STARTUNED®

Information for the Independent Mercedes-Benz Service Professional

December 2013 U.S. $6.00 € 9.00 Volume 13 Number 4

E-THERMOSTAT

CDI DIESEL

MEET THE CLA

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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.

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Cover photo:
2014 CLA250 (courtesy Mercedes-Benz)

Visit us at our web site www.MBWholesaleParts.com to view this issue and all 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.

In This Issue

Narrowing the Range of Temperatures with the E-Thermostat

In order to maintain emissions compliance, Mercedes-Benz engineers have to control the temperature range the engine will operate in and develop engine management parameters within this range. This may sound simple enough, but how do you accomplish this when the car might sit for an hour of traffic on a hot summer day, or cruise at highway speeds in the dead of winter?

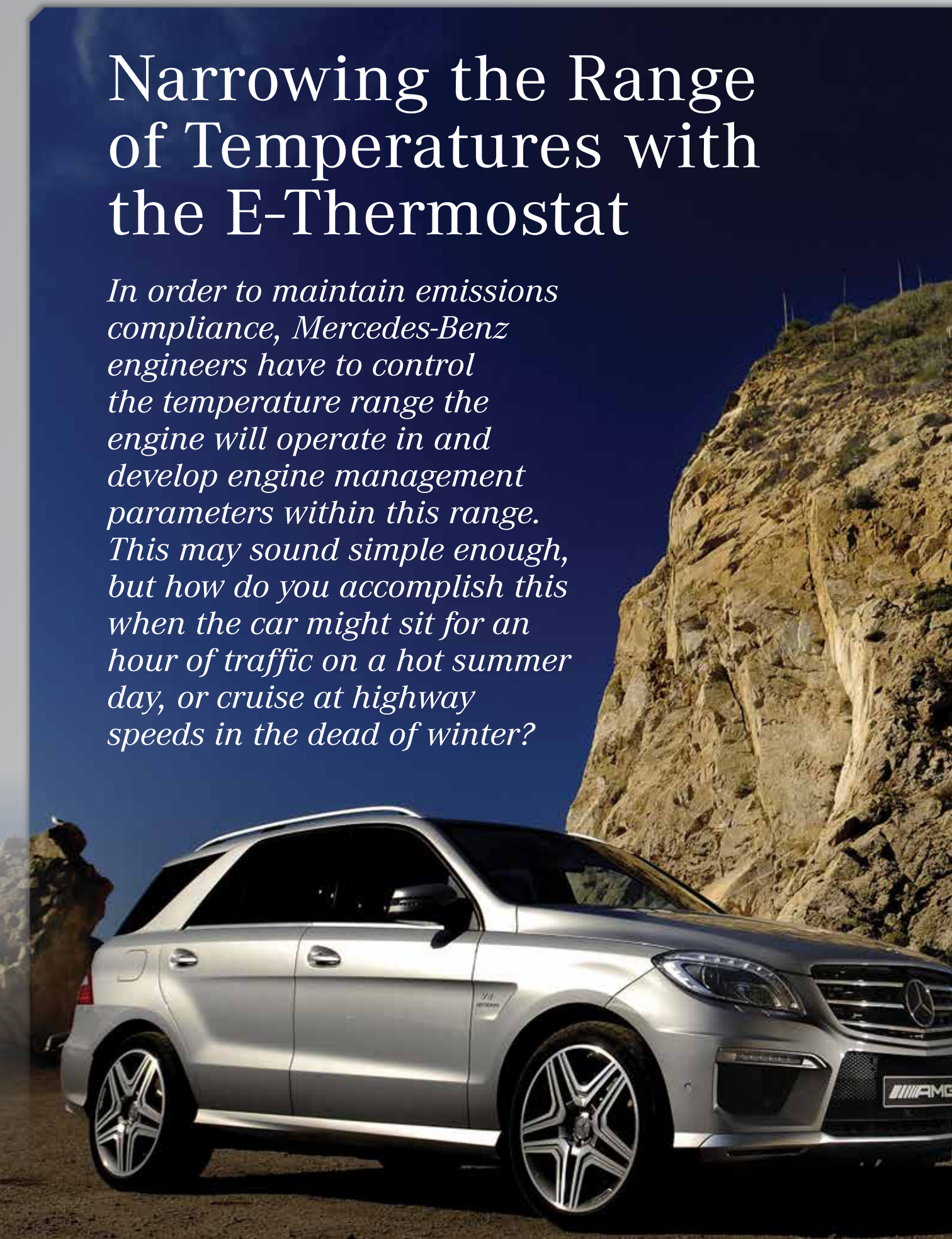


Photo courtesy Mercedes-Benz

When most of us think of technological developments, we don't think about cooling systems. We think about high-speed CAN data buses that allow the traction control system to work with the electronic throttle to rein in a vehicle. We may even think about fiber-optic systems that carry music, movies, and media for entertaining our passengers, and providing navigation. We think about electronically fuel-injected high-horsepower engines that still get 25 to 30 mpg.

Now think about a typical car being driven in a temperate climate that may sit for an hour in an urban traffic jam on a 100 deg. F. day. This same car may need to carry its owner to work in single-digit temperatures on a February morning. A car's cooling system does more than just prevent the engine from overheating. It keeps it within the temperature range required to promote optimum efficiency and emissions control, and to allow long life for mechanical components.

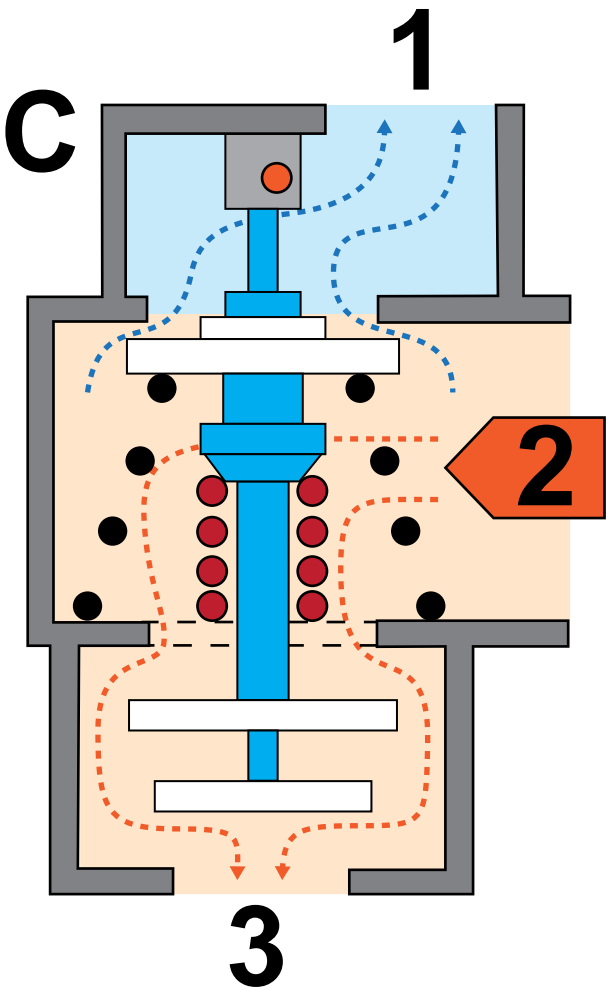
Engineers design engines to work best within a specific temperature range. The engine management system uses coolant temperature as a reference for controlling fuel delivery and ignition timing. The pistons, rings, valve stems,

This is the e-thermostat location on a 221 chassis with the V12 engine. It is buried under the Secondary Air Pump motor and behind an idler pulley for the drive belt. WIS can help you with both testing and service procedures.

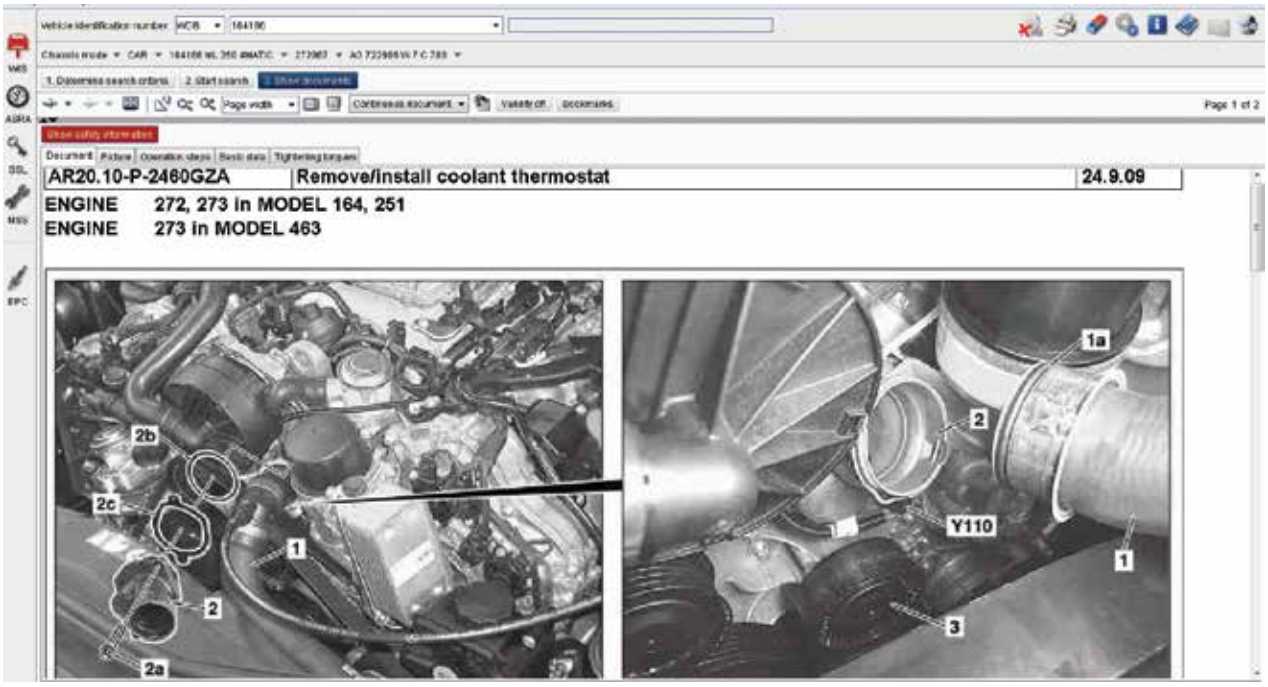
bearings and other internal engine parts will have expanded to the tolerances that will maximize the life of all components. The cooling system's job is to keep the engine operating in that temperature window as much as possible. Think of our example of a car being driven in traffic on a hot day. Most of the airflow over the radiator fins would be only what's available from the cooling fans. So, the thermostat opens all the way to allow the maximum volume of coolant flow. On a cold day at cruising speeds, the heat load is low, and so is the temperature of the coolant in the radiator. The thermostat will close as its element shrinks, coolant flow is decreased. This is how engine temperature was maintained in its "Temperate Zone" for decades.

