



Stripping a Burman GB Gearbox.

If you look on "YouTube" you'll find numerous videos showing how to dismantle and/or rebuild the Burman GB gearbox, as fitted to the early '50s AMC "heavyweight" singles and twin cylinder motorcycles. Some videos are excellent, some not so good. All of them need you to pay attention and remember what to do. While you're doing that, you're not actually taking the box apart. Sometimes it's easier just look at pictures and read how to do it. There's a link on the left for you to open this as "PDF" file and print it off, if that's what you'd like to do. I'm not about to claim that this is the definitive tutorial or the best. I hope it's not the worst; it's just the way I do it, and I've dismantled and rebuilt a few.

The first problem is how to hold the gearbox. If the gearbox is still mounted in the frame, then unless you really need to remove it, my advice would be to leave it where it is. It's possible to completely dismantle the gearbox with the case still in the frame. If you're intending to strip the box completely, then you will, of course, need to remove the primary drive, clutch and final drive sprocket. You can't remove the mainshaft or the final drive gear with those still in place. If the gearbox is already on the bench and you

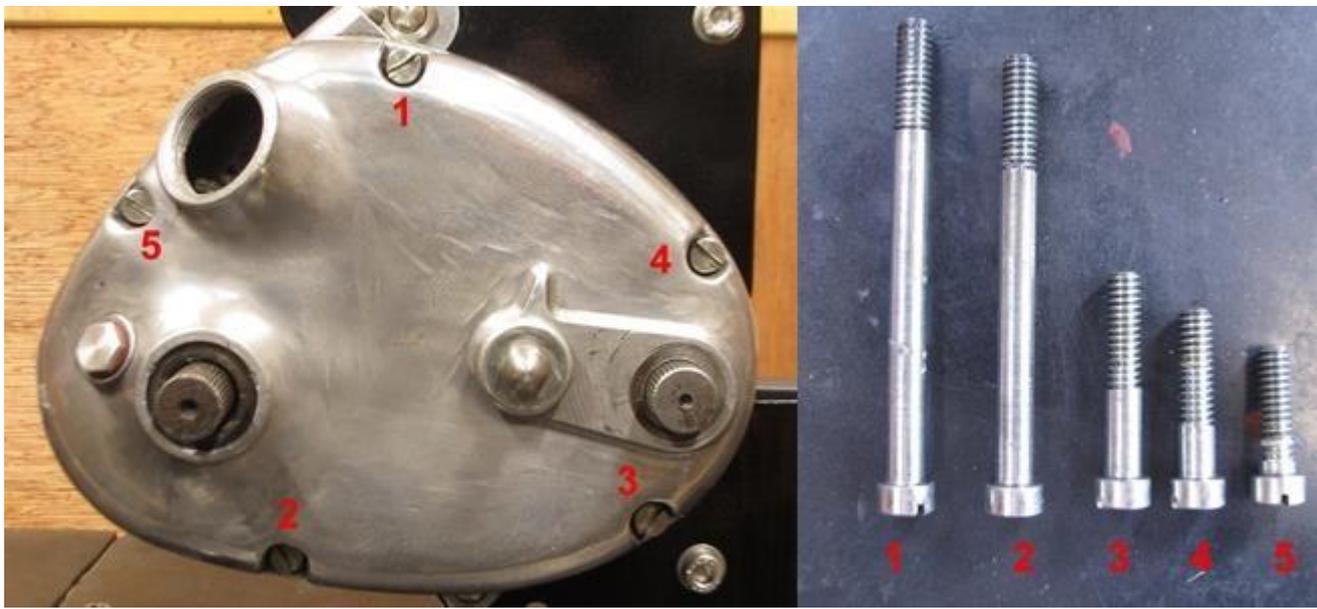
have a large(ish) vice with jaws that will open up to 3.1/2", you can use that by clamping the lower gearbox mounting in the vice. Or you could fabricate a simple stand to hold it. That's what I've done. It's definitely a good idea to clean all the road muck, oil and grease off the outside of the case before you start. Don't forget to drain out the old oil or things will get messy.

