1999-2006 Twin 88 (excluding '06 DynaGlide)

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Installation Instructions: Twin 88 cams with S&S gear drives

A. This documentation applies to 1999-2006 Twin 88 engines ***except for 2006 DynaGlides***. Cams for '06 DynaGlides are different. Cam lifts and durations for gear drive cams are shown on page 3 of this document.

B. Andrews Products "G" series cams which use S&S gear drives have ball bearings on both front and rear cams. Since gear drives generate much lower bearing loads than chain drives, there is no need for roller bearings. Also, gear drive cams with roller bearings will make more noise during engine operation.

C. Please refer to the H/D factory Twin 88 service manual section on camshaft removal and replacement. The procedure for retracting and removing sprocket chain tension devices is especially important.

D. S&S camshaft drive gears must be installed with all gear drive cams. Andrews Products part number for gear drives (all 4 gears) is 288908. For a complete description of parts kits, please see bottom of page 2. In addition, an installation parts kit (Andrews Products part# 288901) must be used.

E. It is extremely important that instructions 13 and 16 be carefully followed. **Gear backlash must be correct!**

General Instructions:

1. All Andrews Products 21G, 26G, 31G, 37G, 44G and 50G Twin 88 cams are made with stock size lobe base circles so stock pushrods will be the correct length. If you are going to use the original pushrods, removing the fuel tank(s) and rocker boxes will be necessary. Mark the pushrods so they can be replaced in their original locations. (Not all stock pushrods are the same length). 55G, 60G and other high lift cams will require adjustable pushrods.

2. If you want to save installation time not and remove fuel tanks and rocker boxes, stock pushrods can be cut with bolt cutters and removed in two pieces. New Andrews Products EZ-install pushrods (either aluminum or chrome moly steel) can then be used. Part numbers for EZ-install pushrods are: 292188 for aluminum or 292088 for steel.

3. Remove the 10 bolts holding outer cam cover. When this cover is reinstalled later, there is a specific tightening sequence and torque setting for these 10 bolts as shown in a factory service manual.

4. Before proceeding further, put the transmission in 4th or 5th gear. With spark plugs removed (no resistance from compression pressure), position the engine (by turning rear wheel) so camshaft timing marks are aligned. This will simplify installation of new cams.

5. As noted in the factory service manual, the outer chain tension shoe must now be retracted. This can be done with H/D tool set (part number H/D-42313, cam chain tension arm tool with retention pins).

6. Remove the retaining bolt holding the crankshaft sprocket and the retaining bolt holding the rear camshaft sprocket. This can be done with H/D tool set (part# H/D-42314, crankshaft/camshaft sprocket locking tool).

7. Remove the cam support plate. All four oil pump retaining bolts must be loosened to permit correct oil pump rotor alignment when the cam support plate with new camshafts is reinstalled.

8. With the cam support plate out of the engine and both old cams removed, the internal and the external cam chain tension arms and springs can removed from the support plate since they are not used with gear drive cams.

9. Andrews Products is recommending replacing both inner camshaft needle bearings at this point with Torrington B148 drawn cup needle bearings. This requires removing the original bearings from the right side engine case.

10. Drive gears can now be installed on both front and rear camshafts. Note that there is a front gear for the front cam and a rear gear for the rear cam. Gears can be assembled by pressing camshafts into drive gears *with drive keys in place*. ***Also note that the gears must be pressed onto the camshafts with the timing marks facing the cam lobes!***

11. Cams with .550 or higher lift may require cutting material from the top of the case bearing boss to clear lobe tips.

12. After drive gears and bearings have been assembled, both camshafts can be installed into the cam support plate. Cam lobe surfaces should be coated with engine oil or assembly lube. ***At this point, timing marks on both cam drive gears must be correctly aligned!***

Checking cam gear backlash

13. Once the new cams and gears are installed, backlash for inner cam drive gears (31T) must be checked. Using a wooden rod, press down on the front cam through the exhaust lifter bore and hold the front cam from rotating. Gear backlash can be checked by turning the rear cam back and forth. Some backlash must be present. Recommended operating backlash for cold gears is .0005 to .001. Cams should roll freely with **NO** binding. Cams with 0.000 backlash (too tight) may whine when running. Backlash greater than .002 is too much and can sound like noisy lifters at lower RPM. Either of these conditions must be corrected before continuing. Undersized or oversize cam gears are available from Andrews.

14. With the cam support plate assembly now in the engine and correct backlash verified, the rear cam drive gear (62T) and the crankshaft drive gear (31T) can be installed, correctly timed and secured with the retaining cap screws.

15. When reinstalling drive gear retaining bolts, use Loctite retaining compound to secure the bolt threads. Bolt torque should not exceed 25 ft-lbs for 5/16 x 18 and for rear camshafts (3/8 x 24 bolt) should not exceed 35 ft-lbs. Please note that these bolts *must be rated grade 8*. (All grade 8 bolts have a 6 pointed star symbol on the top of the bolt heads).

