13.1 Model 129, 170, 202, 208, 210 as of M.Y. 1998, Model 220

Diagnosis – Function Test

1. Prior to performing the Function Test, please review the following pages as well as the following Service Informations:
   For Models 129, 170, 202, 208, 210: P-SI-MBNA 82/112 (Sept 1998),
   For Model 220: P-SI-MBNA 82.64/116 (March 1999)

Connection between the components:
The D2B ring (ring or closed loop) connects the COMAND (monitor) with the CD changer (CDC), the telelphone or Handy. The audio amplifier remains wired as before on models 129, 170, 202, 208, 210. The radio or COMAND take over the master function as Head Unit (HU) and realize as well the serial interface to the interior CAN bus (model 220 with Multifunction Steering Wheel only), also see 11/2 as well.

Acronyms:
HU = Head Unit (radio or COMAND)
CDC = CD changer
SBS = Voice activation system (VAS)

Ring-Loop sequence of vehicle/model/interface:

Model 129	HU – telephone (or TeleAid) – CDC – HU
Model 170	HU – telephone (or TeleAid) – HU
Model 202/208	HU – telephone (or TeleAid) – SBS – HU
Model 210	HU – CDC – SBS – telephone (or TeleAid) – HU
Model 220	HU – Sound – CDC – telephone (or TeleAid) – SBS – optional Handy Interface – HU

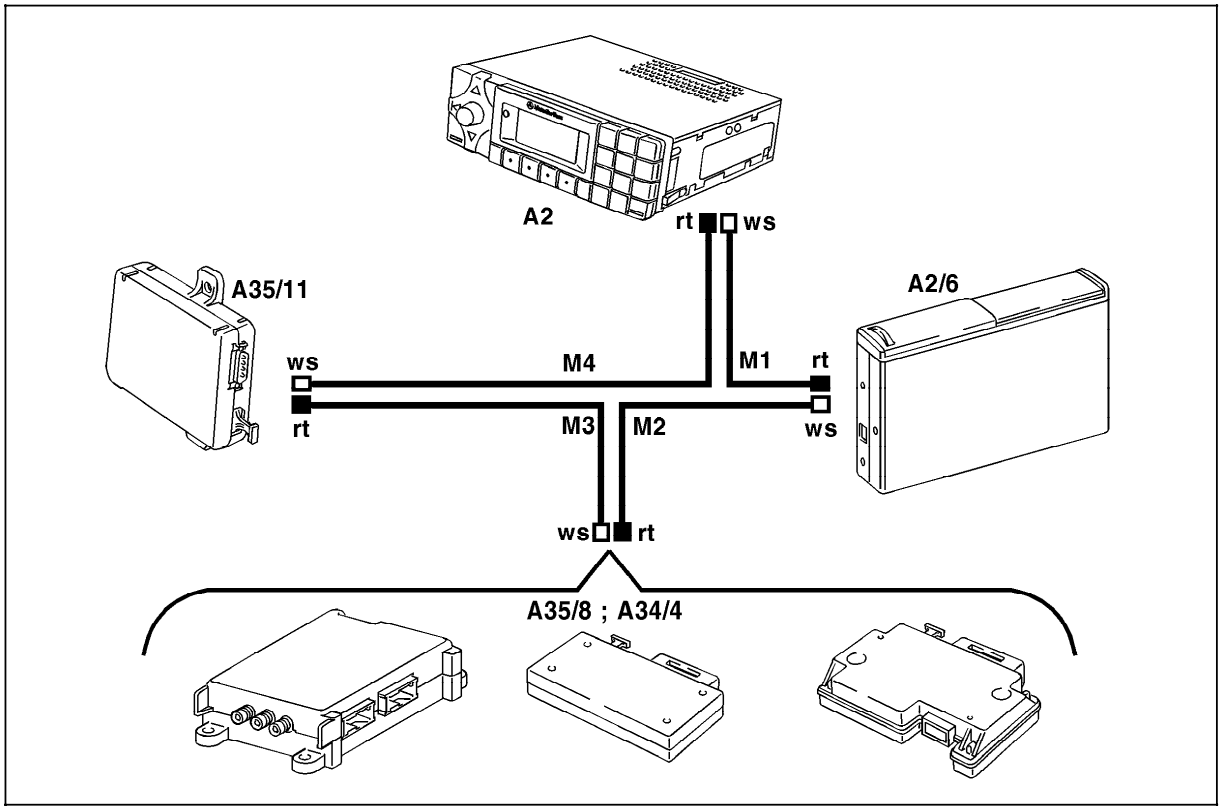
The above Ring-Loop sequence displays the maximum component connections based on options. If one of the options is not supplied, then the component is removed from the ring-loop and a new ring-loop sequence is established.

Diagnosis – Function Test

Connection between Components
Model 202 Shown

A2	Radio (HU)
A2/6	CD changer (in trunk)
A34/4	CTEL interface
A35/8	Emergency-Call control module
A35/11	Voice activation control module
M1	Fiber optic control module 1
M2	Fiber optic control module 2
M3	Fiber optic control module 3
M4	Fiber optic control module 4
ws	white insert (lens end)
rt	red insert (lens end)

Do not knick or lay fiber optic cables over sharp edges, or bend in a radius of less then 25mm (1 inch). Do not apply more 25 N force on Inserts.
Do not expose fiber optic cables to temperatures beyond 185°F or to – 40 °F
Do not pinch fiber optic cables, therefore do not use hose clamps or cable ties to secure fiber optic cables.



P82.70-2189-06

Figure 1

Diagnosis – Function Test

Position of the Fiber Optic Control module Identification Tag:
The identification tag for the models 170, 202, 208, 210, 220 is located behind the radio on the end of the fiber optic cable (Figure 2). Noted on the tag are the installed fiber optic control modules (M1 – M4) including the exact length (for that model).
On model 129,this identification tag is located in the trunk at the CD changer.

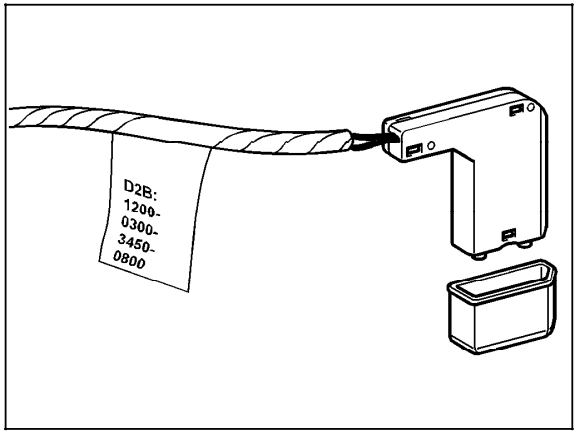


Figure 2 P82.70-2190-01

In case of required repair, the idividual fiber optic control modules (M1 – M4) can be ordered via the PDC (see Spare Parts Microfiche).

Routing of the Fiber Optic Cables:
The fiber optic cables are to be routed using the same routing as before (i.e. production lay-out). When routing the fiber optic cables, be sure to apply protective end cap (3, Figure 3) on end of each fiber optic cable end.

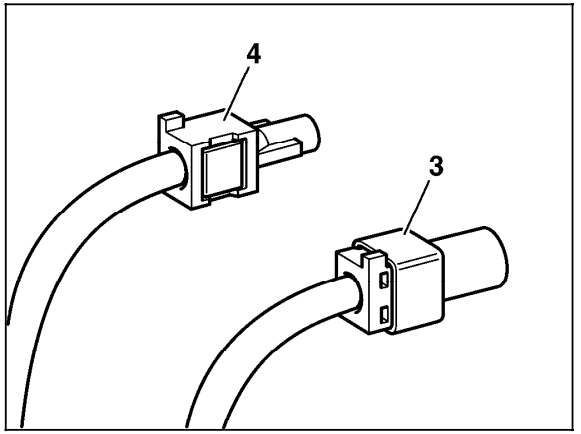


Figure 3 P82.70-2227-01

For each individual model a sequence for the component connection is to be followed within the Ring-loop (see 11/1). The connection of the components is to be acomplished using the fiber optic controll modules (M1 – M4) only. They are secured to the wiring harness via an orange colored sleeve.

