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Information for the Independent Mercedes-Benz Service Professional

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Number 1



CONNECTIONS COME FIRST

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TO OUR READERS:

Welcome to STARTUNED, the magazine for independent service technicians working on Mercedes-Benz vehicles. Your Mercedes-Benz dealer sponsors STARTUNED and provides the information coming your way in each issue.

Mercedes-Benz wants to present the information you need to know to diagnose and repair Mercedes-Benz vehicles accurately, quickly and the first time; text, graphics, on-line and other technical sources combine to make this possible.

Feature articles, derived from approved company sources, focus on being useful and interesting.

Our digest of technical information can help you solve unanticipated problems quickly and expertly.

We want STARTUNED to be both helpful and informative, so please let us know just what kinds of features and other diagnostic services you'd like to see in it. We'll continue to bring you selected service bulletins from Mercedes-Benz and articles covering the different systems on these vehicles.

Send your suggestions, questions or comments to us at: STARTUNED

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Visit us at our web site

www.MBWholesaleParts.com to view this issue and past issues of StarTuned, along with a wealth of information on Genuine Mercedes-Benz Parts.

To locate a Mercedes-Benz dealer near you, go to www.mbusa.com.

Connections Come First

With the advent of the computer, electronics have exploded in every aspect of our lives, and the automobile is no different. Mercedes-Benz is arguably the most technologically-advanced automaker in the world, but regardless of how sophisticated and productive, all M-B electronics still rely on basic wiring connections. It's our job to keep all those connections clean, tight, and moisture-free to make everything in the electronics chain – and the vehicle -- work the way it should.



Think about this for a second: The 1886 Benz Patent Motorwagen had no electrical system whatsoever! Not one wire in the whole vehicle. How far we've come in 128 years.

diagram, you can see that the wiring for both the switch and the motor pass through the connector in the door, which in our example is X35/4.

Since we know both the inputs from the switch and the output control travel through this connector, we can check the connections without having to pull off the door panel. This connection is normally well-insulated from moisture and corrosion, but improper repair procedures may introduce conditions that allow moisture to corrode the electrical connection, especially if a connector is mounted outside the confines of the body where water can infiltrate as it drains away.

WATER, WATER, EVERYWHERE...

Now that you know where to look, you can perform manual electrical testing. For this you will need a digital multi-meter (DMM) to measure the actual voltage, amperage, and resistance, depending on how you go about your testing.

You can measure resistance with the ohmmeter function of the DMM from the source of supply voltage and the component it supplies.

This testing is possible, but can be difficult. Often the power supply is some distance away from the component it is supplying, and DMMs can't supply anywhere near enough current to put a significant load on the circuit. For instance, a high-current item such as a fuel pump may not be getting sufficient voltage to operate, but the power supply wire may show no significant signs of high resistance in the circuit when ohms are measured with a DMM.

VOLTAGE DROP

Measuring voltage drop is the generally-accepted way to test the integrity of a circuit. Voltage drop is often thought of as the voltage found on the ground side of an improperly functioning circuit, but can occur anywhere



In this example, we had fuel trim codes and mild drivability issues. We checked the wiring at the MAF to verify proper function and found that the power supply voltage was 11.16V, lower than normal. This test told us to look at the power supply wiring.



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along the line of a circuit. This can result from wires that are corroded through from exposure to moisture or otherwise damaged, or from a connection where water has penetrated the seals and has caused oxidation.

NEED PRECISE MEASUREMENT

Feeling for heat in wires and connections and using a 12V test light are crude ways of uncovering resistance and inadequate supply voltage. They may work in a rudimentary fashion for simple switches directly supplying power or ground to a circuit, but you won't be able to quantify your findings, and the test light can draw enough current to damage a delicate electronic device.

With computer-controlled outputs, reference, and signal voltages, you need more precise instruments to verify proper supply voltage, current draw, and ground potential. The DMM or a graphing multi-meter is appropriate for performing these tests, but you must know what you are looking for.

To properly test a component in an electrical system, you need to know the path it follows in the car. You can get this information from a detailed wiring diagram such as the ones found in ETMs available on www.startekinfo.com. Some aftermarket information systems also supply wiring diagrams, but they do not always include a detailed account of all the connectors and splices in the circuit.

The diagrams found on the Mercedes-Benz technical website provide the exact circuit path,



By inspecting the wiring coming out of the front SAM and powering up the MAF, you can see that someone has spliced aftermarket wiring into the original harness. This could be the cause of damage to the front SAM. So, it's important to visually inspect the wiring if you have a problem with a control unit.

with a detailed account of the connectors and links built into the wiring that allows you to quickly identify the location of various connectors.

This procedure can save you a lot of time when it comes to diagnosing a wiring problem. Once you have located the various connectors in the circuit where there is trouble, you can begin electrical testing. The first step in measuring voltage drop with this procedure is to know what the battery voltage is, and on vehicles with dual battery systems this is not always as straightforward as you might think. You need to measure the voltage supply at the source, and a properly charged battery will produce 12.6 volts with little to no load.

Of course, when you turn the ignition key on, the entire car will put a load on the battery -- but the voltage should only drop slightly. If you are leaving the key turned on while you are testing circuits, you should install a voltage maintainer/battery charger.

ACCEPTABLE AND UNACCEPTABLE VOLTAGE DROP

Once you have determined supply voltage, measure the voltage at the next connection. It is generally accepted that 0.1V is acceptable voltage drop across a connection. Keep in mind that every connection from the battery supply should be considered, and drops should be added up. This means the battery terminal, the terminal at the battery control unit, the connection at the front SAM, etc. If your circuit path is through five connections, you can lose up to 0.5V at the end of the circuit. This is normal and is to be expected.

If the voltage drops lower than that, you have a poor connection somewhere along the current path. Using the ETMs, go to the connections one by one and measure the voltage drop across each. This is accomplished by back-probing one side of the connector with the red test lead and the other side of the connector with the black test lead.

You can use the meter to measure the voltage difference between two connector halves. If you find a difference of 0.1V or less, it is a good connection. You can also keep the black lead attached to the battery ground terminal and

use the red lead to back-probe each connection along the circuit path -- expect no more than a 0.1V drop each as you get farther away from the battery. Keep in mind that if you use the negative battery terminal as the ground reference, you are measuring the drop on the basic ground wires and connections of the circuit as well. If your voltage drop adds up to be excessive, you may have a bad ground -- perhaps something as simple as where a wire is bolted to the engine or the firewall.

The example we have shown here is the power supply of the MAF on a 220 chassis. The power supply comes from the front SAM to the Z7/38 leg. The engine management system was setting fuel trim codes. We suspected a bad MAF, but while testing the MAF directly we measured only 11.16V coming out of the front SAM to the MAF. We measured 12.4V coming out of the front SAM supplying the ignition coils, so replacing the MAF would have been an unnecessary expense and an embarrassment.

We determined it was a bad front SAM module. We jumped battery voltage to the MAF and the problem was temporarily solved. The voltage drop occurred in the front SAM. After inspecting the



After replacing and programming the front SAM, we were able to restore battery voltage to the MAF. This corrected our drivability problem and the fuel trim codes did not return. With only a quick glance -- and without testing -- at the operation of the MAF we might have replaced it, with no positive results and with the problem still present. Always be sure to verify the power and ground to solenoids, relays, and even sensors before rushing to replace.

wiring harness we noticed some aftermarket wiring had been added to the MAF power supply, and this probably caused the damage to the front SAM.

It is always important to check for the water intrusion that causes corrosion in both outside and inside connectors. Water can leak past worn door seals and lighting fixtures, and you should check these seals regularly along with the lower portions of the body such as the trunk, hatchback, and cabin flooring for evidence of leaks and plugged drains. Make sure convertible top and sunroof drains are clear so water does not get trapped, build up, and flow into connectors and harness splices inside the vehicle.

LIKELY CONNECTION PROBLEMS

The most common culprits in a system with weak or failing connections are:

- Water infiltration that causes corrosion.
- Broken wires from faulty procedures during repairs.
- Corrosion under bolts or screws that ground a circuit.
- Loose pin, spade, or threaded connections.

