

# MFW design

## Variants

The multi-function steering wheel is available in two different versions:



### Audio/CCS variant

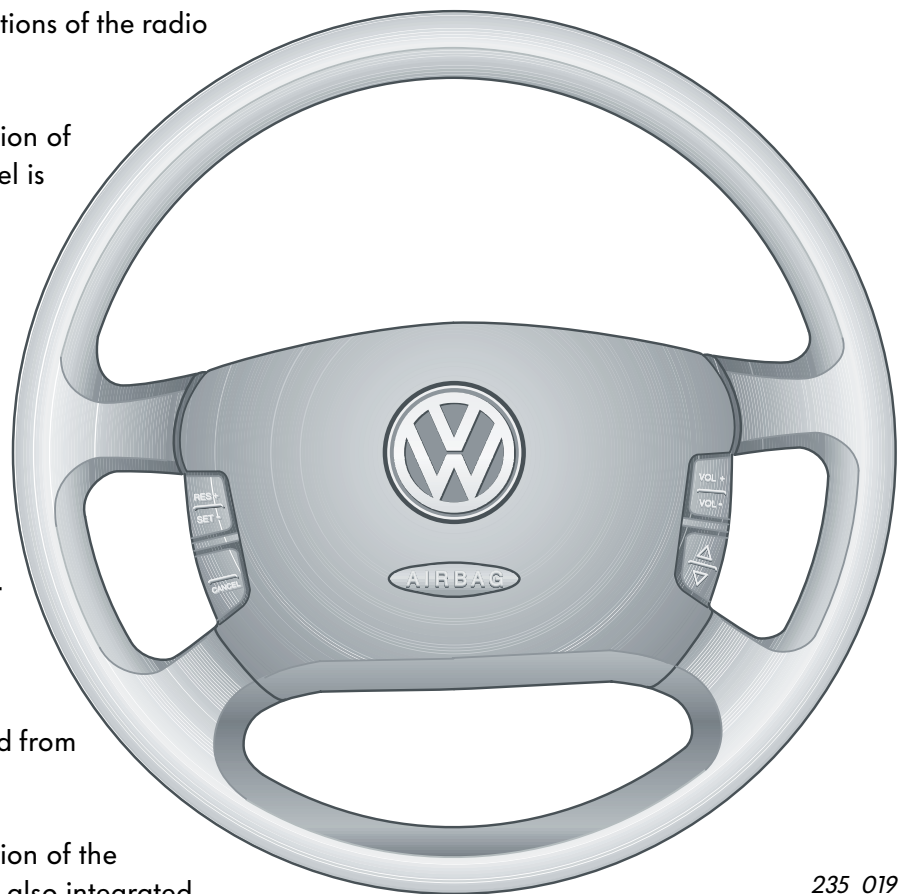
MFW can remotely control functions of the radio and CCS.

A button to control the illumination of the buttons on the steering wheel is also integrated.

### Audio/CCS/telephone variant

In addition to the above mentioned functions, the fitted telephone can also be controlled from the steering wheel.

A button to control the illumination of the buttons on the steering wheel is also integrated.



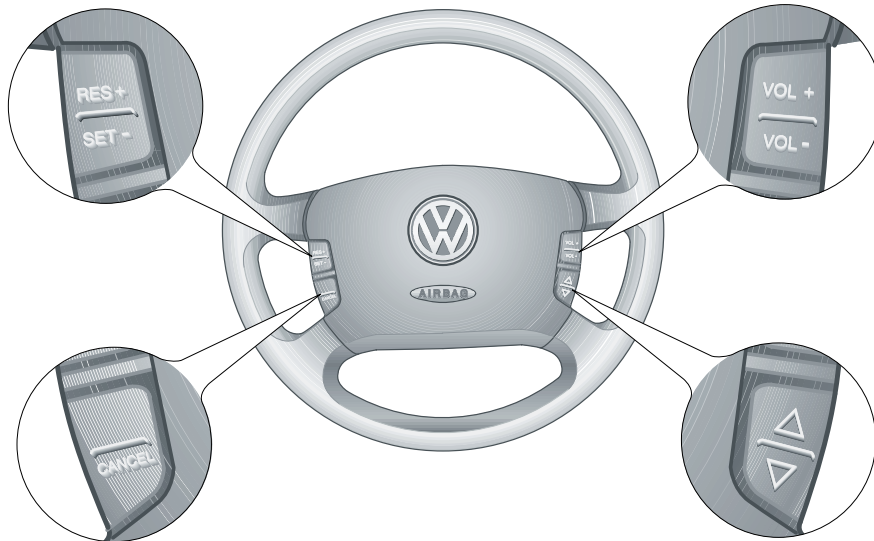
235\_019



With both variants of MFW, the selection of radio, cassette or CD changer operation is made directly on the radio unit as before.