The Outer Cover

The outer cover can be removed without removing the gear change or the kickstart levers. In fact, it's a definite advantage to leave the kickstart lever in place. When the cover is removed, the kickstart lever can be held to stop the return spring from unwinding uncontrollably. If the levers have already been removed, a pair of "Mole" grips clamped onto the kickstart spindle will do the same job, but don't clamp them tight enough to damage the splines though.



The first thing to do is undo the nut holding the gear indicator. The cover can't be removed with that nut in place. If you're lucky, the nut will undo easily. If it's tight, be very careful not to shear it off. If you do, you'll need a new gear selector drum... be warned. The one in the photo was seized solid and had to be cut off. I used a Dremel multi-tool with a thin cutting disc to slice the nut off. Two cuts, one each side of, and parallel to, the spindle and the nut came away in four pieces with no damage to the thread on the shaft. With the nut removed, the indicator can be lifted off, along with the spring behind it. There's a small rubber oil seal set into the case on the outside behind the spring. It's cheap and available, so it's a good idea to replace it when the time comes to re-assemble the gearbox.

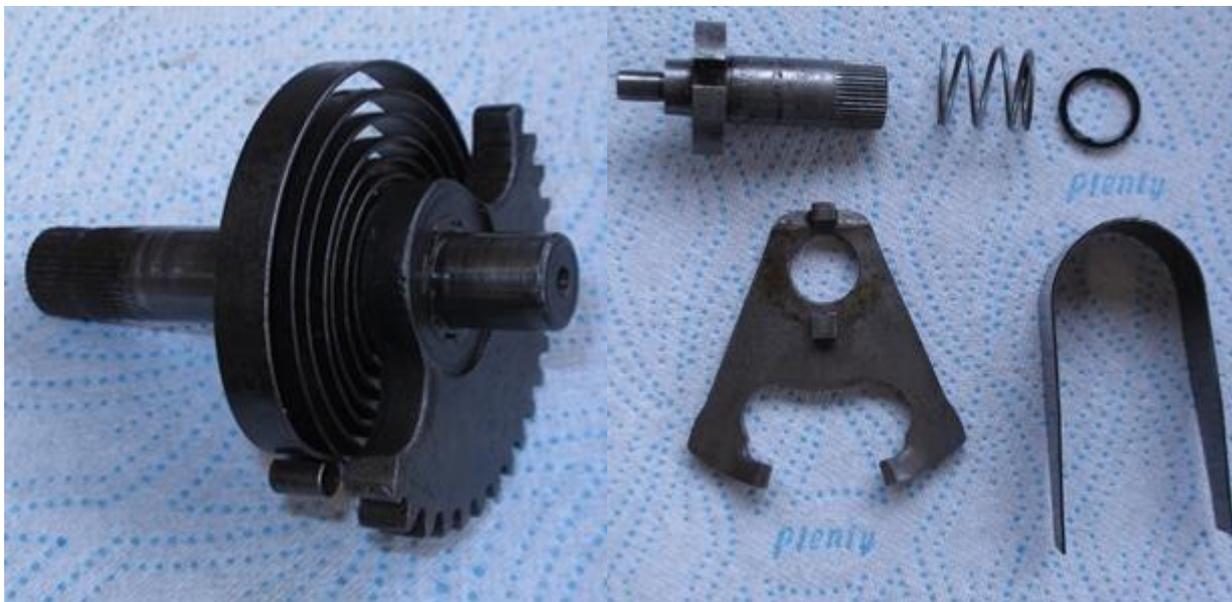


Undo and remove the five screws securing the outer cover. An impact screwdriver is useful if the screws are tight or damaged. The screws are all different lengths so make a note of which position they came from. It's fairly obvious, but better to be safe. It may need a little gentle persuasion to break the outer cover joint, but don't be tempted to prise the cover off with a screwdriver. The joint faces will be damaged and may subsequently leak oil. A tap with a plastic faced hammer where the clutch cable enters is usually enough to break the seal. As a last resort, I've used a thin sharp tool like a "Stanley" knife blade (without the holder) tapped into the joint to break the seal. The outer cover can then be eased away. Remember to hold the kickstart lever or Mole grip to stop the kickstart quadrant from spinning. When the cover is off, allow the kickstart spring to unwind. The kickstart and gearchange levers can be undone and eased off their respective splined shafts.

