



INSTRUCTIONS

-J00043

REV. 4-1-96

Kit Number 25633-86A

HIGH PERFORMANCE VALVE TRAIN KIT

This kit is designed for use on the Sportster V2 Evolution 883 and 1100cc engines.

NOTE

This kit is designed for off-road application only. Installation of this kit may adversely affect the emissions and/or noise control systems of your motorcycle. It should not be installed on a motorcycle used on public roads. Use of this kit in an on-road application may be illegal and could negatively affect Limited Warranty coverage.

This kit contains the following items:

ITEM	QTY	DESCRIPTION
1	4	Camshaft
2	1	Valve spring and collar kit (kit contains Items 3, 4, 5, and 6)
3	8	Valve spring collar keys
4	4	Valve spring upper collar (titanium)
5	4	Valve spring unit (inner and outer springs)
6	4	Valve spring lower collar (titanium)
7	1	Valve guide seal installation tool

Required Gaskets

Installation of this kit will require the following gaskets available from your Harley-Davidson dealer:

1	17032-86	Gasket kit, top overhaul
1	25263-86	Camgear cover gasket

Installation

To properly install the kit, you must have a Service Manual that covers the V2 Evolution 883 and 1100 engines. Service Manuals covering the Evolution engines are available from your Harley-Davidson dealer.

Valve Spring and Collar

1. Refer to the Service Manual procedure that covers stripping the motorcycle for engine repair.
2. Remove the cylinder heads.
3. Compress valve springs; remove upper collar retainers (keepers), upper collars, seals and lower collars. Clean and inspect the cylinder heads.

NOTE

Mark valves so they will be returned to their original locations.

4. See Figure 1. Assemble each valve in the cylinder head with the upper titanium valve spring collars and keepers from this kit in place without valve springs. Check valve movement for free travel. Free travel is the distance the valve can move off the valve seat until the underside of the upper valve spring collar strikes the upper end of the valve guide. Measure the free travel of the four valves and record the measurements.
5. Remove upper collars and keepers.

6. Measure valve stem protrusion following the instructions in the Service Manual. Record the measurements.
7. Install, from this kit, the lower valve spring collars, the upper collars and keepers. Measure the distance from outer valve spring seat on lower collar to underside of upper valve spring collar with valve on its seat. Record the measurements.
8. Compare the measurements recorded in Steps 4, 6, and 7 with the following:
 - Free travel.....0.650in. minimum
 - Valve stem protrusion.....2.014in. maximum
 - Installed spring height.....1.560-1.575 in.
9. If all measurements are within the dimensions given above, proceed to Step 15. If any measurements are outside the dimensions given above, go to Steps 10 through 13. These steps give procedures for obtaining the required valve stem protrusion, spring height and free travel.
10. If valve stem protrusion is greater than 2.014 in., but less than 2.034 in., a service valve with 0.030 in. shorter stem must be installed. Valve stem protrusion exceeding 2.034 in. requires replacing the valve seat insert or cylinder head.

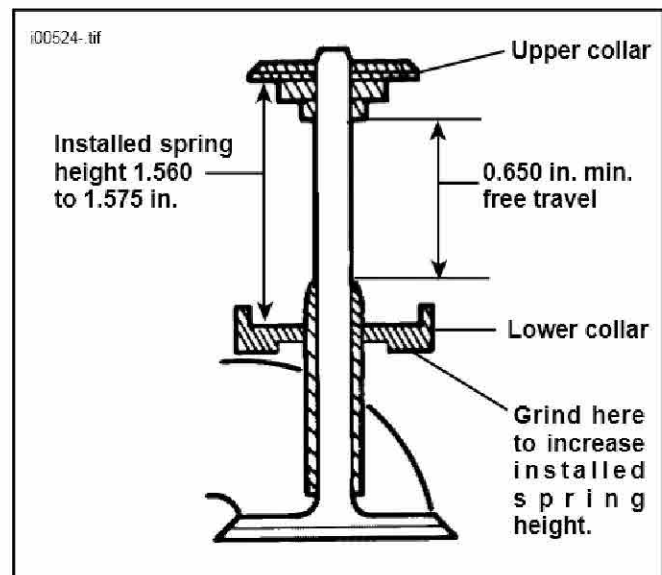


Figure 1. Valve Free Travel Check and Installed Valve Spring Height

NOTE

If service valves with 0.030 in. shorter stems are installed, the free travel and installed spring height, measured with a stock valve, will be reduced 0.030 in.

