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

- A. 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.
 - B. Please refer to the H/D factory Twin 88 service manual section on camshaft removal and replacement. The procedure for retracting the sprocket chain tension devices is especially important.
 - C. Cam lifts and durations for gear drive cams are shown on page 3 of this document. Gear drive cams and chain drive cams are not interchangeable even though timing specifications are the same for both types.
 - 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.
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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 (and not remove fuel tanks and rocker boxes), EZ-install pushrods are available from Andrews Products in either aluminum or chrome moly steel. If you are going to use EZ-install pushrods, stock pushrods can be cut with bolt cutters and then removed (in two pieces). Part numbers for EZ-install pushrods are: 292188 for aluminum and 292088 for steel pushrods.
- 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.
- 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 old cams removed, both the internal and the external cam chain tension arms and springs can be removed from the door since they will not be used with gear drive cam systems.

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 installed, both camshafts can be reassembled into the cam cover 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!***
13. Since the drive gear for the rear camshaft is larger than the original chain sprocket, the inside of the cover must be checked for gear tooth clearance. If there is any interference, the inner surface of the cover must be relieved at this time so that there is approximately .030" clearance.
14. With the cover assembly in place, the rear cam drive gear and the crankshaft drive gear can be installed, correctly timed and then secured with retaining bolts.
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).
16. 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.
17. 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.
18. 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.
19. For engines with new heads, stroked flywheels and/or high compression pistons, the piston/valve and valve to valve clearance must be checked.
20. 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.
21. Tuning fuel injected engines with big cams often requires installation of a Power Commander setup. This will permit different calibration maps to be programmed into the fuel injection controls so fuel mixtures can be correctly set.
22. When tuning engines, always remember that your personal safety is the most important consideration.
23. Each parts kit 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) 99 (carb)	-02/38 36/-04	216 220	.473 .473	Stock -	.072 .110	Stock Stock
Stock (B) 99 (fuel inj)	02/34 36/04	216 220	.473 .473	Stock -	.087 .110	Stock Stock
21G	10/30 40/08	220 228	.498 .498	Stock -	.134 .121	Stock Stock
26G	11/35 41/09	226 230	.490 .490	Stock -	.129 .112	Stock Stock
31G	10/46 52/08	236 240	.510 .510	Stock -	.131 .120	Stock Stock
37G	18/38 46/14	236 240	.510 .510	Stock -	.174 .148	Stock Stock
44G	21/41 49/17	242 246	.495 .495	Stock -	.182 .158	Stock Stock
50G	20/48 54/18	248 252	.510 .510	Stock -	.184 .168	Stock Stock
55G	22/46 52/20	248 252	.550 .550	Hi-lift -	.197 .181	.620 .620
60G	24/56 58/22	260 260	.560 .560	Hi-lift -	.205 .205	.620 .620
67G	24/48 58/22	252 260	.570 .570	Hi-lift -	.209 .187	.630 .630

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

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

Timing and durations are listed for .053 cam lift

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

