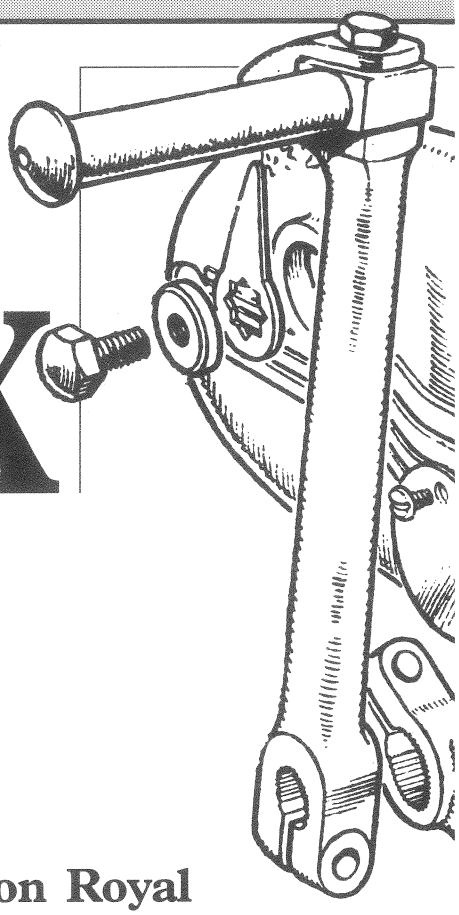
PART ONE: introduction

# ALBION GEARBOX REBUILD



**Don Morley is an acknowledged expert on Royal Enfields and happened to mention he was rebuilding the gearbox for one of his restorations. 'Write about it', we asked and he now obliges with an intro into just how many bikes this Albion gearbox was fitted to. Loadsa readers will find this series indispensable!**

"MOST will learn to love or loathe Royal Enfield gearboxes," criticised one famous 1950s magazine road tester. He might as well have added Excelsior's post war motorcycles, Berkeley's three wheeler cars, and the vast number of Villiers (post 1946) engined British lightweights, all of which also relied on Messrs Albion & Co Ltd for their gearboxes and clutches.

The problem was Albion could never quite forget they earned most of their serious money from providing remarkably similar but much heavier such components for military use. Tanks and battleships, for example.

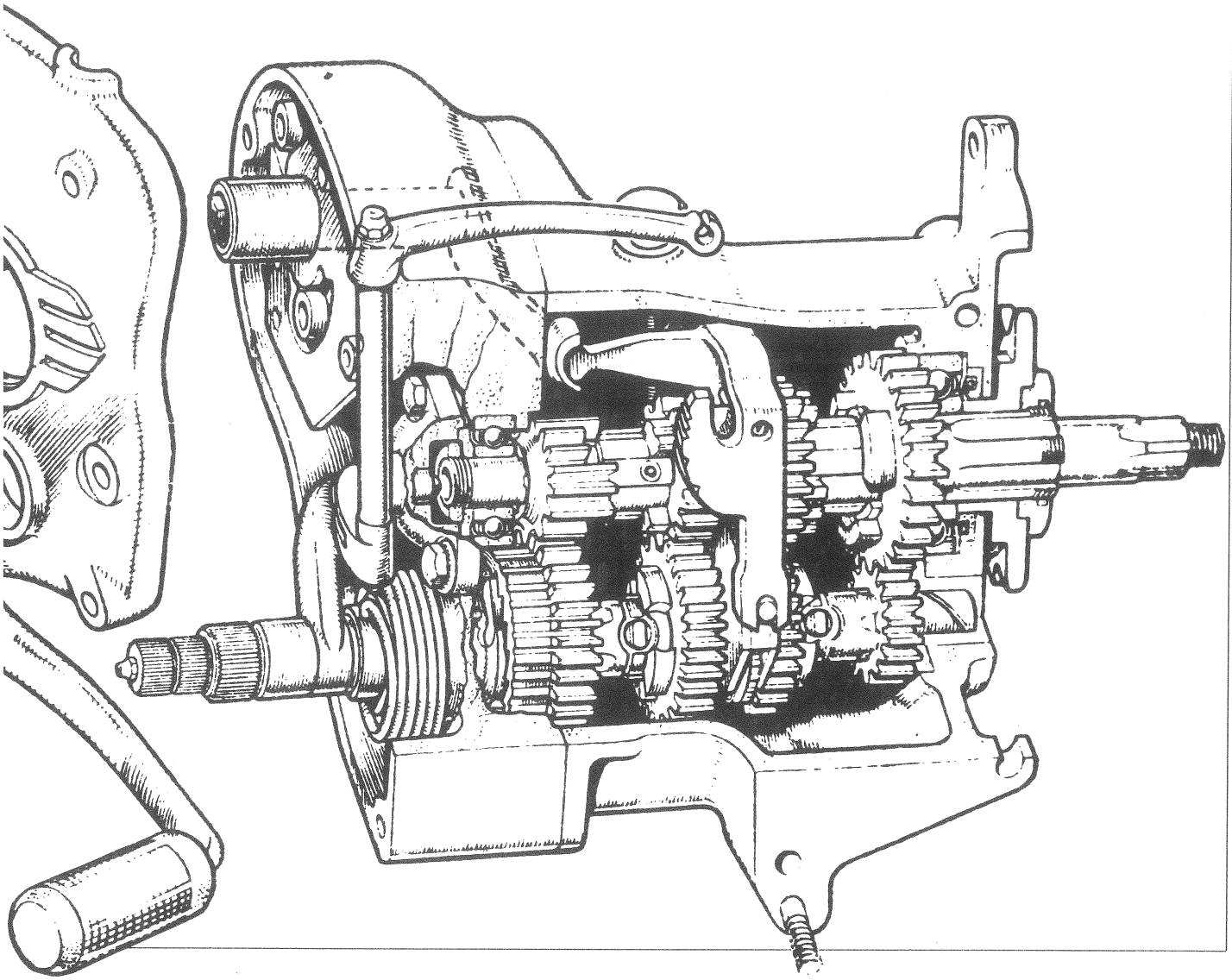
They had never been particularly well known amongst two-wheeled circles for their products' delicacy or finesse. Not least because their virtually unilateral design of gearbox was an adaptation of one they provided for industrial lathes!

