FAST & FURIOUS™

36

Build the Legendary

DODGE CHARGER R/T



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DODGE CHARGER R/T



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THE SOUNDS OF FAST & FURIOUS

In the *Fast & Furious* franchise the cars do not just look spectacular. They also have their own "voice": a voice that is associated, moreover, with the personality of the people driving them. And this can only be achieved thanks to the brilliant work of the sound crews who demonstrate their talent in every movie.

You only have to mute the sound of the TV at home to see how important it is in a movie. And it's not just a case of being able to hear the people talking. Film sound has been developed in such a way that it contributes as much to a scene as the cinematography does. Its importance is much greater when it comes to action movies like *Fast & Furious*.

WITH ITS OWN VOICE

Some may think that a film sound crew is made up of two technicians, one working the recorder and another holding the sound boom – a microphone attached to the end of a long pole – up above the actors and away from the camera's view. The truth is that the members of the sound crew, and their job before, during and after filming, have all changed considerably.

The job of the sound designers in the *Fast & Furious* franchise is far more complex than you might imagine. Generally speaking, one of their main objectives is to make the vehicles sound powerful on screen. But, as any automobile lover knows, each vehicle usually has its own "voice". As Peter Brown, a sound designer associated with the franchise since the third film, tells us, "We can't just make a good recording of a car's engine and put it on the screen." Many fans would never forgive that. And not even because they are totally familiar with the world of cars. Anyone would have thought it strange if, for example, in the final race in *The Fast and the Furious*, the engine of Dom Toretto's Dodge Charger sounded exactly like Brian's Toyota Supra.

IN SEARCH OF THE PERFECT SOUND

Every time a new *Fast & Furious* movie gets underway, the first thing the sound crew does is meet with vehicle coordinator Dennis McCarthy to find out first-hand what

Audio equipment plays an essential role throughout the entire saga to create a soundtrack that resonates with the audience.



From the most exciting car chases to suspense scenes, the soundtrack of *Fast & Furious* makes a major contribution to the movie. In the picture, Tej Parker in action.

genuine cars he has found for the filming and which ones are going to be created specifically for the production. And at these meetings some important points have to be cleared up for the sound experts, such as whether vehicles with V8 engines or with Japanese four-cylinder engines are going to be used.

With this information, the professionals do not merely record the sound of the engines that will be heard in the movie. They are looking for the very best. For example, when they had to put a "voice" to Toretto's fabulous Dodge Daytona in *Fast & Furious 6*, Peter Brown found a collector who restores retired NASCAR racing cars. In his peculiar catalog he had a model identical to the one Brown was looking for. But the sound engineer discovered an added incentive: the collector had modified the engine so that it produced a far louder noise than the one of the original car in the early 1970s, and something that would give it even more personality in the movie.

A NEW SOUND

That same search process was repeated later to locate a Ford Mustang and a Plymouth Road Runner. However, although finding these models might have been laborious, the greatest challenge arose when putting a voice to a type of vehicle that did not exist on the market. In the sixth film in the franchise this was the case, for example, with the famous Flip Car, which Owen Shaw's crew drives in its London-based operations. This amazing and elusive vehicle was designed and built by Dennis McCarthy himself at the suggestion of director Justin Lin.

The Flip Car was fitted with a Chevrolet LS3 engine giving 500 HP, but it was Peter Brown's responsibility to find a personal voice for it. And this time he could not turn to any collectors. For these cases, the sound designer resorts to previous recordings and, following the director's guidelines, he looks for sound mixes until he eventually finds a specific sound for the car.

THE RECORDING PROCESS

Once suitable vehicles have been located the really complex process begins: the recording. In general, Peter Brown goes with his crew and the cars to a remote, little-used airfield, usually one in the middle of the Mojave Desert (California), a lonely and silent place where only one or two aeroplanes land each day. With the help of experienced drivers, they start recording the cars doing a great variety of maneuvers: from a moment of acceleration on a straight to a full-speed skid. The expert drivers manage to make their cars roar and scream, while making sure they stay safe at all times.

PETER BROWN

Few sound designers in the United States are as prestigious as this man, who won an Emmy for his work in the *Blackwater* episode of the popular Game of Thrones. Peter Allen Brown was born in Rochester (New York) on October 9, 1969. He began his professional career in the early 1990s with different tasks in sound crews for movies and television. He had to get to know the job from the inside, doing mixing, editing sound effects or recording dialogs. It was his work in charge of the sound effects for films as vibrant as *Spider-Man* (2002), *Terminator 3: Rise of the Machines* (2003) and *S.W.A.T.* (2003) that gained him a name in the profession. After meeting director Justin Lin when filming the romantic drama *Annapolis* (2006), the latter invited him to join the *Fast & Furious* team for the third movie in the franchise, *Tokyo Drift*. His involvement and the quality of his work made him one of the key players of the franchise. Despite his loyalty and commitment to the world of *Fast & Furious*, Brown has also demonstrated his talent through his work in other well-known Hollywood movies, such as *Birdman* (2014), *The Last Witch Hunter* (2015) and *Aquaman* (2018).