What's an E-Thermostat's Purpose?

To adhere to specific fuel mileage and efficiency standards, engineers needed tighter control of the engine's temperature. For the M272 engine, Mercedes-Benz developed a more advanced



Right: In phase 3, the engine control unit starts to energize the heater coil in the e-'stat and heated coolant from the engine block (passage 2) can either flow through passage 3 (to the water pump), or now to the radiator through passage #1.



Use www.startekinfo.com to access WIS. This will give you all the steps needed to service the e-thermostat. Here, we have looked up the procedure on a 164 chassis M-Class with the 272 engine.

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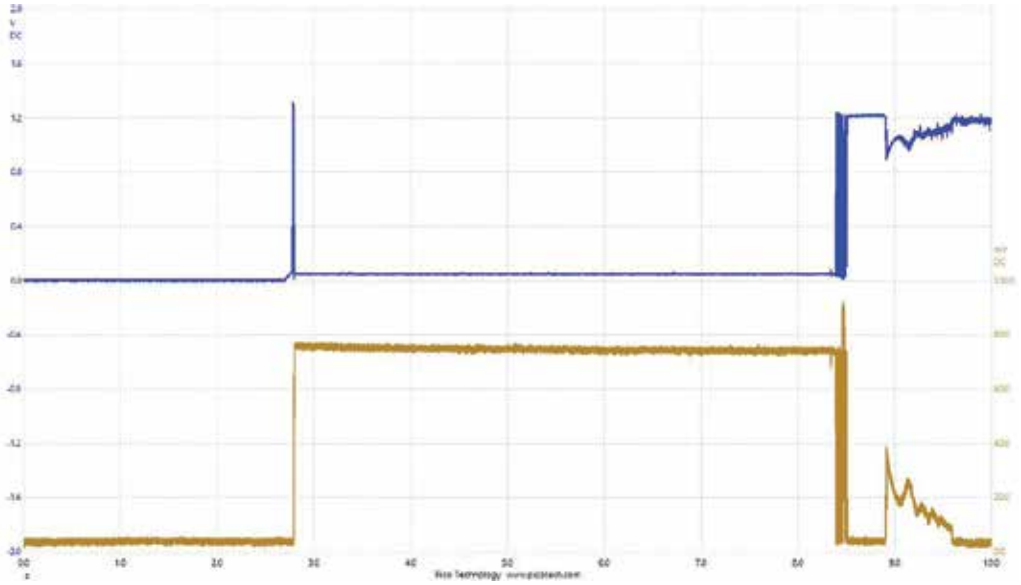
thermostat that can control engine temperature accurately in multiple situations. It still functions like a traditional thermostat with an expanding/contracting element that opens and closes according to coolant temperature, but it has three disks (meaning the thin, round metal plates that alternately cover and uncover coolant passages) instead of the normal single disk to gradually step coolant flow, and a computer-controlled heating element. The three disks provide four different stages in opening the thermostat. Each stage regulates the coolant flow to match the cooling provided by the radiator and the needs of the engine. Any thermostat, even the "e-'stat," has a fully closed position when the engine is cold to build up coolant heat quickly. Rapidly reaching normal operating temperature allows critical mechanical components to expand to their ideal working shape as soon as possible, and speeds the transition to closed-loop operation.

You can measure the resistance of the heating element in the e-thermostat to see if it's okay. A good one will have about 14.7 to 15.0 ohms at room temperature. The electrical connection is a little difficult to get to, so you may want to put your test leads across one of the wires that share the power supply and the pin on the ME control unit that grounds it.

Think of the e-thermostat as having one single upper disk and two staggered lower disks. The upper disk directs coolant flow to the radiator, and the lower disks can either allow coolant to be split between the engine and the radiator, or totally block flow to the engine forcing all of the coolant flow through the radiator. During a cold start, both the upper disk and one of the lower disks totally block coolant flow allowing the engine to build heat rapidly. The heat of the engine coolant opens the first stage supplying the heater core in the cabin. In the third stage, the computer controls the current flowing through a heater element inside the body of the e-'stat. This assistance occurs on both a



Here we are looking at the electrical control of the e-thermostat. The upper blue trace is the voltage signal. The lower brown trace is the amperage draw. Soon after a hot restart, the ME grounds the element for a few seconds and we can measure the amperage draw. If amperage draw is too low or too high, the e-thermostat has probably failed.

hot restart where the engine temperature reads over 208 deg. F. (98 deg. C), or after a cold start where the engine temperature is about 82 deg. F. (28 deg. C).

When the ME is in Command

The ME control unit (aka the PCM for Powertrain Control Module, or engine management computer) can regulate the temperature between 185 deg. F. (85 deg. C) to 221 deg. F. (105 deg. C) while the engine is running. Above these temperatures, the ME commands the thermostat to block coolant flow back into the engine, directing all coolant flow to the radiator for maximum cooling. As you can see, with cooling temperatures reaching above 221 deg. F. (105 deg. C), and the boiling point of water being 212 deg. F. (100 deg. C), it is critical that the mixture of Mercedes-Benz extended life coolant and water be in the proper dilution ratio to transport Btus efficiently. The fundamental functions of the cooling system must be working properly for the e-thermostat system to be able to do its job. The water pump must still be capable of providing sufficient flow, and there cannot be any air in the system. When diagnosing and servicing these systems, do not jump to testing this new technology until you have done some basic checks, such as pressure testing.

It makes no sense to use anything but genuine Mercedes-Benz antifreeze for cooling system service. The current blue-dyed formula carries the part number BQ 1 03 0004, which is also designated as G48. It only comes full-strength, not pre-diluted.

The e-thermostat gets its voltage supply from power distribution components such as the front SAM. The ME controls the ground with a pulse-width modulated signal. It determines how much current should flow through the heating element using coolant temperature, engine speed, engine load, and vehicle speed as references. You can monitor the voltage signal and current flow directly, or you can monitor e-thermostat operation through Xentry software. While it is possible to test the element at the thermostat itself, in most instances it is difficult to get to and may require that some components to be removed. What may be easier is to measure the resistance, voltage and current at the ME. Looking at a wiring diagram available on www.startekinfo.com, you can identify the ground pin location at the ME and put your other lead on one of the shared power supply wires.

Stages

The ME controls the e-thermostat in three stages. It can leave the heating element alone by not providing any ground. Without a ground, the circuit is incomplete -- there is no current flow and therefore no e-thermostat activity. Or, the ME can pulse the ground thereby heating up the element to a specific temperature and maintaining that temperature. It can also fully ground the element to allow maximum current flow, thus generating the maximum heat the element is capable of. You can monitor this circuit for voltage and amperage. As the wiring diagram shows, you should find battery voltage on the circuit when the ME is not grounding the element. When the ME starts to operate the e-thermostat, you may see your reading go directly to ground, or find a pulse-width modulated signal. Remember, the pulse-width modulated signal holds the e-thermostat

in a static position to regulate the coolant flow between 185 deg. F. (85 deg. C) and 221 deg. F. (105 deg. C).

If you measure the current flow while the e-thermostat is being grounded, you should see about 7/10ths of an amp (0.7A). If you measure directly, the meter will probably average the signal over time so you will see less amperage while the signal is pulse-width modulated. You will have to wait for the engine to run long enough to fully ground the e-thermostat to measure the amp draw accurately. If you use a scope with an inductive milliamp probe, you can monitor both the voltage and amperage at the same time. Almost immediately after a hot restart, the ME operates the e-thermostat for approximately six seconds, during which time you can easily read the voltage and amperage. If you are using Xentry software to view the computer's management actions, it will give you a data PID to evaluate the commands to the e-thermostat.

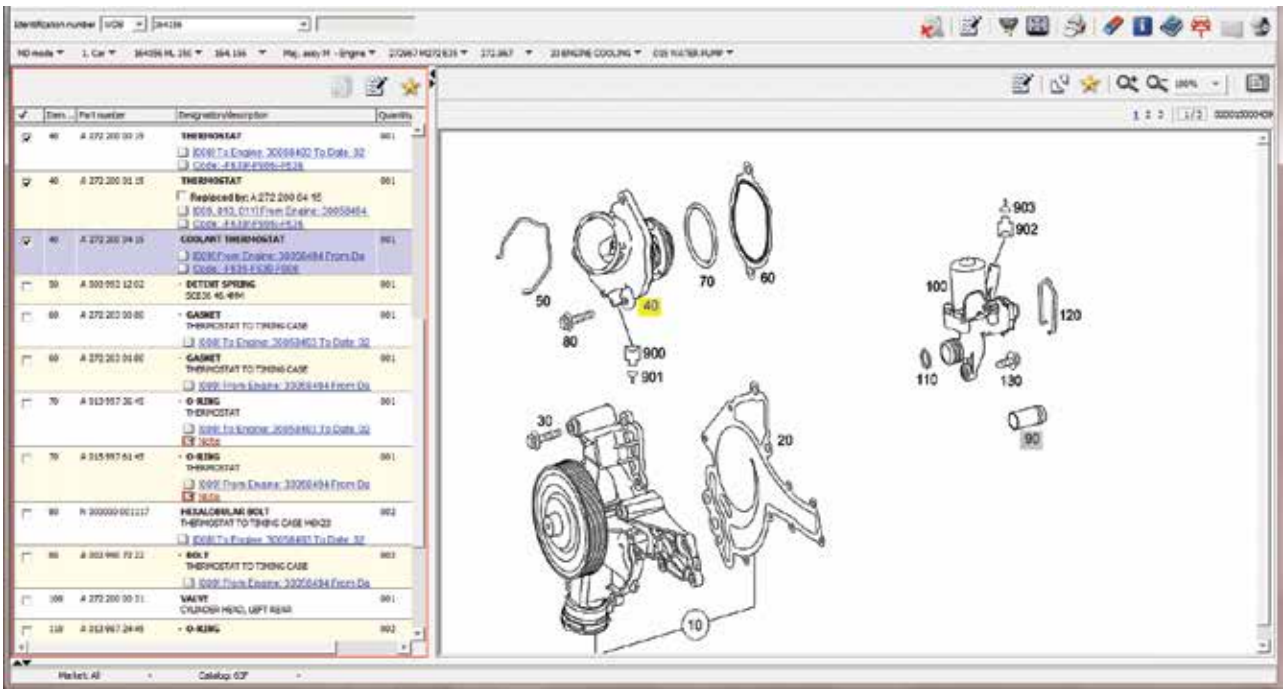
It's Still a Cooling System

As mentioned earlier, every other aspect of the cooling system must be functioning properly for the e-thermostat to be able to do its important job.