Diagnosis – Function Test

In order to minimize the loss of light within/around the D2B components and its connectors, use these following cautions when handling/working with these same components:

- Never remove the protective caps on the connectors or inserts before starting the work, likewise when disconnecting the connectors or removing the Inserts always cap the ends. Soiled/scratched/damged surfaces of the connectors/inserts result in "dampened" light transmission
- Do not knick or lay fiber optic cables over sharp edges, or bend in a radius of less then 25mm (1 inch), otherwise the fiber optic cable interior will yellow and then break. Yellowed or broken fiber optic cables will "dampen" the transmitted light.
- If the proper tools are not available to install the inserts onto the fiber optic ends, then use only the ready made idividual fiber optic control modules (M1 – M4).

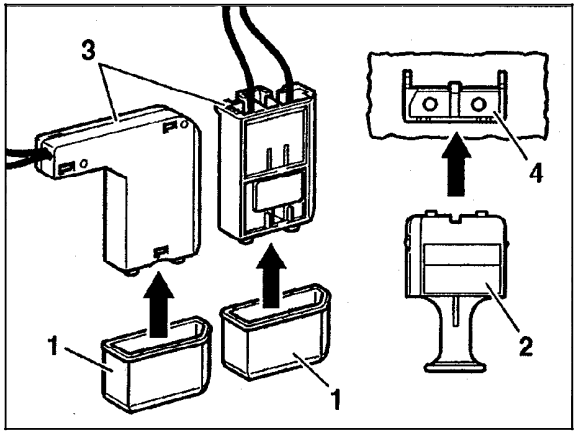


Figure 4 P82.70-2048-01

1 Use caution when pulling off the connector (3, figure 4) from the control module (4, Figure 4).
2 Cap-off connector end using a protective cap (3, Figure 4), and on component (4, Figure 4) using protective plug (2, Figurer 4).

Diagnosis – Function Test

Position Determination within D2B Ring-Loop

In order to determine component position, the number of components must be known within the D2B Ring-Loop. This can be determined via the readout of the D2B Ring-Loop via the HHT or via Star Diagnosis System (Model 220).

In order to determine the component position, the following procedure must be observed:

- Readout DTC fault memory
- Readout via DTC memory indicates: No data transfer between radio (or COMAND) and the control module in position 3 (3, Figure 5).
- The CD changer (A2/6, Figure 5) is located in position 3 of the D2B Ring-Loop, see below. Thus the fault may lie either at the receiver unit for the CD changer or in the fiber optic cable to the CD changer itself.

The counting method for determining the position location during the fault finding diagnosis occurs in a **counter-clock wise direction (see arrows, Figure 5)** , which **is opposite** of the **information flow** (which flows clock-wise) within an intact D2B Ring-Loop.

A2	Radio
A2/6	CD changer (in trunk)
A2/13	Audio amplifier (Model 220 only)
A59	D2B fiber optic interface
A59/1	D2B interface/handy
A35/11	Voice activation control module

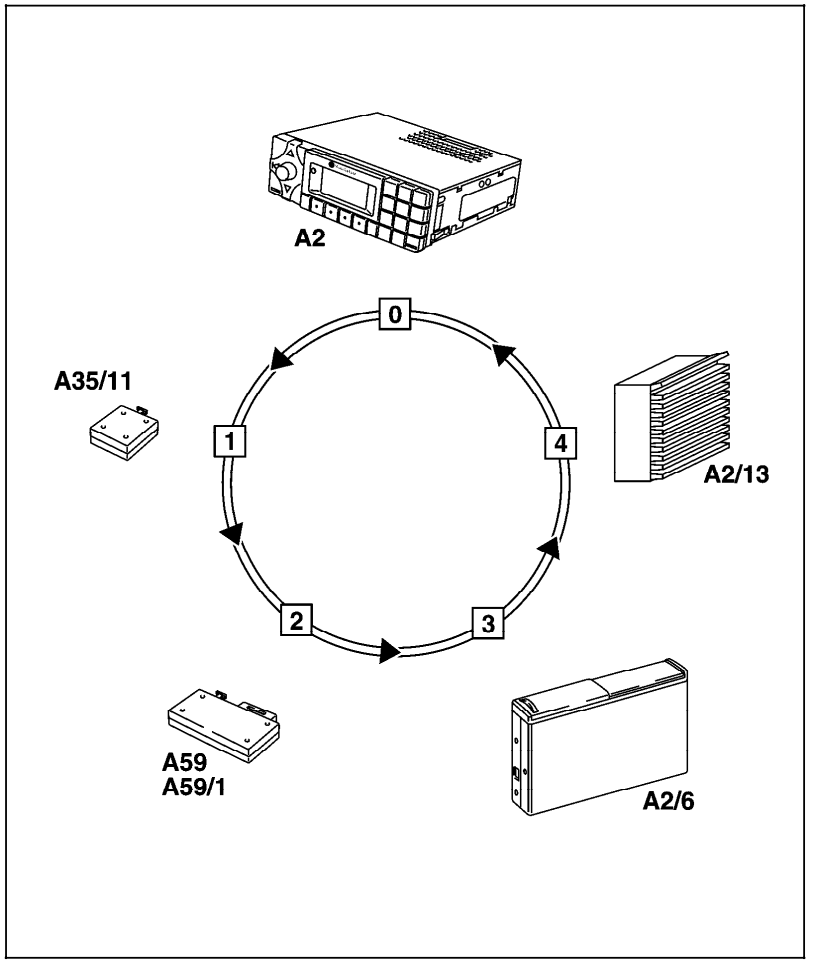


Figure 5 P00.00-2573-12

Diagnosis – Function Test

Preparation for Test:

1. Review pages: 11/1 – 11/4,
2. Battery voltage: 11 – 14 V,
3. All fuses OK,
4. Determine Ring-Loop sequence (see 11/1) and activate only one of the components,
5. Review vehicle Data Card (see owners portfolio) to determine factory installed options (may not be same for each vehicle) as installed on vehicle.

Test step/Test sequence	Test condition	Nominal value	Possible cause/Remedy
Activate D2B Ring-Loop (CD changer, Code 819) **OR** Activate D2B Ring-Loop (Voice activation system [VAS], Code 813b). **OR** Activate D2B Ring-Loop (Telephone Code 316, 317) **OR** Activate D2B Ring-Loop (Sound amplifier, code 810) (Model 220 only)	Radio/COMAND: **ON** Play a CD in CD changer Radio/COMAND: **ON** Press button/switch on push button control module Telephone: **ON** Radio/COMAND: **ON**	Digital Data Bus is activated, volume, tone and indications must be without interference. Digital Data Bus is activated, Peep tone is heard. Digital Data Bus is activated. Digital Data Bus is activated, volume, tone and indications must be without interference.	see 12

Diagnosis – Diagnostic Trouble Code (DTC) Memory (D2B)

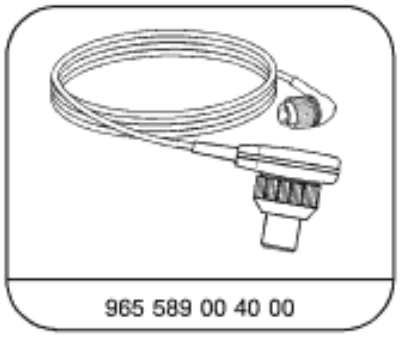
Preparation for Test:

1. Review 11,
2. Check actual configuration of the control modules as located in the vehicle using the HHT,
3. Connect HHT (see section 0) and read out DTC codes.
   (Use Star Diagnosis System for Model 220).

