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## Clutch Slave

The muck and gunge both inside and outside

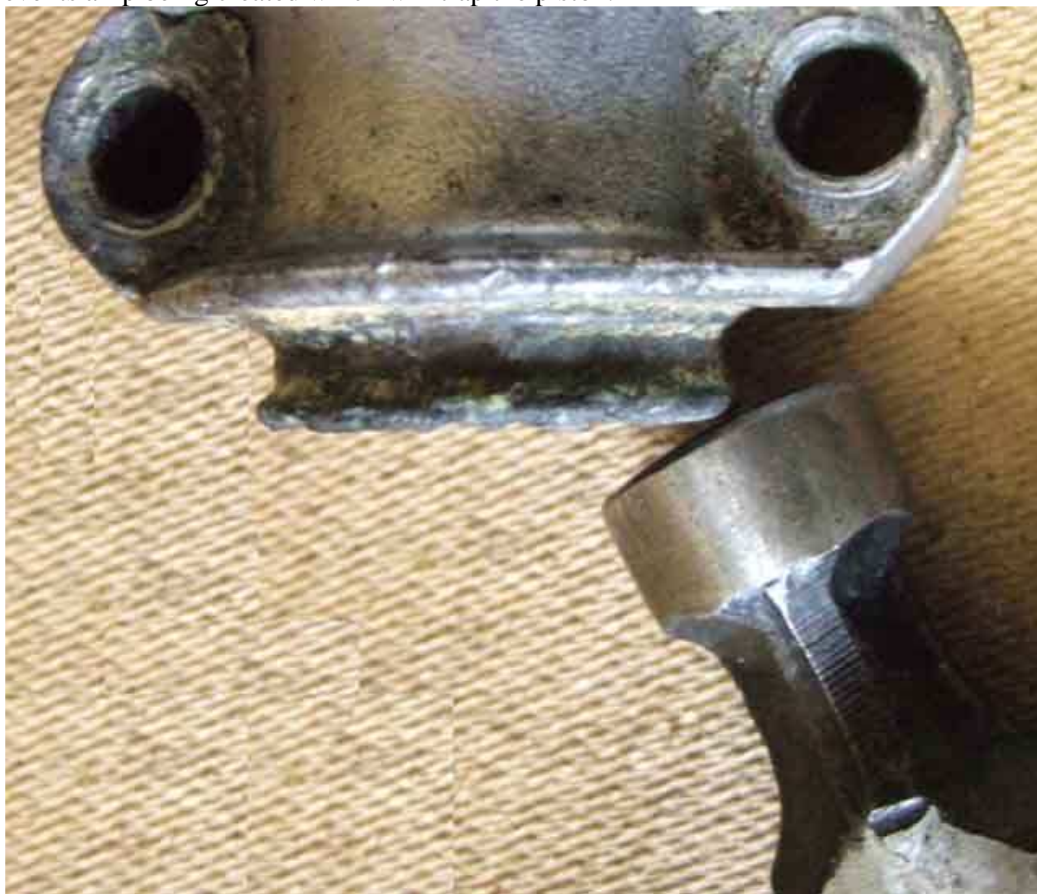


Cleaned, seal positioning disc separated from the spring, and the external boot turned inside-out and its clamping ring removed. This also shows the correct position for the bleed nipple and hence the hose.



Tap the edge of the cylinder at an angle to dislodge the piston. This and the chamfer on the inside of the

cylinder prevents a lip being created which will trap the piston.



Showing the very close fit between piston and cylinder wall. I have read one claim where so much wear had taken place that the piston got 'cocked' in the bore and jammed. I can't really see this, the seal would have become so loose it wouldn't seal at all long before that, more likely an under-sized piston had been used.



The fluid-side of the seal.



The outer boot with the larger diameter turned 'inside-out' to show the small inner ring that gives a seals the boot to the push-rod as well as the large outer ring that seals it to the cylinder.



The plastic disc that butts up to the fluid side of the seal, showing the three holes.