If you're doing a flush and refill as maintenance, or whenever you've done any major cooling system work that required draining, it's recommended that you use coolant exchange equipment. Not only is it a lot faster and neater, it does a much better job of completely flushing the entire system, eliminates trapped air that can cause various troubles, ensures a complete fill, and even helps you find leaks. By the way, the e-thermostat has a check ball to allow air to pass through it during the filling.

Of course, to keep the cars in your care trouble-free, always follow the cooling system maintenance intervals stated in the Owners' Manual or on WIS to the letter, and use only genuine Mercedes-Benz antifreeze for top-ups and refills.

Knowing how a system functions and what you can do to service it is what keeps your customers coming back. By purchasing genuine Mercedes-Benz parts from your dealer you have a partner in the maintenance of your customers' vehicles who not only supplies properly-engineered parts, but also offers the best warranty in the industry. Who wouldn't want a partner like that? |



Use Mercedes-Benz EPC to assist you in identifying the proper part. While you should always trust the knowledge of the parts man at your local dealer, EPC will help you identify other parts you may want to replace during the job, such as a new electrical connector if the old one was damaged.

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Mercedes-Benz CDI Diesels

No More Knocking, Smoking, or Stinking

Unstable fossil-fuel markets, customer environmental awareness, and government regulations have all contributed to automobile manufacturers searching for the silver bullet for mpg. Mercedes-Benz has looked to its long diesel engine history, and added a huge dose of new technology.

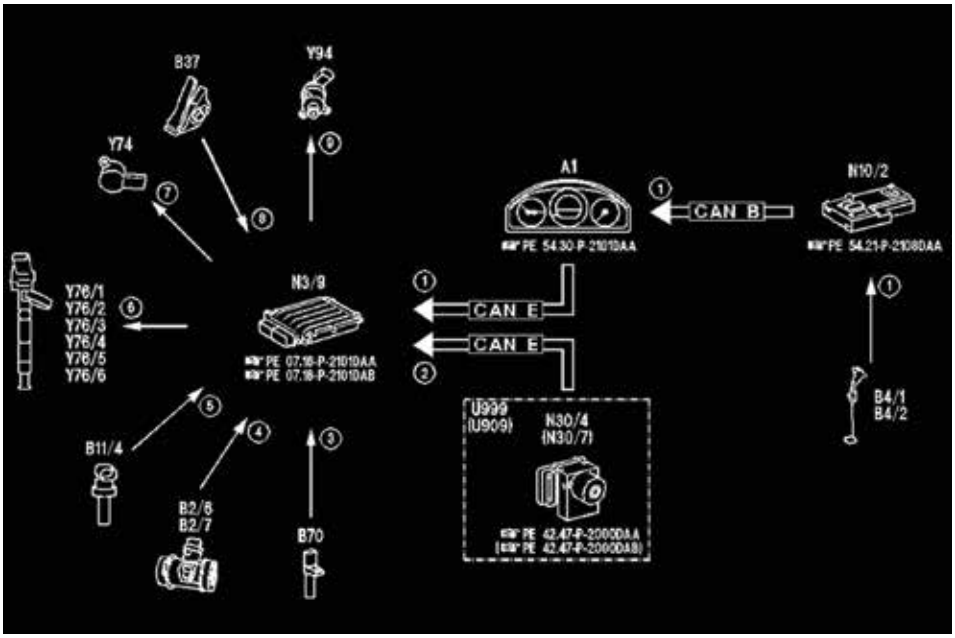
Ask powertrain engineers and they will all tell you their ultimate goal is "the free lunch." Of course, like the physicists' Absolute Zero, that's not really attainable, but it at least provides a clear direction. The goal of an engineer is to optimize an internal combustion engine's output in order to produce maximum power while using the minimum amount of fuel. Approaches such as turbocharging, variable valve timing and lift, direct fuel injection, etc. all contribute to this main objective.)

There's a concept that goes even further, however: compression ignition. Diesels have always squeezed more useful work out of a gallon of fuel than gasoline-burning engines, and with Mercedes-Benz's application of advanced technology their inherent drawbacks in terms of noise, smell, emissions, cold starting, and lackluster performance have all been pretty much eliminated. This article is intended to help you keep up with this technology so that you'll have a better understanding of the service requirements involved.

Since 1936

Mercedes-Benz has always felt that the diesel engine has tremendous advantages when it comes to increasing fuel economy and reducing harmful emissions, although only the former was germane in 1936 when the company introduced the 260D, the world's first diesel passenger car. It has successfully sold diesels to the American public for decades. With the modern push for fuel efficiency and clean exhaust, Mercedes-Benz has practically reinvented the compression ignition engine. Electronically-controlled high-pressure direct injection and an after-combustion catalytic system are just two of its prominent advances.

But revolutionary engineering improvements rarely come without additional levels of technical complexity, which makes our job of keeping everything operating properly challenging. We believe, however, that you will find that your experience with the electronic management systems of gasoline-burning engines will be very helpful.



With a paid subscription to www.startekinfo.com, you can access function diagrams in the ETM section. These let you know what sensors and control units are involved in the system you are working on. This is a function diagram of the smooth-running system on the 642 diesel engine. The CDI control unit looks at all of these components to mitigate crankshaft fluctuations through individual cylinder injection control.

Major PSI

The Mercedes-Benz CDI (Common rail Direct Injection) system has an electric fuel pump that supplies relatively low pressure, but high volume, to the mechanical high-pressure pump that's driven by a camshaft. The 5,000 to 30,000 psi (!) generated is routed through a common rail that branches to the individual injectors, so it's similar to a typical port-type gasoline EFI albeit at up to 600 times the pressure. The injectors are opened when the CDI control unit sees fit, again similar to EFI.

As in any modern engine, the control unit gets signals from both crankshaft and camshaft position sensors to determine where the engine is in its four-stroke cycle (many other inputs are involved in the grand scheme of things, too, of course), thus when to fire each injector, but it's relieved of the duty of controlling an ignition system. The serious pressure in this system not only greatly enhances fuel atomization, it also makes the efficient direct injection feature work better.

Once diesel combustion has taken place and the last possible ounce of power has been extracted from the air/fuel charge, Mercedes-Benz made sure the exhaust comes out squeaky clean by means of the Selective Catalyst Reduction system (SCR) that aids in the continued combustion of any excess

It was 77 years ago when Mercedes-Benz introduced the world's first diesel-powered passenger car, the 260D.

fuel that did not burn in the combustion chamber. This utilizes urea injection -- a chemical additive, commercially called AdBlue® Diesel Exhaust Fluid (DEF), is sprayed into the SCR system. This type of system has been around for years in the European trucking industry, so is not a new, untried concept. It's needed to make the engine emissions-compliant, and be fully functional in order for the engine to be allowed to run.

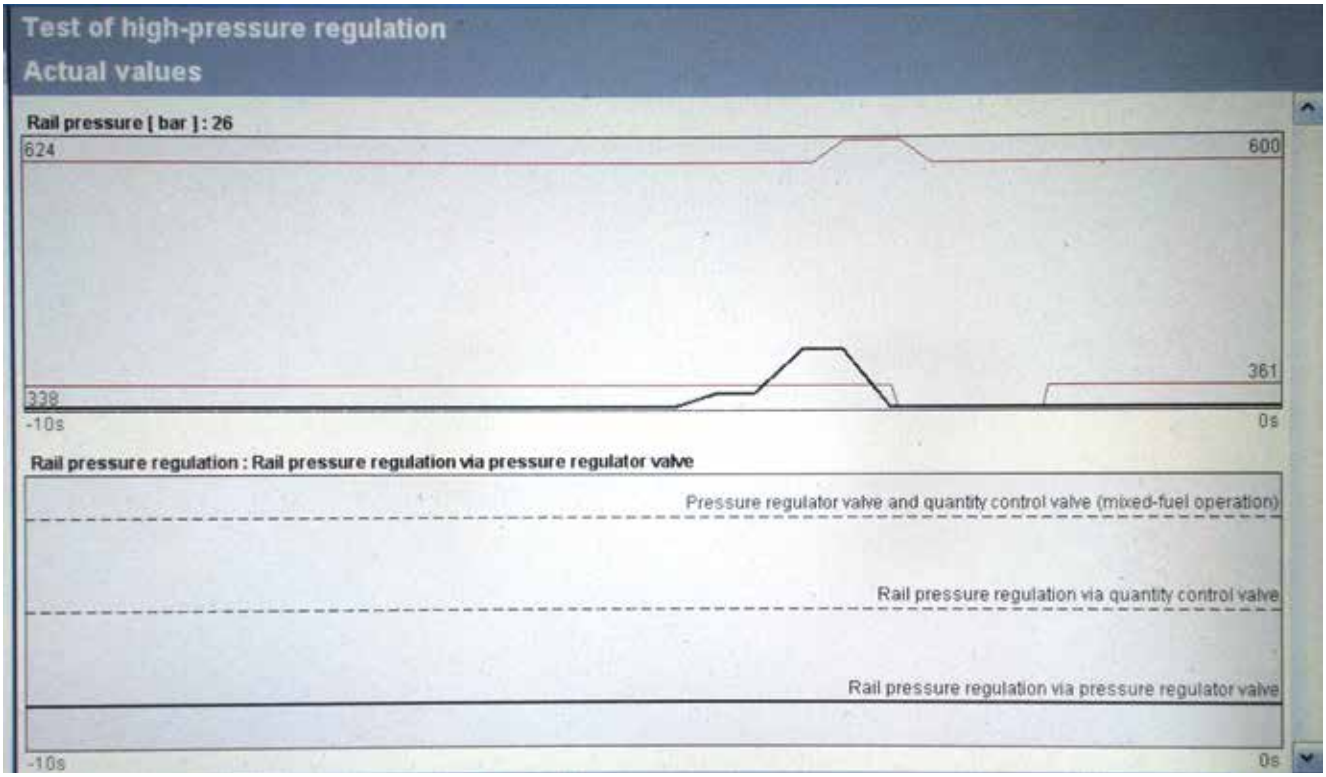
An easily-accessible AdBlue® DEF tank is mounted in the vehicle, and each gallon lasts at

