We follow P&L Minis while they replaced the standard Mini rubber suspension cones and trumpets with ride height adjustable Hi-Lows and fitted a P&L Minis coil spring insert kit.

Words and photos: Rob Hawkins.

Fitting P&L Minis' coil spring kit

Mini's Moulton dry rubber springs can be replaced with short steel coil springs. They are designed to offer improved handling and ride quality over the rubber cones, although this is down to personal preferences. They can be fitted with OE trumpets (also known as spring struts) or adjustable trumpets (called Hi-Los, Adjusta-Rides or Hi-Lows, depending on the manufacturer), which allow the ride height to be altered.

P&L Minis, in South Yorkshire, demonstrated how to fit a full set of their coil springs which, they say, are suitable for use on Minis with 10, 12 or 13-inch wheels, along with Hi-Lows. All of the parts are manufactured in nearby Sheffield and include progressive coil springs that aim to provide a progressive rising spring rate.

The work involved in removing the old rubber cones and trumpets, and fitting the new parts, can be time consuming, depending on the condition of the old parts and how much space is available in the engine bay. The rear suspension is usually easier, so we recommend starting here to help you feel as though you've achieved something. One of the most awkward parts at the rear is removing the petrol tank(s). This needs to be manoeuvred out of the way so you are able to undo the top damper mount from inside the boot. It's important to take care when manoeuvring the petrol tank to ensure fuel is not spilt and leaks are not generated. Consider safely draining the tank(s) first too. Check all fuel pipes and hoses afterwards.

At the front, space is a problem when it comes to undoing the upper suspension arm's support shaft. This is secured with ¾-inch nuts on either end. The rearmost nut can be reached from within the wheel arch, but the front nut, and thrust collar, isn't so easy to reach, so you have to locate it in the engine bay. On the nearside, the radiator is in the way but, if the front grille can be removed, there is usually space to feed a socket and long extension bar through.

Most of the tools required for this conversion are typical of those needed to maintain a Mini (see the Toolbox list on page 45). On UK Minis from 1976-onwards, there is a single 1 5/16-inch front subframe tower bolt at each corner of the crossmember within the bulkhead, which needs to be undone to reveal the top of the front rubber cones, allowing access for the cone compressor tool. On earlier dry suspension Minis, there's an access hole for the cone compressor tool, which may be covered with a rubber grommet that can be prised off. On some pre-Mk4 Minis there is a steel locking plate covering this access hole and it has to be removed first). The thread inside the front rubber cones should be metric on Minis from 1976-onwards, so a metric compression tool is required. On pre-1976 dry suspension Minis, the original rubber spring thread should be UNF. Most Mini specialists sell each type of compression tool.

It's worthwhile renewing the suspension knuckles when fitting new coil springs and Hi-Lows. The old knuckle and nylon cup can be extracted and reused, providing they are in good condition. One of the biggest problems with the knuckles and cups concerns keeping the rubber gaiter in position on the lip of the nylon cup, especially if the nylon cup is too short and is tapped into the radius arm or front top arm too far. If the nylon lip is too close to the suspension arm, the gaiter will not wrap around and will constantly slip off, causing an MOT fail and short knuckle life. Once the knuckle joint has been properly packed with grease, the gaiter must be slipped onto the nylon cup and then the whole lot has to be inserted into the radius arm or top arm but not so thoroughly as to displace the gaiter from its lip. P&L Minis has found this problem is less prominant with OE suspension knuckles and nylon cups.

The coil spring inserts can be fitted with standard trumpets, should you not require adjustable ride height, which saves almost £50 on total costs. If Hi-Lows are fitted, then the ride height (if satisfactory) must be measured before work commences and adjusted afterwards, which we covered in the September 2016 issue. Handling and road holding buffers may also take advantage of adjustable trumpets to get your Mini's corner weights optimised.

REAR SUSPENSION:
REMOVING THE OLD RUBBER CONES AND TRUMPETS

01

Open the boot, remove everything inside, such as spare wheel, tools and also the battery, then undo the 9/16-inch nut that secures the top of the offside rear damper to the bodywork (see the next step if you have a right-hand petrol tank). Put your hand inside the wheel arch to see if the damper spins as the nut is turned. If it does, hold the top of the damper's body with vice grips.

02

The top mount nut for the nearside damper isn't so easy to reach because the petrol tank is in the way (this also applies to a Mini with a right hand tank). So the petrol tank will need to be removed once drained (if possible) and the battery must also be disconnected. First remove the filler cap and undo the ½-inch nut and bolt for the tank strap. The nut and bolt may be a different size, such as 5/16-inch.

