

Original BMW Accessories.

Installation Instructions.



Retrofit engine start.

BMW X5 (F15)

BMW X6 (F16)

BMW 5 Series Saloon (F10) after 07/2013

MINI 3-door (F56)

MINI 5-door (F55)

Installation instructions only valid for US cars with automatic gearbox.

Retrofit kit number

64 50 2 408 984 Retrofit engine start

Installation time

The installation time is **approx. 1.5 hours**. This may vary depending on the condition of the vehicle and the equipment in it.

Important information

These installation instructions are primarily designed for use within the BMW/MINI dealership organization and by authorized BMW/MINI service companies.

These installation instructions are intended for use by qualified specialist staff trained on BMW/MINI vehicles with the relevant expert knowledge.

All work must be completed using the latest BMW/MINI repair manuals, wiring diagrams, servicing manuals and work instructions, in a rational order, using the prescribed tools (special tools) and observing current health and safety regulations.

If you experience installation or function problems, restrict troubleshooting to approx. 0.5 hours for mechanical work and 1.0 hour for electrical work.


To avoid unnecessary extra work and/or costs, send an inquiry straight away to the technical parts support team via the Aftersales Assistance Portal (ASAP).

Quote the following information:

- Chassis number,
- Retrofit kit part number,
- A detailed description of the problem,
- Any work already carried out.

Do not archive the hard copy of these installation instructions since daily updates are provided via ASAP.


Pictograms

 Denotes instructions that draw your attention to dangers.

 Denotes instructions that draw your attention to special features.

◀ Denotes the end of the instruction or other text.

Warning instructions for vehicles with knee airbag

 Work carried out on pyrotechnic objects must only be carried out by authorized and trained personnel. Incorrect activities may result in significant dangers.

Other people are strictly banned from carrying out any work on this system.

Note and comply with the safety instructions on how to use airbag modules and pyrotechnic belt tensioners. Incorrect handling can trigger the airbag and cause injuries.

The installation of the retrofit system must never impair the function of the knee airbag. When routing cables, ensure that no cables from the retrofit system touch or are secured to parts of the airbag system.

Installation information

Ensure that the cables and/or lines are not kinked or damaged as you install them in the car. Costs arising from this will not be reimbursed by BMW AG.

Additional cables/wires that you install must be secured with cable ties. If the specified PIN chambers are occupied, bridges, double crimps, or twin-lead terminals must be used.

An additional remote control is required for the retrofit. The remote control must undergo a teach-in process on the car and be functional.

Ordering instructions

The remote control **S**, the sealing compound **T** and the cartridge press **U** are not part of the retrofit kit and must be ordered separately (for part numbers and instructions, see EPC).

List of special equipment

The following special equipment must be taken into consideration when installing:

- SA 205** Steptronic automatic gearbox
- SA 2TE** Steptronic gearbox with shift paddles
- SA 2TB** Steptronic Sport gearbox

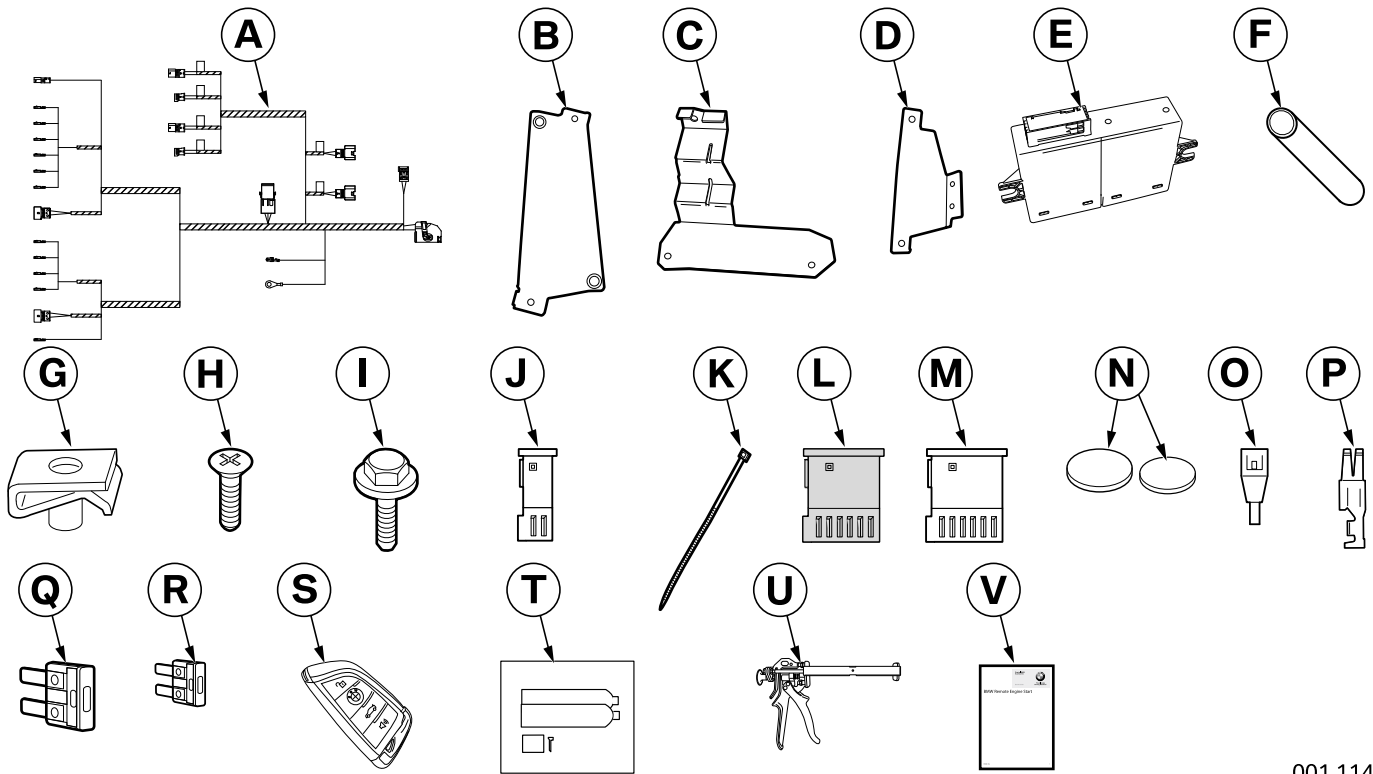
Special tools required

Details of the special tool required can be found in the relevant ISTA repair manual.

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1. Parts list for retrofit kit



001 1145 Z

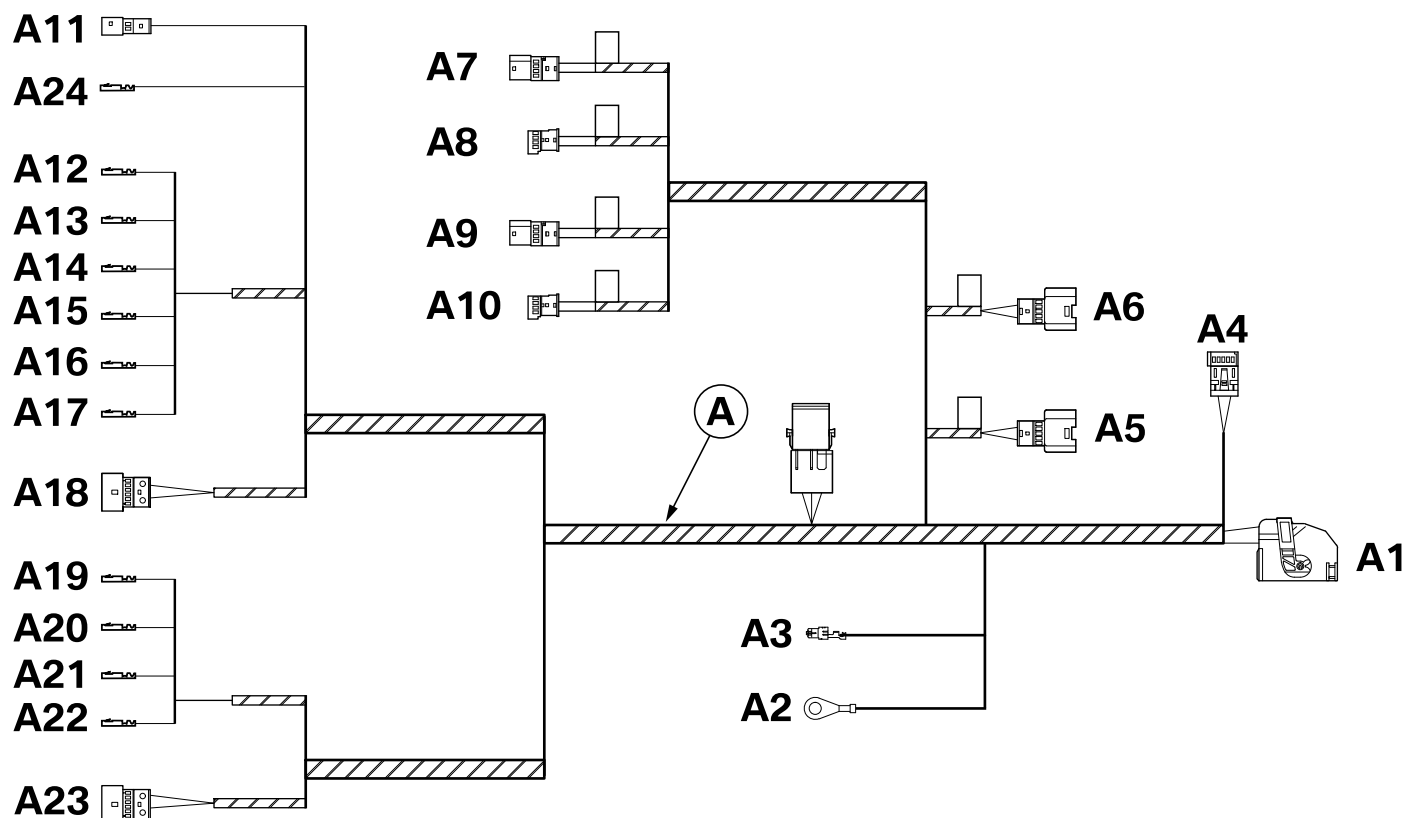
Legend

- A** Retrofit wiring harness
- B** Holder (for F15/F16 cars only)
- C** Holder (for F55/F56 cars only)
- D** Holder (for F10 cars only)
- E** Control unit
- F** Shrink hose (2 x)
- G** Flat nut M6 (4 x)
- H** Countersunk screw M6 x 16 mm (2 x)
- I** Hexagon screw with M6 x 16 mm washer (2 x)
- J** SW 2-pin socket casing
- K** Cable ties (15 x)
- L** SW 6-pin socket casing
- M** WS 6-pin socket casing
- N** Adapter plate (thickness 4 mm/diameter 24.4 mm for F15/F16/F55/F56 cars, thickness 2 mm/diameter 19.9 mm for F10 cars)
- O** Socket contact (for F55/F56 cars only)
- P** Double flat spring contact (for F10 cars only)
- Q** Fuse 5 A ATO (for F15/F16/F55/F56 cars only)
- R** Fuse 5 A Mini (for F10 cars only)
- S** Remote control (not supplied in the retrofit kit)
- T** Sealing compound (Betalink K2, not supplied with the retrofit kit)
- U** Cartridge press (Betalink K2, not supplied with the retrofit kit)
- V** Operating instructions (to be given to the customer)

2. Preparatory work

	ISTA No.
Disconnect all negative battery cables	61 20 900
Release and disconnect various plug connections	61 13 ...
Cut, strip and crimp cables	61 11 ...
Open the plug housing and remove the contacts from various connection systems	61 13 ...
Instructions for handling the documents: Repair instructions, Technical data, Tightening torques	00 11 ...
Instructions for handling wiring harnesses and cables	61 00 ...
The following components must be removed first of all	
Pedal trim	51 45 184
Airbag module for driver knee protection	72 12 004
Bottom right dashboard trim	51 45 195
Airbag module for passenger knee protection	72 12 006
Glove box, complete	51 16 366

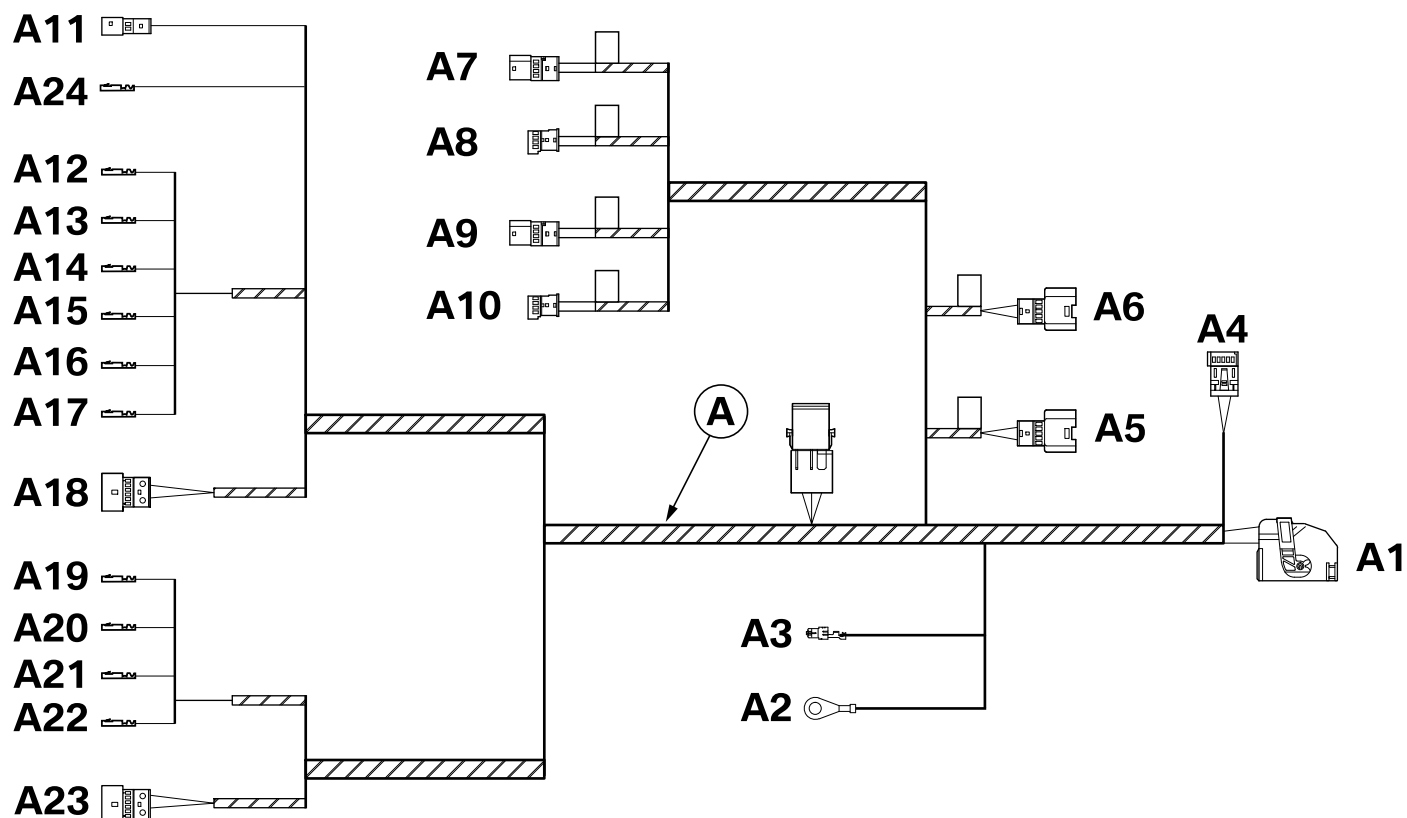
3. Wiring harness connection diagram (F15/F16 cars only)



001 1263 Z

Item	Designation	Signal	Cable color/ cross-section	Connection location in the car	Abbreviation/ slot
A	Retrofit wiring harness	---	---	---	---
A1	SW 32-pin socket casing	---	---	To control unit E	---
A2	M6 ring eyelet	31	BR 0.75 mm ²	To passenger footwell ground support point	Z10*10B
A3	Double flat spring contact	30B	RT/SW 0.75 mm ²	To front fuse box Z7	Z7*9B PIN 5
A4	SW 10-pin socket casing	---	---	Connect to branch A5	X21*S
A5	SW 10-pin plug housing	---	---	Connect to branch A4 (check strap)	X20*B
A6	SW 10-pin plug housing	---	---	Insulate and tie back (check strap)	---
A7	WS 4-pin plug housing	---	---	Insulate and tie back (check strap)	---
A8	WS 4-pin socket casing	---	---	Insulate and tie back (check strap)	---
A9	WS 4-pin plug housing	---	---	To plug on brake light switch S25 (check strap)	S25*1B
A10	WS 4-pin socket casing	---	---	To brake light switch S25 (check strap)	S25
A11	SW 2-pin plug housing	15_3_OUT	GR/RT 0.50 mm ²	With socket casing J to the disconnected cable from BDC plug A258	---
A12	Socket contact	SSP_H1	GN/GR 0.35 mm ²	Connect to BDC plug A258	A258*7B PIN 45
A13	Socket contact	SSP_H2	WS/BR 0.35 mm ²	Connect to BDC plug A258	A258*7B PIN 49

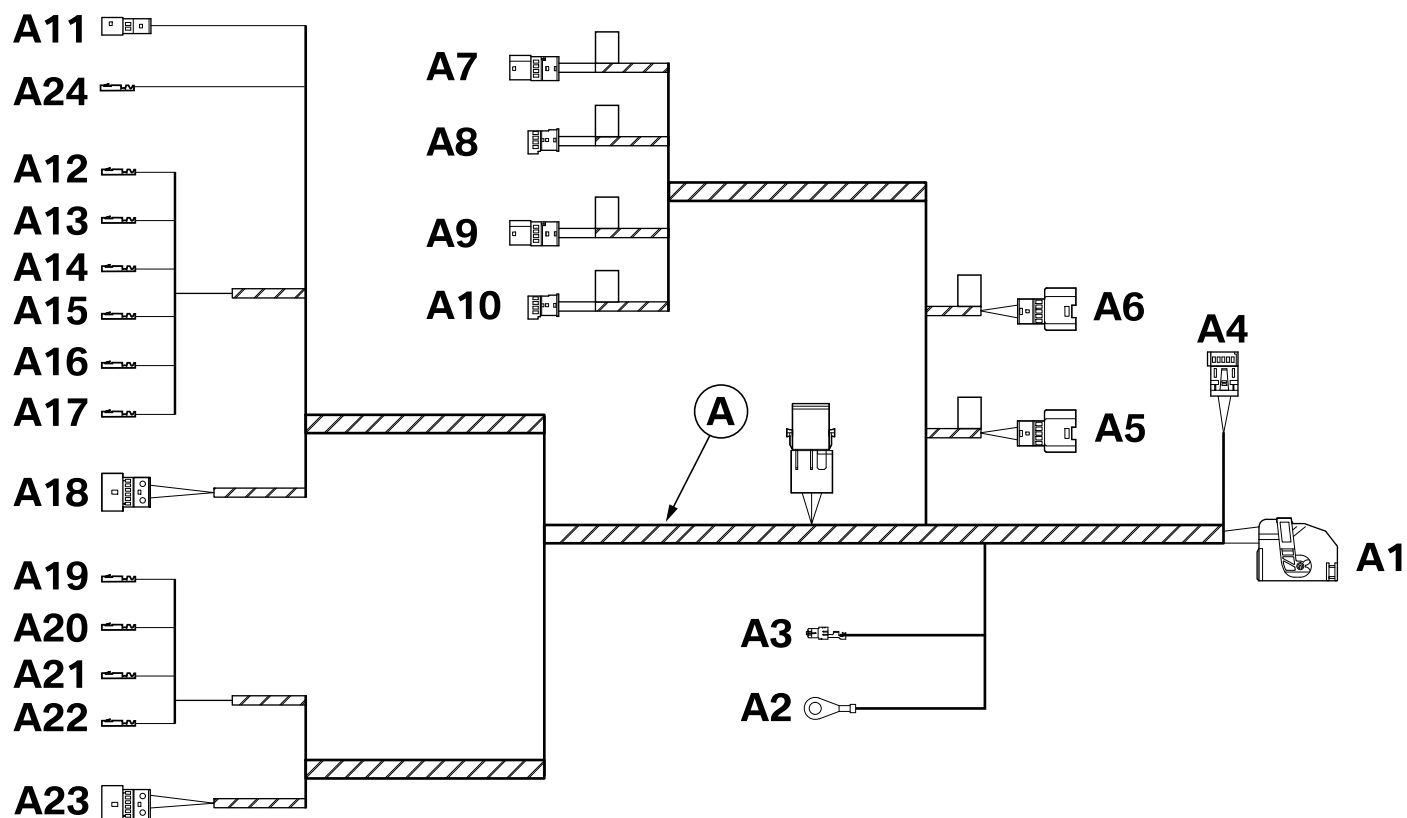
3. Wiring harness connection diagram (F15/F16 cars only)



