Retrofitting an auxiliary battery with isolation relay

DESCRIPTION: This retrofit consists of installing an auxiliary 12V/100Ah deep cycle battery for running additional electrical equipment, and an isolation relay to separate it from the starter battery circuit. The isolation relay prevents electrical equipment connected to the auxiliary battery from discharging the starter battery. When the engine is running, the relay allows the battery to be charged. The additional battery is located under the passenger seat.

PARTS REQUIRED:
Following is the list of parts. Some parts will have to be purchased locally.

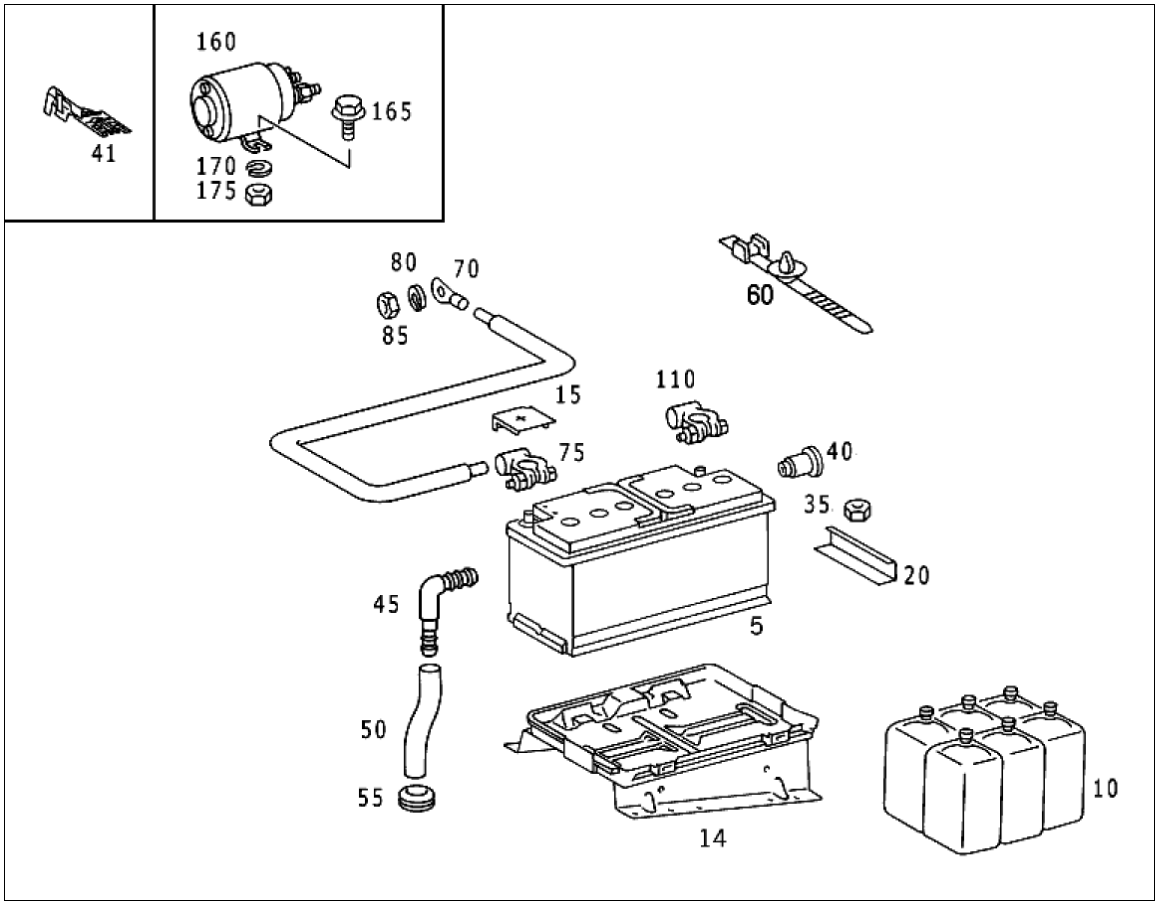


Fig 1, Parts breakdown

Item	MOPAR #	Description	Qty.
# 5	05133941AA	100 Ah deep cycle battery	1
# 14	05122170AA	Battery tray	1
# 15	05098850AA	Boot, battery positive pole	1
# 20	05121607AA	Rail, battery mounting	2
# 35	05126254AA	Nut, battery mounting	2
# 40	05099303AA	Plug	1
# 41	05133403AA	Fuse contact spring, unipolar, 2.5 - 4.0 mm	2
# 45	05125802AA	Distributor (elbow), battery venting	1
# 50	05125962AA	Hose, battery venting	by meter
# 55	05125940AA	Grommet, drain hose through vehicle floor	1
# 60	05126053AA	Tie strap clip	1
# 70	05133950AA	Cable shoe, positive cable	6
# 75	05120949AA	Clamping piece, battery positive pole	1
# 80	05104669AA	Lock washer	2
# 85	05097674AA	Nut M6	2
# 110	05129657AA	Clamping piece, negative pole	1
# 160	05133946AA	Isolation relay (contactor)	1
# 165	05133947AA	Screw, isolation relay to seat box	2
# 170	05104668AA	Lock washer, isolation relay to seat box	2
# 175	05133948AA	Nut, isolation relay to seat box	2

Purchase locally:	
- Battery electrolyte	as required
- 15 A fuse	1
- 3/8 SAE bolts, grade 8 with locknuts	8
- Stainless steel washers 1” O.D.	16
- Battery cable, red, 25 mm^2 cross section *	as required