## Button assignment

### Audio/CCS variant



235\_020

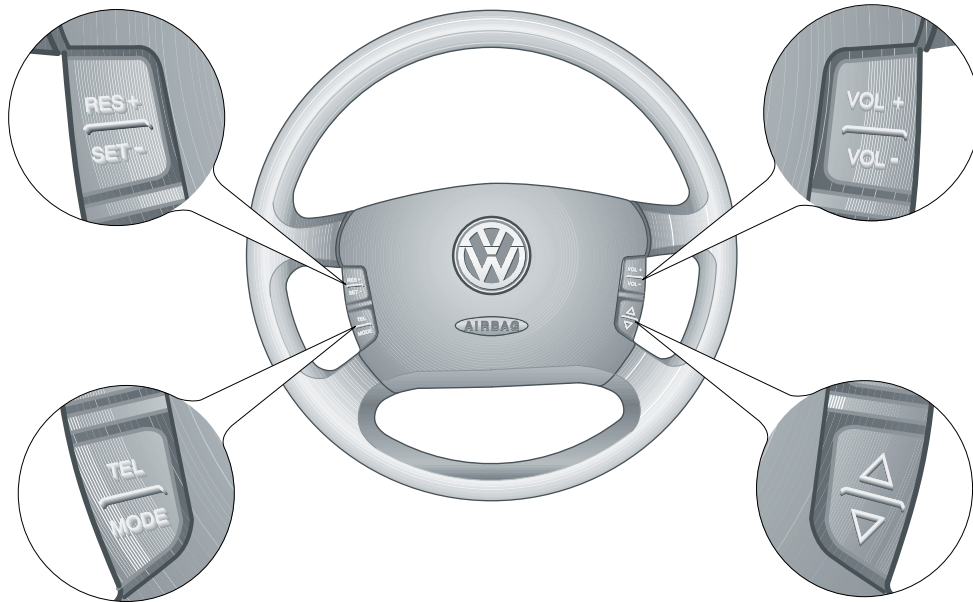
Button module	Button symbol	Function	Significance
Right	VOL +	Volume "up" Louder	Increases volume
	VOL -	Volume "down" Quieter	Decreases volume
	△	Scroll "up" Station search up	Radio: Station search, up Cassette: Fast forward CD: Title search forwards Telephone: Scroll up
	▽	Scroll "down" Station search down	Radio: Station search, down Cassette: Fast rewind CD: Title search backwards Telephone: Scroll down
Left	RES +	Resume Resume stored speed	Speed of vehicle will increase or will be resumed
	SET -	Set Store or reduced speed	Current speed will be stored or reduced
	Vacant	Vacant	Blocked mechanically
	CANCEL	CCS off;	Switches CCS off
Rear		Button illumination	Button illumination ON/OFF



# MFW Design

## Button assignment

### Audio/CCS/telephone variant



235\_021

The lower rocker of the left-hand button module is assigned differently to the Audio/CCS variant.

Button module	Button symbol	Function	Significance
Lower left	TEL	Telephone	Initiate call Accept call End call
	MODE	Change-over	For radio/CC/CD: switch to telephone mode For telephone: switch to radio mode
Lower right	△	Search telephone book	Search telephone book upwards
	▽		Search telephone book downwards

The CCS function "CANCEL" is controlled from the CCS switch.

The functions for the horn and airbag remain unchanged.

## Display

### Highline display

#### Example: Radio mode



235\_012

MODE	Radio	Compact cassette (CC)	CD player	Telephone
Display	Pop-Radio FM 1.2 TP	TAPE ◀ ▶	CD 02 TR 09	MEIER 0234567
Significance	Station name Station frequency	Cassette forwards or rewind	CD number Title number	Name or telephone number of subscriber *

- \* The name of the subscriber is displayed when the name is stored. Otherwise the number transmitted will be displayed or "Call", will be displayed when no number is transmitted.

# MFW design

When in telephone mode additional display texts are activated.

They equate to the standard operating texts displayed by a mobile telephone etc.



Following texts can, for example, appear on the display:

