Bugatti Veyron

If you were missing a supercar...

Text and images by Sheepo

Ever since Technic appeared back in the 70's, one of the main pillars of the line were the Supercars. So far 5 of them have been released: 853 (1977), 8860 (1980), 8865 (1988), 8880 (1994) and 8448 (1999).

With each Supercar, LEGO® showed us new mechanisms such as the independent rear suspension of the 8860, the double traction of the 8880, and the 5 speed gearbox plus reverse of the 8448. But after the fantastic Super Street Sensation, LEGO hasn't produced any Supercar... and 10 years without a new one are too many.

Like most Technic fans, I love sets with a high piece count, complex mechanics and most of all: character, something the Supercars exhibited. Longing for the Supercars, the thought of making my own by putting all the knowledge I acquired during these past 15 years into practice became stronger.

Building something different and new, while maintaining the essence of the Supercars and adding new mechanisms (if possible) was something I was set on from the beginning. Whenever I looked on the Internet, I kept finding awesome MOCs, but most of them used the same old mechanisms (with a few exceptions) and many even used the same gear box the 8448 had (some built it studless, but essentially it is the same thing).

I also wanted to base it on a real car, but I wanted one with a central motor, double traction, and it had to be exotic and exclusive.

All these requirements left just a couple of Lamborghini and the Bugatti Veyron. This last one is way more exotic, but at the same time harder to recreate due to all the curves and the limited technical information available.

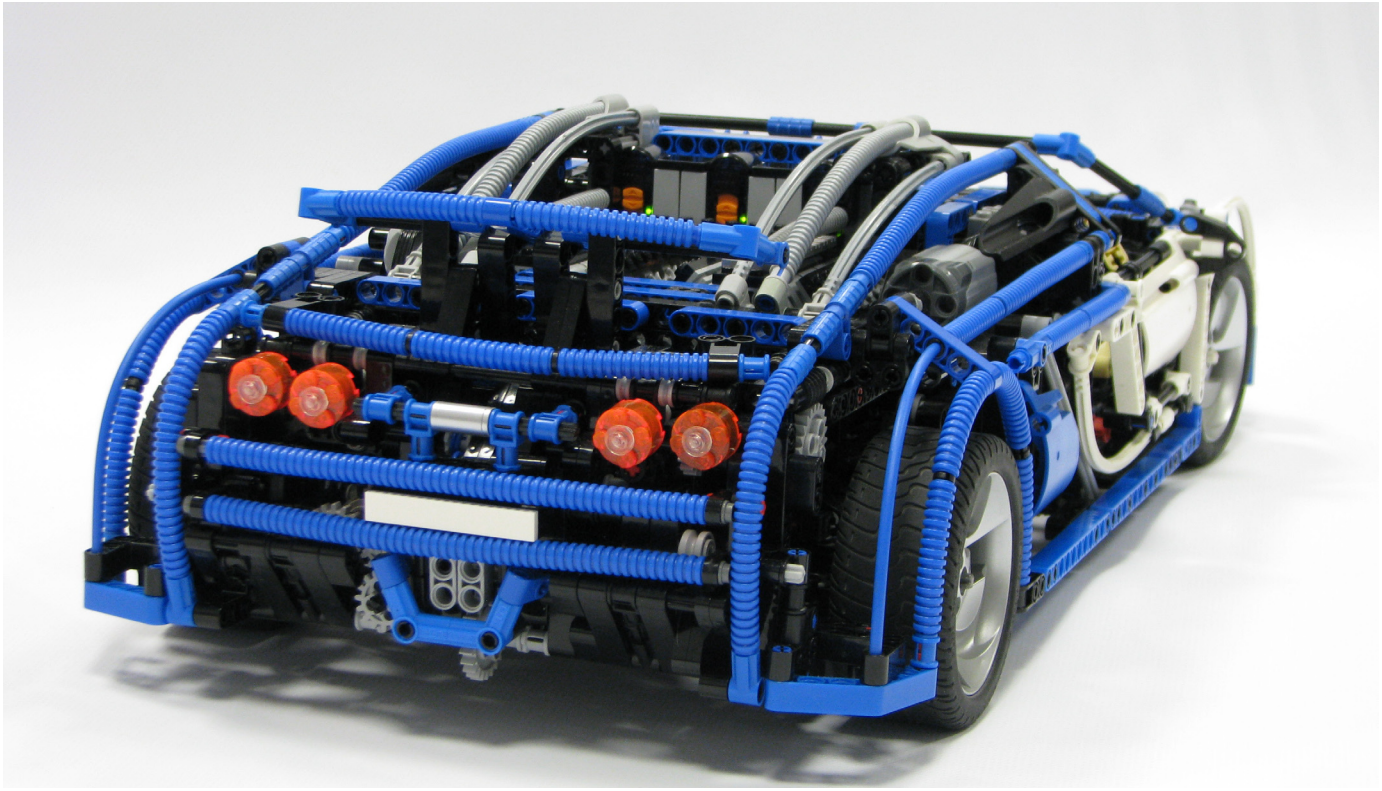
In the end I chose the Veyron for being more spectacular and exclusive, its 1001cv motor and the 407 km/h it can reach.

