

STORY CRAIG PARKER
PHOTOS ANGUS MACMASTER

CLUTCH UPGRADE

If you're thinking about upgrading your engine, you're going to need a performance clutch



THE LS engines really are the new small-block Chevys and owners aren't shy about adding a few go-fast goodies. After a few basic mods, the owner of this smart Maloo ute decided to jump in boots 'n' all and strap on a high-boost supercharger, projected to make around 600rwhp. However, the factory clutch is marginal at best and wouldn't last long behind such a stout mill — time for an upgrade.

High performance clutch manufacturer Direct Clutch Services offers five different packages to suit mild to wild LS (and other) applications. Given the expected power output and the owner's driving habits, Direct recommended its Street Series twin-plate.

The pair of button-style clutch plates offer immense torque handling capability, while the twin-plate configuration creates only a modest increase in pedal pressure, resulting in easy use and very little change in wear rates on the vehicle's clutch actuation mechanism.

It's important to properly bed in any new clutch before using its full torque capabilities, which is why the Maloo's clutch was upgraded prior to the supercharger installation.

While installing a clutch can be tackled at home, we called upon Advanced Performance Centre (APC) to complete this installation. The professional and highly experienced APC crew had plenty of great hints and tips for all those looking to tackle the job themselves.



HORSES FOR COURSES

DIRECT'S entry-level unit is the Heavy Duty (A), which sports an extra 25 per cent clamping force and slightly firmer pedal. It's ideal for mildly modified engines, towing and occasional competition. The Hi Torque Organic (B) looks identical but via a machining trick inside (which increases the cost) it increases clamping force a further 25 per cent. Next up is the Hi Torque cushion button (C). It's good for 600hp, yet offers smooth engagement due to the sprung hub and wafer spring design. For ultra-high power street cars, there's the Street Series; a billet twin-plate design (D) with eight-button plate, available in a number of clamping combinations rated up to 1000hp. The five-button, twin-plate set-up (E) is for 1200hp+ competition applications.



STEP 01

Begin by disconnecting the battery so nothing shorts out. After unbolting the shift lever (the whole aftermarket short-shift assembly in this case), crack the hydraulic clutch line. Clutch fluid is brake fluid and like brake fluid should be changed about every 12 to 18 months. The extremely black colour of this fluid is a sure indication of contamination due to lack of maintenance. All of it was therefore dumped, to make way for fresh fluid.



STEP 02

Mark the position of the tailshaft before yanking it (inset) so it can be reinstalled in the same orientation — not doing so can introduce nasty drivetrain vibrations. If you don't have a bung or an old yoke to slip into the rear of the 'box, wrap and tape a rag around it, otherwise you'll end up with an awful mess when oil gushes out. As with many vehicles, the exhaust had to be removed to facilitate removing the gearbox.



STEP 03

Remove the top bolts first (a very long extension simplifies this job; see Step 13), leaving the two side bolts (closest to the locating dowels) for last. Due to excessive engine mount flex, APC supports the front of the engine (see stand in Step 8) which makes it much easier to wiggle the 'box in and out. Physically extracting the 'box will require a gearbox jack or a couple of good strong blokes, as a T56 weighs in at a hefty 63kg.