- Battery cable, black, 25 mm^2 cross section *	as required
- Electrical wire, brown, 1 mm^2 cross section *	as required
- Electrical wire, red w/black, 1 mm^2 cross section *	as required
- Electrical wire, red w/green & violet, 1 mm^2. *	as required
- Convoluted tubing and cable tie straps	as required
- Heat shrink tubing	as required

* It is strongly recommended to adhere to the color coding of the wires. This simplifies the servicing and troubleshooting of the electrical system, and agrees with shop documentation and electrical wiring schematics. Color identifiers can be applied with paint. AWG wire sizes are acceptable, as long as a minimum gauge of 16 AWG is used instead of the 1 mm^2 cross section and a minimum gauge of 4 AWG is used instead of the 25 mm^2 cable.

PROCEDURE:

1. Disconnect the cable from the negative battery post.

2. Remove front seats.

3. Using a 13 mm socket, remove the passenger side seat base bolts. See **fig.3**. Remove the passenger seat base from the floor.

4. The battery tray 05122170AA does not have any mounting holes, since it is designed to be welded to the floor. Modify the tray by drilling four holes on both flanges (eight holes total), and mount it to the floor using eight 3/8" SAE (grade 8) bolts and 1" O.D. washers. See **fig.1.** Remove all metal filings to avoid corrosion damage. The additional battery is grounded through the tray, so the mating surfaces to the floor must be stripped from paint to provide a good electrical path. Treat exposed metal surfaces with a corrosion protection agent, e.g. zinc dust paint.

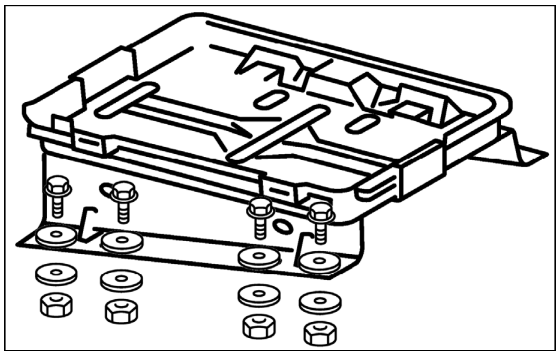


Fig 1, Battery tray installation

5. Drill a hole on the floor to install the vent tube for the battery case. See **fig.2**. Install the grommet 05125940AA in the hole.

