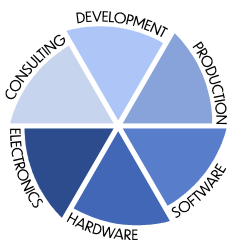


# Commander ZBO

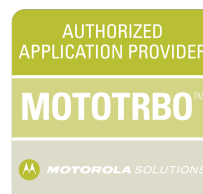
Handset for Motorola

MTM800FuG/MTM5x00/DM4x00

Manual



**FunkTronic**  
Radio Control Systems & more



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## 1. Order Information

FT no.	Description
412012.M	Commander ZBO for Motorola digital radios
412901	Connection Cable 412012.M (open end for terminal strip) to Motorola <b>TETRA</b> radio (26 pin MAC)
412902	Connection Cable 412012.M (open end for terminal strip) to Motorola <b>MOTOTRBO</b> radio (26 pin MAC)

Amongst others, the connection cable 412901 (TETRA) uses pins 13 (MIC\_1/EXT\_MIC), 14 and 19 (RX\_AUDIO\_OUT + HOOK\_PA\_EN) at the Motorola Accessory Connector (MAC).

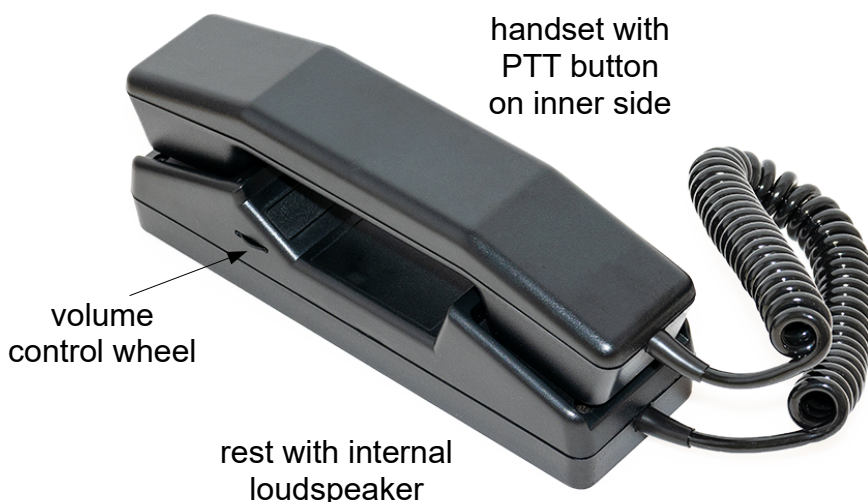
In cable 412902 (DMR), only pin 13 is switched to pin 11 (TX\_AUDIO).

For correct functionality the respective Motorola radio must be configured appropriately.

## 2. Technical Data

Operating voltage	+12 VDC -25% +30%
Current consumption	typ. 50 mA (max. 400 mA)
Weight (Handset + Rest)	approx. 200 + 250 g
Dimensions W x D x H	65mm x 75mm x 220mm
Input impedance	600 Ohm
Input level	500 mV
Output impedance	7.5 kOhm during transmission high-impedance in passive state
Output level	80 mV (set ex factory)

## 3. Features



### 3.1. General Features

Our Commander ZBO for Motorola is a robust PTT handset that is optimized for use with Motorola digital radios (MTM800 FuG, MTM5x00, DM4x00 ...). It comes with a rest for secure snap-in attachment. Hence, it can be installed in horizontal or vertical orientation. In addition, the rest comprises an internal loudspeaker with a small wheel for volume control.

It is possible to connect an additional external loudspeaker to the rest if desired. As the AF output lines are only active if the PTT button is pushed, it is possible to connect several Commander ZBO in parallel to a single radio.

### 3.2. Communication with Commander ZBO

Please push PTT on the inner side of the handset to initiate the communication and then speak into the handset's microphone. Radio messages can be heard on the earphone of the handset as well as via the loudspeaker.

It is possible to connect an additional external loudspeaker to the rest if desired. As the AF output lines are only active if the PTT button is pushed, it is possible to connect several Commander ZBO in parallel to a single radio.

