIES 31

LIMITED WARRANTY POLICY 31

ORDERING INFORMATION

FAX #: 847-759-0848 **TEL # : 847-759-0190**

YOUR CUSTOMER NO:

CUSTOMER TECHNICAL SERVICE:
Available for customers during listed hours:
Morning: 9:00 A.M. - 10:00 A.M. (Central Time)
Afternoon: 3:00 P.M. - 4:00 P.M. (Central Time)
Web address: www.andrewsproducts.com
E032204

ANDREWS PRODUCTS: COMPANY HISTORY

Andrews Products was founded in the spring of 1972 and for 30+ years has specialized in making camshafts and transmission gears for the performance motorcycle market.

On behalf of the entire Andrews Products organization, we proudly present this catalog to all motorcycle enthusiasts and to the many designers and builders of performance motorcycle engines and transmissions.

Please review the pages of this catalog and see how Andrews Products can help you get the most out of the engine and transmission in your bike.

While we started making motorcycle transmission gears and shafts, performance camshafts and related valve gear parts soon became additional, distinct product lines.

More new gear sets with better ratios soon followed. The results were gears which easily out-performed anything else available. Their superior performance was quickly recognized by everyone who tried them. The novelty and uniqueness of both the cams and gears resulted in a wave of demand for new Andrews Products cams and gears. And that was only the beginning.

Today, Andrews Products is recognized world wide and throughout the Motor Sports community as an industry leader. We utilize state-of-the-art engineering design and manufacturing technology for producing superior quality camshafts and transmission gears for both street and racing applications. As an industry leader, we at Andrews Products understand what keeps us on top also keeps our customers on top. Over the years and to this day, Andrews Products has made significant investments in new computer controlled production machinery and inspection equipment. Some of these machines are pictured in this catalog.

Strategic purchases in the latest technologies keeps us and our customers right at the leading edge. With Andrews Products' unique and proprietary processing, innovative design and strict quality control, we can consistently deliver the highest quality camshafts and transmission gears.

Many of the customers we now work with include the top Nascar and Busch racing teams as well as other builders of racing engines for the automotive and motorcycle high performance markets. This is a very demanding group of people for whom second best is not an option; they simply demand the best.

At Andrews Products, we share with our customers a passion for excellence and will not accept second place. Our customers rely on us to help them achieve top performance. This culture is well established throughout Andrews Products, its people and processes. And whether we are working with top race teams or making parts for street motorcycles, the same technology is used.

The entire Andrews Products Team looks forward to helping you achieve top performance and take the checkered flag as leaders.

In November of 2002, Andrews Products moved into a brand new 45,000 square foot facility in Mt. Prospect, Illinois. The two illustrations on this page show our new building. As a result, we now operate out of a fully equipped air conditioned facility with everything under one roof

Our main office and manufacturing plant is eleven miles north of the Chicago, O'Hare International Airport. We are in one of the world's great manufacturing areas with easy access to efficient transportation and shipping to anywhere in the US and most foreign countries.

We are better equipped than ever to serve all of our customers with the first class quality and support that all of you deserve.

Andrews Products is committed to the motorsports industry for the long haul.

www.andrewsproducts.com
431 Kingston Court • Mount Prospect, IL 60056
Phone: 847-759-0190 • Fax: 847-759-0848

ANDREWS PRODUCTS, INC.

www.andrewsproducts.com
431 Kingston Court
Mount Prospect, IL 60056
Phone: 847-759-0190
Fax: 847-759-0848

CHOOSING A CAM

The question “What cam should I buy for my bike”? is one we often hear. While there are no hard and fast rules for picking a cam for a specific application, some basic guidelines are worth considering. Keep in mind that performance camshafts are usually chosen for the basic purpose of producing more power from your engine. The three questions to answer before choosing a new cam are:

1. Primary application: Is the bike going to be used for all around street riding or is the goal to have an engine which is running at maximum torque and horse power for track or drag racing?

2. Type of riding: Do you spend a lot of your time riding two up on highway trips or is it more important to have the most power you can get. In other words is your riding style conservative or more aggressive?

3. Engine/Bike combination: This question relates to displacement (cubic inches), compression ratio, bike weight and what kind of cylinder head modifications have been done. Have the intake and exhaust ports been changed to result in better flow efficiency? Does the engine have a higher than stock compression ratio to take advantage of a longer duration cam? Is the bike lighter like a Dyna or a heavy bagger?

To get the best cam for your bike all of these factors have to be taken into account. Almost every type of engine modification imaginable has been performed on H/D type engines. Here is a short summary of modifications listed in order of increasing cost and installation complexity.

1. Relieved air cleaners
2. Free flow exhaust system
3. Performance camshafts
4. Higher output ignitions
5. Modified fuel injections
6. Larger carburetors
7. High compression pistons
8. Big bore cylinders and pistons
9. Long stroke flywheels

It is important to note that too much cam sometimes results in poor low RPM power.

Street bikes will often perform better with a mild cam than more radical cams. While bigger cams may have a higher peak horsepower, more conservative cams may feel stronger to a street rider because the max torque occurs at lower RPM. Changing cams is the easy way to more torque in the 2000-4000 RPM range. A cam with a longer intake duration will reduce static compression pressure at low speed which in turn will tend to reduce low RPM torque. But with a longer duration cam and a higher compression ratio, power at middle and high speeds will be increased which is what you wanted all along. This is the main benefit of a good performance camshaft and a properly tuned engine.

For an engine with a cam properly matched to the displacement and compression ratio, the net result will be more power at middle and higher engine speeds. In general, higher compression ratios need longer duration cams. Bolt in type cams are intended for stock compression ratios.

CAMSHAFTS AND HYDRAULIC LIFTERS

There has always been a great amount of interest regarding the application of hydraulic lifters with performance camshafts. On H/D engines, this attention relates to Twin 88s, EV80 big twins and Sportsters (1991 and later) since all of these engines now use hydraulic lifters as stock components.

Because we hear many questions about whether to use “solids” or “hydraulics” we felt that some discussion might help in deciding when one type of lifter or the other would be the best for specific applications. Each type of lifter design has distinct advantages.

First, all Andrews Products H/D camshafts will operate properly with hydraulic lifters *if the engine and heads are set up correctly.*

If hydraulic lifters are installed and correctly adjusted, they have some definite advantages:

- Quiet operation
- Long time service intervals
- No loss of lift and duration from heat expansion

For hydraulic lifters to operate properly in your engine, the most important point to consider at the time of installation is to make sure that the oil feed holes in the lifter blocks are in position to feed oil to the lifters when the cam is positioned at the lowest lift point. For this to occur with high lift cams, it may be necessary to modify the lifter blocks or lifters so oil can flow into the lifter feed hole from the tappet body.

However, solid lifters real advantage relates to all out racing. For anything else including all kinds of street riding, we recommend that hydraulic lifters be used.

For all out dragsters, a properly designed cam with solid lifters will be the best choice. But for most street bikes, the idea of low maintenance hydraulic lifters is pretty attractive. New H/D hydraulic lifters work so well that unless you really need 6500+ RPM, don't bother with solid lifters on a street bike. Hydraulic lifters are a little harder to install and adjust, but you will end up with a quieter engine that needs less servicing.

ANDREWS PRODUCTS, INC.

www.andrewsproducts.com
431 Kingston Court
Mount Prospect, IL 60056
Phone: 847-759-0190
Fax: 847-759-0848

POLARIS CAMSHAFTS 2002-UP (FREEDOM ENGINE)

The new Polaris engines have a lot of potential. With 92 cubic inches, 4 valve heads and a 9.2 compression ratio, more performance is only a pair of camshafts away. Our two new camshafts are a perfect match for the factory kits.

Part#	Grind	Duration@ .050	Duration@ .020	Valve Lift	Springs	Application
Stock	----	230 226	256 252	.414 .404	Stock	Stock cam specs listed for comparison.
268450	**V-438**	242 236	270 264	.438 .420	Stock	More valve lift and duration means extra power thru RPM range (2000-6000+). Piston and valves should be checked for proper clearance.
268460	**V-460**	252 246	282 276	.460 .445	Stock	Higher lift cams for modified Freedom motors with bored cylinders and higher comp. ratio. More torque and HP for larger motors. RPM range (2400-6500+).

POLARIS VICTORY CAMSHAFTS 1998-2001

Don't be misled by the conservative ratings of the Polaris Victory V twins. With 4 valve cylinder heads and a big bore 1507cc engine, more power is now a readily available option. Victory engines can be tuned to output a lot more useable power by just changing camshafts.

If you want more performance from your Victory bike, the first thing on your list of modifications should be a new set of Andrews Victory camshafts.

Part#	Grind	Timing(*)	Duration .050	Duration .020	Valve Lift	Lift @ TDC	Springs	Application
Stock	----	-04/34 34/-04	210 210	240 240	.433 .433	.037 .042	Stock	Stock cams specs listed for comparison. Centerline angles are intake=109; exhaust=109.
268402	**PL402**	13/37 41/09	230 230	258 258	.402 .402	.095 .080	Stock	Easy installation (no head work) with big boost in HP and torque over the entire RPM range.
268440	**PL440**	12/48 48/12	240 240	260 260	.440 .440	.091 .091	Stock	Long duration cams for engines with higher comp. ratios and low restriction exhausts. Big boost in HP and torque at middle and upper RPM speeds.

* Timing data listed for .050 lift at VALVE

ANDREWS PRODUCTS, INC.

www.andrewsproducts.com
431 Kingston Court
Mount Prospect, IL 60056
Phone: 847-759-0190
Fax: 847-759-0848

TWIN 88 PUSHRODS, SPRINGS AND COLLARS

Shown from left to right:

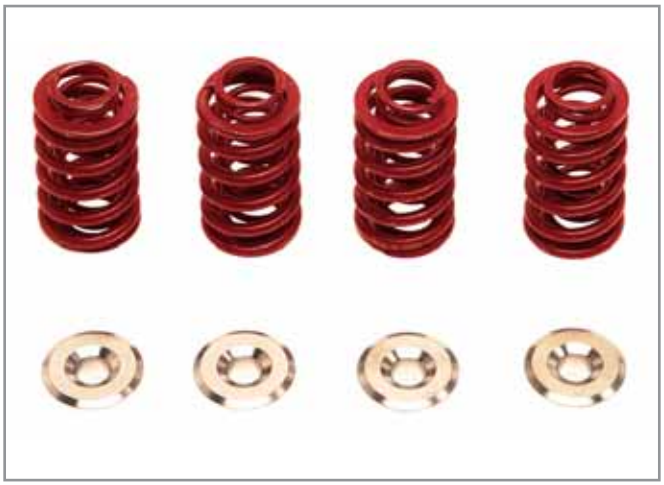
Standard tip aluminum pushrods:. . . . . **Part# 292388**

Standard tip chrome moly pushrods: . . . . . **Part# 292288**

EZ-install aluminum pushrods: . . . . . **Part# 292188**

EZ-install chrome moly pushrods: . . . . . **Part# 292088**

Twin 88 pushrods are available with EZ-install ends or standard adjustable tips. Both types are made in anodized aluminum or chrome moly steel. EZ-install pushrods can be installed without removing gas tanks or rocker boxes. If you are installing bolt-in cams, this is a big plus! These pushrods are a great match for cams listed on the next page. Extra long or short pushrods are available as specials. Call if you need them.



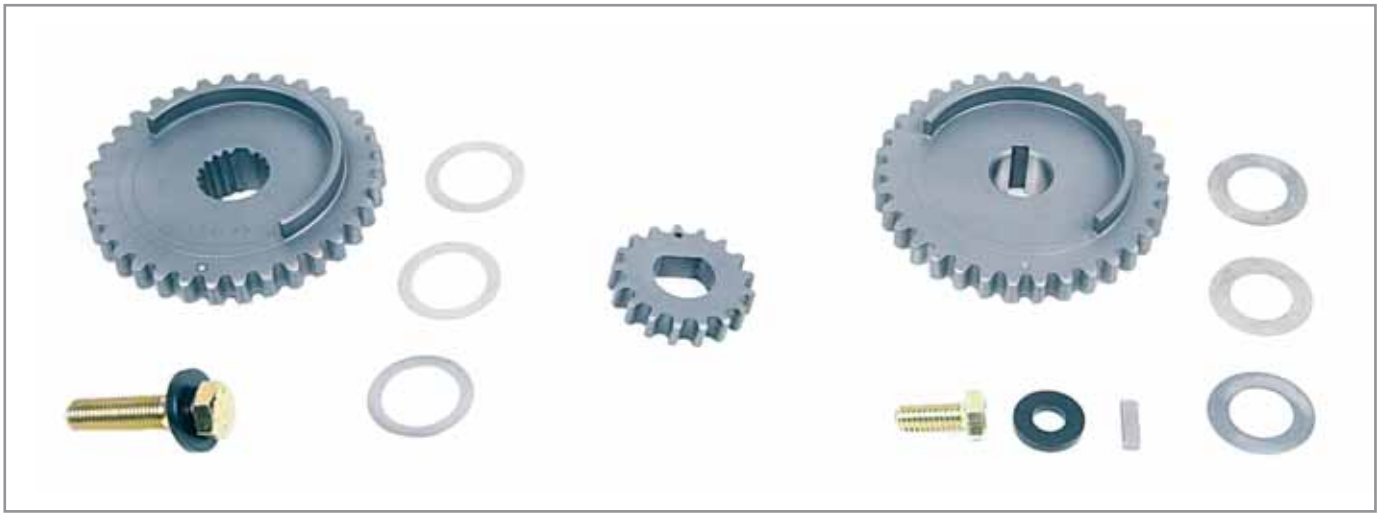
High Lift Springs . . . . . **Part# 294150**

Kit includes (4 inner and 4 outer springs)
For valve lifts up to .560. Installation does not require head machining. High lift springs and collars makes installing big cams a lot easier.

