Триома

Разработка и производство
интерфейсных адаптеров

Audio-interface MOST-RCA 3.0 (Adapter for RCA outputs)

Service manual

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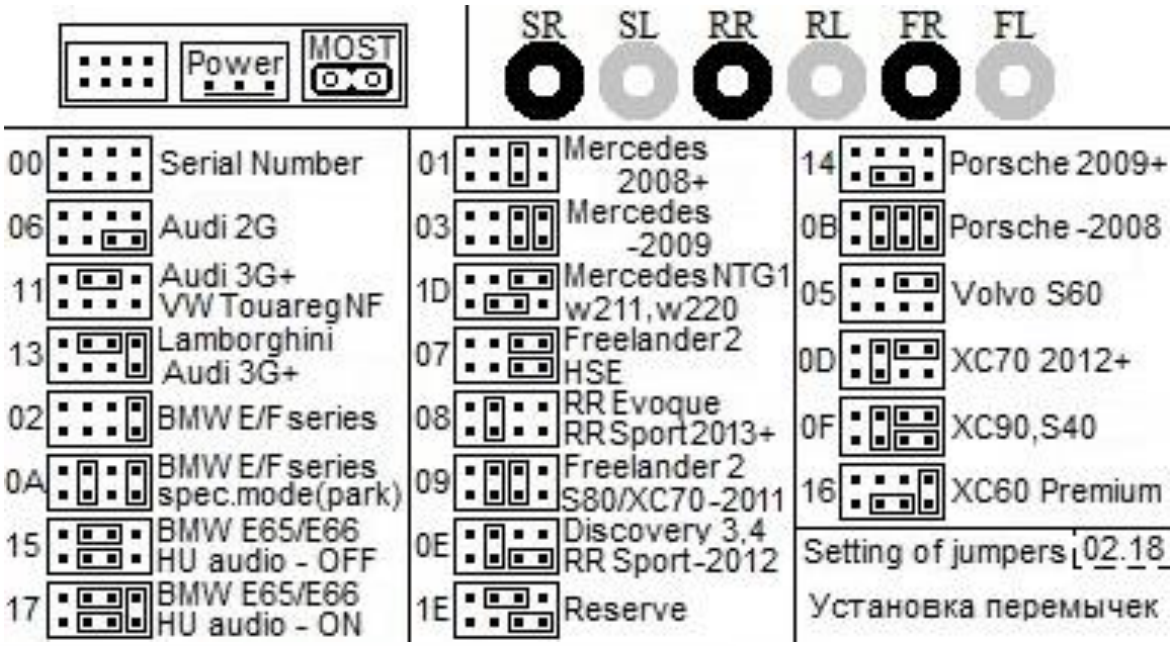
The contents



Chapter 1. Description

Adapter MOST-RCA is designed to provide RCA (analog) outputs in the car audio system with optical interface MOST-25. It allows you to use a non-standard audio amplifier (amplifiers) instead of the original amplifier.

Compatibility

The adapter is compatible with cars equipped with the MOST-25 interface:

- Audi (A4, A5, A6, A8, Q5, Q7 with MMI 2G/3G/3G+, up to 2014)
- BMW (E/F series - E60, E65, E70, E90, F10, F30…, some models G-series)
- Land Rover (Freelander 2, Discovery 3 and 4, all Range Rover)
- Mercedes Benz
- Porsche
- VW Touareg NF (3G+)
- Volvo (S40, S60, S80, XC70, XC90). For Volvo XC90 (with parktronic) need special version Most-RCA 3.0 (PARK)

Package contents

- Adapter Most-RCA 3.0
- Power cable
- Jumpers - 3 pcs.
- Quick guide

Depending on car`s specification, possibly additionally required (sold separately):