001 1263 Z

Item	Designation	Signal	Cable color/ cross-section	Connection location in the car	Abbreviation/ slot
A14	Socket contact	VCC_H1	GN 0.35 mm ²	Insulate with shrink hose F and tie back	---
A15	Socket contact	VCC_H2	WS 0.35 mm ²	Insulate with shrink hose F and tie back	---
A16	Socket contact	31E_H2	GE/GN 0.35 mm ²	Connect to BDC plug A258	A258*7B PIN 50
A17	Socket contact	31E_H1	BL/GN 0.35 mm ²	Connect to BDC plug A258	A258*7B PIN 46
A18	SW 6-pin plug housing	---	---	With socket casing L to the disconnected cables from BDC plug A258	A258*7B
A19	Socket contact	FA_CAN_H	WS/BL 0.35 mm ²	Connect to BDC plug A258	A258*8B PIN 48
A20	Socket contact	FA_CAN_L	GN/BL 0.35 mm ²	Connect to BDC plug A258	A258*8B PIN 47
A21	Socket contact	B_CAN_H	GE/RT 0.35 mm ²	Connect to BDC plug A258	A258*8B PIN 50
A22	Socket contact	B_CAN_L	GE/BR 0.35 mm ²	Connect to BDC plug A258	A258*8B PIN 49
A23	WS 6-pin plug housing	---	---	With socket casing M to the disconnected cables from BDC plug A258	A258*8B
A24	Socket contact	15_3_IN	GN/GE 0.50 mm ²	Connect to BDC plug A258	A258*3B PIN 2

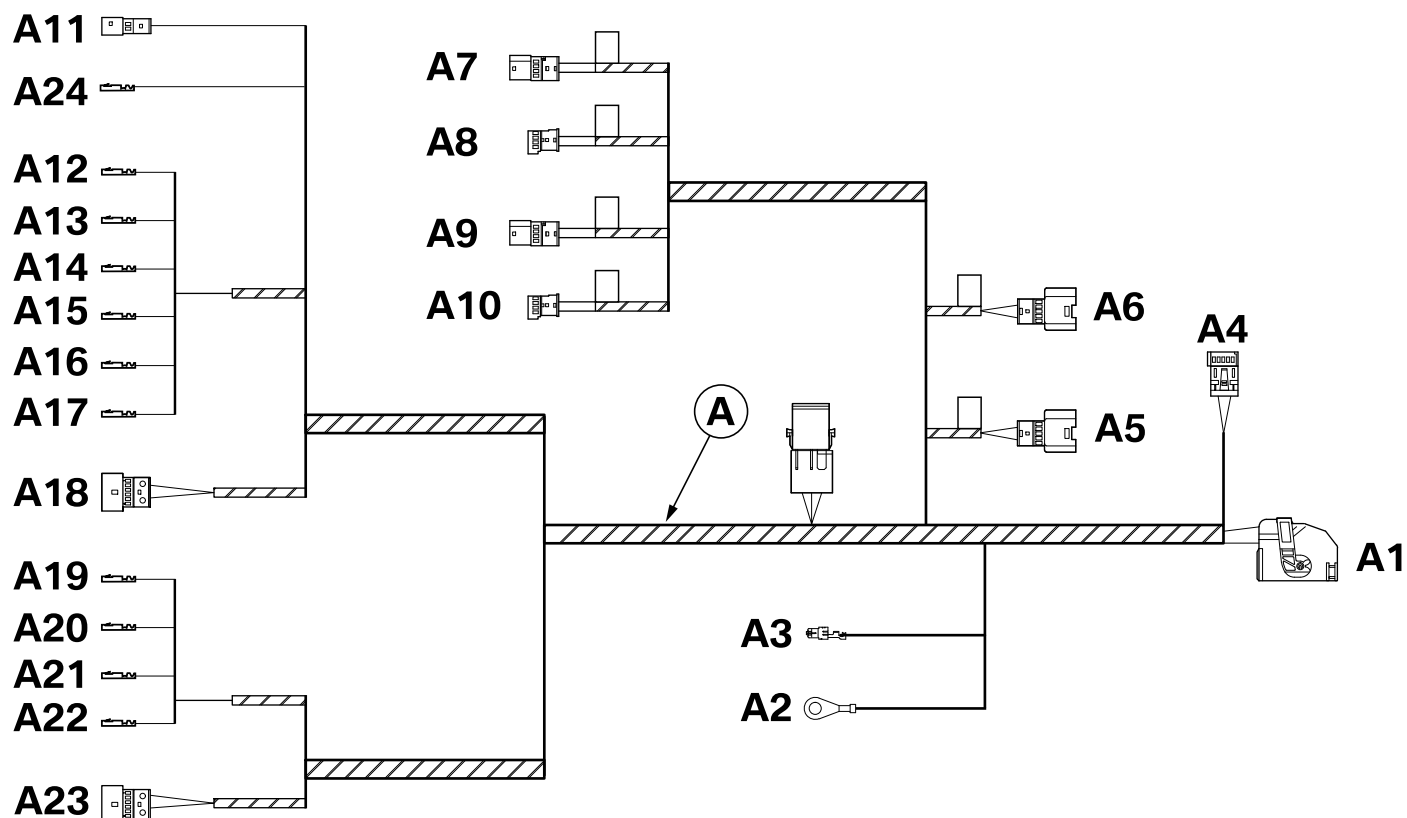
4. Wiring harness connection diagram (F55/F56 cars only)



001 1263 Z

Item	Designation	Signal	Cable color/ cross-section	Connection location in the car	Abbreviation/ slot
A	Retrofit wiring harness	---	---	---	---
A1	SW 32-pin socket casing	---	---	To control unit E	---
A2	M6 ring eyelet	31	BR 0.75 mm ²	To ground support point on right-hand A pillar	Z10*6B
A3	Double flat spring contact	30B	RT/SW 0.75 mm ²	With socket contact O to front fuse box Z7	Z7*5B PIN 38
A4	SW 10-pin socket casing	---	---	Connect to branch A5	X21*S
A5	SW 10-pin plug housing	---	---	Connect to branch A4 (check strap)	X20*B
A6	SW 10-pin plug housing	---	---	Insulate and tie back (check strap)	---
A7	WS 4-pin plug housing	---	---	Insulate and tie back (check strap)	---
A8	WS 4-pin socket casing	---	---	Insulate and tie back (check strap)	---
A9	WS 4-pin plug housing	---	---	To plug on brake light switch S25 (check strap)	S25*1B
A10	WS 4-pin socket casing	---	---	To brake light switch S25 (check strap)	S25
A11	SW 2-pin plug housing	15_3_OUT	GR/RT 0.50 mm ²	With socket casing J to the disconnected cable from BDC plug A258	---
A12	Socket contact	SSP_H1	GN/GR 0.35 mm ²	Connect to BDC plug A258	A258*7B PIN 45
A13	Socket contact	SSP_H2	WS/BR 0.35 mm ²	Connect to BDC plug A258	A258*7B PIN 49

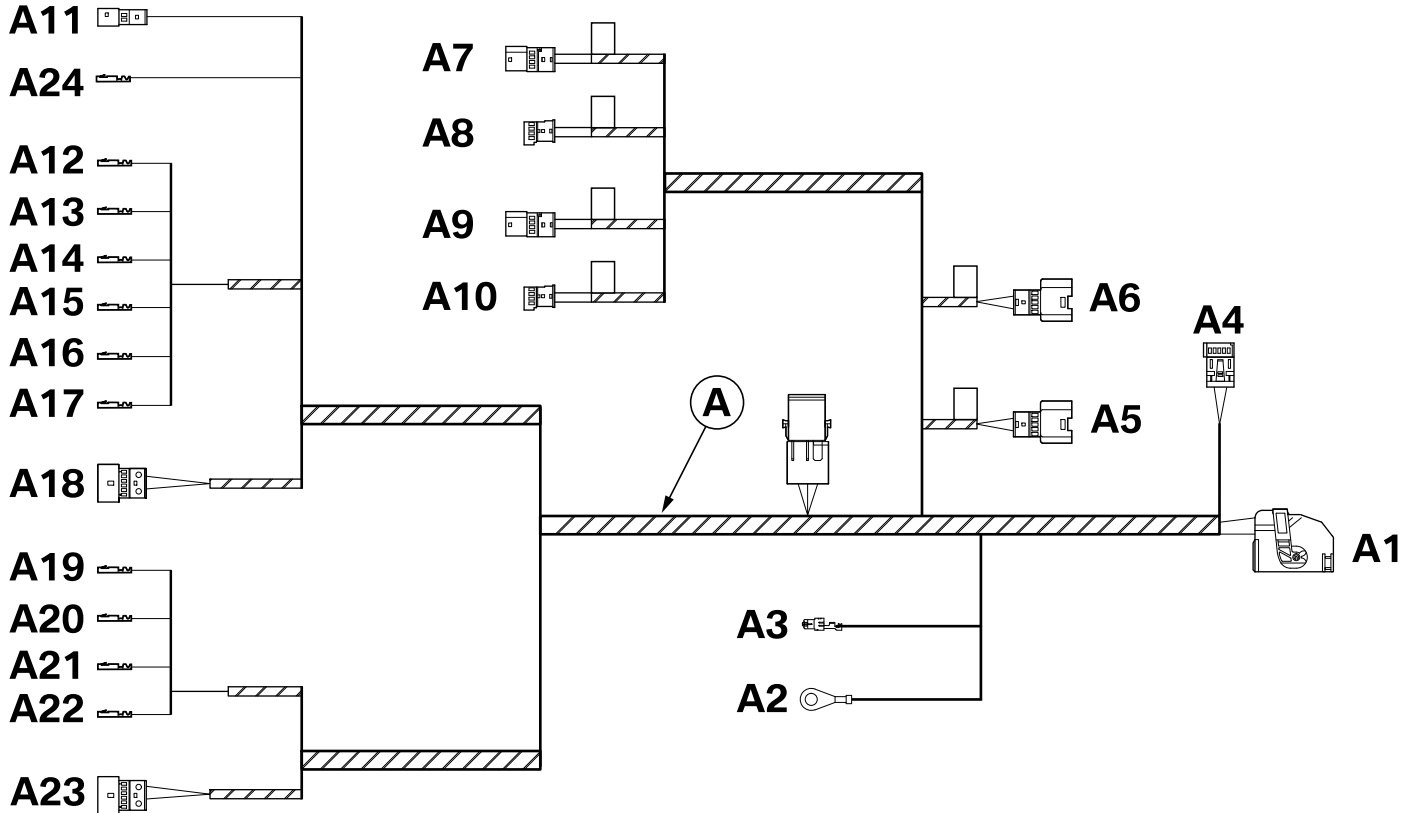
4. Wiring harness connection diagram (F55/F56 cars only)



001 1263 Z

Item	Designation	Signal	Cable color/ cross-section	Connection location in the car	Abbreviation/ slot
A14	Socket contact	VCC_H1	GN 0.35 mm ²	Insulate with shrink hose F and tie back	---
A15	Socket contact	VCC_H2	WS 0.35 mm ²	Insulate with shrink hose F and tie back	---
A16	Socket contact	31E_H2	GE/GN 0.35 mm ²	Connect to BDC plug A258	A258*7B PIN 50
A17	Socket contact	31E_H1	BL/GN 0.35 mm ²	Connect to BDC plug A258	A258*7B PIN 46
A18	SW 6-pin plug housing	---	---	With socket casing L to the disconnected cables from BDC plug A258	A258*7B
A19	Socket contact	FA_CAN_H	WS/BL 0.35 mm ²	Connect to BDC plug A258	A258*8B PIN 48
A20	Socket contact	FA_CAN_L	GN/BL 0.35 mm ²	Connect to BDC plug A258	A258*8B PIN 47
A21	Socket contact	B_CAN_H	GE/RT 0.35 mm ²	Connect to BDC plug A258	A258*8B PIN 50
A22	Socket contact	B_CAN_L	GE/BR 0.35 mm ²	Connect to BDC plug A258	A258*8B PIN 49
A23	WS 6-pin plug housing	---	---	With socket casing M to the disconnected cables from BDC plug A258	A258*8B
A24	Socket contact	15_3_IN	GN/GE 0.50 mm ²	Connect to BDC plug A258	A258*3B PIN 2

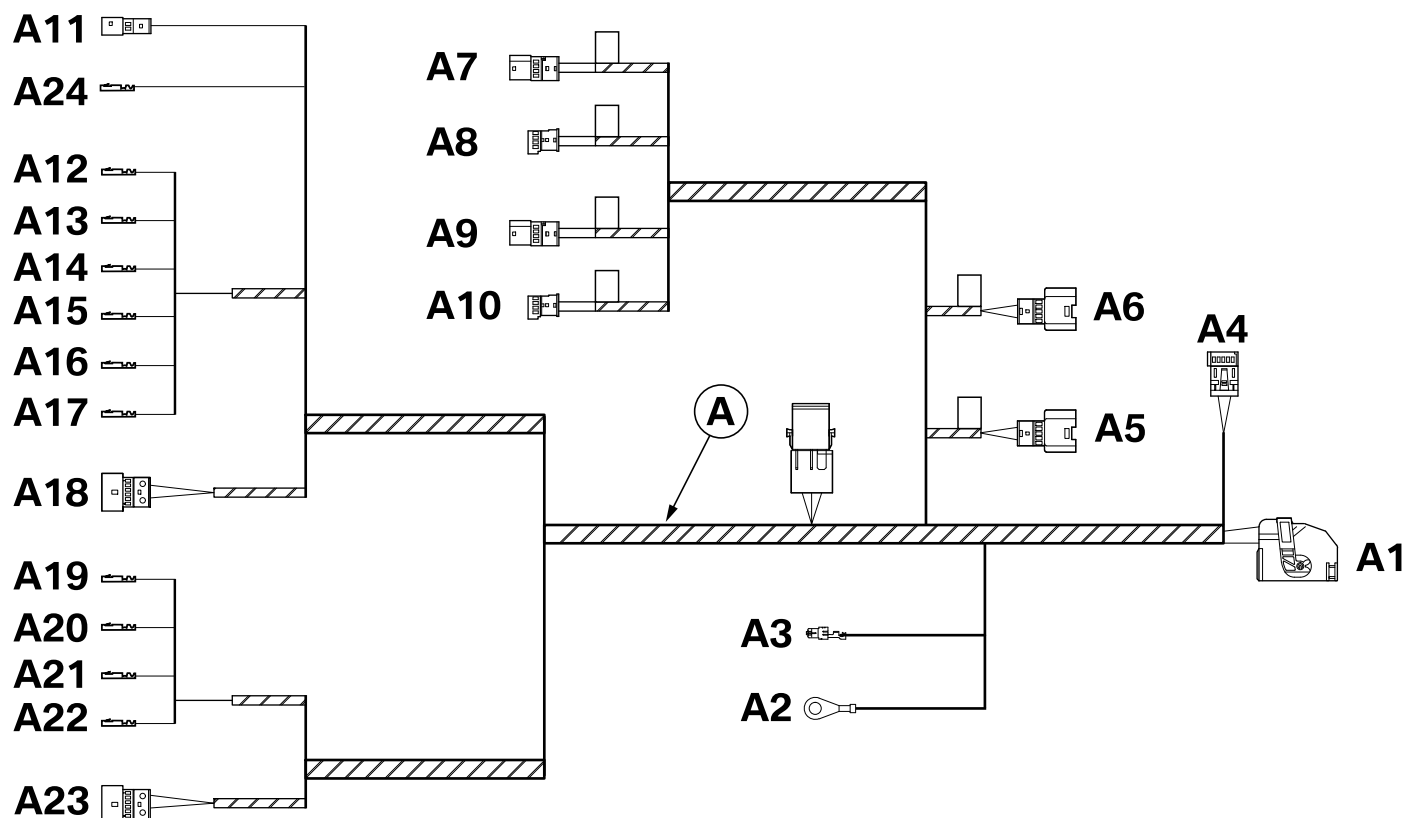
5. Wiring harness connection diagram (F10 cars only)



001 1263 Z

Item	Designation	Signal	Cable color/ cross-section	Connection location in the car	Abbreviation/ slot
A	Retrofit wiring harness	---	---	---	---
A1	SW 32-pin socket casing	---	---	To control unit E	---
A2	M6 ring eyelet	31	BR 0.75 mm ²	To ground support point on right-hand A pillar	Z10*6B
A3	Double flat spring contact	30B	RT/SW 0.75 mm ²	With double flat spring contact P to front fuse box Z1	Z1*8B PIN 3
A4	SW 10-pin socket casing	---	---	Connect to branch A6	X21*S
A5	SW 10-pin plug housing	---	---	Insulate and tie back (check strap)	---
A6	SW 10-pin plug housing	---	---	Connect to branch A4 (check strap)	X20*B
A7	WS 4-pin plug housing	---	---	To plug on brake light switch S25 (check strap)	S25*1B
A8	WS 4-pin socket casing	---	---	To brake light switch S25 (check strap)	S25
A9	WS 4-pin plug housing	---	---	Insulate and tie back (check strap)	---
A10	WS 4-pin socket casing	---	---	Insulate and tie back (check strap)	---
A11	SW 2-pin plug housing	15_3_OUT	GR/RT 0.50 mm ²	With socket casing J to the disconnected cable from CAS plug A16	---
A12	Socket contact	SSP_H1	GN/GR 0.35 mm ²	Connect to CAS plug A16	A16*2B PIN 8
A13	Socket contact	SSP_H2	WS/BR 0.35 mm ²	Connect to CAS plug A16	A16*2B PIN 7

