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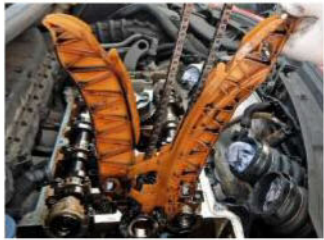
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# Scrapping roadworthy vehicles

Mazda is publicising its scrappage scheme using a model from its past. All its part-exchanged vehicles will be removed from the road.



► It's happening up and down the country. Cars and vans with current MOT certificates are being traded in by the lure of recent manufacturer scrappage deals, offering vast money off new 'less polluting' vehicles.

Most of the manufacturers stipulate that their scheme covers any vehicle registered on, or before, December 31, 2009 (pre-Euro 5) against a selection of latest Euro 6 petrol or diesel models.

OK, some of those motorists giving up on their vehicles are doing so because its current state of roadworthiness requires work to gain a new MOT, and others are perhaps finding it an easy route to off-loading their old motor without the shock of 'real' trade-in values or the potential hassle of selling privately. Rock up at the dealer and come out a few hours later with fresh new metal – your old vehicle, no matter what its current value (ie, much less than the given trade-in value), taken as down payment.

That's all well and good, but the vehicles traded in at dealerships aren't being offered to anyone apart from a recycling centre. That means there's no chance of spare parts being made available to help keep other vehicles on the road and you lose aftermarket parts sales for each vehicle that is scrapped.

Vauxhall was the first to start a scrappage scheme earlier this year, I believe, having had them in place in 2015 and 2016 for limited periods. In this year's scheme, it scrapped more than 5000 vehicles over a three-month period, with 63% of that figure coming from other marques.

One criticism of the 2009 UK Government scrappage scheme was that many classics and future classics were destroyed. Unlike most companies, Vauxhall recognised this as being bad publicity, so it instructed its approved recycling partner, Autogreen of Daventry, to identify any vehicles manufactured prior to 1991 that were presented through the scheme. Vauxhall's Luton HQ then informed any relevant classic owners' clubs giving them the opportunity to purchase potentially scarce parts.

Simon Hucknall, PR manager for Vauxhall Product and Heritage, says: "The Scrappage Allowance is designed to capture vehicles that are beyond economic repair and, given the low value of scrap metal, recycling of parts is vital to the scheme's viability. We're also confident that the number of genuine classics over 25 years old presented to the scheme will be minimal, especially

given the steady rise in value of even the most mainstream collectors' cars in recent years. But if we do see any, our 'safety-net' will ensure that classic car owners and clubs will benefit."

Ford and Hyundai started a similar scrappage scheme in August. Ford have incentives of between £2000 (Fiesta) and £7000 (Transit) off a variety of models. But they aren't concerned about potential future classics being destroyed – the Ford scheme scraps all traded-in vehicles. Meanwhile, Hyundai will scrap Euro 1-3 emission vehicles and Euro 4 models can be traded in.

With the new 67-reg coming out in England, Scotland and Wales on September 1, other manufacturers have now instigated scrappage schemes.

Citroën, DS Automobiles and Peugeot have changed the rules by taking in vehicles registered before December 31, 2010; all vehicles will be recycled.

On the other hand, Kia is offering a £2000 scrappage bonus against any car more than seven years old – this applies to a purchase of a Picanto or Rio model. The Kia dealer will arrange for the old vehicle to be destroyed through regulated channels. The scheme runs until the end of December 2017.

Renault offers incentives of up to £7000, but the scheme excludes the Twingo, ZE electric vehicles and the all-new Koleos. All vehicles must have been owned by the customer for more than 90 days, and all vehicles will be permanently destroyed.

Suzuki has a one-month scrappage period until September 30, offering up to £2000 on selected models. All vehicles are sent to the Autogreen recycling centre (as with Vauxhall).

Fiat/Chrysler Automobiles offer a similar deal with vehicles registered before December 31, 2009.

Ironically, given the recent 'dieselgate' scandal, VAG is offering incentives to scrap all Euro 1-4 registered vehicles. That's one way of cutting emissions!



Young drivers are constantly tempted from their old models into new by manufacturer deals, including PCP plans, cheaper insurance and free servicing. This could mean some youngsters never having to lift the bonnet to do maintenance checks – manufacturer warranties and servicing will keep them on the road. Having a PCP on a new car is a way of making cheaper monthly payments over three years and either paying off the outstanding final instalment (known as a balloon payment) or else chopping in the vehicle for another new make/model.

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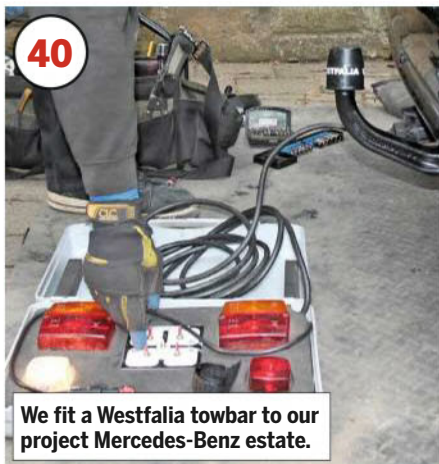
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# DIY PAINT REPAIRS

Scuffs and scratches can really spoil the appearance of a well-maintained car. As a professional repair, or respray, can be pricey, **Rob Marshall** looks at more affordable DIY options.

**A**ccidents happen. Whether brushing your car against a hedge, making light contact with a bollard, or wiping a dusty panel innocently with a hand, all of these seemingly innocuous actions can damage the soft paint that is designed to enhance and protect the bodywork. Even using incorrect products and poor wash techniques can result in swirl marks, the build-up of which causes a noticeable dulling of the finish. Apart from looking unsightly, scruffy paint can also knock hundreds of pounds from your car's value,

DIY spray painting can provide decent results, provided that you are patient and prepare the surface – but there are alternatives before breaking-out the rattle cans.



or present unexpected costs, when the time comes to hand back a leased vehicle.

Naturally, prevention is better than cure. For example, choosing parking spots carefully will reduce the risk of someone damaging the paintwork with their clothing, shopping bags, or a carelessly opened door. For

concise information on correct paint maintenance, consult our detailing series in the May and July 2016 issues of *CM*. Consider also applying a separate layer of wax, which is an inexpensive method of reducing the risk of light scratches, even though reapplication tends to be required every few months.



Scratches on clear coats stand out, especially on dark colours, because the marks on the lacquer appear white. However, these scratches should require no painting to remedy.



◀ Problems that afflict the metal, such as rust bubbles and scratches that have been caused by poor preparation work by a bodyshop, cannot be rectified without removing the paint.



▶ Metallic paint can suffer from peeling lacquer, which reveals the duller base coat beneath it. The only cure is to repaint it.

## DEALING WITH DEFECTS

► Regardless of the paint type, scratches and stone-chips permeate the top layer. The question is, how deeply? Depending on the response, three repair methods can be considered.

The first option is to reduce the level of the surrounding paint until it's equivalent to the lowest point of the scratch. Alternatively, layers of paint can be added to the defect, prior to the excess being removed from the surface. The final option is respraying, which can be performed either by a bodyshop, or with DIY aerosol cans that are readily-available through automotive accessory shops and motor factors.

Ian Sealey and Rich March of UK

**Wet-and-dry sandpaper, compounding pastes and even polish all work by removing a fine top layer of paint. This is why professional detailers use a paint depth gauge to avoid the risk of abrading through either the base, or clear coats. Years of polishing can result in primer being exposed (see photo), necessitating a respray.**

Detailing of Cirencester, our technical partner for this feature, say the defect's depth and location will dictate the most appropriate action and they

advise that you can perform a simple test by sliding a fingernail across the scratch: if a notch can be felt, fresh paint will be needed.

### The anatomy of paint

Older cars, many of which reside within the tax-exempt Historic classification, were painted with single-pack top coats from new. The coloured finish contains solvents that evaporate after being applied and it was this process that made the paint dry; manufacturers then sought to speed-up the process by using heat to maximise productivity.

Two-pack paints became more popular from the 1980s. These cure chemically, by using a hardener additive that is mixed with the paint, again being sped-up with ovens. This results in a far harder finish that is less resistant to oxidation (colour fade), caused by ultraviolet rays breaking down the pigments within the colour coat. To protect and enhance this coloured paint (which is called 'base coat' in the trade), a 'clear coat' translucent protective layer started to be offered by car manufacturers. Metallic and pearlescent paint finishes involve adding reflective colour flecks into either the base, or clear coats (or both) – a profitable

optional extra for most carmakers. While clear coats offer a further layer of protection to the colour, the UV-resisting ingredients still degrade naturally, allowing the base coat to fade beneath.

### Buffing-out

The easiest option is to remove layers of surrounding paint, but Ian Sealey of UK Detailing advises caution: "While modern car paint is very resilient, it lacks depth and DIY users must be careful not to break through either the clear coat, or the base coat and into the primer."

Should you make this mistake, the only way to rectify the damage is through repainting, which can be very expensive. Ian says: "Very often, to make a seamless blend between new and old paint, a small defect on a car's flank might mean that the entire side of the car would need a respray."

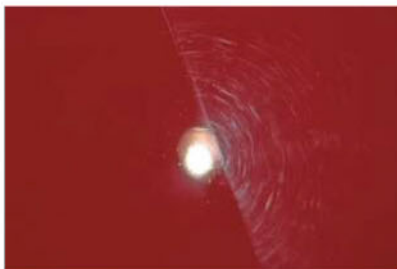
Both DIY rubbing compounds of varying grades, as well as scratch remover products, are available to DIYers and professionals alike. Many trade products, however, are designed to

be applied with a rotary, or dual-action polisher, rather than a cloth, and may not be appropriate for domestic use. To save both time and effort, you might wish to work across the scratch with 3000-grit wet-and-dry sandpaper, using a soap solution that provides a degree of lubricity and reduces the danger of working through the paint completely. The resulting dull haze can be polished to a sheen with abrasive pastes – either rubbing compound, or scratch remover, followed by a polish – before the area is protected with a coat of wax.

### Filling the gap

Dealing with deeper defects is riskier and it is important to manage your expectations accordingly. "Such repairs are not of bodyshop quality," says UK Detailing's Rich March. "While everything depends on the nature of the damage and where on the vehicle it has occurred, paints that are safe for DIY use are not as long-lasting as professional products, largely because of safety aspects."

► Poor car washing techniques cause many fine scratches, called swirl marks, in the finish. Use a mobile phone torch to look for them. A fine rubbing/cutting compound and polish should eradicate the marks – note the difference between left and right.



◀ These attempts to touch-up the scratches on an Alfa Romeo Spider's rear bumper have made things look worse, not helped by the poor colour match and excess paint that has spilled over the repair areas.



Should you choose to paint your vehicle, ensure that any replacement paint has been mixed properly. Pre-mixed aerosol cans tend to offer a fairly good colour match, but ensure you shake them before spraying.

# DIY PAINT REPAIRS

Laden with isocyanates, bodyshop-grade two-pack paints are dangerous when inhaled and should not be used outside of a filtered, air-fed paint booth, which is out of the typical DIYer's reach. The only option is to rely on air-drying solvent-based paints, but you are still required to wear a breathing mask and all painting must be carried-out in a well-ventilated area.

In our non-spraying examples (see Steps 37-47), we used the Chipex system, which is a comprehensive kit costing £29.99. While you could spray cheaper aerosol paint into a clean receptacle and dab it on with a small brush, such paints are very thin. The Chipex formula is thicker and faster-drying. Not only is no primer required but, for modern finishes, no clear-coat is needed afterwards. However, you must lower your expectations with such repairs. The final result should improve the cosmetic appearance of a car from a distance but you may be disappointed if you are expecting a truly flawless repair. In some cases, that may be achievable only after an expensive visit to a paintshop. Yet, a number of professional companies, such as Chips Away, can carry-out localised repair work without resorting to extensive repainting.



**ROB'S TOP TIP**  
Assess carefully which repair technique is best for the type of damage and its location.

## DIY SPRAYING

▶ The final DIY option is suitable for larger areas and is closer in methodology to those used by a bodyshop. As with all repairs, the location of the damage will tell you how far you should extend the work area beyond the flaw. Should you be confronted with a small panel, such as a fuel filler cap, it would be easier to paint the entire thing. However, painting a complete door skin, for example, tends to not be feasible with an aerosol can.

If possible, one alternative for a larger panel is to paint a section edge-to-edge. This explains our decision to paint an embossed bumper panel in our example (see Steps 1-36), which has defined boundaries. The alternative is much harder to achieve, which is to paint a localised area and blend-in the new colour with old after the paint has dried – the newer the car, the better the colour match will be of the replacement paint. Another option is to blend the new paint into a curve, where the change in contour will disguise any minor colour differences.

You should accept that your objective is to make any damage look better and that a perfect repair might not be possible without professional assistance. Aerosol can paint is not only much softer than two-pack professional blends, making it more prone to future scratches, but it is also more vulnerable to fading. Nevertheless, one huge advantage with DIY painting is that, should you make a mistake, you can simply wipe away the paint with cellulose thinners and start again.



### Thanks to:

The Professional Valeters and Detailers' Trade Association [www.pro-valets.co.uk](http://www.pro-valets.co.uk)

Chipex [www.chipex.co.uk](http://www.chipex.co.uk)

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Rich March, John Painter, Ian Sealey and Bert Youell



## DIY PAINTLESS LIGHT SCRATCH REMOVAL



**A** ◀ These small scratches on a rear wheelarch are typical of minor damage, caused possibly by a coat button, or a rivet from a pair of jeans.

**B** ▶ Deeper scratches can be buffed with 3000-grit wet-and-dry sandpaper, prior to an abrasive paste being applied either to a polisher or a microfibre cloth.



**C** After being applied evenly to the pad, professionals move a rotating dual-action polisher head evenly around the damaged area.



**D** After the compound has dried and buffed-off with another microfibre cloth, sufficient clear coat should have been removed.



**E** Applying wax will not only enhance the colour but also protect the paint against further damage and UV degradation.

Continued on page 10



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## ROB'S TOP TIP



You can use newspaper to mask your car, although bodyshop masking paper costs less than £10 per small roll.

## DIY AEROSOL CAN REPAIRS



**1** This car had suffered from a scrape that had not only penetrated the paint but also gouged the plastic deeply.



**2** Fortunately, most of the damage had been confined to the indented part of the bumper that, on this car, is a moulded portion that couldn't be unclipped.

**3** To remove any contamination, including polish and old wax, the damaged area and surroundings require wiping down with a panel-wipe solvent.



**4** As it is easier to paint the entire bumper portion, its edges were masked after the solvent had evaporated. Use good quality masking tape from a bodyshop supplier.



**5** The tape provides protection to the surrounding paintwork. Starting with 320-grit wet-and-dry, the damaged section was flatted to remove any protruding plastic.



**6** Moving to 400-grit wet-and-dry, used wet with cold water, the rest was rubbed down, to provide a key so that new paint will adhere satisfactorily to the panel.



**7** Once the surface was level, a distinct gouge remained that had to be filled. First, however, the sanded area was cleaned with a panel-wipe solvent.



**8** An air-drying 'stopper' can be used, or a two-pack body filler, as pictured. Follow the instructions to mix the filler and its hardener to an even-coloured paste.



**9** Prior to applying the filler to the surface (pictured), ensure that it is mixed to an even colour and is not streaked, or else it will not cure entirely.



**10** You can use a flat block with 320-grit wet-and-dry sandpaper to rub down a small area like this. Note that excess filler remains at the top of this repair.



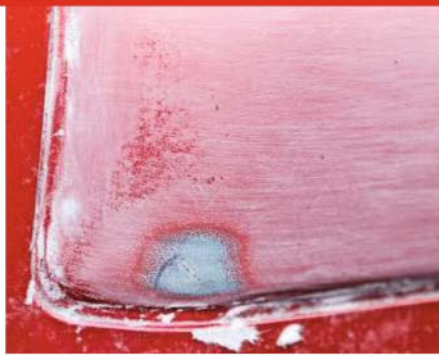
**11** This is the repair smoothed down; if the scrape is deep, you might decide to apply a further filler layer. Small marks can be filled with filler primer paint, or stopper paste.



**12** As it is easier to paint the entire section, rather than blend the new paint with the old, the surface was rubbed down again with 400-grit wet-and-dry (used wet).



**13** Remove the tape, ensure that the surface is dry and wipe down the repair area and its surroundings with panel-wipe solvent.



**14** Shiny, non-dulled areas indicate portions that have not been keyed properly by the sandpaper. Note the small imperfection that has been keyed down to the primer.



**15** Small areas, especially those that are difficult to reach with sandpaper, can be keyed with an abrasive Scotch Brite pad, which looks and feels like a Brillo pad.



**16** Use panel-wipe solvent again to clean the work area. If you leave the masking tape in place for too long when wet, the solvent will remove any lingering residue.



**17** Re-mask the edges carefully. Apply sufficient masking paper (newspaper is a good substitute) to prevent any surrounding paintwork being damaged by overspray.



**18** Here is an area of damage on the other side of the bumper. Note that the grey colour is the original plastic primer, while the black hue, just visible, is bare plastic...



**19** ...which requires a special plastic primer so that the paint can adhere properly. If you sand through the paint on a metal panel, apply etch primer.



**20** If plastic primer is not used on bare plastic, the new paint will chip-off within a very short period of time, possibly making the car look worse than before.



**21** Single-pack, air drying filler primer is available in aerosol cans and has the consistency of custard. Be sure to spray it in thin layers only...

**22** ...and wait for each coat to dry, before building up the layers. Here, six thin coats have been applied over the damaged area.



**23** Painting up to the tape, positioned to the right of the moulding, would have created a hard edge, so the paint layers were 'feathered'.



**24** Once dry, the filler primer layer had covered the imperfections. You might wish to apply air-drying stopper to any small indentations at this stage.



## DIY AEROSOL CAN REPAIRS *continued*



**25** With the masking removed, use 500-grit wet-and-dry sandpaper (used wet) and a flat block to sand down the filler primer, to achieve a smooth and even surface.



**26** Once flatted, the filler primer should be feathered-out so that it blends in evenly with the original paintwork. No hard edges must be evident (compare with Step 14).



**28** Again, use panel-wipe solvent with fresh kitchen roll to clean the surface of contaminants, including grease and silicon, which could react with the new paint.



**29** Spray the base coat in thin layers only. Commence by applying 2-3 coats of colour over the areas with the greatest colour contrast.



**30** Build-up the layers and work either side of the filler primed area to ensure that the colour match remains even. Here, the panel was painted up to the masking.



**31** It might be tempting to apply too much paint, or not be patient enough for the paint to touch-dry between layers. If this happens, the paint will sag.



**32** You'll need to let the paint dry for long enough, so that it can be sanded back gently using 500-grit wet-and-dry, to remove unsightly sags, or runs.



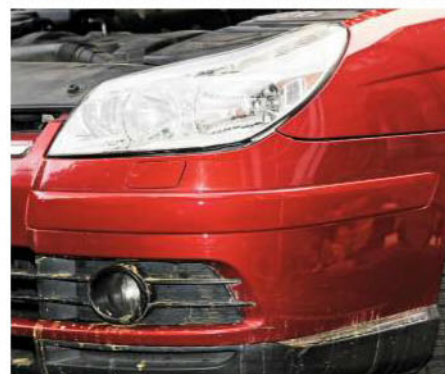
**33** Here, sanding down the sag has revealed the filler primer. The colour must be built-up once more in layers so that the undercoat can no longer be seen.



**34** If a clear coat is required, apply two even layers after the base coat has dried sufficiently. Adjust your technique, because lacquer paint can be thinner...



**35** ...than the base colour coat. Applying too much will create sags and runs; applying too little will create an ugly orange-peel effect. Experiment beforehand.



**36** After several hours, remove the masking tape carefully. After a day, the paint will have hardened sufficiently but avoid using polish, or wax, for several weeks.



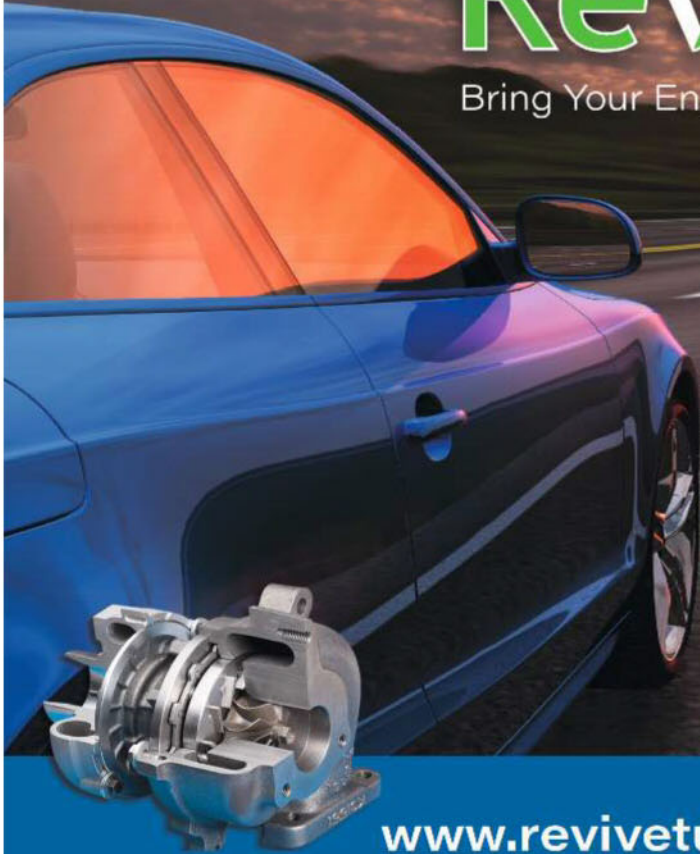
### ROB'S TOP TIP

Painting outside on a warm, still day is ideal, but be wary of insects and airborne dust.

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**ROB'S TOP TIP**  
Should there be a risk of dust landing in your fresh paint, wet the floor with water.

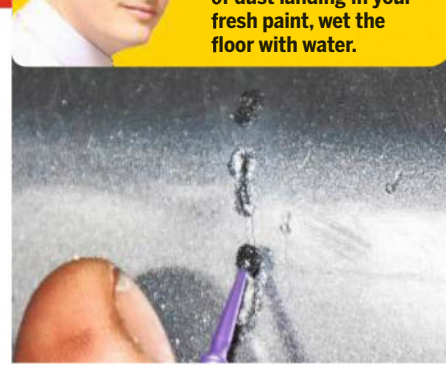
## STONE CHIP REPAIR



**37** Smaller chips, such as these marks on a MINI's rear bumper, can be made less obvious by touching them in without resorting to painting, which can take hours.



**38** Apply either panel wipe, or cellulose thinners, to the scratch mark, will remove contaminants that will prevent paint adhesion, including polish remnants.



**39** Pour your pre-mixed paint – well shaken – into a clean receptacle. Apply the paint to the scratch. No primer is required with this Chipex kit.



**40** After building-up the colour in several layers, remove any excess using the kit's blending solution without digging-out the paint from within the scratch accidentally.



**41** Unless working on chips, use a small flat block and 3000-grit wet-and-dry sandpaper (used wet) to remove any paint surrounding the scratch.



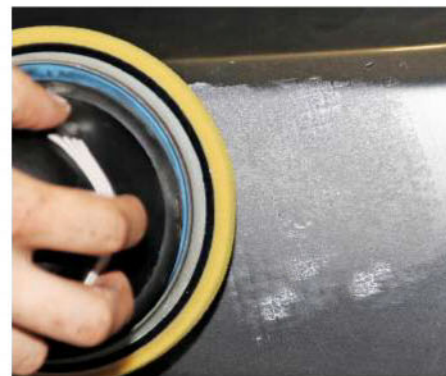
**42** The dulled area shows where the wet-and-dry has abraded – take care not to sand through the lacquer, which can be very thin on modern vehicles.



**43** Repeat Steps 39-41, to build the paint within the scratch, until it is flush with the original paint. Always ensure that the coating paint is touch-dry between layers.



**44** As an alternative to Step 41, a razor blade can be used to remove excess paint. Here, a thin stainless steel guide plate is protecting the surrounding area.



**45** Once the paint level is even, wait until it has dried and use an abrasive compounding paste/rubbing compound to blend the repair with its surroundings.



**46** Finally, use a polish to achieve the final shine. After allowing several weeks for the paint to harden, you can apply a protective wax.



**47** While the scratch is still visible, it is considerably less noticeable. Using fast-drying paint, this repair took less than 30 minutes.



**48** This is a typical example of a badly matched touch-up repair, coupled with a rust patch that has been ground-out with a flap-disc and coated in a rust inhibitor product.

## PAINT & BLEND



**49** Whatever paint system you choose, consult the paint code, which may be on the vehicle's chassis plate, to identify the type and colour name. You can buy specific touch-up kits, or pre-mixed paint.



**50** We elected to use the Chipex system. The advantages for DIY use are that the paint is thick and dries quickly. Included is polish, cloths, gloves, a blending solution and a pre-mixed solvent-based paint.



**51** First, this is not a comprehensive bodyshop repair. Ideally, the rust patch would have been filled and the whole side of the car resprayed. To start, 60% paint is mixed with 40% blending solution.



**52** This type of repair is ideal for slightly more advanced DIYers, who own an air-brush and a small compressor. The next stage involves cleaning the repair area with blending solution.



**53** As with any paint job, surrounding panels and trim are vulnerable to damage by overspray. Masking the localised area is critical to achieving a decent repair.



**54** Like our bumper repair (see Step 29), the first layers of colour coat must be applied over the area that contrasts most with the original colour. With Chipex, no primer is required on anything other than bare metal.



**55** Wait until the paint is touch-dry, before applying further layers. In this case, a dedicated heater helped to speed-up the drying process, but a domestic electric halogen heater can be used, with care.



**56** As the paint layers build, you can spray further along the panel, to blend the repair with the original paintwork. Here, Rich from UK Detailing has sprayed over the badly-matching paint from a previous repair.



**57** You can judge the thickness of the paint by how quickly it dries. The outer portion of the repair might only have had a single layer of paint, but the centre has four or five, explaining the darker colour.



**58** Once the solvent has evaporated, blend the new paint by working from the outside of the repair, inwards. With Chipex, you can apply the supplied blending solvent to remove excess paint from the edges, prior to using abrasives.



**59** You can start to use 3000-grit wet-and-dry, followed by a rubbing compound, to finalise the blending process. Professionals tend to use a dual-action polisher with different grades of pads and rubbing compound abrasive paste.



**60** The repair area might not be entirely invisible, but represents a significant improvement and no longer stands-out from more than six feet away. This repair requires further polishing and protective wax, which was applied several weeks afterwards.



## PRODUCT GROUP TEST

# SCRATCH REMOVERS

A variety of DIY-friendly scratch removers are available to assist car owners maintaining their paintwork. **Rob Marshall** separates the good from the bad.



► Marketing can be very effective. Take chlorine bleach. You can buy it in large quantities very cheaply. Alternatively, you can get a much smaller spray bottle of mould remover for considerably more. Same ingredients, same result, but a higher price.

The same can be said for certain scratch removers. Many bodywork professionals claim that these DIY offerings are simply repackaged rubbing compounds, which they use by the gallon in their paint shops, perhaps with the odd formulation tweak to make them more effective for hand, rather than machine, application. However, most DIY motorists do not wish to purchase and store rubbing compound by the litre, when a smaller quantity will meet their needs.

An effective scratch remover must comprise a suitably loaded paste that is aggressive enough to remove the surrounding paint, without the operator breaking into a sweat, yet be mild enough to impart a decent shine and not pass through either the base (colour) or clear (lacquer) coats.

Scratch remover pastes work in two ways. Abrasive particles are designed to grind away the paint's top layer, with some varieties designed with particles that wear down and become less abrasive as they are worked, thus creating a superior shine. The second method is to utilise special masking oils that fill deeper marks and create an optical illusion that helps to disguise them. Unfortunately, those oils wash away naturally with time and this can lead to the scratch reappearing usually within several weeks. Coloured polish, for example, tends to rely heavily on these ingredients.

### The test procedure

We procured a well-used nearside front wing from a 1997 Citroën Saxo, finished in its original metallic blue paint. As it already exhibited a large number of even, light scratches, caused presumably by regular contact with hedgerows, we added a number of scratches that were deep enough to damage the lacquer layer but did not penetrate through to the colour coat. We washed the panel with car wash shampoo and wiped it over twice with panel wipe solvent, to remove any lingering wax, or polish, that might have affected the result. We then masked-out 10 sections of the wing, each for a different product.

The scratch removers chosen were bought from UK-based sellers. No trade products were used. Unless manufacturers' applicators were included, two fresh microfibre cloths were employed. We used each product according to their instructions for a timed two minutes on the Saxo panel, using a maximum of three applications of paste. During this part of the test, we factored ease of use, along with price and the quality of product supplied. After the area had dried, it was buffed to a shine with a microfibre cloth and each section was inspected carefully for the presence of swirl marks and both light and deeper scratches.

To compare further, a small lamp was directed at each test area and we photographed the result using consistent camera settings. The products' performance was assessed for longevity, after being panel-wiped to remove any masking oils.

### TURTLE WAX ESSENTIAL SCRATCH REMOVER

Price: **£4.49 for 100g**

Sold by: **Amazon**

► Being such a universally-known brand, we were mildly disappointed with Turtle Wax's performance. This slightly thick paste had to be worked hard and significant swirl marks remained, which would have required either further applications, or polishing, to obtain an acceptable shine. We noted also that it was not the easiest product to buff afterwards. Essential Scratch Remover lived up to its instruction's claims of not being able to touch the deeper scratches, although Turtle Wax retails a scratch repair pen separately for this. The price of such a small tube was also significant. Our final degreasing test also suggests a reliance on optical filling oils but it did yield an overall improvement.

**SCORE 2/5**



### FARÉCLA G3 PERMANENT PRO SCRATCH REMOVER PASTE 7163

Price: **£8.96 for 150ml**

Sold by: **Amazon**

► Having achieved fine results with Farécla's professional products, we expected this DIY scratch remover to be one of our top performers. It disappointed us. It contains impressive-sounding 'Diminishing Abrasive Particles', which reduce in size as they are worked. However, Farécla recommends that it's applied with a special G3 white applicator but, as this is not supplied, we used a microfibre cloth instead, which might explain the unimpressive results. Despite being easy to apply and buff, it did not make any difference to the larger scratches and additional work would be necessary to achieve a reasonable shine. The price is also too high.

**SCORE 2/5**



### T-CUT RAPID SCRATCH REMOVER

Price: **£4.12 for 150g**

Sold by: **Amazon**

► As the ordered item did not arrive in time for our photoshoot, we used an older bottle for photography purposes, but the current product for testing. T-Cut (Tetrosyl Cutting Oil) is so well known that it has been used as a verb for years to describe the action of enhancing faded paintwork. Tetrosyl has extended the T-Cut brand into other areas of paint rectification, including scratch removal. The product is well-priced and achieved a solid result in our test, by being easy to use and removing all of the minor scratches on our panel. However, we feel that it's slightly too abrasive, as we noticed a fair few swirl marks afterwards, which will require further attention. In short, a solid performance from a well-recognised brand that remains competitively-priced.

**SCORE 3/5**







## AUTOSOL SCRATCH REMOVER

SCORE 3/5

Price: £6.90 for 75ml

Sold by: Car Spares Direct via Amazon

► Classic and kit car owners will be familiar with Autosol's metal restorer. Its scratch remover pays homage to the metal polish by virtue of its matching toothpaste-type squeeze tube that contains a lowly 75ml, making this product appear to give less value for money than many competitors. In use, we found that its creamy paste was pleasant to apply, but hard to buff, and left a residue that took extra effort to remove entirely. As with T-Cut's offering, some swirl marks remained, but its performance is slightly better than its Motul-branded competitor. However, its higher price, small tube and slight lack of user friendliness at the buffing stage counted against it even more.



## MOTUL SCRATCH REMOVER E8

Price: £5.95 for 128g

Sold by: Opie Oils via Amazon

► Better known for its lubricants, the French company, Motul, has expanded its range to include this scratch remover. Notwithstanding its hair-gel style of packaging, we found E8 to be more expensive than T-Cut's Rapid Scratch Remover for less product, only with a slightly superior result. The white paste does not feel especially abrasive, but it dissipated all of our light scratches easily; the same cannot be said of the deeper scratches. Some moderate-depth scratches were left behind and some swirl marks remained. Even so, its instructions emphasise that it is suitable for superficial scratches only and, for these, it succeeded.

SCORE 3/5



## PURE DEFINITION SCRATCH REMOVER POLISH KIT

Price: £11.95 for 250ml + 250ml

Sold by: Pure Definition

► You might think that Pure Definition offers poor value but bear in mind that you're buying a complete kit, consisting of Ultra Compound Paintwork Polish and Final Finish Paintwork Polish. Using the supplied pads, we applied the abrasive compound polish for 90 seconds and allowed it to dry. After buffing, we applied the polish for 30 seconds. The result saw not only all of the minor scratches removed, but also some improvement to the deeper scratches, although some very light swirl marks remained. There was no difference in the result after we had wiped the panel with solvent, indicating that masking oils have been kept to a minimum.

SCORE 4/5



## AUTOGLYM SCRATCH REMOVAL KIT

Price: £16.99 for 100ml + 100ml

Sold by: Autoglym

► Autoglym is renowned for its quality, so a podium finish for its scratch remover is unsurprising. Its solution to light scratches is a complete system: a sturdy plastic case holds 100ml of abrasive scratch remover, plus 100ml of Super Resin Polish, as well as a waffle pad, with which we applied the scratch remover and polish, and a microfibre cloth. The shine on the panel was very acceptable, even before polish was applied. After buffing, the deeper scratches appeared to be reduced, although this did not survive the panel wipe, suggesting that filler oils helped disguise the effect, although the impressive sheen remained. While the kit is ideal for novices, more experienced DIYers may find better value elsewhere.

SCORE 4/5



## QUIXX CAR PAINT SCRATCH REPAIR/REMOVAL SYSTEM

Price: £16.90 for 25g + 25g

Sold by: gsfcarparts.com

► The German-made Quixx includes four strips of 3000-grit wet-and-dry, a 25g tube of slightly abrasive repair paste, 25g of polish and a pair of low-quality cloths. We used 30 seconds of our two minutes on using the wet-and-dry (with cold water) to a pair of deeper scratches, followed by 70 seconds to apply the repair paste and a further 20 seconds for the polish. Not only were all minor scratches removed, but also one deeper scratch disappeared, while the other had its depth reduced significantly. The shine that remained afterwards was just as impressive. The kit is suitable only for localised repairs and you could buy the sandpaper separately and achieve very similar results with cheaper scratch removers. It is just too pricey to win.

SCORE 5/5



## MEGIAR'S ME G10307 SCRATCH X 2.0, 207 ML

Price: £10.00 for 207ml

Sold by: theultimatefinish.co.uk

► Hailing from America, our test winner combines excellent performance, good value and sufficient paste to fix minor defects on a whole vehicle. The manufacturer says that it is less aggressive than traditional cutting compounds. The paste's creamy consistency dried very quickly and buffing to a glossy shine was effortless. All light scratches were removed, and many of the deeper scratches faded, although some were visible again after being wiped with solvent, indicating that the product uses masking oils. In truth, combining this with 3000-grit wet-and-dry would get equivalent results to the Quixx system, at a far keener cost.

SCORE 5/5



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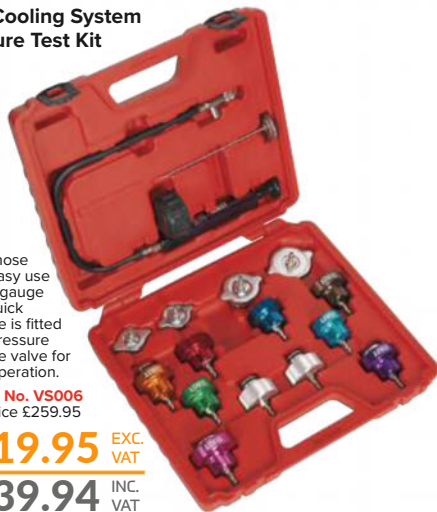


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# CM Insider

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## FREE tickets for the Lancaster Insurance Classic Car Show



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► *Car Mechanics* has five pairs of tickets to give away for this year's Lancaster Insurance Classic Motor Show at Birmingham's NEC from November 10-12. The UK's biggest and best celebration of the classic motoring community will have 2500 vehicles on display, including rare and exciting marques from the pre-World War Two era, plus retro classics, American muscle cars, Japanese performance vehicles and British sports cars.

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► Tickets to the Lancaster Insurance Classic Motor Show, with Discovery, are now on sale. For more information on ticket prices and booking details, visit [www.necclassicmotorshow.com](http://www.necclassicmotorshow.com)

► If you would like to enter the draw to win one of the five pairs of tickets to this year's Lancaster Insurance Classic Motor Show, please send your name and full postal address in an email to [carmechanics@bauermedia.co.uk](mailto:carmechanics@bauermedia.co.uk), with the words 'Classic Car Show Tickets' in the subject line. Entries must reach us by October 27, 2017.

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## BEST Finique Smart Dust Mask

▶ BEST Finique and its European distribution partner Direct Tool Company have just launched a next-generation Smart Dust Mask that offers advanced respiratory protection with supreme comfort. Designed for use in professional paint shops, workshops and cleanrooms working with typical hazardous products such as paints, primer and base coats and adhesives, the F2+ masks protect from fine dusts for both solid and liquid particles of toxic substance, conforming to EN149:2001 + A1:2009 requirements. The comfort nose shaper sits on the inside of the velvet-soft inner web, offering a better fit and maximum comfort for extended periods of time. An innovative Super Cool valve gives lower breathing resistance, less heat build-up in warm and humid conditions, and a low profile to minimise obstruction of vision. Another key feature is the bonded head-strap which contains no staples and assures a longer product life.

The BEST Finique Smart Dust Masks are available in handy boxes of 10, competitively priced at **£18.64**. For further information, visit [www.best-finique.co.uk](http://www.best-finique.co.uk)



**10** TO GIVE AWAY

**WIN**  
We have 10 BEST Finique Smart Dust Masks to give away to CM readers. For a chance to win one please complete the coupon on page 23

## NEWS IN BRIEF



▲ The new 500-page autumn/winter catalogue from **Machine Mart** is available now. It's packed with more than 500 new products and price cuts on tools and machinery, including jumpstarts, battery starter/chargers, air compressors, welders, jacks and tool chests. You can pick up a copy at any of Machine Mart's 66 superstores or order one online at [www.machinemart.co.uk](http://www.machinemart.co.uk)

▶ Lumag's own-brand brake pads, Breck, has had its range expanded with the introduction of four new part numbers, covering 20 new vehicle applications, including BMW, Mini, Renault and Nissan.

▶ **GSF Car Parts** is offering a promotion throughout September in conjunction with Purflux filters. All customers purchasing a service kit before September 30 will receive a free thermal travel mug branded with GSF and Purflux logos.



▶ **Comline Auto Parts** has launched an e-news bulletin, Comline Industry Eye, to inform its customers of the brand's latest news. Available to all free of charge, Comline Industry Eye will be e-mailed once a month and comprises technical bulletins, model features and new product updates, alongside news from industry partners. To subscribe, visit <https://comlineindustryeye.curated.co/>

## Power-TEC Magnetic Paint Clamp

▶ When spray-painting smaller components or body parts in a spray-booth, this magnetic paint clamp (part number 92425) holds the part securely and speeds up the painting process. The clamp allows hands-free painting and its 250mm length gives the operator access to all sides of the component.



Items such as mirror covers, body mouldings, etc. can be positioned for ease of spraying and are held firmly by the screw-on clamp. The very strong magnetic base of the clamp is then mounted on a panel stand or on steel spray-booth walls.

The Power-TEC Magnetic Paint Clamp is priced at **£25.16**. For full details see [www.power-tec.co.uk](http://www.power-tec.co.uk)

## VW Heritage launches Porsche sibling

▶ Having established itself as one of the UK's leading suppliers of Volkswagen parts and spares over the past 30 years, VW Heritage has launched a sibling company that offers a similar service for Porsche owners. Managed by a team of Porsche experts, the new Heritage Parts Centre will utilise the existing supply and logistics partnerships already in place at the company's West Sussex warehouse. It will also offer the same level of service and product knowledge for Porsches as it already does for VWs.

Initial focus will be on air- and water-cooled 911s, Boxsters and transaxle models, but the range will be constantly expanding to meet demands, with a view to manufacturing replacement Porsche parts in the future.

For further information about the service and parts availability, visit [www.vwheritage.com/porsche/](http://www.vwheritage.com/porsche/) or ring 01273 444044.



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## NEWS IN BRIEF



▶ **Anderson Clark Motor Repairs**, a member of the Servicesure Autocentre network, has been named Motor Trader Independent Garage of the Year for the second year running. The award recognises best practice, innovation and professionalism in the non-franchised repair sector.

▶ If you're already preparing for the winter, special 600ml bottles of **Prestone Rapid De-icer** with 20% extra free will be available for just £3.50 from September in Tesco stores nationwide. Rapid De-icer melts ice down to -40°C and works in seconds, as well as preventing refreeze.

▶ Following a comprehensive update, the **Bosch** wiper blade wiper blade app has new and improved features and is available for download from the App Store for iOS and the Google Play Store for Android devices. With intuitive handling, matching front and rear wiper blades can now be identified more easily and chosen wiper blades can be saved as favourites. The product finder for Bosch wiper blades at [boschwiperblades.com](http://boschwiperblades.com) has also been redesigned.

▶ **Carbon Clean**, the revolutionary engine decarbonising system that works with tap water, has welcomed two new members into its growing network of Carbon Clean Centres. Needham Analysis Ltd joined as Carbon Clean Centre Stanton and James Jackson's Central Garage became Carbon Clean Centre Fleetwood. Both businesses will deliver the 30-minute treatments to tackle carbon deposits.

## NEW from LASER TOOLS

### Brake Pad Thickness Gauge

▶ This is a quick and easy way to check brake pad condition and measure thickness without removing the vehicle's wheels. Simply locate the end of the lightweight aluminium gauge (part number 6678) against the surface of the brake disc, then slide back the measuring peg until it stops against the back plate of the brake pad. You can read off the thickness of the pad material in millimetres or the green/amber/red traffic-light symbol alerts you whether the pads need replacing.