There are jumpers inside the rest to accomplish custom functionality, such as muting of the loudspeaker if the handset is taken or if PTT is pressed. Another option is the setting of a minimum volume for the loudspeakers, so that they cannot be muted completely (see also chapters 7+8).

# 4. Radio Settings (for MTM800 FuG/MTM5x00)

Below you can find the necessary accessory configurations for the respective TETRA radios.

Feldname	Feldwert	Standardeinstellung
1 Visiermikrofon/rückseitiges Zubehör	RMN5054	Standardeinstellung
2 Rückseitiger Handapparat-Zubehör	Nicht zugewiesen	
3 Rückseitiges Zubehör Handmikrofon	Nicht zugewiesen	Standardeinstellung
4 Rückseitige externe Lautsprecher-Zubehör	Nicht zugewiesen	Standardeinstellung
5 Rückseitiges Line-In-Zubehör	Nicht zugewiesen	

Hilfe Ungültig Warnung Find Result

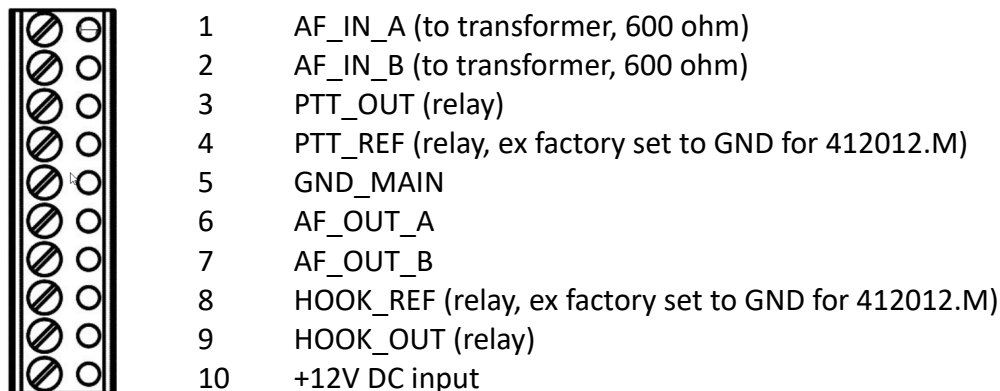
## Transceiver-Zubehör-Einrichtung

Feldname	Feldwert	Standardeinstellung
1 S-/E-Gerät Audioausgang (Line-out)	+14dB Point	Standardeinstellung
2 Pegel Bevorzugtes Notfallzubehör - S-/E-Gerät	Letztes actives Mikrophon	Standardeinstellung
3 Zuweisung für rückseitiges Zubehör	CH/Bedienkopf 1	Standardeinstellung
4 Schnittstelle Visiermikrofon/rückseitiges Zubehör	MIC1/EXT_MIC (Pin 13 rücks. Zubehörschluss)	Standardeinstellung

Hilfe Ungültig Warnung Find Result

## Transceiver-Zubehöreinstellung

## 5. Pin Layout - Terminal Strip



## 6. Connection of Cables 412901 and 412902

10-Pin Terminal Strip (inside rest)	Lettering on PCB	Wire Color (TIA-568A)	
Pin 1	AF_IN_A	NF Hoerer	blue/white
Pin 2	AF_IN_B	NF Hoerer	blue
Pin 3	PTT_OUT	Sendertastung	brown/white
Pin 5	GND	Masse	green
Pin 6	AF_OUT_A	NF Mikro	orange/white
Pin 7	AF_OUT_B	NF Mikro	orange
Pin 9	HOOK_OUT	Traeger+/Hook+	brown
Pin 10	+12V IN	+12V	green/white



## 7. Configuration of the Handset

Usually, **for connection to the above-mentioned Motorola radios, no configuration changes are necessary** at the Commander ZBO for Motorola. Hence, the following information is only necessary if similar radios with e.g. different level settings are involved or if the customer's desired functionality deviates from its standard settings.

