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***microHAM***



fax. +421 2 4594 5100  
e-mail : [support@microham.com](mailto:support@microham.com)  
url : [www.microham.com](http://www.microham.com)

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## **1. Warranty**

For this product, microHAM provides life time warranty.  
The product must not be modified in any way, except configuration,  
otherwise the warranty voids.  
microHAM assumes no responsibility for damages on other devices  
or injuries on persons, as a consequence of using our products.

## 2. Packing

### **micro STACK MAX**

The product includes micro Stack Max™, supply connector, PCCOM1 cable, printed manual and microHAM Device Configurator© program on a CD-ROM.

### **micro STACK SWITCH**

The product includes micro STACK SWITCH 1 piece, 1 x 5 m (16.4ft) of 10 x 0,14mm<sup>2</sup> (AWG26) shielded control cables terminated by DB15M connectors for direct connection to micro Stack Max™, printed manual and a fixture.

Please check the content of the shipment against this list. If the shipment is incomplete, please contact us at the following address:

[support@microham.com](mailto:support@microham.com) or

fax : +421 2 4594 5100, or

by mail to :

**microHAM**  
**Matúškovo 709**  
**92501**  
**Slovakia**

### 3. Important warnings

**!!! Always check for proper polarity when connecting the power supply !!!**

**!!! Prevent shorts on output signals of micro Stack Max™ !!!**

**!!! Never operate the antenna switch with open top lid !!!**

**!!! When installing at elevated site, keep the necessary safety precautions !!!**

**!!! Protect the inside of switch from humidity !!!**

**!!! Always use shielded cable, if the provided cable is not suitable !!!**

#### 4. Quick start

- ⑩ Place the micro Stack Max™ to a convenient place in your hamshack so, that the front panel is well visible and easily accessible when controlled manually.
- ⑩ Connect power supply 12V to the micro Stack Max™. Check the polarity of power supply !!!
- ⑩ Connect micro Stack Max™ to micro Stack Switch™.
- ⑩ Connect WL/2 coaxial cable to connectors marked WL/2 on micro STACK SWITCH™

After powering on, the micro Stack Max™ can immediately control the connected stack switch according to its configuration. The factory configuration of micro Stack Max™ is for stack switch given in the purchase order. If no stack switch has been given in the order, the basic configuration is for micro Stack Switch™.

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## 5. Parameters

### micro STACK MAX :

**Supply voltage:** 12 - 16V DC (up to 200mA without stack switch)

**Current consumption:** up to 200 mA without stack switch, max. 600mA

**Outputs:** 8 x source or sink output (configurable), depending on the input voltage, max. 400mA (with optional relay board also sink outputs)

#### **Connectors:**

**STACK SWITCH :** DB25F

**PC :** DB9F

**ACC :** 3,5 Phono STEREO

**REMOTE :** MINIDIN6F

**PTT, INH :** 2 x RCA female

**Operating temperature range:** 0 - 55 C (32 - 131 F)

**Dimensions:** W 175mm (6,89") x H 44 mm (1,73") x D 130 mm (5.12")

**Weight:** 600 g (1.32 lbs)

### micro STACK SWITCH :

**Frequency range :** 1,7 - 30 MHz

**Characteristic impedance :** 50 ohm

**Number of antenna ports :** 3

**Number of inputs :** 2

**Supply voltage :** 9 - 16V on the required port against ground

**Consumption :** max. 300mA

**Isolation voltage of relays :** 10kV



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**Connectors** : PTFE SO239 or N, depending on version

**Guaranteed power rating** :

**SWR <1.3**

30 MHz < 5KW

**SWR <2**

30 MHz < 3KW

**SWR <3**

30 MHz < 2KW

**Operating temperature range** : -35 .. +70 C (-31.. 158 F)

**Dimensions** : W 220mm (8,66") x H 103 mm (4") x D 120 mm (4.72")

**Weight** : 2,4 kg (5.29 lbs) + 1,1 kg (2.42 lbs) fixture

## 6. Characteristics and functions

### micro STACK MAX

- ⑩ provides outputs signals for micro Stack Switch™ or other types of stack switches (e.g. WX0B)
- ⑩ hot switch protection (provides inhibit signal and prevents switching of stack switch while PTT signal is active)
- ⑩ configurable from PC using "microHAM Device Configurator ©" program
- ⑩ downloadable firmware with free updates
- ⑩ steel-aluminium box for best suppression of EMI
- ⑩ all inputs and outputs are filtered by chokes

