JAN/FEB 24

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»» Challenge yourself!

autotech 2024 campaign preview


21


25


30


33

IN THIS ISSUE »» LIGHTING »» BATTERIES »» CLUTCHES »» STEERING & SUSPENSION

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Welcome to the first issue of 2024!

Several awards concluded their deliberations before the festive break and we congratulate the winners of the Motor Ombudsman's Garage Star Awards and IMI Skills from page 6. For those looking to have their achievements recognised in 2024, you still have time to enter the Independent Garage Association's British Independent Garage of the Year Awards – check out the News pages to find out more.

We launch our 2024 **autotech** campaign in the upcoming printed March issue of **autotechnician**, with a new online assessment, ongoing practical advice, plus the Workshop Takeover training event in June. If you don't already receive a printed copy in the post, and would like to, provide your **workshop info here** to subscribe for your free mag.

Within this issue, we provide insights, product news and best practice across lighting, batteries & chargers, clutches, and steering & suspension. Plus, look out for a case study from young Des of Top Gear Motor Services.

Here's to a successful year in work and play!



Nicola St Clair
Editor
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P4 Industry News

P8 Autotech 2024 Preview

P10 Bosch KTS guide: Actual Value Analysis

P16 Case Study: Misfiring Mokka

P21 Lighting opportunities

P25 Batteries – Pulling in the power

P30 Clutches – Reaching for the extras

P33 Steering & Suspension repairs

P40 Parts, Tools & Tips

Subscription to the magazine is free to those who fulfil the publisher's criteria. UK independent workshops can subscribe at **www.autotechnician.co.uk/subscribe**. Nine issues will be published throughout 2024 and will be mailed out free of charge to qualifying readers - you must work in a UK independent workshop, have buying responsibility and reside in the UK. Those who do not meet the qualifying criteria can request to receive a link to the digital issue free of charge or can opt to pay £25 for an annual subscription to receive an issue in the post.

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Is it your time to shine?

Entries are open for the Independent Garage Association's (IGA) British Independent Garage of the Year Awards 2024 – celebrating the best in the independent aftermarket industry.

The award categories are diverse and recognise excellence within workshops and also their suppliers. Awards celebrate the Best Newcomer, Innovation, Customer Service, Marketing Strategy, Specialists, Training & Development and many more areas.

Stuart James, IGA Chief Executive, comments: "The BIG Awards are a chance to showcase the dedication and excellence that makes our industry great. This is an exciting opportunity for businesses and individuals within the UK independent automotive sector to step into the spotlight and be recognised for their contributions to keeping the UK moving. We look forward to a night honouring innovation, commitment, and the exceptional talent that shapes the independent automotive sector."

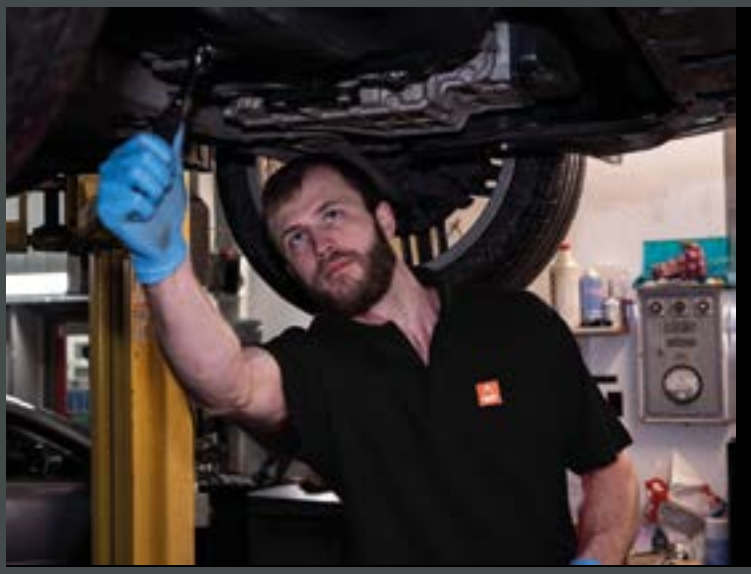
Click here to enter The BIG Awards 2024!

Freelancing with added security

Autotech Recruit, who operate the automotive industry's largest contractor network, introduces a new pathway so that skilled technicians and MOT testers can experience the benefits of freelancing.

The recent cuts to National Insurance contributions for self-employed workers and the continued demand for temporary staff may influence those considering the transition to working freelance but Autotech Recruit appreciates the reservations people may have. In response, it has introduced ATech and ATester – where skilled techs and MOT testers are employed directly by Autotech Recruit so people can enjoy the benefits of full-time employment but with the freedom to work across various clients, like those within its contractor network.

Its first ATech joined in early 2023 as a full-time employee but has since taken the contractor route due to the work/life balance and financial opportunities available. "I would encourage anyone, particularly those who left the industry during the pandemic, to try this route. The



industry desperately needs more people and if they are wary of becoming a contractor, especially in a cost-of-living crisis where everyone needs reassurance that they will receive enough money each month to pay the bills, then the ATech route is ideal for dipping their toe in the water before taking the plunge."

2023 IMI Skills winners revealed

Following a year-long process, 23 winners and runners-up have been revealed by the Institute of the Motor Industry across the four categories of the Skills Competition: Light Vehicle Technology, Body Repair, Refinishing and Heavy Vehicle. Finalists may now move forward to the World Skills International competition in Lyon, September 2024.

"Despite the ongoing challenges across the sector, the IMI Skills Competition has been a huge success once again, highlighting some extraordinary talent from across the UK," said Richard Hutchins, Competitions Manager at the Institute of the Motor Industry. "As an organisation committed to fostering equality, diversity, inclusion and belonging within the automotive industry, we are hugely encouraged by the increasing diversity of the nominees in recent years. The example these individuals set helps demonstrate that this industry has many roles suitable for those with physical and non-visible disabilities which may not be the general perception outside the sector."

Congratulations to all the winners. The following excelled in the Light Vehicle category:

GOLD: Oliver Young, J&R Auto Services, Perth UHI

SILVER: Ryan Cullen, AL Services, Southwest College

BRONZE: Elliot Ritchie, Western Mazda, Calex UK

HIGHLY COMMENDED: Jack Johnston, J&R Auto Services, Perth UHI

RUNNER UP: Aaron Powell, J&J Motors, Bosch Training Centre

RUNNER UP: Ashley Hursley, Audi Approved Colchester, Volkswagen Group National Learning Centre.

The full list of winners can be found at https://tide.theimi.org.uk/industry-latest/news/2023-imi-skills-competition-winners-announced

Garage network welcomes 1,000th member

The AutoCare garage programme, a nationwide network of independent family-run workshops, has welcomed it's 1,000th member EA Mitchinson Station Garage & MOT Centre in Staveley, Kendal.

"We are thrilled to welcome E A Mitchinson Station Garage & MOT Centre to the AutoCare Garage Network," said Maria McCullough, Autocare Garage Networks Manager. "Their commitment to providing high-quality service aligns perfectly with our values, and we are excited to work together to bring our customers the best possible experience."



AutoCare Garages connects drivers with garages that are vetted and approved to meet high standards of service and professionalism. The network offers a wide range of services, including MOTs, servicing, repairs, and diagnostics.

www.autocaregarages.co.uk



Winners of Star Awards revealed

Luke Laurence, Sales Executive at Crown Suzuki in Hendon, North London, became the first individual to win The Motor Ombudsman's National Garage Star Award.

3,186 online nominations were received from aftermarket customers across the UK, highlighting how a business or individual had gone above and beyond to assist them. A shortlist of 24 contenders were then passed to a judging panel to deliberate the regional winners. Four individuals at separate dealerships, two car showrooms and two independent garages emerged as this year's winners. They included Luke Laurence in the southern region, who went above and beyond during the purchase of a vehicle by a customer who had recently moved from another country.



The customer's nomination for Luke, *pictured right*, unanimously caught the attention of the panel and resulted in winning the overall title of National Garage Star. He received £1,000 in high street vouchers and his trophy at the Trading Standards Institute's Hero Awards ceremony at the Houses of Parliament back in November.

Two independent garages were crowned regional winners in the 2023 awards. Garej Arwyn, pictured above right, won the Welsh region accolade. Established in 2004 by Arwyn Hughes (Director) the garage has grown to 24 staff members, operating 13 ramps. The garage offers a wide range of services including dealer level diagnostics and servicing, tyres (onsite & mobile) and recovery services. They have also opened a dedicated tuning workshop, complete with a dynamometer (AGT Performance). We asked Accounts Manager Martin Hill what differentiated their garage from their local competitors: "The main thing that sets us apart is our investment in new diagnostic equipment & specialist tools, which allows us to be able to work on a wide range of vehicles. We also have a fleet of over 30 courtesy cars available free of charge to our customers."

Martin continued: "We were nominated [for The Garage Star Awards] for assisting a customer out of hours late on a Sunday evening after their vehicle broke down and providing a courtesy car to allow their safe return home. After being a finalist in the IGA Independent Garage of the year Award in 2022, and the NTDA Tyre Retailer of the year awards in 2023, winning this award means a lot to the whole team, and is a testament to the hard work our Director Arwyn has put into building the business over the years."



The team at Garej Arwyn

Returning winners

Cadley Garage have become winners of the West region for the second time, after also winning the trophy in 2021. They have been highly commended in 2020 and 2022. Cadley Garage has been a workshop since the late 1800's and has operated as an independent garage from 1931. Owner Jon Horsley says: "We have six staff and specialise in Jaguar, Land Rover, Mini and Volvo. We work on early vintage and classic cars up to brand new cars, so pretty much cover everything. We offer all the normal servicing, MOT tests and repairs with state-of-the-art, four-wheel alignment, all types of air conditioning work and full diagnostics, we are also able to carry out fabrication work."

