



FLYWHEEL TECH: LIGHTEN THE LOAD

Useful Contacts

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If you want a more responsive engine that can rev freely, it pays to fit a lightened flywheel. Courtenay shows us how to make a V6 sing.

When you're thinking about improving the performance of your car, the typical parts to consider changing include the induction and exhaust. Yet the aspects of a car that often get overlooked concern weight — or more specifically, components that slow down the engine.

Take the flywheel, for instance. The standard flywheel on a V6 weighs in at 15 kg, but for £275 you can knock that weight down to a mere 5.6 kg. For your money, you're not going to get any extra bhp to boast about, but you will notice a considerable improvement in throttle response and

the engine's ability to rev more freely and quickly.

Even the smaller XE motors can benefit from a weight loss of around 30 per cent with either a machined or billet flywheel. A billet flywheel is where the weight loss really takes effect because it's a structurally stronger material, which means you can use less of it.

Specialists such as Courtenay are gradually developing billet flywheels for most of the popular Vauxhall engines (see the Weight Loss Table for details), but otherwise they can machine a flywheel for you on an exchange basis.

Fitting a lightened flywheel on a front-wheel drive Vauxhall involves removing the gearbox. Many of the later-model Vauxhalls (Vectra B onwards, Astra MkIV and V) use a subframe or bed to secure the engine and gearbox. This needs to be removed and the engine suspended, but it presents a few headaches when refitted because it needs to be precisely installed in its original position to ensure the tracking and gear linkage settings are correct. Adding paint marks to all the fixing points for the bed can help to ensure it's correctly refitted, but ideally a jig should be used to secure it.

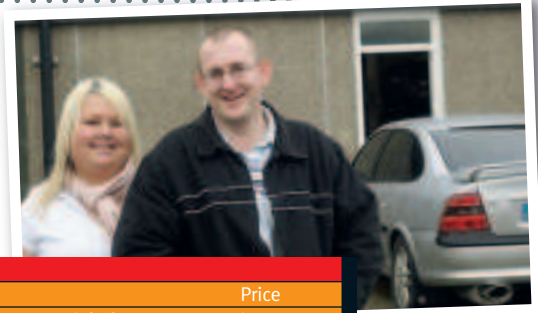
Over the following pages, we've set out 20 step-by-step instructions on how to fit a lightened flywheel to a V6 Vectra — although most of the steps are similar for many front-wheel drive Vauxhalls. If you've removed your engine and gearbox, the fitting of a flywheel involves steps 15 onwards. Oh, and when you've finished, don't forget to top-up the power-steering fluid and gearbox oil.

Set aside at least one day to fit a new flywheel, and make sure you have all the necessary tools and a workshop manual to check specific details for your car before you get started on the project.

Owner's Verdict

The V6 Vectra featured in this workshop belongs to Leigh Rose and Emily Brown. Leigh's owned a string of Cavs, but is now a V6 convert who likes the torque and pull of this engine. Before the conversion, he found his V6 had plenty of torque, but rarely broke into a sweat. His first comment when he test-drove the Vectra with the lighter

flywheel was that it was actually torque-steering and felt much livelier — and one week after the conversion, Leigh's still happy. "I think the fuel economy has now improved a little bit," he says. "If you drive it normally, you don't have to put your foot down as much, but when you do it's much quicker. Also, the gear change is a lot smoother."



Weight Loss Table					
	Standard	Lightened	Billet or		
Car/Engine	flywheel	flywheel	lightened	Weight loss	Price inc VAT
Corsa 1.4, 1.6 XE	9.6 kg	6.6 kg	Lightened	31%	£175
Ecotec 2.0 XEV	9.8 kg	5.6 kg	Billet	43%	£225
2-litre XE	6.8 kg	4.5 kg	Lightened	34%	£175
2-litre XE ex-dist	9.8 kg	5.6 kg	Billet	43%	£225
2.2 16V	9.8 kg	5.6 kg	Billet	43%	£225
C20LET Calibra/					
Cav Turbo	9.6 kg	5.6 kg	Billet	42%	£225
2.5/3.0 V6	15 kg	5.6 kg	Billet	63%	£275
Z20LET VX220/					
Astra MkIV/					
Zafira	9.8 kg	5.6 kg	Billet	43%	£225

