Major BOS V(oIP)

Major BOS 1V

Major BOS 4V

## Major BOS 8V

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Kompetent für Elektroniksysteme

Contents

Major BOS 1V/4V/8V

Major BOS 1V, Major BOS 4V and *Major BOS 8V* are µC-controlled desktop controller units for 2-way radio systems controlling one, up to four or eight radios, respectively. The connection to the radios is achieved over one single ethernet connection (LAN or via Internet) instead of separate cables for each radio circuit. The device can be configured via its web interface using any PC that is connected to the same IP network. For this, you can use an ordinary web browser (e.g. Firefox or Internet Explorer).

Connectivity

For operation a 12 V DC power supply is necessary. Alternatively, the Major can also be ordered with the option **Power-over-Ethernet** (PoE), that allows power supply via the ethernet socket (**ETH**).

A **Major BOS 1V** can control one, a **Major BOS 4V** can manage up to 4, a **Major BOS 8V** up to 8 channels (radio sets, PA systems -/intercom etc.) via their ethernet interfaces. Furthermore, an external handset/headset, an external signalling device and a tape recorder. Furthermore there is a RS232-connection, to which a terminal or PC can be connected.
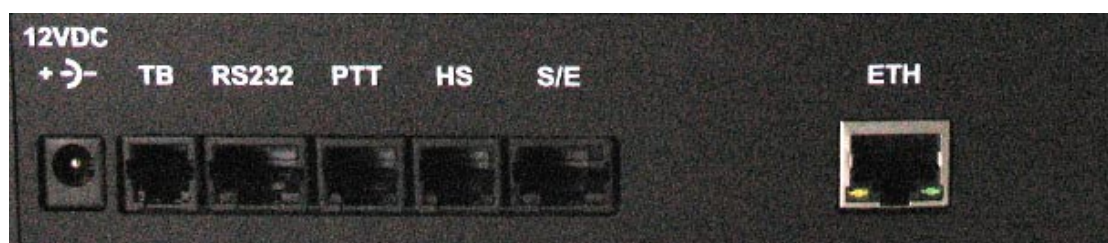
12VDC	->	power supply connector (12V DC, external, max. 1.5A)
TB (ST7)	->	tape recorder
RS232 (ST6)	->	RS 232 connection
PTT (ST5)	->	PTT (e.g. foot switch)
HS (ST4)	->	headset
S/E (ST3)	->	no function
ETH (ST1)	->	ethernet interface

see also section **Sockets Pinout**

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Control and Display Elements

Keyboard

The keyboard holds the following functions for each of the four/eight channels:

Button	Function (standard)
(Funk-)kreis x	selection button
VOL+	increase volume
VOL-	decrease volume
L / ◀	mute loudspeaker
S	special function (not assigned, only MBOS 4V)
I / RUF1	button for tone call 1
II / RUF2	button for tone call 2
⤳ / Senden	PTT button

All buttons can be disabled separately. For Major BOS 1V, channel selection and loudspeaker buttons are not necessary. The volume is adjusted by a potentiometer knob.

Carrier Display

For each of the four/eight circuits there is a separate carrier display (squelch) LED ▼, that is activated/deactivated using data telegrams.

PTT Display

For each of the eight circuits there is also a separate PTT display LED ▲, that lights if the transmitter for the respective circuit is keyed by pressing PTT, call 1 or call 2. (If a PTT display flashes, another control set is transmitting on this radio circuit.)

Selection Display

The selection display LED ● lights, if the respective circuit was selected and is active. A flashing selection display LED indicates that the Major is currently trying to establish the connection via ethernet.

Loudspeaker / Volume Display (not for Major BOS 1V)

The volume display (separately for each channel) is an LED chain and indicates the current volume. If the the loudspeaker is switched off, all LEDs of the chain are dark for Major BOS 4V. The Major BOS 8V has a separate loudspeaker LED that displays the status of the loudspeaker.