- *Optical cable (0,8m) with connector*
  - ✓ *for system MMI 3G+ (Audi or VW Touareg NF).*
  - ✓ *for BMW or MB (if original MOST-amplifier is missing).*
  - ✓ *for Volvo (during the procedure «serial number assignment»),*
- *Only optical connector*
  - ✓ *for BMW or MB (if the original MOST-amplifier is present).*

Chapter 2. Connection

***Attention*: Color of wires of the power cable does not match the color of the regular car wiring. Incorrect connection of the supply leads to the device failure.**

1) set the jumpers according to the picture.
2) to connect the adapter to the car system has:
   - connector “MOST”. Before connecting remove the cover.
   - connector “Power” and Power cable (Red wire +12V Battery, Black wire Ground, GND, Blue wire REM.OUT for control (remote output).
3) RCA connectors must be connected to a non-original amplifier.

Notes for BMW: an additional mode of the adapter (BMW spec.mode (park)). This mode should be used if you want to change the volume of the signal (parking sensors and system messages). Read more about this mode in the Application 1.

Notes for Volvo (if you have activated component protection):

Before connecting the adapter must be assigned to the adapter serial number (a marker of activity of the protection components is the cessation of broadcast audio adapter in 20-40 seconds after turning on the system).

For the assignment you need to set the jumpers to position «Read Serial Number», then, not disconnect the original amplifier, connect the adapter to the optical interface MOST and turn on audiosystem. After you enable the adapter «read» the serial number of original amplifier and store it in its non-volatile memory. This procedure usually takes less than 20 seconds, a sign of the end of the procedure «Read Serial Number» is the formation of pulses with an interval of 1 second on the line Remout (blue wire). After that you should disable original amplifier, set the jumpers to a position corresponding to the car and use the audio interface in the system instead of the original amplifier.

Chapter 3. How the adapter works

Audio-interface MOST-RCA:

1) emulates an original audio amplifier (Logic-7, TOP Hi-Fi, etc.).

2) select the main stereo signal from the optical stream, as well as additional audio signals from the phone, navigation system, parking sensors and other messages.

3) performs mixing of additional signals to the main signal in the respective proportions for each audio channel using digital mixers.

4) allocates a separate channel for the subwoofer and controls the level of this channel (if there is adjustment of the subwoofer).

5) generates on their outputs analogue outputs signals to standard RCA amplitude of 2V.

6) when using it, the system saves all adjustments and the performance of additional components (sat NAV, phone module, etc.).

7) play sound from a DVD source is only possible in Stereo mode. The device has no built-in decoder 5.1 multichannel audio. If you try to play 5.1 audio, no signal will be broadcast.

The adapter allows a precise assignment of all service and information signals by the respective acoustic channels (front, rear, left and right). Supported "Fader" (front/rear), balance and all frequency adjustments.

Device (in addition to the optical connector MOST) contains control output "Remout" and three pairs of RCA connectors (output on the acoustics front (FR and FL), rear acoustics (RR and RL) and the subwoofer (SR and SL)). The maximum amplitude of the output signal is 2 volts, which is

consistent with inputs of modern amplifiers. The frequency response of the subwoofer output has a cutoff frequency of 100Hz, which is provided by a digital filter of second order.

The final link adapter to convert the audio signal from digital form to analog using high quality 24-bit digital to analogue converter (DAC) BURR-BROWN.

When you turn on the original head unit audio interface "MOST-RCA" is initialized in the interface MOST like a original audio amplifier and emulates his work, takes information from the head unit about the regulations and forms necessary messages to the head unit. After all the sound interface circuit enters the working state and the broadcast audio signal on the RCA outputs, is formed a control signal REMOUT to enable the amplifier.

When you turn off the audio system first, remove control voltage from the output of the REMOUT, then the audio circuit are transferred to the standby mode, thus avoiding spurious clicks when switching on and off.

When the MOST bus is inactive, the interface adapter is in "sleep" mode, like other components in MOST systems, while consuming less than 0.5 mA.

