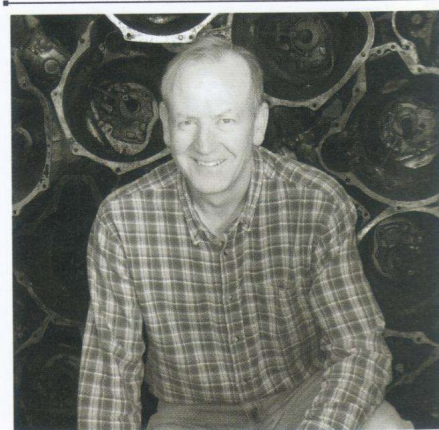


Minor Gearboxes

WORDS AND PICTURES **Andrew Bywater**

It's been a while since my two original gearbox articles appeared in Minor Matters, (March/Apr 2014, and July/Aug 2015) so I thought that a part three update might be helpful to readers. My speciality is parts supply rather than gearbox rebuilding but, even so, I pick up little nuggets of information based on personal experience and talking to customers around the world.



Gearbox Identification

It is quite often the case that an A-series gearbox will be found in a car that isn't the original fitment, having been scavenged from another model from within the BMC stable, such as Austin or MG. Most people are familiar with 'ribbed' or 'smooth' casings, but fewer are aware of the internal differences within these categories.

Problems arise when ordering parts, particularly for overseas customers when the additional shipping and import duties are included. Key to avoiding difficulties is in identifying the laygear fitted, as all of the other internals will correspond to this. Not all laygears have the BMC part number stamped on them, so the teeth have to be counted to confirm the gear's identity. I have created the following chart, which should help, along with the subsequent notes.



BMC PART NO	TOOTH COUNT	ORIGINAL APPLICATION
22A288	13;18;23;29	APHM smoothcase. 803cc Minor, Austin A30 (note 1)
22A287	13;18;24;28	9M smoothcase. 948cc Minor, Austin A35, A40, and 9C smoothcase - Healey 'Frogeye' Sprite
22A207	13;19;23;26	9CG smoothcase. 948cc MG Midget Mkl, Austin Healey Sprite Mkl (note 2)
22G083	13;19;24;28	10MA and 10MC ribbed case. 1098cc Minor, Austin A35, A40
22G76	13;19;23;26	10CG ribbed case. Early 1098cc MG Midget (note 2)
22G232 or 22G1100	13;19;23;26	10CC ribbed case. Late 1098cc MG Midget and 12CC, 12CD, 12CE ribbed case. 1275cc MG Midget (note 2)

Note 1: 803cc Morris Minor and Austin A30 internals are the same, except that the A30 mainshaft is approximately 2.5in shorter, to accommodate a different prop-shaft length.

Note 2: Although the Midget laygears have the same tooth counts, they're not interchangeable, as the tooth angles can vary, ie 'A' and 'B' type, and the overall length of the laygear varies by approximately. 0.5mm, depending on whether smooth or ribbed case.

Identifying Mainshafts

Once the gearbox has been stripped, other identification clues can be gained from the mainshaft (also known as the third motion shaft).

A selection of A-series in-line mainshafts, showing the subtle differences, top to bottom as follows;

1098cc: The groove for the 22G89 locating plunger on the first/second synchro hub splines (more about this later.)

9CG (Sprite/Midget): This is an example of the rare shaft fitted to smooth-case 'boxes, but with internals similar to the later MG Midget gearboxes. This looks almost identical to the later MG item, except that it does not have the 22G89 groove; the most notable identifying feature of these being the dividing collar between second and third gears.

803cc and 948cc: Almost identical to the 1098cc item, except that it does not have the plunger groove in the first gear hub splines.

803cc Austin A30: The bottom shaft shows the unique A30 shaft, which approximately 2.5in shorter than the Morris Minor item above, although identical in every other respect.

It is interesting to note that the locating spigot journal at the end of this shaft is blackened from overheating. This type of failure is more common on the Sprite/MG shaft; reclamation of this area is not generally successful, leading to expensive replacement (repro items £500+).

Below this shaft in the photograph is the 22G374 interlocking washer which sits between second and third gears on all examples, other than Sprite/Midget. Note: Close inspection of this washer is recommended – checking for cracks at the spline corners.



