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DODGE CHARGER R/T



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LEON
A DISCREET GUY

Despite having no wish to hog the limelight, Leon is a key member of Toretto's group. Calmer than some of the others, loyal to his friends and with a clear tendency to see the funny side of things, this guy has the great virtue of always being in the right place when he is needed.

A close friend of Jesse's and the serene counterpoint to Vince's hot temper, Leon stands out as an essential character in Dominic Toretto's original team, since he provides balance, confidence and a great sense of humor too. Although he has some knowledge of mechanics, he's no match for Jesse, but that doesn't bother him either. Similarly, he's not like Vince, who regards the presence of Brian O'Conner as a threat to his place in the group. For Leon everything is simpler. Above all when he has a fast car in which to speed through the streets of Los Angeles. And he has a powerful 1995 Nissan Skyline R33 GT-R, which isn't bad.

A DISCREET GUY

Leon has a very clear idea of his key role in the group: to keep watch during the street races, besides helping to provide cover for his buddies. Of course, without wanting a medal or to be too obvious. Good proof of this is the first street race we see in *The Fast and the Furious*. While Dom and Brian test their skills at the wheel, Leon works in the background, organizing the race. With his car, he blocks off one of the main avenues along which the race will take place. He even has to get rid of a pizza delivery guy who complains a lot – a character played by the director of the movie, Rob

JOHNNY STRONG

There are three things that John Christopher Strong, born in 1974, loves: music, the movies and martial arts. When he was seven years old he began doing Judo in his hometown, Los Angeles. Later, he also learned other disciplines such as Jujitsu and Kickboxing. So when he arrived in Hollywood, measuring more than 1.80 meters tall and with a muscular body, he seemed a perfect fit for action movies. His first parts were in movies starring great legends in this genre: Steven Seagal, in *Glimmer Man* (1996), and Sylvester Stallone, in *Get Carter* (2000). But his big break came when the director Rob Cohen gave him the part of Leon in *The Fast and the Furious* (2001). His interest in music, as leader and vocalist of the band Operator, gradually led him away from the cameras, but in recent years he has resumed his career as an actor, appearing in movies such as *Daylight's End* (2016), *Cold Brook* (2018) and *Invincible* (2019).



Cohen, in an amusing cameo – so he can concentrate on what the radio in his car is saying, ready to intercept any police messages. Shortly after Toretto has managed to beat his rivals once again, Leon will have to alert the racers when he hears the police are coming after them.

THE NEIGHBOURHOOD KID

Typically seen in a basketball jersey (his favorite sport), showy chains around his neck, tattoos on his arms, and usually a toothpick between his teeth, he's a tough guy with a big heart. He met Jesse when he was a kid and they both became inseparable. And how did he manage to enter Toretto's team? As Mia tells Brian while they have dinner: "Jesse and Leon just sort of showed up one night and never, ever left."

His relationship with Jesse is a close one. He's always on hand to help out in the garage, and he takes charge of preparing his friend's Volkswagen Jetta when Jesse decides to take part in the Race Wars. "You visualize the win. Visualize the win, Jesse. I'm serious, you got to listen to me, man," he tells him a few seconds before his ill-fated race against Johnny Tran begins.

In fact, Leon will be the first to see that things are going to get complicated that day, far more than they expected. "Dom, heads up, bro. We got problems," he warns the team leader pointing to Jesse. "What's with him?" Toretto asks. "He just raced Tran for slips," Leon says, seeing that his friend is unable to accept defeat and looks like he's going to disappear at the wheel of the Jetta.

ALWAYS FOLLOWING ORDERS

Jesse's defeat by Johnny Tran will be just the start of the difficult times that lie ahead for Dominic Toretto and his people. At nightfall, there's a party going on in the place reserved for the Race Wars. Everyone is dancing and having fun, except for Dom and his team, who have to leave to carry out the definitive heist with which they will be able to retire. Mia tries to stop them, foreseeing that things will go wrong. Something that not only she feels. "Your sister's right about this one. This don't feel good," Leon warns Dom before committing the last robbery.