I decided to divide the building process into different and independent phases for a more successful result, something like on the 8448. Overall it took 6 different phases.

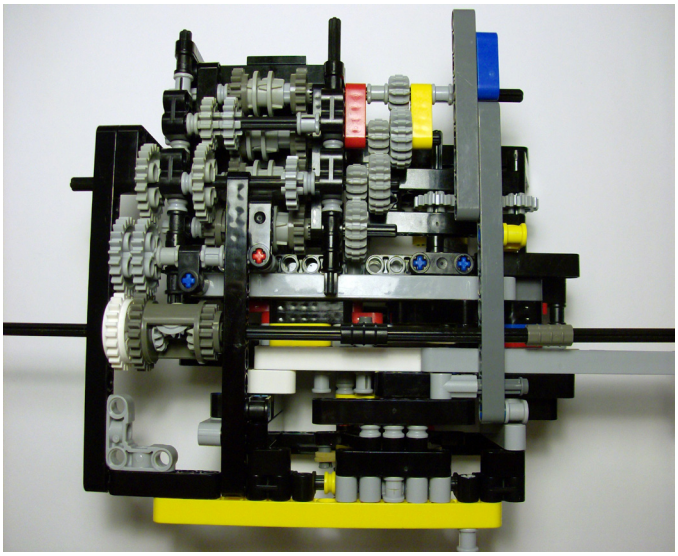
Phase 1. Gear Box

They always say that sport cars are designed from the inside out. In my case I did the very same, I built the gear box first and designed the rest to fit it properly.

I'd been thinking how to build a synchronized sequential gearbox for a long time without any success. After starting this project I understood that if I wanted to make something



innovative I needed a gearbox like that, so I made it my priority and spent all my available building time on it. After a month and a dozen prototypes I came up with a fully functional model of reasonable proportions. Even so, the gearbox is still pretty big, but personally I still think it is worth using, even if it only fits in bigger MOCs.



As I already mentioned, most builders end up using the 8448 gearbox for building MOCs because even though its functionality is a bit coarse, it is compact and reliable, making it really versatile when adding it into a MOC. For these very reasons I decided to use it as a base for building mine. Initially it was going to have only 5 gears and a reverse, like the 8448, but once the design was finished I realized that making it 4 studs bigger would allow me to add 2 extra gears (the same number as a real Veyron), and this improved the results.

The gearbox works with a system of rockers that are placed in line and operated by a selector. I think it isn't necessary to explain the mechanism in depth, but if you want to know more about it, please visit the following links:

Spanish: http://www.hispalug.com/foro/index.php?topic=9335.0
English: http://www.mocpages.com/moc.php/180863

Phase 2. Gearbox plus rear axle

Normally you would build the rear axle independently from the gearbox, but I did it this way so the result would act as a structural element as well as complementing the chassis through some reinforcements.

The suspension structure is built using two overlapped triangles with shock absorbers placed and activated in a pushrod position (similar to the system used in F1). I'm not sure if the real Veyron is built this way, but I placed them like that because it was handier and made it look more appealing.

I've been building mechanical systems that LEGO® has never used in their sets for years now. Among them, I built some transmission brakes with some uneven results. Trying to stick to my goal of adding new mechanisms to this car, after a few tries I managed to design a system of friction based brakes that was compact enough to fit within a tire (the tires from 8448). This way I was able to place it in each of the wheels to achieve a system closely similar to that of a real car.

