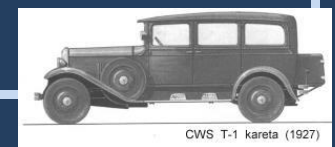
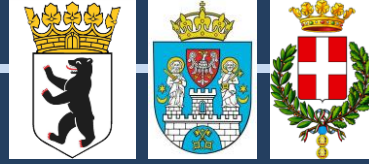


# AGENDA Transnationals

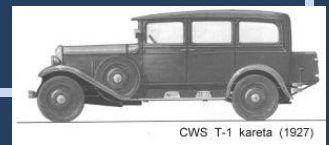
21<sup>th</sup> – 23<sup>th</sup> September 2015

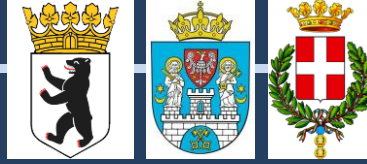
Meeting in Posen





current condition – the car is in the school workshop



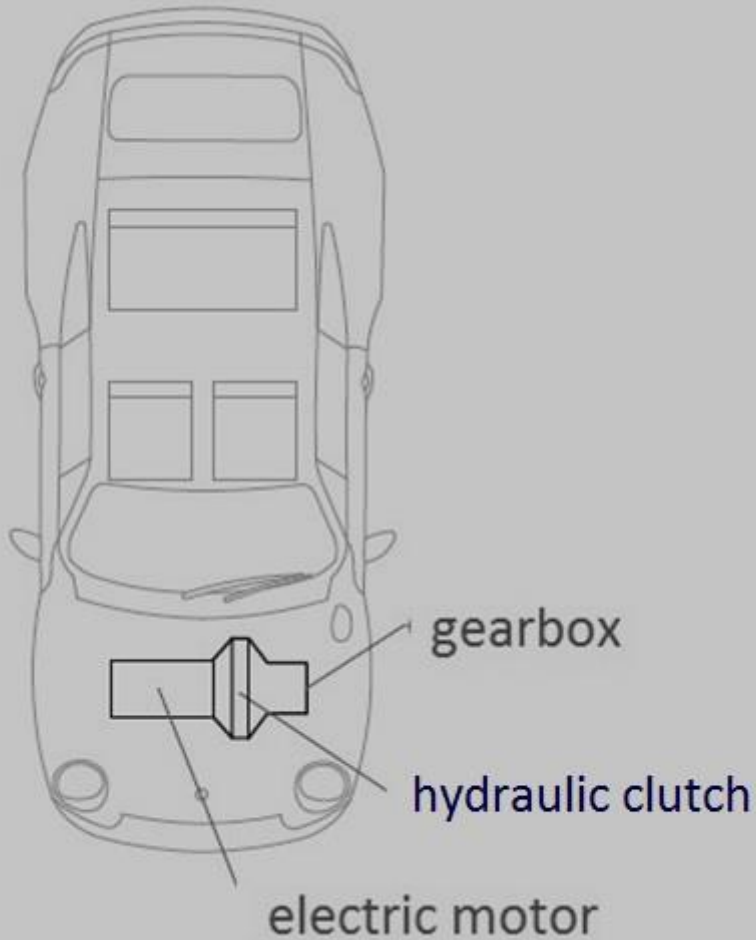


drive unit

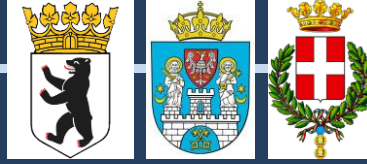
Gearbox - Toyota Starlet original

Hydraulic clutch - Toyota Starlet original

Electric motor - BrushLess Direct-Current (BLDC)



Pic.1. Electric motor assembled to the manual 5 - speed gearbox using dry clutch, which is hydraulic controlled.



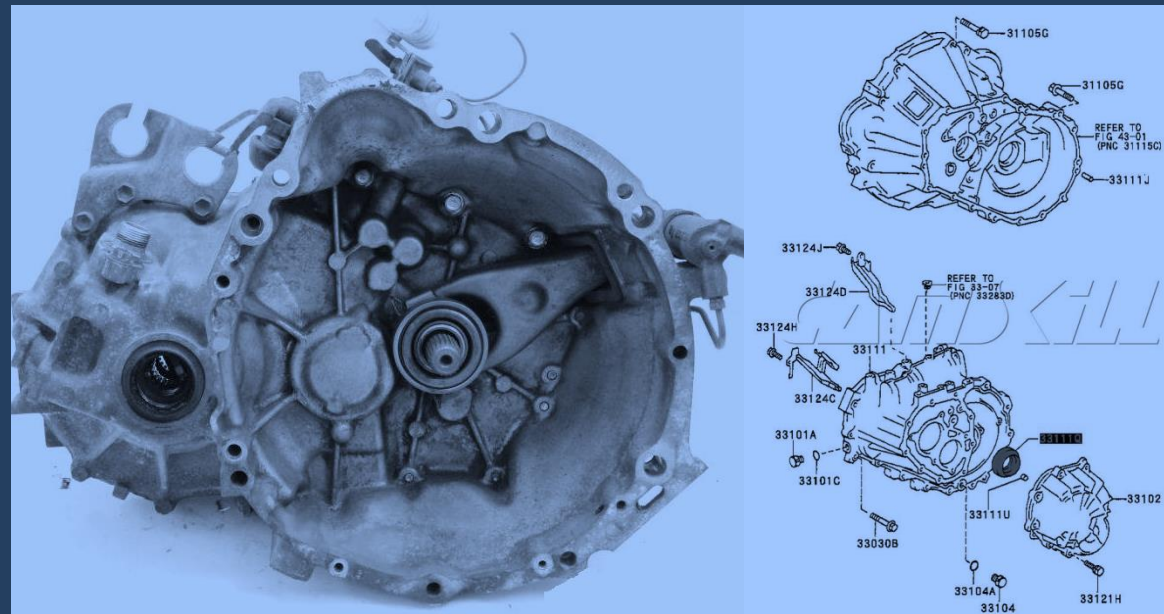
# The technical specification of drive unit:

## 1. Gearbox:

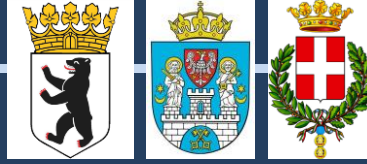
- manual, type C40,
- 5-Speed manual transmission.

Table 1. Gear ratios for this transmission

1st	2nd	3rd	4th	5th	Reverse
3.545	1.904	1.310	0.969	0.815	3.9

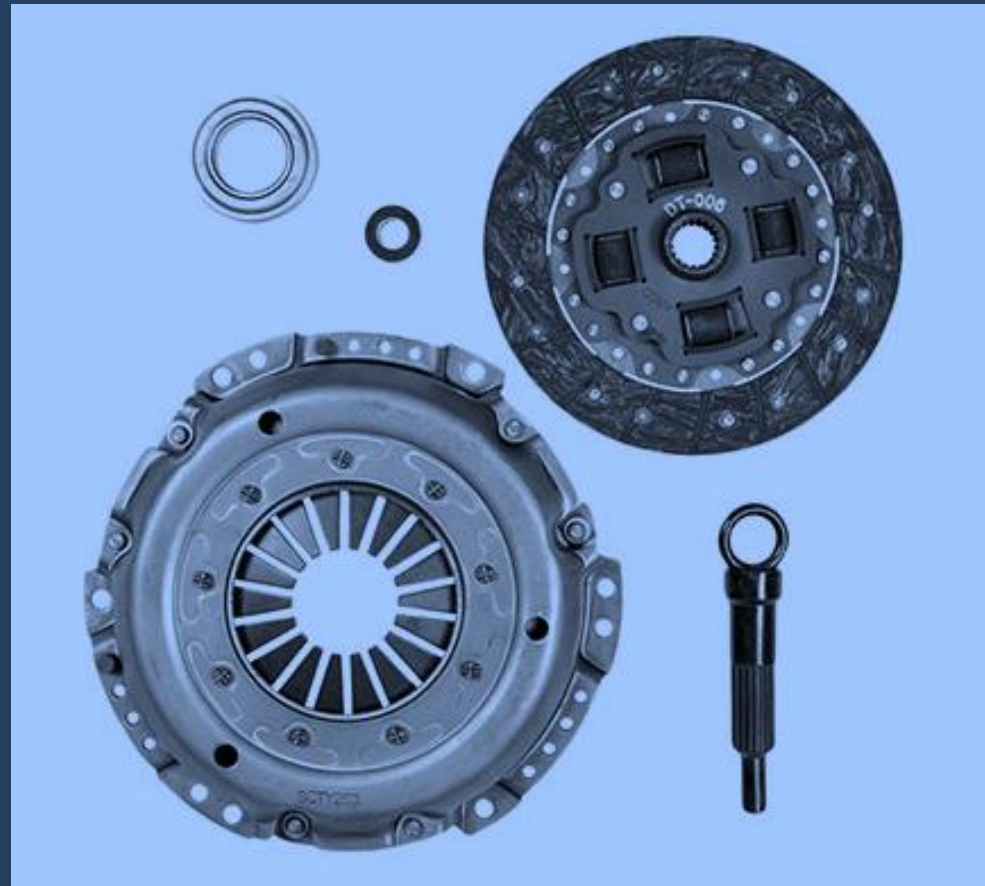


Pic.2. Toyota Starlet gearbox.

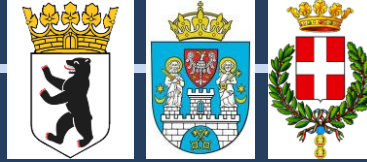


## 2. Hydraulic clutch :

- type 4E-FE,
- hydraulic controlled.



Pic.3. Toyota Starlet hydraulic clutch.



### 3. Electric motor :

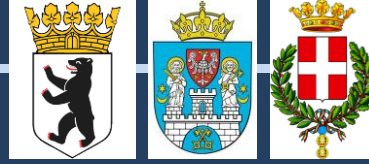
- manufacturer EVC-MOTORS.EU (Poland),
- brushless DC Motor:

Table 2. Electric motor specification

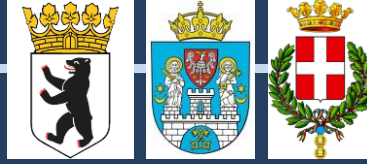
Features	Data sheet
Nominal power-	13kW
Peak power	26kW
Max torque	96Nm
Voltage	min- 60V max-90V
Motor speed	1200-6000 rpm
Motor cooling	water
Controller	300A



Pic.4. BLDC electric motor.

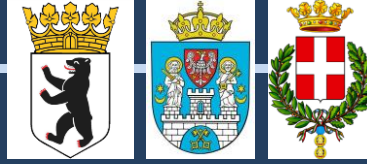


Pic.5. Assembly location of the electric motor, hydraulic clutch and gearbox.



