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REF: Primary Drive & Clutch

Clutch Parts & Mods - Aftermarket

Aftermarket Rivet Plate

Alto Spring Plate

Alto Products Corp has developed a new version of the Harley Davidson spring separator plate (Alto P/N 095763HD). [1)]
It is made to replace the stock version for the Sportsters (91-On) and Big Twin (90-97 Evo). (Used to replace HD P/N 37975-90)

The Alto version features 16 Stainless Steel Rivets to hold the plate together for longer lasting durability, instead of the usual Brass Rivets. This heavy duty replacement addresses the issue of the original brass rivets loosening over time.

[2)]

See this XLForum thread about using one.

Click here for the Alto website

Click here to download a PDF of their Complete Motorcycle Catalog.

Alto also offers two versions of the spring plate with brass rivets: 095763 & 095763UP1

91 and Later Aftermarket Clutch Packs

Alto Clutch Pack

Alto kit part number 095750BC is for Sportsters.
From Alto;
This kit will correct, prevent, and reduce overheating of the Clutch Pack.
There is also an increased friction area for more grab and durability.
This kit uses our CARBONITE® material and is our strongest clutch in this application.

Installation Instructions:
Click here to download the instruction sheet PDF. [3)]
The friction material should face the back of the drum.

- Start with an externally splined friction plate with the lining facing down (inward) and the steel side facing up (outward).
- Followed by an internally splined friction plate with the lining facing down and the steel side up.
- Continue this process making sure each time a plate is installed that you only see the steel side.
- The last plate to be installed will be the double-sided friction plate (in the front).
- Reinstall the pressure plate and spring. Finish by adding lubricant.
- Once installation is finished ride the motorcycle two or three times to make your final adjustments. If the Stack Up extends above the basket, remove internally splined plate and one externally splined plate.

ALTO Part #(095750BC): For All Sportsters 91-later (and Big Twin 90-97 w/EVO engine)
Contents:

- (10) 095731B185 Steel/Friction Plate, Internally Splined
- (10) 095730D150 Steel/Friction Plate, Externally Splined
- (1) 095730A185 Double Sided Friction Plate

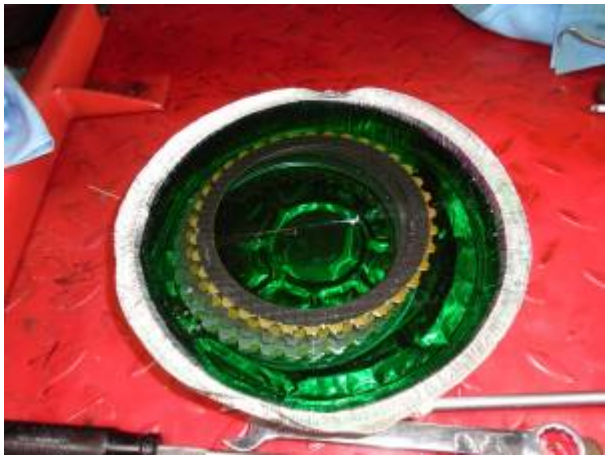
Note Sportster installations only use 9-Int + 9-Ext + 1-Double plate. 1 each of Int & Ext left over.
…….. Check your total stack height as compared to the stock parts being removed.

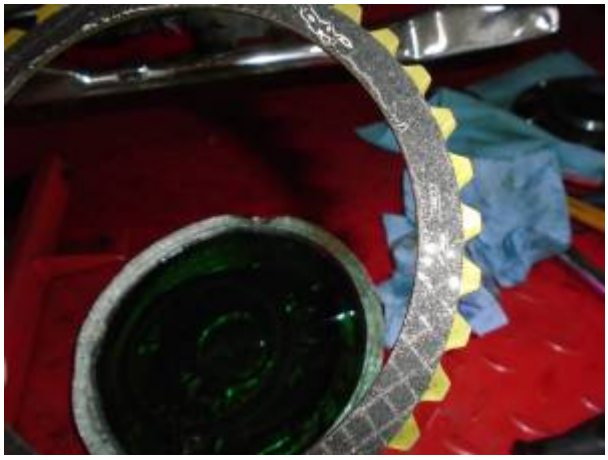
ALTO Part # (095750CC): ONLY For Buell 2005-later
(There is misprinted information at Alto & elsewhere indicating this kit is for 05+ XLs - **IT IS NOT!**)
Contents:

- (8) 095731B185 Steel/Friction Plate, Internally Splined
- (8) 095730D150 Steel/Friction Plate, Externally Splined
- (1) 095730A185 Double Sided Friction Plate

Pics of ALTO (095750BC) Installed

Note that most plates are combination plates - steel on one side & fiber on the other side, then, the outermost one, which is fiber on both sides. [4)]
Install all the combo plates first (fiber side inward) and then the double-sided fiber plate placed in last (outermost).




Energy One - Extra Plate Kit

BTX-11:
9 Kevlar friction plates, 8 steel plates plus a 15% stronger diaphragm spring. [5)]
Recommended fluid type:
The use of synthetics is not recommended as they tend to cause slippage. [6)]

- Any HD petroleum based, non-synthetic, primary oil, as light weight as possible.
- Or even a good petroleum based motor oil such as 10/40 or 20/50 in weight.
- You can even use ATF Type F or B&M Trickshift.

Installation:
Start with a friction plate and end with a friction plate. [7)]
The OEM rivet plate is discarded and not used with this kit.
This kit includes 1 extra friction and steel plate to retain the OEM stack height.

Energy One BTX-11 [8)]	Soaking the plates in oil [9)]
	

Screamin' Eagle® Performance Clutch Kit

HD has a Performance Clutch Kit (Number 38002-04) designed to fit 1991-later XLs (and 1994 to 1997

1340 Big Twins) with Evolution® model engines.[10] This kit is still being sold by HD as of 01-20-2021.

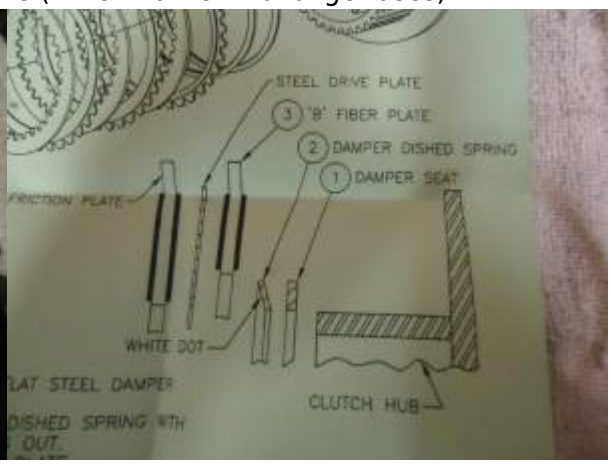
- The nine high performance friction discs and eight spacer discs in this kit replace the original eight paper friction discs and six spacer discs. This kit also replaces the spring plate and diaphragm spring with a higher rate diaphragm spring.[11]
- Cautions: Do not reinstall the OE spring plate and diaphragm spring with this kit. Doing so will affect the stacked height of the clutch discs. The spacer discs supplied in this kit must be used with the high performance friction discs. Do not use the original equipment (OE) spacer discs with this kit. Doing so will affect the stacked height of the clutch discs, resulting in clutch slippage.
- Installation, refer to the applicable Harley-Davidson Service Manual for installation of friction discs, spacer discs, and diaphragm spring in kit, but follow these important guidelines:
  - Remove the original eight friction discs, six spacer discs, spring plate, and diaphragm spring from the clutch assembly as described in the Service Manual, and discard.
  - Replace with nine high performance friction discs, eight spacer discs, and diaphragm spring from kit. Place a friction disc into the clutch shell first, then alternate spacer discs and friction discs.
  - Kit includes:
    - Disc set including 9 friction and 8 spacer discs. Part #(38001-04)
    - 1 Spring, clutch diaphragm Part #(37949-98A)

Barnett Kevlar Clutch Kit

In this section, Grind, from the XLForum.net, notes that he had ordered a new Barnett Kevlar clutch pack & Barnett 25% stronger diaphragm spring for his 2004 1200C Sportster. The pictures below are from that thread: [12]