The way it works is rather simple. It is just a soft tyre placed within the same axle the tyre is attached to and a piece connected to the suspension that contacts with it, producing a progressive brake (the more you press the piece, the more it brakes).

Apart from the friction based brakes, the system has another mechanism. If the part that contacts the tyre is activated in the opposite direction, it will hit the inner spokes and act like a handbrake, blocking the wheel.

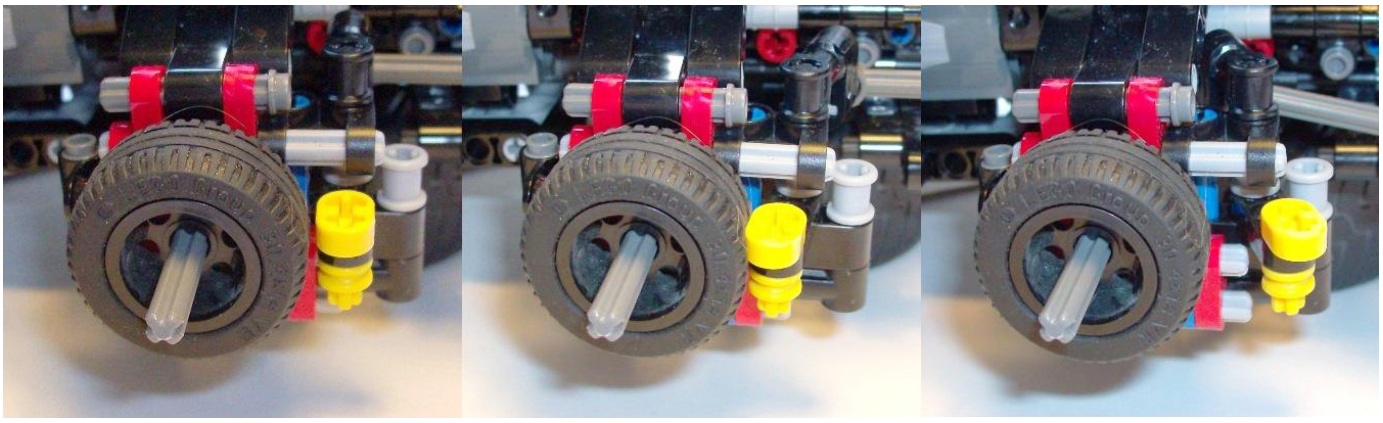
Phase 3. Front axle

I've always thought that making axles and suspensions with LEGO parts specifically made for such uses was simply too easy. And that's why I try to avoid them whenever I can, unless there is no other option. I tend to use links, and this axle was no exception.

This axle, just like the one in the real Veyron and the aforementioned rear axle, uses a system of two overlapped triangles. In this case the shock absorbers are placed vertically to save as much space as possible, because otherwise they would be popping out of the hood.

The front axle uses the same braking system as the rear one, and while the functionality is the same, it is adapted to the steering gears. Unlike the rear axle it doesn't have a handbrake, because most cars don't have it either. For preventing the handbrake from activating in the front axle at the same time as the rear axle, I placed a small mechanism between both axles that slows down the spin of the transmission.

The steering system is placed in front of the axle, built flat and low for leaving enough space to add a trunk, which sits right on top of it.