But his warning falls on deaf ears. Toretto is determined to go ahead with it and he asks Leon to listen to the radio as usual in case there is a police alert. The young guy doesn't complain. His loyalty to the boss trumps any sense of foreboding.

COUPLE ON THE RUN

The last heist goes wrong. The situation immediately gets complicated, as Vince ends up hanging from a cable on one side of the cab of the truck they were hoping to rob. Moreover, the truck driver is armed with a sawn-off shotgun, which puts him in serious trouble. While Dom works to save Vince, Letty pulls in to lend a hand, but the driver smashes his truck into her and forces Letty off the road, flipping her vehicle over.

Seeing his girl crashing makes Dom's blood run cold, but he doesn't dare abandon Vince to his fate, so he uses a walkie-talkie to ask Leon to help Letty. Of course, Leon does not hesitate. With just one hand, he spins the steering wheel and drives back at top speed to the place where Letty's car turned over. He quickly gets out of the car and runs to help her. "You okay, girl? Come on, we got to go," he says, pulling her out of the car and driving away.

Later, we will hear Dom say that Letty and Leon are a long way away. They are safe from the chasing police. And that's the last time we will see Leon in the franchise.



In Dom's workshop, Leon takes care of polishing Brian's car like never before. He prefers to stay in the background and only stands out when driving his car with its Speed Warrior decoration.



DODGE MATERIAL WITH CHERYL MILLER

In the early 1970s, the Dodge marque launched a bold advertising campaign, *Dodge Material*, which appealed to a demanding type of driver who was not content with having a good sports car, but who wanted the best and at the most competitive price. The actress Cheryl Miller became the face of the campaign.

The daring advertising campaign entitled "Dodge Material" lasted two years and promoted several vehicles from the Dodge range. In the picture: a fragment of an ad from 1970, showing the Dodge Challenger as "the sports car with a big difference."

The advertisements created for *Dodge Material* combined a classic style with an innovative part. They generally centered the photograph on the wide hood or on the lateral curves of the automobile, which was almost always accompanied by a female figure that reinforced the idea of the vehicle's elegance, freshness, and attractiveness. Below the image, the model's qualities were described. It ended with a slogan, which went from the initial timid "If you have your own idea of what a car should be … you could be Dodge Material" to a categorical "You can't afford not to be Dodge Material". This slogan suggested that a Dodge car was not just brilliant, but affordable too.

To catch the eye of the female public, in one of the advertisements it was pointed out that the Dodge Challenger could have been designed by a woman, given the perfect combination of sportiness, accessories and the finish in the interior. "The sports car that knows how to treat a lady", read the strapline.

In some adverts an actress with blonde hair, blue eyes, and a perfect smile appeared. It was Cheryl Miller, famous for the TV series *Daktari*, very popular in the 1960s. Miller successfully took on the role of "Dodge girl" for the two years that the campaign lasted.



Actress Cheryl Miller, in the bottom right-hand corner of this advertisement, was the ambassador for the *Dodge Material* advertising campaign.