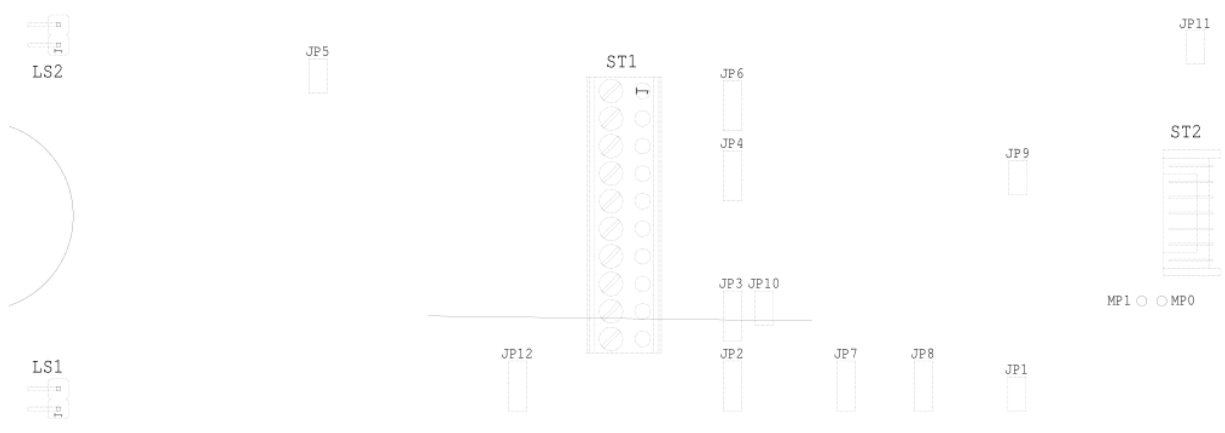
### 7.1. Level Settings

The microphone level of the handset is already set to the default for standard Motorola radios (80mV). For a more detailed description of possible adjustments see section 8.

The rest is equipped with an internal AF amplifier that supplies 3 watts each to the internal as well as to an optional external loudspeaker. The signal of the AF amplifier is independent from the radio volume setting. The input signal can be adjusted via a potentiometer inside the rest. Ex factory, an input level of 500 mV is expected (Poti R8, see section 8).

The integrated AF amplifier can be muted if desired (for both loudspeakers). By default the muting function is not activated. The loudspeakers could either be muted during outgoing transmission (using jumper JP9) or when the handset is taken (JP1). For more options regarding jumper settings please have a look at section 8.