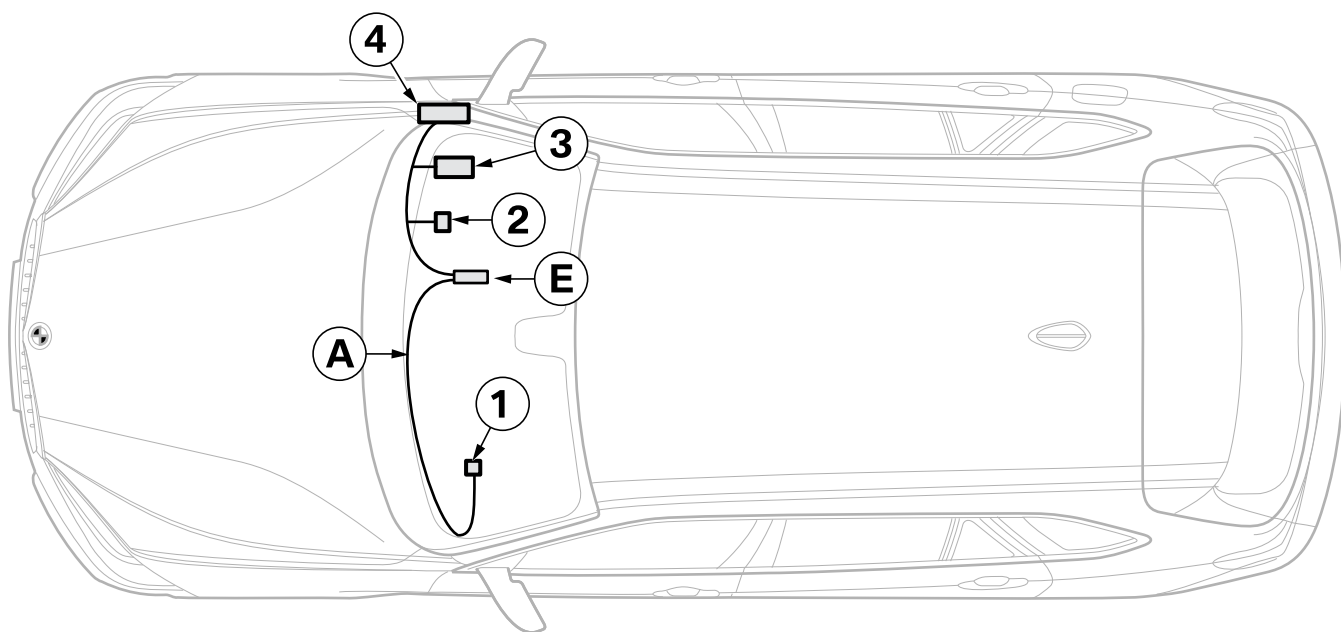
5. Wiring harness connection diagram (F10 cars only)



001 1263 Z

Item	Designation	Signal	Cable color/ cross-section	Connection location in the car	Abbreviation/ slot
A14	Socket contact	VCC_H1	GN 0.35 mm ²	Connect to CAS plug A16	A16*2B PIN 21
A15	Socket contact	VCC_H2	WS 0.35 mm ²	Connect to CAS plug A16	A16*2B PIN 6
A16	Socket contact	31E_H2	GE/GN 0.35 mm ²	Connect to CAS plug A16	A16*2B PIN 18
A17	Socket contact	31E_H1	BL/GN 0.35 mm ²	Connect to CAS plug A16	A16*2B PIN 5
A18	SW 6-pin plug housing	---	---	With socket casing L to the disconnected cables from CAS plug A16	A16*2B
A19	Socket contact	FA_CAN_H	WS/BL 0.35 mm ²	Connect to ZGM plug A51	A51*1B PIN 46
A20	Socket contact	FA_CAN_L	GN/BL 0.35 mm ²	Connect to ZGM plug A51	A51*1B PIN 47
A21	Socket contact	B_CAN_H	GE/RT 0.35 mm ²	Connect to ZGM plug A51	A51*1B PIN 48
A22	Socket contact	B_CAN_L	GE/BR 0.35 mm ²	Connect to ZGM plug A51	A51*1B PIN 49
A23	WS 6-pin plug housing	---	---	With socket casing M to the disconnected cables from ZGM plug A51	A51*1B
A24	Socket contact	15_3_IN	GN/GE 0.5 mm ²	Connect to CAS plug A16	A16*1B PIN 7

6. Installation and cabling diagram (F15/F16 cars only)

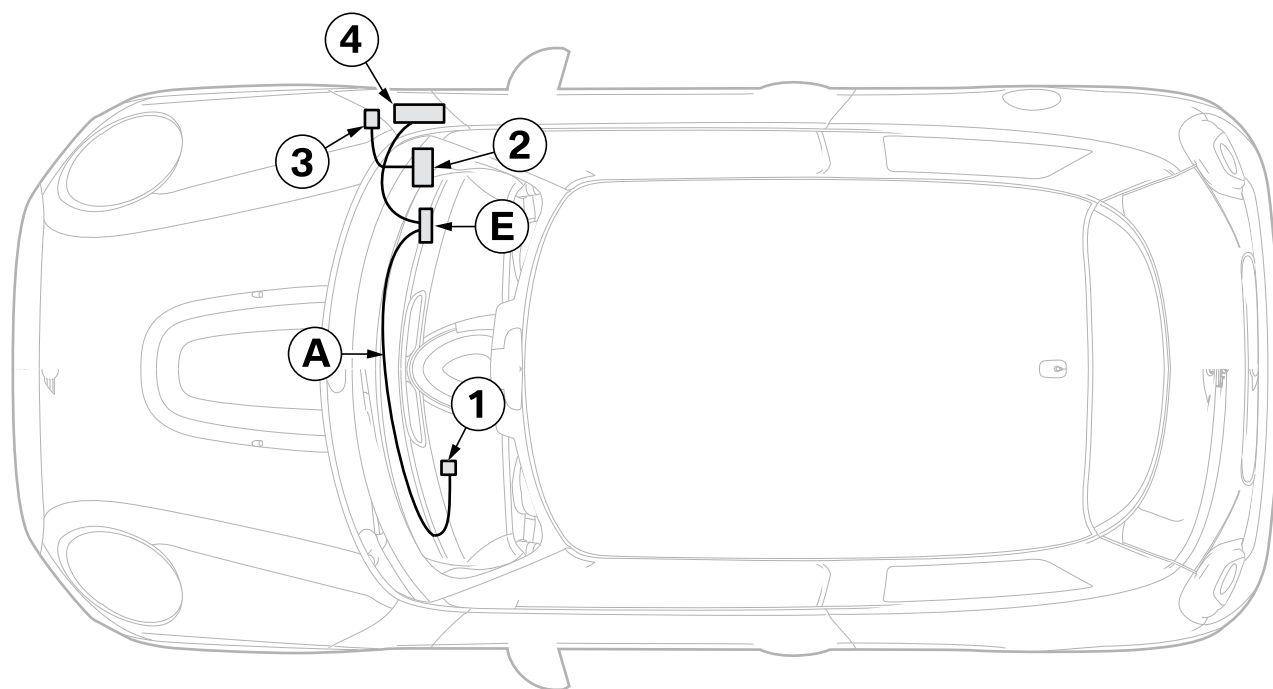


F15 0211 Z

A Retrofit wiring harness
E Control unit

1 Brake light switch **S25**, plug **S25*1B**
2 Ground support point **Z10*10B**
3 Fuse box **Z7**, plug **Z7*9B**
4 BDC **A258**, plugs **A258*3B**, **A258*7B** and **A258*8B**

7. Installation and cabling diagram (F55/F56 cars only)

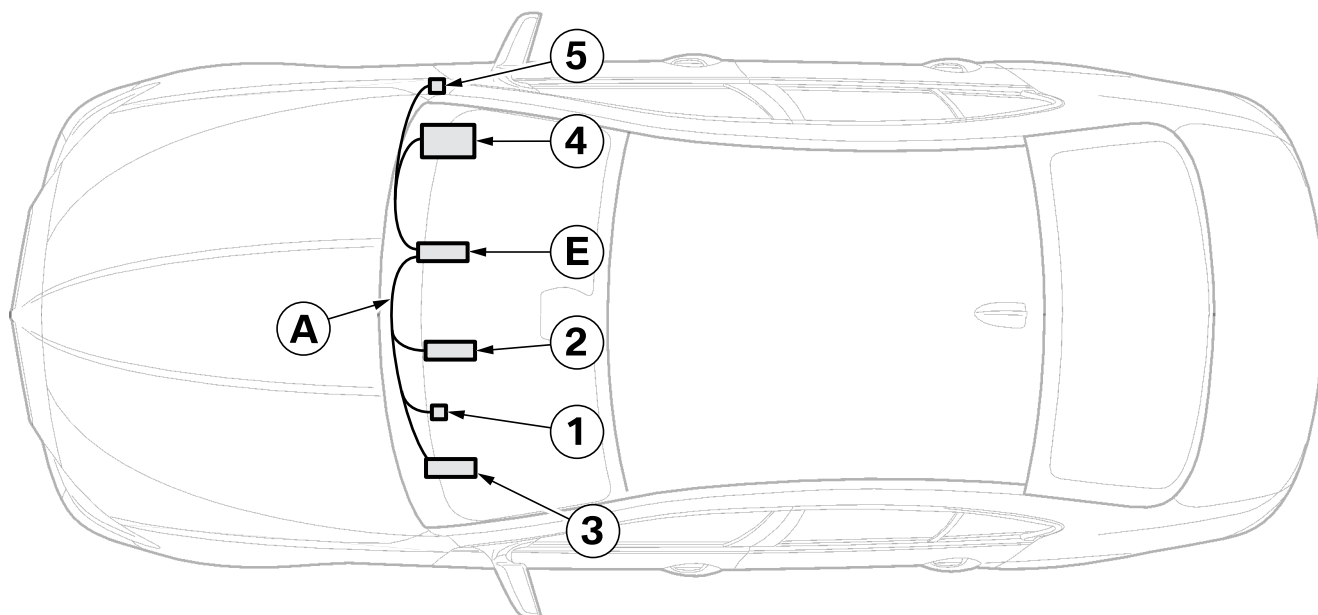


F56 0210 Z

A Retrofit wiring harness
E Control unit

- 1** Brake light switch **S25**, plug **S25*1B**
2 Fuse box **Z7**, plug **Z7*5B**
3 Ground support point **Z10*6B**
4 BDC **A258**, plugs **A258*3B**, **A258*7B** and **A258*8B**

8. Installation and cabling diagram (F10 cars only)

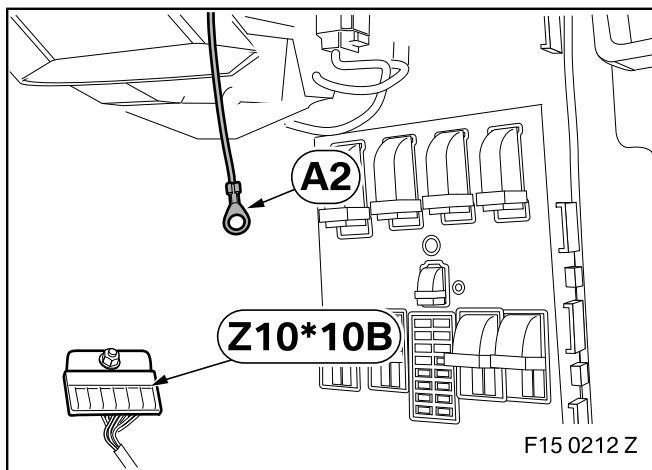


F10 0279 Z

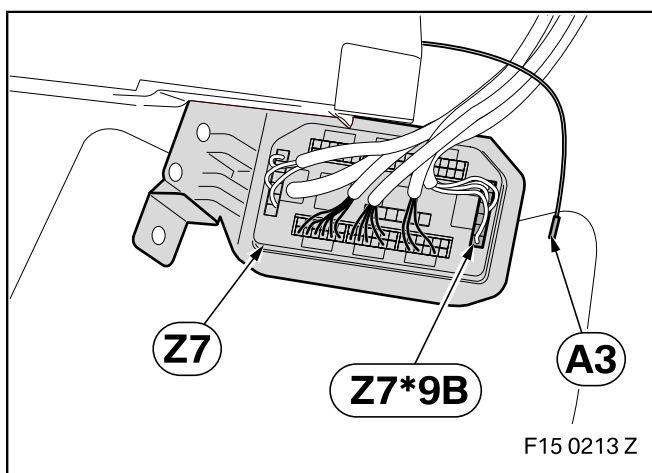
A Retrofit wiring harness
E Control unit

1 Brake light switch **S25**, plug **S25*1B**
2 CAS **A16**, plugs **A16*1B**, **A16*2B**
3 ZGM **A51**, plug **A51*1B**
4 Fuse box **Z1**, plug **Z1*8B**
5 Ground support point **Z10*6B**

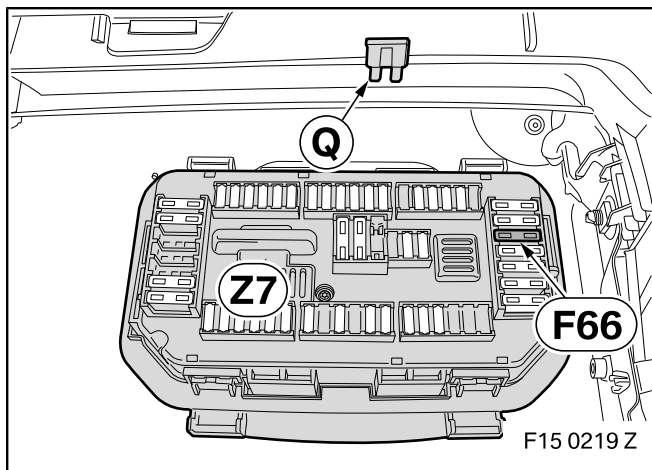
9. Route and connect the retrofit wiring harness (F15/F16 cars only)



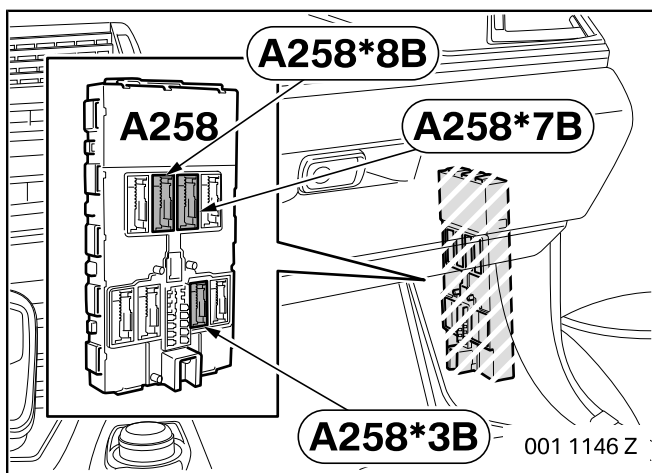
Screw branch **A2**, M6 ring eyelet, to ground support point **Z10*10B** under the carpet in the passenger footwell.



Route branch **A3** to fuse box **Z7** and connect to PIN 5 of plug **Z7*9B**, WS 7-pin socket casing.



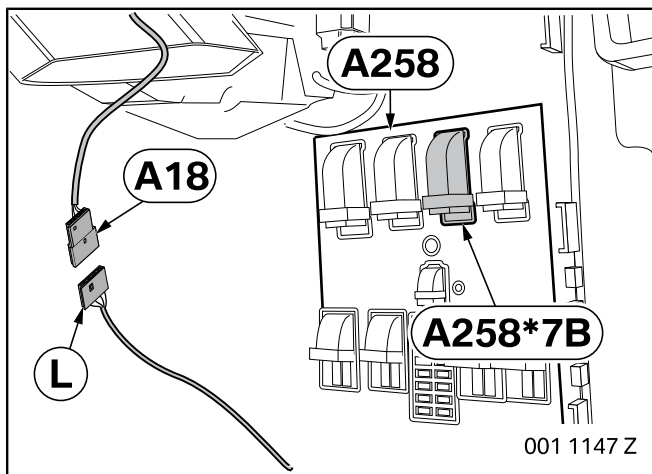
Insert fuse **Q** into slot **F66** of fuse box **Z7**.



Connection locations on BDC **A258**:

- **A258*3B**, SW 54-pin socket casing
- **A258*7B**, WS 54-pin socket casing
- **A258*8B**, SW 54-pin socket casing

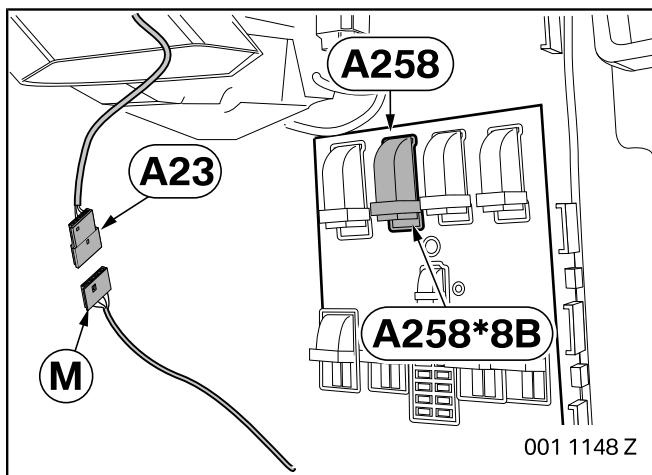
9. Route and connect the retrofit wiring harness (F15/F16 cars only)



Disconnect the cables from plug **A258*7B**, WS 54-pin socket casing, on BDC **A258** as follows and connect them to SW 6-pin socket casing **L**:

- GN cable from PIN 45 to PIN 1
- BL/GN cable from PIN 46 to PIN 2
- WS/BL cable from PIN 49 to PIN 3
- GE/GN cable from PIN 50 to PIN 4

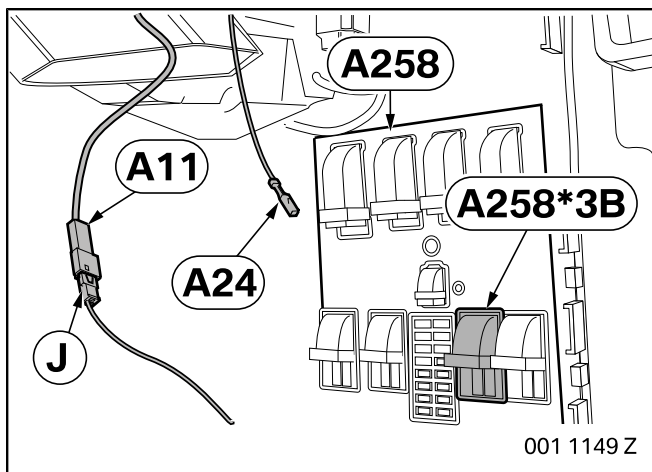
Connect SW 6-pin socket casing **L** to branch **A18**, SW 6-pin plug housing.



Disconnect the cables from plug **A258*8B**, SW 54-pin socket casing, on the BDC **A258** as follows and connect them to WS 6-pin socket casing **M**:

- BL/RT cable from PIN 47 to PIN 1
- RT cable from PIN 48 to PIN 2
- GE/RT cable from PIN 50 to PIN 3
- GE/BR cable from PIN 49 to PIN 4

Connect WS 6-pin socket casing **M** to branch **A23**, SW 6-pin plug housing.

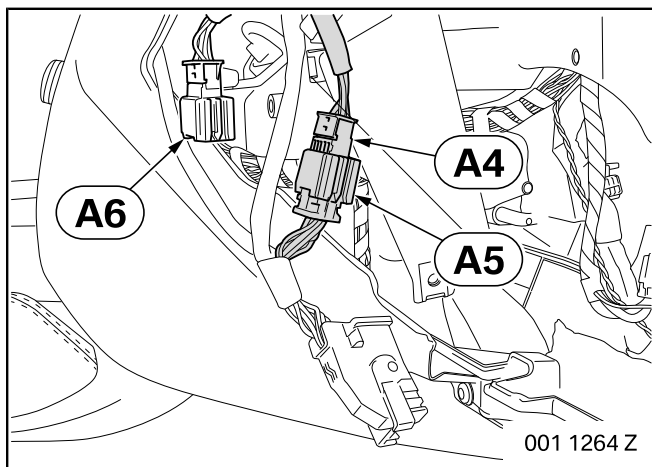


Disconnect the GE/GN cable from PIN 2 of plug **A258*3B**, SW 54-pin socket casing on BDC **A258** and connect it to PIN 1 of SW 2-pin socket casing **J**.

