FAST & FURIOUS™

Build

BRIAN'S NISSAN SKYLINE GT-R

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BRIAN'S NISSAN SKYLINE GT-R

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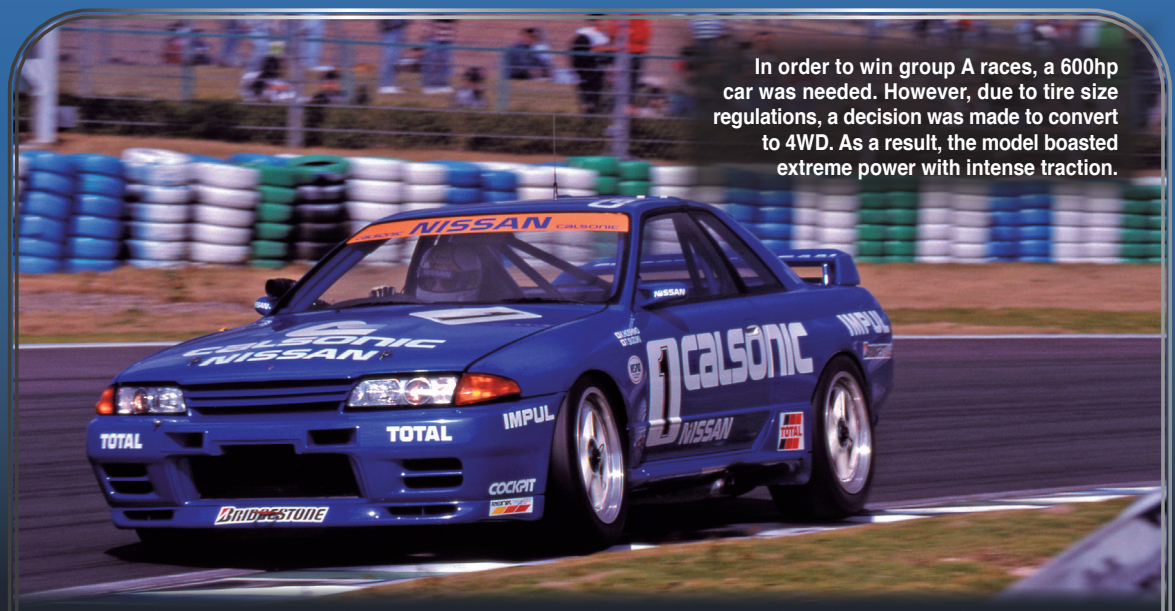


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UNIVERSAL



In order to win group A races, a 600hp car was needed. However, due to tire size regulations, a decision was made to convert to 4WD. As a result, the model boasted extreme power with intense traction.

ELECTRONICALLY CONTROLLED TORQUE-SPLIT 4WD

The Skyline GT-R (R32) included 4WD, which until then had only been used in off-road and rally cars. It uses an innovative system that reliably transmits plenty of power to the road surface, while also ensuring maneuverability and stability.

The "electronically controlled torque-split 4WD", which is the core driving technology of the current Nissan GT-R (R35), was first adopted in the Skyline GT-R (R32) in 1989. The system, named ATTE-SA-E-TS, was refined in the subsequent Skyline GT-R (R33) and (R34).

This 4WD system does not have a center differential and is not a full-time 4WD – it normally runs in 2WD and automatically transfers torque to the front tires when the rear tires are idle. The front-rear torque distribution automatically changes by electronic control from 0:100 to 50:50.

The torque-split 4WD system was already used by the Porsche 959 in 1986, but was still in the development stage at Nissan at the time. Nevertheless, the reason it was adopted in the Skyline GT-R (R32) was because it was the only system that could reliably transfer power to the road, enhance limit controllability, embody the joy of driving, and be used for racing. Furthermore, the "unique feel" of 4WD had a big impact at the time and was also advantageous in terms of Nissan's sales strategy.

ORIGINALLY A 2WD

There is an interesting story behind the adoption of the electronically controlled torque-split 4WD system. When the plan to add a GT-R to the Skyline range began, the initial idea was to use 2WD.

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In contrast to the full-time 4WD system that was common in the rally world at the time, the ATTESA E-TS did not have a center differential. The driving force of the front tires was controlled via a transfer.

According Nagonori Ito, the Chief Product and Vehicle Engineer: "A race is run by professional drivers, so to win races, the idea was to make the GT-R lighter with 2WD. If there was a specified weight, the weights should be loaded in the most suitable place to achieve a low center of gravity. At that time, the GT-R concept was different."

However, even drivers of the two-liter, four-cylinder Skyline 2000 Turbo RS (DR30) – which was competing in the Group A races at the time – had their opinion about power only going through two wheels: "Any further increase in power cannot be controlled in 2WD due to the tire size restrictions." With the tire size determined by Group A vehicle regulations, 4WD was the only reliable way to ensure that power levels over 500hp could be transferred to the road surface.

Ito eventually decided to adopt 4WD for the rebirth of the Skyline GT-R. He noted: "If you're going to go 4WD, it's not just about being fast and winning races, it's about weather and safety too. And that's what the appearance of the next generation of high-performance cars should be, so we changed the concept of the GT-R to the 'ultimate road-going car.'"

