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Build

BRIAN'S NISSAN SKYLINE GT-R

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BRIAN'S NISSAN SKYLINE GT-R

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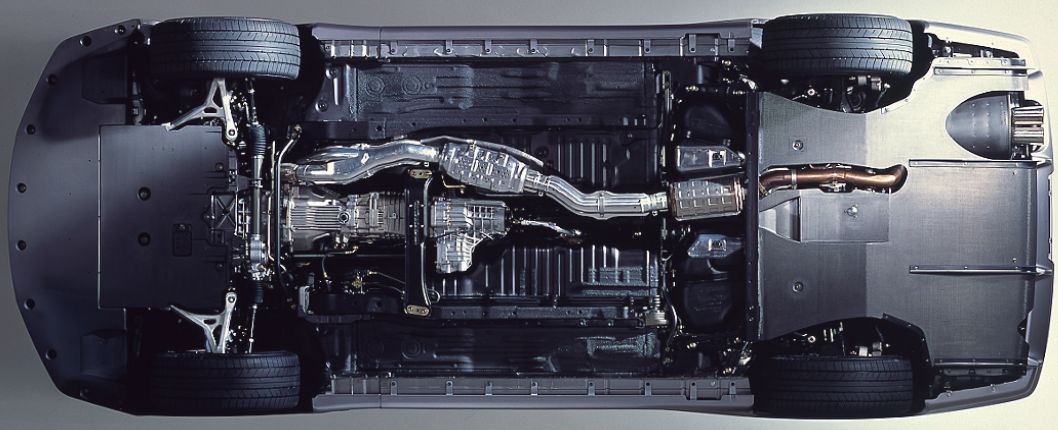


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The Skyline GT-R (R34) V·spec was equipped with ATTESA E-TS PRO. As seen from the photo, it is a FR-based, torque-split 4WD system.

THE 4WD SYSTEM – DEFINING ATTESA E-TS

ATTESA E-TS detects rear-wheel slip and electronically transmits torque to all four wheels. Data collected from various sensors that monitor driving conditions is evaluated in real time to work out the optimum front-rear torque distribution.

What does ATTESA E-TS mean within the context of the electronically controlled torque-split 4WD system of that name adopted by the Skyline GT-R (R34)?

ATTESA means anticipation and expectation in Italian, and is an acronym of Advanced Total Traction Engineering System for All. For Nissan, it represents an “advanced integrated driving force control system” that gives drivers total confidence in their car in all situations.

The ATTESA technology was first adopted in the 8th-generation Bluebird (U12) launched in September 1987. However, unlike the front-engine, rear-wheel drive (FR)-based ATTESA E-TS of the successive Skyline GT-R models, this ATTESA was a full-time 4WD with viscous coupling. This meant it incorporated a viscous LSD instead of a conventional center lock mechanism in the bevel gear-type center differential, which distributed driving force to the front and rear wheels. The basic driving force distribution to the front and rear wheels was 50:50, so the driving force was normally distributed evenly to all four wheels.

As a result, even in the event of wheel slip, the viscous LSD automatically corrected the driving force distribution transmitted to each wheel, resulting in smooth movement of the vehicle.

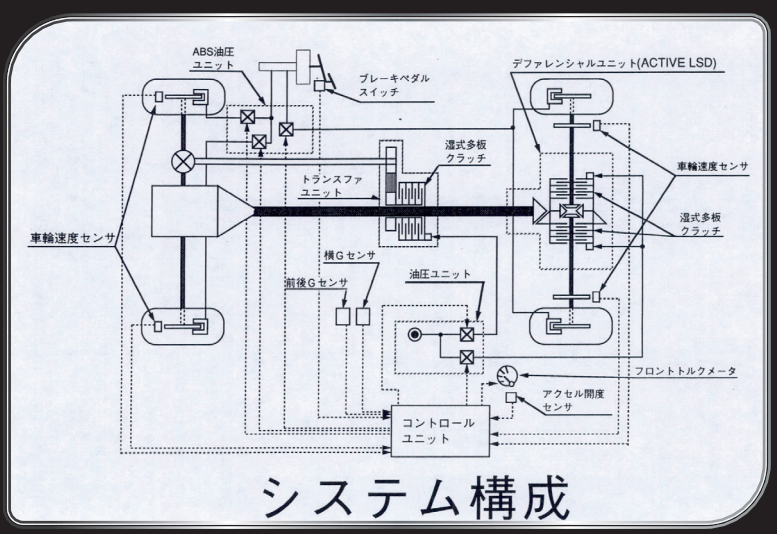
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The Bluebird 1800SSS-R with a 4WD system simply called ATTESA. It adopted a full-time 4WD set-up for FF with a viscous coupling, which was mainstream in the rally world at the time.