Example:

Measured free travel.....	0.680 in.
Minus	<u>0.030 in.</u>
	0.650 in.

Measured installed spring height.....	1.590 in.
Minus	<u>0.030 in.</u>
	1.560 in.

In the above example, the service valve did not cause the free travel and installed spring height dimensions to become unacceptable.

- 11. If the installed spring height or the distance between collars is less than 1.560 in., remove lower collar and grind the surface shown in Figure 1 to obtain the 1.560 to 1.575 in. dimension.
- 12. If the installed spring height measured is greater than 1.575 in., install one or more of the following shims under the lower collar to achieve the 1.560 to 1.575 in. dimension.

Part Number	Shim Thickness (in.)
18245-67R	0.007
18246-67R	0.015
18247-67R	0.036

NOTE

If service valve with 0.030 in. shorter stem is being used, reduce shim thickness by 0.030 in.

- 13. If free travel is less than 0.650, the valve guide must be shortened using the following cutting tool:

Source: K-Line Industries, Inc.
315 Garden Avenue
Holland, Michigan 49423

Part No.: KL1435, valve guide machining tool - This tool will shorten and machine outside diameter of guide.

NOTE

If service valve with 0.030 in. shorter stem is being used, guide must be shortened an additional 0.030 in. Do not shorten guide more than required, as accelerated wear of the valve and guide may result.

- 14. After correct free travel, valve stem protrusion, and installed spring height have been obtained, go to Step 15.

CAUTION

If this kit is being installed in a 1100cc engine, bevel the intake and exhaust valves at this time. See Figure 3 for the grind angle and minimum margin.

- 15. Install valves in their original locations.

CAUTION

Lower collars must be installed before installing valve guide seals. Lower collar inside diameter is smaller than outside diameter of seal; therefore, collar will not fit over seal.

- 16. Install lower collars from this kit.
- 17. Place a protective sleeve over the valve stem keeper grooves. Coat the sleeve with oil and place a new seal over the valve stem.

CAUTION

If the seal is installed without using the protective sleeve, the seal will be damaged.

- 18. Tap the seal onto the guide using the VALVE SEAL INSTALLATION TOOL included with this kit. The seal is completely installed when it bottoms on the top of the valve guide.

CAUTION

If valves are removed after seals are installed, the sharp edges on the keeper groove will cut and ruin seals.

- 19. Assemble cylinder heads following Service Manual procedures, but using the valve springs, upper collars and keys (keepers) from this kit. Do not install cylinder heads on cylinders at this time. Proceed to Camshaft Installation.

Camshaft Installation

Camshaft installation requires the removal of the tappet guides, tappets and gear case cover. The cams in this kit may be used with the stock hydraulic tappets.

Following the Service Manual procedures to perform the following:

- 1. Remove tappet guides and tappets. Remove push rods and push rod covers if they have not already been removed.
- 2. Remove ignition components from gear cover and the two bolts that retain the oil filter housing.
- 3. Remove the gear cover screws and gear cover.

NOTE

It is not necessary to remove pinion gear, oil pump gear, or oil pump.

- 4. See Figure 2. Rotate engine to align timing marks. Cams are numbered 1 to 4 from the rear exhaust (1) to the front exhaust (4). Remove camshaft 2. One at a time, remove camshaft 1, 3 and 4 and replace with the appropriate camshaft from this kit. Be careful to maintain timing mark alignment. Install camshaft 2 from this kit last. Carefully check alignment of all timing marks.
- 5. Following Service Manual instructions, assemble gear case cover and check that minimum camshaft end play is present. After final assembly, torque cover screws to 80-110 in-lbs.
- 6. Install tappet guides and tappets using new O-rings. Be sure tappets are fully oiled.
- 7. Install ignition components.
- 8. Place modeling clay on the piston valve reliefs. Clay must be about 1/8 in. thick.
- 9. Following Service Manual procedures, install cylinder heads using old head gaskets. Tighten cylinder head screws to 7 ft-lbs following the pattern in the Service Manual.
- 10. Following Service Manual procedures, check push rod length.
- 11. Install push rods.

CAUTION

Wait ten minutes before turning engine after installing push rods. This wait allows tappets to bleed down and prevents bending push rods or valves.