Layout - Major BOS 4V

1 - Transmiting- ▲, Squelch-▼, Selection Status LED ●
2 - Channel Selection Buttons
3 - Volume Display (row of LEDs)
4 - Volume Control Buttons (+/−)
5 - Loudspeaker Buttons (mute)
6 - Special Function Buttons
7 - Encoder Buttons (I/II)
8 - PTT (for gooseneck or headset microphone)
9 - Loudspeaker
10 - PTT Button (for handset)
11 - Handset
12 - Gooseneck Microphone

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Layout - Major BOS 8V

1	-	PTT ▲ , carrier ▼, loudspeaker ◀ and selection displays ●
2	-	selection buttons
3	-	volume buttons (increase)
4	-	volume displays (LED line)
5	-	volume buttons (decrease)
6	-	loudspeaker buttons (mute)
7	-	call 1 buttons
8	-	call 2 buttons
9	-	PTT buttons (for gooseneck microphone)
10	-	loudspeaker
11	-	handset with PTT button
12	-	gooseneck microphone

Calling Radio Channels

Channel Selection

To activate one of the different channels push the corresponding **selection button**. To deactivate a channel again push the corresponding selection button once more. Depending on the configuration (see also: **Configuration via the Web Interface**) you can either select several channels simultaneously or only one channel at a time. The status of the loudspeaker can be set accordingly.

The **channel selection display LED** is illuminated if the channel is selected.

The channel selection at power-on can be configured via the *Web Interface*. The channel selection during the last operation can also be saved for the next power-on.

Communicating with the Radio Subscriber

There are three different ways of talking to a radio subscriber:

a) By pushing one of the red PTT buttons the transmitter of the corresponding channel is activated via a TCP telegram (PTT display LED ▲ lights up) and you can talk to the caller through the gooseneck microphone. (It is also possible to connect an external switch contact instead of a PTT button. See section **Opto-Coupler input**.) After pressing the PTT button the caller can be heard on the loudspeaker. The receiver volume of the corresponding channel is adjustable.

b) By picking up the handset and pushing the PTT button on the inside of the handset. By doing so the transmitter of the selected channel is activated (PTT LED ▲ lights up) and you can talk with the caller through the microphone of the handset.

Depending on the configuration you can hear the caller constantly on the handset or only after deactivating the PTT button. The call is ended by replacing the handset. The volume of the earpiece and the microphone are each adjustable via the *Web Interface*.

c) By connecting a compatible headset and pressing the corresponding PTT button **PTT2** (e.g. a foot switch). By doing this the transmitter of the selected radio channel is also turned on (PTT LED ▲ lights up) and you can talk with the caller through the microphone of the headset.

Depending on the configuration you can hear the caller constantly on the headset or only after releasing the PTT button. The volume of the corresponding channel is adjustable.

The level settings for microphone, loudspeaker etc. can also be configured via the *Web interface*.

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Encoder

Major BOS V has an integrated encoder for **call 1** and **call 2.** The calls for each channel are transmitted directly with the corresponding buttons on the keyboard (**I / RUF 1** or **I / RUF 2**). The calls are transmitted as long as the corresponding button is being pressed.

Transmitter Control

The transmitters of the selected radio channels are activated with one of the PTT buttons (e.g. handset or headset) and stay activated as long as the PTT button is being pressed. During transmission of call 1/2 the corresponding transmitters are automatically activated.

It is always possible to transmit on non-activated radio channels by using the red PTT buttons on the control panel. The assignments of the buttons to the channels can also be customized (Web Interface).

Connection to Telephone AF

The audio-frequency connection is not integrated in the *Major BOS V* anymore. But by connecting the external headset-adapter the headset can be used as a combined communicating device for telephone and radio.

The headset is switched to the telephone by an opto-coupler input, which has to be configured accordingly.

Microphone Selection

For each of the 3 PTT inputs it is possible to program the corresponding microphone individually via the *Web Interface*.

Additionally there are **two** ways of automatic headset detection:
 - the Major BOS 8a can detect if a headset is connected by measuring the headset supply voltage (see *Web interface*).
- one of the inputs can be configured as headset detection (headset is connected if input is activated, i.e. connected to GND)

If the Major BOS 4a has detected a headset then all buttons programmed as SH/HS-PTT use the headset microphone. Otherwise they use the gooseneck microphone.

Opto-Coupler Input

The **opto-coupler input** on **ST5** can be configured via *Web interface* to fulfill different tasks in the same way as all inputs can be.