Without a doubt, the need to maintain the cars in perfect condition forces the crew members to use all their ingenuity when the time comes to record the sounds of collisions. For this, they call on their experience and the magic of the cinema. To create and update his own crash library, Peter has resorted to absolutely all kinds of ingenious ideas, from placing pieces of metal inside a spin dryer and spinning them, to using a crane to drop a vehicle from a height of several meters onto other cars.

THE SOUND LIBRARY

Throughout the history of the franchise, the sound crews have made a lot of recordings of specific vehicles. All of them are incorporated in the *Fast & Furious* sound library. For example, at the end of *Fast & Furious 6*, it became necessary to use the sound of Han's RX-7. The crew was able to utilise recordings made with the same car for *Tokyo Drift*.

But, despite the fact that the sound library has been helpful when reusing past recordings, the people in charge of it usually prefer to make new ones with which to continue surprising the fans of the franchise. And to remain consistent too, since the noise of the cars becomes a kind of extension of the characters' personality. When Dom Toretto gets behind the wheel of a Dodge Challenger, fans do not expect this to sound like a vehicle that has just left the factory, but one that roars with the typical noise made by the 8-71 supercharger, a characteristic sound that spectators have already associated with the image of the star of the franchise.

AVOIDING "SOUND FATIGUE"

Something that has maybe never occurred to moviegoers is that the sound people in *Fast & Furious* always work with great restraint. The franchise has been getting more spectacular and the action scenes, the car chases and the explosions take place at a frantic pace. In movies about two hours long, this may be a strain on the ears of even the most devoted spectator, eventually leading the audience to disconnect and lose track of the plot. Aware of this, the sound designers make every effort to create a spectacular soundtrack that does not overload the audience. To achieve it, they choose the sounds very carefully, trying to avoid high frequencies that might be too much for the audience – delicate work on the mixing desks that leads them to perform an tricky balancing act.

Each vehicle in the franchise is given its own "voice," contributing to creating its unique personality as events unfold.





DODGE POLARA

After making its debut in 1960, the Dodge Polara occupied the high end of the manufacturer's range until it was replaced by the Dodge Monaco in 1974. This included a brief period of time during which its size was reduced (between 1962 and 1964). The Dodge Polara was a classically structured model with six and eight-cylinder engines and many different kinds of bodywork available.

The front of the 1963 Dodge Polara, with its unmistakable large chromed grille and four round headlamps.

The first generation of the Dodge Polara (a name that evoked the pole star Polaris) shared the top of the brand's range with the Matador, a very similar car, although less luxurious. Built on a platform with a wheelbase of over three metres, it maintained the essential features of the great models of the preceding decade, with large tail fins and a lot of chromed elements. In 1962, the size of the Dodge Polara was reduced (2.94 metre wheelbase) and it became a mid-sized model. Available in six different kinds of bodywork (two and four-door saloons in normal, hard top, convertible, and family versions), it was sold with straight-six engines and, optionally, with 6.8 litre V8 engines. In 1962 the style of the bodywork aroused a great deal of controversy, so the cars' lines were smoothed out in the following years. The third generation appeared in 1965. It was larger, and it only had 7.2 litre V8 engines. The last generation of the Dodge Polara, launched in 1969, was sold with four kinds of bodywork: saloon, coupé, convertible and family. It disappeared in 1974, suffering, like so many other big American cars, from the effects of the 1974 oil crisis that forced brands to build cars with lower fuel consumption.



The 1960 Dodge Polara was a big car with pronounced short tail fins.



ASSEMBLING THE TRANSMISSION (II)

In this step you are going to connect the rear axle with the differential.

PIECES FOR THIS STAGE



36A

36B



36C



KM



36A Rear axle
36B Rear differential (piece 1)
36C Rear differential (piece 2)
KM Screws 1,7 × 4 mm, (x3)*

* Some of the parts are spares.

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.