The kickstart shaft and quadrant can be removed, easing the spring of its retaining post as you go. There is an oil seal pressed into the outer cover, on the outside. That should be replaced as it will almost certainly have hardened with age. The gearchange shaft, selector arm and the large



"U" shaped spring can be removed. There is a coil spring on the shaft and a rubber ring oil seal located in a recess on the inside of the case. That should be replaced as well.



need a little persuasion. With that out of the way, the "three ball" clutch operating plates can be taken out. It's obvious how that goes together. It can be dismantled and inspected at your leisure by removing the split pin.

The Inner Cover

The steel ring that retains the clutch operating mechanism just pushes into the cover. It may come out easily or more usually,

You need to do a couple of things before you can remove the inner cover... disconnect the selector rods from the selector cam-drum and remove the nut on the end of the mainshaft that secures the kickstart ratchet mechanism.

There is a reason why I would tackle the selector rods first. It's a simple task; remove the split pins that secure the gear selector dowels. The dowels can then be

pushed through the selector rods and removed. The selector drum and the dowels are both hardened so the wear should be minimal but if the gearbox has seen a lot of service, there may be some wear on the dowels. If it's excessive, it can affect the gear selection so they should be replaced. With the dowels out of the way, the selector drum can be lifted away. Behind it, you'll find the spring loaded

detent plunger.

That should be a free, sliding fit in the inner cover.

Pull it out and check that the spring is not broken. Like the dowels, this plunger is also hardened, but if it shows excessive wear, that may be a cause of the



gearbox jumping out of gear whilst you're riding. Now... if you do intend to replace it, be aware that there are two variants with different part numbers. The earlier GB boxes had a plunger that was 1/2" (12.7mm) in diameter and part number G-42-1. At some point, they changed to 13mm (0.512") diameter. I was told, by someone

well respected as a font of AMC knowledge, that the change occurred for 1954 manufactured gearboxes and the part number for the larger diameter plunger became G42-3. However, the

GB box on my 1956 G80CS is stamped GB27K55, indicating that it was manufactured in 1955 and that most definitely has the smaller 1/2" diameter plunger. So, who knows? If you do need one, measure its diameter and then talk to Steven at AMC Classic Spares as he is well aware of the problem and can supply both variants under their correct part number. If you go onto the AJS & Matchless Owners Club Spares web site, you may not get the correct part. According to their list, you can't order part G-42-1. You are directed to Part G-42-3 and told that this supersedes G-42-1. When I ordered one of these I got, as you would expect, the larger 13mm plunger, not the smaller one I wanted. They also list a part G-42-3/13 which they call "Cam Plunger - oversize" which at that time was "out of stock", though they appear to have some now. All very confusing which is why I went to AMC Classic Spares to get the correct part.

Right... gripe over; now the reason why I disconnect the selector rods first. You can now do something that you hope will never happen when riding your machine. You can select two gears at the same time. By pushing one selector rod into its fullest extent and pulling the other one out, (or both in, or both out) two gears are engaged, effectively locking the gearbox and stopping the mainshaft from rotating.