Also, depending on the model, in addition to the center differential, the rear differential also incorporated a viscous LSD, improving straight-line performance, maneuverability when cornering, and road handling capabilities. ATTESA was used for car grade names for 4WD, such as Bluebird SSS ATTESA. At that time, full-time 4WD was very advanced technology.

A system diagram of ATTESA E-TS PRO with active LSD in the rear. It is a 4WD system that has evolved even more than the ATTESA E-TS of the Skyline GT-R (R32).



The ATTESA E-TS that was first adopted in the Skyline GT-R (R32), which debuted in 1989, combines the ATTESA's "integrated driving force control system" with E-TS – electronically controlled torque split. It continued to evolve with full model changes of the Skyline GT-R (R33) and (R34).

The FR layout, which has been adopted by successive Skyline cars, enjoys top performance and sporty driving. On the other hand, 4WD can disperse the driving-force torque to all four wheels and is superior in terms of stability and traction performance. However, as the driving-force torque is provided to the front wheels, turning performance is left to FR. Therefore, an electronically controlled torque-split 4WD ATTESA E-TS system was developed as a new 4WD that combines the advantages of FR and 4WD. Based on FR, the driving force torque that cannot be absorbed by the rear wheels in certain situations is distributed to the front wheels, making both the turning capabilities of FR and the driving performance of 4WD compatible. It is not a full-time 4WD as it is rear-wheel drive only.

INTEGRATED CONTROL WITH ABS

Let's take a look at how ATTESA E-TS is controlled. The driving force distribution is continuously controlled step-free from 0:100 to 50:50 (rigid 4WD). The driving conditions are carefully judged by monitoring the vehicle speed, the degree

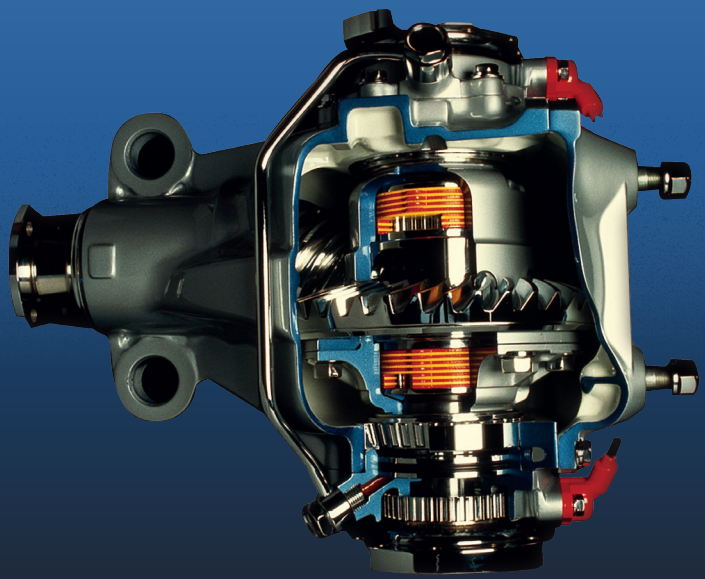
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of acceleration, the wheel speed sensors for each of the four wheels, and the front and rear G-sensors and lateral G-sensors. The driving-force distribution to the front wheel is optimally controlled according to the detected values.

