

# Castlemaine ROD SHOP

AP051.DOC

## V6 COMMODORE AUTO (PRE MID 1991) TO HOLDEN 6 CYLINDER MOTOR.

This kit allows the fitting of a Commodore V6 4 speed automatic transmission up till mid 1991 to a Holden 6 cylinder motor. Check to see if the transmission has a manual valve body, this is important because some of the later model transmissions have an electronic valve body which may cause some problems to set up properly.

### Kit consists of:

- 1 off Adaptor Plate fitted with dowels (07)
- 1 off Torque Converter locator (03)
- 3 off Torque Converter spacers (06)
- 3 off 7/16 UNC bolts x 1-3/4 long }
- 2 off 7/16 UNC bolts x 1-1/2 long bolts} Trans to adaptor
- 3 off 7/16 UNC bolts x 1-1/2 long bolts - adaptor to motor
- 1 off 7/16 UNC unbrako bolt x 1" long - adaptor to motor
- 8 off 7/16 spring washers
- 3 off M 10 x 1.5P x 40 long flex plate to Torque convertor

### Optional:

- 1 off Holden 6 flex plate modified to suit V6 Torque convertor

**NOTE:** This modification can be carried out quite easily at home using a round file as described in step no. 4 of these instructions.

## FITTING INSTRUCTIONS:

### Step 1:

Fit the adaptor plate to the transmission using the dowels for location (see main drawing for details). Put the 3 off 7/16 UNC x 1-3/4" long bolts and 2 off 7/16 UNC x 1-1/2" bolts FITTED WITH SPRING WASHERS in to the correct holes as shown on the drawing and tighten into position. Look to see if any thread is protruding past the face of the adaptor face. If any thread is protruding you will need to shorten the bolts so that the end of the bolt DOES NOT protrude and is just behind the face of the adaptor plate, MAKE SURE THE SPRING WASHERS ARE FITTED WHEN DOING THIS. Remove the bolts and adaptor from the transmission.

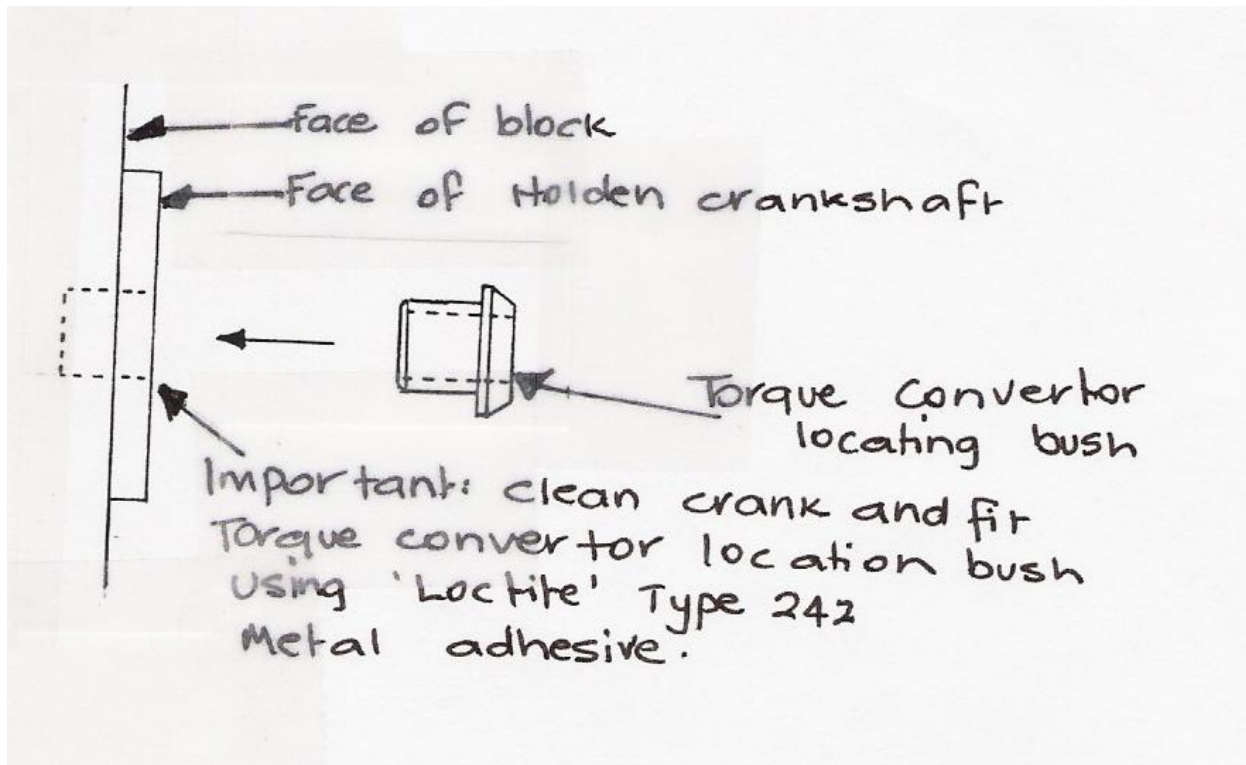
### Step 2:

The transmission case needs some metal removed to allow the Holden 6 starter to fit proceed as follows: Fit adaptor to transmission again and with a sharp scriber, scribe a line onto the face of the transmission using the starter cut out shape in the adaptor plate for a guide. See main drawing. Mark out the sides as shown, cut the shape carefully out of bellhousing after removing adaptor plate. Check starter clearance by bolting the starter to the adaptor and then fitting the adaptor to the transmission. Keep removing metal until the adaptor with the starter fitted, fits flush onto the face of the transmission. (Note: The starter motor faces away from the transmission, it is on the motor side of the adaptor.)