These are the instructions that came with the kit:

This Barnett Kit still came with the Judder Plate (which Barnett no longer uses):



Below, on the left, is a comparison of the Stock Diaphragm Spring (Top) & the Barnett 25% upgrade spring (Bottom).
On the right is a comparison of four brands of Friction Plates. Top to Bottom is: Stock HD, Energy One Kevlar, Alto Carbonite & Barnett Kevlar:

Upgrade Clutch Diaphragm Springs - Pressure

Below are a list of upgrade versions. The 'xx% stronger' are claimed values by the respective vendors. Energy One suggests that if you are using a diaphragm spring of +25% that you should also upgrade your pressure plate to a billet version because they have had issues with the stock cast pressure plate cracking. [13)]

L1984-90 Sportster

Barnett Scorpion Clutch Kit 607-30-10084 [14)]

- MT-33-6 - - - 396lbs (six springs)
- MT-112-6 - - 420lbs (six springs)
- MT-113-6 - - 480lbs (six springs)

1991-later Sportsters

Screamin’ Eagle HD-style Clutch Spring [15)]

- 350lbs - 10% Stronger Than Stock 1200 Clutch Spring (SE Clutch Spring 37949-98A)

Energy One HD-style Clutch Spring [16)]

- 340lbs - 15% Stronger Than Stock 1200 Clutch Spring (BT15) (% based on '91-'03 1200 OEM spring)
- 380lbs - 25% Stronger Than Stock 1200 Clutch Spring (BT25) (% based on '91-'03 1200 OEM spring)

Barnett HD-style Clutch Spring [17)]

- 360lbs MT-81 - 10% Stronger Than Stock 1200 Clutch Spring (502-00-01081)
- 400lbs MT-77 - 25% Stronger Than Stock 1200 Clutch Spring (502-00-01077)

Barnett Scorpion Clutch Kit 607-30-10091 [18)]

- MT-18-6 - - - 348lbs (six springs)
- MT-112-6 - - 420lbs (six springs)
- MT-113-6 - - 480lbs (six springs)

These springs can be mixed such as: [19)]

- 3x MT-18 plus 3x MT-112 = 384 lbs
- 3x MT-18 plus 3x MT-113 = 414 lbs
- 3x MT-112 plus 3x MT-113 = 450 lbs

AIM Corp. sells Diaphragm Springs (made by Energy One):[20)]

- 150lbs - AM006-150
- 190lbs - AM006-190
- 240lbs - AM006-240
- 320lbs - AM006-320
- 400lbs - AM006-400
- 480lbs - AM006-480

E1 Claims 400lbs is the max pressure version they make. As shown below, the AIM 480lbs version & the E1 400lbs version may be the same product.

21)

'91-later Alternative Clutch Pack Using XR1200 Parts

This discussion regards using some of the clutch parts found in the XR1200 model in place of the stock XL model design. This XR parts usage was initially explored due to some issues that occur after the XL Spring Plate is replaced with an aftermarket 'Extra Plate Kit' or when adding 2 stock steels & a friction. Sometimes those alternatives will 1) have an abrupt grabbing (lurching) on clutch engagement and/or 2) produce an unpleasant squeel. Using the XR parts instead of the XL Spring Plate is said to eliminate those issues.