Connection to transmitter is not possible;  
connection will be disconnected

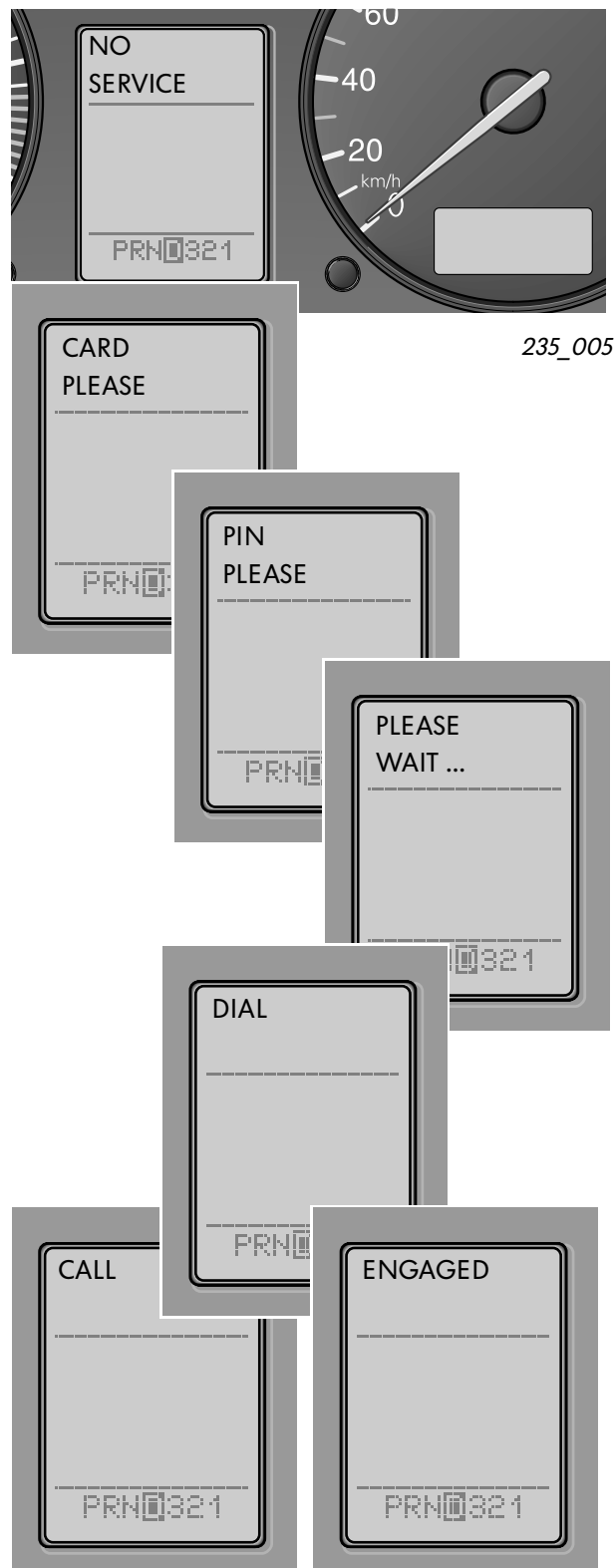
No telephone (SIM) card in telephone unit

Enter PIN code

Telephone (SIM) card being read

Incoming call

Line engaged



235\_005

235\_006

## Operation

### Example: telephone



#### Incoming call

- Telephone rings, **“CALL”** e.g. appears in central display; press **“TEL”** on left-hand button module
- The hands-free system switches to **“ON”** automatically
- When the telephone number of the caller is stored on the telephone SIM card, the callers name appears on the central display of the combi-instrument
- **Telephone** as normal
- Once call has ended press **“TEL”** button
- The hands-free system switches to **“OFF”** automatically
- Call ended **“END CALL”**
- With **“MODE”** button you can return to radio mode

or

if the function “Accept calls automatically” is activated:

- The hands-free system switches automatically to **“ON”** after 3 rings
- **Telephone** as normal
- The subscriber ends call and the hands-free system automatically switches to **“OFF”**

