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United Kingdom
Published by De Agostini UK Ltd c/o Royds Withy King, 69 Carter Lane, London EC4V 5EQ

USA
Published by De Agostini Publishing USA, Inc. c/o Becker, Glynn, Muffly, Chassin & Hosinski LLP, 299 Park Avenue, New York, New York 10171

ISBN: 978-1-4439-5183-8
FFN40: 21 06 09

ISSN 2631-9799 (Print)
ISSN 2732-4583 (Online)

Picture credits: Age Fotostock; NBCUniversal Archive; FCA Archives; PxHere; Marco Boccolini; Audi AG; Lamborghini Media

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Printed in Poland

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DRIFTING: SMOKE AND WHEELSPIN!

In the first two movies in the franchise, ten-second races produced the most thrilling moments. In *The Fast and the Furious: Tokyo Drift* the dizziness and the adrenalin shot up with the introduction of a new racing technique: drifting, which consists of accelerating and oversteering until the car is at an angle to the direction of motion.

Drifting has existed as a sporting event since the late 1990s. It soon stood out from other motor racing events, mainly because in most of the races points are awarded more for style than for speed. For drivers, who must be given special training, the most important thing is the skill of doing controlled skids at high speeds.

The producer of the *Fast & Furious* franchise, Neal H. Moritz, was aware of the drifting technique when they began preparing the third movie. Without being a great fan, he was surprised when he learned that the origin of this unusual technique was the city of Tokyo, in Japan. When Moritz learned this, he was very excited. This is how he recalled it: "We were not prepared to shoot a third movie if we didn't have a new story to tell. One day I found out that a style of racing had originated in Tokyo that was called drifting. From that point on I was sure that this was the story we were going to tell."

THE WORLD OF DRIFTING

It was in the 1970s when a group of young guys in Tokyo began meeting in the mountains around the city. There, they challenged one another to see who could drive down a particular hill the fastest. Of course, rather than driving at high speed, this kind of racing forced them to remain in complete control of the car to avoid ending up at the bottom of a gully. One of the guys who used to take part, Keiichi Tsuchiya, came up with an unusual way of taking bends, oversteering until his car was at an angle to the direction of movement. This way, he made sure that he stayed in control while preventing other cars from passing. His technique was so effective that very

During his visit to Tokyo, Sean Boswell was forced to learn the sophisticated drifting technique. But he left several cars the worse for wear while he learned

TANNER FOUST

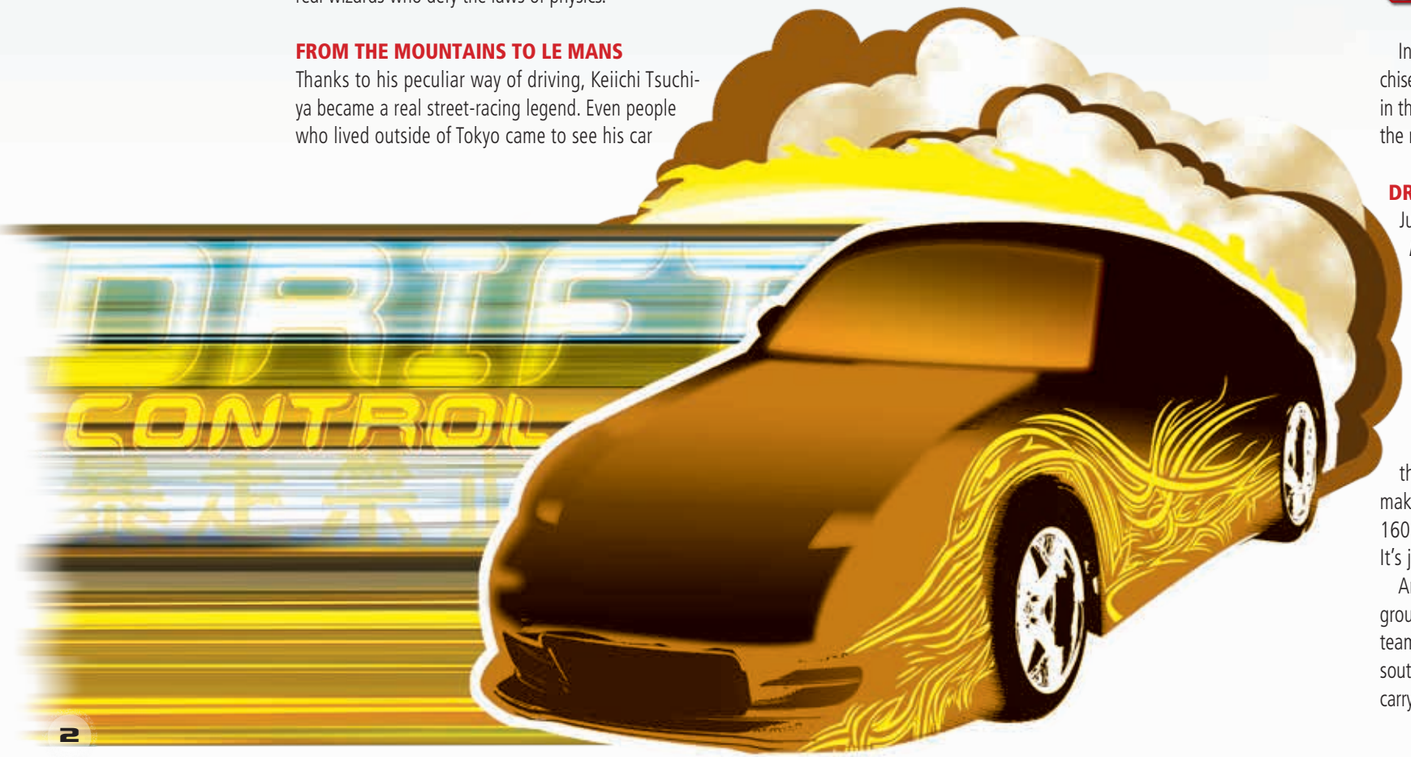
To film *The Fast and the Furious: Tokyo Drift*, it was essential to have a stunt driver who could master the drifting technique and act as a double for the stars in the most dangerous scenes. This responsibility fell to Tanner Foust, a professional racing driver who would later stand out above all for his brilliant, bold appearances in the X Games. Capable of driving in drag racing, drifting, rallycross, and even on ice, thanks to Foust's crucial contribution the races in *The Fast and the Furious: Tokyo Drift* looked awesome. Having studied to be a molecular biologist, this driver's career as a stuntman in films continued with the thrilling action scenes in *The Bourne Ultimatum* (2007) and *The Bourne Legacy* (2012). He also took part in the chases in *Need for Speed* (2014) and *Hitman: Agent 47* (2015). Nevertheless Foust has always had a weakness for the *Fast & Furious* franchise, and he returned for the fourth movie and the spin-off *Fast & Furious Presents: Hobbs & Shaw*.