To **activate** the opto-coupler input, a direct current (3V < U < 15V) is necessary that can be obtained directly from **ST14a/2**. For higher ext. switching voltages an additional external dropping resistor is necessary (internal dropping resistor = 1kohm).

Functions for TETRA Digital Radios

Using TETRA, speaking is not possible until the conversation is initiated. Therefor, the radio transmits an attention tone. Usually, this tone cannot be heard in the loudspeaker as it is muted when transmitting. Hence, the PTT button must be configured so that the loudspeaker is not muted when it is pressed.

Configuration via the Web Interface

Preparing the PC

To be able to acces the *Web Interface* of the **Major BOS V**, a PC has to be configured properly. Ex factory, the network address of the Major is as follows:

IP address: **192.168.16.181**
**Subnetzmaske:**   **255.255.255.0**

The configuration of the network settings works similarly under Windows XP, Vista, 7 and 8. The following examples are for Win7. If you encounter any network problems, you might have to contact your local network administrator. If you do not know the IP address of your Major you can start it in "**Default IP-Mode**" (Major has the IP address as set ex factory). Therefor, press the PTT button of channel 1 and the PTT button on the inside of the handset while leaving the handset hung-up and switch on the Major (connect to power).
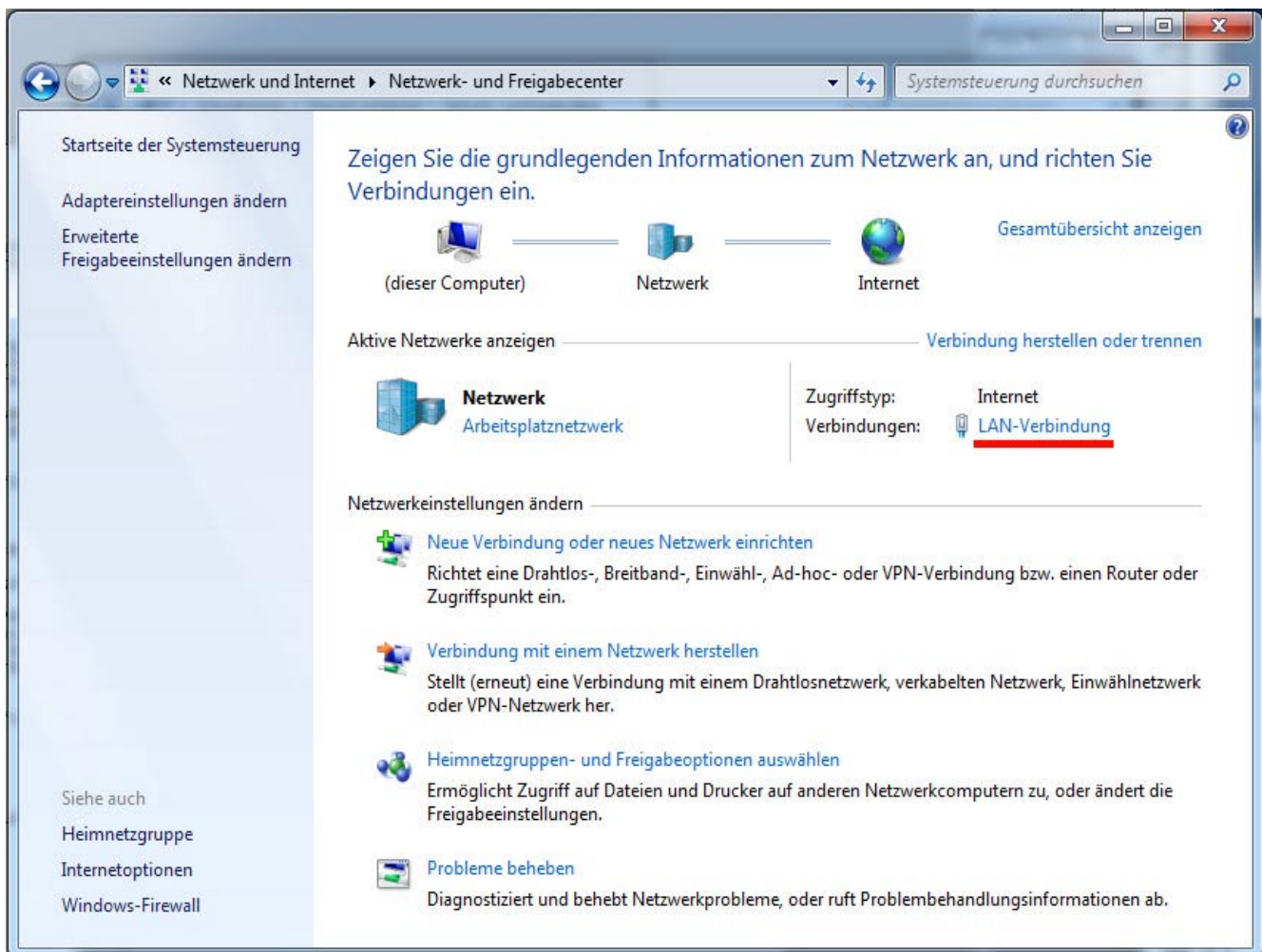
Open Control Panel (via the "Start" menu) and choose "View network status and tasks" (via "Network and Internet"). On the following screen (see image above) click on "LAN connection" (underlined red). On the next screen "LAN connection status", click on "Properties" (you need administrator rights here), to get to the window "Properties of LAN connection". Choose "TCP/IP(v4)" and again click on "Properties".