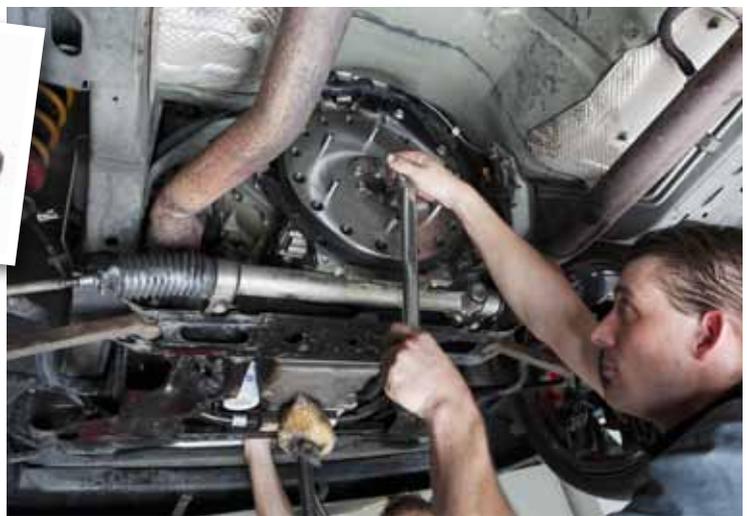
STEP 04

Inspection of the old clutch reveals typical wear; hot spots are hard, raised, shiny sections with clear signs of scuffing, while the friction material is almost worn down to the rivets. This clutch would've needed replacing soon irrespective of engine wear — unless the vehicle has super-high mileage it should be okay, but it never hurts to check.



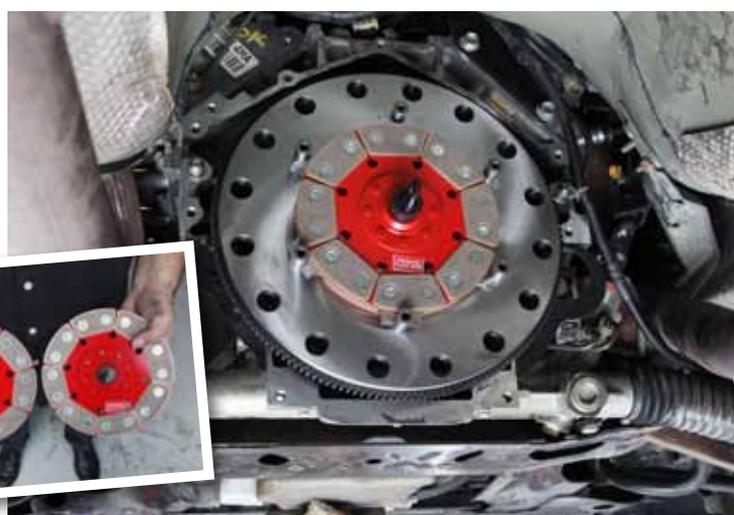
STEP 05 Inside the bellhousing will be caked with clutch dust. Wash it out with brake or carby cleaner, rinse with water and install the new concentric slave cylinder (around \$330). More preventative maintenance than mandatory, Direct strongly recommends fitting a new slave cylinder with any new clutch as it is a consumable item. Besides, pulling the 'box back out to change it later on will cost a lot more.

STEP 06 Direct also recommends replacing the pilot bearing as a matter of course. Wetness around the engine's rear main or around the input shaft of the gearbox indicates leaking seals. The rear main showed clear signs of leakage and was replaced. The LS1 has a hollow crank, therefore you can't remove the pilot bearing using the traditional grease/hydraulic method. Rather APC has this neat puller for removing pilot bearings.



STEP 07 To retain reasonably smooth engagement, Direct's Street Series uses eight large Carbotic buttons, as opposed to the typical four or six smaller buttons. For increased durability, both the floater and apply plates are machined from billet steel, while the 16 lightening holes reduce rotational mass. Note that kit-specific flywheels come with all Direct kits, as there's virtually no scope for skimming the thin (10mm) factory flywheel.

STEP 08 Correctly torquing the flywheel bolts and using thread-locking compound is crucial. To stop thread lock squeezing in between the flywheel and crankshaft, APC nips up two bolts without thread lock, firmly clamping the two faces together. The other bolts are then installed and torqued with thread lock in three stages (20, 50 and 100ft-lb). After that the two initial bolts are removed and reinstalled correctly.



STEP 09 Machined components often have a very light anti-corrosion film to keep their surfaces pristine until installation. Clean off this film and any fingerprints with a quick squirt of brake or carby cleaner, as either can lead to clutch slippage or uneven and premature wear. It's imperative that the clutch plates are installed in their correct orientation (they're clearly marked) otherwise they will foul the floater and apply plates.