Put simply, Messrs Albion more or less re-scaled this same lathe box's components up or down in size to suit any and all other applications.

This is why stripping or rebuilding one of their 125cc or 197cc Villiers-intended transmissions is of little practical difference from tackling those much larger scale gearboxes or clutches as provided for such as Royal Enfield's relatively massive 736cc 'Interceptor'.

Cleverest of all about this almost modular design, however, was that Albion also got by for so many years with just two basic types (or rather sizes) of roadster gear clusters. One set for the heavyweight bikes, the other for the lightweights.

**Cutaway drawing of the Albion gearbox used on Villiers 125/197cc bikes from 1952 onwards**



They could either be supplied as complete entities housed within Albion's own gearbox shell for those bikes of pre-unit or semi-unit construction, or merely as internal components for the motorcycle's manufacturer to integrate in their own engine. This was the case with Villier's 9E power units onwards or Royal Enfields early 'Crusaders'.

Such was the degree of interchangeability that the gear pinions used inside Villier's 1952 onwards, semi-unit construction, four speed 7E type gearbox can even be interchanged quite happily with the above mentioned and appreciably later period 250cc unit-construction four speed Royal Enfield, etc.

This despite the gearbox lengths and the internal choice of gear change selector mechanisms being different in design and detail between these various bikes.

Albion similarly doubled their heavier grade pinions between lathe, motorcycle and light car application; though usually with their matching mainshafts again varying considerably in length according to whether the finished gearbox was for fitting to a relatively narrow single cylinder engine, a twin or a very wide triple — the Excelsior two stroke engined Berkeley three wheelers for instance.

**The Enfield Crusader with ubiquitous Albion box**

And these internal shaft lengths vary additionally to match up with Albion's other choice of three, four or five plate clutches.