On screen "Properties of TCP/IP(v4)" choose "Advanced..." and click "Add..." in the IP

adress area. In the appearing input screen (see image below) the first three numbers of the IP address must be chosen analogously to the Major's address. As each IP may only appear once in a given network, the fourth number must be different from the Major's (0-254, **not 181**). The subnet mask is set to 255.255.255.0 as for the Major. Confirm your input with "Add" and close all previously opened screens with "OK" or "Close".
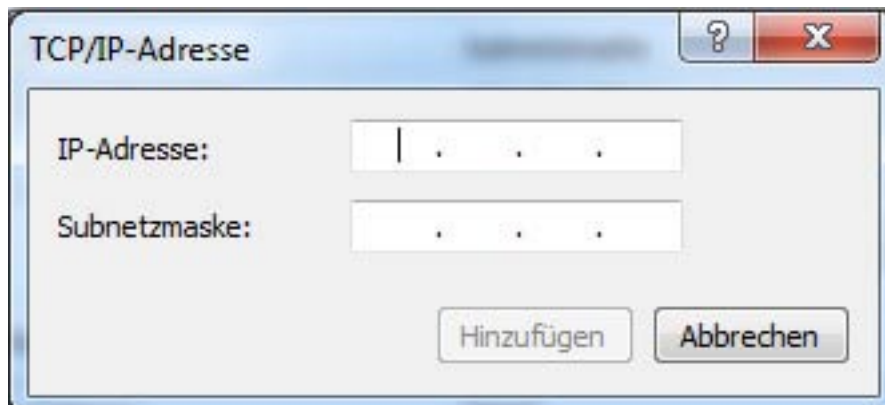
In case the first 3 numbers of your PC's standard IP address are already 192.168.16, you can skip the previous steps, but you have to take care that no other device with the IP 181 (4th number) is connected to the network during configuration. In more sophisticated network architectures the range 192.168.16 could also be already used in another network segment.

This kind of problems can be completely avoided if Major and PC are connected to a to a separate network hub or switch, which is solely used for that purpose.

Example Configurations of Funktronic devices in different network architectures can be found in the **manual: "Ethernet Connections"**.

The Web Interface

Currently, the Web Interface is only available in German, but the following pages should simplify its use.

To start the Web Interface, open a HTML browser (e.g. Mozilla Firefox, Internet Explorer) and enter the Major's IP: (ex factory:) 192.168.16.181
You are prompted for authentification. Factory defaults are:
User Name (Benutzername):   **mbosv**
Passwort: **radio**

The **main menu in the title bar** (see image on next page) contains the items "System", "Applikation", "Reboot" and "Update". The **System pages** mainly contain the network configuration and the possibility to change the authentification information. All further paramaters are configured on the **Application pages**. The button **Reboot** executes a restart, including a reset to factory defaults if desired. The button **Update** can be used to update the network component's software.