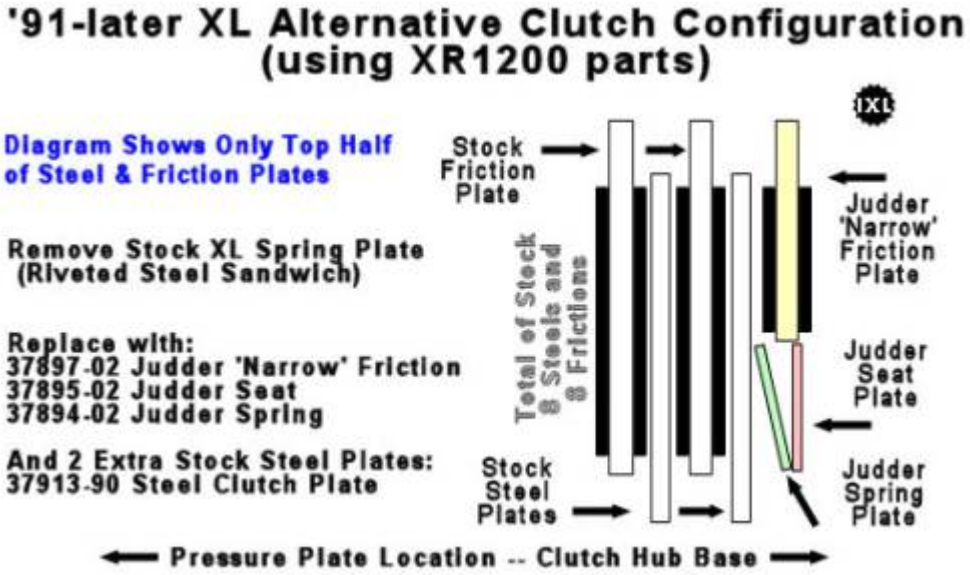
These are the XLForum threads related to this alternative: (Thanks to Bluto for pioneering this alternative):

https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-drivetrain/sportster-motorcycle-transmission-clutch-primary-secondary-drive/191597-barnett-extra-plate-kevlar-kit?t=2044017
https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-drivetrain/sportster-motorcycle-transmission-clutch-primary-secondary-drive/195972-grenade-plate-fix-with-xr1200-parts?t=2072418
https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-drivetrain/sportster-motorcycle-transmission-clutch-primary-secondary-drive/198254-huge-cock-up-xr1200-clutch-mod?t=2074994

Here's the pictures Bluto posted of the parts:

In both designs, the clutch pack is a combination of friction plates and steel plates that are sandwiched together between the base of the clutch hub and the pressure plate. In the stock XL design, there are 8 friction plates, 6 steel plates & one spring plate (see below).

The XR1200 model was offered between 2008 & 2013. The clutch design in this model uses springs built into the clutch hub along with a bevelled spring plate (known as a Judder Plate) to absorb clutch engagement forces. The XL models also use a spring plate, but it consists of two metal plates that are connected with spring leafs that are riveted in place. This XL spring plate, especially in the rubbermount models, has failed quite often by the rivets sheering. Most often, the clutch basket is scarred. This requires careful filing to remove the raised areas on the damaged clutch basket so that the friction & steel plates can move back and forth smoothly.



The XR1200 clutch basket is not a drop in replacement for the XL design but the Judder Plate portion of that design will fit into the stock XL basket. In this implementation, the XL spring plate, subject to many failures, is removed. In this XL alternative configuration, there is the Judder Plate plus 8 friction plates and 8 steel plates.

The components that make up the Judder Plate design are a 'narrow' friction plate, a bevelled spring plate and a spring seat plate. The inner diameter of the friction plate is larger than a normal friction plate (thus making its radial thickness 'narrow'). Both the spring & spring seat (which have the same smaller outside diameter) fit inside the diameter of the 'narrow' friction plate. This makes the combined components equivalent to one friction plate.

These components are placed in this order in the bottom of the clutch hub (first pieces to be installed) - Narrow Friction Plate, Spring Seat and Bevelled Spring Plate. Next is placed a Steel Plate, followed in succession by a Friction then Steel Plate until all plates are installed.

As regards the bevelled spring, the inside diameter should sit closer to the Hub Base and the outside diameter should sit closer to the Pressure Plate.

NOTE-1: With the Judder design, which requires additional motion in the clutch compression process, I would expect it to be more difficult to get the correct setting of the adjustment screw (perfectly balanced) to allow enough motion for the plates to get from fully engaged to fully disengaged. Pay close

attention when you make the clutch adjustment of the ball & ramp assembly so that the clutch plates will move sufficiently.

(**Note of Caution:** This configuration is a new experiment - implement it as you see fit. Additional notes will be added as more experiences are related on the XLForum regarding the success.)