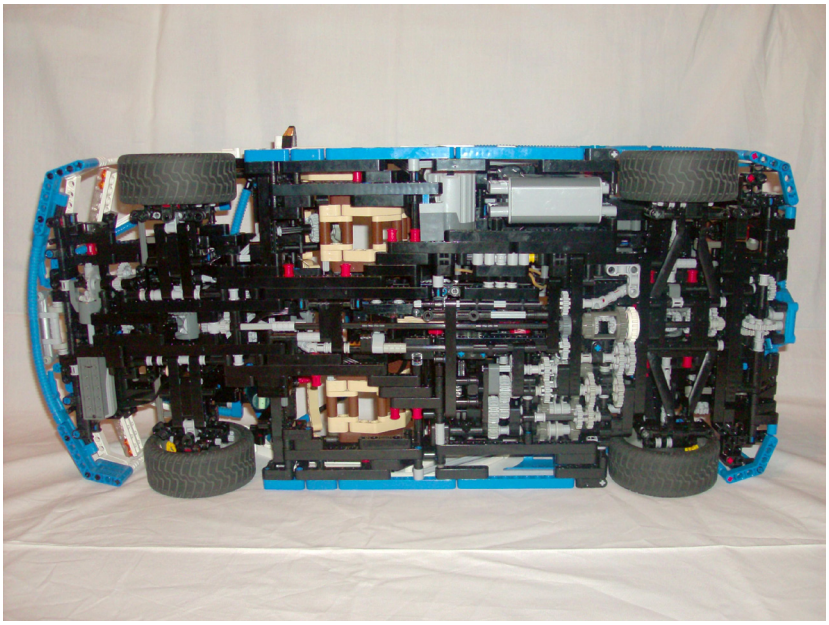
Phase 4. Chassis

In order to have all the parts well connected, it is necessary to build a chassis that is robust enough that it doesn't get deformed, but for this car it needed to be compact as well. Not only is the car really low, but the elements that needed to be placed in it were a tad big (Phase 2 for example).

For all these reasons and for keeping it as realistic as possible, I decided to go with a unibody frame, leaving aside the typical double beam chassis LEGO® likes to use.

The result is a tangle of liftarms forming a single block that is full of openings for placing all the needed elements (Phase 2 and 3). It also has enough space for the inside of the car, the trunk, and some extra openings for adding other elements necessary for the car to function (such as the transmission, different levers and the electric system).

Included in this phase, even though it technically isn't part of the chassis, is the distribution and brake synchronizing system, placed right behind the rear axle.



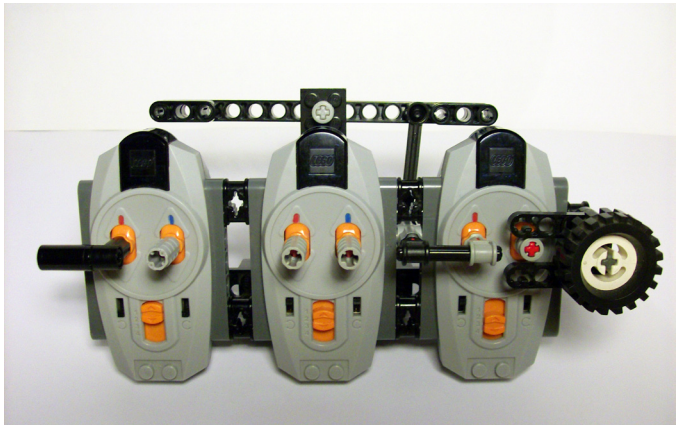
Phase 5. Motorization

When I started developing this car I wasn't planning on motorizing it. I just wanted to make a car the old way, with some lever to control different mechanisms and such, but seeing how widespread and versatile Power Functions are, I found them appropriate for this. Now all the important mechanics are motorized.

All in all, the car uses a PF Battery, three PF receivers, three PF remote controls, an RC motor, a PF XL motor, and four PF M motors.

So, in a schematic way, the functions are:

Remote Control No.1 controls:
- Red: Accelerator. RC Motor used for moving the whole car.
- Blue: Brakes. M Motor. If pushed it backwards the friction brakes are activated, but only as long as it is pushed. As soon as it is released the brakes will deactivate. On the other hand, if pushed forward the hand brake is activated, which will stay activated even after releasing the lever. To deactivate it you just need to push it back and release it.



The use for Remote Controller No.2 will be explained in Phase 6.

Remote Controller No.3 controls:
- Red: Sequential Gear Box. XL Motor. This button is connected to a double lever in front of the set of controllers for changing gears more comfortably, just like in F1 cars. If you press it to the right it increases gears, and it you press it to the left it decreases. The gear shift lever placed inside the car will move synchronized to the gear box whenever you change gears with the remote controller.
- Blue: Steering. M Motor. Apart from moving the wheels, it will move the steering wheel as well.

