Does the *switched power supply* still meet today's needs?

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Beijer defines *Switched Power*

SWITCHED POWER SUPPLY

Is the switched power supply, which we have used for decades, still present in the modern car and suitable for after-market systems? Or do we need to adjust our views on this?

'Ignition', 'switched power supply, 'switched +, 'ignition-on', '15+', 'ignition +': these are all names for a signal in the car that was switched by a conventional ignition switch (key switch) in the last hundred years. The voltage on the relevant wire was "high" when the ignition was turned on and remained "high" during starting and engine running. Deliberately we are speaking in the past tense here for the "switched power supply" nowadays is not what it has been. If we can even still speak of a 'switched power supply' at all!

In this article we'll look back on the function of the switched power supply so far, and indicate what has changed in recent years. Possible alternatives are reviewed and we will finally explain our views on how we are going to deal with it and how we have shaped it with our CAN solutions.

LESS ACCESSIBLE

Many after-market systems such as fleet management, alarm, cruise control systems, GPS, taxi meters and accident analysis devices that are installed in cars are to be connected to a permanent power supply and a switched power supply. The permanent power supply is needed to 'feed' the system with the engine running or with ignition-on, to save settings, or for example to keep a clock running when the ignition is off. The switched power supply determines when the after-market system should be active or when, for example, in case of a fleet management system, a trip starts or ends. So far, finding a switched power supply was never really a problem. In many cases, the ignition switch was accessible and with that also the 'switched power supply' signal wire. However, with the introduction of start buttons, key cards, more security and, of course, CAN-bus technology, this has become increasingly difficult. Bearing in mind that there are numerous makes and models on the market, each with their own specifications and protocols and the problem noted not identical is on every make and model. The ignition switch has become less accessible in many cases with often only thin wires that carry data. Data that cannot simply be connected to an after-market system. Not as a signal and certainly not as a charged supply! So far finding a switched power supply in a car's fuse box was not so hard. However, nowadays all crucial components in the car, although fused, are equipped with a supply that is already 'high' during *CAN activity*. CAN activity is defined as the state where there is data available on the CAN network of the car. And CAN activity can already occur when the vehicle is unlocked or when the door is opened. The control signal for a component is then simply transmitted over the CAN network.

Components that still require a real switched power supply, such as an ABS unit, are usually located in inaccessible places under the car or in the engine compartment. The source is then often a +15 relay in the engine compartment, integrated in a poorly accessible relay block.

ALTERNATIVES

Manufacturers of after-market systems may consider an **engine-running signal** as an alternative to the switched power supply. A signal is "high" when the engine is running and "low" if the engine is not running. This could be a battery or an oil pressure indicator light in the car. To avoid problems when connecting to these lights, you'll find solutions on the market that look at the voltage level of the battery and determine on that basis whether the engine is running. However, these solutions are not infallible because modern cars increasingly determine the time of recharge itself. The battery voltage can then for some time be at a low level, causing the system to believe that the engine is not running.

The conventional ignition switch in cars is gradually disappearing.

Apart from the problems that can arise when tapping the engine-running signal, the signal itself seems at first sight a good alternative to a switched power supply. But what if the car is equipped with a start-stop system? Each time the start-stop system is activated at the traffic light, the engine is turned off and the after-market system switches off. And when the engine starts again at the green light, the after-market system switches back on. An undesirable situation, at least for fleet management systems because the trip reports show too many rides. This contrasts to a switched power supply that continues to be "high" in the event of an active start-stop system (the wipers and fan for example also continue working). In addition, situations where the ignition is on but the engine is not running, will not be registered.

Generally, finding a conventional analog switched power supply or a suitable alternative such as an engine-running signal in modern cars, is not an easy task! Not to mention an electric car where the difference between contact-on and driving is much less clear than in a car with a combustion engine. The electric engine in an electric car is not running when the car is at a standstill. There is therefore no question of starting and engine idling.

Then just pick up a **switched power supply of the CAN network** you would think, as happens with so many other signals that are difficult or no longer present in the car. You 'read' the 'switched power supply signal' of the CAN bus and offer this, after a thorough analysis conventionally with a CAN interface or a data set. Problem solved! In practice, however, this appears to be more difficult than expected because the 'switched power supply signal' is not always as such on the CAN network. Each component in the car is activated if there is a demand and goes to "sleep" when the demand stops. So often there is no universal 'switched power supply signal' to be found on the CAN network that could be useful to, for example, define a trip for a fleet management system. In those cases where we do find a switched power supply on the CAN network, we also offer customized solutions. The engine-running signal actually is a signal that we can filter from the CAN network for all makes and models and can be offered analog to an after-market system with a CAN interface. But the aforementioned disadvantages of the engine-running signal persist, even if it is obtained from the CAN network.

CAN-ACTIVITY

One way or the other, the solution must be sought in the CAN network. But is simply switching on CAN activity a good alternative or does also this has its limitations? Let us assume that we use CAN activity to activate a system or starting a trip. A trip will then start when the CAN network 'wakes up' and ends when the CAN network 'goes to sleep' and the data flow stops. Sounds good at first glance you might say, but there are a few aspects that you should take into account. The moment when the CAN network is in sleep can be a lot later than the time at which the car ride actually ends. It happens that CAN networks in cars remain active for 15 minutes after the car is locked. For one after-market system this might be an excellent alternative to a switched power supply, for the other not a suitable solution. A fleet manager of a parcel delivery company for example, wants to know how many short trips his cars are having on one day, and does not want to see only one trip per day. The latter could happen if the system is switched on CAN activity while the network remains active for fifteen minutes after each ride.

Another aspect of CAN activity as a determining factor is the fact that car manufacturers sometimes choose to let the car do some sort of self-check at a time when the car is "asleep", for example in the middle of the night. The CAN network then wakes-up, which in the case of a fleet management system could register a trip without movement. The CAN network can also wake up at night for less legitimate reasons.

For example during a burglary, what definitely an important trigger is for an after-market alarm system. The actual recording of the above two situations where CAN activity occurs, is for both the trip registration as well as the alarm system not a problem, they should just deal with them differently!

DIFFERENT VIEW

It therefore requires a different view of manufacturers of after-market systems now that a switched power supply is not always available as we were used to. To generate a switched power supply purely on CAN activity is not universally applicable, as concluded earlier. However, a universally applicable solution must be sought on the CAN network of the car. Because only there useful information about the car can be found. It is up to the manufacturers of after-market systems to define in their applications when the value of a signal is of interest and when not. For example, a situation in which CAN activity occurs for a short time without any speed being recorded, no doors were opened, and no engine running would for a fleet management system be considered as irrelevant data and not be shown to the user of such application (without actually deleting the recorded data).

BEIJER DEFINITION: SWITCHED POWER

Beijer engineers for their part have, after consulting various parties in the market, defined a status **based on relevant data** present on the CAN network of the modern car. A so called 'Switched Power' that can be offered as an alternative to a switched power supply, universally. Conventionally using a BCI CAN interface, or directly through RS232 or CAN-to-CAN. In this way, the most optimal alternative to a switched power supply is created without the loss of data. And where necessary a client-specific definition combined with Beijer data can be composed.

The question in the title whether a switched power supply still meet today's needs can simply be answered with NO. The introduction of data networks in cars has finally put an end to old values and protocols that were considered granted for over a century. All the more reason to follow 21st century car developments closely. And that is exactly what we do at Beijer Automotive!

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