How do they stand out from the competition? Jon explains: "We can deal with customers in a way that they all relate to, so we tailor our approach to each individual. We run an Offset Alliance Campaign (OAC) which sees us pledge to plant a tree in local community spaces to offset their carbon footprint and currently have either planted or pledged to plant 4,892 trees as of November 2023. Since 2015, I have been involved with the Bloodhound LSR project, which is now actively seeking funding to run a fossil-free land speed record with the opportunity to have a new driver. With my other hat on, I work on the council at Beaulieu national motor museum with the 100 club."

Why did a customer nominate them for the award? They re-arranged their fully booked schedule to help a customer last minute, so they could deal with a family emergency. "Since the award started in 2020, we have been finalists every year – we find this very humbling, and to win our region in 2021 and 2023 is an amazing thing to happen. Our customers obviously are happy with what we do and trust us to look after them and their pride and joys."

www.themotorombudsman.org/awards



Jon Horsley (centre) with Bloodhound

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Supporting independent workshops and technicians *who want to improve their technical abilities and invest in their futures*

The Autotech campaign helps independent technicians and workshops across the UK improve their skills, learn best practices and achieve technical excellence through free, online assessments, the Workshop Takeover live training event and editorial content from the industry's experts throughout the year.

Test your technical knowledge at your own pace

There are more than a dozen online multiple-choice assessments available, created to test technical knowledge and diagnostic procedures, by logging on or quickly registering at **www.autotechnician.co.uk/ registration/**.

Why not try Test 7, that consists of fifteen questions designed to test your knowledge of LIN Bus systems and your ability to analyse the data and waveforms provided to draw diagnostic conclusions.

Test 13 teases SCR system knowledge from users and presents the case of a VW Crafter fitted with an SCR System, which has an illuminated AdBlue Malfunction Indicator, presenting code 'P202A - Reductant Tank Heating 2 circuit -open circuit' in the Engine Computer memory.

Test 16 is a logic check for the real-world fault assessments happening in workshops up and down the land. Questions centre around a real fault to fix scenario where a customer presents an Audi A3 2005 8P model with several faults present.

Get free lifetime access to the full library simply by logging in or registering, by filling out a few details, at www.autotechnician.co.uk/ registration/.



Hands-on fault guidance



As part of our **autotech** campaign, independent technicians are invited to the next Workshop Takeover at Cleevely EV, Cheltenham on **Saturday 15th June 2024**, to gain practical advice on fault-finding across various systems and to hang out with like-minded guests and trainers who want to share their tips honed over many years of training and head scratching!

The hands-on sessions with live faults within the workshop are guaranteed to get your diagnostic mojo flowing!

Independent garage owners Andy Crook and Gareth Davies will once again engage small groups in practical sessions within Matt Cleevely's fantastic workshop. Topics and full line-up to be confirmed.

A limited number of subsidised tickets are available to purchase online here. A small number of additional tickets will be available a month before the event.



Welcome to the seventh bitesize guide in our series of tips to help your workshop maximise the potential of ***Bosch ESI[tronic] 2.0*** *software*

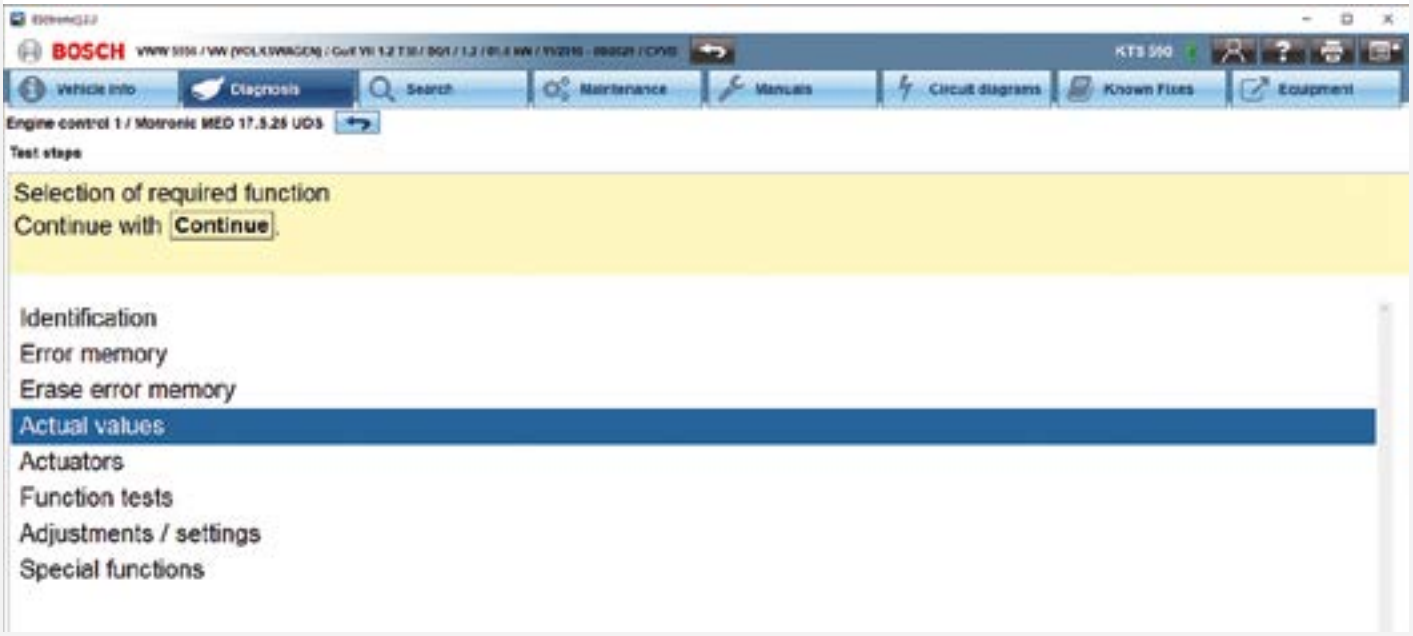


Figure 1

KTS Diagnostics: Lesson 7 ACCESSING ACTUAL VALUE ANALYSIS, TIME PROFILE AND DATA RECORDING

ACCURATELY EVALUATING ACTUAL VALUES

In the previous lesson, we explored the comprehensive and reliable library of official original manufacturer manuals and technical diagrams. Today, we will take a closer look at the benefits available when evaluating the 'Actual values' of a system. An essential source of information for automotive system diagnosis and analysis, 'Actual values' (AVs) are the variable data parameters that have been processed by the ECU.

They offer a useful representation of the state of an ECU system based on data collected from the sensors or switch input signals and the component outputs on the vehicle. You can use Bosch ESI[tronic] 2.0 to display the information in a variety of helpful formats while also saving the results for benchmarking and comparison.

Once you have connected the Bosch KTS to the vehicle and selected the relevant system, ESI[tronic] 2.0 will offer you 'Actual values' in the function selection screen if the ECU in question supports this type of data transfer, **see Figure 1**.

Remember, an AV can either be a numerical value of measurement, such as 'Control module supply voltage: 12.9 volts', or alternatively an input or output condition like 'Driver's door status: Door open'. The system continually refreshes the on-screen data stream to make viewing any changes in condition that are recognised by the ECU and visible in ESI[tronic] 2.0 simple.

> *"Actual Values are the variable data parameters that have been processed by the ECU"*

FINDING THE RIGHT AV FASTER

Modern vehicles' ECUs can support hundreds of AV parameters. ESI[tronic] 2.0 simplifies the process of selecting the right AV by providing an 'Actual value group' selection screen in some cases, and notably these 'Actual Value groups' help you to find exactly what you need, faster, **see Figure 2**.

The 'Actual value' search bar is another quick and easy way to efficiently search the list of AVs by key word. Simply type straight into the search field to filter the AV list to only show values that contain the text you have entered instantly, **see Figure 3**.

Following your search, you can choose any of the required AVs to be displayed for comparison purposes. Up to eight different AVs can be displayed together and a 'tick' symbol in the box on the left confirms your selected values.

If you are using a computer with a keyboard, a handy tip for selecting values from the list is to use the up and down cursor keys to scroll through the list and the space bar or left/right cursor keys to select or deselect the highlighted value name.

Once you have made your selection, clicking 'continue', pressing F12 or hitting the enter key, will show you the values on screen in a text format. Each AV will have the name, value, unit and possibly a hint such as "Allow engine to idle" displayed. At this point, you will see the value changing as the parameter data is refreshed, **see Figure 4**.

Using the 'Save F2' soft key at any time will add the data on screen to the job protocol. After some time has elapsed, pressing the F3 soft key when viewing the AVs will allow you to cycle through the Maximum, Minimum & Current values collected since the data stream was started – a very helpful tool if you are looking for a value that is operating outside of its expected threshold.

For example, if the turbo of an engine system was over-boosting on a road test, then you will see, via the F3 maximum key, that the tolerance boost value was exceeded at some point. Without having to constantly monitor the changing value stream you may identify a momentary value that could have otherwise been missed.

You will also notice that there are up and down arrows on the right side of the screen that will enable you to scroll to the next or previous values from the AV list.

BENCHMARKING AGAINST EXPECTED VALUES

Sometimes when investigating a fault on a vehicle there is a physical symptom present, but no diagnostic trouble codes stored. If you decide to investigate the AVs of the system for any anomalies and you have a valid licence for ESI[tronic] 2.0 manuals, you can now click on the blue underlined AV name to see the functional description of the associated component and any expected values for the conditions.