### Step 3:

Clean the back of the motor, remove any "burrs" or "hi spots" from the face that the adaptor will bolt too. Remove the old spigot bearing or flex plate locator from the end of the crankshaft. Fit the original Holden 6 sandwich plate to the motor, this is important as it locates the starter correctly. Bolt the adaptor to the motor using the dowel in the motor for location. See main drawing for bolt locations. Recommended torque seating for the unbrako bolt is 94, 9 N-m or 840 inch-lbf.

Fit the torque converter location bush to the crankshaft. USE Loctite metal adhesive type 242 to hold this bush in place. Loctite metal adhesives can be purchased at most good Automotive, Engineering or bearing outlets.



Step 4:

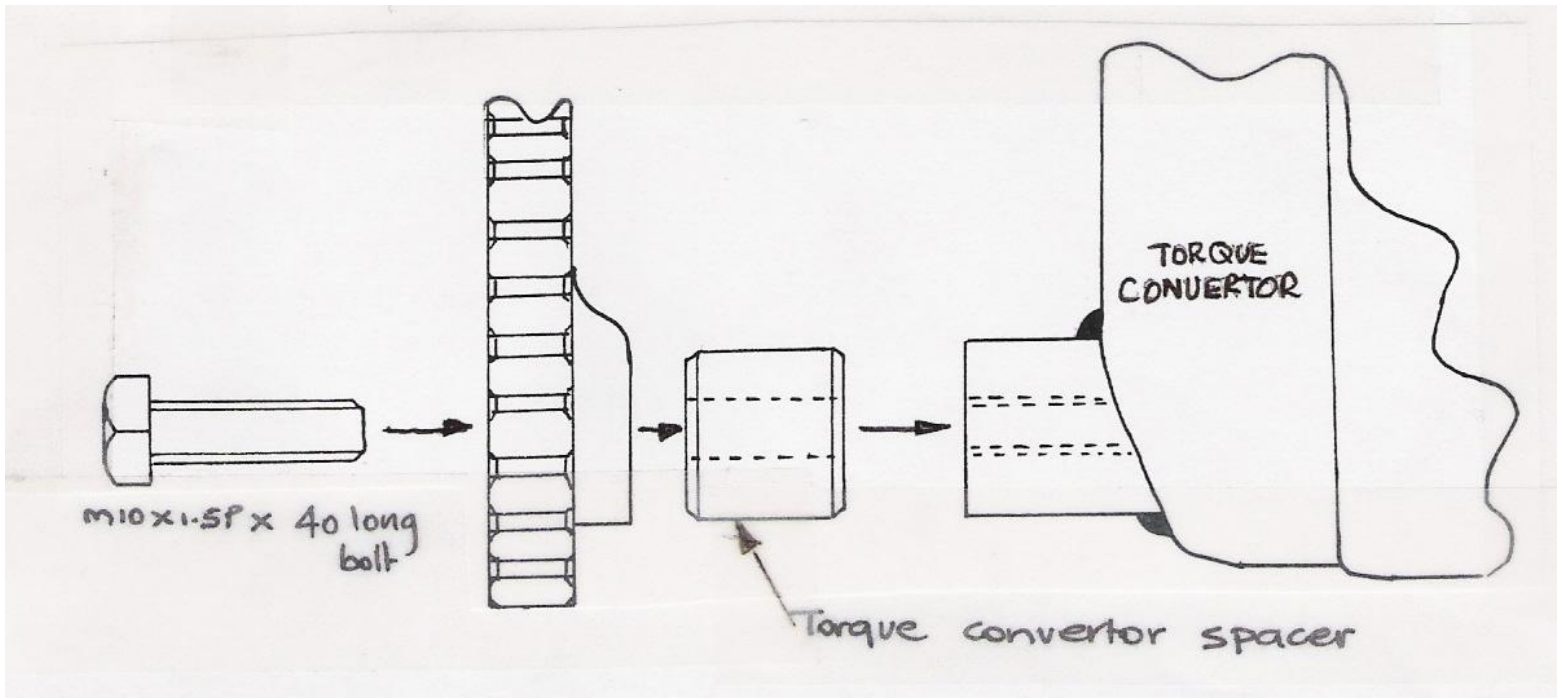
The original Holden 6 flex plate needs to be modified by filing the bolt holes with a round file as shown on the flex plate modification drawing. Bolt flexplate to the motor when modification has been carried out.

Step 5:

With the modified flex plate bolted to the motor and the adaptor plate bolted to the motor, the transmission fitted with the torque converter can now be bolted to the motor, make sure the torque converter is fully on the transmission. The measurement from the "Face of the transmission" to the "Bolt face of the torque converter" should be approximately 27mm when it is fully on. Do not force the torque converter on to the transmission, keep rotating it and lightly push it until it goes on properly. Fit transmission to motor using the bolts as shown in main drawing.