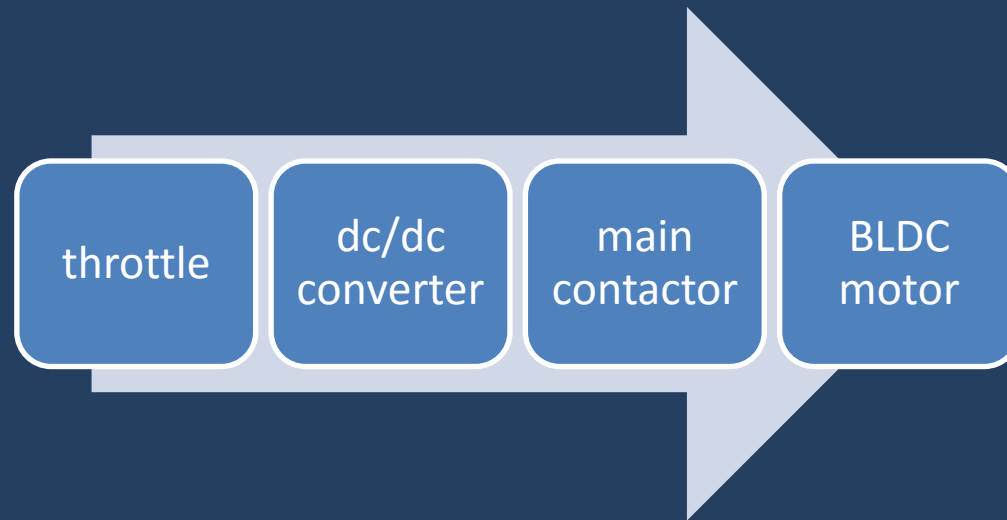
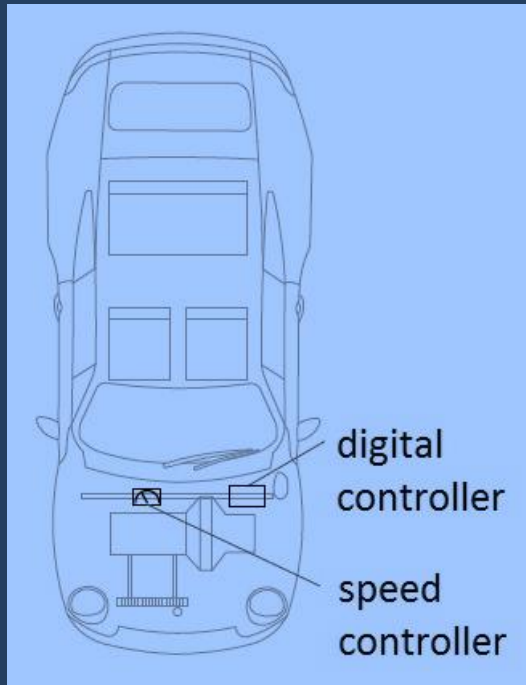
Pic.6. Electric motor, clutch and gearbox ready to assembly.





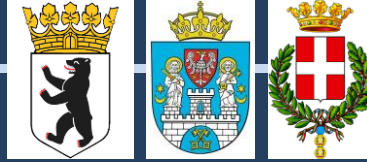
## 4. Digital controller

- throttle,
- dc/dc converter,
- main contactor.

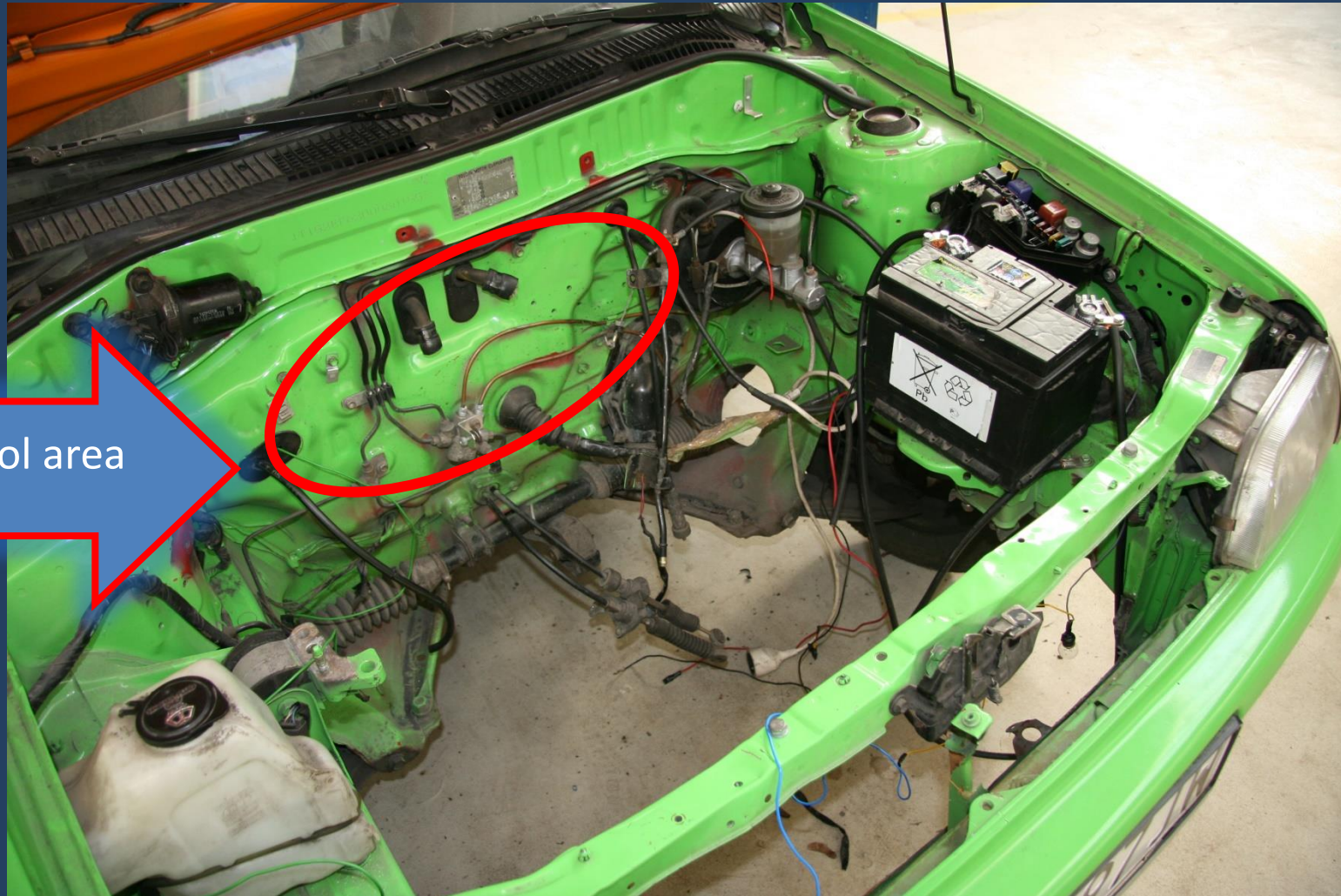
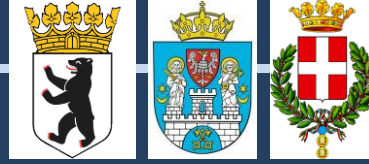


