Technical Service Bulletin

Cobra Motorcycle Mfg.

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TSB0710: Clutch washer, bolt, & arbor

December 14, 2009

New for 2010, Cobra has again improved the clutch washer design. The new washer stacks have taller springs but are overall shorter and have a single thin shim.

These new washer stacks are being double sorted at the factory. They are first sorted by measured height. Secondly, each stack with bolt is sorted by measured engagement force.

Because of this, we have been able to widen the range of stack heights that provide an acceptable clutch 'hit'. The stacks in each stack of three will measure within 0.05mm (0.002").

There are many variables in an automatic centrifugal clutch. These variables are set to world class standards from the factory but will change over time as the components wear, relax, and just plain get used.

There are performance characteristics to observe and things to measure.

1) Performance characteristics to observe
   a) Clutch coming in **too late**
      i) Engine rev's to a high RPM before moving the motorcycle
      ii) Clutch never fully engages on a reasonable straight stretch
      iii) Basket turns blue in short amount of time
   b) Clutch coming in **too early**
      i) Motorcycle moves too soon when accelerating off idle
      ii) Motorcycle moves but not with much power
      iii) Clutch fully engages before the 'power band' kicks in
2) Things to measure that can have an effect

   a) Spring washer configuration
   b) Spring stack without flat washer
   c) Thickness of flat washer
   d) Individual spring washer thickness
   e) Individual spring washer height
   f) Effective bolt shoulder length
   g) Shoe thickness (difficult to measure accurately - can only be approximated by the size of the step where it sticks out of the basket)

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There is a relationship between observed characteristics with things to measure

If a clutch comes in **too early**, it means that clutch spring stack is **not providing enough force** to keep the shoes from being thrown out to the clutch basket at the proper time with the given shoes, basket, arbor, and bolt. This can be due to:

i) Clutch spring stack is to short
   (1) Wrong configuration
   (2) Sacked out (over stressed) washers
   (3) Too thin a flat shim in the stack
ii) Spring rate too low (wrong configuration with proper stack height)
iii) Clutch arbor shoulder bolt is too long
iv) Clutch shoe radius is to large

If a clutch comes in **too late**, it means that clutch spring stack is **providing too much force** to keep the shoes from being thrown out to the clutch basket at the proper time with the given shoes, basket, arbor, and bolt. This can be due to:

v) Clutch spring stack to tall
   (1) Wrong configuration
   (2) Too thick a flat shim in the stack
vi) Spring rate too high (wrong configuration with proper stack height)
vii) Clutch arbor shoulder bolt is too short
viii) Clutch shoe to small of radius

With the exceptions of component failures, generally two things will occur:

1) The clutch shoes will wear causing the clutch to engage later, and
2) The springs will sack causing the clutch to engage earlier.

Typically the springs will sack at a quicker rate than the shoes will wear, meaning that an un-tampered clutch that worked fine will ultimately hit too early at some time. When this occurs it is easily remedied with a new spring stack **or** a thicker flat shim. Because the shoes have worn, a thinner flat washer may be needed with the fresh new springs to allow proper clutch engagement.

One thing to remember

If your clutch is hitting fine, don't mess with it!

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Factors that effect what the clutch spring stack should be include

1) Amount of wear on shoes (this is difficult to measure and can only be approximated by the step in the shoe where it rides outside the basket – new shoes will not have one, old shoes will have a large one).

2) Effective length of the shoulder on the clutch arbor bolt (see figure 1). Nominal is 15.85mm (0.624”). As this decreases, the spring stack needs to decrease equally. This can change due to the shoulder bolt ‘setting’ into the arbor (see figure 2)

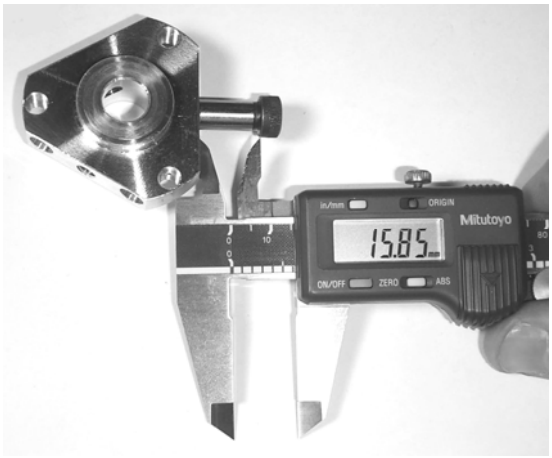

Figure 1

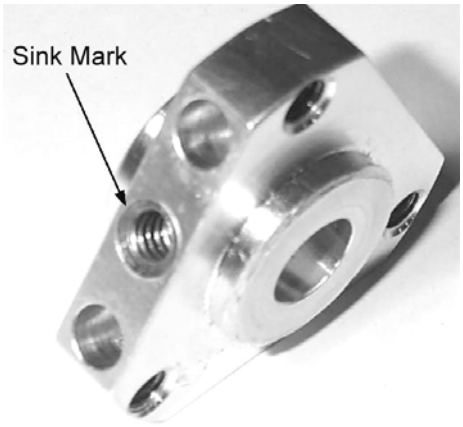

Figure 2

If your effective shoulder length is off, or your shoes are worn, adjust the height of your overall combined spring stack accordingly (i.e. if your effective shoulder length is 0.5mm short of the 15.85 measurement, decrease the overall combined spring stack height by 0.5mm, or if your shoes are worn by 0.5 mm, increase the overall combined spring stack height by 0.5mm).

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Frequently asked questions

Q: When should the springs be replaced?

A: When the clutch 'hit' occurs too early or too late.

Q: Should the clutch springs be replaced if the shoes wiggle on the arbor?

A: Not if the clutch is 'hitting' correctly. Don't mess with it.

Q: What is the acceptable tolerance on any of the measurements?

A: For the most part that does not matter. Suffice it to say that any efforts to make the three shoes behave identically will make the best performing clutch. Taking extra time to balance the three stacks (shims, springs, bolts, etc…) to as close to the same length as you are willing to put effort into will result in a better performing motorcycle.

Q: One of my two riders weighs 85 pounds and the other weighs 45 pounds. Should I have their clutches adjusted differently because of their weight?

A: No, there is one best setting and it works for light or heavy riders.

Q: If my clutch basket changes color, should I replace it?

A: If it is blue or purple, replace it. If it is silver or brown, you are fine.

Cobra is now going to greater lengths to ensure that the clutch on your motorcycle is performing the best possible from the shop and so it may have a different clutch stack or shim washer. Please take note of what flat shims are in your stack that you pull out before you blindly install a new set of springs with other flat washers.