soon everybody else was imitating it. In no time, it looked like all the cars were coming down the mountains over-steering and sliding, rather than driving. This original technique was called drifting.

"Drifting has nothing to do with pushing buttons and stepping on pedals," says Chris Morgan, the scriptwriter of *The Fast and the Furious: Tokyo Drift*. "You have to know your car better than the guy who made it. Those drivers are real wizards who defy the laws of physics."

FROM THE MOUNTAINS TO LE MANS

Thanks to his peculiar way of driving, Keiichi Tsuchiya became a real street-racing legend. Even people who lived outside of Tokyo came to see his car drifting around the bends in the road. Despite having a humble family background, his popularity made it possible for him to enter official races. Tsuchiya's professional career was very successful and it took him to circuits as famous as Le Mans or those of NASCAR. He undoubtedly became the best-possible ambassador of drifting and thanks to him the style that had already caused a furore in the East now began to catch on in the West.





Introducing this type of racing to the *Fast & Furious* franchise was a great idea. However, to make it more important in the story, the producers of the franchise decided to move the movie's action to Tokyo, the home of drifting.

DRIFTING SCHOOL

Justin Lin, the director of *The Fast and the Furious: Tokyo Drift* had had the chance to see some drifting races. He clearly saw that it was nothing like the way in which people traditionally drove in the USA, so he suggested that the leading members of the cast should learn to do drifting. And to set up the improvised classes, he had the help of the veteran racer Toshi Hayama as technical advisor.

"Drifting consists of taking a car and breaking all the rules of what is supposed to be done with it. You make it lose rear traction, you drive sideways on bends at 160 km/h, with the smoking tires spinning like crazy … It's just awesome!"

American Formula Drift champion Rhys Millen joined the group as the actors' personal trainer. For several weeks, the team got permission to turn a closed section of freeway in southern California into a training track, where they would carry out the training sessions. The experience was explosive.

"The first time they took us to the track and showed us how to drift … was amazing," the star Sean Boswell said. "I was hooked."

SPECTACULAR SHOTS

As usual, a key part of the production was choosing the cars that were going to be part of it. Of course, the new vehicles had to be adapted to the context, the city of Tokyo, and to the style of driving, drifting, so many of the cars that had featured in the earlier films had to be ruled out. The director did not think this was a problem, as he knew they had an ace up their sleeve to surprise audiences with.

"Drifting is a very cinematographic sport," says Justin Lin. "It was exciting to film something that had not been seen before in movies. We invented camera angles and movements to best capture the action. And we were able to materialise all our ideas because we had a fantastic team of drivers and technicians."

And cars too. Two hundred and fifty in all, many of them imported from Japan with the steering wheel on the right. The supervisor of this gigantic fleet, Dennis McCarthy, modified most of the cars, in some cases to better adapt them to the demands of drifting, and in others to allow the cameras to film the most spectacular shots.

↑ Twinkie helped out in Han's workshop, preparing the cars before the races. The continuous drifting and skidding meant that the tyres did not last long



The front with four headlamps, the many chrome elements, the spoked wheels and the vinyl roof characterized the Dodge 400 (in the picture, a coupé version) and set it apart from the more basic Dodge Aries.