Here's what the ADBlue® DEF tank filler cap looks like. The fluid level is continuously monitored to make sure there is enough. When it gets low, a message will appear in the instrument cluster, then there will be a warning gong.

least 2,500 miles. A level sensor lets the control unit know how much fluid is in the tank. If the fluid drops below a specified level, a message will appear in the instrument cluster ("Check AdBlue®/ Check Diesel Exhaust Fluid (DEF)"). If the vehicle is driven for a certain amount of time with the warning illuminated, a gong will be sounded. The number of gongs sounded starts at something like 21, depending on the model. If the level is allowed to drop even further, the number of gongs will go down also reflecting the number of engine starts permitted. Once it reaches zero, the control unit will either put the engine into idle mode, or prevent it from starting, depending on the model. Adding a gallon of AdBlue® will get things going again.

The players

We already know the CDI control unit completes the circuit to the fuel injectors. We also know that the control unit receives crank and cam position sensor signals so it can determine when to fire the injectors. But, as mentioned above, there are many other sensors and solenoids that help manage all that fuel pressure. Since time is of the essence in



With a XENTRY system you can graphically display the fuel rail pressure as picked up by the fuel rail high pressure sensor. Here, we see the thick black line indicating the increase in psi as the engine is cranked and started (then immediately shut off). This can help in the diagnosis of a no- or hard-start condition.

a high-pressure direct fuel injection system, more is needed than just increased injector on-time to add enough fuel under acceleration. The pressure itself is increased in order to get more fuel into the combustion chamber under high demand. This is one instance where diesel engines differ from their gasoline counterparts. With gasoline fuel injection, injector pulse width is increased to meet the demands of acceleration, but system pressure stays pretty much constant.

CDI controls the amount of pressure in the fuel system with a combination of a Quantity Control valve (mounted on the high-pressure pump) and the Pressure Control valve mounted on the fuel rail. Both receive pulse-width modulated signals from the CDI unit.

The CDI control unit needs to be aware of the actual pressure in the fuel rail (also called a "manifold") in order to calculate pulse width and pressure requirements. It gets this information via a high-pressure sensor mounted on the rail. As with any other diesel, the high compression generated by the engine starts the combustion process. On very cold days, it is sometimes difficult to get the fire started. In older designs, there was a pre-chamber with a glow plug installed. When the ignition key was turned on, the glow plug heating element was supplied with electric current. This would heat the fuel as it entered the chamber, making it easier to ignite. With CDI, pencil-type glow plugs are mounted directly inside the combustion chamber for pre-heating. A separate glow plug control unit supplies the necessary amperage with the ignition key on and during the warm-up phase to increase efficiency. The glow plug control unit takes its orders from the CDI control unit.

Here's the fuel rail of the new four-cylinder Mercedes-Benz diesel engine that's gaining so much notoriety. Metal lines carry the pressurized fuel to the individual injectors. The fuel volume is very small, so even a small leak will not allow pressure to build. This can lead to a hard- or no-start condition.

Injection actualities

When we think of traditional gasoline EFI, we think of a computer energizing a solenoid that allows pressurized gasoline to pass through a nozzle. With a high-pressure diesel fuel system capable of producing 30,000 psi or more, it may seem that it would be virtually impossible to electrically open an injector whose pintle has that much force bearing on it. Engineering injectors that could do just that dependably was one of CDI's breakthroughs. Depending on the year, model, and country of sale, either the Piezo type or electric solenoid type has been used. Regardless, the traditional diesel's rattle and knock are practically eliminated by up to seven injection events occurring for each power stroke. It's not just one big blast anymore, but a relatively slow, controlled burn.

Being a sequentially-fired injection system, CDI is prone to some of the same drivability issues usually associated with gasoline SEFI. Older diesel injection systems typically had a mechanically or electrically-controlled pump. A rack inside the injection pump would be moved to provide more or less fuel to all of the cylinders. If you had an individual cylinder misfire, or "nailing," it was due to either the injector itself, or to an engine mechanical problem, such as a bad valve.

With common-rail, each cylinder is individually controlled. CDI has the sensitivity to continuously monitor and adjust injector flow rates to match the needs of individual cylinders. The CDI unit needs to know the flow rate of any injector that is being replaced. This information is entered into the CDI unit through the SDS/XENTRY software. As the injector wears, the flow rate may change over time. The CDI unit also monitors these changes and performs "adaptations" accordingly. These adaptations need to be cleared after replacing injectors or otherwise servicing the system so the CDI does not inject fuel using information from the old injectors. These adaptations can be viewed and reset with your SDS/XENTRY system.

We Need Feedback

Just like modern gasoline injection systems, there needs to be a sensor that monitors the effectiveness of fuel control. The CDI unit is always asking itself, "Am I injecting too much or too little fuel for complete combustion?" To get an accurate answer to that question, the CDI unit uses a wide-band oxygen sensor -- the gasoline engine equivalent would be called an air/fuel ratio sensor. These sensors have a six-pin connector and use a milliamp signal to indicate a rich or lean mixture to the CDI control unit. They are capable of measuring a wider range of mixture ratios than could a traditional zirconium oxygen sensor. Having a good understanding of modern Mercedes-Benz diesel fuel injection systems will allow you to perform proper maintenance and more accurate diagnosis of any complaints. Your local Mercedes-Benz dealer's parts department is a partner in this process, and will support you in making sure you have the knowledge and the quality parts needed to serve your customers in the most professional manner possible. |

Left: Between the fuel pump and the high-pressure pump, there is a fuel filter with a "water in fuel" sensor. When the filter's water separator is more than half full of H2O, a warning light in the cluster will turn on. This filter needs to be replaced at the specific intervals outlined in the maintenance booklet, but may need to be replaced more often depending on the quality of the diesel fuel available to your customers.

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Meet the CLA, Model Series 117

Big news from Mercedes-Benz! Not only front wheel drive and MacPherson struts, but also a host of other departures that prove the superiority of the company's forward-thinking engineering

Photo courtesy Mercedes-Benz

Let's just hit this head-on: In spite of what some snide automotive journalists have said comparing the American introduction of a Mercedes-Benz FWD platform to "the fall of Western Civilization," or "the end of life as we know it," it is anything but. Instead, it represents an important, positive departure that will allow the Stuttgart company to weather the predicted turmoil of extreme fuel economy and emissions regulations, and, with it's high-value pricing, attract another whole level of buyers to the brand, which can't do anything but help Mercedes-Benz service specialists like you.

The FWD CLA belongs to the company's "New Generation Compact Cars" family, which will go a long way in defining its future, here and elsewhere. The Model Series 117 is a four-door premium coupe in the compact segment, built on the current A-Class and B-Class models sold elsewhere. Innovations abound in this class that improve energy efficiency and further reduces emissions, besides offering unprecedented safety and comfort in a car at this price point.

While you probably won't be seeing these cars in your bays for some years, we at StarTuned believe you should have a clear idea of what your future holds, so here we're going to lay out the amazing array of features the CLA presents (well, many of the important ones, at least).

Don't be shocked to see that four-cylinder engine in there transversely. It's an essential element of Mercedes-Benz's "New Generation Compact Cars" family. Shown is an A-Class, which has been successful in other markets.

Four -- who needs more?

The AMG CLA 45 version, at $17,550 more than the CLA 250, is billed as having the most powerful production four-cylinder in the world with 355 hp and 332 ft. lbs of twist. But you'll be seeing a lot more of the CLA 250, which is no slouch. With 208 hp and 258 ft. lbs. of torque, it produces a nice combination of 0-60 in less than seven seconds, along with 26 city/38 highway mpg -- incredible for a 2L in a 3,300 lb. car.

This feat is achieved by means of the following engine characteristics (among other things):

- Low internal friction
- Gasoline direct injection
- Piezo injectors for multiple fuel injection events
- Twin-pipe/scroll turbocharging with up to 27 psi (1.8 bar) of boost
- Highly-evolved intake and exhaust camshaft dynamic timing adjustment
- Demand-controlled multi-spark ignition
- Optimized thermal management
- ECO start/stop function
- Optimized regulation of the oil and cooling circuit pumps

Drag & multi-squirt & spark

Mercedes-Benz was the first automaker to use cast-in silicon-aluminum cylinder sleeves with a low-friction surface that allows piston-ring spring tension to be reduced by 50 percent. In the CLA's case, the cylinder sleeves get a "NANOSLIDE" coating to optimize both the production process and friction characteristics.

Other mechanical engine features include forged pistons designed to withstand ignition pressure loads of 2,100 psi (140 bar), a forged crankshaft with eight counterweights, bearing caps made of cast iron with nodular graphite, and a viscous vibration damper.