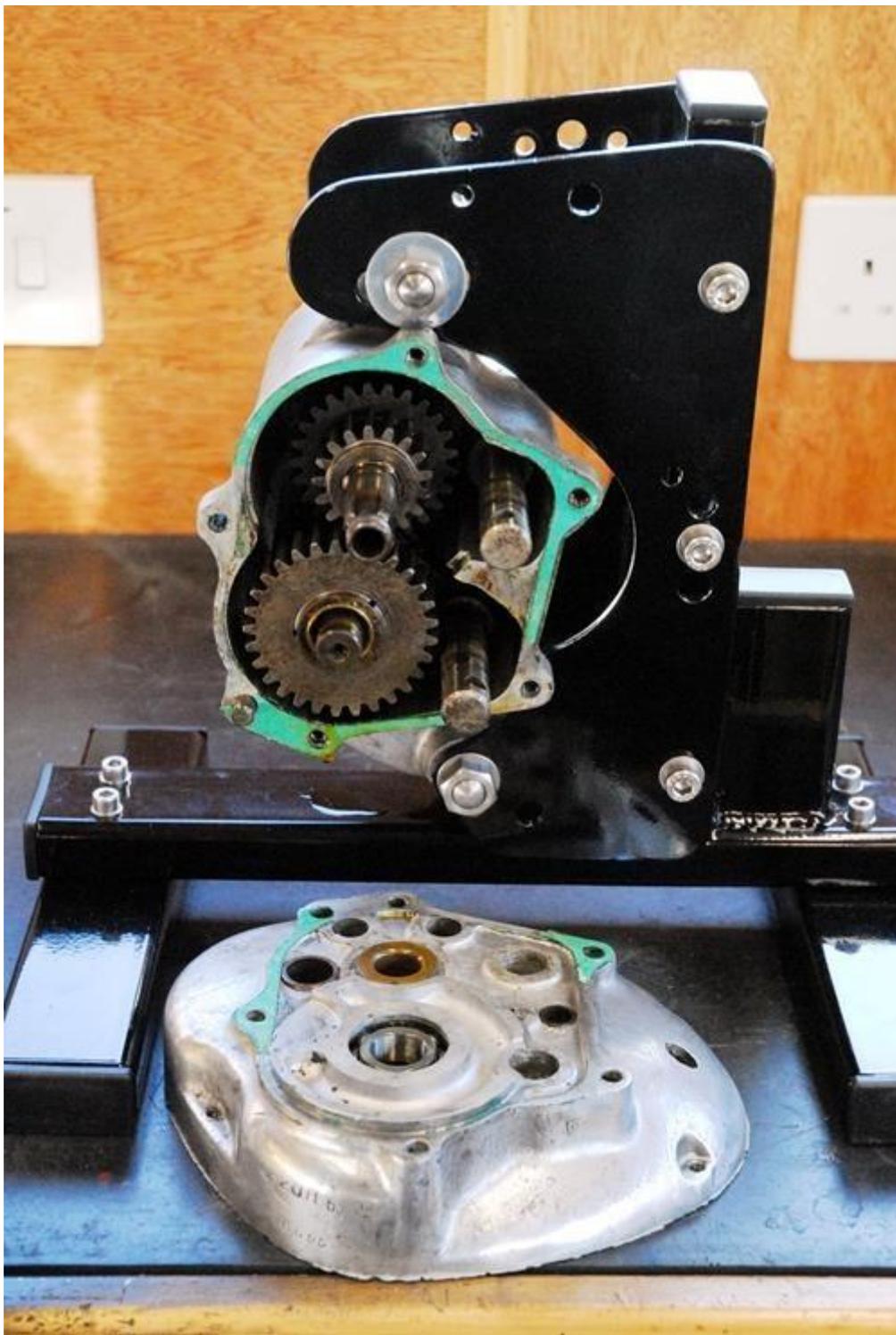
Now you can undo the nut that secures the kickstart ratchet mechanism. It's a normal right hand thread but may be tight, particularly if whoever last assembled your gearbox used a drop of "Loctite" to stop the nut coming undone. Having available an electric or air operated impact gun is a distinct advantage. With the nut off, the ratchet washer, ratchet gear, bearing sleeve and spring can all be slipped off the mainshaft. If you haven't already done so, and you intend to remove the final drive sprocket, now while the gearbox is "locked", would be a good time to undo the large nut that secures it. You need to bend back the tabs on the locking washer first, of course.