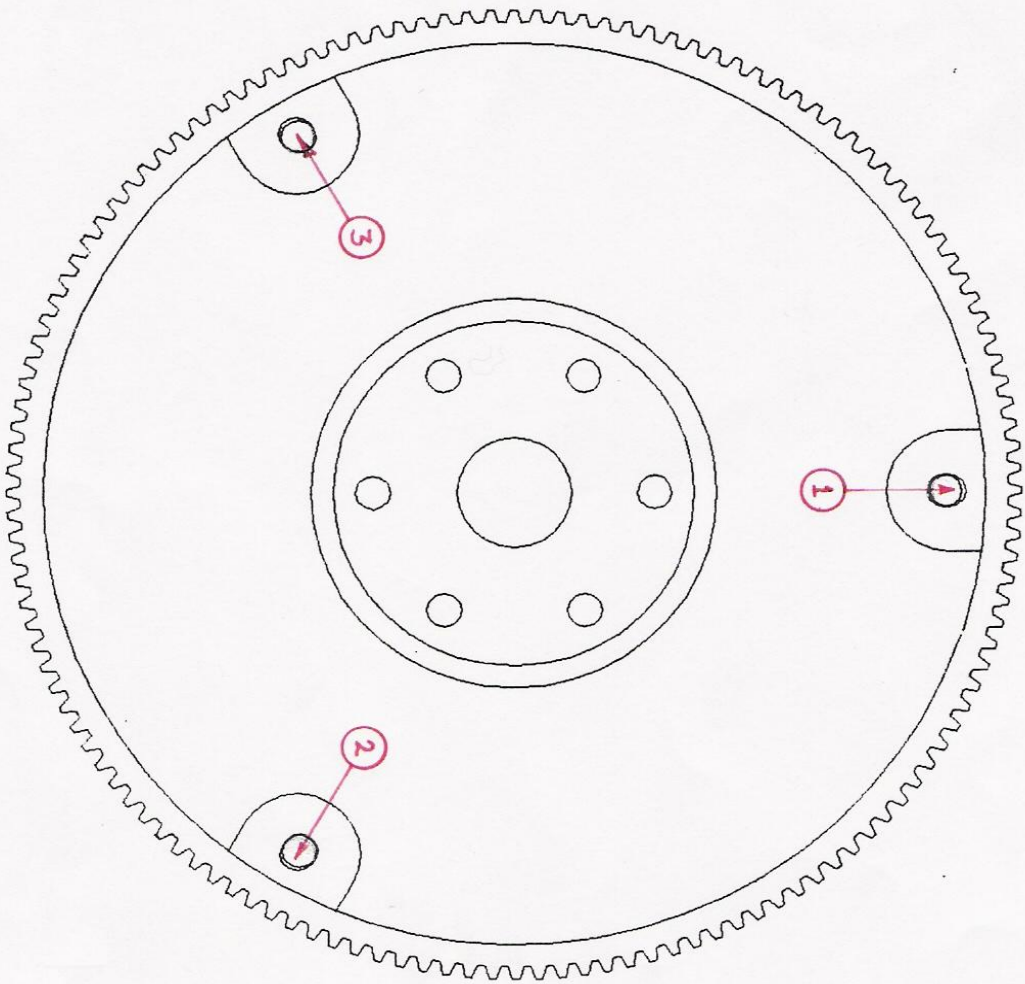
Step 6:

Bolt the torque converter to the flex plate making sure the three torque converter spacers are between the torque converter and the flex plate when you bolt them together. Use the M 10 x 1.5P x 40 long bolts. It would pay to use "Loctite" type 242 metal adhesive on these bolts.

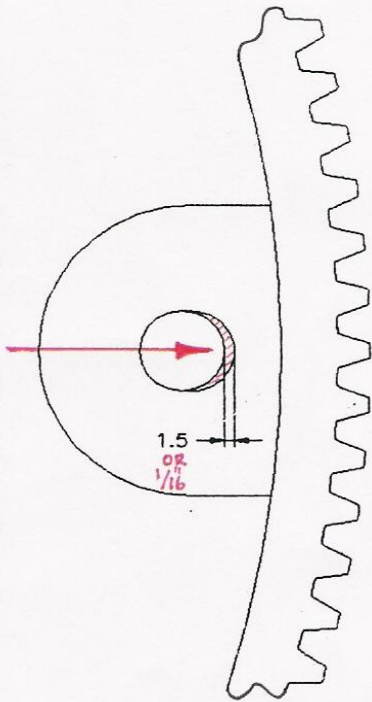


The motor to transmission adaption is now complete and can now be fitted to your vehicle.

We wish you all the best with your project. – CRS.

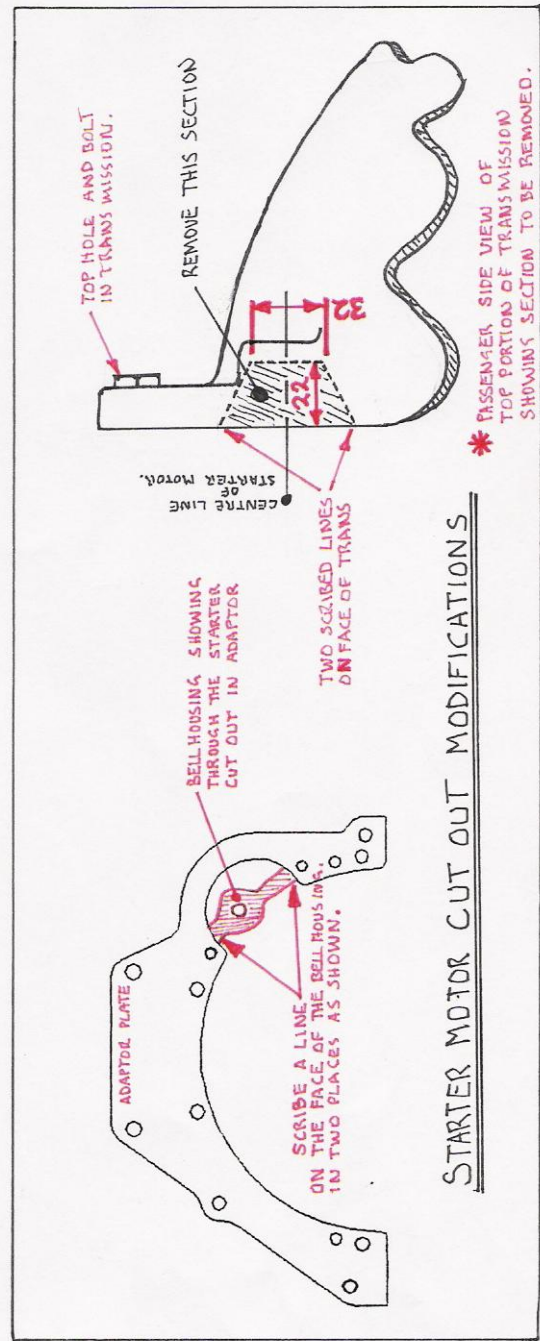
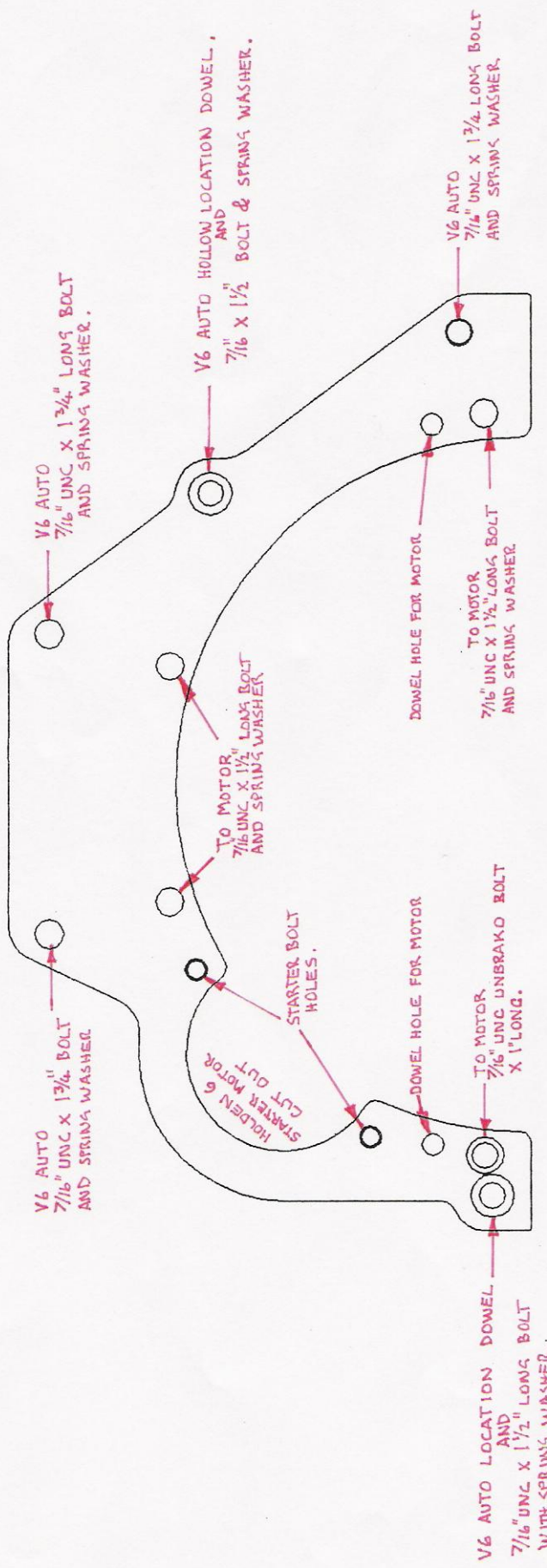