DODGE 400/600

The Dodge brand's 400 and 600 series used the Chrysler Group's K platform, the first one built by the consortium with front-wheel drive. These mid-range cars, manufactured between 1981 and 1989, signaled the return of convertible bodywork to American manufacturing. They were also sold in sedan and coupé versions.

The Dodge 600 saloon of recent years, with a longer wheelbase, could mount the 2.2-litre engine with electronic fuel injection.



The 1981 Dodge 400 was a deluxe version of the Dodge Aries, built on the same front-wheel-drive K platform shared also by the Plymouth Reliant and the Chrysler Le Baron. With a newly designed front and back, it was sold as a four-door sedan, a two-door coupé and, above all, a convertible. It was therefore the first cabriolet launched by an American brand since 1976, when Cadillac ended production of the Eldorado convertible.

It had two four-cylinder engines, an 84 HP 2.2-litre and a 92 HP 2.6-litre, both made by Mitsubishi, with which the Chrysler Group had agreements for the joint development of models.

In 1983 it made way for the Dodge 600. The saloon was larger and presented a more luxurious interior, while the coupé and the convertible were merely the Dodge 400 with new logos. In 1984 a 140 HP 2.2-litre turbocharged engine was launched for the ES finish, with a sportier chassis.

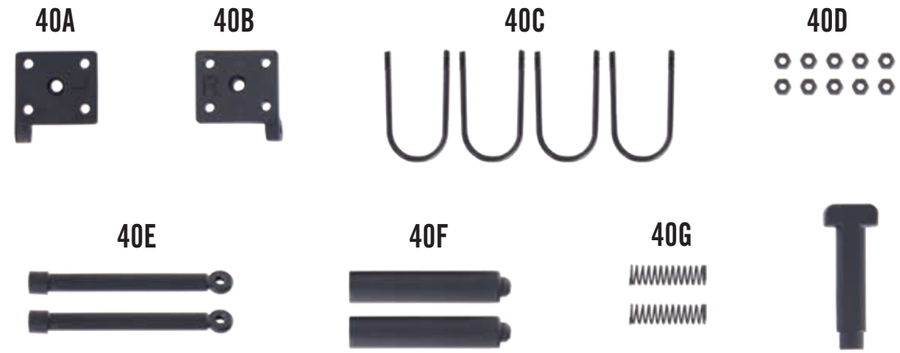
In 1985 the Dodge 600 saloon adopted a slightly longer wheelbase, and two new engines were offered, a version of the 2.2-litre with fuel injection and a 2.5-litre to replace the Mitsubishi power units. Production of the Dodge 600 ended in 1987.



ATTACHING THE LEAF SPRINGS TO THE AXLE

In this assembly session you will assemble more of the rear suspension, attaching the leaf springs that will later be joined to the chassis.

PIECES FOR THIS STAGE





Editor's note: The parts shown here may differ slightly from the parts supplied with this issue. This does not affect the quality or the assembly instructions in any way.

- 40A Left leaf spring plate
- 40B Right leaf spring plate
- 40C U-bolts (x 4)
- 40D Hex nuts (x 10)
- 40E Rear shock absorber pistons (x 2)
- 40F Rear shock absorber cylinders (x 2)
- 40G Rear shock absorber springs (x 2)
- Hex key
- AM Screws 2 × 4 mm, (x 10)*
- FM Screws 2 × 5 mm, (x 8)*

* Some of the parts are spares.