Obviously, if you find a bad or weak connection somewhere in the system, it's the first thing to attend to before going deeper into diagnosis, or replacing components. This kind of attention to the basics will often save you the time you might have spent on high-tech troubleshooting, and make you a hero to your customer. |



On this 164 chassis, the automatic rear hatch stopped working. A visual inspection revealed water intrusion that caused serious, unmistakable corrosion in the wiring for the hatch motor and control unit. Your Mercedes-Benz dealer can supply the factory connectors and replacement wiring with factory pin connections to repair damaged harnesses.



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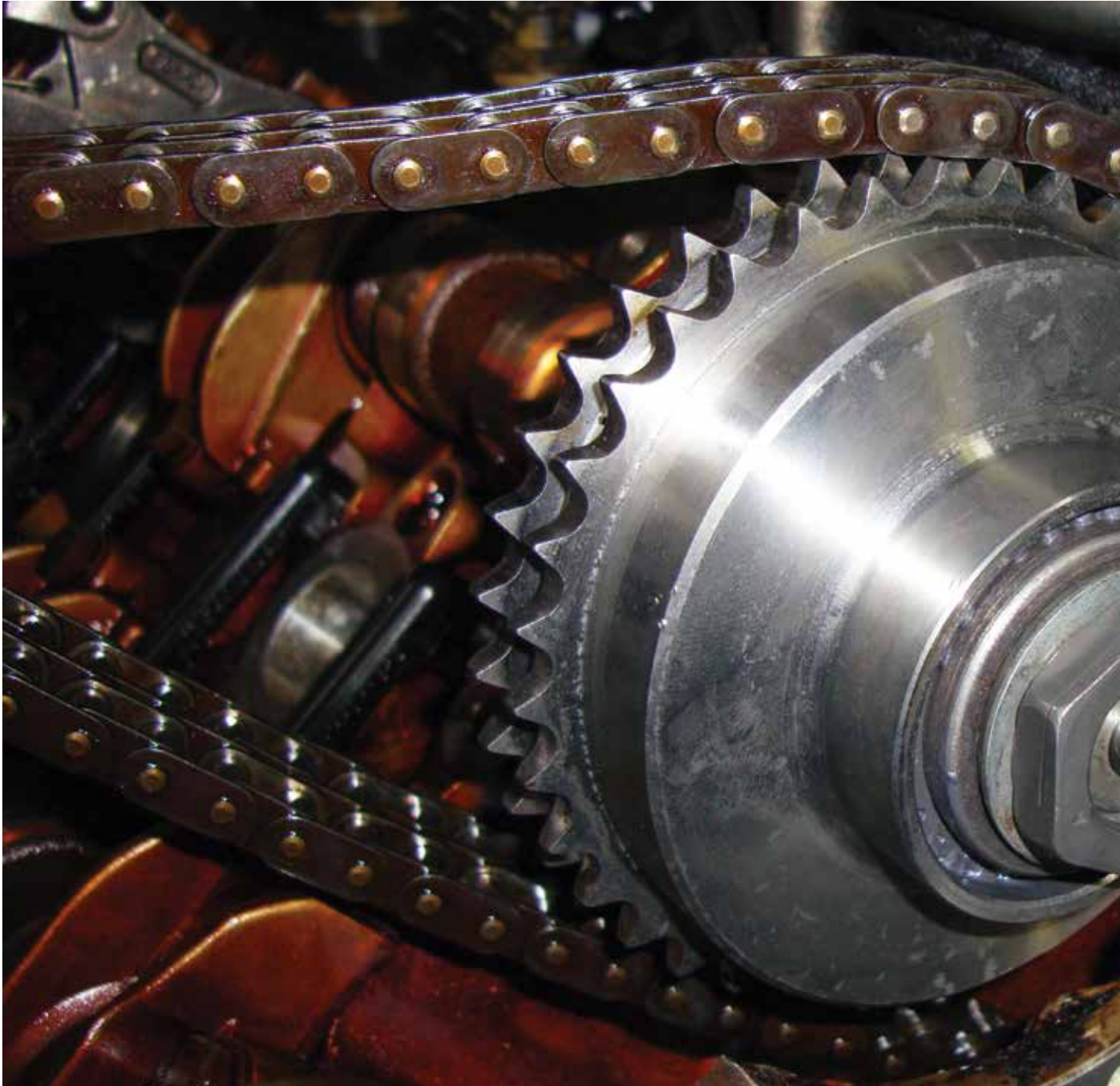
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VVT: The Best of Both Worlds

We are a demanding people. We want to buy high-performance cars, but we don't want to deal with the hard-starting and "lumpy" idle that come with high-profile, long-duration camshafts. How can engineers make more power and yet still give us a smooth idle?



Think of an automobile engine as an air pump. That's all it is, an air pump. The only difference is it is a self-powered air pump. We should all know the four phases of an Otto-cycle internal combustion engine: Intake, Compression, Ignition and Exhaust, in that exact order. Now, this may sound simple, but it really isn't. Engineers learned a long time ago the timing of the intake, compression, ignition and exhaust determines the state of tune of the engine.



If you have a portable gasoline-powered generator, you know that when you start the engine it only runs at one speed. An engineer will have designed it to open the intake valve, close the intake valve, ignite the air/fuel mixture, and finally open the exhaust valve allowing the spent combustion gases to escape all at the proper and most efficient time for that rpm. It's not a particularly difficult task to design an engine to run efficiently within one specific rpm range.

Simple enough for a generator, but automobile engines don't spin at one specific rpm. Instead, they must be able to make enough compression to start while being spun by an electric motor at 150 to 250 rpm, then continue to produce power up to 6,000rpm or more. Even though most cars are capable of doing this, it is not so easy to engineer. The problem is that at low rpm the air is flowing through the engine (the air pump) more slowly than at high rpm. The valve timing needs to match the air flow if efficiency is to be gained. This is known as the engine's volumetric-efficiency -- the amount of air that it can flow at a given rpm with the current valve timing. If an engine is designed with ideal valve timing for low revs, the air flow will be insufficient at high speed and restrict power output.

VALVE TIMING LIMITATIONS

If, on the other hand, an engine is designed to work best at high rpm it will "breathe" better and produce more power, but its volumetric efficiency will be low at low rpm. This means the car will be hard to start and not produce power until the driver revs the engine and gets it up into the "power-band." If you were a mechanic in the 1960s, you may remember the procedure of "re-degreeting" a camshaft. By advancing or retarding the valve timing, you would change the relative position of the power-band. What if a system could be developed that could vary the valve timing dynamically so it could be retarded at low rpm, then advanced at high rpm? That would represent the best of both worlds: smooth running at low rpm, and the ability to generate more power at high rpm. Since as early as 1990, Mercedes-Benz has used variable valve timing to broaden the power band of its engines.

Early systems keep the intake camshaft in the relatively retarded position while starting and at low rpm, and advance the intake cam timing at higher rpm. The means of doing this are cleverly-conceived. Hydraulic actuators in the cam sprockets are used to vary the valve timing. Oil pressure is fed through an electrical solenoid valve to the actuator. At low rpm, oil pressure, with the help of a return spring, keeps the valve timing retarded. At higher rpm, the PCM energizes the solenoid. This action pulls on a valve in the actuator that redirects the oil pressure and moves the piston inside the cam sprocket actuator. The piston moves along a helical gear and changes the position of the sprocket relative to the camshaft. The grooves in the gear are cut to move the intake camshaft in the advance direction, thus opening the intake valves sooner.

Later-model Mercedes-Benz engines such as the M272 use “vane-type” cam actuators and vary the valve timing of both the intake and exhaust camshafts. This gives the engineers a lot of latitude in achieving volumetric efficiency throughout a broader rpm range.

EXHAUST VALVE TIMING?

While advancing valve timing to generate additional power is a

On early 112, 113, 119, etc. engines, only the intake cam had variable valve timing. Oil pressure and a spring kept the intake cam in the retarded position. The solenoid pulled on a shaft and altered the oil flow moving an inner piston along a helical-cut gear thereby advancing intake valve timing.