Connect branch **A11**, SW 2-pin plug housing, GR/RT cable, to SW 2-pin socket casing **J**.

Connect branch **A24**, GN/GE cable, to PIN 2 of plug **A258*3B**, SW 54-pin socket casing on BDC **A258**.

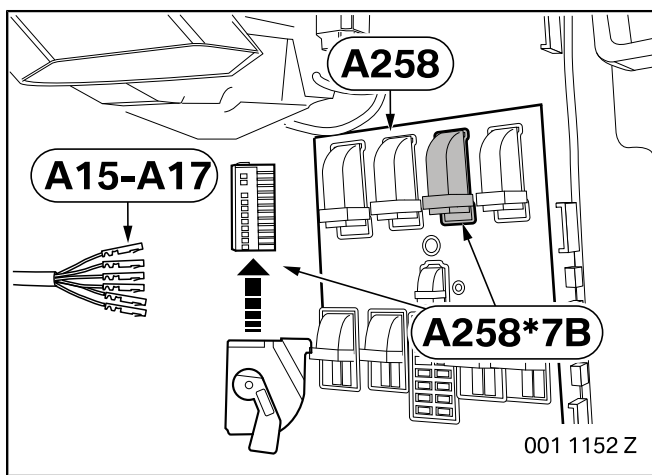
9. Route and connect the retrofit wiring harness (F15/F16 cars only)



▶ Check the straps on the retrofit wiring harness. ◀

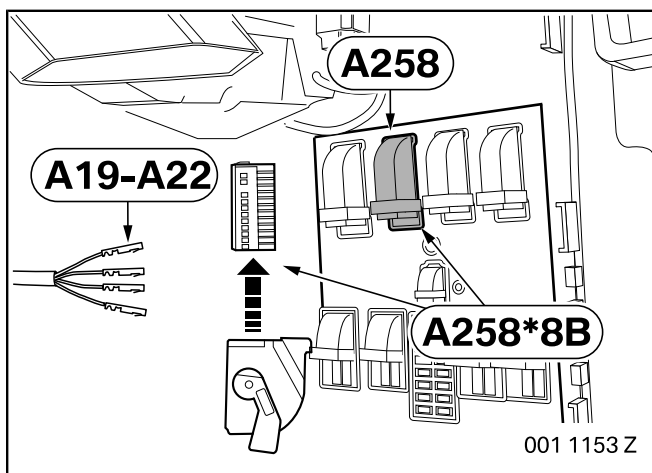
Connect branch **A4**, SW 10-pin socket casing, to branch **A5**, SW 10-pin plug housing.

Tie back branch **A6**, SW 10-pin socket casing (not required).



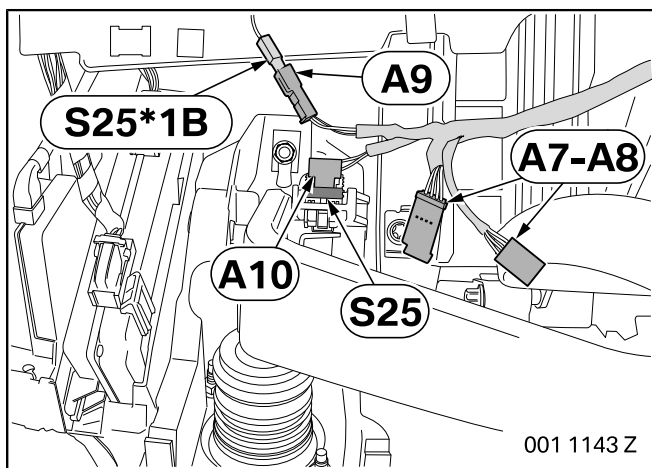
Route branches **A12–A17** to location of BDC **A258** and connect as follows to plug **A258*7B**, NT 54-pin socket casing:

- Branch **A12**, GN/GR cable, to PIN 45
- Branch **A13**, WS/BR cable, to PIN 49
- Insulate and tie back branch **A14**, GN cable, with shrink hose **F**
- Insulate and tie back branch **A15**, WS cable, with shrink hose **F**
- Branch **A16**, GE/GN cable, to PIN 50
- Branch **A17**, BL/GN cable, to PIN 46



Route branches **A19–A22** to location of BDC **A258** and connect as follows to plug **A258*8B**, SW 54-pin socket casing:

- Branch **A19**, WS/BL cable, to PIN 48
- Branch **A20**, GN/BL cable, to PIN 47
- Branch **A21**, GE/RT cable, to PIN 50
- Branch **A22**, GE/BR cable, to PIN 49



▶ Check the straps on the retrofit wiring harness. ◀

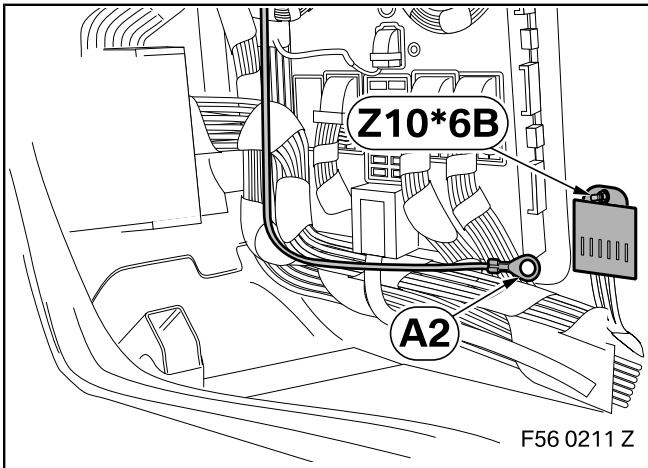
Route branches **A7–A10** to the location of the brake light switch **S25**.

Disconnect plug **S25*1B**, WS 4-pin socket casing from brake light switch **S25** and connect it to branch **A9**, WS 4-pin plug housing.

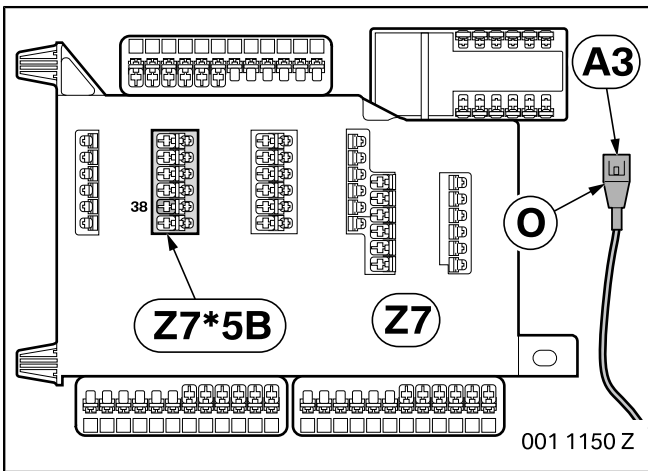
Connect branch **A10**, WS 4-pin socket casing, to brake light switch **S25**.

Tie back branches **A7–A8** (not required).

10. Route and connect the retrofit wiring harness (F55/F56 cars only)

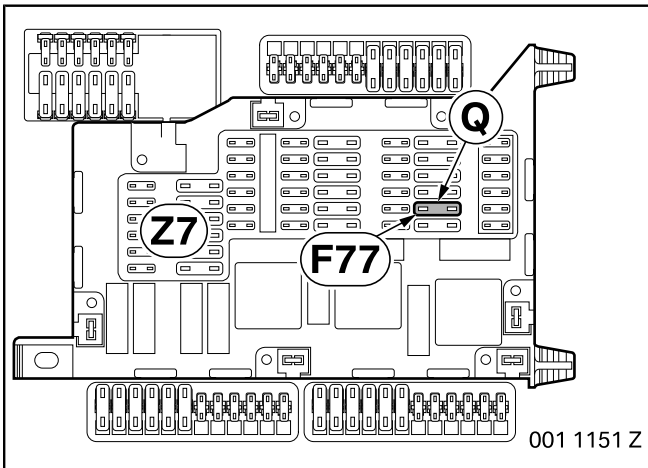


Screw branch **A2**, M6 ring eyelet, to ground support point **Z10*6B**.

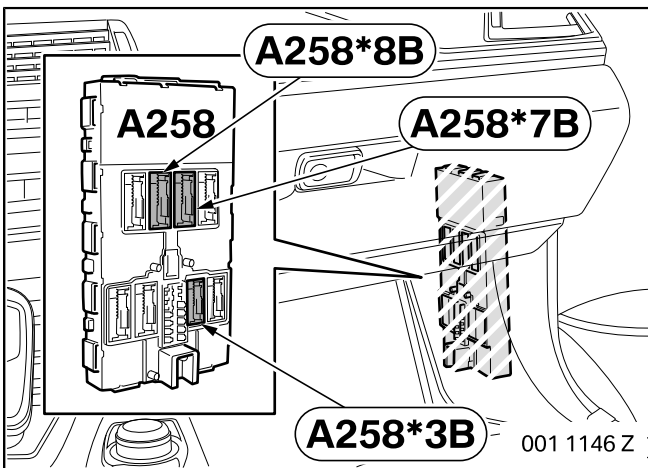


Disconnect the double flat spring contact of branch **A3** and crimp on socket contact **O**.

Route branch **A3** to fuse box **Z7** and connect to PIN 38 of slot **Z7*5B**.



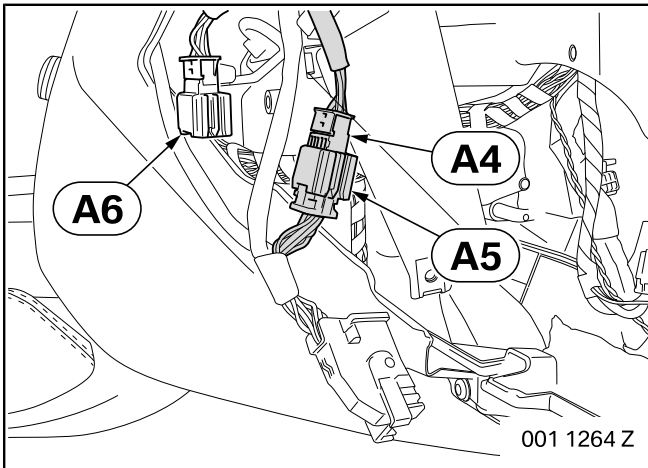
Insert fuse **Q** into slot **F77** of fuse box **Z7**.



Connection locations on BDC **A258**:

- **A258*3B**, SW 54-pin socket casing
- **A258*7B**, WS 54-pin socket casing
- **A258*8B**, SW 54-pin socket casing

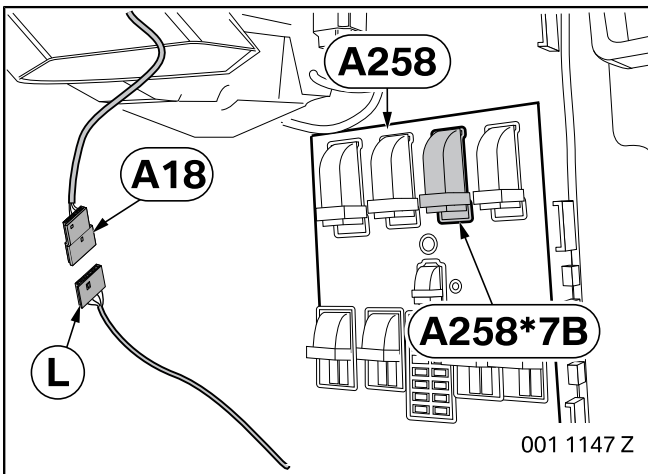
10. Route and connect the retrofit wiring harness (F55/F56 cars only)



☐ Check the straps on the retrofit wiring harness. ◀

Connect branch **A4**, SW 10-pin socket casing, to branch **A5**, SW 10-pin plug housing.

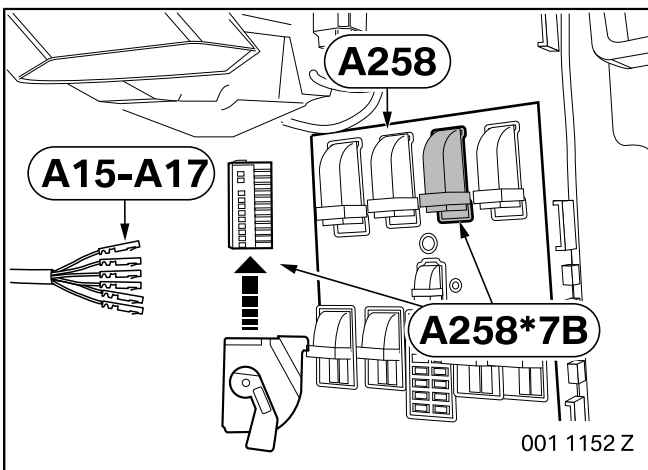
Tie back branch **A6**, SW 10-pin socket casing (not required).



Disconnect the cables from plug **A258*7B**, WS 54-pin socket casing, on BDC **A258** as follows and connect them to SW 6-pin socket casing **L**:

- GR cable from PIN 45 to PIN 1
- WS/BR cable from PIN 46 to PIN 2
- WS cable from PIN 49 to PIN 3
- GE/BR cable from PIN 50 to PIN 4

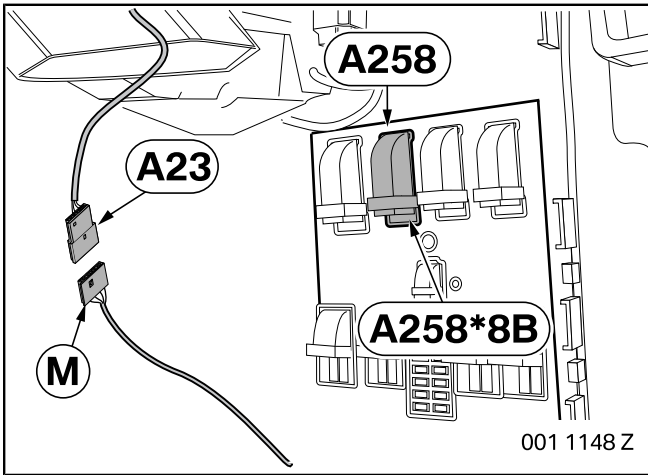
Connect SW 6-pin socket casing **L** to branch **A18**, SW 6-pin plug housing.



Route branches **A12-A17** to location of BDC **A258** and connect as follows to plug **A258*7B**, NT 54-pin socket casing:

- Branch **A12**, GN/GR cable, to PIN 45
- Branch **A13**, WS/BR cable, to PIN 49
- Insulate and tie back branch **A14**, GN cable, with shrink hose **F**
- Insulate and tie back branch **A15**, WS cable, with shrink hose **F**
- Branch **A16**, GE/GN cable, to PIN 50
- Branch **A17**, BL/GN cable, to PIN 46

10. Route and connect the retrofit wiring harness (F55/F56 cars only)

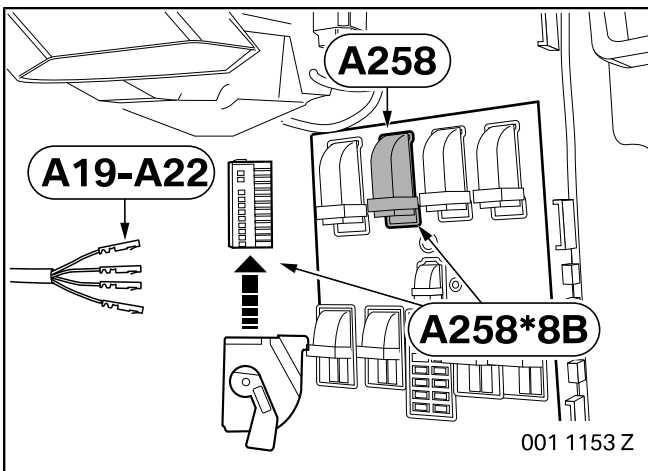


☐ The RT cable from PIN 50 and GE cable from PIN 49 of plug **A258*8B** are not always present. ◀

Disconnect the cables from plug **A258*8B**, SW 54-pin socket casing, on the BDC **A258** as follows and connect them to WS 6-pin socket casing **M**:

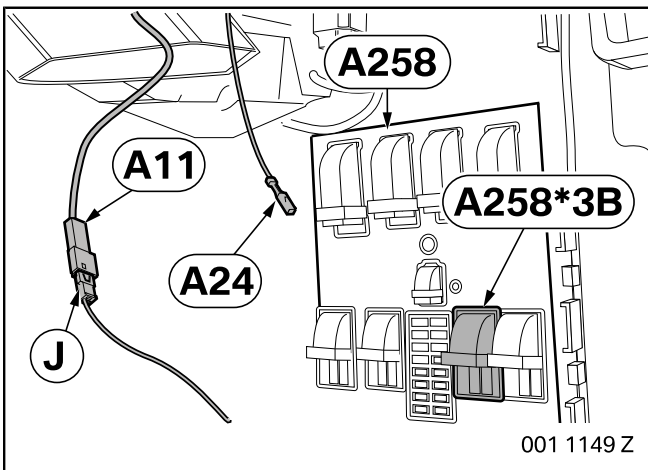
- RT cable from PIN 47 to PIN 1
- BL cable from PIN 48 to PIN 2
- RT cable from PIN 50 to PIN 3 (only if present)
- GE cable from PIN 49 to PIN 4 (only if present)

Connect WS 6-pin socket casing **M** to branch **A23**, SW 6-pin plug housing.



Route branches **A19-A22** to location of BDC **A258** and connect as follows to plug **A258*8B**, SW 54-pin socket casing:

- Branch **A19**, WS/BL cable, to PIN 48
- Branch **A20**, GN/BL cable, to PIN 47
- Branch **A21**, GE/RT cable, to PIN 50
- Branch **A22**, GE/BR cable, to PIN 49

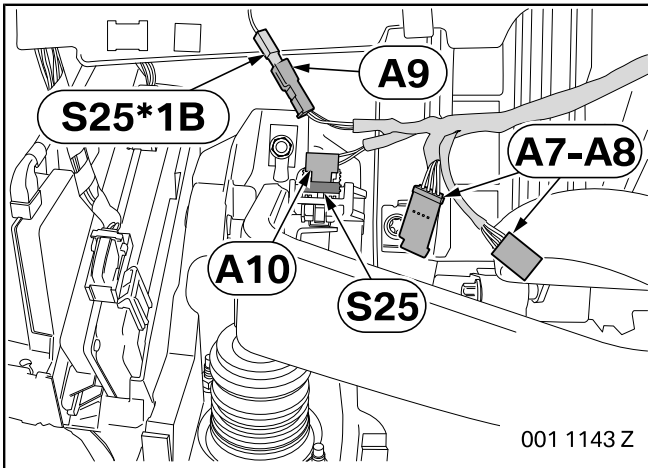


Disconnect the GN/GE cable from PIN 2 of plug **A258*3B**, SW 54-pin socket casing on BDC **A258** and connect it to PIN 1 of SW 2-pin socket casing **J**.

Connect branch **A11**, SW 2-pin plug housing, GR/RT cable, to SW 2-pin socket casing **J**.

Connect branch **A24**, GN/GE cable, to PIN 2 of plug **A258*3B**, SW 54-pin socket casing on BDC **A258**.