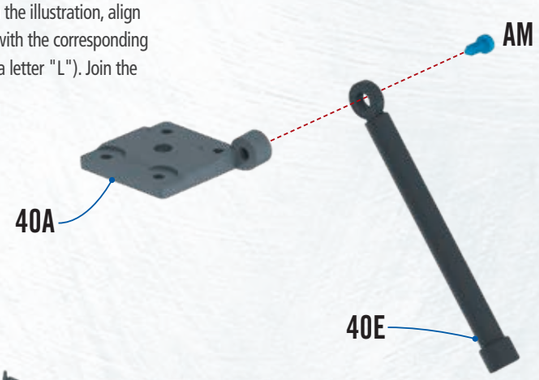
ASSEMBLY AREA

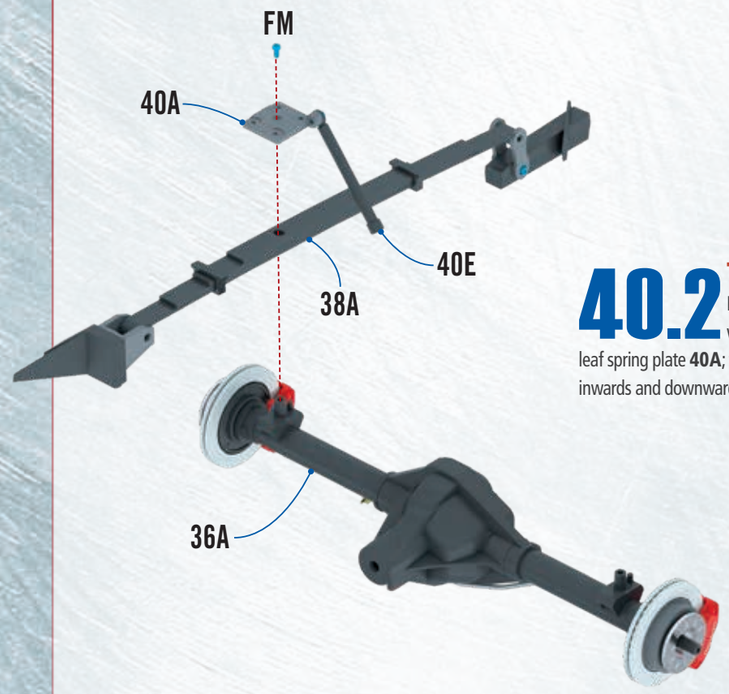


REAR AXLE

Attaching the leaf springs to the axle

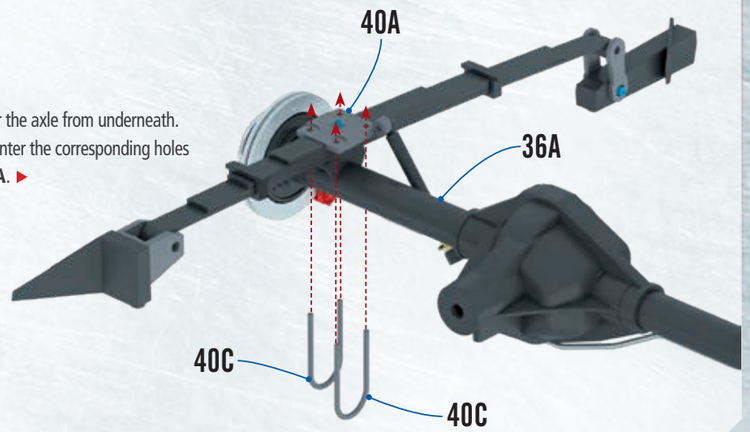
40.1 **With** the pieces facing the same way as those in the illustration, align the eye on one of the shock absorber pistons **40E** with the corresponding eye on the left leaf spring plate **40A** (marked with a letter "L"). Join the pieces with an **AM** screw. ▶

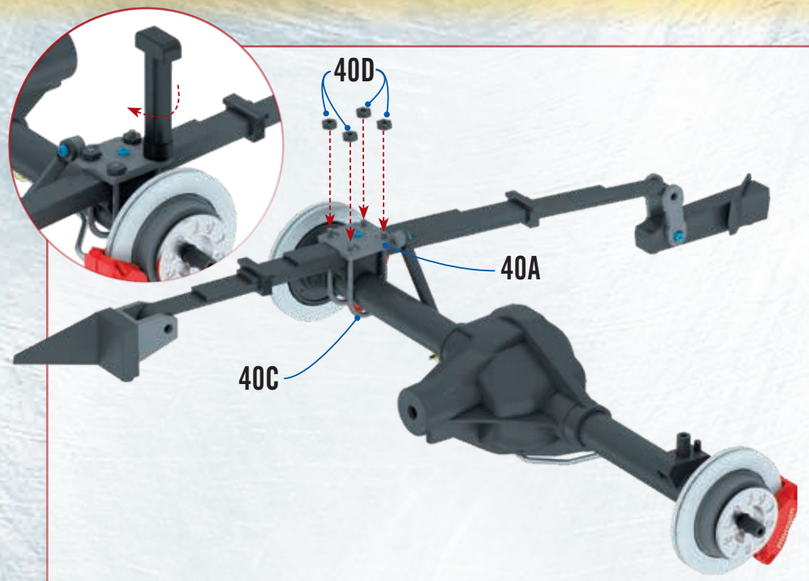




40.2 **Take** the rear axle **36A** and the left rear leaf spring **38A**. Make sure that the central hole in the leaf spring is aligned with the left locating pin on the rear axle. Also align the left leaf spring plate **40A**; the free end of the shock absorber piston **40E** must be facing inwards and downwards. Use an **FM** screw to secure the pieces. ◀

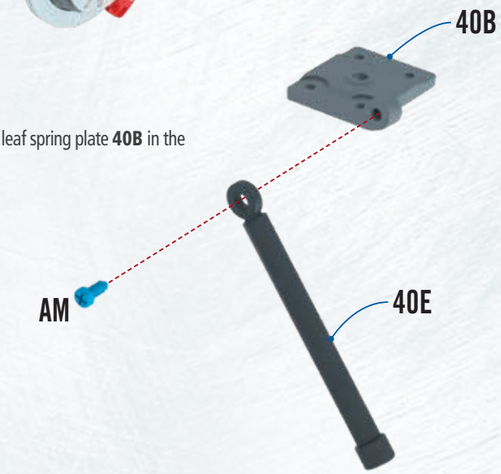
40.3 **Slide** two U-bolts **40C** over the axle from underneath. The ends of the U-bolts must enter the corresponding holes in the left leaf spring plate **40A**. ▶