On this early system, a repair requires the replacement of the entire camshaft. Speak with your Mercedes-Benz dealer's parts specialist who can recommend all the hardware needed to do the job. This can save you several parts-acquisition trips.

good thing, there's more to the story. Advancing exhaust valve timing would allow unburned fuel to exit the combustion chamber and increase harmful emissions. Retarding the exhaust cam timing, on the other hand, allows some of the exhaust gas to stick around for the next combustion cycle. Recycling exhaust gases into the combustion process has been done for years to reduce combustion chamber temperatures and cut NOx production. Exhaust Gas Recirculation (EGR) does just that – dilute the air/fuel charge for a cooler burn. By retarding the exhaust valve timing and leaving some exhaust gas around for the next combustion cycle you achieve the same thing. In fact, this is known as the “EGR Effect.” Federal emissions regulations require that a manufacturer do all it can to reduce harmful emissions and increase fuel economy. This is why the M272 motor and others vary the valve timing for both intake and exhaust camshafts.



Looking at the passenger side bank at the front of the engine you can see the cam actuator solenoid mounted with three Torx bolts. Just to the left of it is the cam sensor for that actuator. Each actuator has its own cam sensor so the ME control unit can monitor what position the camshaft is in relative to that of the crankshaft.

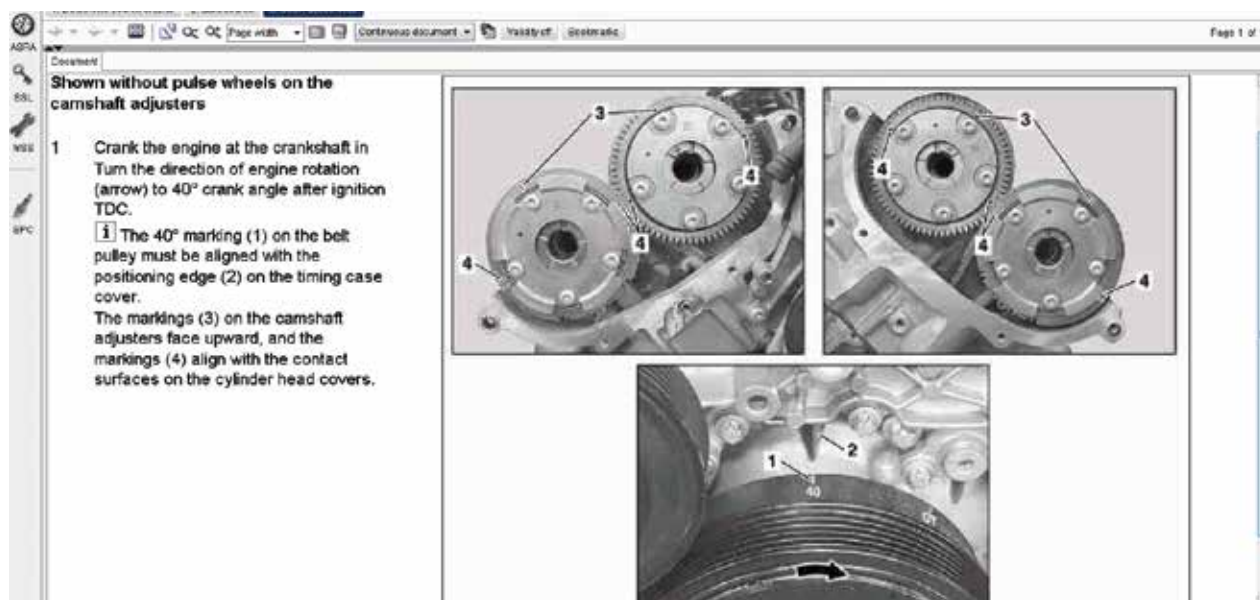
You can monitor the position of the intake and exhaust camshafts on your Xentry software SDS. The values are given in degrees, which indicate the position of the intake and exhaust camshafts. The positions are read by the cam position sensors and they are compared to the signal from the crankshaft position sensor. On later models (272 and later), there are four cam position sensors -- right intake, right exhaust, left intake, and left exhaust. With this array of sensors the ME control unit can determine the engine's exact position with the ignition key on even before the engine is cranked, which helps reduce crank times. It also allows the cam position to be monitored relative to the crank position, and the variable valve timing to be measured and controlled. Of course, it can also detect if there is a problem. If a cam sensor stays in the advanced position or does not return fast enough, the ME can figure out if the actuator is sticking.

IF ACTUATORS RELY ON OIL PRESSURE...?

Each of these actuators (two intake and two exhaust on V8s) are of the vane type and rely on oil pressure to help the actuator move between the advanced and the retarded position. If the

improper (non-synthetic) oil is used, sludge can develop in the actuators causing them to stick in either the advanced or retarded position. This can cause the ME to flag a code. This is one reason it is critical that only Mercedes-Benz approved engine oils are used at the recommended service intervals. If the camshaft actuators are sticking, you will need to replace them. This is the equivalent to doing a timing chain job since the cam sprockets will need to be removed. If you are servicing the actuators, make sure you have all the proper tools for setting valve timing, and carefully read the instructions for the procedure. Each actuator must be in the correct position when it is installed on the camshaft. With a paid subscription to www.startekinfo.com, you will have access to the proper procedures and a list of the special tools required, if any, to complete the job.

As with any electronically-controlled system, you should back up your scan tool results with electrical and mechanical testing. The basics should not be overlooked when diagnosing a problem. Keep in mind that if you test the cranking or running compression when you suspect a stuck camshaft actuator, your readings



If you have diagnosed a bad camshaft actuator, you can access step-by-step repair techniques on WIS (Workshop Information Systems) with a paid subscription to www.startekinfo.com. You will also see what special tools, if any, are required to do the job. Here, we are measuring the basic setting of the intake and exhaust cams.

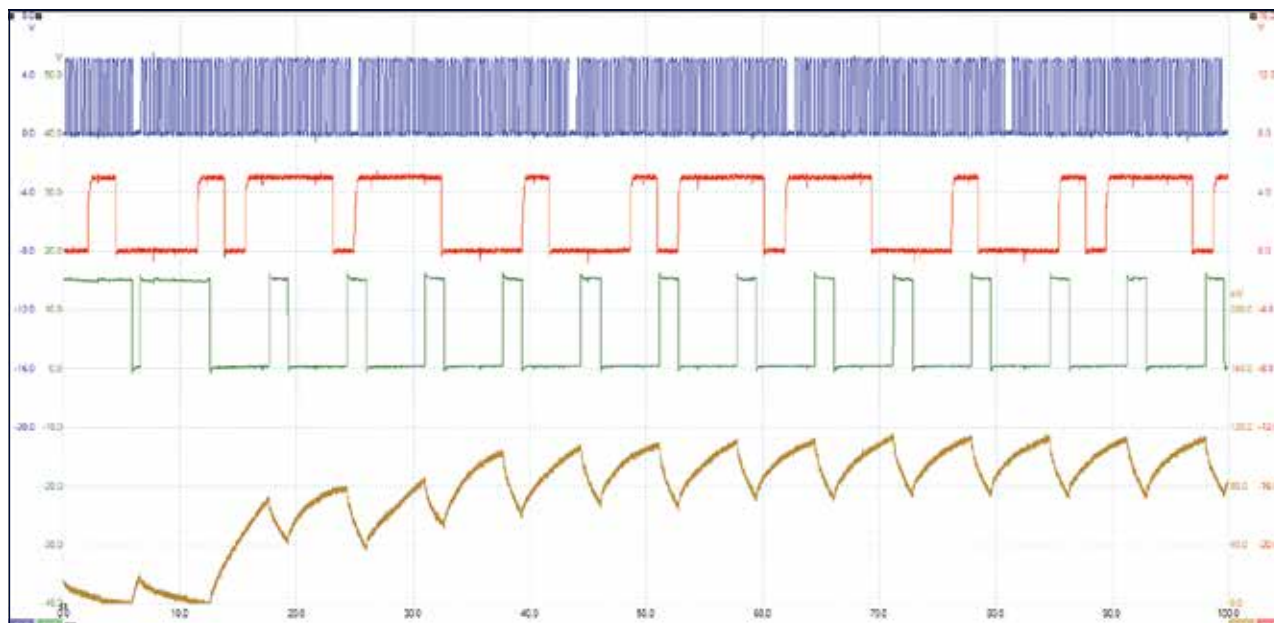
will show only subtle differences from one bank to the other. The diagnostic trouble code (DTC) present should direct your testing. If you have a circuit code for a camshaft actuator solenoid, you should verify that you have voltage to the component with the key on, and check the integrity of the wire from the actuator to the control unit. This is quite simple since the control unit is mounted on top of the intake manifold. You can use a DMM or an oscilloscope to watch the control unit switch the actuator solenoid on and off. If the control unit is not advancing or retarding the valve timing, note if it is pulsing the solenoid to ground with a very small duty cycle. To change the valve timing, the ME control unit increases the duty cycle of the cam actuator solenoid to ground.

