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EVO: Primary Drive & Clutch

Clutch Design & Operation

The clutch system consists of the following parts, starting at the transmission and working backwards - The clutch hub & basket, the friction plates, steel plates & the spring plate, the diaphragm spring & pressure plate, the release assembly, the clutch cable and, finally, the clutch lever. The following explanation is not intended to cover every single part of the clutch system but to provide conceptual knowledge of its design and operation.

The clutch operates between the engine & the transmission. The primary chain from the engine sprocket drives the clutch outer shell unit called the “Basket”. The clutch inner shell unit is called the “Hub”. The Hub connects to and drives the transmission. Between the Basket & the Hub are the clutch plates which are actually ring-shaped with no center plate surface.

There are “Friction Plates” which have tabs (teeth as it were) only on their outside circumference that engage with the Basket. Alternating on either side of the Friction Plates are the “Steel Plates” which have tabs only on their inside circumference that engage with the Hub. The engine energy is transferred between the Friction Plates and the Steel Plates by compressing these packs of plates together (against each other) by using a Pressure Plate & Diaphragm Spring.

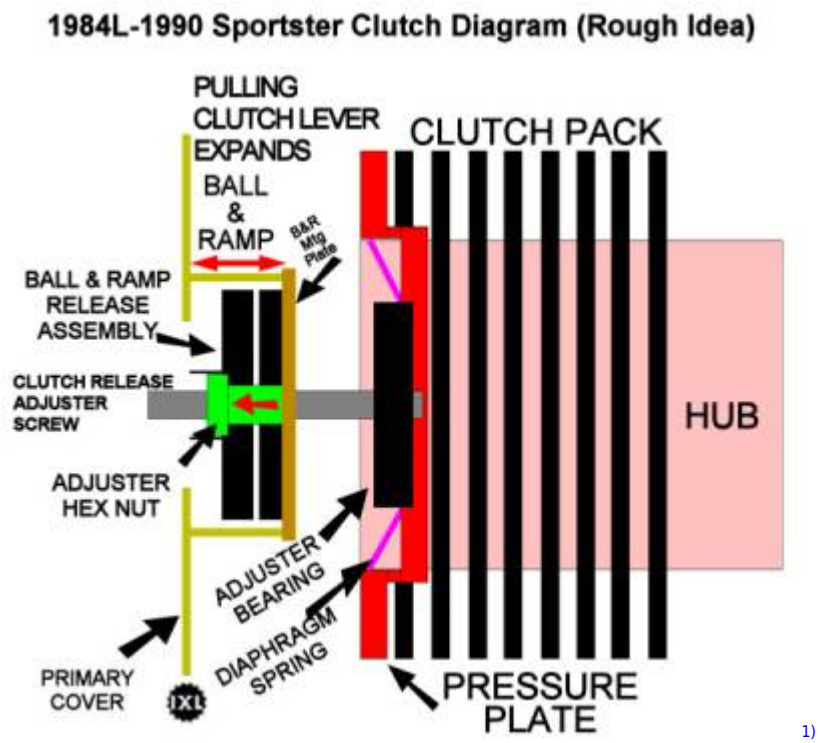
There is also a special Steel Plate called a Spring Plate located in the middle of the pack. The Spring Plate consists of two separate metal plates attached together with riveted movable springs. The idea is to absorb some of the instantaneous force of the clutch engagement and release it over a few microseconds of spring energy transference.

IMPORTANT NOTE: There have been problems with the clutch spring plate disintegrating. Be sure to read this section below: Spring Plate Failure

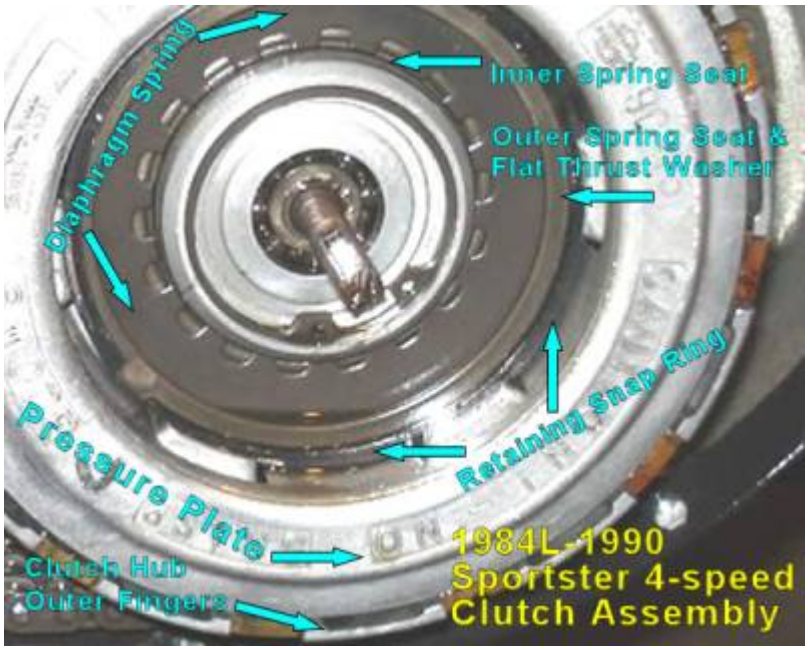
In order to operate the clutch, we need to be able to release pressure on or tightly compress these plates together using the Clutch Lever. The Clutch Release Assembly, mounted to the Pressure Plate (centered in the Diaphragm Spring), allows this control. The 'Ball & Ramp' unit converts the Clutch Cable pull, into a rotational motion, then into a direct force on the Pressure Plate (& Diaphragm Spring) to release the pressure holding the clutch plates together. In other words, when you pull the clutch lever, the cable rotates the Ball & Ramp Assy which expands itself and “pushes” out on the adjuster screw/nut, thereby, pulling the Pressure Plate away from the clutch plates. This allows separate movement of the Friction & Steel Plates - The Frictions & Steels can now rotate past each other effectively stopping the engine energy from going to the transmission.

1984Late-1990 Clutch Release - Rough Operational Diagram - Four Speed

Transmission



1)



Here's the re-assembly sequence of the 1984L-1990 clutch diaphragm spring & pressure plate according to InsaneShane:

- Here is the best way I can explain the direction (orientation) of all the parts.
- Stack the clutch steels & frictions and install the pressure plate.
- Then install the **inner spring seat** - the dome facing outward - the grooved side against the pressure plate.
- Next install the **diaphragm spring** - the point of the cone facing the already installed inner spring seat.