Additionally the title bar shows some basic data of the device and the software.

The System Pages

After entering the Major's IP address into the adress bar of the browser, **system page 1** is displayed (see image above). This page contains the **local network settings of the Major BOS V**. Als Startseite wird **die System-Seite 1** geöffnet (siehe oben). In order to have effect, any configuration changes need to be confirmed with "Anwenden". Thereupon The Major restarts using the new parameters.

Status

Shows the connetion status of each radio channel (red: channel active, but no connection to the remote station, green: channel active and connected, white: channel deactivated)

Host-Name

Name of the Major in the local network.

Lokale IP-Adresse

If the IP adress is highlighted in orange, the device was started in Default IP Mode. Here, the default IP address is restored, to assure access even if the IP adress is unknown. This operation mode is achieved by pressing the PTT button of the hung-up handset and the PTT of channel 1 simultaneously at power-on. All LEDs are flashing.
Default: „192.168.16.190"

Netzmaske

Subnet mask, as is used in the local network.
Default: „255.255.255.0"

Gateway IP-Adresse

The address of the router/DSL gateway in the local network. This is necessary, if the remote stations are not part of the same network.
Default: „0.0.0.0"

Primärer DNS-Server

A DNS server is only necessary if host/DNS names are used. For the use of IP addresses, only, no information has to be made.
Default: „0.0.0.0"

Alternativer DNS-Server

If host/DNS names are used, a secondary DNS server should exist in case the primary DNS server is currently not available.
Default: „0.0.0.0"

Jitter Buffer Delay

Compensates for deviations in the transfer time of the audio packets. The higher this value is, the better cracks and interruptions are avoided. However, the voice delay is increased by the jitter buffer delay.
Default: „80 ms"

Web Server Port

The port on which the web server of the device is listening.
Default: „80"

LS Port

Via this port controlling the device by an external software is achieved. For that purpose, the Major BOS V is listening on the TCP port defined here.
Default: „9999"

Debug/Syslog

Here, the amount of syslog messages, that is displayed on the system page "Info", is configured.

On system page 2 you can find the **network settings of the remote stations** (radio channels). On this page, changes for one radio channel must be always confirmed with "Anwenden" before continuing the changes for the next one. For each single channel, the following settings exist:

Status

A channel can be active ore deactivated. For active channels the Major tries connecting to the respective remote station. As long as no connection is established the channel LEDs are flashing. If the channel is deactivated, no connection is established and the channel cannot be used.

Kreisbündel

Channel bundles are necessary to operate both channels of an (old) *FT636 IP Interface*. For this purpose, two neighboring radio channels must be combined to a channel bundle.

Ziel DNS Name

The target DNS name can be used instead of the IP address. In this case, one has to pay attention that at all times at least one DNS server is operating and can be accessed.

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Ziel IP Adresse

The IP addresses of the remote stations must all be different (also different from the own IP address).

Port für Audio/NF

The audio port is used for transmission of the audio packets. The used UDP protocol must be activated in firewalls. All ports must be different from each other.

Port für Signalisierung

The signalling port is used to transmit control telegrams (PTT, Squelch). The used TCP protocol must be activated in firewalls. All ports must be different from each other.

On system page 3 you can change the **user name** and the **password**. Before this page opens you are prompted once more to enter the current password.

The system page Info is used to diagnose the network connections. No settings can be changed in this page.

Verbindungsstatus

Informations on the connection status are displayed for one radio channel. The desired channel can be sleceted using the + / - buttons.

Debug und Syslogmeldungen

Here, you can see the 20 most recent syslog messages. These are broadcasted throughout the ethernet. For diagnosis they can be recorded by a suitable tool (Syslog Server, Wireshark, TCP-Dump).

The Application Pages

Application page 1 allows to configure the common **parameters of operation** of the Major BOS V. As well as for the system pages, any configuration changes need to be confirmed with "Anwenden", in order to have effect.

Codec

The audio codec must be chosen accordingly to that of the remote station. As the FT636 IP Interface uses A-law, this codec has to be used for this kind of remote station.