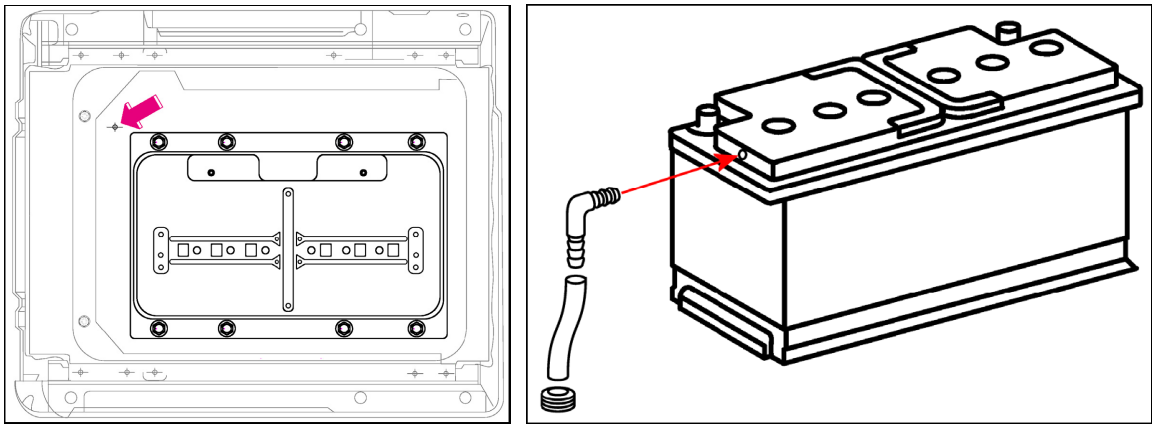


Fig 2, Battery vent tube setup

6. Fill the 100 Ah deep cycle battery 05133941AA. Pour in battery electrolyte up to inner level marking with a filling device. Let the battery sit for approximately 20 minutes. Check the level and correct if necessary.

Danger. When working with the battery, there is a risk of explosion from explosive gas, risk of poisoning and caustic burns from swallowing battery electrolyte, risk of injury from caustic burns to eyes and skin from battery electrolyte or from handling damaged lead acid batteries. No fire, sparks, open flames or smoking should be present when working in the battery area. Wear acid-protective gloves, clothing and eye protection when working with the battery. Pour battery electrolyte only into suitable and appropriately marked containers.

7. Install the deep cycle battery on the battery tray. Install the hold-down brackets 05121607AA and tighten the nuts 05126254AA. Assemble the vent tube 05125962AA and elbow fitting 05125802AA. Insert the elbow fitting into the battery vent channel and route the tube through the hole in the floor. See fig.6. Plug the battery vent channel rear hole with plug 05099303AA.

Note: the battery tray is designed to mount DIN batteries with bottom hold-downs. A standard battery will not fit properly.

8. Install the seat base. **See fig.7.** Install the bolts that hold the seat base to the floor.

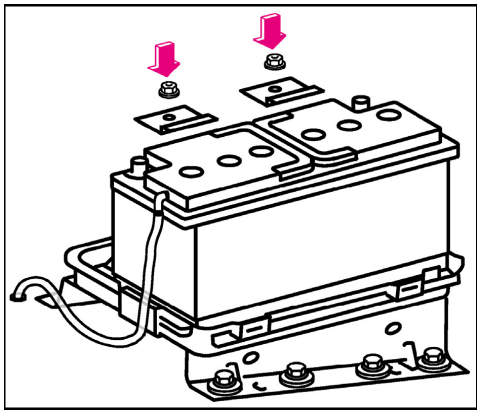


Fig 6, Battery mounting

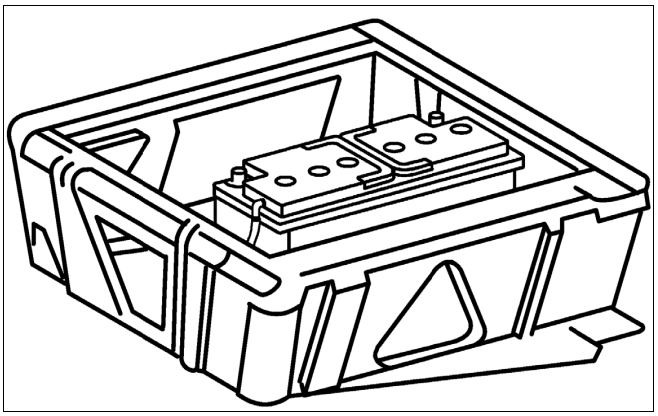


Fig 7, Seat base installation

9. Install the isolation relay 05133946AA on the driver's seat base rear control unit bracket using screws 05133947AA, lock washers 05104668AA and nuts 05133948AA. **See fig.8.**