MODIFY 3 FLEXPLATE BOLT HOLES  
 BY REMOVING THE AMOUNT OF METAL  
 SHOWN WITH AROUND FILE





ADAPTOR PLATE AS IT WILL APPEAR WHEN BOLTED TO MOTOR.



STARTER MOTOR CUT OUT MODIFICATIONS

DATE	REVISION	BY
METRIC TOLERANCE UNLESS SPECIFIED A.S. 1100 201 - 1992 TABLE AT GR. F		
C.R.S. ENGINEERING		
CRS496	DRAWN BY	B.B. 5/8/1994
V6 HOLDEN TRANS TO HOLD 6 MOTOR		
DECIMAL TOL. ON ANGLES 0.25°		





# TH700 BOX SWAP



T H 700 &gt; T H 700

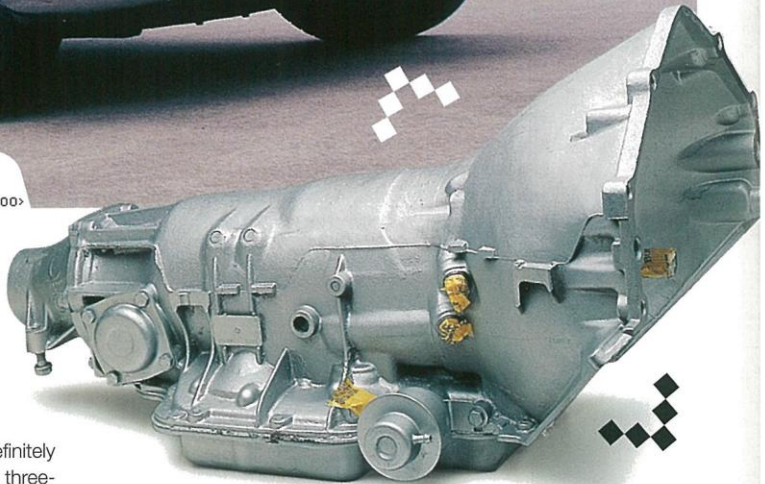
## Give your old Holden modern dynamics by dropping in a TH700, four-speed auto



WINNING an early Holden complete with angry six is definitely a fun thing, but sawing through the gears on the old three-on-the-tree in heavy traffic really takes the shine off the experience. So what are the alternative gearbox options?

Slotting in a T5 or appropriate Jap five-speed is a no-brainer if you want to go the manual route, but stick-shifts are a sports car thing. Most old-girl Holdens are cruisers not bruisers, making a modern auto an excellent option. But make enquiries about a Trimatic and you'll most probably be met with "ohhhh the traumatic", so why not go all the way and step up to a late-model, four-speed TH700? After all, while most classic car owners refuse to park a modern car in their driveways, they're more than happy to incorporate the advantages of their refined drivelines.

For street duty, the TH700 is an ideal gearbox behind any engine. For simplicity's sake, stick with either the VN/VP V6 or V8 variants, as moving to an electronically-controlled unit (4L60E), as offered in the VR (and onwards), creates further hassles and added expense.



Internally, the VN/VP V6 and V8 variants are virtually identical and interchangeable, other than in their one-piece case/bellhousing and input shaft. V8 boxes, which are now getting a bit thin on the ground, use a standard Chev bolt pattern (Trimatic, TH350, TH400, and so on) and bellhousing configuration, with a longer 30-spline input shaft. The V6 variant, however, uses a unique bellhousing and bolt pattern, combined with a shorter 27-spline input shaft. Castlemaine Rod Shop (03 5472 2853) offers conversion kits for either box behind a wide variety of engines — including grey motors.