WEIGHT CONCERNS

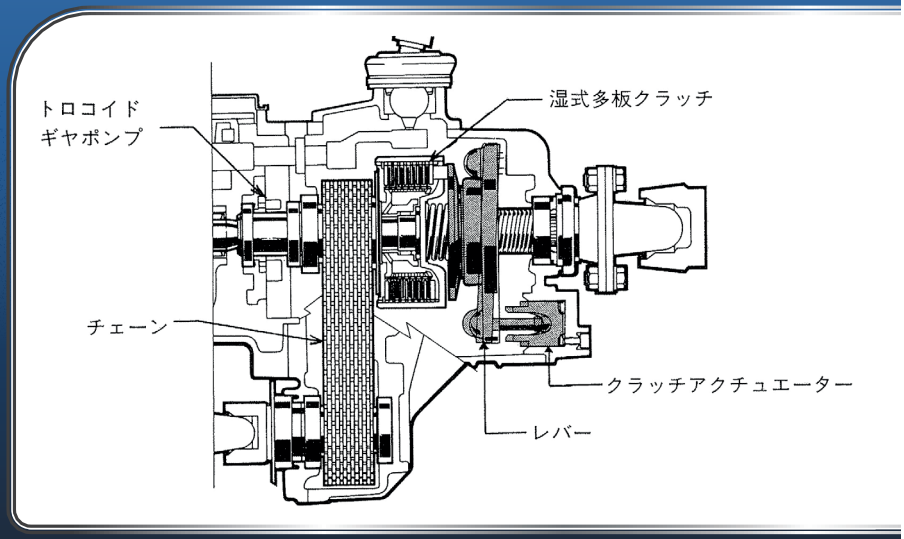
However, there were many different 4WD systems. At the time, the WRC (World Rally Championship) Group B cars were in a "golden age" and high-power 4WD machines were dominating. It was here that the benefits of distributing the power across four wheels were fully demonstrated. Nevertheless, there were few examples of 4WD cars in other racing groups, and the risk of breakdown increased due to the added weight of the system.

When the 7th-generation Skyline underwent a minor change, a full-time 4WD prototype was made. A decision was made to halt the development of the car, as the weight became too heavy, and it would take time to meet the required performance and handling capabilities of the model. There were also other details that had to be considered when finalizing the next-generation Skyline.

In December 1986, while Ito was pondering the advantages and disadvantages of adopting 4WD, he received positive news about the new model's chassis design:

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A rear-wheel drive-based 4WD system was adopted, in which the driving force torque is distributed from the transmission output shaft to the front via a chain with a multi-plate clutch.



"We have completed a prototype for the 7th-generation Skyline (R31) 4WD car, assembled with a new electronically controlled torque-split 4WD system and equipped with a RB30 type turbo engine, so we want you to drive it." Ito test-drove the prototype himself and was amazed by its capabilities and handling.

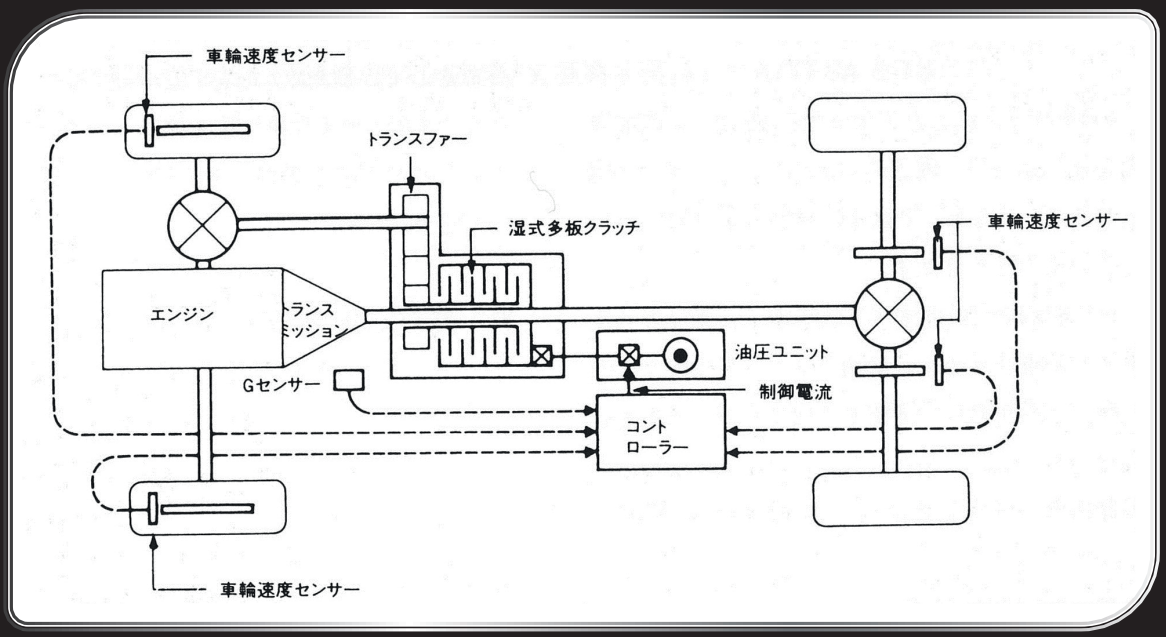
"Even in places where my arm says 'don't spin,' if I step hard on the accelerator, the front wheels will pull me out," he recalled. "It was possible to run with counter-steer, this was the only way. That's when I decided to go for it." This was the moment when the electronically controlled torque-split 4WD system was adopted, the core technology that continues in the current Nissan GT-R (R35).

A system diagram of the ATTESA E-TS. The rear-wheel drive is directly connected via a propeller shaft, while the front driving power is computer-controlled based on the vehicle speed and acceleration. The result is a 4WD with exceptional handling.