Another first for the company was the original gasoline direct injection system on the legendary 1954 300SL Gullwing. The third generation of modern GDI uses piezo-ceramic crystalline elements in the injectors. Replacing mechanical solenoids, the piezo crystal changes shape

instantly when electrical current is applied, which makes it possible to program several small injection events per cycle. The first occurs as the piston is descending on the intake stroke. Depending on speed, load, and temperature conditions, another injection (or two) takes place during the compression stroke before ignition, forming a stratified mixture. A fourth injection can stabilize combustion if it's needed. System pressure, by the way, is up to 2,840 psi (190 bar), in the range of a pre-common rail diesel.

Coordinated with that sophisticated metering of gasoline is multi-spark ignition. After the first spark, the system can recharge and deliver up to three more sparks within a single millisecond, creating a gas plasma with more expansion than conventional ignition would allow. The time lapse between sparks is adjustable, so combustion duration can actually be controlled, resulting in two percent better fuel economy, and a total of four percent improvement in combination with direct fuel injection.

Of course, these precise functions are orchestrated by the ME-SFI control unit, which is attached to the air filter housing for cooling. It does a lot more than that, though, including management of:

- Cylinder-selective, adaptive knock control
- Electronic accelerator
- ECO start/stop function
- Stepless adjustment of intake and exhaust camshaft timing
- Turbo boost pressure
- Torque interface to ESP, transmission, and air conditioning
- Alternator interface

Here's the mighty AMG version of the CLA 2L engine. At 355 hp and 332 ft. lbs. of torque, it's the most powerful production four-cylinder in the world.

The European BlueEfficiency Edition of the CLA boasts the best aerodynamic number of any production car ever: 0.22! Special attention was paid to such details as the mirrors and windows, and the whole undercarriage has been streamlined, right down to the mufflers.

- Thermal management for shortening warm-up phase
- Engine oil pump control
- Exhaust flap control
- Diagnosis and fault storage
- Drive authorization system and immobilizer

The bottom end looks indestructible. The crank, rods, and pistons are all forged.

If the ME detects a mechanical fault in the electronic accelerator throttle actuator, the fuel injectors are partially shut off in order to restrict engine speed to 1400 rpm at idle, and 1800 rpm while driving. Another safety-related job is shutting down the fuel pump in the absence of an engine speed signal, or if a crash signal is received indirectly via the chassis CAN, or directly from the supplemental restraint system control unit. In addition, the injectors are briefly actuated to depressurize the fuel system.

Current management

The electrical system battery (G1) is located in the driver's side of the engine compartment. An additional battery (G1/13) for the ECO start/stop function is installed in the front passenger footwell.

The energy management system ensures that the engine can be started and that all electrical consumers receive a reliable power supply. This is achieved through the major assembly coordinator and on-board electrical system management subsystems. The major assembly coordinator is

A low-pressure pump moves gasoline from the 50L high-density polyethylene tank (six layers with a block layer made of ethylene vinyl alcohol to prevent hydrocarbon evaporation) to the high-pressure pump, which can generate an impressive 2,840 psi (190 bar).

integrated into the ME and forms the interface of the on-board electrical system management to the alternator. The ME communicates with the alternator via the powertrain LIN (LIN C1). The major assembly coordinator regulates the power output of the alternator in accordance with the instructions of the on-board electrical system management, taking engine load into account.

The on-board electrical system diagnosis function provides precise analysis of causes in the event of complaints. The last 100 driving and idle cycles are stored with important information. This can be read out using Xentry. In addition, the diagnosis function now makes it possible to read the no-load current curve for the most recent hours and display it graphically.

Trans

The adoption of FWD and the tightened requirements for performance and fuel efficiency resulted in a truly unique new transaxle. The 7G-DCT is a 7-speed dual-clutch, three-shaft transmission unit. It consists of two sub-transmissions each with its own clutch. Clutch operation and gear changes occur rapidly without interruption of tractive power for improved efficiency and sporty vehicle dynamics.

A few more important features of the 7G-DCT:

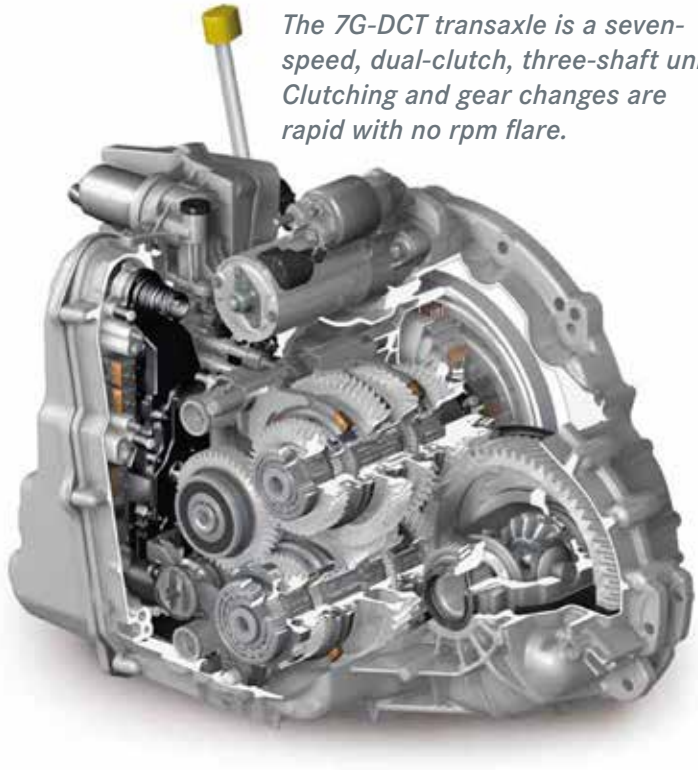
- Wet, hydraulically-operated dual clutches
- One oil circuit for hydraulic control and lubrication of the gear set
- Integrated electric auxiliary oil pump
- Integrated shift-by-wire

Cooling is handled by an active oil system. It is also suitable for usage with the start/stop function. When this function is active (engine off), the electric auxiliary oil pump supplies the shift elements and actuators with oil.

Automatically controlled all-wheel drive (4MATIC) is optional, with power sent to a multi-disk clutch in the rear axle differential.

Electrically-powered steering

Yet another big advance is the electric power steering, which consists of a rack-and-pinion steering gear, a torque sensor, an actuator motor, and a control unit. The steering assistance is transmitted



The 7G-DCT transaxle is a seven-speed, dual-clutch, three-shaft unit. Clutching and gear changes are rapid with no rpm flare.

At a Glance...	CLA250	CLA250 4MATIC
MSRP	$29,900	$31,900
Fuel Economy	City: 26MPG Highway: 38MPG Combined: 30MPG	TBA
Engine	2.0L Inline 4-Cylinder Turbocharged	2.0L Inline 4-Cylinder Turbocharged
Performance	208 HP 258 lb-ft torqu	208 HP 258 lb-ft torque
0-60 (sec.)	6.9	6.8 (est.)

by the motor to the rack-and-pinion to boost the steering moment applied by the driver. Compared to hydraulic power steering, electric steering force assistance offers the following advantages:

- Improved steering feel
- Fuel savings
- No power steering fluid required
- Compact design
- Speed-dependent steering force assistance
- Assisted steering return
- Diagnosis capability

The brake and engine intervention functions of ESP, which are intended to stabilize the vehicle, have been supplemented by steering torque intervention. This additional steering torque is provided in the form of electric steering force assistance.

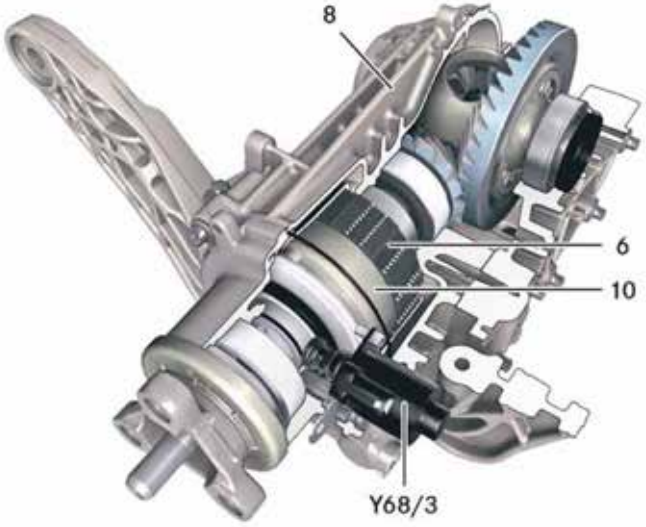
Tons of brake features

Mercedes-Benz has spared no effort to make sure the CLA has an integrated brake system that's more than a match for the competition where high-technology is concerned. For example, ABR (Adaptive Brake) assists the driver in dangerous situations which occur suddenly. The familiar system has been adapted to the new model series and consists of the following subfunctions:

- Electronic Stability Program (ESP)
- Electronic brake force distribution (EBD)
- Anti-lock braking system (ABS)
- Acceleration skid control (ASR), electronic traction system (ETS)
- Brake Assist (BAS)
- Dry braking
- Precharging, depending on accelerator pedal actuation
- Precharging, depending on lateral acceleration
- Standstill coordinator (SSK)
- System fault display
- ESP dynamic cornering assistant

There's even an electric parking brake, which is identical to that found on models R231 (SL) and R172 (SLK). It acts on the rear wheels by making use of special electrically-adapted brake calipers, which are operated via a switch on the instrument panel.

As you can see, there's way too much new technology in the CLA for us to be able to delve very deeply into it in one magazine article, but we will concentrate on the operation and diagnosis of specific systems in future issues of StarTuned. |



4MATIC is a great option. The rear axle carries a multidisc clutch, and up to 50% of the engine's torque can be directed to the rear axle.

This may look like terra incognita to you -- FWD, MacPherson struts, and electrically-powered steering -- but it's thoroughly modern and works superbly. Note the long link between the stabilizer bar and the strut.