The photo shows the interlocking washer's position between 2nd and 3rd gears when assembled



22G89 plunger: On the ribbed-case gearboxes, BMC introduced a small plunger/peg to better locate the 1st/2nd synchroniser hub onto the mainshaft splines. This is covered in section FFF3 of the factory workshop manual.

Special tools

Fortunately, in gearbox terms, the A-series in-line gearbox is relatively simple, not requiring much in the way of special tools. The majority of the work can be completed with basic hand tools and a little improvisation.



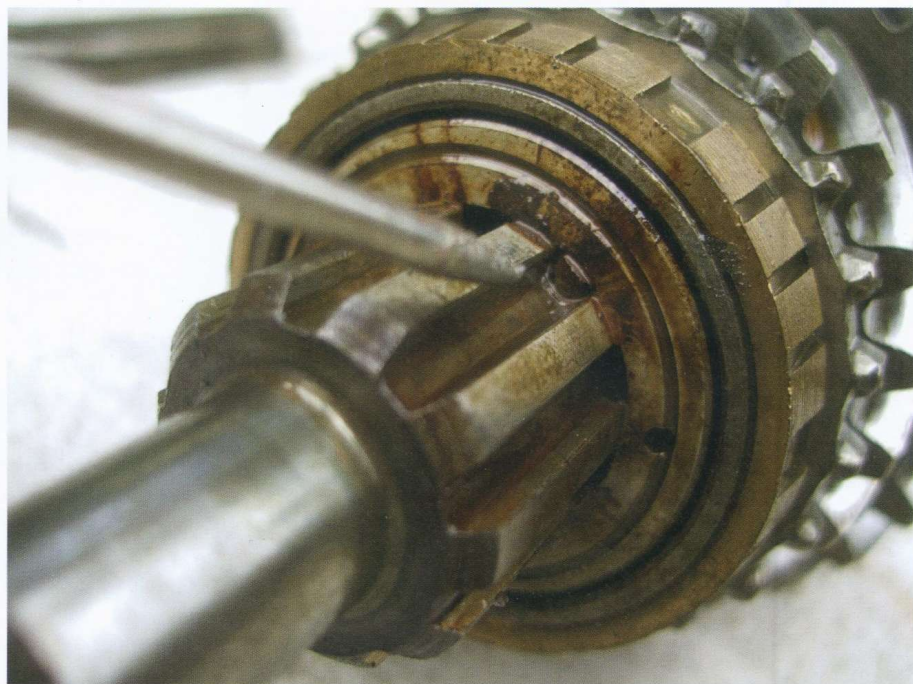
BMC specialist assembly tools

BMC did supply a couple of specialist assembly tools:

18G471 – dummy layshaft: This tool can be used for re-assembly of the laygear, shaft and bearings into the gearbox casing.

18G144/18G572 synchromesh assembly ring:

Supplied to BMC by Churchill tools. This tool is the most invaluable, as it helps greatly with the replacement of the synchroniser springs and balls, otherwise a fourhanded job. The white nylon ring in the photograph is a modern alternative to the Churchill tool. I have highlighted the ball insertion grooves in black.



Third Gear Removal

Removal of the third gear thrust washer can only be described as a bit of a fiddle as it's a fourhanded job with access for two! I can remove them on my own, but a knack has to be developed. The little spring-loaded peg has to be compressed with a thin-bladed screwdriver, while the washer is turned half a spline using the small hole in the face of the washer. A light tap with a copper hammer to the rear of the gear helps to break the 'set' on the splines to get things moving.