Pic.7. The control area.

Electric motor control is done using a BLDC driver 96V/560A. Adjust the engine speed using the speed adjuster which is mechanically controlled accelerator.

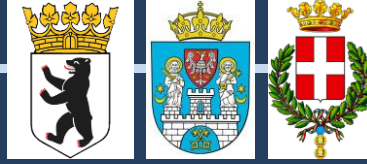


Pic.8. BLDC Motor 13/26 kW 72V + controller.

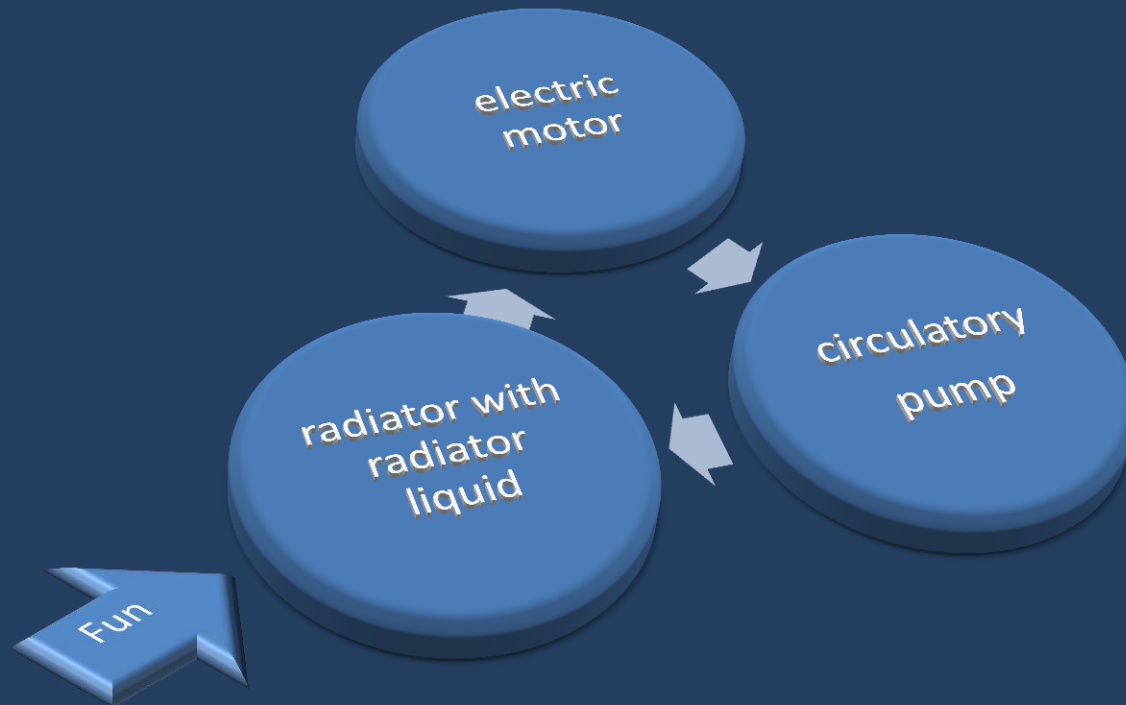
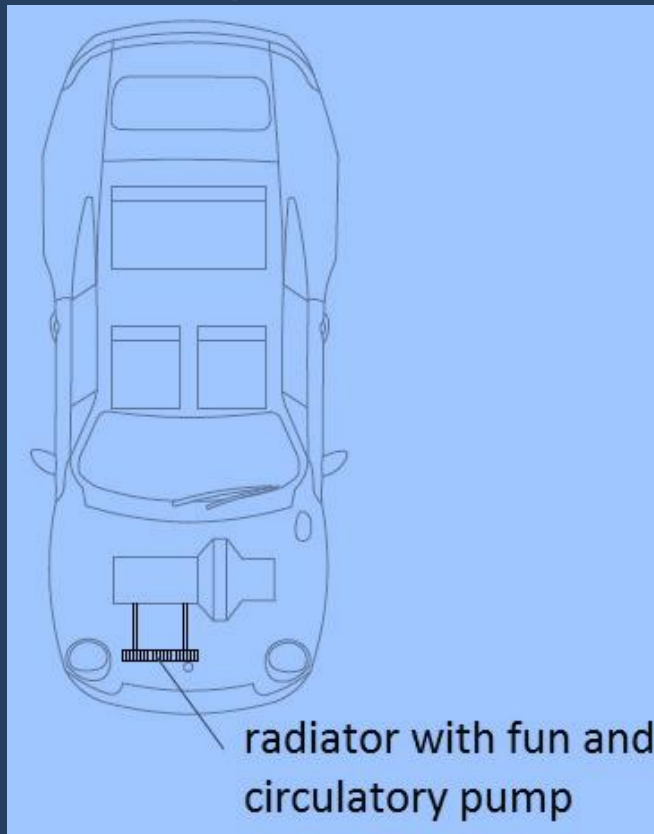