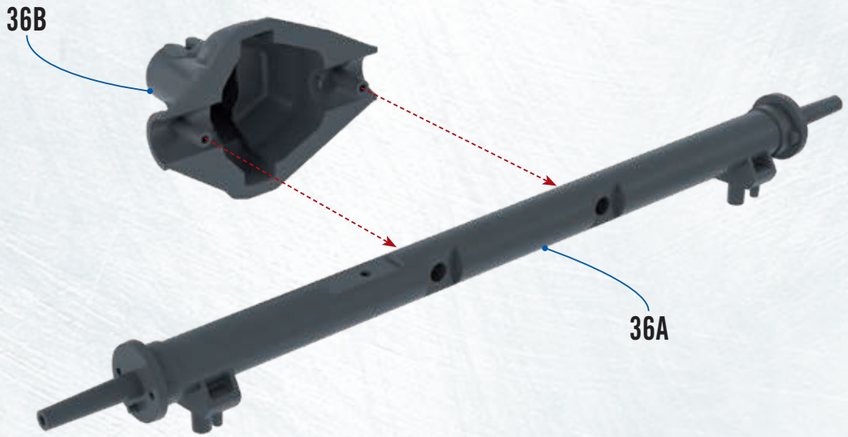
ASSEMBLY AREA



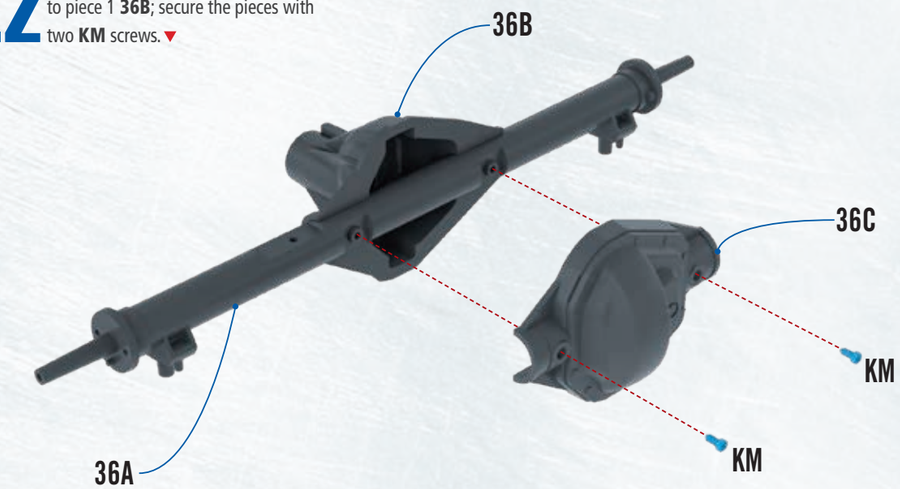
DRIVESHAFT

Assembling the transmission (II)

36.1 **GET** piece 1 of the differential **36B** and insert the two pins on the inside into the middle holes in the rear axle **36A**. Position the pieces as shown in the illustration. ▼