FITTING A LIGHTENED FLYWHEEL

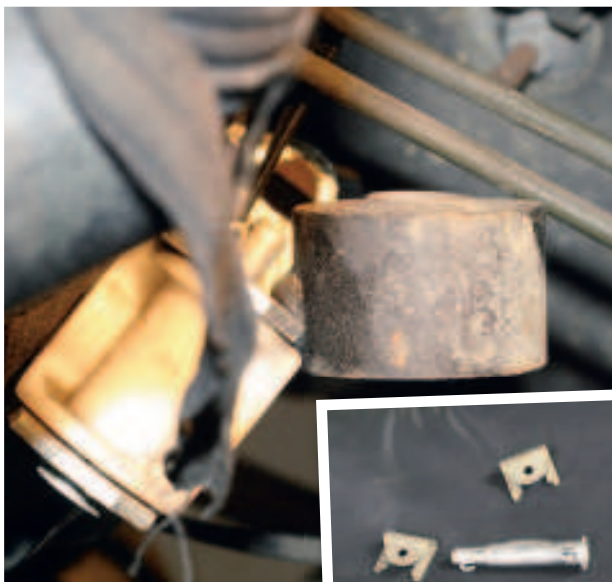
1

Disconnect the battery, ensuring you have made a note of your stereo codes to save frustration later. Undo and remove the Torx E10 bolt where the steering column joins the steering rack. This bolt can be found inside the driver's footwell, behind the clutch and brake pedals.



2

If the gearbox uses selector rods (some models have cables), these will need to be disconnected at the gearbox. There will be spring clips or bolts to undo and a gear selector pin with a small sprung bar at the rear. This is difficult to remove, so use long-nosed pliers and apply penetrating fluid.



3

Fit cable ties around the top radiator mounts to hold it in position when dropping the engine bed. The bumper will need to be removed. First, remove the front grille. The Vectra's grille is fitted with three 8 mm bolts, although some are fitted with clips instead.





TECH NOTE

4

Raise the front of the car (ideally using a ramp) and remove the front wheels. From underneath the offside front, undo four 8 mm bolts securing a plastic cover that protects the bottom of the timing gear. Remove the plastic cover.



5

Use a trim clip remover (bent screwdriver with a fork at the end) to remove four clips on the underneath of the bumper. Undo two T25 screws inside the wheelarches for the bumper, then pull back the wheelarch liner to reveal another T25 screw below the back of the indicator.



6

Disconnect the electrical connector plugs to the fog lights, and the bumper can now be removed. Pull away the corners first to release it. If it doesn't release, check there are no other bolts to undo and make sure nothing has been cable-tied in position.



"Set aside at least one day to fit a new flywheel"

7

Remove the hub nut caps with a screwdriver, then extract the split pins. Slacken each hub nut with an airgun or breaker bar (apply the footbrake to help) and remove it along with its washer. Use a rubber hammer to release the driveshafts, but don't knock them through the hubs.



8

Undo the top anti-roll bar drop-link bolt, track-rod end nut and the pinch bolt for the bottom ball joint. All of these nuts and bolts are 18 mm. When undoing the drop link, there's a flat on it that needs to be gripped with an 18 mm spanner.

Track rod end.



Anti-roll bar drop link.

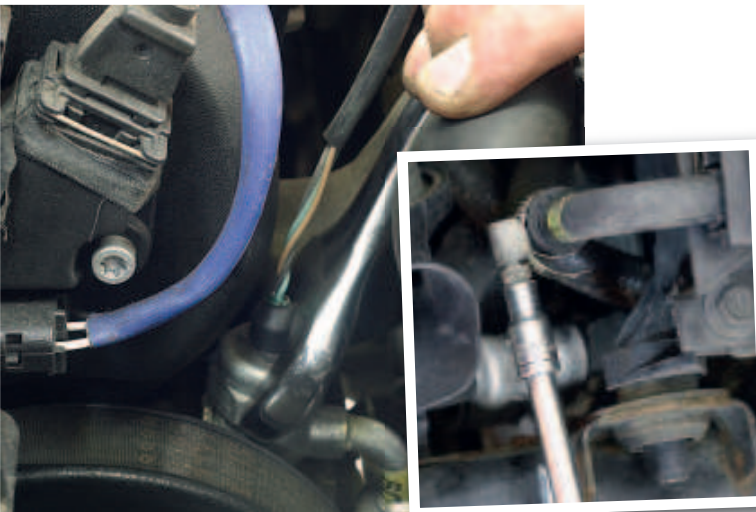


Bottom ball joint.