A favourite AV feature included in ESI[tronic] 2.0 is the 'F6 - Time profile' soft key. By changing the

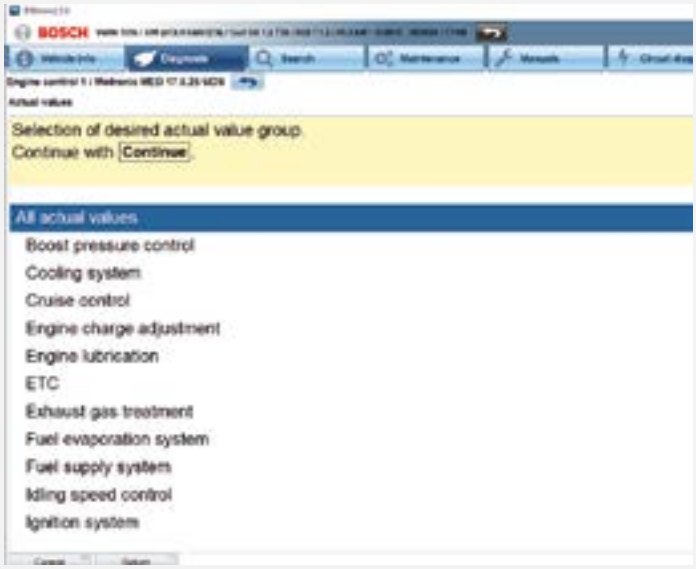


Figure 2

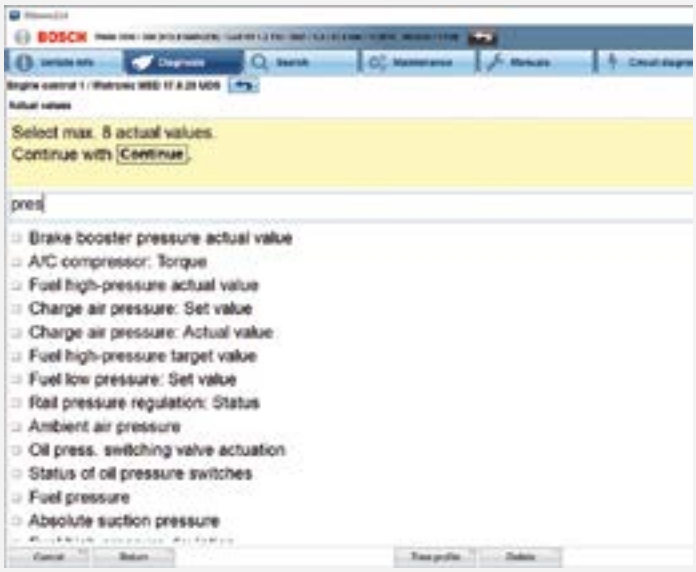


Figure 3



Figure 4

display of AVs to a colourful graphical format that plays across the screen you can configure the data presented to best suit your requirements.

The time base can also be adjusted between 5 and 60 seconds to zoom in or out of the graph on screen. Pressing the 'pause' key will stop the data collection at that point and the buffer memory will store up to approximately the last six minutes, depending on how many values were selected, **see Figure 5**. Allowing you to play back the capture in a sequence – or scroll through the data screen-by-screen – and then zoom into millisecond detail if needed, **see Figure 6**.

ALL THE INFORMATION YOU NEED IN ONE PLACE

It is easier to identify a problem when you can clearly see the relationship between components in operation together. Depending upon the system and fault that you're investigating, the applicable values can be viewed together in one graph. For example, the accelerator pedal position, air mass meter flow, EGR valve actuation and boost pressure on a Common Rail diesel engine during acceleration.

Clicking 'F4 Save' during an AV time profile will take a static screen capture of the data graphing on screen and add it onto the protocol report which can be saved and printed off for reference.

Along the bottom you will notice an icon that looks like a floppy disk symbol, called 'Data recording', which will save a flight recorder style file of the current time profile data collection. You can save, open, review and play back the data recording at any time.

A useful feature if you are searching for an intermittent fault and wanted to first record the event occurring out on the road, and later view and analyse the results back in the workshop. The file at that point will be saved in the 'Recordings' tab (found in the 'Main menu' under the 'Protocols' section) **see Figure 7**.

Finally, you can also add important information, such as customer and vehicle reference, to be able to later identify the job associated with the file. The 'Actual value' display features described in this article can be highly useful in automotive system diagnostics by allowing you the versatility to view and store the data from the vehicle in different ways.

WHAT 'S NEXT?

Join us for our next lesson to discover how your ESI[tronic] 2.0 can help you to continue delivering a full service in the face of increasingly stringent and commonplace secured diagnostic outputs.

"It is easier to identify a problem when you can clearly see the relationship between components in operation together"

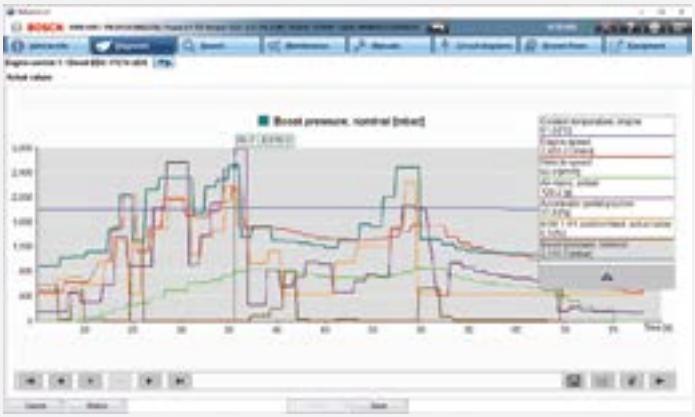


Figure 5



Figure 6

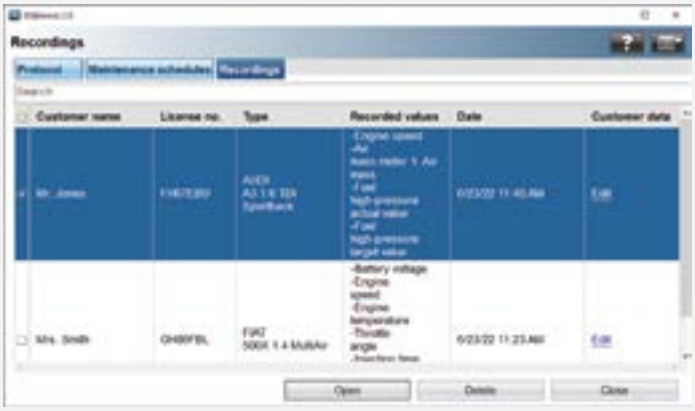


Figure 7

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***Case study** by **Des Davies** AAE MIMI, Top Gear Motor Services*

***Vehicle:** Vauxhall Mokka 1.4 LUJ/B14NET Turbo 2018*

***Mileage:** 17,077*

***Fault Code:** P0300*

***Customer complaint:** Loss of power, feels like lack of fuel and engine running poorly*



Misfiring Mokka



I interrogated the customer to get as much detail and information on the symptoms, leading up to and when the faults first developed. I then visually inspected the engine bay for any anomalies or obvious faults.

I confirmed the fault – the engine was misfiring badly, and the check engine light was displayed on the instrument panel. There was no need for a road test as it was running poorly on idle speed.

I connected my scanner to the OBD port to check for fault codes to get some clues that may help diagnose the fault. It flagged up a 'P0300 Engine Misfire Detected', so not much help from this generic code.

My next plan of attack was to work smarter not harder by going global and using the OBD11 on my scanner and checking Mode 6 as this has helped me in the past. This mode can be useful as Vauxhall have misfire counters in Test Mode 1.

Mode 6 global information, **see Figure 1**, recognised cylinder no.4 as the misfiring offender so it was time to break out my PicoScope and investigate. I needed to confirm cylinder no.4 was indeed misfiring as this data can be incorrect. Don't always trust what you see, I have been burnt before.

Checking the essentials

For a good combustion burn we need a good spark, at the right time, with the correct amount of air and fuel at the correct time, and good compression. If we have all these requirements then the engine should start and run efficiently.

Planning my next diagnostic approach, I could do a quick relative compression test which is non-intrusive and a good procedure to confirm that the engine mechanicals are in good working order, but bear in mind that it only compares the cylinder work rate against each other and is not an indication of good cylinder compression.

I disabled the fuel to prevent the vehicle from starting and needed to locate the fuel relay or fuse by extracting this information from a technical data source. **Figure 2** shows the



Figure 1

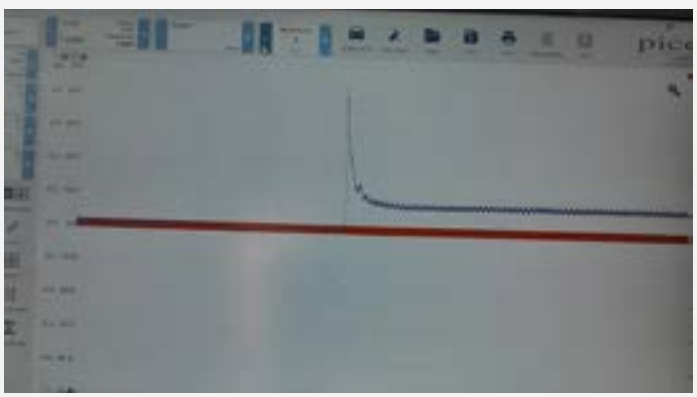


Figure 2

good relative compression waveform.

The relative compression test confirmed that all cylinders were mechanically distributing an equal amount of engine compression, so I decided to test the next easiest system, because of its ease of access, the ignition coil pack assembly.

Working smarter not harder, I now needed a wiring diagram on this system to help me test the ignition system and to confirm the correct wiring for this vehicle, **see Figure 6**.

These ignition systems use an ignition coil pack, also called cassettes, where the four ignition coils are housed as one coil unit. Each coil is individually controlled and switched with a square wave signal wire by the ECM.