10. Route and connect the retrofit wiring harness (F55/F56 cars only)



▶ Check the straps on the retrofit wiring harness. ◀

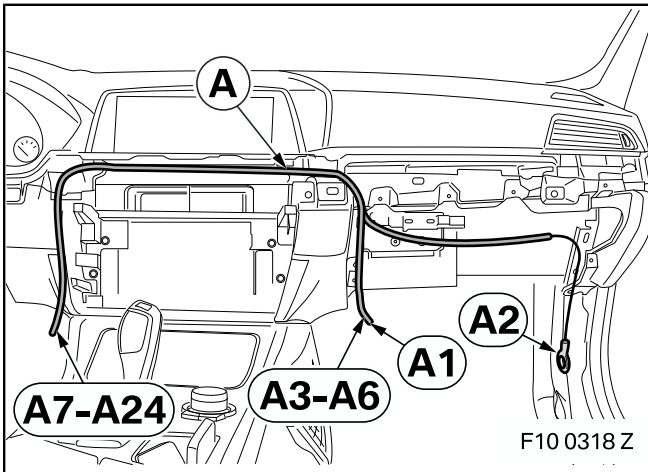
Route branches **A7-A10** to the location of the brake light switch **S25**.

Disconnect plug **S25*1B**, WS 4-pin socket casing from brake light switch **S25** and connect it to branch **A9**, WS 4-pin plug housing.

Connect branch **A10**, WS 4-pin socket casing, to brake light switch **S25**.

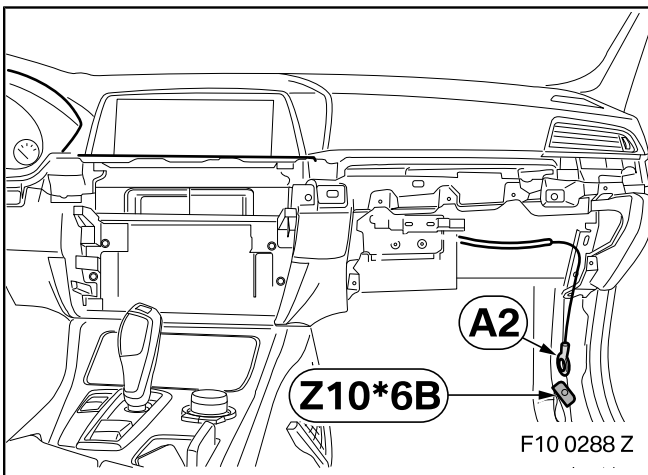
Tie back branches **A7-A8** (not required).

11. Route and connect the retrofit wiring harness (F10 cars only)

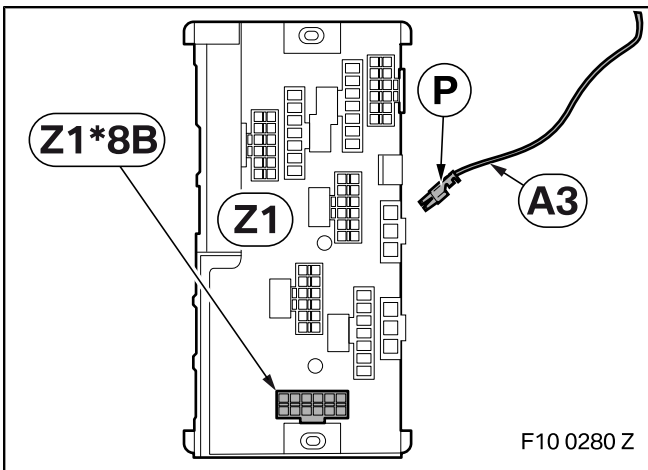


Route retrofit wiring harness **A** as follows above the heating/air-conditioning control:.

- Branches **A1-A6** to the passenger side footwell
- Branches **A7-A24** to the driver side footwell

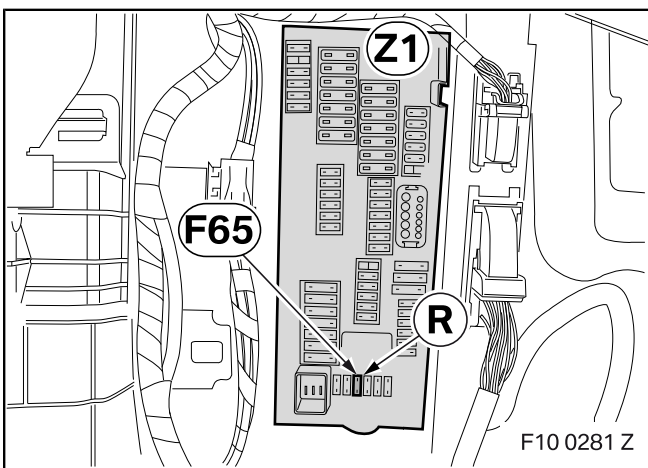


Screw branch **A2**, M6 ring eyelet, to ground support point **Z10*6B**.



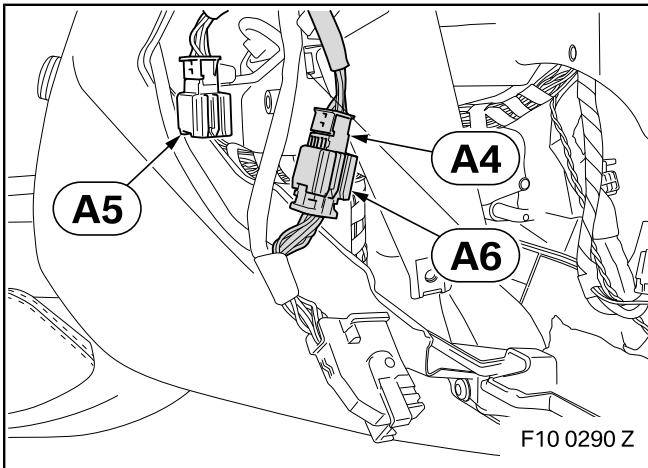
Disconnect the existing double flat spring contact from branch **A3** and crimp on double flat spring contact **P**.

Route branch **A3** to fuse box **Z1** and connect to PIN 3 of slot **Z1*8B**.



Insert fuse **R** into slot **F65** of fuse box **Z1**.

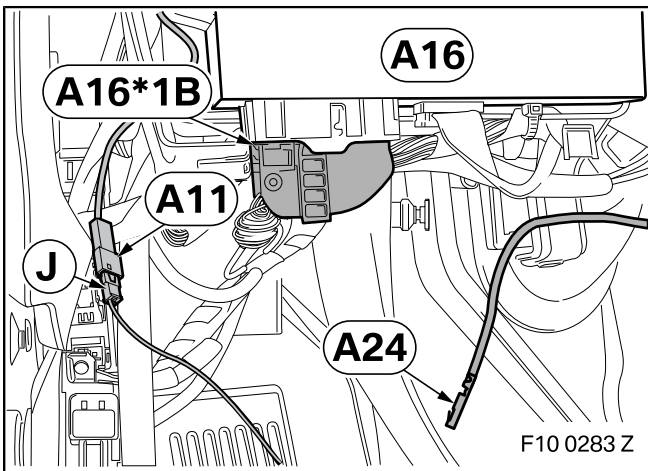
11. Route and connect the retrofit wiring harness (F10 cars only)



☐ Check the straps on the retrofit wiring harness. ◀

Connect branch **A4**, SW 10-pin socket casing, to branch **A6**, SW 10-pin plug housing.

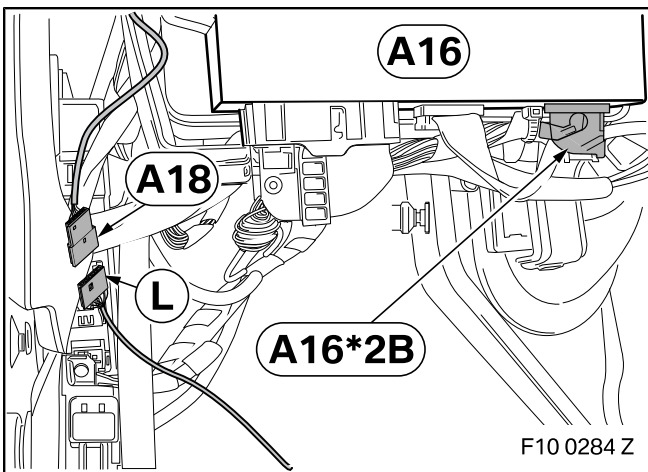
Tie back branch **A5**, SW 10-pin socket casing (not required).



Disconnect the GN/GE cable from PIN 7 of plug **A16*1B**, WS 41-pin socket casing on CAS **A16** and connect it to PIN 1 of socket casing **J**.

Connect branch **A11**, SW 2-pin plug housing, GR/RT cable, to SW 2-pin socket casing **J**.

Connect branch **A24**, GN/GE cable, to PIN 7 of plug **A16*1B**, SW 41-pin socket casing on CAS **A16**.

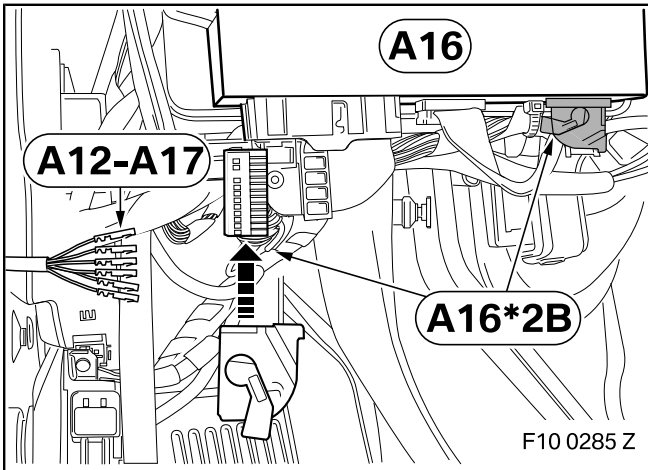


Disconnect the cables from plug **A16*2B**, SW 26-pin socket casing, on the CAS **A16** as follows and connect them to socket casing **L**:

- OR cable from PIN 8 to PIN 1
- SWWS cable from PIN 7 to PIN 3
- GN cable from PIN 21 to PIN 5
- WS/BL cable from PIN 6 to PIN 6
- GE/GN cable from PIN 18 to PIN 4
- BL/GN cable from PIN 5 to PIN 2

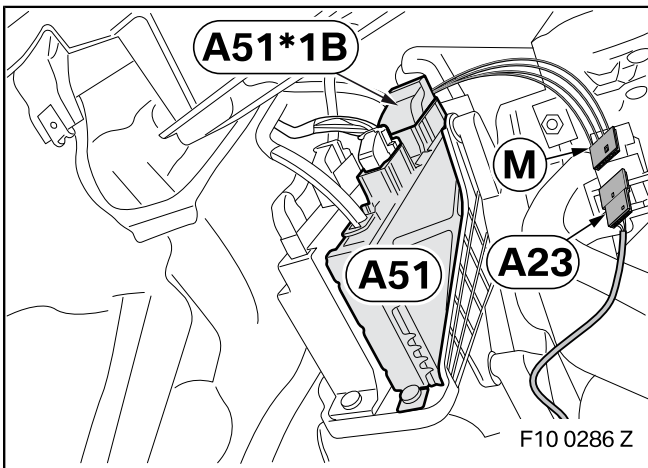
Connect socket casing **L** to branch **A18**, SW 6-pin plug housing.

11. Route and connect the retrofit wiring harness (F10 cars only)



Route branches **A12-A17** to location of CAS **A16** and connect as follows to plug **A16*2B**, SW 26-pin socket casing:

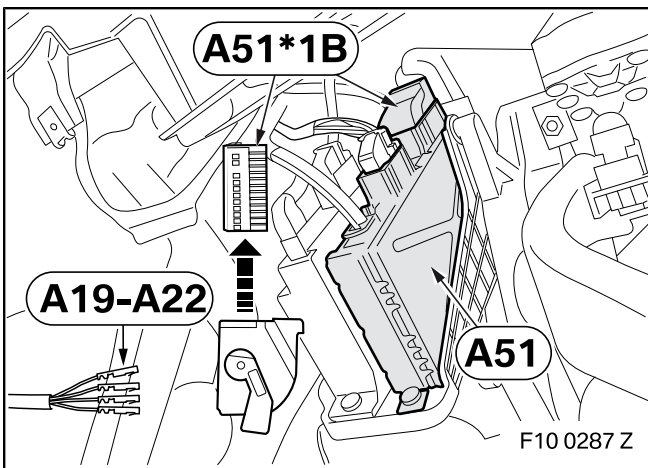
- Branch **A12**, GN/GR cable, to PIN 8
- Branch **A13**, WS/BR cable, to PIN 7
- Branch **A14**, GN cable, to PIN 21
- Branch **A15**, WS cable, to PIN 6
- Branch **A16**, GE/GN cable, to PIN 18
- Branch **A17**, BL/GN cable, to PIN 5



Disconnect cables from plug **A51*1B** of ZGM **A51**, SW 54-pin socket casing, as follows and connect to socket casing **M**:

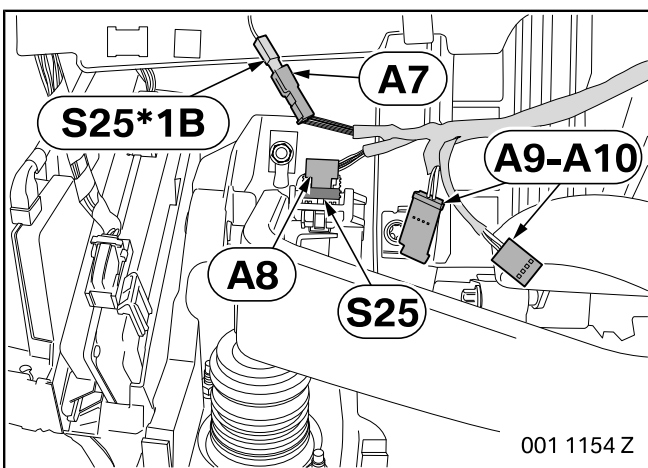
- BL/RT cable from PIN 46 to PIN 2
- RT cable from PIN 47 to PIN 1
- GE/RT cable from PIN 48 to PIN 3
- GE/BR cable from PIN 49 to PIN 4


Connect socket casing **M** to branch **A23**, WS 6-pin plug housing.



Route branches **A19-A22** to location of ZGM **A51** and connect as follows to plug **A51*1B**, SW 54-pin socket casing:

- Branch **A19**, WS/BL cable, to PIN 46
- Branch **A20**, GN/BL cable, to PIN 47
- Branch **A21**, GE/RT cable, to PIN 48
- Branch **A22**, GE/BR cable, to PIN 49



 Check the straps on the retrofit wiring harness. ◀

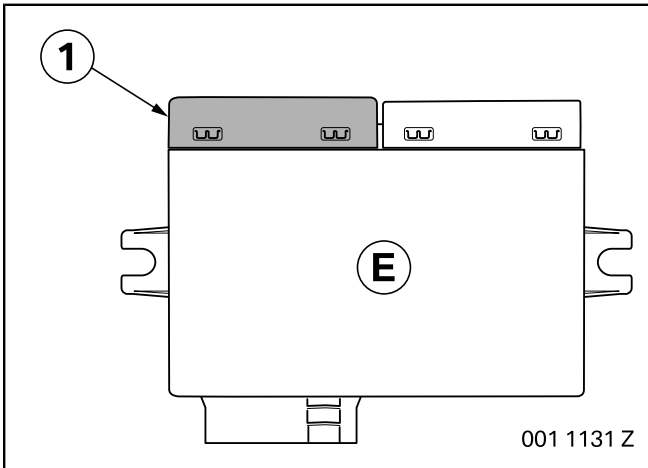
Route branches **A7-A10** to the location of the brake light switch **S25**.

Disconnect plug **S25*1B**, WS 4-pin socket casing from brake light switch **S25** and connected to branch **A7**, WS 4-pin plug housing.

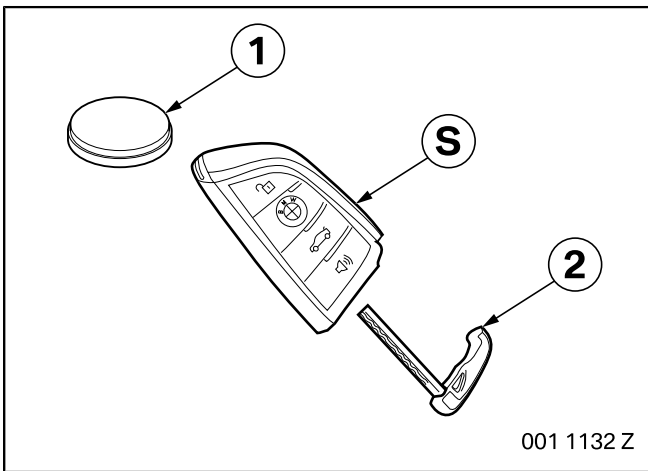
Connect branch **A8**, WS 4-pin socket casing, to brake light switch **S25**.


Tie back branches **A9-A10** (not required).

12. Connect the remote control

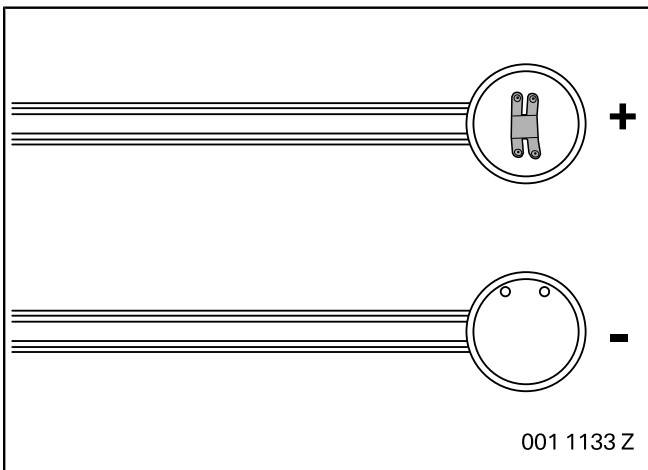



 Never open the cover (1) of control unit **E**. ◀

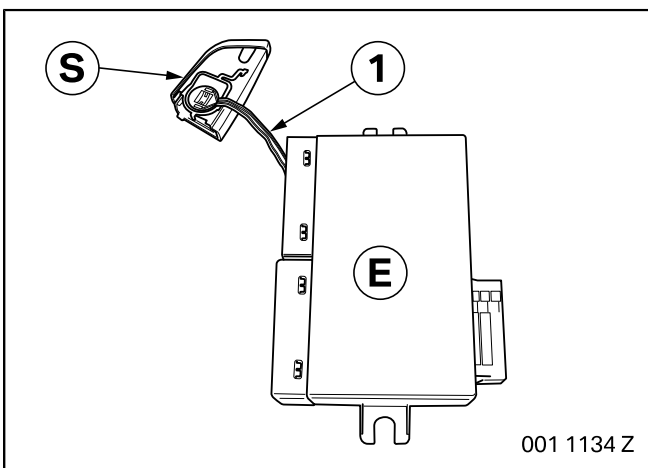



 The remote control **S** must undergo a teach-in process on the car and be functional. Check the function of the remote control **S** before removing the battery. ◀

Remove the battery (1) and integrated key (2) from the remote control **S**.