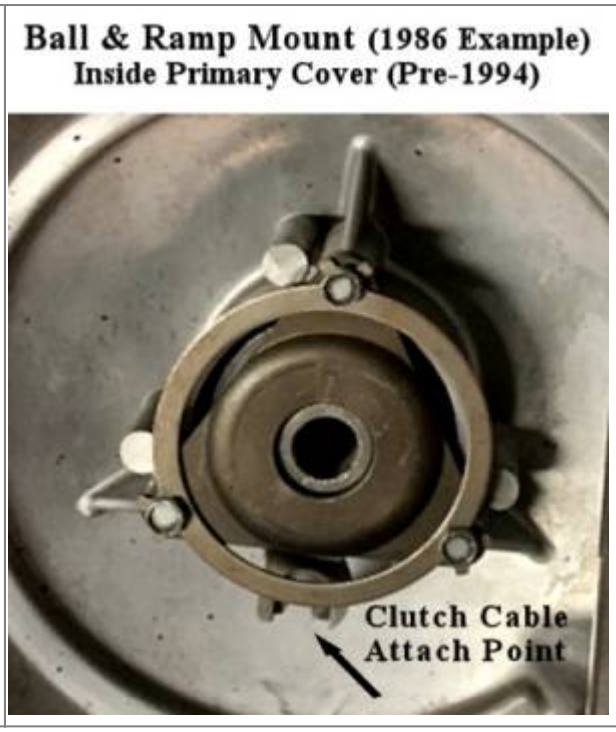
- Then comes the **outer spring seat** - the dome facing inside against the outer edge of the clutch diaphragm spring.
- The **flat thrust washer** goes in next - against the grooved side of the spring seat.
- Finally, you compress the clutch and install the **retaining ring**.

See this XLForum Thread - https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-era-specific-and-model-specific/frame-mount-evo-sportster-talk-1986-2003-models/189592-clutch-install-troubles-clutch-diaphragm-spring?t=2021615

On the 4-speed models, the Ball & Ramp Assembly is mounted to the inside of the Primary Cover. This necessitates the removal of the Primary Cover in order to replace either the B&R unit or the Adjuster Bearing unit.

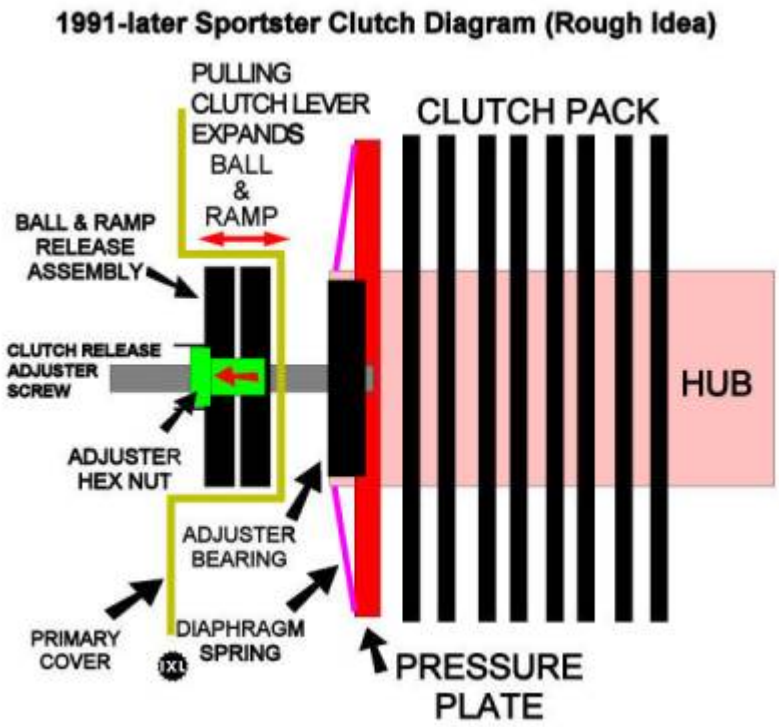
This same Ball & Ramp mounting design was carried forward and used on the 1991-1993 5-speed model engines.

The 1994 models were the first to place the B&R assembly behind the larger derby cover.



2)

1991-later Clutch Release - Rough Operational Diagram - Five Speed Transmission



3)

The 1994-later models have the Ball & Ramp unit mounted in a cavity of the Primary Cover (as shown above). This cavity, accessible under the 'Derby Cover', allows the replacement of the B&R unit and the Adjuster Bearing unit without removing the Primary Cover.

On the other hand, for 1991-1993 models, which also have five-speed transmissions, while the clutch operation is the same, the Ball & Ramp Assembly is mounted to the inside of the Primary Cover (as illustrated for 1984L-1990 four-speed models). This necessitates the removal of the Primary Cover in order to replace either the B&R unit or the Adjuster Bearing unit on those models.

Removing the Clutch Pack - 5-Speed

See your Factory Service Manual for the procedure of replacing the clutch plates and review the parts catalog to see all the parts involved in the assembly.

When removing the clutch pack, it is necessary to compress the Diaphragm Spring with a compression tool. There are many commercially available as well as various functional DIY versions. See the REF Section 'Clutch Hub / Spring Compressor Tools'.

It is important to understand that, once you have the Diaphragm Spring compressed, in order to remove the clutch pack snap ring (RETAINING RING - 37908-90) you will first need to press the spring seat (SPRING SEAT - 37872-90) back into the clutch hub. The L-shape of the Spring Seat is below the Retaining 'Snap' Ring and it's face is against the fingers of the Diaphragm Spring.

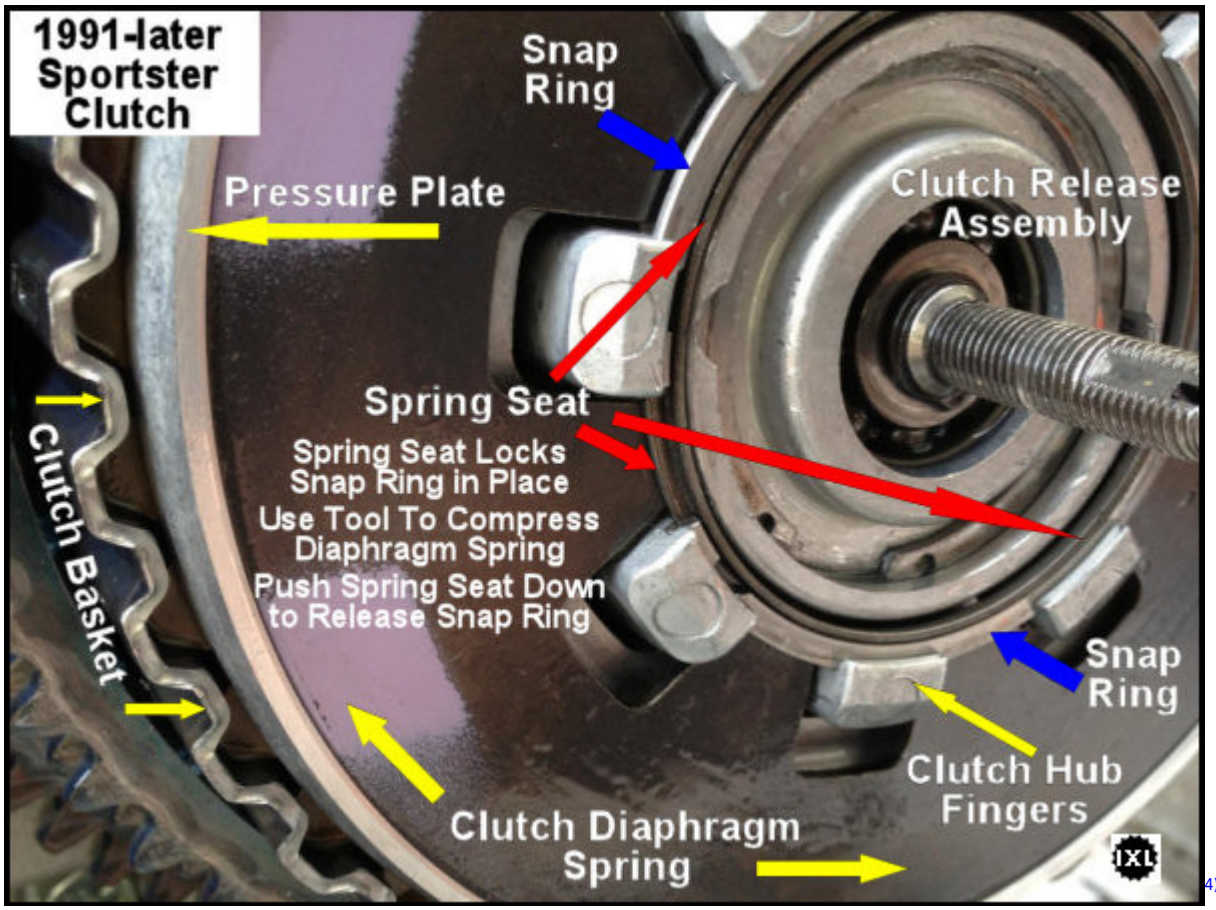
Once the Spring Seat is pressed inward (after compressing the spring), then, the snap ring can be pushed