Unfortunately, the diagram information did not give me the wiring locations from the ECM pins to this coil pack. I needed to locate the terminal for no4, so I had to test all the ECM coil



Coil secondary KV waveform output from coil no4 with engine misfiring



Testing the ignition coil cassette KV output cylinder no.4 with the non-intrusive ignition probe/wand



Coil secondary KV waveform from coil no2 with engine misfiring, this is a known good output

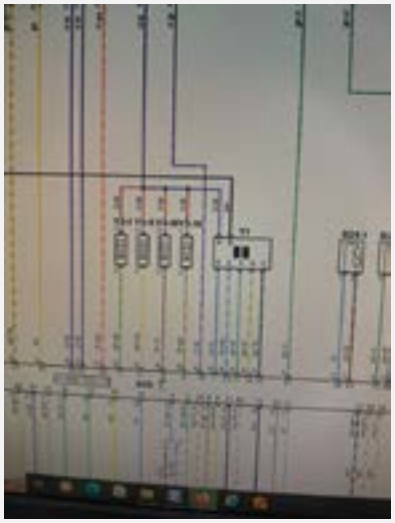


Figure 6

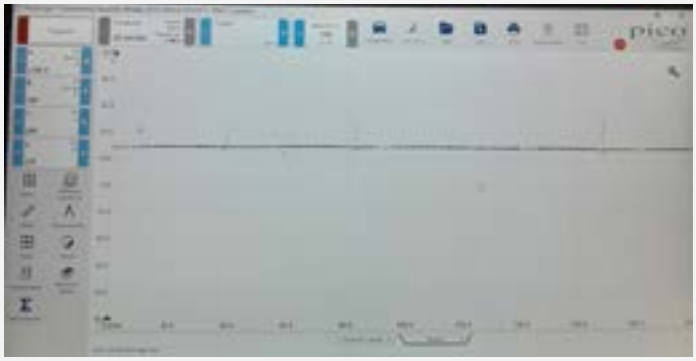


driver wires to confirm that they were being switched by the ECM coil driver and were all operating correctly.

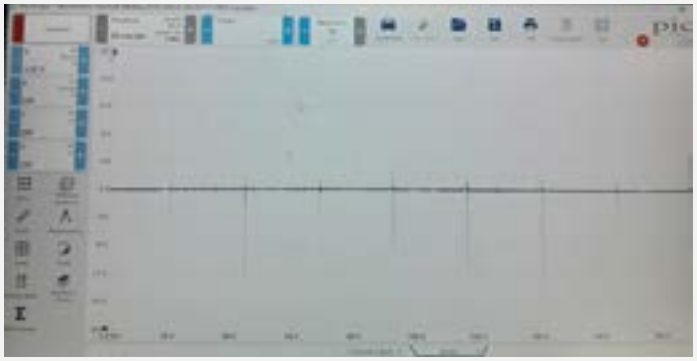
We now needed to take a closer look at cylinder no.4's coil secondary output extension lead and the spark plug to check for any anomalies. **In Figure 10**, we can see evidence of the results of the spark plug firing voltage for no.4 with carbon tracking on the spark plug insulator arcing across the spark plug terminal to the cylinder head, causing the plug not to fire inside the engine cylinder and causing our misfire.

A new coil pack was required as well as new spark plugs. We then needed to retest the ignition system waveforms to confirm the faulty coil pack and spark plugs had fixed the misfire. **Figure 13** (*next page*) shows the waveform of the secondary ignition system after fitting the new ignition components. **Figure 14** (*next page*) shows the ignition coil pack current was good.

Ignition coil pack module 12V feed was good



Ignition coil pack module ground/earth good



Square wave signal wire controlled by the ECM to coil pack was good. All 4 signal wires were tested with the same results

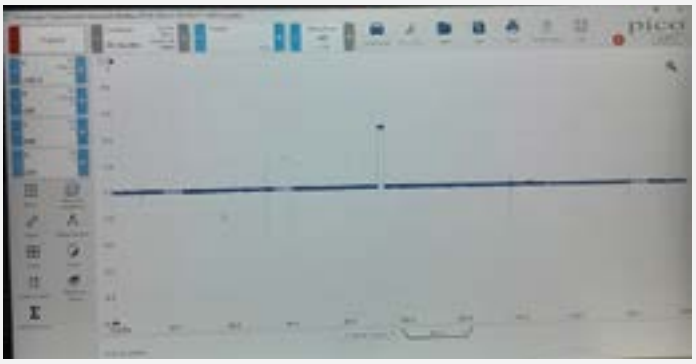


Figure 10



Ignition HT lead connection coil no.4



Coil pack/cassette with no.4 HT connection eroded



In summary

- Testing ignition systems in a logical manner, understanding the fundamentals and using the correct technical data for these systems helps to reduce mistakes.
- It does not matter where you decide to start your diagnostic testing for a misfiring engine, or any other fault on the vehicle, because the test results that you have chosen to perform should guide you towards your next test for elimination of that system or component to help you locate the fault or faults in the system.

Figure 13

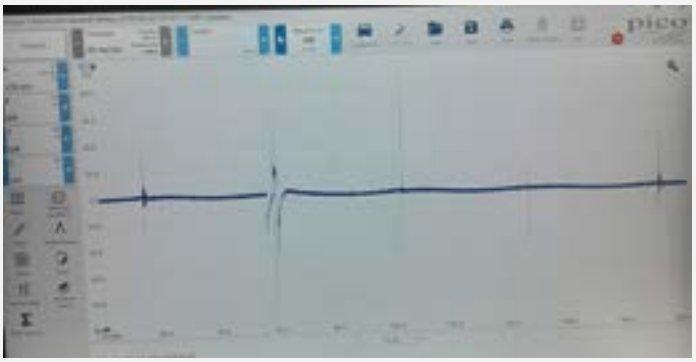


Figure 14



- I look for the easiest point to check a faulty system and use the appropriate tools and equipment for testing these components. If my test results are not what I expected, then I need to either backtrack my testing procedures and methods or test that system or component in a different manner, using other test equipment to achieve the correct results or manufacturer technical data.
- I do not rely too heavily on my scanner results and information, but I do use them as a guideline. The scanner's refresh rate can be slow and it has to make a quick judgement and diagnosis of the fault and can easily get it wrong.
- Always test don't guess, as this will only create expensive mistakes, is time consuming, and produces poor customer relationships.
- If you have not got a labscope for this problem, finding this fault is very difficult and laborious. Changing and swapping parts is a recipe for disaster and very expensive for the customer and for your reputation.
- Think before you leap, as it's a long way down and very lonely at the bottom!
- Diagnostics can be rewarding but we need to be kept on our toes by keeping up with the latest vehicle technology.



SAVE MONEY WITH PULS-AIR – WORKSHOP AND HALL HEATING

Enjoy 50% less heating costs, thanks to innovative workshop heating from Austria

Inflation and price increases in all sectors have caused heating costs to rise sharply for many workshops and halls. With the heaters from the Austrian manufacturer Puls-air, heating costs can be reduced.

What is Puls-air?

Puls-air is an oil-powered warm air heater for workshops and halls. Halls up to 1,800 m³ (with very good insulation) can be heated with one unit. For larger premises, several units can be used in combination. The commissioning of Puls-air is very simple and no separate chimney is necessary.

How does Puls-air work?

The patented pulsating combustion with an efficiency of 97 % is installed. This means that almost all the fuel supplied is converted into heat. Pulsating combustion originally comes from rocket research and has been used by Puls-air to heat workshops for over 30 years.

Why is Puls-air so economical?

Firstly, because of the already mentioned patented pulsating combustion with 97 % efficiency. During combustion, an oscillating gas column is created that changes direction 63 times a second. Movement = heat. This heat is used to heat the workshops and halls. The second reason is the physically optimal positioning on the floor of the room to be heated. The warm air is released where work is being done, distributes itself in the floor area and then slowly rises, cools at the top, sinks again and is drawn back through the unit preheated. A slowly rotating thermal air roll is created, the entire room is heated evenly and quickly.





Most Puls-air customers report heating cost savings of more than 50 % compared to ceiling fans, radiators, etc.

Clean combustion, quiet operation

The pulsating combustion achieves excellent exhaust gas values (NOX - 25 - 30, CO - 2 - 5 ppm; soot number 00). The running noise of the innovative heater from Austria is low at 57 dB.

Easy commissioning (plug and play)

The commissioning of Puls-air is very simple and consists of three main steps:

1) Place the unit in the room to be heated

2) Plug in 230 volt power

3) Conduct the exhaust gas via a 35 mm stainless steel pipe over the roof into the open air.

DONE. The manufacturer also recommends connecting the unit to a larger heating oil tank via an 8 mm copper pipe and a non-return valve. Thanks to the 20-litre tank supplied, the heating system is immediately ready for operation.

Delivery time, order and advice

In order to avoid delivery bottlenecks, we recommend that you place your order as soon as possible. Puls-air will be happy to advise you by telephone or e-mail in German and English. Orders can be placed online at **www.pulsair.net**.

Further information can be found at:
www.pulsair.net | +436642015883 | info@pulsair.net

Lighting – an overlooked opportunity?



When the temperature drops, bulbs are more prone to failure. **Ring Automotive** *considers missed opportunities and offers suggestions on how to get the most profit with bulb sales*

Replacement car bulbs are one of the fastest moving and profitable product lines in the aftermarket but it is up to staff in workshops to find the best opportunities to upsell to their customers.

Firstly, there are increased sales opportunities for the forward lighting on modern vehicles – easily demonstrated by comparing the value of replacing halogens bulbs with an upgrade halogen.