The control area

Pic.9. Assembly location of the throttle, dc/dc converter and main contactor.

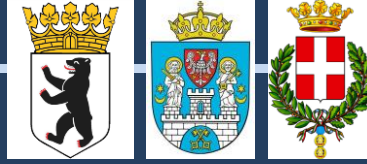


## 5. Cooling system.

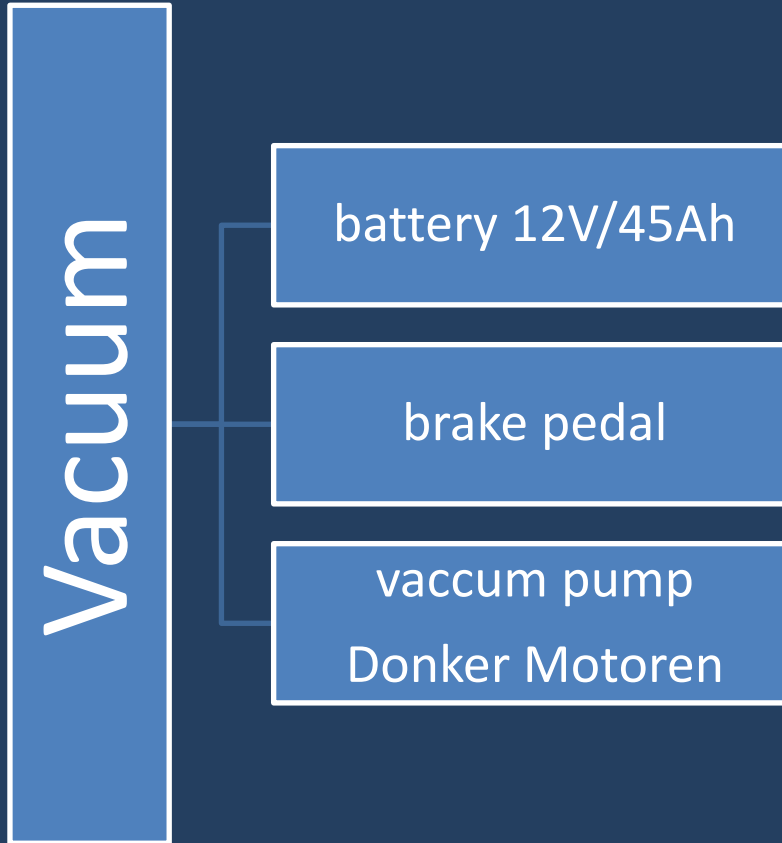
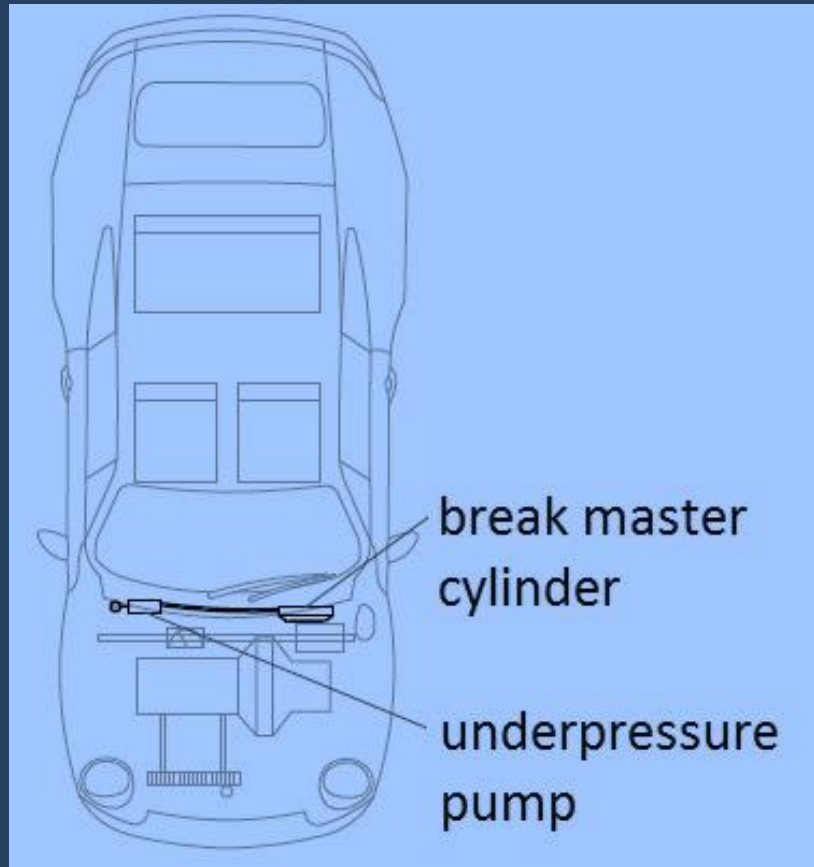