03

Detach the wiring at the tank for the fuel sender/gauge on the side of the tank (for fuel injection tanks disconnect the power feed at the top of the tank too. Fuel lines may also need to be disconnected). Carefully manoeuvre the petrol tank's filler neck into the boot and move the tank so that you can reach the nearside mounting nut for the damper. Check the fuel feed pipe from the tank doesn't leak and make sure fuel doesn't spill out of the filler neck. Only do this in a well-ventilated area with no electrical motors or switches operating and appropriate breathing and fire safety equipment available.

04

With the top mount nut undone for both of the rear dampers and the bottom nut loosened, raise the rear of the Mini, support it on axle stands and remove the rear wheels. Compress each damper from inside the wheel arch and pull it down to the position shown here, allowing the radius arm to drop down as well.

05

Use a hammer and wide-faced chisel to release the end of the trumpet from the rubber suspension cone. The two parts may appear to be seized together, so they will require some force with the hammer and chisel to separate them.

COSTS AND CONTACTS

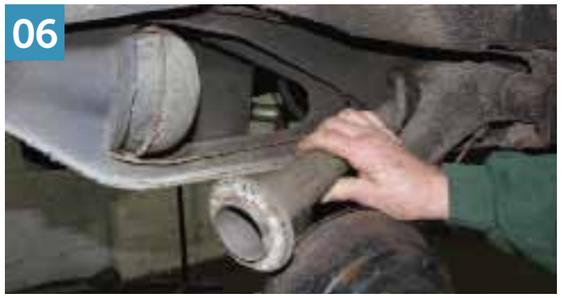
P&L Minis, 34 High Street, Thurnscoe, Rotherham S63 0SU.
+44 (0)1709 889922
w.plminishop.com

P&L coil spring conversion kit: **£238.80**

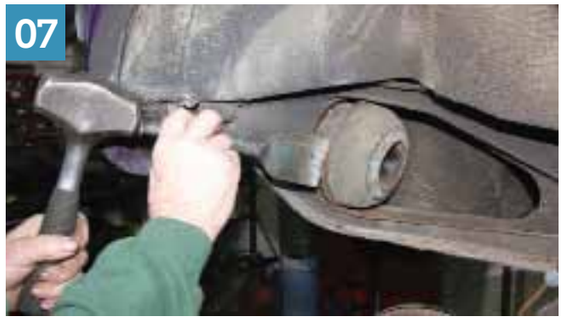
Four coil springs and two rear toppers: **£184.80**

Suspension knuckles: **£3.24 each**

REAR SUSPENSION: REMOVING THE OLD RUBBER CONES AND TRUMPETS *(CONTINUED)*



Once the trumpet has been separated from the rubber suspension cone, try to extract the entire trumpet from within the wheel arch. The front end of the trumpet is fitted into the radius arm with a knuckle. The trumpet can be refitted with the new spring, but not if you are fitting Hi-Lows.



Remove the rubber suspension cone from the rear subframe. Its metal base may be stuck in the subframe so use the hammer and chisel again to release it. Each rubber cone will be replaced with a coil spring.

If the knuckle on the end of each rear trumpet has recently been renewed and you are confident you can extract the nylon cup that's probably lodged inside the radius arm, then the knuckle can be drifted out of the old trumpet. You'll need a long drift or metal rod and a hammer to remove it.

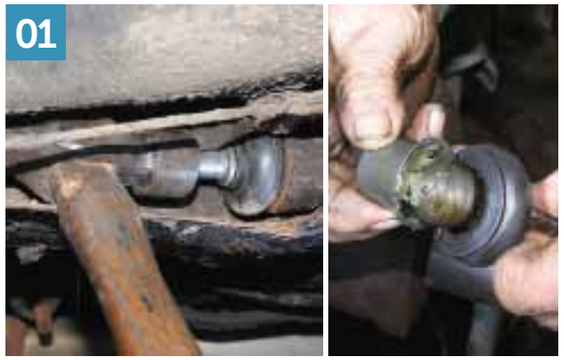
If you are reusing a knuckle, then once it has been extracted, inspect the part of it that sits inside the trumpet. It may have a small raised section, which will need to be filed down to allow it to be fitted inside the new rod for the Hi-Lows.

Look inside the front of the rear subframe and radius arm for a nylon cup (ball socket) where the end of the trumpet sat. This nylon cup needs to be extracted and should ideally be renewed as it's a cheap part at around £1. It is fitted onto the end of the knuckle.

To remove the nylon cup try using a pair of vice grips to extract it. If the cup is old and brittle, the edges of it will probably break, so it must be renewed. It may be possible to lever it out with a screwdriver, but this will usually damage it, so it must therefore be renewed.