FAST AND SAFE IN ALL WEATHERS

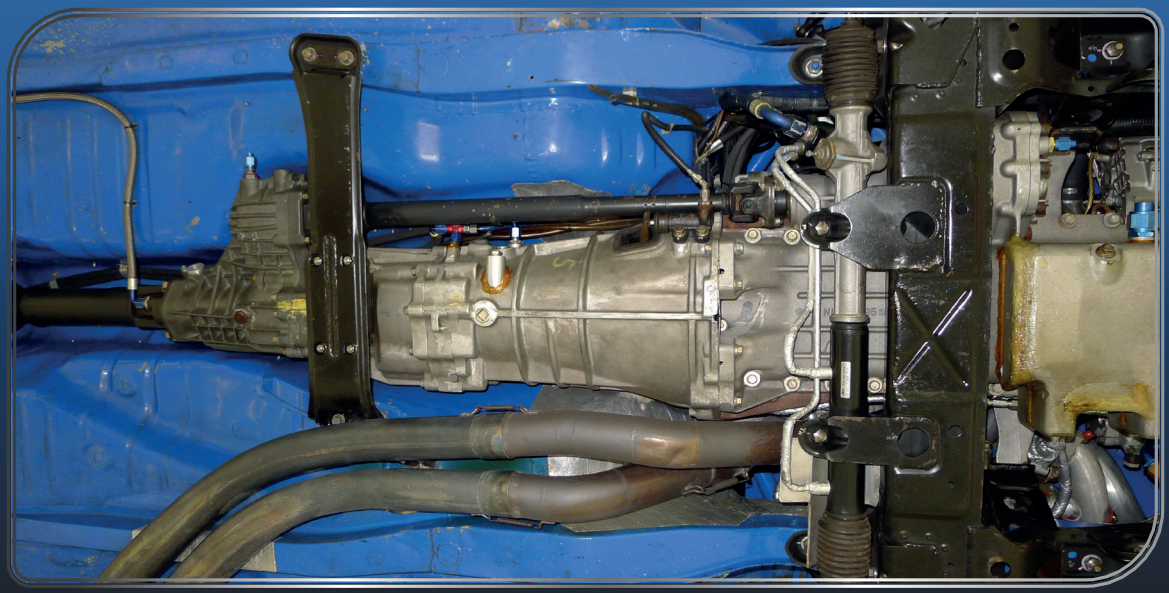
Known as ATTESA E-TS, the electronically controlled torque-split 4WD script system has a transfer provided on the right side of the five-speed manual transmission in the direction of travel, and the torque is transmitted by a chain. A short front propellor shaft extends forward and the front differential is integrated with the aluminum oil pan. The driveshaft transmits torque to the left front tire and penetrates the inside of the oil pan.

Normally, only one side of the wet multi-plate clutch rotates together with the transmission main shaft, and no torque is transmitted from the clutch to the front tires. When the clutch actuator is activated with hydraulic pressure, the clutch plate is pressed and the torque from the main shaft is transmitted to the front tires.



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ELECTRONICALLY CONTROLLED TORQUE-SPLIT 4WD



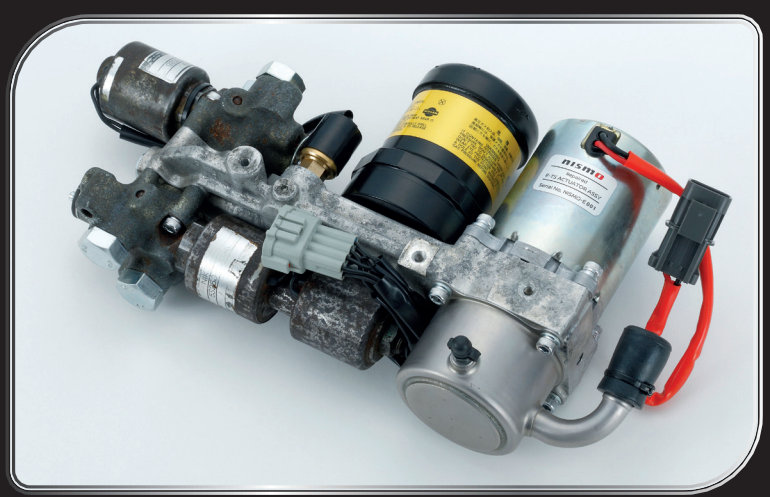
The transmission was used for racing, but production models used the same transfer as Group A race cars. However, the software was race-specific, and had a greater distribution of driving force to the front than the production car. Plus it had the strength to withstand 600ps.

The torque applied to the front is controlled by the strength of the hydraulic pressure pressing down on the clutch. Signals picked up by the multipurpose wheel speed sensors installed on each of the four wheels, and the G-sensor fitted under the center console, are sent to the ETS controller – this is used to control the hydraulic pressure. The factors that change torque distribution are the differences in rotational speed in the front and rear tires – rear tire slip and lateral G.

When combined with a Group A specification engine that pushed out 600ps, there were concerns about the durability of the transfer using a wet multi-plate clutch. Therefore, in the early stages of development, a hybrid system with a viscous coupling attached to a wet multipurpose plate clutch was considered. When the wet multi-plate clutch was later deemed to be fine, the hybrid system was not adopted, but the space in the viscous coupling was a remnant of the hybrid idea.

In order to enhance the driving performance of the Skyline GT-R (R32), the electronically controlled 4WD split-torque system was tested under various driving conditions and was finally completed.

The cutting-edge technology and performance of the new Skyline GT-R – which was created by bringing together Nissan's best innovations of the time to create the "ultimate road-going car" – astonished other car manufacturers around the world. Furthermore, the Skyline GT-R (R33) and (R34) would reflect further evolution of the 4WD system by adopting an active LSD for the rear differential. ♦



In the system, the multi-plate clutch in the transfer is controlled by hydraulic pressure. More than 30 years after its launch, the production of parts for the system was discontinued – if a 4WD part broke, the vehicle had to run in 2WD. However, from 2019 NISMO expanded its repairs to include 4WD to give GT-R owners peace of mind.

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THE "VERONE TEST"

In the second movie in the *Fast & Furious* series, the car races take place across the roads and highways that head north from Miami, where Brian and Roman demonstrate their skill at the wheel.



Carter Verone commissions a group of drivers to compete to recover a mysterious package that is in the glove compartment of a vehicle requisitioned by the police located in a warehouse on the outskirts of Miami.