Special Tools

965 589 00 01 00

Hand-Held-Tester



965 589 00 40 00

Test cable

Test equipment; See MBUSA Standard Service Equipment Program

Description	Brand, model, etc.
Digital multimeter	Fluke models 23, 77 III, 83, 85, 87

Diagnosis – Diagnostic Trouble Code (DTC) Memory (D2B)

DTC 	Possible cause	Test step/Remedy [1]
No fault code	No DTC recognized. In case of complaint: 13 (entire test).	13
n 1111	Fiber optic cable defective. The transmitter of one of the control modules defective, The receiver of one of the control modules defective. (No data transmission between Radio or COMAND and control module in position X is possible).	See 11/5
n 1112	Fiber optic cable defective. The transmitter of one of the control modules defective, The receiver of one of the control modules defective. (No data is transmitted between Radio and component located prior to D2B Interface).	See 11/5
n 1113	Fiber optic cable defective. The transmitter of one of the control modules defective, The receiver of one of the control modules defective. (Data transfer/transmission is faulty).	See 11/5
n 1114	Head unit can not be integrated into D2B Ring-Loop Initialization of D2B is faulty. (Erase DTC readout codes, switch on entire system and then readout DTC fault codes again.	If fault continues to show, swap out head unit.

[1] Observe Preparation for Test, see 22.

Diagnosis – Diagnostic Trouble Code (DTC) Memory (D2B)

DTC	Possible cause	Test step/Remedy [1]
n 1115	Due to faulty Initialization, a control module can not be integrated into a position within D2B Ring-Loop D2B Initialization of the control module is faulty: Readout DTC memory, switch-on entire system and then readout DTC fault codes again.	See 11/5, if fault continues to show, swap out effected control module.
n 1116	D2B component has failed at its position within D2B Ring-Loop (bypass-mode). Internal fault of the control module located in that position. Erase DTC memory, switch-on entire system and then readout DTC fault codes again.	See 11/5
n 1117	D2B Initialization of a D2B component is faulty. Erase DTC memory, switch-on entire system and then readout DTC fault codes again.	There are also faults within other control modules that are within D2B Ring-Loop: Swap Head Unit. There are **no** faults within other control modules that are within D2B Ring-Loop: Swap control module.
n 1118	D2B Initialization of a D2B component is faulty. Erase DTC memory, switch-on entire system and then readout DTC fault codes again.	There are also faults within other control modules that are within D2B Ring-Loop: Swap Head Unit. There are **no** faults within other control modules that are within D2B Ring-Loop: Swap control module.
n 1141	Radio: The "Should Be" and actual configuration of the D2B Ring-Loop vary.	Re-configure system again.

[1] Observe Preparation for Test, see 22.

Diagnosis – Complaint Related Diagnostic Chart

Preparation for Test

1. Review 11, 20,
2. Check actual configuration of the control modules as located in the vehicle using the HHT,
3. Connect HHT (see section 0) and read out DTC codes.
   (Use Star Diagnosis System for Model 220).

Complaint/Problem	Possible cause	Test step/Remedy [1]
D2B Ring-Loop does not come-up (energize).	Voltage supply to one of the D2B components not ensured. (Voltage is used to check for voltage supply to D2B ring-Loop components). A "Diagnosis Wake Up Call" can only be used when there is an interruption within the D2B Ring-Loop.	Perform Diagnosis Wake Up Call.
D2B Ring-Loop does not come-up (energize).	The D2B connectors are improperly connected or are dirty.	Clean and properly reconnect all D2B connections.
D2B Ring-Loop does not come-up (energize) and there are no concrete indications in the DTC memory as to where the fault lies within the D2B Ring-Loop.	Fiber optic cable defect.	Check all the fiber optic cables beginning in a clock-wise direction (Information flow pattern) starting at the radio or COMAND unit. Also see 20
D2B Ring-Loop does not come-up (energize) and there are no concrete indications in the DTC memory as to where the fault lies within the D2B Ring-Loop.	Transmitter unit of a control module is defective. Receiver unit of a control module is defective.	Check all the fiber optic cables beginning in a clock-wise direction (Information flow pattern) starting at the radio or COMAND unit. Also see 20

[1] Observe Preparation for Test, see 22.

Electrical Test Program – Connection of Components

Connection of the Network Tester into the D2B Network

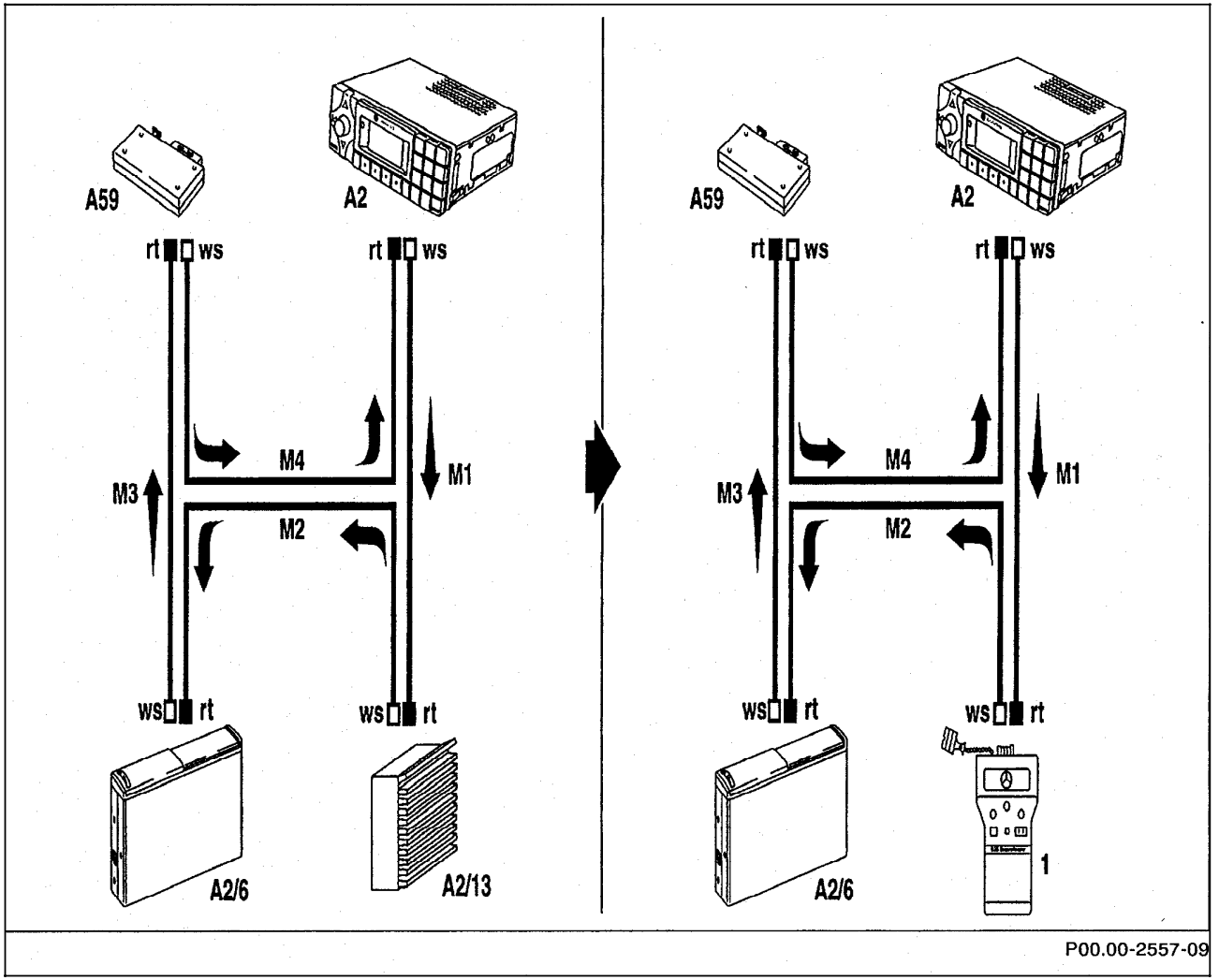


Figure 1

1	Network Tester
A2	Radio
A2/6	CD changer
A2/13	Audio amplifier
A59	D2B interface/handy
M1	Fiber optic control module 1
M2	Fiber optic control module 2
M3	Fiber optic control module 3
M4	Fiber optic control module 4

The arrows show the flow of information within the D2B Ring-Loop.
In the D2B mode, the Network Tester has been inserted into the optical ring, in place of a (presumed) faulty control module.