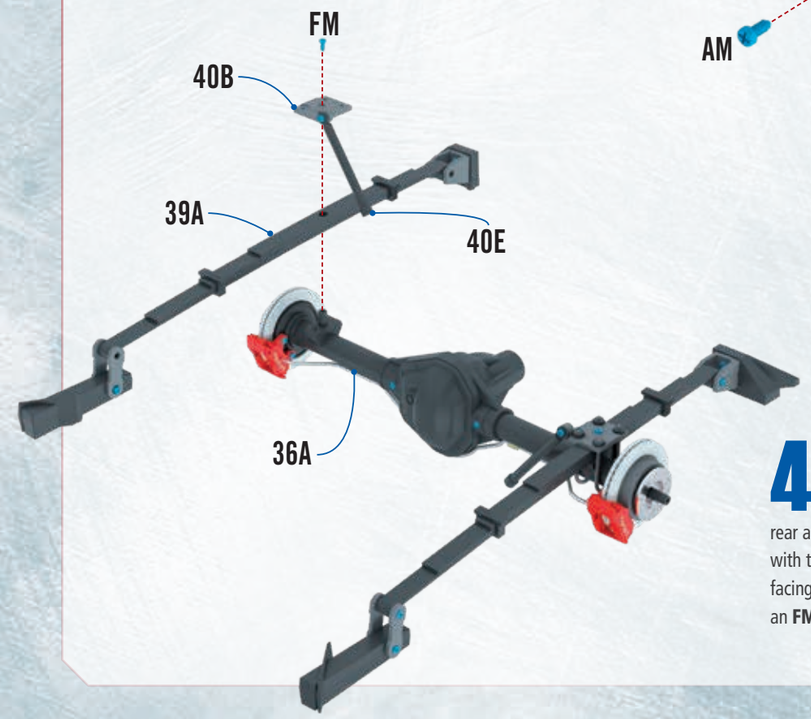




40.4 **Put** a hex nut **40D** onto the threads of the U-bolts. Tighten the nuts carefully, using the hex key that was provided with this stage. ◀

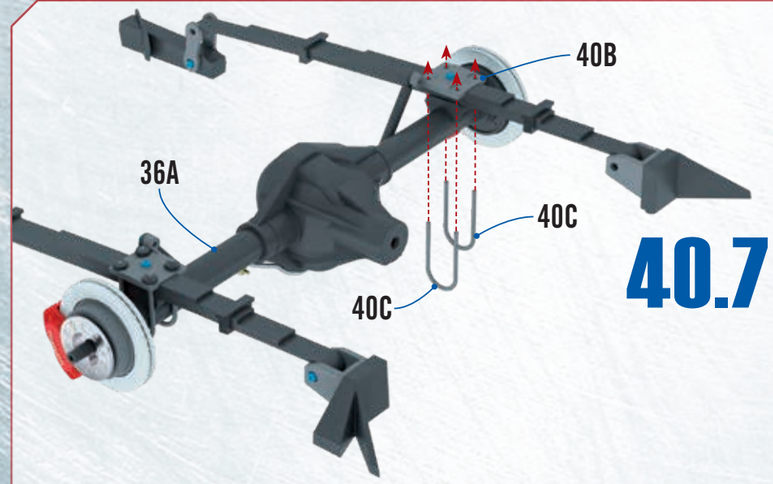
40.5 **Attach** the second shock absorber piston **40E** to the right leaf spring plate **40B** in the same way, using an **AM** screw. ▶



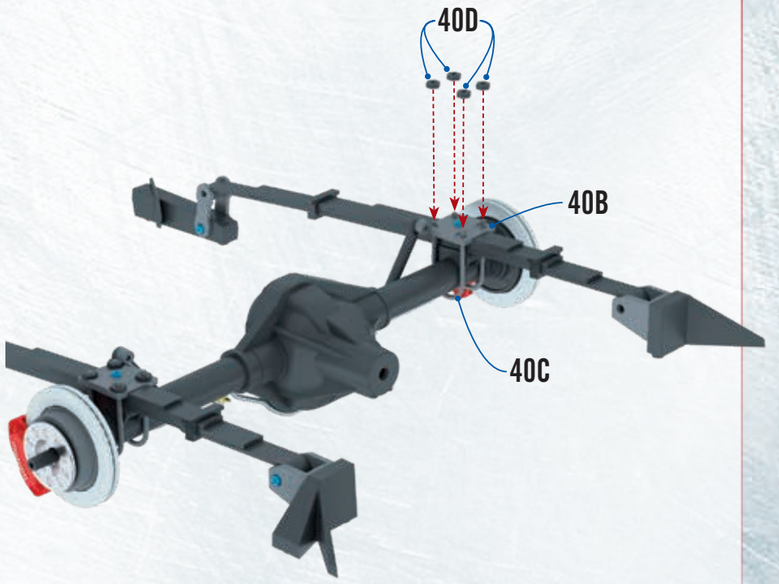


40.6 **Position** the right leaf spring so that the central hole is aligned with the right locating pin on the rear axle **36A**. Also align the right leaf spring plate **40B** with the same hole (the shock absorber piston must be facing inwards and downwards). Join the pieces with an **FM** screw. ◀

Attaching the leaf springs to the axle



40.7 **Slide** two U-bolts **40C** onto the axle from underneath, making sure that the ends enter the corresponding holes in the plate **40B**. ◄



40.8 **Put** a hex nut **40D** onto the threads of the U-bolts. Tighten the nuts carefully, using the hex key that was provided. ►

STAGE 40 FINAL RESULT



You have now attached the two leaf springs to the rear axle. Put everything you have assembled in a safe place, along with the shock absorber springs and cylinders, which you will need in a future work session.