Checking crankshaft gear backlash

16. At this point, it is extremely important that the crankshaft gear (31 teeth) and the rear cam drive gear (62 teeth) be checked for proper backlash. ***Before installing pushrods, rock the rear cam gear forward and backward with your fingers.*** Backlash can be felt as "freeplay" between the two gears. Gear backlash must be checked at four different crankshaft positions by rotating the crankshaft 90 degrees and checking the backlash at each position. **Some backlash (.0005-.001 minimum) must be present at each crank position**. The gear mesh should not be so tight that there is no backlash present. If checking the gear mesh shows no backlash, a smaller 31 tooth crank gear will have to be used.
Warning: Running with NO backlash can cause gear tooth and/or engine damage.

17. Since the rear cam drive gear is larger than the original chain sprocket, the outer cover must be checked for gear clearance. If there is any interference, the inner surface of the cover must be relieved to provide .030" clearance.

18. Reinstall the outer cam cover with the 10 cover bolts. Cover bolts *must be tightened* to a torque specification of 90-120 in-lbs. The H/D service manual shows the correct tightening sequence.

19. EZ-install pushrods are made with 2 long (exhaust), and 2 short (intake) rods. To install, adjust pushrod to shortest length, then position in engine, rocker arm end first. Swing the lower end into lifter. Lengthen pushrod adjuster until free play is gone. Adjust pushrod 3.5-4 full turns longer (21-24 flats) and tighten locknut. Wait until hydraulic unit bleeds down and repeat procedure on next pushrod. When adjusting pushrods, make sure that cam lobe for that pushrod is on low lift point. Lifter housing covers can be temporarily removed to gain another 1/4 inch of clearance. Shorter pushrod cover tubes are available from H/D. They will make the pushrod installation and adjustment much easier. Part numbers are: 17938-83 and 17634-99. You will need 4 of each part number to install a complete set.

20. For engines with stock pistons and stock heads, 21G, 26G, 37G and 44G cams will bolt in without head work. 50G cams need piston to valve clearances and valve to valve clearances checked. 55G and 60G cams need .620 minimum valve travel and .060 minimum piston to valve clearance. With Andrews Products high lift titanium collars (part# 293110; includes 4 pcs), setting valve spring travel for either of these two cams will be easier.

21. For engines with new heads, stroked flywheels and/or high compression pistons, the piston/valve and valve to valve clearance must be checked.

22. Final tuning of carbureted engines with big cams usually requires re-jetting. For stock H/D Keihin CV carbs and 26G or 37G cams, #48 slow jets and #175 main jets are good sizes to start from.

23. Tuning fuel injected engines with big cams often requires installation of a Power Commander or similar ignition setup. This will permit different calibration maps to be used for the fuel injection so fuel mixtures can be correctly set.

24. When tuning engines, always remember that your personal safety is the most important consideration.

25. Each of the parts kits listed below can be ordered individually.

Parts Kit 288901
1. 2 # B148 Torrington needle bearings
2. 2 # 6004 Nachi ball bearings
3. 1 # 5100-78 snap ring
4. 1 Cam cover gasket

Parts Kit 288908
1. 2 inner cam drive gears
2. 1 crankshaft gear
3. 1 outer cam drive gear
5. 2 grade 8 retaining bolts
6. 1 retaining washer
7. 2 # 404 Woodruff drive keys
8. 1 square drive key

Parts Kit 288903
1. 1 crankshaft gear
2. 1 outer cam drive gear
3. 2 grade 8 retaining bolts
4. 1 retaining washer
5. 1 square drive key

Andrews Products: Twin Cam 88 Camshaft Timing Specifications

Grind	Timing	Duration	Lift	Springs	Valve Lift (@TDC)	Spring Travel (MIN)
Stock (A)	-02/38	216	.473	Stock	.072	Stock
99 (carb)	36/-04	220	.473	-	.110	Stock
Stock (B)	02/34	216	.473	Stock	.087	Stock
99 (fuel inj)	36/04	220	.473	-	.110	Stock
21G	10/30	220	.498	Stock	.134	Stock
	40/08	228	.498	-	.121	Stock
26G	11/35	226	.490	Stock	.129	Stock
	41/09	230	.490	-	.112	Stock
31G	10/46	236	.510	Stock	.131	Stock
	52/08	240	.510	-	.120	Stock
37G	18/38	236	.510	Stock	.174	Stock
	46/14	240	.510	-	.148	Stock
44G	21/41	242	.495	Stock	.182	Stock
	49/17	246	.495	-	.158	Stock
50G	20/48	248	.510	Stock	.184	Stock
	54/18	252	.510	-	.168	Stock
55G	22/46	248	.550	Hi-lift	.197	.620
	52/20	252	.550	-	.181	.620
60G	24/56	260	.560	Hi-lift	.205	.620
	58/22	260	.560	-	.205	.620
67G	24/48	252	.570	Hi-lift	.209	.630
	58/22	260	.570	-	.187	.630

The following two cam grinds are for highly tuned engines setup for max HP and drags

59G	29/57	266	.590	Hi-lift	.238	.650
	63/27	270	.590	-	.218	.650
64G	30/62	272	.640	Hi-lift	.262	.700
	66/30	276	.640	-	.232	.700

Timing and durations are listed for .053 cam lift

(Photo below shows complete set of parts which requires 2 kits listed on page 2 and one set of camshafts..
Cover gasket is not shown but is part of kit 288901.