Titanium upper spring collars . . . . . **Part# 293110**

Designed to fit all Twin 88 engines. Provides .050" more spring travel than stock collars. Collars are stronger and 50% lighter than stock collars.

TWIN 88 CAM DRIVE SPROCKET KITS



Andrews heat treated steel cam drive sprockets fit all 2000 and later rear camshafts (with involute splines). Kit includes three spacer shims and one grade 8 bolt and hardened washer. New sprockets can be set up to the same length specs as original stock sprockets. If you're into performance riding with a Twin 88 engine, steel sprockets are a must even with stock camshafts.

Shown from left to right:

34 tooth splined cam sprocket kit: . . . . . **Part# 288015**

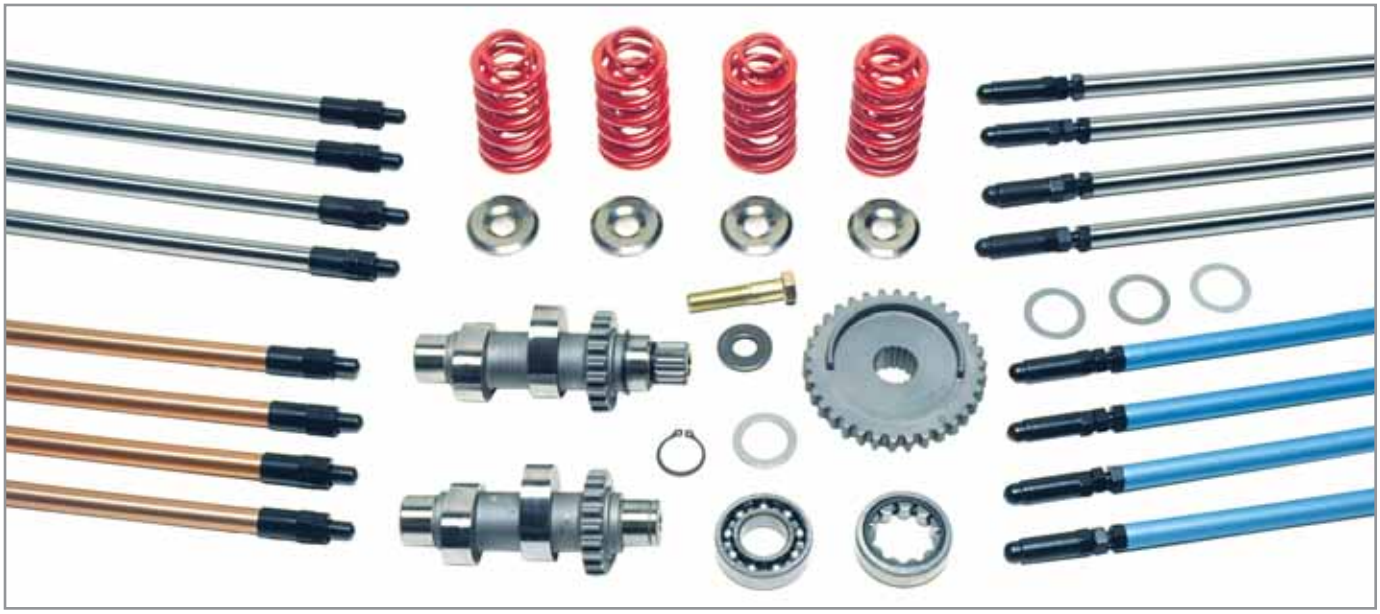
17 tooth steel crank sprocket:. . . . . **Part# 288020**

34 tooth steel keyed cam sprocket kit
(with square key drive; '99 style): . . . . . **Part# 288010**

ANDREWS PRODUCTS, INC.

www.andrewsproducts.com
431 Kingston Court
Mount Prospect, IL 60056
Phone: 847-759-0190
Fax: 847-759-0848

TWIN 88: CHAIN DRIVE CAMS AND KITS



Want more power from your new 88 engine? Andrews Products has eight proven Twin 88 grinds for 2004 to get you there. More HP and torque for stock or modified engines is within easy reach. All cam grinds listed are designed for use with stock H/D hydraulic lifters. Matching pushrods and heat treated steel sprockets are listed on the preceding page. For any bolt in cam grind, EZ-install pushrods do not require removal of gas tanks or rocker boxes for installation.

TOURING AND PERFORMANCE CAMS

Part#	Grind	Timing(*)	Duration .053	Duration .020	Valve Lift	Lift @ TDC	Springs	Application
Stock Carburetors	**(A)**	-02/38 36/04	216 220	257 260	.473 .473	.072 .110	Stock	Carbureted engine: stock cam data listed for reference. (Stock engine output is approximately 62 HP).
Stock Injectors	**(B)**	02/34 36/04	216 220	257 260	.473 .473	.087 .110	Stock	Fuel injected engine: stock cam data listed for reference. (Stock engine output is approximately 62 HP).
288121	**TW21**	10/30 40/08	220 228	255 264	.498 .498	.134 .121	Stock	Bolt in cam first introduced in 2000, more torque for all around riding with stock comp. ratio and heavy bikes. Similar to #23 cam for EV80. (1700-5200 RPM).
		TW21 cams run great with fuel injectors or carburetors!						
288126	**TW26a**	11/35 41/09	226 230	262 266	.490 .490	.129 .112	Stock	Bolt-in cam for lower RPM torque, FLT, etc. For two up touring, this cam will add torque and HP at lower and middle RPM. (1800-5500 RPM).
		TW26 cams run great with fuel injectors or carburetors!						
288137	**TW37b**	18/38 46/14	236 240	272 276	.510 .510	.174 .148	Stock	Twin 88s with this bolt-in cam grind have shown 80+ rear wheel HP. Smooth idle, broad torque band. (2200-5800 RPM).
		TW37 cams run great with fuel injectors or carburetors!						
288131	**TW31s**	10/46 52/08	236 240	272 276	.510 .510	.131 .120	Stock	Great street cam for large motors and/or superchargers. Same lobes as 37G with different timing. (1800-5600 RPM) with 95+ inches.
288144	**TW44**	21/41 49/17	242 246	279 283	.495 .495	.182 .158	Stock	First available in 2000 for 88 or 95 inches and 9.25 CR or higher. Maximum torque and HP at middle and upper RPM ranges. (2400-6000+ RPM).
288150	**TW50**	20/48 54/18	248 252	283 287	.510 .510	.184 .168	Stock	Easy installation in 95 inch motors with 9.25 C.R. and stock heads. (2500 to 6000 RPM).
288155	**TW55**	22/46 52/20	248 252	283 292	.550 .550	.197 .181	Hi-lift	High lift variation of the TW-50; this cam is best for 95+ inch engines with 9.5+ C.R. Max torque and HP at middle and higher RPM. (2600-6300+ RPM).
288160	**TW60a**	24/56 58/22	260 260	296 296	.560 .560	.205 .205	Hi-lift	For a well prepped street engine with 95 cubic inches and head work, 100+ HP is within reach. (2700-6500+ RPM max torque range).

(*) Timing and duration listed for .053 cam lift.

ANDREWS PRODUCTS, INC.

www.andrewsproducts.com
431 Kingston Court
Mount Prospect, IL 60056
Phone: 847-759-0190
Fax: 847-759-0848

TWIN 88: GEAR DRIVE CAMSHAFTS

Andrews Twin 88 camshafts are available with S & S gear drives. Engines with gear driven cams show gains of 4 hp over cams with chains. If less power is needed to run the camshafts, more power gets to the rear wheel. For all out drag motors, there is another advantage: With gear drive cams, very high lift cams can be used without interference between front and rear cam lobes. With the gear drive cams, lobe angles are different so lobe interference cannot occur. The gear drives are so smooth that ball bearings are used on both camshafts instead of a rear roller bearing. Also, gear drive cams do not have chain tensioner shoes to wear out.

TOURING AND PERFORMANCE CAMS

Part#	Grind	Timing(*)	Duration .053	Duration .020	Valve Lift	Lift @ TDC	Springs	Application
Stock cam data for both carbureted engines and injected engines is listed on page 7.								
288121G	**21G**	10/30 40/08	220 228	255 264	.498 .498	.134 .121	Stock	Bolt in cam first introduced in 2000, more torque for all around riding with stock comp. ratio and heavy bikes. Similar to #23 cam for EV80. (1700-5000 RPM).
		21G cams run great with fuel injectors or carburetors!						
288126G	**26G**	11/35 41/09	226 230	262 266	.490 .490	.129 .112	Stock	Bolt-in cam for lower RPM torque, FLT, etc. For two up touring, this cam will add torque and HP at lower and middle speed ranges. (1800-5500 RPM).
		26G cams run great with fuel injectors or carburetors!						
288137G	**37G**	18/38 46/14	236 240	272 276	.510 .510	.174 .148	Stock	Twin 88s with this cam grind show 80+ rear wheel HP. Smooth idle, broad torque band. Same grind as TW37b but w/gear drive. (2200-5800 RPM).
		37G cams run great with fuel injectors or carburetors!						
288131G	**31G**	10/46 52/08	236 240	272 276	.510 .510	.131 .120	Stock	Great street cam for large motors and/or superchargers. 1800-5600 RPM with 95 inches and easy installation. Same lobe design as 37G but different timing.
288144G	**44G**	21/41 49/17	242 246	279 283	.495 .495	.182 .158	Stock	For 88 or 95 inches and 9.25 C.R. or higher. Max torque and HP at mid and upper RPM (2400-6000+)
288150G	**50G**	20/48 54/18	248 252	283 287	.510 .510	.184 .168	Stock	Designed in '99 for easy installation in 95 inch motors with 9.25 C.R. and stock heads. (2500 to 6000 RPM).
288155G	**55G**	22/46 52/20	248 252	283 292	.550 .550	.197 .181	Hi-lift	Great cam for 95 inch engines with 9.5 C.R. Max HP and torque at mid and upper RPM (2600-6300 RPM).
288167G	**67G**	24/48 58/22	252 260	287 297	.570 .570	.209 .187	Hi-lift	New in '03. Performance cam; 95-103 inches. 10.25 C.R. and heads set up for high flow (2800-6500+ RPM)
288160G	**60G**	24/56 58/22	260 260	296 296	.560 .560	.205 .205	Hi-lift	For a well prepped 95-103 in, 100 HP+ is within reach. Max torque and HP range is (2700-6500+ RPM).
288159G	**59G**	29/57 63/27	266 270	303 307	.590 .590	.238 .218	Hi-lift	Great cam for gear drive 95+ inchers with 10:1 C.R. or higher. Max torque and HP (2400-6500+ RPM)).
288164G	**64G**	30/62 66/30	272 276	307 312	.640 .640	.262 .232	Hi-lift	High lift cams for modified 95-116 inch motors running 10:1 CR or higher. Heads must be set for .700 lift and modified for max air flow. (3000-6500+ RPM).

(*) Timing and duration listed for .053 cam lift.

ANDREWS PRODUCTS, INC.

www.andrewsproducts.com
431 Kingston Court
Mount Prospect, IL 60056
Phone: 847-759-0190
Fax: 847-759-0848

TWIN 88: CAM GEAR INSTALLATION KITS

OUTER DRIVE GEARS

Outer Drive Gears . . . . . Part# 288903

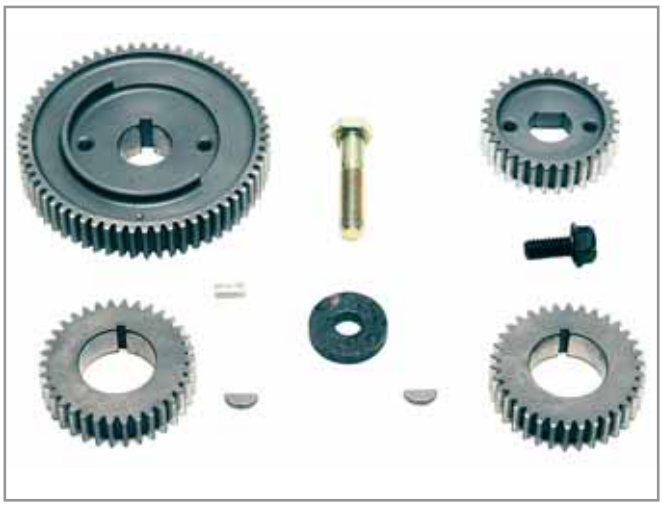
This kit includes the crankshaft and cam drive gears for a gear drive installation. Both bolts for the gears are also included.

GEAR DRIVE INSTALLATION KIT

Gear Drive Installation Kit . . . . . Part# 288901

Gasket and bearings shown are necessary to complete the installation of gear drive camshafts.