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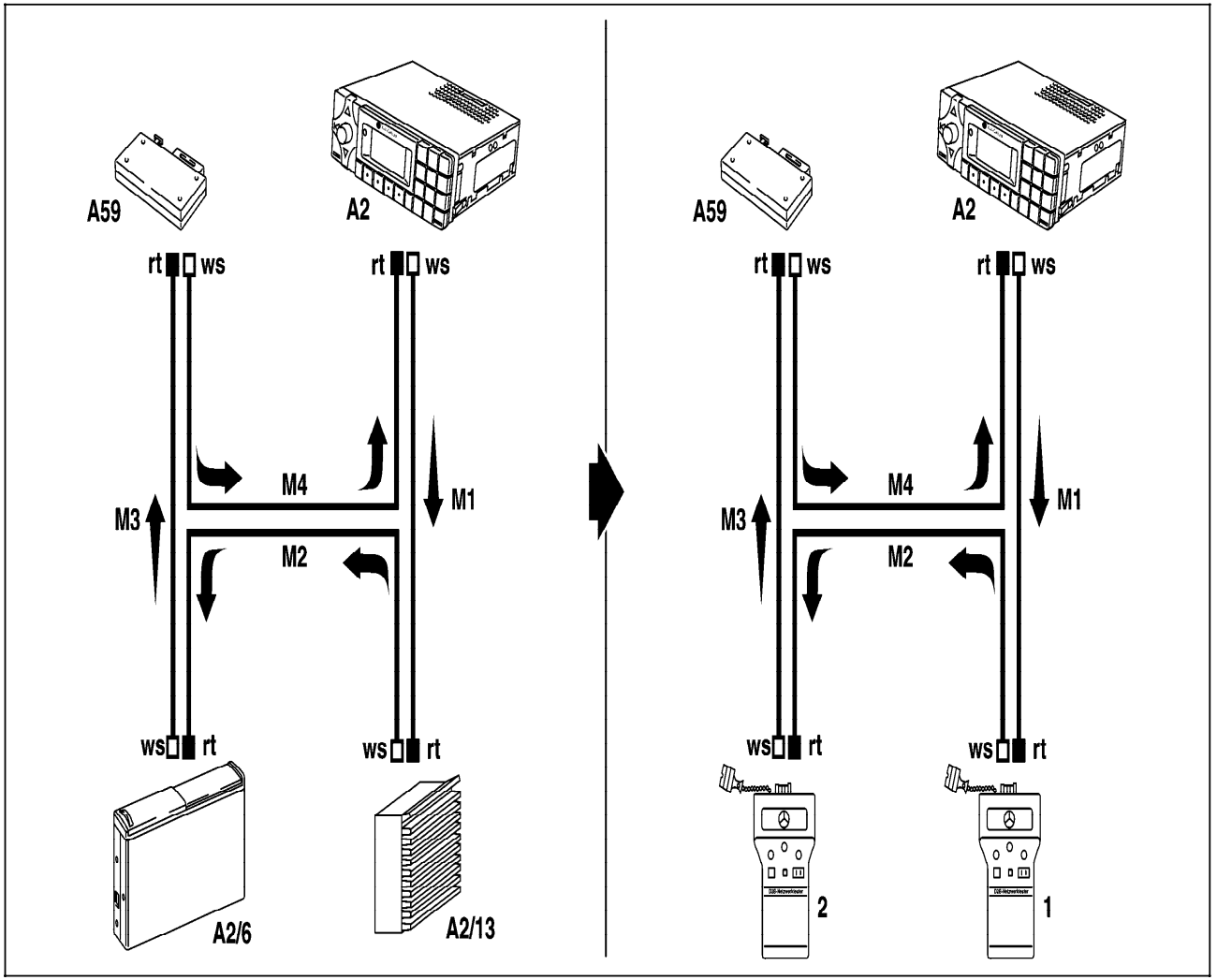
Electrical Test Program – Connection of Components

Connection of the Network Tester into the Test Mode



P00.00-2577-09

Figure 2

1	Network Tester
2	Network Tester
A2	Radio
A2/6	CD changer
A2/13	Audio amplifier
A59	D2B interface/handy
M1	Fiber optic control module 1
M2	Fiber optic control module 2
M3	Fiber optic control module 3
M4	Fiber optic control module 4

The arrows show the flow of information within the D2B Ring-Loop.
In the Test mode, the light dampening effect of a fiber optic control module can be determined.