SEEING WHAT THE ME SEES

If you have a dual-trace oscilloscope, you can watch the relationship of the crank sensor and cam sensor signals while actuating the solenoid through your Xentry SDS unit. Under “Actuations,” you can control each cam individually and watch the degree readings change. You will be directed to rev the engine to between 3,000 and 3,500 rpm

to perform the test. You can also see the cam/crank sync change on your scope if everything is working properly. Older Mercedes-Benz engines such as the 112, 113, and 119 used AC pulse generator crank and cam sensors. Cam sensors evolved into three-wire Hall-effect sensors. The more modern M272 engines and later use three-wire Hall-effect sensors for both the cam and crank sensors. These newer sensors require a reference voltage, signal voltage, and ground. Scope the signal wires for the cam and crank shaft sensors.

You will see consistent pulses with a single TDC pulse from the crank sensor. The cam sensor will have four for each revolution. By the way, if the camshaft impulse wheel (what passes by the cam sensor) needs to be removed to service other components, it must be replaced. The mechanical work of setting up the VVT actuators will be covered in future issues of StarTuned. Understanding how these systems work should give you a greater understanding of what to do if something goes wrong. Consider your Mercedes-Benz parts supplier as your partner in this effort. |



This oscilloscope is monitoring the driver's side intake cam. The top trace is the crank sensor -- notice the TDC cutout in the pattern. The second trace is the cam sensor pattern (each cam sensor pattern is unique). The third trace is the control of the actuator. Notice the duty cycle change as the cam is actuated in the beginning of the pattern. The bottom trace is the amp draw of the solenoid. It pulses with the actuation and averages about one amp when activated.

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Why You Should Use Only Genuine Mercedes-Benz Brake Parts

Great stopping power, pleasant pedal feel, no noise or pulsation, and long life are all good reasons to buy friction components and everything that goes with them from your local M-B dealer's parts department. Your customers recognize quality and value or they wouldn't be driving Mercedes-Benz vehicles in the first place, so explaining the following points to them should make them happy that they are choosing the best in brake parts – and a shop that's offering only that.



Where safety is concerned, Mercedes-Benz engineers represent a paradox: They're both forward-thinking and conservative at the same time. Certainly, they investigate and develop any new concept that might help keep Mercedes-Benz drivers and passengers from bodily harm, but nothing gets put into production until it's been tested and proven to an extent you might find hard to believe. This is true not only of systems designs, but also of the materials and manufacturing processes used to produce the components. Therefore, the only way to feel confident that those systems will continue to function as designed is to use genuine O.E. replacement parts. This is especially so with brakes, as we shall see.

BIG BUSINESS

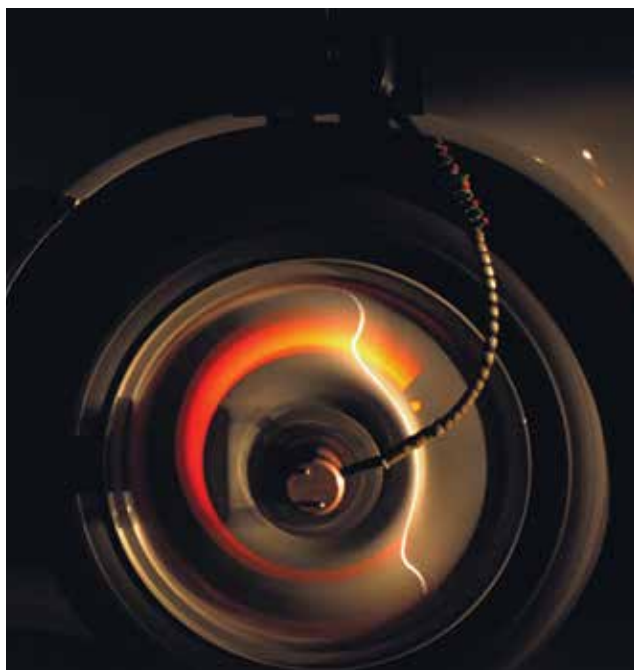
Although many other areas of automotive service are shrinking as cars continue to get better and better, brakes are an exception. No matter how modern and well-made they may be, it's in the nature of brake friction components to

be sacrificial – you might call them consumables. Given that people are driving more than they did in years past, and in ever-increasing stop-and-go traffic, the market for brake work is actually growing. Another factor is the addition of high-tech on-board braking enhancements from ABS to Mercedes-Benz's exclusive BAS (Brake Assist System) and SBC (Sensotronic Brake Control). In the long life expected of that company's vehicles, there's always a chance that these systems will need repair. So, it's a pretty sure thing that this area of service represents a very large chunk of your business income. That's one reason why it's important that you manage it properly. Not only in terms of customer relations, but also by making wise parts-purchasing decisions. Think quality and value, not just price, and you'll reap benefits in not only profitability, but also in freedom from frustration and worry. Let's put it this way: How much is peace of mind worth to you?

RECIPE FOR SUCCESS

Linings are the first thing that comes to mind when you hear the term "brake job." They bear the brunt of converting kinetic energy into heat energy, and are consumed in the process. How well they do that, how much noise and dust they make while they're at it, pedal feel, and how long they last are all dependent on what's known as the "recipe" of the friction material. For generations, there was just one ingredient, that dangerous, thready mineral asbestos. It was phased out almost completely three decades ago not only because of health concerns, but also because formulations with better performance characteristics were needed anyway.

The wholesale conversion to semi-mets, non-asbestos-organics (NAOs), and ceramics amounted to a major teething process throughout the industry, with one notable exception: Mercedes-Benz. Its lining formulas/recipes were always much less apt to cause squeal, eat rotors, or make dust than those of other manufacturers, or of aftermarket brands. That was because cost wasn't the primary factor in deciding what would go into those pads; performance was.



Nobody does more exhaustive testing than Mercedes-Benz engineers. We hope your customers never get their brakes this hot, but even if they do they're covered – providing they've opted for genuine M-B friction components. It's your job to advise them to do so.

That is still the case. When you buy genuine O.E. Mercedes-Benz pads from your local dealer's parts department, you can be sure you're getting the same formulation that the engineers hit upon while designing the brake system for that particular model. They won't be something that will merely fit physically, but lack the proper performance characteristics.

Another advantage to buying pads from your local Mercedes-Benz dealer's parts department is that you get everything you need for the job in the package.



HORROR STORIES

Historically, Mercedes-Benz has done a better job formulating, producing, and testing its friction materials than some other car makers we can think of. We particularly remember many thoroughly-unpleasant, even frightening, examples of ill-conceived brake lining materials and shoddily-made pads from both O.E. and aftermarket companies.

First, there was a domestic car from the early semi-met era. The original linings were so hard and abrasive that on the first brake check you'd find that the pads were still thick, but the rotors were worn down past their throw-away spec. Or, how about a powerful sports car whose brakes felt as if you were pushing cinder blocks against the discs? It made you cringe and avoid stopping at all costs.

Then there was the time we road tested a domestic minivan right after the installation of O.E. pads at a dealership and ended up rolling through a red light into the middle of an intersection even though we were pressing on the pedal with both feet. Another example was a car in which the new aftermarket brakes would fade out completely on the first stop after any drive (the transmission and the parking brake were the inadequate, but only, means of dicey deceleration). It turns out that the aftermarket linings were made way too thick, so even with the caliper pistons bottomed they dragged continuously against the rotor and overheated.