Whether it be a H4 or H7 (the common references for halogen headlamps), workshops can earn extra profit through selling upgrades. To replace a dipped beam H7 can typically cost anywhere between £5 and £10. Therefore, for a pair, motorists will be looking at a cost of between £10 and £20. Yet, if they bought an upgrade bulb, like the Xenon200, that puts 200% more light on the road, it will cost motorists £39.99.

By offering premium bulb upgrades that improve visibility, workshops could increase their sales by 50% and once customers see the improvement for themselves, they rarely go back to standard bulbs. Simply ask the customer if they want brighter or whiter lights. Most motorists don't know such bulbs exist but do want better lighting for their vehicle.

On top of selling performance bulbs, garages should be replacing bulbs in pairs when replacing a blown bulb in a paired lighting system. If one headlamp or brake light goes, replacing the bulb in the other at the same time produces an even light output to aid driver vision. Plus, it provides a higher level of customer service. It is logical to presume that if one headlamp bulb goes, the other bulb in the other unit will also fail shortly. A motorist would be frustrated to have to replace another bulb soon after having a car in the workshop, so it is always worth replacing bulbs in pairs for these reasons.

Performance upgrades are not exclusive to the forward lighting on vehicles. Rear performance lighting upgrades are available too, such as the Ring Rapid Response Range. These are high intensity bulbs designed to offer up to 20% more luminous power and faster illumination. Drivers following vehicles using these upgrade bulbs will see them earlier and have more time to react.

With retail values of £3.99 per pair for some of the most common replacement bulbs, such as R382, R380, R207 and R245, workshops should see profits increasing with the sale of these bulbs.



Pre-empt failure and improve sales

In winter, drivers will easily notice bulbs that are performing poorly but lighting specialist Osram urges workshops to actively encourage drivers to consider their bulbs before they fail. One of the main reasons for failure during the winter months is down to the tungsten filament, a part of every halogen bulb, which generates light when a current passes through it. Cold weather can cause it to contract, which can lead to it breaking.

Drivers can also benefit from better and whiter bulbs, to maximise visibility in the darker months. NIGHT BREAKER 200 is Osram's brightest halogen bulb, with up to 200% more light on the road and up to 150-metre-long beam and recently recognised in Auto Express's 2023 Product Awards.

The supplier has introduced a new counter display for its NIGHT BREAKER 200 range, to encourage impulse purchases. It is designed to be quick and easy to set up and comes with ten duo packs of its upgrade bulbs (seven H7s and three H4s).

https://osram.co.uk/am

INTELLIGENT BATTERY CHARGING

RING

12V and 24V compatible battery chargers ideal for intensive use with fleets of mixed vehicles including cars, LCV and HGVs, plus in commercial garages and workshops.

12/24V Voltage | 12.4 LCD Display | Battery test | 12/24V Alternator test | Battery recondition | Rapid Charge

RSCP3024
Smartcharge Pro 30A Battery Charger

RSCP5024
Smartcharge Pro 50A Battery Charger

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LED bulbs and classic cars

For most road users, it is illegal to retrofit their vehicles with LED bulbs, but Osram points out that the story is different for classic car owners.

The MOT inspection manual states: “Existing halogen headlamp units on vehicles first used on or after 1 April 1986 must not be converted to be used with high intensity discharge (HID) or LED bulbs. If such a conversion has been done, you must fail the headlamp for light source and lamp not compatible.” Therefore, pre-April 1986 vehicles are not subject to these restrictions, and subsequently, drivers can fit LEDs to their classic cars if they so wish.

Not every classic car driver will agree with fitting their car with LED lights, as it is not in keeping with the time period, but fitting a classic car with LEDs allows drivers to see much farther.

Osram’s LEDriving retrofit offering includes LED bulbs for high and low beam, fog, signalling and interior lighting applications. The product ranges include the newly launched LEDriving HL EASY, BRIGHT and INTENSE for 12V headlight applications, LEDriving FL for fog light applications, LEDriving HLT for trucks and 24V vehicles, LEDriving HLM for motorcycles and LEDriving SL for auxiliary lighting applications. While all the bulbs in the LED portfolio are marked for ‘Off-Road’ use only, due to UK legislation, as mentioned, this does not apply to pre-April 1986 vehicles.

Osram has manufactured the LEDriving HL EASY bulbs as socket based, meaning it has no external driver and does not need additional caps or adapters. Drivers can simply take their old halogen bulbs out and replace it with these LED versions. These bulbs provide an ultra-compact LED replacement for conventional high and low beam lamps with cool white LED light – with an optimised high-speed fan that ensures active cooling and maximised heat dissipation.

> *"For most road users, it is illegal to retrofit their vehicles with LED bulbs, but..."*





Lighting of the future

Valeo manufacturers lighting systems for numerous car manufacturers, including Volkswagen AG, Stellantis, Renault-Nissan and Ford, with more than 95% of its products manufactured in Europe.

It states that the latest technologies, such as Pixel Light and the monolithic adaptive headlights, are set to revolutionise safety standards for drivers and pedestrians. The introduction of Valeo's Pixel Light enables innovative lighting functions such as road markings, driver assistance and improved interaction with pedestrians.

Its glare-free high beam with three lines of LEDs and a pixel count of 22 to 102, provides the ability to deactivate one or more pixels to prevent glare for other road users while ensuring maximum illumination. The first references will be available in 2024.

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PULLING IN THE POWER

All cars, be they BEVs, hybrids or ICE, have 12-volt batteries. Yet, they are not always where you expect them to be. This battery, from a BMW X5 Mild-Hybrid, is the lithium-ion pack; the 12-volt unit lies within the luggage compartment.

*12-volt batteries are a win-win for garages and customers but only if the opportunities are grasped, as **Rob Marshall** finds...*



Languishing as we are, in the post-Christmas hangover, most people are keen to keep expenditure to a minimum. This poses a problem for garages, because it is even harder to persuade customers that it is a good idea to replace a part before it fails. Of course, any business must make a profit to survive but you should not feel guilty for thinking about the bottom line. In most cases, you are also saving customers money in the long run, as well as helping them to avoid inconvenient and potentially dangerous situations that come with flat batteries.

Grasping the nettle

Varta reminds us of its findings that nearly one in three 12-volt batteries needs workshop attention. This means that garages are not just losing out financially, but they are also not acting in their customers' best interests, by omitting to assess the battery on every vehicle that enters the workshop. Ecobat agrees with Varta that EFB and AGM batteries require more up-to-date testing equipment that supplies information about not just the State of Charge but also State of Health and highlights its EBT780 for consideration. Banner Batteries adds that modern testers can assess the entire charging system and promotes its BBT HD1+ tester as one that does just that. Yet, testing is only one part of the diagnostic process. Ecobat reminds us that new batteries

2023/24 battery market conditions

As with so many things, the pandemic caused normal seasonal variations to change as car use plummeted. Yet, our technical partners reveal a mixed supply and demand picture. Banner Batteries reveals that battery replacement cycles remain relatively constant all year round, with minor peaks in the summer and winter. Yet LKQ Euro Car Parts and Ecobat report that seasonal trends have returned, with demand returning to pre-COVID seasonal cycles.



Not all 48-volt Mild Hybrid Electric Vehicles use AGM batteries. This 2023 Ford Puma uses an EFB. While it could be upgraded to an AGM, come replacement time, it should never be downgraded to a 'standard' flooded battery.

require validating with the car's Battery Management System, for the correct charging algorithms to be applied to optimise the new battery's life.

Avoiding temptations

Should an impecunious customer sanction a battery replacement, resist any pressure to fit the cheapest battery you can, especially if it downgrades the original specification. Ecobat says that downsizing is a false economy. As battery performance levels are dictated by the carmaker, owners should not opt for anything below this standard. This applies not just to reducing the capacity (CCA) but also the technology type. Varta says that, if an Absorbent Glass Mat (AGM) has been removed, it should be replaced with an AGM and garages should not downgrade to a traditional flooded battery, known also as an SLI, or Starter, Lights and Ignition.

"Should an impecunious customer sanction a battery replacement, resist any pressure to fit the cheapest battery you can, especially if it downgrades the original specification"

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THE BATTERY BEYOND ORDINARY The power of Banner Batteries has not only evolved through ongoing product innovation combined with world class manufacturing, but an unparalleled OE pedigree that is the backbone of the company's genetic make-up. Indeed Banner's battery technology is the preferred original equipment choice of Audi, Aston Martin, Autotrail, Bailey Motorhomes, BMW, Caterham, Lotus, Mercedes, Morgan, Porsche, Rolls-Royce, Seat, Skoda, Volvo, VW.... and many more.

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While most technicians are familiar with the delicate battery monitoring sensor on the negative terminal, they do not negate battery replacement programming. Interestingly, Hella recommends that the BMS and its cable be replaced at every battery change.



Support, or charge?

Most garages realise the importance of supporting the battery during protracted diagnostic or software update sessions. Apart from the corruption risks, a technician does not wish to be led down the wrong paths, due to faults caused by low-voltage situations. Ecobat argues that battery life could be reduced as the result of a deep discharge, something a garage would not want, while the vehicle is on-site.

Yet, most cars cannot recharge their 12v batteries fully and so offering an overnight recharging service for low-mileage users might be beneficial, should testing indicate a low state of charge.

LKQ Euro Car Parts explains that a battery charger goes through various stages of float to provide current, to define and supply exactly what the battery needs, when it is not under load. In contrast, a battery support unit provides a constant power supply and can react in milliseconds to a sudden power draw that may be caused by, for instance, a door being opened.

Going the extra mile

While Varta agrees that you should fit like-for-like, it also sanctions fitting like-for-better. In most cases, this involves fitting a superior and more profitable battery that is more likely to last longer. Varta advises that, should a garage choose to store a range of batteries, it recommends the AGM range so you can keep your stock range manageable. The main reason is that these premium lead-acid batteries can be fitted to all cars, including those that are electrified.