The movie *2 Fast 2 Furious* has some of the most thrilling, eye-catching races in the entire saga. These races are not always for prestige or to win a big cash prize – they can also guarantee securing a job.

As soon as Brian O'Conner and Roman Pearce agree to collaborate in the police investigation against Carter Verone, they go to a hangar where they have arranged to meet the undercover Customs and Border Protection Department agent, Monica Fuentes. Without wasting a second, she tells them: "Here's the deal. Verone's looking for drivers. I've arranged for both of you to join up. I've also hired some thugs, you know, to make it legit." This will be known as the Verone test, a way of demonstrating not only who is the fastest driver, but also who has a rap sheet that does not arouse suspicion. Brian is immediately intrigued by what he will be driving. Monica has brought along two spectacular Mitsubishis confiscated by the police: an Eclipse Spyder convertible for Roman and a Lancer Evolution VII for Brian.

When they reach the entrance to Verone's mansion, they find six more guys who in their respective vehicles are also aspiring to become drivers for the wealthy businessman. They all gather in the garden of the house under the severe gaze of the host, who thanks them for coming.

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THE "VERONE TEST"

"My red Ferrari was confiscated yesterday, and it sits in an impound lot in Little Haiti, about 20 miles from here," Verone says. "The car isn't important. What is important is the package I left in the glove box. The first team back here with the package will have an opportunity to work for me."

WHAT'S IN THE PACKAGE?

There's no time now for questions or introductions. Just as in the legendary 24 Hours of Le Mans, the drivers run as fast as they can to their vehicles, start them up in a split second, and hit the accelerator, heading north of the city to Little Haiti. Brian and Roman have the chance to really put the new sports cars to the test... and they know how to get the absolute most out of them. Weaving in and out of the vehicles traveling on the highway at top speed, the old friends challenge one another and do some amazing stunts. They get to the impound lot first and retrieve the package from Verone's Ferrari.

When they try to leave the lot, the other drivers block their exit. However, when Agent Markham unexpectedly appears on the scene – thinking that Brian and Roman are trying to get away – all the others take off at top speed. The two buddies still manage to get back to Verone's mansion with the package. At the entrance, the businessman himself is waiting for them, and shortly afterwards he reveals that the package contains nothing but a huge Havana cigar. "We did all that for a cigar?" Roman asks, rather aggrieved. "No," Verone immediately corrects him. "You did that for a job." Brian and Roman have achieved their objective: they've become Verone's drivers. They're in. ♦

Roman takes advantage of Verone's test to try to prove his superiority as a driver over Brian.

THE ADVENTURES OF BRIAN O'CONNER

Feeling the pressure

In Los Angeles, the authorities are trying to stop freight truck robberies. The police and the FBI put pressure on their undercover officer, Brian O'Conner, who asks for more time. He's beginning to admire Dom Toretto and his superiors begin to suspect this. They bring up Dom's rap sheet, as well as some violent episodes from his past. Although Brian is reluctant to believe it, all the signs point to Dom as the one responsible for the heists on the highway.



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THE ALL JAPAN CHAMPIONSHIP RALLY SERIES

Part 2: Success with the Fairlady Z

In the mid-1980s, the dirt courses used in most domestic rallies – except Hokkaido – were narrow, with tight corners and rough surfaces. For this reason, compact, rear-wheel drive cars with engines under 2,000cc were traditionally seen as the best models for this type of racing.

For NISMO's entry into racing, the vehicle choice was especially important. The Silvia Turbo (S12) was considered for international rallies, but the feeling at the time was that the model's large body would be a disaster in domestic racing.

The base car eventually chosen by NISMO was the Fairlady Z 300ZX (Z31), which was actually larger and thought to be unsuitable for domestic rallies. It was fitted with a 3,000cc V6 SOHC turbo engine that developed 230hp – the most powerful power plant of the time.

When this model was first seen at rally venues, many officials were surprised by NISMO's "unlikely choice". Very few people, including racing fans, thought this car would be competitive, let alone dominate the series.

However, against all expectations, the Fairlady Z won the 6th and 7th rounds of the 1985 All Japan Championship Rally series. It continued to succeed in later races, earning points and sensationally winning the Championship on its debut.

The background to this was the skilful driving of Masao Kamioka, but also the impressive torque and power of the 3,000cc V6 turbo engine. In addition, the Fairlady's large-diameter tires contributed to the model's ability to negotiate the rough surfaces of some of the tracks. Despite its large body, the rally car was surprisingly easy to handle, while its downhill speed was especially impressive.

The surprising series victory ensured that the NISMO logo was immediately engraved in the hearts of many motorsports enthusiasts. ♦



FAIRLADY Z 300ZX (1985 ALL JAPAN CHAMPIONSHIP RALLY WINNING CAR)

Model:	HZ31
Total length:	170in (4,335mm)
Total width:	68in (1,725mm)
Total height:	51in (1,295mm)
Wheelbase:	91.3in (2,320mm)
Tread (front):	55.7in (1,415mm)
Tread (rear):	56.5in (1,435mm)
Total displacement:	2,960cc
Engine:	VG30E Type (V6, OHC turbo)
Maximum output:	230ps / 5,200rpm
Maximum torque:	34.0kgm / 3,600rpm
Vehicle weight:	2,921lb (1,325kg)
Suspension (front/rear):	strut / semi-trailing arm
Brakes (front/rear):	ventilated disk / disk
Tires:	215-60R1590H

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SLEEK NEW BODY FOR THE REDESIGNED BLUEBIRD

The third-generation Bluebird (510) debuted in August 1967. The first generation was called the "Persimmon Seed" due to the unique shape of its tail lamp, while the second generation was handled by Pinnifarina in Italy, but was described as a "backward trend". The third generation arrived with a completely new design and adopted a basic, straight-line styling called the "Supersonic Line". The sleek side view, which eliminated the triangular windows on the front door, was well received, and it instantly became a popular model. By the time it ceased production, approximately 1.55 million models had been manufactured, making it a worldwide hit.