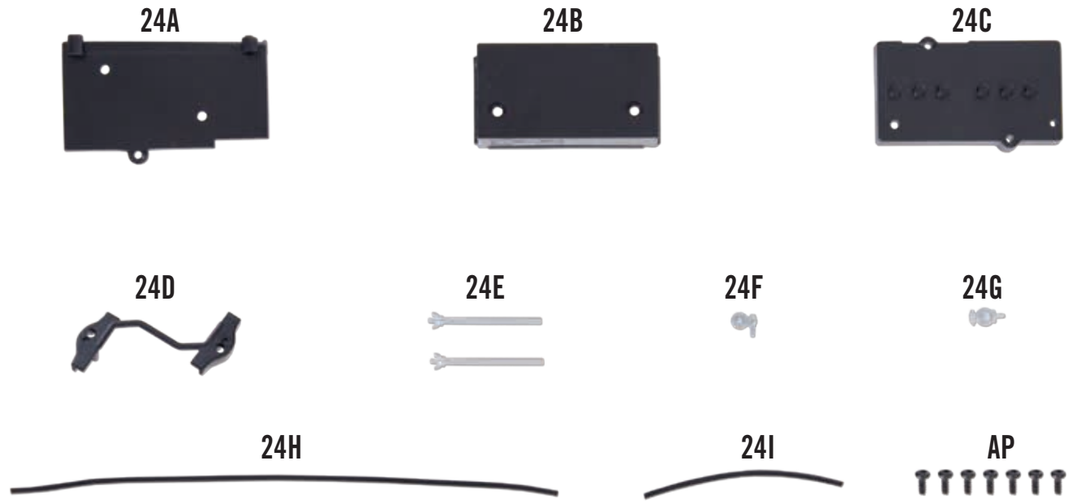


ASSEMBLING THE BATTERY

In this assembly session you will join the battery pieces together. Then, you will install the battery in the left side of the engine housing.

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.

PIECES FOR THIS STAGE



24A	Battery housing	24F	Negative terminal
24B	Battery body	24G	Positive terminal
24C	Battery top	24H	Positive cable
24D	Clamp bracket	24I	Ground cable
24E	Mounting screw	AP	Screws 1,7 × 4 mm, (x8)*

* Some of the parts are spares.

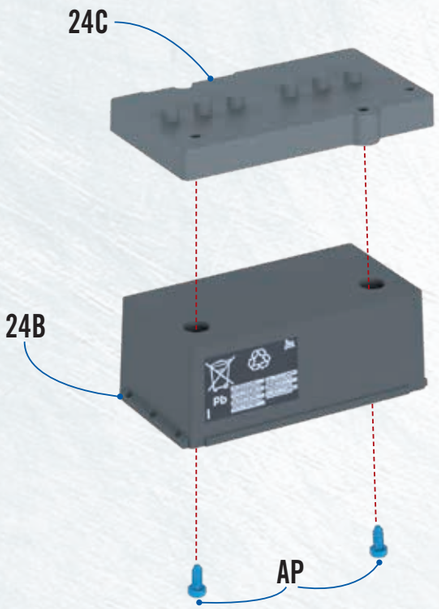
ASSEMBLY AREA



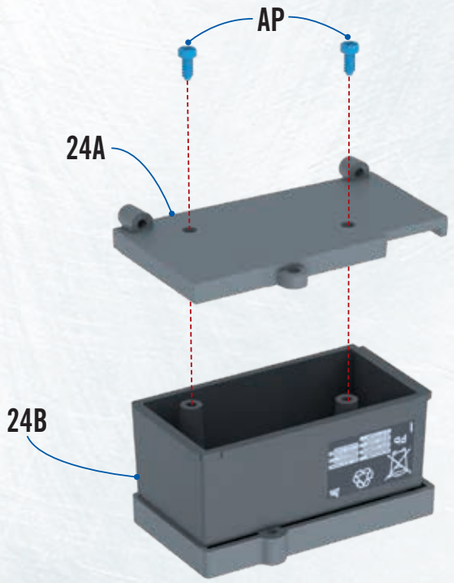
BATTERY

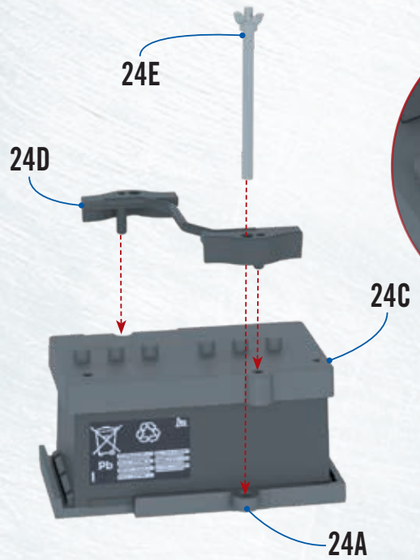
Assembling the battery

24.1 **PUT** the battery top **24C** onto the battery body **24B**, making sure the pieces are facing the same way as those in the illustration (use the battery recycling label as a reference). From the inside of the battery body **24B**, insert two **AP** screws and tighten them to join the two pieces together. ▼