Some of those cases are from long ago, others not so much. Although things have generally improved throughout the industry, we don't think using anything but genuine M-B O.E. linings is worth the risk. After all, they have an unsurpassed track record.



As long as you see that three-pointed star emblem on the back of the pad, you won't be causing these kinds of catastrophes.



DISCORAMA

The other half of the energy-conversion device we call a disc brake is, of course, the rotor. There's so much to this subject that it would easily justify a whole StarTuned feature, so we'll just hit the high points here.

First, almost nobody turns Mercedes-Benz discs anymore. As one successful M-B service manager told us some years ago, "We threw our brake lathe in the trash." That's a big change from traditional American brake service, and something your patrons may give you an argument about since they've probably been hearing about brake rotor machining ever since they bought their first car.

There are lots of good reasons to choose replacement over the lathe, however. First, although the machining of M-B rotors was regularly done in independent shops for decades, the company doesn't approve of this operation because the O.E. tolerances aren't reproducible in the field. Next, when you subtract the labor of turning rotors in a workmanlike manner on a well-maintained lathe, then cleaning them thoroughly (the avoidance of which task is a common cause of squeak and squeal), the difference between that alternative and installing new isn't so great after all. In the case of cross-drilled discs, machining is not allowed, period.

It's not likely that you'll ever have one of these super-high-performance McClarens in your shop with their fiber-reinforced ceramic-composite discs, but they show that Mercedes-Benz is on the cutting edge. Of course, machining is not an option here.



Perhaps you've been expending a lot of work cleaning that nice rust-preventative coating off a new rotor before putting it into service. You can stop now. It's meant to stay on.

Besides being fast, rotor replacement amounts to a profitable parts sale for the shop. But how do you choose among the available options? Do you try to save the customer a few dollars, or would you rather feel confident that the job won't come back to haunt you?

An independent shop owner tells us, "We've tried premium aftermarket rotors from one of the biggest disc manufacturers in the world, but we got warpage and comebacks. So, we did a little research and found that these parts weighed about two lbs. less than the original equipment discs. When we told the manufacturer about this, they said, essentially, 'take it or leave it.' We left it, and now we use only O.E. rotors."

A delicate diplomatic situation may come up that complicates your used disc/new disc decision. Suppose you replaced a regular customer's rotors with the proper O.E. units at the last reline. Now, he or she's been driving a lot and has worn out the

pads in a relatively short period of time. You've wisely adopted the no-cut policy, but there's still plenty of meat left on the existing discs to assure they won't wear past the throwaway-thickness in the next cycle. You can't help but feel that selling this loyal patron another new set of rotors after just, say, 30,000 miles might be perceived as excessive, even if he or she trusts you enough to bite the bullet. That, of course, puts an even heavier responsibility on you to do the right thing in this particular case. So, if there's no evidence of pulsation, you might opt to just install new linings. While the notion of "hanging pads" might be offensive to your sense of craftsmanship, there are cases where it's the only reasonable route. Just make sure you do it right so that you don't generate a comeback.

CRYSTAL BALL

We should mention an excellent tool for the sale of new discs: rotor forecasting. Although you can find values for new and minimum thicknesses,



Our digital disc micrometer gives us fast readings, which we can use as a basis for rotor forecasting.

and wear limits for maintenance, on WIS, the following method can transform hands-on measurements into a powerful justification for the replacement route. The idea is to take the original thickness of the disc (look it up, or measure an unworn area), then subtract the current thickness from that number, which will give you the amount of iron reduction the wearing out of one set of linings results in (or, if this is a second reline, two sets, and so on). Typically, this will be 0.032 to 0.040 in., or 0.8 to 1.0mm per cycle. If the rotor has more than that left, you can reuse the discs

as-is and just hang those pads. On the other hand, if that subtraction puts you below throw-away, you're leaving yourself open to both complaints and liability. It's easy math to explain to your customers, and if you handle it right you should sell a lot more new rotors.

We'll conclude with some practical points:

- Genuine Mercedes-Benz replacement rotors come with an even, light-gray rust-preventative coating. You may have heard that this should be removed before installation, but that's not true. The word from Europe is, "This highly effective surface protection enables installation without additional cleaning of the brake disc and full braking effect from the first braking movement is fully guaranteed."
- M-B has made special "cleaning pads" available to improve the wear surface of rotors that are to be reused without taking a lot of meat off. You drive no more than 300 meters at 30 kph (roughly 300 yards at 20 mph) while repeatedly applying the brakes moderately.
- Since Mercedes-Benz owners typically keep their cars for a very long time, you are probably still servicing older models with one-piece hubs and rotors. If you're following the "no turn 'em" philosophy, you should think about repacking wheel bearings and replacing the grease seal when a rotor is reused.
- There's a factor that might cause problems with aftermarket rotors that most people aren't aware of: hub chamfer. If the angle doesn't match the hub exactly, the disc won't seat right, leading to trouble with runout and heat dissipation, yet some cheap items just use, say, 45 deg. as a one-size-fits-all manufacturing convenience.
- The best-made rotors possible will tend to warp if you tighten the lugs with blasts from your thermonuclear impact wrench. Use a torque wrench in the star pattern. |



We've been talking about front brakes, but who wants squeaks or squeals in the rears? You've also got the little parking brake shoes and their mechanism to think about. No problem if you use genuine M-B parts.