out of the hub fingers with light pressure toward the center of the hub. WITHOUT PRESSING THE SPRING SEAT DOWN, YOU CANNOT REMOVE THE SNAP RING.

REASSEMBLY - The Pressure Plate sits up against the clutch pack - the Diaphragm Spring sits on top of the Pressure Plate - The Locking Ring sits on top of the fingers of the Diaphragm Spring - The Snap Ring sits on top of the Locking Ring in the notches of the Hub Fingers.

CRITICAL - After compressing the Diaphragm Spring, be sure the Spring Seat (locking ring) is on top of the Diaphragm Spring fingers (not behind them). Then place the Retaining (snap) Ring in place. When releasing the compressed Diaphragm Spring, make sure the locking ring is on top of the fingers and in the proper place to keep the snap ring from coming loose.

When you compress the Diaphragm Spring, it must be compressed deep enough for the L-shaped Locking Ring to slide down the collar of the Pressure Plate far enough (to be out of the way) that the Snap Ring will go into the notches of the Hub Fingers. Then, when you release the pressure, the fingers of the Diaphragm Spring will push up (out) on the L-shaped Locking Ring until it seats (taking it's place under & inside of the Snap Ring). In this way, the Locking Ring holds the Snap Ring from coming out of place & the fingers of the Diaphragm Spring holds the Locking Ring tightly in place between the fingers & the snap ring.



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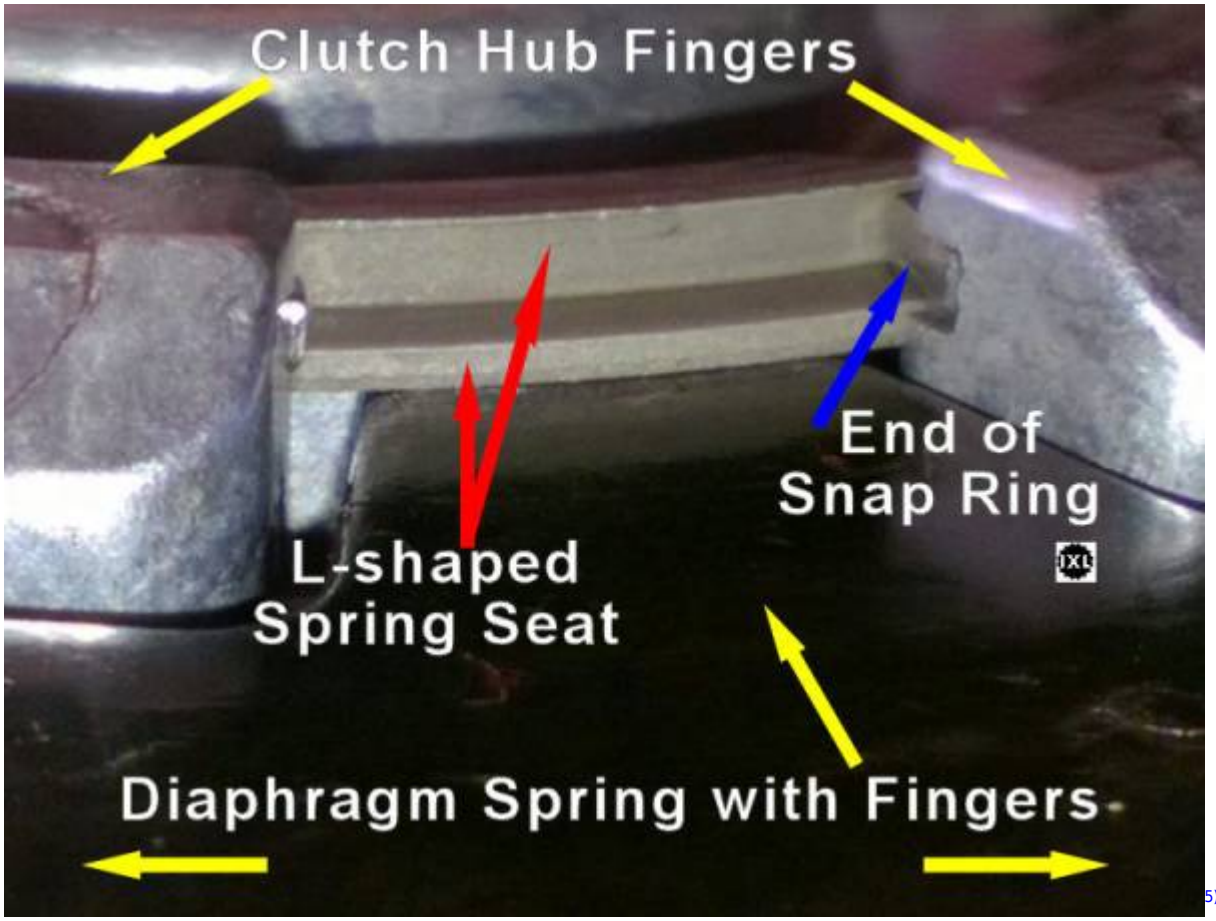


[5)]

Additional information threads at the XLForum.net:
https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-motor-engine/sportster-motorcycle-engine-conversions/171908-2013-883-cafe-hammer-performance-1250-conversion?t=1843303
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

Clutch Pack Stack Height

The exploding spring plate condition seems to be more prevalent in rubbermount (04+) bikes.
Although, it can and has happened with prior models equipped with the riveted spring plate.

Due to the large number of spring plate failures on 04+ models;
Many owners are replacing the spring plate with two extra steel plates and one more friction plate.
See below for Spring Plate Failure and Clutch Parts & Mods - Aftermarket for other options.

Measuring the spring plate [6)]

Typical 86-90 Sportster Wet Clutch Multiple Disc Specifications:

ITEM	New Components		Service Wear Limits	
	IN	MM	IN	MM
Clutch Plate Thickness				
Friction plate (1)	.150“ ± .0031”	3.81mm ± .079mm	.130“ (min)	3.302mm (min)
Steel plate (1)	.0629” ± .002“	1.598mm ± .0508mm	.060”	1.524mm
Clutch pack				
7 friction plates nominal midrange value	1.05“	26.67mm	N/a	N/a
- service limit (total)	N/a	N/a	1.028”	26.111mm
5 steel plates nominal midrange value	.3145“	7.988mm	N/a	N/a
- service limit (total)	N/a	N/a	.3045”	7.734mm
Maximum Allowable Warpage				
Friction	N/a	N/a	.010“	.254mm
Steel plate	N/a	N/a	.010”	.254mm

Stock clutch uses 7 friction and 5 steel plates plus the spring plate.
OEM Nominal Stack Height: 1.365“ (34.671mm) + (compressed) spring plate dim.