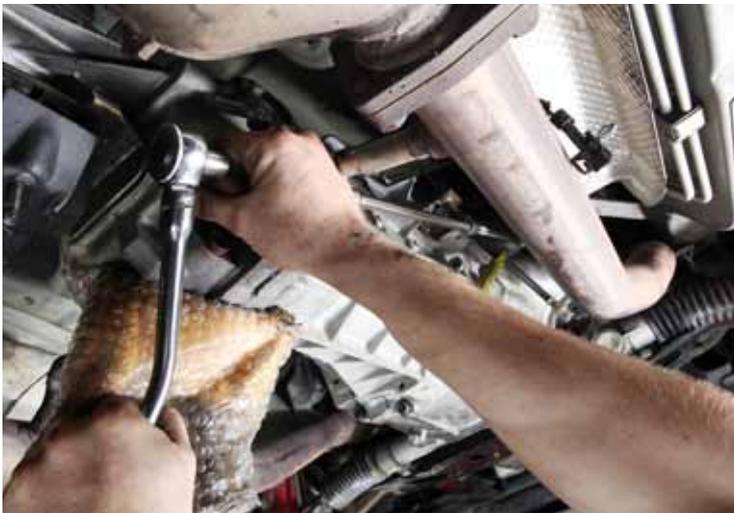
STEP 10 While the clutch alignment tool (Steps 7 & 9), gets it close, double check the clutch plate is concentric with the pressure plate by running your fingers around the edge — it should be equidistant from the edge of the pressure plate around the entire circumference. The more time you spend lining the clutch plate up, the more easily the 'box will slip into place. Torque the pressure plate in a criss-cross pattern similar to tightening a wheel.



STEP 11 Put a smear of high-temperature grease on the snout of the input shaft and a small amount on the front edge of the input spline — the clutch plate will push it down the spline when the 'box is slipped into place. Don't apply too much or it could fly out and you'll risk contaminating the friction surfaces, which is bad. Before refitting the 'box, check the block face and the bellhousing for any crud that could cause a misalignment.



STEP 12 Line up the dowels, tweak the position gently and the 'box should slot straight into place. If it hangs up, don't let the weight of the 'box sit on the clutch plate as it will shift it out of alignment or, worse still, bend the clutch plate. Never force it; the 'box should seat by hand. Once in, it's fine to use a couple of bolts to hold it in place but never use the bolts to pull it into position, as this can break the bellhousing or damage the new clutch.



STEP 13 Another installation trick APC mentioned is to have the 'box in gear. That way, if you need to rotate the input shaft to make the splines line up, you can simply rotate the 'box's output shaft. Start all the bellhousing bolts by hand and tighten them in a diagonal pattern, in about three or four stages. Double-check that they're all torqued correctly. If you damage the clutch plate during installation, chances are it won't release.



STEP 14 The hydraulic clutch needs to be bled of air bubbles, just like a brake system. This is a messy job on the Holden T56, as the bleed nipple is located inside the bellhousing (see bleed nipple, Step 5), making it difficult not to get fluid everywhere. Due to the tiny size of the reservoir it will need topping up several times, so watch it like a hawk during bleeding. If it runs dry, air will re-enter the system and you'll have to start over.



WRAP UP

YOU need to treat your new clutch very nicely for the first couple of hundred kays. Until it beds in properly, portions of the friction surfaces will not be in full contact and the clutch may only be operating at 60 to 70 per cent. It must be fully bedded-in to achieve 100 per cent contact and full torque-handling capability. Drew Tarrant, from Direct Clutch, says a big no-no is installing a brand new clutch and immediately strapping the car onto a chassis dyno. Doing so can wreak havoc on the fresh friction surfaces.

The best way to bed in a new clutch is to create as little heat as possible. Don't ride it, make sure all the shifts are nice and smooth with easy engagement, and do not thrash it. Suburban driving is best; freeway miles don't bed it in well as there's little engaging/disengaging and equally limited slippage. The idea is to get a bit of wear between the surfaces but without burning them up.

For this high-torque street clutch, the pedal ended up about 30 per cent heavier. However, keep in mind that as your old clutch gets tired, the diaphragm loses tension and softens. You don't notice this softening as it happens very gradually so it's not uncommon for a new stock clutch to feel heavy. However, the 30 per cent figure is compared with a stock replacement clutch.  **CONTACT** Direct Clutch Services via www.directclutchservices.com.au or on (07) 3862 2680; APC is at www.apc-racing.com.au or on (07) 3341 7223.

