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## EVO: Engine Mechanicals - Sub-03B

# Time-Sert Repair on Engine Case Cylinder / Head Stud Hole

Article by ReddTigger of the XLFORUM <sup>1)</sup>

Click on a pic to enlarge:

To repair a stripped cylinder stud.

Below, only the first few threads in the stud hole are stripped.

This agrees with the assumption that only the first couple of threads do most of the holding.



There are many different options for fixing the stripped stud. This one was repaired using a Time-Sert kit.

You can buy a drilling jig that will center the drill bit but it is expensive.

You also build a jig using an old cylinder with the bottom cut off then use the top as a jig plate to precisely hold the drill.

On the left is a drill guide (sleeve to keep the drill bit straight) and a drill bit held with a tap wrench.

On the right, with the drill guide on the engine, drill bottomed out on the top of the case, the insert is longer than the amount protruding.

The included bit with the kit wouldn't work using the guide. <sup>3)</sup>



So a holding jig for the engine was devised hold the slanted portion of the case in a level and upright position.  
Two 3/8"x16 holes were drilled and tapped to hold two long bolts to be just outside the front lower engine mounts.  
Then four holes were drilled around the outside perimeter to level the base plate with 3/4" long bolts. Some square tubing was cut down and threaded down a standard nut and large fender washers were added to support everything.  
This will allow you to adjust the bottom nut to raise or lower the case.  
An old piece of a trailer hitch was used to adjust the rear side of the engine to get the top portion zeroed out in all directions.

**Homemade jig:** <sup>4)</sup>

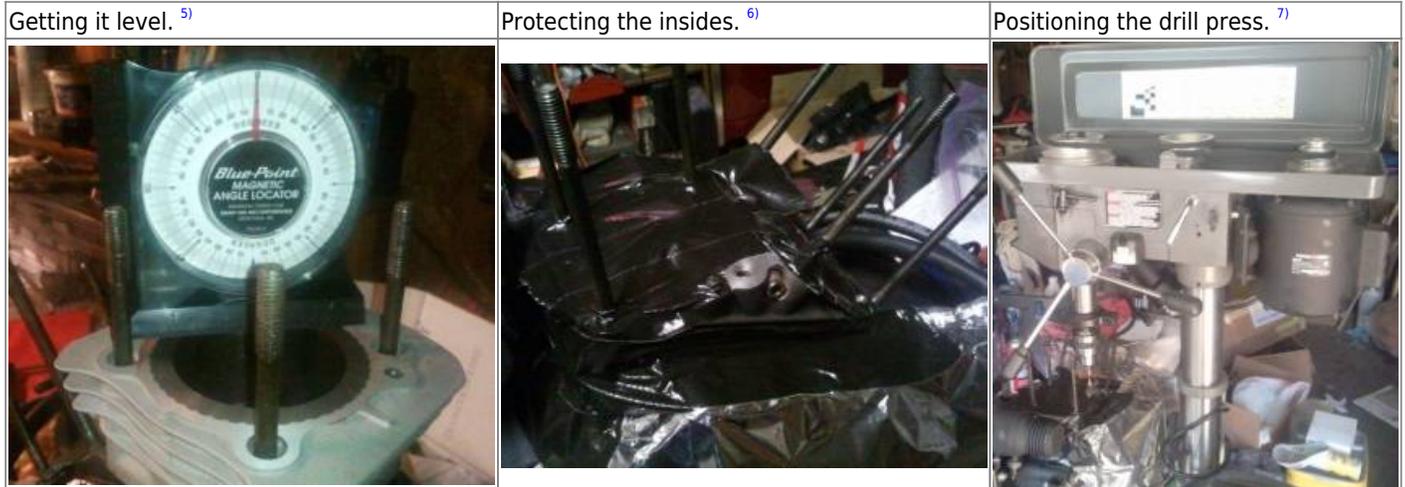


With the cylinder in place on the case, a construction type level was placed on top to insure it was level before drilling.  
This requires 0° tilt in either direction (with the level turned in several directions to verify).  
The engine was covered with duct tape and aluminum foil to prevent anything from entering it.

It was too tall to set under the drill press base so it was placed on a bike lift beside the drill press and re-aligned.

The base was swung backwards to be able to bring the bike lift with the engine under the bit. And the drill press was positioned to meet up with the hole.

### Positioning the engine:



A 19/64" drill bit (which just barely fit inside the existing hole) was used to ensure the drill press was aligned to the hole.

With the bit in the press, you should be able to raise and lower the collet of the drill without this bit touching any sides.

This press also has a fairly accurate laser guideline but trust the bit method more all the way to the bottom to ensure it's straight.

The drill press speed was set 990 RPM.

Always use lubrication when drilling to keep down heat.

Heat will actually expand the hole bigger than the drill bit. Short plunges are even better than pulling the bit down hard.

Also, always use sharp drill bits.

When drilling, especially aluminum, don't use the final hole size to start the hole.

Instead, drill the hole in steps from smaller to bigger bits for each step.

This hole bore was drilled in steps of 1/32" increments as an example of the importance of doing this. Since the existing hole was 19/64, the next bit size was 21/64", then 23/64" and finally the "X" bit provided with the kit.

The depth of the original hole was 1.3125". You don't want to drill past that and this hole was actually drilled to only 1.250".

It only needs to be drilled as long as the insert and installer (with the drill bit chamfer taking into account).

The Inserts are 1.000" and you need at least 1.125" for the installer to pass through.

In addition to using the depth stop on the drill press, you can mark and tape off the bits to get a visual of the depth drilled.

On the final bit, a drill stop was used to ensure the bit wouldn't go any further in than needed. (it has a set screw to hold it to the bit).

Caution, if the press is pulled down too far or too hard, the drill stop collar can still move.

Testing the bit for straightness in the hole. <sup>8)</sup>



Using multiple drill bits. <sup>9)</sup>



Using a drill stop. <sup>10)</sup>



Once the hole is drilled with the X Bit, then you use the counter bore bit, it has a built in stop so you can't go to far.

Clean the hole out with brake cleaner and dry it with compressed air in preparation to tap the hole.

Again use plenty of WD-40 or other and the included tap guide to ensure a straight start.

If you don't already have one, you will need a tap handle.

Once the hole is tapped, all chips need to be blown out with an air compressor.

Then clean the hole brake cleaner and dry it with compressed air.

Time Sert kit as recieved. (also with instructions and a couple extra inserts) <sup>11)</sup>



Hole drilled and cleaned. <sup>12)</sup>



Tap the hole using the guide. <sup>13)</sup>



Let it sit for about 15 min. and install the insert.

Using regular engine oil, you can lubricate the installer tool and screw on the insert until it stops.

Then apply some Loctite onto the outside of the insert and screw the insert into the tapped hole.

It will bottom out on the countersunk portion you drilled earlier and the installer will continue on. Keep turning until you feel the installer get easier to screw.

This causes the bottom threads on the insert to expand into the base material and cause a mechanical bond.

This is typically sufficient for most repairs, but for a case stud, it's a wise move to use red Loctite.

Now the insert is installed flush with the base gasket surface and sitting awaiting for insert of the cylinder stud. The new studs come with Loctite already on them.<sup>14)</sup>



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<https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-motor-engine/sportster-motorcycle-bottom-end/159077-how-i-repaired-stripped-case-stud?t=1704056>

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photo by ReddTigger of the XLFORUM

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14)

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