#### Outgoing call

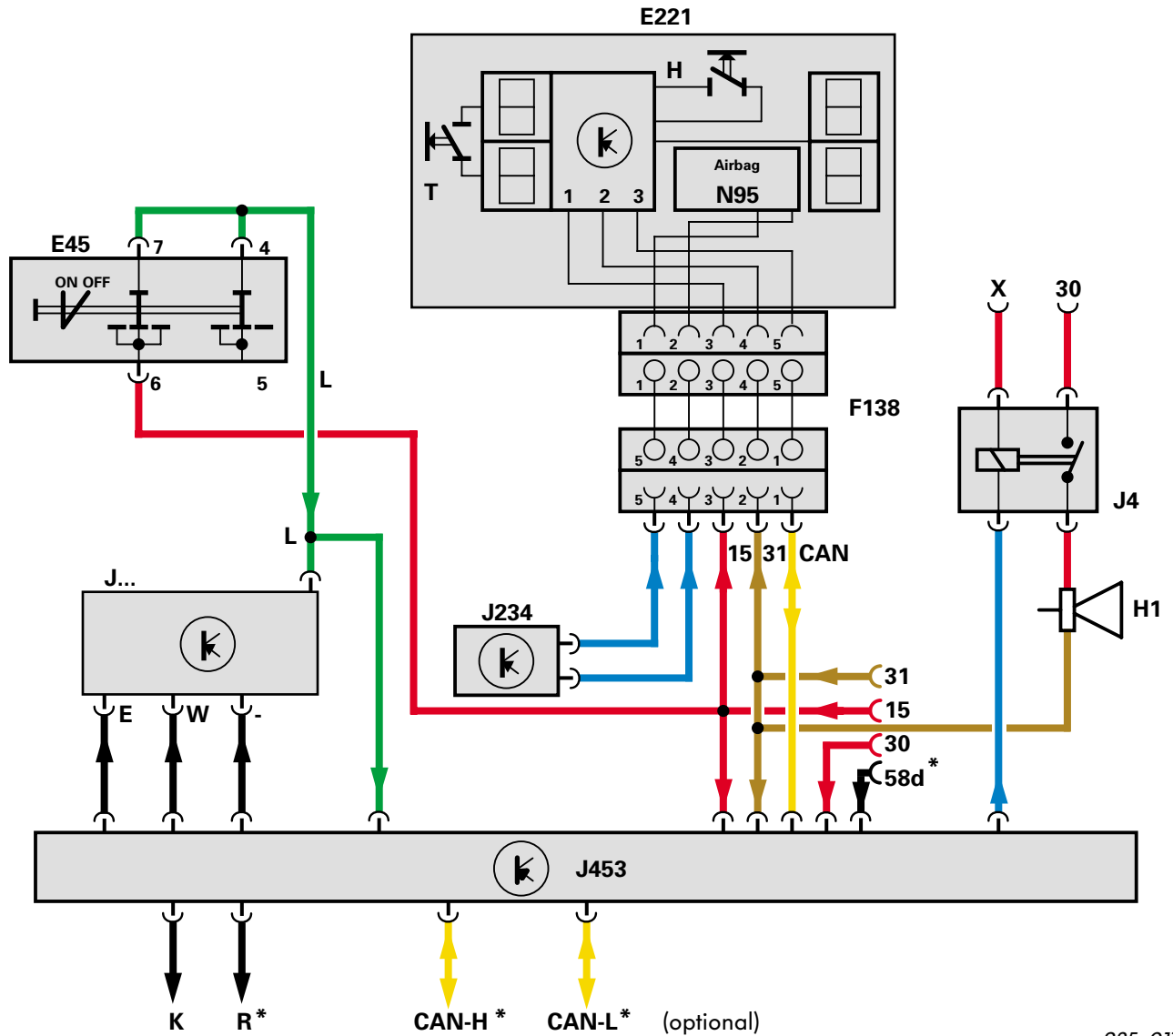
- Depress **“MODE”** button to change to function **“TEL”**; use button **“△”** and **“▽”** (lower right-hand button module), to scroll through the telephone book until the required name or telephone number appears on the central display of the combi-instrument; Once the item desired appears press **“TEL”** button and telephone dials the number displayed; **“DIAL”** appears in the central display
- Once the subscriber has accepted the call the hands-free system switches to **“ON”**
- If the number dialled is engaged then **“ENGAGED”** appears on the central display
- Calls are ended by pressing the **“TEL”** button; the hands-free system switches to **“OFF”**
- Call ended **“END CALL”**
- With **“MODE”** button you can return to radio mode

#### Note:

Pressing once:  
jumps to next entry;  
Pressing longer (approx. 2 seconds);  
scrolls through alphabetically;

# Electrical circuits

Block circuit diagram



235\_017

E 45	CCS switch	J234	Airbag control unit
E221	Multi-function steering wheel (steering wheel operating unit)	J453	Multi-function steering wheel control unit
F138	Coil connector	K	Diagnostic connection
H	Horn plate	N95	Airbag igniter, driver's side
H1	Horn	R	Radio
J...	Engine control unit	T	Button for illumination of button module
J4	Dual tone horn relay		

