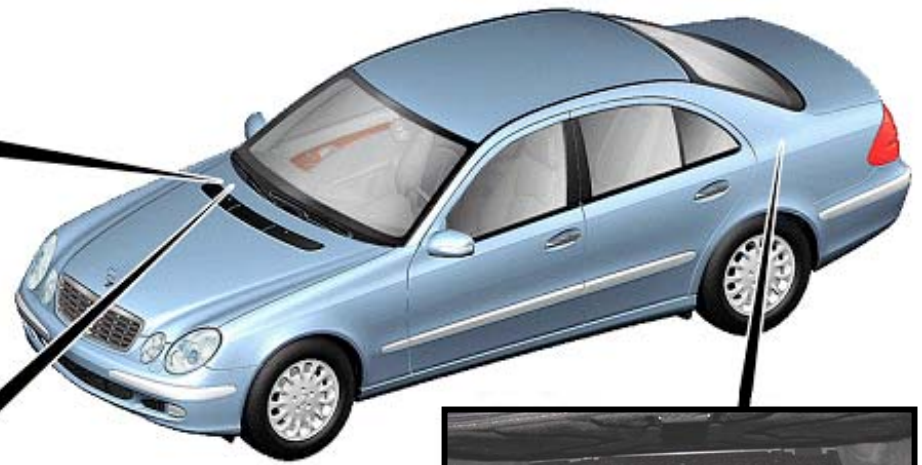
Mercedes-Benz

W211 Dual Battery System



These technical training materials are current as of the date noted on the materials, and may be revised or updated without notice. Always check for revised or updated information.

To help avoid personal injury to you or others, and to avoid damage to the vehicle on which you are working, you must always refer to the latest Mercedes-Benz Technical Publication and follow all pertinent instructions when testing, diagnosing or making repair.
Illustrations and descriptions in this training reference are based on preliminary information and may not correspond to the final US version vehicles. Refer to the official introduction manual and WIS when available.

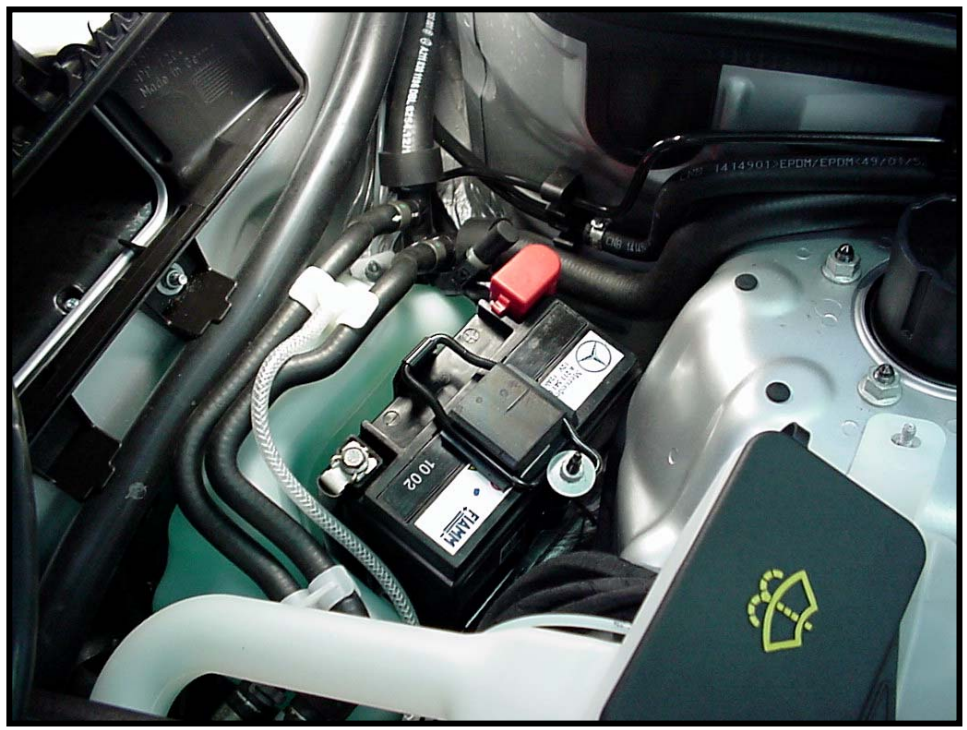
Published by Mercedes-Benz USA, LLC
Printed in U. S.A.

Program Highlights

- Power distribution
  - pre-fuse diagram
  - pre-fuse locations
- Dual battery on-board electrical system components
  - systems battery
  - auxiliary battery
  - battery control module
  - auxiliary battery relay
  - cut-off relay for interruptible loads
  - polyswitch fuse
- Dual battery functional description
  - normal modes
  - failure modes

W211 Dual Battery System Function

An auxiliary battery supplies electrical energy for a limited time if the systems battery voltage is low.



Systems Battery (G1)

Location: (G1) installed in trunk

W211 Systems Battery (G1)

- Systems Battery: 12V, 95 Ah, 520A (DIN)
- Absorbent Glass Mat (AGM) design, also known as Valve Regulated Lead Acid (VRLA) type
- Function - Primary power source for **all** vehicle electrical systems

Location of Auxiliary Battery (G1/7)

Auxiliary battery installed below air intake of HVAC

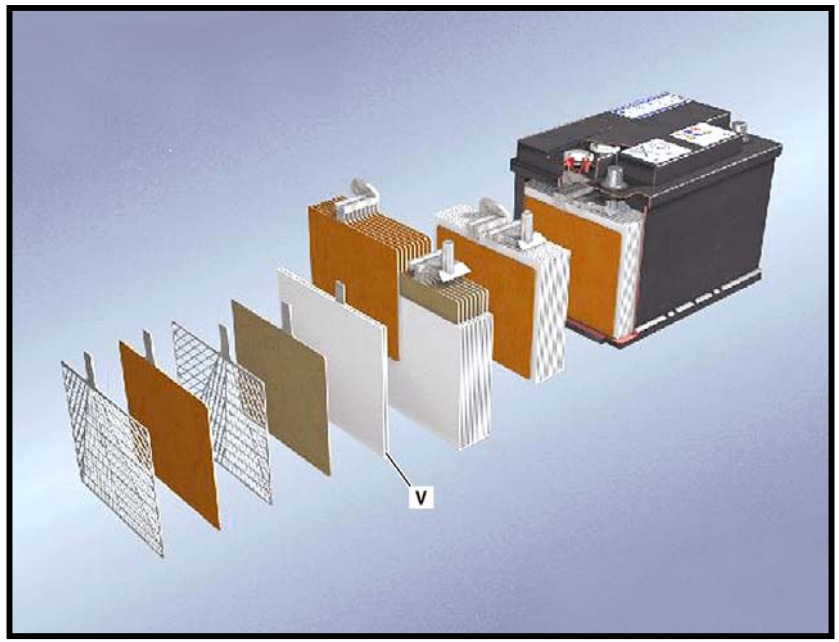
Location of Auxiliary Battery (G1/7)

Shown with HVAC air intake / fiter removed

Auxiliary Battery (G1/7)

- Auxiliary Battery: 12V, 12Ah, 170 A (DIN)
- Absorbent Glass Mat (AGM) design
- Function - Provides supplemental power if systems battery (G1) voltage is low

AGM / VRLA Battery Construction

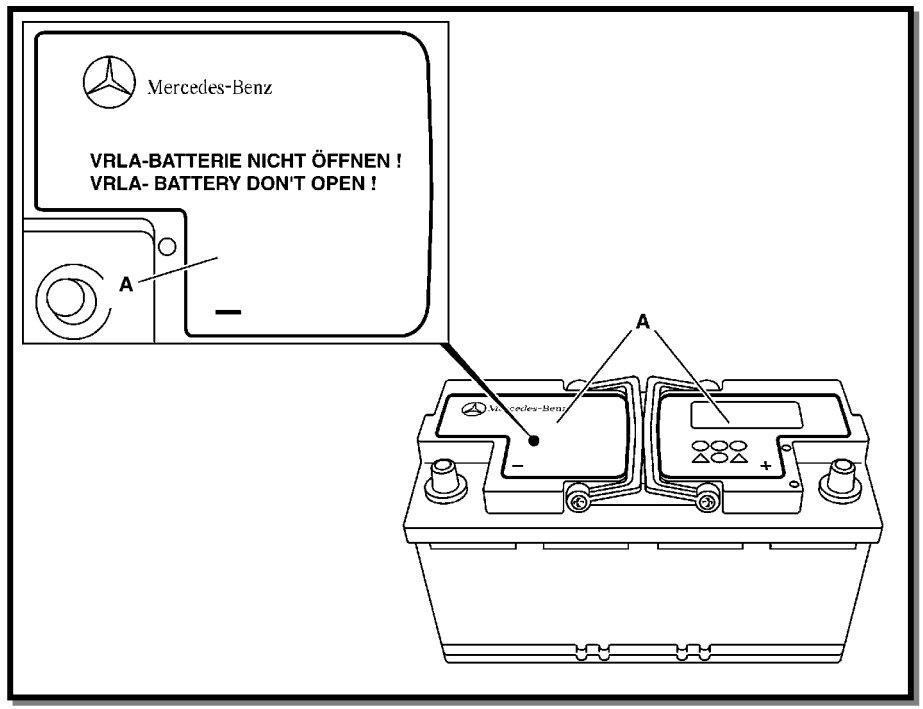


The major differences in construction between a AGM battery and standard lead acid automotive battery are:

- Completely sealed case construction
- No liquid electrolyte
- 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

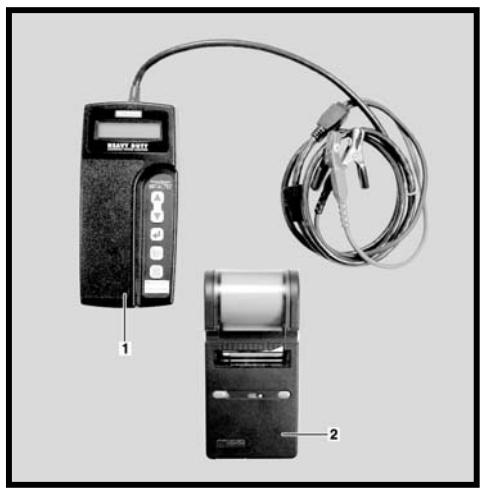
AGM / VRLA Battery Properties

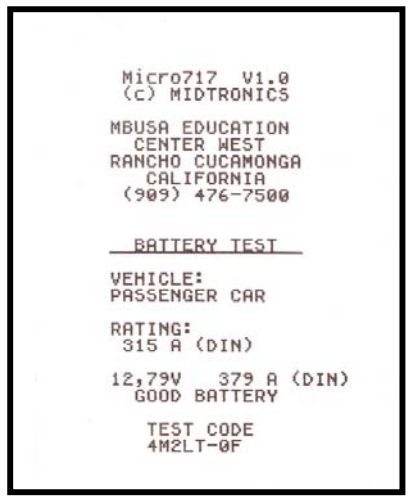
- Longer service life
- Improved cold starting characteristics
- Improved deep cycle performance
- No liquid acid spills or leaks
- Fast recharge time
- Completely maintenance free



AGM / VRLA Battery Testing

- AGM batteries cannot be tested using previous methods (load and acid density tests)
- 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




Micro717 V1.0
(c) MIDTRONICS

MBUSA EDUCATION
CENTER WEST
RANCHO CUCAMONGA
CALIFORNIA
(909) 476-7500

BATTERY TEST

VEHICLE:
PASSENGER CAR

RATING:
315 A (DIN)

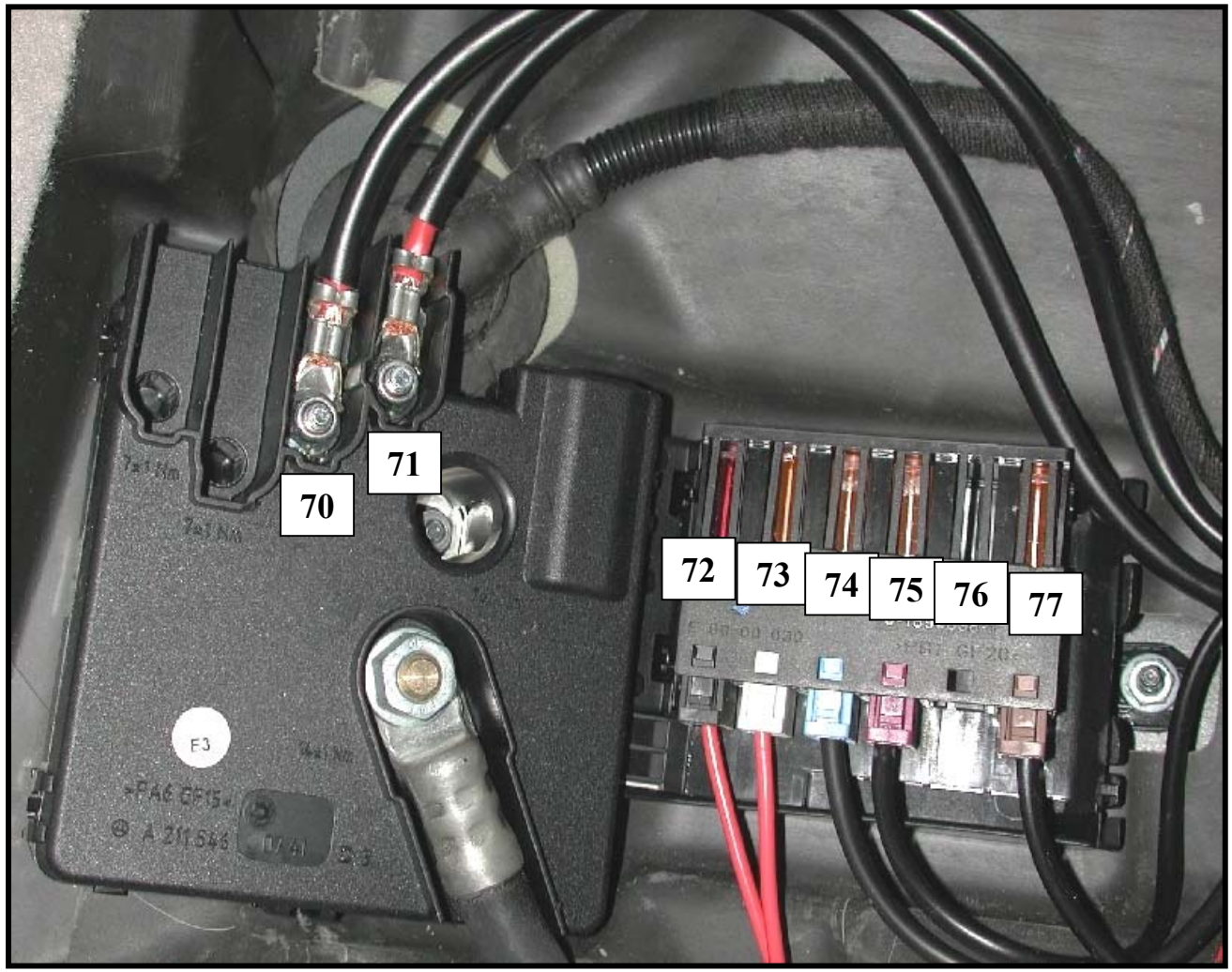
12,79V 379 A (DIN)
GOOD BATTERY

TEST CODE
4M2LT-0F

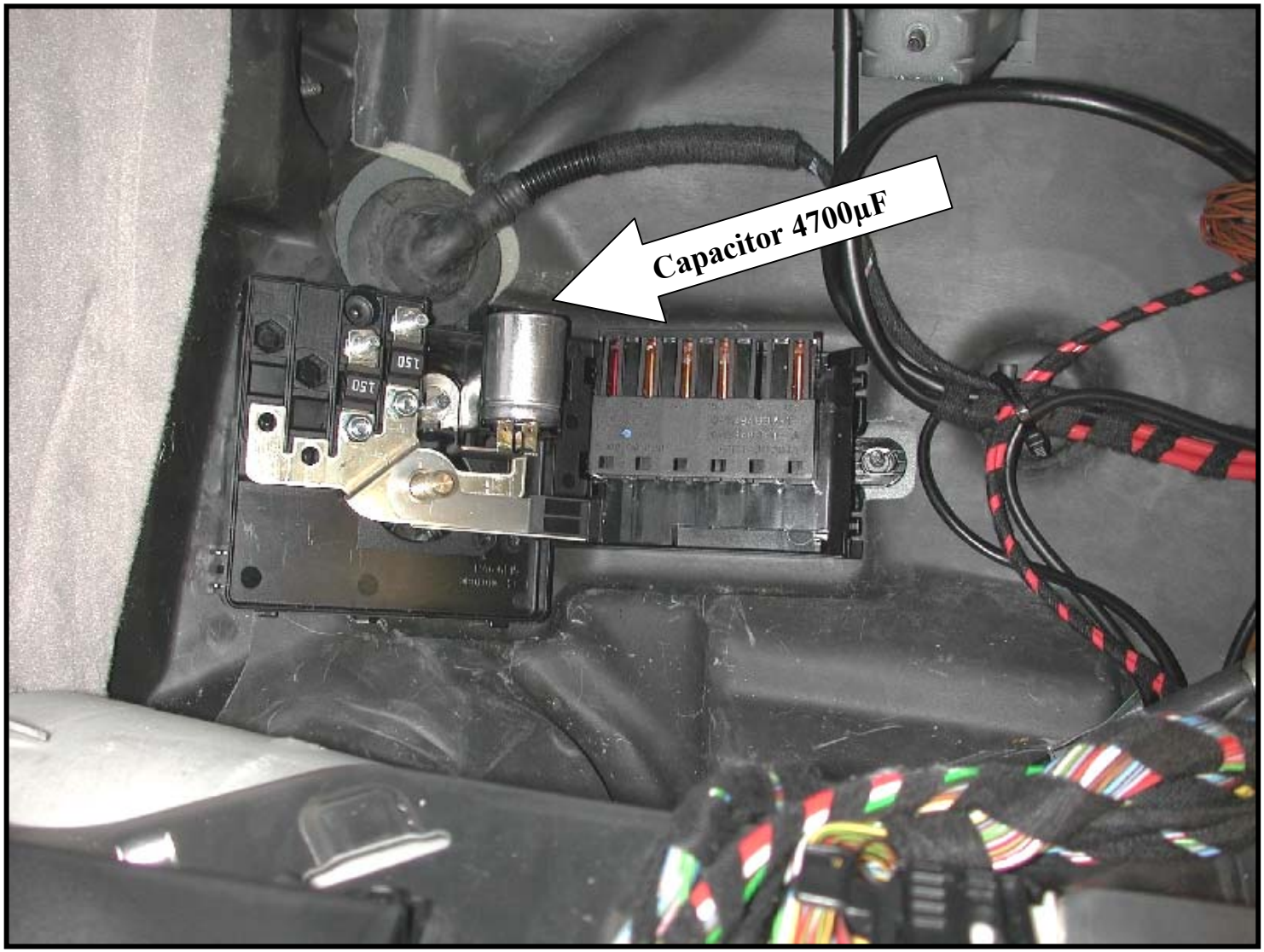
Pre-fuse Box (F32)