Mercedes-Benz Mobil 1

| Product Name | Part Number | Quantity | Product Description | Recommended Consumer Applications |
|---|-----------------|---------------------|--|---|
| Mercedes-Benz SPEC. | | | | |
| Mobil 1 Formula M 5W-40 | BQ 1 09 0144 | Bulk - No Equipment | Fully synthetic formulas designed specifically for gasoline passenger cars | Low SPAsh. Available at most MB dealers |
| | BQ 1 09 0162 | 6/1 Quart Cases | | |
| | BQ 1 09 0151 | 55 Gallon Drum | | |
| Genuine Mercedes-Benz Oil MB 229.5 Specification SAE 5W-30 | A0009898301USA6 | 12x1 Quart Cases | Fully Synthetic formula specifically designed for Mercedes-Benz engines that require the 229.5 Specification | Mercedes-Benz Engines that require 229.5 Specification Oil |
| | A0009898301USA8 | 55 Gallon Drum | | |
| | A0009898301USA9 | Bulk - No Equipment | | |
| Mobil 1 0W-40 | BQ 1 09 0010 | Bulk - No Equipment | Fully synthetic formulation designed to meet the requirements of many European vehicles | Porsche A40. Many European vehicles. HT/TS applications. |
| | BQ 1 09 0015 | 6/1 Quart Cases | | |
| | BQ 1 09 0016 | 55 Gallon Drum | | |
| Mobil 1 ESP Formula M 5W-40 | BQ 1 09 0135 | Bulk - No Equipment | Advanced full synthetic formulas designed specifically for diesel passenger cars that have particulate filters | Low SPAsh. Available at most MB dealers |
| | BQ 1 09 0142 | 6/1 Quart Cases | | |
| | BQ 1 09 0143 | 55 Gallon Drum | | |
| Genuine Mercedes-Benz Oil MB 229.51 Specification SAE 5W-30 | A0009899701USA6 | 12x1 Quart Cases | Fully Synthetic formula specifically designed for Mercedes-Benz engines that require the 229.51 Specification | Mercedes-Benz Engines that require 229.51 Specification Oil |
| | A0009899701USA8 | 55 Gallon Drum | | |
| | A0009899701USA9 | Bulk - No Equipment | | |
| Mobil 1 5W-50 | BQ 1 09 0133 | 16 Gallon Keg | Higher viscosity, advanced full synthetic formula designed for performance vehicles | Porsche A40. HT/HS applications. |
| | BQ 1 09 0134 | 6/1 Quart Cases | | |
| Mobil ATF 134 | BQ 1 09 0166 | 55 Gallon Drum | Extra high performance automatic transmission fluid formulated with selected HVI base oils | Recommended for use in Mercedes-Benz automatic gearboxes |
| Mobil 1 ESP Formula MB 5W-30 | BQ 1 09 0165 | 12x1 Liter Cases | Advanced full synthetic formulas designed specifically for passenger car diesels that have particulate filters | Low SPAsh. Available at most MB dealers. |
| AdBlue® 1/2 Gal. | A 000 583 0107 | 1/2 Gallon Bottle | Non-toxic solution that transforms harmful Nitrogen Oxide (NOx) emissions from diesel-powered vehicles into harmless water vapor and nitrogen | Recommended for use in Mercedes-Benz, Volkswagen + BMW AdBlue® (DEF) applications |
| Diesel Exhaust Fluid 55 Gal | BQ 1 47 0002 | 55 Gallon Drum | | |
| Mobil 1 5W-30 | BQ 1 09 0017 | 6/1 Quart Cases | Advanced full synthetic formulation designed to meet the requirements of many domestic, including GM, and imported vehicles | Vehicles that require 5W-30. Corvette approved. |
| | BQ 1 09 0018 | 55 Gallon Drum | | |
| Mobil 1 10W-30 | BQ 1 09 0019 | 6/1 Quart Cases | Advanced full synthetic formula designed for domestics and imports | Vehicles that require 5W-30 or 10W-30 |
| | BQ 1 09 0020 | 16 Gallon Keg | | |
| | BQ 1 09 0021 | 55 Gallon Drum | | |
| Mobil 1 5W-20 | BQ 1 09 0083 | 6/1 Quart Cases | Advanced full synthetic formulation designed to meet the requirements of many newer vehicles including Hondas, Fords, Chryslers, and newer Toyotas | Vehicles that require 5W-20 |
| | BQ 1 09 0084 | 55 Gallon Drum | | |
| Mobil 1 0W-20 AFE | BQ 1 09 0169 | 6/1 Quart Cases | Advanced full synthetic formulation designed for enhanced fuel economy and cold weather performance | Most vehicles that specify 0W-20 (newer Toyotas and Hondas), 5W-20 and certain hybrids |
| | BQ 1 09 0168 | 55 Gallon Drum | | |
| Mobil 1 0W-30 AFE | BQ 1 09 0174 | 6/1 Quart Cases | Advanced full synthetic formulation designed for enhanced fuel economy and cold weather performance | Most vehicles that specify 5W-30 or 10W-30 |
| Mobil 1 Synthetic ATF | BQ 1 09 0164 | 6/1 Quart Cases | Multi-vehicle, fully synthetic fluid designed to meet the demanding requirements of modern passenger vehicles | Vehicles that require Dexron III, Ford Mercon and Mercon V performance levels |
| | BQ 1 09 0163 | 55 Gallon Drum | | |
| Mobil 1 15W-50 | BQ 1 09 0023 | 55 Gallon Drum | Boosted, higher viscosity, advanced full synthetic formula designed for performance vehicles | HT/HS applications. Racing and Flat tappet applications |
| Mobil 1 Gear Oil (Mobil 1 Gear Lube 75W-90) | BQ 1 09 0085 | 12/1 Quart Cases | Exceeds the most severe service requirements in both conventional and limited slip applications | SUITABLE for use in modern high performance automobiles like SUV's, Vans and Light duty trucks requiring API GL-5 level performance |

Mercedes-Benz automobiles are designed to perform on the most challenging roads and conditions. Shouldn't the oil used in Mercedes-Benz engines do the same? We think so.

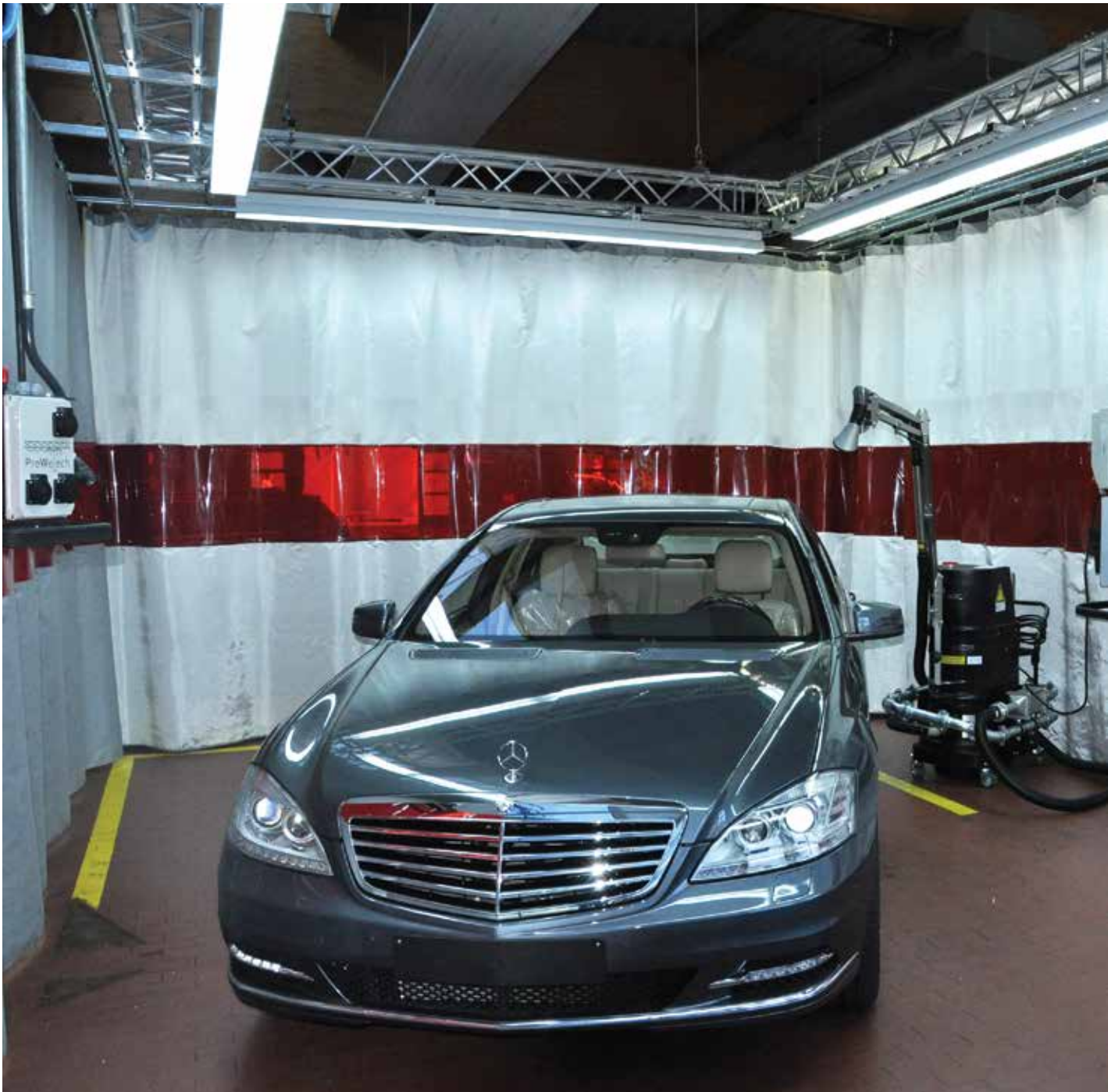
That's why Mercedes-Benz and Mobil 1 have partnered to offer an unbeatable combination of total engine performance and driving luxury.