XR Parts to Replace Stock XL Spring Plate

- -

37894-02 Judder Spring
37895-02 Judder Spring Seat
37897-02 Friction Clutch Plate - Narrow

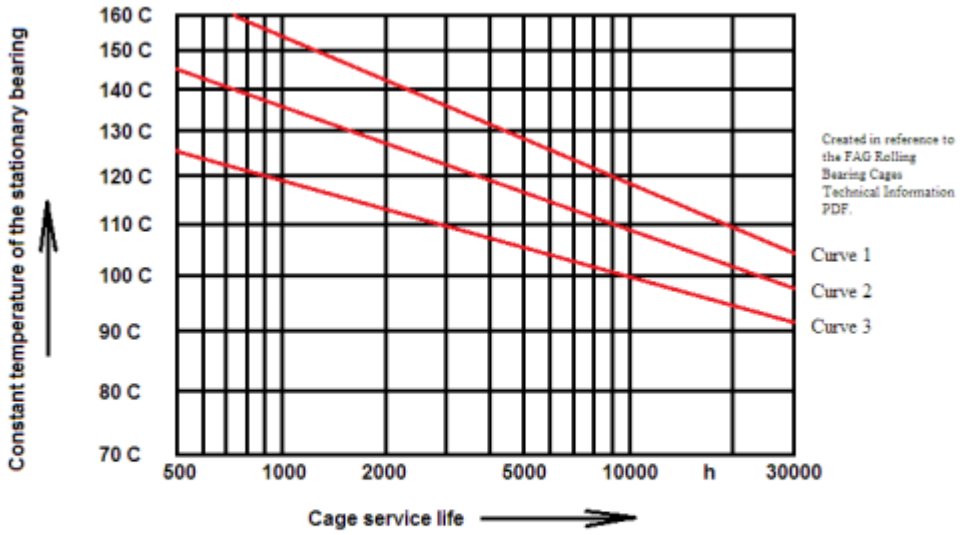
Extra Steel Plates (2ea)
37913-90 Steel Clutch Plate

Upgrade Clutch Release Bearing - HD P/N 8885 to 7200B Angular Ball Bearing

You might consider replacing the stock bearing, P/N 8885, which is a standard ball type bearing (equiv. to 6200). Using an angular contact bearing, which provides additional support in the axial direction, is a better alternative for this application.

[22)]

The upgraded replacement would be FAG 7200B (not available from HD) and is an angular contact bearing.
Click this link to view the PDF for FAG Angular Contact Bearings Catalog.
Click this link to view the PDF for FAG Rolling Bearing Cages Technical Information.



Curve 1: Rolling bearing lubricant grease "K" (DIN 51825, motor or machine oil)
Curve 2: Gear oil
Curve 3: Hypoid oil
www.sportsterpedia.com
Curves relate to constant temps.
If bearings are not subjected to such high temps all the time, cage life will be longer.
Glass fiber reinforced polyamide cages are suitable for extended use at operating temps up to 248 F (120 C). In oil lubed bearings, additives in the oil may lead to a reduction of cage service life

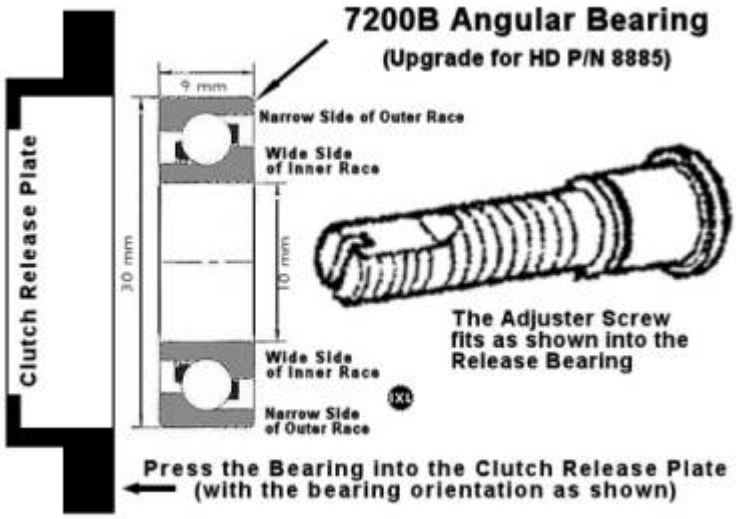
- **FAG 7200-B**.
  This 7200-B-TVP bearing is a single row angular contact bearings with a modified internal construction and a glass fiber reinforced polyamide cage. [23)]
  The cage has a high degree of elasticity, a low weight as well as having good sliding and dry-running properties have a positive effect on the bearing service life according to FAGs technical information on rolling bearing cages. Glass-fiber reinforced polyamide cages are suitable for extended use at operating temperatures of up to 248°F (120°C). That's constant temperatures though. If the bearings are not subjected to such high temperatures all the time, the cage service life will be longer. In oil-lubricated bearings, however, additives contained in the oil may lead to a reduction of the cage service life. At increased temperatures, aged oil can also have an impact on