Location: Passenger footwell

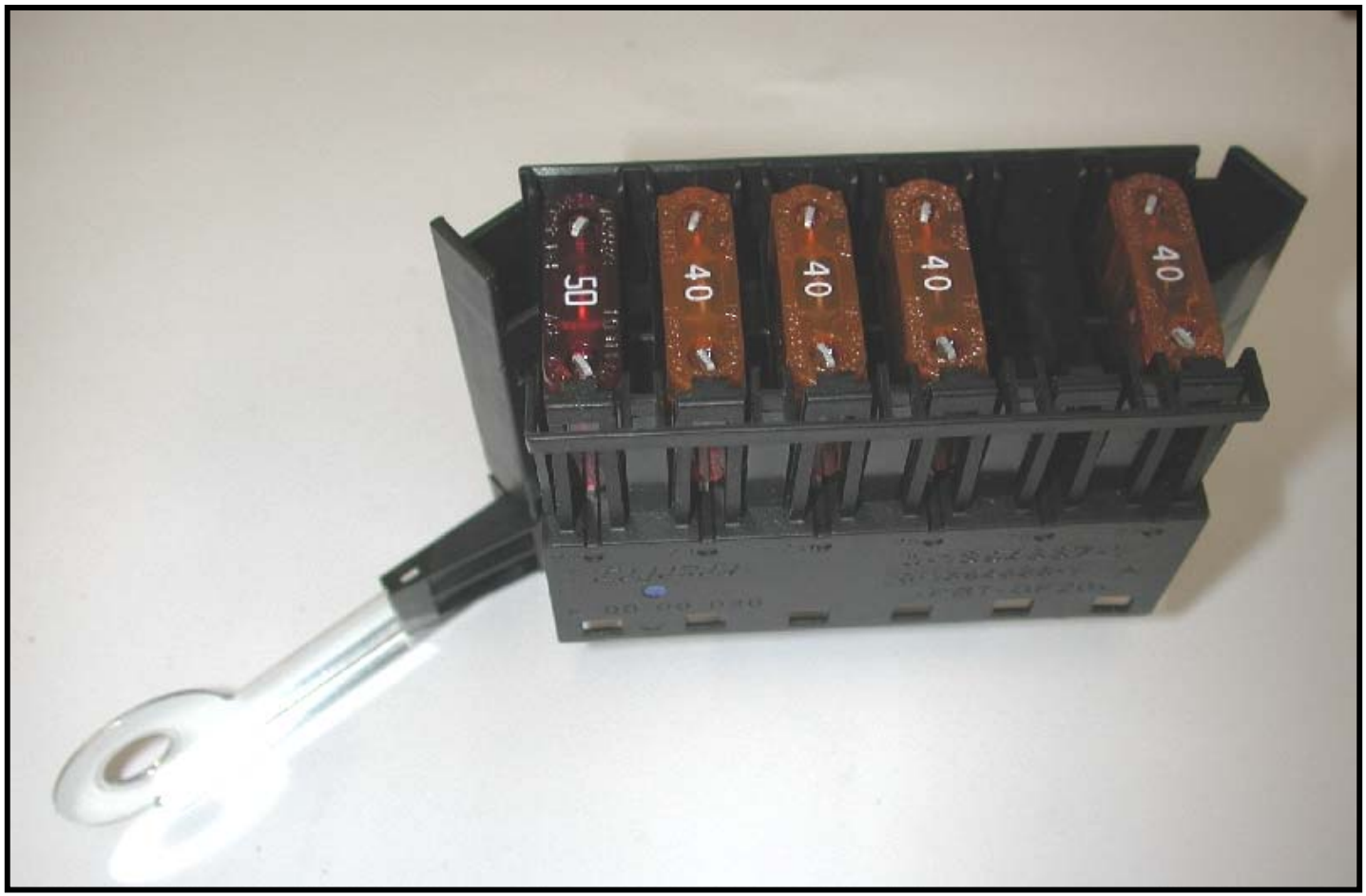
Front Pre-fuse Box (F32)



Front Pre-fuse Box (F32) Disassembled

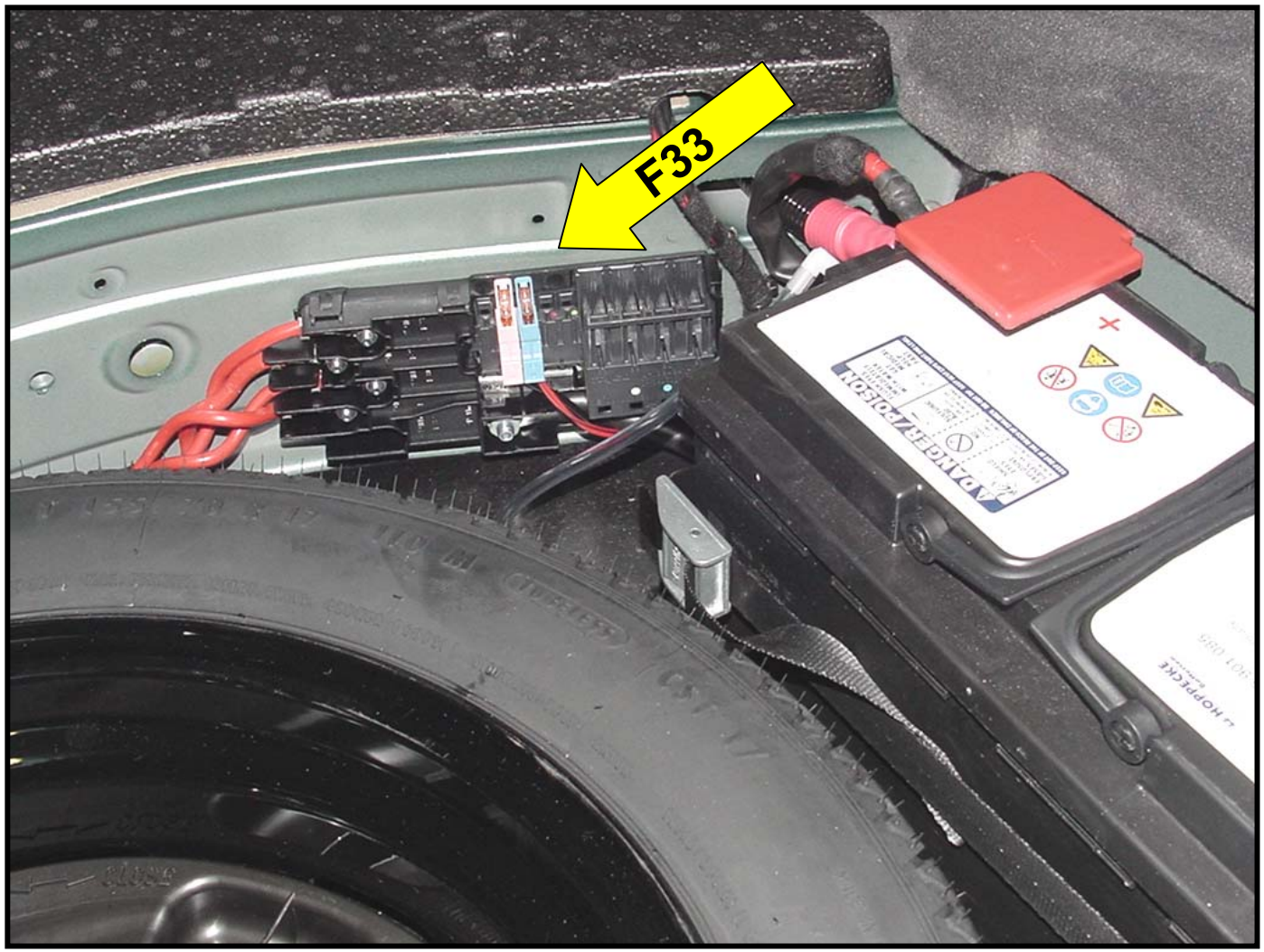


Front Pre-fuse Box (F32) Disassembled (terminal unit fuses)