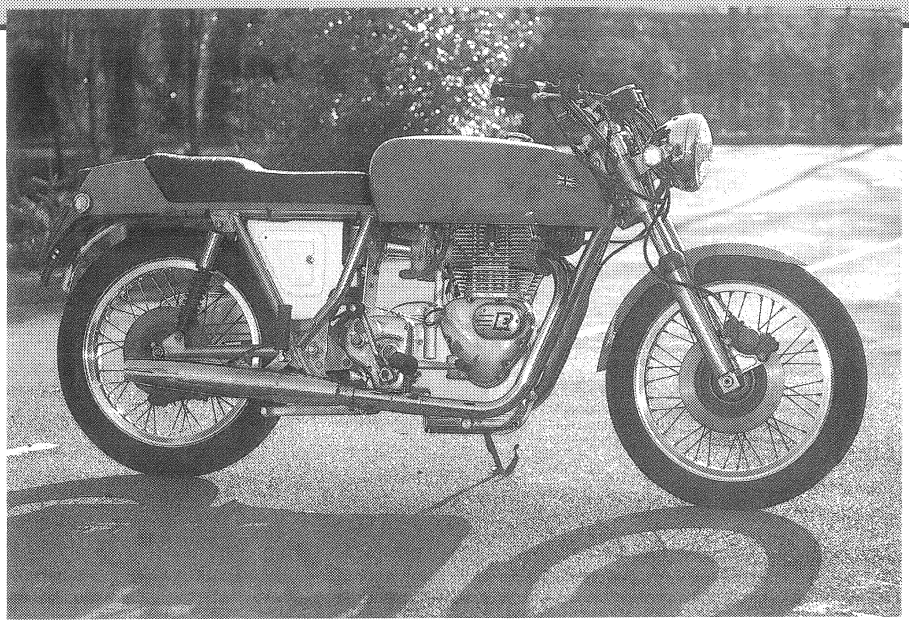
From there onwards there were very few modifications of any great significance over the years. In 1955 though, the heavyweight box's gear-change selector mechanism was extensively revamped for Royal Enfield's Roadsters, with the lightweight version similarly revamped for Villier's 9 series engines onwards.

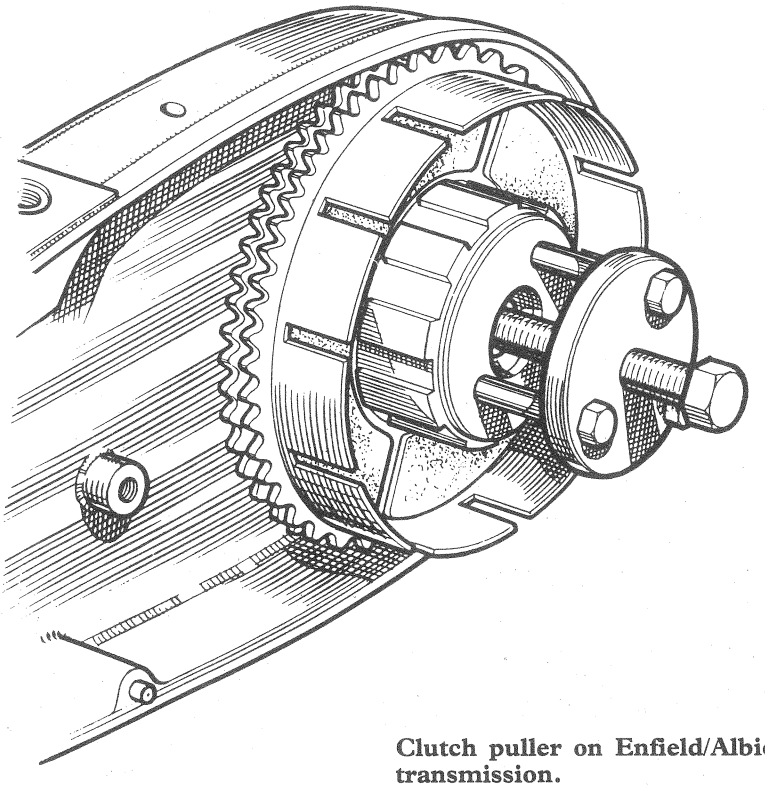
This was primarily a gearbox end or outer cover streamlining exercise behind which the major components remained more or less the same with some minor exceptions like the kick starter shaft being longer.

Royal Enfield, however, chose to continue fitting the earlier end-covered gearbox to the 'works' and production 'works

replica' trials bikes right through until their demise in the early 1960s. One reason was that the older type outer casings were appreciably narrower and therefore less vulnerable to being clouted by rocks. Also, the newer version suffered an even heavier and more 'hit or miss' feeling gearchange than the old. Such was progress!