the cage service life. It is, therefore, important that oil change intervals are observed.
    - Light series bearing
    - Dimensions: ID (10mm), OD (30mm), Width (9mm)
    - 40° contact angle
    - Cage type: plastic
    - Open shield
    - Dynamic load rating (KN): 5
    - Static load rating (KN): 2.5
    - Fatigue load rating (KN): 0.177
    - Reference speed rating (R/MIN): 26000
    - Limiting speed rating (R/MIN): 32000
    - Weight: 0.0320 KGS
    - Continuous operating temperature up to 248°F (120°C)

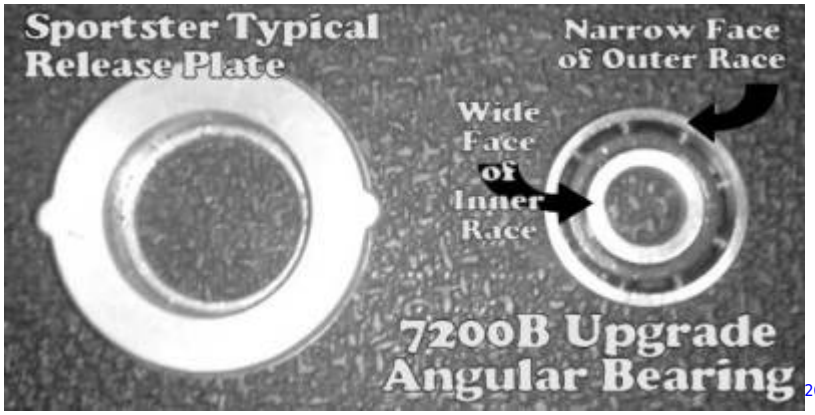
- **FAG 7200-B-JP**.
  This 7200-B-JP bearing is a single row angular contact bearings with a modified internal construction and a sheet steel cage. [24)]
    - Light series bearing
    - Dimensions: ID (10mm), OD (30mm), Width (9mm)
    - 40° contact angle
    - Cage type: pressed sheet steel
    - Open shield
    - Dynamic load rating (KN): 5
    - Static load rating (KN): 2.5
    - Fatigue load rating (KN): 0.177
    - Reference speed rating (R/MIN): 26000
    - Limiting speed rating (R/MIN): 32000
    - Weight: 0.0330 KGS
    - Continuous operating temperature up to 392°F (200°C)
    - Insensitive to synthetic lubricant
    - Longer grease operating life

Be sure to purchase the genuine FAG brand or another high quality bearing (as knockoff versions do not hold up).

It is important to orient the bearing in the right direction when pressing the bearing into the Release Plate. Examine the side view of the bearing below and notice that there is a wide & narrow face to both the outer bearing race and the inner bearing race. They have a sort-of L-shape. They are oriented in opposing directions to create the axial support.



25)



26)

When placing the bearing into the release plate, be sure the wide side of the OUTER bearing race is placed into the release plate first.
In other words, that wide side of the OUTER bearing race presses against the inside lip of the release plate.

Now, when installing the Adjuster Screw into the bearing, be sure the head of the screw rests against the wide side of the INNER bearing race. Refer to the side diagram above.

Additional discussion:
https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-drivetrain/sportster-motorcycle-transmission-clutch-primary-secondary-drive/157723-clutch-squeal-bad-throwout-bearing?t=1688139

XLForum member 'Bikervation' has created a utube video of replacing this bearing. In it he uses a 17mm & 30mm socket to remove the old bearing and a 22mm socket to install the new bearing. These are used for pressing, not as socket wrenches, during the procedure. You will benefit from viewing the actual process.