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® ½ 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

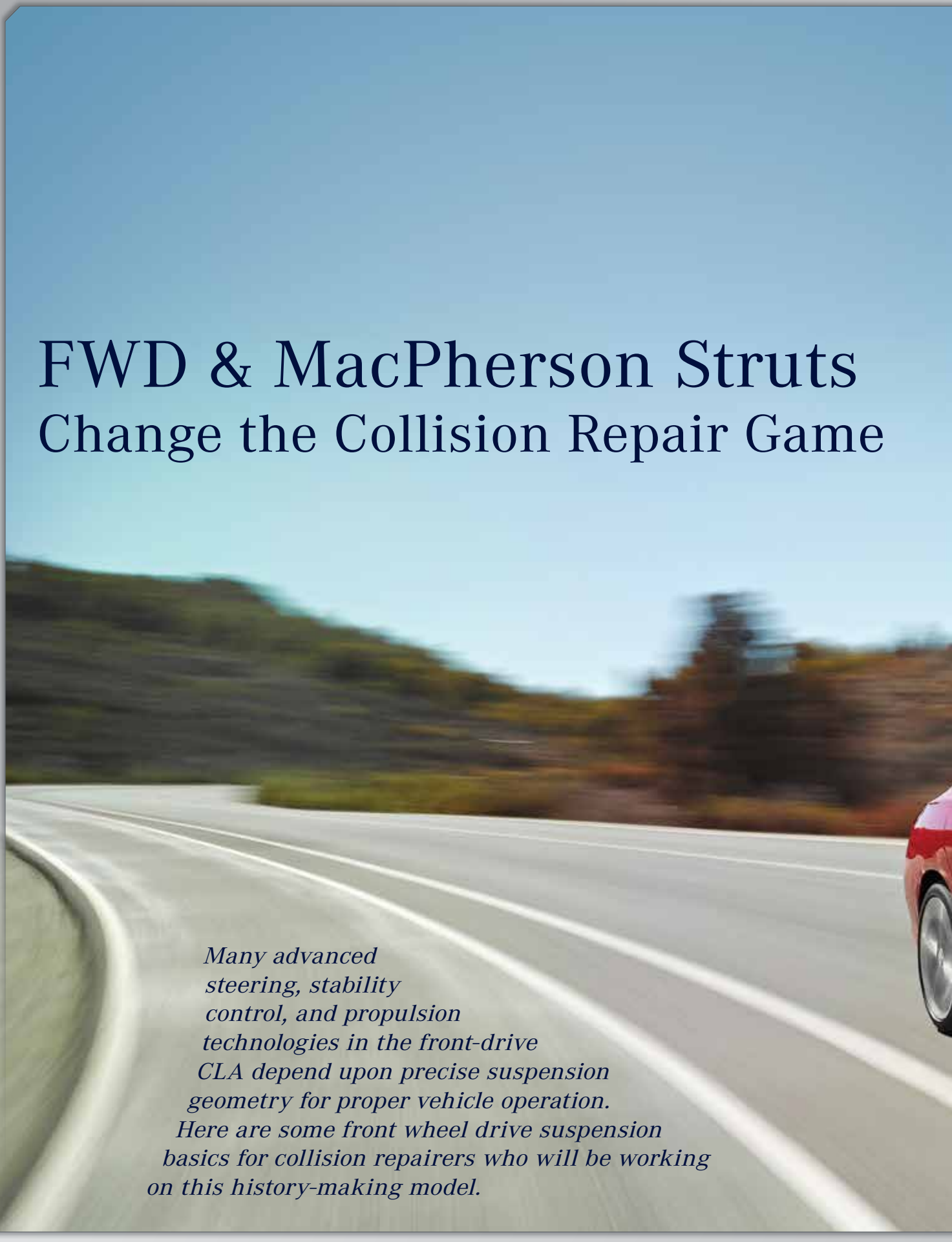
Mercedes-Benz automobiles are designed to perform on the most challenging roads and conditions. Shouldn't the oil used in Mercedes-Benz engines do the same? We think so.

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		

FWD & MacPherson Struts
Change the Collision Repair Game



Many advanced steering, stability control, and propulsion technologies in the front-drive CLA depend upon precise suspension geometry for proper vehicle operation. Here are some front wheel drive suspension basics for collision repairers who will be working on this history-making model.

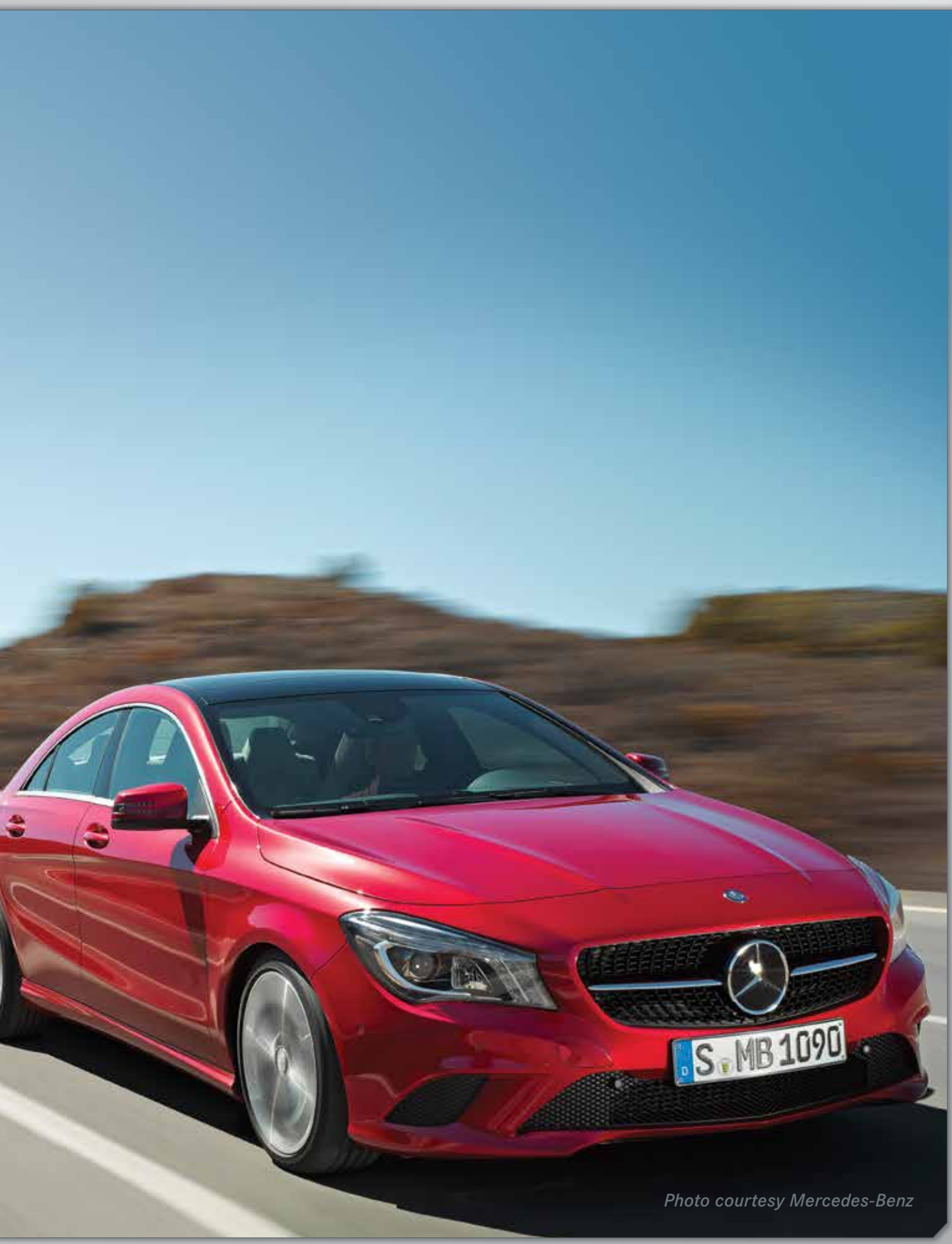
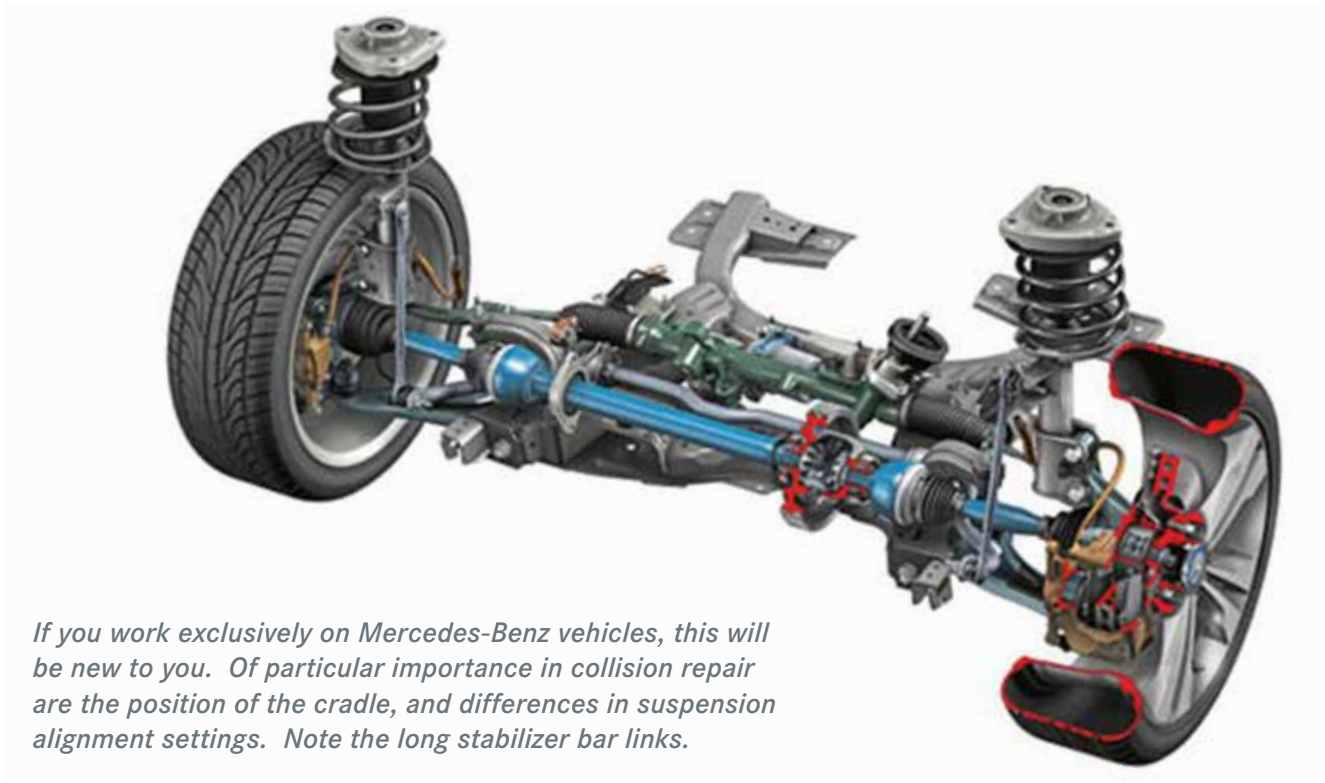


Photo courtesy Mercedes-Benz



If you work exclusively on Mercedes-Benz vehicles, this will be new to you. Of particular importance in collision repair are the position of the cradle, and differences in suspension alignment settings. Note the long stabilizer bar links.