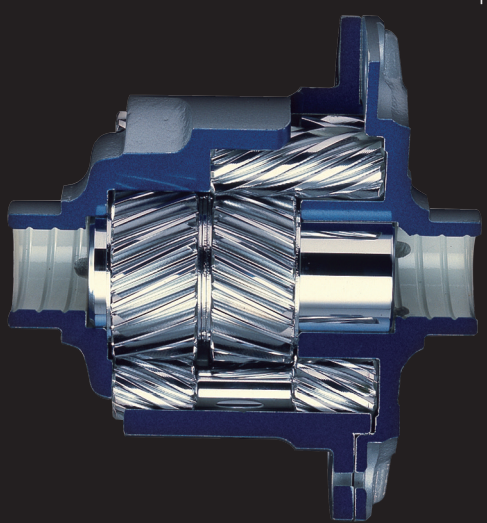
When starting to drive, torque is transmitted to the front wheels according to the amount of acceleration – front/rear drive force distribution varies from 0:100 to 50:50 depending on the maneuverability and stability of the vehicle. Straight driving at a constant speed is 0:100 at low and medium speeds, but at high speeds, torque is transferred to the front wheels to match the increase in driving resistance, thereby improving high-speed stability.

In addition, during cornering where the rotational speed difference is small and the lateral-G is high, the front and rear torque distribution system is reduced to close to 0:100. The control gives top priority to sharp turns, and performance and vehicle controllability. Furthermore, when the rotational speed difference increases in the front and rear wheels, part of the rear wheel torque is sent to the front wheel, optimizing the yaw point – the ease at which the vehicle turns – to further enhance stability. During acceleration, such as when exiting a corner, the torque transmission to the front wheels changes from 0:100 to 50:50 depending on the degree of acceleration, improving performance and stability. On difficult surfaces such as icy roads, the torque distribution to the front wheels increases to generate stable traction unique to 4WD.

Furthermore, integrated control with ABS optimizes braking stability and ABS performance on various roads. Under normal braking, the torque transmitted to the front wheels is increased in proportion to the rotational difference between the front and rear wheels, optimizing the distribution and increasing the effectiveness of the brakes. The front/rear drive force torque distribution varies from 0:100 to 50:50, with the greater the front/rear braking imbalance, the greater the torque distribution to the front wheels. In addition, under sudden braking when ABS is activated, the engine brake is not set to a perfect 0:100 to prevent deterioration of vehicle stability. Instead, the engine brake volume is estimated from the engine speed, and hydraulic pressure of a comparable magnitude is transmitted to the hydraulic multi-plate clutch. It is a control system that is designed to release the engine brake to the front wheels.



A cutaway model of active LSD. This system electronically controls the multi-plate clutch with hydraulic pressure, making it easier to turn and with higher driving force compared to normal mechanical LSD.



The rear helical LSD adopted in the standard Skyline GT-R (R34). Compared to the multi-plate LSD that was used in competitions, this LSD has a smoother effect and less noise.

SKYLINE GT-R V·SPEC WITH ACTIVE LSD

Two types of LSD (limited slip differential) were adopted for the rear-wheel differential. The Skyline GT-R (R34) V·spec featured ATTESA E-TS Pro with enhanced driving performance, which adopted an

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active LSD for the rear differential; the basic Skyline GT-R (R34) ATTESA E-TS adopted a helical LSD with a combined gear structure.

While the ATTESA E-TS is a 4WD system that distributes torque between the front and rear wheels, the LSD is a system that controls the torque distribution between the left and right rear wheels. Optimal control of the four-wheel capability is achieved by smoothly integrating both of these elements.

The active LSD on the Skyline GT-R (R34) V-spec limits differential movement by electronically controlling the hydraulic pressure that controls the pressure force of the multi-plate clutch. This is based on the information sent from each sensor for wheel speed, accelerator opening, lateral G, and front/rear G. Because of the active control, the response is excellent, and optimum control can be achieved depending on the road surface and driving conditions.

The electronically-controlled 4WD system used in the Skyline GT-R (R34) was installed in the Group A-spec Pulsar GTi-R (N14) that competed in the World Rally Championship, proving its durability and maneuverability.

The helical LSD in the Skyline GT-R (R34) consists of a total of eight pinion gears and two side gears, and is incorporated into the differential case. Differential limiting is a torque-sensitive LSD that uses frictional force generated between gear-to-gear and gear-to-housing. When cornering, the drive torque on the outer wheels is generated without time lag according to the degree of acceleration, enabling excellent cornering traction, accelerator responsiveness, and controllability.