10. Route the battery cables. See **fig.9.** Beginning at the passenger seat base, determine the proper length of cable required to connect the negative battery terminal to the battery tray ground stud. Cut the black battery cable and assemble with clamping piece 05129657AA and ring terminal 05133950AA. Temporarily connect the assembled cable to the negative battery post. Connect the other end to the battery tray ground stud and tighten the nut. **As a safety precaution, disconnect the negative battery terminal and leave it disconnected during the installation procedure.**

11. Determine the proper length of cable required to connect the positive battery terminal to the isolation relay. Cut the red battery cable and assemble with clamping piece 05120949AA and ring terminal 05133950AA. Cover the crimped end of the ring terminal with heat shrink tubing. Connect the cable to the positive battery post and install the post cover 05098850AA. Cover the side section of the auxiliary battery's positive cable with convoluted tubing and fasten it to the battery tray with the tie strap clip 05126053AA. See **fig.9.**

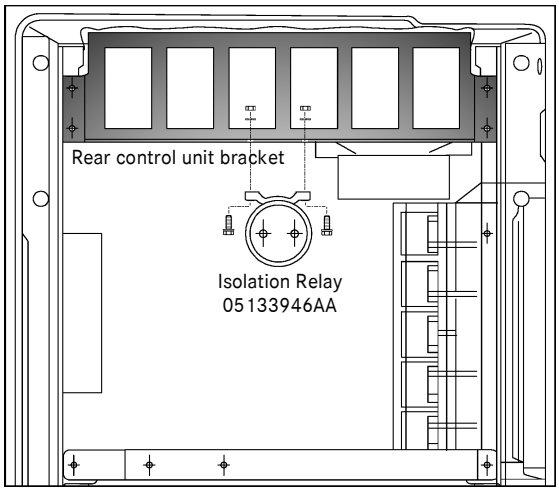


Fig 8, Isolation relay installation

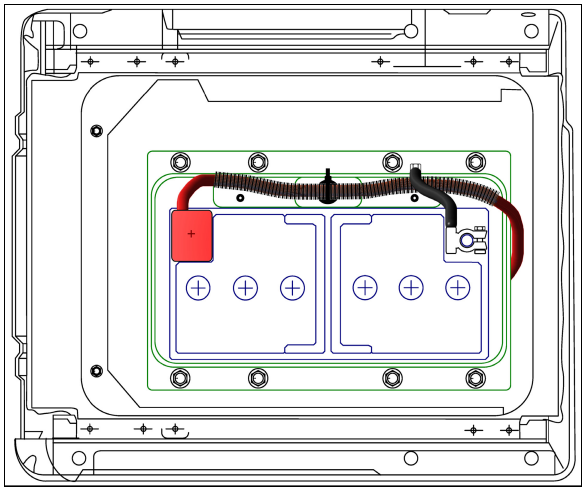


Fig 9, Auxiliary battery layout

12. Route the cable under the battery tray, through the channel under the floor covering, to the isolation relay on the driver's seat base. See **fig.10.**

13. Install a ring terminal 05133950AA on the end of the cable. Cover the crimped end of the ring terminal with heat shrink tubing. Connect the cable to one of the switch terminals of the isolation relay. Now determine the length of cable required to connect the isolation relay to the main battery. Cut the red battery cable and install a ring terminal 05133950AA on one end of the cable. Cover the crimped end of the ring terminal with heat shrink tubing. Connect the cable to the other switch terminal of the isolation relay. Route the cable from the isolation relay through the seat base harness rubber boot, under the vehicle (keeping it close to the vehicle harness) to the positive terminal of the main battery in the engine compartment. See **fig.10.** Cover the cable from under the vehicle and engine compartment with convoluted tubing and fasten it to the vehicle's harness using tie straps about every 6 inches.

14. Remove the nut that holds the high current fuse box bracket to the main battery positive terminal. See. **fig.10.** Install a ring terminal 05133950AA on the end of the battery cable. Cover the crimped end of the ring terminal with heat shrink tubing. Connect the cable to the bracket and reinstall the nut.