Application 1. Special mode for BMW

If you want to change the volume levels of parking sensors and system messages, you should use an additional mode of the adapter MOST-RCA

To set the desired volume of the parking sensors and signals:

1) set the jumpers to position BMW (one jumper).
2) turn on the system.
3) not turning off the system, add a jumper (position "BMW spec.mode (park)").
4) adjust the level of the lower border signals by adjusting low frequency timbres. Below this situation, the signal level will not drop ever.
5) install attenuation additional signals relative to the level of the main channel by adjusting the timbres of the upper frequency (weakening of the signal levels of the parking sensors and of the system with respect to the main music signal).
6) Turn off the system. Wait until the car "fall asleep".
7) Operation with the set parameters is possible if the position of jumpers "BMW spec.mode (park)". To return to the default settings again, set the jumpers to the normal position "BMW"

Application 2. General specifications

- Dimensions adapter: 110 x 80 x 27 mm
- Power supply voltage: 8 ... 16 volts
- Current consumption in sleep mode: less than 0.5 mA
- Analog output signal: RCA 2 VRMS
- Flatness in the frequency range 20Hz...20KHz: less than 0.5 db
- Permissible load on the RCA outputs: not less than 1 KOhm

- The number of bands equalizer: 5 bands
- EQ adjustments Depth: +/- 15db
- Depth adjustment of bass and treble: +/- 12db
- Threshold of anti-clipping: +2db

Application 3. Characteristics of the sound processor (STA309A)

- Bit Sound Processor: 24 bit
- Dynamic range: no less than 100 db
- Number of active channels concurrently: 5 channels (1-stereo and 4-mono)

Application 4. DAC characteristics (PCM1680)

- Conversion type: Delta-Sigma
- Bit Converter: 24 bit
- Dynamic range: no less than 105 db
- Total harmonic distortion: 0,002%

Application 5. Images

Fig.1. Adapter MOST-RCA

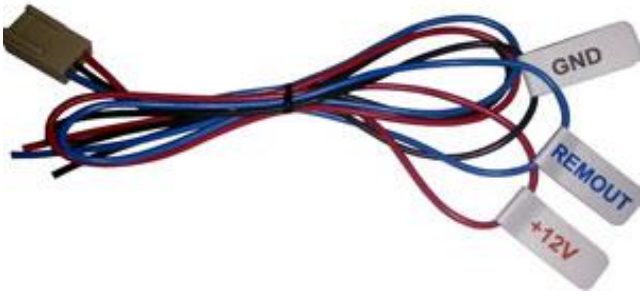


Fig.2. Power cable

Chapter 4. Recommendations

General description of Most-TosLink and Most-RCA adapters

Sound interfaces MOST-TosLink and MOST-RCA provide the ability to install non-standard audio processing devices, sound processors, power amplifiers and speakers in the car. Using these interfaces, the car multimedia system creates audio outputs to which non-standard equipment is connected. Both interfaces support broadcasting of all regular service channels (phone, navigation, Parking sensors, service signals). They provide regular control of volume level, balance, high and low frequencies and 5-band equalizer. The "Fader" adjustment (sound distribution between the front and rear speakers) only supports the MOST-RCA interface. MOST-TosLink and MOST-RCA interfaces do not include a surround sound processor and multi-channel sound decoders, so the "Logis-7" effect is not supported, and DVD playback of multi-channel audio formats (Dolby Digital, Dolby Pro Logic II, DTS, SDDS, etc.) is not possible.

Interface MOST-TosLink creates output 24-bit stereo audio "TOSLINK optical output (IEC-60958, S/PDIF) of 44.1(48)kHz 24 bit stereo PCM".

Interface MOST-RCA creates 3 pairs of analog stereo outputs: front channel (Front Left/Right RCA OutPut) rear channel (Rear Left/Right RCA OutPut) and the subwoofer (SW Left/Right RCA OutPut).