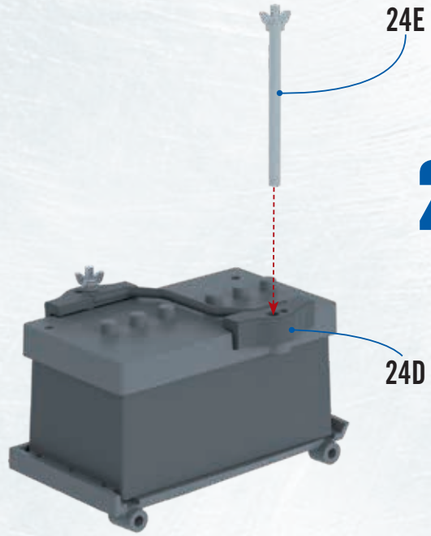
24.2 **TURN** over what you have built so far and put the battery housing **24A** under the battery body **24B**. Ensure the pieces are facing the same way as those in the illustration. Attach the housing to the battery with two **AP** screws. ▼





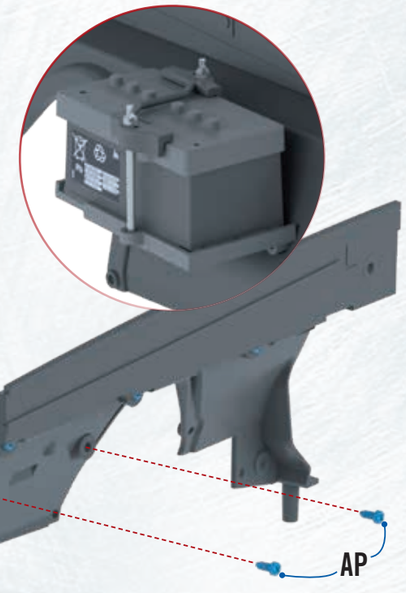


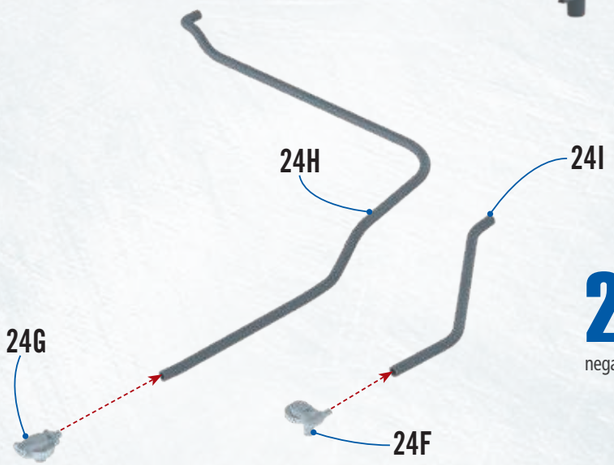
24.3 **TURN** the assembled parts back over and put the clamp bracket **24D** over the battery top. Now insert the first mounting screw **24E** into the hole in the clamp bracket, the one on the side where the recycling label is. The bottom end must be inserted into the semi-circular tab on the battery housing **24A**. ◄



24.4 **INSERT** the second mounting screw **24E** into the bracket **24D**, and push it right down. ◄

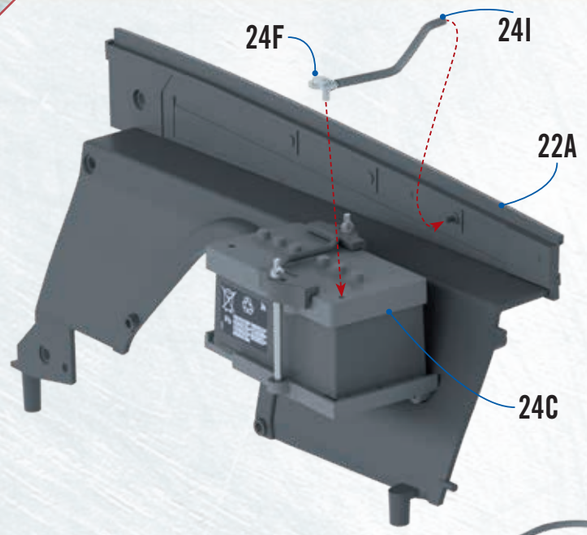
24.5 **TAKE** the left panel of the engine housing that you assembled in assembly session 22. Align the two screw holes on the battery housing **24A** with the two widest holes in the left panel **22B**. From the other side of the panel, insert and tighten two **AP** screws to join the pieces. ►