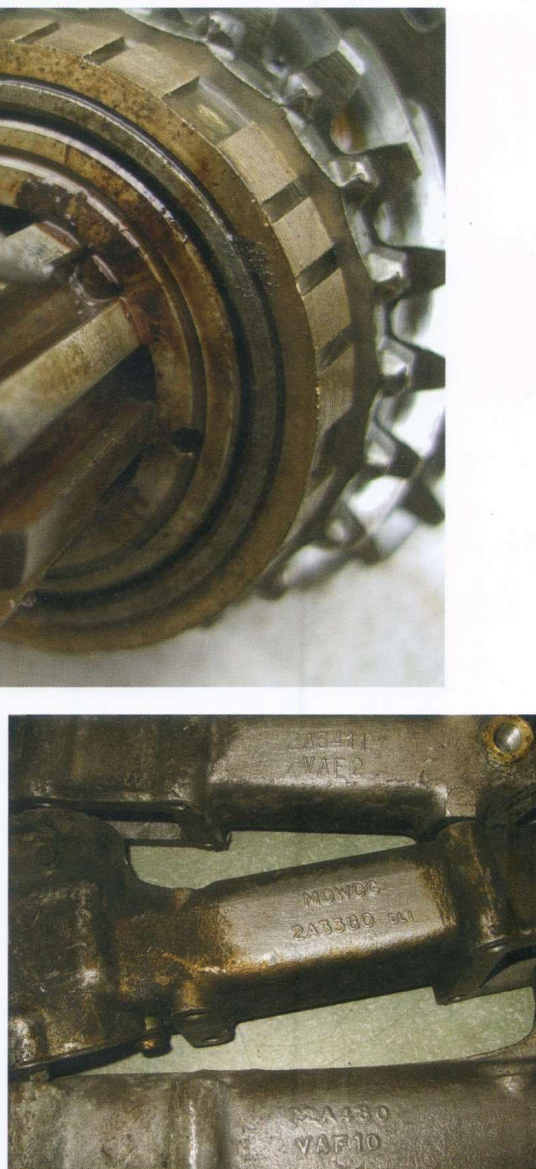
The third gear thrust washers are available in a variety of factory sizes to enable the correct end-float of the assembled components on the mainshaft assembly.

Remote control – gear selection problems

Previously ignored or taken for granted when the rest of the gearbox has been overhauled, wear and the resultant play in the gear lever can blight the enjoyment of an otherwise perfect car.

Remote Control Identification

Fitted on later gearboxes, these devices are designed to give a more precise gear change by virtue of a shorter gear lever. Identification can be made by checking the casting number on the left-hand side: 2A3411 and 2A3380 are fitted to 948cc cars, and are not interchangeable with the 'ribbed type' boxes.



Casting number 22A480 appears on the 1098cc Minor, and 1098cc and early 1275cc Midget gearboxes.

Late MG Midget Remote

Late remotes have an external reverse light switch and wiring, mounted via an additional threaded port in the casting. In the past this was a popular retro-fit to Morris Minors, less so now due to lack of availability.

► Removal of Excess Play

The photo below of the remote linkage with the castings removed shows the extent of the components from the gear lever, via the remote and extension housing levers to the selector rods (that pass through the main casing) shown at the bottom of the photograph. An accumulation of wear in all of these parts will lead to excessive movement at the gear knob.



3/ Plunger and spring – reverse selector 1G3707 and 1G3863

4/ Nylon cup and spring – gear lever seat.

5/ Spring and ball – reverse selector plunger, 22A75 and BLS110

6/ Anti-rattle spring and plunger AEG3123 and 22A84.

Note: these often disappear into the bowels of the gearbox when the gear lever is removed.

Springs, Balls and Plungers

Much of the excess gear lever movement will be removed by replacement of the items shown in these photographs.

Listed as follows;

1/ 2A3377 (two halves) front selector bush (early 948cc) and retaining circlip (1G3709). Superseded/replaced by

2/ 2A3468 nylon one-piece bush (late 948cc, 1098cc and 1275cc)



Loose Pinch Bolts/ Woodruff Keys

The remote control rod assembly is shown, highlighting the pinch bolts, which sometimes come loose, causing wear in the woodruff keys and corresponding grooves in the shaft. This can be rectified by retightening and application of a product such as Loctite Threadlocker.