\* when CAN, then R and 58d are omitted

## Coil connector

### Design and function

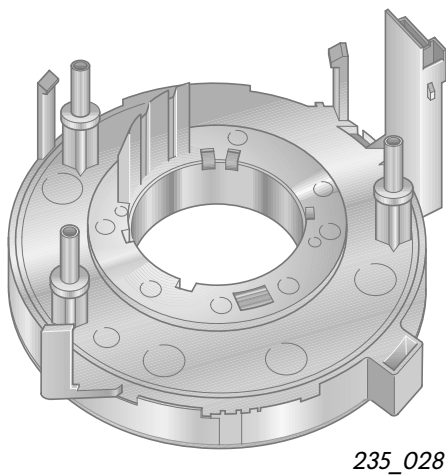
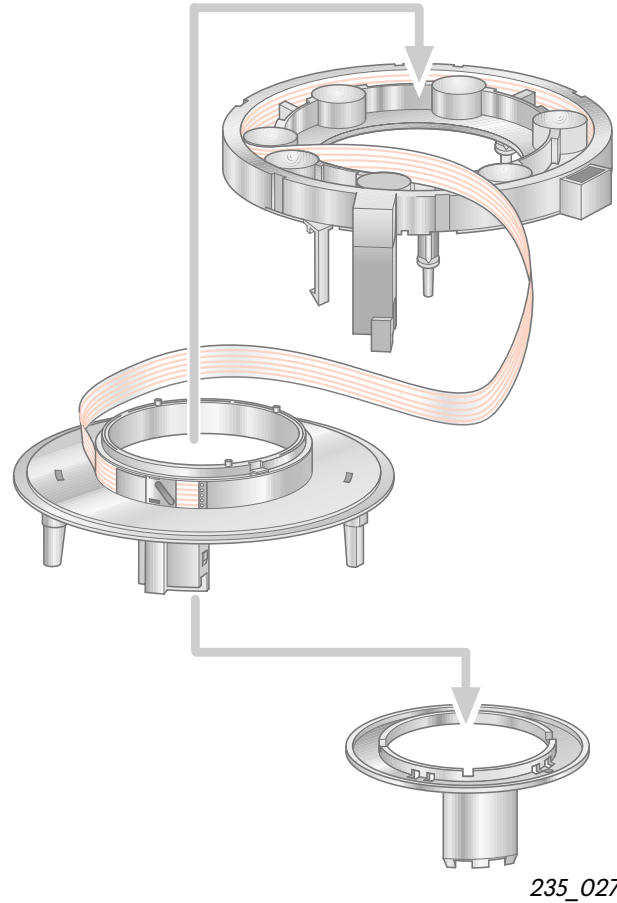
The electrical connection between the rotating steering wheel, with its steering wheel electronics, and the onboard electrics is provided by a highly flexible coil connector.

With increased desires for more comfort and safety, ever more functions are being controlled from the steering wheel. The number of available conductors is limited.

The multi-function steering wheel uses a coil connector with five conductors. These circuits are printed on a highly flexible strip.

The five conductors are used for:

- the triggering of the driver's airbag (2 conductors),
- the current supply for the operating units in the steering wheel (2 conductors) and
- the CAN wiring (1 conductor)



The coil connector fitted into the steering angle sender G85 functions analogously.

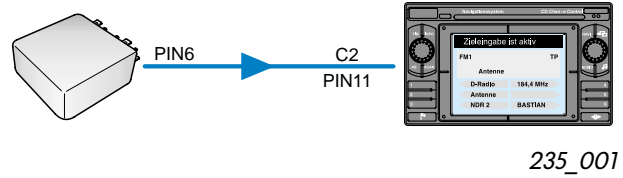
F138 Airbag coil connector



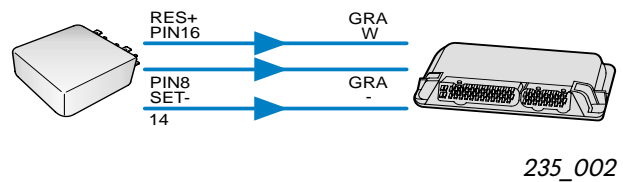
# Electrical circuits

## Data transfer

... between multi-function steering wheel control unit and radio is via the remote control interface for the radio/RNS (radio connector C 2, pin 11).

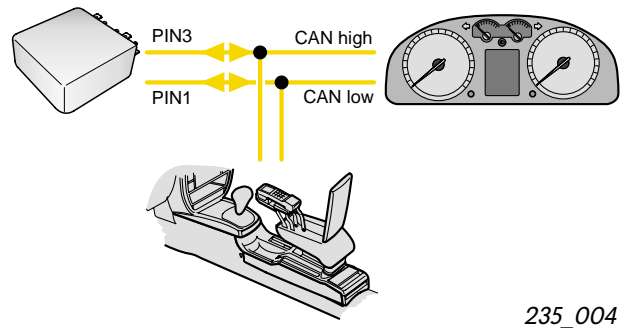


... from multi-function steering wheel control unit to engine control unit to remotely control the cruise control system (CCS) direct via the wiring (pin 16 and 8) and CANCEL CCS.

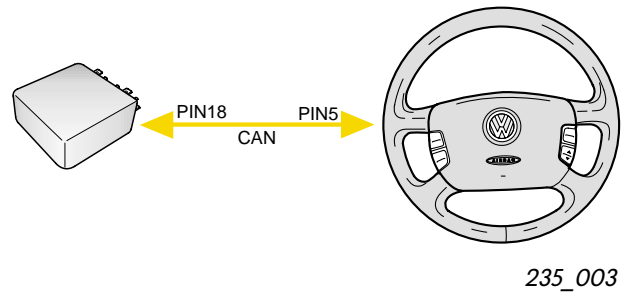


... from multi-function steering wheel control unit to dash panel insert for the displays and telephone interface via the convenience data bus (Infotainment CAN).