While exact fitment is different for each individual model, the basic process and concept is the same for all early Holdens. To show what's involved, we followed Peter and Emilio at Flash Automotive (02 9331 3633) as they fitted a V6 TH700 into a neat '61, 186ci EK ute.

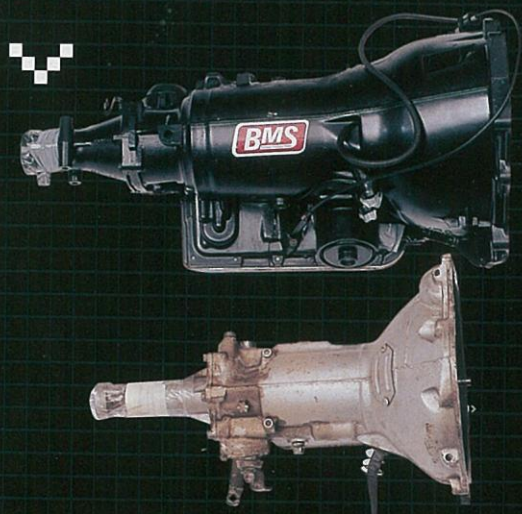


## + THE BOX

THE sheer difference in physical size between the original three-speed manual and the new four-speed auto is massive. Fitment of such a large gearbox into an EK (or any early Holden) requires modification of the transmission tunnel and floor members. These modifications comprise the biggest element in the conversion. Expect to pay up to \$250 for a rebuildable V6 TH700, while a rebuildable V8 version will cost as much as \$600.

BMS Performance Transmission Parts (02 9913 2469) supplied all parts to rebuild the box and recommends addressing two main weaknesses of the TH700 while you've got it apart. Firstly, split hub-splines in the drive shell are common; BMS supplied a beefed up Art Car unit to eliminate this problem. The second is an overrun clutch-hub. Once again, BMS supplied a heavy-duty, Kolene-coated Art Car unit to improve longevity when driven manually.

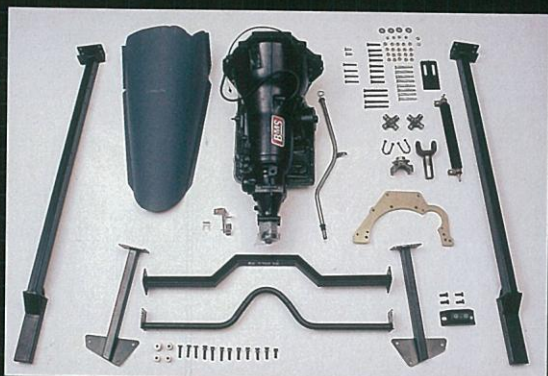
Raybestos friction clutches and a factory V8 servo – for crisper shifts – were also supplied by BMS. A straight rebuild will set you back around \$1500, while a mildly beefed-up rebuild (like this unit) runs closer to the \$2200 mark.



## + THE KIT

WHILE fitting the TH700 is a straightforward operation, the number of parts involved – as illustrated – mean that it's nonetheless quite an involved process. Based on its underbody brace (chassis) kit for V8 conversions, the \$475 CRS chassis kit incorporates the new gearbox crossmember. It has the added benefit of stiffening up the EK's original monocoque chassis to improve handling dynamics, as well as the ability to accommodate future power upgrades.

For the engine-to-gearbox adaptation, CRS can supply everything you need – you tell 'em what you've got and they'll tell you what's missing and supply it, if need be. The V6 TH700-to-red-motor adapter kits retail for \$341, while the simpler V8 TH700-to-red-motor version will set you back \$275. Other components you'll need to source (and which CRS can also supply) are gearbox, dipstick, flexplate, HQ Trimatic tailshaft, trans-cooler, throttle cable and linkage mount.



CRS supplies a larger tunnel to clear the girth of the TH700. Sit it in place, trace around it and cut it out. Due to the enlarged tunnel, the existing carpet will no longer fit. The new tunnel is, however, modelled from an original EK auto, so simply specify the auto version when ordering your new set of carpets

STEP 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17



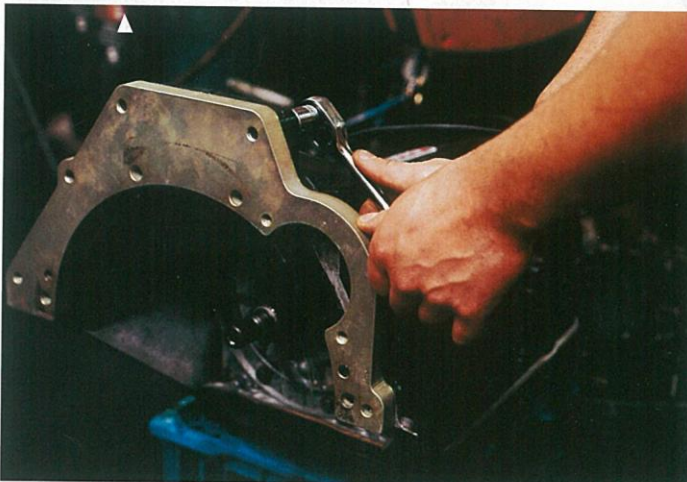
Although a factory VN/VP shifter could have been used, this installation utilised a B&M Hi-Tek Street Bandit shifter. Careful routing of the shifter's cable, with no sharp turns or tight bends, will ensure smooth operation. B&M supplies detailed fitting instructions – take note of its recommendations, as there are no short cuts

STEP 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17



Fit the adapter plate up to the gearbox and check that none of the mounting bolts protrude through the adapter – they'll need to be shortened if they do. Trial-fitting everything the whole way through is vital to ensure a smooth final fit-up, and to prevent any headaches during final assembly