## 8. Jumpers and Potentiometers

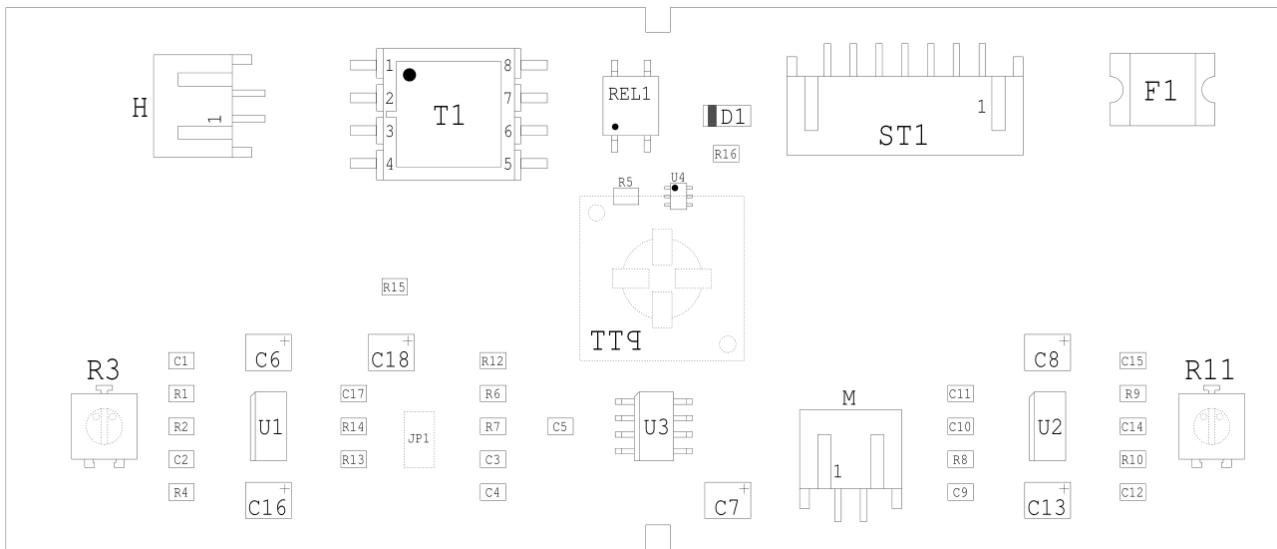


### Description of Jumpers of the Rest:

Jumper	Function	Factory setting
JP1 open closed	No muting when handset is taken Loudspeaker muting when handset is taken	Default
JP2/JP3 top closed bottom closed	ST1 pin 8+9 is hook function ST1 pin 8+9 is squelch function	Default
JP4 open top closed bottom closed	AF input impedance is 2.8 kohm AF input impedance is 600 ohm AF input impedance is 200 ohm	Default
JP5 open closed	At minimum a loudspeaker volume is always present No loudspeaker volume when adjusted to minimum	Default
JP6 top closed bottom closed open	Loudspeaker muting if TX line (pin 3) is active to GND Loudspeaker muting if TX line (pin 3) is active to +12V No muting if TX line is active	Default
JP7/8 top/bottom closed bottom/top closed	Hook relay is active when handset is hung up Hook relay is active when handset is taken	Default
JP9 open closed	No loudspeaker muting if PTT button is pushed Loudspeaker muting if PTT button is pushed	Default
JP10 open closed	HOOK_REF (pin 8) is not connected to GND HOOK_REF (pin 8) is connected to GND	Default
JP11 open closed	Microphone level is 80 mV at 600 ohm Microphone level is 500 mV at 200 ohm	Default
JP12 top closed bottom closed open	TX_REF (pin 4) is connected to GND (pin 5) TX_REF (pin 4) is connected to +12V (pin 10) TX_REF (pin 4) has to be connected externally	Default



**PCB Layout of the Handset:**



Potentiometers R3 and R11 (microphone/earphone levels) are accessible with a small screwdriver from the inner side of the handset if necessary. Jumper JP1 must be open to allow for high microphone levels up to 500 mV (jumper is set ex factory for 412012.M).

## 9. General Safety Instructions

Please read the manual carefully before installation and setup of your device.

The relevant regulations must be complied to when working with 230V line voltage, two-wire-lines, four-wire-lines and ISDN-lines. It is also very important to comply to the regulations and safety instructions of working with radio installations.

### Please comply to the following safety rules:

- All components may only be mounted and maintained when power is off.
- The modules may only be activated if they are built in a housing and are scoop-proof.
- Devices which are operated with external voltage – especially mains voltage – may only be opened when they have been disconnected from the voltage source or mains.
- All connection cables of the electronic devices must be checked for damage regularly and must be exchanged if damaged.
- Absolutely comply to the regular inspections required by law according to VDE 0701 und 0702 for line-operated devices.
- Tools must not be used near or directly at concealed or visible power lines and conductor paths and also not at and in devices using external voltage – especially mains voltage – as long as the power supply voltage has not been turned off and all capacitors have been discharged. Electrolytic capacitors can be still charged for a long time after turning off.
- When using components, modules, devices or circuits and equipment the threshold values of voltage, current and power consumption specified in the technical data must absolutely be complied to. Exceeding these threshold values (even if only briefly) can lead to significant damage.
- The devices, components or circuits described in this manual are only adapted for the specified usage. If you are not sure about the purpose of the product, please ask your specialized distributor.
- The installation and setup have to be carried out by professional personnel.

## 10. Returning of Old Equipment

According to German law concerning electronic devices, old devices cannot be disposed off as regular waste. Our devices are classified for commercial use only. According to § 11 of our general terms of payment and delivery, as of August 2015, the purchasers or users are obliged to return old equipment by us free of cost. FunkTronic GmbH will dispose of this old equipment at its own expense according to regulations.

Please send old equipment for disposal to:

**FunkTronic GmbH**  
**Breitwiesenstr. 4**  
**36381 Schlüchtern**  
**GERMANY**

>>> **Important:** Freight forward deliveries cannot be accepted by us!

**Subject to change, errors excepted!**

## 11. Release Notes

2020-Sep-23 - First English manual

2020-Sep-28 - Order Information for cable 412902 was added

- Lettering on PCB was added for more coherent cable connection info