For the young, upscale market that the CLA 250 is intended to attract, it offers luxury, a ton of advanced technology and safety features, and aggressive design cues, all at a new, competition-busting price point. Technicians – if you cut your collision repair teeth on Mercedes-Benz rear wheel drive vehicles, read on because FWD and MacPherson strut front suspension mean there are some new things to take into consideration.

The suspension of this front wheel drive model is tasked with controlling vehicular movement under a variety of speeds, weight loads, road conditions, and driver intentions. This routinely requires resisting or redirecting the kinetic energy of a 3,300 lb. vehicle that is in a constantly changing state of motion.

That Newton guy

Newton's First Law says that a body in motion will continue that motion until it is acted upon by an opposing force. Just to make life fun, Newton's Second Law says that there is always an opposing force, and it will generally equal the other.

Think about a vehicle about to enter a turn. The inertial force established by the vehicle's speed, weight, and balance wants to push straight ahead. As the driver turns the steering wheel, the cornering forces of the tires act against the momentum of the vehicle to change its direction. Newton's First, meet Newton's Second.

A little patch will hold us

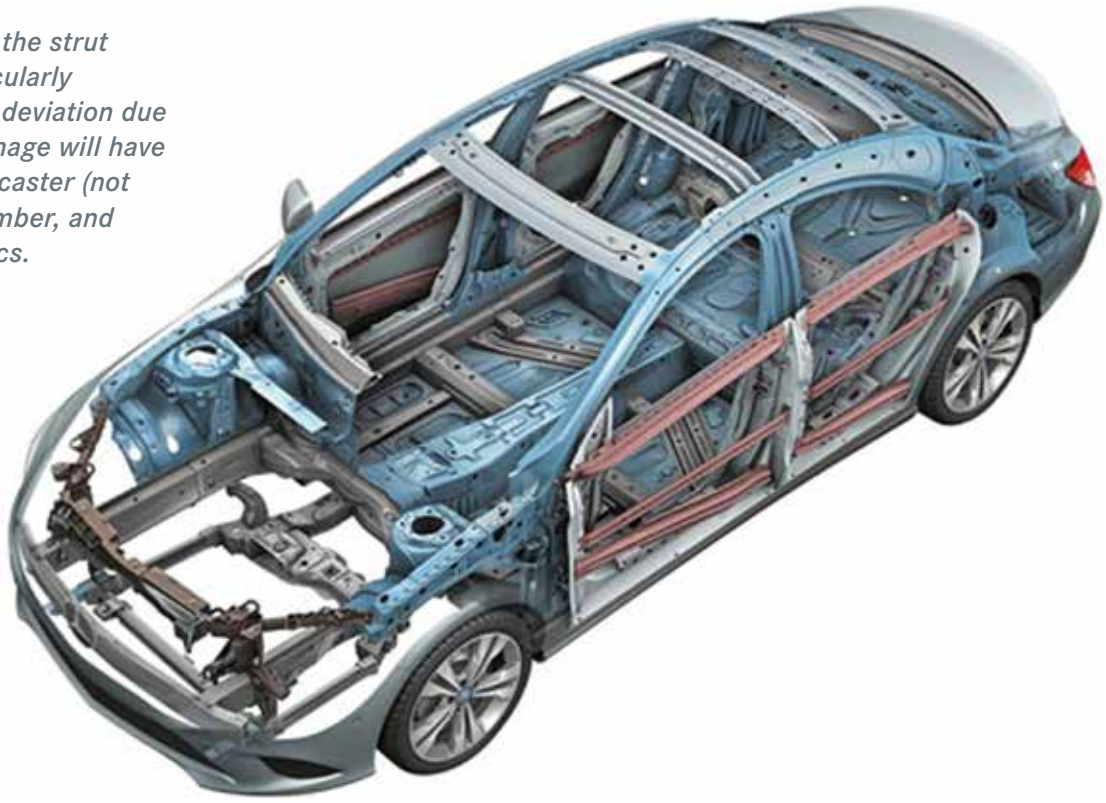
All of the forces that contribute to directional control, cornering ability, vehicle stability, velocity or thrust, and ride comfort must accomplish their goals through the small patch of tire tread that is actually in contact with the road at any one time. The job of the suspension is to turn, tilt, and position the wheels so that little patch of tread maximizes its grip on the road in spite of all of the different forces at play.

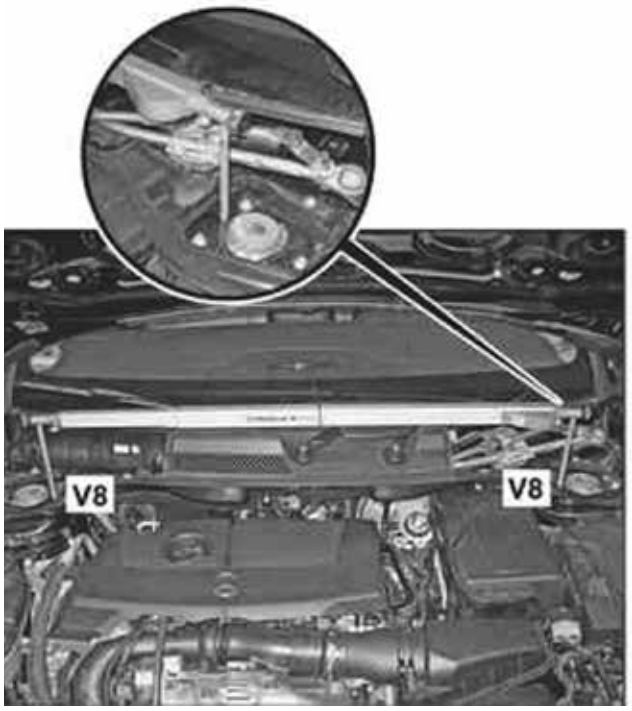
Secondary damage

Collision energy can travel through the vehicle to other areas that may be only indirectly related to the point of impact, where it can cause secondary, or hidden, damage.

Secondary damage may be difficult to catch with a traditional visual inspection. If you miss a bent strut or control arm, the tire patch won't hold the road properly, and your finished repair will come back from the alignment bay needing additional work.

The position of the strut towers is particularly important. Any deviation due to collision damage will have a big effect on caster (not adjustable), camber, and vehicle dynamics.





Measure the distance between reference points ("V8," not to be confused with a type of engine the CLA doesn't have) at each front strut tower. If there is a problem with a strut itself, Mercedes-Benz recommends replacing only the damaged side, not both struts.

If you want to avoid an unpleasant 5 o'clock surprise (most likely not included on the original estimate), you must search for secondary damage. Check for loose or worn ball joints, leaking or bent struts, and damage to upper strut mounts and lower control arms, tie rods, and other key components.

Since you are probably used to working on rear wheel drive with upper and lower control arms or wishbones, you should realize that it's important to spend a little extra time making sure that strut tower placement and cradle alignment match OE specifications. In its Workshop Information System (WIS), Mercedes-Benz recommends taking a series of measurements to check for bent front suspension components and mounting points. The list of measurements includes, but is not limited to, the distance between the front bearings of the front axle carrier, between the rear outer mounts of the front axle carrier, between the front bearing of the front axle and the rear outer mount of the front axle carrier, and the distance between suspension strut towers.

Three angles, plus . . .

The big three suspension angles to check on an FWD vehicle are the same as for a RWD -- caster,

camber, and toe -- but there are some subtle differences. We'll go through the basics here to make it easier to see them.

Caster refers to the tilt of the steering axis when viewed from the side of the vehicle. The steering axis is a line drawn through the upper and lower steering pivot points. On traditional Mercedes-Benz vehicles, these would be the upper and lower ball joints in the control arms. With the strut system in the CLA 250, on the other hand, the upper pivot is the center of the strut's top bearing mount and the lower pivot is the lower ball joint.

Regardless, positive caster tilts the top pivot toward the rear of the vehicle. When an imaginary line through the steering axis meets the ground at a point ahead of the center point of the tire contact area, it creates a self-centering force that helps keep the wheels pointed straight. This is responsible for pulling a vehicle back to the straight-ahead position when the driver lets go of the steering wheel while coming out of a turn.

Since the top strut mounting position on the CLA 250 is fixed, caster cannot be adjusted. Large deviations in specified caster may be due to a bent lower control arm, damaged or misaligned front axle carrier, or body damage that affects the position of the upper strut mount. After making the appropriate collision repairs, compare caster measurements on the vehicle against specifications in WIS to confirm that you have corrected the problem.

Camber

Camber is the inward or outward tilt of the top of the wheel when viewed from the front or rear of the vehicle. Measured in degrees, an inward tilt is said to be negative, and an outward tilt positive. Proper camber helps position the wheel so that it contacts the road with as even an amount of force as possible across the width of the tire as the spring compresses and rebounds. This minimizes uneven tread wear, and, more importantly, helps keep the vehicle rolling straight down the road.