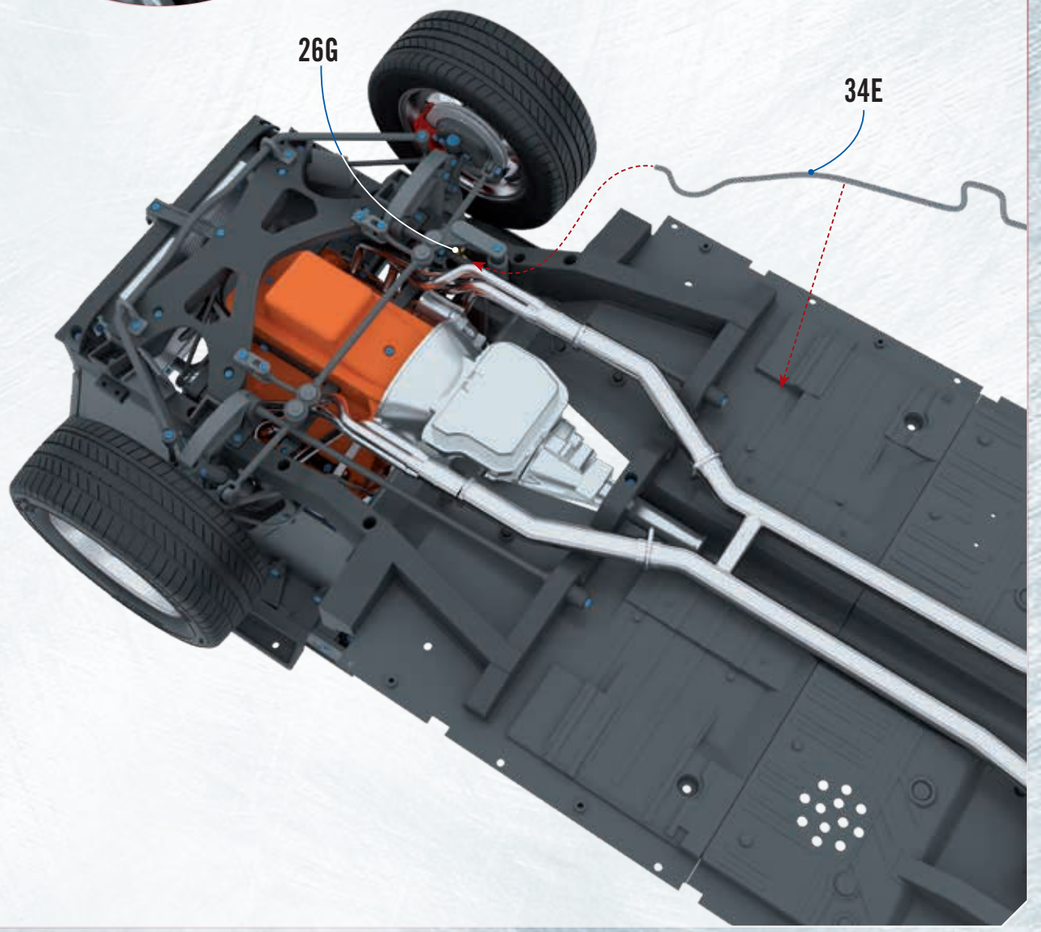


36.2 **ATTACH** piece 2 of the differential **36C** to piece 1 **36B**; secure the pieces with two **KM** screws. ▼

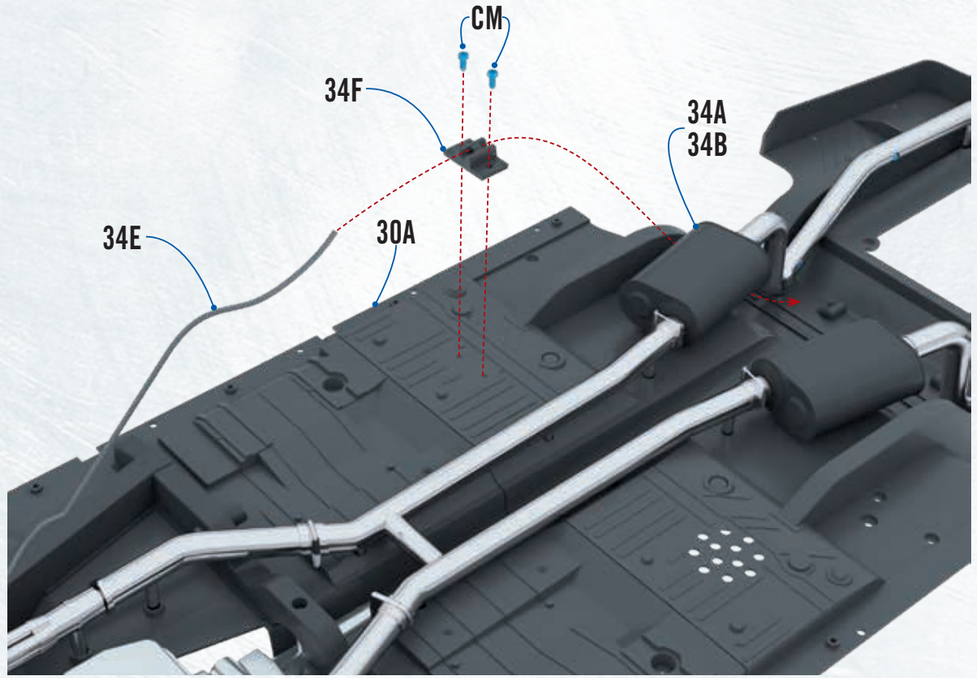




36.3 **GET** the chassis and the pieces you haven't used yet from stage 34. Turn the chassis upside down on your work surface. Find the free pin on the brake connector **26G** and slide one of the free ends of the rear brake hose **34E** onto it. ▼



Assembling the transmission (II)



36.4 **Feed** the free end of the rear brake hose **34E** through the hole in the guide **34F**. Then secure the guide to the middle section of the chassis **30A** with two of the **CM** screws supplied with stage 34. Now feed the rear brake hose underneath the silencer (**34A** and **34B**) and for now leave the end free.▲

STAGE 36 FINAL RESULT



You have now attached the differential to the rear axle and the rear brake hose to the chassis.

REMAPPING THE ENGINE CONTROL UNIT (ECU)



To increase your engine's power, it is quite useful to modify the ECU parameters, especially if you have installed performance parts that require new settings to work at their best. But be careful not to overdo it!

Let us start at the beginning and understand more about the ECU and how it works. It is a device for the electronic management of the engine, and controls the engine's behaviour based on a series of values detected by sensors installed in the car. It measures, for example, the temperature of the engine, the number of revolutions, the vehicle speed and the inlet air temperature, among other things. All this information is received in real-time. It allows the ECU to manage the main engine functions and set, for example, the correct

To remap the controller, the technician connects a computer to our ECU via OBD and modifies its parameters using specific software on the PC.