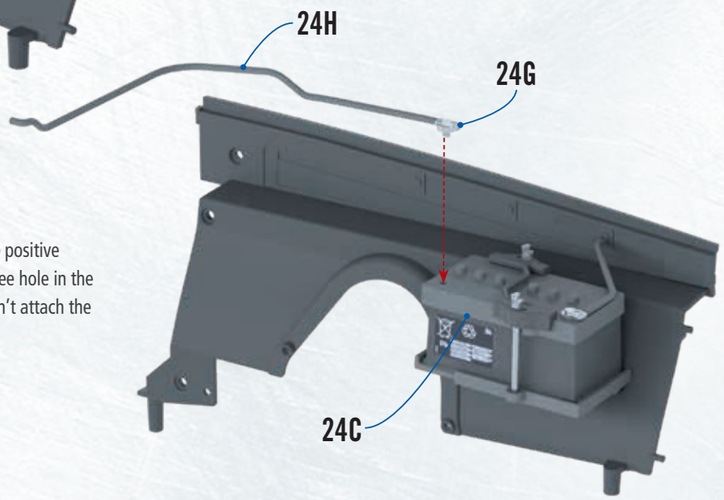


24.6 **TAKE** the positive cable **24H** (the longest one) and insert the positive terminal **24G** into the end of it, as shown in the illustration. Attach the negative terminal **24F** to the cable **24I** in the same way. ◄

Assembling the battery



24.7 **INSERT** the pin on the negative terminal **24F** into the hole in the battery top **24C**, as shown in the illustration. Now connect the free end of the ground cable **24I** to the pin on the top righthand side of the left panel of the engine housing **22A**. ◄



24.8 **INSERT** the pin on the positive terminal **24G** into the free hole in the battery top **24C**. You don't attach the other end of the cable **24H** just yet. ►

STAGE 24 FINAL RESULT



You have now installed the battery, complete with the bracket, screws and cables, inside the left panel of the engine housing.

THE CAMSHAFT: A DIFFICULT CHOICE



What do you have to take into account before choosing the right camshaft for your car? Here are some tips on how to find the perfect one for your needs.

As we discovered in the previous issue, the valve timing and the profile of the cams are fundamental, not only for the behaviour of the engine but also for the efficient delivery of power. In general, manufacturers choose camshafts based on the expected type of use of the car they are producing. For example, they will adopt high-performance, high-lift camshafts for engines that have more heavy-duty profiles, whilst choosing light-duty profiles for models to be used in cities or for long journeys. Of course, we are talking about large companies that have sophisticated tools, highly advanced computer programs and advanced simulation systems. They also have plenty of development time, both on the test bench and on the road, during which they can experiment with different camshafts. These systems allow them to establish very accurate settings by cross-referencing different results and comparing parameters.

The valve timing consists of the opening advances and the closing delays of the valves with respect to the piston dead centres, and can be represented on a diagram.

The camshaft: a difficult choice



Some of the camshafts proposed by the specialists have a slightly higher lift than the original, which results in faster movement of the valves and other related parts.



These two camshafts are part of an upgrade kit for a very high-performance engine.

THE DISTRIBUTION DIAGRAM

As you will understand by now, the valve timing has everything to do with the opening and closing of the valves, i.e. advances and delays, which are expressed in degrees of crankshaft rotation and which can also be illustrated diagrammatically. Unsurprisingly, it is called a Valve Timing Diagram. Valve timing is a fundamental operation through which the camshaft is set up so as to obtain the correct angular position with respect to the crankshaft. In this way, the manufacturer's settings for the opening advance and the closing delay of the valves are achieved with precision. This is one of the most critical parts of the engine-building phase, especially when assembling a high-performance engine. However, the valve timing is not everything – there are also operating profiles to take into consideration.

