

built to take the weight of a V8 engine. A frame that's sturdy enough to do so will cost as much as an engine crane anyway and a decent block and tackle is also fairly expensive. A dedicated engine crane can be had for as little as \$400 if you shop around.

Of course, \$400 is still a fair bit of money. But the fact that you won't use an engine crane all that often means ownership can be spread between a number of people. I've found this approach to work well among groups of enthusiasts who are all into restoring cars.

There are a number of ways to attach the engine to the crane. The simplest is with a couple of bolts and a length of reasonably heavy chain as shown on the orange 308.

One problem with using a chain like this is that anything caught between the chain and the engine will be crushed, broken or scratched. That's why rags are positioned between the chain and manifold in the shots.

Also, unless a swivel hook is fitted to the engine crane, the engine will often twist as it's released from the mounts and withdrawn.

### Balancing act

a better method, and probably the most popular in workshops, is to use a carburettor plate as shown in the shots. These avoid twisting and minimize the distance between the hook on the boom of the crane and the connection point on the engine. This is important because the shorter this distance is, the more clearance you'll have to get the engine in and out.

If you haven't removed your engine before it's a bit difficult to know where the centre of mass is and how it will balance when the engine mounts are unbolted. However, for a V8 one of the forward holes in a carburettor plate seems to be about right.

There are threaded adjuster mechanisms that fit between the hook and the engine and provide fine adjustment over the angle at which the engine hangs, however they also increase the distance between the boom and the engine, reducing clearance. Still, some prefer them.

Removing an engine from a car calls for similar steps regardless of model. Re-fitting is pretty much the reverse of removal with a few differences.

The most dangerous aspect of the job is disconnecting and reconnecting the fuel system. This is made safer by making sure there's no possibility of sparks occurring. So, the first thing to do is disconnect the battery and remove it. Your radiator will have to come out so disconnect the lower hose and drain the coolant from the system. Disconnect the upper radiator hose and the heater hoses from the engine cooling system. Drain the engine oil, too.

### Getting undressed

if the car is an automatic, disconnect the oil cooler lines at the radiator. Make sure all the connection points are plugged or capped off to ensure that no contaminants can get into the transmission system.

Undo the fan shroud and move it backwards to temporarily hang behind the fan. Unbolt the radiator and remove it after making sure that anything else attached to the radiator is also removed. Unbolt and remove the fan and shroud.

Make sure the air conditioner condenser doesn't interfere with the

removal of the radiator. If it does remove it. However, if you can, leave the lines attached if the whole air conditioning system isn't being removed from the car, or it will have to be re-gassed.

It's the same with the compressor. Simply unbolt it from the engine and move it to one side with the lines still attached. Of course, if you're removing the engine as part of a complete rebuild

disconnected. You'll have the air cleaner off by this stage and the actuating cables or rods for the carburettor throttle and choke must be separated from their linkages. And of course, if you're using a carburettor plate to lift the engine, the carburettor has to be removed.

So, disconnect the line from your fuel pump to the carburettor, then disconnect the fuel line from the tank to the pump.

## "MOST AFTERMARKET EXHAUSTS WILL HAVE TO BE REMOVED FIRST; IT'S NOT EASY."

of a car then the air con system will likely have to come out anyway. If this is the case and you want to reuse any components you have to cap every part of the system virtually at the instant it's disconnected to avoid any moisture getting into it.

Undo the wires to your starter motor and remove it. All other electrical connections to the engine must also be removed like the earth strap, gauge sender wires and ignition coil wires. The brake booster vacuum hose and all other vacuum lines also have to be

Catch or mop up any fuel that comes out of the system. Make sure all the open fittings are capped or plugged.

### Tight squeeze

many engines can be removed and fitted with cast factory exhaust manifolds fitted. Most aftermarket exhaust systems will have to be removed but this isn't as simple as it sounds. Engine bays are pretty tight places and it can be extremely difficult to get at all the exhaust manifold bolts.

The Mustang without guards is a

case in point. Leo, owner of Muscle Car ([musclecarfactory.com.au](http://musclecarfactory.com.au), 03 9580 3548), explained that a 427 won't go in this particular car with the headers attached. The engine has to be lowered into the car a certain amount, then the headers have to be fitted and then lowered a bit more to reach certain bolts before being set in final place.

Although engines can be removed and fitted with transmissions attached, here we're covering applications in which they must be separated. To do so, undo the lower pressed cover plate to expose the flexplate/torque converter assembly. Rotate the engine until one of the bolts securing the torque converter to the flexplate is exposed and undo it.

Rotate the engine to gain access to the other bolts. When they're all undone push the torque converter rearwards so the flexplate clears the central locator on the torque converter during lifting.

Set a jack under the front of the transmission and raise it so that it just begins to support the weight of the transmission. Attach the engine crane hook to the lifting plate and raise it until the hook just begins to take the weight of the engine. Undo the bolts holding the bell housing to the block. You'll probably need extension bars to reach all of them.

Finally, you're ready to undo your engine mounts. While there's still some weight on them get the nuts undone maybe half to one turn; just get them moving. Then raise the boom to ease the weight off the mounts. Undo both halves of the mounts so they can be separated. Gradually lift the engine clear.

Getting it out, or in, is a three dimensional effort. It certainly has to go up and down but forward and backwards too, and it may also have twist. More helpers means greater stability through all these operations.

These are the basic steps for getting an engine out. As we said, getting it back in after modification is pretty much the same with a couple of different steps like aligning gearbox input shafts and the like.

We haven't shown a manual transmission because we're going to talk about this in an issue or two when we cover fitting a clutch. In fact, it will probably be on the brown XR. ■



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Some fittings like this power steering pump don't have to be disconnected. They can simply be unbolted and moved to one side.



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You'll need to consider what modifications have been made to the engine. If it has 550hp like this 427 you'll break standard engine mounts.



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Getting the engine in and out calls for movement in all dimensions.



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Things can be tight in an engine bay. Try to operate so that your fingers and hands don't get jammed.



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Don't let engines linger on cranes. Get them onto stands or into cars as quickly as possible.



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Don't lock off the hydraulic cylinder too tightly otherwise it will tend to snap open suddenly – which is what you don't want.



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Ease the engine down into place, let it settle and then tighten the engine mounts.



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Plenty of room in the engine bay, but how to get more bonnet clearance? Simple, undo the front bolts on each side. Then check out how far the bonnet opens then.



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Everything should be pre-fitted before paint. Leo likes to leave the front panels until last to minimize potential for damage.



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Car and powerplant reunited.