Remapping the engine control unit (ECU)

amount of fuel to be delivered, based on the parameters pre-set by the factory. Standard cars must meet a number of fuel and emissions targets which are often very rigid. But even so, there is always some scope for parameter changes to increase performance without creating problems. In technical terms, this type of modification is called remapping or chipping the control unit. In simple terms, it means overwriting the standard parameters with new settings.

The add-on modules are straightforward to install and do not require any special technical skills. Simply place them in the engine compartment and connect them using plug-n-play cables supplied by the manufacturer.

HOW TO REMAP AN ECU

Before we start: ECU remapping is a complex procedure that requires expensive hardware and software tools and above all, specialist knowledge. Technically, remapping the ECU means optimising a series of values to obtain improvements in terms of torque and power, ideally without blowing up the engine!

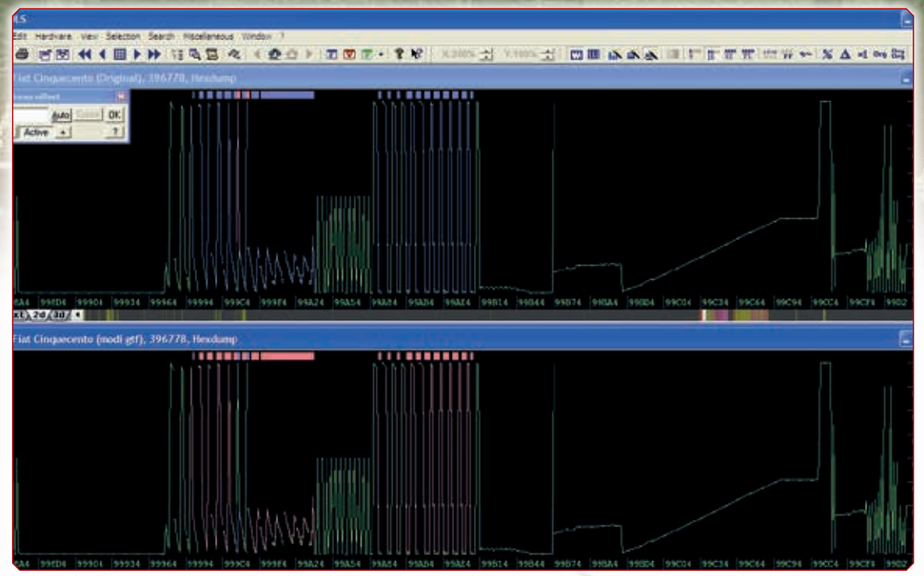
There are two ways of modifying the unit. There are "pre-packaged" maps that are developed specifically for your own model of car and engine. These can be "loaded" immediately into your control unit. Then there are customised maps that are programmed "live" by analysing the car's responses on a "rolling road". A rolling road is a set of rolling cylinders on which a vehicle's wheels can ride to simulate road conditions. When remapping a control unit, first, we need to acquire the original data. This procedure consists of connecting to the ECU via an Onboard Diagnostics (OBD) instrument. This reads and then transfers all the information on the controller to a computer. During this phase, the technician can recover all the data relating to the analysed vehicle, among which are a series of identifying abbreviations that will allow him to modify the original map. At this point, the optimisation of the actual parameters is carried out using software installed on a PC, which may be a laptop or sometimes a tablet computer.

There are many different software options. They vary depending on the type of car and the type of EPROM built into the ECU. Remapping can modify fuel pressure and injection timing, turbo boost delivery, throttle input maps and torque limiting maps and much more. Adjustments can also be made according to the engine revolutions and the speed of the car. A modern engine ECU can have thousands of parameters that are available to the knowledgeable tuner. Of course, all these parameters are modified based on specific calculations and are designed for each individual vehicle. You cannot use the same map on two cars with different engines! Once the remapping is complete, all you have to do is load the new data back onto the controller via the OBD. The undoubted advantage of remapping is the possibility of modifying parameters and creating customised setups and, therefore, substantially improving performance. This is a reversible process. It is always possible to restore the original map, although it still requires a specialist technician's services.