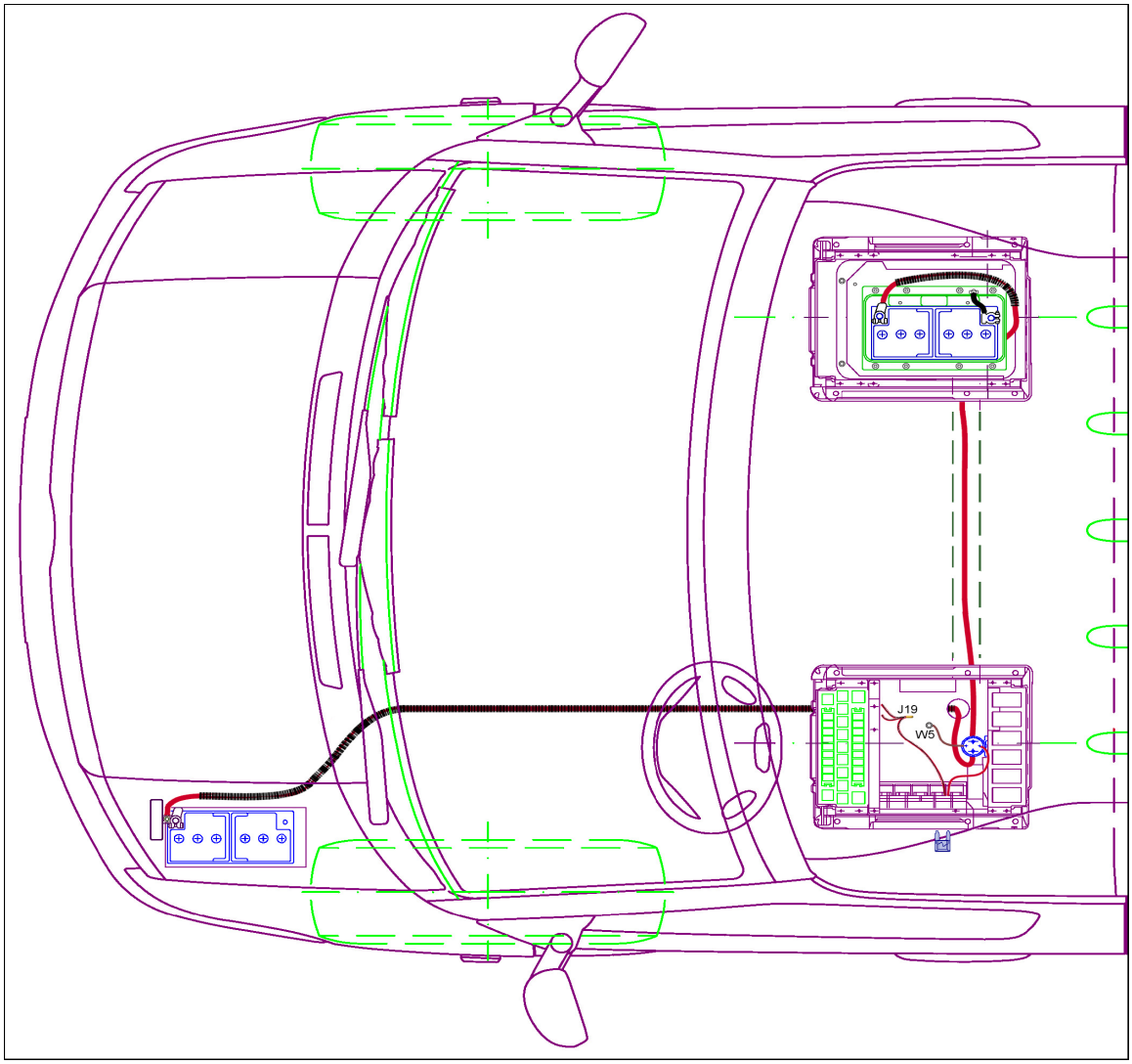


Fig 10, Auxiliary battery wiring layout

15. Find an empty fuse position on the driver's seat base electrical center for installing the auxiliary battery circuit fuse (15 A). Gently lift the locking tabs to remove the fuse block from the adapter frame mounting. Release the appropriate terminal lock (red clip) by pushing it upwards and removing it from the fuse block. See **fig.11.**

16. Crimp an electrical terminal 05133403AA on the end of the red/black 1 mm^2 wire. Crimp another electrical terminal 05133403AA on the end of the red/green/violet 1 mm^2 wire. See **fig.11.** Insert the red/black wire terminal into the top cavity of the selected fuse location and push until it clicks in place. Insert the red/green/violet wire terminal into the middle row cavity of the same fuse location and push until it clicks in place. Install the terminal lock (red clip) and place the fuse block back into the adapter frame mounting. Install a 15 A fuse and note its description, e.g. cut-off relay, aux. battery, 15 A, on the fuse assignment decal on the fuse cover (use permanent ink).