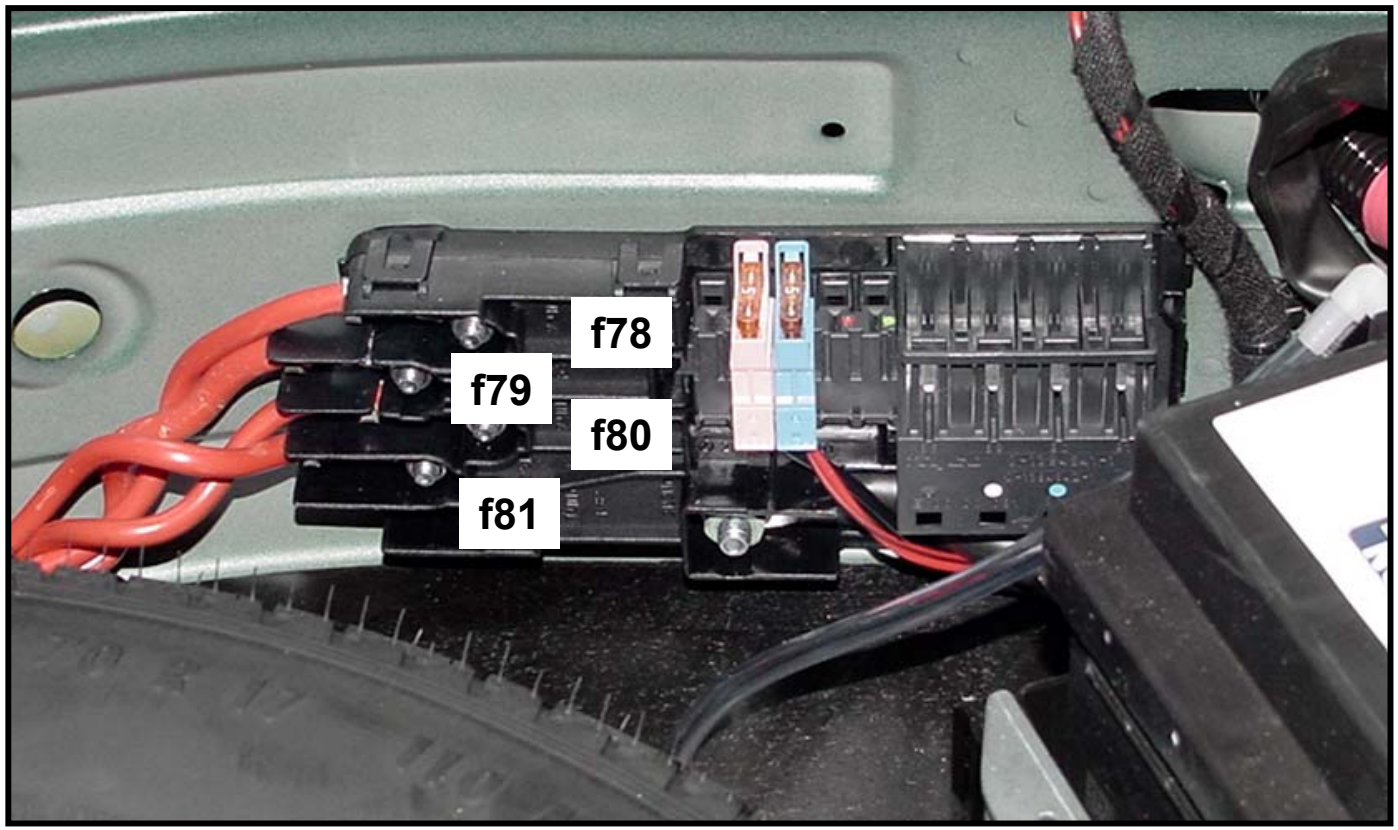
Viewed from top

Pre-fuse Box (F33)

