Definitive guide to

Type-9 gearboxes

When it comes to sourcing a five-speed for your rear-wheel-drive classic Ford, the Type-9 is the default choice. Here's why.

Words Simon Woolley **Photos** Jon Hill

Type-9, T9, Type-N, Sierra 'box — whatever you want to call it, Ford's first rear-drive five-speed gearbox has had an incredible part to play in the classic Ford scene — second only to the Crossflow and Pinto engines, that it often ends up being sat behind.

First introduced in 1983 in the Sierra, its Type-E origins (the Pinto four-speed gearbox introduced in the Mk3 Cortina in 1970) meant that right from the off, classic Ford enthusiasts recognised its potential as a relatively easy to install upgrade for fuss-free cruising on the burgeoning network of motorways in the UK. And despite being out of production for nearly 20 years, and superseded by the technically superior — but larger and costlier — MT75 gearbox, the demand for good, second-hand Type-9s, and the information and parts required to fit them to classic Fords remains relentless.

In fact, thanks to its compact nature, the Type-9's become the default choice of five-speed for almost all rear-wheel-drive classic cars where five gears were never offered as standard. Check out the upgrade kits for all manner of classic marques and invariably you'll find the Type-9 at the centre of the conversion.

Info

Contact
BGH Geartech
01580 714114
www.bghgeartech.co.uk

The 2.8 V6 version was even used in production Caterham Sevens.

Inherently strong, it's also proved itself as a useful upgrade for tuned classic Fords where the existing gearboxes just aren't up to the job.

So, if you've been thinking about giving your classic Ford an extra gear before you head out on the motorways to the shows this Summer, or are looking for a way to improve the strength and performance of your standard Type-9 turn the page to become an instant expert with the help of long-standing Ford gearbox gurus, BGH Geartech. →

The history of the Type-9

In production for 10 years, not all Type-9s are the same...

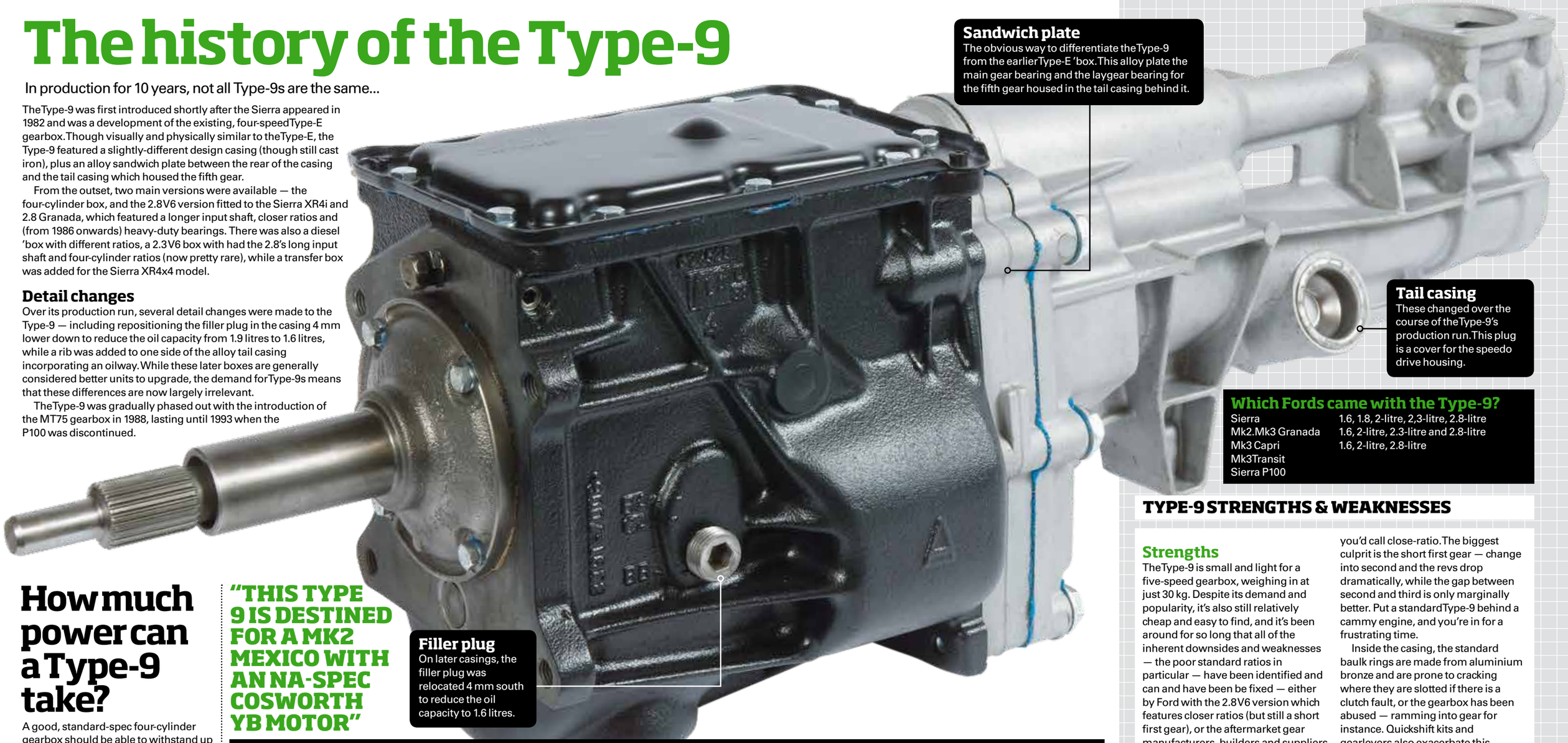
TheType-9 was first introduced shortly after the Sierra appeared in 1982 and was a development of the existing, four-speedType-E gearbox.Though visually and physically similar to theType-E, the Type-9 featured a slightly-different design casing (though still cast iron), plus an alloy sandwich plate between the rear of the casing and the tail casing which housed the fifth gear.