12. Carefully turn the engine through two full revolutions by hand. (This will open the valves and compress the clay in the valve reliefs on the pistons. Clay thickness will be measured when heads are removed later.)
13. Rotate engine so that both valves of the front cylinder are partially open. Shine a light through the exhaust port and look through the spark plug hole. Turn engine, if required, to the point where the exhaust and intake valve heads cross.

There should be 0.040 in. clearance between the two valve heads. See Figure 3. A wire gauge may be used to make this measurement. If insufficient clearance exists on 883cc engines, the edges of both the intake and exhaust valves may be ground at a 45° angle as shown in Figure 3.

NOTE

Exhaust and intake valves from 1100cc engine should have been beveled prior to assembling them into head.

Do not reduce the valve margin to less than 0.031 in. On 1100cc engines, grind the valve seats deeper into the head to obtain the 0.040 in. clearance between valve heads.

NOTE

Do not remove heads to bevel valves on 883cc engines or grind valve seats deeper on 1100cc engines at this time — continue with the remaining checks.

14. Repeat Step 13 for the rear cylinder.

15. Rotate engine so that both valves of the front cylinder are fully closed. Check for clearance between the top of the upper spring collar and the bottom of the rocker arm. If less than 0.010 in., mark the offending area of the rocker arm. Remove the rocker arm and carefully grind or file to establish the correct clearance. The area must be polished to remove all tool marks after grinding or filing.

CAUTION

Failure to polish the rocker arm could result in a fatigue failure of the rocker arm.

16. Repeat Step 15 for the rear cylinder.
17. Remove the heads and perform the following:

- A. Measure the clay thickness in the valve reliefs on the pistons at its thinnest point. This measurement must be at least 0.080 in. If 0.080 in. clearance is not present, the valve reliefs must be machined deeper to obtain the 0.080 in. clearance.

CAUTION

Do not deepen valve reliefs more than 0.020 in. or piston will be ruined.

- B. If 0.040 in. clearance was not present when checked in Step 13, remove and bevel the intake and exhaust valves on 883cc engines. If 0.040 in. clearance is not present on 1100cc engines, the valve seats must be ground deeper to obtain the clearance. After grinding valve seats, assemble the engine and recheck the valve head clearance per Step 13.