1991-later 5-Speed Clutch Disc Specifications (2006 example)

ITEM	NEW COMPONENTS		SERVICE WEAR LIMITS	
	IN	MM	IN	MM
CLUTCH PLATE THICKNESS				
Friction plate (fiber)	0.0866 ± 0.0031	2.200 ± 0.079	N/A	N/A
Steel plate	0.0629 ± 0.0020	1.598 ± 0.051	N/A	N/A
Clutch pack **Wear Limit for set of 8 Friction Plates**			0.6610 (minimum)	16.787 (minimum)
MAXIMUM ALLOWABLE WARPAGE				
Friction plate (fiber)	N/A	N/A	0.0059	0.150
Steel plate	N/A	N/A	0.0059	0.150

Stock clutch uses 8 Friction Plates and 6 Steel Plates plus the Spring Plate.

The Spring Plate measurements are:
Compressed: 4.826mm (0.190")
Uncompressed: 5.283mm (0.208")

Stock w/Spring Plate

Thus, the stock clutch stack (8F+6S+compressed SP) would be: 32.014mm (1.2602")

If you eliminate the Spring Plate by adding two Steels and a Friction you will have 9 Frictions and 8 Steels in your clutch pack.

Using the nominal mid-range value from above:
9 Frictions measure .. : 19.800mm (2.2mm X 9)
8 Steels measure ..... : 12.784mm (1.598mm x 8)
Total Stack Thickness (No SP): 32.584mm (1.2826") (using nominal chart values)

7)

Clutch Release Adjustment - Why & How

This explanation of why & how you adjust the clutch release point references information from members on the XLForum.
(THIS_THREAD from member XLXR is informative)
(THIS_THREAD from member cjburr has some nice pictures of the parts discussed.)

The adjuster screw under the derby cover controls when the Ball & Ramp begins to move the pressure plate. The pressure plate must move a sufficient range for the clutch plates to move from fully engaged to fully disengaged.

While the mounting of the Ball & Ramp Assembly is different for 1986-1993 from the 1994-later models, the adjustments are based on the fact that the operation of the B&R is the same, therefore, the adjusting procedure is done in the same manner.

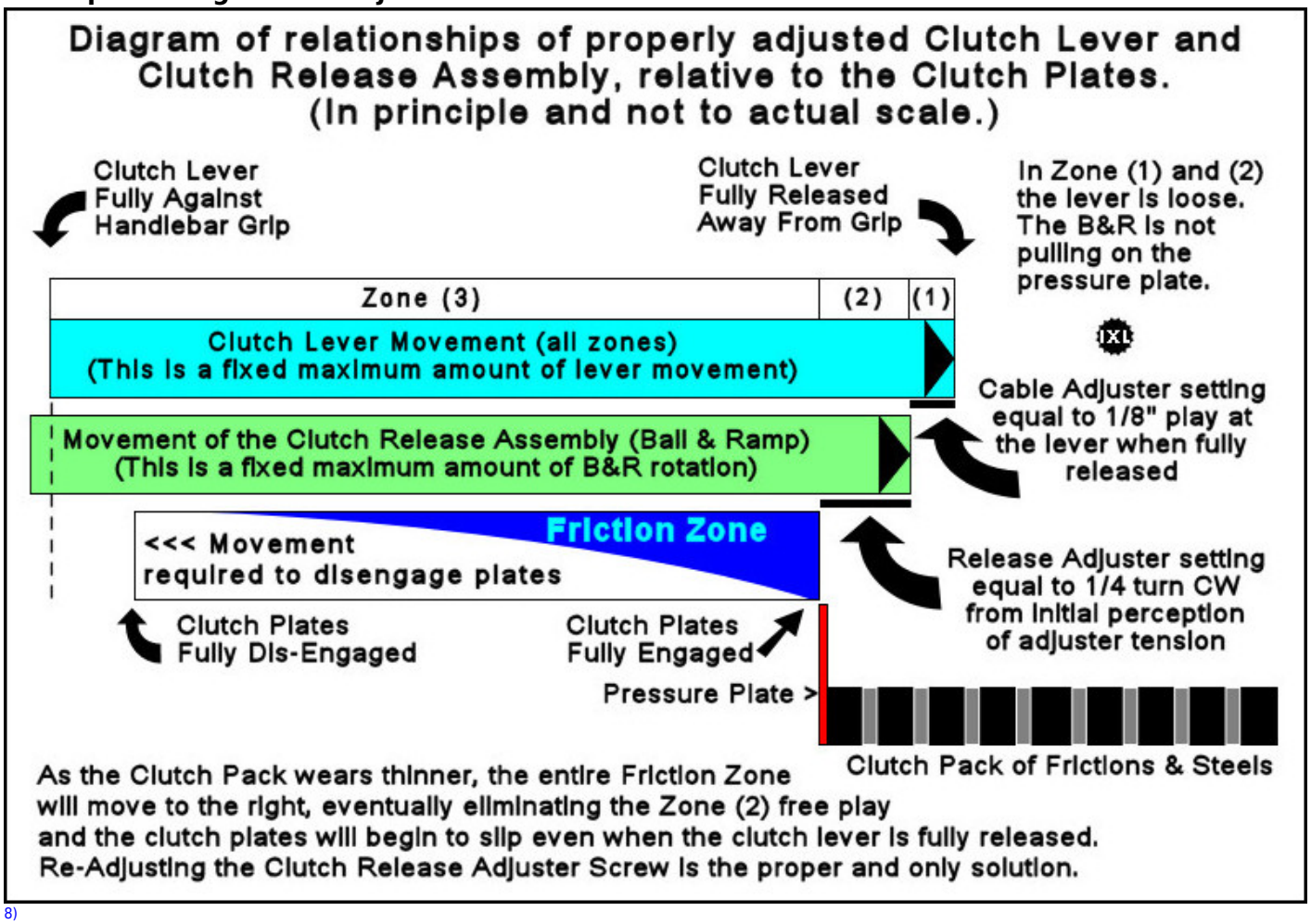
Quoting XLXR - If the adjuster screw is too loose, the pressure plate will not be able to move the full distance it needs to and the clutch plates will not fully disengage causing hard shifting, hard to find neutral and clutch dragging while in gear with lever pulled in.

If the adjuster screw is too tight, the pressure plate will not move far enough to allow the clutch plates to fully engage and the clutch will slip.

In addition, if the adjuster screw is too loose, no amount of tightening the cable adjuster will compensate because the cable adjuster really does nothing except adjust the slack in the clutch cable and position of the lever. If the adjuster screw is too tight, no amount of loosing the cable adjuster will compensate.
(End Quote)

Remember, the **Cable Adjuster** is for the Cable slack only, which sets the position of your Clutch Lever. The Clutch Release Adjuster is for the Clutch pack slack only, it sets when the Clutch begins to release. These are two different adjustments for two different functions.