From the outset, two main versions were available — the four-cylinder box, and the 2.8V6 version fitted to the Sierra XR4i and 2.8 Granada, which featured a longer input shaft, closer ratios and (from 1986 onwards) heavy-duty bearings. There was also a diesel 'box with different ratios, a 2.3V6 box with had the 2.8's long input shaft and four-cylinder ratios (now pretty rare), while a transfer box was added for the Sierra XR4x4 model.

Detail changes

Over its production run, several detail changes were made to the Type-9 — including repositioning the filler plug in the casing 4 mm lower down to reduce the oil capacity from 1.9 litres to 1.6 litres, while a rib was added to one side of the alloy tail casing incorporating an oilway.While these later boxes are generally considered better units to upgrade, the demand forType-9s means that these differences are now largely irrelevant.

TheType-9 was gradually phased out with the introduction of the MT75 gearbox in 1988, lasting until 1993 when the P100 was discontinued.



Which Fords came with the Type-9?

Sierra	1.6, 1.8, 2-litre, 2,3-litre, 2.8-litre
Mk2.Mk3 Granada	1.6, 2-litre, 2.3-litre and 2.8-litre
Mk3 Capri	1.6, 2-litre, 2.8-litre
Mk3Transit	
Sierra P100	

How much power can a Type-9 take?

A good, standard-spec four-cylinder gearbox should be able to withstand up to 145 bhp, reckons Chris, while the 2.8 V6 'boxes will generally cope with up to 100 bhp more — that heavy duty bearing on the layshaft makes a lot of difference.

What about uprated gearboxes? BGH's Sporting Close gearboxes are rated to 280 bhp and 250 lb.ft, which is more than enough for most normally-aspirated engines. However, they have builtType-9s to cope with a lot more.The record is 496 bhp, and that was in a Vauxhall Viva running a 16-valve XE engine with a truck turbo and nitrous.The gearbox was obviously heavily reworked, and used one of BGH's alloy casings, as well as a polished mainshaft.