The Laser Brake Pad Thickness Gauge has a typical price of **£24.24**.



### EcoBoost Petrol Injector Puller

▶ If you have been reading our *DIY Servicing* feature this month for the Ford Fiesta EcoBoost, you may be interested in this new addition to Laser's engine timing tool kits and cambelt setting tools for these engines. This injector puller kit (part number 6953) can be used with any EcoBoost engine up to the 2.0-litre. The machined split collet design fits over the injector securely and allows the use of a slide hammer (included in the kit) to steadily pull out the injector. The weight of the slide hammer has been carefully calibrated to ensure the correct shock level is used, and the puller is significantly stronger than the OE tool and offers a much improved service life.

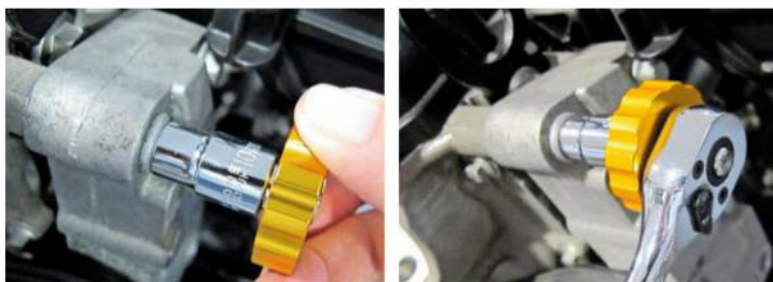
The Laser Petrol Injector Puller is supplied in a sturdy metal case with a dense foam insert to keep the components secure. It has an RRP of **£229.20**.



### Socket Spinner Adaptor Set

▶ This set of three spinner adaptors (part number 6688) lets you quickly remove fasteners after the initial loosening. Colour-coded for easy identification, the three adaptor sizes are ½in-drive (blue), ¾in-drive (gold) and ¼in-drive (black). Each adaptor features an internal drive socket to take a ratchet or bar for the initial loosening or final tightening – the ½in- and ¼in-drive adaptors have a ⅜in-drive socket and the ¾in-drive adaptor features a ½in-drive socket, so they can be paired up if necessary to provide the required drive size combination. The lightweight spinner is manufactured from aluminium and the socket adaptor is tough chrome vanadium steel.

The Laser Socket Spinner Adaptor Set is supplied on a plastic socket rail that can be hung on a tool board or stowed neatly in the tool chest and is available for **£18.38**.



### Cable Cutter

▶ Automotive battery cable is difficult to cut and it's even harder to get a professional-looking finish. This handy cable cutter (part number 6872) effortlessly snips through any thickness of automotive cable up to 70mm<sup>2</sup>, leaving a neat cut. It can also be used for removing insulation and includes an insulated terminal crimper. The blades are manufactured from corrosion-resistant SUS 420 J2 stainless steel, with the cutting edges hardened to 56 HRC (Rockwell scale). The handles are glassfibre-reinforced nylon with TPV inserts for increased grip.

The Laser Cable Cutter is priced at **£26.83**.



Shop around for the best prices and any special offers. More details from [www.lasertools.co.uk](http://www.lasertools.co.uk)

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[www.caarparts.co.uk](http://www.caarparts.co.uk)



## Blackline Infrared Thermometer from Rally Design

▶ Blackline Tools has just released an inexpensive but top-quality infrared thermometer, available through Rally Design. Unlike many other similar thermometers, the Blackline unit can measure up to +500°C, which is essential for measuring exhaust and brake temperatures accurately.

- ▶ Temperature range -50°C to +500°C
- ▶ Accuracy ± 2%
- ▶ Response time 500Ms
- ▶ Auto power cut-off 10 second inactive
- ▶ Laser wavelength 635-650nm
- ▶ Range 12 metres maximum

The Blackline Infrared Thermometer costs just **£28.56**. For further information visit [www.rallydesign.co.uk](http://www.rallydesign.co.uk)



**1** TO GIVE AWAY

**WIN**  
We have one **Blackline Infrared Thermometer** to give away to **CM** readers. For a chance to win it please complete the coupon below.

## NEWS IN BRIEF



▶ To support current and future emissions regulations, **BorgWarner** has developed an economical series of exhaust gas recirculation (EGR) coolers featuring a compact floating core. Unlike conventional units, which must be specifically designed for each application, the company's modular coolers includes four adaptable designs covering engine sizes from 2.0- to 16.0-litres.

▶ **Fuchs Lubricants** has launched premium performance engine oil Titan GT1 LL-12 FE SAE OW-30, which has been designed to produce maximum efficiency in BMWs. Utilising XTL-Technology, it has exceptional viscosity levels and fuel-saving potential of more than 4%, and has secured BMW approval for Longlife-12 FE.

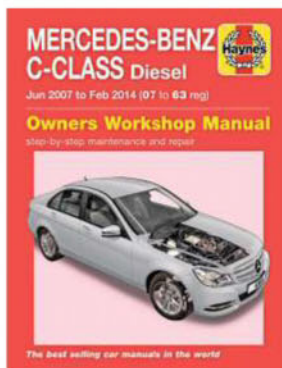


## Haynes Mercedes-Benz C-Class Diesel (Jun 2007-Feb 2014) Owners Workshop Manual

▶ The latest in Haynes best-selling workshop manuals covers 07 to 63 models of the Mercedes-Benz C-Class diesel, including the C-Class W204 C200 CDI, C220 CDI and C250 CDI saloons from June 2007 and estate from March 2008 with the 2.1-litre turbo-diesel engine. (Please note that this manual does not cover the C320/C350 CDI 3.0 4Matic or the coupé and C-Class W205 series introduced in February 2014).

The Haynes Mercedes-Benz C-Class Diesel (Jun 2007-Feb 2014) Owners Workshop Manual costs **£22.99** from all good booksellers or direct from [www.haynes.co.uk](http://www.haynes.co.uk)

Haynes Car Manuals Online cost just **£20** per manual for a year.



## Peugeot record-breaker

▶ Although world records tend to get broken by the biggest and best, Peugeot has just gone into the record books with the world's smallest vehicle dealership – inside a converted phone box in Russell Square in London.

Measuring just 0.8 square metres, the red K6-series phone box will be open for business from 7am on September 12. Customers can get access to the diminutive dealership by getting a special code from [www.peugeot.co.uk/russellsquare](http://www.peugeot.co.uk/russellsquare)

Inside, they will find a tablet device connected to Peugeot's Order Online e-commerce portal, where they can browse, configure, finance and ultimately order a new car.



**Clarke**

**COMPETITION WINNER**

**ENGINE CRANES**

**Scott Hadden, Burrigde Les Sayer, Spalding**

Q What is the maximum lift height of the folding engine crane in millimetres?

A 2010

To be in with a chance of winning one of our **FREE** giveaways this issue, please indicate your preferred product below:

- Clarke JET 9500 Power Washer     BEST Finique Smart Dust Mask  
 Blackline Infrared Thermometer

Simply fill in your details below and send to: **Car Mechanics Giveaways October, Bauer Media, Media House, Lynchwood, Peterborough PE2 6EA. Offer closes October 20, 2017.**

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\*Please enter this information so that Car Mechanics can keep you informed of newsletters, special offers and promotions via email. You may unsubscribe from receiving these messages at any time and we will never pass your email address to any third parties.

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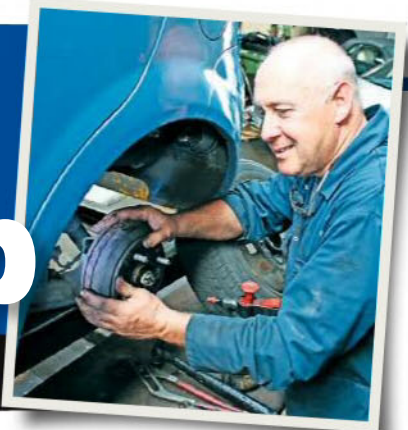
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# Tales from the workshop

Finding & fixing advice from our garage proprietor **Steve Rothwell**



## VAUXHALL VECTRA

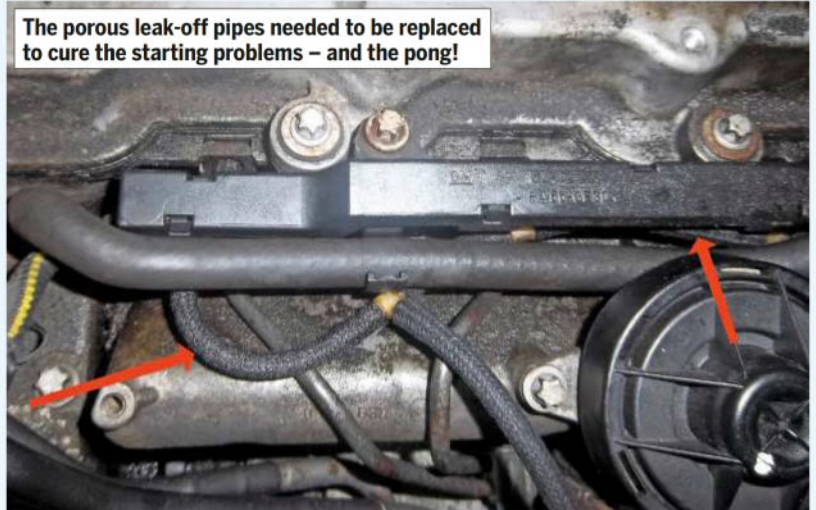
### Excessive diesel leak

► This 2001 Vauxhall Vectra diesel had been reluctant to start for a while. The owner thought it might be down to the cooler weather, but then he started to smell the aroma of diesel coming from under the bonnet.

With the vehicle running, he could see that the leak-off pipes were oozing fuel. He realised this would also account for the poor starting of late. Although replacing the leak-off pipes is normally a straightforward job, on this Vectra engine the ends of the pipes are hidden in a small recess.

In itself, this is not a problem, but the old and perished pipes often break off during removal, leaving a portion of pipe in the recess. To avoid this, we devised a small pick-type tool to get behind the pipes and help drag them off safely.

The porous leak-off pipes needed to be replaced to cure the starting problems – and the pong!



## AUDI A4

### Failed window winder

► The owner of this 2005 Audi A4 was worried that something she had done had caused the window to fail in the open position. She said it seemed to be a bit tight as it went down, but then refused to go up again. The fact was that it had nothing

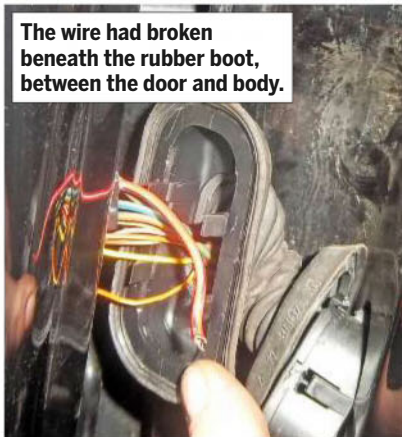
to do with the window mechanism. After removing the door panel and checking out the motor and regulator, all was found to be in a good working condition.

The failure was down to a wiring fault in the door shut. Years of opening and closing the driver's door had resulted in the loom breaking between the door and the body.

Wiring only has so much flexing ability and such breakages are becoming common as age begins to creep in.

Soldering a new length of wire into the loom was all that was needed to restore full operation to the driver's window.

The wire had broken beneath the rubber boot, between the door and body.



## FIAT FIORINO

### ABS failure surprise

► When the ABS warning light illuminated on this 2010 Fiat Fiorino van, the diagnostics scanner revealed that the source of the problem was the nearside rear ABS sensor. The trouble with the little Fiat van is that this sensor is incorporated into the hub bearing assembly and, although easily fitted, this works out to be a bit more expensive than just fitting a sensor. The owner was unconcerned about this as he had detected a rumble from the rear nearside and thought replacing the bearing wouldn't be a bad idea anyway.

When the new bearing/sensor assembly was fitted, we were dismayed to find



The wiring loom was the cause of the ABS problem.

that the ABS light was still on and the scanner was still displaying a fault with the nearside rear sensor. Using an ohmmeter to check the wiring, it turned out that there was a break in the wiring for the rear section of loom. This section of loom costs just £18 and, once fitted, the Fiat van no longer showed the ABS light – and the owner was happy that the rumbling wheel bearing had been replaced.

Right First Time.







The tyres were down to the cords and the brake pads were wafer-thin.

### HYUNDAI i20

## Why four years is too long

► Once again the subject of putting off the first MOT until a vehicle is four years old has been suggested, allegedly to save the motorist money. It is quite common in other countries for new vehicles to not need a test in the first four years, but as we operate a three-year system, why change it?

This two-and-a-half-year-old Hyundai i20 had been brought to us for a service by its owner, who decided it was just about due at

50,000 miles. When it arrived, we discovered the mileage had actually reached 58,000 and the last service had been at 30,000. Along with two balding tyres, we also uncovered a set of wafer-thin brake pads and three failed lightbulbs.

Not even due for its first MOT, this was one vehicle that would have failed the test on multiple items. How bad would it have been if left another year without inspection?

### VOLKSWAGEN GOLF TDI

## Sudden strange sound

► One day this 2003 VW Golf 1.9 TDI was driving fine, the next the owner felt a distinct lack of performance. This was coupled with what he described as "a strange sound". We identified the mystery noise as the compression leaking from the cylinder back to the inlet manifold. Put another way, it sounded like a valve seat had failed.

Once we had stripped off the top, we discovered that a cam lobe had worn down and the corresponding hydraulic lifter had been beaten to a pulp. The repair required a new camshaft and shells, plus a set of hydraulic lifters. We fitted the camshaft using an assembly lubricant that should



Damage was apparent on both the camshaft and the hydraulic lifter.

prevent the possibility of damage during the initial start-up.

Once the new parts were in place, an oil and filter change was carried out before starting up the engine. We were happy that the valve seats had not been damaged and the engine ran smoothly. Normally, we would also have done a quick compression test, but this is not a simple job on the VW Pumpe Düse engine.

### PEUGEOT 206

## Strange power loss

► This 2003 Peugeot 206 had been driving about without so much as a cough or splutter, but after stopping at traffic lights, it suddenly lost power. The engine was smooth at tickover speed, but pressing the accelerator resulted in a flat response.

When the Peugeot reached our doors, the first move was to code-read the system. No specific codes were retrieved, but it was noted that some of the readings were incorrect – the ambient air temperature was giving out different readings from different systems. After testing the coil pack and crankshaft sensor, along with the MAP and MAF sensors, we came to the conclusion it was an ECU problem.

Removing the connecting plugs, it was noticed that a small amount of corrosion was visible. We decided to clean the connections with electrical switch cleaner before moving on to the next stage, which would have entailed sending the ECU off for testing and repair.

On restart, the motor fired back into life and behaved as it should. It continued to behave during the test-drive and on a drive the following day. Problem solved.



The corrosion had crept into the connecting plugs, resulting in the running problems.

## SEAT IBIZA

### Neglected maintenance

► You would be amazed how many motorists are oblivious to the fact that their vehicles need regular servicing. A case in point was the owner of this 2006 SEAT Ibiza, who had no idea when the car had last been serviced. He had owned the vehicle from new and its life had been one of blatant neglect.

We had seen this vehicle in the past for its annual MOT and occasionally it would come in for a misfire or failed bulb. When the SEAT was in our care we would ensure that the oil and coolant were up to the correct level and do our best to persuade the owner that an oil change would benefit the longevity of the engine, but he was not overly concerned and, while the little SEAT was running, ignored our recommendations.

Then on a journey up the motorway, the engine lost power and stopped. While waiting for the recovery service, the owner phoned us to let us know he was on his way and that he was hoping we could get him back on the road as soon as possible.

When the vehicle arrived, it didn't take too long to discover the problem was terminal. The lack of oil changes had taken its toll and now the conrod had been pushed through the engine block.



The hole in the side of the engine block was a result of years of neglect and insufficient oil changes.

## VAUXHALL ASTRA

### Mystery bottle

► The owner of this 2005 Vauxhall Astra had recently acquired the car and was checking the fluid levels regularly in an effort to maintain his vehicle. He correctly assumed that the best way to keep the motor reliable was to ensure none of the fluid levels was allowed to drop below the minimum mark. He also knew that if he checked things regularly he would quickly notice if something was wrong.



The mystery bottle was the hydraulic power steering reservoir.

When the vehicle came in for its service he had a question to ask us. He had been checking the levels and to date nothing had needed topping up, but there was one container under the bonnet that he did not understand. The object he pointed to was for the power steering fluid. When I informed him of this, he was slightly confused as he knew the power steering was electric and that the vehicle did not have a pump on the engine. I explained that the system was electric over hydraulic and used an electric pump to supply the hydraulic pressure. Hopefully, the level in the bottle will not drop, but if it does he will now know what to do.

## FORD TRANSIT CONNECT

### Gummed-up door lock

► There are many unwanted scenarios for the hapless mechanic, normally in the shape of something that should open but which doesn't. The biggest problem is that all of these are easy enough to work on when open, but not so simple when closed.

The door on this 2006 Ford Transit Connect would not open from inside or outside. In such cases, our usual routine is to attempt to gain access down through the window drop glass slot. By removing the weather strip, it is often possible to get access to the lock mechanism and a long rod and a hammer will sort things out.

With the Connect, the weather strip is quite wide and fair access was available.



With the top weather strip removed, enough access could be gained to reach the door lock.

Enough of the lock could be seen to see that debris had stuck to the mechanism, preventing it from dropping back into position. A push with a long screwdriver set the mechanism back into place and allowed the door to open, after which a long-term cure was achieved by cleaning and lubricating the lock.

# Right First Time.



**MINI ONE**

# Blood bank

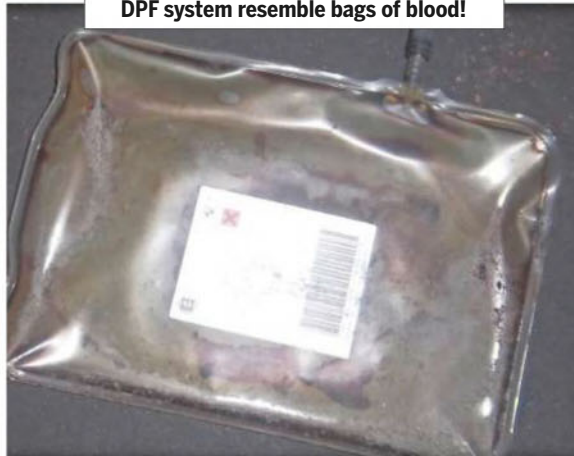
▶ Just recently we have had a spate of diesel owners who were unaware that the diesel particulate filter (DPF) system on their vehicle also required an additive. One such owner recently popped into the workshop with her 2009 MINI Cooper. A warning had appeared on the dash informing her that the additive was low. The vehicle had been serviced some six months earlier and she was concerned that it should have been attended to then.

Unlike some vehicles, the BMW MINI system uses a bag of additive that looks exactly like a bag of blood and costs £130. The system cannot be topped up, but is easily changed by unplugging the old bag and plugging in the new.

Once the new bag is fitted, the vehicle needs to be informed of the fact via a compatible scanner. The job should be very quick and simple, but be warned: the housing for the additive bag is secured by a bolt which screws into a nut held captive in plastic. If the bolt is corroded, the nut will spin in the plastic and can be very awkward to remove.



The bags of additive for the MINI Cooper's DPF system resemble bags of blood!




Available From  
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**LAND ROVER DISCOVERY 4**

# Simple brake pad change

▶ Some jobs should be straightforward and simple but, due to lack of access, can take longer than expected. One such job was replacing the brake pads on this 2013 Land Rover Discovery 4. To be more precise, replacing the pads was easy enough, but fitting the new warning light wire, which for some reason known only to Land Rover has been tucked up under the very secure inner wing, was a real headache.

The warning light wire needed to be replaced as it had self-destructed and the connecting loop had been cut through by the contact with the brake disc. Removing the inner wing and plugging in a new warning light wire took as long as the rest of the brake pad change.



The connecting plug for the warning light wire is in a ridiculously inaccessible position.

Follow Steve on Twitter:  
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**twitter**

**AUDI A1**

# Difficult oil pressure switch

▶ When this 2011 Audi A1 first came in we were given slightly misleading information. It was only in for a service and we were asked to check the low-level oil light which was illuminated. The oil level was fine and no lights were showing on the dash, so we carried on with the service. The owner was passing later and popped in to let us know she had taken a picture of the light on her mobile phone when it had appeared. We could see that this was the low-pressure light, not the low-level light.

The sensor on the A1 is located in a hidden position at the back of the cylinderhead. When we checked it, we found a slight trace of oil around the switch.



The switch was tricky to access, but had signs of oil seepage around it.

Further inspection revealed that oil was oozing through the centre of the switch. This was sufficient evidence for us to decide that the oil pressure switch should be replaced. With the Audi serviced and the new pressure switch fitted, there should be no more unwanted lights showing up.

Right First Time.



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Post to: **CAR MECHANICS CLARKE JUMPSTARTS COMP**, Dept CM10, Bauer Media, Media House, Lynchwood, Peterborough PE2 6EA.

Simply answer the following question for a chance to win one of these three prizes:

**How many bulbs are fitted in the front lamp of the Jumpstart 1010?**

ANSWER: 4  5  6  (Tick one only)

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CLB200	2 Dr step up	672x310x195	£47.98	£57.98
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## MECHANICS/PROFESSIONAL TOOL CHESTS/CABINETS

Superb quality & value for automotive workshops

**FULL EXTENSION ROLLER RUNNERS FOR SMOOTH OPENING ACTION**



MODEL	DESCRIPTION	DIMS LxWxH (mm)	EXC. VAT	INC. VAT
<b>MECHANICS RANGE</b>				
1 CTC600B	6 Dr chest	600x260x340	£49.98	£59.98
CTC900B	9 Dr chest	610x255x380	£59.98	£71.98
CTC500B	5 Dr cabinet	675x335x770	£109.98	£131.98
CTC800B	8 Dr chest/cab set	610x330x1070	£94.99	£113.99
2 CTC700B	7 Dr cabinet	610x330x875	£119.98	£143.98
CTC1300B	13 Dr chest/cab	620x330x1320	£139.98	£167.98
<b>PROFESSIONAL RANGE</b>				
3 CTC103	3 Dr step up chest	672x310x250	£49.98	£59.98
4 CTC106	6 Dr drop front	662x305x365	£59.98	£71.98
CTC109	9 Dr chest	662x305x421	£69.98	£83.98
5 CTC105	5 Dr cabinet	685x465x790	£159.98	£191.98
CTC107	7 Dr cabinet	685x465x950	£189.98	£227.98

### EXTRA LARGE EXTRA HEAVY DUTY

**BALL BEARING ROLLER DRAWERS**

RUBBER GRIP SIDE HANDLES

BLUE LINE INDUSTRIAL

EXTRA LARGE SIDE HANDLE FOR EASY MOVEMENT FITS EITHER SIDE

EXTRA DEEP DRAWERS

GAS STRUTS Hold lid open

EXTRA LARGE DRAWER PULLS

FULL DETAILS - SEE IN-STORE OR VISIT WEBSITE

GREAT LOOKING, BIG 5" INDUSTRIAL CHROME SPOKED WHEELS FOR EASY MOVEMENT\*



MODEL	DESCRIPTION	DIMS LxWxH (mm)	EXC. VAT	INC. VAT
1			£259.98	£311.98
2			£449.00	£538.80

### Clarke HEAVY DUTY & PROFESSIONAL

## THE ULTIMATE IN TOOL STORAGE!

Extra heavy gauge double wall steel construction

FULL DETAILS - SEE IN-STORE OR VISIT WEBSITE

EXTRA LARGE SIDE HANDLE FOR EASY MOVEMENT FITS EITHER SIDE

BLUE LINE INDUSTRIAL

BLACK LINE

RUBBER GRIP SIDE HANDLES

EXTRA LARGE DRAWER PULLS

GREAT LOOKING, BIG 5" INDUSTRIAL CHROME SPOKED WHEELS FOR EASY MOVEMENT



MODEL	DESCRIPTION	DIMS LxWxH (mm)	EXC. VAT	INC. VAT
CBB206B	6 Dr Chest	710x328x365	£97.98	£117.98
1 CBB209B	9 Dr Chest	710x315x420	£114.99	£137.99
CBB210B	10 Dr Chest	710x315x475	£129.98	£155.98
CBB203B	3 Dr step up	710x315x250	£67.98	£81.98
CBB215B	5 Dr Cabinet	758x468x815	£199.98	£239.98
2 CBB217B	7 Dr Cabinet	758x468x975	£239.98	£287.98
CBB213B	3 Dr Cabinet	758x461x975	£189.98	£227.98

\* Except on CBB231B & CBB230B

MODEL	SIZE	DESCRIPTION	DIMS LxWxH (mm)	EXC. VAT	INC. VAT
CBB306	36"	6 Dr Chest	910x305x47	£149.98	£179.98
CBB315	36"	5 Dr Cabinet	927x416x985	£279.98	£335.98
CBB228B	41"	8 Dr cabinet	1126x468x1000	£389.00	£466.80
1 CBB224B	41"	14 Dr chest	1045x415x486	£259.98	£311.98
2 CBB226B	41"	16 Dr cabinet	1126x468x1000	£449.00	£538.80
CBB231B	56"	9 Dr chest	1460x615x490	£399.00	£478.80
CBB230B	56"	13 Dr cabinet	1503x622x1011	£599.00	£718.80

### Clarke TOOL CHESTS/CABINETS


Heavy duty/industrial build quality with lockable front covers for added security and protection

**LOCKABLE FRONT COVERS STORE NEATLY WITHIN CABINET**

**BALL BEARING ROLLER DRAWERS**

EXTRA LARGE DRAWER PULLS

LARGE 37" CABINET



MODEL	DESCRIPTION	DIMS LxWxH (mm)	EXC. VAT	INC. VAT
1 CBB209DF	9 Dr chest	710x370x420	£129.98	£155.98
2 CBB211DF	11 Dr Cabinet	785x490x1075	£279.98	£335.98
3 CBB309DF	9 Dr chest	975x370x420	£159.98	£191.98
4 CBB311DF	11 Dr Cabinet	1045x490x1075	£339.98	£407.98

### Clarke HEAVY DUTY BOLTLESS SHELVING

Boltless, quick and easy assembly (only a mallet required) - Tough steel frame

- Adjustable height shelves
- 5 easy wipe clean laminate board shelves

(W)1200 x (D)460 x (H)1830

ONLY **£79.98** EXC.VAT  
**£95.98** INC.VAT

BLUE, RED AND SILVER AVAILABLE

ALSO ASSEMBLES AS BENCH

CORNER UNIT

265kg PER SHELF

WIDE 48"/1220mm

SAVE 10% WHEN YOU BUY 4 SHELVING UNITS AND SAVE AT LEAST £38.39 INC.VAT



### Clarke BOLTLESS SHELVING BENCHES

Simple fast assembly in minutes using only a hammer

FROM ONLY **£29.98** EXC.VAT  
**£35.98** INC.VAT

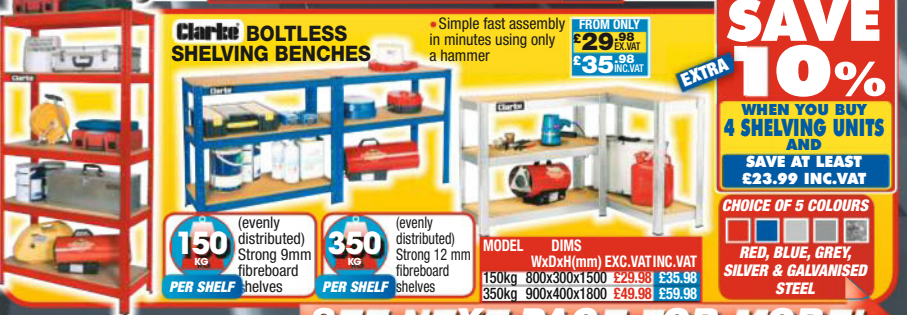
SAVE 10% WHEN YOU BUY 4 SHELVING UNITS AND SAVE AT LEAST £23.99 INC.VAT

CHOICE OF 5 COLOURS: RED, BLUE, GREY, SILVER & GALVANISED STEEL

150kg (evenly distributed) Strong 9mm fibreboard shelves PER SHELF

350kg (evenly distributed) Strong 12mm fibreboard shelves PER SHELF

MODEL	DIMS WxDxH (mm)	EXC. VAT	INC. VAT
150kg	800x300x1500	£29.98	£35.98
350kg	900x400x1800	£49.98	£59.98



## Clarke

### MIG WELDERS

Quality machines from Britain's leading supplier. See online for included accessories.

**GAS TIPS, SHROUDS & WIRE IN STOCK**



135TE

MODEL	MIN-MAX AMPS	EXC.VAT	INC.VAT
PRO90	24-90	£189.98	£227.98
110E	30-100	£229.98	£275.98
135TE Turbo	30-130	£249.98	£299.98
151TE Turbo	30-150	£279.98	£335.98
175TECM Turbo	30-170	£449.00	£538.80
205TE Turbo	30-185	£489.00	£586.80

**FROM ONLY £189.98 EXC.VAT**  
**£227.98 INC.VAT**

## Clarke NO GAS/GAS MIG WELDERS

Professional type torch with on/off control & Thermal overload protection. Turbo fan cooled. Easy conversion to gas with optional accessories.

**FROM ONLY £119.98 EXC.VAT**  
**£143.98 INC.VAT**

MIG145

\*no gas only

MODEL	MIN/MAX AMPS	EXC.VAT	INC.VAT
MIG 102NG*	35/90	£119.98	£143.98
MIG 145	35/135	£169.98	£203.98
MIG 180	40/160	£194.99	£233.99
MIG 196	40/180	£219.98	£263.98

## Clarke ARC WELDERS

For home use, automotive and industrial applications.

**FROM ONLY £54.99 EXC.VAT**  
**£65.99 INC.VAT**

MIG145

MODEL	AMPS	EXC.VAT	INC.VAT
EA110	40-100	£54.99	£65.99
EA165	65-160	£67.99	£81.99
115N	30-110	£69.98	£83.98
EA200	60-200	£96.99	£116.99
160N	40-150	£71.99	£86.99
190N	50-185	£99.98	£119.98
190TEN#	35-180	£147.99	£177.99
235TEN#	40-210	£156.99	£188.99

SEE THE FULL RANGE ONLINE & IN-STORE

#Turbo fan cooled

## Clarke PRO 7" SANDER/POLISHER

CP185

- Includes hook & loop backing pad and hook & loop polishing bonnet. • 1200W motor

**FROM ONLY £79.99 EXC.VAT**  
**£95.99 INC.VAT**

**£69.98 EXC.VAT**  
**£83.98 INC.VAT**

## Clarke AXLE STANDS

Ratchet action for quick height adjustment. Sold in pairs.

**FROM ONLY £1.99 EXC.VAT**  
**£4.99 INC.VAT**

MODEL	MAX TONS	MIN/MAX HEIGHT	EXC.VAT	INC.VAT
CAX2TF	2	235-360mm	£11.99	£14.99
CAX-3TBC	3	300-430mm	£21.99	£26.99
CAX6TP	6	333-500mm	£24.99	£29.99
CAX-6TBC	6	400-615mm	£31.99	£38.99
CAX10TP#	10	450-750mm	£79.98	£95.98

## Clarke 2/3 TONNE TROLLEY JACKS

**FROM ONLY £22.99 EXC.VAT**  
**£27.99 INC.VAT**

JACKS ALSO IN STOCK UP TO 5 TONNE

MODEL	TYPE	TONNE	EXC.VAT	INC.VAT
CTJ2B	DIY	2	£22.99	£27.99
CTJ2MB	DIY + Case	2	£27.99	£33.99
CTJ2250LP*	Low Profile	2	£39.98	£47.98
CTJ2001G	Pro Garage	2	£79.98	£95.98
CTJ3000QL	Quick Lift	3	£49.98	£59.98
CTJ30LG	Pro Instant Lift	3	£83.99	£101.79
CTJ3000G	Pro Garage	3	£99.98	£119.98

\*CTJ2250LP has a 2.25 tonne capacity, has a low entry of only 80mm and includes 2 sockets

## Clarke ALUMINIUM RACING JACKS

Quick lift. Non-marking nylon wheels. Rubber contact pad - helps protect vehicle undersides.

CTJ1250AB

**FROM ONLY £94.99 EXC.VAT**  
**£113.99 INC.VAT**

MODEL	LIFTING CAP.	EXC.VAT	INC.VAT
CTJ1250AB	1.25T	£94.99	£113.99
CTJ1800A	1.8T	£159.98	£191.98
CTJ2500QLG*	2.5T	£149.98	£179.98

LOW ENTRY ONLY 85MM

# Machine Mart

**NOW 66 SUPERSTORES NATIONWIDE**

## WHERE QUALITY COSTS LESS



## Clarke NO GAS/GAS MIG WELDERS

Uses flux cored steel wire, which creates own gas shroud as it burns.

**FROM ONLY £194.99 EXC.VAT**  
**£233.99 INC.VAT**

151EN

MODEL	AMPS	EXC.VAT	INC.VAT
105EN	30-100	£194.99	£233.99
151EN	30-150	£219.98	£263.98
130EN	30-130	£234.99	£281.99
160EN	30-150	£274.99	£329.99

## Clarke ARC ACTIVATED HEADSHIELDS

Activates instantly when Arc is struck • Protects to EN379 • Suitable for arc, MIG, TIG & gas welding.

**FROM ONLY £39.98 EXC.VAT**  
**£47.98 INC.VAT**

GW4

SEE FULL RANGE IN-STORE/ONLINE

## Clarke CAR RAMPS

Lift cars safely and quickly. Tough angled steel construction.

**FROM ONLY £26.99 EXC.VAT**  
**£32.99 INC.VAT**

PER PAIR

UK MADE

## Clarke HYDRAULIC BOTTLE JACKS

Telescopic Range

MODEL	CAP.	JACK HEIGHT (mm)	EXC. VAT	INC. VAT
CBJ2B	2	148-276	£7.99	£9.59
CBJ3B	3	180-350	£11.99	£14.39
CBJ5B	5	185-355	£14.99	£17.99
CBJ7.5	5	220-495	£49.98	£59.98
CBJ8B	8	190-365	£17.99	£21.59
CBJ10B	10	195-375	£21.99	£26.39
CBJ10*	10	210-525	£69.98	£83.98
CBJ12B	12	200-380	£24.99	£29.99
CBJ12*	12	235-580	£89.98	£107.98
CBJ15B	15	205-390	£29.98	£35.98
CBJ20B	20	217-407	£34.99	£41.99

## Clarke HYDRAULIC PRESSES

Professional Quality. Built for tough daily use in automotive/industrial workshops.

**FROM ONLY £139.98 EXC.VAT**  
**£167.98 INC.VAT**

CES100BB

\* Available with/without 7 pce pin, bracket & pressing plate kit. Adjustable polycarbonate safety screen # Economy model

MODEL	EXC.VAT	INC.VAT
4 tonne bench#	£139.98	£167.98
10 tonne bench#	£198.00	£237.60
12 tonne floor#	£249.00	£298.80
20 tonne floor	£329.00	£394.80
30 tonne floor	£649.00	£778.80
50 tonne floor	£1299.00	£1558.80

## Clarke ELECTRIC IMPACT WRENCH

Powerful 1/2" heavy duty corded impact wrench.

**FROM ONLY £59.98 EXC.VAT**  
**£71.98 INC.VAT**

CEW1000

Only Inc. 17, 19, 21 & 22mm sockets & carry case

## Clarke 12V BATTERY CHARGERS

For lead acid batteries. Automatic charger. Maintains optimal charging condition.

**FROM ONLY £24.99 EXC.VAT**  
**£29.99 INC.VAT**

AC80

**BEST SELLER**

MODEL	MAX CHARGE AMPS	EXC.VAT	INC.VAT
LA4	4	£17.99	£21.59
LA6	6	£19.98	£23.98
AC80*	8	£39.99	£47.99

## Clarke BATTERY CHARGERS/ENGINE STARTERS

Ammeter. Multi-position charge regulator. Overload protection on charging cycle.

**FROM ONLY £64.99 EXC.VAT**  
**£77.99 INC.VAT**

BC520N

MODEL	MAX CHARGE/BOOST	EXC.VAT	INC.VAT
BC130C	15/120	£64.99	£77.99
BC190	38/180	£94.99	£113.99
BC210C	25/200	£109.00	£130.80
BC410E	35/400	£129.98	£155.98
WBC180	35/180	£129.98	£155.98
BC205N	30/200	£179.98	£215.98
WBC240	45/240	£159.98	£191.98
BC520N	50/100	£179.98	£215.98
WBC400	60/350	£199.00	£238.80

## Clarke GRINDERS & STANDS

Stands come complete with bolt mountings and feet anchor holes.

**FROM ONLY £32.99 EXC.VAT**  
**£39.99 INC.VAT**

6" & 8" AVAILABLE WITH LIGHT

STANDS FROM ONLY £47.98 INC.VAT

## Clarke POLISHING KITS

6" KIT. Cotton mop, pure cotton mop, tapered spindle & polishing compound.

**FROM ONLY £22.99 EXC.VAT**  
**£27.99 INC.VAT**

For use with hand held electric drill. For use with bench grinders.

SIZE	SPINDLE (MM)	EXC. VAT	INC. VAT
6"	12.7	£22.99	£27.99
6"	16	£28.99	£34.99
6"	16	£34.99	£41.99

## Kiwi KWT-002 18V BRUSHLESS IMPACT WRENCH

Heavy-Duty, lightweight design. 1/2" Square Drive.

**FROM ONLY £149.99 EXC.VAT**  
**£179.99 INC.VAT**

440Nm Max Torque

**BEST SELLER**

## Clarke CRANES

**FROM ONLY £164.99 EXC.VAT**  
**£197.99 INC.VAT**

MODEL	DESC.	EXC.VAT	INC.VAT
CFC500F	1/2 ton fold	£169.98	£203.98
CFC100	1 ton fold	£164.99	£197.99
CFC1000LR	1 ton fold long reach	£219.00	£262.80

Folding and fixed frames available. Robust, rugged construction. Overload safety valve.

## Clarke INTELLIGENT AUTOMATIC CHARGER / MAINTAINERS

Keep batteries in top condition over a long period.

**FROM ONLY £24.99 EXC.VAT**  
**£29.99 INC.VAT**

CB09-12

## Clarke HIGH FREQUENCY BATTERY CHARGERS

Microprocessor provides appropriate charging rate. Variable current output for quick, medium or trickle charge.

**FROM ONLY £44.99 EXC.VAT**  
**£53.99 INC.VAT**

MODEL	MAX CHARGE	MAX BATTERY CAP.	EXC.VAT	INC.VAT
HFCB12	6 Amps	100Ah	£34.99	£39.99
HFCB12/24	20 Amps	200Ah	£79.98	£95.98

## Clarke SPRAY GUNS

HUGE CHOICE IN-STORE/ONLINE. **FROM ONLY £22.99 EXC.VAT**  
**£27.99 INC.VAT**

MODEL	DESC.	EXC.VAT	INC.VAT
PRO12C/	1.2mm	£22.99	£27.99
14C/18C	1.4mm, 1.8mm	£26.99	£32.99
PGF14/18	Pro Gravity	£26.99	£32.99
AP15	H.V.P.	£26.99	£32.99
SP14/18C	1.4mm/1.8mm	£27.99	£33.99

## Clarke WORKSHOP AIR TOOLS

**FROM ONLY £18.99 EXC.VAT**  
**£22.99 INC.VAT**

MODEL	DESCRIPTION	EXC.VAT	INC.VAT
CAT110	1/2" Impact Wrench	£26.99	£32.99
CAT111	Air Orbital Sander	£21.99	£26.99
CAT113	3" Cut Off Tool	£18.99	£22.99
CAT117	13 piece 1/2" Impact Wrench Kit	£34.99	£41.99
CAT120	43 Piece Air Tool Kit	£99.85	£119.82
CAT121	Dual Action Sander	£24.99	£29.99
CAT123	Reversible Air Drill	£29.98	£35.98

## Clarke TELESCOPIC SPRING COMPRESSOR

**FROM ONLY £89.98 EXC.VAT**  
**£107.98 INC.VAT**

Designed for use on wishbone suspension. 1250kg capacity. 115-300mm jaw opening. 19mm hex drive. For use with a wide range of vehicles.

CHT746

## Clarke TOOL CHEST AND TOOLS

**FROM ONLY £259.98 EXC.VAT**  
**£311.98 INC.VAT**

329 HAND TOOLS

Includes: great value includes CTC900B 9 drawer chest & CTC500B 5 drawer cabinet. Includes the most popular sockets, spanners, pliers, drivers, wrenches etc.

## air master 8/250

### TURBO AIR COMPRESSORS

Superb range ideal for DIY, hobby & semi-professional use.

**FROM ONLY £89.98 EXC.VAT**  
**£107.98 INC.VAT**

\*V Twin Pump

MODEL	MOTOR	CFM	TANK	EXC.VAT	INC.VAT
8/250	2HP	7.5	24ltr	£94.98	£113.98
7/250	2 HP	7	24ltr	£94.99	£113.99
11/250	2.5HP	9.5	24ltr	£109.98	£131.98
8/510	2HP	7.5	50ltr	£119.98	£143.98
11/510	2.5HP	9.5	50ltr	£139.98	£167.98
16/510*	3 HP	14.5	50ltr	£209.00	£250.80
16/1010*	3 HP	14.5	100ltr	£259.98	£311.98

## Clarke INDUSTRIAL AIR COMPRESSORS

Top quality belt driven air compressors for industrial & commercial users inc. garages, factories, workshops and farms. 10 bar/150psi max working pressure.

**FROM ONLY £369.90 EXC.VAT**  
**£442.90 INC.VAT**

UK BUILT

## Clarke AIR DISPENSERS

NEW RANGE

MODEL	AIR DISP. cfm	MOTOR (HP)	AIR RECEIVER	EXC. VAT	INC. VAT
XEV111(00)QL*	2	100tr	£369.00	£442.80	
XEV16100**	14	3	100tr	£399.00	£478.80
XEV16150**	14	3	150tr	£429.00	£514.80
XEV16200(OL)*	14	3	200tr	£499.00	£598.80
XEV16150(400)H14	3	150tr	£499.00	£598.80	
XET19200(OL)*	18	4	200tr	£599.00	£718.80
XE18200(OL)*	18	4	200tr	£559.00	£670.80
XEV26200*	23	5.5	200tr	£699.00	£838.80
XE37270(OL)*	36	2x 4	270tr	£1149.00	£1378.80

## Clarke ELECTRIC BELT DRIVEN AIR COMPRESSORS

Super range of belt driven air compressors, ideal for powering all commonly used air tools & spray equipment.