STANDARD OR PERFORMANCE CAMS

The performance and the nature of the power delivery are closely linked to the design of the cams and to the opening and closing points of the valves: we therefore need to distinguish between "performance" and "standard" cams. A performance cam provides greater advances and greater delays with respect to the dead points of the piston. Consequently, it increases the duration of the intake and exhaust phases, thus allowing better exploitation of pressure waves and inertial phenomena during high revolutions: in short, the engine breathes better at high revs. However, at lower revolutions the process is inefficient, as the advances and delays are excessive. In particular, too much delay in closing the intake valve causes the incoming air and fuel mixture to reverse the direction of its flow (this phenomenon is also called "rejection"), significantly worsening volumetric efficiency when the engine runs slowly. Any given camshaft will be perfect only at one engine speed. At every other engine speed, the engine will not perform to its full potential. So understanding the operating profile is essential to making the right choice.

CAST IRON VS FORGED STEEL

Specialised camshaft companies might ask for the original shaft in order to modify it by carefully re-profiling the cams. This is a good way to keep the cost down, although it is not always possible to do with absolute precision. They must first assess whether the thickness of the hardened layer, which varies according to the production technology of the original manufacturer, is sufficient for it to be modified.

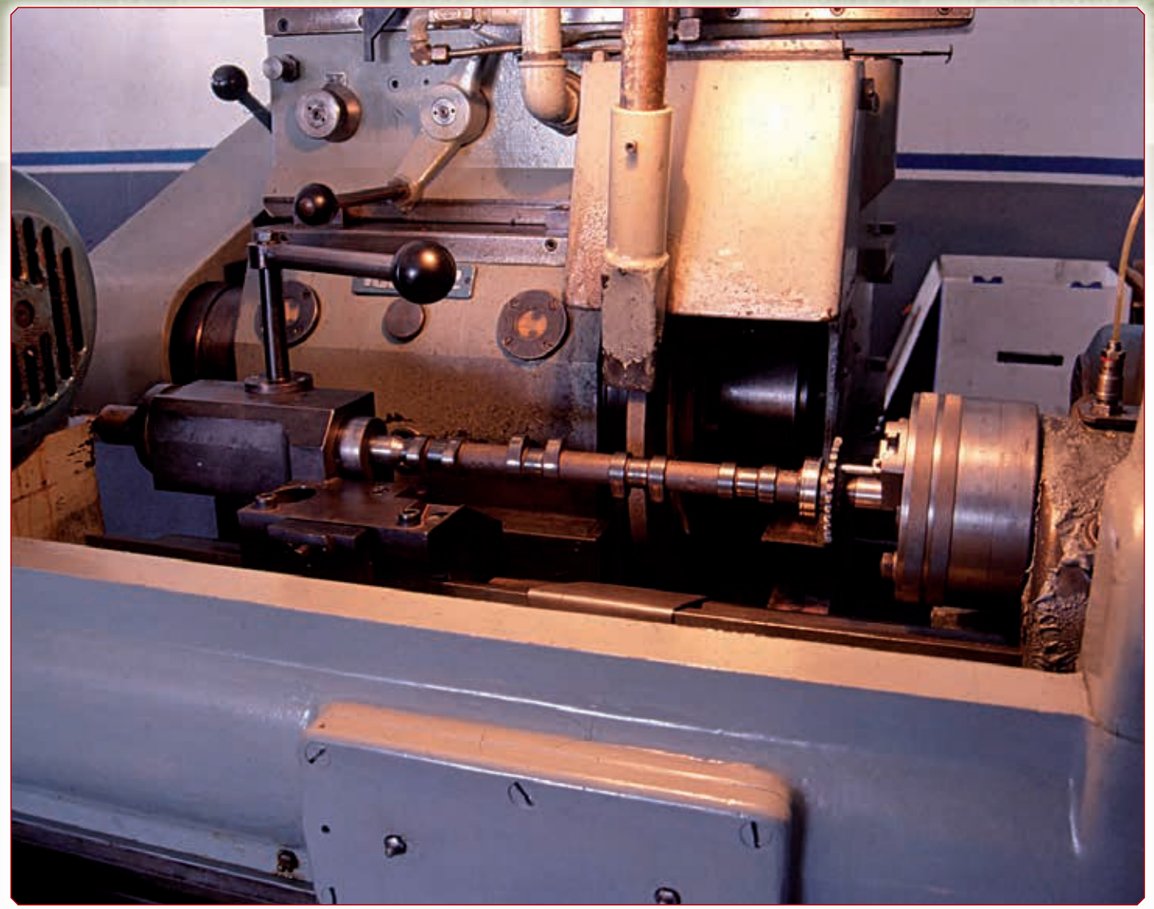
Alternatively, new camshafts are created starting from a solid bar of material that is shaped by machine until the desired result is obtained. Standard off-the-shelf camshafts are often made of cast iron, hardened on the surface by suitable heat or thermochemical treatment. Sometimes these components are produced in such a way that on their outermost skin, white iron is formed. It is tough, but fragile, and can only be machined by grinding. With high-performance camshafts for road or track use, the camshafts are carefully made of forged steel that has been suitably treated to obtain a high surface hardness on the lobes. Recently, a powder metallurgy process is used to shape and harden the cam lobes. A mixture of powders that will produce the desired composition is prepared. This mixture is pressed into a mould which shapes the material in a process called cold compaction. The resulting shaped material is heated in a furnace. This removes pores through atomic diffusion and increases the density and hardness of the component.