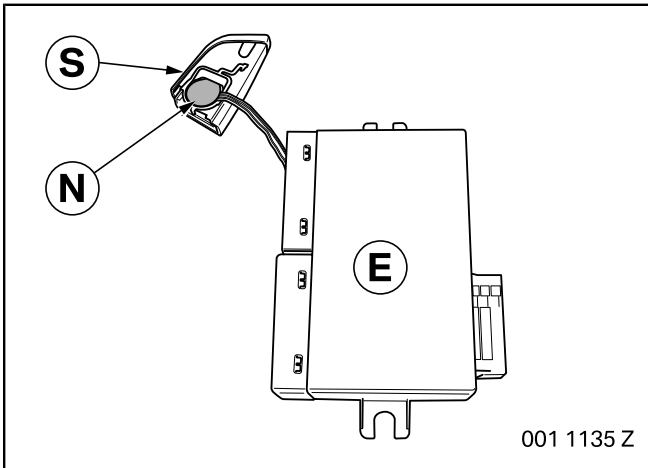
 Check the polarity of the ribbon cable (1) on the control unit. ◀



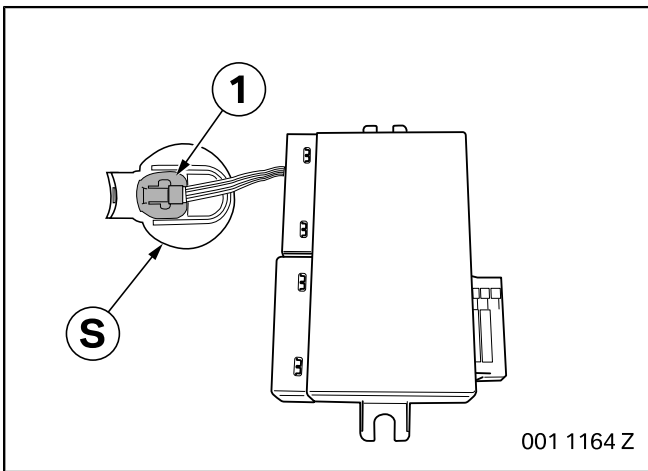
 Check the correct polarity of the ribbon cable (1). Ensure that the ribbon cable (1) is not kinked and is positioned precisely in the battery compartment of the remote control **S**. ◀

Route the ribbon cable (1) from the control unit **E** to the battery compartment of the remote control **S**.

12. Connect the remote control



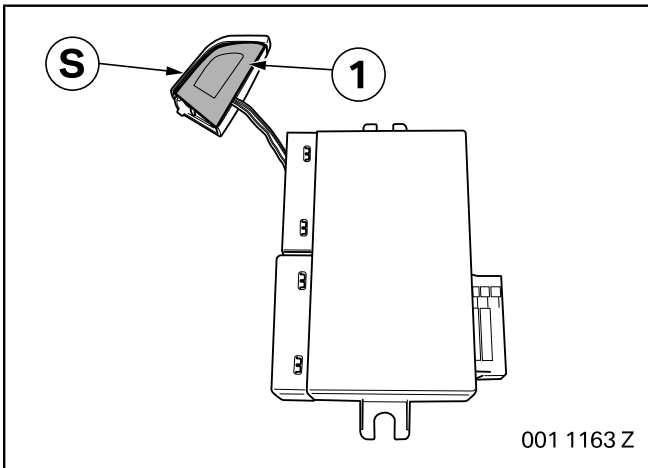
Place the adapter plate **N** in the battery compartment of the remote control **S**.



F55/F56 cars only

▶ Ensure that the ribbon cable is not damaged when you clip in the battery holder (1). ◀

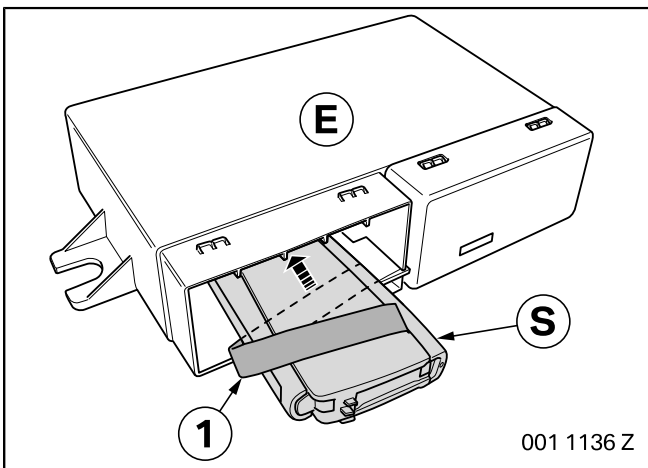
Clip the battery holder (1) into the remote control **S**.



All cars

▶ Ensure that the ribbon cable is not damaged when you clip in the cover (1). ◀

Clip the cover (1) into the remote control **S**.

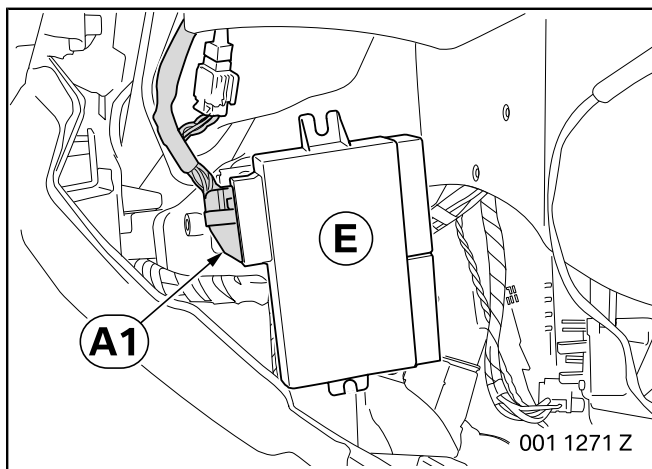


▶ Ensure that the ribbon cable (1) is not kinked. ◀

Wrap the ribbon cable around the remote control **S** and push it into the control unit **E**.

13. Commissioning test

- ▣ Extensive function tests must be carried out before the remote control **S** is sealed into the control unit **E**. If any faults occur during the function tests, the faults must be rectified in full before sealing the remote control **S** using the section entitled "Diagnostics and error rectification" at the end of these installation instructions. Only seal the remote control **S** if the retrofit system works perfectly. ◀



Connect branch **A1** to control unit **E**.

Start the test procedure. Refer to the attached operating instructions.

13. Commissioning test

▶ Ensure that all the starting conditions described in the operating instructions are satisfied. ◀

Normal function test

- Lock the car
- Wait 60 seconds
- Press the remote engine start
- The engine **must** start

Safety function test (F10/F15/F16 cars only)

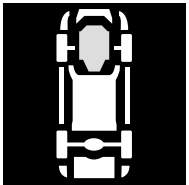
- Release the handbrake
- Lock the car
- Wait 60 seconds
- Press the remote engine start
- The engine must **not** start

Safety function test (F55/F56 cars only)

- Do **not** select "P"
- Lock the car
- Wait 60 seconds
- Press the remote engine start
- The engine must **not** start

Test terminal 15_3 safety function (all cars)

- Start the engine using the remote engine start
- Disconnect terminal 15_3 relay on retrofit wiring harness A. The following error messages must appear on the instrument cluster:



Drivetrain

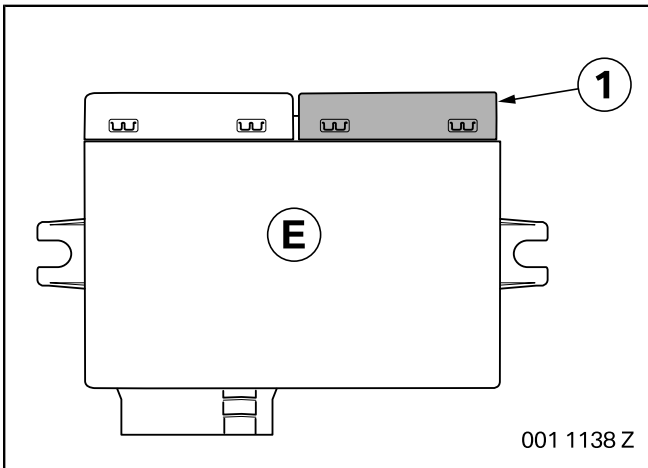


Automatic Start-Stop deactivated

- The engine **must** stop
- Connect terminal 15_3 really on retrofit wiring harness
- The engine **must** start and the following error memory entry must be generated in the engine control unit
- Delete the error memory using the ISTA workshop system

14. Seal the remote control

! In this step the remote control **S** is irreversibly sealed in the control unit **E**. It is no longer possible to remove the remote control **S**. Ensure that the retrofit system functions reliably.

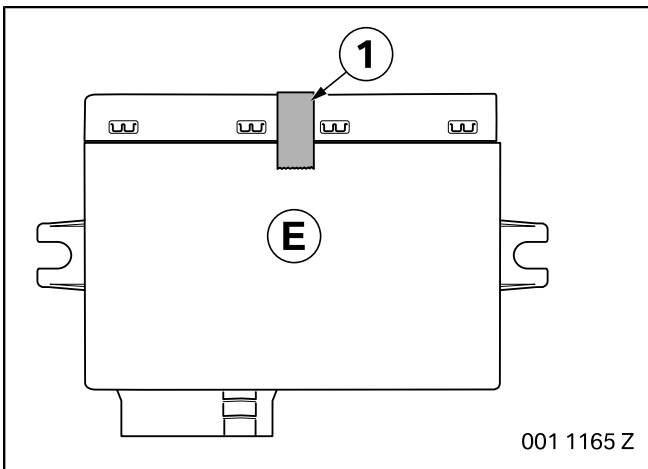


▶ Ensure that the components are clean and free of grease before being sealed.

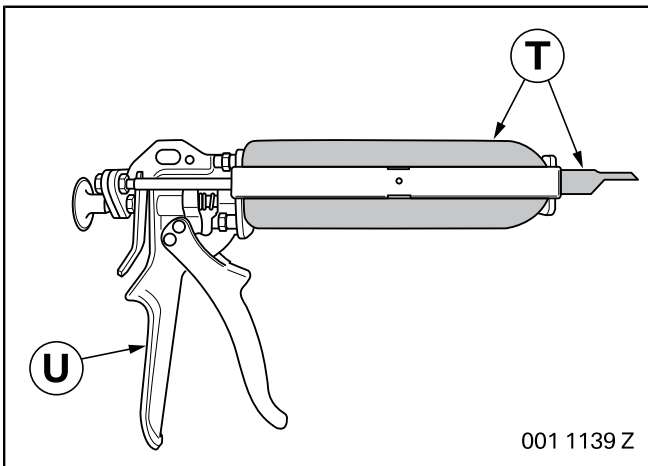
The remote control must be connected within the control unit **E**.



Fit the cover (1) to control unit **E**.



Seal the opening between the two covers using conventional adhesive tape.

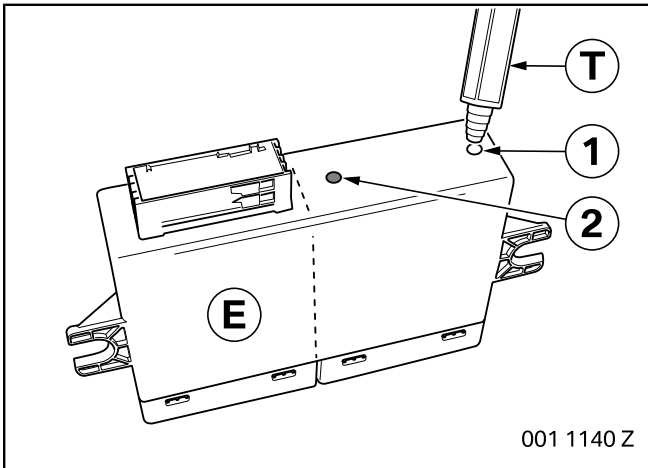


▶ The sealing compound **T** must be processed outside the car.

See the instructions supplied with the adhesive kit for using the sealing compound **T**. ◀

Place the components of the sealing compound **T** in the cartridge press **U**.

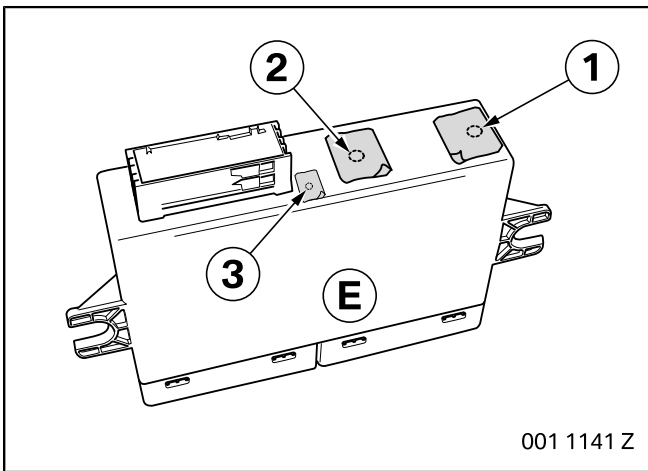
14. Seal the remote control



Fill the shaft of the control unit **E** with sealing compound **T** through openings (1) and (2) until sealing compound **T** comes out.

After the first filling, wait around five minutes until the sealing compound **T** has spread fully in the shaft of the control unit **E**.

If the level of sealing compound **T** in control unit **E** falls, top it up with sealing compound **T**.

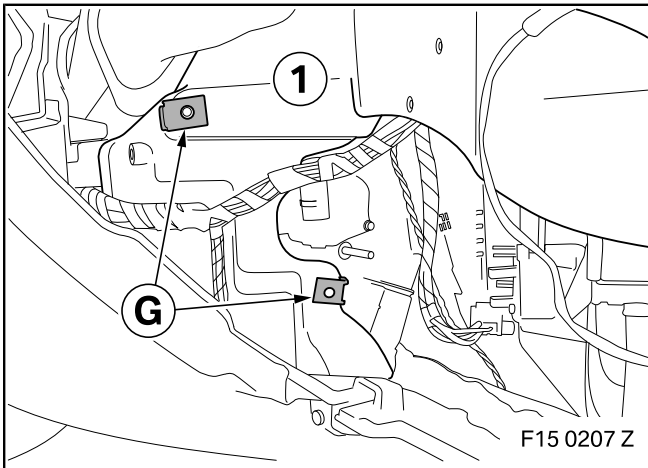


▶ Allow the sealing compound to dry outside the car before installation. Ensure that no sealing compound comes out after the control unit **E** has been filled.

See the instructions supplied with the adhesive kit for information about the curing time of the sealing compound **T**. ◀

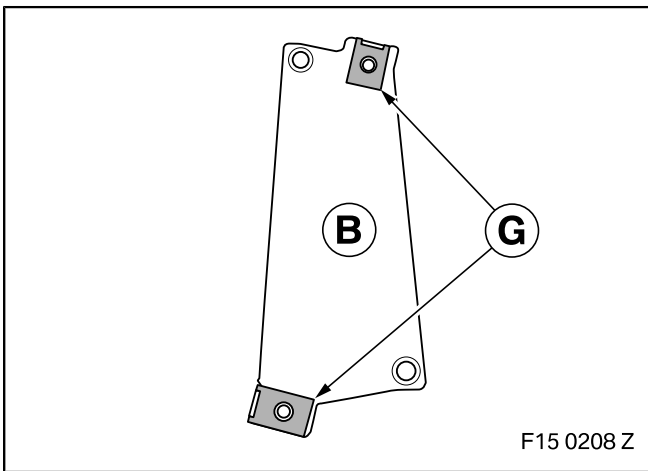
Remove surplus sealing compound and seal opening (1), opening (2) and LED opening (3) on the control unit **E** with conventional adhesive tape.

15. Install the holder and control unit

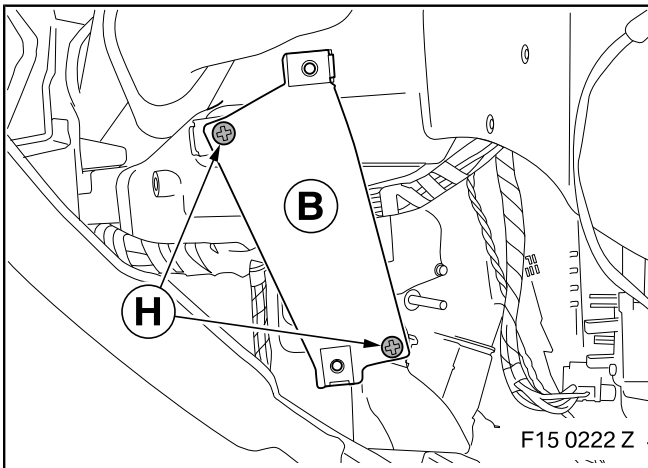


F15/F16 cars only

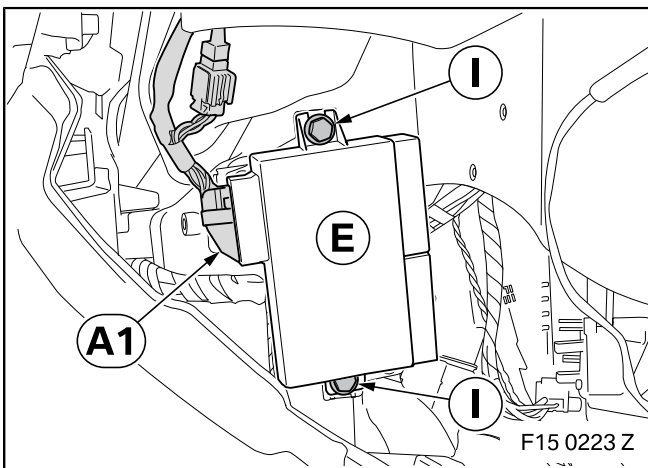
Connect flat nuts **G** to instrument panel support (1).



Connect flat nuts **G** to holder **B**.



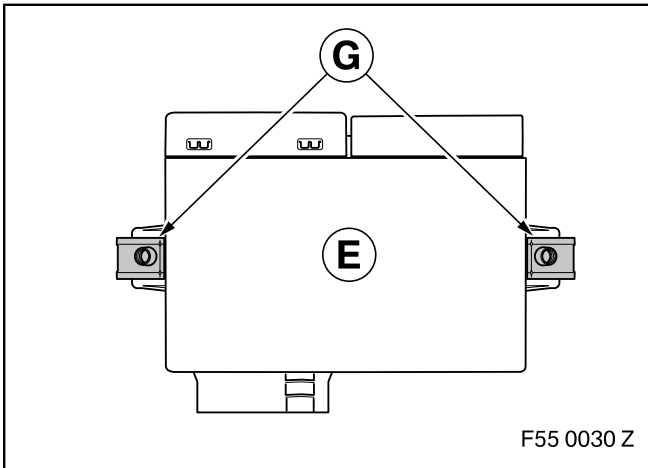
Secure holder **B** using countersunk screws **H** to the instrument panel support.



Connect branch **A1** to control unit **E**.

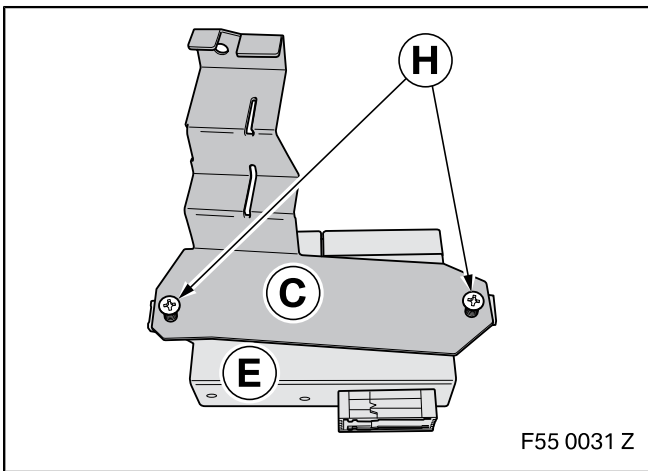
Secure control unit **E** with hex screws **I** to the holder **B**.