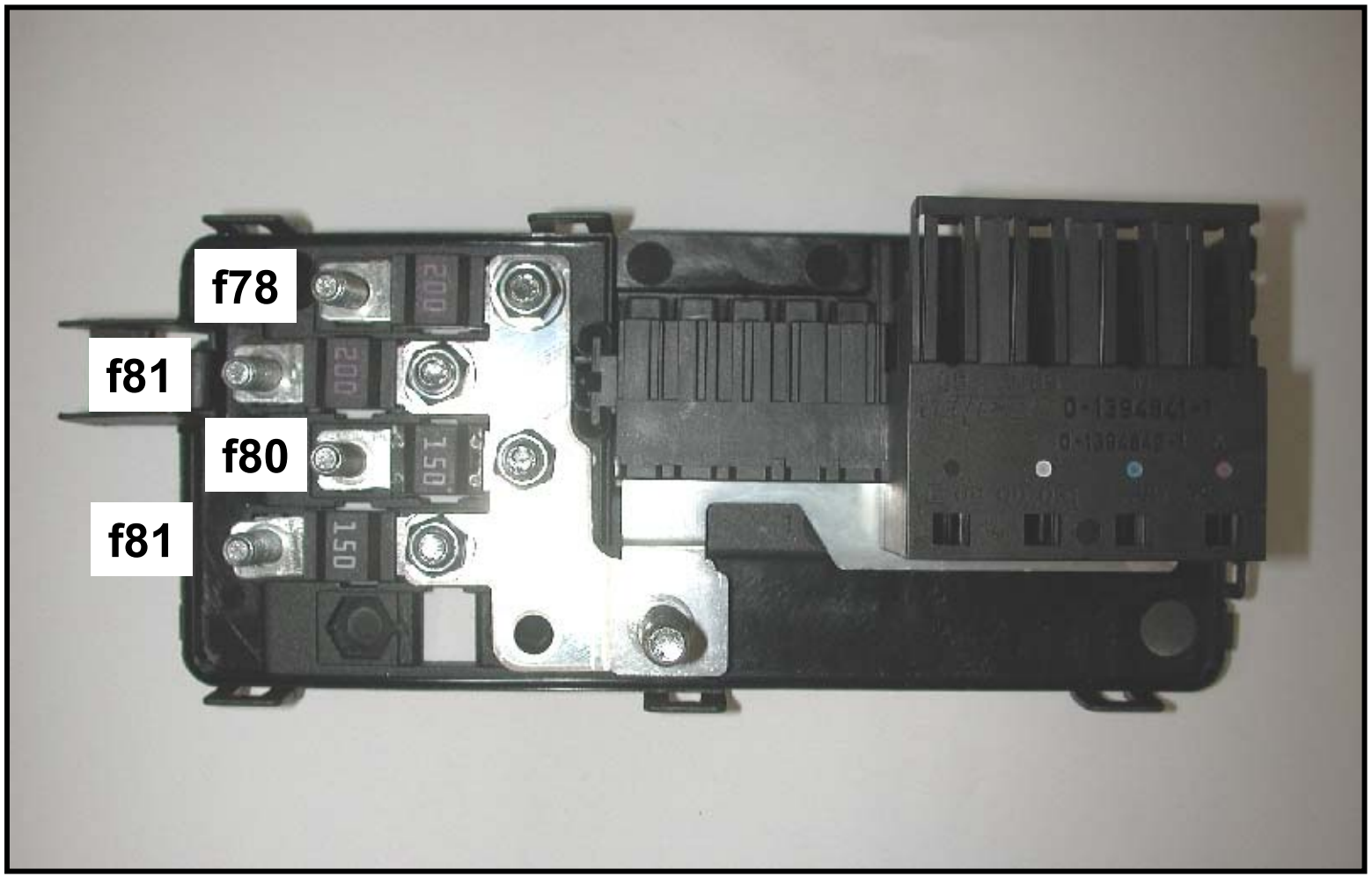


Location: Front of spare tire well

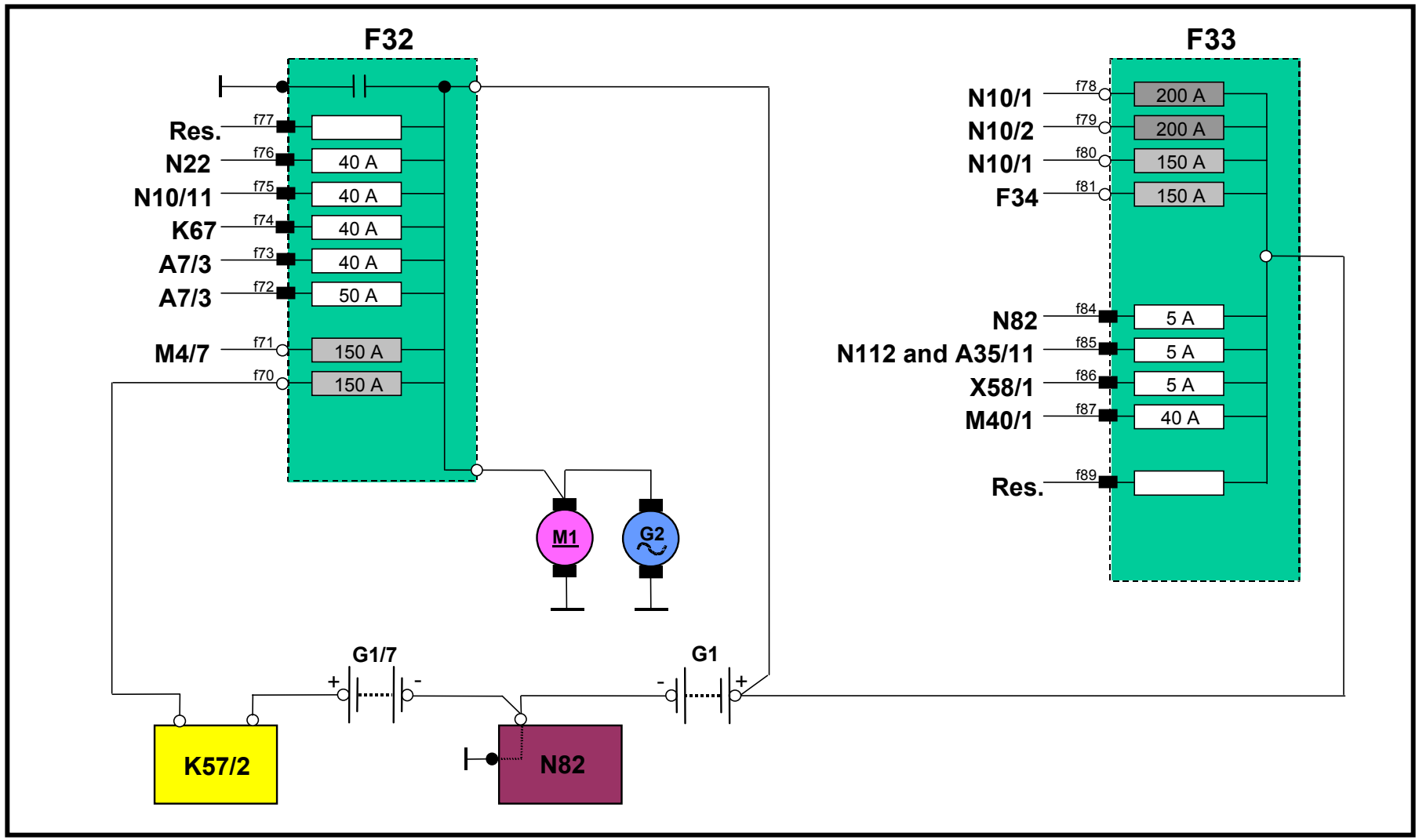
Pre-fuse Box (F33)



Rear Pre-fuse Box (F33) Disassembled



Pre-fuse Power Distribution



Legend: Pre-fuse Power Distribution

A7/3	Traction system hydraulic unit
A35/11	Voice recognition module (VCS)
F32	Front pre-fuse box
F33	Rear pre-fuse box
F34	Interior fuse box (left of instrument panel)
G1	Systems battery
G1/7	Auxiliary battery
G2	Alternator
K57/2	Auxiliary battery relay
K67	AIRmatic relay
N10/1	Driver signal acquisition and actuation module (SAM-D)
N10/2	Rear signal acquisition and actuation module (SAM-R)
N10/11	Passenger signal acquisition and actuation module (SAM-P)
N22	Air conditioning control module
N82	Battery control module
N112	Communication platform (CP)
M1	Starter motor
M4/7	Electric suction fan with integrated control
M40/1	Pneumatic pump of dynamic seat control
X58/1	Interior socket

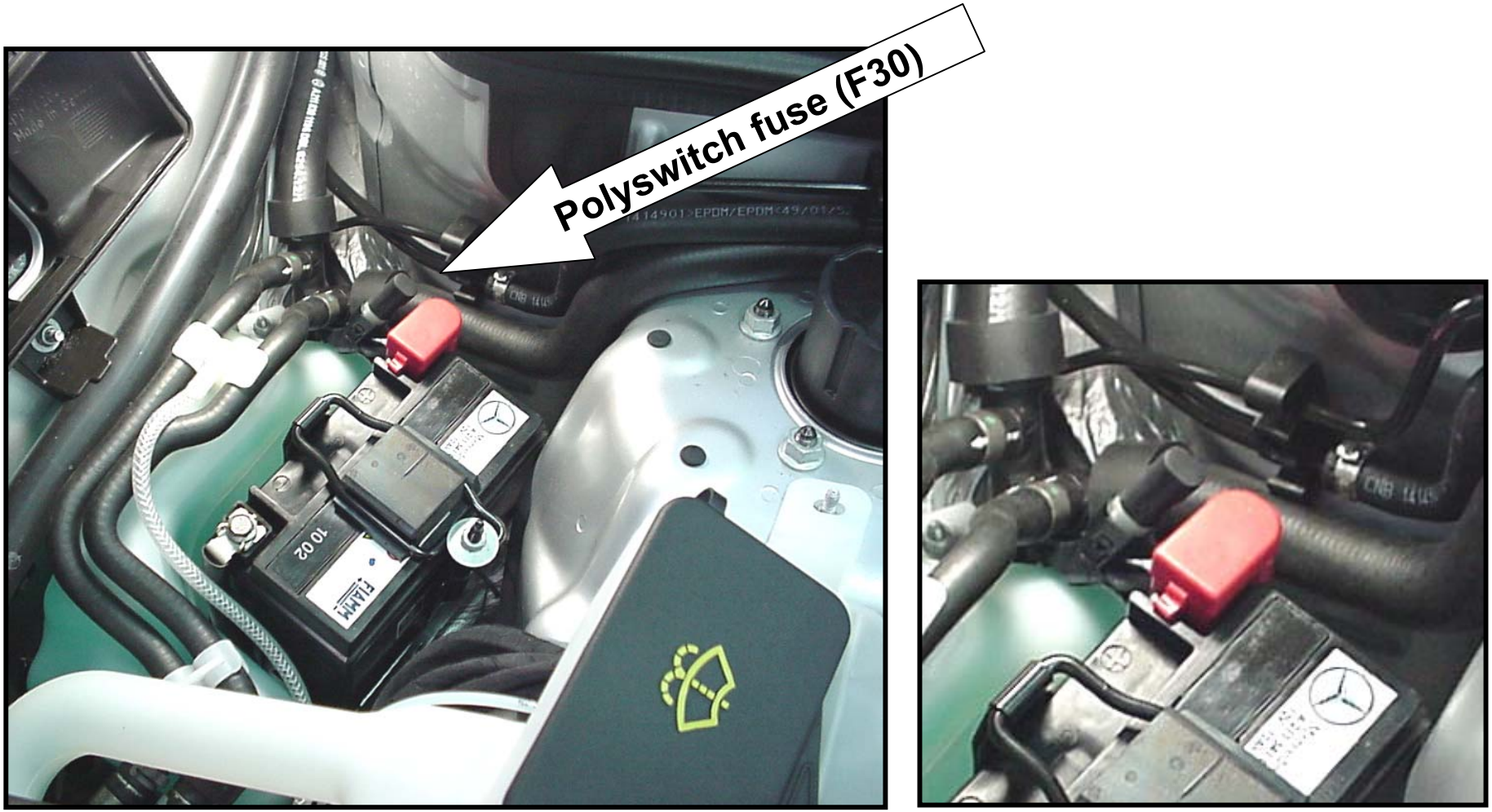
Battery Control Module (N82)

Location: Rear of spare tire well

Function of N82

1. Monitors the voltages of (G1) and (G1/7)
2. Monitors alternator voltage (terminal 61) via CAN B
3. Controls auxiliary battery relay (K57/2)
4. Controls consumer prioritization function
5. Optimizes charging of auxiliary battery (G1/7)
6. Notes emergency operation and sets fault codes (CAN communication / DTC's)
7. Notes emergency operation resulting in IC / MF fault message displays

Polyswitch Fuse (F30)