SUSPENSION AND SHOCK ABSORBERS: HOW THEY WORK



Before reviewing the different ways of improving your car's suspension setup, let's do a theoretical review of the suspension and shock absorber system that is an essential component of every vehicle. There are different configurations available on the market.

It is not uncommon to hear inexperienced people using the words "suspension" and "shock absorbers" as if they were the same thing. Experienced tuners and mechanics know better! So we will start by making the point that suspension and shock absorbers are not the same. The only thing they have in common is that they are essential not only for performance but also for safety, because they are key to ensuring safe road holding.

The suspension is made up of flexible components that connect the chassis of the car to the wheels. Their purpose is to absorb the shocks and stresses transmitted from the road surface. For example, when hitting a pothole, the suspension maintains the vehicle's stability and offers the maximum possible comfort to those inside the passenger compartment. The suspension is so-called because it separates the suspended (sprung) weight (i.e. the bodywork, the engine,

The suspension is so-called because it separates the suspended (sprung) weight (i.e. the bodywork, the engine, etc.) from the unsprung weight (i.e. the tires, wheels and brakes) of the vehicle.

Suspension and shock absorbers: how they work



Every 20 to 30,000kms (15-20,000 miles), a professional checkup of the shock absorbers should be carried out.

etc.) from the unsprung weight (i.e. the tires, wheels and brakes) of the vehicle. It is easy to understand the importance of the system. Think about what it would be like to travel in a car without "filters" between the chassis and the wheels: the driver and passengers would feel every bump and pothole. Every movement of the wheels would be transmitted to the chassis. Controlling the vehicle with all that shaking would be practically impossible, not to mention very uncomfortable!

WHAT ARE SHOCK ABSORBERS?

Shock absorbers are a fundamental component of the suspension system. They have the task of regulating its movement, slowing it down and damping the oscillations of the vehicle in motion to ensure driving comfort and stability on the road at all times. Usually, a standard vehicle's behaviour, and therefore its suspension and shock absorber configuration, is designed to maintain the best compromise between grip and driving comfort. This is the main difference between a sports car with a rigid chassis, designed for maximum precision and grip, and a family car. The latter generally has a more flexible suspension that guarantees maximum comfort for the driver and passengers on both city roads and long journeys.

DIFFERENT TYPES OF SUSPENSION

Over the years, cars have used different types of suspension, ranging from leaf springs to coil springs and on through to more sophisticated pneumatic suspension systems. The most used is coil-spring suspension, which is based on torsion springs which work by compressing and extending through a range of movement.

Let's start with torsion bar suspension. It is basically a length of metal rod anchored at one end to the car body and at the other end to the suspension lower link. As the wheel passes over a bump, the bar twists. It returns to its original position when the bump is passed and restores the car to its normal drive height. This is a solution that is often used on vehicles with several axles or that carry considerable weight, such as vans or lorries. It offers good lateral stability in turns and takes up less space than other types.

Now we move on to leaf springs. These are of made up several steel strips, or leaves, stacked one on top of another and held in place by metal clips. This is a rigid system that, thanks to its simplicity and effective operation, was fitted on the first motor vehicles and is still used on heavy commercial vehicles today.

We continue with coil spring suspension. There are different types depending on the geometry of the motion of the guiding elements: the best-known versions are the

