R230 Dual Battery
On-board Electrical System
Dual Battery System Tasks

• Extends vehicle’s driving time for safety
  Manage electrical power consumption by temporarily disabling convenience consumers if vehicle power falls below a certain voltage.

• Guarantees vehicle will start with a dead systems battery
  To provide a back-up power supply to the systems circuit if the system battery cannot provide sufficient power to the vehicle.
Program Highlights

• Dual battery on-board electrical system components
  - starter battery
  - systems battery
  - vehicle power supply control module
  - battery cut-off relay
  - isolation relay

• Power distribution
  - prefuse function & locations

• Dual battery functional description
  - normal modes
  - failure modes
Starter Battery (G1/4)

- Starter battery: 12V 35Ah 315A (DIN) 520A (EN)
- Construction: standard automotive lead acid (maintenance required)
- Function: i) supplies electrical power for starter motor armature only
  ii) provides back up power to the system circuit

Note: when jump starting, ONLY USE THIS BATTERY!
Starter Battery Failure Display

- Multi-function display red (category 1 malfunction)
- DTC’s will be set in the vehicle power supply control module (N82/1)
- Cannot be erased by customer (can only be erased using SDS / DAS)
Systems Battery (G1)

Note: when jump starting, NEVER USE THIS BATTERY!

- Systems battery: 12V 70Ah 450A (DIN) 798A (EN)
- Construction: Valve Regulated Lead Acid (VRLA) type, using Absorbent Glass Mat (AGM) design
- Function: supplies electrical power for entire vehicle (incl. the starter solenoid) with the exception of the starter motor armature

Location: in trunk - right side
AGM / VRLA Battery Construction

The major differences in construction between a AGM battery and standard lead acid automotive battery are:

• Completely sealed case construction
• No liquid electrolyte in solution
• Absorbent glass mat (V) holds electrolyte in contact with positive and negative plates
• Vent valve is normally sealed no gases can escape during normal charging
• Vent valve is only opened if internal pressure exceeds predetermined level
AGM / VRLA Battery Properties

- Longer service life
- Improved deep cycle performance
- No liquid acid spills or leaks
- Fast recharge time
- Completely maintenance free
AGM / VRLA Battery Testing

- Requires the new Midtronics MCR 717 tester and printer
- Tester measures battery conductance by inducing A/C voltage of a given frequency and amplitude on the battery posts and monitoring the current flow in response to it
- Discard the acid density sheet, and enter test code (recorded by tester) on warranty claim forms
- Battery replaced under warranty must have a test printout attached to the R.O.
- Detailed information about testing, and using the MCR717 can be found in WIS SI54.10-P-0003-01
Systems Battery Failure Display

- Multi-function display blue (category 2 malfunction)
- DTC’s will be set in N82/1
- High current consumers are shut down (prioritization feature)
Front Pre-fuse Block (F52)

Location: passenger footwell (upper left)

F52f1 - Circuit 30a protection for supply wires to K57, K75, and N82/1
F52f2 - Alternator (G2) short circuit protection
Front Pre-fuse Block (F32)

Location: passenger footwell

Function: over current protection for the following:

- F & R SAM
- EIS
- Blower motor
- Suction fan
Rear Pre-fuse Block (F33)

F33f3 - External fuse 7.5A
Used for Emergency Engine Stop

- Feeds Z4/4 (30z)
  - EIS (N73) power supply
  - SCM (N80) power supply
  - ME (N3/10) power supply

Location: right side of trunk

Note: vehicle fuse chart refers to this fuse as #78
Vehicle Power Supply Control Module (N82/1)

Location: right side of trunk

Note: SDS / DAS Acronym BNS (Board Net System)
N82/1 Function as Described in WIS

1. Monitors the voltages of (G1) and (G1/4)
2. Controls battery cut-off relay (K57) & isolation relay (K75)
3. Protects vehicle electrical systems from voltage surges
4. Protects vehicle electrical systems from short circuits
5. Controls consumer prioritization function
6. Optimizes charging of starter battery (G1/4)
7. Notes emergency operation and sets fault codes
   (CAN communication / DTC’s)
Cut-off (K57) and Isolation (K75) Relays

Location: right side of trunk
Function of Relays (K57) and (K75)

**Cut-off relay (K57):**
- Controlled by N82/1
- De-energized during normal operation (N.O.)
  - Isolates (G1) from (G1/4) during normal operation
- Energized during emergency operation
  - Connects (G1/4) to (G1) during emergency operation

**Isolation relay (K75):**
- Controlled by N82/1
- De-energized during normal operation (N.C.)
- Energized during emergency operation
  - Opens 30/15R to cigar lighter (R3r1), and 12V trunk socket (X58/1) during emergency operation
Dual Battery
On-board Electrical System

Functional Description
Normal Operation (Wake-up)

N82/1 control module is activated by: CAN-B or microswitch in EIS.
Normal Operation (Voltage Monitoring)

N82/1 control module checks battery voltages

N82/1 control module isolates starter battery from systems battery via open relay K57 (not energized)
Normal Operation (Charging)

- Engine running, alternator charges the systems battery directly
- Starter battery charged via the DC / DC converter (15A max), based on:
  - Starter battery voltage
  - Starter battery temperature calculated by N82/1 using:
    - Ambient temperature (B14)
    - Engine coolant temperature (B11/4)
Emergency Start (Wake-up)

Scenario - Systems battery weak:

N82/1 control module is activated by the ground microswitch in EIS (N73)
• N82/1 control module checks battery voltages (for up to 30 seconds)
• Terminal 30 less than 10.8 volts
• N82/1 control module initiates emergency start operation
• N82/1 activates relay (K57), starter battery supplies power to systems circuit
• N82/1 control module sends emergency operation message via CAN B
• DTC's stored in N82/1
Emergency Operation (Limp Home)

- Engine running alternator charges G1 and G1/4
- Relay (K57) remains activated ~5 minutes after engine is started to quick charge G1/4
- Prioritization function active for ~8 to 18 minutes (if voltage at t30 > ~10.8V)
Emergency Mode Summary

- N82/1 activates cut-off relay (K57) and isolation relay (K75)
- Starter battery (G1/4) supplies power to systems circuit
- N82/1 sends emergency operation message via CAN B
- N82/1 stores DTC's
- Instrument cluster multi-function display “Electric consumers offline!“
- Prioritization function active:
  - seat heaters inoperative
  - seat fans inoperative
  - Vario roof can only be raised
  - AAC blower is regulated up to a maximum of 50%
  - rear window defroster inoperative
  - parktronic switched off
  - radio volume limited
Emergency Mode Summary (cont.)

• Engine switched off, SmartKey in pos. 0 or removed:
  - K57 remains energized for ~5 min. (e.g. windows, CTEL, or TeleAid call)

• SmartKey reinserted in pos. 0:
  - K57 will re-energize for 30 seconds

• SmartKey reinserted to pos. 1 or 2:
  - K57 will re-energize for ~5 min.

• If voltage at N82/1 terminal 30 increases to >10.8v:
  - prioritization function cancelled after ~8 to 18 min. of engine running
Dual Battery Service Tips

Normalization:

If batteries are disconnected or dead, the following systems should be checked for normal operation. If systems are inoperative or erratic then normalization will have to be performed.

Potential systems requiring normalizing are:

- ESP - electronic stability program
- AAC - automatic air conditioning (2 items)
- Left front seat (7 items)
- Right front seat (7 items)
- Steering wheel and mirrors
- Windows
- Tire pressure monitoring
## Appendix

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<td>PE54.10-U-2101-99KA</td>
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## Internet Sites

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