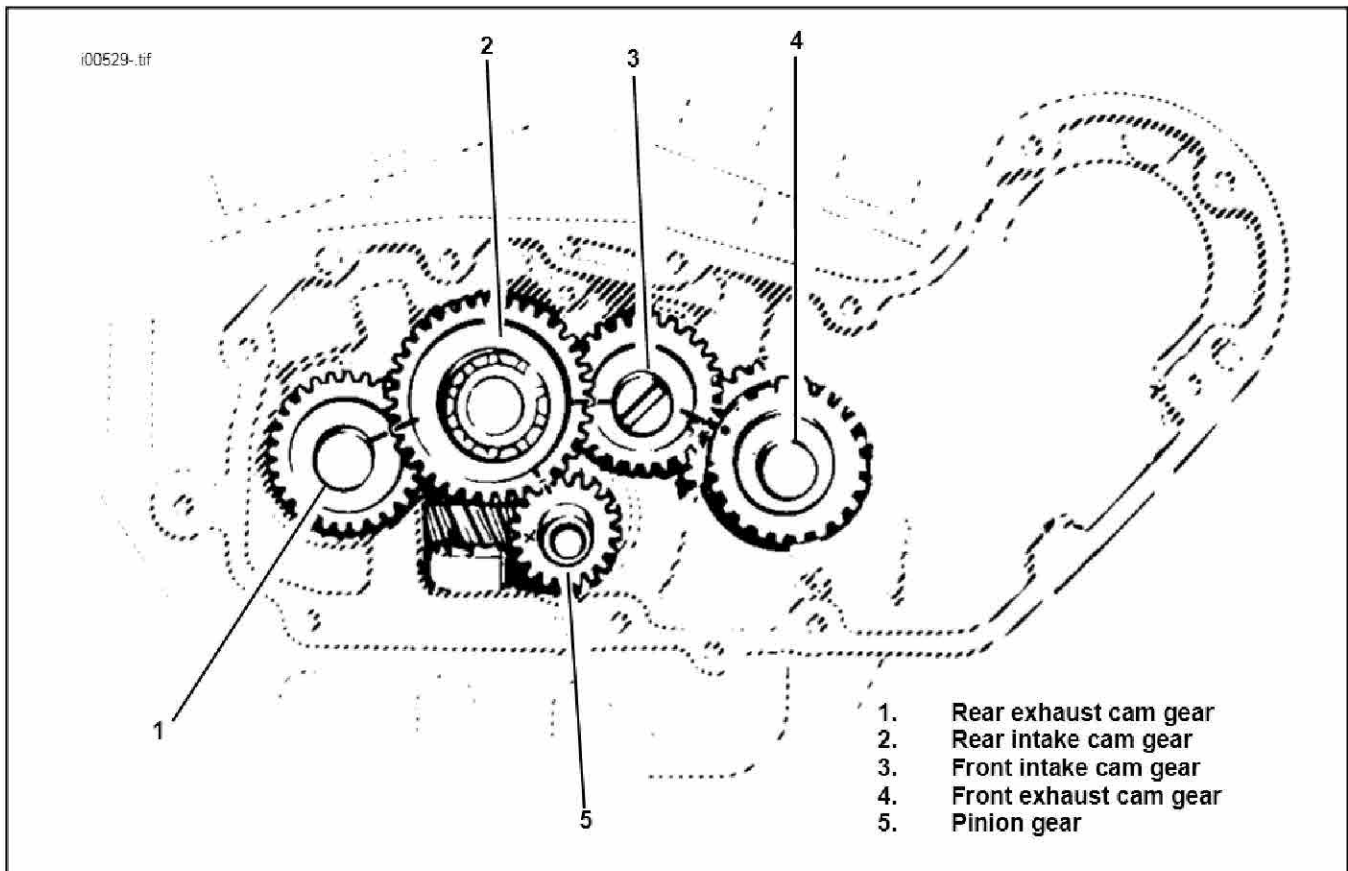


Figure 2. Proper Alignment of Camshaft Timing Marks

NOTE

If valve seats are ground, recheck valve stem protrusion, distance between valve spring collars, and push rod length. Free travel will be increased and need not be rechecked. Install new valve guide seals if valves were removed.

18. Following Service Manual procedures, assemble the engine using new gaskets and check push rod length if valve seats were ground.
19. Check ignition timing following Service Manual procedures.

Improving Engine Output

Carburetor/Air Cleaner

To enhance the power increase of this kit, install one of the following items available at your Harley-Davidson dealer:

PART NO.	DESCRIPTION
91731-85	Hi-flow carburetor and air cleaner kit
29258-86	Sportster carburetor adapter kit (used with 91731-85)
80040-81	Drilled disc air cleaner
29162-82	Internal velocity stack (used with 80040-81)
29039-85	8 in. round hi-flow air cleaner kit

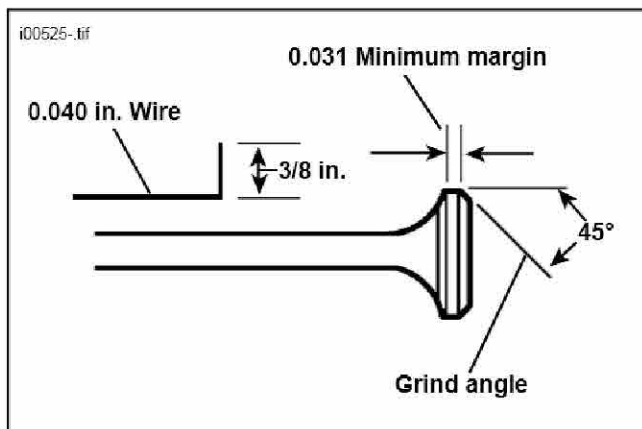


Figure 3. Beveling Valve Heads

Exhaust System

A free flowing exhaust system, such as Harley-Davidson slip-on mufflers, will give additional horsepower. See your Harley-Davidson dealer for an exhaust system recommendation.

Ignition Timing

Stock ignition timing is recommended. Use Screamin' Eagle ignition module for greater rpm range, Part No. 32429-86.

CAUTION

The 32429-86 module will allow the engine to rev to 8000 rpm which is well above design parameters. It is imperative that the rider use the tachometer and avoid harmful over-revving. An adjustable rev limiter is recommended. See your Harley-Davidson dealer for rev limiter information.

Carburetor Jetting

If using stock carburetor, a larger carburetor main jet may be required on engines modified with this kit.

Porting

Smooth all transitions and sharp edges in the intake "Y-manifold", intake tract, and exhaust tract. The valves are somewhat shrouded by the squish area of the head. This area can be relieved for better flow. There should be about 1/4 in. of clearance from the valve head to the sides of the combustion chamber.