Conceptual Diagram for Adjustments



[8)]

The diagram illustrates three zones on the Clutch Lever - When fully released, Zone(1) is the 1/8” Cable Free Play where there is no tension whatsoever from the cable pulling on the lever - The lever just sorta dangles there in its mount... As you pull the Clutch Lever toward the handlebar, you reach Zone(2)[9)] which is the Adjuster Free Play - The cable is now pulling on the Ball & Ramp, rotating it to expand, but it is not pulling on the clutch pressure plate, yet. This brings us to Zone(3)[10)] which occurs when the Ball & Ramp has expanded far enough to actually begin pulling the Clutch Pressure Plate away from the Clutch Pack. Zone(3) continues all the way until the Clutch Lever reaches the handlebar. If adjusted correctly, you will have these three distinct zones in the movement of your Clutch Lever and the Clutch Pack will be

fully dis-engaged before the end of Zone(3) - before the lever is against the handlebars.

Zone(2) diminishes as the plates wear. The actual lever free play (Zone(1)) should not change as the clutch plates wear - Here's why:

The clutch lever, once set with the cable adjuster, is in a fixed position (with a fixed length to the cable). The Ball & Ramp Assembly is mounted to the Primary Cover, so it, too, is in a fixed position. The cable (fixed length) runs between the clutch lever (fixed position) and the coupling on the Ball & Ramp Assy (fixed position).

The adjuster bearing is mounted to your pressure plate and the adjuster hex nut (around the adjuster screw) is mounted on the Ball & Ramp Assy. When the Ball & Ramp Assy is rotated, it expands the distance (ball up the ramp) between each side of itself, pushing against the Primary Cover on one side and the adjuster hex nut on the other side. This is how it pulls the clutch pressure plate away from (pushing on the adjuster screw/nut) the Clutch Pack in order to fully dis-engage the plates.

BUT, since the Ball & Ramp Assy is mounted to the Primary Cover, there is no change in the position or movement of that assembly with which the lever interacts. Therefore, Zone(1) does not change - The lever will continue to move 1/8“ before starting to tug on the Ball & Ramp coupling.

Eventually the friction zone begins to slide past the point on the clutch lever where Zone(2) meets Zone(1), and the bearing is now fully active, laterally, all the time (since the pressure plate is moving inward as the plates wear) and the Clutch Pack is slipping because the Pressure Plate can no longer fully compress the pack...
(Also see this __XLFORUM THREAD__)

MAKING THE CLUTCH RELEASE ADJUSTMENT - Refer to your FSM to be sure this procedure is correct for your particular model - Check/Adjust every 5000 miles (or as needed). Grab the Clutch Lever and squeeze and release a few times before you start - This helps to settle the position of the Release Adjuster.

Now find the Clutch Cable Adjuster - Move the boot & loosen the Jam Nut - Fully loosen the tension by screwing the two parts of the Clutch Cable Adjuster together, thus making the adjuster shorter - thereby the cable (and lever) becomes loose.

Remove the Clutch Inspection Cover (off the Primary Housing - Small Cover on '86-'93 - Large 'Derby Cover' on '94-up) (You may have to loosen or remove the left mid-mount foot peg) - be careful as you remove the cover because there is an internal spring & Release Adjuster Position Lock Nut - Remove the internal spring & Release Adjuster Position Lock Nut.

Turn the center screw of the Release Adjuster clockwise one turn away from the original position to be sure you are fully unloading any pressure - then **slowly turn the Release Adjuster screw COUNTERCLOCKWISE until you feel ANY CHANGE IN TENSION** - Do this a few times to be sure you feel the right spot where tension begins – When you're satisfied you have the right spot, turn the adjuster screw back clockwise 1/4 to 3/8 of a turn to be sure no preload tension is on the Diaphragm Spring & Pressure Plate.

Place the Release Adjuster Position Lock Nut back in place (turning the screw farther **CLOCKWISE ONLY - JUST ENOUGH** to get the nut to fit in the nearest position - Do not turn the screw more

counterclockwise) - Place the spring back over the nut and place the Inspection Cover back onto the Primary Housing and retighten the foot peg if necessary…

Side note:

- It may be difficult to feel the right spot while turning the screw.[11) 12)]
- You may want to grab the release arm and check for movement where the cable attaches.
- Play (or lack of play) is obvious there as you adjust the screw.
  Check for movement there, same direction as the cable operating the release.
- You can easily feel the clearance change at the arm as you adjust the screw vs the vague feel you get at the screw.
- The “feel” at the release arm where the clutch cable attaches is very distinct so you have a high degree of confidence you got it right.
- There should be some play at the release arm to assure there is no preload tension on the Diaphragm Spring & Pressure Plate.
- **See this XLForum Post for a discussion of the adjustments:**
  https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-drivetrain/sportster-motorcycle-transmission-clutch-primary-secondary-drive/203096-2005-xl1200r-clutch-adjustment-issues#post4531677

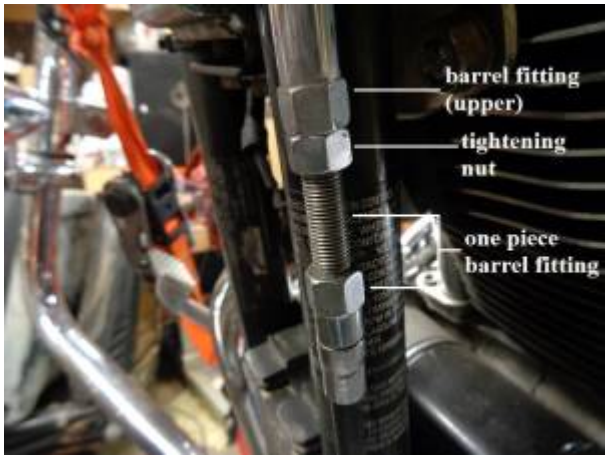
Now, go back to the Clutch Cable Adjuster - Unscrew the two parts to lengthen the Adjuster just enough that there is still 1/8” of free play in the clutch lever movement BEFORE IT BEGINS TO ENGAGE THE CLUTCH RELEASE (check this at the cable connection to the lever) - Now tighten the Jam Nut on the cable adjuster and move the rubber boot back over it…

BEFORE STARTING THE ENGINE - TEST THAT THE CLUTCH WILL FULLY DISENGAGE - Pull the clutch lever and put the bike in second gear and roll the bike backward and forward to guarantee that the clutch is disengaging the transmission from the engine!!!

NOW PUT THE TRANSMISSION IN NEUTRAL!!!
BE EXTREMELY CAREFUL WHEN OPERATING THE BIKE AFTER MAKING A CLUTCH ADJUSTMENT IF YOU GOT IT WRONG, THE BIKE MAY SURGE FORWARD WHEN YOU PUT IT IN GEAR EVEN THOUGH YOU HAVE THE CLUTCH LEVER PULLED FULLY AGAINST THE GRIP!!! BE SAFE - CHECK & DOUBLE CHECK!!!