"THIS TYPE 9 IS DESTINED FOR A MK2 MEXICO WITH AN NA-SPEC COSWORTH YB MOTOR"

What to look for when buying a Type-9

To be honest, there's not an awful lot you can check without stripping the 'box down, says BGH's Chris Laing , but there is a basic test you can do, and that's to slowly turn the input shaft with the gearbox in neutral — it should turn smoothly without any rough spots if the 'box is in good health. If it doesn't then the 'box is almost certainly in need of a rebuild, and if you can't turn it at all, then the innards are probably rusted or seized where it's been left without any oil, and you're best off walking away.

By the way, checking for play in both the input and mainshafts is an old wives' tale. Gearboxes are meant to have a certain amount of play here.

Identifying 2.8 V6 'boxes

If you're being offered a 2.8V6 gearbox, look for the three-bolt stub at the front of the casing (there will be a slot in the bellhousing to accommodate it) — 2.3V6 gearboxes, which have the same-length input shaft as the 2.8 (205 mm), won't have this.

Input shafts

The four-cylinder shaft is 175 mm long and ends flush with the bellhousing (V6 ones stick out). Just the confuse matters, the Transit came with a 195 mm shaft. Another way to tell if you're looking at a 2.8 'box is to count the number of teeth on the input shaft gears.The 2.8 will have 19, whereas the 2.3, four-cylinder and diesel will have 18.

TYPE-9 STRENGTHS & WEAKNESSES

Strengths

TheType-9 is small and light for a five-speed gearbox, weighing in at just 30 kg. Despite its demand and popularity, it's also still relatively cheap and easy to find, and it's been around for so long that all of the inherent downsides and weaknesses — the poor standard ratios in particular — have been identified and can and have been be fixed — either by Ford with the 2.8V6 version which features closer ratios (but still a short first gear), or the aftermarket gear manufacturers, builders and suppliers like BGH.

Weaknesses

The standard ratios in the four-cylinder boxes are renowned for being poor — ideal for economy and cruising but not much else.The 2.8's ratios are better, but still not what you'd call close-ratio.The biggest culprit is the short first gear — change into second and the revs drop dramatically, while the gap between second and third is only marginally better. Put a standardType-9 behind a cammy engine, and you're in for a frustrating time.

Inside the casing, the standard baulk rings are made from aluminium bronze and are prone to cracking where they are slotted if there is a clutch fault, or the gearbox has been abused — ramming into gear for instance. Quickshift kits and gearlevers also exacerbate this problem, which is why BGH recommend you don't fit one.

Finally, the gearshift quality is often described as sloppy.This is often because the plastic cup (rail clip) that sits under the gearlever breaks, allowing the lever to slop around. If intact, the shift quality should be fine.