Ecobat recommends strongly that technicians consider that the battery needs to satisfy not just the vehicles' systems but also driving cycles. If the recommended specification battery has failed not just due to old age, upgrading the replacement would be a sensible idea. Ecobat says that an inexpensive battery can cost more than a more expensive one that lasts up to four times longer. In start/stop applications, upgrading from an EFB to an AGM could make a significant difference.

Even so, Banner Batteries highlights that the most significant challenge facing suppliers of automotive batteries relates to incorrect use and fitting of the wrong battery type, particularly when it comes to start-stop applications. Should you be unsure, this may be an area on which you may wish to brush up your skills for 2024.



Banner claims that its BBT HD1+ tests not just battery state of charge and health but also the charging system. Note the print-out, which you can hand to the customer as evidence of your findings.

Battery finder links

www.bannerbatteryfinder.co.uk

www.ecobatbattery.com (*battery finder rests within the drop-down menu***)**

www.eurocarparts.com/car-battery

www.varta-automotive.com/en-gb/battery-finder





Clutch replacements are both physically and mentally exhausting, hence the importance not just of getting it right first time but also of replacing all worn parts

You are doing your customer a disservice, if you do not renew any leaky seals

REACHING FOR THE EXTRAS

Replacing a three-piece kit is not the only consideration, when embarking on a clutch change, as ***Rob Marshall*** *discovers*

Let's face it, clutch changes are hardly the easiest and most enjoyable tasks. A small problem can lead to an immobile vehicle hogging a ramp, until the issue is resolved. Therefore, it is in everyone's interest to make a clutch replacement go as smoothly as possible.

Making the appropriate match

Naturally, with much of the task comprising labour, most garages are sufficiently wise to advise customers that selecting a low-quality clutch is an ill-advised move just to nibble a small sum from the invoice. Quality, therefore, must be the priority.

Schaeffler says that its products are designed for each specific vehicle's power and weight. When using a vehicle in extreme conditions, such as carrying very heavy loads, or towing, clutch and DMF lifespans are reduced, because they will have to work harder. Schaeffler's advice is to use a vehicle designed to do the job required.

While also being an OEM Supplier, Valeo has a different stance. It offers a range of DPF solid-flywheel conversion kits for vehicles used in such extreme conditions. The company says that the damping properties of the DMF are then actioned via a limited travel damper technology within the clutch friction disc. First Line says that its range of solid flywheel conversion kits is, perhaps, more suitable for extreme uses due to better heat dissipation.

We would be interested to receive feedback from garages that have used DPF conversion kits, about whether their customers have noticed any difference in driving experience, or mechanical longevity.
Contact Nicola@autotechnician.co.uk.



Training for 2024

As part of their training programme for the year, Valeo and Schaeffler will be looking at Dual Clutch Technology, both wet and dry clutch types.



DOUBLE OR £NOTHING!

Are you missing out on a valuable profit opportunity by sending semi-automatic gearbox work to a 'specialist'? Do you know that the latest semi-automatic vehicles are equipped with easily repairable double clutch systems?

LuK double clutch transmission systems can be found in an ever-growing number of popular vehicles, in both wet and dry versions. They can be serviced and repaired with just a little bit of know-how from us, along with the correct tools and a LuK 2CT repair solution from your local parts distributor.

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www.repxpert.co.uk | aftermarket.schaeffler.co.uk |

SCHAEFFLER

Going the extra mile

The other issue, of course, involves checking and inspecting additional components. Schaeffler says that it is not always necessary to replace the DMF, although it is advised strongly to avoid unnecessary follow-on work. This, the company reasons, is because you never know the flywheel's complete history, such as if it has been subjected to excessive heat stresses that could affect the internal grease, arc springs or friction control plate. Engine misfires, or poor starting, will also affect the arc springs. Therefore, it is prudent to check it; Schaeffler reports that inspection tolerance values are available on its REPXPERT system. The data you extract can be employed to support a DMF sale, by proving the existing part is approaching the end of its service life, even when it remains relatively silent in operation.



Should you consider not to replace the DMF, check and assess its condition, with appropriate tools and specification data, before deciding

Valeo adds that DMF tolerances and testing processes are available through its TechAssist website. **This video** shows how to diagnose a DMF, while **this film** shows the company's checking procedure.

Naturally, other parts require close inspection, as the transmission is dismounted and the clutch kit removed. First Line says that technicians should inspect all parts comprising the release mechanism, from the pedal to the clutch release bearing. Hydraulic cylinders must be checked for correct operation and First Line highlights that replacements are available through the company's Borg and Beck Brand.

Blue Print also emphasises the importance of checking and replacing other worn parts within the system. It highlights that it sells not just the three-piece kits but also new release arms, retaining bolts, flywheels, release forks/arms and slave cylinders (including concentric types). Yet, it also advises that technicians should also check the various transmission oil seals and, of course, not neglect to replace the oil itself. Valeo adds that, while the CSC should be replaced regardless, technicians should also check vibration-reducing hydraulic modulators and, of course, test the hydraulic fluid for moisture content.

Sachs's Top 10 tips for successful and long-lasting clutch repairs

1. **Inspect the flywheel** – Aside from testing the DMF, this includes spotting general damage and looking at the starter ring gear condition. Also check the input shaft support/pilot, or the spigot bearing. As bell housing misalignment can cause accelerated and abnormal spline wear, all dowels must be present and in good order

2. **Check end-float** – Excessive crankshaft tolerances cause clutch clearance issues. It must be within the manufacturer's specifications. If it is not, further work, which may include an engine rebuild, might be required

3. **Look for contamination** – By checking the old parts, you can theorise why they have failed. Once the transmission is out, inspect the engine's rear main oil seal and the transmission input shaft seal for signs of wear, or oil loss

4. **Study the release mechanism** – Inspect the clutch release fork pivot points and bushings for signs of excessive wear, or damage

5. **Examine the input shaft** – Any wear or damage to the spine edges can cause the driven plate to stick and not release fully, causing it to drag

6. **Study the release bearing guide tube** – Any excessive, abnormal wear or incorrect lubrication in this area can cause uneven application of pressure to the clutch diaphragm, leading the clutch cover to move unevenly

7. **Torque and order** – When installing the new clutch, observe correct tightening sequences

8. **Consider the operation** – Before refitting the transmission, inspect the clutch release system cable/ hydraulic lines and seals for signs of damage, wear, or leaks

9. **Easy on the lube** – Never use multipurpose, or copper-based, greases. Insufficient lubrication can cause the driven plate to stick on the splines, causing drag. Overgreasing contaminates the new clutch components, causing slipping

10. **Use the correct tools** – For instance, Sachs self-adjusting 'Xtend' clutches must be assembled and fitted using.



Do not be scared to offer to replace additional parts, or supply upgraded components, at a higher price. If anything, it improves safety and saves your customer money in the long run.

MAKING THE MOST FROM YOUR STEERING AND SUSPENSION REPAIRS

While the motorcar is undergoing transformative changes at an increasingly fast rate, steering and suspension consumables remain relatively unchanged. Yet, ***Rob Marshall*** *looks at whether, or not, garages are grasping current opportunities with both hands.*

We all need time away occasionally. While hurtling down the M5, bound for the English Riviera for what only be described as a "lads' weekend", the conversation drifted inevitably onto cars. One friend was worried, because he feared that his garage was 'ripping him off' – a common accusation that is banded around our trade far too much by the public and, very often, unfairly. The issue revolved around his abused V50, which had suffered a broken nearside coil spring. The garage advised and quoted for two front replacements, leaving my friend concerned that he would have to throw more beer tokens than absolutely necessary into the direction of his battered Volvo. Naturally, I responded that his garage was acting in his best interest and I recommend that he authorise the repair. Suitably reassured, the chat moved on to topics that I dare not share

"The garage advised and quoted for two front replacements, leaving my friend concerned that he would have to throw more beer tokens than absolutely necessary into the direction of his battered Volvo"



Do not forget that upgraded parts provide an ideal upsell opportunity. These Meyle HD Tesla control arms have been redesigned to prevent moisture from entering the joint and causing a common and irritating squeaking – a problem that plagues the OEM part.

this magazine but it left me concerned that advice from a competent and well-respected garage was still questioned by someone who should know better.

Do not just listen to me...

I am not the only one who thinks this. KYB may be well-known for its dampers but it also is a major spring manufacturer for the car manufacturers and aftermarket. KYB recommends that replacing in pairs is essential to ensuring that a vehicle performs safely as its maker intended. If only a single spring were changed, it could harm vehicle handling and stability. The company also stresses that replacing one coil spring could lead to an uneven ride height. This creates an imbalance and exerts more stress on the spring that was not renewed. Furthermore, if the part has failed, then the opposing part is likely not far behind, especially if they have been on the vehicle for the same amount of time and exposed to the same conditions. In the case of shock absorbers ('dampers'), when damping rates are significantly



Avoid re-fitting single-use fixings. Check with your parts supplier that replacements are included, or available to order separately.

> *"Replacing one coil could lead to an uneven ride height. This creates an imbalance and exerts more stress on the spring that was not renewed."*

different on either side of the vehicle, the vehicle body and wheel movement variations can cause handling abnormalities.

Delphi also advises garages to think of their customers, who rely on you to get the job done right, first time. Additionally, stress and wear affect the entire steering and suspension system, whether the problem came from a collision, a pothole, or simply ageing parts. That is why Delphi says is so important for garages to complete the task properly, by replacing in pairs. MOOG recommends that, should any technician find any uneven wear, or damage, identify the underlying cause and address the issue appropriately, first. Even so, MOOG says that it remains best practice to replace parts on both sides of the axle, especially as consistent and balanced performance could be compromised, should there be any difference in part design, through either supersession, or manufacturing variation.