Please have a look at our oil portfolio which is available through your local Mercedes-Benz dealer. Our dealers are able to offer you a wide variety of oil grades at competitive prices.



| Product Name | Part Number | Quantity | Product Description | Recommended Consumer Applications |
|---|----------------|---------------------|--|---|
| Mercedes-Benz SPEC. | | | | |
| Mobil 1 Gear Oil (Mobil 1 Gear Lube 75W-90) | BQ 1 09 0085 | 12/1 Quart Cases | Exceeds the most severe service requirements in both conventional and limited slip applications | SUITABLE for use in modern high performance automobiles like SUV's, Vans and Light duty trucks requiring API GL-5 level performance |
| Mobil Special 5W-30 | BQ 1 09 002464 | Bulk - No Equipment | Formulated from quality base stocks combined with modern performance additives to give the engine the expected protection and performance under a wide variety of operating conditions | Recommended for gasoline fueled automobiles and light duty trucks requiring an API SN/SM/SL/SJ |
| | BQ 1 09 0171 | 12/1 Quart Cases | | |
| | BQ 1 09 003064 | 55 Gallon Drum | | |
| Mobil Special 10W-30 | BQ 1 09 003164 | Bulk - No Equipment | Formulated from quality base stocks combined with modern performance additives to give the engine the expected protection and performance under a wide variety of operating conditions | Recommended for gasoline fueled automobiles and light duty trucks requiring an API SN/SM/SL/SJ |
| | BQ 1 09 0172 | 12/1 Quart Cases | | |
| | BQ 1 09 003764 | 55 Gallon Drum | | |
| Mobil Special 10W-40 | BQ 1 09 003864 | Bulk - No Equipment | Formulated from quality base stocks combined with modern performance additives to give the engine the expected protection and performance under a wide variety of operating conditions | Recommended for gasoline fueled automobiles and light duty trucks where a higher viscosity API SN/SMSL/SJ oil is preferred or recommended |
| | BQ 1 09 0173 | 12/1 Quart Cases | | |
| | BQ 1 09 004464 | 55 Gallon Drum | | |
| Mobil Special 5W-20 | BQ 1 09 012464 | Bulk - No Equipment | Formulated from quality base stocks combined with modern performance additives to give the engine the expected protection and performance under a wide variety of operating conditions | Recommended for gasoline fueled automobiles and light duty trucks requiring an API SN/SM/SL/SJ |
| | BQ 1 09 0170 | 12/1 Quart Cases | | |
| | BQ 1 09 013264 | 55 Gallon Drum | | |
| Mobil Special 20W-50 | BQ 1 09 004664 | 55 Gallon Drum | Formulated from quality base stocks combined with modern performance additives to give the engine the expected protection and performance under a wide variety of operating conditions | Recommended for gasoline fueled automobiles and light duty trucks where a higher viscosity API SN/SMSL/SJ oil is preferred or recommended |
| Mobil Delvac 1300 Super 15W40 | BQ 1 09 0053 | Bulk - No Equipment | Extra high performance diesel engine oils that help extend engine life in the most severe on and off-highway applications while delivering outstanding performance in modern, high-output, low-emission engines including those with Exhaust Gas Recirculation (EGR) and Aftertreatment Systems with Diesel Particulate Filters (DPFs) and Diesel Oxidation Catalysts (DOCs) | Specifically recommended for the latest low-emissions, high performance diesel applications equipped with aftertreatment systems using Diesel Particulate Filter (DPF) and Diesel Oxidation Catalyst (DOC) technologies |
| | BQ 1 09 0058 | 12/1 Quart Cases | | |
| | BQ 1 09 0059 | 4/1 Gallon Cases | | |
| | BQ 1 09 0060 | 55 Gallon Drum | | |
| Mobil Delvac 1300 Super 10W30 | BQ 1 09 0086 | Bulk - No Equipment | | |
| Mobil Delvac 1 5W40 | BQ 1 09 0051 | 4/1 Gallon Cases | Fully synthetic supreme performance heavy duty diesel engine oil that helps extend engine life while providing long drain capability and fuel economy for modern diesel engines operating in severe applications | Recommended for use in all super high performance diesel applications, including modern low emission engine designs with Exhaust Gas Recirculation (EGR) |
| | BQ 1 09 0052 | 55 Gallon Drum | | |
| Mobil Grease XHP 222 | BQ 1 09 0078 | 60/14 oz Cartridge | Formulated to provide excellent high temperature performance with superb adhesion, structural stability and resistance to water contamination | Recommended for industrial and marine applications, chassis components and farm equipment |
| | BQ 1 09 0079 | 120 lb Keg | | |
| | BQ 1 09 0080 | 400 lb Drum | | |
| | BQ 1 09 0098 | 40/14 oz Cartridge | | |
| Mobil Lube HD Plus 80W90 | BQ 1 09 0096 | 120 lb Keg | Extra high performance, automotive lubricant formulated from select base oils and an advanced additive system specifically for limited-slip differentials | Recommended for use in limited-slip differentials, axles, and final drives requiring API GL-5 level performance |
| | BQ 1 09 0097 | 400 lb Drum | | |

Mercedes-Benz Certified Collision Centers: The Future Is Here



New structural and safety features of Mercedes-Benz vehicles, including extensive use of aluminum and other light-weight materials, plus new applications of camera, sensor, and advanced electronics technologies, all require significant changes to collision repair facilities, equipment, and technician skills.



Curtain systems are a less expensive alternative to a pre-fab enclosure for isolating aluminum repairs from repairs on steel vehicles

A decade ago there were so few cars on the road with light-weight and high-strength body and chassis components that a collision repair shop could delay investing in the equipment, tools, and training required for working on these vehicles. That is changing rapidly, partly in response to ever-tightening fuel economy requirements.

Technicians can no longer get by with just being able to do smooth welds and good color matching. Today's collision repair specialist has to be competent in working with aluminum, magnesium, boron, high-strength steels, and other lightweight alloys and structural compounds. A Mercedes-Benz technician must also be able to detect the presence and condition of sensors, cameras, and advanced electronics all over the vehicle body, and to make sure that all are reset before delivering the vehicle to the customer.

The Mercedes-Benz family today includes aluminum-intensive CL-Class and SL-Class models. The company builds several models, including the S-Class, CL-Class, and 2007-2014 C-Class, using boron and other light-weight materials in place of some steel components.

The pace of change in electronic controls and safety features has also accelerated. Over several decades, the biggest changes we saw in collision repair were the introductions of unibody construction and waterborne paints. Now, almost every year brings vehicle changes that impact collision repair practices significantly.

Photos provided by Park Place Dealerships, Dallas, TX, and Reliable Automotive Equipment, Belford, NJ.

“Two years ago, very few vehicles had Lane Assist,” said Gary Wano, V.P. of GW & Son Autobody, a Mercedes-Benz Certified Collision Center in Oklahoma City, OK. “Now we see Lane Assist, Blind Spot Assist, Distronic Plus adaptive cruise control with sensors that alert the driver to slowing traffic ahead, and every year other new high-tech and safety upgrades.”

A BETTER BODY

The lightweight body of the new SL features a variety of different types of aluminum construction, including cast, extruded, and sheet panels of different thicknesses. The A-pillars are made of high-strength steel. The rear panel is constructed of lightweight magnesium. Overall, the body structure of the new SL is 40 percent lighter than that of the previous model.

The S-Class includes boron steel in the inner rocker panel and B-pillar; the CL includes it in the inner rocker panel, B-post and part of the rear seat; and the 2007-2014 C-Class in the B-pillar and inner roof rail.

The addition of boron makes the steel in these models stronger and at the same time a lot

lighter than traditional steel. However, working with boron steel presents challenges for collision repair. Boron steel has a low tolerance for heat. If bent, it cannot be straightened. It must be replaced as a complete structural member. The exception is the rocker panel on the S-Class and CL, according to Gregg Butts, lead collision repair instructor at the MBUSA Learning & Performance Center in Houston, where technicians receive the official training for the Mercedes-Benz Certified Collision Center Program. The rocker panel can be sectioned and reinforced with a heavy-gauge sleeve attached with adhesive and rivets.

Because of its heat sensitivity, MIG welding is not recommended. Instead, squeeze-type resistance spot welding (STRSW) with or without the addition of bonding adhesive, or riveting (with or without adhesive) is preferred.

Boron steel is hard enough that it can quickly wear out the cutting edges of conventional spot weld drills, cutters, and reciprocating saws. Stronger spot weld bits and drill bits for making rivet holes in boron steel can cost in the neighborhood of \$100 each.

ESTIMATED COST OF KEY CERTIFICATION REQUIREMENTS

“If I take away the things we would have bought regardless of whether we became a Mercedes-Benz-certified shop or not, I estimate one might spend approximately \$75,000-\$100,000 on equipment and tools specifically for Mercedes-Benz vehicles, i.e., a new Celette bench, and other things,” said Kirkpatrick.

| ITEM | EST'D. COST |
|---|----------------------|
| Dedicated Bench (Celette) with Mercedes-Benz fixtures | \$60,000+ |
| Aluminum Room | \$35,000 - \$40,000 |
| Aluminum Welder | \$9,000 - \$10,000 |
| Aluminum Rivet Gun | \$10,000 - \$ 14,000 |
| Aluminum Hand Tools | \$10,000 - \$12,000 |

To work on these vehicles, technicians must know how to use different types of welding and hemming methods, cutting tools, aluminum rivet guns, and selected adhesives, along with other bonding techniques.