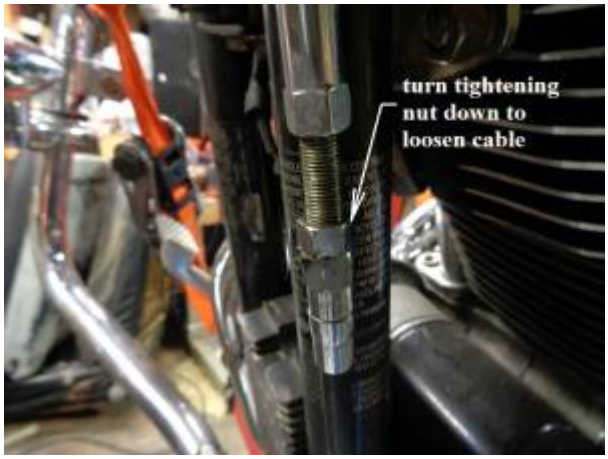
Pics - Adjusting the clutch cable on a 98 model

13)

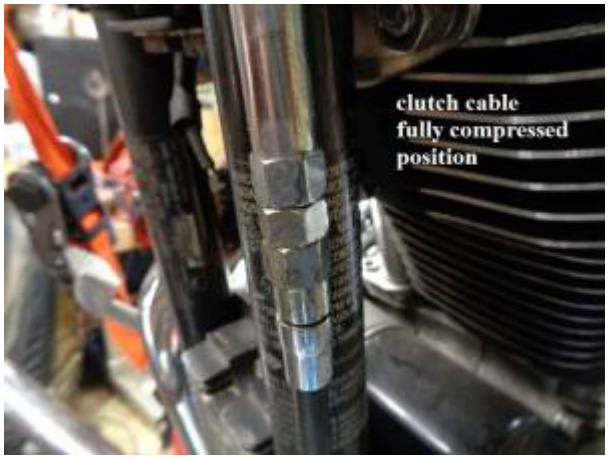


14)

15)



16)

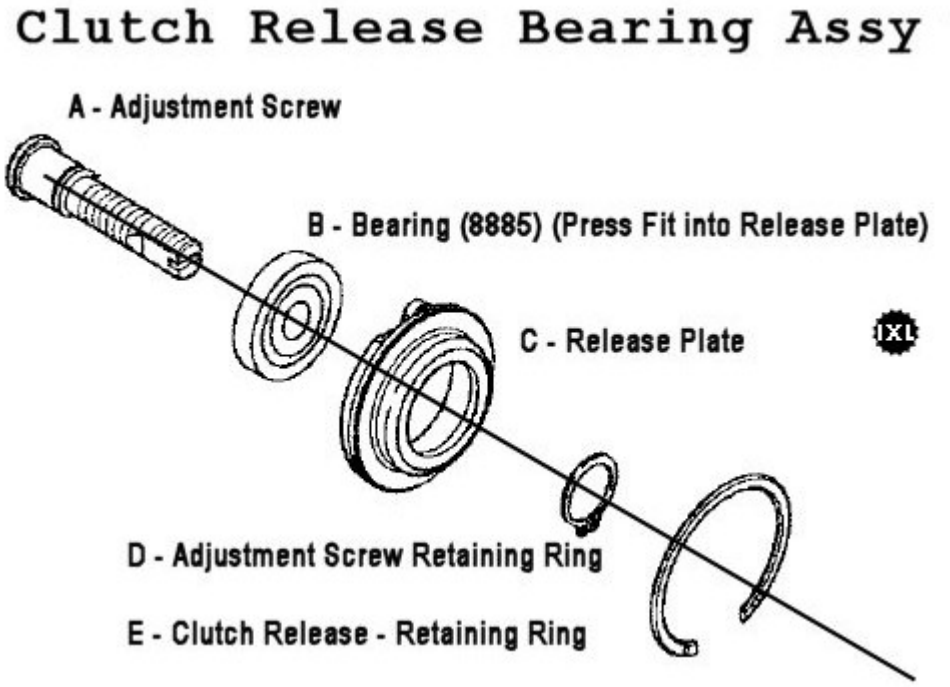


17)

18)

Pics - Adjusting clutch release screw on a 98 model

Clutch Release Bearing Assembly



19)

Part Desc / Year >	1986-90	1991-93	1994-2003	2004+
A- Adjustment Screw (5/16-24)	11735A	11735A	11752	11765Y
B- Bearing	8885			
C- Release Plate	36730-84	37918-91	37918-91	36731-91
D- Adjustment Screw - Retaining Ring	11046			
E- Release Plate - Retaining Ring	11045	37909-90	37909-90	37909-90

The 8885 bearing dimensions are Outer OD = 30.00mm, Center ID = 10.00mm & Outer Race Width = 9.00mm

NOTE: The stock Bearing(B) and Release Plate(C) can be purchased already assembled. Part number 36731-91 is the release plate assembly, which includes both the 37918-91 release plate and the stock 8885 bearing.

Pics - Removing the clutch release assembly on a 98 model.

20)


21)


22)


23)


24)


25)

26)

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 (FAG 7200B), which provides additional support in the axial direction, is a better alternative for this application.

When the original style bearing is worn out or damaged, it is a good time to consider an upgrade.

[27)]

For more information, click this link to see the Clutch Parts & Mods - Aftermarket page in the REFerence section.

Clutch Basket Parts

1986-1990 Clutch Basket Parts - Used on All Models [28)]

- 36791-84 - Clutch Shell and Sprocket

- 36795-84 - Hub (outer) Retaining Ring
- 36799-84 - Hub Ball Bearing
- 36798-84 - Hub (inner) Retaining Ring
- 36785-84 - Clutch Hub
- 5707 - Clutch Hub Spacer
- 11164 - Hub Bearing Retainer Ring

1991-2003 Clutch Basket Parts - Used on All Models [29)]

- 36790-91 - Clutch Shell & Sprocket
- 37904-90 - Hub (outer) Retaining Ring
- 36799-91 - Hub Ball Bearing
- 37905-90 - Hub (inner) Retaining Ring
- 36785-91 - Clutch Hub
- 37870-91 - Spring Washer
- 37495-91 - Main Shaft Nut

2004 and later Clutch Basket Parts - Used on All Models (except XR1200 / XR1200X) [30)]

- 36790-04 - Clutch Shell & Sprocket
- 37904-90 - Hub (outer) Retaining Ring
- 36799-91 - Hub Ball Bearing
- 37905-90 - Hub (inner) Retaining Ring
- 36785-91 - Clutch Hub
- 37870-91 - Spring Washer
- 37495-91 - Main Shaft Nut

XR1200 / XR1200X Clutch Basket Parts [31)]

- 37899-02A - Clutch Shell & Sprocket
- 37891-02 - Bearing (outer) Thrust washer
- 9214 - Hub Needle Bearings and Outer Race
- 37892-02 - Needle Bearing Inner Race
- 37890-02 - Bearing (inner) Thrust Washer
- 37898-02A - Clutch Hub
- 37870-91 - Spring Washer
- 37495-91 - Main Shaft Nut

Diaphragm Springs & Clutch Plate Parts

1986-1990 Diaphragm Spring

- 36792-84 - Stock Diaphragm Spring used on All Models

1991-2003 Diaphragm Spring

- 36792-91 - Stock Diaphragm Spring used on All Models

2004-later Diaphragm Spring

- 37910-04A - Stock Diaphragm Spring used on E04 and 05 883 Models [32] [33]
- 37910-04B (light blue) - Stock Diaphragm Spring used on L04 and 06-up 883 Models [34] [35]
- 37924-04 - Stock Diaphragm Spring used on E04 and 05 1200 Models [36] [37]
- 37924-04A (purple) - Stock Diaphragm Spring used on L04 and 06-up 1200 Models [38] [39]
- 37934-06 - Stock Diaphragm Spring used on XR-1200 / XR1200X Models [40]
    - HD Stock XR1200 Diaphragm Spring Pressure is approx. 320lbs of pressure [41]

