Broken Head Stud
XK Motor 4.2Ltr

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You've just discovered there's water seeping out the top of a head stud & to make life worse the stud has come apart from the base thread, so what are the options – remove the head & tap a thread into the top deck of the block, not the best option – expensive & time consuming, next option is to access the remaining thread via a welsh plug (freeze plug) you could try & grind flat to drill and tap out the old thread but this again is time consuming & can be expensive & unfortunately some will try re welding – now that's a real mess.

Don't despair there is hope with a fix I have done on my own engine (XJ6 S2) & others I call "The sandwich bolt", this method works when you just need the problem fixed & back driving with a minimum of fuss & expense. Here's a step by step guide with graphics to repair the problem without removing the cyl/ head.

Replacement parts: 7/16 UNF high tensile nut – mild flat steel (final size - 25mm L X 16mm W X 2mm thick) – welsh plug – new stud, or recycle old stud.

Step 1: Remove the carburettors or exhaust manifold/s to gain easy access, drain as much water out of the engine as you can then remove the welsh plug that lines up with the offending stud, clean as much gunk & remaining water away as you can, in most cases the remain thread will have a bit of old stud point left, you can either grind it down flat or just leave it.

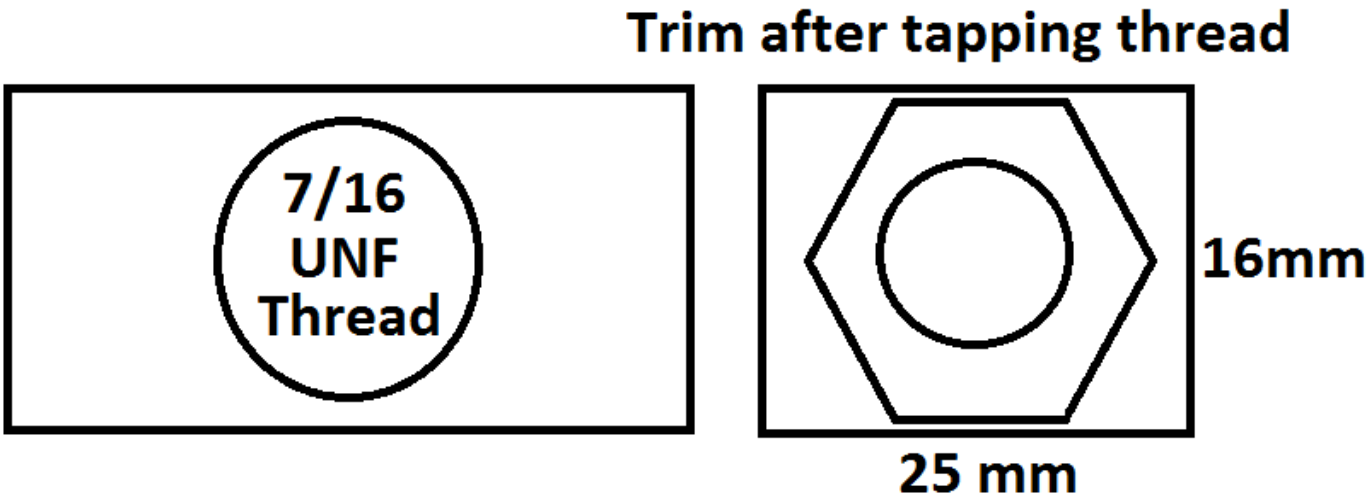
Step 2: You can recycle the remaining stud providing it's in reasonable condition & at least 8 inches long including the top thread or use a new stud. For this example we'll recycle the old stud. Wire brush the old stud clean.

Step 3: Repurposing the old stud – with the new nut inside the water gallery – with the stud upside down (dome nut thread downward) feed the old stud through the cyl head till it shows in the water gallery – screw the new nut fully onto the old stud, now push the stud back up as hard as you can by hand & with a felt marker draw a line around the stud at deck level of where the dome nut would normally sit. Lower the stud down – remove the nut & stud.

Step 4: The measurement – typical length from the top of the threaded end to your mark is 6 ½ inches, cut the old stud to at least 7 ½ inches from the top of the threaded end, now you need to cut a new thread on the blank end of the old stud, using a 7/16 UNF die cut the thread to at least 6 ¼ inches from the top thread end, the reason for this is you'll need to shorten the length between threads so you can get proper tension on the modified bolt. **NOTE** measurements are a guide not an absolute in all cases.

Step 5: Flat steel plate – in most cases this will be necessary to stop the bolt from turning when you try to tension the new bolt, the new nut will jam up inside the water gallery under the cylinder block deck but not enough to stop the bolt from turning, the flat plate will provide enough lock up on the bolt and will continue to get tighter as you tension the dome nut.

Step 6: The flat Plate – follow the diagram below.



Step 7: Now you're ready to fit the replacement, graphics below show some of the stages mentioned. After final check of the modified bolt replacement thread lengths ensuring you can properly tension the top dome nut – smear a little non hardening sealer on both sides of the top washer – feed the bolt through the head to access the bottom thread in the water gallery, screw on the flat plate first then the new nut, with the flat plate running length ways with the block – push the bolt back up so the top thread comes through.

Fit the top washer & then dome nut, tension the nut to recommended setting – usually 50 ft/lb 54ft/lb max/. While you are tensioning the bolt you'll feel the resistance on the bolt as the flat plate edges mould into the block, after tensioning clean surface for the new welsh plug & fit.

Over view

Take advantage of the engine being drained of water to flush as much gunk out of the block as you can. The thickness of the engine block at deck level is more than strong enough to cope with the tension required, this method won't weaken the block deck as thread tapping can. It's Murphy's Law that if one stud is weakened due to corrosion then there will be another. Initially you have a choice to do all the bolts if one is faulty with cyl head off & or motor out, this "Sandwich" method solves the problem quickly & keeps you mobile.

If you decide to try this method then feed is back welcome.

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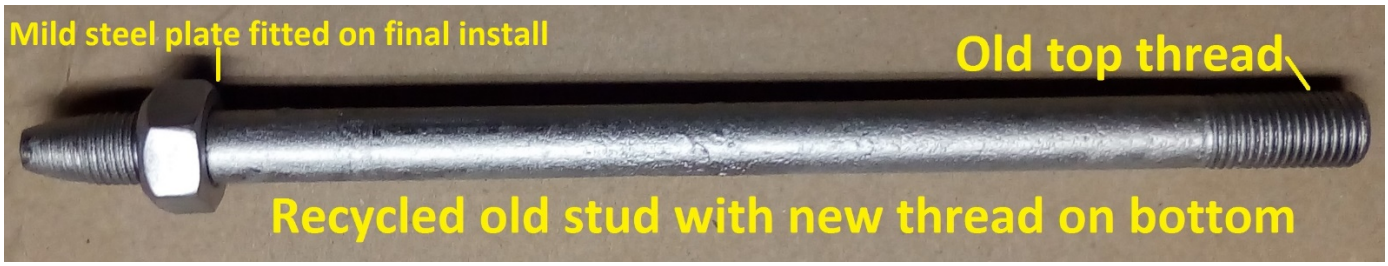
old stud levelled off


Mild steel plate fitted on final install
Old top thread
Recycled old stud with new thread on bottom


New stud modified
New Top Thread to below top deck line