Not terribly clear, but the pale patch is significant erosion of the cylinder wall, the reddish area lighter corrosion.



Showing the bleed hole (circled) drilled along the line of the join of the cylinder wall to the back wall, in an arc at the top of the cylinder, normally at the highest point of the cylinder when the car is on its wheels or has the front raised.



## Clutch Linkage Wear

The clutch pedal very ovalled, ...



... and the master push-rod significantly so. Both had also cut into the clevis pin, recucing travel still further.



## Clutch Change

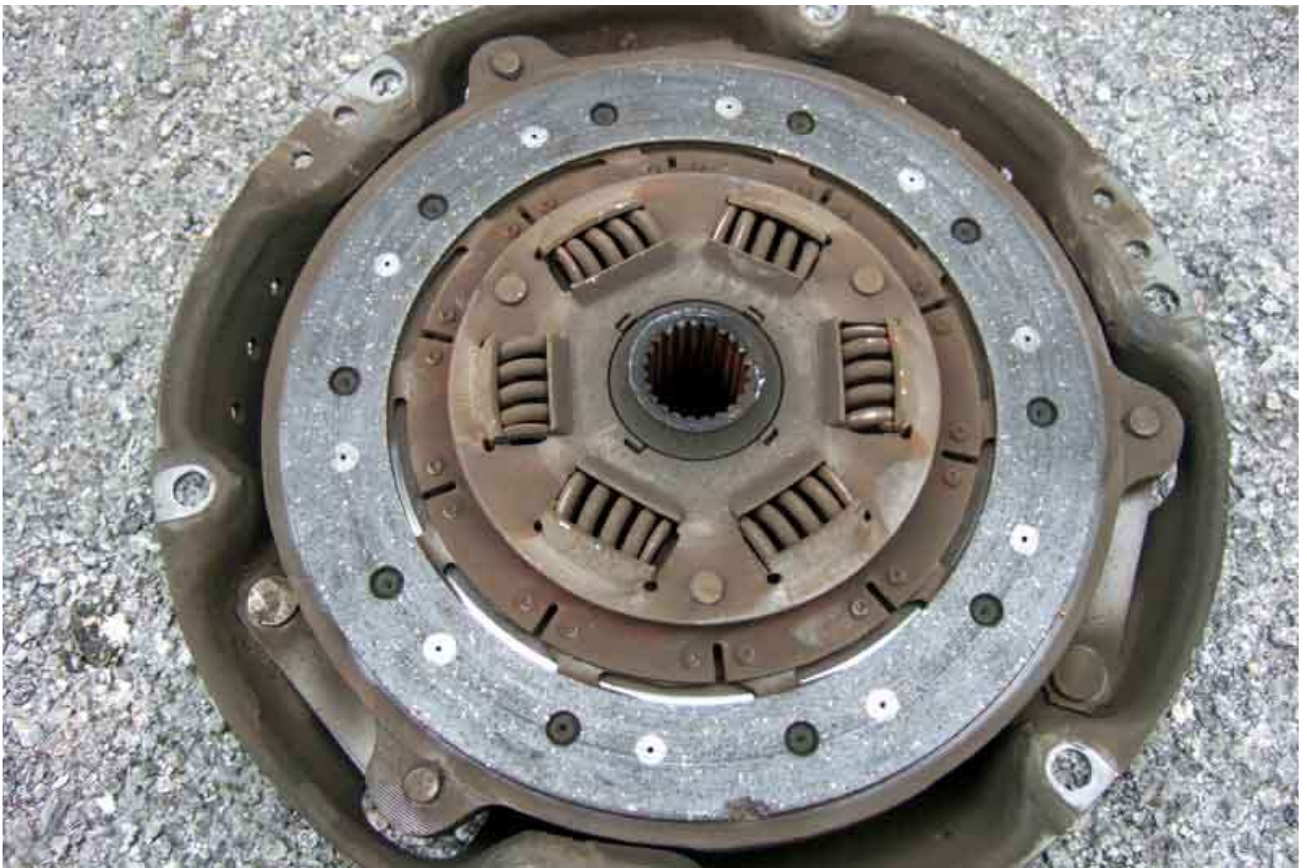
Engine ready to lift out ...