Muller Power Clutch - Release Assembly

The Muller Power Clutch is a replacement for the stock Ball & Ramp Clutch Release Assembly. It consists of a front & rear plate with 3 ball bearings between the plates (similar to the stock version). The Power Clutch version has wider ramps, smaller ball bearings and the arm (to which the cable attaches) is longer.

These changes provide a longer, but easier, pull on the clutch lever to activate the release of the clutch plates. This product is often added when a stronger clutch diaphragm spring is chosen to help keep the clutch from slipping when a power upgrade to the engine has been installed.

There have been some complaints that the total pull of the clutch lever (when used with the Muller Power Clutch -and- using a very heavy pressure diaphragm spring) is not sufficient to properly adjust the clutch release. Either the clutch plates drag at one end of the adjustment or they slip at the other end of the adjustment because of the motion required by the very heavy spring.

The typical retail price for the Muller Power Clutch is $180.

27)

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1)
thanks to rocketmangb for the tip
2)
Alto spring plate picture used by permission from Alto Products Corp.
3)
Thanks to sml1226 for providing this link

4)

rocketmangb of the XLFORUM
https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-drivetrain/sportster-motorcycle-transmission-clutch-primary-secondary-drive/199132-stacking-the-alto-carbonite-clutch/page2?t=2075976&page=2

5) , 6) , 7)
https://www.energyoneclutches.com/clutchinfo/BTX11.pdf

8)

photo by SarahColt of the XLFORUM
https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-general-discussion-and-problems/163701-sarah-needs-help-fixing-her-bike/page21#post3494568

9)

photo by chris_b_owens of the XLFORUM
https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-styles/cafe-racer-sportster-motorcycle-talk/170788-my-2013-iron-883-cafe-build/page30#post3698865

10)

shanneba from the XLFORUM

11)

https://serviceinfo.harley-davidson.com/sip/service/document/2295

12)

https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-drivetrain/sportster-motorcycle-transmission-clutch-primary-secondary-drive/153224-clutch-feeling-odd/page15?postcount=219#post3324751 - Grind

13)

cjburr at
https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-drivetrain/sportster-motorcycle-transmission-clutch-primary-secondary-drive/29955-06-clutch-install/page2#post661195

14)

http://www.barnettclutches.com/media/service_center/607-30-10084.pdf

15)

http://www.phaedrus.me/id155.html

16)

https://www.energyoneclutches.com

17)

http://www.barnettclutches.com/1845/harley-davidson/0/0/0-harley-davidson-1991-and%20later.html

18)

http://www.barnettclutches.com/media/service_center/607-30-10091.pdf

19)

AB,Frank
https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-drivetrain/sportster-motorcycle-transmission-clutch-primary-secondary-drive/167512-primary-rattle-noises-wtf-now?t=1799188

20)

https://aim-tamachi.com/collections/diaphragm-coil-springs

21)

Pics by EricZ at
https://www.xlforum.net/forum/buell-motorcycle-forum/buell-motorcycle-project/145267-turbo-xb-up-and-running/page6?postcount=87#post3158846

22)

Pics by goblin_dust at this thread:
https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-era-specific-and-model-specific/rubber-mount-sportster-motorcycle-talk-2004-2006/185780-clutch-woes?t=1987885 - Annotated

by IXL2Relax at the XLForum
23)

https://www.qualitybearingsonline.com/7200-b-tvp-fag-angular-contact-bearing-10x30x9mm/
24)

https://www.qualitybearingsonline.com/7200-b-jp-fag-angular-contact-bearing-10x30x9mm/
25)

Annotated by IXL2Relax at the XLForum
26)

Thanks to Reddtigger - https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-drivetrain/sportster-motorcycle-transmission-clutch-primary-secondary-drive/157723-clutch-squeal-bad-throwout-bearing?t=1688139
27)

Pic by Gram399 at https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-drivetrain/sportster-motorcycle-transmission-clutch-primary-secondary-drive/154758-primary-side-tear-down?t=1661362
Annotated by IXL2Relax