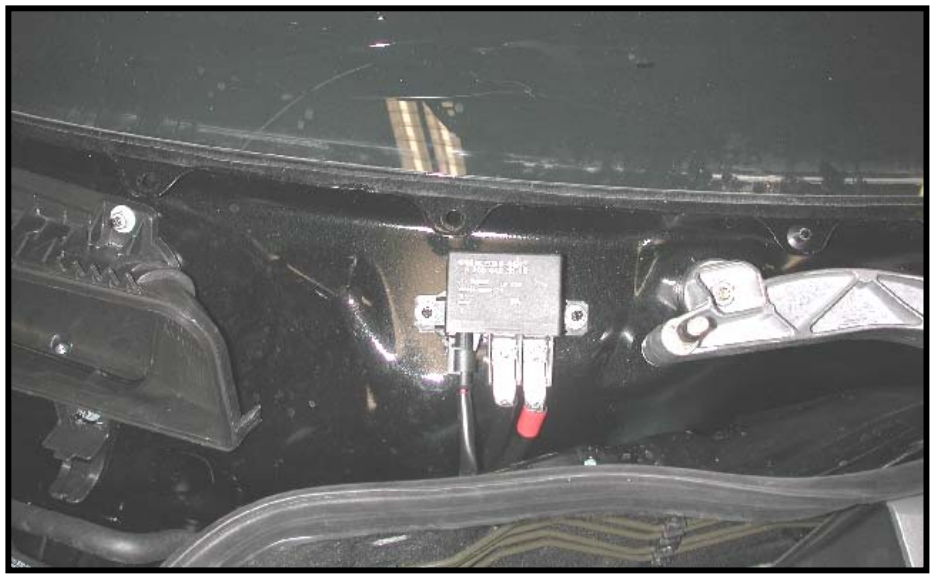


Location: Behind auxiliary battery (G1/7)

Polyswitch Fuse (F30)

- Positive temperature coefficient thermistor
- 5A rating
- Protects internal voltage sensing circuit in N82

Auxiliary Battery Relay (K57/2)

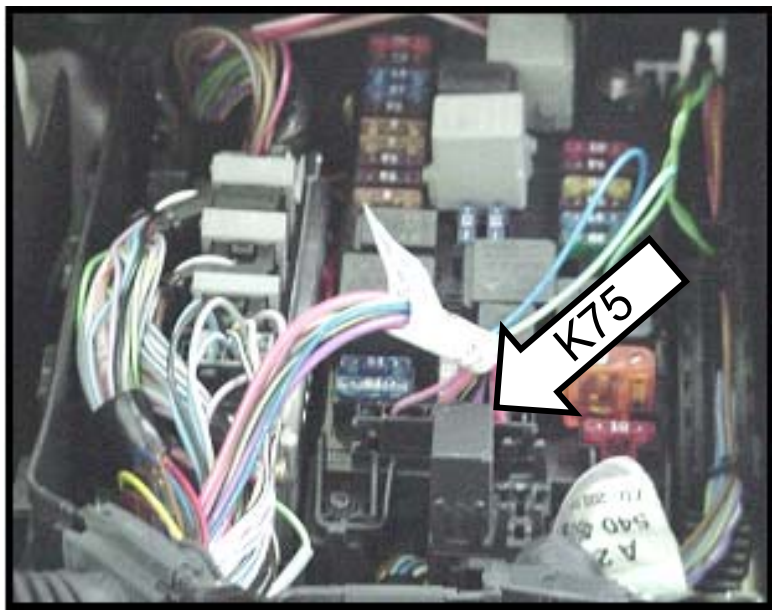


Location: Below windshield wiper cowl plastic trim

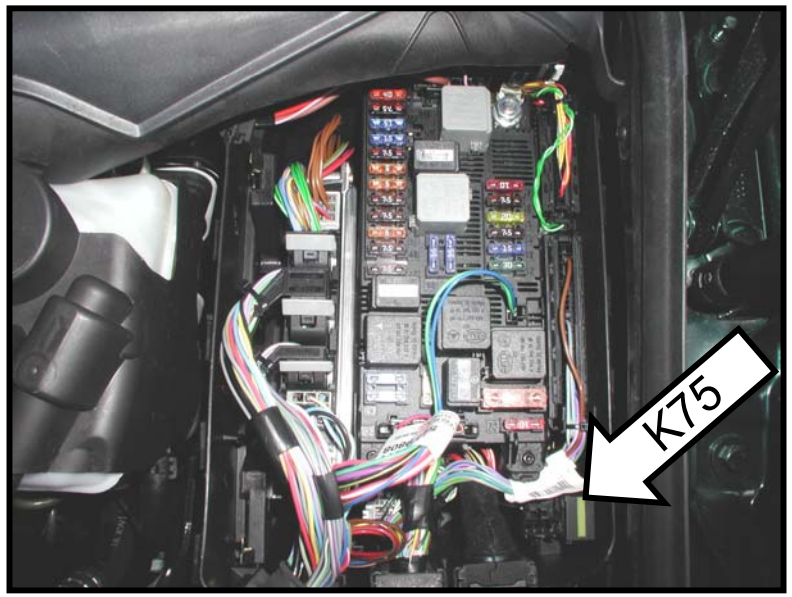
Function:

- Controlled by N82
- De-energized during normal operation (N.O.)
- Energized to recharge G1/7
- Energized if engine running and system voltage low
- Connects G1/7 to electrical consumers

Cut-off Relay for Interruptible Loads (K75)



or

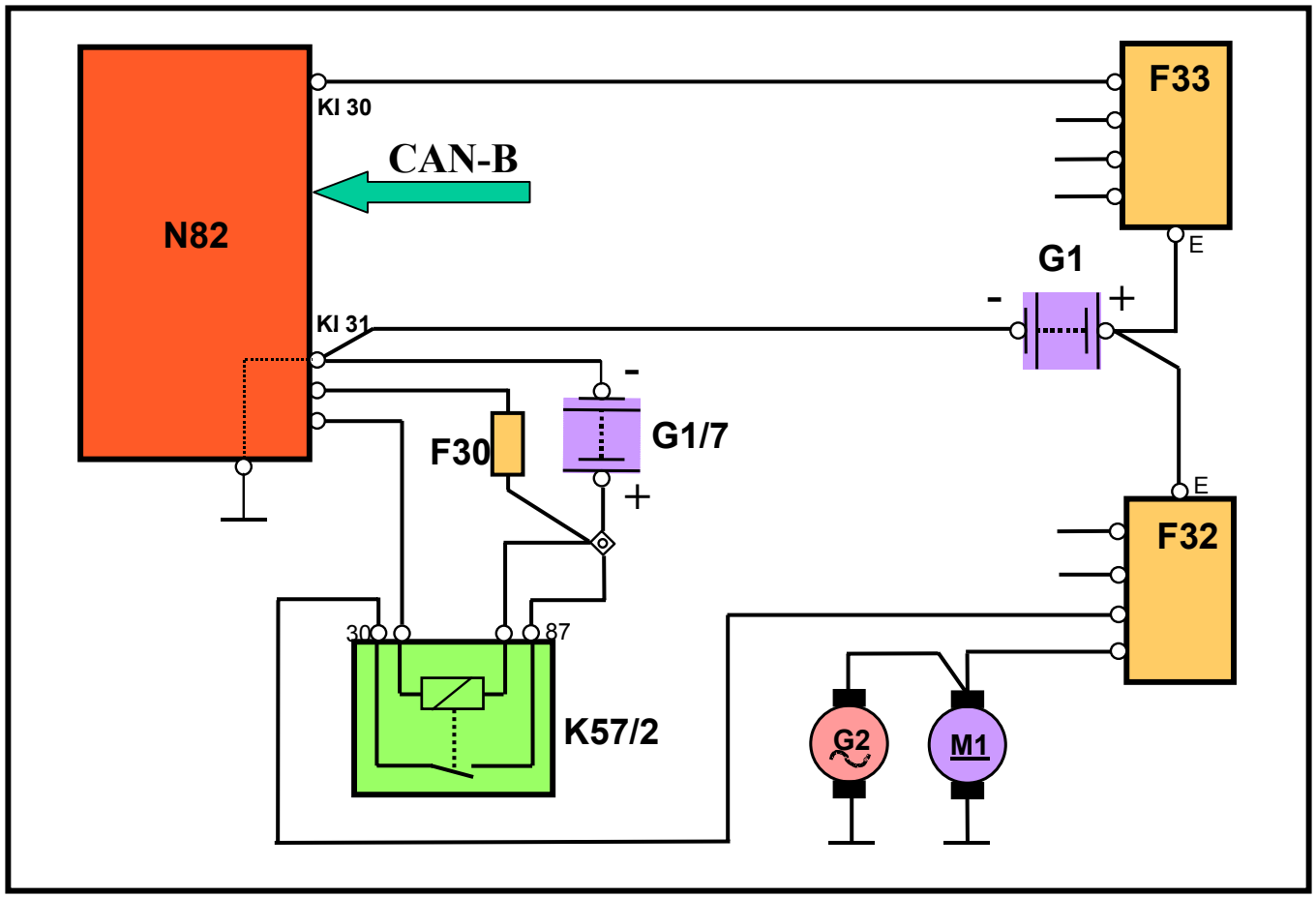


Location: LF SAM (N10/1)

Function:

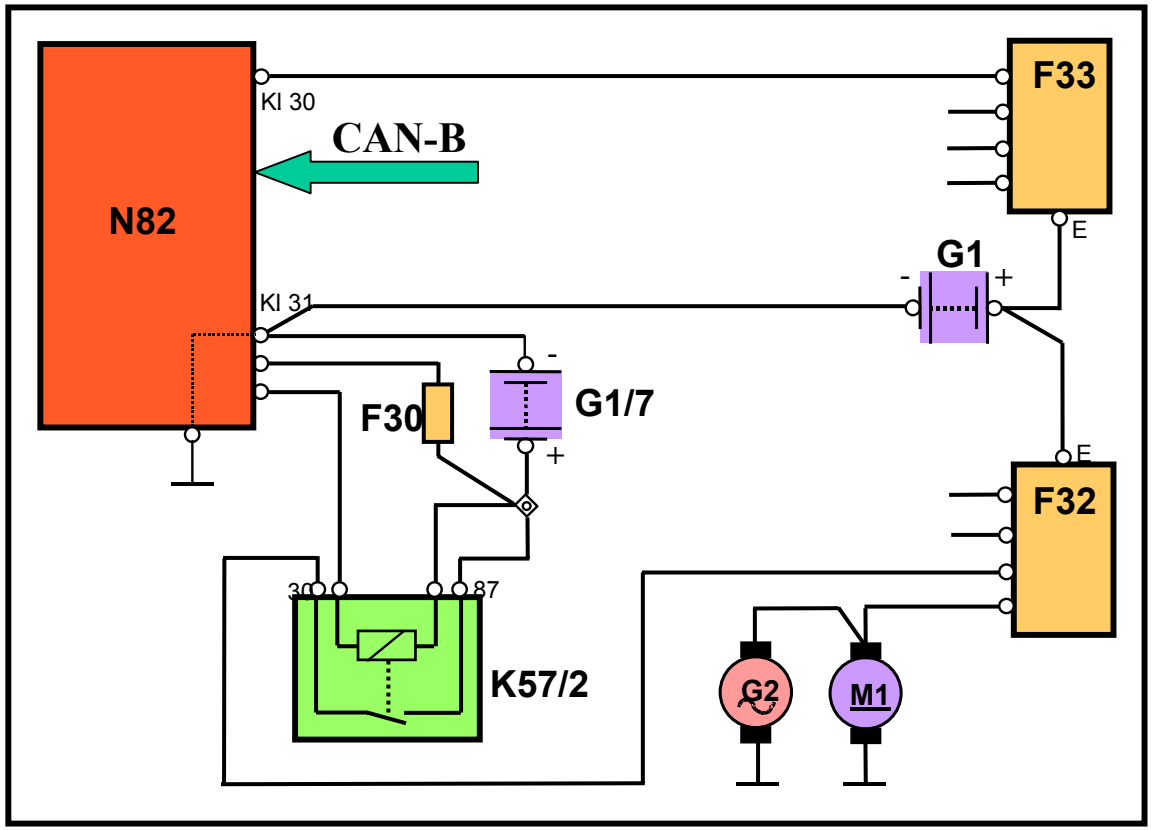
- Controlled by N82
- De-energized during normal operation (N.C.)
- Energized during emergency operation
- Opens 30/15R to cigar lighter (R3r1), and 12V socket (X58/1) rear of center console during emergency operation

Dual Battery System Diagram



F30	Polyswitch fuse	G1	Battery	K57/2	Auxiliary battery relay
F32	Front pre-fuse box	G1/7	Auxiliary battery	M1	Starter
F33	Rear pre-fuse box	G2	Alternator	N82	Battery control module

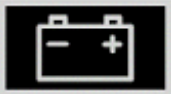
Normal Mode



- Battery control module monitors voltages and calculates the condition of both batteries
- Monitors total current consumption through common ground
- Consumer prioritization off
- Relay K57/2 de-energized

F30	Polyswitch fuse	G1	Battery	K57/2	Auxiliary battery relay
F32	Front pre-fuse box	G1/7	Auxiliary battery	M1	Starter
F33	Rear pre-fuse box	G2	Alternator	N82	Battery control module

Multi-Function Display Fault Messages

Display message		Possible cause	Possible solution
	Battery/ Alternator Visit workshop!	The battery is not being charged. Possible causes: • faulty alternator • torn poly-V-belt Bear in mind that the SBC brake system requires electrical power. ▶ Observe the additional SBC brake system messages in the multi-function display	▶ Stop immediately and check the poly-V-belt. If it is torn, ▶ **Do not drive any further.** Notify a Mercedes-Benz Service Station. If it is OK, ▶ Drive immediately to the nearest Mercedes-Benz Service Station.
		There is a malfunction in the electronics system	▶ Have your vehicle checked at a Mercedes-Benz Service Station.
	Undervoltage Charge battery		▶ Charge the battery.
	Undervoltage Switch off consumers	The battery has insufficient voltage	▶ Switch off any consumers which you do not need at the moment.
	Overvoltage Visit workshop!	The alternator is faulty.	▶ Have the alternator checked at a workshop.
		The vehicle was jump-started using the wrong voltage.	▶ Have the battery checked at a workshop.

Consumer Prioritization

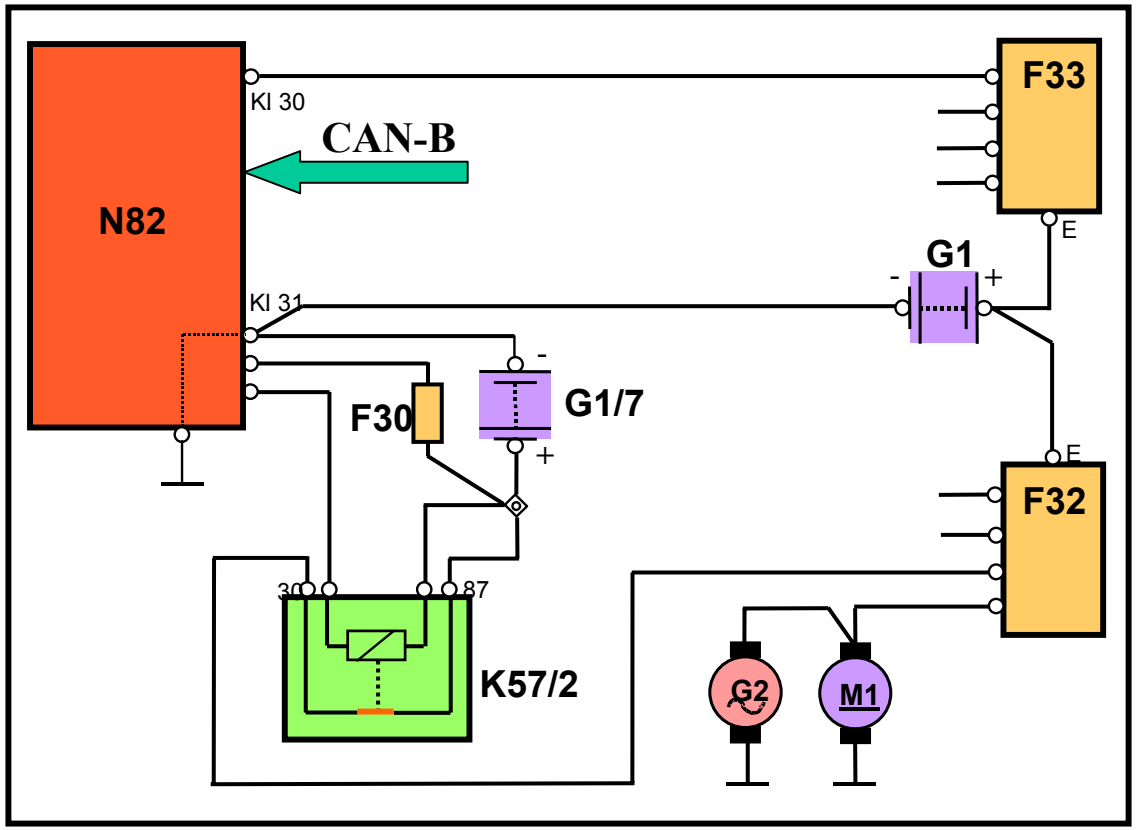
If, for example, the alternator fails:

- Both consumer prioritization stages (1 and 2) are immediately activated via the CAN
- A red warning info appears in the instrument cluster
- The auxiliary battery is not engaged until G1 voltage is low

If for example, N82 determines that the load capacity of systems battery (G1) is inadequate:

- Stage 1 consumer prioritization via CAN
- Stage 2 consumer prioritization via CAN (if deactivating stage 1 consumers was not adequate)
- The auxiliary battery is connected and the red warning then appears in the instrument cluster