ATTESA E-TS seamlessly varies the drive force torque to the front wheels according to the driving conditions. A front torque meter is fitted as standard, a feature that has not been available on viscous full-time 4WD vehicles since the Skyline GT-R (R32) pictured.

The ATTESA E-TS system improves the signal accuracy of the accelerator opening sensor and each G-sensor to enable more precise control. Along with a newly designed controller equipped with a high-performance CPU, the software was refined after extensive testing. ♦



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MODIFYING THE SKYLINE GT-R

The Nissan Skyline GT-R (R34) driven by Brian in *2 Fast 2 Furious* was adapted to realize its full potential for the filming of the movie.



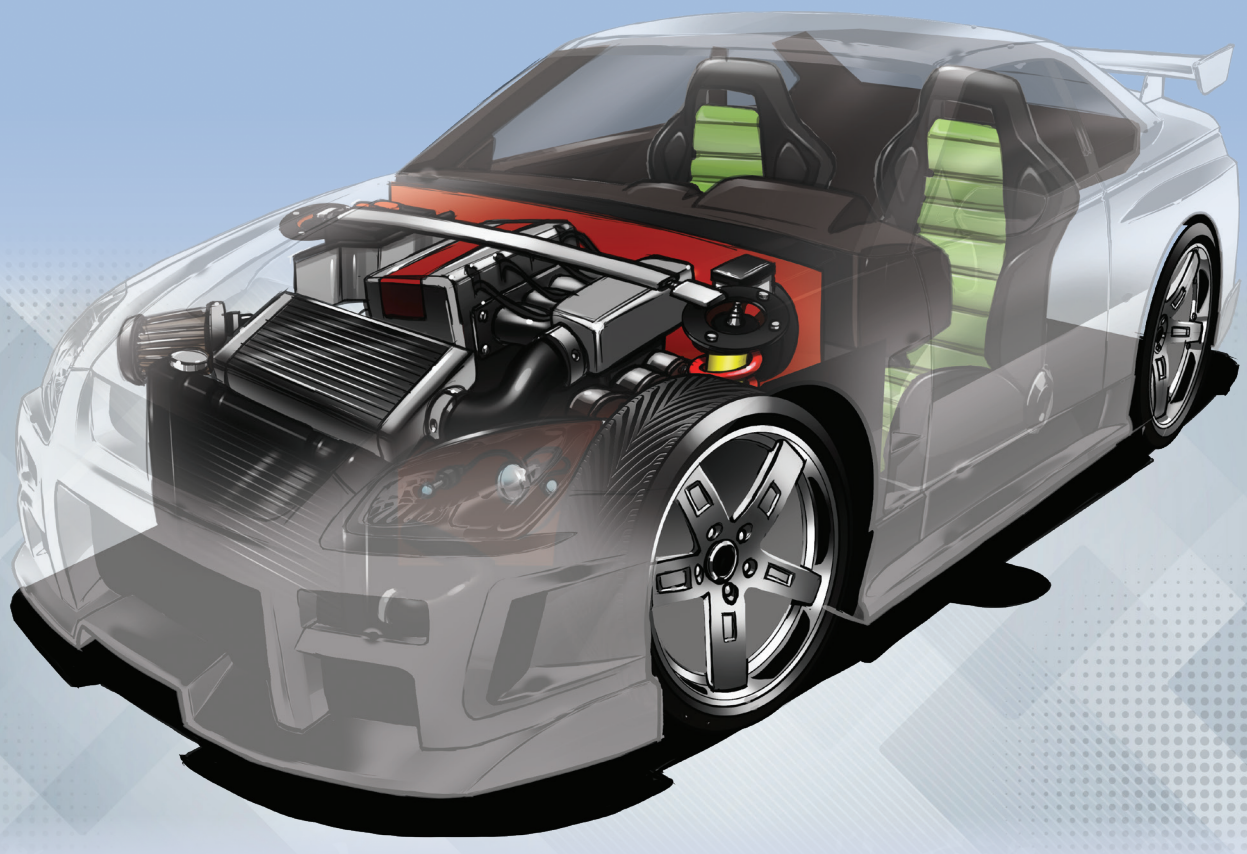
Seeing a Nissan Skyline GT-R circulating on the roads of the United States was quite unusual, so Craig Lieberman quickly got the producers of *2 Fast 2 Furious* interested in this spectacular sports car.