9

Place a container underneath the power-steering pump, then crack and undo the 27 mm union to it. Disconnect the pipe and drain the power-steering fluid. Disconnect the power-steering return pipe underneath the front offside. This is fitted with a jubilee clip and is the lower connection.



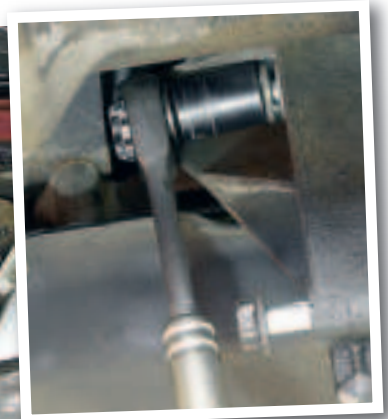
10

From under the engine, remove the front and rear lambda sensors with a 22 mm spanner. Disconnect and remove the front exhaust pipe, fitted with 16 mm bolts at the flanges to the manifold and 13 mm bolts at the cat. Collect any flange gaskets when removing.



11

Use an engine support across the inner wings to hold the engine in position, with a chain and three hooks attached to the head ('lifting eyes' should be fitted as standard). From underneath, undo the three 18 mm bolts for the gearbox mount. Do not attempt to remove the mount, just remove the bolts.



"A billet flywheel is where the weight loss really takes effect"



TECH NOTE

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Under the engine, Courtenay positions an engine bed jig to secure the bed before removing it. Then, two 16 mm engine mount nuts need to be undone, along with ten 18 mm engine bed bolts that include triangular support plates at the rear. Once undone, lower the bed and place aside.

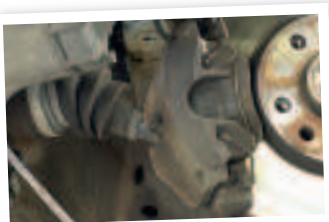


Triangular support plates at rear of engine bed.



13

Undo two Torx E14 bolts for the longer, offside driveshaft, then remove the driveshaft from the hub, pull it out of the gearbox and collect any gear oil that drains out. Use a tyre lever to pop the shorter, nearside driveshaft out of the gearbox.



14

Disconnect the reverse light switch on the gearbox from under the car. Lower the engine to provide better access to the gearbox. Clamp the hydraulic clutch fluid hose, then disconnect it by removing a retaining clip using a small screwdriver. The pipe can then be pulled off.



15

Undo all the bolts that mount the gearbox bell housing to the engine. There are four 15 mm bolts around the lower half and seven 19 mm bolts around the top. When undoing the last bolt, get an extra person to hold the gearbox and help remove it. Don't do this on your own.



16

Spray the clutch with brake cleaner, then undo six E10 or 11 mm bolts for the clutch and remove it. Then remove the flywheel fitted with eight E14 or 17 mm bolts. Watch the flywheel doesn't fall off after you remove the last bolt.



"The standard flywheel on a V6 weighs in at 15 kg"

17

Fit the new flywheel (it can only be fixed in the correct position on the end of the crank, because the eight bolt holes are not all evenly spaced), apply thread lock to each bolt and fit loosely. Tighten each flywheel bolt and torque down to 65 Nm, followed by 30 degrees and 15 degrees of a turn.



18

Clean the threads on the clutch bolts. Refit the clutch using an alignment tool, which will prevent the friction plate from slipping between the flywheel and clutch cover. Fit the eight clutch bolts with thread lock. Tighten the bolts progressively, then use a torque wrench to tighten them to 28 Nm.



19

Before refitting the gearbox, check around the clutch release bearing for clutch fluid, signifying the hydraulic system has a leak. If a leak is found, get it fixed before refitting the gearbox. Also, check for oil leaks around the rear main seal, which can be fixed with the engine in situ.



20

Refit all the parts that were removed. After the gearbox has been refitted, bleed the hydraulic clutch system using the bleed nipple shown, which requires a 9 mm spanner to slacken it. You'll need an extra pair of hands (well, feet actually) to pump the clutch pedal.