OUTER GEARS AND CAM GEARS



Complete kit of all four cam drive gears with installation bolts.
Crank and Cam Drive Gears . . . . . **Part# 288908**
Two inner cam drive gears are available separately.
Inner Cam Drive Gears (2 pcs). . . . . **Part# 288905**

TWIN 88 PUSHRODS

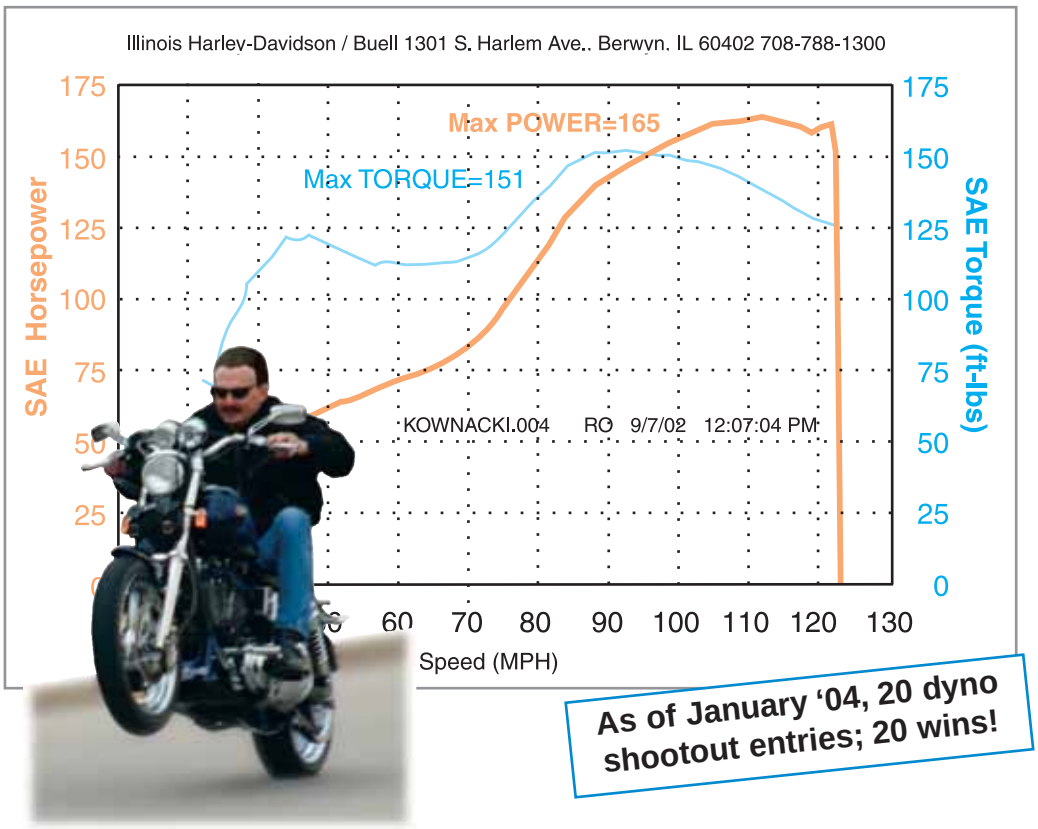
Shown from left to right:
Standard tip aluminum pushrods:. . . . . **Part# 292388**
Standard tip chrome moly pushrods: . . . . . **Part# 292288**
EZ-install aluminum pushrods: . . . . . **Part# 292188**
EZ-install chrome-moly pushrods: . . . . . **Part# 292088**

Twin 88 pushrods are available with EZ-install ends or standard adjustable tips. Both types are made in anodized aluminum or chrome moly steel. EZ-install pushrods can be installed without removing gas tanks or rocker boxes. If you are installing bolt-in cams, this is a big plus! Andrews pushrods are a great match for cams listed on the previous page. Extra long or short pushrods are available as specials. Call if you need them.

ANDREWS PRODUCTS, INC.

www.andrewsproducts.com
431 Kingston Court
Mount Prospect, IL 60056
Phone: 847-759-0190
Fax: 847-759-0848

LET'S TALK HORSEPOWER: 165 hp & 151 ft. lbs. torque!



As of January '04, 20 dyno shootout entries; 20 wins!

On September 7, 2002, at Illinois Harley Davidson, John Kownacki again won the dyno horsepower shootout with an astounding 165 hp and 151 ft. lbs. of torque running an S & S 113 engine in a 1994 FX frame. The bike is owned by John Kownacki of Chicago and ridden on the street. Together with Kownacki's legendary tuning skill and a custom designed Andrews camshaft, the bike has won every shootout contest it has entered; 20 for 20! (20 shootouts: 20 wins). The sound and power of this engine has to be seen up close to be truly appreciated.

Every camshaft listed in this catalog has the same cam design know how and built-in quality that helped this engine pull 165 horses. Think of what an Andrews cam can do for your bike!

EVOLUTION 80 PUSHRODS, SPRINGS & COLLARS

From left to right:
Standard tip aluminum pushrods . . . . . **Part #292110**
Standard tip chrome-moly pushrods. . . . . **Part #292140**
EZ-install aluminum pushrods . . . . . **Part #292215**
EZ-Install chrome-moly pushrods. . . . . **Part #292245**

High Lift Springs for Evolution engines-used with titanium spring collars, cam lifts of .550+ can be accommodated. Installation does not require head machining.
Part #294150 (4 inner and 4 outer springs)
Titanium upper spring collars will fit all Evolution 80 engines. Provides .050" more spring travel than stock collars. Collars are stronger and 50% lighter than stock collars.
Part #293110 (4 titanium upper spring collars)

ANDREWS PRODUCTS, INC.

www.andrewsproducts.com
431 Kingston Court
Mount Prospect, IL 60056
Phone: 847-759-0190
Fax: 847-759-0848

EVOLUTION 80 CAMSHAFTS

Andrews Products performance cams mean extra power for Evolution engines. H/D hydraulic lifters are capable of 6000+ RPM with stock springs and no valve float. Aluminum (T7) or chrome-moly pushrods (EZ-install type) are available to match any of our camshafts. Aluminum pushrods are lighter while the chrome-moly steel pushrods are more rigid for high performance.

TOURING AND PERFORMANCE CAMS

Part#	Grind	Timing(*)	Duration .053	Duration .020	Valve Lift	Lift @ TDC	Springs	Application
Stock 88-91	**(L)**	01/37 53/-01	218 232	266 280	.495 .495	.091 .083	STOCK	Listed for reference. 1984-1987 cam is 212 deg. intake, 202 deg. exhaust, .472" lift on both valves.
Stock 92-up (carburetors)	**(N)**	-02/30 31/-09	208 202	250 242	.472 .472	.070 .049	STOCK	Listed for reference. "N" cam is close to '84-'87 specs. Fuel Injector "O" cams are 200 deg int. and 216 exh.
291117	**EV31**	10/46 52/08	236 240	270 274	.495 .495	.133 .122	STOCK	Super power for supercharged engines; Basically an EV27 cam with timing set for superchargers. When too much is just about right.
291123	**EV23**	10/30 40/08 *OK with fuel injectors or carburetors!*	220 228	255 264	.498 .498	.134 .121	STOCK	Mild bolt-in street cam with more torque and HP for all around riding with stock comp ratio. Similar to stock L cam but more output. Pulls from 1800-5200 RPM.
291113	**EV13**	15/31 45/13 *OK with fuel injectors or carburetors!*	226 238	.270 .280	.485 .495	.161 .148	STOCK	Bolt-in street/touring cam for heavy bikes. Much more low and mid-range power than either stock cam. Best cam for 2 up riding with camping gear and side cars.
291127	**EV27**	20/36 46/14 *OK with fuel injectors or carburetors!*	236 240	270 274	.495 .495	.182 .166	STOCK	A great bolt in cam for stock EV80 engines using state of the art design. Very strong, broad torque band which will pull hard from 2000 to 5500 RPM.
291130	**EV3**	21/37 43/15	238 238	280 280	.495 .495	.197 .159	STOCK	Bolt-in street cam for light bikes (FXRS, etc.). Lots more mid-range and upper end power. Smooth idle 2800 to 6500 RPM cam with stock heads and springs.
291146	**EV46**	25/41 49/17	246 246	283 283	.495 .495	.207 .163	STOCK	Bolt-in performance cam; state of the art ramp design. Longer duration than EV3 but higher static comp. pressure; wide torque band; 2600 to 6000+ RPM.
291151	**EV51**	28/44 54/22	252 256	286 290	.510 .510	.233 .195	STOCK	Easy installation; longer duration for modified street engines with hydraulic lifters and 9.0 or higher compression ratio. Power range from 2800-6500 RPM.
291159	**EV59**	28/48 56/24	256 260	290 294	.560 .560	.236 .208	HI-LIFT	Upgraded EV57, fast ramps for modified 80 to 88 inch motors. Use with AP springs and collars. Very broad power band; 6000 RPM. OK for hydraulic lifters.
291172	**EV72**	30/54 60/28	264 268	298 302	.560 .560	.246 .230	HI-LIFT	Upgraded EV7, for 92 in. + street motors. For use with Andrews springs and titanium collars. Very broad power band, 2800-6000 RPM. OK for hydraulic lifters.

(*)Timing and duration listed at .053 cam lift.

Special cams can be made to order with 2 front head set-ups, etc. Call for information & prices!

ANDREWS PRODUCTS, INC.

www.andrewsproducts.com
431 Kingston Court
Mount Prospect, IL 60056
Phone: 847-759-0190
Fax: 847-759-0848

CAM GEAR NOISE (EV 80 AND SHOVEL 74 & 80) HOW TO FIND IT AND ELIMINATE IT

WHY DO CAM GEARS CAUSE NOISE:

In the last few years there has been more and more interest in quieter running engines. Since cam gear noise can sound like bad lifters, the following description should be helpful. This explanation mostly applies to H/D type four lobe cams.

Whenever the roller follower on a cam lobe passes the maximum lift point, the forces on the cam drive gear teeth change direction. If more than .002 inches (.005mm) backlash is present between a cam gear and a pinion gear, the directional change of force will result in an audible "click" as the backlash moves from the back side of each gear tooth to the front side.

While some positive backlash is necessary to prevent localized gear tooth overloads, excess backlash (and "clicking") may sound annoying but won't hurt anything.

Tight fitting gears will cause very noticeable whining which is definitely a more serious problem. Gear tooth and bearing damage can result from running zero backlash. In this case, a smaller cam gear or pinion gear would be required.

Different size gears permit custom fitting for a specific engine. By choosing two gears which are compatible sizes for a given engine, gear backlash can be minimized so that gears will not whine or click but just run quietly.

If you need them, Andrews Products makes cam gears one size larger than standard and one size smaller. H/D makes pinion gears in a range of sizes.

If you are working with an engine that does not have quiet running cam gears to use as a starting point, another method may be used to size drive gears when installing new cams.

In this case it will be necessary to use either a larger cam gear, a larger pinion gear, (or both) to correct the noisy gears. If the problem is excess whining, a smaller pinion or cam gear will be needed.

Measure pinion and cam gear sizes over pins. Look in H/D service manual for part numbers listed by pin sizes. A decision must now be made regarding what size pinion or cam gear to choose. Our recommendation would be to pick 2 sizes larger (to correct clicking) or 2 sizes smaller (to correct whining) as a starting point.

If both gears are sized properly for the engine, a very slight whine is normal. Only a small percentage of engines are made with larger size cam drive gears. The two largest sizes of cam drive gears will be color coded green or black. If a particular engine has a stock cam with one of these color codes, matching cam drive gears and pinions for correct backlash can result in a quieter running engine whenever a new camshaft is installed.

Engines having cam gears color coded red or blue should not require any cam or pinion gear changes.

Another approach is to press the stock cam gear off your stock cam and install it on the new camshaft. Assuming it ran quietly before, it should also run quietly with a new cam.

HOW TO MEASURE STATIC COMPRESSION PRESSURE:

Static or cranking compression pressure is what each cylinder experiences when the starter motor is turning the engine or when the engine is running at idle RPM. Please don't confuse static compression with "compression ratio" which has to do with how much volume remains in the cylinder when the piston is at the top of its' stroke. Static compression and compression ratio are related but the definition of each is different.

Compression pressures that are too high can result in difficult starting and detonation or "pinging" which in turn can cause engine damage. These high static compression pressures are a result of compression ratios set too high, intake cam duration too short or the intake cam timing set with too much advance.

Low compression pressures translate to poor low RPM torque. Causes for low compression pressures are late intake cam timing, too much intake duration or a compression ratio set too low.

Modifying an engine by changing pistons, camshafts or compression ratios will have a direct effect on static or cranking compression pressure. If the static compression pressure is too high or too low, the engine will not run as well as it should and in some cases, the resulting problems can be serious. Static or cranking compression can easily be measured with a COMPRESSION testing gauge. Cost is usually less than $25.00 and most auto supply stores or well equipped motorcycle shops sell them. To measure static pressure, the procedure is as follows:

With a warm engine, turn off the fuel from the tank, make sure the choke is off and the transmission is in neutral. Remove both spark plugs and insert the gauge adapter in one spark plug location. Now, holding the throttle wide open, turn on the starter motor and read the pressure indicated on the gauge. Then repeat the procedure on the other cylinder. The figures on the next page give some idea as to the significance of different pressure readings. Also some gauges have a rubber tip instead of a screw in adaptor. Either way, reading the static pressure of your engine should be fairly easy. Generally, higher static pressures mean more torque at lower RPM ranges but the trade off is that above a certain point (around185 PSI) the risk of detonation enters the picture. What happens at higher RPM is less predictable and can't be easily determined from a static pressure reading. What is important is that the cam timing, duration and compression ratio all be properly matched so that each compliments the others.