The spectacular Nissan Skyline GT-R (R34) that Paul Walker drives at the start of the second movie in the franchise was a real automobile. Its owner, Craig Lieberman – hired as a technical consultant for the movie – had imported it to the United States via the specialist company MotoRex. After it was delivered to him, Lieberman, who had previous experience upgrading vehicles, was determined to customize his new acquisition with a long list of modifications.

LIGHTER AND MORE POWERFUL

To the 2.6-liter straight-six RB26DETT biturbo engine, with which the model left the factory, Lieberman added two HKS 2.540 turbos, an HKS titanium exhaust pipe, and a direct port system by Nitrous Express that gave the car an extra 150hp. Although he did not touch the original six-speed manual gearbox, he preferred to use 19x10-inch HRE 446R tires, assisted by StopTech disk brakes, 14-inch on the rear axle and 15-inch on the front. In the cabin, he also made some notable changes by reworking the seat upholstery and fitting a Sparco steering wheel and safety belts. The most remarkable change, however, was using a fiberglass bodywork kit for the exterior, to which he added an enormous carbon-fiber rear spoiler. The finishing touch was a spectacular audio and video system personally designed by the vehicle's owner.

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THE FINAL APPEARANCE

Shortly before production of *2 Fast 2 Furious* was underway, Craig Lieberman offered Universal the opportunity to rent his magnificent Nissan Skyline GT-R (R34) for the main character to drive. The studio accepted the offer and asked the actor Paul Walker to begin driving it in order to become familiar with it. On top of all the modifications the vehicle had undergone, Universal requested even more, such as having it painted Platinum Pearl, with paint supplied by House of Kolor – this would result in blue stripes and graphics, along with eye-catching neon lights fitted to its undersides.

By the time the cameras began rolling and Brian appeared driving round the streets of Miami at full speed in his Nissan Skyline GT-R (R34), the vehicle was quite unlike the car that had left the factory. The choice of this model meant that the production had to order as many as five different replicas of the car to film the more challenging sequences. This way it guaranteed that, when filming had finished, Craig Lieberman could get his Nissan Skyline GT-R (R34) back in good condition. He then modified it even more until Lieberman decided to sell it. The original car that appeared in the movie is now in the possession of a private owner. ◆

The performance of a vehicle depends on its equipment, materials, and shape, among other factors. In capable hands, a mass production car can become an impressive race car.

THE ADVENTURES OF BRIAN O'CONNER

Under suspicion

By infiltrating the world of street racing in Los Angeles as a driver, Brian got the chance to meet people who could be behind the truck heists. One of them is Héctor, the leader of his own gang. To find out if he is in any way involved in any of the robberies, Brian breaks into his garage one night. When he comes out, Vince is waiting for him and accuses him of being a cop in front of Dom. Brian is forced to deliver the best performance of his life in order to keep his true identity a secret.

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NISMO – A NEW BRAND IN FASHION AND MERCHANDISE

In the 1970s, emission regulations and the oil crisis forced Japanese carmakers to concentrate their resources (people, goods, and money) on developing emission-control measures and low-consumption engines. As a result, motorsports in Japan were forced into a period of stagnation.



The original NISMO clothing line only included T-shirts and sweatshirts. However, the range and number of items has increased, with simple designs developing into more eccentric styles.

During the 1980s, however, the environmental measures taken by car manufacturers eased off, and motorsports returned to the limelight. Models equipped with high-performance engines – such as turbo and four-valve DOHC units – were released by various companies, and the motorsports sector as well as ordinary fans began to talk passionately about racing cars once again. It was against this backdrop that NISMO was created as Nissan's motorsports division in the mid-1980s.

In 1985, the year after NISMO was founded, a Silvia Turbo C secured victory in the Japanese round of the WEC (World Endurance Championship) at Fuji Speedway; it marked the first time that a Japanese engine and Japanese driver had won a WEC race. In addition, the Fairlady Z won the 1985 All Japan Championship Rally series, marking an impressive start for the newly born NISMO in the world of motorsports.