Pic.10. Cooling system.

The electric motor is cooled by radiator liquid combined with radiator mounted in front of the vehicle. Forced fluid circulation is using the circulation pump. Pick up heat from the radiator through the movement of the vehicle.

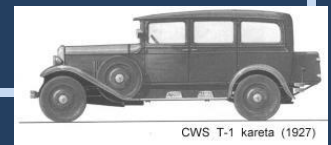


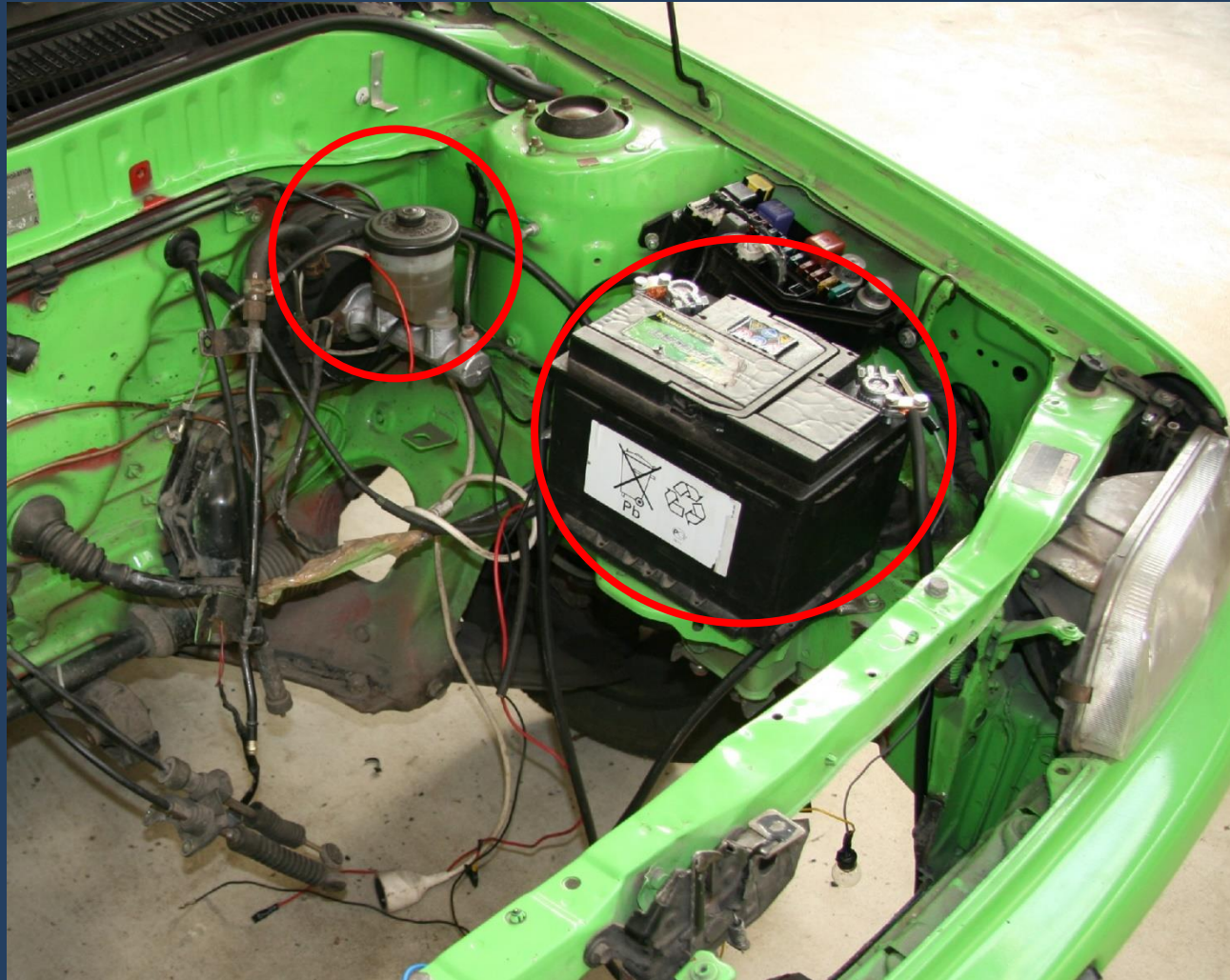
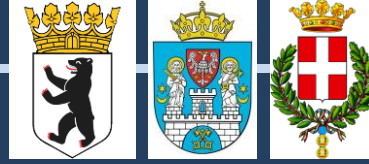
## 6. Break system.