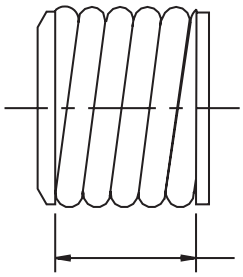
ANDREWS PRODUCTS, INC.

www.andrewsproducts.com
431 Kingston Court
Mount Prospect, IL 60056
Phone: 847-759-0190
Fax: 847-759-0848

ENGINE TUNING INFORMATION

HOW TO FIGURE OUT WHAT THE INSTALLED SPRING HEIGHT SHOULD BE:

Spring shown compressed (in vise)



SPRING SOLID HEIGHTS

Andrews Ev80 & T88	1.190"
Stock Ev80	1.250"
Andrews Shovel	0.900"
Stock Shovel	0.900"
Iron Sportster	0.910"

Measure solid length of spring only.

Spring Loads	Solid Height+.060*	Solid Height+.560*
Shovel	350 lbs	160 lbs
Evolution & T88	350 lbs	210 lbs

*Andrews Products springs

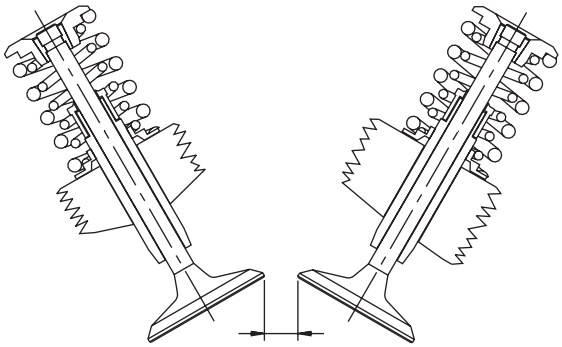
1. Using both top and bottom collars, place spring assembly in a small vise and close the vise until the outer spring is solid. Be careful when compressing springs in a vise!
2. Now measure the distance between spring lands as in diagram and write down the number for later use. This is the Solid Height.
3. Calculate INSTALLED SPRING HEIGHT (min.) as follows: INSTALLED HT.= Solid Height + .060 + Max. Valve Lift
4. Max. valve lift can be taken from catalog figures. For example, max. valve lift for an EV59 cam is .560.
5. For an EV51 cam, using Andrews Products springs and collars; INSTALLED SPRING HEIGHT = 1.190+.060+.510 = 1.760
6. This technique will work for any cam and spring system as long as measurements are carefully made.
7. At time of installation, make sure that .050 (minimum) clearance is present between top of valve guide and bottom of upper spring collar at maximum cam lift.
8. "Solid height + .560" (diagram at left) refers to spring forces **when the valve is seated.** (.560 is an assumed spring travel).

HOW TO CHECK FOR POSSIBLE VALVE TO VALVE INTERFERENCE

If your heads have large valves or new seats installed or if a new performance cam has been installed, being able to easily check for possible valve to valve interference is helpful. For all H/D heads (EV, FL, XL, etc.), a simple calculation can be done to see if valve to valve interference might be a problem which will need correcting before proceeding.

1. Andrews Products lists valve lifts at TDC (Top Dead Center) on all cam instruction sheets. Write down the number for your cam. For an EV51 cam, the TDC lift =.233" (see data on page 11)
2. Minimum valve to valve clearance should be .060".
3. Calculate the minimum valve separation distance as follows: Minimum Valve Separation Distance = TDC lift + clearance.
4. For EV51 cams, Minimum Valve Sep. Dist. = .233 + .060 = .293"
5. Measure the minimum separation between the two valves **when they are seated** (as in diagram). If actual measurement is not at least .293, modifications will be necessary to avoid valve to valve interference. (Cut seats deeper or back cut valves)
6. Remember, this technique is NOT for piston to valve clearance.

Valves shown in **seated** position



Minimum Separation Distance

STATIC COMPRESSION AND ENGINE TUNING

When installing cams with high lifts and long durations, a few general observations are worth keeping in mind. Remember that additional cam duration can produce more usable power but too much duration may actually hurt overall performance. The problem of poor engine response begins when too much duration results in lower cylinder compression pressure (at low RPM) which in turn can reduce low RPM torque and power. Too much duration in a camshaft is not necessarily a good thing.

Static Compression Pressure Ranges and Engine Performance:

1. Less than 115 psi: poor low speed response, hard starting. Pistons and cams not well matched or worn rings, valves.
2. 125 to 145 psi: OK for stock or modified street motors. On the lower end of the best range for a stock street motor.
3. 145 to 165 psi: OK for modified street motors. Static pressures in this range will be the best for stock street motors.
4. 165 to 185 psi: Marginal for large displacement street motors, possible hard starting, detonation and overheating.
5. Over 185 psi: These are high performance numbers. Street motors over 185 PSI may need compression releases.

The above numbers are not absolute but the point is that static compression is important. Proper matching of cams and compression ratios will allow engines to be modified for more performance and still run smoothly in street engines.

ANDREWS PRODUCTS, INC.

www.andrewsproducts.com
431 Kingston Court
Mount Prospect, IL 60056
Phone: 847-759-0190
Fax: 847-759-0848

SPORTSTER CAMS (IRON HEAD)

Pictured is a late style Sportster cam gear kit, lower collars and pushrods made from either steel or aluminum. Steel pushrods are the best choice for stroker motors and drag applications where the greatest strength is needed. For street applications where quiet operation is desired, aluminum pushrods are the recommended choice. Both pushrod kits are made from 7/16 diameter tubing which will not interfere with rod covers. Lower spring collars are similar to late style H/D parts and will provide .060 more spring travel over stock collars. High lift cams are easier to install with these collars.

Part #240040 . . . . . (4 steel pushrods)
Part #240060 . . . . . (4 aluminum pushrods)
Part #277160 . . . . . (4 lower spring collars)

TOURING AND HIGH PERFORMANCE CAMS

Part#	Year	Grind	Timing(*)	Duration(*) .053	Duration(*) .020	Max Lift	TDC Lift	Application
STOCK	(76-85)	**Q**	10/32 35/07	222 222	262 262	.400 .380	.114 .114	Specifications for stock Q cams are listed for reference and comparison purposes.
214010 214014 214020 214025	(57-70) (71-80) (81-84)** (84-85)***	**P** **PB+**	34/40 43/31	254 254	294 298	.400 .410	.200 .192	4/1 kit; exhaust cams only for use with stock P intakes. Bolt-in power for all iron head Sportsters with no head work. (Stock P exhaust is .380 lift, 242 deg. duration)
214040 214045 214050 214055	(57-70) (71-80) (81-84)** (84-85)***	**PB+**	34/40 43/31	254 254	298 298	.410 .410	.208 .208	Bolt-in replacement cams for stock 'P' or 'Q' cams; more horse power and torque thru RPM range with this great street grind. Stock springs will rev. to 7000 RPM
214075 214080 214085 214090	(57-70) (71-80) (81-84)** (84-85)***	**Y**	35/47 53/29	262 262	310 310	.425 .425	.206 .182	Street 900/1000: Biggest cam available for no headwork installation. Stock springs OK. Great mid-range and upper end power. Needs 9.0 or higher C.R. pistons for best output.
214105 214110 214115 214120	(57-70) (71-80) (81-84)** (84-85)***	**R5**	33/41 43/31	254 254	306 306	.445 .445	.209 .200	Street/Drags: Modified 900/1000 motors and strokers. Big boost in torque over stock cams (2000-7500 rpm). Stock springs are OK, but checking valve clearances required.
214135 214140 214145 214150	(57-70) (71-80) (81-84)** (84-85)***	**X**	35/55 57/33	270 270	314 314	.450 .450	.210 .206	Street/Drags: For stroker motors to 76 inches. More mid range and upper end power. Lower lift means easier installation in 1977 and later engines. Stock springs OK. Needs 9.0 compression minimum.
214190 214195 214200 214210	(57-70) (71-80) (81-84)** (84-85)***	**V9**	32/52 52/32	264 264	311 311	.490 .490	.207 .207	Street/Drags: Excellent cams for 65-76 inches. High lift short duration for broad RPM torque range: 2500-7000+ rpm.

(*) Timing listed for .053 lift figures.
(**) 1981-early '84 cam gear kits (with generators) do not have tachometer drive gears.
(***) Late '84 to 1985 cam gear kits (with alternators) do not have generator drive gears.

ANDREWS PRODUCTS, INC.

www.andrewsproducts.com
431 Kingston Court
Mount Prospect, IL 60056
Phone: 847-759-0190
Fax: 847-759-0848

SPORTSTER EVOLUTION AND BUELL CAMS

Andrews Products makes high performance cams for all EV Sportster engines. All of the cams listed below will run to 6500 RPM with stock hydraulic lifters. Stock H/D hydraulic lifters are very proven units and we recommend that they not be changed to solid lifters. Andrews Products EV Sportster cams have stock base circle sizes so stock (nonadjustable) pushrods can be used (except V9 or BV). Adjustable aluminum or chrome-moly steel pushrods are also available. ***Note: #2 cam drive gears used in 2000 and up EV Sportster cams uses 46 teeth; the '91-99 #2 gear has 36 teeth. 46 tooth gears will fit 91-99 #2 cams.***

EV Sportster Adjustable Length Pushrods

Part #292020 . . . . . (4 aluminum pushrods; '86-'90)
Part #292090 . . . . . (4 chrome-moly steel rods; '86-'90)
Part #292030 . . . . . (4 aluminum pushrods; '91 up)
Part #292085 . . . . . (4 chrome-moly steel rods; '91 up)

EV Sportster Fixed Length Pushrods

Part #292025 . . . . . (4 aluminum pushrods; '91 up)
Part #292095 . . . . . (4 chrome-moly steel rods; '91 up)

High Lift Evolution Springs used with titanium spring collars, cam lifts of .550+ can easily be accommodated. Installation does not require machining of heads.

Part #294150 . . . . . (4 inner and 4 outer springs)

Titanium Upper Spring Collars will fit all Evolution Sportster engines. They are stronger than stock, +.050" more spring travel, 50% lighter and install with stock keepers.

Part #293110 . . . . . (4 titanium upper spring collars)

TOURING AND HIGH PERFORMANCE CAMS

Part#	Year	Grind	Timing(*)	Duration .053	Duration .020	Max Lift	TDC Lift	Application
Stock	(86-91)	**D** **D**	02/41 41/02	223 223	270 270	.458 .458	.094 .094	Listed for comparison. V series cams listed fit '86-'90 engines. (Note: 1986-1987 exhaust cam lift is .414).
Stock	(91-up)	**W** **W**	08/26 36/14	234 230	272 270	.470 .470	.122 .138	Late Sportster cam data listed for comparison. Late cams marked "**D**" ('91 and later) have same specs as "**W**" cams.
298120 298125 298130	(86-90) (91-99) (2000-up)**	**V2** **N2**	22/38 46/18	240 244	290 290	.465 .440	.180 .155	Bolt in cams for stock 883, 1100 or 1200 engines. More duration and lift means extra power thru RPM range. Stock springs and hydraulic lifters recommended. 2000-6000 RPM.
298140 298145 298150	(86-90) (91-99) (2000-up)**	**V4** **N4**	30/46 52/24	256 256	296 296	.490 .490	.216 .189	Street/drags: Stock or modified 883/1100/1200. Slightly higher idle speed but stock springs-hydraulic lifters are recommended. RPM range: 2000-6000.
298180 298185 298190	(86-90) (91-99) (2000-up)**	**V8** **N8**	32/44 56/28	256 264	296 302	.490 .500	.226 .212	Modified 1100-1200, stroked 883's with stock springs and hydraulic lifters. Same intake cam as N4 but more exhaust cam duration. Great mid-range power: 2000-6500 RPM.
298160 298165 298170	(86-90) (91-99) (2000-up)**	**V6** **N6**	34/50 56/28	264 264	302 302	.500 .500	.241 .212	Modified 1200s to 80 inches and/or high comp. pistons. Stock springs and hydraulic lifters are recommended: RPM range: 2500-6800.
214210 214215 214219	(86-90) (91-99) (2000-up)**	**V9** **N9**	33/53 53/33	266 266	309 309	.555 .555	.240 .240	Med. lift cams for stroked engines from 80-88 inches. Broad torque range to 6000+ RPM with hydraulics. Andrews springs, collars and pushrods required. (1991-up need long pushrods).
214265 214268 214272	(86-90) (91-99) (2000-up)**	**BV** **NV**	35/59 59/35	274 274	316 316	.590 .590	.260 .260	Hi-lift cams for 88+ inches. Andrews pushrods, springs and collars required. BV/NV cams start easy and run strong; 2000-6000+ RPM with hyd. lifters. (1991-up need long pushrods.)

(*) Timing listed for .053 lift figures.
(**) Model year 2000-up Sportster engines require a different #2 drive gear than '91-'99 engines.

ANDREWS PRODUCTS, INC.

www.andrewsproducts.com
431 Kingston Court
Mount Prospect, IL 60056
Phone: 847-759-0190
Fax: 847-759-0848

BUELL BLAST CAMSHAFTS

Has any H/D engine ever made it past the first year of production without someone thinking about modifications for extra power? The new Blast engine is no different. Almost from the time the first Blast bike hit the street, we have been asked about cams with more stuff. The Blast engine is basically designed around the front cylinder from a Sportster engine. Andrews Products has more experience making Sportster type cams than anyone else in the industry. To compliment new Blast cams, pushrods can also be included.