A DIFFICULT COMPARISON

Evaluating a camshaft is undoubtedly not easy. Yes, we have the diagram and the maximum lift imparted to the



The instrument generally used to create the valve lift diagram consists of a sensor that detects the linear movement of the tappet and its supports, combined with a device for detecting the angular motion of the camshaft.



In this image, we can see the machining of a camshaft using a calibrated grinder.

valves. But it is practically impossible to predict the performance and the power delivery profile a camshaft will allow us to achieve, by merely looking at it and making a couple of measurements with a gauge – despite what some mechanics like to think. And don't forget that the profile of the cams must always be taken into account, together with the type of cam followers on which they work. In automobile engines, tappets and finger rockers might be used, and the latter have different curvature and clearances, depending on the manufacturer. It may seem obvious, but at the end of the day, the only way to obtain reliable information is to see the diagram of the lifts that the camshaft lobes impart to the valves. To do that, we would need to mount the camshaft and the cam followers onto a single cylinder on a cylinder head. Fortunately, it has already been done for us by the companies that specialise in the manufacture of the components.

WHAT THE MARKET OFFERS

The specialised companies that manufacture and market camshafts for car engines have, of course, accumulated considerable know-how over the years, thanks to the evaluation of their products on the test-bench as well as on the road. In their catalogues, we can find specific camshafts for every type of engine, all developed for optimum performance. That said, because every engine is different, some valve timings and clearances might work for one engine but could be unsuitable for another. If that were not the case, the camshafts could all have the same profile, and the valve timing diagrams would be the same for all engines of the same type. So we need to consider the different needs of the users. Some might just want more spirited performance on the way to work, while others might be looking for high performance on a race track. That is why there may be different versions of a single camshaft for the same type of engine.