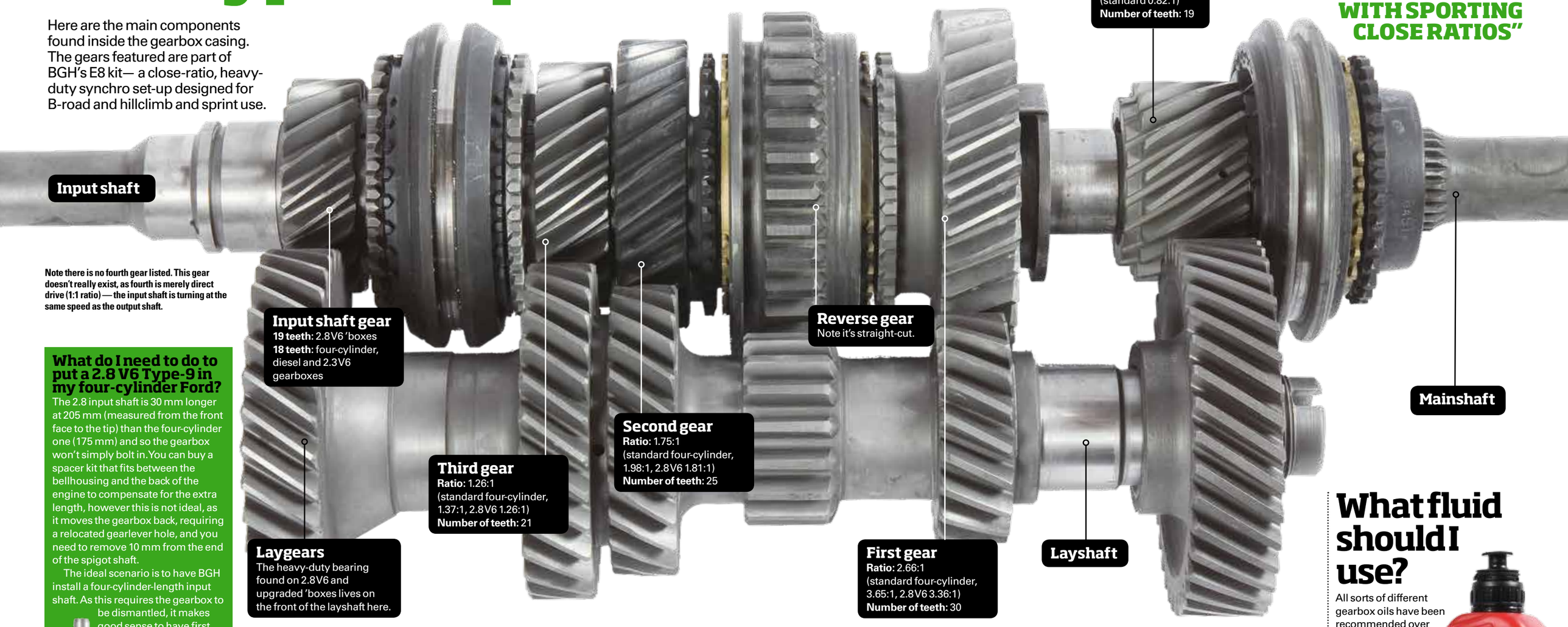
HOW MUCH SHOULD I PAY SECOND-HAND?

You can pick up a standardType-9 for £75-100 from a private seller — regardless of whether it's a four-cylinder or later 2.8V6 'box. If buying from a specialist, expect to fork out around £150 upwards — the greater cost being offset by the fact that you can get a refund or another unit if the 'box turns out to be worn or faulty when you come to fit it.

The Type-9 exposed

Here are the main components found inside the gearbox casing. The gears featured are part of BGH's E8 kit— a close-ratio, heavy-duty synchro set-up designed for B-road and hillclimb and sprint use.

"THIS IS ONE OF BGH'S HEAVY-DUTY SYNCHRO KITS WITH SPORTING CLOSE RATIOS"



Note there is no fourth gear listed. This gear doesn't really exist, as fourth is merely direct drive (1:1 ratio) — the input shaft is turning at the same speed as the output shaft.

What do I need to do to put a 2.8 V6 Type-9 in my four-cylinder Ford?

The 2.8 input shaft is 30 mm longer at 205 mm (measured from the front face to the tip) than the four-cylinder one (175 mm) and so the gearbox won't simply bolt in.You can buy a spacer kit that fits between the bellhousing and the back of the engine to compensate for the extra length, however this is not ideal, as it moves the gearbox back, requiring a relocated gearlever hole, and you need to remove 10 mm from the end of the spigot shaft.

The ideal scenario is to have BGH install a four-cylinder-length input shaft. As this requires the gearbox to be dismantled, it makes good sense to have first gear upgraded at the same time.

TAIL CASINGS AND SPEEDO DRIVES

Over the course of the Type-9's production run, the design of the alloy tail casing was altered slightly.

As has already been mentioned, later ones (middle and left) feature a extra rib that hides an oilway on the left-hand-side looking from the front.

Some later ones also feature an additional bracket on the lower back (middle casing) to hang a weight on to help reduce noise and vibration. This is not required when you come to fit aType-9 to your classic Ford.

Speedo drives

The different tail casings fitted to the Type-9 over the course of its production run also means that there were a number of different design speedo drive housings, too. This is important to note if you plan on retaining a mechanical speedo drive when fitting theType-9 to your classic Ford. Early tail casings feature a traditional drive, while some later ones also feature an electronic output on the opposite side (right).Very late tail casings may come with just the boss for an electronic output.The latter cannot be adapted to run a mechanical drive, and must be swapped for an earlier tail casing.