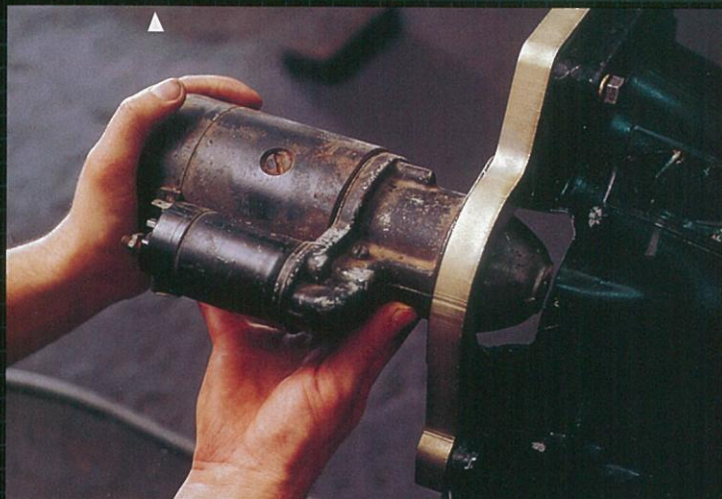
STEP 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17





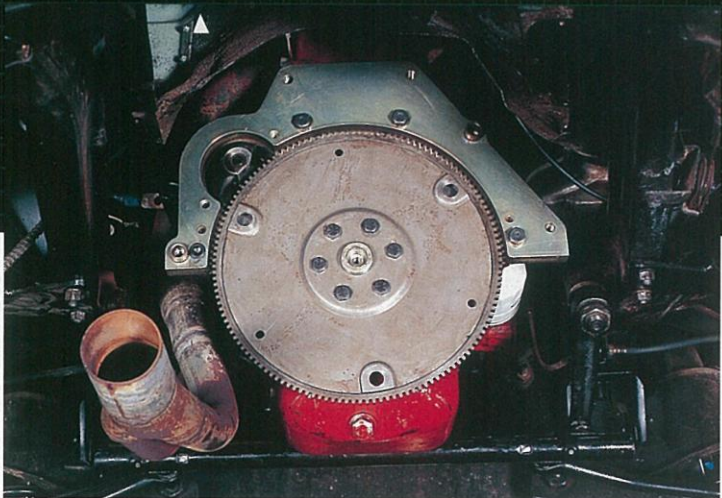
Some metal will need to be removed from the TH700's bellhousing to accept the original starter. With the adapter bolted to the box, use the starter cut-out in the adapter to scribe the starter's position into the bellhousing. Keep removing metal until a neat fit is achieved — probably a little less material than illustrated here

STEP 1 2 3 **4** 5 6 7 8 9 10 11 12 13 14 15 16 17



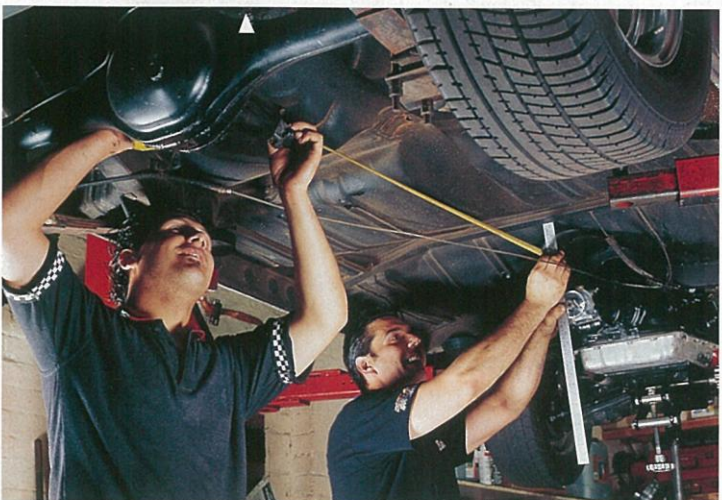
The adapter plate and flexplate are bolted up ready for gearbox installation — note that the conversion uses the original sandwich (engine) plate (not seen). Remove any burrs or high spots from the face of the engine block before assembly. Get the starter's pinion to move forward to check it meshes correctly with the ring-gear

STEP 1 2 3 4 5 **6** 7 8 9 10 11 12 13 14 15 16 17



CRS supplied a new flange and gearbox yoke for a heavy-duty tailshaft — normally a modified six-cylinder HQ unit is the go. Either way, measuring up during trial-fitting allows the new tailshaft to be ready by job's end. The tailshaft shop needs to know the distance from the rear seal of the transmission to the centreline of the rear universal

STEP 1 2 3 4 5 6 7 8 **9** 10 11 12 13 14 15 16 17



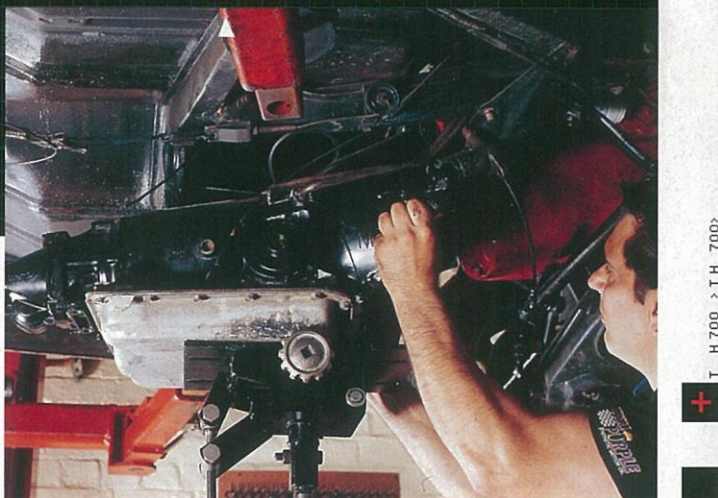
You'll need to source a flexplate. A new one (standard) will set you back about \$80; however, a heavy-duty unit is recommended if you're generating decent power. Either way, the bolt holes will need to be enlarged to accept the larger mounting bolts of the TH700's accompanying torque-converter