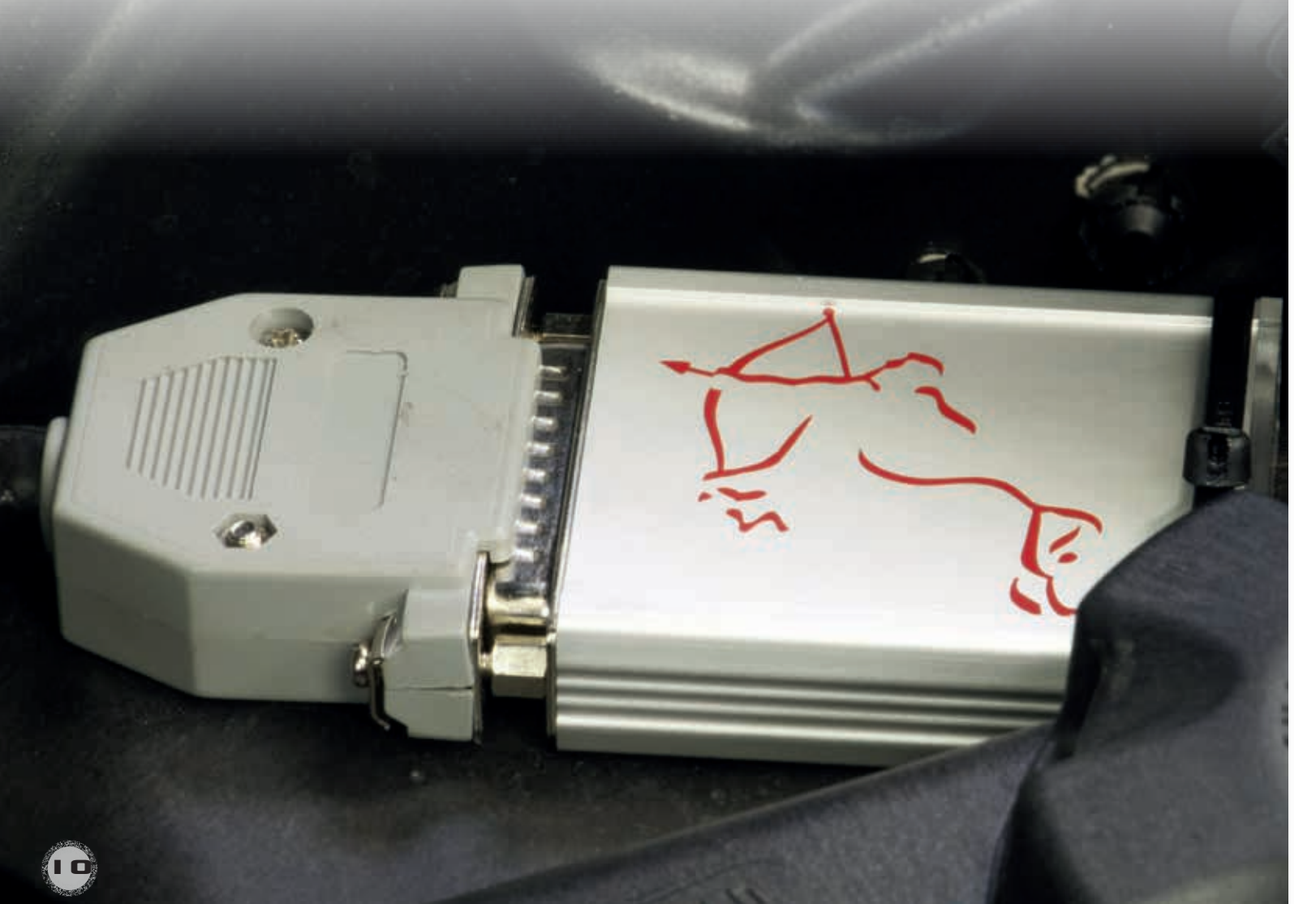
ADDITIONAL MODULES

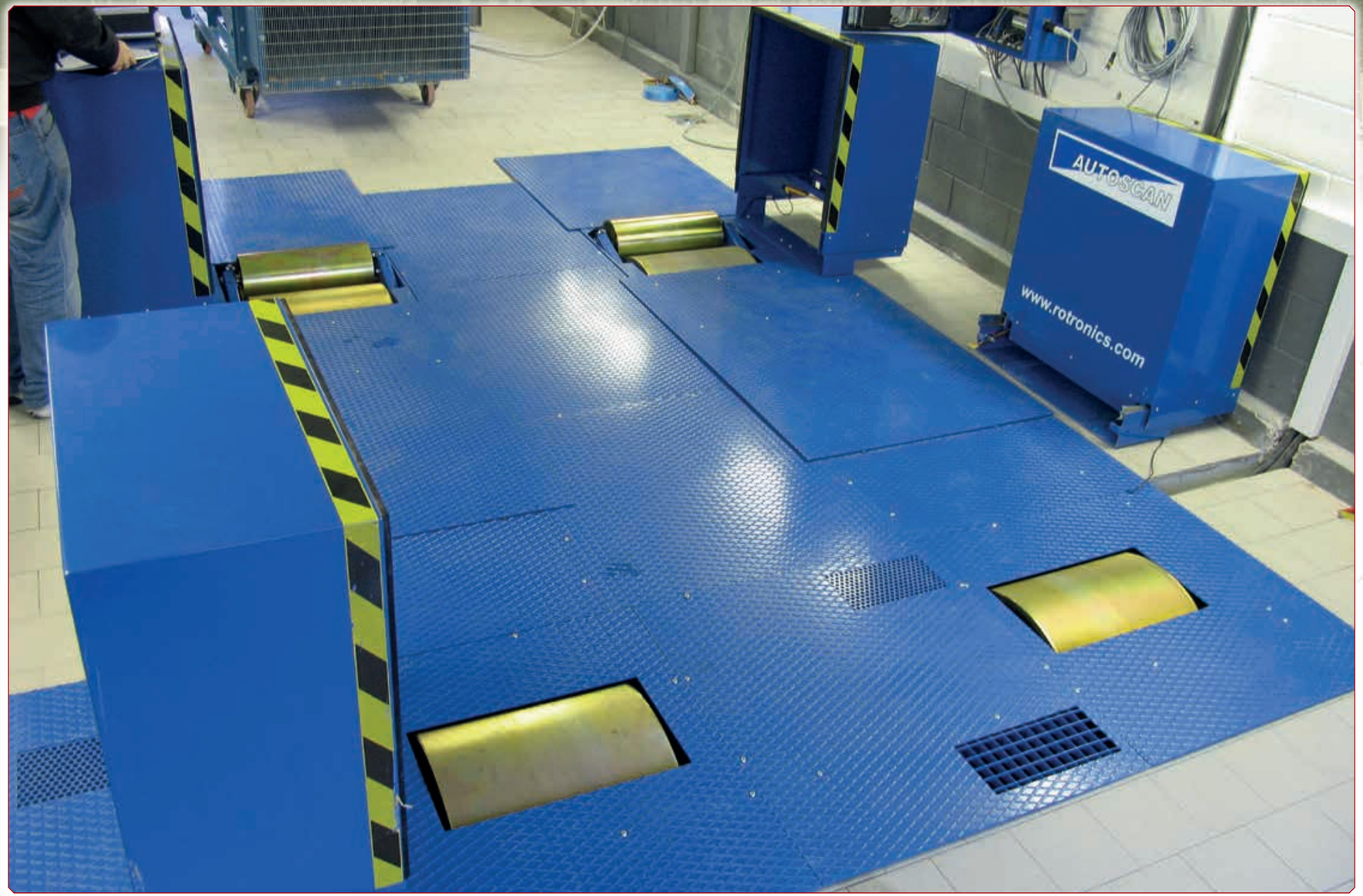
Chipping the controller is not the only way to modify the electronics. There are also add-on modules that can "piggy-back" the ECU and cause the engine to behave differently. They can, for example, introduce more fuel or make the turbo work at higher pressures, thus achieving more power. Installation is straightforward. You just place it in the engine compartment and connect it via a plug-n-play socket and a special connector. There are several models, from the cheaper ones that simply vary the amount of fuel delivered, to more complex ones with different maps that can be selected using a remote control unit. The most modern modules are equipped with their own microprocessors, with both Flash EPROMs and RAM EPROMs. They can take control of the pressure sensors and intercept some signals sent directly from the original control unit of the vehicle. These units can allow tuners to customise the engine's operation by analysing various values such as airflow, inlet manifold pressure, turbo pressure and engine revolutions of petrol engines. They can work on the rail pressure sensor signal simply and effectively on diesel engines. They can also modify the inlet manifold pressure for turbo management, using both the number of revolutions and additional signals from the original ECU as a reference.

Thanks to specific calibration software, it is also possible to set module reference values that determine the intervention threshold and the increase in torque and power. So you can customise the output according to the vehicle and your performance requirements. Obviously, these additional modules are developed to respect the original engine control unit's safety and protection