Function
The task of the on-board electrical system is to supply power to all the electrical consumers and components of the vehicle according to requirement and situation.

To maintain startability, the on-board electrical system is divided into two circuits:
- starter battery circuit and
- supply battery circuit

The vehicle power supply control unit (N82/1) adapts the two battery circuits to the different factors and circumstances. They can be coupled if this should be necessary in order to ensure operability of the vehicle.

Central consumer shutoff
To prevent the battery from discharging under all driving conditions, the state of charge of the on-board electrical system is evaluated continuously.

The vehicle power supply control unit sends a signal to the consumers assigned to the supply battery circuit centrally in a defined sequence and according to parameterized time and voltage values. With this signal, the individual control units are requested to shut down consumers or to reduce the power requirement of these consumers.

Quiescent current shutoff
To enable a longer service life if the vehicle remains idle (engine OFF), the quiescent current cutout relay (N82/1k1) minimizes the quiescent current. For this purpose, the consumers are disconnected from the power supply after a programmed time.
The charge converter is not active while the quiescent current cutout relay is closed.

Emergency-P function
Here the voltage is switched to the emergency path by the EIS [EZS] control unit. A spring accumulator is actuated in the intelligent servo module for DIRECT SELECT (A80) and the transmission is shifted to the "Park" position. The electrical and mechanical system in the servo module for DIRECT SELECT are synchronized automatically after reproducing the functionality.

Power supply/distribution

Front prefuse box
The front prefuse box together with the vehicle power supply control unit and the main power lines forms the basic structure of the on-board electrical system.

On-board electrical network line pyrofuse (N82/1f1)
The pyrofuse in the vehicle power supply control unit protects the on-board electrical network line to the front prefuse box. The pyrofuse is triggered by the following parameters:
- Temperature of on-board electrical network line higher than approx. 140 °C (up to 31.7.05)
- Crash signal from restraint systems control unit (N2/7)

The vehicle power supply control unit checks whether the pyrofuse has been triggered. A triggered pyrofuse is stored in the fault memory of the vehicle power supply control unit. The pyrofuse is only monitored if the vehicle power supply control unit is not in the bus idle state.

Starter battery circuit
The primary starter (M1) and starter battery (G1/4) are assigned to the starter battery circuit. Other consumers can only draw power under certain conditions.
After the engine is started, the starter battery is charged from the supply battery circuit for at least 1 h via the charge converter in the vehicle power supply control unit.

Supply battery circuit
All other electrical consumers are assigned to the supply battery circuit. Power is supplied from the on-board electrical system battery (G1) and alternator (G2).

On-board electrical system emergency running mode
If the on-board electrical system battery is discharged, the battery coupling relay (F32k1) installed in the front prefuse box (F32) is closed when the vehicle is started. As a result, consumers required for starting the vehicle are also supplied with power from the starter battery circuit.
When the engine is running (circuit 61 ON), all non-essential consumers are then switched off.
As soon as the alternator makes adequate power available, both batteries are charged via the alternator.

If there are faults in the supply battery circuit (e.g. alternator fault, open circuit along the on-board electrical network line), the starter battery circuit is decoupled. Only the EIS [EZS] control unit (N73) is still able to draw power from the starter battery via the vehicle power supply control unit. This is important for the emergency-P function as it permits the vehicle to be secured via the transmission when the transmitter key (A8/1) is removed (emergency-P function).

Like the vehicle power supply control unit, the front prefuse box also has a prefuse zone to which the powerful consumers are connected:

- Front SAM control unit with fuse and relay module (N10/1)
- Rear SAM control unit with fuse and relay module (N10/2)
- Right instrument panel fuse box (F1/6)
- Left instrument panel fuse box (F1/7)
- Special vehicle multifunction control unit (SVMCU [MSS]) (N26/9) (model 221)

Display in instrument cluster (A1)
The vehicle power supply control unit sends status and fault signals via the chassis CAN to the central gateway control unit (N93) and from there via the central CAN to the instrument cluster.
The red battery symbol is displayed if:
- the engine is "running" and there is no signal from the alternator "circuit 61"
- there is a fault in the vehicle power supply control unit, e.g.
  - charge converter faulty
  - on-board electrical network line pyrofuse triggered

	2-battery on-board electrical system, block diagram		GF54.10-P-0001-02SX
	Normal operation of 2-battery on-board electrical system, function		GF54.10-P-1101SX
	Emergency mode of 2-battery on-board electrical system, function		GF54.10-P-1103SX