Electrical Test Program – Component Locations

Fiber Optic Control Modules as routed within vehicle
Model 129 shown

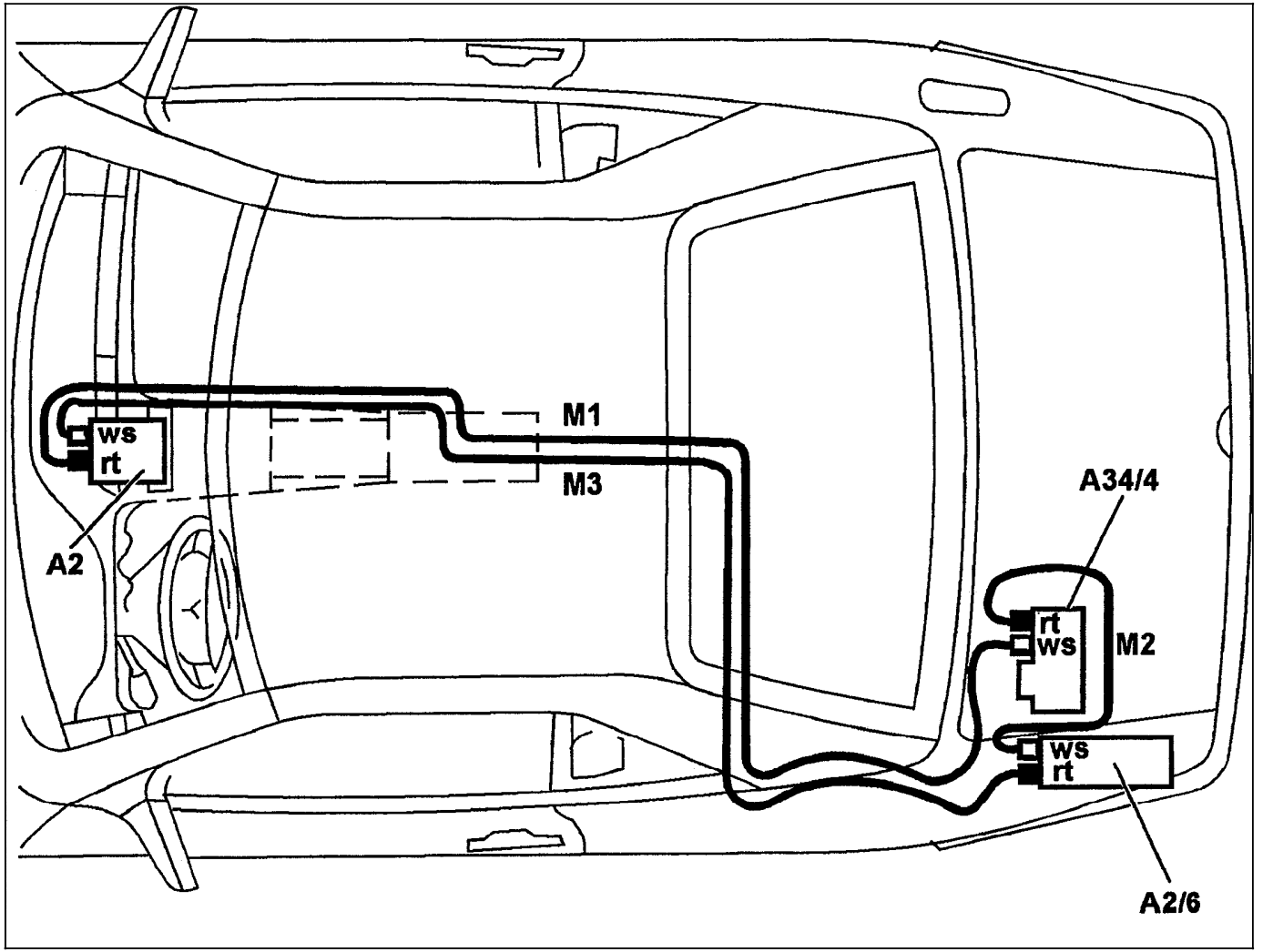


Figure 1

A2	Radio
A2/6	CD Changer
A34/4	CTEL Interface (phone mounts to back of CD Changer)
M1	Fiber optic control module 1
M2	Fiber optic control module 2
M3	Fiber optic control module 3
M4	Fiber optic control module 4
ws	White insert (lens end)
rt	Red insert (lens end)

U82.70-2210-06

Electrical Test Program – Component Locations

Fiber Optic Control Modules as routed within vehicle
Model 170 shown

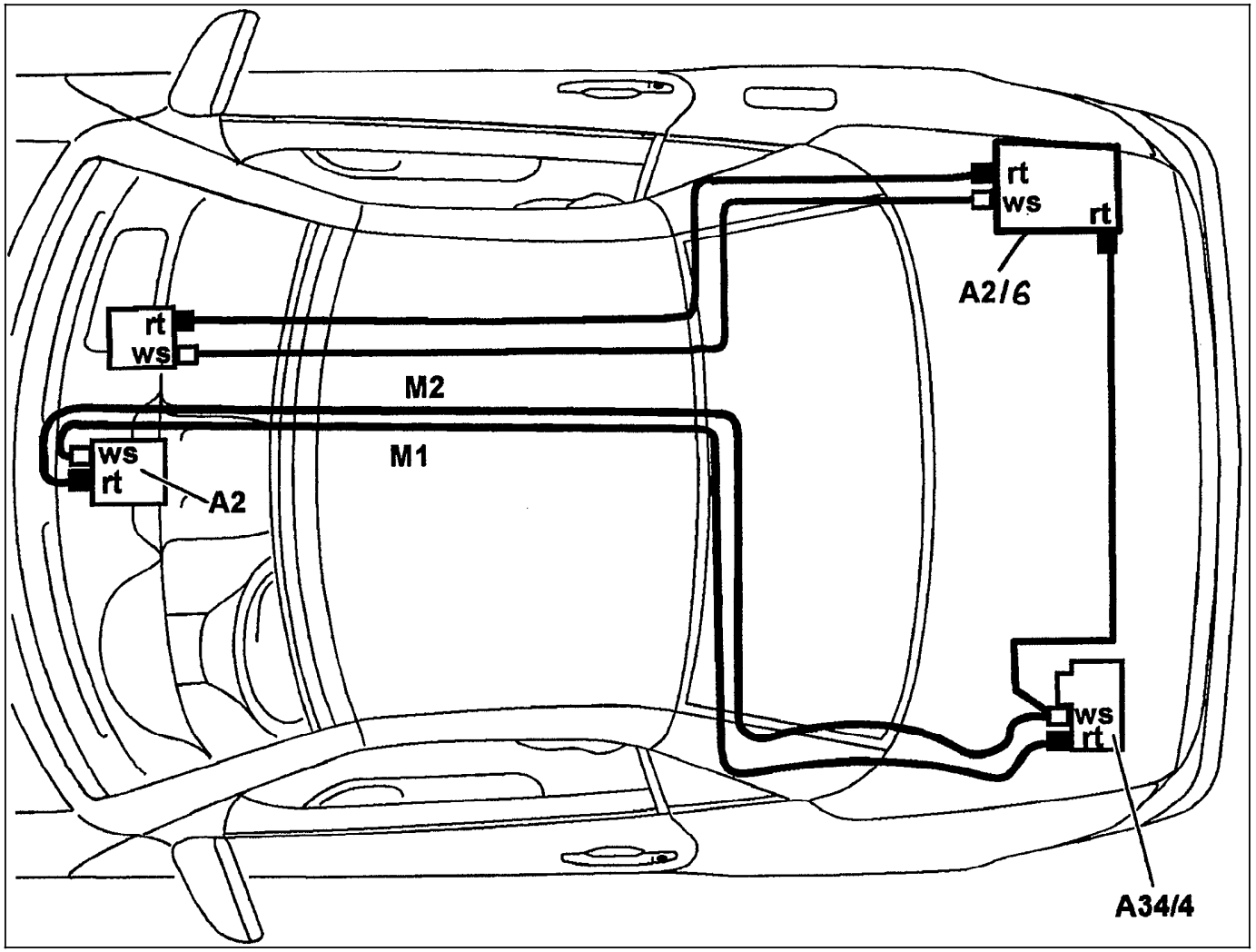


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Figure 2

A2	Radio
A2/6	CD Changer
A34/4	CTEL Interface
M1	Fiber optic control module 1
M2	Fiber optic control module 2
M3	Fiber optic control module 3
M4	Fiber optic control module 4
ws	White insert (lens end)
rt	Red insert (lens end)

Electrical Test Program – Component Locations

Fiber Optic Control Modules as routed within vehicle and with Handy Telephone installed Model 202 shown