### micro STACK SWITCH

- ⑩ three antenna matching and switching
- ⑩ separate match for two and for three antennas
- ⑩ two BOP (out of phase) combinations are available: between ANT 1&2 or ANT 2&3
- ⑩ with no power, antennas 1, 2 and 3 are connected in phase
- ⑩ any combination of antennas can be switched to RADIO MAIN feed
- ⑩ any single antenna can be switched to RADIO SUB feed
- ⑩ can be fit up inside the shack or outside on the tower

## **7. Principle of operation**

micro STACK MAX™ is a device controlling the external power match of your stack. To micro STACK MAX you can connect not only our external unit (micro STACK SWITCH), but also the popular external units of other manufacturers - WX0B Stack Match™ and Stack Master™.

micro STACK MAX™ features a pushbutton operation, with configurable function of the buttons; a choice of special properties of stack: BOP, AUX, T/R. It features a specially designed logic for hot switch protection and thanks to (optional) connection to PC it enables you - the only on the market - to switch antennas in your stack by a single mouseclick or by pressing a hotkey on the keyboard of your PC.

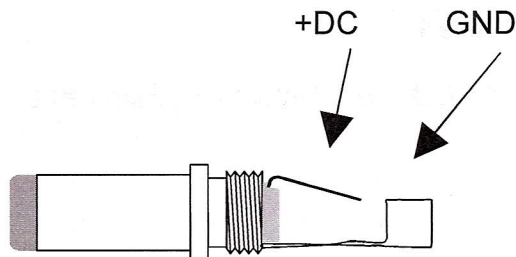
## 8. Interconnections and connectors

micro STACK MAX™ is connected to micro STACK SWITCH™ by 8 wires + GND. Through these wires, the switching matrix in micro STACK SWITCH™, or WX0B Stack Match™, or Stack Master™ are controlled.

All connectors for connecting power supply, PC, PTT and inhibit signals and stack switch are situated on the rear panel of decoder.

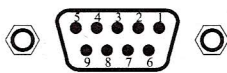
### DC Connector

This connector is for power supply connection. The positive voltage is on the center and the ground is on the ring. Check the proper polarity of connected power supply. We recommend supply voltage in the range of 12 – 16V, with regard to the switch box. Power connector is included.

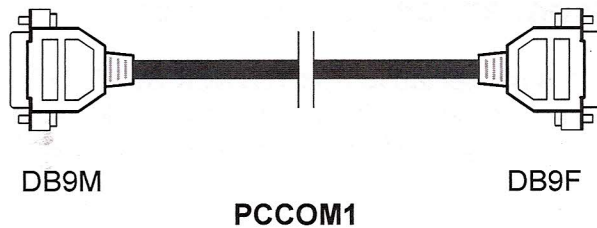


### PC Connector

Connector for connecting the micro Stack Max controller to PC COM port. Used to configure and control the controller remotely. Signals have RS232 levels.



controller rear panel view  
connector type DB9F



Pin number	Signal (direction from PC)
1	CD
2	RXD
3	TXD
4	DTR
5	Signal GND
6	DSR
7	RTS
8	CTS
9	RI

Table 1

For connecting to PC use the **PCCOM1** direct interconnection cable.

### **STACK SWITCH Connector**

#### **DB15F**

This is output connector. Stack switches, such as micro Stack Switch™ or some of the WX0B stack switches are connected to this connector. Outputs for stack switch are designed as voltage sources and have built-in short and overload protection.

### **REMOTE Connector**

#### **MINIDIN6F**

External control connects to this connector.

<i>Pin number</i>	<i>Signal (dir. from SM)</i>	<i>Description</i>
1	Signal 1	Matrix control
2	Signal 2	Matrix control
3	Signal 3	Matrix control
4	Signal 4	Matrix control
5	Signal 5	Matrix control
6	Signal 6	Matrix control
7	Signal 7	Matrix control
8	Signal 8	Matrix control
9	NC	NC
10	NC	NC
11	NC	NC
12	+	Positive power output
13	GND	Negative power output
14	EXT	External positive power
15	GND	Negative power output

### **PTT, INH Connectors**

#### **2x RCA**

PTT – input. When grounded, micro Stack Max goes into transmitting state.