Very badly scored friction surface on the cover-plate, a deep groove from the friction plate rivets as well as significant wear across the full width of the friction surface.



Friction-plate down to the rivets, fortunately only on the cover-plate side



Flywheel fortunately sound. Only a very slight depression across the full width, what looks like a groove from rivets is actually only a polish mark as can be seen by the reflection of the screwdriver. No blueing from the slipping or sign of oil from the crank seal.



Old and new friction plates - the old has the pads completely worn away both sides plus about half the base

material on the cover-plate side. Quite a difference in thickness between old and new, together with the wear on the cover plate it's not surprising it was slipping and the springs wouldn't push the cover-plate off the dowels.



New and old release bearings - plenty of meat left on the old, perhaps only 1/3rd worn, as the boss on the cover plate can go right down inside the release bearing casting.



... and engine out (wish it were as easy as that). Gunky oil in the bell-housing, around the release arm rather than straight down from the first-motion shaft and cleaner oil if it had been the oil seal. I would very strongly advise freeing-up the connection between the clutch hydraulic pipe and the end of the hose, and the locknut securing the hose to the bracket on the chassis rail while the engine is out even if you don't think you will be removing it later. It's an absolute pig when the engine is in.



No visible seepage from the seal itself, so just checked the nuts on the seal plate for tightness. Check the release arm does not wobble on its pivot, but still moves freely. If the arm wobbles the release bearing can be off-set to the cover plate which causes premature failure.



## Clutch Master

The canted over Mk2 version BHA 4667, not needed with the single-circuit brake master ...



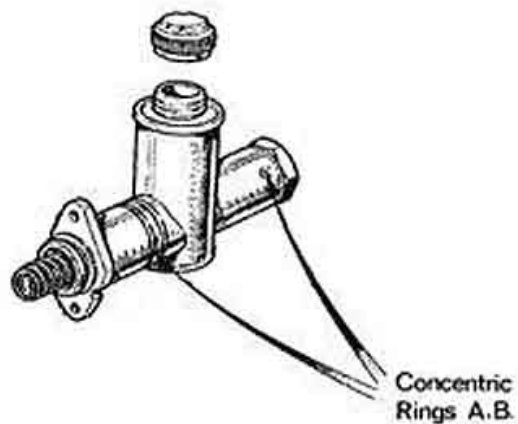
... or the later dual-circuit master (image from [Steve Shoyer](#)).



... but definitely was with the early North American dual-circuit (image from [Dave's Cars](#)).



AAU7152 with the two concentric rings indicated on the cylinder body on the mounting flange side. The other arrow is indicating an alternative but unspecified identification mark (image from [Parts5](#))



GMC 1007 for a 4-cylinder (image from [Sussex Classic Cars](#))



GMC 1011 for the factory V8 and also some Midgets (image from [eBay](#))





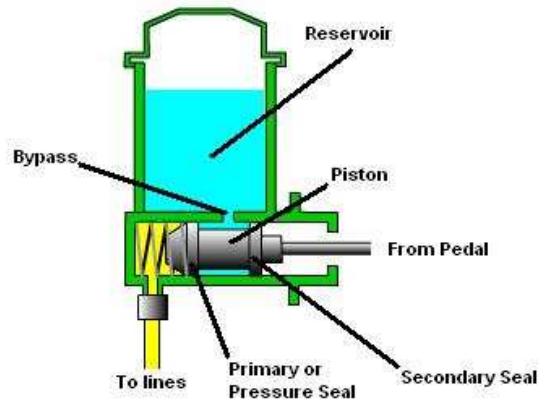
GMC1011 installed on Hans Duinhoven's MGB. Enough room to access the cap even though it is an LHD so the clutch master is more tucked into a corner of the engine compartment that it would be on an RHD. Hans's car is a 4-cylinder, so strictly speaking should have the GMC1007. Originally the V8 master was 1.2mm smaller bore than the 4-cylinder, which with a 4-cylinder slave would give a slightly lighter pedal but less throw, i.e. the biting point would be a bit nearer the floor if the remainder of the mechanical linkage at the master remains the same.