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NISMO – A NEW BRAND IN FASHION AND MERCHANDISE



Replica race team clothing was a popular item, albeit a bit more expensive than other items. The authentic down coat was a reliable friend on any circuit in the middle of winter.



The number of merchandising items was expanded to include replicas of the bags (left) that were actually used by the team when they traveled to races. Versions were also available for women (right).



A shot of the winning NISMO drivers at the 1992 24 Hours of Daytona. The team members in the back row are wearing clothes that Nissan fans can buy replicas of from the NISMO outlet.

In addition to the main cornerstone of motorsports activities, NISMO had another strand – the development and sales of racing components. These included competition parts for drivers who enjoyed motorsports such as rally



Since its launch in 1985, the NISMO original fashion and goods collection has grown to include numerous items including specially designed caps, T-shirts, towels, and coats.

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and gymkhana, as well as “street” components, which have become commonplace today.

In June 1985, the company also began developing and selling original fashion items and merchandise incorporating NISMO’s unique identity. As a commemorative first release, six types of summer items – including T-shirts, caps, shirts, and other clothing – were made available. The items were replicas of the clothing and items that works drivers actually wore and used on the circuit, and were created by combining the materials actually used in the racing environment with the latest fashion trends.

NISMO original fashion and merchandise became popular



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NISMO – A NEW BRAND IN FASHION AND MERCHANDISE



For several years from 2013, Tsugio Matsuda (right) and Ronnie Quintarelli (left) successfully raced the MOTUL AUTECH GT-R, a NISMO works car. The trend for NISMO-branded fashion and goods lives on today.

"It makes you feel a sense of unity with your team."

among motorsports fans who support Nissan as well as with traditional Nissan car owners who love the brand's production cars. One of the reasons for the popularity of the items is the sense of unity with NISMO and Nissan – wearing a branded T-shirt, for example, was a way for people to express their identity as Nissan car owners.

These motorsports-related fashions flourished as the popularity of motorsports grew in the late 1980s.



Race fans used to be a group of individuals, but today they are an organized team of supporters. For them, NISMO-branded clothing, flags, and other items provide a sense of unity with the team.

Other carmakers besides Nissan/NISMO also offered similar fashions and goods as the trend grew. They offered a variety of high-end items that became so popular that some brands even opened boutiques in the Roppongi and Ginza districts of Tokyo. Against this backdrop, NISMO fashion and goods grew to the point where new items were released twice a year, once in spring/summer and once in fall/winter. ♦

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STAGE 12
FRONT SUSPENSION SYSTEM (3)

In this issue, we will assemble the parts of the front right knuckle.

PARTS



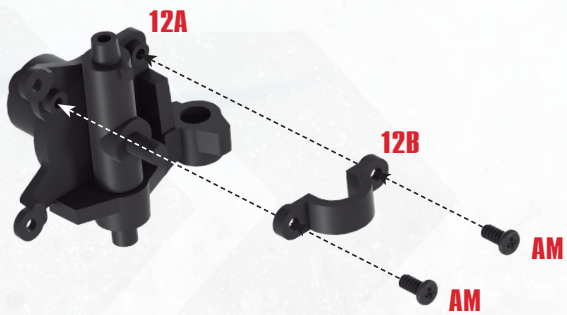
12A Front right knuckle 1	12G Right knuckle arm
12B Mounting bracket	12H Right suspension linkage
12C Front right knuckle 2	12I Right suspension upper bracket
12D Front right driveshaft	AM Screws 1.7×4mm (×3*)
12E Right outer dust cap	AIM Screws 2.0×3×6mm (×3*)
12F Right inner dust cap	EM Screws 2.0×5mm (×4*)

*Including spares

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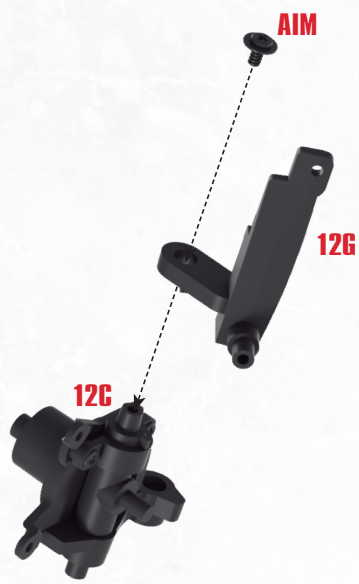
12.01 Start the assembly by connecting the front right knuckle 1 12A to the front right knuckle 2 12C, as shown in the picture.