A SEPARATE ALUMINUM ROOM

You'll need an enclosed or curtained-off room for aluminum-only repairs. "You want to prevent the risk of galvanic corrosion," said Wano. "A curtained area or separate room reduces the possibility of steel dust from other repairs getting onto aluminum surfaces in your repair. Even a small amount of steel dust or shavings remaining in contact with aluminum in your repair will cause a galvanic reaction that leads to corrosion of the aluminum."

For safety, your room should also have its own vacuum or air handling system. "The really fine dust that sanding aluminum generates is highly combustible," said Wano. "If a spark or bit of slag from welding flies into an area in which there is a high concentration of aluminum dust in the air, it could cause an explosive ignition of the dust."

THE BIGGEST BENEFIT: TRAINING

"Mercedes-Benz documentation is phenomenal," said Dennis Kirkpatrick, manager of European Collision Center, an independent shop in San Francisco. "It is step-by-step, but because there are so many different models, there are gaps in the average technician's experience and knowledge, and they get that filled in by training."



The Celette bench positions a structural member with factory precision, so it can be repaired with zero tolerance.

One of the primary focuses in the Mercedes-Benz training is to make sure that technicians are capable of making the correct welds on aluminum. The training follows the ISO 9606-2 standard that specifies the requirements for qualifications of welders for fusion welding of aluminum and aluminum alloys.

“Technicians learn about proper heat management for welding aluminum,” said Michelle Coombs, General Manager of Sports & Imports Collision in Duluth, GA. “They must perform various welds, which are then visually inspected, dye-checked, and tested for tensile strength.”

“The Mercedes-Benz training also explains how to work with the different metals on specific vehicles, when to use which welding and bonding techniques, and so forth,” said Kirkpatrick. “Without training, you just don’t have that high level of knowledge on individual models that you get by learning from the people that designed and built the vehicles.”

Something as simple as knowing the location of a radar sensor that is near, behind, or embedded in a bumper cover can be critical to making the proper repair. “If you repair the bumper in a way that obstructs or covers the sensor, you’ve just limited the parameters that the radar can feed to the computer,” said Wano. “Are you willing to be responsible for what might happen if your repair reduces or eliminates the

distance the Lane Assist, Blind Spot Assist, or other sensor could cover?”

Learning when to use seam seal or cavity wax, or both, is another simple thing that is part of the model-specific training. “Cavity wax literally goes into crevices and seals the sheet metal,” said Wano. “You should be installing cavity wax that is specially branded for Mercedes-Benz, and in the exact places where they want it to go. It helps prevent corrosion over the long term.”

“When my technicians come back from Mercedes-Benz training, they are no longer guessing about what the correct repair procedure is for a given type of damage,” said Kirkpatrick. “They have learned whether the component can be pulled, how it should be spliced, and how Mercedes-Benz wants it repaired. They come back more mature and a little calmer about how to handle a wide variety of repairs.”

DEDICATED BENCH

An important recommendation of the Certified Collision Center program is the use of a bench



If a vehicle does not fit precisely in the fixtures of a Mercedes-Benz dedicated bench, it is a sign there is damage that has not yet been corrected.

A rivet gun designed for use on aluminum offers adequate clamping force, but not so much as to risk distorting the aluminum work piece.



with fixtures that are specific to individual Mercedes-Benz models. The fixtures, or jigs, hold the vehicle in place and allow the technician to place the structural member being replaced or repaired in only one position – with factory installation measurement precision.

The fixtures and jigs on Celette frame equipment are model-specific and developed using the Mercedes-Benz chassis blueprints, so the bench offers zero tolerance placement of a vehicle structural member. The Celette bench enables the detection of damage so small that it may not easily be found with other equipment.

The model-specific jigs add time to the process of setting up the bench, and most shops in the program charge extra for it. “Insurers recognize that it takes extra time to set up the frame equipment jigs for a specific Mercedes-Benz vehicle,” said Coombs. “We charge a setup fee in addition to the actual bench time, and find very few insurers unwilling to pay the setup cost.”

MARKET OPPORTUNITY

Because the certification program is still relatively young, there are many markets with no or only one or two Mercedes-Benz Certified Collision Centers. In those markets, the certified shops draw business from a much wider area than the



Separate tools for aluminum help prevent transfer of steel dust from other repairs onto an aluminum part. If the two metals remain in contact after the repair, a galvanic reaction occurs that leads to corrosion damage to the aluminum.

typical collision facility. GW & Son Autobody, for example, is one of only two Mercedes-Benz certified collision centers in Oklahoma. “We get business from all over Oklahoma, and often from Texas as well,” said Wano.

Dealers that have no in-house capability refer their customers with collision-damaged vehicles to GW & Son Autobody. Independent shops send vehicles for which they have not had the Mercedes-Benz collision repair training to the experts at Wano’s shop.

“Smart shop owners don’t want the risk that comes with working on a vehicle for which their technician has not been trained,” said Wano. “If a technician does not put a frame rail in properly, or does not follow the Mercedes-Benz procedures and electronic or other problems occur down the road, the shop is liable.”

A CERTIFIED TEAM

To become a Mercedes-Benz Certified Collision Center, a shop must meet extensive facilities requirements, including having a dedicated frame bench, separate enclosure for aluminum repairs, and separate aluminum repair equipment and tools. It must also agree to keep its technicians up-to-date as new technology is introduced on Mercedes-Benz vehicles.

Talk to the owners of any facility that has already qualified for the program, and they will quickly tell you it was worth it. |

Right: Using a separate vacuum for your aluminum repair room can help prevent the galvanic corrosion that results from steel dust or shavings from other vehicles in the shop coming into contact with aluminum materials in your repair.



the **NET**

Sourcing Mercedes-Benz
Repair and Parts Information

The screenshot shows the Mercedes-Benz Wholesale Parts website. At the top left is the Mercedes-Benz logo and the text "Mercedes-Benz". To the right, the page title "Mercedes-Benz Wholesale Parts" is displayed. Below the title is a navigation menu with links: Home, What's New, Certified Collision Program, Remanufactured Parts, Accessories, Service Parts, and Find a Dealer. The main content area features a large banner with the heading "The Advantages of Genuine Mercedes-Benz Parts". To the left of the banner is a list of advantages: Value, Quality, Fit, Performance, Warranty, Service, and Experience. To the right is a detailed image of a car's engine. Below the banner are several red buttons: "Price Updates" (with a house icon), "Tech Support" (with a gear icon), "Tools and Links" (with a wrench icon), and "Order Parts Online" (with a globe icon). The "Tech Support" button also includes sub-links for "Repair Information" and "STAR TekInfo". At the bottom left, there is a copyright notice: "© 2012 Mercedes-Benz USA, LLC". At the bottom right, there is a link for "Limited Warranty | Contact Us".



Extensive information on Genuine Mercedes-Benz **Service Parts** such as Brakes, Wipers, Filters, Batteries and Oil



Revamped **WebParts** overview page and refreshed manuals on WebParts and the **EPC**



Genuine Mercedes-Benz **Remanufactured Parts** Catalog and Core Return Policy, as well as current price updates



StarTuned magazine section with archive search functionality and downloadable articles





Performance. Reliability. Success.

With our competitively priced replacement parts, you no longer have to settle for anything less than Mercedes-Benz quality. But that's just part of the story. You see, our filters all carry a 12-month, no mileage-restriction warranty. So our parts are not only a great deal. They're a great value. Since they're genuine Mercedes-Benz, you can have confidence they'll last, and so will your relationship with your customers.

Contact an authorized Mercedes-Benz dealer or learn more at www.mbwholesaleparts.com.

MSRP excludes state and local taxes and freight if applicable. Prices may vary by dealer. See your authorized Mercedes-Benz dealer for additional details or a copy of the Mercedes-Benz parts limited warranty.



Mercedes-Benz