Introduced in 1968, the Coupe was a popular and good-looking model. The flasher-type indicator lights on the taillights were a novelty.

The Bluebird was equipped with a newly designed, L-type four-cylinder engine. It had a SOHC turn-flow aluminum cylinder equipped with a five-bearing crankshaft used for high-speed driving. The "SSS" (Super Sports Sedan) lineup included the mass-produced 1,296cc L13-type (72ps) and the 1595cc, a high-end model featuring the SU twin carb L16 (100ps).

The suspension was Nissan's first combination of front struts and rear semi-trailing arms. In 1966, Nissan and Prince had merged and the development of the third-generation Skyline C10 series was underway. Naturally, sharing parts between models was an issue, but only some parts were common to the Bluebird and Skyline; although the configuration was similar, the result was a different design, and the Bluebird was the first to be launched. Incidentally, the four-door station wagon and four-door van had a leaf-rigid rear for increased carrying capacity and durability.

Minor changes to the lineup were made as early as October 1968, including the addition of the 1600 Dynamic Cab series.



The cockpit of the 1600 Sedan. The design was simple with a sporty look, as reflected in the steering wheel and dashboard.

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The Bluebird (510) was very successful in international rallies. This Sedan-bodied model was the overall winner in the 18th East African Safari Rally in 1970.

At this time, the windshield wipers changed from the so-called "fighting wiper" to the regular "side-by-side" wiper style. The two-door Coupe (KP510) was added the following November to compete with the rival Corona HT. In September 1970, there was a second minor change when the 1800SSS (H510) equipped with a 1,770cc L18-type twin carb engine was released. At the same time, the basic 1300 model was upgraded to include a 1,428cc L14-type (85ps) unit.

The Bluebird 510's performance in the gruelling East African Safari Rally cannot be forgotten – it was both Class and Team Champion in 1969, while in 1970 it secured overall victory. The 1969 film *5000km to Glory,* starring Ishihara Yujiro, depicted the Nissan team's success, and left a lasting impression on many motorsports fans. ♦

TECHNICAL DATA

BLUEBIRD 1600SSS SEDAN P510 (1967)

Length:	162.2in (4,120mm)
Width:	61.4in (1,560mm)
Height:	55.1in (1,400mm)
Wheelbase:	95.3in (2,420mm)
Tread (front):	50.4in (1,280mm)
Tread (rear):	50.4in (1,280mm)
Engine:	L16 Type (straight four, OHC, SU twin-carb)
Total displacement:	1,595cc
Maximum output:	100ps / 6,000rpm
Maximum torque:	13.5kgm / 4,000rpm
Vehicle weight:	2,017lb (915kg)
Suspension (front/rear):	strut / semi-trailing arm
Brakes (front/rear):	disk / drum
Tires:	5.60-13-4pr

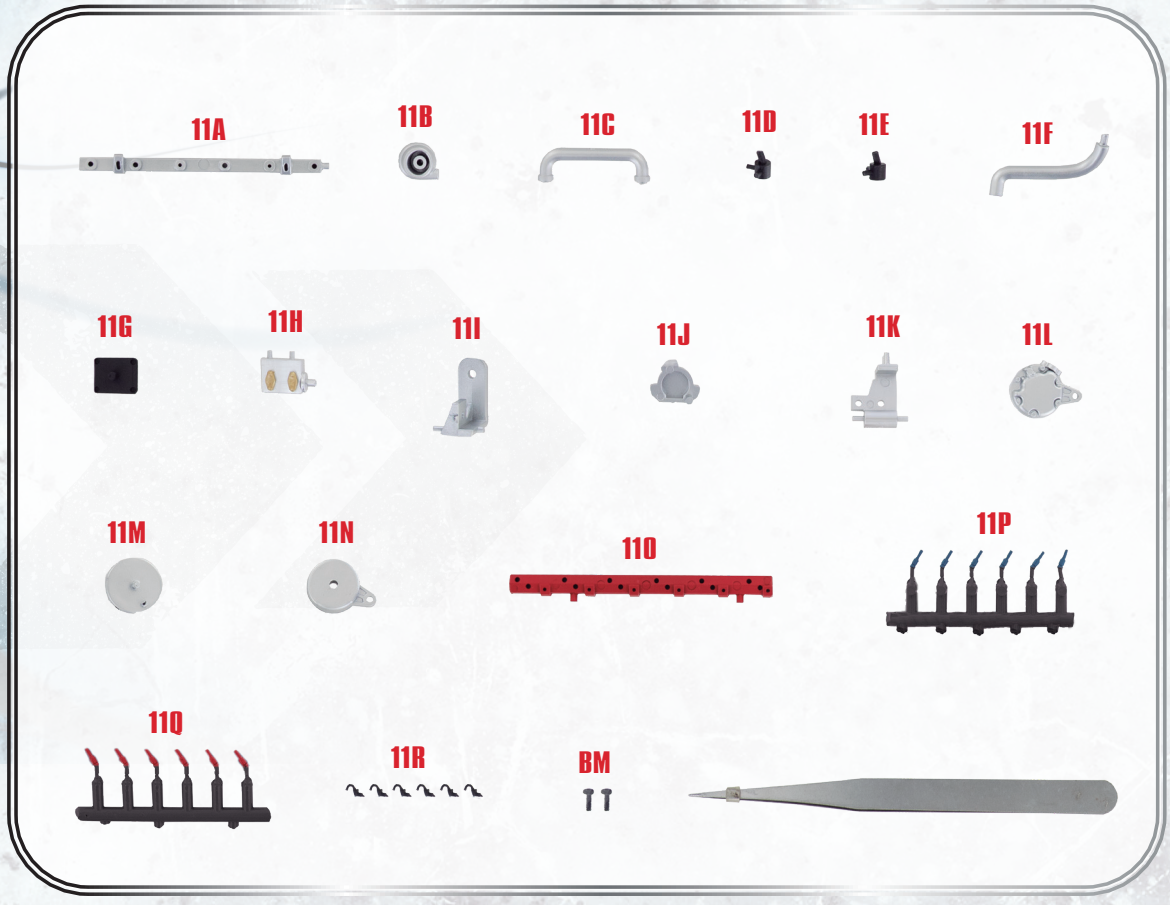


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STAGE 11
INJECTION SYSTEM

In this issue, we will continue with the assembly of the engine block by attaching parts including the crank case ventilation, compressor, fuel rail and injector ramp. You can use tweezers to fit small parts.