12.02 Referring to the image, place the mounting bracket 12B over the front right knuckle parts 12A and 12C you just assembled. Secure the parts with two AM screws.

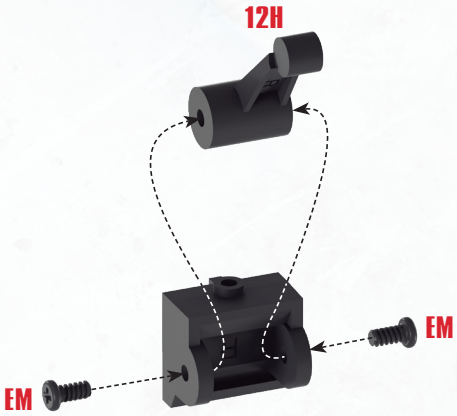
12.03 Place the tab on the right knuckle arm 12G over the upper end of the front right knuckle 2 12C. Connect the parts with one AIM screw.



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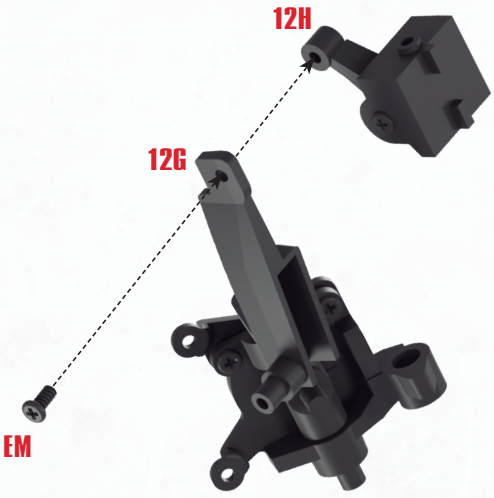
12.04

Position the right suspension linkage 12H between the tabs on the right suspension upper bracket 12I as shown in the picture. Use two EM screws to connect the parts.



12.05

Attach the tab on the right suspension linkage 12H to the top of the right knuckle arm 12G using one EM screw.



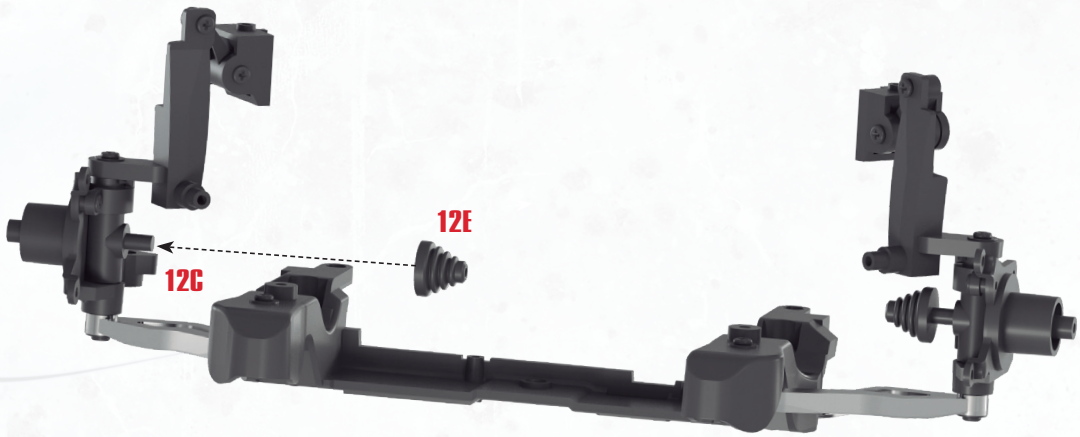
12.06

Insert the bottom pivot of the front right knuckle 2 12C into the hole in the front right lower control arm 8C. Connect the parts together with one AIM screw.



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12.07 To finish this stage, fit the right outer dust cap **12E** over the highlighted pivot on the front right knuckle 2 **12C**.



Final assembly



Keep the right inner dust cap **12F** and the front right driveshaft **12D** aside for later stages of assembly.

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