17. Route the red/green/violet wire from the fuse middle row cavity to the isolation relay. Crimp a ring terminal on the other end of the wire and connect it to the positive coil terminal of the relay. See **fig.12.** The isolation relay has a reversed-biased clamping diode connected in parallel to the coil circuit. This diode suppresses the voltage peaks generated during the collapse of the coil's magnetic field (e.g. when interrupting the power to the relay). Proper polarity must be observed to avoid damage to the diode (do not forward bias the diode).

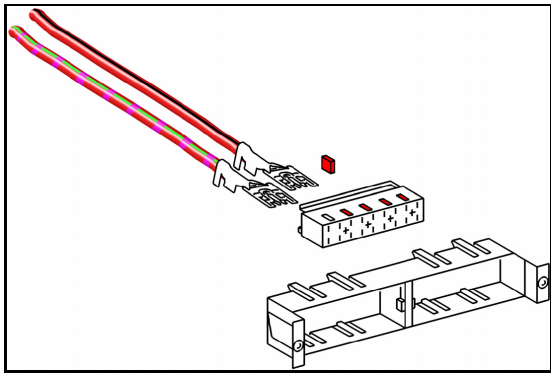


Fig 11, Fuse installation

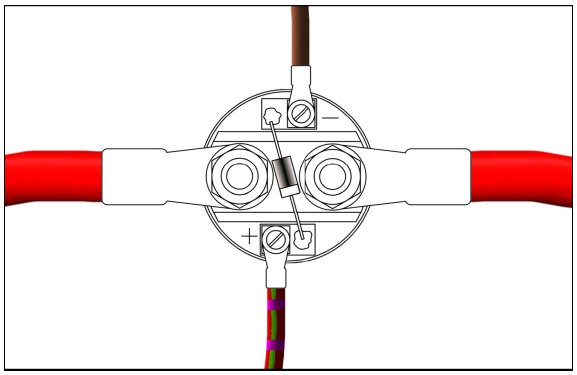


Fig 12, Isolation relay wiring

18. Crimp a ring terminal on one end of the brown 1 mm^2 wire and connect it to the negative coil terminal of the isolation relay. Route the wire to the ground stud (W5) on the seat base. See **fig.13.** Crimp a ring terminal on the other end of the wire and connect it to the ground stud (W5).