Phase 6. Bodywork

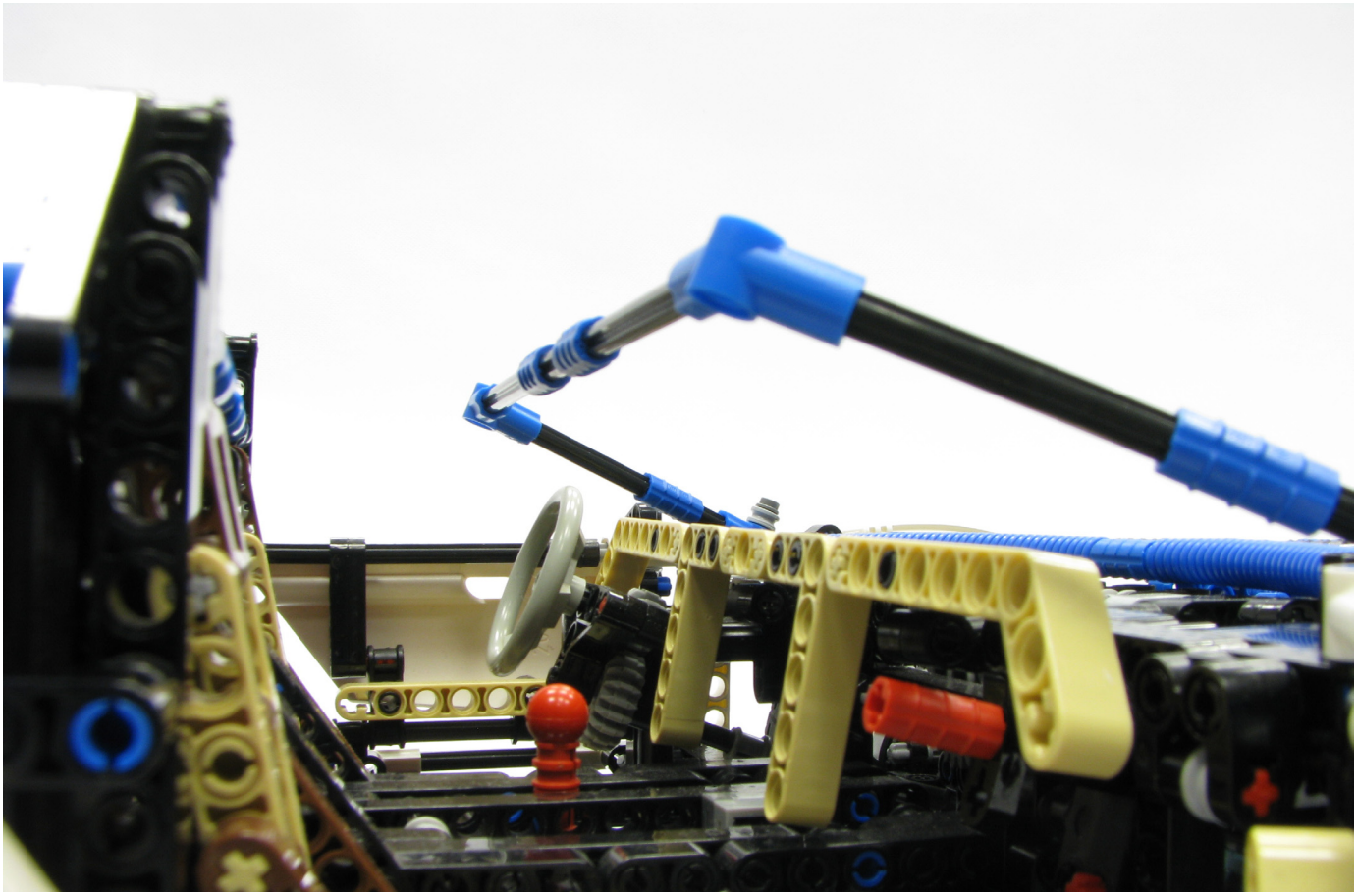
When I started developing the car, I calculated the approximate scale using the diameter of the wheels (81.6mm) as a base. According to that, the car should have been roughly around 65 studs long. But that was a tad too small, so I increased the size to 71. Due to this, the wheels are slightly smaller than they should be, but these extra 6 studs gave me a lot of space for adding more functions and mechanisms.

In order to be able to build the bodywork without having any problems with the chassis, I was cautious and left a 2 stud margin all around the car.

The final shape of the car maintains the proportions of the length, width, height, wheelbase, hood length and probably some other proportions as well. With this, the final proportion would be around 1:8, and the build comes to 71x31x18.5 studs.

The typical paint work of a Veyron features two different colours. Blue for the base, and an additional colour for the hood, fins and doors, so I did the same and went with the colours I liked most: blue and white.

The bodywork features elements such as opening doors. They open normally, but in order to prevent them from doing so whenever the car bumps into something, it has a lock-like system at the top that keeps them closed. To open them you just have to pull lightly.