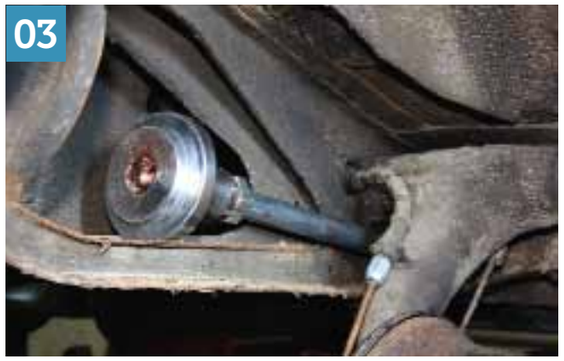
If the nylon cup cannot be extracted with a screwdriver or vice grips, warm it up with a heat gun or hairdryer and try again. Once it has been removed, de-grease and clean inside the housing with abrasive paper to remove any dirt. Remember to leave the housing spotlessly clean before a new nylon cup goes in.

REAR SUSPENSION: FITTING THE SPRING INSERTS AND HI-LOWS



Fit the nylon cup (the old one if it's in good condition, or a new one) over the old or new knuckle with fresh multi-purpose grease, then position it into the housing on the radius arm. Lightly tap it into position with a hammer.

Assemble the new Hi-Low with its short length of threaded bar and two nuts, applying a smear of copper grease to the threads. Wind the Hi-Low's thread in fully but do not tighten either of the nuts. This will be adjusted when it's fitted on the Mini. Fit the new rod into the Hi-Low with a smear of copper grease.



Manoeuvre the Hi-Low and rod inside the subframe and fit it onto the end of the knuckle that was fitted in step 1. It helps to have the radius arm hanging down at this stage to ensure the knuckle is at the correct angle.

Fit the coil spring (it can be fitted two ways and there is no difference) along with a new alloy mounting plate (topper) that must be fitted over the rear of the spring and against the subframe. There should be enough space to fit these parts, especially if the Hi-Low is fully wound in.

Ensure the damper is vertical, then raise the radius arm so the top of the damper is inserted into its upper mounting point. Refit the rubber bush, washers and $^{9}/_{16}$-inch nut from within the boot with a new locking nut (some dampers have two nuts per side). Wind the thread of the Hi-Low out until the coil spring is secure. The ride height will need to be adjusted after all four coil springs and Hi-Lows have been fitted. Remember to re-torque the damper lower mount securing nut.

TOOLBOX

- Ball joint splitter
- Breaker bar
- Chisel
- Copper grease
- Hairdryer
- Hammer
- Impact driver
- Multi-purpose grease
- Penetrating fluid
- Pliers
- Pry bar
- Mini rubber-cone compression tool
- Screwdrivers
- Long socket extension
- Sockets/spanners: $^{7}/_{16}$-1 $^{5}/_{16}$-inch, long-reach 1½ socket (for dome nut)
- Trolley jack and axle stands or ramp
- Vice grips
- Low-range torque wrench (up to 75lb/ft)

NB: *MiniWorld* recommends use of correct imperial spanners and sockets rather than metric equivalents, where applicable.

FRONT SUSPENSION: REMOVING THE OLD RUBBER CONES


Raise and secure the front of the Mini on axle stands and remove both front wheels. Open and secure the bonnet, then undo the large 1 5/16-inch tower bolt in each rear corner of the engine bay. This only applies to (UK Mk4-on) Minis from 1976-onwards. On earlier models with twin tower bolts or studs each side, there will be a rubber grommet to extract or a steel blanking plate held by two bolts or studs. In both cases, this allows access to the top of the rubber cone to compress it. Fit a rubber cone compression tool with the correct thread, which maybe easier with the bonnet removed, (metric for 1976-on single tower bolt per side, possibly metric for earlier Minis, if they have had fairly recent replacement doughnuts) to compress the rubber suspension cone and allow the front suspension to be dismantled. The photograph here shows an empty engine bay but, unless you are working on a bare or stripped Mini, there will be more parts around where the compression tool is inserted.

Fit a rubber cone compression tool with the correct thread, which may be easier with the bonnet removed, (metric for 1976-on single tower bolt per side, possibly metric for earlier Minis, if they have had fairly recent replacement doughnuts) to compress the rubber suspension cone and allow the front suspension to be dismantled.

From within the wheel arch, undo the 9/16-inch nuts that secure the top and bottom of the damper in position. Collect the nuts and any washers and spacers before easing the ends of the damper off the upper and lower mounting points and lifting it out.

Undo the 11/16-inch nuts that secure the upper ball joint to the upper suspension arm. If the thread of the ball joint spins when undoing the nut, raise the hub with a trolley jack to exert some load on it. Separate the upper arm from the ball joint using a ball joint splitter.