INH – output, open collector, normally closed. When micro Stack Switch is changing the combination, this output opens for a time period given by the configuration (min. 26ms, which is also the default). This output can be directly connected to INH (LINEAR) pin of YAESU transceivers with BAND DATA connector.

### **ACC Connector**

#### **phono 3,5 female**

This connector has the same function as PTT and INH connectors as an alternative connection. PTT is connected to TIP, INH to RING and SLEEVE is the GND.

## 9. Controlling micro Stack Max

The micro Stack Max controller fully controls all the functions of the connected micro Stack Switch.

Four gray buttons on the front panel can be switched between two modes: basic mode and memory mode.

### Basic mode of antenna buttons

In basic mode, antenna/s connected to the radio can be directly chosen. Basic mode can be of exclusive or toggle type. The user chooses the type of basic mode when configuring the device, and it cannot be changed from the front panel. Usually the **exclusive** basic mode is used, when combinations of antennas are chosen pressing the appropriate button. Buttons 1, 2 and 3 are assigned to single antennas. Pressing the fourth button "all" switches all three antennas simultaneously, as an alternative to simultaneous pressing of buttons 1, 2 and 3.

In **toggle** basic mode, pressing a button toggles status of the appropriate antenna with the limitation, that it is not possible to disconnect all the antennas. The toggle mode is useful especially for WX0B Stack Master, which connects four antennas, as it is not convenient to press four buttons at once and there is no more button for "all" function.

While receiving (PTT inactive) the antennas are switched immediately when the buttons are pressed. During switching, the INH signal is generated.

While transmitting (PTT active), the combination of antennas does not actually change upon pressing the buttons, but the required change is remembered and indicated by flashing LEDs and the antennas are changed after releasing PTT.

LEDs above the gray buttons indicate the current status of stack switch. LED is on (red), when the appropriate antenna is connected.

### **Memory mode of antenna buttons**

In memory mode, combinations stored in the memory are chosen using the gray buttons. There are four memory positions, one for each gray button. Combinations are assigned by the user choosing them in the basic mode and storing to memory. Storing to memory and switching between basic and memory mode is accomplished in the following way:

Press and hold (for more than 600ms) the red button (T/R); all LEDs (except the one above the red button) start to flash and the controller expects pressing one more button within 5 seconds. Now, pressing the green button (AUX) activates the memory mode, pressing the yellow button (BOP) activates basic mode, pressing one of the gray buttons stores the current combination to the appropriate memory position and pressing the red button cancels this mode.

### **T/R split**

The micro Stack Max controller enables to use different combinations of antennas (signal paths) for transmission and reception. This function can be enabled or disabled in the configuration. This function is activated by pressing briefly (for less than 600ms) the red T/R button. The current status is indicated by the LED above the button. The controller acts upon the PTT signal: while PTT is inactive, the combination of antennas for reception is set, and while active, the combination for transmission is switched. The user can change the combinations using the gray buttons; the combination for reception is changed while receiving, and the combination for transmission is changed when transmitting, but the changed combination becomes active at the subsequent activation of PTT, and is indicated by flashing LEDs until the end of transmission.

### **BOP function**

The controller supports also the BOP function, transmitting/receiving with antennas out of phase. micro Stack Switch features two types of the BOP function. The first is a combination of antennas 1 and 2



out of phase, and the second is a combination of antennas 2 and 3 out of phase. Each of these combinations can be enabled or disabled in the configuration. If at least one of them is enabled, the user can choose it pressing briefly (for less than 600ms) the yellow BOP button. Pressing briefly the yellow BOP button again, the second BOP combination is activated (if enabled), and pressing the BOP button again switches the BOP feature off. Pressing and holding the BOP button (for more than 600ms) switches the BOP function off immediately. The BOP function is indicated by yellow LED above the yellow BOP button, and also by appropriate antenna LEDs above the gray buttons, in this case yellow.