15. Install the holder and control unit

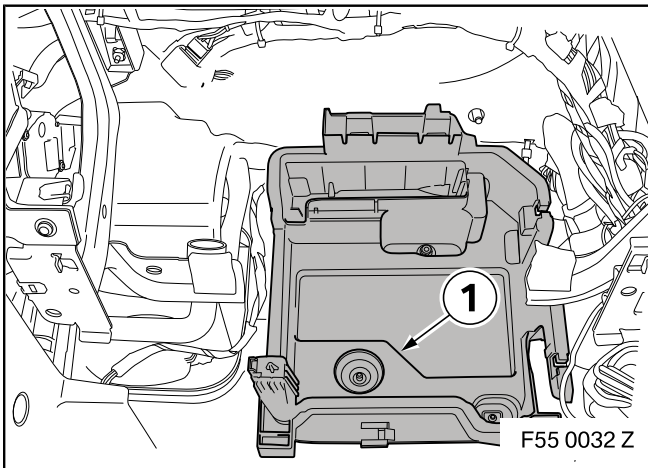


F55/F56 cars only

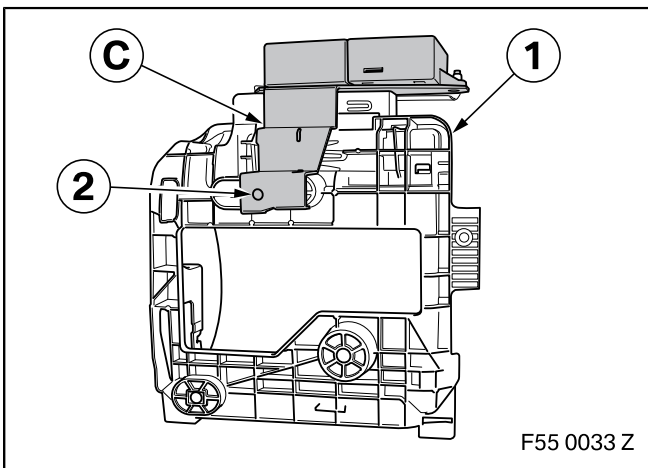
Connect flat nuts **G** to control unit **E**.



Secure control unit **E** with countersunk screws **H** to the holder **C**.

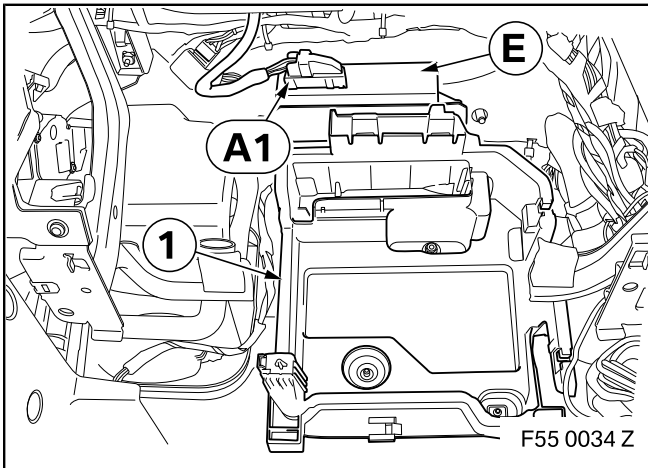


Remove the fuse box support (1).

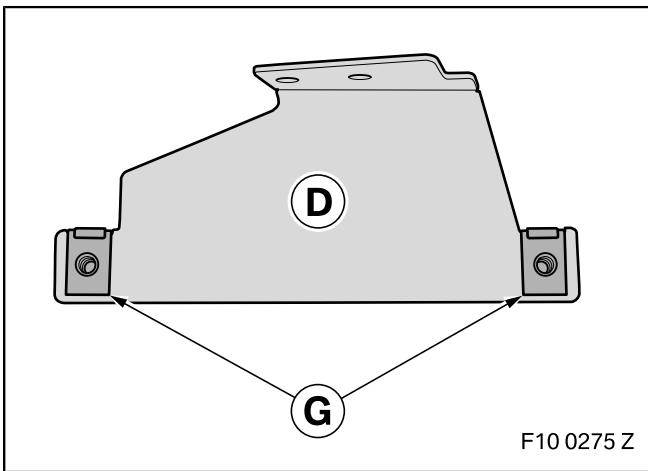


Push the holder **C** onto the fuse box support (1) and position it over the fastening opening (2).

15. Install the holder and control unit

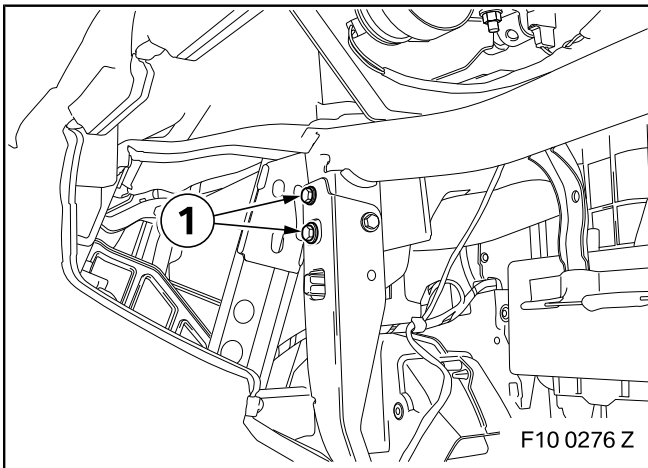


Install the fuse box support (1) and connect branch **A1** to the control unit **E**.

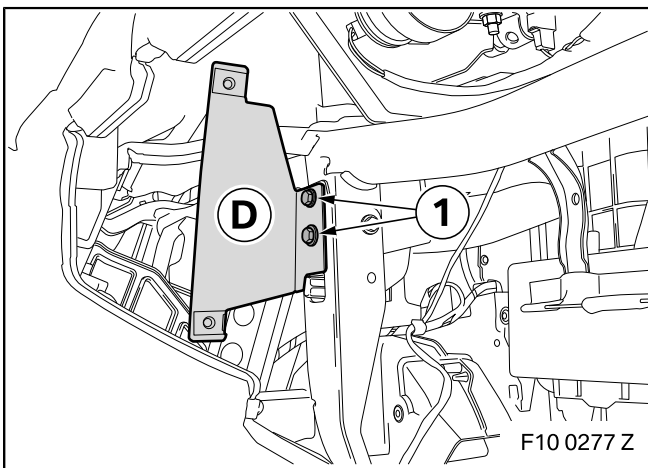


F10 cars only

Connect flat nuts **G** to holder **D**.

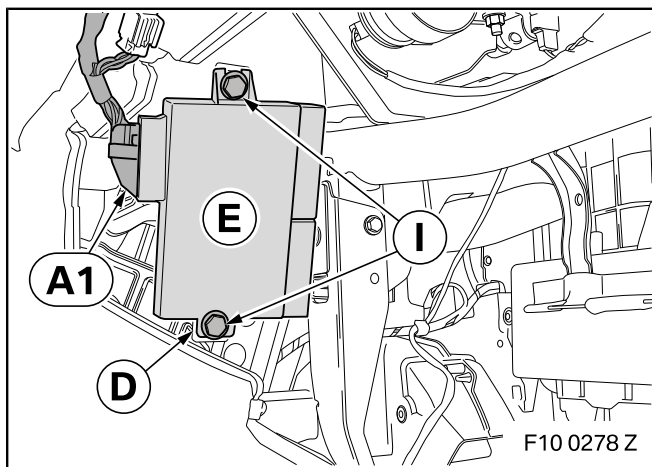


Undo screws (1) from the instrument panel support.



Secure holder **D** to the instrument panel support using the screws (1) you removed earlier.

15. Install the holder and control unit



Secure control unit **E** with hex screws **I** to the holder **D**.

Connect branch **A1** to control unit **E**.

16. Concluding work and coding

The retrofit system does not require programming/coding.

- Connect the battery
- Connect the battery charger to the car
- Connect the car to the ISTA workshop system
- If necessary, carry out a vehicle test using the ISTA system and note, or work through, any error memory that has been entered
- Conduct a function test
- Re-assemble the car
- Give the owner's manual supplied with the retrofit kit to the customer

17. Circuit diagram (F15/F16 cars only)

Legend

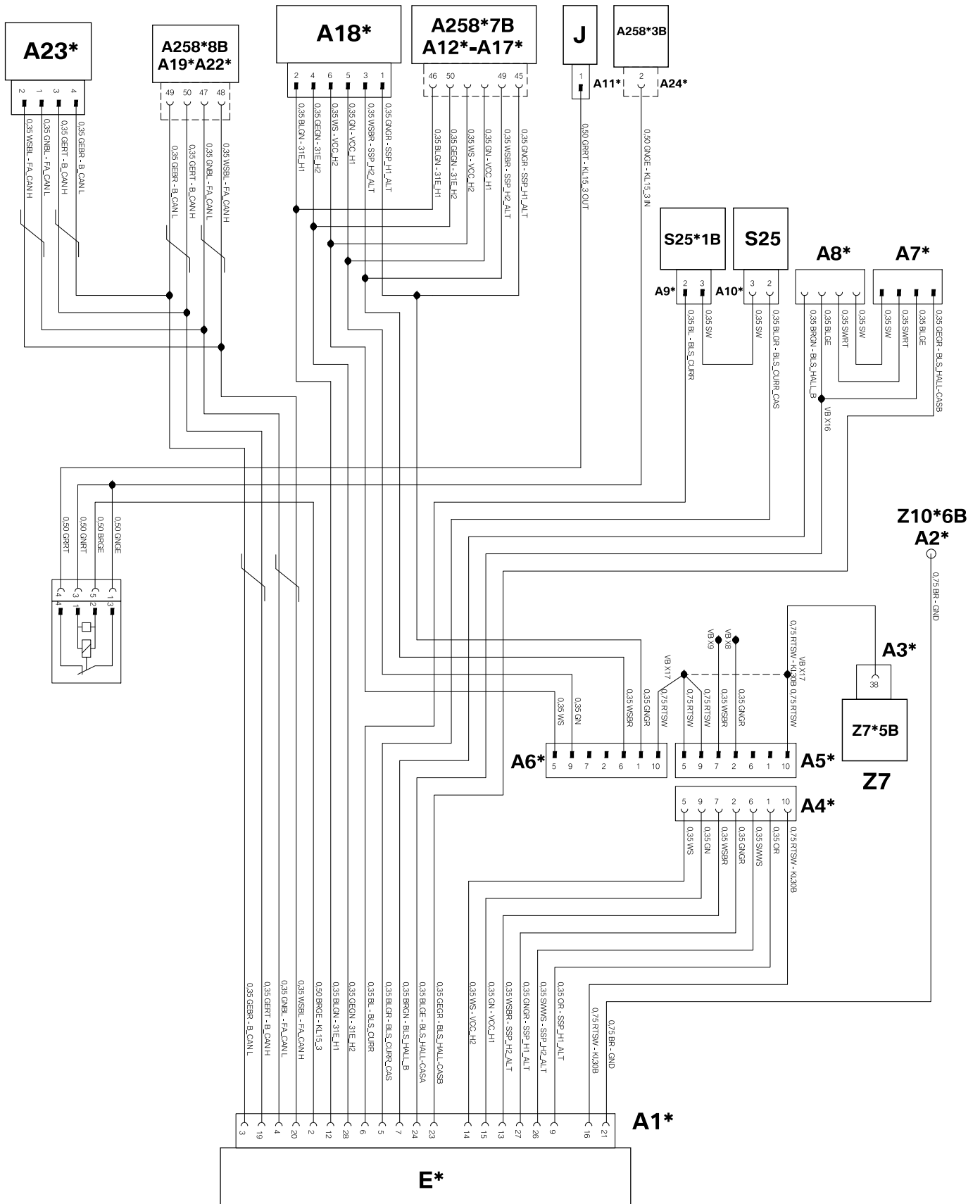
A1*	SW 32-pin socket casing, to control unit E*
A2*	M6 ring eyelet, to passenger footwell ground support point Z10*10B
A3*	Double flat spring contact, to front fuse box Z7
A4*	Connect SW 10-pin socket casing to branch A5*
A5*	Connect SW 10-pin plug housing to branch A4*
A6*	Insulate and tie back SW 10-pin plug housing
A7*	Insulate and tie back WS 4-pin plug housing
A8*	Insulate and tie back WS 10-pin socket casing
A9*	Connect WS 4-pin plug housing to the plug on the brake light switch S25*1B
A10*	Connect WS 4-pin socket casing to brake light switch S25
A11*	SW 2-pin plug housing, with socket casing J* to cables from plug A258*3B
A12*-A17*	Socket contacts, to plug A258*7B on BDC A258
A18*	SW 6-pin plug housing, with socket casing L* to cables from plug A258*7B
A19*-A22*	Socket contacts, to plug A258*8B on BDC A258
A23*	WS 6-pin plug housing, with socket casing M* to cables from plug A258*8B
A24*	Connect socket contact, GN/GE cable, to plug A258*3B on BDC A258
E*	Control unit
J*	SW 2-pin socket casing
L*	SW 6-pin socket casing
M*	WS 6-pin socket casing
A258	Body Domain Controller (BDC)
S25	Brake light switch (BLS)
Z7	Front fuse box
A258*3B	SW 54-pin socket casing to BDC A258
A258*7B	WS 54-pin socket casing to BDC A258
A258*8B	SW 54-pin socket casing to BDC A258
S25*1B	SW 4-pin socket casing to brake light switch S25
Z7*9B	WS 7-pin socket casing to fuse box Z7
Z10*10B	Ground support point under carpet in passenger footwell

All of the designations marked with * apply only to these installation instructions or this wiring diagram.

Cable colors

BL	Blue	GR	Grey	RT	Red
BO	Bordeaux (Burgundy)	L-GN	Light green	SW	Black
BR	Brown	NT	Natural	TR	Transparent
GE	Yellow	OR	Orange	VI	Violet
GN	Green	RO	Pink	WS	White

18. Circuit diagram (F55/F56 cars only)



F56 0217 Z

18. Circuit diagram (F55/F56 cars only)

Legend

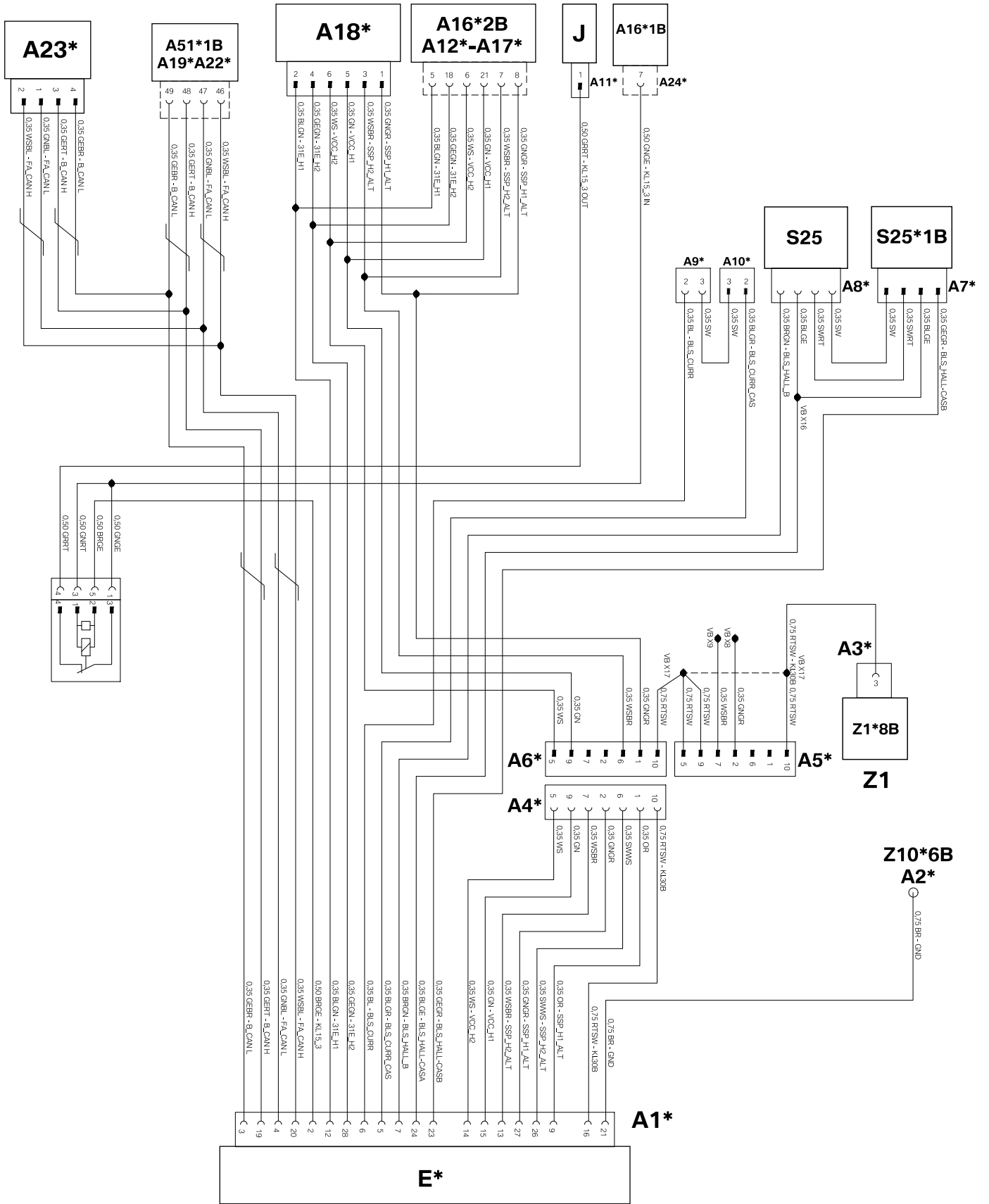
A1*	SW 32-pin socket casing, to control unit E*
A2*	M6 ring eyelet, to right A-pillar earth post Z10*6B
A3*	With socket contact O* to front fuse box Z7
A4*	Connect SW 10-pin socket casing to branch A5*
A5*	Connect SW 10-pin plug housing to branch A4*
A6*	Insulate and tie back SW 10-pin plug housing
A7*	Insulate and tie back WS 4-pin plug housing
A8*	Insulate and tie back WS 10-pin socket casing
A9*	Connect WS 4-pin plug housing to the plug on the brake light switch S25*1B
A10*	Connect WS 4-pin socket casing to brake light switch S25
A11*	SW 2-pin plug housing, with socket casing J* to cables from plug A258*3B
A12*-A17*	Socket contacts, to plug A258*7B on BDC A258
A18*	SW 6-pin plug housing, with socket casing L* to cables from plug A258*7B
A19*-A22*	Socket contacts, to plug A258*8B on BDC A258
A23*	WS 6-pin plug housing, with socket casing M* to cables from plug A258*8B
A24*	Connect socket contact, GN/GE cable, to plug A258*3B on BDC A258
E*	Control unit
J*	SW 2-pin socket casing
L*	SW 6-pin socket casing
M*	WS 6-pin socket casing
A258	Body Domain Controller (BDC)
S25	Brake light switch (BLS)
Z7	Front fuse box
A258*3B	SW 54-pin socket casing to BDC A258
A258*7B	WS 54-pin socket casing to BDC A258
A258*8B	SW 54-pin socket casing to BDC A258
S25*1B	SW 4-pin socket casing to brake light switch S25
Z7*5B	Slot on fuse box Z7
Z10*6B	To ground support point on right-hand A pillar

All of the designations marked with * apply only to these installation instructions or this wiring diagram.