The MOST-TosLink and MOST-RCA interfaces are connected to the MOST-25 automotive multimedia network using the MOST-25 optical connector (optical receiver and optical transmitter), as well as to the vehicle power supply circuit with special power wires (Batt and GND). To control additional equipment interfaces have a special control output "RemoteOut". Adapters can work with different cars. Special contacts with jumpers (Jumper) installed in these contacts are used to select the type of car.

Дополнительные контакты

The MOST-TosLink interface uses 6 contacts and 3 jumpers that determine 1 of 22 possible algorithms. The MOST-RCA interface has a similar algorithm selection, but there is an additional pair of contacts (see the figure on the left). An additional pair of contacts in the MOST-RCA interface is used if the car uses only the front speakers and you want to switch the sounds of the rear Parking sensors to the front speakers.

About radio interference

The MOST-TosLink and MOST-RCA interfaces use a switching power supply. To reduce the level of radio interference, the interfaces are mounted in a metal case, which is a radio screen. Due to the metal body, the level of radio interference from the device is insignificant. In addition, electronic components with optimal parameters are used in the scheme of these interfaces to reduce the impact on radio reception. The only source of radio interference when using these interfaces can be electrical wires connected to the unit. With high-quality performance of the standard radio module, the interfaces in question are not able to interfere with its operation.

If, after installing additional equipment, the quality of the radio receiver deteriorates, the reason may be any installed module, including the MOST-RCA or MOST-TosLink interface. The following recommendations apply equally to any module you install.

How to reduce the effect on radio reception

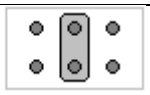
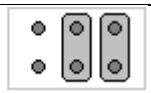
- not have the interface and cables connected with the interface in the vicinity of a receiving radio antenna, antenna cable and blocks associated with the radio.

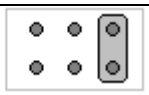
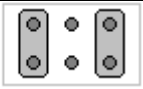
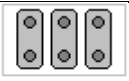
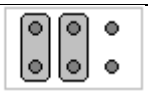
- power wires (Batt and GND) are recommended to be laid together with each other (can be twisted pair). Since the Batt and GND wires create antiphase interference, the two twisted together wires will have zero activity. If it is impossible to provide laying of power wires together with each other, then it is possible to reduce influence of power wires if to include between these wires the capacitor (0,1 ... 100,0 mkF, voltage over than 16 volts) with low value of ESR. The place of connection of the capacitor and its nominal value is selected experimentally.

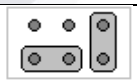
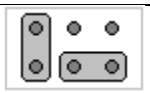
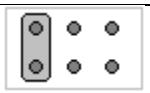
- the location where the power wires are connected to the car`s wiring can make a difference. Especially important is the distance from the interface connection points to the power connection points of the standard radio module (the result can be affected by both reducing and increasing this distance).

- the RemoteOut control wire is also desirable not to be placed in close proximity to the radio receiving nodes. The length of the RemoteOut line should be as small as possible. If you cannot use a short RemoteOut line, you can use a shielded wire as the line. The ground point is selected experimentally (the optimal ground point of the screen can be located near the ground of the standard radio receiver).