**FROM ONLY £289.90 EXC.VAT**  
**£346.80 INC.VAT**

## Clarke ENGINE STANDS

Rotates through 360°. Fully tested to proof load.

**FROM ONLY £44.99 EXC.VAT**  
**£53.99 INC.VAT**

CE5680F

## Clarke 6 SPEED METAL LATHE WITH 12 SPEED MILL DRILL - CL500M

**BUY NOW SPREAD THE COST**

**FROM ONLY £995.00 EXC.VAT**  
**£1194.00 INC.VAT**

Floor Stand Including Suds Tray £169.00 Exc. VAT/£202.80 Inc. VAT

**FAST, EASY FINANCE ONLINE/IN-STORE**

**NEW BUY NOW SPREAD THE COST**

- Over 12, 18 or 24 Months
- Purchases over £300
- 12.9% APR, 10% Deposit\*

**EASY TO USE WEBSITE**

**NOW OVER 21,000 PRODUCTS ONLINE!**



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- 0844 880 1265

**Clarke HEAVY DUTY PETROL POWER WASHERS**  
PLS195

FROM ONLY £219.99 EXC.VAT  
£262.99 INC.VAT

**CAN DRAW OWN WATER** Honda engine models in stock

**Clarke JETSTAR PRESSURE WASHERS**

FROM ONLY £59.98 EXC.VAT  
£71.98 INC.VAT

**NEW RANGE**

Makes easy work for washing vehicles, patios, stonework, etc. • JET7500, 8500 & 9500 include hose reel

**Clarke ELECTRIC HEATERS**  
DEVIL 7005

FROM ONLY £74.99 EXC.VAT  
£89.99 INC.VAT

**Clarke PARTS WASHERS**

FROM ONLY £39.98 EXC.VAT  
£47.98 INC.VAT

**BEST BODY**

**Clarke PRESSURISED SANDBLASTERS**

FROM ONLY £139.98 EXC.VAT  
£167.98 INC.VAT

**CPSB100**

• Heavy duty steel construction sandblasters for the quick removal of surface rust, paint, dirt/grease etc.

MODEL	BAR/PSI	HP	EXC. VAT	INC. VAT
Tiger1800 110/1595	2.6	£219.99	£262.80	
Tiger2600 170/2465	4	£289.99	£346.80	
Tiger3000 200/2900	6.5	£349.99	£418.80	
PLS195	186/2698	6.5	£439.99	£526.80
PLS265	260/3770	13	£669.99	£802.80

MODEL	MOTOR	MAX. PRESSURE	EXC.VAT	INC.VAT
JS1850	1400W	1323psi	£59.98	£71.98
JS1950	1600W	2030psi	£89.99	£107.98
Jet17500	1600W	2030psi	£124.99	£149.98
Jet6500	2100W	2610psi	£149.99	£179.98
Jet9500	2400W	3045psi	£179.99	£215.98

MODEL	VOLTS	HEAT OUTPUT	EXC.VAT	INC.VAT
DEVIL 6005	400V	2.5-5KW	£74.99	£89.99
DEVIL 7005	400V	5KW	£84.99	£101.99
DEVIL 6009	400V	4.5-9KW	£119.99	£142.80
DEVIL 6015	400V	5-10-15KW	£179.99	£214.80
DEVIL 7025	400V	22KW	£299.99	£358.80
DEVIL 7030	400V	30KW	£349.99	£418.80

MODEL	TANK CAP.	TYPE	EXC.VAT	INC.VAT
CW2D	10Ltrs	Bench	£39.98	£47.98
CW1D	45Ltrs	Floor	£99.98	£119.98
CW2M	22.5Ltrs	Floor	£139.98	£167.98
CW40	75Ltrs	Floor	£159.98	£191.98

MODEL	TANK VOLUME	FLOW RATE	EX. VAT	INC.VAT
CPSB100	32 litre	6-19 cfm	£139.98	£167.98
CPSB200	63 litre	12-20 cfm	£169.98	£203.98

**Clarke JUMP STARTS**

FROM ONLY £59.98 EXC.VAT  
£71.98 INC.VAT

Provides essential home, garage and roadside assistance • Integral work light • 910 includes air compressor • Long life battery

MODEL	START BOOST	PEAK AMPS	EXC.VAT	INC.VAT
900	400A	900A	£59.98	£71.98
910	400A	900A	£69.98	£83.98
CLPPJS	200A	400A	£74.99	£89.99
4000	700A	1500A	£124.99	£149.99
1/2/24	1000A@12V	2000A@12V	£139.98	£167.98
	500A@24V	1000A@24V		

**Clarke AUTOMOTIVE WHEEL DOLLY SET**  
AWD1

FROM ONLY £44.99 EXC.VAT  
£53.99 INC.VAT

**BIG 3" CASTORS**

• Four non-marking castors for easy movement in confined spaces • Heavy duty steel construction - load rating 500kg per dolly

**Clarke TAP & DIE SETS**

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# Back on the chain gang

**PART TWO:** We tackle the infamous timing chain job – but it's easier than expected if you're methodical and have the right tools, says **Andrew Everett**.

**W**hen we acquired our 2007 Peugeot 207 CC project car, we were well aware that its Prince petrol engine has a reputation for timing chain stretch. What actually goes wrong? Well, wear in the chain links results in chain extension. The tensioner plunger does its best, but it gets to the stage where the chain starts to beat against the plastic rails, often breaking them. The chain can also jump, upsetting the cam timing and, as we will show later, the chain stretch can allow significant changes to the cam timing, often bringing on the EML.

In the September issue, we noted that the Prince engine is also fitted to the 2006-onwards MINI R56, but there are

differences between the way the MINI and PSA units are timed up: the MINI is timed with Number 1 piston at Top Dead Centre, however, the PSA engine is timed at 90° with all four pistons level in their bores. The timing chain is the same part in both engines, as well as the 2001-onwards BMW N42-46, but the guide rails have subtle differences and the Febi chain kit has a different part number. The kit for the Peugeot 207 CC 1.6 Turbo is 100301 and, as Febi chain kits are not stocked by everyone, you need to contact the company direct to find a supplier. Febi parts are all OE and are the only stuff you should use – many aftermarket kits either don't fit properly or are poor quality.

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As well as the chain kit, you'll need two new camshaft bolts (available from either PSA or BMW dealerships) and it's worth replacing the auxiliary drivebelt at the same time. Last, the cam cover will have to come off for the job, so it makes sense to replace the leak-prone rubber gasket, too. Be aware that PSA and MINI often use different sizes of Torx bolt, so make sure you have a complete set of both male (T) and female (E) sockets.

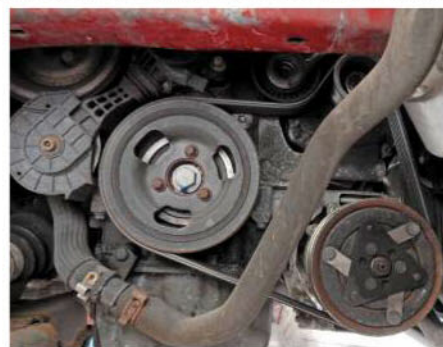
Here's how Parkside Autos in Worksop do a chain job, charging around £600.

## TIMING CHAIN REPLACEMENT



**1** Here is the new Febi chain kit 100301 – accept no substitute. As mentioned, the chain is universal, but the guides are slightly different to the MINI application. Notice how they're still white – they get brittle when they turn brown.

**2** ▶ The first step is to remove the plastic wheelarch liner. It's secured by multiple clips that are removed by flipping out the centres with a small flat-blade screwdriver. The arch liner comes out in one piece – an easy enough job.

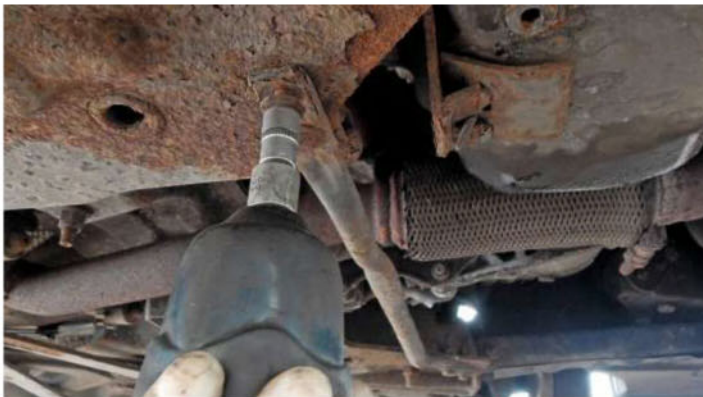


**3** ◀ Here you can see the crank pulley, the belt tensioner unit to the left of it, and the water pump pulley above that, almost out of view. The MINI has an identical set-up, but there is less room to work at this end of the engine.

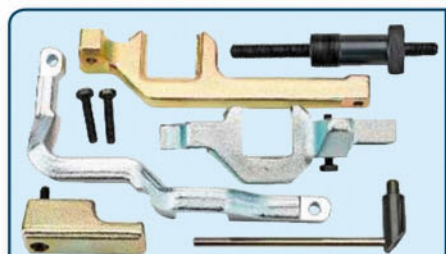
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**4** ▶ Next, this chassis cross brace needs to come off, but exercise caution as the bolts can snap off in the captive nuts. Use lots of penetrating fluid and wind them in and out until they come out in one piece.



**5** ◀ You need to support the engine with a trolley jack once the engine mount is released. Parkside Autos has made up this bracket for this job – it's a length of reinforced angle iron that bolts into one of the bracket bolt holes, supporting the engine without fuss.



### LOCKING KIT

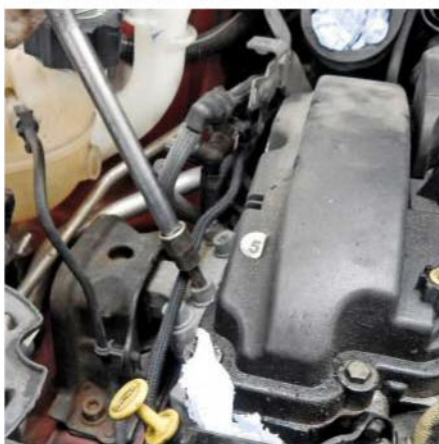
You can buy a **Draper Tools** kit (part no ETK28) from Machine Mart for **£199.99**. See <http://bit.ly/2wy3wHD>. On the other hand you may be able to hire the tools for the job.



**6** In the engine bay, the next stage is to detach the intake pipes to the turbo and to the intercooler and air filter box – they're held by hose clips and a single sensor on the left-hand pipe. Insert clean cloth into the exposed inlet holes to stop anything falling in inadvertently.



**7** Unplug the coil packs and extract them by pulling them up and out. You should remove the plugs as well, as it makes the engine easier to turn over. You'll need a special 12-point socket for the plugs – the Laser 4376 tool is ideal.



**8** Next, detach the engine mount. The bracket in Step 5 holds the engine up once the mount is out, or you could place a jack underneath if doing the job on the ground. Start by removing these four T20 Torx bolts, releasing the upper mount.

## Prince engine chain job pointers



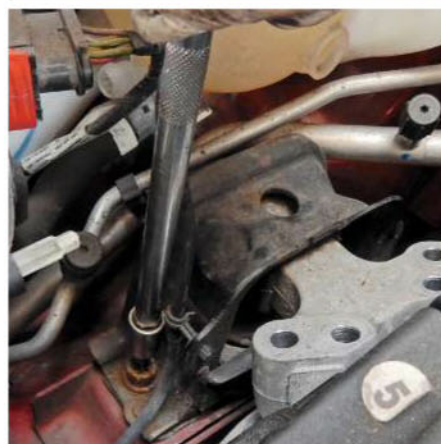
▶ The turbo versions of this unit fitted to the Peugeot 207 and 308, various Citroëns and the MINI Cooper S only have Vanos on the inlet cam, but normally-aspirated versions such as the Cooper and the regular C4 and 308 have double Vanos – do both centre bolts up to 50Nm plus 180°.

▶ If the chain assembly won't lift out, make sure the dipstick is free as it runs through the front chain guide. When undoing the Vanos bolts, check that they are locked solid and don't move – any fore and aft movement of the Vanos unit in relation to the cam means they're worn.

▶ With any of these jobs, the rules are simple: take your time, make notes, buy a Haynes manual and check everything.

▶ Part numbers? Don't buy the chain kit from MINI or Peugeot as they're at least twice the price. The 100301 kit can be bought from Febi for around **£130**, depending on supplier, but you can find the same kit (Febi 47639) without the crank gear for around **£80** from Amazon, with the crank gear costing another **£20**.

▶ New bolts? Peugeot part numbers are Vanos Torx 080677 (**£1.96**), exhaust bolt 080678 (**£2.02**) and crank bolt 0516L8 (**£8.59**).



**9** Using the same socket, now undo the bolts that secure the bracket to the inner wing. If the engine is supported correctly, it won't drop at all. Thankfully, this engine doesn't need to be raised or lowered during a chain job.

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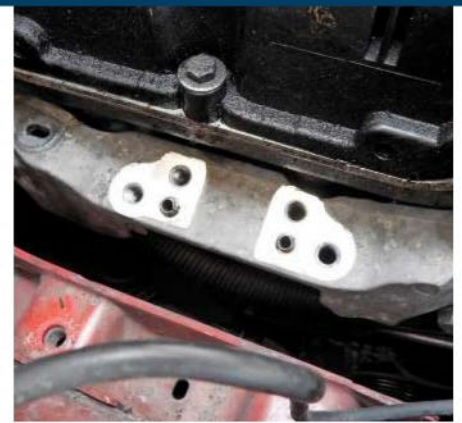
## TIMING CHAIN REPLACEMENT *continued*



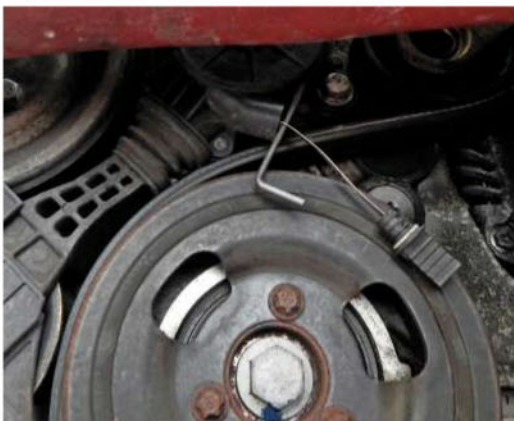
**10** Now to sort the belt tensioner. Deactivate the main tensioner using a 19mm spanner to heave the tensioner clockwise. See that small spring-loaded pin (circled)? Push it inwards with the tensioner pulled back to lock it in place.



**11** From above, pull the coil pack wiring loom out of the way in preparation for removing the cam cover. Make sure you have a new gasket to hand because, like the BMW N Series, these engines are prone to oil leaks.



**12** This engine mount bracket now needs to be detached. It's secured by four bolts that you can easily see on a Peugeot, but on a MINI, access to this side of the engine is extremely tight and there's little room to manoeuvre.



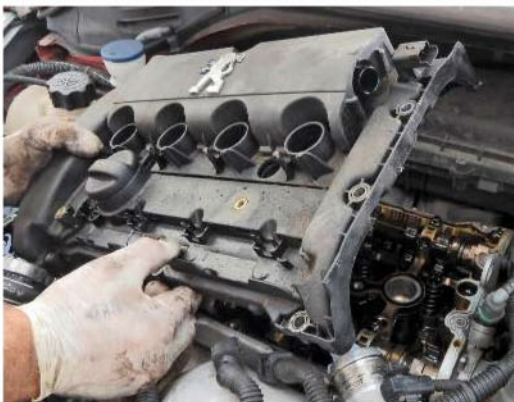
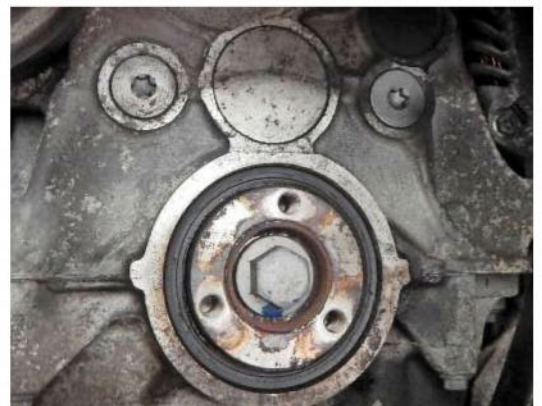
**13** ◀ The secondary belt tensioner has to come off next. This puts tension on the water pump when hot, but not cold, to warm up the engine more quickly. Pull the metal release cord, inserting a small Allen key to hold it in the open position.

**14** ▶ Here we're removing the two 13mm tensioner retaining bolts. Unlike PSA, the MINI unit uses threadlock on these bolts and there's very little clearance, making this part of the job particularly frustrating. With the bolts out, extract the tensioner.



**15** ◀ Next, detach the crank pulley – it's secured by three E12 Torx bolts tightened to 28Nm. Once these are removed, the crank pulley will come off, leaving the centre section behind – we'll come to that bit shortly.

**16** ▶ This is a good view of the side of the Prince unit. We can see the two Torx-headed chain guide retaining bolts – unlike older BMW units, these are complete bolts and not covering caps with separate bolts hidden behind.



**17** ◀ Detach the plastic cam cover by undoing multiple 10mm bolts, but take a note of their position as there is a mixture of long and short ones. It's a good idea to remove the gasket and pressure-wash the cover.

**18** ▶ Because the PSA unit is timed at 90°, not Top Dead Centre like the MINI unit, all four pistons need to be level. Use two identical lengths of welding wire or similar and set them up so they are at the same height, as shown.





**19** Under the car, detach the plug (if fitted) and insert the flywheel locking pin into the flywheel – you'll probably have to tweak the crank with a spanner until it locks in place. The pin is strong enough to lock the engine while undoing the crank bolt.



**20** Using either an air-gun or breaker bar, undo the big crank bolt (tightened on reassembly to 50Nm) and a further 180°. Our bolt was a 22mm, but they can vary – it's a stretch bolt and cannot be reused, so pre-order a new one.

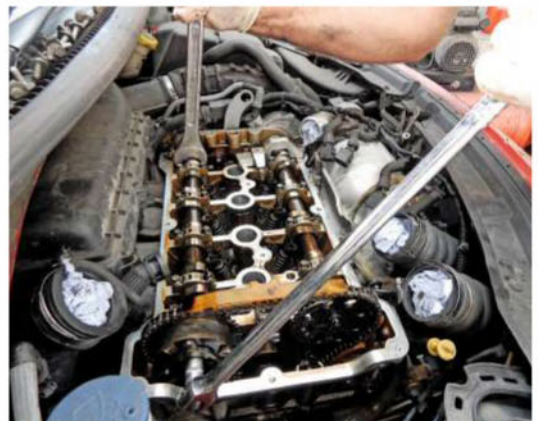


**21** The camshafts have locking squares on one end onto which the locking tools fit. PSA and MINI cams are slightly different, but there are still four squares to fit the locking tools for all applications of the Prince engine.



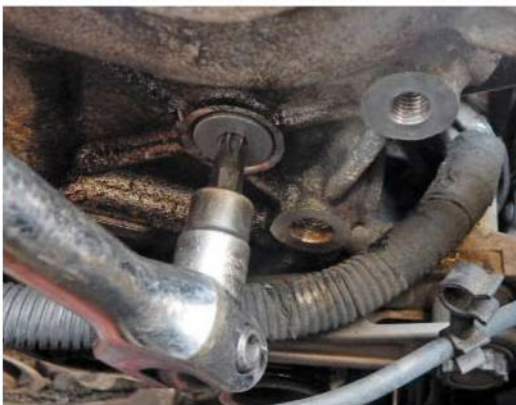
**22** ◀ Here are the locking tools fitted to the cams. You can see that the inlet cam is a mile off – the left-hand locking tool is securely fitted to the inlet cam, but there's a massive gap between the inlet and exhaust cam locks.

**23** ▶ We need to get the cam locks to fit properly so that the cam timing is locked in the optimum position. The inlet cam timing is wrong because of timing chain stretch. Slacken the pulley bolts so the cams can be moved to the correct position.



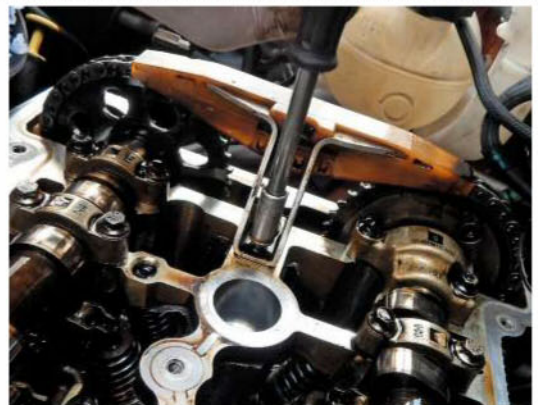
**24** ◀ Now the locks can be fitted and bolted into position, ready for reassembly. Incorrect timing due to chain stretch can bring on the EML – it's not unknown for the cams to be re-timed with the old chain left in place.

**25** ▶ It's virtually impossible to see, let alone photograph, but there is a 27mm chain tensioner plunger fitted to the back of the head and this needs to be unscrewed and removed. The new one may be slightly longer, but that's not a problem.



**26** ◀ Using a Torx T10, undo this upper chain guide bolt. Use a good tight-fitting Torx bit as these have to be done up to 25Nm and can often require a good crack to undo. It's a good idea to fit new O-rings as well.

**27** ▶ The upper guide rail needs to be removed by undoing two 10mm bolts – it's worth stuffing clean rag down the side of the engine to prevent one dropping into the sump. Any bits of this guide that have gone astray means the sump will have to come off.



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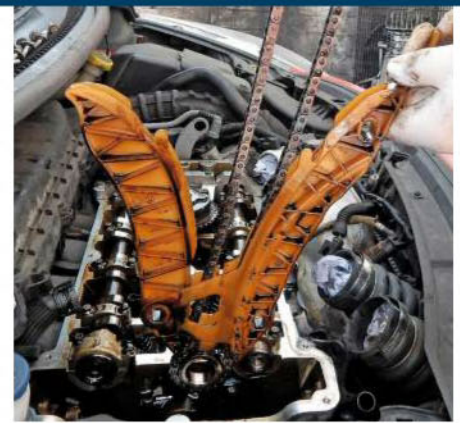
**TIMING CHAIN REPLACEMENT** *continued*



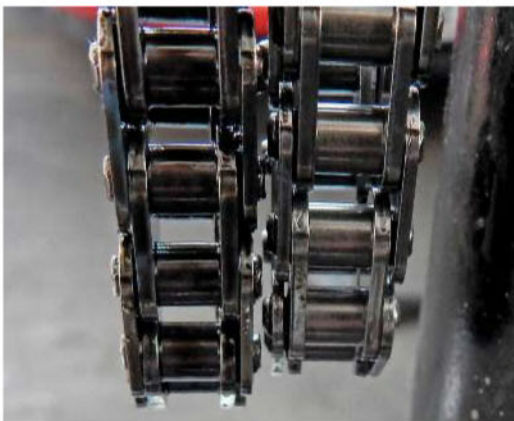
**28** Use the Torx T10 bit to undo the two lower guide retaining bolts, both tightened to 25Nm. Order replacements from the Peugeot main dealer – part numbers are 082026 for the lower bolt pins (with O-rings), 082027 for the upper one and gasket 082028.



**29** Now the crank hub can be withdrawn using a bolt threaded into one of the three holes. These hubs are not keyed onto the crank, but instead use the sheer force of a new, tightened stretch bolt to hold them in place.



**30** After the inlet and exhaust cam pulleys have been removed along with the dipstick, the timing chain cassette can be lifted out. They are not keyed on, but you should mark the position of the Vanos units to the camshafts.



**31** ◀ Here we have a 66,000-mile timing chain with 4mm of stretch – absolutely knackered in other words! It's rare for the chain to actually break, but the tensioner would barely cope with this, and the plastic guides can disintegrate.

**32** ▶ As you can see, the crank sprocket is equally goosed – note that the teeth are starting to take on a hooked appearance, which would make even a new chain noisy and cause it to wear out rapidly.

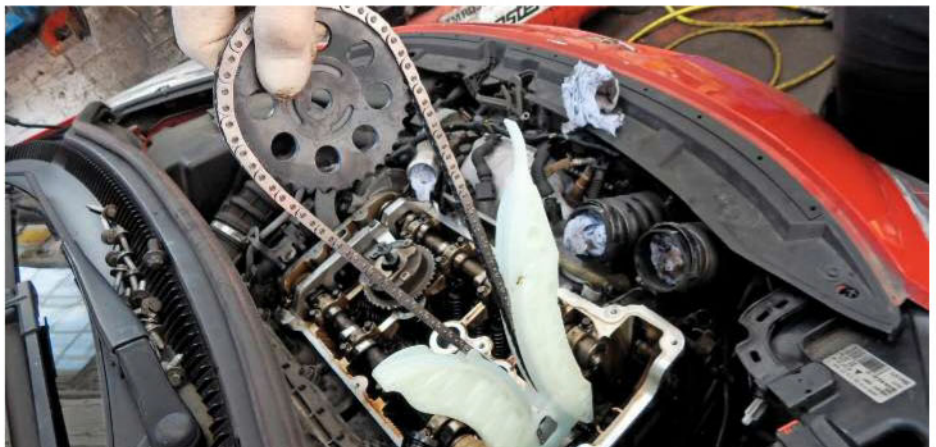


**33** The new Febi chain kit assembled into its running position. The rails have the same markings as the originals, but the kit is cheaper than main dealer prices.



**34** ◀ Here's a close-up of the chain guides that need to be clipped together, showing how the lower crank sprocket fits. You can add a dab of grease here to keep it all together while it's lowered in, but this is not essential.

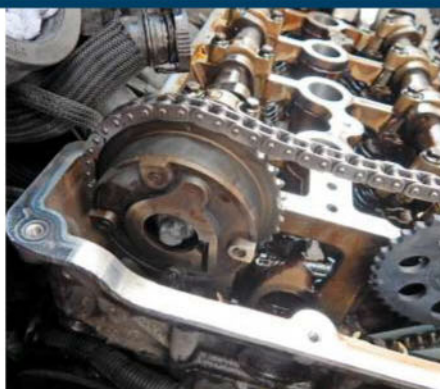
**35** ▼ The chain cassette is lowered into the engine with just the exhaust sprocket – it will only go in so far and won't drop down. You can screw in the old crank bolt to make sure the sprocket doesn't fall out, although it's unlikely.



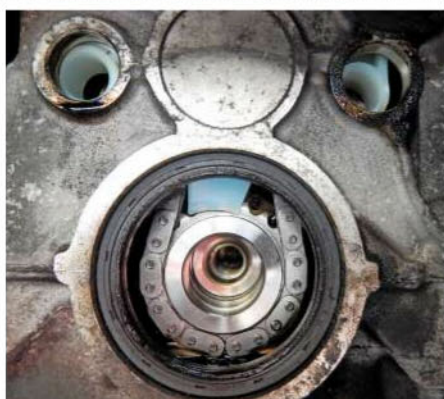
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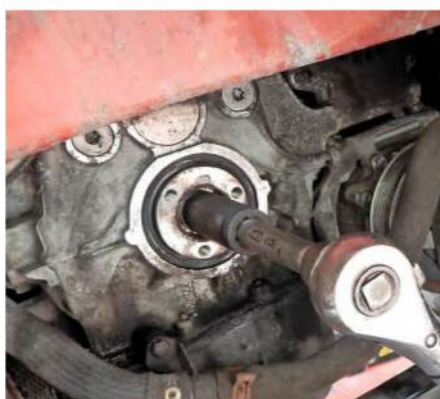
**36** Holding up the chain, the upper chain guide bolt can be screwed into place. It's a good idea to devise a way of holding up the chain at this point, to stop it from falling into the engine – a long tool like a breaker bar is ideal.



**37** Hook the cam sprockets into the chain and fit them to the ends of the cams with the new bolts – do NOT reuse the old ones as the sprockets won't be tight enough and can move. Do the bolts up finger-tight so the sprockets can move.



**38** Now fit the two lower chain guide retaining Torx bolts. The crank oil seal then needs to be oiled, along with the crank hub that can be slid into the seal and a new crank bolt fitted – do not reuse the old one.



**39** Tighten the crank bolt to 50Nm, then another 180°. Mark the hub after the first 50Nm and make another mark directly opposite. A ½-inch breaker bar is OK – it's only the BMW N engines that are done to 300Nm.

## PROJECT COSTS

### PURCHASE OF CAR



£1341.00

### PARTS & RUNNING COSTS

Febi timing chain kit	£130.00
Camshaft bolts	£6.60
Auxiliary belt	£15.00
<b>TOTAL</b>	<b>£1492.60</b>



## NEXT ISSUE

We find out what's causing the metallic twang when the steering wheel is turned lock-to-lock.

## USEFUL CONTACTS

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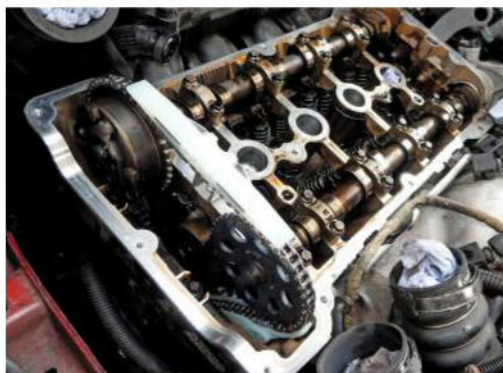
Febi UK 01977 699777  
[cars.febi-parts.com](http://cars.febi-parts.com)

Parkside Autos 01909 506555



**40** ◀ This is the chain tension setting tool. Screw it into the hole in the head where the tensioner goes, winding in the inner section until the chain is reasonably tight. As you do this, the cam sprockets will adjust into their positions.

**41** ▶ Now tighten the sprocket retaining bolts to lock them to the camshafts, which are, in turn, locked into their correct positions. Do up the Vanos bolt to 20Nm plus 180°, and the exhaust sprocket to 20Nm plus 90°.



**42** ◀ Remove the setting tool and fit the new tensioner. Extract all locking tools, rotate the engine twice on the crank bolt and refit the locking tools to recheck. All good? Then reassemble the rest of the unit and fire it up.

**43** ▶ The chain may have a brief rattle at first, but will quickly quieten. You may also notice a slight whine from the new chain, but that's normal. Last, reset any adaptations and clear fault codes – we found 24 of them!



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# Fitting a towbar

**PART FIVE: Rob Hawkins** visits Yorkshire Towbars to have a Westfalia towbar fitted to our Mercedes estate.

**A** V6-engined estate such as our Mercedes-Benz E320 CDI project is an ideal towing vehicle, so we decided to have a towbar fitted. Already supplied as standard with all the provisions as communicate with the car's electrics to change suspension and brake settings when towing, we opted for a well-known brand, Westfalia, and requested a 13-pin socket to provide power to a caravan.

The work involved in fitting a towbar to an E320 is similar to many other cars. The rear bumper and crash beam have to be removed, a pair of bumper arms discarded (replaced with new arms as part of the towbar kit) and the boot stripped to access the mounting points and the car's rear-mounted fusebox.

We've worked with Chris Giles from Yorkshire Towbars before when we followed him fitting a Westfalia kit to our Volvo XC90 project (see the March 2015 issue of *CM*). When we turned up with our E320, he said he'd recently fitted a towbar to one of these, but not an estate with seating in the rear. However, he soon managed to figure out how to remove the seats and trim in the spare wheel well in order to access the standard mounting holes for the new towbar's longer arms.

Our only difficulty concerned the rear bumper and what we found behind it. The crack in the middle of the bumper didn't tell the full story of how much of an impact our car had taken at some time in its life. Once we had removed the

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- ✗ REPAIR TORN LEATHER TRIM ON DRIVER'S DOOR
- ✗ WHEEL ALIGNMENT

PART 2  
JULY 17  
PART 3  
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PART 4  
SEP 17  
PART 4  
SEP 17  
PART 4  
SEP 17

*Plus anything else that arises in the coming months*

bumper, we discovered the crash beam was slightly misshapen in the centre, just behind the crack. The majority of the impact had been absorbed here, which at first didn't seem to be a problem. When we came to refitting the crash beam, we discovered the middle of it fouled the new towbar. We fixed this by straightening the crash beam with a lump hammer.

It took a full day to photograph and fit the new Westfalia towbar. When we tested its electrics, we were impressed to see the car's dashboard could raise faults, such as a blown trailer bulb.

## STRIPPING THE BOOT



**1** We started stripping the boot area by detaching the two side panels. The nearside panel provides access to the fusebox, so it has a release button with a warning sign, whereas the offside panel doesn't conceal anything, so it's just clipped in position.



**2** We have two rear-facing seats in our boot, and the seat base has to be removed to be able to access the spare wheel compartment. After raising the seat base to the vertical position, it can be lifted up and off its two hinge points.

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**3** The spare wheel is concealed by a hinged cover. Once raised, it can be removed by undoing three Torx T40 bolts. One of these bolts was obstructed by the cover's gas strut, so we detached it by undoing its 10mm bottom mounting nut.



**4** After extracting the spare wheel, we then detached the housing for the vehicle jack, which is secured with two 8mm bolts and a stud that makes it awkward to lift out. It's often easier to remove the jack first, then lift the housing forwards to release it.



**5** The stainless steel plate that's fitted across the rear slam panel needs to be detached. This panel can be awkward to refit as it's only secured along the front edge with a series of Phillips PH2 screws and a couple of Torx T30 bolts in the centre.



**6** All that remained to clear from the boot was the trim in the spare wheel well, which then allows access to the bumper's mounting bolts and the holes to attach the towbar's arms. The trim is secured with plastic trim plugs and can only be moved aside, not fully extracted.

## REMOVING THE BUMPER & CRASH BEAM



**1** The back of each rear wheelarch liner is pulled away to access a mounting bolt for each front corner of the rear bumper. First, a 10mm plastic nut was undone, followed by extracting one or two plastic trim plugs.



**2** With the back of the wheelarch liner released and pulled away, we could feed a 10mm socket and extension bar into the top corner of the bumper to undo a small bolt. This holds the front of the bumper to the rear wing.



**3** Like many rear bumpers, the front corners slide onto mounts on the rear wings. It's easier to undo these mounts from inside the boot. There are a couple of 10mm bolts to remove on each side.

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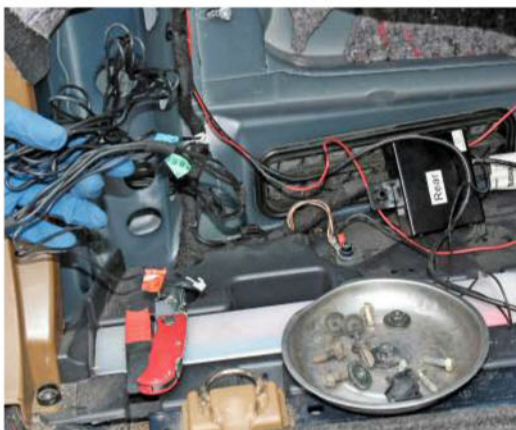
## REMOVING THE BUMPER & CRASH BEAM *CONTINUED*



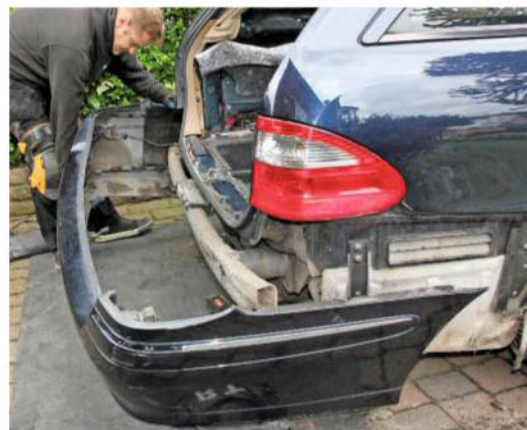
**4** ◀ There was another 10mm nut to undo, as shown in the picture. This secures the back of the bumper in position on a small stud that's fitted through the rear of the bodywork.



**5** ▶ A couple of Torx T30 bolts hold the bottom edge of the rear bumper via mounting brackets. Once these had been undone, the bumper was loose, but we still had to disconnect the wiring for the parking sensors.



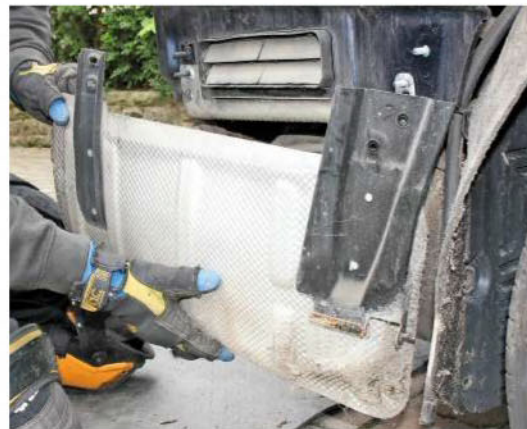
**6** ◀ We could have detached the parking sensors from inside the bumper, but decided instead to undo their wires from the control module (labelled 'Rear' in this photograph), then feed them through to the bumper.



**7** ▶ We carefully parted the bumper from the rear of the car, ensuring the wiring for the parking sensors was pulled through. A drain tube on each rear corner had to be detached before the bumper could be removed and safely stored on a special stand.



**8** ◀ Our bumper has a crack in the centre, possibly from an impact. We could now see that this had gone through to the crash beam and given it a noticeable dent. We proceeded with removing the crash beam by undoing two 16mm nuts and bolts.



**9** ▶ The arms for the crash beam need to be replaced with new arms for fitting the towbar. First, we removed the exhaust heat-shields at each rear corner of the car (held with four 10mm nuts), which provides better access to some of the mounts for the arms.



**10** ◀ With four 16mm bolts securing each arm to the bodywork, two of the bolts were straightforward to access from within the boot. They were also dry and rust-free, whereas...



**11** ▶ ...the other two had been exposed to 10 years of road dirt, and space was much tighter, so they took a lot longer to undo (one with a ratchet spanner and the other with a  $\frac{3}{8}$ in ratchet and deep socket). Once free, the arms could be removed and discarded.

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## FITTING THE TOWBAR



**1** ◀ Our towbar from Westfalia includes a removable swan neck, the wiring and electrical components for a 13-pin plug, and all the necessary fittings. However, we also needed to add wiring for a charge line and its earth.



**2** ▶ There are special mounting holes inside the boot that are used to thread bolts into the new arms for the towbar. These holes were covered with small rubber grommets, which we prised out.



**3** ◀ The new arms are supplied with rubber covers/grommets to keep the area where they are fed into the chassis rails watertight. We fitted the large grommets, then fed the arms into position, making sure the threaded sections were the right way round, then loosely fitted new bolts and washers.



**4** ▶ Transparent self-adhesive covers were placed over the mounting holes on the towbar, where it's secured to the arms. This helps to prevent water from travelling inside the chassis rails at the point where the arms are secured.



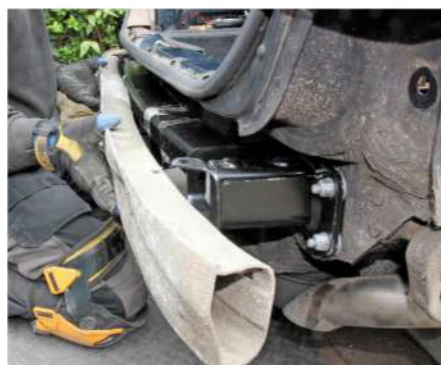
**5** ◀ With all eight of the new mounting bolts in position, the towbar was lifted up and fitted. This was easier with a second pair of hands, but it is possible to do it on your own. Locking nuts were loosely placed onto the mounting bolts.



**6** ▶ Two bolts secure the towbar to the ends of each arm. This is quite awkward to do on your own as the towbar needs to be raised sufficiently to line up the mounting holes and avoid cross-threading.



**7** ▶ Once the mounting bolts were in the correct positions, we started to progressively tighten them, then finished off with a torque wrench. The M10 nuts and bolts inside the boot and those shown here are tightened to 55Nm. The M14 bolts fitted in the last step were tightened to 95Nm.



**8** ▶ We tried to refit the crash beam, but realised the damage to it had distorted the middle, which meant it fouled the towbar and couldn't be lined up with the new mounting holes at the ends of the towbar.



**9** ▶ We tried to reshape the crash beam in a vice, but resorted to using a lump hammer. This thick length of metal had clearly done its job, absorbing the crash impact. We'll consider replacing it in the future, but, for now, we refitted it, tightening the mounting bolts to 40Nm.

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## TOWBAR ELECTRICS & TESTING



**1** The electrics kit supplied with our Westfalia towbar included all the necessary wiring, connector plugs and control module to communicate with our vehicle's CANbus system. We'd also requested a 13-pin socket for powering caravan electrics (eg. leisure battery and fridge).

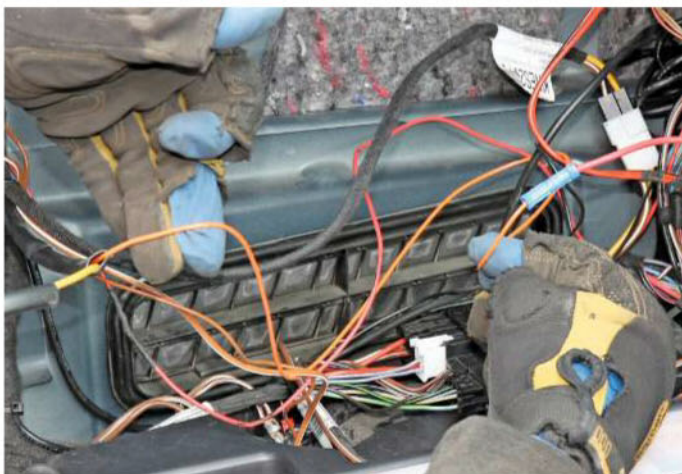
**2** The wiring for the 13-pin plug connector was fed through a spare hole in the nearside rear corner of the bodywork. This is covered by the bumper. One of the holes was used by the wiring for the reverse sensors.