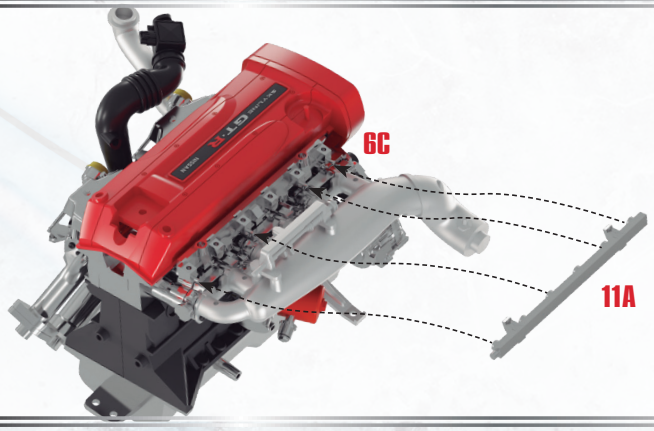
PARTS



- 11A Fuel rail
- 11B Oil plug
- 11C Crank case ventilation tube
- 11D Crank case ventilation connector 1
- 11E Crank case ventilation connector 2
- 11F Crank case ventilation intake connection
- 11G Rocker cover ornament
- 11H Steering pump
- 11I Tension pulley support
- 11J Camshaft sensor
- 11K Air conditioning compressor and steering pump bracket
- 11L Compressor rear part
- 11M Compressor housing
- 11N Compressor front part
- 11O Injector ramp
- 11P Blue connection fittings (×6)
- 11Q Red connection fittings (×6)
- 11R Black connection fittings (×6)
- BM Screws 1.7×5mm (×2*)
  Tweezers

*Including spares

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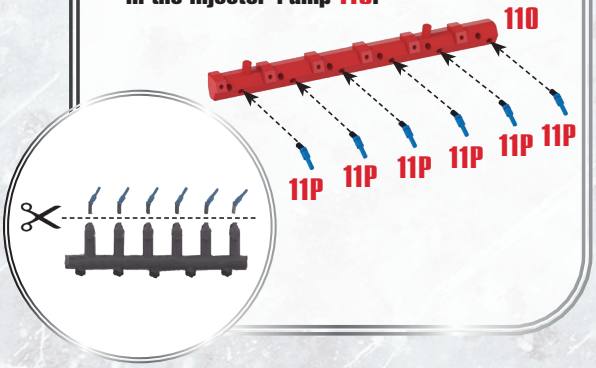


11.01

Take the engine block assembly that you built in issue 10 and place the fuel rail 11A over the four pivots on the intake manifold 1 6C.

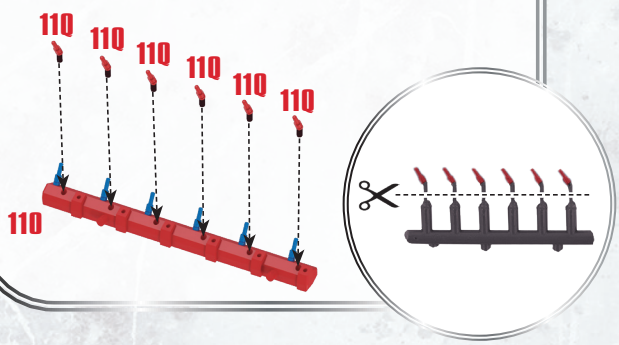
11.02

Carefully remove the six blue connection fittings 11P from their sprue. Insert their wider ends into the highlighted holes in the injector ramp 11O.



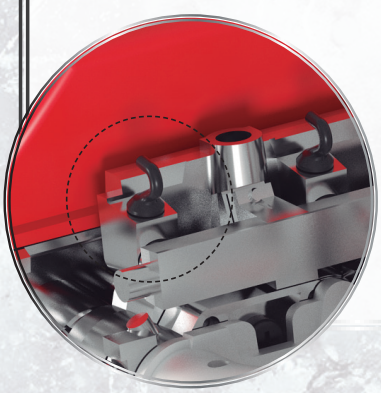
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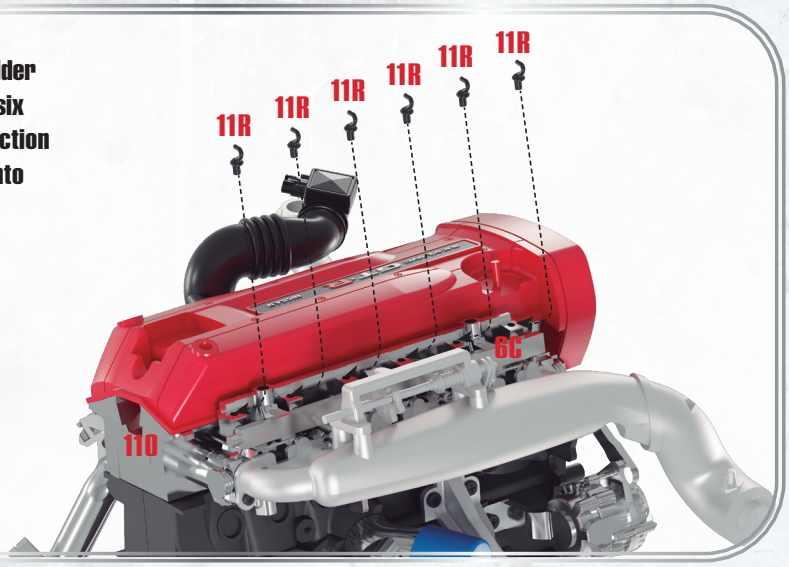
Carefully remove the six red connection fittings 11Q from their sprue. Insert their wider ends into the highlighted holes in the injector ramp 11O. Check their correct positioning on the picture.