1986-1990 Clutch Plates - Used on All Models

- 36788-84 - 7ea - Stock Friction Plates (paper material)
- 36787-84 - 5ea - Stock Steel Spacer Plates
- 36789-84 - 1ea - Stock Spring Plate
    - Note: The Spring Plate is a weak point for possible failure.
      If the clutch gives you problems, it's important to check that the rivets aren't loose on the plate.
- 36786-84 - 1ea - Stock Pressure Plate

1991-later Clutch Plates - Used on All Models (slightly different on XR-1200 / XR1200X)

- 37911-90 - 8ea - Stock Friction Plates (paper material)
- 37913-90 - 6ea - Stock Steel Spacer Plates
- 37977-90 - 1ea - Stock Spring Plate
    - Note: This Spring Plate is a serious performance weakness for failure on 2004-later rubbermount models (unknown reason).
      The spring plate is often eliminated by using 2 more Stock Steel Spacer Plates and 1 more Stock Friction Plate.
- 37912-91 - 1ea - Stock Pressure Plate

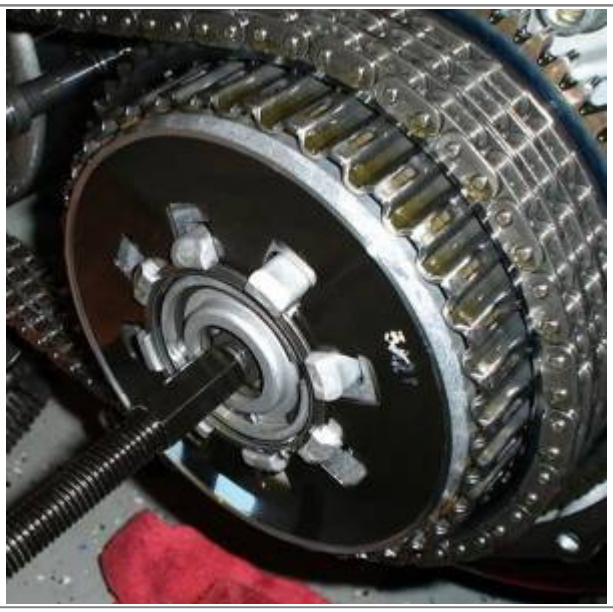
2008 and later XR Clutch Plates - Used on XR-1200 / XR1200X Models

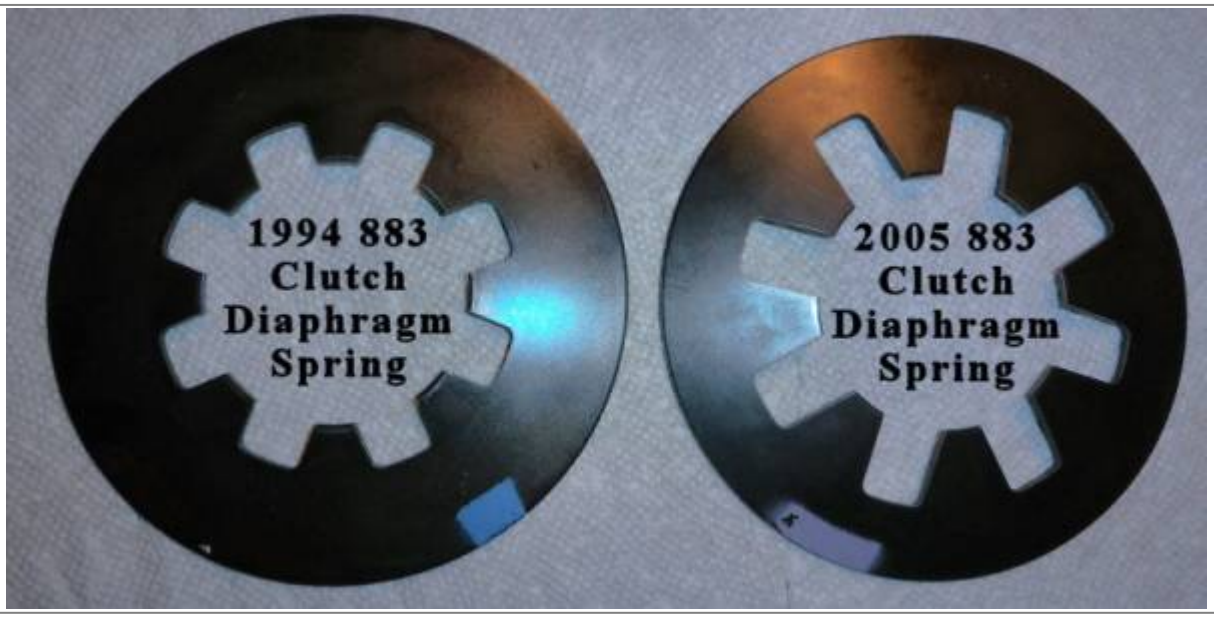
- 37911-90 - 7ea - Stock Friction Plates (paper material)
- 37913-90 - 7ea - Stock Steel Spacer Plates
- 37897-02 - 1ea - Stock Judder Friction Plate (narrow)
- 37895-02 - 1ea - Stock Judder Spring Seat
- 37894-02 - 1ea - Stock Judder Spring (beveled)
- 37896-02 - 1ea - Stock Pressure Plate

91-up clutch plates and spacing (F-St-F-St-F-St-F-SP-F-St-F-St-F-St-F). [42]

“Beginning in 2004, the 883 models started coming with a lighter clutch spring than the 1200's.”[43] This was to reduce the effort required to pull the clutch lever. There was also a change in the clutch cable in 2007 to help reduce the clutch lever effort.

Notice the difference in the slots between the Diaphragm Spring fingers of '91-'03 and '04-later springs. Above left is an '01 example and on the right is an '06 example. Both are 883 model springs.[44][45] Below are two more examples of diaphragm springs.[46]





Spring Plate Failure

As mentioned above, the Spring Plate is located in the middle of the clutch pack. It consists of two separate steel plates attached together with riveted, movable, flat springs sandwiched between the two steel plates. There is a friction plate on either side of the Spring Plate. The idea is to absorb some of the instantaneous force of the clutch engagement and release it over a few microseconds of spring energy transference. See this Post#44

While the functional goal is a good idea, this Spring Plate has caused untold headaches for many riders. When the rivets fail they get caught in between the friction & steel plates, causing the clutch to malfunction, damaging the plates & the clutch basket. [47)]

Here's a good description of the most common symptoms when the Spring Plate Fails:

I noticed the clutch felt like it was dragging then it became harder to get neutral gear and when I stopped I could see that the cable had some slack to it and the lever didn't engage until halfway into the pull towards the grip. It got harder to deal with so I stopped and borrowed 2 cresent wrench's and took the slack out where the adjuster deal is on the cable where it runs down the frame tube.