What fluid should I use?

All sorts of different gearbox oils have been recommended over the years — including automatic transmission fluid (ATF) — however BGH insist that the original Ford-recommended semi-synthetic 75W90 fluid to GL4 specification is best, regardless of whether the gearbox is being used on the road or track.

Improving the Type-9

Three decades of development mean that there are well-worn routes to making a Type-9 a stronger and better performer. Here's what BGH can offer.

BGH alloy Type-9 casing is lighter and stronger than the stock iron casing. Lid (below) can be modified to take a dipstick, too.

Closer ratios and improved synchros

The first stage of improving the Type-9's ratios is to change the short first gear for a longer one. BGH make this possible by machining off the original gearwheel, spline the shaft beneath, then fit and secure a lower ratio onto it — either a 2.98:1 or 2.83:1 according to the 'box type. The rest of the ratios remain as standard, but this does make for a much improved 'box.

A step up are BGH's Sporting Close ratios which feature the longer first gear, but also bring second, third and fourth closer together. The overdriven fifth gear can also be altered according to the duty the 'box will be put to — top speed is not always king, pulling power is needed, too.

In addition, the Sporting Close set are also available with heavy-duty synchro gears on third and fourth – the oilways on these are slotted (below left) to allow much better lubrication between the centre bores of the gears and the mainshaft to help prevent oil starvation.

BGH prefer the quiet refinement of helical-cut gears, but straight-cut gears are also available — although there's the obvious increase in noise levels that go with them. Both Quaife and Tran-X manufacture a range of straight-cut gearkits, but these are really only suited for competition use.

Steel baulk rings

The standard aluminium bronze rings (bottom right) are prone to breaking, so BGH have designed a steel version (bottom left) featuring a Molybdenite surface coating. These are thicker than standard, so the synchro cones on the gears are of smaller diameter to accommodate them.

Alloy casings

Although the standard iron casing is fine for most applications, BGH have designed and manufactured their own alloy casing, which is half the weight of the standard item, despite being thicker and stronger. To go with the casing, they can also supply an alloy top plate too, which replaces the flimsy tin original, and puts some much needed rigidity into the casing. The alloy top plate can also be modified to take a dipstick.

Bigger bearing

The four-cylinder, 2.3 V6 and diesel gearboxes came with a small bearing in the front of the layshaft featuring 21 needle rollers (far right), and it's just not up to the job of handling bigger power and torque outputs. The 2.8 V6 came with much bigger, heavy-duty bearing from 1986-onwards, and BGH can retrofit this to the four-cylinder 'boxes, so it's no longer imperative to track down a 2.8 V6 casing if you're after a heavy-duty 'box.

What ratios are available?

The Type-9 came with the following ratios as standard:

	1st	2nd	3rd	4th	5th
Four-cylinder and 2.3 V6	3.65	1.97	1.37	1.0	0.82
2.8 V6	3.36	1.81	1.26	1.0	0.825
Diesel (early)	3.9	2.32	1.399	1.0	0.82
P100 & Diesel (late)	3.9	2.29	1.38	1.0	0.82

In addition, BGH offer these alternative ratios for road and competition use (with long or short input shaft):

E2 (long 1st)	2.98	1.97	1.37	1.0	0.82
E6 (2.8 ratios with long 1st)	2.83	1.81	1.26	1.0	0.85
E7 and E8 (Sporting Close)	2.66	1.75	1.26	1.0	0.84

(alternative 2.75 first, and 0.82, 0.86, 0.89 fifth gears also available for Sporting Close)

Fitting A Type-9

Want to fit a five-speed into your classic Ford? Here are the basics to get you started.

These are the brief details to get one into your classic Ford — a complete rundown of what's needed will be listed in a future edition. Note also that there is usually more than one way to get a Type-9 into your car — we've chosen to list the most popular and/or easiest routes to five-speed freedom below.