#### **AUX functions**

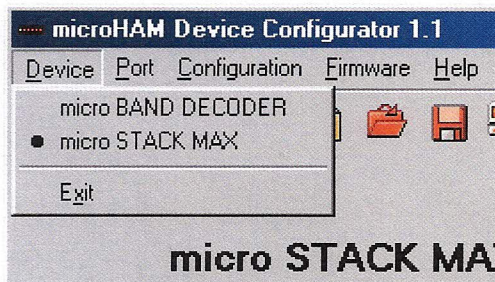
As micro Stack Switch enables to exclude one of the antennas and connect it to a second radio for SO2R operation (SUBRADIO FEED), the controller also supports this function. It is activated by pressing briefly (for less than 600ms) the green AUX button, indicated by green LED above the AUX button and also the appropriate antenna LED going green. Now the antenna connected to the SUBRADIO FEED can not be set to combination with other antennas. It is also possible, that some of the BOP combinations will not be possible. Pressing the AUX button briefly again, the following antenna is switched to AUX and so on, in the order 1,2,3,1,2,3,... Pressing the AUX button also switches off the T/R split function. The AUX function can be switched off by pressing and holding the AUX button (for more than 600ms) and the last combination before activation of the AUX function will be restored.

## 10. Configuration

Description of micro Stack Max controller configuration is given for firmware version 1.0 and microHAM Device Configurator© v.1.1. In case of upgraded FW or SW, please download the latest version of the manual and/or description of the upgrade. All versions of FW, SW and manuals are available on our website [www.microham.com](http://www.microham.com). The behavior of the controller, i.e. type of connected stack switch, the button mode to be used, enabling/disabling special functions such as BOP or AUX and other parameters are configured from PC using Windows program microHAM Device Configurator©. After installing the configurator to the PC's harddisk and running it, you must select micro Stack Max device in menu "Device". The main configuration window for this device is displayed.

### Program items :

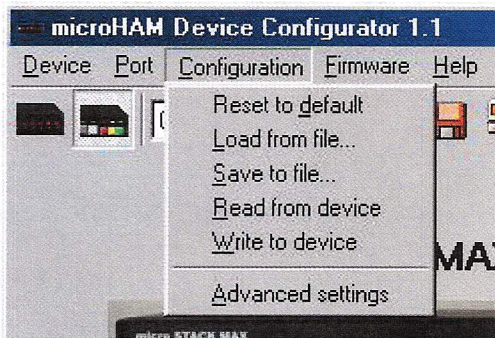
**Device:** First choose the device to be configured - in this case, choose micro Stack Max.



**Configuration :** This pull-down contains configuration data processing commands.

Reset to default... resets the device to default values

Load from file... loads previously store configuration to the decoder. Clicking on this item, standard browsing



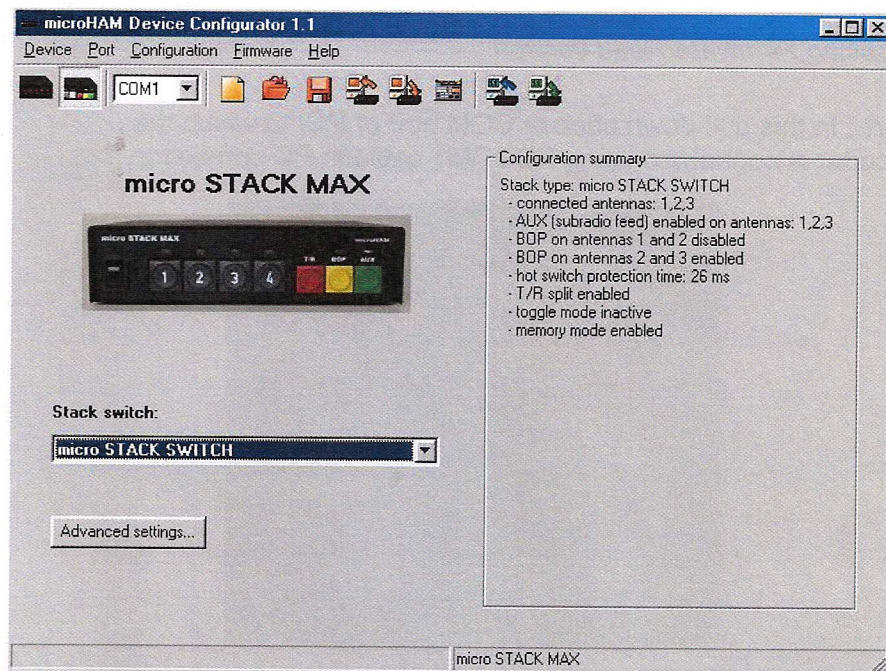
window opens, where path and name of file to be load can be chosen.