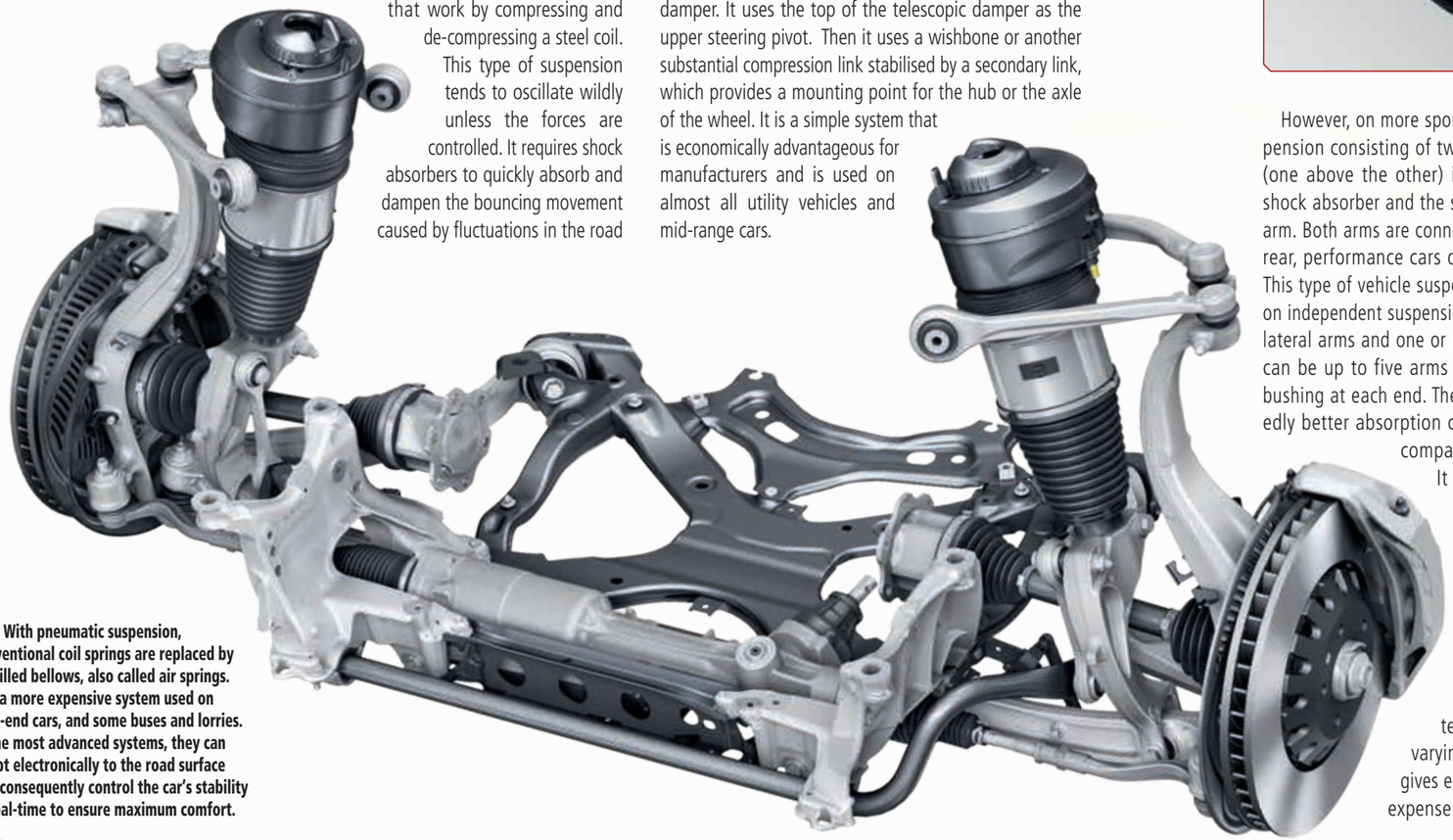
When the shock absorbers are worn out

It is not difficult to understand when your shock absorbers have reached the end of their life. You just need to pay attention to the feel of the car while you are driving:

1) You feel the car body bouncing in an exaggerated, uneven way when travelling on uneven roads.
2) You realise that you have less grip on the road: the car "skids" when braking, and stopping distances begin to lengthen.
3) The car "floats" and wanders when cornering, with reduced stability.
All these symptoms are a clear warning sign. You should have the shock absorbers checked by a professional, usually every 20-30,000km (15-20,000 miles), to determine if they need to be replaced. We use the plural because it is good to replace them in pairs, never individually, although not everyone does!



MacPherson strut, the Multi-Link, and the quadrilateral types. Coil spring suspensions are made with springs that work by compressing and de-compressing a steel coil. This type of suspension tends to oscillate wildly unless the forces are controlled. It requires shock absorbers to quickly absorb and dampen the bouncing movement caused by fluctuations in the road surface. The MacPherson strut is a type of automotive suspension system that combines a coil spring with a telescopic damper. It uses the top of the telescopic damper as the upper steering pivot. Then it uses a wishbone or another substantial compression link stabilised by a secondary link, which provides a mounting point for the hub or the axle of the wheel. It is a simple system that is economically advantageous for manufacturers and is used on almost all utility vehicles and mid-range cars.



With pneumatic suspension, conventional coil springs are replaced by air-filled bellows, also called air springs. It is a more expensive system used on high-end cars, and some buses and lorries. In the most advanced systems, they can adapt electronically to the road surface and consequently control the car's stability in real-time to ensure maximum comfort.

However, on more sporty cars, double-wishbone suspension consisting of two triangular transversal arms (one above the other) is common. In this case, the shock absorber and the spring is connected to a lower arm. Both arms are connected to the wheel hub. At the rear, performance cars often use a multi-link system. This type of vehicle suspension design is typically used on independent suspension setups, using three or more lateral arms and one or more longitudinal arms. There can be up to five arms with a ball joint or a rubber bushing at each end. The main advantage is undoubtedly better absorption capacity and lower vibrations compared to wishbone suspension. It allows sporty handling and increased ride comfort.

FROM SPRINGS TO AIR

An alternative to springs is using air to fill a bellows, and it can be just as efficient. The compressibility of air allows for creating a system that is easily adjusted by varying the pressure of the air. It gives excellent ride comfort but at the expense of a much-increased maintenance schedule. Operating components consist of an air bellows, an oil-gas (or air only) shock absorber, an electric compressor that keeps the air in the circuit under pressure, and a group of valves that directs the air to where it is needed. But we'll talk about it more in detail in one of the forthcoming issues.