2 Chrome-Moly Pushrods; **Part#: 292035**

Part#	Grind	Timing(*)	Duration .053	Duration .020	Valve Lift	Lift @ TDC	Springs	Application
Stock	**W**	9.5/25.5	215	254	.475	.073	Stock	Stock W grind cam specs listed for comparison.
		39/11	230	270	.475	.080		
297150	**B50**	16/32	228	264	.498	.163	Stock	More valve lift and duration means extra power thru RPM range (2000-6000+). Piston and valves must be checked for proper clearance.
		43/15	238	276	.498	.146		
297170	**B70**	22/38	240	277	.530	.191	Hi-lift	High lift cams for modified motors with high comp. ratio. More torque mid and upper RPM range (2400-6500+)
		48/20	248	285	.530	.156		

CAMS FOR KNUCKLE ENGINES

Part#	Grind	Timing(*)	Duration .053	Duration .020	Valve Lift	Lift @ TDC	Springs	Application
212965	**N**	13/41	234	270	.348	.089	Stock	Stock Knuckle replacement cam. For stock motors and restorations, this is the cam to use.
		44/16	240	276	.348	.105		
212970	**S**	27/55	262	308	.370	.130	Stock	Bolt-in Knuckle performance cam for stock motors, smooth idle, strong pull to 6000 rpm. This cam is the Knuckle equivalent of a “B” cam in a shovel motor.
		55/27	262	308	.370	.130		
212980	**K**	35/63	278	318	.368	.156	Stock	Knuckle perf cam for stroked motors; strong pull to 6000 rpm. This is the Knuckle equivalent of a “C” cam.
		63/35	278	318	.368	.156		

Knuckle cam bearings are ground to .8115 to fit stock bushings.
(*) Timing listed at .053 cam lift.

KNUCKLE CAMS

It seems amazing but there are still a lot of Knuckle engines going strong. Some of them have been around for more than 50 years! How many other bikes can make this kind of a claim for long life and durability.

ANDREWS PRODUCTS, INC.

www.andrewsproducts.com
431 Kingston Court
Mount Prospect, IL 60056
Phone: 847-759-0190
Fax: 847-759-0848

SHOVEL AND PAN CAMSHAFTS

Whether you want a better street cam for a stock motor, a big lift cam for a dragster or something in between, Andrews Products can supply it. All of our cams for these engines are computer designed and precision ground from alloy steel billets. The rocker arm ratios are: Shovel: 1.42, Pan: 1.50, Knuckle: 1.00, UL80: 1.00.

CAMS FOR STREET AND DRAG APPLICATIONS

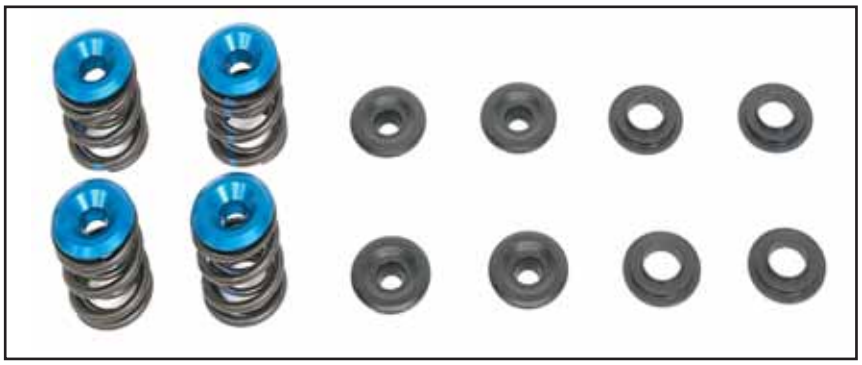
Part# Year	Grind	Timing(*)	Duration .053	Duration .020	Valve Lift Shovel	Valve Lift Pan	Lift(**) TDC	Application
STOCK (Front cyl)	H	-06/46 44/20	220 244	256 282	.390 .390	.412 .412	.051 .176	Stock H/D front cylinder timing listed for comparison. Later stock "S" grind cams have similar specs.
STOCK (Rear cyl)	H	14/38 44/20	232 244	274 282	.390 .390	.412 .412	.129 .176	Stock H/D rear cylinder timing listed for comparison. Later stock "S" grind cams have similar specs.
212011 (48-69) 212020 (70-77) 212030 (78-84)	J	21/41 41/21	242 242	292 292	.405 .405	.425 .425	.154 .154	Mild street: Pans and Shovels, smooth idle, more power through RPM range. Bolts in with no head work.
212270 (48-69) 212280 (70-77) 212290 (78-84)	A	21/43 43/21	244 244	296 296	.450 .450	.470 .470	.156 .156	Street/drags: Bolts into Shovels (except '80-'81) with no head work. More mid-range and high end power. Idle unaffected. (Head setup req'd on '80 & '81). (See note 1).
212310 (48-69) 212320 (70-77) 212335 (78-84)	AB	21/43 50/26	244 256	296 300	.450 .450	.470 .470	.156 .170	"A" intake and longer duration exhaust for cooler running and more high end power. Bolt-in street cam (except for 1980-1981). OK for hydraulic lifters.
212130 (48-69) 212140 (70-77) 212150 (78-84)	1	16/36 36/16	232 232	288 288	.427 .427	.450 .450	.098 .098	This is the low compression piston version of an "A" grind cam for 74 - 80 engines with 7.5 to 1 pistons.
212330 (48-69) 212340 (70-77) 212350 (78-84)	2	15/35 35/15	230 230	288 288	.490 .490	.512 .512	.098 .098	Back in our catalog by popular demand. Low compression version of a "B" grind cam. More power through RPM range for engines with 7.5 pistons.
212630 (48-69) 212640 (70-77) 212650 (78-84)	3	23/43 43/23	246 246	304 304	.514 .514	.540 .540	.125 .125	High lift short duration cam for motors with 84+ inches. More power for strokers with 7.5 compression ratio.
212360 (48-69) 212370 (70-77) 212380 (78-84)	B	26/50 50/26	256 256	298 298	.485 .485	.507 .507	.182 .182	Street/drags: Much more mid-range and high end power. Idle smoothness unaffected. THE cam for modified 74/80 inchers and small strokers. Spring spacing required.
212420 (48-69) 212430 (70-77) 212440 (78-84)	BH	24/52 52/24	256 256	302 302	.450 .450	.470 .470	.156 .156	Hydraulic version of a "B" cam. Usually a bolt-in but spring spacing required on stock '80-'81 Shovel heads.
212510 (48-69) 212520 (70-77) 212530 (78-84)	6	32/56 56/32	268 268	325 325	.510 .510	.535 .535	.190 .190	Hotter version of B grind. Great street cam especially for 84/88 inch strokers: maximum torque available from 2500 to 6500 rpm.
212600 (48-69) 212610 (70-77) 212620 (78-84)	C	37/61 61/37	278 278	318 318	.525 .525	.550 .550	.234 .234	Best production cam made for big street engines. Strokers from 84 to 96 inches will really turn on this cam. Broad torque range pulls from 2000-7000+ rpm.

Note (1); 1980 and 1981 engines: The height of original stock H/D valve guides restricts spring travel (and cam lift) to .430 or less!
(*) Timing listed at .053 cam lift.
(**) TDC Shovel lift listed: TDC Pan lift will be 5% higher.

ANDREWS PRODUCTS, INC.

www.andrewsproducts.com
431 Kingston Court
Mount Prospect, IL 60056
Phone: 847-759-0190
Fax: 847-759-0848

SHOVEL VALVE SPRINGS AND COLLARS



If you are installing cams in a shovel engine, the valve spring collars and related parts shown at left will make things go a lot smoother. Our springs and collars are designed for easy installation and maximum reliability.

A. High Lift Upper Spring Collars: H/D 74/80 motors. Used with high-lift springs, cams with .600 lift can easily be accommodated. Made from T6 aluminum, collars are light weight, hard coated and very strong.
4 high lift spring collars: . . . . . **Part #271100**

B. High Lift Springs: for 74/80 inch motors; will provide correct spring force for any of our performance cams. Installation does not require complicated machining.
4 high lift springs: . . . . . **Part #272110**

C. Medium Lift Upper Spring Collars: for 74/80 inch motors; intended to work with stock springs and add .060" spring travel with no other modification. This is the easy way to install B grind or #2 cams in stock heads.
4 medium lift upper collars: . . . . . **Part #276150**

D. Low Profile Lower Spring Collars: for 74/80 inch motors are similar to stock 1980 style parts but are lower profile for easier installation of higher lift cams. They are required parts if you are using 1980 style valve guides which utilize "K" line stem seals. Heat treated steel.
4 low profile lower collars: . . . . . **Part #273120**

SHOVEL PUSHRODS

Andrews Products pushrods are available for all Shovel engines using stock diameter tubing so there is no cover tube interference. Extra long or short pushrods can be made up to order. Call us if you need them.

A. Aluminum Pushrods and Adjusters-quiet operation.
4 aluminum pushrods and adjusters . . . . . **Part #240055**

B. Chrome-Moly (4130) Steel Pushrods-maximum strength.
4 steel pushrods and adjusters . . . . . **Part #240030**

TROCK VALVE TRAVEL CHECKERS

Trock Valve Checkers are the most accurate tools available for measuring valve travel on all 88, EV80, Shovel, Pan or Sportster heads. If you setup more than two pairs of heads per year, these fixtures are well worth owning.

Part# 230090 EV80, T88, '91 Sportster
Part# 230010 Shovel heads
Part# 230040 Iron Sportster ('57-'90)
Part# 230020 Pan heads

Part# 231010 Dial Indicator for checkers

Part# 230095 Cam End Play checker (for nose cone motors).

ANDREWS PRODUCTS, INC.
www.andrewsproducts.com
431 Kingston Court
Mount Prospect, IL 60056
Phone: 847-759-0190
Fax: 847-759-0848

COMPRESSION RATIO CHANGES

One of the best ways to increase the efficiency of any internal combustion engine is to raise the compression ratio. As long as fuel with a high enough octane rating is available (so it will burn without detonation), raising the compression ratio can be a very effective performance boost.

The amount of material which must be milled from heads (or cylinders) to change compression ratios may be easily determined. Although the formula listed in the next column may look strange (or too simple) it is correct and it does work!

Only the stroke length, the original and new compression ratios need to be known. As an example, how much must be milled off EV80 heads to raise the compression ratio from 8.5 to 9.73? Stroke length=4.25 for a stock EV80. With this formula, T=.080 (see table in next column). All of the values in the following table were calculated with this formula. This formula also assumes that combustion chamber volumes and cylinder bores are not changed for this calculation.

Knowing only this information, the exact thickness, (T) to mill from the heads (or cylinders) can be calculated:

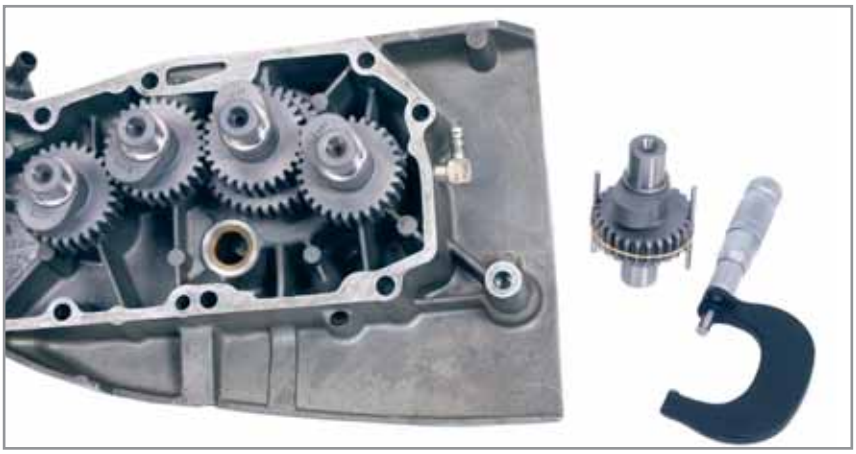
$$\text{Stroke Length} \times \left(\frac{1}{\text{original CR-1}} - \frac{1}{\text{new CR-1}} \right)$$

T = 4.25 x (1 / 7.5 - 1 / 8.73) = .080 in. (EV80; 9.73:1)
T = 4.00 x (1 / 8.0 - 1 / 9.09) = .060 in. (TW88; 10.09:1)

For EV80 and Twin 88 (Stock bore & stroke):

Head Milling (T)	Compression Ratio EV80	Twin 88
.000	8.50	9.00
.020	8.77	9.33
.040	9.07	9.69
.060	9.39	10.09
.080	9.73	10.52
.100	10.11	11.00

EVOLUTION SPORTSTER CAM GEAR NOISE



WHAT CAUSES CAM GEAR NOISE?

Whenever a roller lifter in a Sportster engine passes maximum cam lift, the forces on the cam gear teeth change direction. If there is more than .002 backlash, this change of force will result in an audible "click" as the backlash moves from one side of the tooth to the other. Gear noise always occurs at lower RPM.

Stock EV Sportster cams are made with different gear sizes. They are color coded by size and selectively fitted to engines at the factory to minimum backlash and gear noise during engine operation.