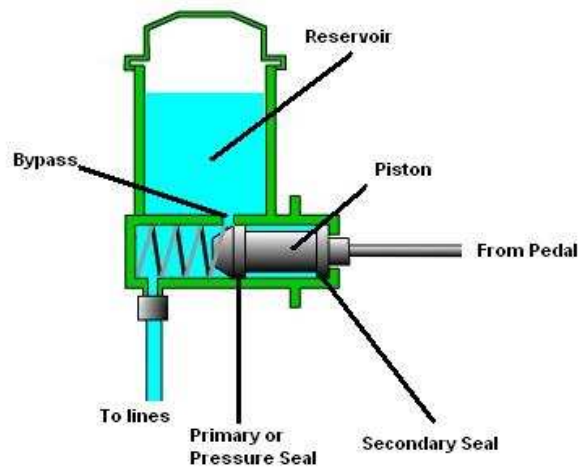
Is this the one that causes problems with the unboosted dual circuit master? Whilst the main casting and the diameter of the reservoir seem to be much the same as for GMC1007, the cap is obviously much bigger. (Image from [Victoria British](#))



Showing how fluid fills the space between the two seals when the pedal is operated. If the secondary seal (nearest the pedal fulcrum) leaks you will get fluid running down the pedal, but the clutch otherwise operates normally (until all the fluid is lost!).



Showing how the primary seal must clear the bypass hole to allow fluid expansion and contraction to pass in and out of the reservoir. If this doesn't happen and the fluid expands, pressure will be applied to the release bearing which could cause the clutch to slip and will definitely accelerate wear, as well as rendering it impossible to bleed.



## Clutch Pedal Return Spring

The fracture well away from the marks showing the pivot-point.



## Release Bearing

The 8000 mile release bearing. Not a trace of carbon left in it, or any pieces in the bell-housing, just a fine dust spread all round the inside. Note the roll-pin on the bottom left-hand side, is this the pin that causes the problem? (Photo: David Bolton)



Two more pictures of the roll-pin in the old bearing. Is it supposed to be sticking out like this or flush? (Photo: David Bolton)



The inner end of the roll-pin. Part shows obvious signs of wear, but there is a recessed part that doesn't. It's not possible to determine whether the pin projected into a hole in the carbon ring and so has had quite a bit ground

off by the boss on the cover plate plus some broken away, or whether the pin only bears on the side of the carbon ring (so holding it slightly off-centre) so very little has been ground away. (Photo: David Bolton)



An NOS AP/Borg&Beck release bearing I've had since 1994, no sign of a roll-pin, protruding or flush.





These four photos by Bob Muenchausen: Badly broken-up bearing but still a ring of carbon seems to be left. Probably once the boss on the cover plate had worn down the carbon to the top of the carrier there was a mismatch that meant it was bearing on the casting rather than the carbon ring, wearing that down instead, note the upper piece of the outer ring of casting is much thinner than the lower piece. Eventually it goes so thin it couldn't take the force of the clutch and it broke suddenly, further operations of the clutch pedal pushing the slave piston out of the end of the cylinder. This is very similar to what happened to the clutch on my roadster many years ago (mileage unknown), although on that the offset was worse and towards one of the pivots which snapped off leaving the rest of the bearing relatively undamaged.



Inside of the bell-housing liberally coated with carbon.



Friction plate with the lands worn away but still well clear of the rivets, not bad for 75k



Deep wear groove in the cover-plate, although Bob reports that the flywheel itself was fine. I found much the same on the clutch change I did, perhaps deliberately dissimilar strength metals?



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