11.04

Place the wider ends of the six black connection fittings 11R into the holes in into the intake manifold 1 6C.





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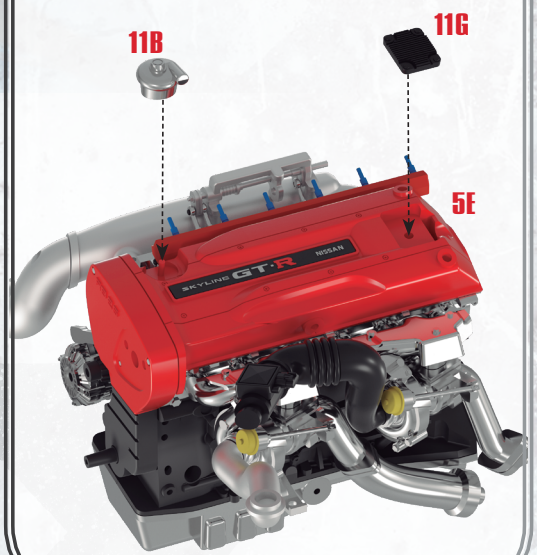
11.05

Insert the pivots on the injector ramp 11O into the hollow posts on the intake manifold 1 6C. Every black connection fitting 11R should match the corresponding opening on the injector ramp 11O.



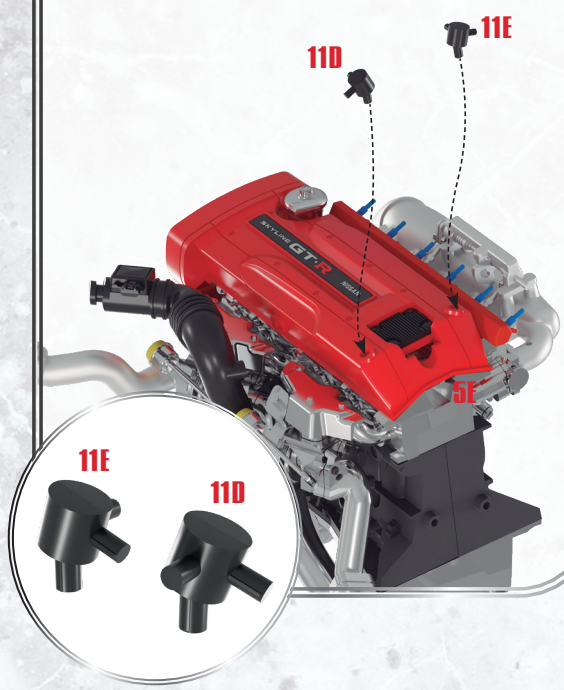
11.06

Place the rocker cover ornament 11G into the rectangular slot on the engine top cover 5E and the oil plug 11B over the pivot in the round slot at the other end of the engine top cover 5E.



11.07

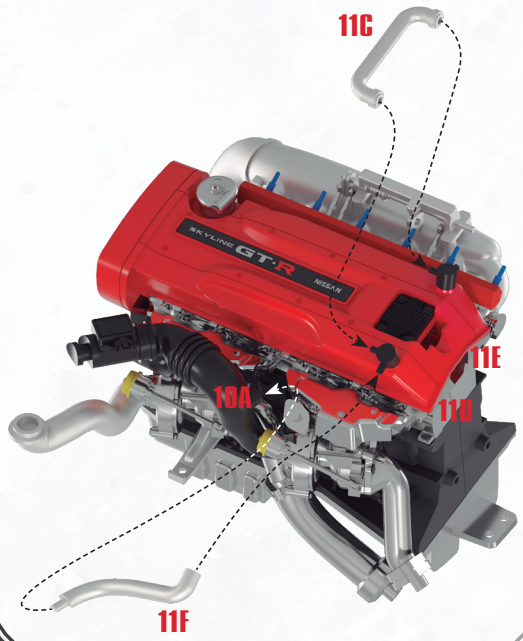
Fit the crank case ventilation connector 2 11E into the hole on the right side of the engine top cover 5E (check the position in the picture) and the crank case ventilation connector 1 11D into the other hole in the engine top cover 5E.



011_FS_FURIOUS_Nissan SkylineD_USA-UK-DE_v2.indd 12 20/12/23 12:33

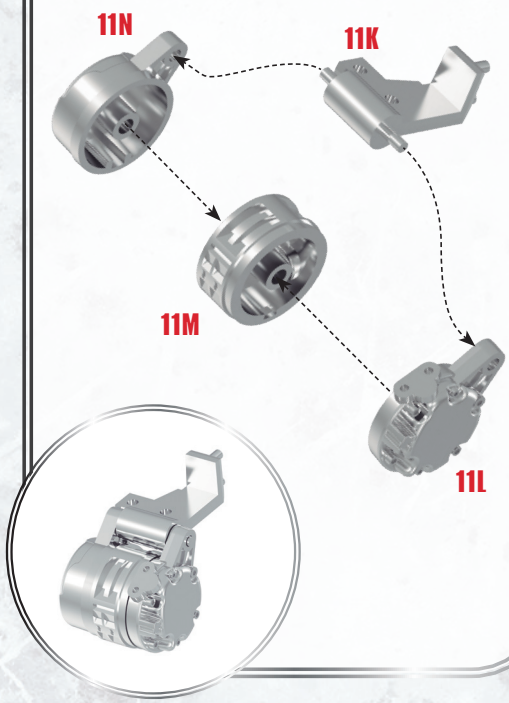
11.08

Fit the curved end of the crank case ventilation intake connection 11F over the left pivot of the ventilation connector 1 11D, then fit the other end of the intake connection 11F over the air inlet duct 1 10A. Attach the crank case ventilation tube 11C to the front pivots on the ventilation connectors 11D and 11E.