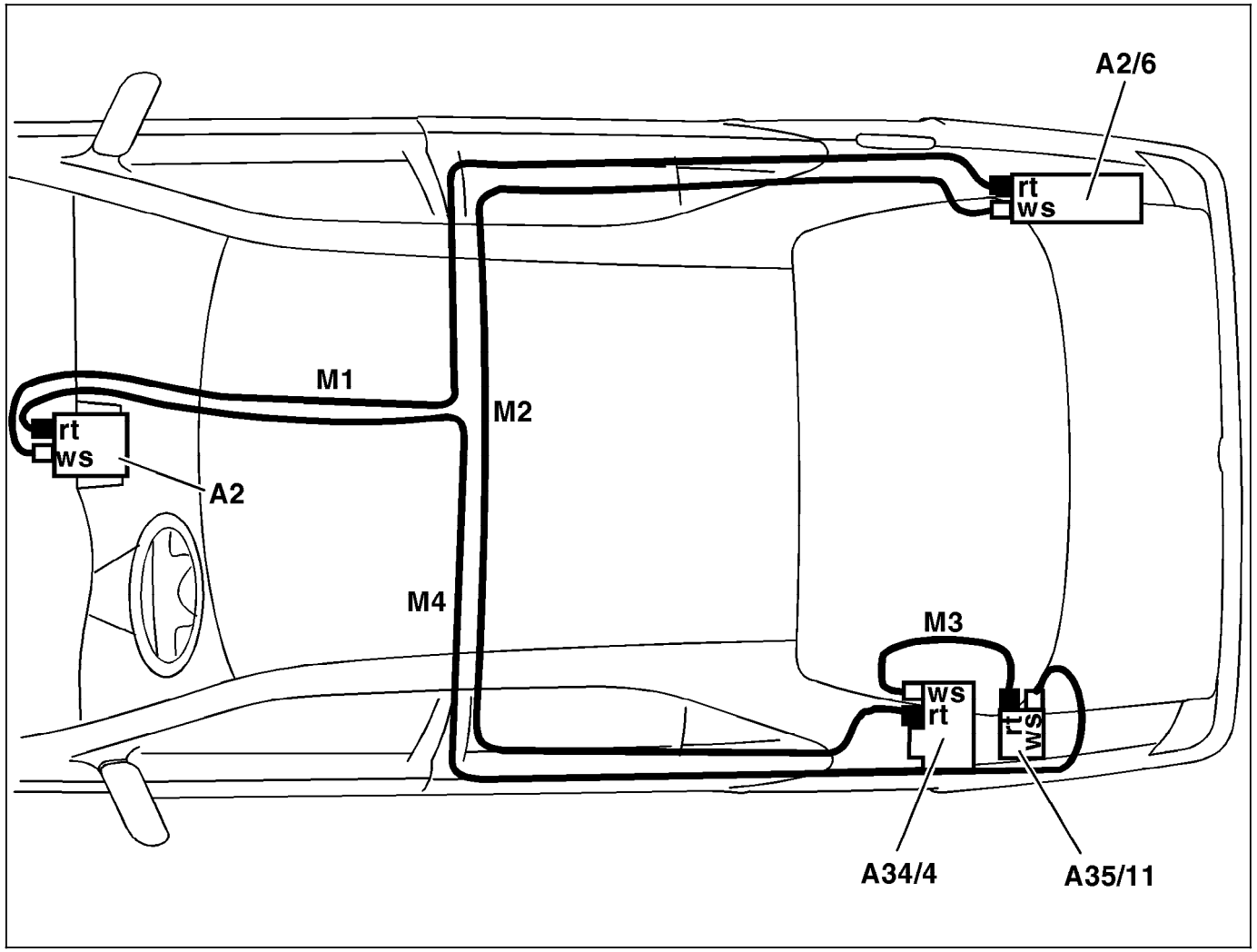

Figure 3

A2	Radio
A2/6	CD changer
A34/4	CTEL Interface
A35/11	Voice activation control module (not USA)
M1	Fiber optic control module 1
M2	Fiber optic control module 2
M3	Fiber optic control module 3
M4	Fiber optic control module 4
ws	White insert (lens end)
rt	Red insert (lens end)

P82.70-2184-06

Electrical Test Program – Component Locations

Fiber Optic Control Modules as routed within vehicle and with TeleAid installed
Model 202 shown

No TeleAid on D2B until M.Y. 2001 for Model 202

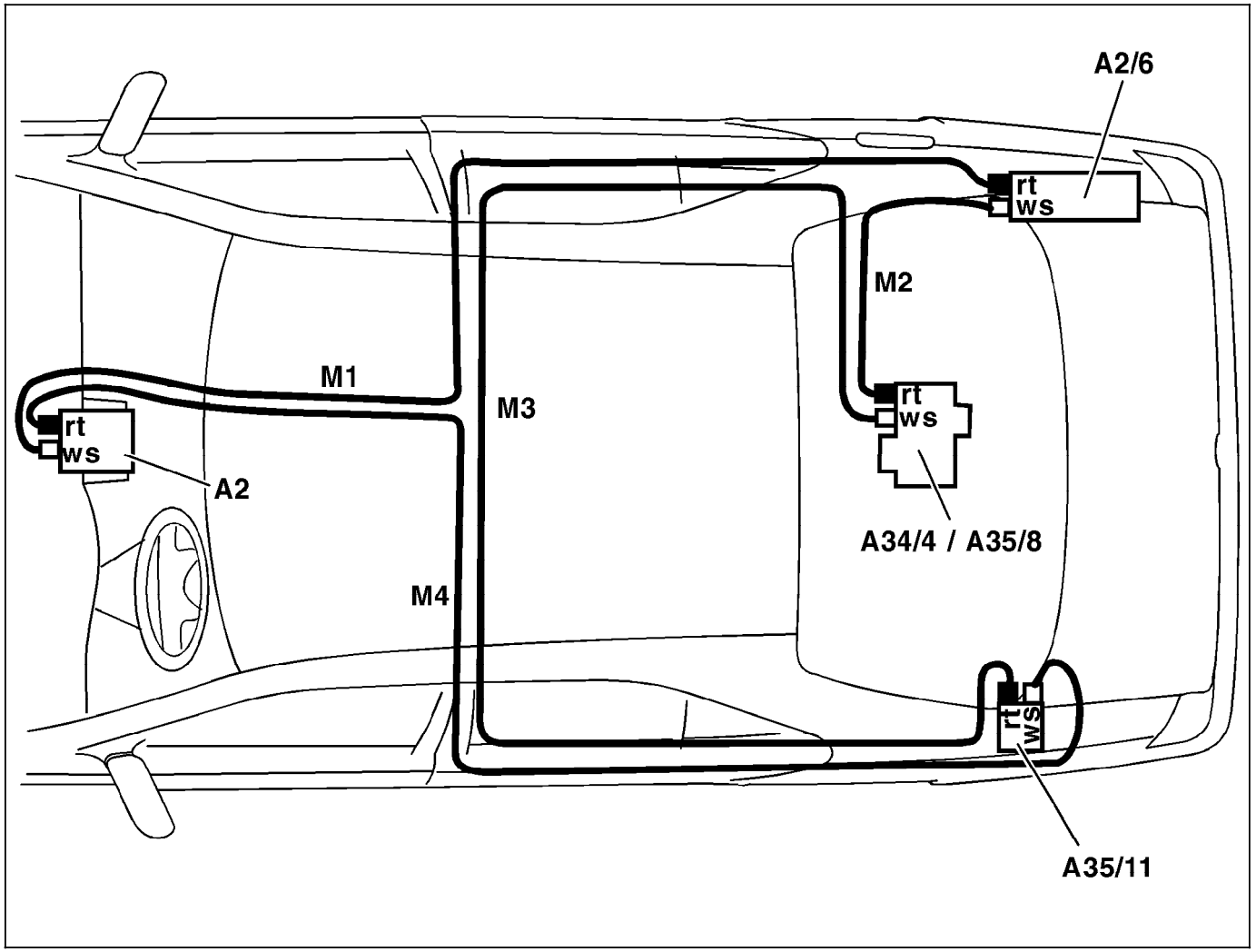

Figure 4

A2	Radio
A2/6	CD changer
A34/4	CTEL Interface
A35/11	Voice activation control module
A35/8	Emergency-Call control module
M1	Fiber optic control module 1
M2	Fiber optic control module 2
M3	Fiber optic control module 3
M4	Fiber optic control module 4
ws	White insert (lens end)
rt	Red insert (lens end)

P82.70-2196-06

Electrical Test Program – Component Locations

Fiber Optic Control Modules as routed within vehicle and with TeleAid installed
Model 210 shown