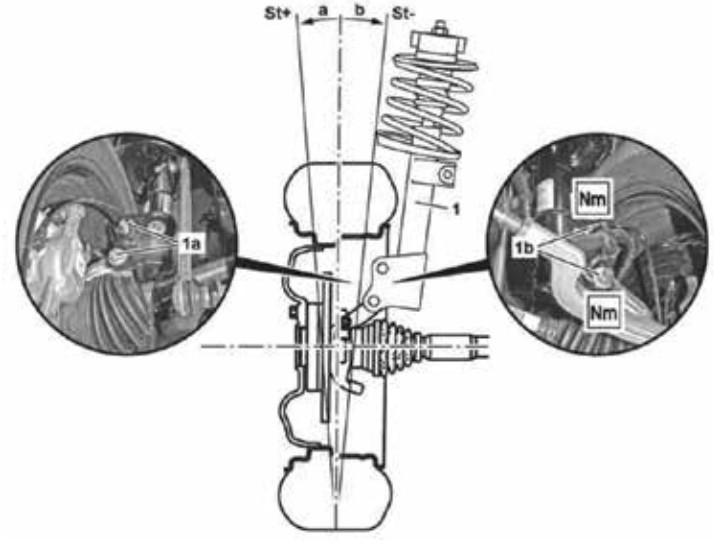
A difference in camber angle that exceeds 1/2 a degree side-to-side will cause the vehicle to pull to the side with the higher camber. In other words, a vehicle will pull toward the side with the most positive camber, all other things being equal.

Possible causes of camber that does not match specifications include a bent spindle, strut, or control arm, or collision damage that has shifted an upper strut mount to one side (the first thing to measure is the distance between the strut towers). For safety reasons, NEVER try to straighten any suspension components, such as struts or control arms. If bent, they must be replaced.

Front suspension camber is adjustable on the CLA. Check in WIS for the exact settings to achieve the desired front axle camber.

Toe in or out?

Toe is simply a comparison of the distance between the leading and trailing edges of the front or rear pair of tires. If the leading edges are closer together than the trailing edges, alignment is said to be "toed-in," and vice versa.



To adjust camber on the CLA 250, loosen the nuts (1b) that attach the strut to the steering knuckle. Use a wedge between the strut tube and the wheel rim to force the rim outward to achieve a more positive setting, and to hold the setting in place. Once you've got camber where you want it, tighten the upper nut first, then the lower nut, and re-check the setting. Torque the nuts to 110 Nm, then twist an additional 90 deg.

Here's where RWD and FWD differ. With RWD, as the vehicle is being powered down the road, tread drag tends to push the leading edges apart. This force is obviously not present while you are making the adjustment, so the specification will typically be toed in slightly to compensate for dynamics.

With FWD, the front wheels are pulling the vehicle forward whenever engine power is applied to them, which would tend to force the leading edges of the tires together. So, you might expect that the specification would be toed out. That doesn't take into account coasting, however, during which mode the forces would be the same as those of a RWD vehicle. Always check WIS for the specified setting, which represents a proper compromise. Mercedes-Benz engineered in less than 1/4 of a degree of toe-in. Permissible difference in toe between the right and left sides of the front axle is ±0° 10'.

Toe settings have a major impact on tire wear. Excessive toe-in or out causes tires to scrub against the road surface even when driving straight. If toe is off by 1/8 in. (3mm), each tire on that axle will scrub the road sideways 28 feet for every mile traveled. Too much toe-in accelerates outer tread wear, while excess toe-out causes rapid wear of the inside tire edge.

Normal wear to the tie rod ends and other steering linkage parts, in addition to collision damage, can cause toe to become out of compliance with the carefully-considered OE specifications. Any other toe setting will produce the scrubbing that eventually causes a feathered or sawtooth wear pattern on the tire.

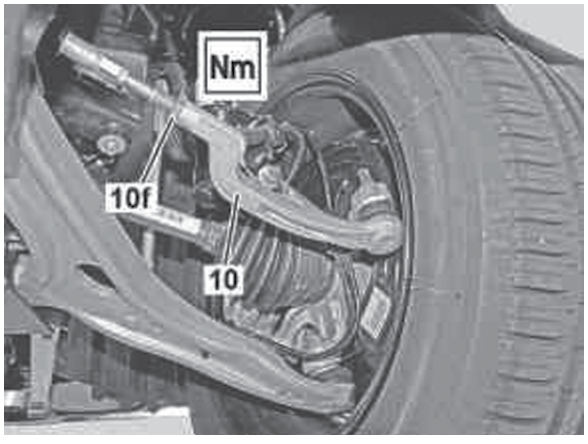
Check for feathered or sharp edges by rubbing your hand lightly across the tread. If it feels smooth when you move your hand toward the center of the vehicle but rough when you reverse hand movement toward the outside, the cause is excessive toe-in. Sharp edges will point in the opposite direction if the problem is excessive toe-out.

Thrust Angle

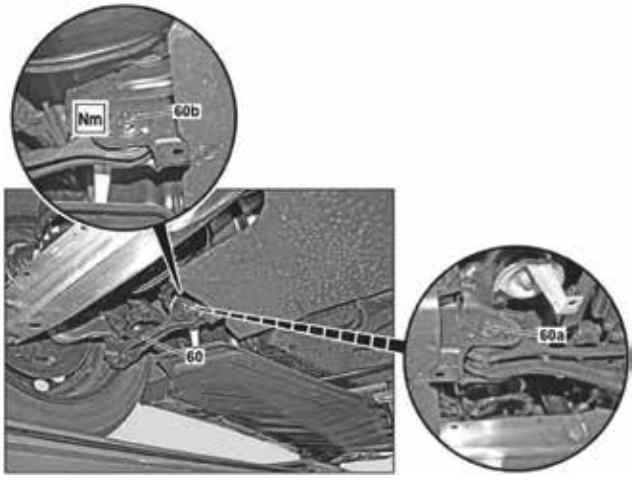
If the steering wheel is not centered while the vehicle's wheels are moving straight, or the body appears to be moving at an angle ("dog tracking"), you have a thrust angle problem. The first steps in correcting this problem include ensuring that side-to-side specifications are met, and replacing damaged tie rods, control arms or other rear suspension components. You can adjust rear toe to the vehicle centerline as part of a four-wheel alignment.

Ride Height & SAI

If ride height is unequal by as little as 1/8" (3mm) side-to-side, it can negatively affect both toe and camber. Sagging, bent, or broken springs



The front axle toe specification for the CLA 250 is 0° 12' (±10'). With the steering wheel and steering gear locked in center position, hold the tie rod (10) and loosen the jam nut (10f). Rotate the tie rods to adjust the toe angle (see WIS for rear toe specifications and adjustment instructions).



Toe is adjustable in the CLA's double wishbone independent rear suspension using the cam bolts (60a). If cam bolt repositioning does not bring rear toe into specification per WIS, replace the tie rod (60).

can change the vehicle ride height and therefore alter the suspension angles.

You can no longer judge whether or not ride height is in balance by how high the fender edge on each side comes up your leg. Mercedes-Benz measures the vehicle level side-to-side difference in degrees, and specifies that there can be no more than ±1.3° difference between the right and left sides at the CLA front axle.

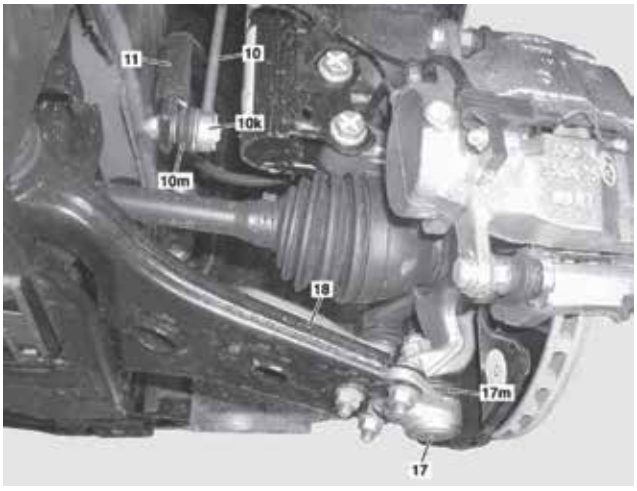
Keeping the tire patch in the right place would be relatively easy if roads were perfectly smooth and had no turns. Since that is not the case in the real world, we have Steering Axis Inclination (SAI). This is accomplished by having the spindle attached to the axle at an angle that moves the swivel line downward from the top position, thus enlisting gravity to help keep the wheels in the straight-ahead position and to significantly reduce the steering impact of road bumps.

This angle projects the swivel line close to the centerline of the tire at ground level. The distance between the tire centerline and the swivel line at ground level is called the "Scrub Radius." The smaller (narrower) the scrub radius, the less effort is required to turn the wheels. A smaller scrub radius also minimizes tire wear. A positive scrub radius projects the swivel line down at an angle that projects the tire centerline outboard of the swivel axis at ground level. SAI and scrub radius must be the same side-to-side on the vehicle.

Before attempting to adjust camber to fine-tune these angles, look for a bent spindle, a strut tower that is out-of-position at the top, or a misaligned front cradle.

Many other factors can negatively affect suspension angles and front wheel drive performance. For example, after a collision, Mercedes-Benz requires checking for damaged ball joints at the flange connecting the lower control arm to the steering knuckle, and where the link rod connects to the stabilizer bar.

By paying particular attention to suspension and steering linkage angles during collision repair, you will assure that a CLA vehicle has the range of motion needed to maintain traction, stability, and ride comfort. |



Check front axle rubber boot (17m in photo) of flange ball joint (17), and boot (10m) of ball joint (10k) at link rod end (10) for leaks and condition. Check link rod ball joints for play by pulling and pushing on the stabilizer bar (11). Also check ball joints by firmly pulling and pushing on lower control arms (18). Photo is of a 2004-12 A-Class (not sold in the U.S.), but instructions apply to the CLA as well. If the rubber boots leak or the ball joints show signs of excessive wear, Mercedes-Benz requires replacement of the applicable lower control arm or link rod.

Strut-related Noise Complaint

1. Use the following procedure to check for noise before replacing a strut:
2. Determine the side causing the problem by driving with one side of the vehicle on a rough surface.
3. Unhook the stabilizer bar linkage prior to the test drive and check whether the noise changes.
4. Release tension on the shock absorber/suspension strut and tighten to ready-to-drive state.
5. If possible, swap the struts from left to right and listen for any change in the noise source.

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