Escort Mk1 and Mk2

GS Escorts supply adapter blocks that allow the gearbox mount to be moved back. There's is not much room in the tunnel and the box normally hits the side where the gearbox mount is welded to the tunnel — this can be remedied with a hammer...The gearlever hole will be in the wrong place — either cut out and turn around the existing metalwork, or use a fabricated section from Retro Ford Limited. Sierra or RS2000 bellhousing can be used — you need to buy or make an adaptor plate for the bellhousing to take the Escort clutch cable, though. The RS2000 prop fits straight up.

Capri Mk1 and Mk2

Use Mk3 bits to make it a bolt-in swap for the earlier cars. The only work you will need to do is to the gearbox crossmember — either remove and reposition the existing saddle that the mount bolts to, or extend the mount to line up. On Essex-engined models, BGH supply a bespoke bellhousing to suit, or use the Milton five-speed adaptor kit.

Cortina Mk3 to Mk5

A bolt-in job. If yours is a 1600, you'll need the 2-litre manual prop, flywheel and clutch, plus an automatic crossmember (or modify the existing one), and a Sierra speedo cable.

Anglia 105E

The gearbox tunnel needs cutting and raising/enlarging, or buy a ready-made tunnel from Retro Ford Limited. Milton supply a gearbox crossmember, plus kit that allows you to retain the Anglia bellhousing and hydraulic clutch, while 105Speed do an off-the-shelf propshaft.

Cortina Mk1-Mk2

The tunnel needs enlarging (Series 2 and automatic Mk2 Cortinas have bigger tunnels) — many use a Capri tunnel. Use a hydraulic release bearing kit to retain the existing set-up, or modify the clutch pedal to run a clutch cable (much cheaper). Prop is custom.

MYTHS

1 **"Diesel 'boxes feature closer-ratios."**
Not true. In fact, the diesel gearboxes feature the widest spaced ratios of all the Type-9s, and are completely unsuited to a Fast Road-spec engine.

2 **"Fitting the longest fifth gear available will improve mpg."**
Actually, this often increases fuel consumption, as you are dumping more fuel because the overstressed engine will be labouring.

3 **"ATF or EP90 oils are fine to use in the Type-9."**
These will kill your Type-9 in 100 miles, reckons BGH. Use the correct GL4-spec fluid.

4 **"A highly-tuned engine will make up for the Type-9's poor standard ratios."**
More than likely, the big gaps between the gears will mean that the engine drops 'off-cam' more often.

5 **"Put too much power through a Type-9 and you'll crack the casing."**
Not true. Cracked casing are almost always due to the bellhousing bolts being incorrectly tightened, distorting the iron casing and causing stress fractures.

The bolts should be tightened in three stages in a diagonal pattern, to 60 lb.ft. The paper gasket that goes between the bellhousing and casing should always be used, too.

ABOUT BGH GEARTECH

The origins of BGH go right back to 1946 when boss and founder, Brian G Hill (hence BGH) completed his engineering apprentiship in the aircraft industry. "I couldn't see my future in it though, so I tried other things before getting sidetracked by cars and bikes," says Brian with a grin.

"I first started doing gear boxes in 1966, mainly for Cortinas, Anglias and Transits. People brought all their difficult jobs to us, and then word spread."

Originally, BGH rebuilt gearboxes from all marques, but with Ford ones by far the most-popular, Brian decided to concentrate solely on Blue Oval products — not just rebuilding standard gearboxes but designed and manufacturing a range of gearkits for the more popular gearboxes, as well as steel baulk rings, alloy bellhousings, gearbox and axle casings — all of which are made in the UK. The Type-9 has become the mainstay of the business and accounts for 80 per cent of the work that comes in. Even so, BGH will happily improve your three-rail or single-rail gearbox with a range of gearkits and components.

For the last 10 years, Brian has been aided and abetted by Chris Laing, and between them they are turning out five-or-six rebuilt Type-9s a week, as well as designing and manufacturing parts when they're no longer available. Despite the relentless workload, they don't allow standards to slip — Brian dismantles and inspects every gearbox, and components are checked three times — at the dismantling and cleaning stages, and prior to assembly by Chris.

Put the heads of these two together, and what they don't know about rebuilding and improving Ford 'boxes isn't worth knowing.

Chris (left) and Brian (right) form BGH, which has been working with Ford gearboxes for 45 years.