Save to file... stores the current configuration to disk. Again, standard browsing window opens, where path and name of file the configuration to be saved into, can be chosen.

Read from device... clicking this item, the program reads the current configuration from the decoder and displays it in the main window.

Write to device... clicking this item, the current configuration displayed on the main window is sent to the decoder. The previous configuration of the decoder is overwritten and the decoder will work according to the new configuration.

Advanced setting... see page 20.



**Firmware :** This pull down contains commands working with firmware of decoder.

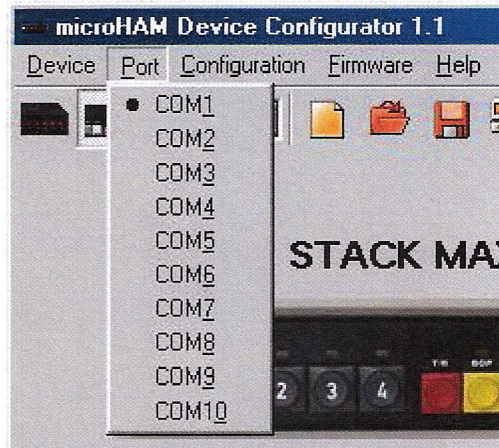


Read version... Clicking this item reads and displays current version of firmware, hardware and case of the decoder and its serial number.

Upgrade firmware... this option uploads (upgrades) a new firmware to the decoder. Clicking on this item a browser window is open, where the file containing the required FW can be chosen. This is

then automatically sent to the decoder. Check the new FW version choosing *Firmware/Read version*

**Port :** In this pull-down choose COM port of PC, to which the decoder is connected using PCCOM1 cable in PC connector.



### Configuration

For fast and simple setup, it is enough to choose the connected stack switch from a combobox in the main window. All configuration values for the chosen stack switch will be set to defaults. If the user needs to modify these basic settings, the advanced settings dialog has to be used.

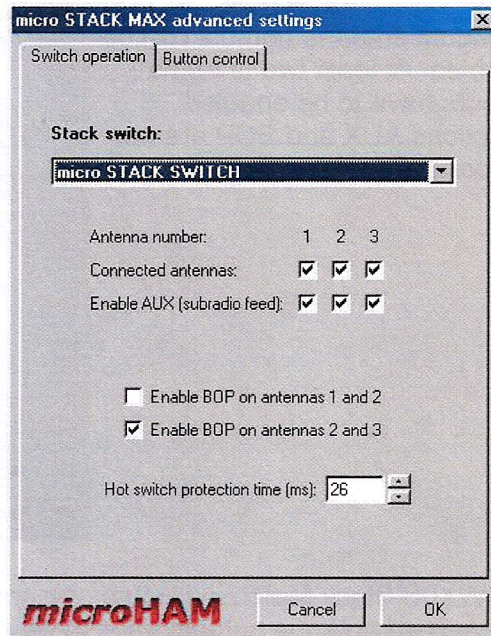
### Advanced settings

#### Switch operation :

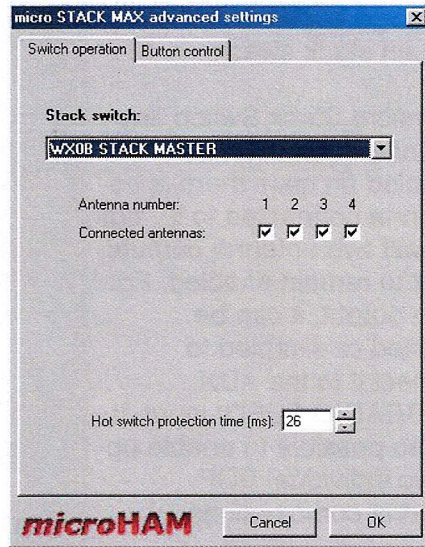
In this page, set the functions of stack switch to be supported by the Stack Max controller. Choose the stack switch using the combobox (similarly to the main window). The last value - hot switch protection - determines the duration of inhibit signal after switching. The remaining values on

this page depend on the chosen stack switch.