**3** After fitting a mounting bracket to the towbar, the 13-pin socket was assembled with a waterproof rubber gasket, then secured with three screws and 10mm nuts. The wiring was concealed inside a plastic conduit and cable-tied to the towbar.



**4** The control module was secured with Velcro pads next to the fusebox. Two colour-matched plugs were connected to the appropriate sockets on the fusebox and fitted with 20- and 25-amp fuses. A similar plug was connected to the Mercedes CANbus system.



**5** The charge line for the 13-pin socket (used for recharging a battery aboard a caravan) needs a 5-amp ignition live connection at the fusebox. We found a spare one and connected the wiring to it using a piggyback fuse tap.



**6** A voltage-controlled relay ensures that the caravan's battery is only charged by the vehicle's battery when the voltage exceeds 13 volts (ie, when the engine is running and the alternator is recharging the battery). This relay was fitted close to the fusebox.

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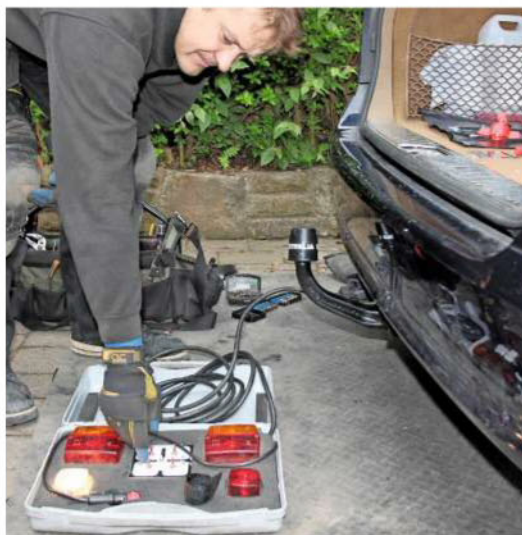
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**7** ▶ We routed a wire for the charge line via the relay to the positive terminal on the battery, fitting a 15-amp in-line fuse before the connection. This safety feature will prevent too much current being drawn.



**8** ◀ Finally, the wiring was tidied up with cable ties. Self-adhesive felt pads were fitted wherever there was danger of wires being chafed, and a dummy plug was added to one of the sockets on the control module that wasn't required.

**9** ▶ Before we could use the towbar's electrics, we coded it to the car's ECU to ensure its control unit – called a trailer module – was recognised and working. This enables towing settings to be used for the brakes and suspension.



**10** ◀ We tested all of the electrics with a dedicated test board. We also activated errors to test the system, such as a trailer bulb failing, and this successfully displayed an alert on the car's dashboard.

## PROJECT COSTS

### PURCHASE OF CAR



£3000.00

### PARTS & RUNNING COSTS

Millers Nanodrive 5W30 oil (7787). Two five-litre containers	£99.98
Febi oil filter (37478)	£8.00
Febi pollen filter (23716)	£10.00
Febi sump plug (05961)	£3.00
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Pagid brake pad retaining pins	£7.99
CarPlan Kleen Air bomb	£5.00
Frost POR15 kit	£19.99
Westfalia towbar with 13-pin electrics and wiring kit fitted by Yorkshire Towbars	£495.00

**TOTAL COSTS** £3883.61

All prices correct at time of going to press

## USEFUL CONTACTS

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Yorkshire Towbars

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## NEXT ISSUE



▶ The rear bumper has a repair, the dents are pulled out of the bodywork and the marks polished out of the paintwork.

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# Dealer's Diary



Our man in the trade, **Steven Ward**, watches amazed as a damaged Nissan Micra sails through an auction.

## Nonsensical Nissan

► I was at a Nissan auction the other week looking for some sensible stock. The choice of cars was good and prices were fair. One of the cars there was a 14-plate Micra Acenta 1.2 auto, with five doors and silver paint, which had covered just 3741 miles. It's worth noting that the SD card was present – these control the sat-nav and the like, and cost about £100 plus the raggy to replace.

That's where the good news ended. There was significant impact damage from the nearside front foglamp upwards, right up until the rear door handle. It looked just like somebody had just missed an exit ramp from the Aston Expressway and carried on driving along the crash barrier. I say that because the damage corresponded to how the Armco barriers start low and then raise up to waist height on such slip roads.

The car also needed a front foglamp and bezel, front bumper, front wing, front wheel, front door and rear door, all either repaired or replaced as applicable. Painting would be required on the rear panel, and possibly the bonnet to blend in correctly. Let's say a whole side required a blow-over. My boss and I valued the car at £4000, as Below

A below-average Micra for an above-average price.



Average Condition was a high £5400. Indeed, we set the sale away at £4000 and ran it in £50 increments until £4400, when it was officially 'on sale'.

The internet bidders started when that 'on sale' announcement was given. Experience has told us to drop out when the TV screens start flashing. Sure enough, they flashed at each other until £5350, close to Average Condition pricing. Crazy.

By comparison, there was a mint-out-of-the-box Nissan Note 1.2 that was finished in a dark metallic red. This was a 2014 car which had covered just 8000 miles – a high-spec Acenta Premium with the Piano Black dash. Alas, it had

*'Experience has told us to drop out when the TV screens start flashing'*

no SD card for the sat-nav and it was a manual. Bottom Book was £5200, but really it was Top Book, so it should have sold for at least £6100. Astonishingly it sold outright for £5000 as nobody paid any interest. The auctioneer struggled to get a bid, so the first nod saw the hammer drop with no running.

Typically, we missed this until the sale had gone too far for us to bid, but at least it went to a good trader.

## Plastic payment

► A new regulation comes into effect in 2018 for taking payment on credit cards. Currently, most small and medium-sized dealers are charged 2% for processing credit card payments, which is passed on to the customer as a surcharge, whereas debit cards payments cost just pennies. From next year, we will no longer be able to apply this surcharge and will have to absorb the 2% loss ourselves. While 2% may not seem like much of a hit to margins, it certainly adds up to the cost of trading over the course of a month.

Assuming most credit cards have an average £6000 limit and that you'll sell half-a-dozen cars at that price range on a credit card per

month, then you will incur banking fees to the tune of £720, plus the cost of the card terminal and telephone line. Thus, over the course of a year, you'll have paid close to £9000 in credit card transaction charges. Plus there's the odd customer who'll use multiple cards to fund high-end car buying, which means a charge for each individual card.

While I'll admit there are sales which I wouldn't have made without the credit card facility, it's always a bonus when a customer opts to pay with cash. The truth is the vast majority of customers will find the money readily enough if they are presented with a 2% surcharge plus VAT.

One thing a dealer shouldn't do is charge more than the cost levied by the card transaction company. That's illegal and it wouldn't do for a dealer to make money on plastic, would it?



# Colours & shades

▶ With its harsh factory lighting, an auction hall is a depressing place on a cold, wet and overcast day. It's fair to say it lacks the elegant appeal of the Concorde departure lounge. Then there are the cars: line upon line of mass produced, cost-per-mile fleet fodder finished in various shades of white, black, grey and silver. You could well be in a dreary scene cut from *The Matrix*.

One ends up yearning for the lively purples and golds so popular in the late 1990s. It's so bad that I hone in on anything that is finished in a colour, even if it's lipstick red – a colour that fades faster than you can T-Cut it.

Given this, the pick of a Fleet and Finance sale for me the other day was a couple of family favourites in something approaching a colour. First up was a five-year-old, five-door Fiesta 1.4 Titanium petrol finished in Fashionista metallic (as an aside to all of you who prefer four-pots to a whizz-bang three-pot: the Fleets agree with you, so that's where you need to look if you want old-school engines). This colour, aside from having a name which gives you no clue as to the actual hue – think green/gold/yellow/brown and you'll still be nowhere near – looked very classy and distinctly un-fleetlike.

CAP'd at £5750 Trade on account of it having a FFSH and being sub-10,000 miles with just the one registered keeper, it sold for a bargain £5100 plus fees. I could not fault this car in any way, and as a bonus you



Ford Fiesta in Fashionista metallic.

wouldn't lose it in a car park.

Next up was a three-year-old Vauxhall Insignia 2.0 diesel manual Elite-NAV five-door. This model has just been replaced, but I can't see that affecting residuals as they look the same. This car had covered 31,500 miles with FVSH and just one registered keeper. Once again, I couldn't fault the condition of the vehicle, but the real reason I'm talking about it here is the colour: Metallic Aurum Green.

This light green body looked striking among a dozen dull Insignias. Inside somebody had ticked the option for ivory leather and, wait for it, walnut trim. This car was more Jaguar-like than the current XE and it looked unfeasibly classy. You could take huge pride in polishing it on a Sunday morning.

The final price was £9050 plus fees, some £500 behind Trade Book. That means it had shed more than two-thirds of its price when new, saving you around £18,000.

Given the low running costs of this model, this was a used bargain in which you could feel very smug.

# Scrappage

▶ The awful word 'scrappage' is now back in vogue, with a number of desperate manufacturers keen to shift stockpiled metal with this crude gimmick. At the time of writing, virtually all manufacturers – certainly too many to list here – are at it, mimicking a wasteful government hand-out from a decade or so ago.

During that wretched recession, we lost a significant number of customers to scrappage. I cannot think of a single car crushed during that time which wouldn't have made fine forecourt fodder. The scheme left the used car trade in tatters as the loyal moneyed who looked after their cars were lured to new purchases thanks to taxpayer-funded incentives that left independent traders desperate for quality used vehicles to sell.



**CITROËN  
SCRAPPAGE  
SCHEME**

*'The scheme left the used car trade in tatters'*

I've no doubt the same thing will happen again. Chances are if you're running a car just an MOT or breakdown away from being weighed-in, you can't afford a new car. But any affordable used replacements will have been cubed and shipped to China. Then there's the used parts that would have ordinarily been salvageable from a car scrapped during the normal course of its life.

Hopefully, this time the Treasury will click up some additional tax receipts by dint of the extra VAT generated on cars that are essentially overpriced – some to the tune of £5000. Because that's all this amounts to: a generous discount on a new, preferably financed car. It's got nothing to do with the environment.

The Treasury may be laughing but it won't help the poorest drivers or the independent motor trade.

# Carmode

▶ This tale came straight from the mobile upholsterer we use and its absolutely genuine – vouched for my missus, as she was there as the story unfolded.

The auto upholster, Alan, is in demand for weeks on end during the summer months. His speciality is seats and fabric roofs. During his quiet time, he prepares retail cars which need some titivation before going on sale at dealerships. Alan rarely works on site; he removes the items such as seats that are requiring attention and takes them to his immaculate workshop.

On this occasion, he'd been asked to attend to some cigarette burns on the front seat of an ex-motability MPV for a franchise dealership. Preparing to remove the seat, he slid open the undertray of the front seat, a common feature on these MPVs, in order to access the bolts and disconnect the SRS systems. As he pulled the tray forward, he discovered that the tray, far from being used for storing the odds and ends associated with a family car, had been used as a toilet. And not just once.

Despite Alan always being dressed immaculately and having a spotless van, he's seen some quite vile interiors in his time and he just gets on with it, without a murmur. But even this 'jobby' was too much for Alan to contemplate, as he quite politely refused to proceed with the repair until the tray had been 'flushed'.



## TOP TIP

With most door locks being remotely operated now, don't overlook maintaining the manual key operation. There's nothing worse than a dead remote only to find a seized lock. Graphite lubricant, readily available online, is ideal for keeping locks lubricated yet dry.





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**Pro Spring Compressors £55.40 £66.48**



**Mk2 Front Wing £72.10 £86.52**

Mk1 Mexico front wing, LH or RH each £265.22 £318.27  
Mk2 front wing, LH or RH, std. each £72.10 £86.52  
Mk2 front wing, LH or RH, RS2000 each £175.00 £210.00

Full listing of all Mk1 and Mk2 body panels on our website

www.rallydesign.co.uk

### TIMING/LOCKING TOOL SETS



**Citroen/Peugeot Pro £29.90 £35.88**

BMW double Vanos	SWE158	£68.90	£82.68
BMW N42/46/46T	SWE159	£29.90	£35.88
BMW Mini Cooper	SWE152	£19.80	£23.76
Citroen/Peugeot Pro kit	SWE148	£29.90	£35.88
Ford Duratorq	SWE134	£26.68	£32.02
Ford/Mazda basic kit	SWE152	£7.36	£8.83
Ford/Mazda Pro kit	SWE135	£59.90	£71.88
12 piece Land Rover, diesel	SWE145	£15.28	£18.34
Mini & PSA	SWE163	£33.60	£40.32
Opel, petrol, chain	SWE155	£13.90	£16.68
Opel/Vauxhall Pro kit	SWE140	£59.90	£71.88
Opel/Vauxhall diesel	SWE153	£13.90	£16.68
Vag 1.6/2.0TD	SWE162	£18.90	£22.68
Vag 2.5/4.9D TDi Pro	SWE161	£68.70	£82.44
Vag 2.0 TDi Basic	SWE136	£11.90	£14.28
Toyota & Mitsubishi, Pro kit	SWE213	£79.90	£95.88

### SPECIAL TOOL SETS

Valve seat removal tool	SWE146	£10.90	£13.08
7 piece body repair tools	SWE154	£19.60	£23.52
7 piece hose clip removal pliers	SWE147	£24.00	£29.76
Bearing separator kit	SWE164	£23.90	£28.68
Valve spring compressor, hollow	SWE165	£9.40	£11.28
Spring compressors, pair, 370mm	SWE133	£11.90	£14.28
Pro spring compressor kit	SWE166	£55.40	£66.48
Glow plug removal set	SWE170	£34.40	£41.28
Diesel injector seat cutter	SWE169	£14.90	£17.88
Fan clutch wrench, Ford	SWE137	£9.90	£11.88
Camshaft pulley holder	SWE138	£9.90	£11.88
2 piece valve suction rubbers	SWE139	£5.20	£6.24
Magnetic workshop wing cover	SWE098	£7.36	£8.83
3 piece flexible hose clamp set	SWE150	£5.90	£7.08

### SPECIAL SOCKETS

BMW Mini filter socket, 36mm	SWE171	£4.90	£5.88
VW/Audi top shock retaining nut	SWE172	£3.90	£4.68
BMW Mini thin spark plug socket	SWE173	£3.20	£3.84
Citroen/Peugeot ball joint socket, pair	SWE175	£9.90	£11.88
BMW locking wheel nut bits, 3 piece	SWE176	£9.60	£11.52
Strut lugs pry sockets	SWE177	£6.90	£8.28
Oil drain plug key, VW gearbox	SWE179	£4.90	£5.88
Mercedes pre camber spline socket	SWE180	£4.90	£5.88
Mercedes fuel injection pump socket	SWE181	£3.90	£4.68
Mercedes 95mm axle socket	SWE182	£39.90	£47.88
Transit wheel bearing nut socket	SWE183	£4.90	£5.88
24" long breaker bar x 1/2" drive	SWE185	£8.90	£10.68
39" long breaker bar x 3/8" drive	SWE186	£18.90	£23.88
Adaptor 1/2" female to 3/4" female	SWE184	£3.90	£4.68
Large size impact quality sockets x 1/2" drive, sizes - 33, 34, 35, 36, 38 & 41mm	SWE190-195	Each £6.90	£8.28

### BLACKLINE MODULAR TOOL SYSTEM



MODULES FIT 1/3rd EACH ROLLER TRAY

### BlackLine

53 piece 1/4 drive socket set	SWEA01	£15.90	£19.08
35 piece 3/8 drive socket set	SWEA02	£19.90	£23.88
24 piece 1/2 drive socket set	SWEA23	£24.90	£29.88
18 piece 3/8 drive sockets only	SWEA24	£9.90	£11.88
24 piece 1/2 drive sockets only	SWEA03	£19.90	£23.88
8 piece socket adaptors	SWEA04	£19.90	£23.88
15 piece 1/2 drive socket/bits set	SWEA06	£14.90	£17.88
8 piece Phillips screwdriver set	SWEA07	£9.90	£11.88
8 piece flat screwdriver set	SWEA08	£9.90	£11.88
18 piece Hexkey plus 44 piece precision set	SWEA09	£13.90	£16.68
16 piece combination spanner set	SWEA10	£23.90	£28.68
7 piece double ring wrench set	SWEA11	£17.90	£21.48
3 piece pliers set	SWEA13	£9.90	£11.88
4 piece circlip pliers set	SWEA14	£9.90	£11.88
2 piece mole plus water pump pliers	SWEA15	£9.90	£11.88
10 piece chisel and hammer set	SWEA16	£12.50	£15.00
3 piece brake spring pliers set	SWEA17	£9.90	£11.88
3 piece flexible line clamps	SWEA19	£9.90	£11.88
5 piece steel file set	SWEA20	£11.90	£14.28
4 piece measure/cutting tool set	SWEA21	£8.90	£10.68

### SPECIAL HAND TOOLS

#### Ratchet tap Wrenches

85mm long, M3 - M10 £6.90 £8.28  
100mm long, M5 - M12 £7.90 £9.48



#### Gear Ratchet Spanners

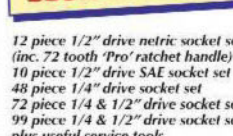
72 TOOTH - THE BEST QUALITY!  
7 piece metric set, 8 - 19mm £23.70 £28.44  
7 piece SAE set, 5/16 - 3/4 £23.70 £28.44

Wire twisting pliers, 7"	£9.92	£11.90
10/12mm spark plug thread chaser	£4.07	£4.88
14/18mm spark plug thread chaser	£4.10	£4.92
5 piece ball joint separator kit	£9.08	£10.89
3 piece exhaust pipe expander	£11.66	£13.99
11 piece trim removal kit	£8.08	£9.69
10.5" heavy duty circlip pliers, replaceable tips	£8.17	£9.80
Spare tips for circlip pliers	£4.90	£5.88
Pocket brake fluid tester, LED readout	£5.83	£6.99
Bralle piston wind back tool	£9.98	£11.98
'Pro' brake piston wind back tool	£17.69	£21.23
Windscreen removal tool	£4.98	£5.97
13 piece impact screwdriver kit	£7.49	£8.98
Magnetic wing protector cover	£7.36	£8.83
Coil spring compressors pair	£11.90	£14.28
Bralle bleeder vacuum tester	£17.69	£21.23
16 piece oil filter removal sockets	£18.73	£22.48
Motorcycle chain breaker	£15.63	£18.76
Heavy duty crimper set	£24.90	£29.88
1/2" drive 3 piece wheel nut socket	£12.64	£15.17
17 piece clutch alignment kit	£10.11	£12.13
125mm piston ring compressor	£4.55	£5.46
46 piece multi-purpose puller kit	£8.25	£9.90
10 piece bearing race driver kit	£23.69	£29.88
96 piece drain plug repair kit	£25.76	£29.90

**Pro Riveter Kit £39.90 £47.88**



**99 Pc Socket/Tool set £55.90 £67.08**



12 piece 1/2" drive metric socket set (inc. 72 tooth 'Pro' ratchet handle)	£14.48	£17.38
10 piece 1/2" drive SAE socket set	£9.68	£11.62
48 piece 1/4" drive socket set	£15.59	£18.71
72 piece 1/4 & 1/2" drive socket set	£37.80	£45.36
99 piece 1/4 & 1/2" drive socket set plus useful service tools	£55.90	£67.08
5 piece socket extractor set - remove locking nuts	£19.92	£23.90
1/2" drive universal coupling	£8.25	£9.90
Pro riveter kit - rivets, rivstuds, pop rivets	£39.90	£47.88
Box set of rivets, studs & pop rivets	£34.50	£41.40
Torque wrench, 40 - 210Nm	£30.90	£40.68
3 piece magnetic bits socket	£4.85	£5.82
4 piece socket adaptors, 1/4 - 3/8 - 1/2	£2.98	£3.58
3/8 drive oxygen sensor socket, 8mm slot	£3.66	£4.39
3/8 drive oxygen sensor socket, 22mm slot	£3.66	£4.39
3 piece 3/8 & 1/2 spark plug socket	£3.72	£4.46
8 piece socket adaptors, impact 1/4 - 3/8 - 1/2 - 3/4 - 1	£16.46	£17.75
6 piece 1/2 Volkswagen impact socket	£11.90	£14.28
18 piece 3/8 oil drain socket	£18.57	£22.21
5/8 oxygen sensor crowfoot wrench	£3.84	£4.61
1/2 oxygen sensor crowfoot wrench	£3.98	£4.78
14/17mm hex drain plug key	£2.90	£3.48
11 piece 3/8 spark plug/glow socket	£18.34	£22.01
Vernier calipers, 0-6" (150mm), high quality	£17.90	£21.48
10 piece T-Handle Allen key set	£11.90	£14.28

### LAND ROVER TOOLING

Oil filter socket	SWE610	£5.90	£7.08
Ally wheel nut socket, 27mm	SWE611	£6.90	£8.28
Timing pins - TD5	SWE612	£6.90	£8.28
Diesel injection pump puller	SWE613	£11.90	£14.28
Diesel injection pump puller, VP44	SWE614	£23.90	£28.68
52mm hub nut socket	SWE615	£8.90	£10.68
Fuel pump removal tool	SWE616	£39.90	£47.88
Oil filter removal tool	SWE617	£11.90	£14.28
3 piece viscous fan wrench set	SWE618	£72.90	£87.48
Rear suspension bush tool, lower hub	SWE619	£69.90	£83.88
Rear suspension bush tool, upper hub	SWE620	£54.90	£65.88
Clutch alignment tool	SWE621	£9.90	£11.88
Propshaft socket	SWE625	£6.90	£8.28
Engine timing/locking set, 2.7TD V6	SWE622	£15.38	£18.46
Cam timing kit, Jag/L.R. petrol	SWE623	£36.62	£43.94
Cam timing kit, V8 5.0L	SWE624	£54.47	£65.36
Land Rover diesel timing kit	SWE145	£15.28	£18.34

### TESTING EQUIPMENT

**Cylinder Leak Detector £21.83 £26.80**



Cylinder leak detector	SWE059	£21.83	£26.80
Fuel injection test port	SWE060	£19.38	£23.26
Diesel engine compression test	SWE069	£27.90	£32.64
9 piece petrol engine compression test	SWE090	£14.92	£17.90
Flow meter common rail set	SWE168	£21.20	£25.44
Radiator pressure test kit	SWE167	£47.20	£56.64

### ESCORT MK1 & 2 PARTS



Roller top mounts	£59.50	£71.40
TCA's	Pair £36.50	£43.80
4-Link kit	£109.50	£131.40
Ally hubs	£42.50	£51.00
Body jacking kit	Car set £119.50	£143.40
English CWP's	£237.50	£285.00
Atlas CWP's	£258.00	£309.60
Aluminium radiators	£179.60	£215.52
M16 calipers, new	Pair £89.00	£106.80
Escort RS struts, brand new	Pair £193.90	£232.68
English 22 tooth helical LSD	£124.00	£388.80
Atlas 16 tooth helical LSD	£354.00	£424.80
Wilwood 4-pot braking kits	from £279.51	£335.41

Classic Ford Wheels	£69.00	£82.80
Quick steering racks, 2.9	£119.50	£143.40
Quick steering racks, 2.4	£139.50	£167.40

### HELICOILS

#### Thread repair kits

From **£8.00 £9.60**



- M5 - M14
- 10/32 - 1/2 UNF
- 1/4 - 1/2 UNC



## INJECTION FUEL PUMPS

058 0464070 Bosch equivalent pump	£19.62	£23.55
058 0254044 Bosch equivalent pump	£37.32	£44.79
058 0254910 Bosch equivalent pump	£32.19	£38.63
Pump equivalent to Walbro GS8342	£33.15	£39.78
Pump mount bracket, billet ally	£15.50	£18.60
Pump 'Bullet' in-line filter	£19.50	£23.40

## SOLID STATE & INTERRUPTER FUEL PUMPS

Solid state, 12v, 18 gallons per hour	£19.00	£22.80
Interrupter, 12v, 18 gallons per hour	£29.00	£34.80
Interrupter, 12v, 38 gallons per hour	£29.00	£34.80

## SET UP EQUIPMENT - Suspension

Trackace from  
**£58.00**  
**£69.60**

Trackace in cardboard box	£58.00	£69.60
Trackace in blow moulded case	£68.00	£81.60
Gunsun Trackrite caster/camber gauge - magnetic mount	£19.50	£23.40
Blackline caster/camber gauge 'Bubble type'	£15.75	£18.90
9mm inspection camera - Borescope	£44.90	£53.88

Digital Caster-Camber Gauge  
**£67.27** **£80.72**

Blackline digital caster/camber gauge, magnetic mount	£67.27	£80.72
Blackline caster/camber gauge mounting kit including digital gauge - suit wheel diameters 10-20"	£107.28	£128.74
Turntables, 1.5ton each capacity pair	£139.80	£167.76
Digital tyre pressure gauge	£3.80	£4.56
Digital tyre depth gauge	£4.80	£5.76

## RANGER LED SPOTLIGHTS

THE MOST POWERFUL LED SPOTLAMPS IN THE WORLD

Ranger 7", 28 LED, 12,600 lumens	£94.00	£112.80
Ranger 9", 45 LED, 22,000 lumens	£112.40	£134.88
Special installation wiring harness	£14.90	£17.88



## LED LIGHTS

Rechargeable workshop light - 30 LED	£16.25	£19.50
Rechargeable under bonnet light - 120 LED	£39.50	£47.40

## CIBIE LIGHTS & COVERS

Cibie 'Oscar Style' Lamp  
**£39.00** **£46.80**

Genuine Cibie Oscar	£89.50	£107.40
Genuine Cibie Super Oscar	£99.50	£119.40
Pattern 'Oscar' lamp, F-marked	£39.00	£46.80
Pattern 'Super Oscar' lamp, E-marked	£44.50	£53.40
Spare Oscar light cover	£15.90	£19.08
Spare Super Oscar light cover	£19.90	£23.88

## BATTERY CONNECTION PARTS

Quick disconnect, cable connector & anti-corrosion washers	set	£4.90	£5.88
Terminals, 13.5mm post	pair	£2.90	£3.48
Terminals, 16.5mm post	pair	£2.90	£3.48
Washers and terminal boots	set	£2.50	£3.00
Hydrometer tester	set	£1.90	£2.28

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MIG 200 amp  
**£194.48** **£233.38**

Arc welder, 200 amp	£93.29	£111.95
Mig welder, 120 amp	£87.88	£105.46
Mig welder, 200 amp	£194.48	£233.38
ARC & TIG welder, 180 amp	£157.20	£188.64
250amp TIG AC welder, special for aluminium	£372.40	£446.88

## PROFESSIONAL Starter/Chargers

Starter/Charger, max. 100 amp	£98.79	£118.44
7 stage charger - reconditions deeply discharged lead acid batteries	£29.80	£35.76
1kw inverter - incl. USB port	£99.90	£119.88

## BLACKLINE POWER TOOLS

BlackLine  
PROFESSIONAL QUALITY TOOLS

### 450Nm Cordless Impact Wrench Set

Includes powerful 450Nm wrench (reverse), 120Nm (forwards), impact socket set, (1) 72T ratchet handle, (1) extendable ratchet handle, (2) x 4a Samsung batteries and quick charger

All for just  
**£149.70**  
**£179.64**

### OTHER BLACKLINE POWER TOOLS & ACCESSORIES

450Nm Impact wrench, mains 240v	£47.82	£57.38
16 piece Impact socket set, 1/2" drive	£15.64	£18.77
Standard ratchet handle, 72 tooth, 1/2" drive	£7.98	£9.58
Extendable, 180" head ratchet handle, 72 tooth, 1/2" drive	£15.79	£18.95
4Ah Samsung spare lithium battery	£32.98	£39.58
Torque wrench, 40-210Nm (30-155lb ft)	£33.90	£40.68
5 piece twist socket set, 1/2" drive	£19.92	£23.90
Universal ball joint impact socket, 1/2" drive	£8.25	£9.90
250Nm lightweight impact wrench, 3/8" drive	£74.80	£89.76
13 piece impact long-reach socket set, 3/8" drive	£11.58	£13.89
1.5Ah Samsung spare lithium battery	£13.25	£15.90
Cordless power drill, 18v, 52Nm torque	£41.50	£49.80
19 piece cobalt drill set, din 338, 1-10mm	£16.58	£19.90
Cordless screwdriver, 7.2v, lightweight, 6 torque settings	£19.42	£23.30
Angle grinder, 1100w x 125mm diameter, 1100rpm	£23.00	£27.60
Polisher, 800-3000rpm, 180mm pad	£39.83	£47.80
Heat gun, 2000w, 50-650°, 500 ltr/min air flow	£24.92	£29.90
170w mini grinder (tool only)	£23.90	£28.68
170w mini grinder plus 130 piece rotary tool set	£33.90	£40.68

## BlackLine

### Portable Generators

0.9kw Portable generator	£82.42	£98.90
1.2kw Portable generator	£124.58	£149.50
2.5kw Workshop generator	£166.58	£199.90
3.0kw Workshop generator	£229.08	£274.90
ELP 2.0kw Inverter/Generator (suitcase style)	£331.67	£398.00

2.0 Ton Nascar Quick Jack  
**£141.25** **£169.50**

THE BIG RED JACKS

## JACKING EQUIPMENT

3.0 ton Trolley jack	£36.50	£43.80
2.0 ton, lojn profile 'Pro' garage jack	£136.65	£163.98
3.0 ton, lojn profile 'Pro' garage jack	£186.40	£223.68
3.0 ton double lock 'Pro' axle stands - pair	£19.50	£23.40
2.25 ton lightweight jack	£49.25	£59.10
2.0 ton 'Nascar' quick jack	£141.25	£169.50
3.0 ton 'Pro' axle stands, pair	£24.58	£29.50
Wheel skate, hydraulic lift - each	£49.58	£59.50
Wheel dolly, pair	£39.50	£47.40
750lb engine stand	£41.25	£49.50
1500lb floodable engine stand	£58.05	£69.66
Engine cradles - pair	£49.50	£59.40
3in1 tool box set	£35.90	£43.08
Trolley style tool box	£79.90	£95.88
Wheel ramp set	£57.92	£69.50
Tyre saver parking mat - pair	£12.42	£14.90
Anti-skid grid, rollable	£22.65	£27.18
Electric hoist, 200kgs	£58.76	£70.51
Electric hoist, 500kgs	£87.51	£105.01
Car creeper, lightweight, 36"	£11.90	£14.28
1 ton engine crane, foldable	£119.50	£143.40
Workshop 'Button' seat, pneumatic	£23.50	£28.20
6 ton double locking axle stands, pair	£28.50	£34.20
500kg Transmission support jack, 1.9mtrs	£59.60	£71.52
Portable tyre changer	£49.70	£59.64
48" farm jack, 3 ton	£26.90	£32.28
10 ton hydraulic workshop press	£133.90	£160.68
0.5 ton Engine support bar	£76.20	£91.44
10 ton hydraulic pull back ram	£43.70	£52.44
10 ton hydraulic body repair ram kit	£79.20	£95.04

## TYRE CARRIERS

(4) Wheel tyre carrier	£24.92	£29.90
(4) Wheel tyre carrier, handle & lock	£39.80	£47.76

Tyre Carrier, handle & lock  
**£39.80** **£47.76**

## AIR COMPRESSORS

Prices from  
**£29.50**  
**£35.40**



### Direct drive compressors

Sealey 1HP, 6ltr tank, 4 CFM	£92.90	£111.58
Sealey 2HP, 50ltr tank, 6.8CFM	£124.90	£149.98
Sealey 3HP, 50ltr tank, 12.6CFM (V-Twin)	£194.97	£233.96
Sealey 3HP, 100ltr tank, 12.6CFM (V-Twin)	£246.97	£296.36

### Air compressors

Big Red, 3hp, 100 litre tank, 14.6cfm	£198.28	£237.94
Double cylinder air pump, max 150psi (60ltrs/min)	£29.50	£35.40
Hi-flow air pump (150ltrs/min)	£59.50	£71.40

Other sizes available on our website

www.rallydesign.co.uk

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15 piece 1/2" impact wrench kit	AIR100	£25.18	£30.22
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3 piece HVLP spray gun kit	AIR104	£29.63	£35.56
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PLEASE NOTE: All prices in Red are EXCLUSIVE OF VAT

# Smart choice

The shortest car on sale in the 21st Century was born out of a partnership between Mercedes-Benz and a Swiss watch manufacturer. But is the minute smart coupé any good as a secondhand buy, asks **Rob Bradshaw?**

**F**ew cars have such an interesting history as the original smart car. The urban coupé was the brainchild of Swiss businessman Nicolas Hayek, founder of the Swatch wristwatch brand. Like Swatch, the car was designed to be a premium product at a non-premium price. Something that was fun, affordable, youthful and colourful, yet manufactured with quality and precision at its core.

Hayek originally did a deal with VW Group to produce the car under a joint venture, but this was curtailed by VW's new boss, Ferdinand Piech, when he took up the reins of the Wolfsburg manufacturer in 1993. Keen to sweep in with all the efficiency of a Swiss-made second hand, Mercedes-Benz's parent company, Daimler, was knocking on Hayek's door within hours. The premium maker wanted a car that it could sell to the sub-premium market, and a partnership with Swatch aligned well with the German company's quality reputation. In 1994, the 'smart' concept was born, the name not only having a positive connotation of its own, but being an acronym for Swatch Mercedes Art.

Under Daimler's leadership, the original Swatch Car concept became somewhat diluted, albeit still unconventional. In order to generate the right level of customer acceptance, Daimler toned down the styling, though

concepts such as the interchangeable body panels were retained. Beneath the panels, the production car – which debuted in 1998 – featured what was known as a Tridion safety cell – in effect, a compact monocoque onto which the plastic outer panels were held by detachable clips. Two subframes were mounted to the shell, with the three-cylinder engine accessible through a rear hatch. The rear-mounted engine was cooled via a front radiator, with coolant pipes passing through the length of the car and feeding the HVAC (Heating Ventilation Air-Conditioning) system with heat on the way past.

The first cars were all left-hand drive and were never officially imported into the UK. They were known simply as the smart city-coupé and were offered in one specification only, with a 599cc three-cylinder petrol engine and a five-speed semi-automatic gearbox. The three-pot powerplant and sequential gears would remain part of the model's DNA throughout its life, despite the latter coming in for some fairly serious (and reasonably justified) criticism for its jerkiness and slow changes. In 1999, a diesel model was added to the line-up, though this wasn't officially available in the UK either. It came with a 799cc engine and similar transmission.

By now, smart was a wholly-owned subsidiary of Daimler, with Swatch

walking away from the project after claiming the design was too conservative. In 2000, Mercedes-Benz UK announced that it would start importing the smart brand, with the first type-approved UK cars arriving on X-registration plates, although several had been privately imported before this. All of the initial batch of cars were left-hand drive, with right-hand drive production not commencing until early 2001. At the same time, smart gave the model a minor facelift and introduced a Cabriolet variant, which enjoyed reasonable success.

There were three primary trim levels. The most basic (and arguably most true to the smart concept) was the Pure, which had steel wheels and no air conditioning or radio, but did have remote locking and electric windows. Next up was the Pulse, which added in-car entertainment and a broader range of styling options and colours, while the range-topper was the Passion, which gained a CD Player and 15-inch alloys, although aircon remained an option until 2003.

In 2002, the city-coupé received a more substantial facelift, with new rear lights and improved interior fabrics, along with two wacky special editions: the Crossblade and the smart BRABUS. The former was a roadster with unusual top-hinged doors, while the latter was smart's attempt at a hot hatch. All models got a much-needed larger fuel tank.

In 2003, the model name was changed from city-coupé to smart fortwo in readiness for a four-door smart, co-developed with Mitsubishi, which would be launched with the forfour name. Also in 2003, the engine was upped from 599cc to 698cc, increasing power from 54bhp to 61bhp. It doesn't sound much, but the more powerful cars were far better on the motorway due to taller gearing and an increase in torque from 59lb ft to 70lb ft.

Production ceased in 2007, with the introduction of a second-generation smart fortwo, this time with a bigger 1.0-litre engine and much smoother transmission, but largely similar appearance.

Crash testing confirmed the strength of the Tridion safety cell that made up the shell of the fortwo – just compare the roof-line of the green Fiat to the smart.



Manufactured from  
**1998-2007**

## Engine choice

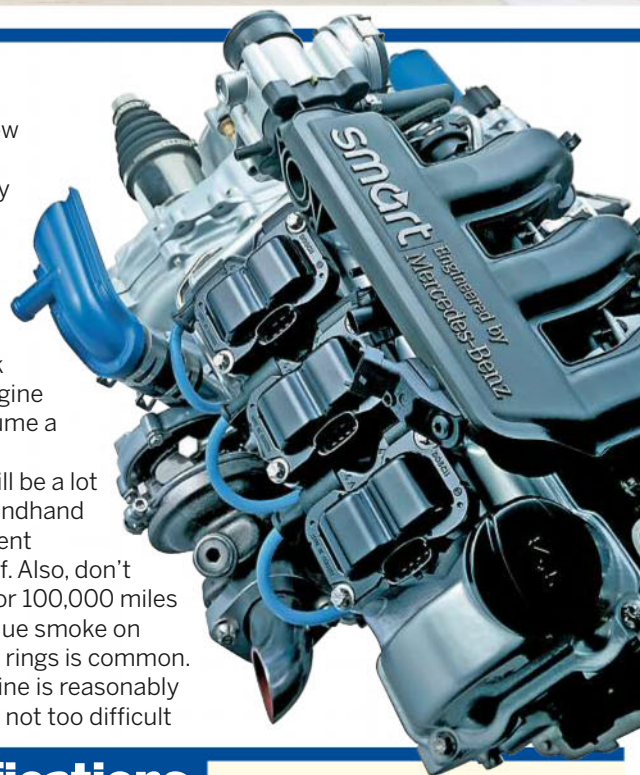
► The biggest threat to any smart is neglect, and there are quite a few examples around that are showing advanced signs of it.

The very nature of the car's tiny engine means it has to work pretty hard, so regular oil changes are essential. When the cars were new, smart recommended an oil change every 9000 miles, though specialists reckon a 6000-mile change is more appropriate – it certainly won't do the car any harm.

The engine is also a Twin-Spark unit – if a servicing garage hasn't done its homework, there's a good chance that three of the six spark plugs haven't been changed as they're not visible from inside the engine hatch, and it would be reasonable for a non-specialist garage to assume a three-cylinder engine came with three spark plugs.

Other common faults include a blowing exhaust manifold, which will be a lot more noticeable when the engine is cold – bear this in mind if a secondhand example has been warmed up in advance by the vendor. A replacement manifold won't be cheap (around £200) and fitting it can be a real faff. Also, don't expect too much from a smart engine. While they're generally good for 100,000 miles if well maintained, the engines work hard and wear easily. Look for blue smoke on start-up and under hard acceleration as wear to the bores and piston rings is common.

On the plus side, with the body panels removed, replacing the engine is reasonably straightforward and the powerplant's diminutive capacity means it's not too difficult to manoeuvre into place. Reconditioned short engines are available for around £350 and complete units for about £600, while a reconditioning kit consisting of rings, pistons and a timing chain kit can be picked up for around £250. The alternative is to farm out the job – A&A Autos, a smart specialist in Kent, is one example of a company that will do a complete engine swap including all parts for £900.



## Specifications

Engine	Power	MPG	0-60mph	Top speed	CO <sub>2</sub>
599cc	54bhp	55	17.2sec	84mph	122g/km
698cc	61bhp	60	15.5sec	84mph	116g/km
698cc BRABUS	74bhp	53	12.3sec	94mph	127g/km



## Bodywork

The Tridion safety cell is extremely effective and was manufactured from high-tensile galvanised steel as it would sit exposed around the smart's detachable plastic body panels. Indeed, to calm concerns about the coupe's truncated length in the event of an accident, Daimler drove one into a concrete block at 70mph to show how well it held up – as a structure, it's incredibly strong. While it's not completely immune to rust, it is generally pretty resistant. Look for signs of corrosion around the seatbelt mounts and door shuts, as well as on the body rail immediately below the rear screen.

Cosmetic scuffs and scrapes on the plastic body panels are commonplace, especially around the front end. You'd think a car as small as a smart would be really easy to manoeuvre, but the reality is that it's so small that it's quite easy to make a mistake, with the both front and rear wheelarches sitting proud of the main body tub, rendering them vulnerable. Replacement panels are easily found either as individual parts or as full body panel sets – for around £400-500 you can change the colour of a car completely by picking up sets on eBay or similar, while smart groups on social



media often feature swap shops. New plastic panels are still available from smart dealers, but they're unpainted.

By far the most significant check to make when buying any smart is for accident damage, as any twists or kinks to the Tridion safety cell will effectively write off the car. It's too small and stiff to be repairable on a standard chassis jig.

Other known faults include premature wear to the window seals, which can dry out and crack, leading to leaks or the risk of glass popping out. There are issues with glass cracking or shattering on the

roof of Pulse or Passion models due to impacts with road debris – a protective strip was applied above the windscreen on post-2001 cars.

Indeed, glass is something of an Achilles' heel for the smart, with a recall carried out for the earlier cars due to the rear windscreen overheating and exploding if the heating elements were left switched on. A redesigned rear screen with curved elements cured this, but it's worth checking on any pre-2002 car that the recall work has been carried out. If not, you can get it done for free at any smart dealer.



## Valuations

► You can pick up a spares or repairs smart for less than **£500**, but in doing so you'll most probably need to consider an engine rebuild or replacement. Fine if you're a gifted mechanic or have the time.

If you want something up and running, you'll need around **£750** to get yourself on the smart ladder, with **£1000-£1500** being the accepted going rate for half decent models, and around **£2300** top whack for a 2006/7 coupé or **£300-400** more for a cabrio.

One anomaly in the smart market is that, unlike other cars that were initially only available in left-hand-drive (the VW New Beetle and Audi TT being the obvious examples), the LHD cars are often worth marginally more than comparable RHD ones. This is down to the smart's popularity with motorhome owners, as they're ideal for continental touring.