The front hood opens, giving access to a small trunk. To open it you can of course just pull the hood up, but inside the car, in front of the co-pilot seat there is a lever that will open the hood as well.

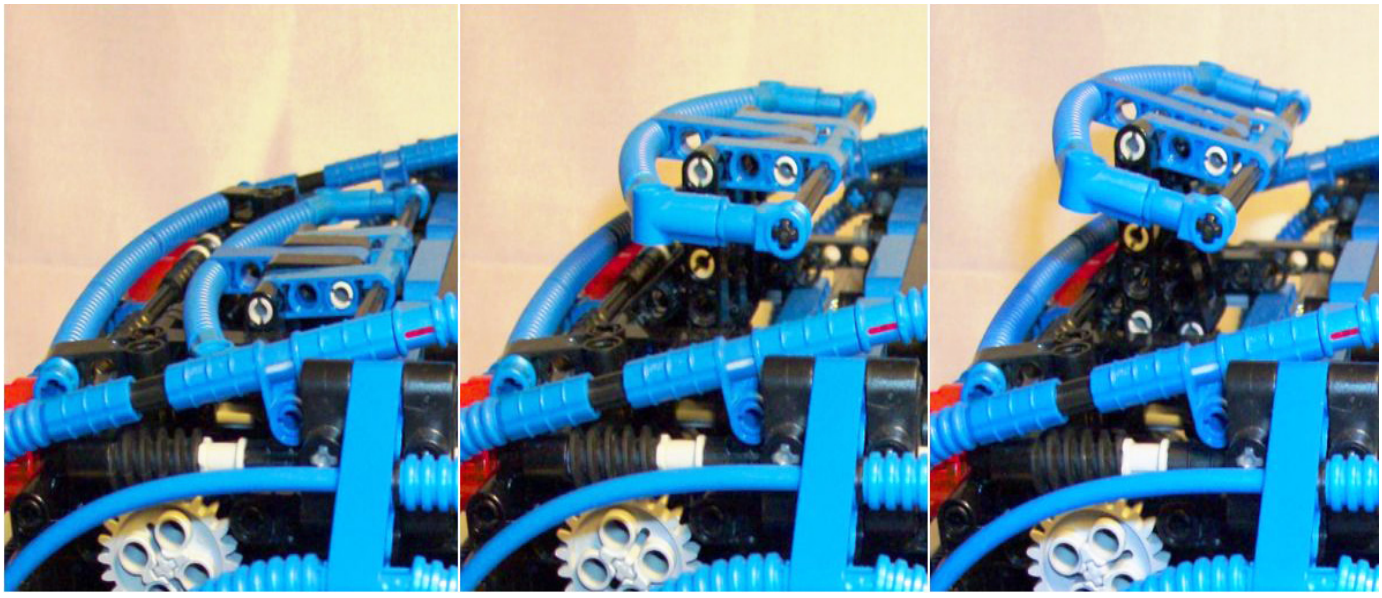
And finally, here goes the use for the previously mentioned Remote Controller 2.

The blue button is linked to the foldable top. In the real Veyron, you can attach and remove the top manually, but it has to be stored separate of the car. For my car I managed to fit the top so it can fold and hide within the car itself. In order to have the top come off properly, part of the roof and air intakes rise up to leave enough space. Once the top is out, they go back to their original position.

The red button is linked to one of the most characteristic features of the Veyron: its foldable and angle adjustable spoiler. Since I only had one motor for both actions, the spoiler is designed to go up vertically. Once it is as high as it gets, it allows you to tilt it and give it the angle you want with the same continuous movement.

Apart from that, the spoiler has one of my favourite mechanisms. If it is unfolded while you are using the friction brakes, the spoiler suddenly tilts forward, acting as a flap (just like the brakes of an airplane) helping the braking of the car, just like the real Veyron.

And now as a personal opinion about the final look of the car, I'm particularly proud of the front grill and rear bumper. I know



it might sound ridiculous, but achieving the proper angle took me many hours of work.

Well, all I have left to say is that I hope you enjoyed reading this article and seeing this car as much as I did building it. I hope I can surprise you again with new MOCs in the future.

For more information about this MOC and others check:

http://www.mocpages.com/home.php/32499
http://www.brickshelf.com/cgi-bin/gallery.cgi?m=Sheepo#