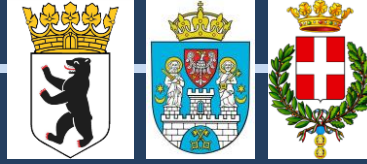
Pic.11. Break system.

The vacuum into this system ensures vacuum pump DONKER MOTOREN 42x40 GR Type, powered by 12 V DC with an additional (car) battery 12V/45Ah





Pic.12. Break system; the vacuum pump and battery (brake pedal inside the cabin).



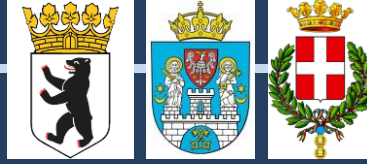
## 6. Battery.

- lithium-ferric (LiFe) battery 2 x 30 voltaic cell x 3,2 V x 90 Ah.
- Producer – Sinopoly, Type SP-LFP180Ah

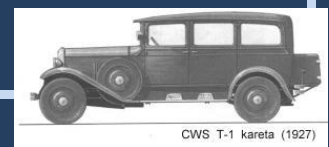


Pic.13. Battery area assembly.

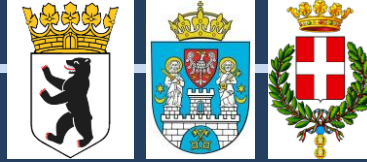
Traction battery kit will be assembled under the rear seats.



Pic.14. Battery area assembly under the rear seats.