Andrews Products cam gears for EV Sportsters are made with gears in the middle size ranges so the chance of cam gears fitting too tight is slight. Cam gears which have excess backlash may rattle during operation. This clicking (or rattling) sometimes sounds like lifter noise. Unlike whining gears, rattling gears will not cause gear tooth failure or engine damage. If you don't mind the noise, it won't cause any engine problems.

Gears which are operating without enough backlash (fitted too tightly) will whine during operation. This condition is serious and can cause localized gear overheating, tooth failure and engine damage. Cam gears which fit too tight must be corrected with smaller size cam gears.

To fit Andrews Products cams in your EV Sportster engine, a procedure will be described.

MEASURING CAM GEARS FOR PROPER FIT

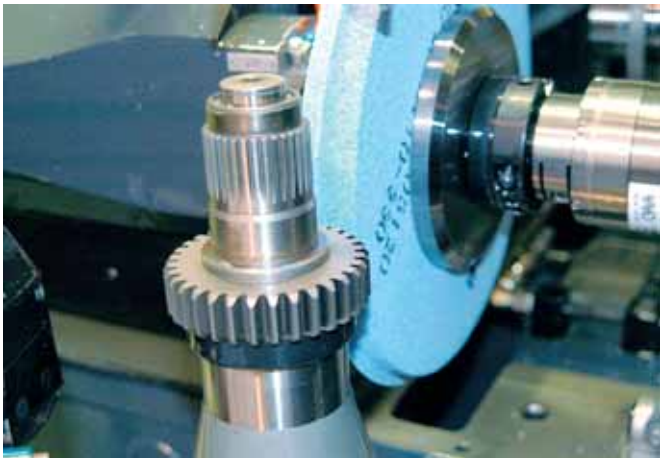
1. Install all 4 cam gears in cover (see photo) for trial fit.
2. Manually turn all four gears and verify that they roll freely. If there is no tightness, proceed to step 6.
3. If there is any tightness, remove #4 cam, then #1, then #3, in that order so that the tight fitting parts can be identified.
4. Measure each new cam gear with a micrometer using .108" dia. pins. Do the same with the stock cam gears. Note any differences in size.
5. Andrews Products makes undersize and oversize cam gears for all 3 production EV cam grinds. Unused parts may be returned and exchanged for under or oversized cam gears.
6. Install the cover onto the engine with no pushrods and only the #2 cam gear. Verify that the engine now freely turns. If so, the cam gear backlash is correct and you can continue to reassemble the engine.
7. If the #2 cam drive gear is tight, a smaller pinion gear (from H/D) must be used. (See page 12 for a procedure to determine the correct size of new pinion).
8. Any 2 adjacent cam gears (1-2), (2-3), (3-4) can be installed in the cover to check for proper backlash by comparing the stock parts (2 at a time) to the new ones.
9. Any significant differences in sizes between the stock cam gears and new cam gears should be investigated and understood before proceeding.

ANDREWS PRODUCTS, INC.

www.andrewsproducts.com
431 Kingston Court
Mount Prospect, IL 60056
Phone: 847-759-0190
Fax: 847-759-0848

ANDREWS PRODUCTS CAMS AND GEARS: THE INDUSTRY STANDARD

Andrews Products has been making cams and trans gears for H/D type engines for 30 years. We are the original maker of close ratio gears starting with 2.44 first gears for 4 speed gear boxes in 1972. The best gears and cams for American motorcycles continues to be Andrews. Our goal as a manufacturer is to maintain the highest level of quality and service for all of our customers.



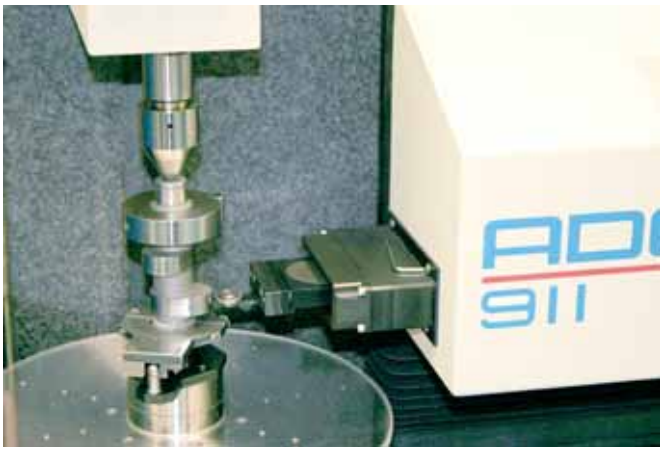
Finish grinding gear teeth on CNC tooth form grinder.

Cutting gear teeth with a Lorenz CNC gear shaper.

Grinding camshaft journal bearings

M & M 400 CNC gear inspection systems in temperature controlled room

Grinding internal diameters on a programmable ID grinder.



Camshaft inspection on Adcole 911 Cam Gage.

ANDREWS PRODUCTS, INC.

www.andrewsproducts.com
431 Kingston Court
Mount Prospect, IL 60056
Phone: 847-759-0190
Fax: 847-759-0848

CAMS FOR DRAGS AND HIGH PERFORMANCE

For big engines (96+ cubic inches) or highly modified smaller motors and running compression ratios of 10.5 or higher, Andrews Products has high lift cams available which will put more usable power at the rear wheel than anything else going. These grinds are specially designed for highly modified motors.

Installation requires expert knowledge and machining capability!

EVOLUTION 80 CAMS (Rocker ratio = 1.63)

(*) Timing @ .053 cam lift

Part#	Grind	Timing(*)	Duration .053	Duration .020	Valve Lift	Lift @ TDC	Springs	Application Comments
291581	**EV81**	32/60 66/30	272 276	306 310	.610 .610	.262 .244	HI-LIFT 160 LBS.	For 80-88 inches, 10.5+ C.R., head work. Broad nose, quick ramps for wide torque band. 6500+RPM.
291584	**EV84**	32/64 70/30	276 280	310 314	.640 .640	.269 .246	HI-LIFT 160 LBS.	Quick ramps, broad nose type design means more power for 90-100 inch motors. 6500+ RPM.
291588	**EV88**	34/70 76/32	284 288	318 322	.680 .680	.288 .264	HI-LIFT 160 LBS.	Same as above but more stuff for 100+ inch motors. Expert installation knowledge required. 6500+RPM.

EVOLUTION SPORTSTER CAMS (Rocker ratio = 1.63)

(*) Timing @ .053 cam lift

Part#	Grind	Timing(*)	Duration .053	Duration .020	Valve Lift	Lift @ TDC	Springs	Application Comments
298880 ('86) 298885 ('91)	**V80** **N80**	32/60 66/30	272 276	306 310	.600 .600	.264 .244	HI-LIFT 160 LBS.	.600 lift for Sportsters with 10.5+ C.R. and head flow work will pull strong to 6500+ RPM. 61-77 inches.
298830 ('86) 298835 ('91)	**V83** **N83**	32/64 70/30	276 280	310 314	.630 .630	.267 .248	HI-LIFT 160 LBS.	For 80 to 96 inch motors with head work and 10.5+ compression. Quick ramps for 6500+RPM.
298870 ('86) 298875 ('91)	**V87** **N87**	34/70 76/32	284 288	318 322	.670 .670	.283 .269	HI-LIFT 160 LBS.	Still more stuff for 100+ cubic inches. Quick ramp, broad tip design will pull strong to 6500+RPM.

SHOVELHEAD CAMS (Rocker ratio = 1.43)

(*) Timing @ .053 cam lift

Part#	Grind	Timing(*)	Duration .053	Duration .020	Valve Lift	Lift @ TDC	Springs	Application Comments
212823 ('70) 212825 ('78)	**S82**	32/60 66/30	272 276	306 310	.590 .590	.237 .220	HI-LIFT 160 LBS.	74-84 inch Shovels with 10.5+ C.R. New design technique for wide, strong power band. 6500+RPM.
212834 ('70) 212836 ('78)	**S84**	32/64 70/30	276 280	310 314	.630 .630	.241 .223	HI-LIFT 160 LBS.	Shovels: 84-96 inches, 10.5+ pistons and head flow work for max HP in these larger engines. 6500+RPM.
212855 ('70) 212857 ('78)	**S86**	34/70 76/32	284 288	318 322	.660 .660	.254 .235	HI-LIFT 160 LBS.	100+ inch Shovels will benefit most from this quick ramp design. Broad power band to 6500+RPM.

ANDREWS PRODUCTS, INC.

www.andrewsproducts.com
431 Kingston Court
Mount Prospect, IL 60056
Phone: 847-759-0190
Fax: 847-759-0848

EVOLUTION 1340: 5 SPEED TRANSMISSION GEARS

The EV Big Twin 5 speed gear box has been around since 1984 but the growing number of modifications for the 1340 engine continues to create more interest. In addition to close ratio first gears, Andrews Products also makes stock replacement gears for 1st, 2nd, 3rd, 4th and 5th gears. All Andrews Products 5 speed gears are made from high nickel alloy and heat treated and shot-peened to give maximum durability and strength. Also, where applicable, lead-in ramps have been machined into most gears to improve shifting and reduce wear on drive dogs and drive slots.

A) 3.24 STOCK RATIO 1ST GEARS
Part #296120 (1st counter - 31T)
Replaces H/D #35622-79A
Part #296125 (1st main - 18T)
Replaces H/D #35025-79

(B) 2.94 CLOSE RATIO 1ST GEAR SET
Part #296110 (2 pieces)
2.94 1st gears provide close ratio shifting into 2nd.
At peak RPM, 2.94 gears will run +5 mph over 3.24 ratio.

(C) STOCK 2ND AND 3RD GEARS
Part #296330 (2nd counter/3rd main)
Replaces H/D #35027-79A
Part #296220 (2nd main/3rd counter)
Replaces H/D #35026-79A

(D) STOCK 4TH GEARS
Part #296445 (4th main gear) replaces H/D #35028-79.
Part #296440 (4th counter gear) replaces H/D #35625-79A (1987-up); also replaces gear/spacer in all earlier 5 speeds.

(E) STOCK MAIN DRIVE GEARS (Belt Drive)
Part #296585 (main drive-belt) replaces H/D #35029-85
Part #296591 (main drive-belt) replaces H/D #35029-91
Part #296555 (cntr drive gear) replaces H/D #35626-79A

STOCK MAIN DRIVE GEARS (Chain Drive) (Not shown)
Part #296550 (main drive-chain) replaces H/D #35029-79

F) TRANSMISSION SHAFTS (All years)
(1) Part #296800 (chain drive mainshaft, 1981-1984)
Replaces (H/D #35042-79)
(2) Part #296850 (belt drive mainshaft, 1985-1989)
Replaces (H/D #35042-85)
(3) Part #296900 (belt drive mainshaft, 1990 only)
Replaces (H/D #35042-90)
(4) Part #296910 (belt drive mainshaft, 1991 - up)
Replaces (H/D #35042-91)
(5) Part #296700 (countershaft-all years, 1984 - up)
Replaces (H/D #35632-79)

Complete gear sets are available. Each set includes:
First gear **(specify ratio)** (ctr & mn) . . . . . 2 pcs
Second gear (counter & main). . . . . 2 pcs
Third gear (counter & main). . . . . 2 pcs
Fourth gear (counter & main) . . . . . 2 pcs
Fifth gear (counter & main) . . . . . 2 pcs
Countershaft . . . . . 1 piece
Mainshaft. . . . . 1 piece
Part #296081 . . . . . chain drive (1981-1984)
Part #296085 . . . . . belt drive (1985-1989)
Part #296090 . . . . . belt drive (1990 only)
Part #296091 . . . . . belt drive (1991-up)

Price sheet shows complete listing of all combinations of gear kits with available ratios.

ANDREWS PRODUCTS, INC.
www.andrewsproducts.com
431 Kingston Court
Mount Prospect, IL 60056
Phone: 847-759-0190
Fax: 847-759-0848

BIG TWIN TRANSMISSION BELT SPROCKETS

Fits all EV80 and Twin 88 5 and 6 speed transmissions, 29, 30, 31, 33 and 34 teeth available

POWER SPROCKETS:
29 Tooth sprockets . . . . 9% MORE RPM*
Part #290290 ('85-'93)
Part #290294 ('94-up)

30 Tooth sprockets . . . . . 6% MORE RPM*
Part #290304 ('94-up)
Part #290300 ('85-'93)

OVERDRIVE SPROCKETS:
34T sprockets. . . . . 6% LESS RPM*
(180 RPM drop in engine RPM @ 60 MPH)
Part #290344 ('94-up)
Part #290340 ('85-'93)

**More RPM means more power; less RPM means more MPH than stock 32 T sprocket.*

POWER SPROCKETS:
31T sprockets. . . . . 3% MORE RPM*
Part #290314 ('94-up)
Part #290310 ('85-'93)

CRUISING SPROCKETS:
33T sprockets. . . . . 3% LESS RPM*
Part #290334 ('94-up)
Part #290330 ('85-'93)

Andrews sprocket pulleys match 1994 style design. This arrangement has the advantage of 50% longer internal spline length compared to the early design. New style pulleys will fit both early (1985-1993) and late transmission shafts. Overall Belt drive ratio changes of 3%, 6% or 9% are very noticeable to a rider! ***All '85-'93 pulley kits have new style spacer, lock ring, retainer bolts and seals included as part of the kit. Pulley kits for '94-up must use original stock seal and lock ring.***

Sprocket Tooth Counts & Ratios 1994-2001
(36 T clutch-25 T engine sprocket)

TRANS.		REAR WHEEL	OVERALL
29		70	3.48
30		70	3.36
31		70	3.25
32	*(Stock)*	70	3.15
33		70	3.05
34		70	2.96
29		65 ('95 softail)	3.23
30		65 ('95 softail)	3.12
31		65 ('95 softail)	3.02
32	*(Stock)*	65 ('95 softail)	2.93
33		65 ('95 softail)	2.83
34		65 ('95 softail)	2.75

Sprocket Tooth Counts & Ratios 1985-1993
(37 T clutch-24 T engine sprocket)

TRANS.		REAR WHEEL	OVERALL
29		70	3.72
30		70	3.60
31		70	3.48
32	*(Stock)*	70	3.37
33		70	3.27
34		70	3.17
29		61 ('93 softail)	3.24
30		61 ('93 softail)	3.13
31		61 ('93 softail)	3.03
32	*(Stock)*	61 ('93 softail)	2.94
33		61 ('93 softail)	2.85
34		61 ('93 softail)	2.76

BELT DRIVE SPROCKETS - INSTALLATION NOTES

Installing a transmission sprocket with more or less teeth than stock requires adjusting the rear axle forward (for more teeth on sprocket) or backwards (for less teeth on sprocket).