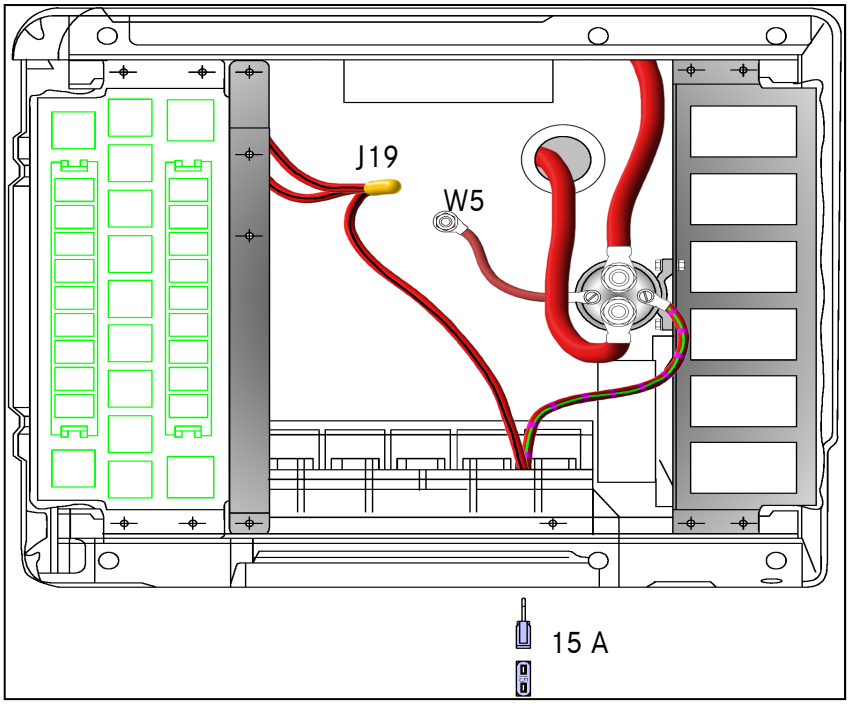


Fig 13, Wiring layout, driver's seat base

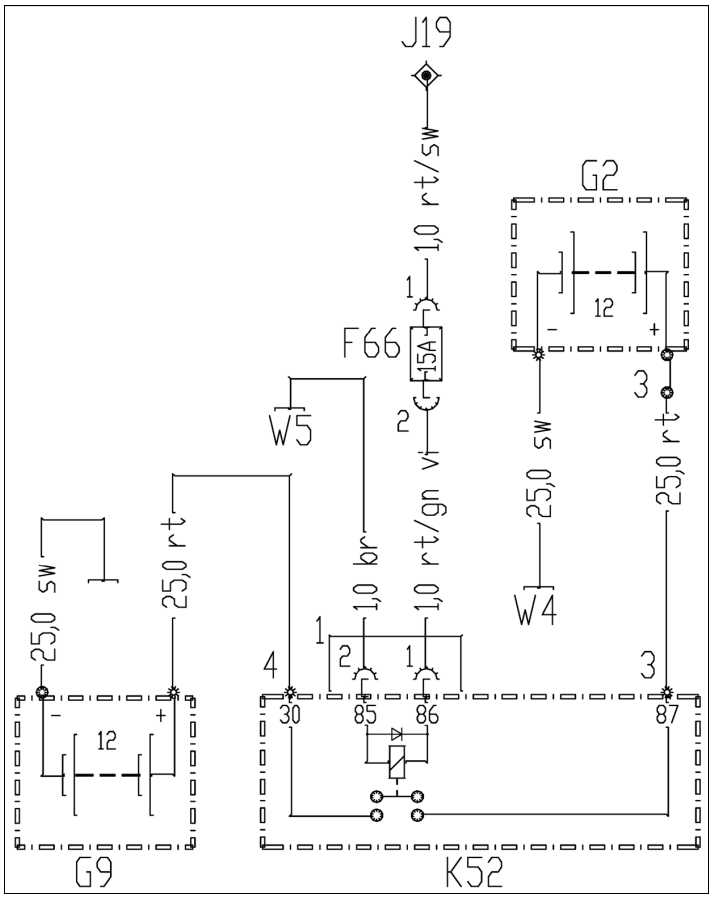
19. Locate the J connector pack. This is a bundle of spliced wires wrapped in black cloth tape located close to the W5 ground stud. Carefully unwrap the tape and find a splice with red/black 1 mm² wires. This is the J19 circuit splice. Remove the heat shrink cap from the splice and verify the circuit with a digital voltmeter. With the engine off and ignition on you should read 0 volts. With the engine running you should read charging system voltage. If this is correct, cut the crimp connector. Route the red/black wire from the fuse top row cavity to the J19 splice. Crimp the wires together with a new crimp connector and cover it with new heat shrink tubing. See **fig.13.**

20. Check the routing of the wires and connections with the wiring schematic. See **fig.14.** Ensure the wiring matches the schematic before proceeding with step 22.

21. Reconnect the negative terminal of the auxiliary battery.

22. Reinstall the front seats.

23. Reconnect the negative terminal of the main battery.



Circuit description:
F66 Isolation relay fuse (15 A)
G2 Battery
G9 Auxiliary battery
J19 Splice, circuit 61 connector sleeve
K52 Isolation relay
W4 Ground point engine compartment
W5 Ground point driver's seat frame

Wire colors:
sw = black
rt = red
br = brown
rt/sw = red with black tracer
rt/gn vi = red with green & violet tracers

Fig 14, Wiring schematic