This gearbox's final major redesign was also at Royal Enfield's behest as their 1958 production racing 700cc 'Super Meteors' proved prone to shedding gear teeth during hard acceleration. As these models were prototypes for the coming 'Constellation' models of 1959, Albion, in readiness, switched to a coarser but stronger tooth profile. This was to become standard to their entire heavyweight range.





**Clutch puller on Enfield/Albion transmission.**

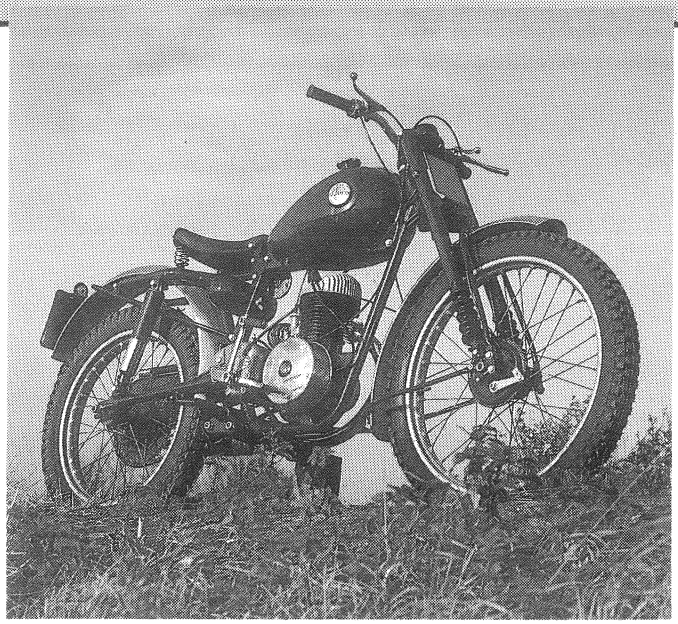
Coarser tooth profiles meant all these new (post 1958) pinions came with several fewer teeth, and so could no longer be individually interchanged with any of their predecessors. However, collectively they could, and still can, be substituted either as complete cluster or at a bare minimum, in matched pairs. This, incidentally, may not alter the relevant existing gear ratios themselves.

This then is Albion's final motorcycle intended version. Shared from then on by such as the even more powerful 736cc 'Interceptor' through to today's rather lesser output Indian Enfield singles built in Madras. To my certain knowledge, this was never accused of being particularly sweet nor light in use, indeed no more so than as implied of the originals by that 1950s tester, which is where we came in.

He was arguable wrong on one score, for there never was much to criticise in Albion's superbly engineered and remarkably simple construction gearboxes.

Not so the same company's decidedly peculiar and out-of-step clutch designs that invariable matched with their gearbox. These sadly required rather more setting up time, patience and skill than

| TYPE | JOURNAL BEARINGS | | LAYSHAFT AND KICKSTART SHAFT BUSHES | | SELECTOR SHAFT BUSH |
|---|---|---|---|---|---|
| | Clutch End | Kick Start End | (Internal dimensions after fitting) In Shell | In Cover | (Internal dimensions after fitting) |
| H | 30 x 62 x 16mm | 5/8 x 1 13/16 x 5/8 | 1.000/1.001 | 1.125/1.126<br>.7185/.7195 k.s. shaft bush | .625/.626 |
| HR | 30 x 62 x 16mm | 5/8 x 1 13/16 x 5/8 | 1.000/1.001 | 1.125/1.126<br>.7185/.7195 k.s. shaft bush | .625/.626 |
| VR | 30 x 62 x 16mm | 5/8 x 1 13/16 x 5/8 | 1.000/1.001 | 1.000/1.001 | .625/.626 |
| HJ | 1 x 2¼ x 5/8 | 15 x 35 x 11mm | .625/.626 | 1.0625/1.0630<br>.625/.626 k.s. shaft bush | .625/.626 |
| TR | 1 x 2¼ x 5/8 | 15 x 35 x 11mm | .625/.626 | .625/.626 | .625/.626 |
| HJR | 1 x 2¼ x 5/8 | 15 x 35 x 11mm | .625/.626 | 1.0625/1.0630<br>.625/.626 k.s. shaft bush | .500/.501 |
| EJ | 20 x 47 x 14mm | — | .5005/.5015 | .8437/.8442<br>.5315/.5325 k.s. shaft bush<br>.590/.591 m.s. bush | .500/.501 |
| EJM | 20 x 47 x 14mm | — | .5005/.5015 | .812/.813<br>.500/.501<br>.4995/.5005 | .500/.501 |