Algorithms of operation at different positions of jumpers

Jumper position	Compatibility	Description
1E 	Mercedes Benz (NTG3 and NTG3.5 audio systems, audio systems with AGW block the production of Becker).	The AGW block (Becker) is significantly larger than the AGW block (Japan). In systems equipped with an AGW (Japan) unit, it is not possible to connect the radio audio channel to an external amplifier. Distinctive feature: systems with AGW (Becker) support Logic-7 function, and systems with AGW block (Japan) do not support it. Regular amplifier is stored in the system (combined with radio tuner). The interface is connected to the MOST-25 in front of a regular amplifier (combined with a radio tuner) in the course of light. After connecting the interface, the standard amplifier cannot play sound. *As 06.2018 tested not all specification of the car.*
01 	Mercedes Benz 2008+ (NTG2.5, NTG4, NTG4.5 audio systems).	The standard amplifier is dismantled. The adapter is connected to any position MOST-25.
03 	Mercedes Benz until 2009 (NTG1 audio systems without external unit the AGW and NTG2).	The standard amplifier is dismantled. The adapter is connected to any position MOST-25.
1D 	Mercedes Benz (NTG1 audio system with the external unit AGW) - W211, W219, W220.	Regular amplifier is stored in the system (combined with radio tuner). The adapter is connected to any position MOST-25. The standard amplifier remains active and can play sound to the speakers in normal mode. *As 06.2018 tested not all specification of the cars.*
15 	BMW E65, E66	This mode is recommended when the music system (amplifier and speaker) is completely replaced. The stereo signal is only played by an external non-standard amplifier. The head unit generates only service signals (Parking sensors, etc.). To save the service signals in the system, the speaker system must be connected to the head unit. *As 06.2018 tested not all specification of the car.*

17 	BMW E65, E66	The non-standard amplifier should be connected to the speakers that were connected to the dismantled standard amplifier. The non-standard amplifier only plays a stereo signal. The head unit generates service signals to the front and rear speakers and plays a stereo signal to the front speakers. Rear acoustics head unit forms the only service signals. *As 06.2018 tested not all specification of the car.*
02 	BMW E60, E61, E63, E64, E70, E71, E72, E90-E93. BMW F01, F02, F03, F07, F10, F11, F12, F13, F16, F20, F25, F30, F31, F34. BMW G-series	The standard amplifier is dismantled. The adapter is connected to any position MOST-25. *On 06.2018 compatibility with BMW G-series is not fully tested.*
0A 	BMW E60, E61, E63, E64, E70, E71, E72, E90-E93. BMW F01, F02, F03, F07, F10, F11, F12, F13, F16, F20, F25, F30, F31, F34.	Special mode for BMW, use to force the specified options signal PDC. The standard amplifier is dismantled. The adapter is connected to any position MOST-25. *On 06.2018 compatibility with BMW G-series is not fully tested.*
06 	AUDI A4, A5, A6, A8, Q5, Q7 (MMI 2G, 3G) with separate external amplifier.	The standard amplifier is dismantled. The adapter is connected to any position MOST-25.
11  13 	AUDI A4, A5, A6, A8, Q5, Q7 (MMI 3G+), Lamborghini (amplifier with radio tuner in a single unit).	Regular amplifier is stored in the system (combined with radio tuner). The adapter is connected to any position MOST-25. Once the adapter is connected, the standard amplifier cannot play audio. *Features of application interfaces MOST-TosLink and MOST-RCA in multimedia systems AUDI 3G+ and VW Touareg NF is described further.*
0B 	Porsche until 2009 (Cayenne, etc. with PCM2.0 and PCM2.1).	The standard amplifier is dismantled. The adapter is connected to any position MOST-25.
14 	Porsche 2009+ (Cayenne, etc. with head unit PCM3.0)	The standard amplifier is dismantled. The adapter is connected to any position MOST-25.
09 	Volvo S80, XC70 until 2012, Land Rover Freelander 2	The standard amplifier is dismantled. The adapter is connected to any position MOST-25.
07 	Land Rover Freelander 2 (HSE)	The standard amplifier is dismantled. The adapter is connected to any position MOST-25.
0D 	Volvo XC70 2012+ and some models Volvo S60, V60	The standard amplifier is dismantled. The adapter is connected to any position MOST-25.