No TeleAid on D2B until M.Y. 2001 for Model 210

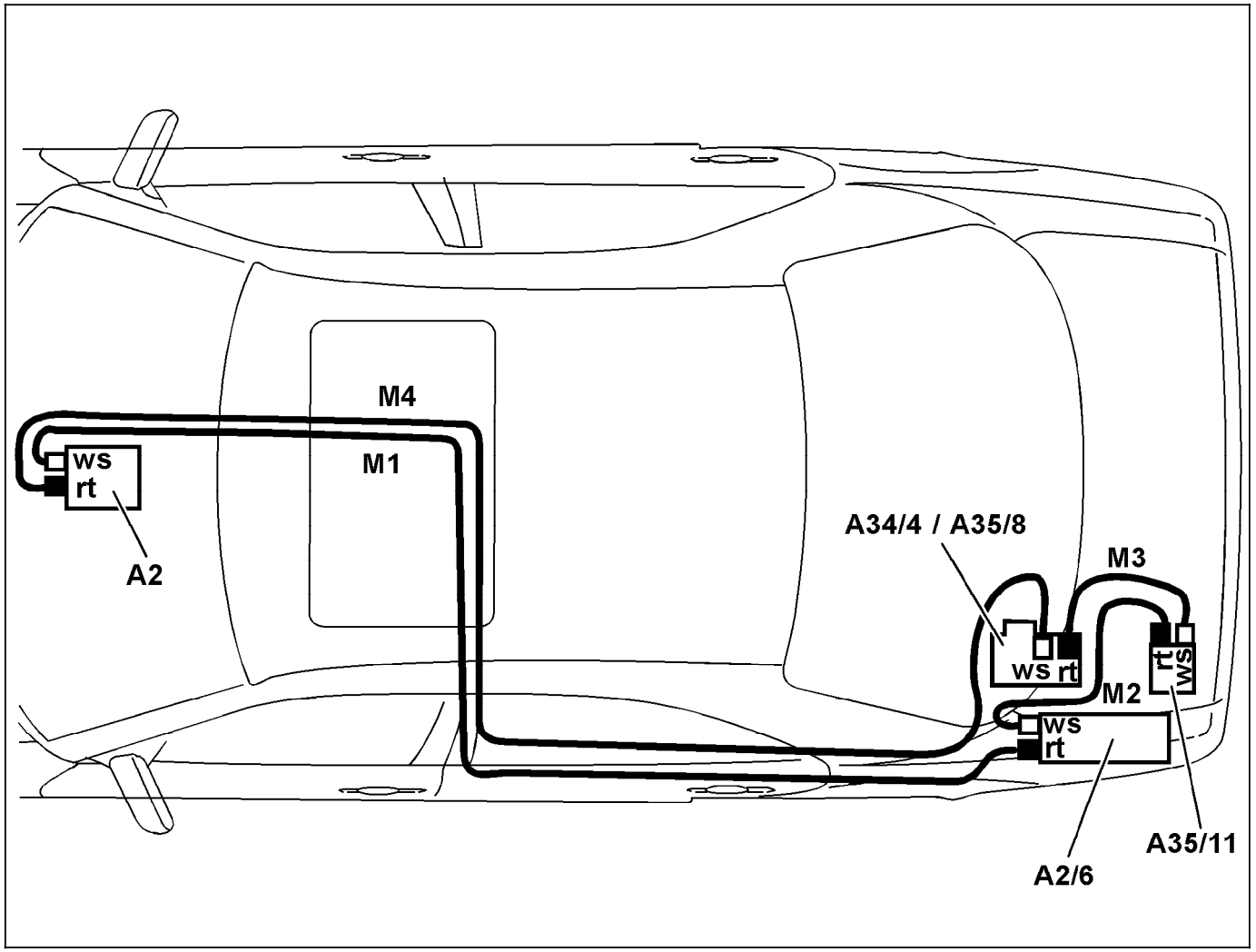

Figure 5

A2	Radio
A2/6	CD changer
A34/4	CTEL Interface
A35/8	Emergency-Call control module
A35/11	Voice activation control module
M1	Fiber optic control module 1
M2	Fiber optic control module 2
M3	Fiber optic control module 3
M4	Fiber optic control module 4
ws	White insert (lens end)
rt	Red insert (lens end)

P82.70-2200-06

Electrical Test Program – Component Locations

Fiber Optic Control Modules as routed within vehicle and with Handy installed
Model 210 Wagon shown

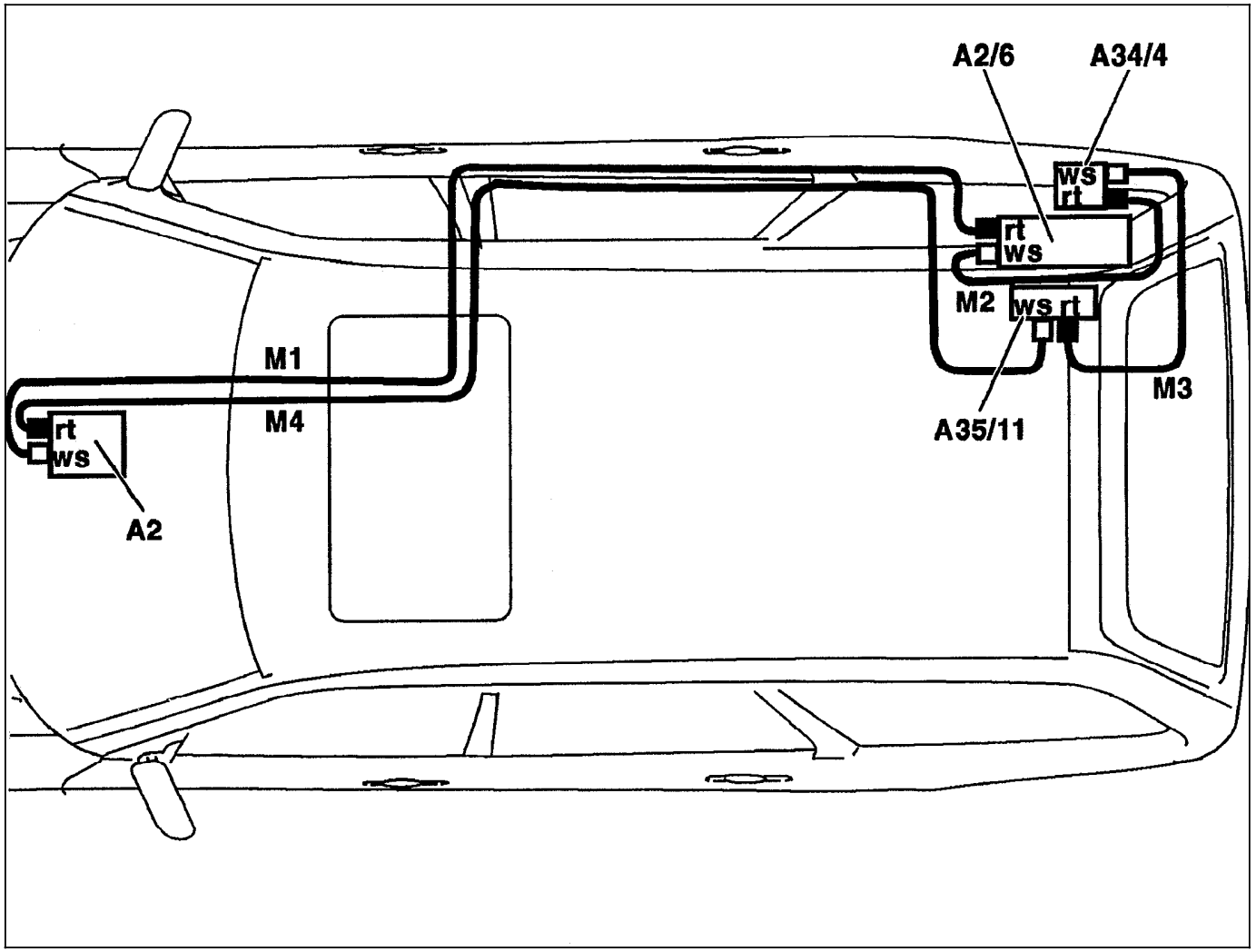

Figure 6

A2	Radio
A2/6	CD changer
A34/4	CTEL Interface
A35/11	Voice activation control module
M1	Fiber optic control module 1
M2	Fiber optic control module 2
M3	Fiber optic control module 3
M4	Fiber optic control module 4
ws	White insert (lens end)
rt	Red insert (lens end)

U82.70-2228-06

Electrical Test Program – Component Locations

Fiber Optic Control Modules as routed within vehicle and with TeleAid installed
Model 210 Wagon shown