I thought that would be fine at least to get me home and it did help a little but it quickly became just as big a problem as it was before I adjusted the cable. (Quoted from FrankZ of the XLForum. [48])

Parrothead, in the same thread, mentions that, like others, when his Spring Plate failed he noticed a gold shimmer (brass flecs) in the primary oil when servicing the engine. This is a tell-tale sign that can be observed even before opening the primary cover to examine the condition of the clutch basket & primary cavity.

If the failure is not caught in time, even sheered rivets may be found in the primary oil when draining it for repairs.

This problem is best addressed before it happens. This XLForum Thread includes an ad hoc poll of those who have or have not had failures of their Spring Plate. Currently, the poll shows the following results: Solid – No=61 Yes=19 / Rubber - No=95 Yes=67 – which shows the rubbermount models (2004-later) failing at double the rate of the frame mount models (1986-2003).

Since the poll is not a controlled study, I'm sure it is not accurate. In fact, I suspect the failure rate difference between the models is higher than reflected with the rubbermounts failing much more often than the frame mount models. In any case, the Spring Plate does fail on either model EVO Sportster and the damage is sufficient to make this an important problem to avoid.

Replacing the old Spring Plate with a new, stock Spring Plate is not a typical solution advocated on the XLForum, although it is an available one. Why replace a failure prone part with another of similar weakness?

The preferred choice is to eliminate the Spring Plate entirely by installing two extra steel plates & one extra friction plate. This works for 91 and up clutches. It is possible to accomplish on 86-90 models but due to the thicker friction plates in them, it will not work unless you have enough wear on your plates to get the total stack height down below 1.5662“. [49] While it is possible to do so on 91 and up models with stock plates, a more typical implementation for 86 and up models is using a complete aftermarket kit of new steel plates & friction plates. There are a number of suppliers of such kits, such as, Energy One, Barnett & Alto, in a number of different materials.

This solution does make the clutch engagement a bit more 'grabby' and there is sometimes an associated 'squeel'. But most users prefer the peace-of-mind of eliminating the Spring Plate despite these 'drawbacks'.

Some power shifting users take this opportunity to replace the stock Diaphragm Spring with one that is stronger. Others try to avoid making the clutch lever pull harder and may even install clutch release kits that ease the clutch lever pull.

Repairing the Damage

If you have a failure of the Spring Plate, with missing rivets having been strewn around the primary cavity, be sure to check everywhere those bits may have gone. The clutch basket is likely to have been

scored by the failure. When the rivets fail, the spring strips that the rivets were holding will now slip out from between the steel plates of the spring plate. Exactly where the spring plate is located in the stack these spring strips make a gouge in the clutch basket (and in the clutch hub). This will require careful filing to remove any burrs created by the gouging or, if bad enough, may require replacing the clutch basket & hub.

Use a fine file and carefully check & smooth every finger of the clutch basket that has a gouge (see the pic below). You want to file the side and top corner where the finger is gouged. DO NOT FILE more than necessary to smooth that side face & corner. It is not necessary to remove the flat portion of the gouge from the finger. Due to the friction plate design, they ride on the sides of the fingers & not the top flat portion (this applies to the hub fingers as well). File off only enough metal for a perfectly smooth movement along the side face and inward corners of the fingers. **If not properly repaired, the new plates will not move smoothly to release the clutch during dis-engagement.**

Also, the existing clutch plates (either steels or frictions) may have been warped or otherwise damaged during the spring plate failure. If the Spring Plate failed, it is best to replace all the steels & frictions to avoid carrying damaged parts forward to damage new parts. You should also carefully check that the Pressure Plate & Release Plate have not been damaged, nor any other primary components (chain, sprockets, etc).

Here are images of the carnage resulting from the Spring Plate Failure:


[50)]


[51)]


[52)]

NOTE: Alto has released an upgraded Spring Plate design for the '91-later Sportsters - Alto P/N 095763HD (as of August 2019). It utilizes Stainless Steel rivets instead of the previous Brass Rivets design. Time will tell if this is more reliable.[53)] >>>Link To Alto PDF<<<

Clutch Parts & Mods - Aftermarket

To explore more options in the REFerence section, click the link below:

Clutch Parts & Mods - Aftermarket

Go To Technical Menu

[1] [3] [8]
Illustration created by IXL2Relax at the XLForum
[2]
1986 primary cover pic by iron mike - https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-era-specific-and-model-specific/ironhead-sportster-motorcycle-talk-1957-1985/201772-late-84-85-primary-cover-to-86-90-cover?t=2078880
[4]
Annotations created by IXL2Relax at the XLForum
[5]
Image from jigoe007 from 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
Annotations created by IXL2Relax at the XLForum
[6] [42]
photos by Hippysmack
[7] [19]
Annotated by IXL2Relax at the XLForum
[9]
Tomcatt of the XLFORUM https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-drivetrain/sportster-motorcycle-transmission-clutch-primary-secondary-drive/29621-clutch-adjustment/page7?highlight=clutch#post4317813
[10]
thanks to Jollly Rogers for the suggestion https://www.xlforum.net/forum/forum-functions/sportsterpedia-com-admin/197389-good-clutch-adjustment-tip#post4317886
[11]
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[12]
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[13] [14] [15] [16] [17] [18] [20] [21] [22] [23] [24] [25] [26]
photo by Hippysmack

27)

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

28)

86-90 HD Sportster Parts Catalogs

29)

91-03 HD Sportster Parts Catalogs

30)

04 and up HD Sportster Parts Catalogs

31)

09 and up HD Sportster Parts Catalogs

32) 36)

,

2004 HD Sportster FSM 99451-04 pg 39

33) 37)

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2005 HD Sportster FSM 99451-05A pg 41

34) 38)

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2004 HD Sportster FSM 99451-04A pg 41

35) 39)

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2006 HD Sportster FSM 99451-06 pg 41

40)

2009 HD Sportster FSM 99451-09A pg 59

41)

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

43)

aswracing from https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-drivetrain/sportster-motorcycle-transmission-clutch-primary-secondary-drive/181426-i-m-no-sissy-but-clutch-pull?t=1953378

44)

https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-drivetrain/sportster-motorcycle-transmission-clutch-primary-secondary-drive/167902-barnett-clutch-install-questions?postcount=7#post3577542 - Graywolf

45)

https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-drivetrain/sportster-motorcycle-transmission-clutch-primary-secondary-drive/29955-06-clutch-install?t=49915 - CJBurr

46)

pic from IXL2Relax

47)

Image to the right by WestJC7745 - xlforum.net/forums/showthread.php?t=1698620

48)

xlforum.net/forums/showthread.php?t=2070923

49)

Hippysmack of the XLFORUM https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-era-specific-and-model-specific/frame-mount-evo-sportster-talk-1986-2003-models/183021-1986-90-evo-sportsters-what-every-owner-should-know-but-were-afraid-to-ask/page22#post4294992

50)

Image by jbyun - https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-drivetrain/sportster-mot

orcycle-transmission-clutch-primary-secondary-drive/29955-06-clutch-install?t=49915
51)

Image by vferdman - https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-drivetrain/sportster-motorcycle-transmission-clutch-primary-secondary-drive/29955-06-clutch-install?t=49915
52)

Image by xlxr - https://www.xlforum.net/forums/showthread.php?t=302142
53)

Rocketmangb at https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-drivetrain/sportster-motorcycle-transmission-clutch-primary-secondary-drive/197759-grenade-plate?t=2074441