Meyle says that the same principle applies to bushes. Since bushing properties change over time, pairing a new bushing with a worn-out one, can impact the vehicle's driving performance. So, replacing a pair is the better and, above all, the safer option.

Air suspension works in a very different way from traditional metal sprung systems. Therefore, the springs cannot sag physically. Even so, replacing in pairs is still a recommendation that you can make. Arnott explains that replacing in pairs is not strictly necessary from a safety point of view, especially when you are replacing an air suspension unit because of normal wear and tear. Yet, it makes sense to at least inspect the unit on the other side. The rubber of the air spring has most likely been exposed to the same conditions and mileage as the one that failed, meaning the likelihood of it needing replacement shortly is high. If you are replacing the air suspension unit because of normal wear and tear of the physical conventional damper, then renew them in axle sets.

Is it all about axle sets?

When dismantling either the steering or suspension system, you may have to replace associated components as you work. Typical examples include nuts, bolts and washers.



Interestingly, EV specialists are working hard to resolve issues for the aftermarket. Cleevely EV of Cheltenham, for instance, is supplying parts for Teslas – pictured is a small sample of its offerings.

The bilstein group advises that it is best practice to replace any single-use fixings, including stretch bolts, any locking nut, or fixing, including Nyloc types. This is why the company supplies them either separately, or as part of its febi ProKit range. While Comline also supplies associated fixings, it reminds technicians to follow manufacturer guidance.

When replacing dampers, KYB recommends replacing the top mounts, too. KYB reasons that, should the struts be worn, the mounts are likely to be as well, because they have been subject to the same conditions. Even on a car that has covered 50,000 miles, the rubber component would have been moved around 75 million times. Naturally, the rubber components would have deteriorated within this time, which would prejudice ride control and safety. Therefore, reusing the old mounts to save costs will mean that the replacement dampers will not be performing at their best.

Naturally, things are more complicated with air suspension. If the owner has brought the car to you as soon as a leaking, or otherwise faulty, air spring has been noticed, there might not be any consequential damage to other parts. Arnott advises that catching a leak early makes a big difference to the lifespan of associated parts. If the leak has been long-standing, it is possible that the compressor may have overheated, or might have even burnt out. In addition to the compressor and relay, Arnott recommends that you check the valve block, right height sensors and air lines for their integrity and advise the customer that these might need changing, especially if they have ignored a leaky spring for some time.

Upgrade choices

Especially where suspension is concerned, there is a multitude of choices available to customise vehicle dynamics. Yet, do not forget the changes that quality companies, including those that supply the OEMs, make to improve their products based on experience over time.

MOOG reports on a common OEM trend of using lighter materials for spare parts to reduce vehicle weight and cut all-important CO2 emissions. This includes sway/anti-roll bar links, which can even be made from plastic, or a hybrid metal/plastic combination. For 2024, MOOG is launching steel-reinforced alternatives for vehicles thus fitted. MOOG says that these upgraded parts possess higher mechanical strength, reducing the risk of breakage during challenging driving situations. They also allow for the integration of a larger ball diameter, within the joint, providing another reason why durability is enhanced. Yet, the company offers these upgraded steel parts (denoted by the suffix 'M' in the part number) alongside the original replacement part, which gives technicians, garages and customers the luxury of choice.



GARAGE GURUS: Do not forget that quality suppliers provide free fitting advice, which can be invaluable



LEADING THE WAY.

KYB is the number one supplier of OE shock absorbers to cars leaving UK production lines.

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Original Equipment Manufacturer



Data valid as of 2022.

kyb-europe.com KYBSuspension KYB-Europe KYBEurope

MOOG also reminds us of its Hybrid Core technology, which is its patented technology of induction-hardened studs, combined with carbon fibre-reinforced bearings. MOOG says that its Hybrid Core parts have double the strength and the ball joint is up to 42% more durable. Last year, the company introduced new dust gaiters, produced from TPU (thermoplastic polyurethane), which it claims is longer-lasting and more resistant to chemicals, compared with conventional chloroprene rubber. This is why TPU gaiters are fitted to the brand's ball joints, link stabilisers, tie rod ends and assemblies, and track control arms.

Yet, MOOG is not the only supplier of upgraded components. Comline is another, which has redesigned the wishbone bushes fitted to the Vauxhall Corsa, one of the most popular cars on UK roads. These bushes feature a swaged shape, which allows more rubber to bond, thus extending their lifespans. The swaged bushes are upgrades from the original equipment specification but there is no need to disclose it to an insurance company. They are available under part numbers CCA1011 and CCA2011.



ADAS: The mandatory 'extra'

Delphi reminds technicians not to forget the importance of wheel geometry and ADAS calibration. ADAS relies on a combination of cameras and radars. Therefore, anything that affects their position, such as steering or suspension work, can be detrimental to ADAS performance. One degree of change in the camera, or radar, position could mean a 1.7-metre deviation 100 metres down the road. Inevitably, the vehicle may fail to detect oncoming hazards, because inaccurate information is being sent to the Electronic Control Unit (ECU). For this reason, it is essential to recalibrate ADAS following any steering and suspension repairs and post-wheel alignment.

Invented for life

Bosch Engine Management Sensors

In order to enable reliable and efficient operation, all components that are part of engine management must work together in the best possible way, including sensors. Bosch provides a wide portfolio for engine management and exhaust-gas sensors. They stand out for their robust design and high-quality materials making them particularly resistant to deformation, tears and cracks.

Choosing Bosch Sensors means choosing products matching OE quality as well as providing high-level of precision, thus helping to lower fuel consumption and optimal combustion. Their easy installation also saves time and reduces the vehicle downtime while being at the workshop.

boschaftermarket.co.uk



Arnott Suspension Products



ADAPTIVE RIDE CONTROL SYSTEMS – A DEEPER LOOK

As the automotive industry continues to enhance drivability and make the ride more comfortable, suspension technology is key to accomplishing this. Suspension systems have been equipped with classic coil spring and shock absorber set-ups for a long time. Conventional leaf and coil spring systems evolved into innovative air suspension systems, and regular hydraulic shock absorbers evolved to highly advanced adaptive damping systems (that can be matched with both coil and air suspension systems). These innovations optimised the ride and handling for different driving conditions. In this article, Arnott will explain how adaptive damping systems operate, providing a better understanding of how this suspension technology works.

System Components

A typical modern Adaptive Ride Control system contains the following components: adaptive dampers, an Electronic Control Unit (ECU), a sensor set, and a driver preference switch. The sensor set is typically a combination of accelerometers that are located on the body, and position sensors located near the suspension at all four corners of the vehicle. Most vehicles with an adaptive damping system feature a driver preference switch. This is a button on the dashboard that allows the driver to select a preferred driving mode such as comfort or sport.

In this technical newsletter, the 'adaptive damper' can be any electronically controlled adjustable damper (including Magnetic Ride) since the basic operating principles for the system are the same.

System Operation

Adaptive damping systems began by using variable dampers with two or more discrete settings. The more modern adaptive systems use 'continuously variable' dampers instead. The working principle between (older) discrete setting and (modern) continuously variable dampers is essentially the same. The difference is that in a discrete setting shock the valve is ON/OFF (fully open or fully closed), whereas a continuously variable valve allows the damper setting to be adjusted to any value between pre-established firm and soft setting limits.

The Ride Control ECU is the brain of an adaptive damping system. The ECU is connected to sensors located on the body and the suspension at all four corners of the vehicle. Additionally, the ECU is also connected to the vehicle's main data bus to get inputs including vehicle speed, throttle position, steering angle, transmission, and brake applications and others.

The ECU receives these different data streams and uses them as inputs to an algorithm which continuously calculates the magnitude and direction of the vehicle's body motions in heave, pitch, roll, and yaw as well as the motion of each wheel relative to the vehicle body. The motion calculation results are then used to determine the damping force required at each individual corner of the vehicle to provide the desired ride and handling characteristics – as defined by the algorithm and the position of the driver preference switch.



Once the ideal damping force has been calculated, the ECU provides the appropriate amount of electrical current to each damper to obtain the desired damping characteristics. This entire process occurs in milliseconds – more than fast enough to react to almost any road input!

Except for the Magnetic Ride systems, the damping force of adaptive dampers are controlled in more or less the same way. If you would like to know more on the system operation of Magnetic Ride, you can read more on our website. The firm and soft damping force limits of adaptive dampers are controlled by shim stacks installed in separate flow passages within the damper. The damping force adjustment is typically achieved by opening or closing a fluid flow control valve to regulate the amount of fluid flowing through each flow passage.

For example, if a softer damping characteristic is needed in a continuously variable adaptive damper, the flow control valve will adjust so that more fluid will flow within the damper will pass through the shim stack which defines the soft setting, and less fluid will flow through the passage containing the firm valve stack.

Arnott eRide Technology

The Arnott eRide R&D team in the US focuses on a perfect collaboration with the continuously variable Ride Control systems currently being used by the different car manufacturers. Getting it right is quite a delicate process because electronic control strategy and the execution of that strategy is a combination of car manufacturer's requirements and supplier offerings. The reality is that every ECU design works a little differently and the algorithms can be significantly different - even if the same shock design is being used.

To design and implement such technology for the aftermarket, it was crucial for Arnott to make the eRide valve design functional and working in compliance with the variety of ECU set ups and valve designs. For example, the switching speed - which is the reaction time to switch between damper settings - can vary greatly. A change made for the switching speed for a particular application may work as improvement for a specific model but could actually cause performance issues for other vehicle applications. The Arnott eRide technology can be used to replace any continuously variable shock with an internal valve. Other valves with alternative designs are currently in development and Arnott will release the eRide solutions for these at a later stage.