thresholds. This includes auto-adaptive functions of the on-board electronics and monitoring of the critical parameters related to the engine's operation. What if we want to return to the original electronic management system? Nothing simpler! The most advanced systems



Remapping of the ECU allows you to modify numerous engine management parameters and consequently to modify the torque and horsepower delivered.





The most advanced dynos allow you to simulate real conditions and even the road's incline, thus affecting the braking pressure applied to the wheels.

can be switched off using a remote control. For the others, just remove the module from the engine compartment. It should take less than a minute to unplug it. These additional modules do not modify in any way the data recorded on the vehicle's original control unit.

THE ROLLING ROAD

When it comes to remapping the controller, we might consider using a rolling road, or "dyno". This allows us to test the car while it stays in one place. There are several different types, from the simplest to some that can even simulate road surface conditions. Continuous development in the automotive sector and innovative technological solutions have made many of them very sophisticated. They can faithfully reproduce real driving conditions and so provide reliable results. New four-wheel-drive dyno rolling roads with directable airflow are state-of-the-art machines that can faithfully simulate real driving conditions. They can take into account the weight of the vehicle, variable terrain simulations, aerodynamics based on speed, and road inclination effects on braking. Therefore, it is possible to accurately simulate a driving scenario that includes multiple variables and analyse the car's performance under those conditions.