TX-LED

Here you can define if the transmission LED is lit immediately or after the acknowledgement of the remote station is received.

RS232 Ausgaben

Here you can define which informations are available via the RS232 interface.

Wiederholzeit Vol +/- Tasten

Defines the duration of pressing the button after which the volume is increased/decreased once more. This time can be configured for the first as well as for further repetitions separately.

Headseterkennung

Automatic headset detection can be configured via the button „Schwellwert einstellen". A new screen opens that leads through the process.

Ein-/ Ausgänge

For pins that can be used as inputs or outputs, the direction of information can be chosen here.

Funktion der Eingänge / Funktion der Ausgänge

The possible functions of inputs and outputs can be freely assigned to the respective pins. For PTT inputs, the assignment to the desired microphones is also made here.

Eingangsverstärkung / Ausgangsverstärkung

If necessary, the different AF input and output levels can be adjusted here.

Mikrofonausgabepegel / Ausgabepegel Ruf

The output levels of the microphone and of call 1/2 can also be adjusted separately for the different AF directions.

Application page 2 contains the **channel-specific parameters** as well as the **volume settings**.

Using "+" / "-" you can browse through the different radio channels. **For each channel the following parameters can be altered:**

Funkkreiszusstand speichern

Remember the last channel selection status for the next power-on.

Funkkreis beim Einschalten

Channel is always on or always off at power-on (overwrites the previous setting).

Lautsprecherzustand speichern

Remember the last channel selection status for the next power-on.

Lautsprecherzustand beim Einschalten

Loudspeaker is always on or always off at power-on (overwrites the previous setting).

Lautstärke speichern

Remember the last volume setting for the next power-on.

Lautstärke beim Einschalten

Set defined volume level at power-on (overwrites the previous setting).

The following **Parameters** can be altered separately **for each AF direction (hand set, headset, Loudspeaker 1, Loudspeaker 2, tape output, S/E output)**:

Min. Lautstärke

Lowest volume level, that is possible.

Max. Lautstärke

Highest volume level, that is possible.

Max. Lautstärke Kreis aus

Highest volume level, if the channel is not selected.

Max. Lautstärke Kreis an

Highest volume level, if the channel is selected.

Max. Lautstärke Sender aus

Highest volume level, if the transmitter is off.

Max. Lautstärke Sender anderer Kreis an

Highest volume level, if the transmitter of another channel is on.

Max. Lautstärke LS aus

Highest volume level, if the loudspeaker is off.

Max. Lautstärke LS an

Highest volume level, if the loudspeaker is on.

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Max. Lautstärke Hörer on Hook
Highest volume level, if the handset is hung up.

Max. Lautstärke Hörer off Hook
Highest volume level, if the handset is taken.

Max. Lautstärke Sender an
Highest volume level, if the transmitter is active.

Max. Lautstärke Sender eigener Kreis an
Highest volume level, if the transmitter of the own is active.

On application page 3 you can define the functions of the buttons. For each button one function for short pressing and one for long pressing can be programmed.

On application page Manuell you are able to directly change the programming of the underlying registers. This page is mainly for settings of non-standard software, that are not implemented into the web interface.

RS232 Monitor

For via the RS232 interface the respective socket of the Major needs to be connected to the PC's COM port. In case your PC does not have a COM socket, you can also use a COM-USB converter. In order to read the syslog messages, you need to use a terminal software (e.g. Hyper Terminal, H-Term...) .
The pins of both sockets must be connected in the following way:

RS232 (ST6)	Function	9pin COM of PC
1	TxD	2
2	RxD	3
3	GND	5

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Sockets Pinout

| 12VDC | | | | | | | |
| +⊙- | TB | RS232 | PTT | HS | S/E | | ETH |

PWR   ST7   ST6   ST5   ST4   ST3   ST1

All sockets of the Major shown from rear view.