## Interior

The cabin of the smart is bright and cheerful, albeit very much evocative of its era. While it exudes the quality and solidity you'd expect from Mercedes-Benz, the shiny plastics, primary colours and chunky switchgear are all a bit toy-like in their functionality. It's clear that the fortwo is a car designed more for trendy early-2000s urbanites than car aficionados. There's very little that goes wrong – indeed very little to go wrong – with excellent fit and finish and hard-wearing fabrics.

One common failure point is the bump stops fitted to the window glass, which prevent the glass from striking the door frame when the window is lowered. These can become brittle in the same manner as the window seals and become detached. The problem is rarely more than an irritation, but on occasion can lead to glass panels shattering. Repairing them is easy, though, as there's just enough clearance with the door trim removed to attach self-adhesive replacements.

Another irritating fault, albeit less common, is failure of the connections inside the column stalks, which can lead to indicators, headlamp main beam, windscreen washers and wipers either not functioning or only working

intermittently. The fault normally lies in the multi-plug unit behind the steering wheel boss. Secondhand replacements are easily sourced and aren't too expensive, but repairing it is a steering wheel-off job that also requires careful disconnection of the airbag. It's not difficult, but bank on at least a couple of hours' work to do it properly.

## Running gear

A harsh and jerky gearchange and slow changes between ratios don't indicate a gearbox that is in poor condition – this is the norm, and was the single biggest criticism levelled at the smart when new. Drive the car in sequential manual mode and you can make much smoother progress, though this does take practice. Indeed, many smart owners take great pride in being able to pilot their cars smoothly – it's a skill all on its own. The gearboxes themselves are actually pretty reliable. Any loss of drive is usually down to an electrical fault, caused by wear or exposed wiring shorting on the transmission loom.

The biggest killer of any smart fortwo is electrical meltdown. The car has two major ECU modules known as the SAM (Signal Acquisition Module) and CCM (Central Control Module), and both are known to fail. If the SAM goes haywire, it can affect everything from gear selection through to immobiliser activation, as well as less significant components such as lights, heaters and electric windows, all of which can cause major frustrations. The CCM is the heart of the car's electrical system, so faults here will manifest themselves as a complete failure to respond, although problems can be intermittent, meaning the car will work fine one day but not the next.

Of the two, it's the SAM (which also incorporates the fusebox) that gives the

most trouble. Used replacements can be bought for about £100 if you're prepared to take the gamble, while new parts can be found for around £350. The CCM is smaller and more reliable, but can still give trouble. Plug-and-play guaranteed used ones cost more than £50, while reconditioned units with guarantees are around £200.

## Verdict

► Even though the earliest examples are nearly 20 years old, the smart's distinctive design means that it still looks fresh and modern. In addition, the car's modular design and high-tensile Tridion safety cell mean that structural problems, the bane of many an old car, are few and far between.

As a distinctive, characterful and fun-to-own city car, the original smart has plenty of charm, not least its ability to be parked anywhere, including nose-in to the kerb in crowded city centres. But with that character comes a level of compromise. The gearchange is jerky at best, especially in fully auto mode (and why would you choose to use it as a manual in city traffic?), it's a strict two-seater, there's little in the way of luggage space and, while it will cruise all day at motorway speeds, it's neither relaxing nor efficient when doing so, not least because it gets blown around by other traffic.

For urban dwellers or as student transport, the smart is a great used car, and one that is very well made. Provided you can live with its idiosyncrasies, it's a good leftfield choice.

# Survival Guide

Ian Cushway searches out new and used parts prices

## Toyota Celica

Japanese precision build means good reliability – and parts aren't expensive either.

**D**espite continuing a theme that started in the early 1980s, the chiselled seventh-generation Celica from 1999 marked quite a departure from its more curvy immediate predecessors. While it looked more aggressive and offered even more grip, it still used the same energetic 1.8 VVT-i engine as before, albeit in two different guises, 140bhp and 190bhp.

The Celica gave good value when new and a revision in 2002 dented residuals early on. Prices have continued to tumble, which means there are bargains aplenty for the shrewd buyer today. In

fact, we've seen them for sale in the classifieds at under £1000.

The rewards are abundant: it's got razor-sharp handling, good brakes and the interior's well kitted out, especially if you buy one with the Premium Pack (standard in the 190) which adds leather upholstery and an electric sunroof to an already pretty comprehensive standard spec list. The range-topping T-Sport from 2001 got 17in alloys, a deeper front spoiler, better stereo and full leather inside, plus stability control, traction control and improved suspension after 2002. There was also



the GT model for the UK market from 2005, which was a T-Sport but with different alloys, an alcantara-trimmed interior and a lower ride height.

Being a Toyota, reliability is good. That said, lots will have had a hard life and, if you read on, you'll discover there are a few gremlins to be aware of on early examples.

### Engines

There were two engine options, the 140bhp VVT-i unit in the standard Celica and the VVTL-i 190. They're two quite distinct engines, with different blocks and cylinderheads, the 190 having a 'lift' function for the inlet cams with a much higher rev limit. In addition, the 140 has a plastic inlet manifold and the

190 has an aluminium one. You could also check the chassis plate – the 190 has the engine code ZZT231.

Pre-2002-facelift 140s suffered from excessive oil consumption, with some owners reporting that their cars use as much as a litre every 700 miles, so it's crucial to keep an eye on the levels with these early examples. It seems less

of a problem on the later 140 and 190. However, on the early 190, the lift bolts (there are two of them) are prone to wear and can break, so fitting improved tapered bolts is a wise move on an engine that's not already had them fitted. An early tell-tale sign is if the car fails to engage lift at around 6200rpm. The bolt issue was addressed with the 2002 revision.

### Toyota Celica

1996-2006

Model	VVT-I	VVTL-I Sport
Engine (cc)	1794	1796
Power (bhp)	140	190
0-60mph (sec)	8.7	7.0
Top speed (mph)	127	140
Average fuel (mpg)	36	33



Early 140bhp VVT-i engines prior to the 2002 facelift will guzzle oil, so beware.



FIX YOUR CAR WITH HAYNES MANUALS

**TOP TIP**

Avoid the pre-2002 facelift 140 as it drinks oil. The block was changed so it wasn't an issue thereafter. The pre-facelift model has the Toyota badge set into a grille, while the facelift car has a longer recess across the top of the bumper and the badge is glued on.



All Celicas employ a timing chain, so there's no need to worry about cambelt change intervals, although the chain should be checked at 100,000 miles. It's worth making sure there are no cooling problems, because the radiator may well need replacing on older models.

Bear in mind, lots of Celicas have been modified with various ECU tweaks, different induction systems and tuned exhausts, so watch for boy racer bodes.

Gearboxes are strong, but the 190 has a closer ratio than the 140, which makes it quicker at the lights but slightly more tedious to drive and more thirsty on fuel.

**Engine component prices****OIL FILTER**

Main dealer **£11.51**  
Independent from **£6.69**

**LIFTER BOLTS**

Main dealer **£1.54 (each)**

**RADIATOR**

Main dealer **£329.80 (exchange)**  
Independent from **£93.99**

**Steering/suspension**

There are no common faults to report regarding the Celica's steering or suspension, although new owners might find the steering very light. It's also sensitive to geometry, which can usually be detected by uneven tyre wear. TTE

(Toyota Team Europe) springs were fitted as standard on the GT and lower the car's ride height by around 30mm, but aftermarket items from the likes of Apex are a cheaper alternative from £105 a set. The progressively-wound Eibach Pro Kit is also popular, costing around £230.

**Suspension component prices****ANTI-ROLL BAR BUSH**

Main dealer **£18.85**  
Independent from **£17.49**

**LOWERING SPRINGS**

Independent (Apex) from **£105.00**

**Electrical issues**

Electrical faults should be restricted to things like failed window regulators, although the alarm system may also give problems on older models, and diagnosing the source can be tricky. When buying a car, make sure there are two remote key-fobs. Misfires could be down to a faulty coil pack, though this isn't a common issue.

**Electrical component prices****WINDOW REGULATOR**

Main dealer **£373.63**  
Secondhand from **£100.00**

**IGNITION COIL**

Main dealer **£136.82**  
Independent from **£155.99**

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**Se7en Motorsports** 01724 488171  
[www.se7enmotorsports.co.uk](http://www.se7enmotorsports.co.uk)

**TCB Performance Parts** 01579 383879  
[www.tcbparts.co.uk](http://www.tcbparts.co.uk)



The Sport edition had black leather trim as standard. Celica Blue and Red were special editions available from 2004.

**Brakes**

Owners report that rusty brake discs are an issue with the Celica, with the corrosion seeming to be worse on the less visible inside face of the discs. Rear calipers can seize and replacements cost £117 from the likes of Euro Car Parts.

**Brake component prices****FRONT BRAKE DISCS (PAIR)**

Main dealer **£121.44**  
Independent from **£68.98**

**FRONT BRAKE PADS**

Main dealer **£58.76**  
Independent from **£31.99**

**Other problems**

Standard Toyota Celica wheels are made from fondmetal and seem to buckle easily, which is why many owners will have fitted aftermarket rims instead. Regarding tyres, cheap rubber can create excessive road noise so is best avoided.

Lots of Celicas have aftermarket exhausts fitted in combination with a faster-flowing catalytic converter. However, owners just wanting a bit more resonance are likely to be happy with a Remus rear box and it's only a little dearer than an original rear system from Toyota.

**Other parts prices****EXHAUST REAR BOX**

Main dealer **£442.78**  
Remus from **£489.06**

# Make your own PATCHES & REPAIR PANELS

**Rob Hawkins** reveals some of the popular methods for replacing rotten bodywork with inexpensive home-made repair panels and patches.

**W**hen bubbles start to appear underneath the paintwork of a vehicle, it's only a matter of time before you will need to cut out the rot and replace it with fresh metal. The sooner it's dealt with, the better.

There are many different ways to try to prevent corrosion, such as applying rust cure solutions and rustproofing afterwards. However, once corrosion has set in, you cannot turn rotten metal back into good metal again. If it's rusty, you need to cut it out. The following steps show how to remove corroded areas,



make templates for patches and repair panels, then weld them in position.

The work and time involved in repairing rotten bodywork depends on the extent of the corrosion, the finish

you require and the skills you have, but if you have never used a welder before, you might want to take a look at our feature on the art of welding in the August 2017 issue of *CM*.

## MAKING PATCHES & REPAIR PANELS



**1** Whether it's a small patch of rust, a few bubbles under the paintwork or a huge corroded hole, the extent of the damage needs to be established. Use a wire brush or a wire wheel attached to an angle grinder or electric drill to clean the metalwork. If you are using a drill or angle grinder, wear a full-face mask, gloves and earplugs.



**2** Rusty metal needs to be cut out, so use an angle grinder with a cutting disc to carefully slice through the rotten bodywork. Wear a breathing mask, goggles, gloves and earplugs (we have a giveaway of BEST Finique Smart Dust Masks on page 21). After cutting out the rotten metal, clean the surrounding metal with an angle grinder and thicker grinding disc.





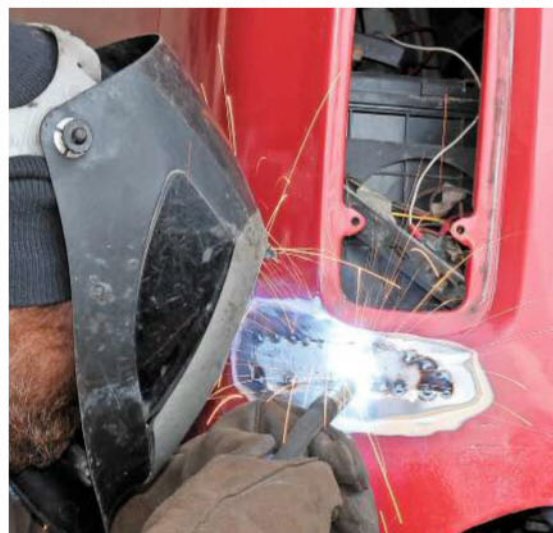
**3** ◀ Work out how you are going to rebuild the bodywork. Use sheets of cardboard to make templates and see how they can be fitted. The new pieces of metal may have to be fed behind existing panels, butt-welded to them or fitted over them.

**4** ▶ Using the templates created in the last step, mark their shapes onto a piece of rust-free steel, then cut them out using an angle grinder and thin cutting disc. Tin snips can be used to slice through the metal, but an angle grinder is quicker.



**5** ◀ Some patches can sit behind the existing bodywork and be tack-welded in position, whereas others need to sit inside a hole and be butt-welded. Fitting a patch over a hole will leave a raised repair, but this is OK for areas that cannot be seen.

**6** ▶ Some repair panels need to be shaped to fit, such as these two for a sill and wheelarch. Several cuts help to bend the panel into shape using a vice and block of wood. Further trimming will be required once the panels have been welded in position.



**7** ◀ When you're ready to weld a patch or repair panel in position, start with a few tack-welds, then check you haven't created more holes in the surrounding bodywork or the new metal. You may have to tack-weld and avoid seam-welding if the metal is thin.

**8** ▶ Securing the panel in position while welding can sometimes be difficult, especially on this sill repair. Clamps and vice grips can help, along with hammers wedged against the metal. Magnets are useful for holding small patches.



## Grinding sparks & welding flashes

▶ Grinding sparks can burn holes in upholstery and leave nasty marks on glass, so always cover these items with thick blankets or towels and try to direct the sparks where they won't do any damage. Similarly, a wire wheel attached to an angle grinder or electric drill will fling small lumps of metal in all directions, so wear a full-face mask and instruct anyone nearby to move away.

When it comes to welding, disconnect the vehicle's battery, wear a suitable mask, gloves and lots of thick, flame retardant clothing, especially if you are lying down. Welding sparks will burn your skin and are difficult to extract if they drop inside your clothes. Plus, make sure nobody looks directly at the area you are welding – a welding flash is extremely painful and may necessitate a visit to A&E.





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# Interstellar overdrive

Can a 2006 Ford Galaxy with over 180,000 miles boldly go beyond the final frontier with new suspension components, tyres and a turbo? **Rob Hawkins** finds out.

**P**eople carriers such as the Ford Galaxy are a popular family transport and consequently don't depreciate as much as other Fords of a similar age. So when we borrowed a 2006 Galaxy 1.9 TDI from MJ Motors to transport a steering rack for our Prius project (*CM*, March 2017), we were impressed that a vehicle with more than 180,000 miles on the clock still had plenty of miles left in it, making it well worth servicing and repairing. At the time of writing, a similar 150bhp PD engine model had just sold for more than £3000 – considering that MJ Motors had originally paid just £1100 for the car with a cracked windscreen, one missing

alloy and a faulty vacuum/servo pump and turbo, this was a very healthy saving. Admittedly, the turbo needed an initial nursing of the throttle pedal to make it respond, the inside edge of the front tyres was scrubbed because the rearmost bushes on the front lower wishbones were worn (a common problem) and the offside front suspension clonked when turning the steering to full lock due to a seized top strut bearing. Yet despite these issues, the bodywork was in good condition, the engine had just been serviced (including a new timing belt and water pump – see *CM*, June 2017) and the gearbox felt fine. Perhaps a new set of springs and dampers, a couple of



front lower suspension arms, a new set of tyres and an overhauled turbo would have the Galaxy driving like new again?

## Ready for launch

We decided to find out, sourcing OE-specification springs and dampers from KYB, new tyres from Avon and a couple of Delphi front lower arms from Autosessive. We also removed the turbo to have it inspected and hopefully repaired by a local specialist.

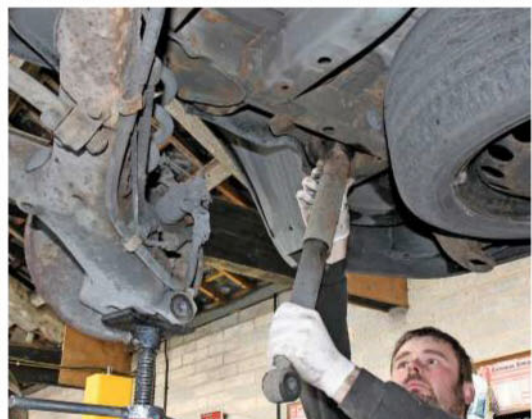
We started with the rear suspension, extracting the old dampers and coil springs and fitting the new components from KYB.

## RENEWING THE REAR SPRINGS & DAMPERS



**1** ◀ With the Galaxy raised on a two-post ramp, we removed all four road wheels, then sprayed penetrating fluid over the 21mm nuts and bolts that secure the bottom of each damper. Luckily, both fittings had not seized.

**2** ▶ The upper mount for each rear damper consists of an 18mm bolt threaded into a captive nut, which is hidden behind the inner wheelarch trim. After undoing some of the trim screws for the liner, we peeled it back and released the bolt on each side.



**3** ◀ We had to support the rear trailing arm on each side with a transmission jack in order to extract each damper's mounting bolts, then detach each damper. With the dampers out of the way, the trailing arms could hang down.

**4** ▶ Pulling down on each trailing arm gave enough space to extract the coil springs at the rear. We compared the old springs and dampers with new parts from KYB. The old dampers offered little resistance when compressed. We'd opted for heavy-duty coil springs for towing.





the strut), we struggled on the nearside where the pinch bolt had seized. This was eventually freed off by heating it with a Mini-Ductor, but we still couldn't release the strut from the upright, so decided to remove the entire assembly and separate the two on the floor. One of the hardest tasks involved accessing and undoing the top mounting nuts for each front strut. Due to the design of the Galaxy, they're not visible when you lift the bonnet. Instead, the trim panel along the base of the windscreen has to be removed, along with the air filter and even the windscreen wiper linkage to access the nuts. Despite being hidden away, water had corroded them, but the Mini-Ductor came to the rescue again.

When compressing the old dampers and the new ones from KYB, it was noticeable there was significantly more resistance with the new units. It's always a good idea to compress and extend new dampers several times, just in case they have been stored for a few weeks or months.

Removing the old front suspension components wasn't as easy as the rear. The balljoints on the lower arms refused to separate, but then we noticed the rubber dust covers had split, so we decided to renew the balljoints as well.

When we tried to separate the base of each front MacPherson strut from the upright (it's clamped around the base of

Thankfully, fitting the new KYB front suspension components was much easier. A complete strut was supplied along with new bearing top mounts, so all we had to do was remove the top mounting plate from the old struts. This gave us the opportunity to inspect the old bearing top mounts. The offside had seized, which explained the steering problems we had encountered.

Extracting the old variable vane turbo was particularly finger-crunching. The turbo and exhaust manifold need to be removed together, and all of the work is completed underneath the car. Space is tight, but there was just enough room to manoeuvre out the old assembly and insert a replacement.

## PROJECT COSTS

KYB Excel-G springs and dampers	£435.00
Avon ZV7 215/55R16 97W XL tyres x 4	£323.00
Delphi front lower arms	£115.48
Front lower balljoints x 2	£36.00
Replacement turbocharger	£400.00
Four-wheel alignment	£20.00
<b>TOTAL</b>	<b>£1329.48</b>

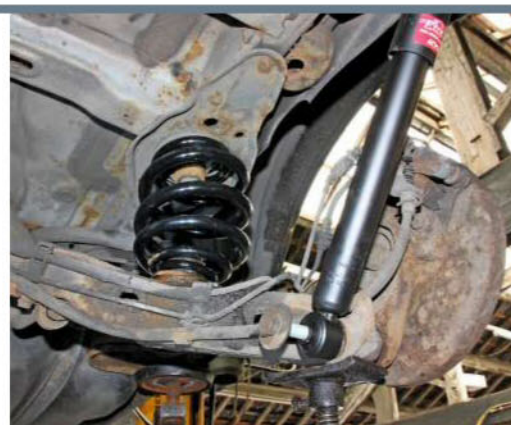
Finally, a new set of tyres were fitted to complement the new suspension components. Plus, judging by the old tyres that had been scrubbed around the inside edges at the front (caused by the worn lower arm bushes), a new set was essential. We opted for Avon's ZV7 tyres, which are a high-performance summer tyre with a good level of grip in the wet, ideal for a Galaxy that will be used for transporting lots of people and occasionally towing a trailer.

After spending a couple of days fitting the new parts, has the Galaxy been transformed? It certainly has. The ride quality is noticeably improved, the front offside coil spring doesn't grab and clonk when turning the steering, and the turbo no longer needs nursing into life.

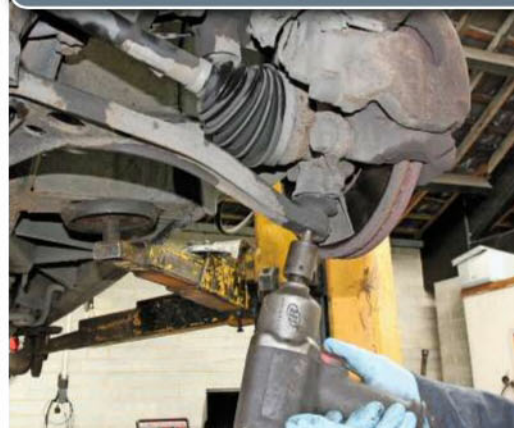


**5** ◀ A wire brush was used to clean around the seats on the trailing arm and the underside of the bodywork where the coil springs are positioned. New rubber inserts for the tops of the coil springs were fitted.

**6** ▶ Pulling down on each trailing arm, the coil springs from KYB were slipped into position. Next, the new dampers were fitted and secured with their upper bolts. A transmission jack raised each trailing arm, allowing us to refit the lower nut and bolt; this was fully tightened when the car was back on its wheels.

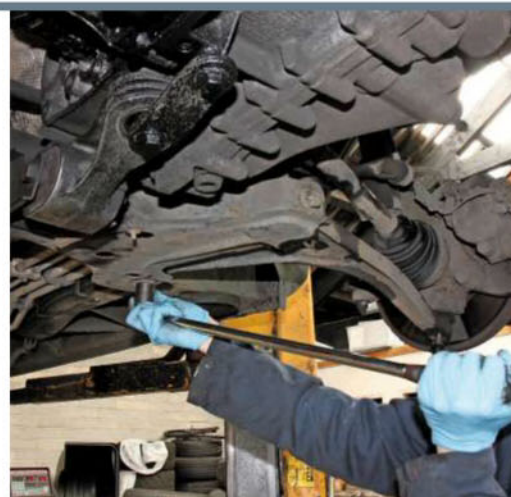


## NEW FRONT LOWER ARMS



**1** ◀ The rearmost bush on the front lower arms of the Galaxy gets worn, resulting in scrubbed tyres. Our vehicle had these symptoms, and it was economical to renew both lower arms. We started by undoing the retaining nut for the outer balljoint.

**2** ▶ The lower arm is secured by a couple of 18mm bolts for its inner mounting points. Both were undone using a breaker bar, before winding them off with an impact driver. We were hoping we could renew the arms, but re-use the balljoints as they didn't seem to be worn.



## NEW FRONT LOWER ARMS *continued*



**3** ◀ We tried separating the balljoint from the hub by hitting the end of the arm, but they refused to budge. We even tried a lever. Then we noticed that the rubber boots on each balljoint were split, so new ones were ordered.

**4** ▶ Each balljoint is secured to the base of the upright by two 6mm Allen key bolts. With the balljoints still attached to the lower arms – they still refused to separate – we undid the bolts, then extracted the lower arms.



**5** Comparing the old lower arms with the new ones from Delphi (supplied by Autosessive), they were an exact match. We also had new balljoints to fit. All of these parts were assembled after we had renewed the front suspension struts and springs.



**6** With each new lower arm loosely in position and the rearmost inner mounting bolt fitted, but not tightened completely, we attached the replacement balljoints, then manoeuvred the ends of the lower arms over them.

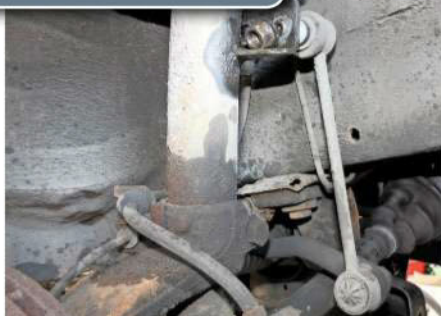


**7** A new nut was fitted onto the end of each balljoint, the frontmost inner mounting bolt was refitted, then all nuts and bolts were tightened fully. All that remained was to reassemble the vehicle and have the tracking checked and adjusted.

## REMOVING OLD FRONT STRUTS



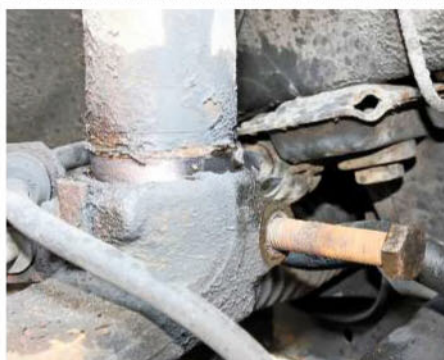
**1** After separating each front lower arm's balljoint (see *New front lower arms*), we suspected we would need a little more room to manoeuvre out the old MacPherson struts from each front wheelarch. So we undid the 27mm driveshaft bolts.



**2** The anti-roll bar droplinks are secured to the sides of the struts, so these had to be detached. After spraying penetrating fluid over the 18mm nut, we crossed our fingers and managed to undo the offside with an impact driver.



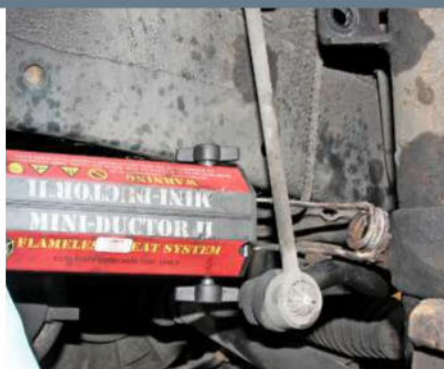
**3** The nearside droplink wasn't so cooperative. The stud of the balljoint was spinning with the nut, so we held it with vice grips and tried again. Luckily, the nut span off and the top of the droplink could be detached.



**4** ◀ The 18mm pinch bolt that clamps the bottom of each strut to the upright had to be undone. On the offside, this came off with the help of an impact driver, but on the nearside it appeared to be seized solid.

**5** ▶ Thinking we might need to detach the strut and hub assembly on the nearside, we removed the brake caliper by undoing two 7mm Allen key slider bolts. These had been coated in copper grease by a previous owner and were awkward to extract.





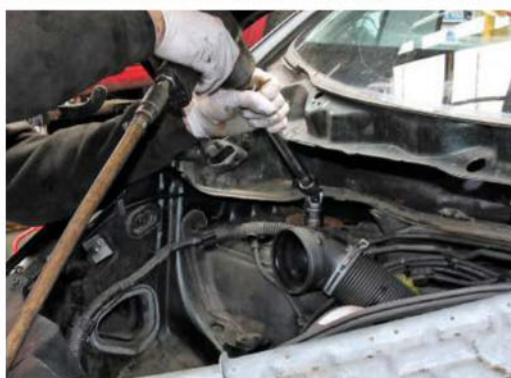
**6** We tried using a Mini-Ductor to apply heat to the nearside pinch bolt. Heating the head of the bolt didn't help, but applying it around the end of the bolt where it's threaded into the upright was more successful. The bolt was then undone with an impact driver.



**7** The base of the offside strut was successfully separated from the upright, so all we had to undo was the top mounting nut. On the nearside, the clamp had seized, so we decided to remove the whole assembly. First, we needed to find the top mounting nuts, so we delved into the engine bay and detached the scuttle panel trim.



**8** We had to remove the trim around the base of the windscreen, followed by the windscreen wipers and the wiper assembly (secured with 13mm nuts and bolts) in order to access the 21mm top mounting nut for each MacPherson strut.



**9** ◀ On closer inspection of each 21mm upper mounting nut, water had collected around them, resulting in corrosion. We sprayed in lots of penetrating fluid, then tried to undo them with an impact driver, but the rod of the damper was spinning.

**10** ▶ We used the Mini-Ductor again to warm up each top mounting nut. The smoke shown here is caused by the evaporating penetrating fluid, not a fire! The Mini-Ductor only generates heat around the object it's fitted over.



**11** ◀ The Mini-Ductor came to the rescue and we managed to undo both 21mm top mounting nuts. On the offside front, we had successfully separated the bottom of the strut from the upright, so the strut was removed. However...

**12** ▶ ...on the nearside, we couldn't separate the strut from the upright, so removed the whole assembly. With it positioned on the floor, more penetrating fluid was applied before hitting the upright with a hammer and releasing it from around the base of the old strut.



## ASSEMBLING & FITTING NEW FRONT STRUTS



**1** We needed to reuse the top mounting plate on our new struts, although we'd received a new bearing top mount and securing nut from KYB, along with new bump stops and dust covers. The old spring was clamped to release the tension on the 21mm top nut, then it was undone.



**2** Assembly of the new components from KYB was very straightforward and all of the parts were an exact match. We inspected the old offside bearing top mount and found it had seized, which explained the steering problems we had experienced.



**3** Upon installing the new KYB strut assembly, we discovered the pinch bolt couldn't be fully fitted. Looking at the old and new struts, we spotted a groove in the body where the pinch bolt had to be seated.

## TURBO RENEWAL



**1** ◀ The old turbo is removed from beneath the Galaxy. Once the undertray had been detached, access to the turbo and the exhaust downpipe was easier. We started by undoing three 12mm nuts that secure the downpipe to the turbo.



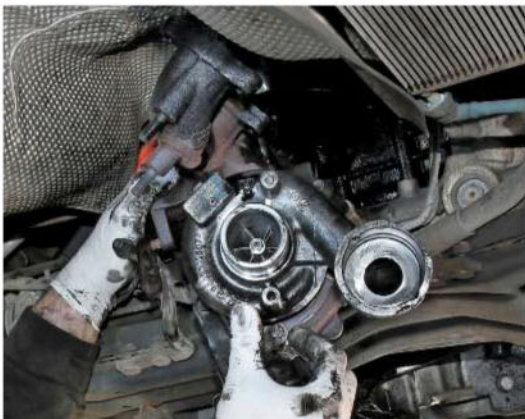
**2** ▶ The mid-section of the exhaust system that includes the catalytic converter was moved out of the way, allowing the downpipe with its flexible joint to be removed. We now had more room to access the turbo, but had to extract it along with the exhaust manifold.



**3** ◀ The oil feed pipe to the turbo was released by undoing an 18mm fitting with an open-ended spanner. Two nuts were undone that connect the pipe between the exhaust manifold and the EGR valve, after which it could be separated.



**4** ▶ The oil drain pipe was detached, followed by the boost pipe. The boost pipe is routed underneath the offside of the engine, and we decided to detach it here to move it out of the way.



**5** ◀ After undoing the 12mm nuts securing the exhaust manifold to the cylinderhead, the turbo and manifold could be carefully manoeuvred out from the underside of the Galaxy. The whole assembly was quite awkward to manipulate.



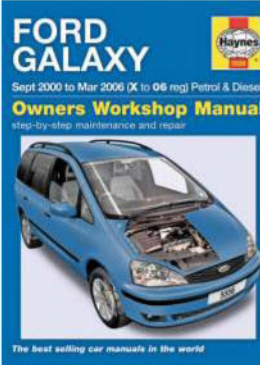
**6** ▶ We considered getting the old turbo overhauled, but were advised the internals of the Borg Warner unit might have seized. Plus, for £400, we could fit a new and apparently better Garrett turbo and manifold, so we opted for this.

## NEW TYRES



### HAYNES MANUAL

▶ For torque figures for these jobs shown and more, make reference to the Haynes manual covering petrol and diesel models. See [haynes.com](http://haynes.com)



### THANKS TO

**Autosessive** 0333 009 0505  
[www.autosessive.com](http://www.autosessive.com)

**Avon Tyres**  
[www.avon-tyres.co.uk](http://www.avon-tyres.co.uk)

**BMF Auto Parts**  
0113 200 0960  
[www.bmfautoparts.com](http://www.bmfautoparts.com)

**KYB Europe** 01925 417444  
[www.kyb-europe.com](http://www.kyb-europe.com)

**MJ Motors** 01924 472404

◀ With the front tyres worn around the inside edge, caused by the worn lower suspension arm bushes, we decided the best approach was to renew all four of them. We chose a set of Avon ZV7 215/55R16 tyres, which carry a C-rating for fuel economy and an A-rating (top) for wet braking. We cleaned the insides of the wheel rims to ensure an airtight seal and inflated them to the recommended 42psi for the fronts and 40psi for the rears. This is quite high for such a vehicle, but Dan Smith at MJ Motors notes that if the tyre pressures are low, the average MPG figure displayed by the on-board computer drops from 35 to 25 when driving around town.



# Air control

**PART THIRTEEN:** Rob Hawkins discovers the importance of an engine's throttle bodies and the upgrades available to increase performance.

**M**ost throttle bodies comprise a butterfly valve that regulates the flow of air between the induction system and the inlet manifold. The valve is controlled via the accelerator pedal, whether it's a mechanical cable or a drive-by-wire system. A throttle position sensor (TPS) is attached to the throttle body to allow the ECU to calculate how much fuel is required to match the quantity of air being drawn.

Some of the popular modifications for throttle bodies include fitting a larger diameter unit or changing a single throttle body for multiple throttle bodies (one for each cylinder). As with many modifications, other upgrades are often required. For instance, a performance air filter will help



to draw more air into the engine (see the February 2016 issue of *CM*), or else the ECU may need to be remapped, especially if a single throttle body is changed for multiple bodies (we covered ECUs and remaps in the December 2016 issue).

## MOTORCYCLE THROTTLE BODIES



► Bogg Brothers of North Yorkshire has developed a range of conversion kits to enable a set of four throttle bodies from a motorcycle to be fitted to a car engine. One of its popular conversions is to take the throttle bodies from a Kawasaki ZZR1400 bike, which have a 48mm diameter at the trumpet and a 44mm diameter at the butterfly – this creates a ram effect for airflow. BB makes its own inlet manifolds to allow these throttle bodies to be fitted to most four-cylinder engines using a standard inlet manifold gasket. Each throttle body is equipped with an injector and the complete standard assembly includes a metal fuel rail, making it easier to route a fuel feed and return. The throttle linkage is adapted using a bicycle brake cable. These throttle bodies include a throttle position sensor, which allows it to communicate with most aftermarket programmable ECUs. BB favours the programmable ECUs from Canems, working closely with the Lincolnshire-based manufacturer.



## FAQ

**Q:** How much extra power can I expect from changing a single throttle body to multiple throttle bodies?

**A:** This varies, but Jenvey can fit a set of four 42-45mm throttle bodies for the Rover K-series and VVC engines, which produces roughly 10% more power. The conversion kit includes linkage, a fuel rail and fittings. Additional costs include a suitable set of air filters and a remap of the standard ECU (MEMS3 only; earlier MEMS units need to be changed), or an aftermarket programmable ECU. Total costs are about £1000.

**Q:** Can I use a set of throttle bodies from a breakers yard?

**A:** Yes, but check they can be fitted. Over the following pages, we've outlined some throttle bodies that are a straight swap and others that will require a conversion kit from a specialist.

**Q:** Can a carburettor-fed engine be converted to throttle bodies?

**A:** Yes, but in most cases it will need a return feed for the fuel, along with an ECU or simpler device to control fuelling and ignition timing. Several conversion kits are available from specialists such as Webcon, Jenvey and Specialist Components.

## CANEMS CASE STUDY

► Canems recently worked on a BMW E36 racer, which had its standard single throttle body and inlet manifold replaced with individual throttle bodies from an M3 along with its programmable ECU. "The M50 series engines have a notoriously restrictive inlet manifold and single throttle body, which give nice torque and low speed manners, but are hopeless for a circuit racing car like this," explains Dave Hampshire of Canems, who found the individual throttle bodies and ECU gained over 50bhp at the rear wheels.



## FITTING A LARGER THROTTLE BODY

▶ A larger diameter throttle body can increase airflow, which may, in turn, improve the torque of an engine, especially when a performance air filter is fitted. The Dell'orto alloy throttle body shown here is 52mm in diameter and is fitted to the VVC version of the Rover K-series 1.8. The standard 1.8-litre K-series is equipped with a plastic 48mm throttle body. The extra 4mm diameter of the throttle body equates to an increase of 17% when calculating the larger area. The unit can be fitted to produce roughly 3-4lb ft additional torque and a better throttle response. As Dave Hampshire of Canems points out, in some cases where a larger throttle body is fitted: "Throttle response can be hugely improved without actually improving the final figure, which is a strange concept to get your head around – and even more difficult to market to a customer!"



## ROVER K-SERIES: 48-52mm THROTTLE BODY SWAP



**1** Detach the throttle cable where the threaded section (for adjustment) is secured into a steady bracket. Also, disconnect the retaining clip for the cable's outer sleeve.



**2** Release the end of the throttle cable where the nipple is secured to the throttle linkage on the side of the throttle body. A screwdriver may be required to lever it out.



**3** Undo the clip that secures the induction hose to the throttle body, then detach it. The clip may need a special tool to release it, or a screwdriver may suffice.



**4** Remove the breather pipe from the side of the throttle body. Detach the electrical plug connector for the throttle position sensor (TPS).



**5** Undo four 8mm bolts that secure the throttle body. A selection of spanners, 1/4in sockets and extension bars will be required to access them. Remove the old plastic throttle body.



**6** Fit the replacement 52mm alloy throttle body with the 8mm bolts and refit all remaining parts. Switch on the ignition and open the throttle five times to reset the TPS data in the ECU.

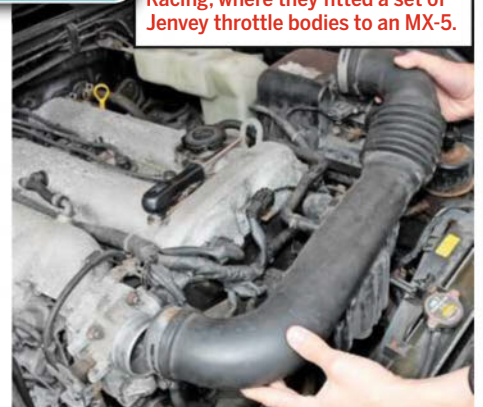
## MAZDA MX-5: THROTTLE BODY CONVERSION



**1** ◀ Detach the vacuum hose between the brake servo and the inlet manifold, along with any electrical connectors (label them for easy identification). Disconnect the fuel lines to the fuel rail and any electrical connections, then remove the fuel rail and injectors. Wipe up any spilt fuel and block or drain any pipes that could leak.

**2** ▶ Remove the induction system fitted to the standard throttle body. This consists of pipework that's routed around the front of the engine to an air filter housing on the nearside front inner wing. Carefully detach the MAF sensor and air temperature sensor.

The following steps were photographed at Roadrunner Racing, where they fitted a set of Jenvey throttle bodies to an MX-5.





**3** Disconnect the electrical plugs, pipework and accelerator cable that are attached to the throttle body. Label all connections. Detach any pipes and other connections from the plenum and inlet manifold, then remove this assembly by undoing the nuts securing it to the side of the cylinderhead.



**4** A pipe on the top of the oil filter housing feeds coolant to the throttle body (it acts as a water-heated inlet manifold). This won't be used with the throttle bodies, so join it to the return pipe to feed the coolant back around.



**5** The injectors must be removed from the cylinderhead on the 1800 engine and blanks fitted – store these in a freezer for 24 hours to make them easier to fit. Also, use a new inlet manifold gasket on the side of the cylinderhead.



**6** ◀ A new adjustable fuel pressure regulator may need to be fitted (the old one is part of the original fuel rail) and the fuel lines connected to it. In some cases, it can be mounted close to the brake master cylinder and brake fluid reservoir.

**7** ▶ The throttle bodies can be assembled on a bench, securing them to the inlet manifold, then fitting the fuel rail, original injectors and loosely attaching the trumpets. A vacuum servo outlet needs to be drilled and tapped.



**8** Attach the throttle body assembly to the cylinderhead with new nuts, progressively tightening all the mounting nuts using spanners and sockets. Fit the brake servo vacuum hose to the appropriate outlet on the new inlet manifold. Connect the accelerator cable to the throttle linkage on the new throttle bodies.

## THANKS TO

**Bogg Brothers**  
01944 738234  
[www.boggbros.co.uk](http://www.boggbros.co.uk)

**Canems** 01724 700222  
[www.canems.co.uk](http://www.canems.co.uk)

**Jenvey Dynamics**  
01746 768810  
[www.jenvey.co.uk](http://www.jenvey.co.uk)

**Roadrunner Racing**  
01482 668088  
[www.roadrunnerracing.net](http://www.roadrunnerracing.net)

**Specialist Components**  
01953 859785  
[www.specialist-components.co.uk](http://www.specialist-components.co.uk)

**Webcon UK** 01932 787100  
[www.webcon.co.uk](http://www.webcon.co.uk)

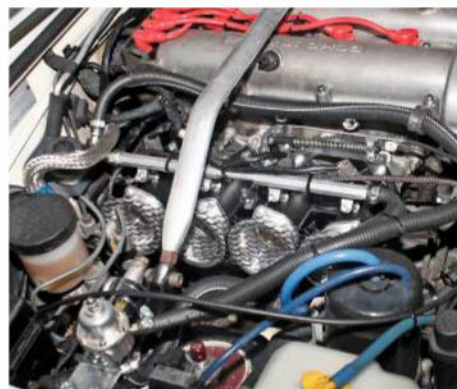


**9** Some of the trumpets may need to be removed to make room for the throttle bodies, which can be refitted now and secured with their clamps and bolts. Refit the original wiring for the injectors. A new air temperature sensor will need to be located elsewhere in the engine bay (not near the exhaust).



**10** ◀ A new connector needs to be made for the throttle position sensor on the throttle bodies. There are a couple of breather pipes attached to the camshaft cover, which can be vented to the atmosphere via a small filter or else routed to a catch tank to collect the vapours from the top of the engine.

**11** ▶ Space may dictate what size of filter, if any, can be fitted to the throttle bodies, but some form of filtration is essential. If space is very tight, then mesh may be the only answer, but this may restrict airflow. Similarly, a foam air filter can affect airflow if it's positioned too close to the ends of the throttle bodies.



# DIY Servicing



## 2014 Ford Fiesta 1.0 EcoBoost

### Keep your Fiesta fit

The Ford Fiesta MkVII has only just been discontinued. Here's **Richard Gunn's** guide to keeping yours going long into the future.