The function of the telephone is not implemented into the hardware or the software of the multi-function steering wheel, but is a component part of the telephone system.



... from multi-function steering wheel control unit to steering wheel electronics via the coil connector.

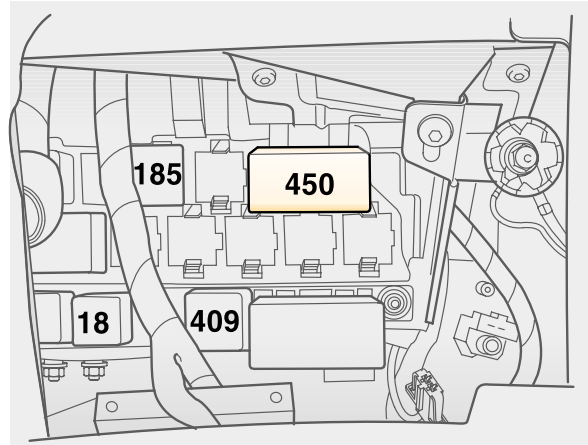


## Contact assignment of multi-function steering wheel

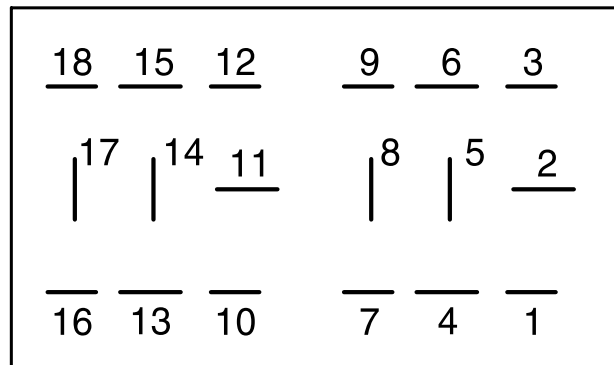
The multi-function steering wheel (MFW) control unit is located in a double relay housing on the central electrics relay carrier as relay No. 450.

The pin assignment is shown in the following table.

Contact	Function
1	Convenience data bus, low (CAN-L)
2	Reserved
3	Convenience data bus, high (CAN-H)
4	CCS OFF
5	Remote control of radio
6	Diagnostic cable K
7	Reserved
8	CCS SET
9	Dual tone horn relay
10	Terminal 31
11	Reserved
12	Terminal 15
13	Terminal 30
14	CANCEL CCS
15	Terminal 58d
16	CCS RES
17	Reserved
18	Data bus for steering wheel electronics



235\_007



235\_014

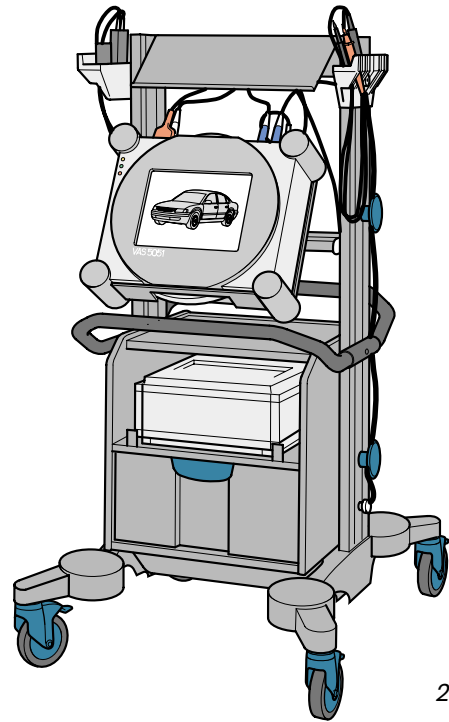
Technical status October 2000

# Electrical circuits

## Self-diagnosis

Vehicle Diagnosis, Testing and Information System can be used for the following diagnosis functions:

- 01 - Interrogate control unit version
- 02 - Interrogate fault memory
- 03 - Final control diagnosis
- 04 - Not used
- 05 - Erase fault memory
- 06 - End output
- 07 - Code control unit
- 08 - Read measured value (data) block