Layout   Power
PWR

12 VDC, max 1,5 A,
inside: + , outside: GND

Two connectors for headsets are available. A headset can be connected to ST14. An external PTT button (e.g. foot switch) can be connected to ST14A.
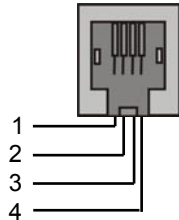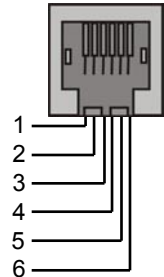
Layout TB Tape
ST7

GND (ground)   1
audio tape switching contact   2
AF output A (mod. +)   3
AF output B (mod. –)   4

The AF output A-B is equipped with a transformer and hence potential-free.

Layout HS Headset
ST4
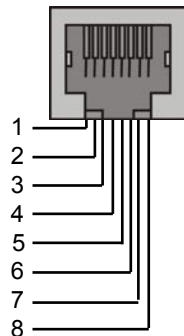
PTT input HS (PTT HS1, to GND)   1
AF input HS (micro +)   2
AF output HS (headset +)   3
AF output HS-GND (headset -)   4
AF input HS-GND (micro -)   5
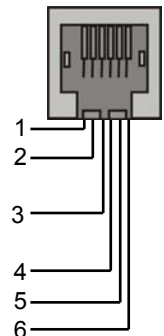GND (PTT HS1 ground)   6

Layout RS 232
ST6

TXD (RS232)   1
RXD (RS232)   2
GND   3
IN/OUT 1   4
IN/OUT 2   5
IN/OUT 3   6
AF out Loudspeaker 2 (LS2 +)   7
AF out LS2: GND (LS2 –)   8

Layout PTT
ST5

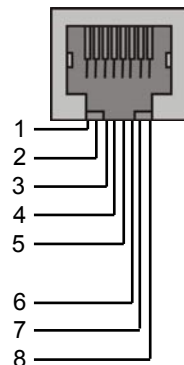PTT input (PTT HS2, to GND)   1
+batt. output., supply voltage   2
   for headset-headset switching PCB
control pin   3
   for headset-headset switching PCB
opto-coupler input (anode +)   4
opto-coupler Input (cathode -)   5
GND (PTT HS2 ground)   6

Ethernet Socket ETH
ST1

TX+   1
TX-   2
RX+   3
RX-   6

The connection to the ethernet is achieved using the standard 8-pin patch cables.

Layout S/E
ST3

AF input (+)   1
AF input (–)   2
input w. pullup (SQL S/E)   3
GND   4
+batt (12V DC)   5
   (**do not connect to radio!**)
PTT S/E (IN/OUT)   6
AF output (Mod +)   7
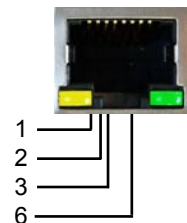AF output (Mod –)   8

The AF in/outputs are equipped with transformers and hence potential-free.

Technical Data

Supply

Voltage	$+12V_{DC}$ -15% +25%
Current Consumption	ca. 160-400 mA

Input Level (S/E)

Factory setting	775 mV (= 0 dB) / 600Ohm
Adjustment range	-99 dB to +26 dB
Input impedance	600 Ohm

Output Level (S/E)

Factory setting	500 mV (= - 3,8 dB) / 200 Ohm
Adjustment range	-99 dB to +26 dB / 200 Ohm
Ausgangsimpedanz	ca. 200 Ohm

Output Level for Earphone (headset) (RX-Out)

Factory setting	0 dB (at 200 Ohm)
Adjustment range	-99 dB bis +26 dB (at 200 Ohm)
Output impedance	ca. 150 Ohm

Input Level for Mikrophone (headset) (TX-In, electret)

Factory setting	0 dB
Adjustment range	-99 dB bis +26 dB
Output impedance	ca. 700 Ohm

Weight   ca. 1500 g

Dimensions (without gooseneck mikrophone)

width x depth x height	245 x 220 x 90 mm

General Safety Remarks

Please read the operating instructions carefully before installation and setup.

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 connecting 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 and 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 dealer.

- The installation and setup have to be carried out by professional personnel.

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 November 2005, the purchasers or users are obliged to return old equipment produced 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**
Breitwiesenstraße 4
36381 Schlüchtern
GERMANY

>>> Important hint: freight forward deliveries cannot be accepted by us.

February 2nd , 2006

Subject to change, Errors excepted!

Release Notes

25.02.2014   - first English version of the manual