05 	Volvo S60, V60	The standard amplifier is dismantled. The adapter is connected to any position MOST-25.
16 	Volvo XC60 Premium	The standard amplifier is dismantled. The adapter is connected to any position MOST-25.
0F 	Volvo XC90, S40, V50	The standard phone module is not supported. The standard amplifier is dismantled. The adapter is connected to any position MOST-25. *As 06.2018 not tested support signals PDC in the models after 2013.*
0E 	Land Rover Discovery-3, Discovery-4 until 2013, Range Rover Sport until 2012.	The standard amplifier is dismantled. The adapter is connected to any position MOST-25.
08 	Range Rover Evoque, Range Rover Sport 2012+, Land Rover Discovery-4 2013+	The standard amplifier is dismantled. The adapter is connected to any position MOST-25.
00 	Volvo, Land Rover, Range Rover with activated protective coding system.	This mode is designed to read the serial number (hereinafter S/N) from the standard amplifier for further use of S/N interface MOST-TosLink or MOST-RCA for correct operation of the system. S/N reading is only necessary when the vehicle is equipped with a protective coding system. When the protective coding system is activated, the amplifying equipment is always switched on normally, after which the S/N of all system units is checked. If The S/N equipments is correct, the system continues to operate, but if the S/N amplifier unit is incorrect, then any change in the audio source will cause the equipments to stop functioning. To read the S/N interface is connected to any position on MOST-25. The regular amplifier must remain in the system during the S/N reading procedure.

Recommendations for AUDI 3G+ and VW Touareg NF

In multimedia systems AUDI 3G+ and VW Touareg NF used a power amplifier located in a single unit with a radio tuner. For this reason, when you install the MOST-RCA or MOST-TosLink adapter, the standard amplifier remains connected to the MOST network with the adapter being installed. Configuration of a standard system that allows the installation of an additional external power amplifier is theoretically possible, but to date there is no information on how to program such a configuration. If the standard system is programmed to work with an external separate amplifier, the position of the jumpers No. 06 "AUDI 2G" should be used in the MOST-RCA and MOST-TosLink interfaces.

In General, when the system is turned on, the standard head unit is connected via the MOST interface to two amplifiers instead of one (the second amplifier is the connected interface). Since the basic version of the standard system is not designed to work with two amplifiers, this fact creates the prerequisites for errors in the appointment of sound channels. During the development of the MOST-RCA and MOST-TosLink interfaces, the relevant studies were carried out, as a result of which special algorithms were created to neutralize errors in the assignment of audio channels. Interfaces MOST-RCA and MOST-TosLink systems AUDI 3G+ and VW Touareg NF in fact not only perform its primary task. They monitor the purpose of the audio channels and cause reinitialization of the system when an error is detected. Because different software versions in automotive systems react differently to the presence of two amplifiers in the system, the problem of error recognition does not have a universal solution. The universal solution for the system performance in this case will be only programming the system to work with a separate external amplifier and installing jumpers in the position № 06 "AUDI 2G".

As of July 2018, in most configurations, MOST-RCA and MOST-TosLink work correctly. They fix and neutralize the error of channel assignments that have been studied and for which there is created the algorithm. Probably, some of the possible errors have not been studied today and will be studied later.

Recommendations for those cases when the system "AUDI 3G +" or "VW Touareg NF" cannot be programmed to work with an external separate amplifier, and when you install the interface MOST-RCA or MOST-TosLink errors appear audio channel assignment:

- make sure that the current software is installed in the interface.
- change the position of the interface in the MOST network (it can be installed in the course of light to the regular amplifier unit with a radio tuner or after it). The position of the device in the MOST interface can affect system initialization.
- test the performance of two different positions of jumpers in the interface (№ 11 AUDI 3G+ Touareg NF) and (№ 13 AUDI 3G+ Lamborghini).
- update on the regular system.
- if these other methods of neutralizing errors is impossible, it is necessary to ensure the possibility of rapid forced system initialization (e.g., by short-term gap in the supply of the interface MOST-RCA or MOST-TosLink) external push button or to abandon the use of the interface.

«Most-TosLink» and «Most-RCA» sound interfaces developed and manufactured in Russia

The manufacturer ("Trioma") reserves the right
make design changes without prior notice,
product specifications and software,
won't decrease its consumer properties

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