235\_029

Address word for self-diagnosis

### 16 - Steering wheel electronics

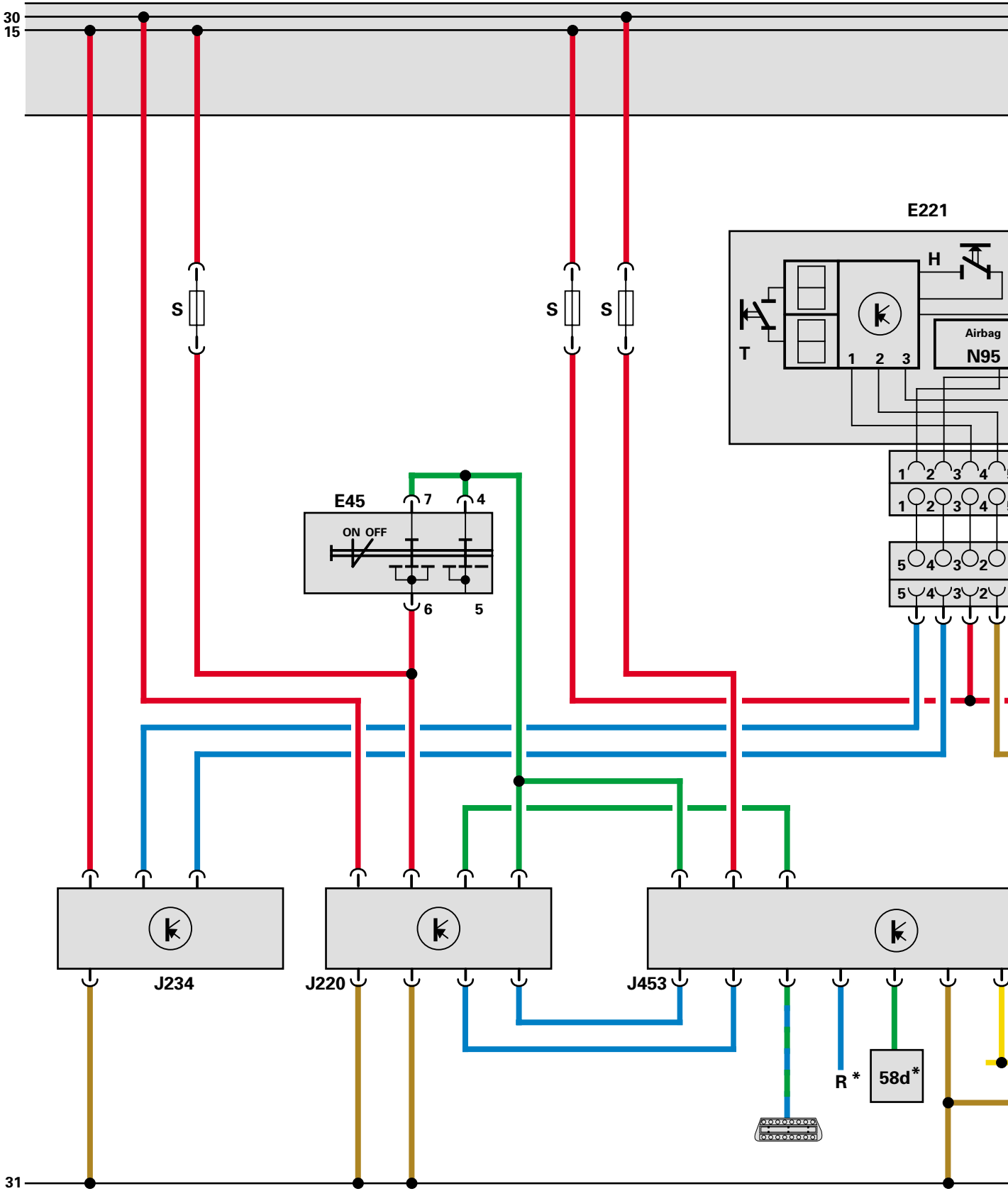
<p>01 - Interrogate control unit version</p>	<div style="border: 1px solid black; padding: 5px;"> <p>1J0907487 Steering wheel electronics xx.xx—&gt;</p> <p>Coding:           00008                           WSC</p> </div>
<p>02 - Interrogate fault memory</p>	<p>01426 Operating unit in steering wheel E221 No communication, Implausible signal; 65535 Control unit defective</p>
<p>03 - Final control diagnosis</p> <p>Following functions are activated one after the other:</p> <p>Radio louder Radio quieter Radio station search upwards Radio station search downwards MODE Telephone memory Next item in telephone memory END</p>	<p>Radio volume increases audibly Radio volume decreases audibly Seeks next radio station, display Seeks previous radio station, display Changes between audio and telephone modes Seeks first name in telephone memory, display Seeks next name in telephone memory, display End of final control diagnosis</p>