STEP 1 2 3 4 **5** 6 7 8 9 10 11 12 13 14 15 16 17



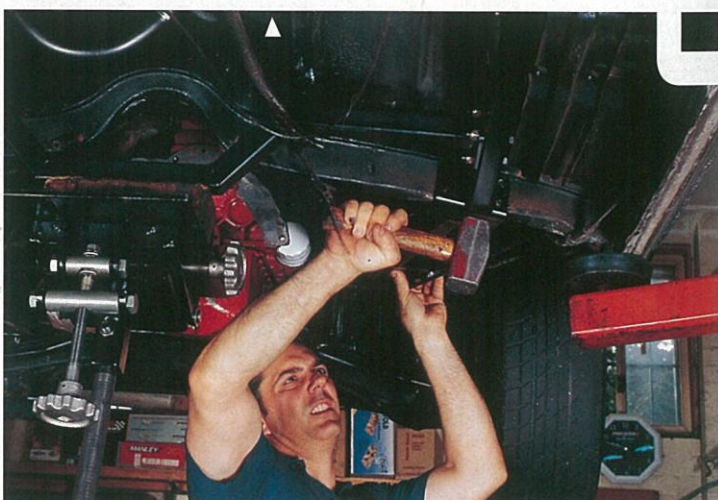
The gearbox will need to come in and out a few times for measure-up and to check clearances. Unlike the original lightweight three-speed, which can be handled by one person, the TH700 is a two-man operation — and make sure you bend your knees. Using a gearbox jack like this example is the hot ticket

STEP 1 2 3 4 5 6 7 **8** 9 10 11 12 13 14 15 16 17



While comprehensive installation instructions are supplied with the CRS underbody brace kit, keep in mind that not all kits fit perfectly. Old cars develop their own personalities with age. Here a floor member that has met with a tree stump or rock is gently persuaded back into position using a hammer

STEP 1 2 3 4 5 6 7 8 9 **10** 11 12 13 14 15 16 17





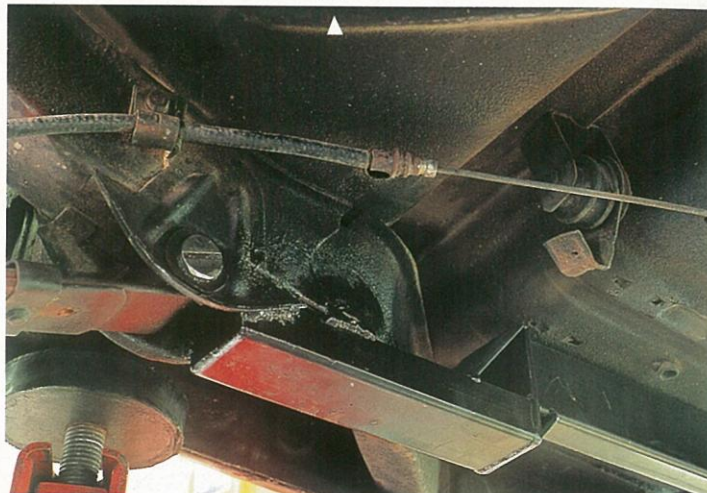
To ensure a snug fit, hold the chassis kit's rails hard against the floor with a gearbox jack (or similar) while the four mounting-holes are drilled. CRS supplies all the necessary bolts for fit-up, including Nyloc nuts

STEP 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17



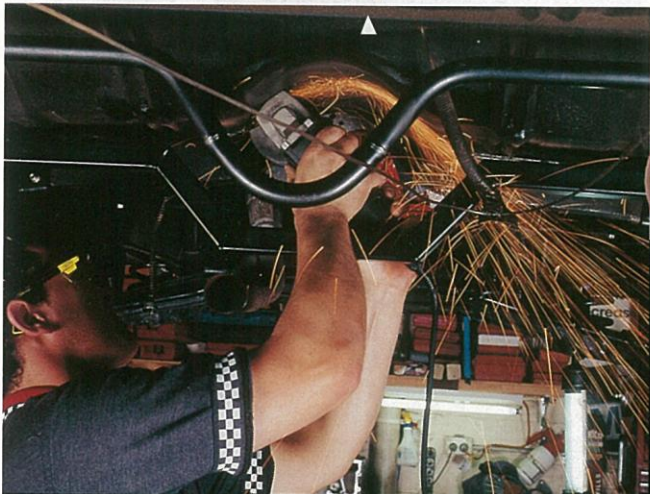
The chassis kit is a bolt-in proposition — apart from the rear of the main longitudinal rails that tie into the spring hangers, which must be welded into place. To ensure overall structural integrity, this welding should be carried out by a qualified person

STEP 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17



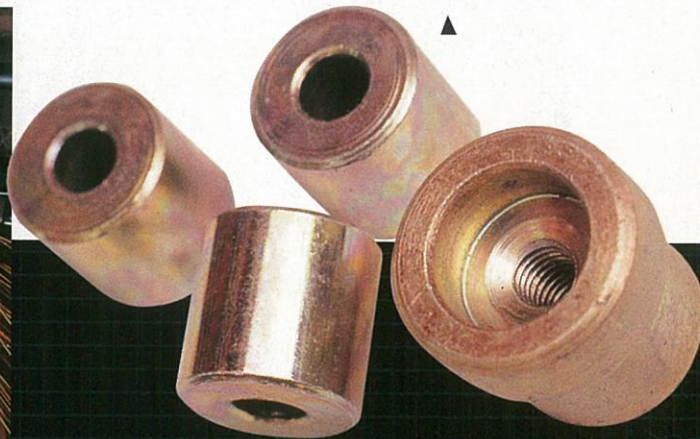
To gain adequate gearbox clearance, a section of an original floor crossmember must be removed. Do not remove this section until the three-quarter chassis kit has been installed. This ensures the unibody's construction and strength are not undermined. Note the bolt-in, round-tube tailshaft catch-bar