Cable colors

BL	Blue	GR	Grey	RT	Red
BO	Bordeaux (Burgundy)	L-GN	Light green	SW	Black
BR	Brown	NT	Natural	TR	Transparent
GE	Yellow	OR	Orange	VI	Violet
GN	Green	RO	Pink	WS	White

19. Circuit diagram (F10 cars only)



F10 0291 Z

19. Circuit diagram (F10 cars only)

Legend

A1*	SW 32-pin socket casing, to control unit E*
A2*	M6 ring eyelet, to right A-pillar earth post Z10*6B
A3*	With double flat spring contact P* to front fuse box Z1
A4*	Connect SW 10-pin socket casing to branch A6*
A5*	Insulate and tie back SW 10-pin plug housing
A6*	Connect SW 10-pin plug housing to branch A4*
A7*	Connect WS 4-pin plug housing to the plug on the brake light switch S25*1B
A8*	Connect WS 4-pin socket casing to brake light switch S25
A9*	Insulate and tie back WS 4-pin plug housing
A10*	Insulate and tie back WS 4-pin socket casing
A11*	SW 2-pin plug housing, with socket casing J* to cables from plug A16*1B
A12*-A17*	Socket contacts, to plug A16*2B on CAS A16
A18*	SW 6-pin plug housing, with socket casing L* to cables from plug A16*1B
A19*-A22*	Socket contacts, to plug A51*1B on ZGM A51
A23*	WS 6-pin plug housing, with socket casing M* to cables from plug A51*1B
A24*	Connect socket contact, GN/GE cable, to plug A16*1B on CAS A16
E*	Control unit
J*	SW 2-pin socket casing
L*	SW 6-pin socket casing
M*	WS 6-pin socket casing
A16	CAS
A51	ZGM
S25	Brake light switch (BLS)
Z1	Front fuse box
A16*1B	WS 41-pin socket casing to CAS A16
A16*2B	WS 26-pin socket casing to CAS A26
A51*1B	SW 54-pin socket casing to ZGM A51
S25*1B	SW 4-pin socket casing to brake light switch S25
Z1*8B	Socket housing to front fuse box Z1
Z10*6B	To ground support point on right-hand A pillar

All of the designations marked with * apply only to these installation instructions or this wiring diagram.

Cable colors

BL	Blue	GR	Grey	RT	Red
BO	Bordeaux (Burgundy)	L-GN	Light green	SW	Black
BR	Brown	NT	Natural	TR	Transparent
GE	Yellow	OR	Orange	VI	Violet
GN	Green	RO	Pink	WS	White

20. Diagnostics and error rectification

General

There are diagnostic facilities available to prevent having to replace the control unit unnecessarily in the event of an error. This consists of a diagnostic LED next to the plug connection on the control unit which outputs a flash code and also the extended diagnostic facility using a micro SDHC card.

The diagnostic using the LED is a comfort feature. Correct installation (by checking the plug connections and cable colors) must also be ensured.

Clear access to the installed LED on the control unit

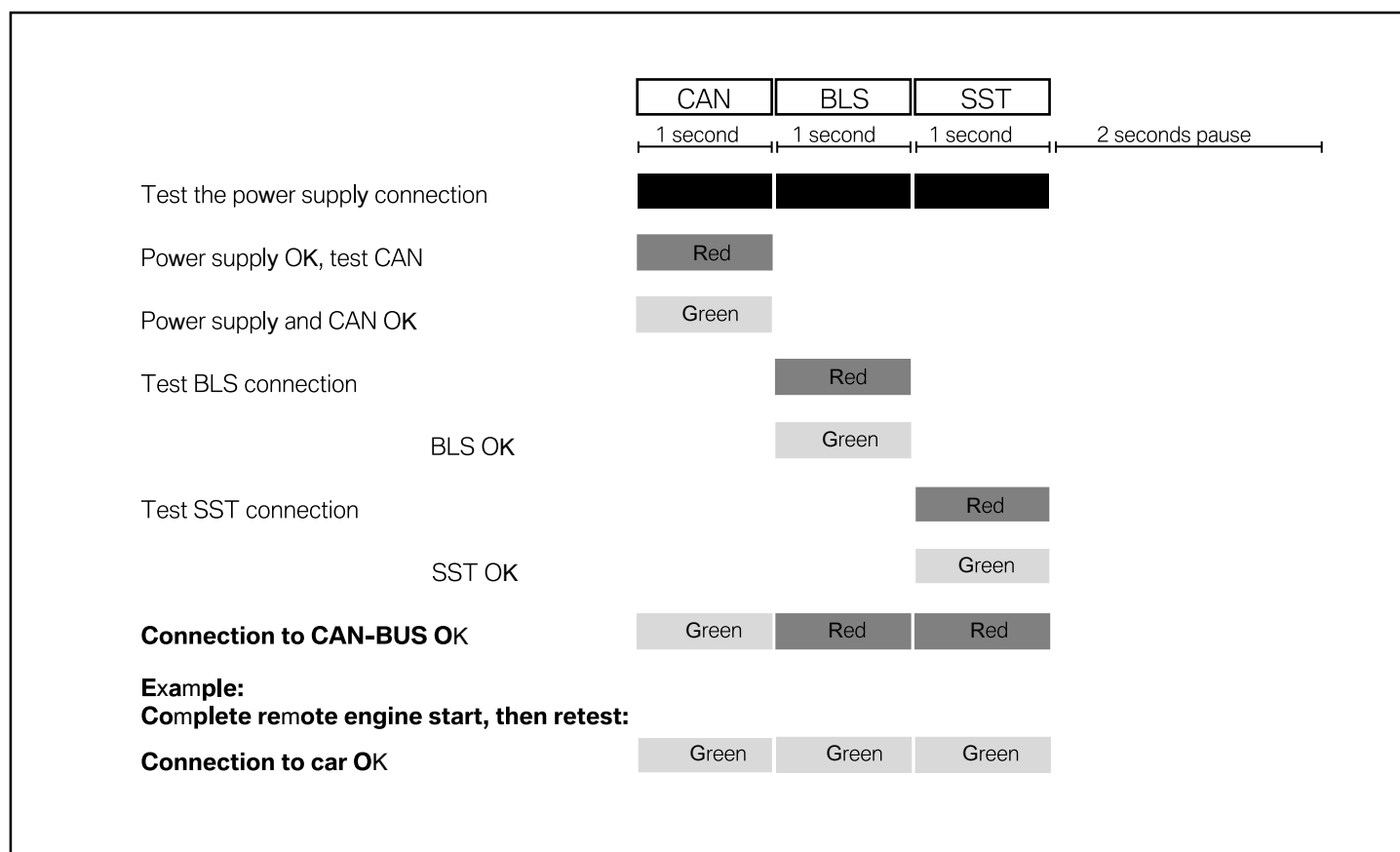
The LED next to the plug connector on the control unit is visible from outside. The control unit and therefore the LED can be made visible by the following action:

- 1 Clear access to the control unit (remove the glove box, etc.)
- 2 Switch on the ignition (terminal 30B is active)
- 3 The flash code can be read off the LED

LED flash code whilst operating the remote engine start

Since it is difficult for a fitter to ensure that the two CAN buses are connected correctly whilst installing the item in the car, this is indicated when the control unit is woken (the voltage supply is activated) by a two-color LED. During installation the first LED sequence is important, the other two sequences for the BLS (brake light switch) and SST (Start/Stop button) do not change from red to green until they have been successfully actuated by the remote engine start (remote engine start completed).


The following flash code is output with an interval of 2 seconds:



20. Diagnostics and error rectification

LED whilst operating the remote engine start

If a remote engine start is initiated by pressing the start sequence on the ID sensor, but the engine does not start, the error is indicated by a flash code for diagnostic purposes when terminal 30B is switched on. If the engine shuts down during the remote engine start, the red flash code is displayed. The following flash code may be displayed:

 Only one flash code is output at any one time. If two starting conditions have not been satisfied, the lowest (flash code) is displayed. ◀

Engine was not started (starting condition not satisfied)

Flash code	LED color	Error	Action
1x	Green	Engine running	Switch off engine
2x	Green	Selector lever not in position "P"	Set selector lever to position "P"
3x	Green	Car moving	Switch off the engine when the car is at a standstill
4x	Green	Central locking not locked	Lock the car
5x	Green	Tank on "reserve"	Top up tank
6x	Green	Hood not closed	Close hood
7x	Green	Windows not closed	Close all windows
8x	Green	Sunroof not closed	Close sunroof
9x	Green	A remote cycle has already been completed	Start the engine manually, set selector lever to D and then return to P and switch off the engine
10x	Green	Handbrake not engaged	Engage handbrake
11x	Green	Dead time of 60 seconds after central locking active	Wait for the end of the dead time of 60 seconds after central locking
12x	Green	Doors not closed	Close doors
13x	Green	Trunk not closed	Close trunk

20. Diagnostics and error rectification

Engine running was canceled (cancellation criterion satisfied)

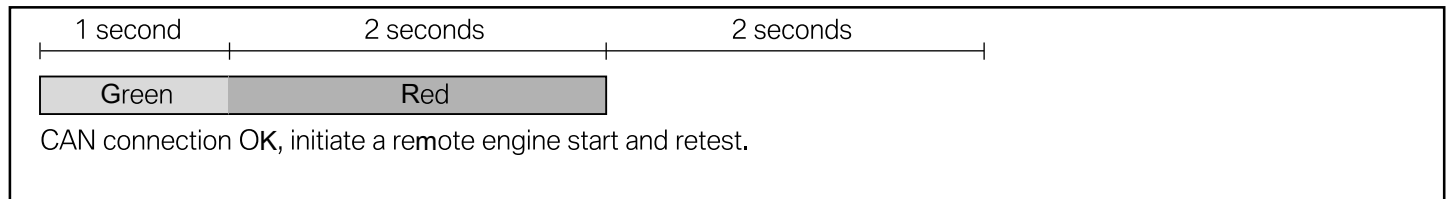
Flash code	LED color	Error	Action
1x	Red	A remote cycle has already been completed	Start the engine manually, set selector lever to D and then return to P and switch off the engine
2x	Red	Selector lever not equal to "P"	Set selector lever to position "P"
3x	Red	Car movement detected	Do not drive car
4x	Red	Central locking not locked	Lock the car
5x	Red	CC message "Engine overheated", " Engine oil pressure", "Battery not charging", "Parking brake", or "Secure car to prevent rolling" active	Rectify error messages
6x	Red	Trunk open	Close trunk
7x	Red	Doors open	Close all doors
8x	Red	Sunroof open	Do not open sunroof
9x	Red	Steering angle sensor detected	Do not move steering wheel
10x	Red	Brake pedal pressed	Do not press brake pedal
11x	Red	Start sequence "short-short-long" detected on remote control	---
12x	Red	Engine speed > 1500 rpm detected	Do not press gas pedal
13x	Red	Engine stop without engine remote start intervention	Look for the cause of the error in the car

20. Diagnostics and error rectification

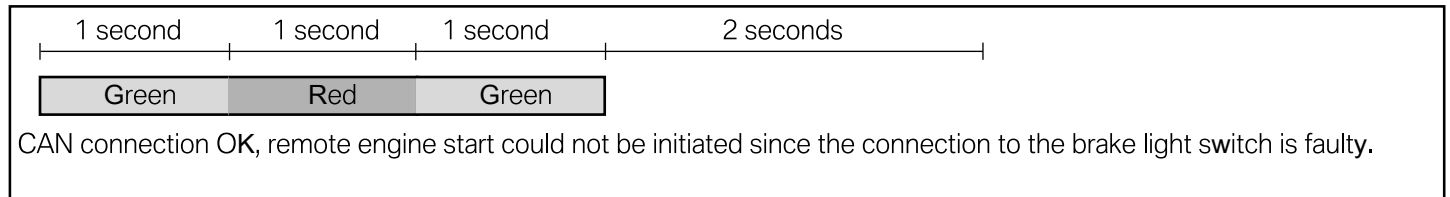
Specimen LED flash code

A general distinction is made between whether a remote engine start has already been completed using the short-short-long command on the locking key on the FFB (remote control) or not.

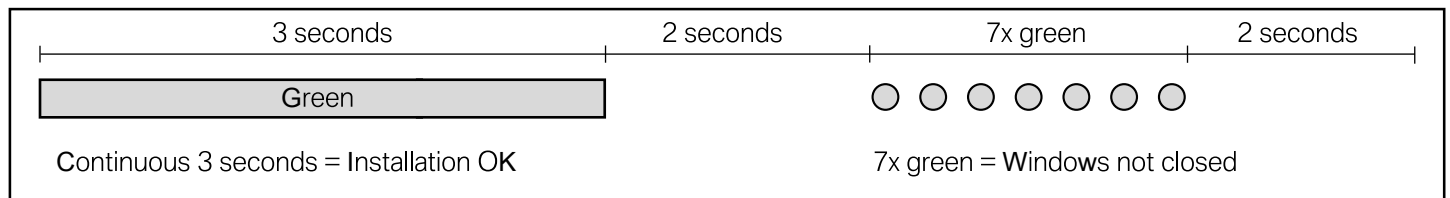
Remote engine start has not yet been initiated



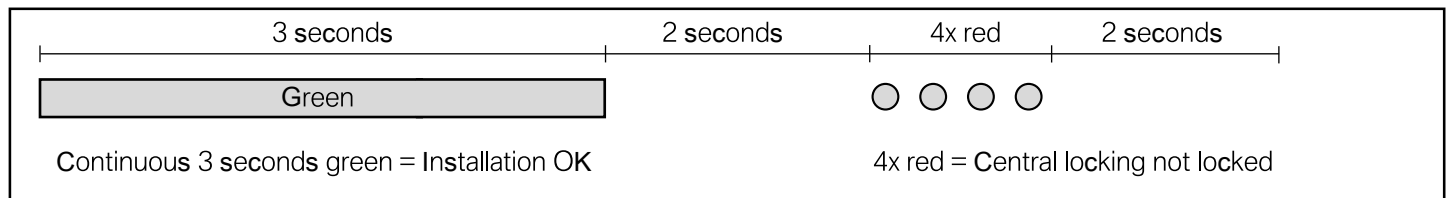
Remote engine start has been initiated



The installation is OK, the engine could not be started remotely because the brake light switch gave an incorrect response.




The installation is OK, the engine could not be started remotely because the "Windows closed" starting condition was not satisfied.



The remote-started engine was stopped because the "Central locking not locked" cancellation condition was satisfied.

20. Diagnostics and error rectification

Use of a micro SDHC card


 An update using a micro SDHC card may only be carried out with the engine stopped and the car at a standstill. ◀

A micro SDHC card can be used for diagnostic purposes and for updates. A micro SDHC card is required for this purpose (not supplied with the retrofit kit). It must be formatted in "FAT" format.

Insert the micro SDHC card into the card slot in the control unit.

The micro SDHC cards manufactured by the following are recommended:

- Intenso 4 GB Class 4
- Samsung 16 GB UHS Class 1
- SanDisk 8 GB Class 10
- Toshiba 8 GB Class 4
- Transcend 4 GB Class 4
- Transcend 8 GB Class 10

 If a micro SDHC card which has already been used for other purposes is used, it must be formatted before you use with the "SD Formatter 4.0" tool from the SD Association (download from https://www.sdcard.org/downloads/formatter_4/). ◀

Reading and writing are indicated by LEDs:

- Green continuous: Reading update
- Red flashing 2 Hz: Writing error memory
- Green flashing 2Hz: Remove card

The remote engine start checks cyclically whether there is a micro SDHC card in the card slot. If this is the case, the system looks for new software. If remote engine start software is found on the card, the remote engine start is flashed with it, see section entitled **>Update function<**. Regardless of this, the error memory content is written to the card in the form of a TXT file, see section entitled **>Extended diagnostic facilities<**.

20. Diagnostics and error rectification

Extended diagnostic facilities

The processor stores the diagnostic information in a ring memory. This memory content is transferred to the card when a micro SDHC card is inserted. If the card remains in the card slot, the information is also written during operation to both the micro SDHC card and the ring memory.

Update function

The remote engine start checks the file for consistency and then completes the update.

A software update is indicated using the LED:

- Green continuous: Reading update
- Red flashing 2 Hz: Writing error memory
- Green flashing 2 Hz: Remove card

List of errors

Possible error messages are recorded by the remote engine start and written to the micro SDHC card in text form. If no micro SDHC card is fitted, the error messages are stored temporarily in a ring memory in the control unit until a micro SDHC card is inserted. Depending on the number of error messages, this writing process may take several minutes.

The following error entries are possible:

Starting conditions

- #1-1 motor start, engine is running already.
- #1-2 motor start, gear selector lever is not in parking position.
- #1-3 motor start, engine is running already.
- #1-4 motor start, vehicle is not locked.
- #1-5 motor start, fuel warning light is active.
- #1-6 motor start, hood is open.
- #1-7 motor start, window is open.
- #1-8 motor start, sunroof is open.
- #1-9 motor start, timer not cleared.
- #1-10 motor start, electric handbrake is released.
- #1-11 motor start, timer still active (car has been locked within the last minute).
- #1-12 motor start, doors are open.
- #1-13 motor start, trunk lid is open.

20. Diagnostics and error rectification

Cancellation conditions

- #2-1 motor stop, gear selector lever is not in parking position.
- #2-2 motor stop, vehicle is moving.
- #2-3 motor stop, vehicle is not locked.
- #2-4 motor stop, check control message is active.
- #2-5 motor stop, trunk lid is open.
- #2-6 motor stop, doors are open.
- #2-7 motor stop, sunroof is open.
- #2-8 motor stop, steering wheel movement $>3^\circ$.
- #2-9 motor stop, brake pedal is actuated.
- #2-10 motor stop, start sequence detected.
- #2-11 motor stop, engine speed to high.
- #2-12 motor stop, engine stopped without action of REnS. -> look #6-5

Vehicle connection - CAN

- #3-1 Body-CAN is missing.
- #3-2 FA-CAN is missing.

Vehicle connection - SST and BLS

- #4-1 The start-stop button has been activated but the ECU read back is wrong.
- #4-2 The start-stop button has been activated but the status is faulty on the can bus.
- #4-3 The stop light switch has been activated but the ECU read back is wrong.
- #4-4 The stop light switch has been activated but the status is faulty on the can bus.

Vehicle connection - voltage supply

- #5-1 The power supply of the ID transmitter has been activated but the ECU read back is wrong.
- #5-2 The power supply of the ID transmitter has been activated but the status is faulty on the can bus.
- #5-3 The power supply of the ID transmitter has not been activated but the ECU read back is wrong (ID transmitter is active - risk of theft).

Vehicle connection - engine start and stop

- #6-1 Cannot start engine.
- #6-2 Engine stop via 15_3 necessary.
- #6-3 Engine stop without REnS action.
- #6-4 Engine panic stop.
- #6-5 Engine stop due to unknown reason.

20. Diagnostics and error rectification

Functional safety

- T#7-1 FuSi, execution error.
- #7-2 FuSi, BLS is act in init.
- #7-3 FuSi, BLS activation not successful.
- #7-4 FuSi, BLS deactivation not successful.
- #7-5 FuSi, safety timer is elapsed.
- #7-6 FuSi, vehicle not braked.
- #7-7 FuSi, REnS phase active after reset.
- #7-8 FuSi, SST not plausible.
- #7-9 FuSi, SST not in wanted state.
- #7-10 FuSi, IO not active/not successful activated.

Self-diagnostic REnS

- #8-1 SelfTest, CPU-register.
- #8-2 SelfTest, CPU-program-counter.
- #8-3 SelfTest, RAM.
- #8-4 SelfTest, ROM.
- #8-5 SelfTest, A/D converter.
- #8-6 SelfTest, Stack-Pointer-Corruption-Test preparing error.
- #8-7 SelfTest, Stack-Pointer-Corruption-Test error.
- #8-8 SelfTest, UB voltage < 4V.
- #8-9 SelfTest, UB voltage < 11V.
- #8-10 SelfTest, clamp 15_3.

Self-diagnostic, memory

- #9-1 Error non-volatile memory