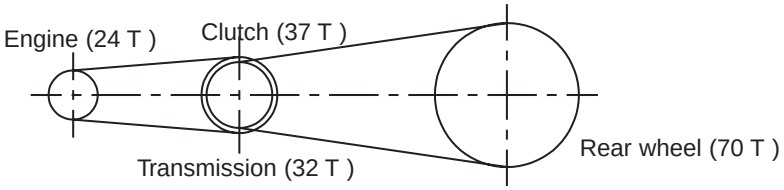
Rear axle position adjustment for each one tooth change on transmission sprocket = + / - .125 inches (3.2mm).

Rear axle position adjustment for each one tooth change in belt length = + / - .280 inches (7.1 mm).

If there is not enough axle adjustment at the rear frame, it may be necessary to use a belt with more or less teeth. There are at least 8 different drive belts available at this time. They have 126, 128, 130, 132, 133, 135, 136 or 139 teeth. The only sure way to tell which belt you have is to physically count the teeth.
(Use a paint mark for reference).

1984-1993 EV80 overall final drive ratio (engine to rear wheel) is 3.37 to 1
Overall = (37 / 24) x (70 / 32) = 3.37

1994-2001 EV80 overall final drive ratio (engine to rear wheel) is 3.15 to 1



ANDREWS PRODUCTS, INC.

www.andrewsproducts.com
431 Kingston Court
Mount Prospect, IL 60056
Phone: 847-759-0190
Fax: 847-759-0848

BAKER: 6 SPEED OVERDRIVE TRANS FOR TWIN 88 AND EVOLUTION 80

Rear View

Complete 6 speed with polished case

The Baker 6 speed is a truly unique upgrade for all EV 80 and Twin 88 bikes! Designed by Baker Inc. with gears and shafts made by Andrews Products, it will take all of the power and torque from stock or big inch engines. All Baker 6 speed transmission gears made by Andrews for '99 and later bikes have PCR (performance contact ratio) gears for ultra quiet riding. 1st, 2nd, 3rd, 4th and 5th gears are the same ratios as a 5 speed; 6th gear ratio is a .86 overdrive. (A .80 overdrive is optional). At 75 mph; 475 RPM reduction from 5th to 6th gear (680 RPM with .80 gear).

Advantages of the Baker 6 Speed:

- Less RPM and vibration at highway speeds
- Reduced noise in 6th gear vs a 5 speed
- Full width gears from aircraft alloy steel
- Set up for electric speedometer installation
- Replacement gears readily available
- Improved shifting system
- All parts made in USA

Baker gears use full width teeth and can take all the power from a big engine. This trans was not designed for compromises. (Some 6 speeds use small, thin gears to squeeze 6 speed gear sets into 5 speed cases).

Front View

6 SPEED GEAR RATIOS:

1st . . . . . 2.94 (optional 3.25)
2nd. 2.21
3rd 1.60
4th 1.23
5th 1.00
6th . . . . . 0.86 (optional 0.80)

The new Baker 6 speed transmission as shown in these two photos should be on the top of everyone's list of what to get next. It looks great in the two photos but you have to see it in person to truly appreciate the spectacular quality and beauty of this new transmission.

The surface finish is about as perfect as anything we have ever seen; absolutely no polish marks or ripples anywhere. If it didn't run so well, it might be more appropriate to show it in a jewelry box.

Andrews Products continues to supply Baker Drive Train with transmission gears and shafts

Andrews Products makes gears and shafts for Baker Drive Train but we do not sell transmissions. For orders, pricing and technical questions please contact Baker Drive Train directly at: 517-339-3835 (phone) 517-339-4590 (fax)

ANDREWS PRODUCTS, INC.

www.andrewsproducts.com
431 Kingston Court
Mount Prospect, IL 60056
Phone: 847-759-0190
Fax: 847-759-0848

NEW LAND SPEED RECORDS: ANDREWS PRODUCTS CAMS AND GEARS

In October of 2003, Andrews Products, Carl's Speed Shop and Warner Riley blazed their way to new Land Speed Records during the East Coast Timing Association's Maxton North Carolina, Championship Speed Trials. Six new records included one at 168.092 MPH in the A/PBF-2000/4 class as well as five other classes. The *lowest* speed recorded for any of the the classes was slightly over 158 MPH.

The bike used a 119 inch S&S engine specially prepared by expert tuner Carl Morrow and was ridden by Warner Riley. The camshaft and transmission gears in this engine were made by Andrews Products.

Above: Serge Torres making some final adjustments and preparing the bike for another run.

Left: Warner starting a run on the one mile course at Maxton, N.C.

Our congratulations to Carl, Warner and everyone else involved in making this effort so successful!

ANDREWS PRODUCTS, INC.

www.andrewsproducts.com
431 Kingston Court
Mount Prospect, IL 60056
Phone: 847-759-0190
Fax: 847-759-0848

BIG TWIN: 4 SPEED TRANSMISSION GEAR SETS

Big Twin 4 speed transmissions have been built since 1936 in several versions. They were included on bikes with Knuckle engines, Pans, Shovels and some '84 and '85 Evolution 80's. They all used this transmission. With Andrews 4 speed gears, transmissions last longer, shift faster, and just plain run better. Bikes with Andrews gears feel so good that it's hard to believe until you experience the difference for yourself.

2.44 1ST GEAR SET (1959 thru 1984)
Part #201105 Best choice for Superglides, choppers and lighter bikes with stock or smaller motor or trans sprockets. This is a 'no clunk', 48 mph, 1st gear. Installation in '80-84 FX requires 21T (1.82 ratio) 2nd gear for this 1st gear.

2.60 1ST GEAR SET (1959 thru 1984) (Not shown)
Part #201145 This gear set works best with "E" glides and heavier bikes with motor or trans sprockets having more teeth than stock sprockets. Installation in '80-84 FX requires 21T (1.82 ratio) 2nd gear for this 1st gear.

3.00 1ST GEAR SET (Original stock ratio) (Not shown)
Part #201090 (Not pictured) (1959 thru 1984)
Part #201094 (Not pictured) (1936 thru 1958)
Stock replacement first cluster and countershaft gear. Cluster gear has 15 and 20 teeth; counter has 26 teeth. 1936 version has no rear counterbore and requires short length 3rd main gear **part #206215.**

COMBINATION 2.24 1ST- 1.65 2ND GEAR SET (Not shown)
Part #201020 If you want peak RPM thru the quarter mile, this gear set will provide the super close ratio shifting to handle it. OK for street or drags with any size motor.

STOCK 2ND GEAR (1.82 RATIO)
Part #202160 (replaces H/D# 35751-36) Stock 2nd gear with face milled drive dogs for more positive 1-2 shifts. This 21 tooth gear fits 1941-1979. It will also fit later transmissions but requires one of the first gear sets shown above.

CLOSE RATIO 3RD GEAR SET (1.35 RATIO)
Part #203365 (early) Transmissions built before mid 1976, to serial# U-8958 (or lower) with loose needle bearings.
Part #203375 (late) For transmissions built after mid 1976, from serial# U-8959 (or higher) with caged needle bearings. New design drive slots include lead in ramps for quicker, more positive shifting (same as stock 3rd and 4th gears).

STOCK 3RD GEAR (1.23 RATIO) (Not shown)
Part #206220 (replaces H/D# 35306-59) (Mainshaft 3rd)
Part #206215 (replaces H/D# 35306-36) (Mainshaft 3rd)
(This gear requires 1936-58 style cluster gear)
Part #206330 (replaces H/D# 35700-36) (Cluster: 36-76)
Part #206335 (replaces H/D# 35700-76) (Cluster: 76-86)
Replacements for stock main and countershaft 3rd. The design of drive slots on mainshaft gear has been upgraded to include lead-in ramps for quicker, more positive shifting.

ANDREWS PRODUCTS, INC.

www.andrewsproducts.com
431 Kingston Court
Mount Prospect, IL 60056
Phone: 847-759-0190
Fax: 847-759-0848

BIG TWIN: 4 SPEED TRANSMISSION GEAR SETS

STOCK MAIN DRIVE GEAR (4TH)
Part #204260 (1936-1976) (replaces H/D# 35065-65)
Part #204280 (1977-1986) (replaces H/D# 35067-77 and 35067-84) Replacement 4th gears are made with wider drive slots and steeper lead-in ramps for more positive 3-4 shifting. The "O" ring groove addition is a design update for all chain drive (1977-1984) 4th gears.

SHIFT CLUTCHES
Part #205120 (1-2 clutch) (replaces H/D# 35665-36)
Part #205340 (3-4 clutch) (replaces H/D# 35440-38)
Replacement clutches are specially heat treated and shot peened for super durability. 3-4 clutches are face milled and have longer lead in ramps for more positive shifts.

SHIFT FORKS
Part #209750 (1-2 fork) (replaces H/D# 34159-36)
Part #209760 (3-4 fork) (replaces H/D# 34158-36)
One piece cold forged forks. Fully heat treated and black oxide coated, a must for all transmission rebuilds.

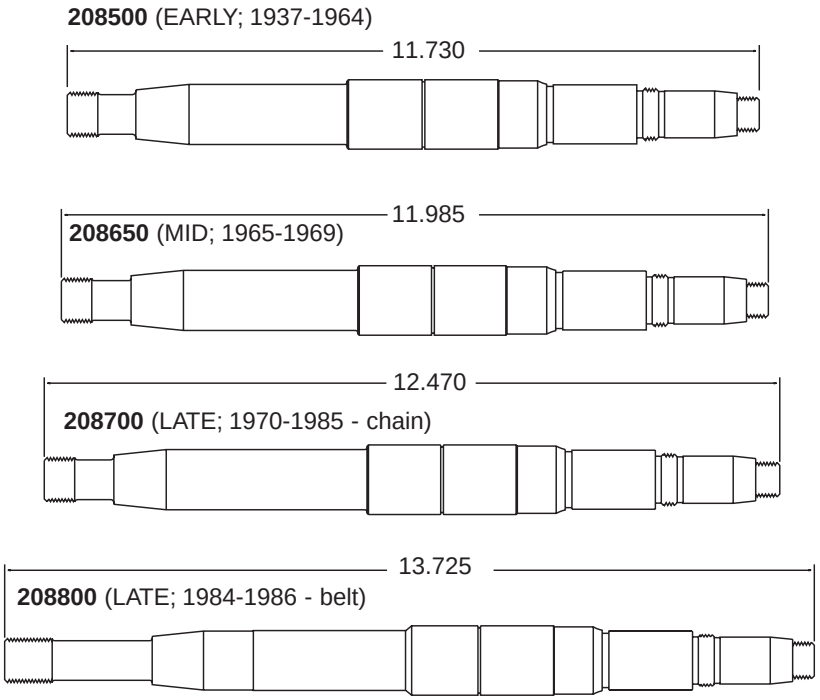
TRANSMISSION MAINSHAFTS
Part #208500 (early) H/D# 35040-50, 1937-1964
Part #208650 (mid) H/D# 35039-65, 1965-1969
Part #208700 (late) H/D# 35039-70A, 1970-1985 chain
Part #208800 (late) H/D# 35039-85, belt drive, Late 1984-'86
Replacement mainshafts for all versions of big twin boxes. Made from aircraft alloy steel. Heat treated and finish ground to ensure maximum durability.

TRANSMISSION COUNTERSHAFTS
Part #207650 (1941-early 1976) (replaces H/D 35614-65)
Part #207770 (late 1976-1979) (replaces H/D 35614-77)
Part #207800 (1980-1985) (replaces H/D 35614-80)
Three types of countershafts fit transmissions thru 1985. They are not interchangeable, so make sure before you order.