FINALLY, ELECTROMAGNETIC FIELDS

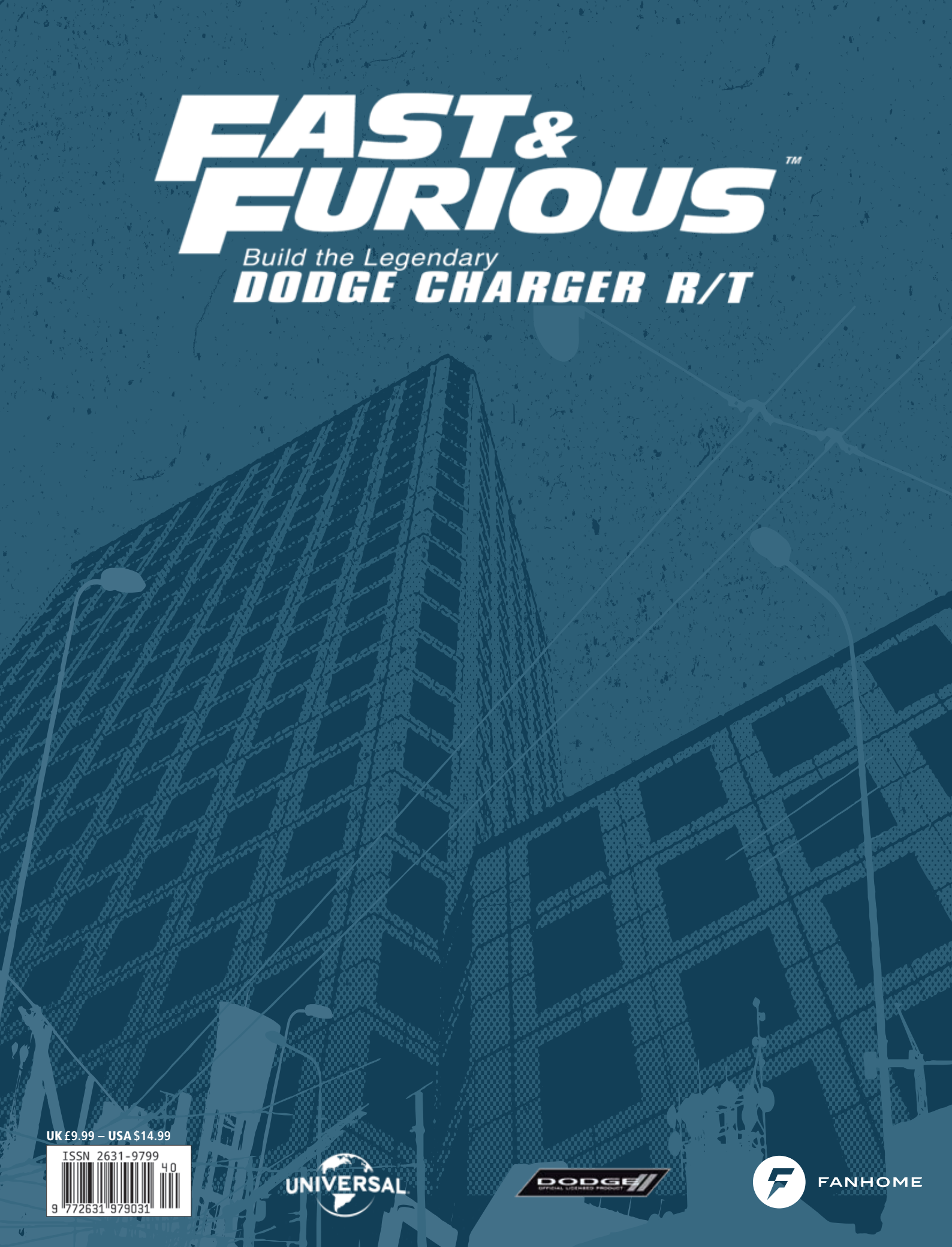
A well-known car manufacturer has developed a technology that uses an electronically controlled magnetic field. It can automatically adapt the stiffness of the shock absorbers to the driving conditions in fractions of a second. The driver can even choose between a basic, comfort or sports setting. In comfort mode, the driver benefits from a trim level that is more comfortable and balanced, especially on long journeys, relieving the driver of stress. In addition, the shock absorber system ensures excellent driving stability and safety, particularly under difficult road conditions. In "dynamic" mode, the ride gives the driver a feeling of increased agility and a more direct response from the road surface. The car feels more agile and allows for a more dynamic driving style during acceleration, braking and high-speed cornering. In "Auto" mode, the adjustment system always chooses the appropriate shock absorber setting for the current driving style, thus ensuring a pleasant drive.

**Some super sports cars use the push-rod system, which separates steering control from suspension movement.
This solution is adopted in the world of motorsports.
It differs from the traditional system in that the spring and shock absorber group is not connected directly to the wheel hub but works through a strut and a connecting rod to the body.**

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