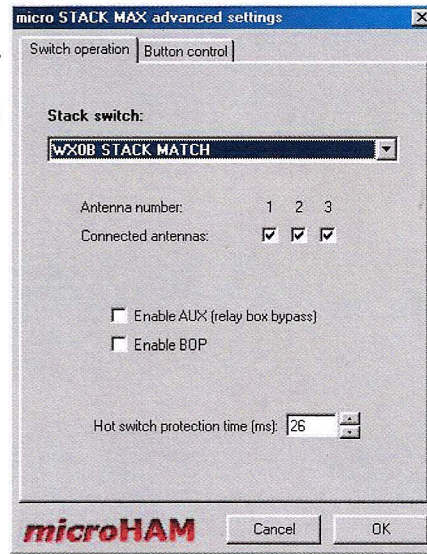
For micro Stack Switch, any antenna output can be disabled (in case there is no antenna connected to it), but at least two antenna outputs have to remain enabled. For each output, it can be enabled or disabled to connect it to the AUX (SUBRADIO FEED) input. It is also possible to enable up to two individual BOP antenna combinations.



For WX0B Stack Master, individual antenna outputs can be disabled. At least two antenna outputs have to be enabled. Functions AUX and BOP are not supported for this switch.

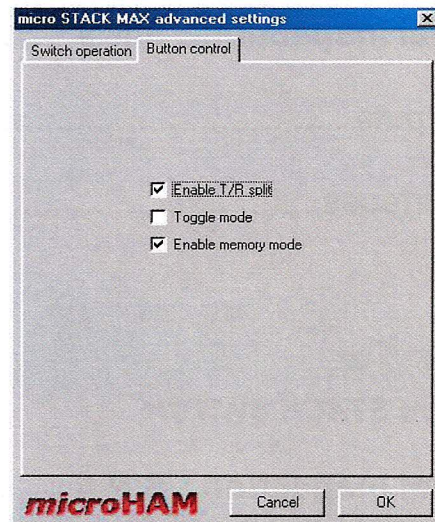


For WX0B Stack Match individual antenna outputs can be disabled. At least two antenna outputs have to be enabled. Functions AUX and BOP are supported and can be enabled for this type of switch. For WX0B Stack Match with N2NU modification only AUX and BOP functions can be enabled/disabled.



### Button control :

This window controls the method of using buttons for controlling the stack switch. Here, the T/R split can be enabled, to use a different signal path for transmission and reception, depending on the PTT signal. The exclusive or toggle type of basic mode of pushbuttons is selected here. Memory mode can be also disabled/enabled in this window.



### Hardware Configuration :

There are two DIP switches inside the micro Stack Max, marked LEVEL and POWER.

**LEVEL** - use this DIPswitch to set the active level of outputs to be positive + or GND. micro STACK SWITCH and WX0B Stack Match and Stack Master require the active level to be set positive +.

**POWER** - use this DIP switch to choose, whether micro STACK SWITCH is supplied from micro STACK MAX or from an external power supply. If external supply is chosen, this has to be connected to micro STACK SWITCH BD15 connector: GND to pin 13, + to pin 14, and the DIP switch has to be switched to position EXT. Use this option, if the cable from micro STACK MAX to micro STACK SWITCH is longer than 100 m.



**micro STACK MAX**

**Final Inspection : S/N # .....**

Outputs .....

Interfaces .....

**micro STACK SWITCH**

**Final Inspection : S/N # .....**

<i>PORT</i>	<i>ANT1</i>	<i>ANT2</i>	<i>ANT3</i>	<i>1+2</i>	<i>2+3</i>	<i>1+2+3</i>
30 MHz SWR MAIN						
30 MHz SWR SUB						

Under power check-out .....

**Date .....**