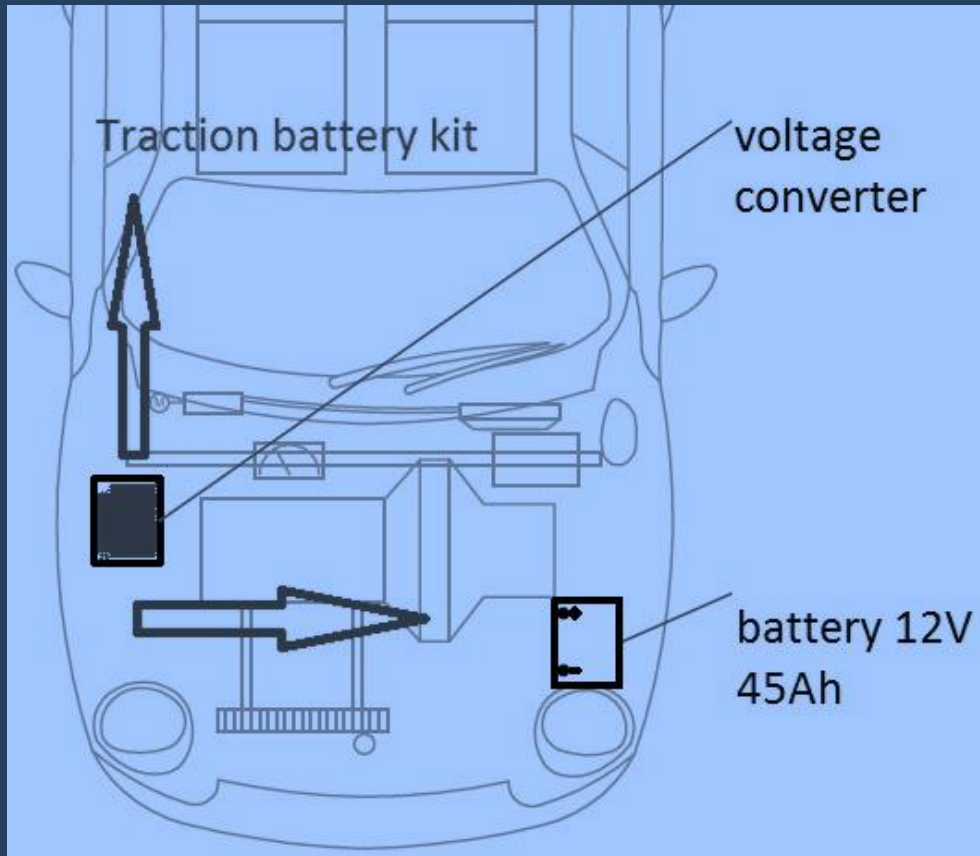






## 7. Battery charging.

- stationary battery charging only



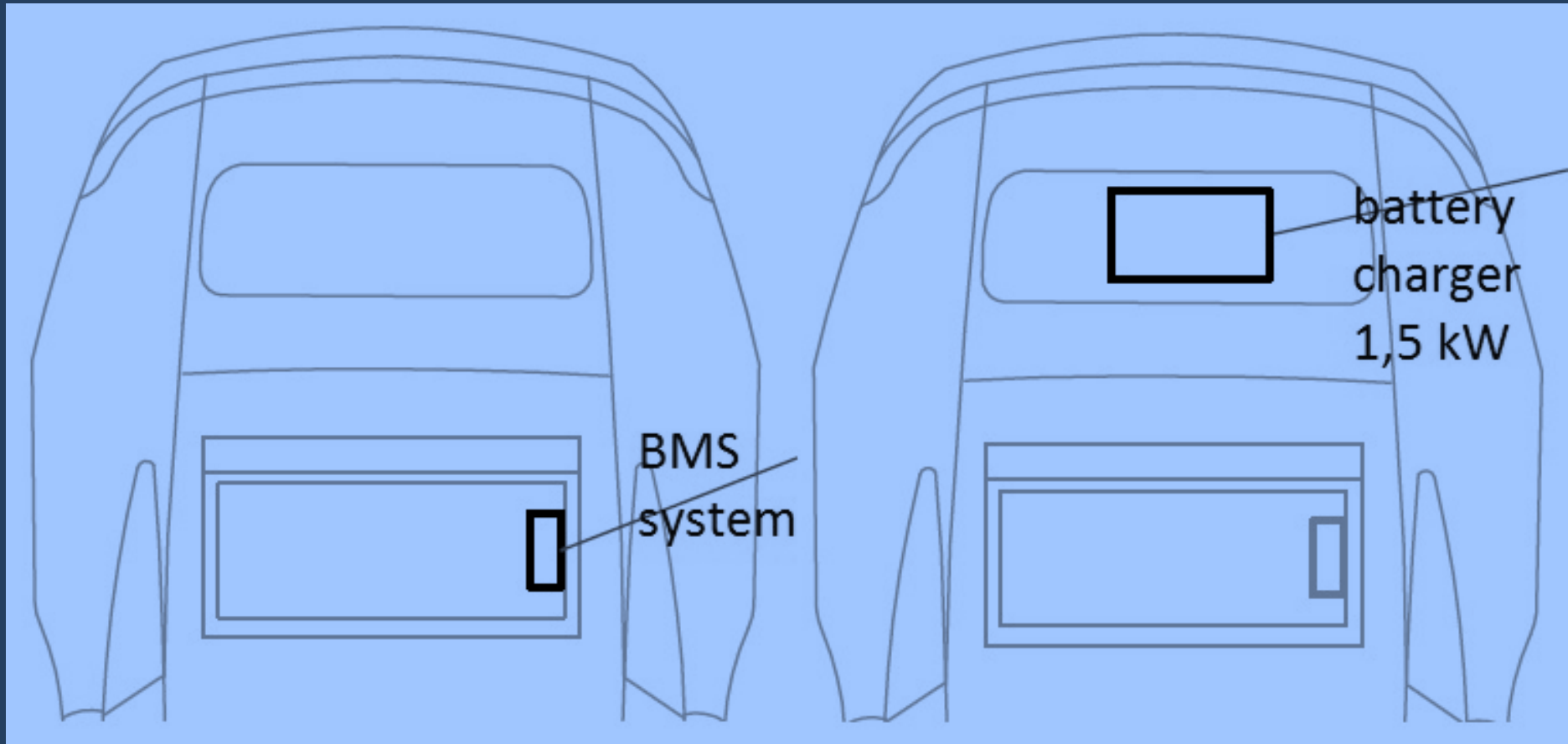
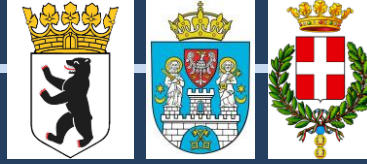
Voltage converter  
DC/DC 84V/13,5V

lithium-ferric  
(LiFe) battery

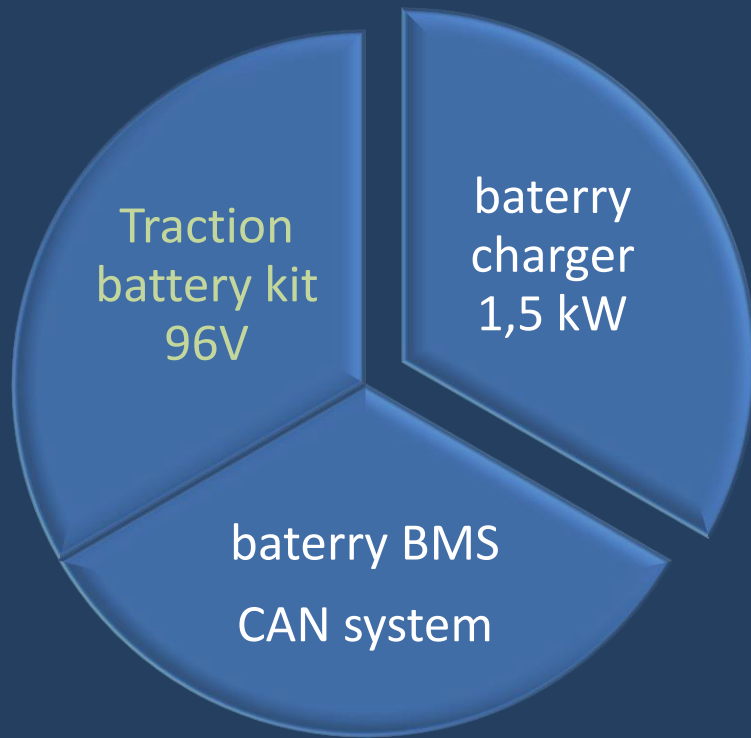
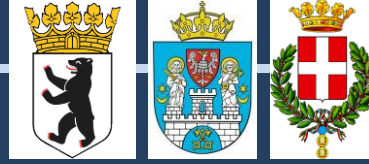
battery 12V

Pic.13. Battery charging system.

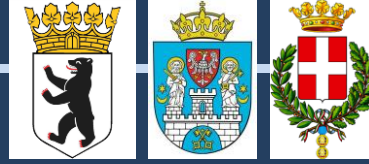
battery 12 V will be assigned to a car in exterior and interior lighting (LED light bulbs have been applied), the charging only in the garage.



Pic.14. Assembly area of battery charging control system.



Pic.15. Battery management system (BMS) and charger socket.



Ladies and gentleman  
thank you for your attention