Emergency Mode

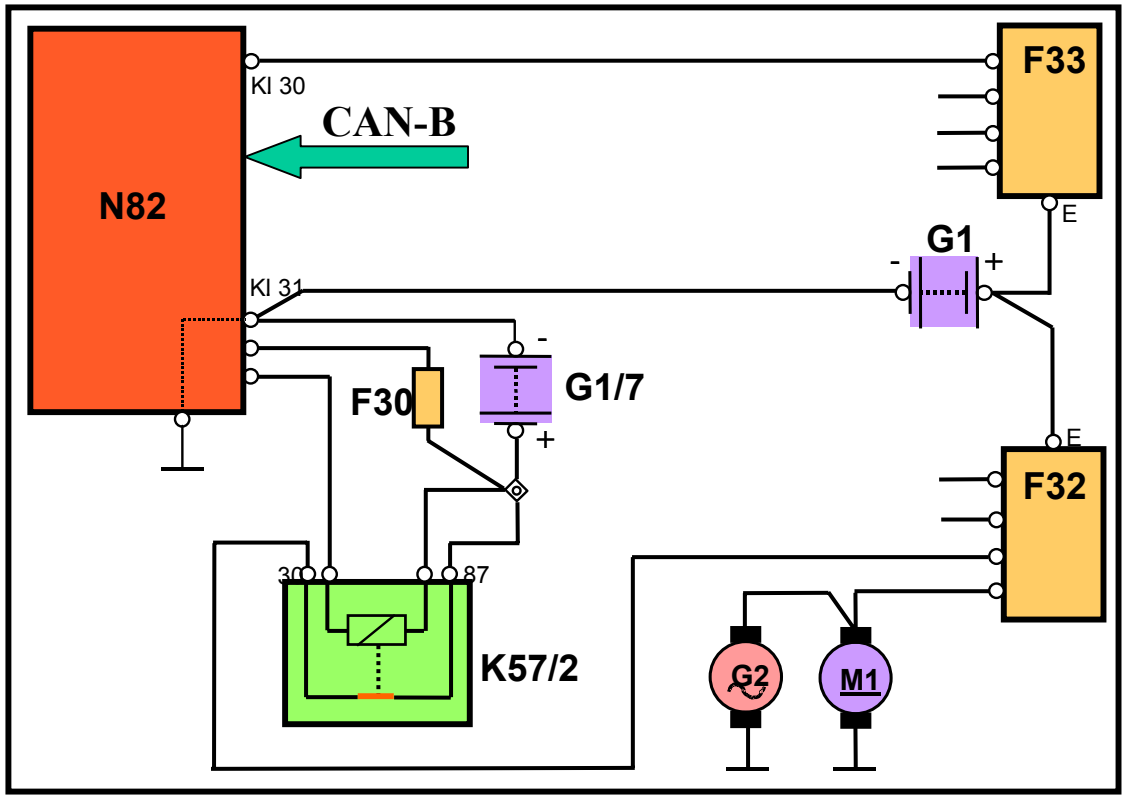


Engine running, systems battery low:

- **Consumers deactivated in 2 stages by CAN messages**
- **Fault messages in instrument cluster indicate deactivation of consumers**
- **Auxiliary battery relay (K57/2) is energized. Auxiliary battery is connected for supplying power to electrical consumers**

F30	Polyswitch fuse	G1	Battery	K57/2	Auxiliary battery relay
F32	Front pre-fuse box	G1/7	Auxiliary battery	M1	Starter
F33	Rear pre-fuse box	G2	Alternator	N82	Battery control module

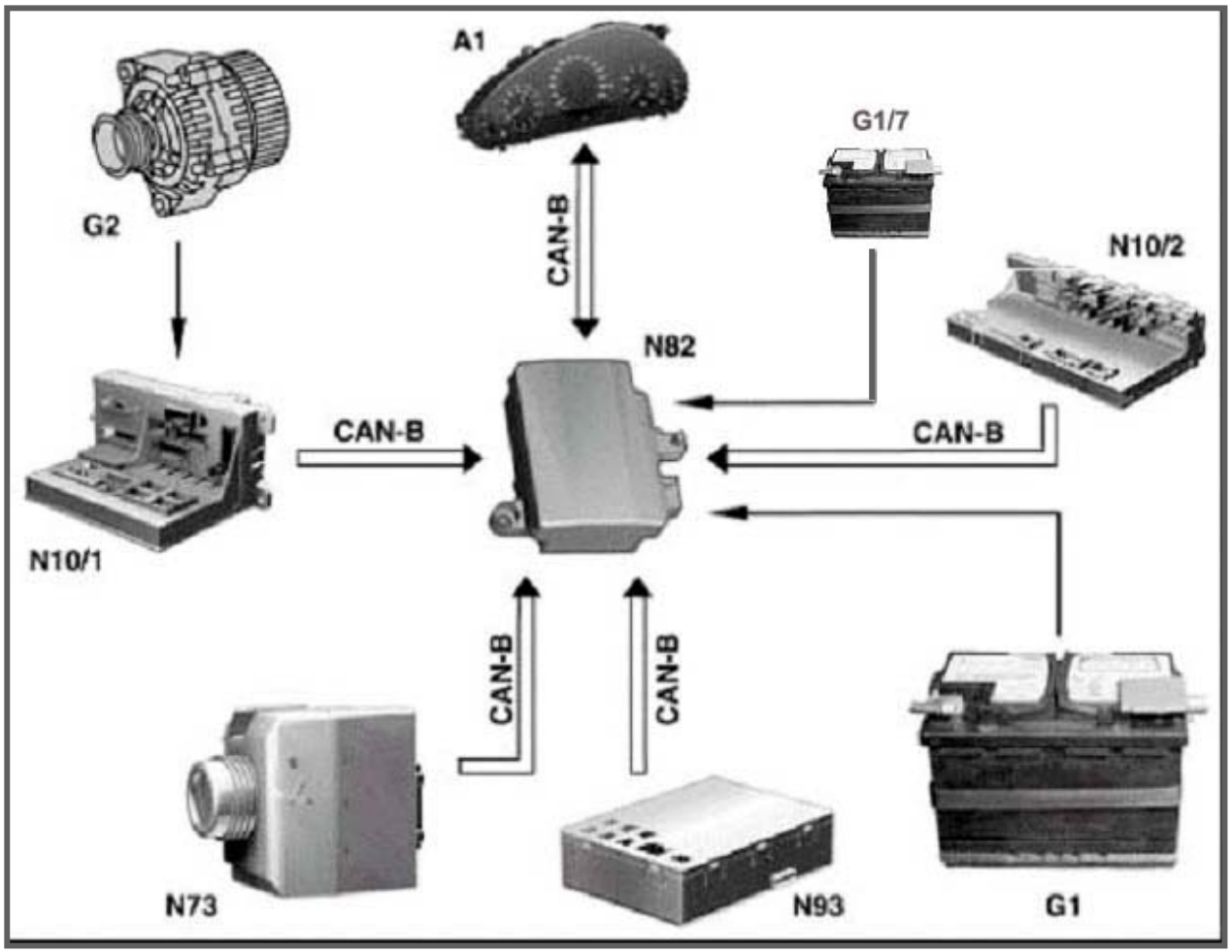
Auxiliary Battery Charging Mode



- Battery control module detects insufficient voltage at auxiliary battery
- Auxiliary battery relay (K57/2) is activated for a short period of time if primary system voltage is above 13.5V
- Auxiliary battery is charged by alternator through auxiliary battery relay (K57/2)
- This charging cycle will only occur once per ignition cycle

F30	Polyswitch fuse	G1	Battery	K57/2	Auxiliary battery relay
F32	Front prefuse box	G1/7	Auxiliary battery	M1	Starter
F33	Rear prefuse box	G2	Alternator	N82	Battery control module

Dual Battery System Diagram CAN B



N10/1 - circuit 61

N73 - ignition key inserted

N93 - diagnosis

G1 - systems battery sensing

N10/2 - trunk switch

G1/7 - auxiliary battery sensing

A1 - warning messages

Dual Battery Service Tips

Normalization:

If the systems battery is 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
- AAC - automatic air conditioning
- Windows and sunroof
- Left front seat
- Right front seat
- Steering wheel and mirrors

Adding additional electric accessories:

When adding accessories always use a power supply that is fused through the pre-fuse boxes. This will ensure that the BCM can monitor the current consumption accurately.
DO NOT CONNECT ACCESSORIES DIRECTLY TO BATTERY TERMINALS

Dual Battery Service Tips

Normalization:

If the systems battery is 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
- AAC - automatic air conditioning
- Left front seat
- Right front seat
- Steering wheel and mirrors
- Windows and sunroof

Appendix

WIS doc.#	Topic
AH54.10-P-0002-01A	Notes on AGM battery construction, and properties
AR54.10-P-1129-01A	Battery test using Midtronics MCR717
OF58.40-P-3000-04A	Order form for Midtronics MCR717
GF54.10-P-4201T	Auxiliary battery relay, location, and function
GF54.10-P-1001T	Two-battery vehicle power supply, function
GF54.21-P-4121-02T	Vehicle power supply control module, task

ETM doc #	
PE54.15-P-2502DA	Pre-fuse F32 wiring diagram
PE54.15-P-2503DA	Pre-fuse F33 wiring diagram
PE54.15-P-2501DA	Pre-fuse F34 wiring diagram

Internet Sites	
www.midtronics.com	Total battery management (AGM) charging, testing