The continuous commitment and hard work of all the teams has led to a valve design that allows Arnott to match or exceed OE ride and handling in all the various applications!

www.arnotteurope.com



This information is provided to you by Arnott - Suspension Products. With 35 years of experience in engineering, designing, and manufacturing high quality air and suspension components for the aftermarket, Arnott is the technical expert when it comes to suspension systems. Arnott's products are produced with high-quality, OE components offering exact form, fit and function. Each product is extensively tested in our American and European facilities and custom-tuned to suit the specific vehicle make and model before being produced.

PARTS, TOOLS & TIPS

New products, fitting tips & technical advice to ease fault-finding and installation



Prevent breakdowns

Battery failure continues to be one of the biggest causes of vehicle breakdowns in the UK and yet many workshops are still missing out on an opportunity to test batteries, according to HELLA.

Cold weather exposes battery weaknesses so by offering a free battery testing service, you are not only preventing your customers from being stranded with a car that won't start, but you also have a genuine opportunity to generate a sale and build customer loyalty.

Hella's battery range has four models: Classic, Premium, Supreme and AGM, for passenger cars and LCVs to heavy duty and agricultural vehicles. All feature Grid Protection technology, increasing plate durability inside the unit by slowing down the aging process of active materials.

www.hella.com/partnerworld/uk/



Ready-to-fit coil suspension strut assembly

An unlimited mileage warranty is now available across the range of steering & suspension parts available from LKQ Euro Car Parts, at no additional cost. This is supplied across its in-house Starline and Optimal brands, as well as brands such as Sachs, Monroe and Bilstein.

This warranty sits alongside the existing manufacturer one, removing mileage restrictions that are typically in play, meaning garages can offer customers peace of mind at no extra cost.

It has also extended the existing manufacturer warranty on its Starline steering & suspension products from three years to four and, has introduced a complete, ready to fit coil suspension strut assemble, saving on labour time and costs and does not require the use of a spring compressor.

Exhaust supply boost for the popular Leon

Klarius Products has extended its range by 14 aftermarket emissions components, including full exhaust systems for a couple of variants of the SEAT León.

The supplier has an extensive range of over 11,000 parts in its catalogue, backed by next-day delivery for orders placed before 5:30pm and a 'Fit-first time guarantee'.



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Driven by Quality

Chance to Win some Garage Essentials!

The latest edition of the Tool Promotion catalogue from SEALEY contains 1,400 products and 60 new lines. This issue focuses on Vehicle Maintenance, Heaters, and Lighting, as well as discounts on selected products across all ranges.

Additions to the vehicle service range, include the AK527 Bumping Mallet, designed with a hex head shape for evenly distributed force, and the AK528 Dashboard Protection Set, for use during windscreen removal.

The AK9991 Digital Inclinometer with laser line, is for measuring angles and tilt percentages. It has four magnetic sides so can firmly attach to metal surfaces and is compact, so can fit into tight spots. The tool can be useful when setting suspension camber and caster, collision avoidance bumper mounted radar and parking assist systems.



Two new impact socket sets in 3/8" and 1/2"Sq Drive are available, both include colour-coded rings and enlarged socket size text for fast identification.

One lucky entrant will win a bumper prize in its latest online competition – a Garage Essentials bundle that comprises a trolley jack, axle stands, creeper, impact wrench, inspection lamp and a selection of hand tools, valued at over £800.

www.sealey.co.uk



Flying carpet ride

The new Tiguan, Passat Variant, Skoda Superb and Kodiaq models will feature KYB's new electronically controlled shock absorbers.

DCC Pro systems use double valve shock absorbers to independently control the extensions and compression oscillations caused by the car body and the wheel movements while driving. The damping characteristics are automatically adjusted in a continuous way to suit road conditions, resulting in what is described by KYB as a 'flying carpet' ride experience.

KYB and the VW Group have been working together for several years, including the sporty Audi RS suspension, and since then have co-operated extensively for the VW brand.



Ignition coil boost

Denso's ignition range has grown with the addition of 14 coils that are linked to 21 original equipment (OE) part numbers, catering for 1,649 passenger car applications, many for high-end models.

All these new additions are available immediately from DENSO distributors and can be found in the company's E-catalogue **www.denso-am.eu/catalog** or via TecDoc.

Winter challenges: Starter motors & alternators

Vehicles face increased demands on their electrical systems throughout the colder months, leading to a higher rate of alternator failures. Autoelectro's Harnek Bhogal highlights how its remanufactured units rise to the challenges...

https://autotechnician.co.uk/winter-challenges-starter-motors-alternators/



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Bringing light into the darkest corners

Philips' workshop lights range has expanded with half a dozen lights, adding three flood lights and, most recently, an under-bonnet light, a head light and a Penlight.

Three Xperion 6000 flood lights, designed using feedback from a group of mechanics, focus the beam where needed and play music while you work. The Philips Xperion 6000 Flood and Flood Audio lights illuminate large, dark areas, producing 1,000 lumens from just 10 Watts of power within a wide beam. If less light and longer battery life are needed, the lamp can be dimmed to just 100-lumens. The compact Xperion 6000 Flood Mini delivers 500 lumens with the same adjustable beam as the Flood.

Every Xperion 6000 Flood light offers a variable beam and a focused beam that concentrates illumination within small areas, ideal for detailed inspections. "We worked closely with mechanics to design the beam adjustment mechanism from wide flood to focused illumination. Our collaboration resulted in an ergonomic smart-zoom knob that makes it easy to adjust the beam, even with gloves on," said Pascal Charvat, Work Light Product Manager at Lumileds. The smart light also remembers a user's last setting and restarts at this intensity.

Users can connect a phone or media player to the Philips Xperion Flood Audio and listen to music through its



integrated speakers. Both the Flood and Flood Audio can be remotely powered on or off by waving a hand and the motion sensor only responds to a specific double-wave gesture and ignores unintended movements. They can also be used as a power bank to charge other devices, such as a phone. The smart handle can be used as a support to hold the light up by itself, as a hook to hang the light from, screwed onto a tripod, or attached to any metal surface with its integrated magnets.

www.philips.co.uk/c-e/au/led-work-lights/

Cleevely EV plugs supply chain gap

The increased weight of an Electric Vehicle battery, coupled with the instant torque from the electric motor, places additional stresses on steering and suspension components, making their replacement a frequent job, according to EV servicing and repairs specialist Cleevely EV.

By 2020, the sheer volume of work seen at Cleevely EV highlighted a shortage of EV parts in the supply chain. "We had customers coming to us in big numbers, many hanging around for the day having travelled a long way," said Matt Cleevely. "If their car failed an MOT or we found ball joint play during a service, they'd be stuck because we couldn't get the parts." So, they launched their own EV parts department and now support other garages.

The steering and suspension range includes high quality suspension arms, ball joints and bushes for the UK's most popular EVs. Orders placed before 10.30am are packed and dispatched for next day delivery.

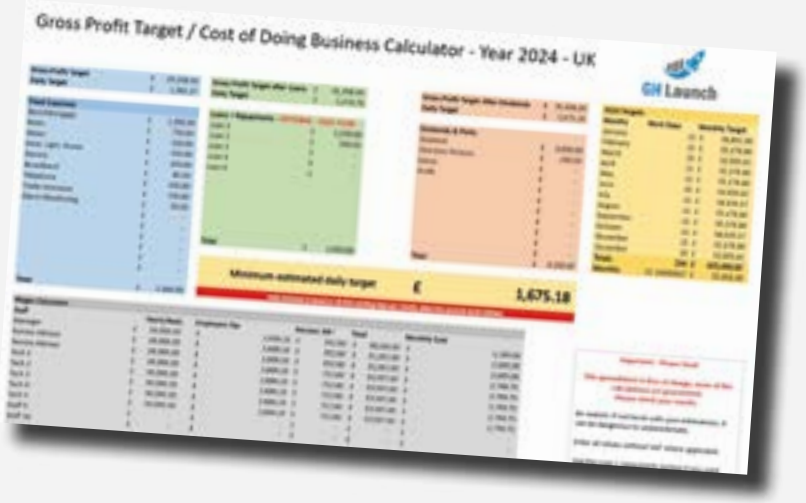
"We deliberately only stock parts for EV-specific models," said Matt. "If it's a steering and suspension part for a petrol or diesel derived EV, these are readily available from your local factor."

Garages can order parts from Cleevely EV online at **www.cleevelyev.co.uk/ev-parts-shop/**. Alternatively, they can call 01242 308006 to place an order.





Profit calculator ideal for business planning



Community-driven Garage Management Software Garage Hive has released its 2024 gross profit calculator. The resource is free to download and helps workshops establish their gross profit and the efficiency required to cover daily business running costs.

Garages can enter their overheads into the spreadsheet template, and it automatically generates daily and monthly gross profit targets. The calculator has been updated to account for an extra three working days due to the leap year, one less bank holiday and one less weekend day compared to 2023.

"With this data you can plan-ahead and be intentional about business changes. It is about making informed decisions," says Garage Hive Director Alex Lindley.

The tool unveils the true cost of doing business, considering fixed expenses, such as rent/mortgage, utilities, and software subscriptions. Loans and repayments, dividend payments, wages, and all additional expenses such as training, building maintenance and office supplies, are calculated.

Workshops can customise the overhead fields to suit their needs and versions are available for garages in both the UK and Ireland.

Garage Hive was recently named Garage Management System of the Year at the Independent Garage Association's (IGA) British Independent Garage (BIG) Awards 2023. The system helps garages to streamline operations, optimise workflow, and enhance overall efficiency to achieve the targets set out by the calculator.

The gross profit calculator can be downloaded for free at **www.ghlaunch.com/gp**.

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