Overall difficulty rating



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#### Equipment required

- › Jack › axle stands › oil tray › sockets
- › spanners › flat-head, crosshead and Torx screwdrivers › Allen keys › hammer › wheel brace
- › antifreeze hydrometer › electronic brake/clutch fluid strength checker › wire brush › abrasive paper › copper grease › general purpose grease
- › spray grease › tyre pump › torch › torque wrench › rags for cleaning › disposable gloves

#### Richard says

Aside from one recall for a blanking plate on the exhaust, this series of Fiesta has proved reliable. However, faulty ignition coil packs can cause the engine management light to come on and the car will lack power, run badly and tend to stall. The master cylinder-to-clutch retaining pedal clip can also break, causing the clutch pedal to sink to the floor – a cable tie will provide a temporary fix.



**RICHARD GUNN**  
Special Contributor

**S**ince the Ford Fiesta was introduced in 1976, it's been one of the most successful models in British – and European – motoring history. With sales well over 16 million and showing no signs of slowing, the Fiesta is set to continue.

In Britain, the MkVII has only just gone off the market. That may well cause values to drop, so keep an eye on prices if you're interested in one of these very competent, budget-conscious cars. And, of course, you'll save even more money by carrying out your own servicing.

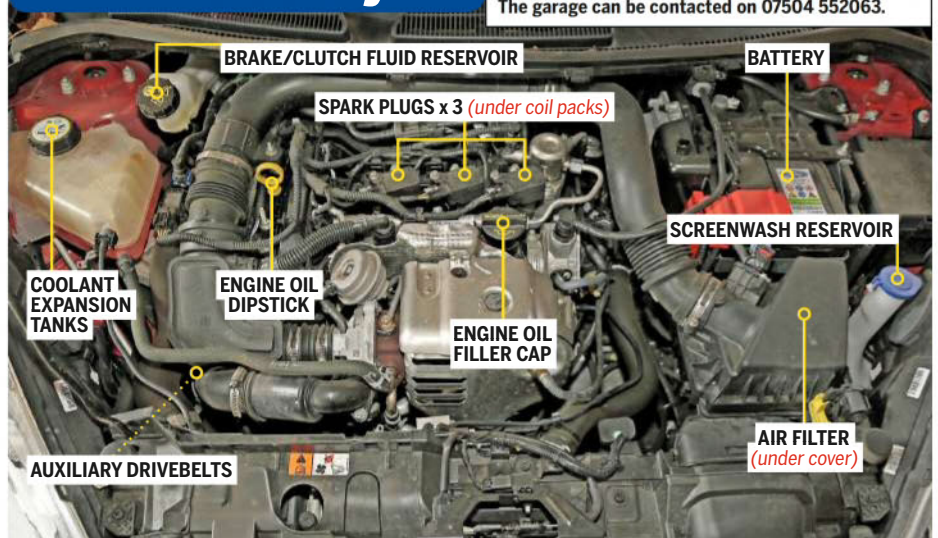
We looked at a 2011 1.25-litre Zetec version a little while back, but our example here is a 2014 EcoBoost model. This dates from the Fiesta's 2013

facelift, which saw the introduction of the distinctive trapezoid grille. Mechanically, the big news was the award-winning three-cylinder turbocharged EcoBoost engine which, despite only being a 998cc, manages to put out a very creditable 99bhp here, but can go as high as 138bhp in other Fiestas. The engine features a cambelt that runs in an oil bath, so is supposed to last the life of the engine or about 150,000 miles.

Our car was having its first service out of the dealer warranty period, so it was in pretty good order. And it shouldn't present too many problems to anyone wishing to do the job themselves, especially as the engine is so small, so there's quite a bit of space to work in.

#### Underbonnet layout

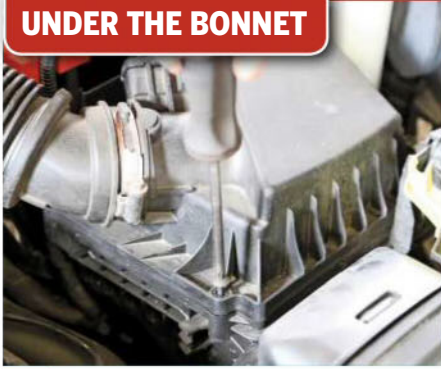
Thanks to Craig Dawson of **Dawson Motors** in Fengate, Peterborough for his help with this article. The garage can be contacted on 07504 552063.



[www.zf.com/uk/protech](http://www.zf.com/uk/protech)



## UNDER THE BONNET



### 1 CHANGE AIR FILTER

Four Torx screws hold the air filter cover in place. They're all easy to undo, although you'll probably also want to undo the adjacent Jubilee clip on the flexible hose to make things easier. Remove the old air filter element, clean out the box, then drop in a new filter element, making sure it's the right way up.



### 2 CHECK BRAKE FLUID

The combined brake/clutch fluid reservoir is against the bulkhead. There are 'MAX' and 'MIN' marks on the side, but they're tricky to make out. Take off the top for further confirmation. You can also use an electronic fluid checker to make sure not too much water has been absorbed. Fluid type is DOT 4.



### 3 CHECK COOLANT

The coolant expansion tank is on the right-hand side of the engine bay. Levels are marked on the outside, so it's easy enough to verify that the fluid is where it should be. Use a hydrometer to ensure the coolant is still giving adequate protection. Have a look inside the cap to make sure the seal is alright.



### 4 CHECK BATTERY

The battery nestles next to the air filter. Aside from a plastic cover over the positive terminal, it's all simple stuff. Make sure the terminals are tight and give them a coating of grease. If the battery has peepholes – some will, some won't – check the fluid is over the cells inside.



### 5 TOP UP SCREENWASH

Also beside the air filter box is the screenwash fluid reservoir, identifiable by its flip-top blue cap. It gets used up quickly, even during summer – as you can't see how much is left, because most of the bottle is hidden, just refill with the correct ratio of water and screenwash until it's at the top of the neck.



### 6 CHANGE SPARK PLUGS

To get at the spark plugs, you need to first remove the three coil packs. Each is held on by two 8mm bolts. Undo these, then unclip the wiring to each pack and pull off the coil packs. Spark plugs – remember you just need three – are Ford HYFS-093-YEC or equivalent. Take care, as the holes are angled.

## TOP TIP

The belt is tricky to see from inside the engine bay, so when the time comes to get beneath the car, also check them from underneath.



### 7 CHECK DRIVEBELT

Check the auxiliary drivebelts, located on the right-hand side of the engine bay. You should keep an eye out for any tearing, fraying or cracking. In addition, check the tension, which should be no more than a quarter- or half-turn at the centre point between the pulleys. Any more and tightening up will be required.



### 8 CHECK UNDERBODY

Underneath the car, look for rust or any other damage, especially the condition of any exposed metal brake and fuel lines, as well as the integrity of the exhaust system along its full length. Make sure there's no significant corrosion that has weakened it, and that its mountings are still secure.



### 9 DRAIN ENGINE OIL

The drain plug is at the rear of the sump and needs a 13mm socket to undo it. Drain the oil when it's warm, but not too hot because of the risk of scalding. Expect about four litres to come out, so have something underneath to collect it, and make sure you dispose of it environmentally.

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MOTION AND MOBILITY

The sump plug has a rubber insert. It is non-removable, so we advise getting a new plug when you change the oil to help prevent leaks. It should be re-torqued to 28Nm.

### UNDER THE BONNET (continued)



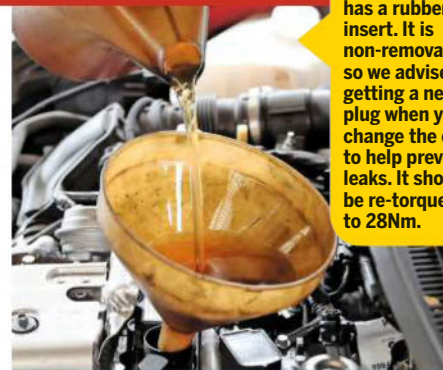
#### 10 UNDO OIL FILTER

You'll need to delve behind the sump to find the oil filter – unfortunately, photographing it is difficult and access is a little tight, although you may be able to undo it by hand after the oil has drained. Be prepared for splatter when it comes off, which can be cleaned up using an old cloth or paper towel.



#### 11 FIT NEW FILTER

The new filter will have a rubber sealing ring already in place on its top. Give this a light coating of oil, to aid with sealing. When you put the new filter on the block, it can be done up hand-tight. After the filter makes initial contact with metal, tighten it a further three-quarter turn.



#### 12 REFILL ENGINE WITH OIL

Use Ford 5W20 Eco-B fully-synthetic engine oil to refill the engine – it's very specific to the EcoBoost type. Around 4.1 litres should be sufficient to fill the sump. Put in just over 3 litres, then start the engine briefly to circulate. Stop the engine and top up slowly, making frequent reference to the dipstick.

### UNDER THE VEHICLE – FRONT



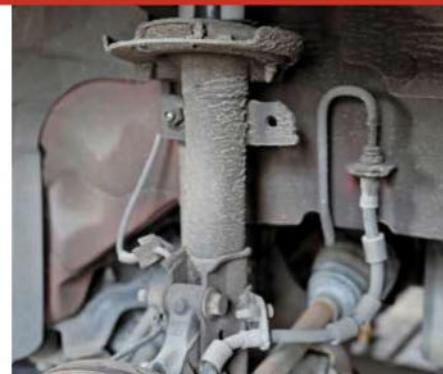
#### 13 UNLOCK WHEELS

As with most modern cars, there are locking wheelnuts to be undone, so make sure you have the locking wheelnut key – the default location is usually with the spare wheel, but if you're not the first owner of the car or this is the first time you're servicing the vehicle yourself, it could be anywhere.



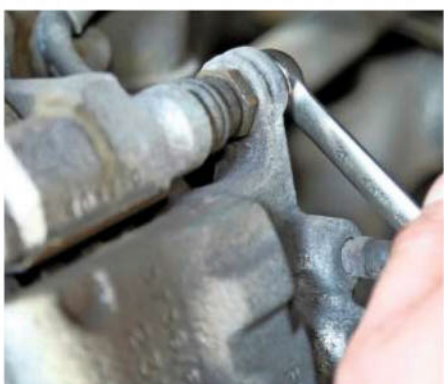
#### 14 CHECK WHEELS

Inspect the tyres for objects stuck in the tread and that they're road legal. Use a depth gauge to check tread. Look for cracking, kerbing or bulging. Rock the wheels top to bottom – significant play points to suspension issues. Spin them and listen for the drone of a worn wheel bearing.



#### 15 CHECK SUSPENSION

Once the wheels are out of the way, check the suspension and steering components. Keep an eye out for any perishing of rubber bushes, plus tears or gaps in the CV boots on the front wheels. Also check for broken road springs or leaking dampers and brake lines, usually around the unions.



#### 16 UNDO BRAKE CALIPERS

Use a wire brush to clean the brakes before dismantling them. Some proprietary brake cleaner spray is also worthwhile. The calipers are held on by two bolts on their rears; you'll need a 12mm socket to undo them. Lift the caliper away – the pads should stay in place around the disc.



#### 17 CLEAN BRAKES

The pads should be able to be lifted away. Put them somewhere safe and then clean the exposed areas of the brake mechanism with a wire brush and spray, such as inside the calipers. The rim of the disc can be turned against a screwdriver blade to remove any loose corrosion.



#### 18 CLEAN BRAKE PADS

Assuming the pads are suitable to be reused – with at least 3mm friction material – clean the fronts by rubbing them on abrasive paper. Also apply copper grease on their rears and lugs, plus the points on the mounting cradle where the pads sit, wheel hub flanges and caliper guide pins. Now reassemble.



## TOP TIP



The fluid shouldn't be too dark or smell burnt – if it does, it suggests problems within the gearbox. Take care when putting the cover back on. It's fiddly, so make sure you get all the tags secure.



## 19 CHECK TYRE PRESSURES

Tyre pressures depend on the size of wheels fitted – there's a data panel inside the passenger door shut. Ours are 195/55 R15 tyres, which means 31psi at the front and 26psi at the rear; this will vary with how much is being carried. The torque figure for the road wheel bolts is 110Nm.



## 20 CHECK TRANSMISSION OIL

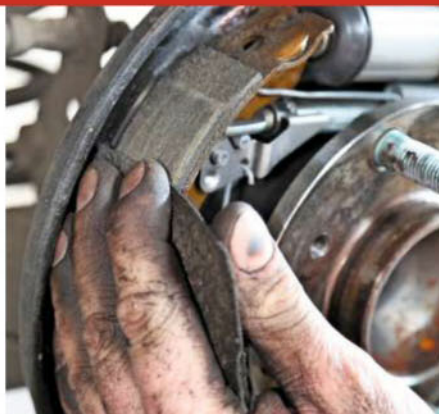
There's a plastic cover at the front of the gearbox. Undo its tags and remove it to get access to the gearbox oil check plug, then use an 8mm Allen key to undo the plug. If the oil doesn't start to come out straight away, dip in a finger or cable tie to check it's up to the aperture.

## UNDER THE VEHICLE – REAR



## 21 DISASSEMBLE BRAKES

There are drum brakes on the rear axle. To remove a drum, you'll need a T40 Torx screwdriver or socket for the two screws that hold it in place. If you then can't lift away the drum by hand, apply some force in the form of a lever or hammer.



## 22 CLEAN REAR BRAKES

Take care cleaning the rear brakes, as their mechanism is more delicate. Be gentle with a wire brush and use spray cleaner to be on the safe side. If the shoes have enough friction material left, they can be cleaned in situ by rubbing them with some abrasive paper.



## 23 REAR BRAKES CHECKS

Peel back the rubbers on each brake cylinder to check for leaks. Push the piston back and forth with a screwdriver to make sure it hasn't seized. Assuming there isn't too pronounced a lip inside the drums, they can be cleaned inside using a wire brush or abrasive paper.



## 24 ADJUST REAR BRAKES

There's a small adjustment wheel (circled) under the piston, which will move the shoes in and out – clockwise adjusts them outwards; this should be lightly lubricated with oil. With the handbrake off, keep trial-fitting the drum and adjusting the shoes outwards, then inwards, until the drum can be turned with just the slightest of resistance.



## 25 REASSEMBLE BRAKES

Before the rear drum goes on permanently, use a bent hacksaw blade or similar to dab some grease on the backplate, at the points where the shoes rest against it. You can push the shoes slightly away from the backplate using a screwdriver to make access easier. Don't forget to apply some grease to the hub flange before the wheel goes on.

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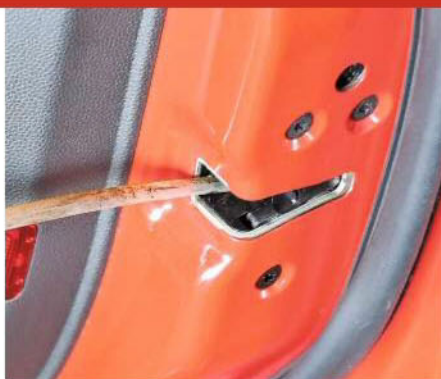
MOTION AND MOBILITY

## OTHER ITEMS



### 26 CHECK DRAIN HOLES

Drain holes on doors and panels can get blocked, which will cause water to pool inside and lead to corrosion – let's face it, small Fords don't have the best reputation for rust resistance. Go around the car and poke the drain holes with wire or a small screwdriver to make sure they're clear.



### 27 LUBRICATE ALL LOCKS

All locks, hinges and catches should receive lubrication. Use old engine oil in a can or some spray grease – the latter will allow you to get an extension tube right inside locks. Don't forget petrol filler and hatchback hinges. If lubrication is missed, it could result in internals getting stiff or even seizing.



### 28 CHANGE POLLEN FILTER

The pollen filter is in the driver's footwell, in the side of the centre console, and you need to be quite flexible to get at it. You'll need to remove the trim clips, then pull the plastic away. A T20 Torx screw holds the filter cover underneath. Undo it, remove the old filter and replace it with a fresh one.



### 29 CHECK ALL INSTRUMENTS

Inspect the seatbelts for wear and tear. Pull sharply to ensure they 'grab' as intended – it's a safety and MoT failure issue if they don't. Run through all the instruments and controls to make sure they're functioning. Also check the lights – use a handy wall to see if the brake lights are working.



### 30 CHECK ALL WIPERS

Check the wipers, especially the lesser-used rear one. Are the rubber parts perished or torn? If they are, water won't clear and the metal underneath could end up permanently marking the glass. If there's anything amiss, such as splitting at the end of the blade, replace the wiper sooner rather than later.



### 31 ADJUST HANDBRAKE

If handbrake adjustment is required, because it is weak or has long travel, you'll need to access the 10mm adjustment nut underneath the centre console. Start by pulling up the rear of the console, giving access to pull off the gearbox console and the centre panel, which will clear the way to that elusive nut.

## Don't forget to also

- ▶ **CLEAR OUT MUDTRAPS** around the bodywork, such as inside the wheelarches. If mud is allowed to build up, it could lead to corrosion.
- ▶ **CHECK TYRE SEALANT** Ford economies means there's no spare wheel on this Fiesta. Instead, make sure there's a fully functional tyre sealant in the boot.
- ▶ **CHECK PIPES & HOSES** scrutinise all these components to make sure they're not perished or going brittle with age.



## SERVICE SCHEDULE

### EVERY 6250 MILES OR SIX MONTHS

(Ford's schedule is for the oil being changed every 12 months or 12,500 miles. However, it's a good idea for an engine's longevity to change it more frequently, especially if the car is used a lot on short urban journeys).

- ▶ Change engine oil and filter
- ▶ Check coolant level and concentration
- ▶ Check brake fluid level and water content
- ▶ Check tyre condition, pressure and tread
- ▶ Top up screenwash fluid
- ▶ Check all instruments and controls
- ▶ Check battery
- ▶ Check wiper blades and washer jets

### EVERY 12,500 MILES or 12 MONTHS

- ▶ Change pollen filter
- ▶ Check all underbody hoses and pipework for condition and leaks
- ▶ Check auxiliary drivebelt
- ▶ Check seatbelt condition and operation

- ▶ Check front brakes; clean or replace as necessary
- ▶ Check rear brakes; clean or renew as necessary
- ▶ Check CV boots
- ▶ Check steering and suspension components
- ▶ Check handbrake; adjust if necessary
- ▶ Check underbody and exhaust condition
- ▶ Lubricate all locks and hinges

### EVERY TWO YEARS

- ▶ Change brake fluid
- ▶ Change coolant
- ▶ Check manual or transmission oil level
- ▶ Check remote control batteries

### EVERY 37,500 MILES or THREE YEARS

- ▶ Change spark plugs
- ▶ Change air filter
- ▶ Check brake system hoses and pipes

### EVERY 100,000 MILES

- ▶ Adjust valve clearances
- ▶ Change auxiliary drivebelt

### EVERY 150,000 MILES or 10 YEARS

- ▶ Change timing belt and tensioner





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# Help!

## Your non-diagnostic vehicle-related problems solved by **Steve Rothwell**



### GENERAL

## Gear oil fumes

**Q** When changing the gearbox oil on my Skoda Fabia MkII, I put the car on ramps to drain out the old oil and fill the gearbox with fresh. The old oil smelt strongly and I began to feel nauseous and only just got up before I vomited. I know synthetic oils are more likely to cause skin problems than mineral oils, but can the fumes make you vomit? Or is it just me?

*John Fisher*

**A** Gear oil does have a strong smell, which many find unpleasant. This originates mainly from the additives used to allow the oil to operate under extreme pressure. In EP-labelled oils, this is sulphur; in GL-5 synthetic oils, sulphur is not used due to its corrosive effects on yellow metals, but the additives have a similarly pungent smell. Some gear oils contain calcium and long chain alkaryl sulphonate, and it is possible that prolonged contact to these elements can produce an allergic reaction. The oils safety sheet deems that the oil has "No known significant effects or critical hazards".

Tolerances to different smells are very individual, and while many find the fumes from gear oil repulsive, some find them pleasant. Providing your symptoms passed immediately after breathing in fresh air, I would not be concerned about any health issues, but would certainly

consider avoiding such situations in the future. It is likely that your personal make-up will not tolerate such pungent odours, but I am sure there are other things that you can cope with that others cannot.

### GENERAL

## Advice after a collision

**Q** My 17-year-old Mazda MX-5 was hit by another vehicle while parked. I was given details by a witness who saw it happen and they gave me the registration number of the vehicle involved. Is there any way of finding out the address of the driver so that I can get their insurance details? The repair will cost around £400-500. I know I can do it through my insurance company, but they could operate a tit-for-tat policy, increasing my insurance premiums and costing me more than the repair. I have two witnesses and their phone numbers and will be filling out a police accident form for when a driver doesn't stop, but I don't know where that will get me.

*Albert Kirby*

**A** From the registration number you supplied, I can tell you that the vehicle was a black Peugeot 207. The police should be able to supply the name and address of the registered keeper, but there are other routes you

can use. The Motor Insurance Database will supply you with the policy number and details of the vehicle's owner for a one-off fee of £4. The website address for this is <http://bit.ly/29asUMD>.

The other option is to request the vehicle owner details from the DVLA by filling out the form V888, which is available here <http://bit.ly/2nVznw4> or by going to [www.gov.uk](http://www.gov.uk) and searching for 'vehicle owner details'.

### GENERAL

## Oscilloscope diagnostics

**Q** I am after older editions of the oscilloscope diagnostics book with the yellow cover and the practical CANbus diagnostics book with the green cover, both by James Dillon.

I have tried to find these on the internet with no success. Do you know where I could get hold of them?

*R Maynes*

**A** I decided to contact James Dillon directly. He informed me that the oscilloscope book is out of print as the content has been moved to a software product at [www.diagnostic-assistance.co.uk](http://www.diagnostic-assistance.co.uk). The CANbus book has been updated and is available from the website [www.techtopics.co.uk](http://www.techtopics.co.uk) or by phoning 01278 428699.



### FORD FOCUS

## Electric power steering

**Q** My daughter has just bought a 2011 Ford Focus and on start-up the other day she received the message 'Steering Assist Malfunction: see manual'. Subsequently, the steering became very stiff, as if power assistance was no longer available. The warning cleared when she restarted the car and it drove normally until she came to start it the following day.

The car is still under warranty, but the independent garage seems unsure what

needs fixing. They could not replicate the fault and a test-drive was OK. I am now worried about letting my daughter drive the vehicle in case a steering fault develops at speed.

Can you shed some light on this fault and offer any remedies? Is the power unit mounted on the rack or is it separate? Should we insist the garage replaces the steering rack or associated equipment, or should it ask Ford about a possible solution?

*Roger Edwards*

**A** The electric power unit is mounted directly on the steering rack and is actually part of the rack. The power is transferred from the motor via a drivebelt which operates a pinion drive on the rack. The unit is controlled using a torque sensor on the steering column shaft, which gives information to the electric power

steering (EPS) module, while power to the motor is controlled by the CANbus system. The steering also receives information from the vehicle speed sensor, and has a temperature sensor to prevent the unit from overheating.

Warnings such as the one your daughter's vehicle is displaying are controlled by the general electronic module (GEM). This should leave a code in the system, and as the garage doesn't appear to be able to correctly diagnose the problem, you may need to take it to a workshop with dedicated Ford software. Once the remedial work has been carried out, the compensation values will need to be reset, so it is important to use a workshop that has the correct equipment.

There was also a powertrain control module (PCM) update in late 2011 that addressed problems with the electric power steering. It may be worth talking to your local Ford dealer about this.





**FORD FOCUS**

## Loss of power

**Q** I need advice regarding my brother's 53-plate Ford Focus 1.8 TDCi with 112,000 miles. He had just come off the motorway when he heard a slight bang. The car lost power, but he got it the four miles to his home, although it would not rev above 3000rpm and the top speed was 40mph.

We took off the small pipes on either side of the intercooler and oil started to slowly flow out of the pipes. There was also oil inside the intercooler. Am I correct in thinking that the turbo has blown?

**Steve Wooldridge**

**A** You do not mention the presence of a management light, but the fault codes from the vehicle

need to be read and these will help to correctly diagnose the issue. Although the problem may be the turbo, there are other, more likely possibilities. It really depends on the quantity of oil – a small amount of oil will be present in the intercooler pipes and intercooler. When the turbo fails, the result is often copious amounts of oil entering the inlet system or exhaust, resulting in clouds of smoke from the burning oil.

As the vehicle was driven home and you did not report any smoke after the noise was heard, I would suspect a failed intercooler pipe. This is a common occurrence and would cause the symptoms you describe. I would thoroughly check the intercooler pipes for any splits or cuts that would result in pressure loss. The problem may also be due to a failed EGR valve, but given the noise heard at the moment of failure the most likely cause is the intercooler pipe.

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**FORD C-MAX**

## Unable to open bonnet

**Q** I have a 2007 Ford C-MAX 2.0 diesel. My problem is that the bonnet lock has broken and I cannot open it. How do I open the lock?  
**Richard Jagielka**

**A** The bonnet locks on the Focus and C-MAX range are prone to failing and this is especially true if they are not used regularly and kept lubricated. The problem is normally that the cable from the lock barrel to the lock mechanism twists and does not relay the movement fully, resulting in the bonnet being stuck fast. There are two courses of action that can be taken, but they will unfortunately destroy the lock and opening mechanism, so new parts will be required.

The first stage is to remove the lower panel in front of the radiator to allow access up to the lock. The cable can then be gripped tightly with a pair of vice grips and turned to release the catch – this often works, but not always. Between the cable and lock is a small plastic connecting rod: this often fails, preventing the first stage from working.

The second stage is to forcibly remove the cable from the catch and then use a long screwdriver guided through the grille to locate the slot in the catch. Hammering the screwdriver into the slot to secure it, it can then be turned to release the catch. The screwdriver shaft does need to be around 30cm long to reach the lock.

Once opened, replacing the lock is easy as there is plenty of access to the fixing bolts. The new lock mechanism will come as a set and needs to be built up to fit the vehicle key. Many Ford dealers will do this for you for a small cost, or if the old barrel is still in good order then this can be fitted.

**FORD STREETKA**

## Emissions question

**Q** I have a query relating to the emissions printout from my 2005 Ford StreetKa. Please could you advise me regarding the Lambda sensor and expand on the meanings of the readings. I am a little concerned about what the Lambda reading may mean.  
**Kevin Stuttard**

**A** The columns list the limits, actual value and result of the test. The result is given by the computer and cannot be bypassed by the tester.

Running down the emissions sheet as listed, the first item 'engine speed' is the engine speed at which the test was carried out; in this instance, the limits column tells us that this should be carried out at between 2500-3000rpm. The tester has confirmed the engine speed and the actual value column shows this by displaying manual check.

The next column is the CO. This indicates the carbon monoxide emissions and the limit column shows this should be below 0.200%. The actual value given is 0.059%, so the third column shows a pass. Carbon monoxide is a dangerous gas and most of the CO produced is converted into carbon dioxide by the catalytic converter to reduce the harmful effects of the exhaust.

The next column is HC (Hydrocarbons). These are the unburned particles of fuel in the exhaust. They are hazardous to health, but not at the same rate as CO. The limit as shown is 200PPM (parts per million) and the actual value is way below this limit at 2PPM, meaning the third column again shows a pass.

The next column and the one you are concerned about is Lambda. I am assuming you are concerned because it appears to be sitting on the allowed limit. You will notice that the limit is very fine, being from 0.970-1.03. This reading does not refer to the Lambda sensor on your vehicle, but is a calculated value by the analyser that takes into account the amount of gas (exhaust) and the readings of the previous two gases (CO and HC)

Putting a complex formula into basic wording, the higher the Lambda reading, the weaker the mixture. So your reading of 1.03 means the mixture is slightly lean. A figure of 1.00 would be the optimum reading, while .970 would indicate you have a fractionally rich mixture.

The last column under the natural idle test is self-explanatory and gives the CO reading at idle. Once again, your vehicle passed this test comfortably.



Description	Limits	Actual Value	Result
<b>Fast Idle Test</b>	-	-	<b>PASSED</b>
Engine Speed	2500-3000 rpm	MANUAL CHECK	Pass
CO	<= 0.200%	0.059%	Pass
HC	<= 200 ppm	2 ppm	Pass
lambda	0.970-1.030	1.030	Pass
<b>Natural Idle Test</b>	-	-	<b>PASSED</b>
Engine Speed	450-1500 rpm	MANUAL CHECK	Pass
CO	<= 0.300%	0.053%	Pass

The reader's emission sheet





## FORD FOCUS

### Paint code

**Q** My neighbour has damaged the plastic spoiler below the front bumper of her 2009 Ford Focus. It is coloured black like the rest of the car, but now has white marks due to scraping the front of the car on a wall. I have looked at the labels on the sill inside the door and under the bonnet, but they don't show the paint code. Looking on the internet, it would seem that Ford no longer supply the code, but I'm not sure why.

*George Woodward*

**A** From the data you have supplied, it would appear the paint code is 'P'. However, the paint code is normally two digits, so there may be another letter or number on the vehicle. This should be on the plate under the bonnet, near to the bonnet catch, with the code stamped in the last row at the bottom. Alternatively, the paint code should be located on the type/chassis plate – there are a couple of different versions, but on older plates the code will be in the last row, while on newer plates the code will be in a small box to the left and one box up from the bottom.

## FORD PUMA

### Exhaust heatshield

**Q** The heatshield that sits over the rear exhaust box in my Ford Puma 1.6 has fallen off due to corrosion. Would it be OK to leave it off, bearing in mind that it also sits between the rear exhaust and the petrol tank?

*Steve Cloke*

**A** Corroded heatshields are a quite common occurrence because the thin shield weakens around the mounting points. However, leaving it off would not be advisable because, as you observe, it sits between the exhaust and the fuel tank.

I normally make up a new fixing that is larger than the original – a small piece of tin plate around 4cm square will hold a broader area than the original fixing. Providing the original screw thread is still protruding from the body, punching a small hole in the tin plate should allow it to be wound up on the screw thread. There are details about this type of repair in the *Tales from the Workshop* feature in the November 2016 issue of CM.

## MG ZT

### Shock absorbers

**Q** My 2003 MG ZT CDTi needs some front dampers. Are the dampers on a Rover 75 the same size as the MG ZT? I know the ZT is stiffer than the 75, but would an uprated shock be the equivalent to the ZT damper? The reason I'm asking is that there are a lot more aftermarket dampers for the 75: Monroe, Sachs, etc. Retailers just say that the 75 and MG are totally different.

*Stan Lurkins*

**A** According to the information I have, the size and specification of the front shock absorbers is the same for both the Rover 75 and the MG ZT. There are, of course, various specifications with regards to the damping of each unit, but this is again applicable for both the 75 and ZT.



The Rover/MG front strut assembly.



## MGB GT

### Brake problems

**Q** My 1980 MGB GT has a brake problem. Despite having an MOT when I bought it, the brakes were very poor. Upon inspection, I found the front calipers had seized on one side – how it passed its MOT I don't know! I replaced both calipers and then inspected the rear cylinders and shoes, which were OK and the rears were adjusted before bleeding with a Gunson Eezibleed.

I bled the brakes several times, but they were still poor, with the pedal going down by about two-thirds. I replaced the master cylinder and bled the brakes again, with the same result, but there were no leaks from the new calipers and master cylinder. I also tested the servo and it seems fine. When I bled the brakes I started at the nearside rear then offside rear, nearside front and offside front. Is this correct?

*Ken Pugh*

**A** From your description, you are doing everything correctly. The problem does sound like air in the system, which might be entering either via a wheel cylinder seal or a brake caliper seal. The problem may also be a brake hose which has failed internally.

To try and pinpoint the problem area, the best method is to clamp off the brake hose on each cylinder/caliper in turn, then check the feel of the pedal. If no difference is felt, repeat the procedure and bleed the system with the hose clamped off. If you do not have a dedicated brake hose clamp, be careful not to damage the hose if using square-jawed grips.



## TRIUMPH TR7

### Ethanol in petrol

**Q** I have nearly completed the restoration of a 1980 Triumph TR7, but there is some fuel in the tank and I will need to drain it down completely. However, I've heard of an additive called E-Zorb that will clean out the remains of any water droplets. What are your views on this product? It is not cheap, but can be bought via Amazon for a reasonable cost including postage.

Ethanol in petrol is a real nightmare for classic car owners who garage their cars over winter and use the fuel in the tank to start on a regular basis. Your views would be appreciated.

*Ray Dullick*

**A** As you say, E-Zorb is not cheap, although I did find a less expensive retailer than Amazon at this website: <http://bit.ly/2vJoDoC>. I have not tried this product and the UK sites have no reviews, but the American sellers do have user reviews and they are generally favourable.

If you are going to drain the tank completely and have time to allow it to dry, you should not need the treatment, although you will have to ensure the tank has fully dried. An alternative for the future would be to use a fuel stabiliser – these are commonly used in marine and gardening equipment to ensure fuel does not degrade over the winter. The product STA-BIL can be purchased at this website <http://bit.ly/2297HGy> and information on the product can be found here: <http://bit.ly/1RdFg59>.




**VAUXHALL ASTRA**

## Rhythmic squeal

**Q** I have a 2008 Astra 1.6 VVT. I love her to bits and have owned her since she was a year old and came off the Motability programme, through which her previous owner had acquired her. She's done just under 70,000 miles and has had one full and two mini services a year since I've owned her.

Since about March, I've noticed a squeal that happens once per rotation of the road wheels when going at slow speed in traffic. When I first noticed it, I drove straight to an emergency garage in London, as getting back to Derbyshire in one piece was a priority. The mechanic changed a faulty hub bearing on the driver's side and I drove home at high speed without incident.

A few days later, I noticed the squeal had returned. I took it to my local Vauxhall dealer and asked them to strip down the passenger side bearing. They said all was fine, as did a second mechanic. I had a look at it, too. The squeal persisted, so I took it back to Vauxhall and had them strip all four wheels to check the bearings, but they all checked out OK. It was then suggested that the problem might be due to my two front tyres being worn to 4-3-4mm respectively. I knew that wouldn't solve the problem as it is a metallic rather than rubber squeal, but I played along and had the tyres changed. Sure enough, it was still squeaking afterwards.

I heard an ad on the radio that mentioned something about warped brake discs. As it had been noted at the car's last service and MOT that the discs were 60% worn, I had both front discs and pads changed by Vauxhall.

The squeal is now louder than ever. It's not generally that noticeable until I'm stuck in a traffic jam on a road approaching a roundabout or else in some slow-moving traffic. I'm not riding the brakes when she does it as the jams tend to be the type where you let the brake off and give it a rise of clutch to let it roll and catch up with the line – so I'm not even doing 10mph! It definitely seems to be coming from the driver's side.

I've got a horrible feeling the next point of investigation could potentially lead to the need for a replacement driveshaft. I'm no mechanic, but I've got an idea of the cost of one of those thanks to a few years of reading *Car Mechanics!*

*Heather O'Mahony*

**VAUXHALL CORSA**

## Reversing sensors

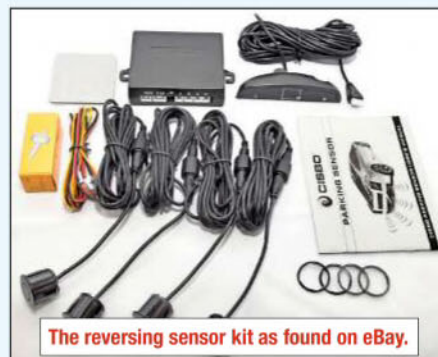
**Q** My friend's daughter has a 63-plate Vauxhall Corsa and has clipped the rear bumper twice when reversing, so I want to fit reversing sensors. Vauxhall dealers will not supply a kit unless they fit it themselves. They told me it has CANbus wiring on it. Is there any other way of fitting aftermarket sensors to the car? I was thinking of either running a direct feed off the battery to a relay wired to the reverse switch or a relay off the reversing light unit wire and connected to the aftermarket kit.

*Paul Brook*

**A** Having the CANbus wiring system means it isn't possible to connect to the reversing light wire to get a feed which will operate the sensors when the reversing lights are on. But there are plenty of reversing light kits on the market which have a separate 12V supply and will work well with this system.

For some reason, none of the suppliers I checked could get even close to the prices offered by eBay sellers. The best price direct from a retailer was £49.99 from <http://bit.ly/2tVNJKl>. This kit is available in a wide choice of colours, but not having used this kit, this is only a suggestion and not a recommendation. The kits on eBay cost around half that price and include a hole cutter for the bumper. I have used these in the past and never had a problem. One kit I found (item No 271575952783) came with a choice of colours and cost £24.95 including postage. If purchasing from eBay, always choose a seller with good feedback.

Before fitting the sensors, it is important to ensure that there is room for them behind the bumper cover. Sometimes a metal support running in this area prevents the sensor from fitting in place correctly. Another important point is to ensure the sensors are level – if they are pointing at a slight angle towards the ground, they will not be accurate.



The reversing sensor kit as found on eBay.

**A** There was a field remedy service bulletin (2439) issued for a very similar problem on your year of vehicle and this may well apply in your case. The complaint in this case was more of a clicking sound, but as with your noise, it was only at slow speeds. The noise was caused by dryness at the point where the driveshaft goes through the hub. Even when tightened to the correct setting, movement occurs within the space between the hub and shaft.

Considering the steps you have already taken the remedy would be worth trying. It entails removing the driveshaft from the hub and greasing the axle shaft, before reinstalling the driveshaft and tightening it to the correct torque. For your vehicle, the tightening is a two-stage procedure, first to 150Nm, then after loosening it by 45°, tightening it to 250Nm.

Given the symptoms you have, I am not inclined to believe that the driveshaft joint is at fault. Although you have already had the discs and pads replaced, if the remedy described above does not rectify the problem, I would next check that the pads used were of a good quality and that the squeal shims were fitted correctly.

**VAUXHALL MERIVA**

## Spacesaver wheel

**Q** I have just bought a 2012 Meriva B supplied with a spacesaver wheel. The road wheels are fitted with 225/45-R17 tyres and the spacesaver is fitted with a 115/70-R16 tyre. This results in the outside diameter of the normal wheels being 24 inches, whereas that of the spacesaver is 22 inches. The dealer from whom I bought the car assures me the size difference is normal and that it is both legal and safe for me to use the spacesaver despite the diameter difference.

*Robert Talbot*

**A** Vauxhall supply one spacesaver for a range of wheel sizes and this can be used with either 15-, 16- or 17-inch wheels. As this is an emergency wheel with a recommended speed limit of 50mph, the variation in diameter is both legally acceptable and safe for use in such situations. Prolonged use of the spacesaver wheel is, of course, not recommended.





**AUDI A6**

## Automatic gearbox advice

**Q** I am thinking of changing my car to an Audi A6 2.0 TDI. I want an automatic and have seen adverts saying CVT, Multitronic, S-Tronic, Automatic, etc. Are all these the same gearbox? If they are different, is there any I should avoid?  
*Dave Spinks*

**A** The gearbox fitted to the Audi A6 between 2001 to 2014 was a CVT Multitronic. There were two versions of this gearbox, with either a six- or seven-part multi-plate clutch. The CVT stands for continually variable transmission and the gearbox offers a limitless range of ratio possibilities to suit all driving conditions. It is no longer available on any Audi vehicle.

The units built before 2005 do seem to have problems and a rebuild is expensive, while the 2006 units were upgraded to the seven-part clutch. The issues to look out for are juddering when

pulling away or slowing down, delay when pulling away, not changing gear or overrevving similar to a slipping clutch. Electrical faults associated with the gearbox will flag up a fault on the dash.

The option of an S-Tronic gearbox was introduced in 2008 and this is a completely different unit. This box uses two sets of gears with two automatic clutches switching between the gear trains to change gear smoothly and quickly.

The two boxes do give a different driving experience and, in my opinion, the S-Tronic is the most reliable when properly maintained. Both types of gearbox are often advertised in the broader term of 'automatic'.

**AUDI A3**

## Boot lock

**Q** My 2011 Audi A3 Quattro rear hatch opening procedure is driving me mad. I have read the manual and it implies that once the doors are unlocked then the button on the hatch handle should open the hatch. What I find is that the only way to unlock the hatch is by using the button on the key. The hatch locks again when you shut it. The 'door unlock' button inside the car does not unlock the hatch.

This means that the only way to open the hatch is to first press the button on the key, then use the button on the hatch. And this only works if you take the key out of the ignition. So to open the hatch, you have to stop the engine and take the key out of the ignition, then press the unlock button on the key and press the unlock button on the hatch and lift. This seems unnecessarily laborious to me and would leave you unable to unlock the hatch if your remote battery was flat.

I find it hard to believe that this is a fault as the car is otherwise 100% reliable. I wondered if it was intended as a high security precaution, but I've been through the configuration menus and, although there are some locking options, none of them make any difference.

*David Ayton*

**A** The system is working as it should, although a double press on the interior unlock button should also unlock the boot, allowing you to open it without using the unlock button on the key. The rear hatch will lock every time it is closed and the key does need to be removed from the ignition before opening the hatch. This is a safety feature to prevent the hatch being opened by anyone while the vehicle is stationary at lights, etc. These locking functions can normally be altered by a main dealer using factory software.



**SEAT IBIZA**

## Knocking noise

**Q** I have a 58-plate SEAT Ibiza 1.4 petrol, with just under 53,000 miles on the clock. I bought the car when it had done 50,000 miles and I always thought the engine rattled slightly. However, I read that this was a common issue with this engine and that it was just noise from the hydraulic tappets.

I have carried out two oil changes since owning the car, but recently the noise seems to be much more noticeable. The noise is at its worst when releasing the clutch to set off and putting a load on the engine. The noise also doesn't get much quieter when the engine has warmed up. Can you think of any other problems that could be causing the noise to get worse?

I had the cambelt replaced just over 2000 miles ago. Do you think there is any chance that the timing could have been incorrectly set and would it be worth removing the cam cover to check this?

*Jack Eckles*

**AUDI A4**

## Unwanted headlight illumination



**Q** I have a 2005 Audi A4 2.0 TDI that is fitted with the driver information system (DIS). When turning on the ignition, the headlights and running lights come on no matter where the headlight switch is set. The high beam only flashes in 'Off' and 'Side light' position, but when the switch is on 'Headlight' the high beam works normally, but a 'Numberplate light out' warning comes up on the DIS, even though new bulbs have been fitted.