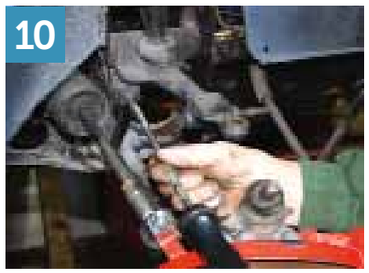
Using an open-ended 3/4-inch spanner, try to slacken the rearmost nut that secures the upper arm pivot shaft. This may be tight and the shaft may rotate with it. If so, try gripping the nut on the other end of the shaft, which can be reached from the engine bay.

Fully undo both 3/4-inch nuts on both ends of the upper suspension arm's pivot shaft. The front nut is awkward to reach, especially on the nearside where the radiator is located. A socket and long extension bar can usually be fitted if you firstly remove the front grille.


Remove the cover over the front of the upper suspension arm's shaft (the thrust collar retaining plate). This is secured with two 7/16-inch bolts. The outer bolt has a nut, which can be reached from within the wheel arch, and the other has a captive nut.

Using a long flat-blade screwdriver and a hammer, release the upper suspension arm's pivot shaft by tapping the back of the spacer from within the wheel arch. The photograph here shows where to position the screwdriver and it also shows the spacer on the shaft after it has moved.

The upper suspension arm pivot shaft has to be extracted from the front, which isn't as easy as it sounds, especially if there is a radiator in the way on the nearside.



The upper suspension arm is almost ready to be removed. First, remove the rubber rebound buffer, aka droop stop, for the upper arm. This is secured with one crosshead screw, which will probably be seized, so spray over it with penetrating fluid and tap the screwdriver into the screw with a hammer to help release it.

The upper suspension arm can now be removed from within the wheel arch, followed by the short trumpet – both parts will probably come out together when they are manoeuvred out.

Undo and remove the rubber cone compression tool, then extract the old rubber cone from inside the subframe tower. The rubber cone has to be tilted sideways so that it can then be removed from the turret.

TORQUE FIGURES

Front subframe single tower bolts (1976 onwards): **49lb/ft (67Nm)**

Front upper arm pivot shaft 3/4-inch nuts: **53lb/ft (72Nm)**

Front upper ball pin retainer (domed nut): **75lb/ft (102Nm)**

Front upper ball joint lock nut (retaining nut): **38lb/ft (52Nm)**

FRONT SUSPENSION: FITTING THE SPRING INSERTS AND HI-LOWS

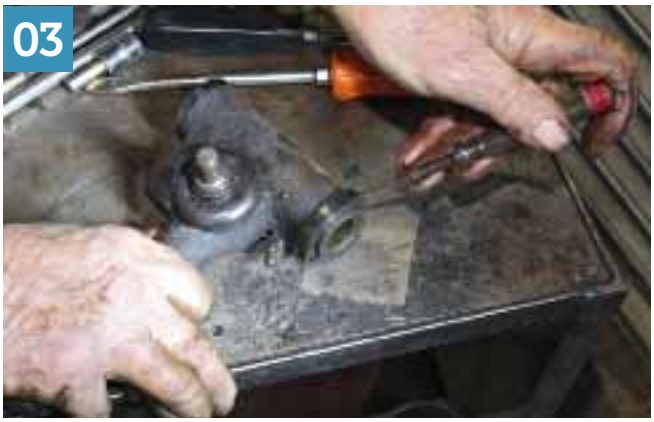
01

If you want to reuse the old nylon cup and knuckle, the knuckle can be drifted out of the end of the trumpet using a suitable drift or metal rod. If you are fitting a new nylon cup and knuckle, the old nylon cup must be removed from the upper arm.

02

Armed with either a new knuckle and nylon cup, or the old parts, apply a smear of multi-purpose grease to the ball of the knuckle and inside the cup, then fit the cup over the ball. Make sure the housing in the top arm is clean, then fit the knuckle and nylon cup into it and tap it into position with a hammer.

03



Make sure the rubber dust cover on the front side of the upper arm (where the shaft fits through) is in the position shown here. This will allow the end of the upper arm to sit in the subframe and not damage the dust cover.

04

Assemble the Hi-Low's threaded bar and trumpet and apply copper grease. Wind it fully in at first. It will need to be adjusted later when the ride height of the Mini is measured. Fit the trumpet into either end of the coil spring.

05

Manoeuvre the upper arm, Hi-Low, trumpet and coil spring into position from inside the wheel arch. This can be a little awkward, so take your time to ensure each part fits together. Once the arm is secured you can move the rubber dust seal into position.

06

Refit the upper suspension arm's shaft, making sure the spacer is fully seated inside the hole in the subframe. Refit the ¾-inch nuts and spring washers at either end of the shaft and tighten them progressively (they should be tightened to 53lb ft or 72Nm). Refit all remaining parts and set the ride height according to the fitting instructions (see September 2016 issue of *MiniWorld* for further suspension information. Buy from http://shop.kelsey.co.uk).