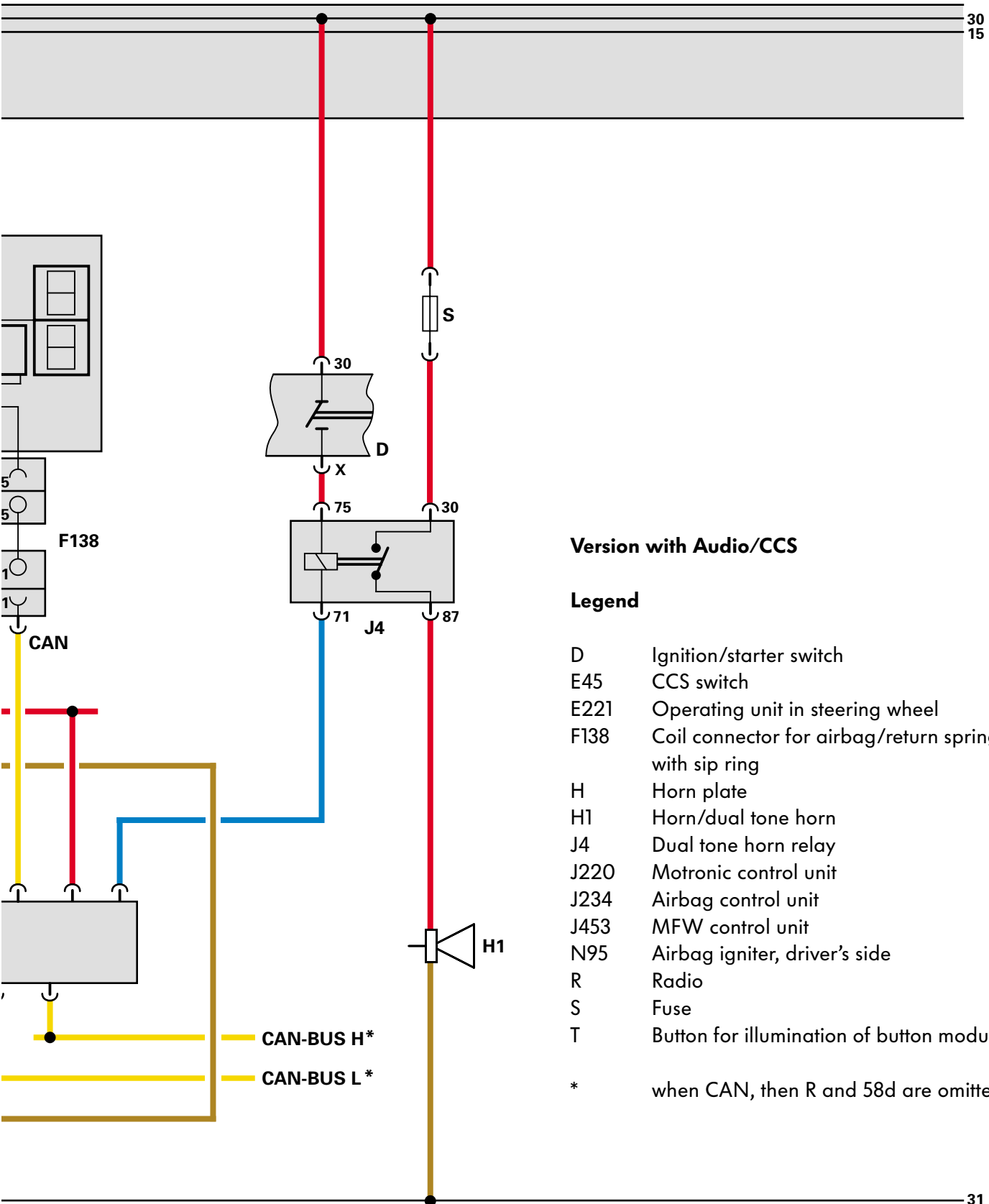
<p>07 - Code control unit</p> <p>e.g. 00008</p>	<p>Audio/CCS</p>
<p>08 - Read measured value block (data block)</p> <p>001</p> <ul style="list-style-type: none"> <li>- Quieter button</li> <li>- Louder button</li> <li>- Search down button</li> <li>- Search up button</li> </ul> <p>002</p> <ul style="list-style-type: none"> <li>- CCS RES button</li> <li>- CCS SET button</li> </ul> <p>003</p> <ul style="list-style-type: none"> <li>- Telephone button</li> <li>- MODE/CCS OFF button</li> </ul>	<p>Quieter (button not operated)</p> <p>Louder (button not operated)</p> <p>Down (button not operated)</p> <p>UP (button not operated)</p> <p>RES/+ (button not operated)</p> <p>SET/- (button not operated)</p> <p>not operated/operated</p> <p>not operated/operated</p>



# Electrical circuits

Function diagram, example: version Audio/CCS



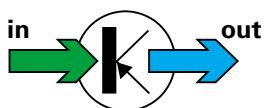


**Version with Audio/CCS**

**Legend**

- D Ignition/starter switch
  - E45 CCS switch
  - E221 Operating unit in steering wheel
  - F138 Coil connector for airbag/return spring with sip ring
  - H Horn plate
  - H1 Horn/dual tone horn
  - J4 Dual tone horn relay
  - J220 Motronic control unit
  - J234 Airbag control unit
  - J453 MFW control unit
  - N95 Airbag igniter, driver's side
  - R Radio
  - S Fuse
  - T Button for illumination of button module
- \* when CAN, then R and 58d are omitted

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