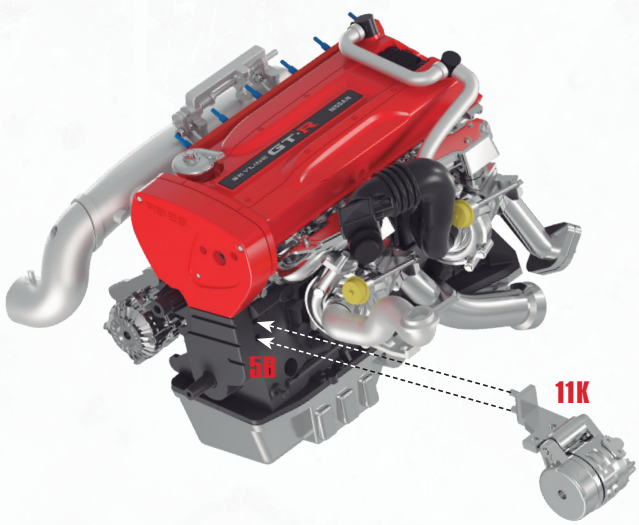
11.09

Place the compressor housing 11M and the compressor and bracket 11K between the compressor front part 11N and compressor rear part 11L, as shown in the picture. Press carefully to connect the parts so they all fit tightly together, as shown in the detail picture.



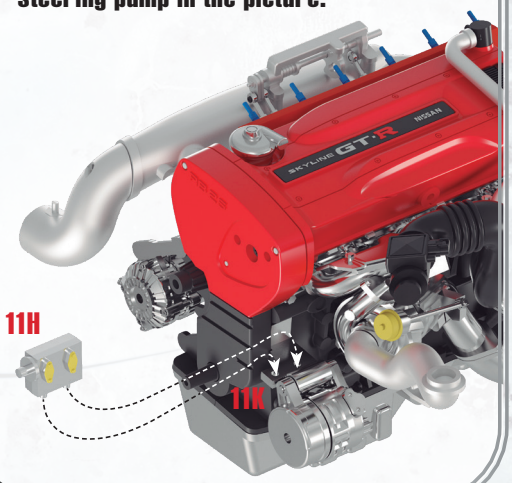
11.10

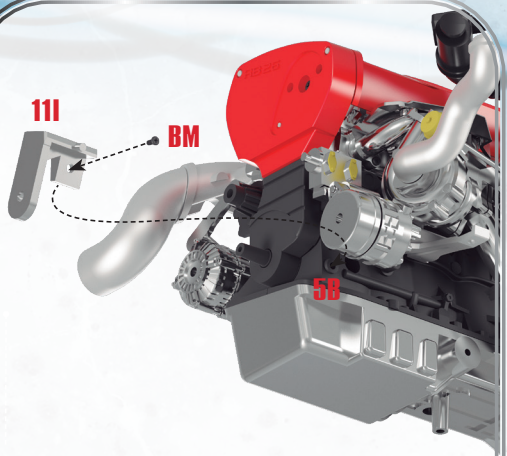
Attach the compressor assembly from the previous step to the engine block left part 5B by fitting the pivots on the bracket 11K into the holes highlighted in the picture.



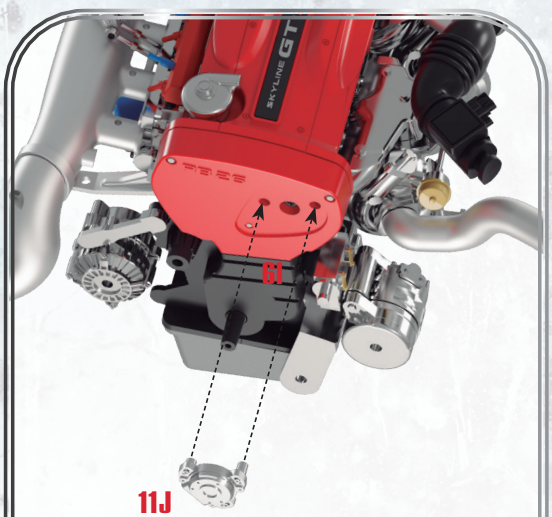
011_FS_FURIOUS_Nissan SkylineD_USA-UK-DE_v2.indd 13 20/12/23 12:33

11.11 Inserts the pivots of the steering pump 11H into the upper holes of the bracket 11K. Check the correct orientation of the steering pump in the picture.



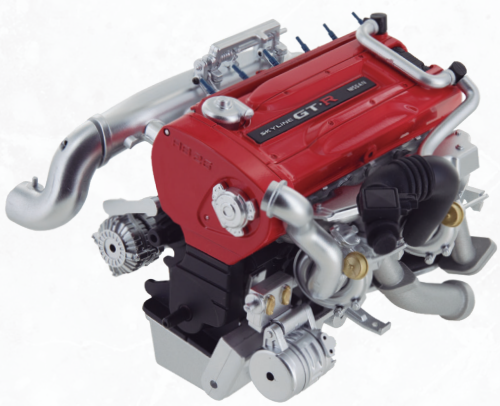


11.12 Align the shorter tab of the tension pulley support 11I with the hole in the lower part of the engine block left part 5B. Fix the parts with one BM screw.



11.13 Place the camshaft sensor 11J into the corresponding slot on the distributor cover 6I.

Final assembly



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