No TeleAid on D2B until M.Y. 2001 for Model 210

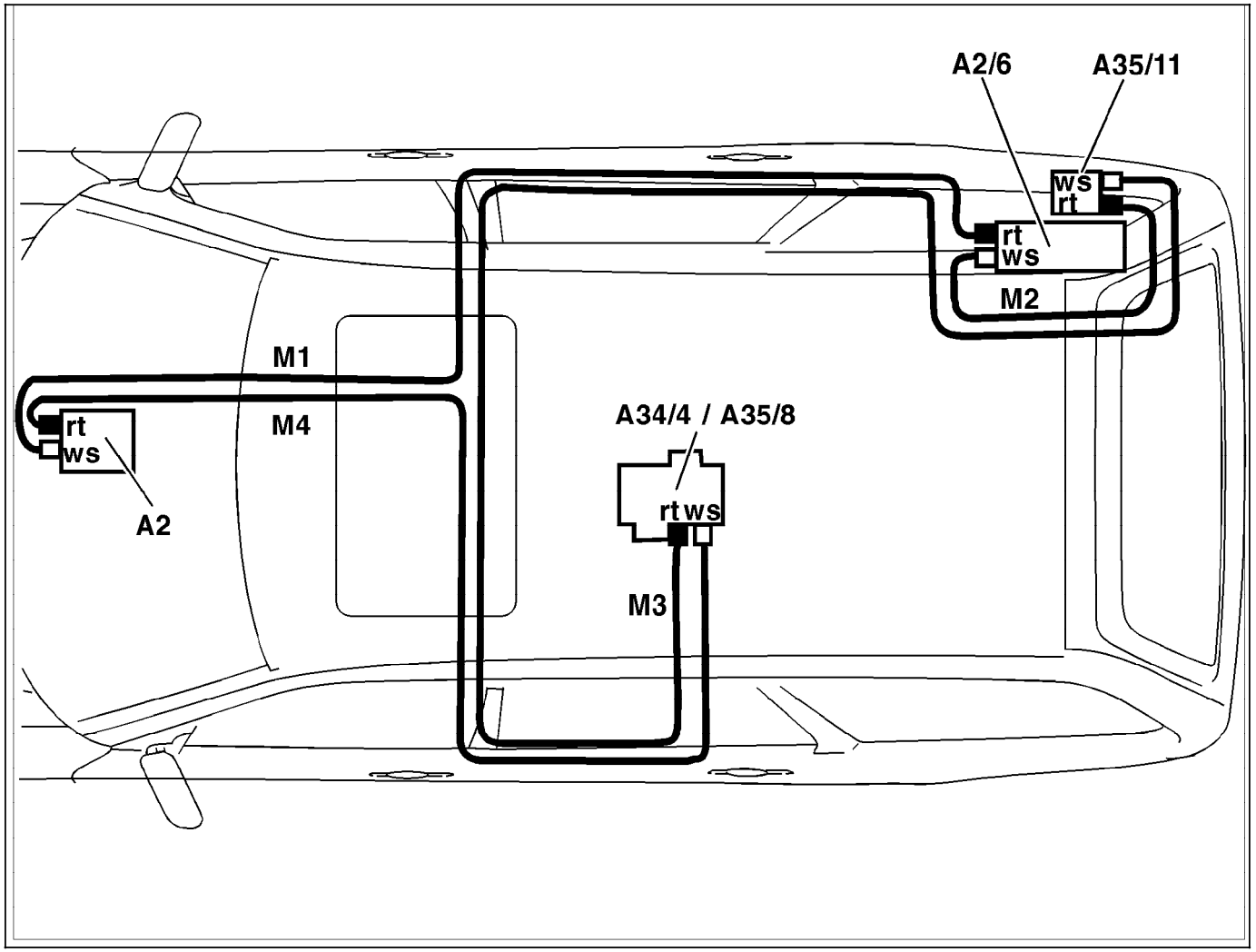

Figure 7

A2	Radio
A2/6	CD changer
A34/4	CTEL Interface
A35/11	Voice activation control module
M1	Fiber optic control module 1
M2	Fiber optic control module 2
M3	Fiber optic control module 3
M4	Fiber optic control module 4
ws	White insert (lens end)
rt	Red insert (lens end)

P82.70-2201-06

Electrical Test Program – Component Locations

Fiber Optic Control Modules as routed within vehicle and with Handy and TeleAid installed Model 220 shown

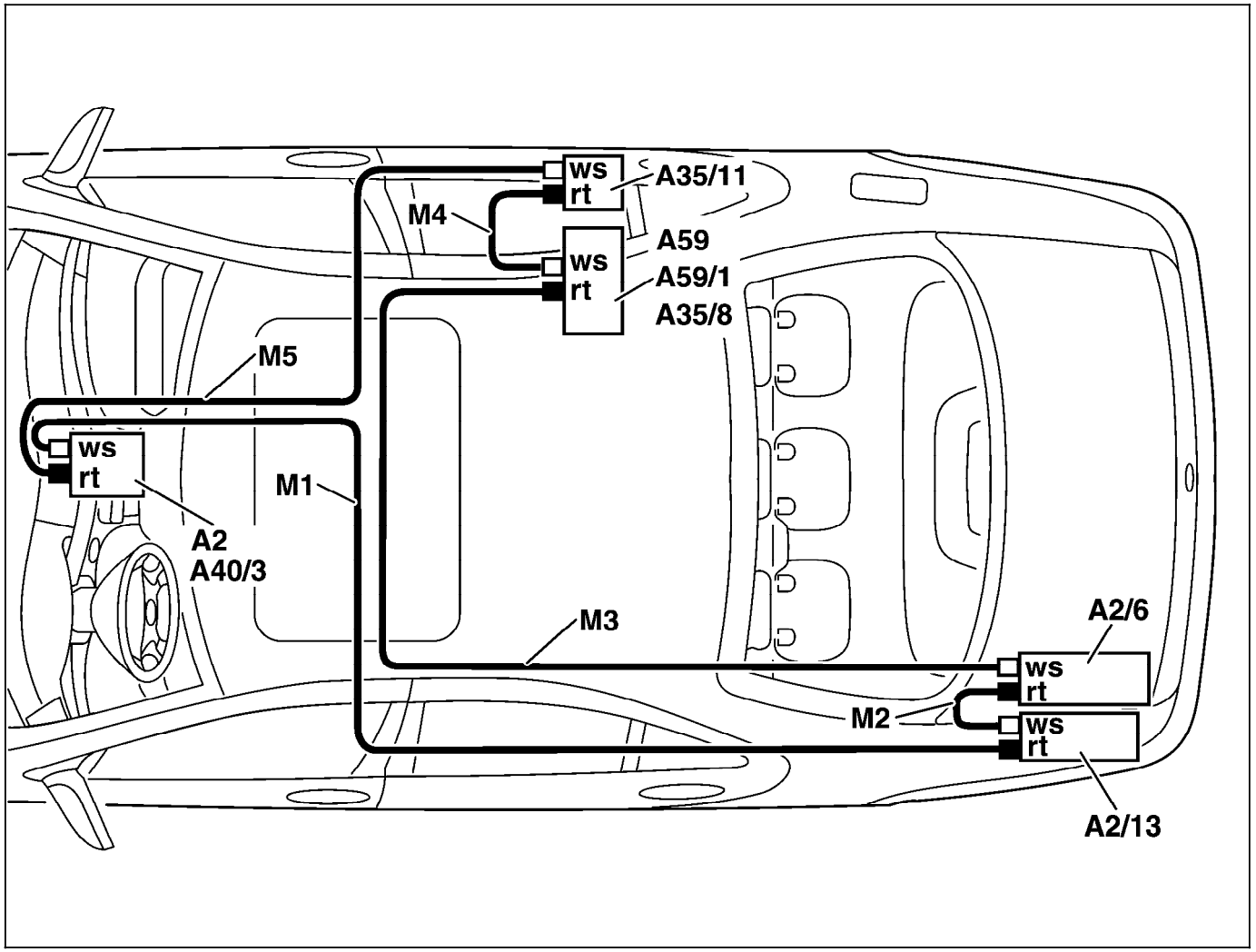

Figure 6

A2	Radio
or	
A40/3	COMAND actuation, display and control unit
A2/6	CD changer
A2/13	Audio amplifier
A34/4	CTEL Interface
A35/11	Voice activation control module
A35/8	Emergency-Call control module
A59	D2B interface/non-portable CTEL
or	
A59/1	D2B interface/handy
M1	Fiber optic control module 1
M2	Fiber optic control module 2
M3	Fiber optic control module 3
M4	Fiber optic control module 4
ws	White insert (lens end)
rt	Red insert (lens end)

P82.70-2427-06