STEP 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17



The three smaller bushes are for spacing the converter rearwards so that it mates up correctly with the input shaft of the TH700, while the single larger unit is the new crankshaft spigot bush. When installing the spigot bush, use some Loctite metal adhesive to ensure it stays in place

STEP 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

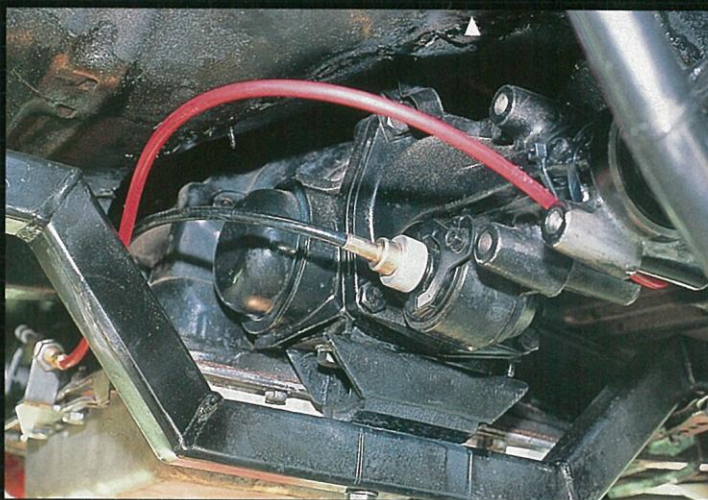


You can see here how the spacers sit between the flexplate and the converter. It's advisable to use a little Loctite to stop the bolts from coming loose. In keeping with the ute's low weight and hot-six set-up, a 2200rpm-9<sup>1</sup>/<sub>2</sub>-inch converter (without lock-up clutch) was recommended for this installation

STEP 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

Although the EK speedo cable screws straight into the TH700, the original had seen better days, so CRS supplied a new cable. To ensure their smooth operation, routing the speedo and shift cables with easy, flowing curves is imperative. CRS offers made-to-order cables for B&M shifters if the cable supplied proves too long or too short

STEP 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17





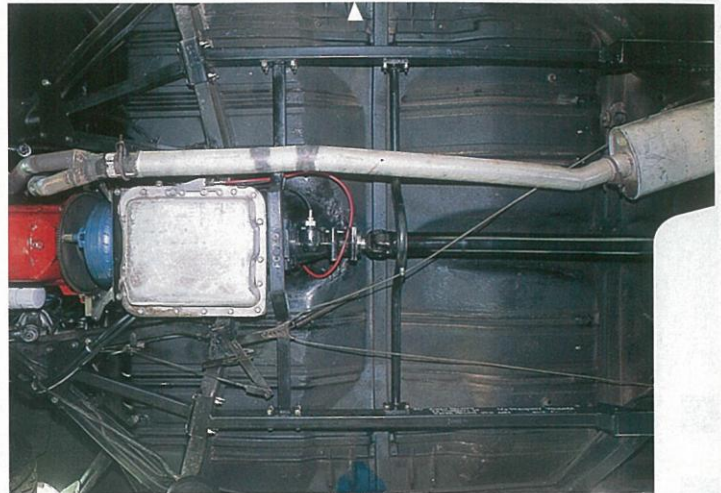
Being a factory manual, the EK's original radiator does not incorporate a transmission oil-cooler. CRS supplies this revolutionary cylindrical cooler, whose internal design swirls the fluid longitudinally, making it hugely efficient yet extremely compact. It's mounted under the lower front edge of the passenger guard

STEP ... 10 11 12 13 14 15 **16** 17



After a tweak or two to the exhaust system (for gearbox and crossmember clearance), the EK's ready to test drive. Note how the gearbox crossmember enables the handbrake to be relocated off to the side, away from its factory location (in the centre), while the tailshaft loop stops the handbrake cable from fouling the tailshaft

STEP ... 10 11 12 13 14 15 16 **17**



### + KICK WHAT?

**CORRECT** adjustment of the TH700's throttle-valve cable (universally known as the kick-down cable) is critical for correct gearbox operation. This – the bottom cable in the picture – does a lot more than just tell the gearbox when full throttle is being applied. Rather, in the TH700, it also operates an internal valve which continuously varies hydraulic line pressures within the box, depending on throttle position – from idle, right through to full-throttle. At idle there must be no slack in the cable, but also no tension. This allows the TH700's throttle valve to begin operating (opening) at the exact moment that the engine's throttle-blades begin to open.

The TH700's throttle-valve must then also reach the fully-open position at the same time as the engine reaches full-throttle. If this ratio-relationship between the two is not spot-on, it will wreak havoc with the operation of the gearbox. Get it wrong and the box will have an overly-harsh or overly-soft shift. Alternatively, it will hold gears too long or bang through all four gears much too quickly. Any of these will result in a gearbox that's unpleasant to live with, while at the same time dramatically shortening its life expectancy.



### + BEHIND THE WHEEL

**WOW**, what a difference! With the TH700 and chassis kit in place, the EK is a completely different car to drive. The difference between the four-speed auto and the three-on-the-tree is chalk and cheese – especially in stop-start city traffic. With the XU-1 spec, 186ci engine and the TH700's low first gearing (3.06:1), the ute launches hard off the line, while the 30 per cent overdrive-fourth gives glorious highway cruising. The 186 purrs along at a lazy 2050rpm at 110km/h (in conjunction with 3.55:1 diff gears and 225/60 R14 rear tyres). Gear changes are seamless and it kicks down to a lower gear exactly when needed – perfect for overtaking in city traffic!

The three-quarter chassis kit has noticeably increased the rigidity of the body and chassis. Pleasingly, this also has a knock-on effect in noticeably improving ride quality and handling dynamics.

While not cheap, the conversion is a huge success and highly recommended. The old EK has never felt so good; indeed, it's a new car!