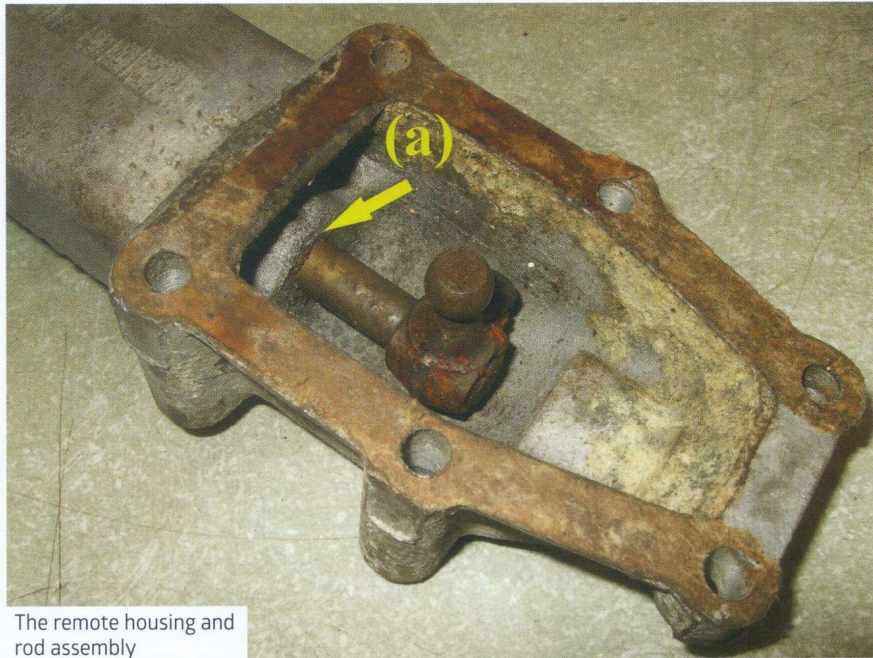


This photo shows the lower half of the selector linkage incorporating the front selector shaft and lever and the ends of the selector rods, contained within the gearbox extension housing. Wear in these components usually requires replacement to eliminate play.

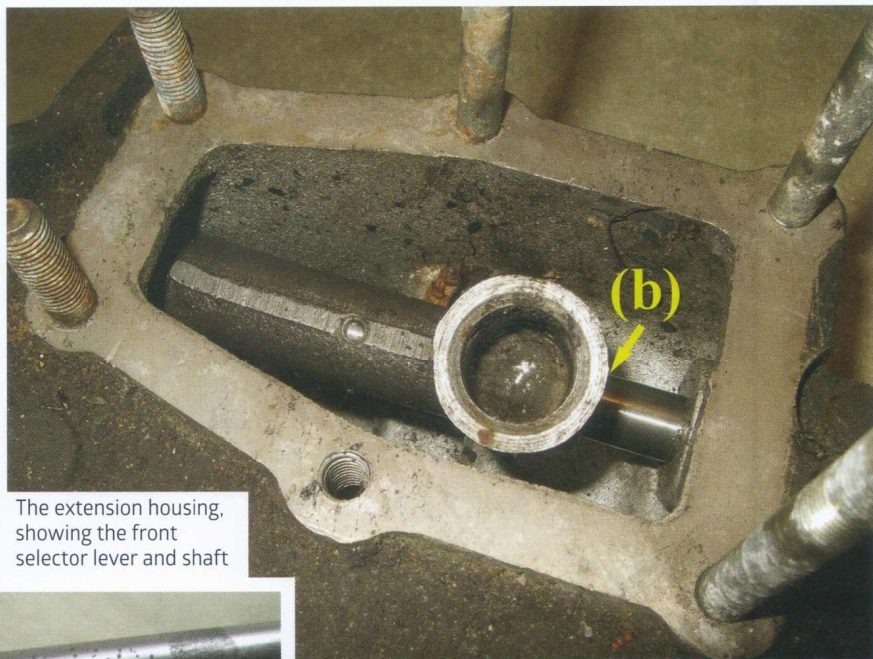
Stiff or Sticky Gear Selection

Sticky or stiff gear selection, particularly fore and aft ie first to second, or third to fourth is probably caused by corrosion, particularly if the gearbox has remained unused for some time.

Steel, aluminium and condensation do not mix well. As the remote assembly sits at the top of the gearbox, and is only 'splash' fed with gearbox oil, it is prone to the steel rods developing surface corrosion in damp conditions, effectively increasing the diameter of the steel rods. The corresponding hole in the aluminium expands due to corrosion at the same time, reducing or totally eliminating any clearance particularly at point (a), and to a lesser extent between the steel components at (b). The only remedy is dismantling, cleaning with emery cloth, and re-lubricating, or else replacement of the affected components. Corrosion to the selector rods where they pass through the rear of the main gearbox casing can result in similar 'sticky' results.



The remote housing and rod assembly



The extension housing, showing the front selector lever and shaft



This is the end of my latest summary of faults and remedies for the in-line A-series gearbox. I hope that the reader finds it useful and informative. Even if a repair is not contemplated, it's interesting to know what goes on beneath the gear lever. ●

For help with parts,
or just advice contact Andrew
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