The nut is a normal right hand thread, and you will need a 1" Whitworth deep socket or box spanner long enough to go over the mainshaft. It's a thin nut and sockets of that size tend to have a deep chamfer so it may only engage on half of an already thin nut. I had no compunction about putting my deep socket up



in the lathe and turning the front face back to remove the chamfer, thus ensuring full engagement on the nut.

The Gearbox Case



There are three screws securing the inner cover to the gearbox case. On my gearbox, a previous owner had replaced the original screws with hex socket cap head screws but they should be slotted cheese heads. There are two shorter ones (1.1/8") and one longer one (1.3/8"). The longer one goes in the top-right position as you look at the inner cover. With the three screws removed, the inner cover will come off. It may need a little persuasion but once the joint has broken, ease the cover off leaving the mainshaft and selector rods in the gearbox.

Start by removing the larger 1st gear from the second motion shaft,

sometimes called the layshaft. (*Note:--- To be a bit pedantic, they are gears, not "cogs". Cogs are mostly made of wood and are to be found in windmills.*) Now remove the smaller 1st gear from the first motion shaft or mainshaft. In this description, 1st, 2nd etc refers to the gear you select whilst riding, not the position of the gear on its respective shaft. With the two 1st gears out of the way, the layshaft 3rd gear can be removed. You will need to bring the layshaft (lower) selector rod and fork with it as they are connected to the gear. Now the mainshaft 3rd gear can be removed, followed by the mainshaft 2nd gear along with the remaining mainshaft selector rod and fork which will be connected to the gear. Now the layshaft with the remaining two layshaft gears

can be withdrawn from the box. The larger inner 2nd gear should be free to rotate on the layshaft but will be held in place by the layshaft output gear. That should slide off the layshaft splines if you need to remove the 2nd gear. If the clutch had already been removed, the mainshaft can also be withdrawn from the box. If the final drive sprocket has already been removed, the output sleeve gear can be withdrawn from the large,

output ball bearing.

Removing the ball bearings, if you need to, isn't that difficult. Start with the smaller of the two, the one in the inner cover. That's secured with a circlip that must be removed. Wash all the oil



off the cover and place in a moderate oven, around 150° centigrade for about half an hour. If the cover is dropped onto a flat wooden surface, the bearing should drop out. If it doesn't, it may need a little assistance from a hammer and a suitable drift.

To remove the large bearing in the gearbox case, you first need to remove the circlip. There is a steel spacing tube in the centre of the oil seal which will just pull out. Check the surface of the spacer where the oil seal rubs. If it is significantly worn, then replace it or it may leak oil later.



The oil seal is pressed into a steel "carrier ring" behind the circlip. If you're putting in a new bearing, then it makes sense to replace the oil seal, so the easiest way to remove the old one is to drill a small hole and screw in a self tapping screw. Use a pair of pliers to pull the oils seal out. If you're lucky, it will come out complete with the carrier ring. If you're not, then don't

worry, the ring will come out with the bearing when that is removed.





To remove the bearing (and old oil seal if it's still in place) I use tool that I made up from some bits and pieces that I had in my scrap box. The screw is a 5" x 1/2" UNF cap head bolt. The piece of aluminium bar I turned up to fit into the bearing and tuned the O/D so that it would fit through the



hole in the case. The tube is 2" long x 2.3/4" O/D piece of aluminium pipe with a 1/8" wall thickness and the plate at the "nut" end I turned from a piece of 10mm thick steel. It truly doesn't need to be that thickness but it was all I had at the time. Likewise the



ball thrust race... I had one so I used it but it's not strictly necessary. The nut is a Chrysler wheel nut that had a 60° cone on the end which I turned off in the lathe but I guess any 1/2" UNF nut will do. To ease the bearing removal I heated the case with an electric hot air gun more commonly used to strip paint. Doing up the nut pulled the bearing and oil seal carrier ring out of the case with a minimum of fuss. Basically, that's it... The gearbox is stripped down to it's component parts. Not that difficult, was it?

Last updated - 22/02/2021.