I've looked online and most replacement switches on sale are for non-DIS cars. Do you know the part number for the proper switch, as the three numbers listed are all the same except for the last letter, which is A, B or C. I have no idea which is fitted to my car.

Please help as it's driving me mad having the headlights on all the time!

*Steve Lloyd*

The A4 headlamp switch.



**A** As you suspect, the problem is very likely to be the switch itself. There are various switches available depending on whether your Audi is fitted with automatic lights and front fog-lights.

The last letter of the part number refers to the version of light. If the switch has been modified over the time of production this letter will rise. So the C version will be a later version than B.

The part numbers are as follows: 8E0 indicates the part is for an A4, 942 is the group and sub-group of the part (ie, electrical/switches) and the next three digits, 531, are the actual part number. Sometimes a further three digits will follow the last letter and these specify colour or trim. From the information I have, the version that fits your Audi with the DIS should be A.





**A** As you say that the engine has always seemed to rattle, I would not suspect the timing was set up incorrectly when the belts were fitted. A more sudden change in engine sound would have occurred at this point. Having said that, there is no harm in checking the valve timing to be sure.

It is always difficult to diagnose a noise without hearing it. As you say the noise is worse when releasing the clutch and setting off, I would ask if it is a pinking noise? This could be the result of a faulty knock sensor.

Noisy tappets are a characteristic of this engine, but there is another problem that has been known to occur: piston slap. This would tie in more with the noise increasing under load, such as when you are setting off.

You do not say what oil you are using. The recommended oil I have listed is a fully-synthetic 5W40.



## VOLKSWAGEN BORA

### Stuck door lock

**Q** I am hoping you can shed some light on a problem I have with my 2003 VW Bora. The rear offside door will not unlock. Could you tell me how to open the door so I can have a look? And if you have any advice on how to fix the problem this would be a great help.

*Mike Shreeve*

**A** It is most likely that the rear door lock mechanism has become jammed in the deadlock position. This may have occurred either because the lock solenoid is faulty or because the wiring in the door has become defective. Either way, the door will need to be opened before any repairs can commence.

The first method is the easiest way, if it works, but unfortunately its success is limited. Sitting inside the vehicle and using the remote central locking fob, first press the lock button. Then immediately press the lock button again while pulling on the interior handle to open the door. This method has been known to work in cases of a sticking solenoid.

If that method is not successful, the interior door trim panel will need to be removed. This is easier if you first remove the rear seat base. Providing your Bora is not fitted with the integrated child seat, this should just be a case of lifting up the seat base and unhooking the securing rods.

## VOLKSWAGEN PASSAT CC

### Dim reversing lights

**Q** I have a query regarding reversing light bulbs. Those fitted to my 2012 Volkswagen Passat CC TDI are quite poor and I find reversing difficult in poorly lit areas. The reverse sensors are fine up to a point, but I would like to replace the bulbs with some that provide a better illumination.

I find that higher wattage is not an option as it will upset the bulb failure system. Are you aware of any bulbs – LED or otherwise – that I can fit without triggering any error codes? Comments on the internet seem divided about bulb resistors, brightness, heat dissipation, light pattern, lens design considerations, etc.

*Mike Thompson*

**A** The reversing lights fitted to your CC should be H6W bulbs. These are 6-watt halogen bulbs and, as you have discovered, give quite a low output for a reversing lamp. There appears to be no LEDs available that would replace your standard bulbs to increase the intensity of the reversing lamp. The option of fitting a further reversing lamp is also not an option as legislation dictates that no more than two reversing lamps can be fitted to a vehicle.

The other option you may wish to consider is a reversing camera with night vision. This would make reversing far easier, and if it helps save a small knock or scratch will easily pay for itself. A dedicated camera that fits in place of the numberplate lamp, along with a display screen, can be purchased for around £100 from this site <http://bit.ly/1IEPgWG>

The H6W halogen bulb.



Once the seat base is out of the way, you can remove the door interior trim panel. First, gently lever off the outer cover of the interior pull handle. Once this is off, you will see two securing screws; undo these. You will then need to pry the panel gently away from the door frame. As the door is closed, this may be quite difficult. Once released, the panel should lift up and away from the top where it sits in the window channel. You will then need to release the cable that is operated from the interior door release.

With the panel removed, you may be lucky enough to detect a wiring fault within the door. If not, you will need to access the door lock and solenoid assembly, which is tucked away at the rear of the door. There is not much external linkage on show and if, at this stage, you have not managed to release the door, you will probably need to break the mechanism apart in order to open the door.

This is generally best done by using a long screwdriver driven into the side of the plastic housing of the solenoid. By then turning the screwdriver, you should be able to break open the housing and release the solenoid. This will damage the lock, meaning a new assembly will be required.

Before fitting the new lock and closing the door, carefully inspect the wiring loom between the body and the door – a faulty connection in this area could put you back in the same position.

## VOLKSWAGEN PASSAT

### Oil query

**Q** I have a 2000 VW Passat. The handbook specifies that the correct engine oil is 505 01 and says no other oil should be used. Can you please explain this to me?

I have bought oil for it, but although I was assured that the oil was suitable it does not specify 505 01 on the label. The oil I have purchased is Carlupe 10W40 semi-synthetic. Can you recommend any alternative oil to use?

*Name supplied*

**A** The specification 505 01 is the recommended minimum specification by VW's own standards. According to my data, the oil for your Passat with unit injectors should be a 5W40 fully-synthetic. Comma does suitable oil (Diesel PD 5W40) which is reasonably priced and conforms to the 505 01 standard.

The oil specified depends on a few factors. Modern engines require thinner oils to lubricate the finely machined parts, but they also require oil which can withstand higher pressures. The oil needs to suspend impurities without leaving sludge in the engine. As engine temperatures and operating requirements vary, so the importance of the oil specification for different engines has become more of a factor.





## VOLKSWAGEN UP!

### Up service schedule

**Q** I have a VW Up. Can you tell me when the spark plugs and air filter need changing?

*D Hartley*

**A** Providing you have one of the engine codes CHYA, CHYB or CPGA, then the VW service schedule gives a time of four years or 60,000 kilometres (37,280 miles) for the replacement of both the air filter and spark plugs. The other time-dependent service items are the pollen filter, which should be changed every two years, and the brake fluid, which should be replaced every three years.

## VOLKSWAGEN PASSAT

### Jerky drive

**Q** I have a problem with my 2008 Volkswagen Passat 2.0-litre diesel automatic with 115,000 miles on the clock. While driving along in traffic, the car jerks forwards while accelerating, as though I am jumping the clutch or prodding the accelerator. The revs don't change while this is happening. I have only had the car for four months and this problem has been there since then.

Could it be the rear engine gearbox mount? Do you know if these are hydraulic mounts and if they are difficult for a home mechanic to change?

*Linda Tomkins*

**A** As you suspect, the rear engine/gearbox mount is the most likely cause of your unwanted jerking. This mount is fairly simple, with just a rubber bush at each end. The gearbox end has a small bracket covering the end of the mount and is secured by two bolts. The other end is slightly larger and fixed to the subframe with just one centre bolt. It's quite an easy job to replace the mount.

If this mount is not the cause of the problem, I would check the mountings that secure the engine and gearbox at each end. I have known these to work loose and failure can be dramatic, with the thread stripping from the remaining bolt. The mounts are both easily accessible and quickly checked.

There is also the possibility that the problem is occurring within the auto gearbox. With this in mind, it may be worth changing the gearbox fluid.



## FIAT PUNTO GRANDE

### Steering column switch replacement

**Q** I need to replace the steering column light/indicator switch on my 2007 Fiat Punto Grande diesel.

Could you please advise me how to remove the steering wheel/airbag to get access?

*Eddie Mandeville*

**A** Before removing the steering wheel, the ignition must be turned off with the wheels in the straight ahead position and the battery must be disconnected for 10 minutes before commencing work. The airbag should be held in place with three bolts from behind the steering wheel at the three o'clock, six o'clock and nine o'clock positions. Once these are

undone, the airbag should lift forward enough to access and remove the connecting plug. If you have the later type of steering wheel, the airbag will be held in place with two retaining spring clips. These can be released by pushing a small Phillips screwdriver into the holes found at 3 o'clock and 9 o'clock at the back of the steering wheel. The steering wheel retaining nut can then be undone, and after marking its position, the steering wheel can be removed.

The steering column trim will then need to be taken off. This is held in place by four retaining bolts from the underside. Once these are undone, the top trim can then be lifted off. The airbag clock spring unit will then need to be unbolted and this is secured by two screws on the bottom edge. It is important not to turn the clock spring once it's off, to ensure that it is replaced in the same position. Next, the steering column switch unit can be removed after loosening the securing band holding it to the steering column and disconnecting the electrical plugs.

The replacement procedure is a reverse of the removal, with the exception that Fiat recommend fitting a new nut to the steering column. This should be torqued up to 50Nm (36.9lb ft).

## FIAT PANDA

### Remote key

**Q** I have a 2004 Fiat Panda and the blue folding key that activates the remote central locking has three buttons. Unfortunately, one of these buttons has cracked and broken off, so there is a hole where the button should be and I can't activate the remote locking. The unlock button is also in danger of breaking.

Going to the main dealer is going to cost me a fortune, so I was wondering if you know of another way to repair or replace the key shell or buttons. The key works manually, but there are times when the remote locking is useful and I'd like to be able to use the function.

*D Bennett*

**A** Broken remote keys are quite common and there are auto-locksmiths who can replace the key-fob housing for much less than the cost of a new key. One firm that advertises a key repair service by return of post can be found here: <http://bit.ly/2dGnZVN>. It quotes £42 to repair the three button remote for your vehicle. I have not personally used this company, so this is only a suggestion not a recommendation.

Thanks for your response. I had a look online and wasn't sure what to do as there were such a huge number of services out there. Anyway, on a trip to my local supermarket I noticed that the small Timpson branch outside advertised car key repairs. A very nice chap took a couple of photos of my key-fob and said he'd give me a ring as he couldn't find the key in his book. Two days later, he had the key in stock and within 30 minutes had swapped over the internals from my old key, cut me a new blade and reset it in the new housing. Total cost? £35. And I could get my shopping done while the key was being sorted! I was really pleased with the service and the price was better than the £280 quoted by the main dealer!

*D Bennett*



The Fiat Panda remote key.







**HONDA CIVIC CRX**



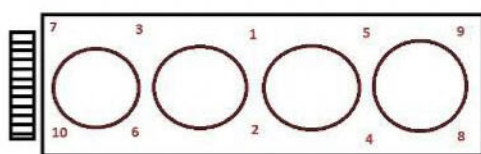
# Cylinderhead torque

**Q** Could you please tell me the tightening torque settings for the cylinderhead on my 1994 Honda CRX?  
*Gerry Carter*

**A** I am assuming that your Honda has the 1.6 VTi engine. If this is the case, the cylinderhead torque settings with the bolts lightly oiled are:

Stage 1 30Nm  
Stage 2 85Nm

The bolts are tightened in sequence from the centre out (see illustration).



The cylinderhead bolt tightening sequence.

**TOYOTA**

**TOYOTA COROLLA**

# Oil warning light

**Q** My 10-year-old Toyota Corolla runs on Mobil 1 ESP Formula 5W30. I added some Toyota fuel Economy 5W30 to it and the oil light has come on. Are these oils compatible?  
*Michael Clenaghan*

**A** The Toyota oil should be perfectly compatible for a top-up. You do not mention how much the oil needed topping-up and I am assuming this did not go down to such a level that damage has occurred.

I would check that this is not merely a coincidence and the oil pressure light has failed. Alternatively, an engine oil pressure check should be carried out using an external gauge.

**TOYOTA CELICA GT**

# Paintwork problems

**Q** I own a red Toyota Celica GT whose paintwork is brilliant except for the bonnet and top of the front mudguards. The car was perfect when bought, but had been freshly polished.

My problem is that the bonnet keeps fading with the mudguards, although the rest of the car does not fade. Someone has used T-Cut so that some undercoat can be seen on the edges. After being washed and polished it is perfect for a few weeks, then gradually fades. It has probably been damaged and repaired at some point, and now lacks the same protection as the paintwork on the rest of the car.

I have read that new cars can be treated to preserve the paintwork. On the internet, there are ads for numerous products that polish and shine. I have tried various polishes, but they all fade. I think I need a special treatment to stop UV rays from attacking the front of my car, but do not know which product would best arrest this problem or slow it down.  
*David Lowe*

**A** As you probably know, red is the worst colour for fading and requires the most amount of attention to maintain. It is the damage from UV rays and oxidation that are the main causes of fading. Using a good quality Carnuba wax will maintain the shine and protect the paint, but its effect will only last for around six weeks.

A paint sealant made from polymers, consisting of tens of thousands of synthetic particles will bond to the paintwork and form a ridged protective shell that should last around six months. There are a whole host of protective treatments, including Dimondbright, Supagard, Autoglym Lifeshine, Smartguard, Silver Seal, Autoprotect, etc. The important thing is to choose a protective layer product and not a polish – two which seem to receive good reviews are FinishKare 1000P Hi-Temp Sealant and G-techniq C2V3 Liquid Crystal Sealant. With body sealants, it is important to ensure the vehicle body is clean before applying, after which the sealant can be reapplied to build up its thickness and provide a stronger barrier.

**TOYOTA PRIUS**

# Service schedule

**Q** It would be helpful if you could supply me with the recommended mileages to replace the spark plugs, transmission cooling fluid and transmission oil on a 2006 Toyota Prius

## Have a problem vehicle? GET IN TOUCH...

If you have a problem vehicle, *Car Mechanics* has the answer in the shape of our technical editor **STEVE ROTHWELL**. Contact Steve, as detailed below, for **FREE** advice on all car-related problems. Please help Steve to help you by giving as much information on the symptoms as you can.

As *Help!* is a free service, some complex questions may require more time and resources than we can reasonably allow – when this is the case we will let you know.

Steve will reply to all queries as quickly as possible, but please allow up to 28 days for a reply. Difficult/complex questions or those requiring research may take a little longer – please be patient.

Neither Bauer Media nor Steve Rothwell can accept any liability for loss, damage or injury resulting from replies to readers' queries.

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**WRITE** (enclosing a SAE):  
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Please include your postal address

These *Help!* pages are dedicated to the late **RODNEY JACQUES**, who answered Q&As here from 1995 to 2012.

with 80,000 miles. I am contemplating these replacements before reaching 100,000 miles.

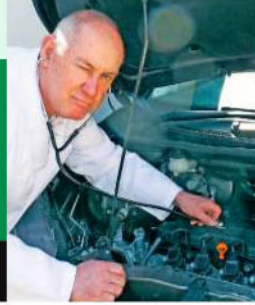
*Alan Forshaw*

**A** The spark plug replacement interval is given by Toyota as 144 months or 120,000 miles. The coolant fluid replacement interval is 54 months or 45,000 miles. The gearbox fluid interval is 72 months or 60,000 miles, although this is specified as only needing changing if the vehicle is used for towing, something which the Prius is not supposed to be used for!



# ▶ Diagnostics Doctor

Steve Rothwell answering your **ENGINE MANAGEMENT** queries



## FORD MONDEO ST220

### Cat or sensor problem

**Q** I have a 2004 Mondeo ST220 V6 3.0 running with, I believe, a Black Oak engine management system. I have the fault code 'P0420' showing; if I reset the code, it reoccurs after about 100 miles. According to my Launch Creader Professional, this means 'Cat system efficiency below threshold bank one'. When idling at about 750rpm, the reader shows the CTS sending 1.28 volts with 90° on the temperature gauge. Bank 1 sensor 1 fluctuates between 0.3 and 0.8 volts and bank 1 sensor 2 shows 0 volts; bank 2 is identical. All other sensors are showing 'No fault'. The car starts, idles and runs perfectly with plenty of power. It does, however, smell like it's running rich.

Do you think this is a cat failure? I wouldn't think it's a sensor fault. If it's running rich, then what should I do?  
*John Wren*

**A** The code 'P0420' is 'Bank 1 Catalyst system efficiency below threshold'. Having tested the O2 sensors using a voltmeter, you have proved that the pre-cat sensor is operating correctly and switching as it should. If the catalytic converter was failing, then the bank 2 sensor would mirror bank 1 as the emissions would not be altered by the catalyst. The bank 2 sensor should remain constant if the catalyst is operating correctly, but it should read more than 0 volts.

As you have two sensors on each cat, it seems unlikely that both banks would have failed and, if they had, you would also have the code 'P0430' indicating the bank 2 failure; this is contradicted by the 0 volts reading from both rear sensors in bank 1 and 2.

My first check would be the engine breather pipes – they can become brittle and snap off, and the air/fuel mixture is totally disrupted, resulting in the code you have. I would also ensure there are no leaks in the exhaust system, another common cause of the 'P0420' code.

Provided you have no breather or exhaust leak problems, I would try



disconnecting the O2 sensors and reading the voltages off using a digital voltmeter. You may have communication problems, which could be due to something as simple as a broken wire or poor connection. If both post-cat sensors are still reading 0 voltage, these need to be replaced first.



## VAUXHALL ASTRA

### Convertible roof operation

**Q** The electric roof has stopped working on my 2008 Vauxhall Astra convertible. The roof has closed, but the warning light beeped and the boot closed but did not lock fully – I could open it about six inches. One of the back windows did not close for a while. The cogs on the side-flaps are perfect and some of the solenoids were checked. I changed the ECU in the boot as I was told there were only three volts coming out of the ECU.  
*Sean*

**A** Vauxhall did release a field remedy – number 2617 – with regard to the roof operation. This concerned the magnet in the pulling rod on the luggage net in the boot. The magnet is in the left-hand side of the rod and, if missing, the roof cannot be operated as the correct signal is not sent to the ECU informing it that the luggage net is correctly in place.

Another relevant field service remedy is number 2232. This makes reference to the incomplete closing of the roof due to misadjustment of the joint buffers in the boot. The buffer should have a

## MERCEDES C-CLASS

### Misfire misery

**Q** I guess I have been lucky not to have had any faults on my 2008 Mercedes C180 Kompressor W204 for quite a while. Unfortunately, this all changed after I cleaned the throttle body. It has covered 56,000 miles and, along with a service, I recently changed the drivebelt and cleaned the throttle body, which had gummed up. After reassembly, the car ran well for about a week, then it began to misfire and showed the generic code 'P2188'. I cleared the code and it ran smoothly again, only to produce the same code the next day.  
*Mike Back*

**A** As you say, the 'P2188' code is generic and indicates 'System Too Rich at Idle Bank 1'. The two most likely reasons for the problem are that either a small piece of dislodged gum has found its way back into the throttle body or, if



The O2 or Lambda sensor

the throttle body was cleaned using a solvent, that has travelled through the system along with some of the dislodged residue and has damaged the O2 sensor. The other possible scenario is that the mass air flow (MAF) sensor is dirty, although this may be unrelated to the earlier work.

In the first instance, I would re-clean the throttle body and also clean the MAF sensor. The MAF sensor should be cleaned using either a dedicated spray or an isopropyl alcohol, not with a solvent that will leave a residue.

You should also ensure that it is completely dry before refitting it or starting the engine. If the problem persists, I would then consider replacing the front O2 sensor.

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**PEUGEOT 3008**

# Parking brake release

**Q** Could you help me with an intermittent problem relating to the electronic parking brake on a 2010 Peugeot 3008 1.6 HDi with 78,000 miles? About two months ago, the ABS light would sometimes come on for a few moments, then go out again as the car was being driven. Also, sometimes in the morning, the parking brake would not release for three or four attempts.

Five weeks ago, the car was taken to the garage – not a Peugeot dealership – and checked over, but no fault codes were logged, so the garage was unable to diagnose the problem. The mechanic told me he had contacted a Peugeot dealership, but it had not come across the problem before.

The car then behaved fine until yesterday. It ran normally all morning, until I popped to the shops. When I returned to the vehicle after about 15 minutes and went to drive away, the parking brake would not release. A message kept coming up on the display saying that the brake pedal was not pressed, even though it was. I tried turning the ignition off and on again at least a dozen times, to no avail, and resigned myself to the fact that it would be a recovery job. Having turned on the ignition one last time, I released the parking brake and it was working normally. The car has been fine since then.



The brake light switch



Have you ever come across this and do you have any idea as to what could be the problem?

**Michael Carty**

**A** Given the symptom that the ABS light has occasionally illuminated, along with the fact that when the parking brake would not release the message displayed was indicating that the footbrake was not pressed, my first thought would be that the brake light switch is faulty. On modern vehicles, the brake light switch is responsible for a lot more than just operating the brake lights, so even though the brake lights may be operating correctly, this does not eliminate the fact the switch may be faulty. This would be the easiest and cheapest part to replace and would certainly be my first move.

As the garage has read the codes with what I am assuming is a Peugeot-compatible system, and as no codes appear to have been logged, hopefully the ABS and electronic parking brake control systems are all operating correctly.

length of 16mm. I would also check this mechanism for any obstructions.

The ECU does only operate on a low voltage and the best way to check for a problem would be with a compatible diagnostic tester. There are contact switches for the roof which instruct the ECU as to the position and status of the roof. If one of these switches is not operating correctly, it will cause a problem such as the one you are experiencing.

Whenever I am asked to check a folding roof problem, the first thing I do is ensure that the boot is clear of any

objects that might affect the operation. I fold the roof down fully and then up again, checking for any obstruction to the operation. If this will not operate automatically, use the manual procedure. This should be listed in the vehicle handbook, but basically means opening the emergency actuation screw to the stop using a Hex wrench. The screw is located under a small panel in the boot area, behind the back seat. Once this is open, it should be possible to manually open and close the roof to carry out the checks.



## Diagnostics Doctor

Diagnostics Doctor is a **FREE** helpline service for CM readers – including trade readers – who are struggling with diagnostic/engine management related faults. **Steve Rothwell** will answer all your queries. He will need as much detail as possible:

**MAKE, MODEL, YEAR** and **ENGINE CODE** of your vehicle, and the type of management system installed

Obviously, Steve will not be able to assess the vehicle up close, so his answer will be on the basis solely of your description. This is a **FREE** service and it may take some time to respond to certain problems. If you would like to receive a personal response via post, please enclose an **SAE**.

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PE2 6EA**

e-mail:

**cmdiagnostics@yahoo.co.uk**

## Common abbreviations

<b>ATS</b>	Air Temperature Sensor
<b>AFM</b>	Air-Flow Meter – not a MAF type (see below). It could be, for example, a vane type
<b>CAS</b>	Crank Angle Sensor
<b>CPS</b>	Crank Position Sensor
<b>CTS</b>	Coolant Temperature Sensor
<b>ECT</b>	Engine Coolant Temperature
<b>ECU</b>	Electronic Control Unit
<b>EGR</b>	Exhaust Gas Recirculation – meters exhaust gas back to the intake manifold
<b>EML</b>	Engine Management Light
<b>EMS</b>	Engine Management System
<b>FCR</b>	Fault Code Reader
<b>HT</b>	High Tension – ignition output to the spark plugs
<b>IAV</b>	Idle Air Valve
<b>ISCV</b>	Idle Speed Control Valve – usually operated by a motor controlled by the ECU
<b>LOS</b>	Limited Operating Strategy – if the ECU detects a malfunction, it runs a programme to allow the car to still go, but at reduced efficiency
<b>MAF</b>	Mass Air-Flow meter
<b>MAP</b>	Manifold Air Pressure
<b>MIL</b>	Malfunction Indicator Lamp
<b>PCV</b>	Positive Crankcase Ventilation – takes crankcase gases and recycles back to the inlet system
<b>TBPS</b>	Turbo Boost Pressure Sensor – used by the ECU to regulate turbo output
<b>TPS</b>	Throttle Position Sensor
<b>VSS</b>	Vehicle Speed Sensor
<b>WOT</b>	Wide Open Throttle

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# Electronic Diagnostics

AUDI  
A4  
2.0 TDI

Tracing and fixing faults in electronic engine management systems

The A4 is seen by many buyers as a safe secondhand bet. **Kim Henson** and **Edward Haggart** evaluate whether the model's diagnostic prospects back this up.



**O**riginally introduced in 1994 as a successor to the Audi 80, the front-wheel drive A4 featured a longitudinally-mounted engine, although some versions had Quattro four-wheel drive. The original car's platform was also used in the contemporary VW Passat.

The first cars were designated B5 and were the subject of a facelift for 1998, eventually being replaced by new B6 models from 2000, with styling by Peter Schreyer. The further revised third-generation B7 A4s (identifiable by their deep, trapezoidal profile front grille) ruled from 2004 until 2008, when they were superseded by the fourth-

## NOTES:

All references in our text and captions to 'left' and 'right' sides are from the point of view of someone sitting in the car and looking ahead.

generation B8 (facelifted in 2012 and, in turn, replaced by the B9 from 2015).

The B7 versions were available with a wide range of petrol and diesel engines, offering a variety of power and fuel economy options. Our vehicle here is a 2006 B7 powered by a 16-valve 2.0-litre turbocharged direct injection diesel engine (code BRD) incorporating unit injection (Pumpe Düse) and controlled by a Siemens management system.

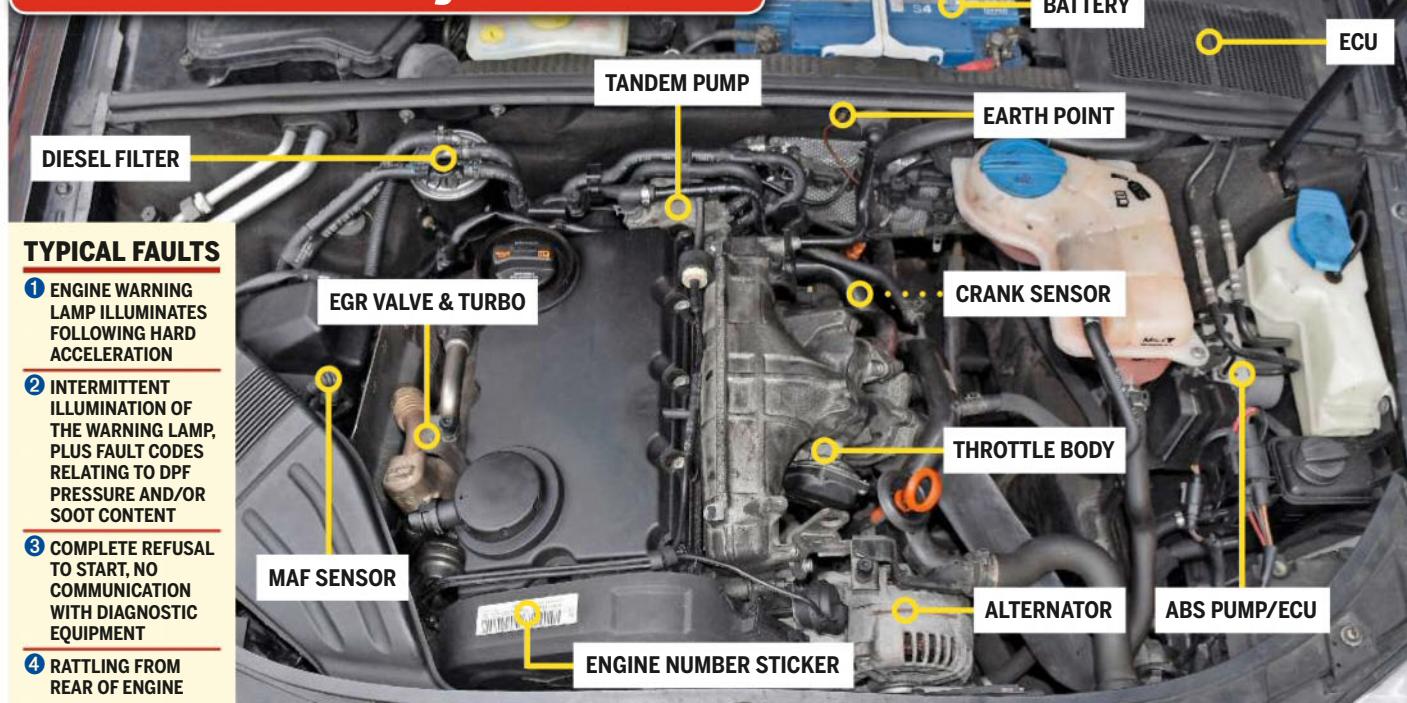
Our guide to this model's engine and its Siemens system is Edward Haggart.

## Preparation

In the motor trade, these engines aren't known for their reliability (the 1.9-litre TDI unit is the preferred VAG engine of choice). In our experience, we have seen some that have covered more than 100,000 miles with no problems, while others suffer oil pump failure causing catastrophic engine destruction after just 50,000 miles.

These engines do require regular and frequent oil and filter changes, and low

## 1986cc 16v four-cylinder diesel



### TYPICAL FAULTS

- 1 ENGINE WARNING LAMP ILLUMINATES FOLLOWING HARD ACCELERATION
- 2 INTERMITTENT ILLUMINATION OF THE WARNING LAMP, PLUS FAULT CODES RELATING TO DPF PRESSURE AND/OR SOOT CONTENT
- 3 COMPLETE REFUSAL TO START, NO COMMUNICATION WITH DIAGNOSTIC EQUIPMENT
- 4 RATTLING FROM REAR OF ENGINE

ash, fully-synthetic engine oil should be used. The relative cheapness of the servicing parts for the engines means that there is no excuse to scrimp on quality. It's also worth noting that using genuine, high-quality components is always worthwhile, especially since, comparatively speaking, their prices are lower than they used to be.

Renewing the timing belt is relatively painless. It might seem daunting to remove the front end of the engine, but with the right tools it's a simple task even for a DIY enthusiast. The water pump must be renewed at the same time as the cambelt, and VAG recommends fitting new engine mounting bolts, since they are of the stretch variety. The cambelt kit should come complete with a new cam pulley and tensioner bolts.

One thing definitely worth mentioning is that if the crank sensor goes down, it is a real pig to change; it's located on the right-hand side of the engine, at the back.

Note that cleaning the exhaust gas recirculation (EGR) valve should be done as part of the car's routine servicing/maintenance programme. Again, it isn't a difficult job as the assembly is fairly easy to reach (see Photo 7).

## Engine management

The Siemens Simos PPD 1 management system used on this Audi incorporates these primary components:

- ▶ 4 x high-pressure Pumpe Düse fuel injectors.
- ▶ Tandem pump incorporating brake servo.
- ▶ Boost pressure sensor mounted in intake trunking.
- ▶ Exhaust gas recirculation (EGR) valve with cooler.
- ▶ Variable turbocharger.
- ▶ Digital crank and cam sensors.
- ▶ Engine control and glow plug relay.
- ▶ Pedal position sensor mounted on throttle pedal.
- ▶ Diesel particulate filter (DPF) incorporating pressure sensor.
- ▶ Coolant sensor reporting engine temperature to ECU.
- ▶ Air mass sensor in air filter housing.
- ▶ Conventional charging system.
- ▶ Brake pedal position sensor mounted on pedal.
- ▶ ABS ECU pump.

The boost pressure sensor (see Photo 9) can suffer from oil contamination, so if you are seeing a fault code relating to boost pressure, it's always worth removing and cleaning the sensor before delving deeper. A cotton wool bud plus brake cleaner fluid does the job – just be very careful not to soak it or apply too much force as the sensors are sensitive.

Always check the battery for condition and for any signs of water in the vicinity, indicating a blocked rainwater drain.

### Fault 1:

## Sticking variable vanes in turbocharger

For our first fault with this Audi, the symptom that the driver will notice is illumination of the engine management system warning lamp following periods of hard acceleration. It is possible that after cycling the ignition, the lamp will

## Typical Audi A4 faults



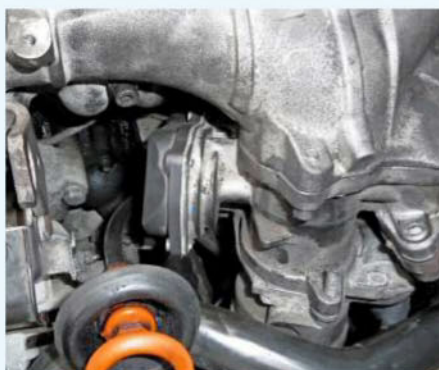
**1** If it's still in place, this label on the cambelt cover will help to identify the engine installed in the Audi you are dealing with. In this case, the engine code is BRD. Unfortunately, these 2.0-litre turbodiesel units are notorious for expensive problems.



**2** The fuel filter is mounted accessibly on the engine bay's rear bulkhead, and the spring clips used to secure the hoses to their stubs are easy to compress during hose removal/refitting. Be prepared for fuel spillage when the hoses are released.



**3** Positioned centrally on the engine compartment's rear bulkhead, the diesel pump assembly doubles as an electrically-activated vacuum pump to operate the brake system servo. Ailing hoses and/or loose hose connections can cause havoc.



**4** Somewhat buried, but visible in the centre of this photo, is the throttle body assembly, which must be clean internally. To more easily reach and remove the assembly, the adjacent coolant pipework can be released from its mountings, but don't disconnect it.



**5** The diesel particulate filter (DPF) sensor – located on the rear bulkhead, towards the left-hand side – assesses pressure within the exhaust system. It communicates this information to the ECU, in turn triggering DPF regeneration when required.



## Typical Audi A4 faults (continued)



**6** Behind the left-hand headlamp is the wiring for the engine's twin cooling fans. Check the cables for condition and the connections for cleanliness. This area is vulnerable in the event of a frontal collision, so check for impact damage, too.



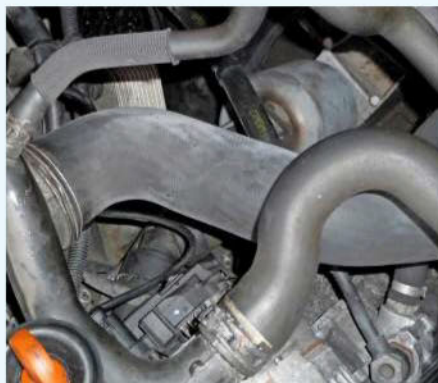
**7** These canisters and trunking along the right-hand side of the engine are part of the A4's exhaust gas recirculation (EGR) system, in the form of an EGR valve incorporating a cooler. Treat cleaning out the EGR valve as part of a regular service.



**8** The mass air flow (MAF) sensor is positioned within the air filter housing on the right-hand side of the engine bay. Its function is to determine the quantity of air passing through to the engine so the ECU precisely calculates fuelling requirements.



**9** The hard-to-reach boost pressure sensor is mounted in the intercooler housing. Its correct operation is essential for passing full information to the ECU regarding boost pressure to permit turbocharger operation at the correct levels.



**10** The large diameter intake hose, visible beneath the other hoses in this shot, can suffer from splits, so check it closely and ensure its securing clips are tight. It must be intact or air leaks will result, allowing the ECU to miscalculate the engine's fuelling.



**11** The battery sits between the engine bay bulkhead and scuttle panel. The battery MUST be in good condition, with clean, sound connections – check the negative post for corrosion and a clean fit, and that the feed/earth cables are in excellent condition.

extinguish again. It is also possible that this fault might not come to light at all if the driver gradually accelerates and only undertakes short journeys.

The fault lies within the variable vane turbocharger. Carrying out a diagnostic check will show a fault code for overboost. The code will clear, but it's likely that it will come back again after further hard acceleration.

If the problem is in its early stages, a quality diesel cleaner can free up the sticking vanes that are the cause of the trouble. However, if the fault is not tackled and left to its own devices, the vanes can become more seriously jammed and the only fix will be a stripdown of the turbo for cleaning.

It's worth feeling the rod on the turbo for free movement; slight resistance should be felt, but anything more suggests the vanes are jammed. Always check the turbocharger bearing shaft for play as well.

Access is good, so any competent DIY mechanic should be able to do this job easily. Always renew the gaskets

on refitting. If you feel it necessary to replace any or all of the parts, gaskets are available off the shelf at factors.

### Fault 2:

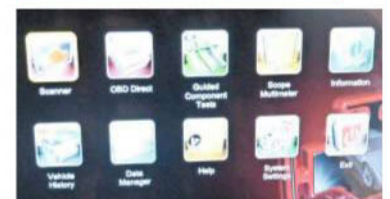
## Fault codes relating to diesel particulate filter

A common problem with modern diesels is trouble with the DPF, and this Audi is no exception. As is usual in such cases, there will be no noticeable lack of power in the early stages, but the warning light will illuminate intermittently and you'll find fault codes relating to DPF pressure, soot content or both.

First, you need to check the live data for soot content. Anything over 60% needs further investigation, and certain driving conditions can cause the filter to clog more, especially town driving/stop-start motoring. Be aware that a stuck EGR valve can cause the DPF to block as well, so this needs ruling out. When fitting a new DPF or after cleaning,

remember that it needs resetting to 0. If carrying out a forced regeneration via a diagnostic tester, note that it must be performed on a hard surface because the heat can melt tarmac. We strongly advise that this procedure isn't carried out by a novice mechanic, because, if done wrong, it can be catastrophic.

## Tool of choice



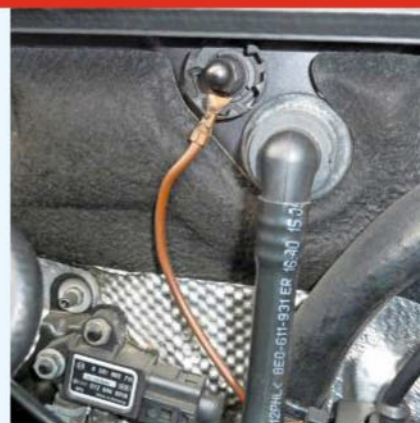
► For this A4, the Snap-on Verus Pro is a versatile and user-friendly diagnostic tool, which is also suitable for use on many other makes and models of vehicle. Note that aftermarket diagnostic tools offer in-depth coverage at near dealer level.



**12** Beneath this plastic cover panel is the underbonnet fusebox assembly, which is best not disturbed unless absolutely necessary. Note that ingress of rainwater is likely if the cover is missing or incorrectly refitted; always check for snug fitting.



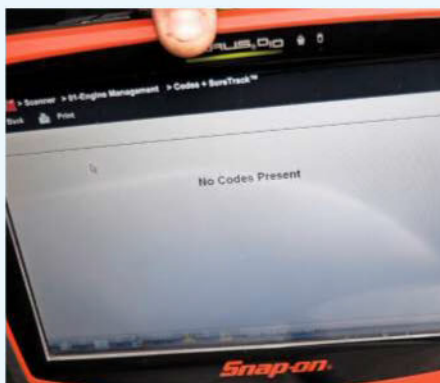
**13** The bonnet switch assembly/sensor assesses whether the bonnet is fully closed. If it decides that the bonnet is still open, it will signal the ECU, in turn resulting in non-operation of the vehicle.



**14** This brown cable is an important earth. Check the integrity of the cable and connection. If there is any sign of dirt or corrosion being present, dismantle the connection, clean it using a protective silicone spray, then reassemble it.



**15** This Audi's diagnostic socket is located at the base of the fascia knee roll on the right-hand side of the vehicle, just above the control pedals. It is shown here with the Snap-on Verus Pro diagnostic tool connected for interrogation of the vehicle's systems.



**16** This screenshot on the Verus Pro tool shows 'No codes present' as the result of an initial scan of the A4's management system. Note that VAG cars are very sensitive and easily trigger fault codes, so even carrying out a general scan might set random codes.



**17** Live data collected by the Verus Pro tool can be invaluable when tracking down faults in the car's systems. Live data can also be very useful, and readings for mass air flow and boost pressure can quickly highlight faults.

It's worth carrying out regular drive cycles to keep things moving.

**A basic regeneration procedure:**

Engine at normal operating temperature, with a road speed of at least 40mph and an engine speed of at least 2500rpm.

**Fault 3:**

**Moisture-contaminated ECU**

When our next fault arises, symptoms can include a complete refusal to start, as well as a failure to communicate with a diagnostic tester. Depending on how bad things are, the engine might crank and not start or else might do nothing when the key is turned.

The fault is that the ECU under the bonnet is contaminated by water. The ECU is located on the rear right-hand side of the engine, below the windscreen, under a black plastic cover secured with Torx 30 screws. What happens is that the drain apertures (with bungs) under the

**Technical specs**

Actual values	
Component	Value
Tandem pump fuel pressure	3.5 bar@ 1500rpm
Crank sensor pins 1 and 2	450-550 ohms
Air flow sensor pins 2 and earth ignition on	11-14 volts
Injector	0.8-1 ohms
Glowplug	0.5 ohms

scuttle panel will get blocked, then water fills up and overflows; it's possible that it will soak the carpets in the footwells. The fault generally only comes to light after a lot of rain.

First, the drain holes need to be unblocked. We recommend removing the battery to get better access, and a coating of silicone on the bungs can help. If you've caught it early enough,

you might be able to remove the ECU and dry it (try leaving it for a few hours in an airing cupboard), but these are very sensitive units and continued water ingress will rot the interior.

If the trouble has progressed too far, you might have to send the ECU to a specialist and get it repaired, but if a new unit is fitted it will require complete coding to enable it to operate.