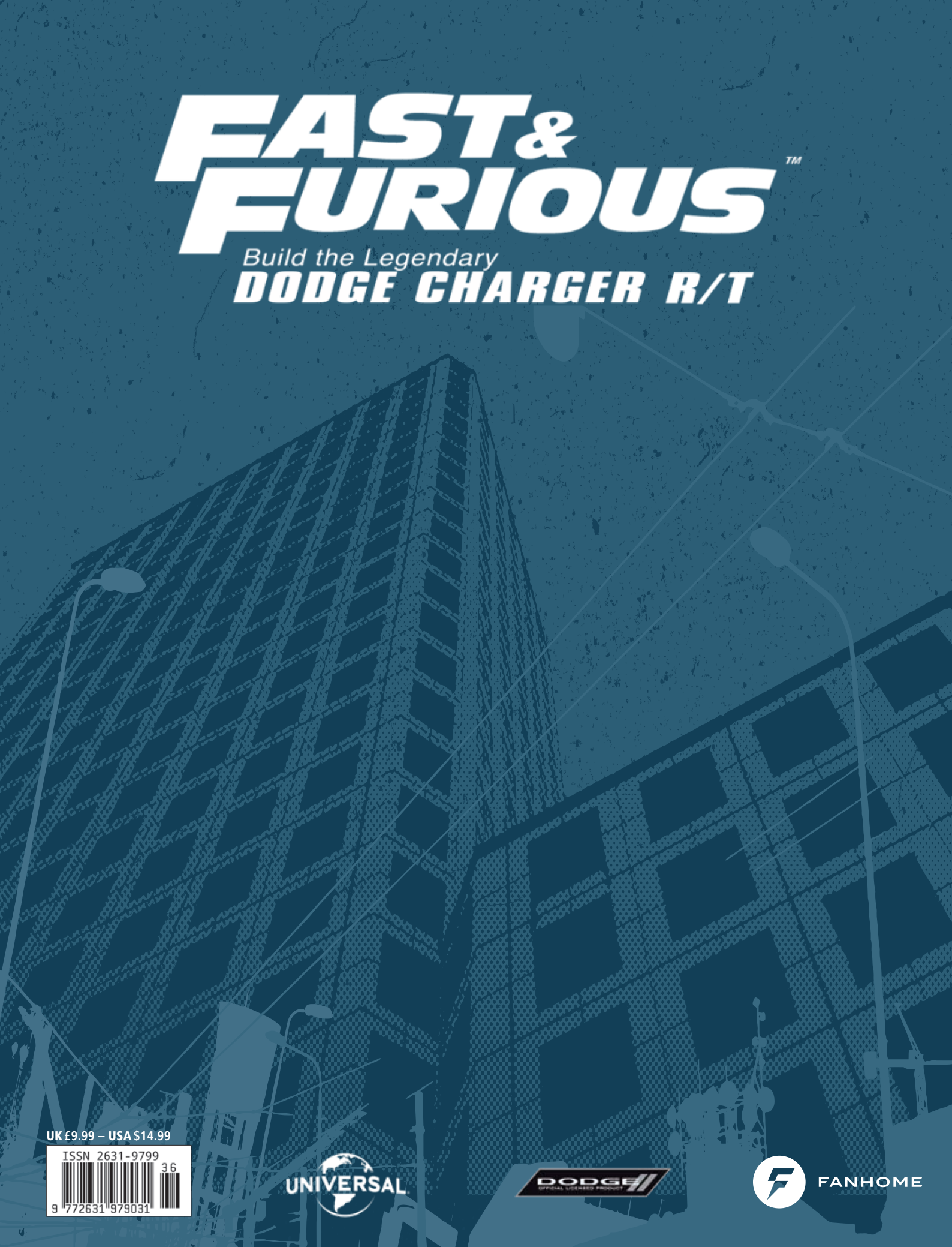
The 4WD dyno is equipped with a single roller for each wheel. This is a solution that ensures safety, even for vehicles with reduced clearance. It also allows the system to preserve as much as possible the natural deformation of the individual tyres. All the rollers are connected to each other with a belt system to obtain equal rotation speed at each wheel, regardless of the type of transmission (2 or 4-wheel drive) or the presence of electronic differential aids. It also avoids triggering failure warning lights on the instrument panel, as happens on some of the old generation dynos. The software can monitor and graph every single output that a modern car's OBD2 data stream can offer, including boost pressure, knock levels, fuel pump and rail pressures, airflow meter outputs, injector duration, fuel trims, and literally hundreds of other useful data streams directly from the vehicles ECU to the dyno software. High-powered fans are used to cool the engine and maintain a constant operating temperature throughout the numerous tests.

Unlike the remapping of the ECU, which requires a technician to restore the original values, with the add-on modules, you can just unplug the module and return to the standard electronic management system.



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