TRANSMISSION REBUILDING KITS (Small Parts)
Bushings, gaskets, locks, keys and ferrules for completing a 4 speed transmission rebuild. These parts are made by JIMS.
Kit #210925 . . . . . (1936-1976)
Kit #210950 . . . . . (1977-1979)
Kit #210975 . . . . . (1980-1984)

TRANSMISSION GEAR KITS
Gear kits must be ordered by part numbers listed below which specify year and 1st and 3rd ratios. Each gear kit includes 6 gears, 2 shift clutches and 2 forks as shown on previous page. (Shafts and small parts kits must be ordered separately).
Kit #210150 (2.44 1st, 1.35 3rd) . . . . . (1936-1976)
Kit #210250 (2.44 1st, 1.23 3rd) . . . . . (1936-1976)
Kit #210350 (2.60 1st, 1.35 3rd) . . . . . (1936-1976)
Kit #210450 (2.60 1st, 1.23 3rd) . . . . . (1936-1976)
Kit #210550 (2.44 1st, 1.35 3rd) . . . . . (1977-1984)
Kit #210650 (2.44 1st, 1.23 3rd) . . . . . (1977-1984)
Kit #210750 (2.60 1st, 1.35 3rd) . . . . . (1977-1984)
Kit #210850 (2.60 1st, 1.23 3rd) . . . . . (1977-1984)

4 SPEED TRANSMISSION MAINSHAFT LENGTHS



Andrews Products makes four different versions of 4 speed big twin transmissions.

For everyone who calls for transmission shaft lengths and asks us to look up blueprint dimensions, here they are!

Regarding one additional mainshaft: H/D part number 35039-84 fits belt drives. This is the same part as H/D 35039-85 except that 35039-85 uses a different drive key. **It is very important that the correct drive key be used.** The H/D part number for the drive key is 37523-85. Andrews Products part number for the belt drive trans shaft is **208800.**

ANDREWS PRODUCTS, INC.

www.andrewsproducts.com
431 Kingston Court
Mount Prospect, IL 60056
Phone: 847-759-0190
Fax: 847-759-0848

SPORTSTER GEARS (EV 5 SPEED)

All 5 speed Sportster gears are made from high nickel alloy steel. Gears are then heat treated and shot-peened to give maximum durability and strength. Also, where applicable, drive dogs have milled lead-in ramps to improve shifting and reduce wear on drive dogs and slots.

(A) 2.61 CLOSE RATIO 1ST GEAR SET
Part# 299110 (2 pieces) 2.61 1st gears provide true close ratio shifting into 2nd. Plus 7 mph of usable 1st gear.

(B) STOCK 2ND AND 3RD GEARS
Part #299102 (2nd main/3rd counter) (H/D #35771-89)
Part #299103 (3rd main/2nd counter) (H/D #35772-89)

(C) STOCK 4TH GEARS
Part #299104 (4th main gear) (H/D #35773-89)
Part #299144 (4th counter gear) (H/D #35775-89).

(D) STOCK MAIN DRIVE GEARS
Part #299105 (main drive) (H/D #35034-89)
Part #299155 (counter drive gear) (H/D #35633-89)

(E) TRANSMISSION MAiNSHAFT
Part #299180 (mainshaft) (H/D #35640-89)

F) TRANSMISSION COUNTERSHAFT
Part #299170 (countershaft) (H/D #35641-89)

EV SPORTSTER 5 SPEED GEAR SETS
Part #299900 (1991-up)
5 speed EV Sportster transmission gear sets are available as complete kits. Each kit includes the parts as pictured: 1st, 2nd, 3rd, 4th, 5th gears, mainshaft and countershaft.

Internal transmission ratios are listed below.				
Gear	Close First	% Change	Stock First	% Change
1st	2.605	22%	2.779	27%
2nd	2.026	27%	2.026	27%
3rd	1.489	18%	1.489	18%
4th	1.216	18%	1.216	18%
5th	1.000		1.000	

Special Ratio Sportster 5 Speed Racing Gears:

S Ratio Gears (1st and 2nd)
Part# 299816 (2 gears) 2.368 1st gears
Part# 299724 (2 gears) 1.876 2nd gears.

Y Ratio Gears (1st, 2nd, 3rd, 4th)
Part# 299717 (2 gears) 2.026 1st gears
Part# 299727 (2 gears) 1.670 2nd gears
Part# 299737 (2 gears) 1.364 3rd gears
Part# 299747 (2 gears) 1.158 4th gears

Internal transmission ratios are listed below.				
Gear	S Ratio	% Change	Y Ratio	% Change
1st	2.368	21%	2.026	17%
2nd	1.876	21%	1.670	18%
3rd	1.489	18%	1.364	15%
4th	1.216	18%	1.158	14%
5th	1.000		1.000	

Ratio "S" includes 1st and 2nd gears (4 piece set).
Ratio "Y" includes 1st, 2nd, 3rd and 4th (8 piece set).

ANDREWS PRODUCTS, INC.

www.andrewsproducts.com
431 Kingston Court
Mount Prospect, IL 60056
Phone: 847-759-0190
Fax: 847-759-0848

SPORTSTER GEARS (4 SPEED)

The gears listed on this page will fit Sportster 4 speed transmissions made from 1956 through 1990. All Andrews 4 speed Sportster gears are made from high nickel alloy steel which is heat treated and shot peened for maximum durability. Shot peening greatly improves the wear resistance of drive edges and slots. All Sportster gearboxes run better with Andrews gears.

(A) STOCK 1ST GEARS.
Part #251050 main 1st (27T) (replaces 35277-52A)
Part #251060 counter 1st (17T) (replaces 35760-73 late only, 1973-1985). To fit 1986 and later requires early countershaft #259010

WIDE RATIO 1ST GEAR SETS (Not pictured)
Changes 1st from 2.52 ratio to 2.68 for more low end torque with 21T or 22T trans sprockets.
Part #251010 (late only, 1973-1985). To fit 1986 and later requires early countershaft #259010

(B) STOCK 2ND GEARS.
Part #252020 2nd main (23T) (replaces 35296-56 & 56A)
Part #252040 2nd counter (20T) (replaces 35750-58 & 58A)

(C) STOCK 3RD GEARS.
Part #253050 3rd main (20T) (replaces 35305-56 & 56A)
Part #253030 3rd counter (23T) (replaces 35709-54A & 54B)

(D) TRANSMISSION SHAFTS.
Replacement transmission shafts for standard H/D part numbers. Our shafts are made of super alloy material for maximum strength and durability on this most critical part.

Part #259010 countershaft (1956-mid-84)
(replaces H/D# 35613-58)

Part #258080 early mainshaft (1956-'69 kick start)
(replaces 35044-56) (Drilled through for clutch rod)

Part #258120 late mainshaft (1971-mid-84)
(replaces 35046-71) (Solid shaft; no through hole)

Part #258190 mainshaft (alternator) (mid-84-'90)
(replaces 35036-84A) (Solid shaft; no through hole)

(E) EVOLUTION / ALTERNATOR "C" RATIO GEAR SET
Part #254850 (mid 84-90) (26T and 18T)
This gear set fits all 1984-1990 alternator engines. All 1987-1990 4 speed Sportsters have "C" ratio main drive gears as stock parts.

(F) "C" RATIO MAIN DRIVE GEAR SETS
Part #254720 (1971-1978)
Part #254740 (1979-mid 84)

STOCK RATIO MAIN DRIVE GEARS (17T & 27T)
NOT PICTURED
Part #254710 Clutch gear (1971-1978) (replaces 37448-71)
Part #254730 Clutch gear (1979-mid 84) (replaces 37448-79)
Part #255580 Countershaft gear (27T) (replaces 35695-58)

COMPLETE GEAR SETS (includes the following parts):
Part #250100 ("W" 1st, stock 4th) (1973-1978)
Part #250200 ("W" 1st, "C" 4th) (1973-1978)
Part #250300 (stock 1st and 4th) (1973-1978)
Part #250400 (stock 1st, "C" 4th) (1973-1978)

Price sheet shows **complete listing of all combinations of gear kits** with available ratios for generator engines (1979-1984) and alternator engines (1984-1990).

Sportster gear ratios are listed below for comparison.

	Stock ratios	"W" ratios[1]	"W" ratios[2]	"C" ratios
1st	2.52	2.68	2.44	2.29
2nd	1.83	1.83	1.66	1.66
3rd	1.38	1.38	1.26	1.26
4th	1.00	1.00	1.00	1.00

(1) "W" ratio 1st plus stock main drive (27/17 teeth)
(2) "W" ratio 1st plus "C" ratio main drive (26/18 teeth)

ANDREWS PRODUCTS, INC.

www.andrewsproducts.com
431 Kingston Court
Mount Prospect, IL 60056
Phone: 847-759-0190
Fax: 847-759-0848

HIGH PERFORMANCE IGNITION COILS

Replacement coils for Harley Davidson engines. Andrews SuperVolt Coils deliver 30,000+ volts. Models are available for both electronic (pointless) systems as well as earlier conventional battery and point ignitions.

Red coils fit 1985 and up engines. Black coils fit all H/D bikes thru 1980 with point type ignition sets. All of these coils will produce more voltage than stock coils.

Black color coil, 4.8 ohms. . . . . **Part #237230**
Red color coil, 2.8 ohms. . . . . **Part #237240**

HI-FLOW ACCELERATOR PUMP (1980-88)

For all 1980 through '88 H/D bikes with STOCK Keihin carburetors, this kit is an easy, inexpensive performance upgrade. Removing the float bowl and drilling one hole is all that's required. The carb body does not have to be removed. On 1980-'88 carbs, the stock accelerator pump is restricted by eliminating check valves in the pump. A high flow accelerator pump puts them back. The result is increased fuel flow through the pump and greatly improved low end and mid range throttle response.

Not intended for 1989 and later CV carburetors.
Hi-Flow accelerator pump. . . . . **Part #269050**

PERFORMANCE PRO BOOKS FOR ALL H/D ENGINES

The three best books written for Harley engine tuning!
All three were written by noted technical author Denny Dennish of Crystal Publications.
Big Twin High-Performance Guide: . . . . . **Part# 700500**
238 pages covering cams, carburetors, ignitions, stroker motors, tuning tips and performance theories about H/D big twin engines. Includes listings of performance parts suppliers.
V-Twin Tuner's Handbook, Volume One: . . . . . **Part# 700520**
Additional 126 pages of discussions on shift points, rod length, airflow, bore/stroke ratios, gearing and many others.. . . . . .
V-Twin Tuner's Handbook, Volume Two: . . . . . **Part# 700540**
260 pages covering engine design and building, flowbench work, dynamometers, power curve analysis, and track side tuning and more. Included is a new section on Twin 88 engines!

These books belong in the library of every serious engine tuner.

ANDREWS PRODUCTS, INC.

www.andrewsproducts.com
431 Kingston Court
Mount Prospect, IL 60056
Phone: 847-759-0190
Fax: 847-759-0848

SALES POLICIES

Payment Terms:

Visa and Mastercard payments for orders are accepted. COD orders will be sent certified check or money order. COD orders sent company check OK must be approved by Andrews Products in advance.

Ordering Cams not listed in this catalog:

Cam grinds which are not currently listed in the catalog are available as special orders. Custom ground or special order cams are priced and quoted on an individual basis. Call for information.

Foreign Shipments:

All foreign orders must be prepaid in U.S. dollars including freight and forwarding charges. Andrews Products, Inc., will provide bank wire transfer information for foreign orders upon request.

Shipping Carrier:

All shipments will be sent United Parcel Service (UPS) ground service unless other arrangements have been agreed upon in advance. All overnight shipping expense will be charged to customer.

Claims of Shortages:

Claims of shipment shortages should be made to Andrews Products, Inc., as soon as possible. Damaged shipment claims must be made directly to the shipping carrier.

Returned Goods:

Any parts returned for credit, exchange or inspection should not be sent without calling for a returned merchandise authorization number (RMA). A 20% charge will be deducted from the original invoice price on all items accepted for return. Custom or obsolete parts will not be accepted for return credit or adjustment unless there is a warranty question. Andrews Products reserves the right to make changes to prices or sales policies at any time without notice.

Shipping Charges for Returned Goods:

Shipments must be sent freight prepaid. Any shipments sent freight collect will be refused. Goods must be packed to prevent damage in transit. Goods damaged because of improper packing will not be accepted for credit.

LIMITED WARRANTY POLICY

Andrews Products, Inc. warrants that its products as shown in this catalog are free from defects in material and workmanship. The warranty extends to original retail purchasers only and is not transferable to anyone else.

The warranty extends for 90 days from the purchase date. Because of the great variety of possible modifications and changes made to motorcycles and/or engines which may affect the performance or durability of other related components, Andrews Products, Inc., obligation under this warranty extends only to the repair or replacement of parts specifically manufactured or sold by Andrews Products, Inc.

Not covered by warranty are parts which show evidence of misapplication, abuse, improper maintenance, any alterations from their original configuration, or failure to follow installation instructions.

In addition, Andrews Products, Inc., reserves the right to make changes to products or specifications at any time without obligation to modify previously manufactured parts.

No person, company, or other organization is authorized to assume for Andrews Products, Inc., any warranty responsibility or make any binding judgements regarding warranties of any parts which may become the subject of a warranty claim.

If you feel that you have a valid warranty claim call for a returned merchandise authorization (RMA) number and then ship parts to Mount Prospect, Illinois, with proof of purchase included! No claims will be considered without valid proof of purchase documentation. Freight charges must be prepaid. Returned parts will NOT be accepted freight collect.

On specific parts which are returned showing damage due to normal wear, Andrews Products, Inc., may offer new replacement parts charged to the customer at a reduced cost.

Any parts which have been replaced for any reason become the property of Andrews Products, Inc., and will not be returned under any circumstances.