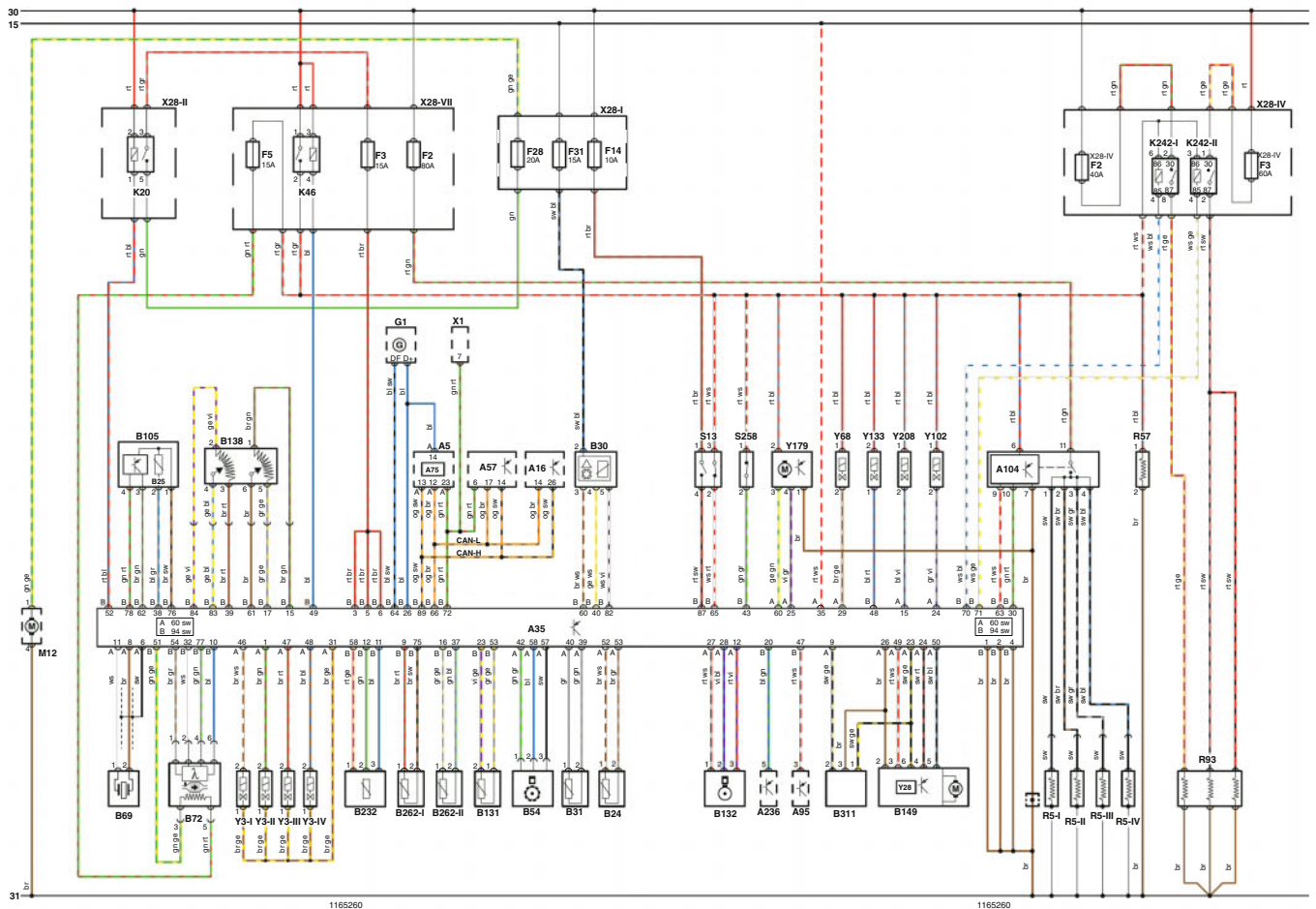
**Fault 4:**

**Faulty dual mass flywheel**

A very common problem across the VAG range is an audible rattle from the rear of the engine, which goes away when the clutch pedal is applied. The fault lies with the dual mass flywheel (DMF). Ensure that the new flywheel is correct in terms of the numbers of teeth, as it needs to be the same as the old unit since the crankshaft sensor takes its pick-up from the flywheel.



# SIEMENS SIMOS PPD 1 CIRCUIT DIAGRAM



CODE	COMPONENT DESCRIPTION
A5	INSTRUMENT PANEL
A16	ABS CONTROL MODULE
A35	ENGINE CONTROL MODULE (ECM)
A57	TRANSMISSION CONTROL MODULE (TCM)
A75	INSTRUMENTATION CONTROL MODULE
A95	ENGINE COOLANT BLOWER MOTOR CONTROL MODULE
A104	GLOW PLUG CONTROL MODULE
A236	STEERING COLUMN FUNCTION CONTROL MODULE
B24	ENGINE COOLANT TEMPERATURE (ECT) SENSOR
B25	INTAKE AIR TEMPERATURE (IAT) SENSOR
B30	MASS AIR FLOW (MAF) SENSOR
B31	FUEL TEMPERATURE SENSOR
B54	CRANKSHAFT POSITION (CKP) SENSOR
B69	KNOCK SENSOR (KS)
B72	HEATED OXYGEN SENSOR (HO2S)
B105	TURBOCHARGER (TC) BOOST PRESSURE SENSOR
B131	EXHAUST GAS TEMPERATURE SENSOR
B132	CAMSHAFT POSITION (CMP) SENSOR
B138	ACCELERATOR PEDAL POSITION (APP) SENSOR
B149	EXHAUST GAS RECIRCULATION (EGR) VALVE POSITION SENSOR
B232	DIESEL PARTICULATE FILTER (DPF) PRESSURE SENSOR
B262-I	DIESEL PARTICULATE FILTER (DPF) TEMPERATURE SENSOR   1
B262-II	DIESEL PARTICULATE FILTER (DPF) TEMPERATURE SENSOR   2

CODE	COMPONENT DESCRIPTION
B311	TURBOCHARGER (TC) WASTEGATE ACTUATOR POSITION SENSOR
CAN-L	CONTROLLER AREA NETWORK (DATA BUS) LOW
CAN-H	CONTROLLER AREA NETWORK (DATA BUS) HIGH
F	FUSE
G1	ALTERNATOR
K20	FUEL PUMP (FP) RELAY
K46	ENGINE CONTROL (EC) RELAY
K242-I	ENGINE COOLANT HEATER RELAY   1
K242-II	ENGINE COOLANT HEATER RELAY   2
M12	FUEL PUMP (FP)
R5-I	GLOW PLUG   1
R5-II	GLOW PLUG   2
R5-III	GLOW PLUG   3
R5-IV	GLOW PLUG   4
R57	CRANKCASE BREATHER HEATER
R93	ENGINE COOLANT HEATER
S13	BRAKE PEDAL POSITION (BPP) SWITCH
S258	CLUTCH PEDAL POSITION (CPP) SWITCH
X1	DATA LINK CONNECTOR (DLC)

CODE	COMPONENT DESCRIPTION
X28-I	FUSEBOX/RELAY PLATE, ENGINE BAY
X28-II	FUSEBOX/RELAY PLATE, ENGINE BAY   1
X28-IV	FUSEBOX/RELAY PLATE, ENGINE BAY   3
X28-VII	FUSEBOX/RELAY PLATE, ENGINE BAY   6
Y3-I	INJECTOR   1
Y3-II	INJECTOR   2
Y3-III	INJECTOR   3
Y3-IV	INJECTOR   4
Y28	EXHAUST GAS RECIRCULATION (EGR) SOLENOID
Y68	TURBOCHARGER (TC) WASTEGATE REGULATING VALVE
Y102	INTAKE MANIFOLD AIR CONTROL SOLENOID
Y133	ENGINE MOUNTING CONTROL SOLENOID
Y179	INTAKE MANIFOLD AIR CONTROL ACTUATOR
Y208	EXHAUST GAS RECIRCULATION (EGR) COOLER BYPASS VALVE
15	IGNITION SWITCH - IGNITION ON
30	BATTERY +
31	BATTERY -

## Useful Preparation Data

- Service interval** Officially every 10,000 miles.
- Air filter renewal** Officially every 20,000 miles.
- Cambelt change** Officially every 40,000 miles or four years.

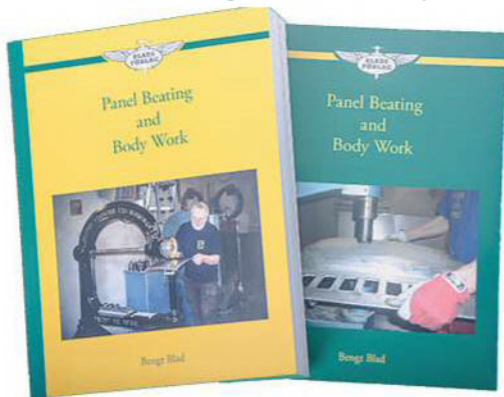
**Engine oil** The official Audi recommendation is to change the oil and filter every 10,000 miles, however renewing them every 5000 miles is preferable.

**Type** SAE 5W40 fully-synthetic oil. **Capacity** 5.2 litres.





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# Our Car

**Martyn Knowles**

Editor

**Y Viva España**



**M**uch money was spent getting our VW Beetle cabriolet in fine fettle, ready for the 2000-mile tour to the northern Spanish resort of San Sebastián. With the post-cat oxygen sensor renewed, the orange MIL was now not glowing and technician Lee, of the Vasstechnik garage in Eastbourne, said: “Jump in – we’ll go for a test drive.”

I was under the impression from way back in my first motoring days that when changing discs and pads you should treat them gently for the first 100 miles to help bed in the pads. Well, that seems to have changed somewhat, because Lee said: “Do you have your seatbelt on?” as we approached the first roundabout. He left the braking to the very last second from 50mph and applied a hefty boot to the brake pedal. That’s how you bed in new brakes now, apparently!

So, I took the Beetle back the few miles home to an excited Sarah, who had her suitcase already packed. The next morning we managed to squeeze all the necessaries into the boot (including a 64-LED Sealey torch, large blue rag, electric tyre pump, spare bulbs, hi-viz jackets and my laptop) and set off to Dover.

The two-hour trip to the port already had me concerned about the driveability

of the 1.6 engine. It didn’t feel right. I thought it best not mention anything to Sarah as we were running late.

We managed to arrive at Dover just in time, only to be told to pull into the Customs checking area. After a quick inspection of the (full) boot, they let us continue to our intended DFDS ferry (very nice clean boat indeed).

Our first port of call was, er, Calais. Seems weird, but if you’re starting a ‘tour’ (as we are doing on Sept 15 – report in a forthcoming issue), it works best to get everyone together for a start-point the following morning. So, at 9am the next day, we set off from Calais. Unfortunately, it was raining, so the electric vinyl roof stayed closed for now.

We had lunch in Honfleur on the Normandy coast before heading to our overnight stay in Rennes. With ‘no tolls’ ticked on our sat-nav from Honfleur, we enjoyed some open-top French-style D-roads. Very pleasant. Except...

## Ooh la la

The Beetle was running no better. The problem was that the engine would get an attack of the hiccups at certain throttle situations; at idle, everything was fine. On the pedal between idle and half-throttle, the hiccupping developed, no matter what gear you were in.

Meanwhile Sarah was enjoying the scenery: “France is lovely isn’t it?”

“Yes, dear.”

“The French dual carriageways are so quiet, aren’t they?”

“Yes, dear.”

“The French do love their wind turbines, don’t they?”

“Yes, dear.”

“Smile! This pic’s going on Facebook.”

“Yes, dear.”

I could feel my blood pressure rising, wondering if the Beetle was going to even make it to Spain, let alone complete the whole round trip. My imagination



My Draper wet vac worked a treat on the carpets and seats. I added Zoflora Disinfectant Citrus Fresh to the mix. Convertible interiors attract dust with the roof lowered and the machine dragged out a lot of dirt. I took out the rear seat base to clean it and found 28p under there. The floor mats I bought from eBay finished off the cabin nicely.



Windbreakers are available to fit into the rear compartment – they ensure less buffeting around the neck area when travelling at speed with the roof down. It was simply a matter of locating the best from eBay. This one cost us £100 including postage, but that didn’t include the storage bag that they can be folded into when not in use.



**What we bought and what we could have bought. Intending to purchase a retro cabriolet, we chose the Beetle over the MINI due to its larger boot, in which we managed to fit two cabin-size suitcases side-by-side with room for a holdall in the middle, plus plenty more room on top of the cases.**

was in overdrive... Had the new Lambda sensor failed already? Was the Throttle Position Sensor (TPS) playing up? Was an injector or coil pack going down?

Then, after 315 miles, it happened: the MIL came back on, keeping company with the illuminated airbag light.

That's when I remembered that I had forgotten to pack my code reader.

At this point, I thought it fair to voice my concerns to Sarah and explain that we might have to make use of motorways as the engine performed as intended at more than half-throttle. Thankfully, we made it to Rennes after a 320-mile drive.

Next day we headed for Bordeaux. All was fine. I could manage the engine foibles by selecting 'neutral' on the manual 'box and coasting in some cases. If you've driven on French D- or N-roads you'll know how great they are, with little traffic. Using the sat-nav, I could tell when the next roundabout was near, selecting 'neutral' and coasting to – and



The original alloys had rusty wheel bolts fitted. I had pre-planned and bought a set of 17mm black plastic wheel nut covers to mask the unsightly bolts – £7.86 delivered from eBay. The centre VW logos were also replaced with copies – these 55mm badges push-fit into place and cost £8 including postage. For around £4 a corner, I had tidied-up the alloys.

## In Martyn's garage

**2005 Renault Clio 1.2** A trade-in, so I presented it to my goddaughter on her 18th birthday. However, she is now 20 years old and still hasn't passed her driving test. The Clio has sat in a lock-up for some time – must drag it out soon and make it roadworthy.

**2004 Audi A8 4.0 TDI V8** Loud ticking in the engine has yet to be resolved, although we now believe it is a leaking injector seal. Sat for months at a VAG specialist garage as repair is needed for an electronic issue with the rear light assembly. On SORN and no MOT.

**2003 Skoda Octavia 1.9 130 PD** Approaching 100,000 miles. Remapped to 195bhp in 2010. Lowered by 30mm.

**1998 Ford Scorpio Ultima 2.3 16v** Got bad press when launched in 1994 and there's still many who dislike the shape of the bug-eyed Ford. I've owned mine since 2008 and 58,000 has clicked up on the odometer. Got a new MOT in August, with no advisories.

**1989 Volkswagen Jetta 1.8 16v** Sat in lock-up since 2005. Failed to start seven years ago – stale fuel and possible fuel pump damage. Need time to collect it and fettle it.

**1974 Ford Capri Ghia 3.0** Bought in 1987. It was original and battered. However, I had the bodywork restored in 1991. Sat for 12 years, then made roadworthy again in 2009. Still needs work and hasn't moved for seven years.



around – the roundabout. At one point we coasted for 1.7 miles along a downhill stretch before hitting the brakes. We made it to Bordeaux just as the sun was setting. Va va vroom!

The following morning we set off for Spain. The road from Bordeaux is non-motorway for most of its length, so I had to endure more engine hiccups and more traffic. However, our 1.6 Beetle made it over the border. Excelente!

After all of the stressful driving, a day exploring the lovely town of San Sebastián was well needed and we set off for home the day after. To cut a long story short, we made it back with a running engine, albeit with the MIL illuminated for 1700 miles.

On our return, the code reader produced a code for a pre-cat oxygen sensor fault. That was renewed at great expense. But even with the MIL out, I can't say the



**Blimey, CM contributor Rob Hawkins has recently bought himself a new mobile – in a very similar hue to our Beetle! I wonder if he wants a cabriolet to go with his phone?**

problem is cured. The hiccuping is still there – and getting more severe – so further investigation is required.

I'd love to talk more about our Beetle experience, including the flexibility of the 1.6 engine and fuel economy figures, but I've run out of space.

Sarah and I enjoyed the open-top experience of touring Europe and we hope to do it again next year.

**Heading back from Spain on the last day, we stopped for lunch in sunny Arras, before the final stretch to Calais.**



The  
**CAR**  
**MECHANICS**

**Good Garage Guide**

This listing is published every six months and will next appear in our **April 2018** issue. We welcome further nominations (from satisfied customers only please, no self-nominations) of businesses to be included, so that we can make this listing as useful as possible to readers throughout Britain and Ireland. Please write to: **Car Mechanics Good Garage Guide, Bauer Media, Lynchwood, Peterborough PE2 6EA.** Or e-mail: **martyn.knowles@bauermedia.co.uk**

## AVON

**Lockleaze Service Station**, Lockleaze Road, Bristol BS7 9RU.

## BERKSHIRE

**Mike Farina Auto Services**, 21 Sedgewell Road, Sonning Common, Nr Reading, Berks RG4 9TA. Tel: 0118 972 4036. *Servicing, repairs.*

## BUCKINGHAMSHIRE

**Stokenchurch Service Centre**, Wycombe Road, Stokenchurch, Bucks HP14 3RR. Tel: 01494 483355. *Servicing, repairs, tuning, MoTs, tyres, tracking, welding, exhausts, batteries.*

## CAMBRIDGESHIRE

**Ellingworth Garage**, 37a Fengate, Peterborough. Tel: 01733 343941. *General servicing and repairs, car & motorcycle MoTs, classic car specialists.*

**G Nice and Sons Ltd**, 3 Chapel Street, Waterbeach, Cambs CB5 9HR. Tel: 01223 860241. *Isuzu specialist, MoT testing, aircon specialists.*

**Kings of Witcham**, The Slade, Witcham, nr Ely, Cambs CB6 2LA. Tel: 01353 778403, email: info@kingsofwitcham.co.uk. *Independent Volvo specialist since 1996. Volvo sales, servicing and parts.*

**Saabmaster**, Unit 7, Robert Davies Court, Nuffield Road, Cambridge CB4 1TP. Tel: 01223 420055. *Independent Saab specialists.*

**Swift Car Care Services**, 145-147 St Pauls Road, Peterborough. Tel: 01733 897080.

## CLEVELAND

**Ron Payne & Son**, Baltic St, Hartlepool TS25 1PS. Tel: 01429 273646.

## CORNWALL

**Ferris Garage Ltd**, Truro TR3 6RE. Tel: 01872 862218.

**M Clark Motors**, Polperro Road, West Looe PL13 2QP. Tel: 01503 265511. *MoTs, servicing, welding, tracking, bodywork, exhausts, batteries.*

## CUMBRIA

**Cleator Moor Auto & Body Repairs Ltd**, Ennerdale Road, Cleator Moor, Cumbria, CA25 5LD. Tel: 01946 811800. *Service is brilliant and the mechanics very knowledgeable.*

**Riverside Garage**, Holmrook, Cumbria CA19 1UH. Tel: 01946 724228. *Friendly helpful and professional service.*

## DERBYSHIRE

**The Service Garage Ltd**, Engineering Services, 51 Derby Rd, Borrowash, Derby DE72 3HA. Tel: 01332 663982 or 677131.

**Walgrove Garage Ltd**, Walgrove Road, Brampton, Chesterfield, Derbyshire S40 2DS. Tel: 01246 278181. *French & VAG specialists. MoTs, tyres and welding.*

## DEVON

**Tuned Auto Repairs**, Newcourt Barton, Clyst Road, Topsham, Exeter EX3 0DB. *Provides excellent customer service at cheap rates.*

## DORSET

**R G Luther and Son**, Knighton Garage, 140 Magna Rd, Bear Wood, Bournemouth BH11 9NB. Tel: 01202 573404.

## DURHAM

**Skipbridge Garage**, Hurworth Moor, Darlington, County Durham DL2 1QL. Tel: 01325 720498.

## ESSEX

**Bennetts BMW Specialists**, Unit 1, Haltgate House, Hullbridge Road, South Woodham Ferrers, Chelmsford, Essex CM3 5NG. Tel: 01245 328601, **www.bennettsbmw.co.uk** *BMW specialists, also all-makes repairs and servicing.*

**D & A Autos**, Unit 1A, Pools Lane, Highwood, Chelmsford, Essex CM1 3QL. Tel: 01245 248317

**Frank Shaikley and Sons**, Hawkins Road, The Hythe, Colchester, Essex CO2 8JY. Tel: 01206 796657.

**Halfway Garage**, behind Frinton Gate Motors, Colchester Road, Tendingr, Essex CO16 9AA. Tel: 01255 831285. *Service, repairs, MoTs incl motorbikes.*

**Motorvation 2000**, Unit 13 Stondon Road, Hallsford Bridge Ind Est, Ongar, Essex CM5 9RB. Tel: 01277 364241. *Engine rebuilds, MoT, servicing, electrics.*

**Oakdene Autos**, Daniels Farm, Wash Rd, Laindon, Essex SS15 4AZ. Tel: 01268 280909. **www.oakdeneautos.co.uk** *Bodywork, welding and all MoT and servicing work.*

**Pristine Bodyworks/RR Automotive**, Scaldhurst Farm, Larkhill Road, Ashington, Essex SS4 3RU. Tel: 01702, 257177. *Family run - one brother handles mechanical work, the other bodywork.*

## GLOUCESTERSHIRE

**Stonehouse Exhaust**, Unit 1, Orchard Place, Stonehouse, Gloucestershire. Tel: 01453 822971. *Excellent garage. Good old fashioned service!*

## HAMPSHIRE

**Keylink Systems Ltd.**, 15/16 The Calvert Centre, Woodmancott, Winchester SO21 3BN. Tel: 01256 379150. *Mercedes/BMW specialists but will take care of anything.*

**SJB Autotech**, Unit 3, Beresford Centre, Wade Road, Basingstoke RG24 8FA. Tel: 01256 477 411. **www.sjbautotech.co.uk.** *Jim, the owner, is extremely experienced with the VAG range.*

**Wes & Co**, Shootash Garage, Salisbury Road, Romsey, Hants SO51 6GA. Tel: 01794 515003. *Full MoT station, all makes servicing.*

## HEREFORDSHIRE

**DC Rogers Auto Repairs**, Unit 11, Beech Business Park, Tillington Road, Hereford HR4 9QJ. Tel: 01432 264200.

## HERTFORDSHIRE

**Broxbourne MoT and Motorist**, Unit 1, Bridge Works, Nazing New Road, Broxbourne, Herts EN10 6SG.

## KENT

**Andrews Garage**, Plain Road, Smeeth, Ashford TN25 6RA. Tel: 01303 813455.

**Bexley Lane Garage**, 33-47 Bexley Lane, Crayford DA1 4DD. Tel: 01322 527279. **www.bexleylanegarage.co.uk** *Lockheed Authorised Brake Safety Centre, MoTs, servicing.*

**Chelsfield Motor Works**, Court Lodge Farm, Warren Road, Orpington BR6 6ER. Tel: 01689 890689. *Mechanical repairs, MoTs, bodywork, aircon, diagnostics.*

**Hartley Garage Services Ltd**,

Ash Road, Longfield DA3 8EL. Tel: 01474 706501. *All usual garage services plus MoTs and aircon.*

**Ivydene Garage Ltd**, Unit 99, Ellingham Way, Ellingham Ind. Est., Ashford TN23 6LZ. Tel: 01233 636081. *Mechanical repairs, servicing all makes, MoTs, aircon, Bosch diagnostics. OFT-approved garage.*

**Modesty Motors**, Modest Corner, Tunbridge Wells TN4 0LS. Tel: 01892 539274. *Servicing, MoT preparation, welding & restoration work.*

## LEICESTERSHIRE & RUTLAND

**Broad Street Garage**, The Old Forge, Brook St, Enderby, Leicester LE19 4ND. Tel: 0116 286 1416.

**Tarsel Motors Ltd**, 173 Church Hill Road, Thurmaston, Leicester LE4 8DH. Tel: 0116 693333.

**J. T. Tilley and Son**, 3 Lutterworth Road, Burbage, Hinckley, Leics LE10 2DJ. Tel: 01455 239303.

## LINCOLNSHIRE

**Corten Miller Performance Centre**, Friskney Eaudyke, Skegness, Lincs. *Very knowledgeable highly-skilled staff.*

**Derek Chapman Motor Services**, 13 High Street, Alford, Lincolnshire. Tel: 01507 462571. *An excellent and friendly garage and bodyshop.*

**G Harnies (Louth) Ltd**, Bolingbroke Road, Fairfield Industrial Estate, Louth LN11 0WA. Tel: 01507 603341.

**Huttoft Service Station**, Main Road, Huttoft, Lincs LN13 9RF. Tel: 01507 490283. *Village garage with all usual repair facilities plus LPG stockists.*

**WH Brand and Son**, Whaplode Drive, nr Spalding, Lincs. Tel: 01406 330265. *Daewoo/Chevrolet franchise and independent MG Rover specialists.*

## LONDON (GREATER)

**Barnet Service & Tuning Centre**, 1 Motor Way, Margaret Rd, New Barnet, Herts EN4 8DW. Tel: 020 8441 6667. *All usual garage services plus MoT testing.*

**GAL Car Repairs**, Rear of 129 Kingsway, Mortlake, London SW14 7HN. Tel: 020 8878 3478. **www.galcars.co.uk.** *Good garage, servicing, clutches, brakes.*

**P & S Carriage Ltd**, (t/a Hopfields Auto Repairs) 2-10 Raymouth Road, South Bermondsey, London SE16 2DB. Tel: 020 7237 2140. *MoTs and servicing.*

**Pit Start Garage**, Standard Way, Park Royal, London. Tel: 020 8827 1919. *Completed my own servicing, as well as giving them my 205 GTi head gasket job.*

## NORFOLK

**Herring and Palmer**, Hewett Yard, Hall Road, Norwich. Tel: 01603 666585. *BMW specialists, all makes catered for.*

**Threeways Garage**, Watton Road, Siphham, Norfolk IP25 7PE. Tel: 01362 820430. *Independent Citroën specialist, also repairs/services other makes. MoTs.*

**S & R Motors**, Sunset Lodge Industrial Units, St. Germans, Kings Lynn. Tel: 01553 617696 or 07788 268121. *Run by Steve Smith. Service is excellent. Nothing is ever too much trouble.*

**Stone Chips Ltd**, 12 Garden Street, Norwich NR1 1QU. *Minor paintwork repairs, bumpers, etc. Valeting, interior repairs, alloy refurbishment.*

## NORTHAMPTONSHIRE

**Rob Price Automotive Services**, 146 Northampton Road, Broughton, Kettering, Northants NN14 1NS. Tel: 01536 790901.

## NORTHUMBERLAND

**JT Auto Services**, The Old Works, Red Row, Morpeth, Northumberland NE61 5AU. Tel: 01670 761711. *Repairs, servicing.*

## NOTTS

**PVS (Professional Vehicle Servicing)**, Glandsdale Drive, Nottingham NG8 4GY. Tel: 0115 928 3333. *Repairs, servicing, reasonable prices, helpful staff.*

## OXFORDSHIRE

**Oxford Autogas**, Tiddington Garage, London Road, Milton Common/Tiddington, Oxon OX9 2NU. Tel: 01844 279588. **www.oxfordautogas.com** *LPG installation and servicing. MoT, service and repairs.*

## SHROPSHIRE

**Bridgnorth Motor Services**, Station Lane, Hollybush Road, Bridgnorth, Shropshire WV16 5DP. Tel: 01746 762562 or 07708 167346. *Mark is an ex-Ford mechanic & seems very experienced.*

## SOMERSET

**Hatley Garage**, 86 Kewstoke Road, Kewstoke, Weston-super-Mare, North Somerset BS22 9YH. Tel: 01934 622495. *A family run garage, specialising in classic Mini's. They cover all aspects of repairs, servicing, bodywork and MoTs.*

## STAFFORDSHIRE

**Midland VW**, 21 Conduit Road, Norton Canes, Cannock, Staffs WS11 9TJ. Tel: 01543 495700. [www.midlandvw.com](http://www.midlandvw.com)

**Snows Garage (Hanley) Ltd**, 706 Leek Road, Hanley, Stoke-on-Trent, Staffs ST1 4NP. Tel: 01782 215544.

**Squire Automotive**, Unit 2A Zone 2 Ring Road, Burntwood Business Park, Burntwood, Staffs WS7 3JQ. Tel: 01543 672247. [www.squireautomotive.co.uk](http://www.squireautomotive.co.uk)

## SUFFOLK

**Barrett-Lee Ltd**, 4 Byford Road, Sudbury, Suffolk CO10 2YG. Tel: 01787 468900. *Former Rover MD.*

## SUSSEX

**Coles Automotive**, Browns Meadow, Edburton Road, Edburton, Henfield, West Sussex BN5 9LN. Tel: 01273 857520.

[www.colesautomotive.co.uk](http://www.colesautomotive.co.uk)  
*Blackcircles tyre fitting station and Land Rover ralliers.*

**Cradle Hill Motors**, Unit 16, Cradle Hill Industrial Estate, Seaford, East Sussex. Tel: 01323 890737.

**Rew Auto Services**, Unit 13, Eastmead Industrial Estate, Lavant, Chichester, West Sussex PO18 0DB. Tel: 01243 839520.

## SURREY

**BM Motors**, Unit 18, 193 Garth Rd. Morden, Surrey. Tel: 0208 337 6006.

**Elmwood TVR Fix**, Pinewood Place, Ewell, Surrey. Tel: 020 8394 2847. [www.tvrfix.com](http://www.tvrfix.com) *TVR specialists, also work on all makes of car.*

## TYNE & WEAR

**Gavin Reed Ltd**, Sunnyside Garage, Front Street, Sunnyside, Newcastle-Upon-Tyne NE16 5EE. Tel: 0191 488 7298. *MoT, service and repair.*

**Scotts Bank Motor Services**, Scotts Bank, Southwick, Sunderland. Tel: 0191 549 7500. *Volvo-trained, also general repairs and servicing.*

## WEST MIDLANDS

**Cottage Garage**, Brandon Way, West Bromwich B70 9PW. Tel: 0121 525 4413.

**GW Motors**, 172 Sockfield Road, Acocks Green, Birmingham B27 6AU. Tel: 0121 706 2327 or 0121 706 4770. *Family-owned and "friendly, helpful and no bullshit."*

**Motorhoist Self-Service Garage**, Unit 19, Meeting Lane Industrial Estate, Meeting Lane, Brierley Hill DY5 3LB. [www.motorhoist.co.uk](http://www.motorhoist.co.uk)

*Hire a ramp/tools to do your own repairs.*

## WILTSHIRE

**Melksham CarCare Centre**, Bath Road, Melksham, Wilts SN12 8DB. Tel: 01225 703014.

## WORCESTERSHIRE

**RK Services**, Lower Leys, Evesham, Worcestershire WR11 3AB. Tel: 01386 48935. [www.rkservices.com](http://www.rkservices.com)  
*A small family run business.*

## YORKSHIRE

**Harry Robshaws and Sons**, Glebe Street, Castleford, West Yorks WF10 4AL. Tel: 01977 554238.

**Pure Car Mechanics**, Westgate Carr Business Park, Westgate Carr Road, Pickering, North Yorkshire YO18 8LX. Tel: 01751 475794.

[www.purecarmechanics.co.uk](http://www.purecarmechanics.co.uk)  
*Kevin runs this garage with his partner, Angie, and they do a fantastic job. The garage is female-friendly.*

**RTM Motor Services**, 11 Waggon's Way, Stainforth, Doncaster, South Yorks. Tel: 01302 351167.

*Peugeot/Citroën specialist, spares, repairs and servicing. On-site cylinderhead pressure testing.*

**W Sykes & Son Ltd**, Low Wortley, Leeds LS12 6AB. Tel: 0113 263 9388. *MoTs, servicing and repairs. Good mechanics, small family garage.*

**Yorkshire vehicles 24-7**, Unit 5 Sunshine Mills, Leeds LS12 3HT. Tel: 0113 318 5259.

[www.yorkshirevehicles24-7.co.uk](http://www.yorkshirevehicles24-7.co.uk)

## NORTHERN IRELAND

**CC Motors**, Unit 6A, Keeburn Industrial Estate, 61 Woodburn Road, Carrickfergus BT38 8HQ. Tel: 028 9336 4050.

*An excellent father and son operation.*  
[www.cc-motors.co.uk](http://www.cc-motors.co.uk)

**T.F. Cars (Tommy Fegan)**, Motor Engineers, 35-39 Parkmount Road, Antrim Road, Belfast BT15 4EQ. Tel: 028 9037 1868. *An excellent father and son outfit, doing mechanical and MoT work at very reasonable rates.*

## SCOTLAND

**Lewiston Garage**, J A Menzies & Sons Ltd., Lewiston, Drumnadrochit, Inverness IV63 6UL. Tel: 01456 450212. *Good village garage with all usual repair facilities, MoTs. Excellent and helpful.*

**Lothian Motors**, 68 Lothian Street, Bonnyrigg, Midlothian EH19 3AQ. Tel: 0131 663 1076. *Family-run, electronic and aircon repairs, servicing and MoT.*

**The Garage (Wishaw) Ltd**, 70A Elison Court, Motherwell, Scotland ML1 2DN. Tel: 01698 265303. *Japanese performance specialist. MoTs, mechanical repair (all makes) & servicing, aircon, Excellent vehicle diagnostic capability.*

## WALES

**MB Motors**, Cowbridge Rd, Brynsadler, Pontyclun, Mid Glamorgan CF72 9BT. Tel: 01443 229522.

**The Olde Pounds Garage**, Penperlleni near Pontypool. Tel: 01873 880312. *MoTs, plus general repairs/maintenance.*

**Three Arches Services Ltd**, Heathwood Road, Cardiff CF14 4HT. Tel: 02920 752101.

## IRELAND

**Harkin's Garage**, Gleneely, nr Carndonagh, Co Donegal, Ireland. *Father/son operation. Workshop covering all types of automotive operations.*

This listing is provided as a reader service and based on recommendations and information supplied by Car Mechanics readers. We have not ourselves visited, used or in any way tested the companies listed, and as always, potential customers must make their own enquiries and decisions. While every care has been taken in the compilation of this list, Car Mechanics and Bauer Media cannot accept responsibility for the actions of any of the companies listed here, nor can we become involved in any disputes between readers and companies on this list, though reports – good and bad – are always welcome. We would also appreciate being told if readers discover any garages listed here are no longer trading so we can verify this and, if appropriate, remove their entry.



# NEXT MONTH PASS THE MOT



**NOVEMBER 2017  
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## Ford Focus Zetec cambelt change

- Toyota RAV4 DIY service
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## Brake vacuum pump renewed

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Car Mechanics offers a **FREE** classified service **FOR PRIVATE SELLERS ONLY** who want to sell-on their **UNWANTED CARS** and **PARTS**, or for those who need a specific item.

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BY POST: **Martyn Knowles, Car Mechanics, Bauer Consumer Media Ltd, Media House, Lynchwood, Peterborough PE2 6EA.**



## CARS FOR SALE



**LAST OF FORD ESCORT Mk4.** H-reg. 1990. Timewarp interior, rear probably never sat in. 1.3 petrol. 5-door. Manual. Metallic paint. Prices will rise. Low miles. Long MOT. Some history. Recent service. Over £1000 spent. 2 owner in 27 years. Hatch fiddly opening. **£1700.** Tel: **07496 028542.** London.

**MG TF.** Spares or repair. **£150.** Tel: **07593 773001.** Drayton.



**ROVER 75.** 1999. Connoisseur V6 auto. All work completed to make sure the next owner has no problems – new exhaust, tyres, all brake discs and pads, springs droplinks. MOT till Oct. Priced to sell **£875.** Tel: **07453 530355.** Llandudno.

**ROVER 75 DIESEL ESTATE 2003.** BMW diesel engine, VGC, never had a towbar, 9 months MoT. Please call for more info. **£795** ono. Tel: **07548 762725.** Cornwall.



**ROVER 25 IMPRESSION S2.** 2002-reg. Silver, 2-door. Only 26,000 miles from new. CD player, electric windows, aircon. 1 previous lady owner. Interior & engine room like new. Good all round condition with no issues and totally reliable. MOT to April 2018. Handbook & part service history. Now surplus to requirements having moved house. Ideal for a first car or learner. **£550** ovno. Tel: Ann on **01430 861636** or email: [karlsheridan123@btinternet.com](mailto:karlsheridan123@btinternet.com)

## GARAGE KIT



**CRYPTON 290 4 GAS ANALYSER.** Good working order and condition. Manual included. Recent checkover by ex-Crypton engineer. **£300.** Buyer to collect from Dorset. Tel: **01929 425564** or **07511 57690.** Dorset.

**MELCO CR3 CAR RAMPS.** Capacity 2000kg per pair. These have longer shallow rise set for low-fronted cars. Ramp size: L: 51in x W: 9in. **£85** ono. Buyer to collect (heavy). Tel: **01572 756321.** Rutland.



**PICOSCOPE 4423.** 4 channel oscilloscope automotive diagnostic kit with Picoscope 6 diagnostics. Includes user manual/DVD and posters. Never used in commercial workshop environment. DIY only. Most of kit never used. Excellent condition. **£695.** Buyer collects. Tel: **07711 834919.** Glasgow.

## PARTS FOR SALE

**BRAND NEW STEEL WHEEL.** Tyre 165/70/14. Fits VW Up! **£35.** Pencil type ignition coil for Renault 16-valve **£10** new. Vauxhall tyre repair kit – new **£15.** Buyer collects. Tel: **01536 484228.** Kettering.



**JAGUAR XF** 17in wheels and winter tyres x 5. Libra alloys in overall good condition, odd bit of lacquer lifting on a couple of them plus the odd mark. 4 tyres are Nokian WR A3 with at least 5.5mm of tread. 1 tyre is Hankook Winter i\*cept with 7.5mm tread (like new). Tyres are all 235/55/R17 103V. **£450** ono. Tel: **07592 621131.** Chorley, Lancashire.

**AUDI COUPE BODY PANELS.** Off a Coupé B4 2.0 16v in white 93-94 L-reg. Bonnet **£40**, tailgate with glass and wiper assy **£50.** O/S drivers door with glass **£50.** O/SF wing **£20.** Or **£150** the lot. All in good condition + various bits of trim I will throw in. Tel: **07879 072734.** Suffolk.

**ROTEX W2500.** M+S winter tyres 195/65 R15 91T. Only done 1600 miles. Four for **£55.** Tel: **02380 846617.** Southampton.

**RENAULT MEGANE 1 (1995-2002).** Various parts available, many as near as new, with only 500 miles or so of use. Please contact for a full breakdown of spare parts and prices. Tel: **07910 062787** or **01633 213460.** South Wales.

## BOOKS

**CAR REPAIR BOOKS.** 1978-82 collection. 140 parts in binders, published by Marshal Cavendish. Binders called 'On The Road' Step-by-Step Guide for car repairs 1980s style. For collection only. Offers. Tel: **07754 605021.** Sheffield.

**CLASSIFIED DEADLINE FOR NOVEMBER 2017 ISSUE: October 3**

# GUIDE TO THE DEFENDER



This all-new third edition of the guide to the Defender includes fantastic vehicles from the pilot-production One Ten to the 90 that inspired the final Defender, together with a guide to buying your dream Land Rover, rebuilds to inspire you and upgrades to help you improve your Defender and keep it for ever!

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# Ted Connolly



Ted goes to a car show and finds out how the other half lives.

## The peasants are revolting

▶ THERE is an elite band of people in the world who belong to a club called 'the other half'. I've never met any of them and I am not entirely sure who they are. But they do exist. I know this because I have very often heard the phrase 'how the other half lives'. Apparently, they swan around in some sort of fantasy existence in which anything less than a 10-bedroom house is a shack, everybody is called 'daahling' and their idea of a hard day is searching for a parking spot near Harrods or paying the monthly botox bill.

Their neighbourhood is so posh that the fire brigade is ex-directory, and when they write a cheque, the bank bounces. Just who are these people? And where on earth do they get their money? It's a kind of mind-boggling thing for me, because I am honest and realistic enough to admit that I am a peasant. I have always been one and always will.

It came home to me quite plainly a little while ago when I visited a car show. It was at a rather posh venue and split into several sections. The main bit was for the usual stuff – classic tinware ranging from Austin Sevens to sporting Fords from the 1970s – and there were a couple of areas roped off. In one section sat four cars, namely, two McLaren F1s and a pair of Lamborghinis. The McLarens I was able to recognise, but the Lambos threw me a bit, because unless you are an aficionado, it's hard to tell them apart (for me, anyhow), but they looked like Murciélagos. All highly impressive stuff. A super-smoothie fella was sitting in the seat of one of the McLarens with the



*'A quick calculation told me I was gawping at £6 million in metal, leather and rubber'*

engine ticking over. Every now and then, he'd briefly floor the throttle, just to let everybody know what was going on under the skin. I have been in and around cars for a very long time, but I have never, ever heard a noise of its type or equal. It was almost violent in its manifestation. Just pure brute power shouting through four rather large tailpipes.

Every one of the four cars was an easy 200mph device and truly astonishing to behold. The Lambos reminded me of the time in the mid-1970s when I first saw one of the Italian exotcars, the Countach. It wasn't Lamborghini's initial offering, but the one that really started it all. Like every car from the company, its name was derived from bullfighting, either a matador, sword or bull (I will not comment on this so-called sport on the basis that my views on the deserved fate of the people involved would probably see me dragged before the European Court of Human Rights). The word Countach is said by some to be little more than an expletive, but translated politely, it means something like 'look at that!' It would be interesting to walk through

the streets of Italy, shout out 'Countach!' and then explain to a bloke that you were not referring to his wife, but a passing sports car.

Anyhow, my fertile imagination at the show let my mind wander to even more indulgent machinery. The Bugatti Veyron, for example, blew the motoring world apart with its 250mph top speed. Something special had to follow that and it was the Chiron. Read and digest these facts and figures: 8.0 litres, W16 (that's a couple of V8s chucked together), close on 1450bhp, 0-60 in under 2.5 seconds, 120mph in under 6.5 seconds and a 261mph top speed. That's electronically limited, by the way – take off the shackles and it will see close on 290mph. Bugatti say the top speed is electronically limited for safety reasons, but I reckon that's somewhat academic. After all, how safe can you be after 261mph? As for the price, well, it's comfortably over £2 million. Just who are these other halves who live in this world?

A couple of hundred yards away, it was back to reality (reality in the sense that I am now referring to actual events, rather than my mind-wanderings), with

another area inhabited purely by Aston Martins – an absolutely splendid line-up, mostly DB4s and 5s with one V8 and a couple of convertibles. The 4s and 5s have an incredible kudos and, partly because of James Bond's exploits, are immensely attractive to collectors. A quick calculation told me that I was gawping at about £6 million in steel, aluminium, wood, leather and rubber. There was nobody around to chat to, probably because the owners of such automotive jewellery would not be seen mixing with mere peasants (especially a rather flaccid, greying and gawping one).

The answer as to who actually owns such machinery came a while back when there were reports in the motoring press of Rowan Atkinson flogging his McLaren after a prang. He paid about half-a-million quid for it new, did some damage and the insurance company forked out a million quid for its repair. He subsequently sold it at auction for £8 million. Those sorts of figures are quite difficult to even type, let alone comprehend. Then again, I am not a member of 'the other half'.

You can see, perhaps, why Wat Tyler led the Peasants' Revolt of 1381. He was obviously fed up with being the underdog (as an aside, for years, I thought Wat Tyler was a consumer magazine for roofers – hmmm). And I admit it was a sort of coming-down when the considerably better half (I said better, not other) and I traipsed back to the Connolly Morris Minor, fired her up and accelerated from 0-30 in a time best recorded by the squares on a calendar. But it kind of felt good getting back to the real world. No punchline – it just felt good.

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