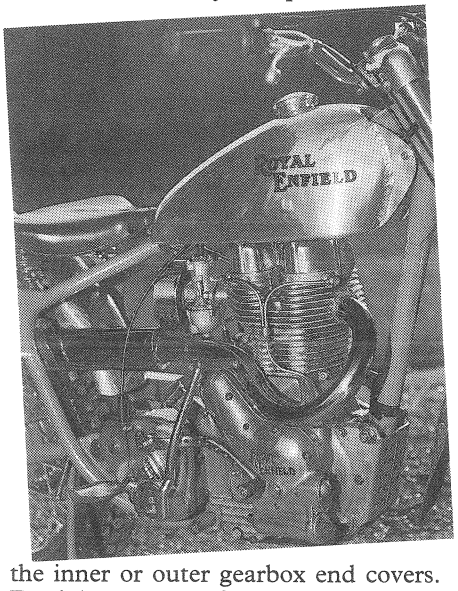


the average Royal Enfield assembly line worker was able or prepared to give.

All however, is not lost — as we shall explain over the next few issues.

There are a few competition-inspired gearbox and clutch modifications easily made during a general overhaul which can transform a Royal Enfield's (or Indian's) gearchange into something at least resembling Britain's best. What's more, no special tools will be required, just a set of the more popular sized BSF/Whitworth spanners and an easy-to-make clutch puller as seen in picture nine.

The chart, in readiness, is a collective list of every known bearing or plain bush size ever used by Albion within a motorcycle gearbox application. These are usually identifiable in advance of actually stripping out via code or type numbers which are normally stamped on one of



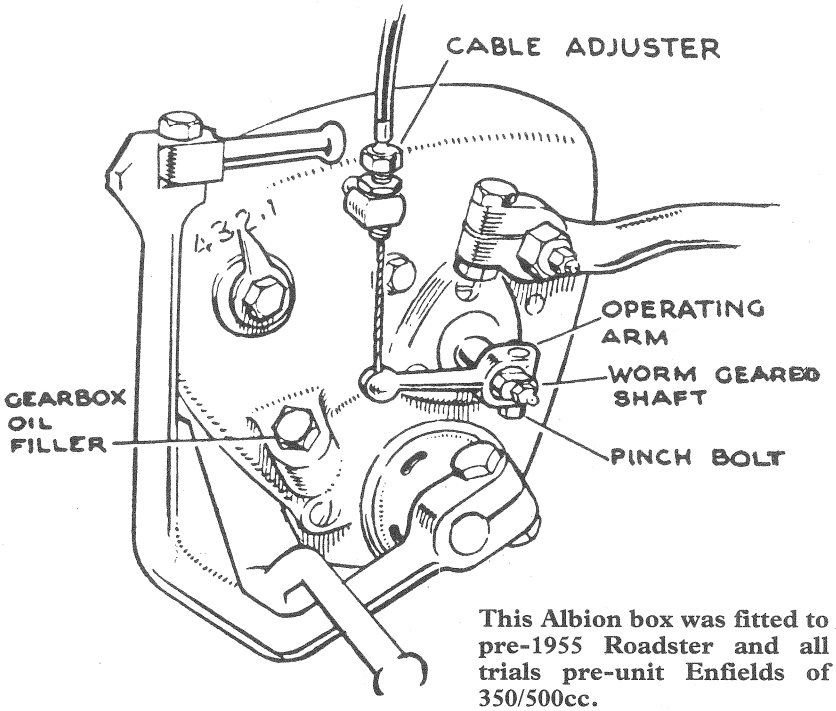
the inner or outer gearbox end covers. Don't buy any new final drive main bearings until you've read my recommendations here.

● *NEXT MONTH: Don's step-by-step trouble shooting guide to stripping a 350cc (and over) Royal Enfield/Albion transmission system.*

**Top left: The Albion 'box fitted to the Enfield Constellation and Interceptor, pictured here in Rickman guise. Above: 1954 James trials, the same example that Don will be rebuilding.**

**Enfield 500cc scrambles bike.**

**Left: Don Morley's own, fine example, Enfield 350 Bullet.**




**This Albion box was fitted to pre-1955 Roadster and all trials pre-unit Enfields of 350/500cc.**