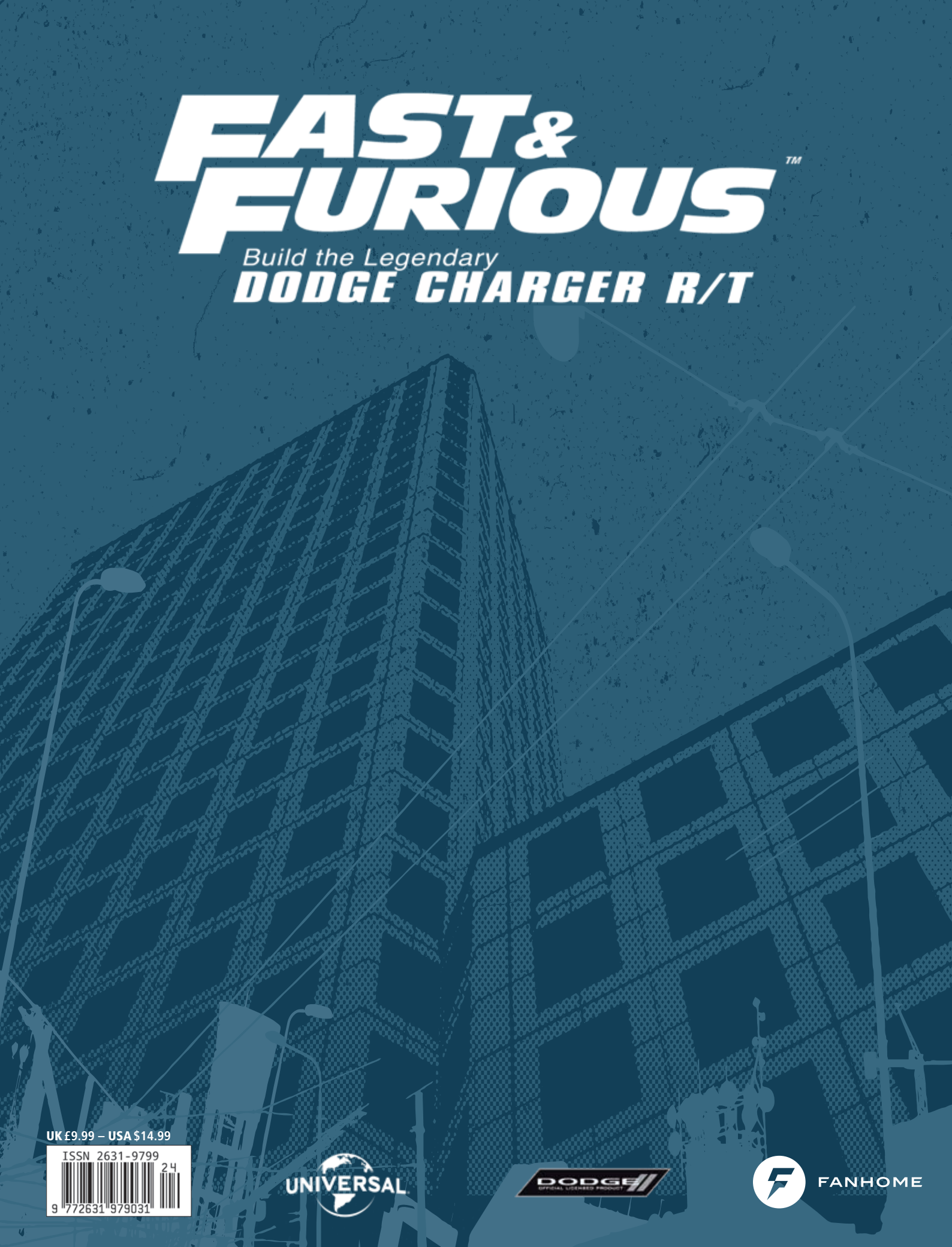
A busy world

At high revolutions, everything happens very quickly. The times of the individual phases are very short, and the reciprocating parts are subject to very high acceleration. The inertial forces, in addition to increasing by the square of the velocity, are directly related to the mass of the components. Consequently, to contain those forces, engineers develop ways of reducing the weight of the moving parts as much as possible. That is why titanium valves are used in racing engines, because they are considerably lighter than those made with conventional materials like special steels or superalloys. Hollow cup tappets weigh much less than hydraulic tappets, and their use is widespread for this reason. Many standard engines use finger rockers fitted with a roller to reduce friction, while in Formula One engines, ultra-light, arched finger followers are usually fitted.



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