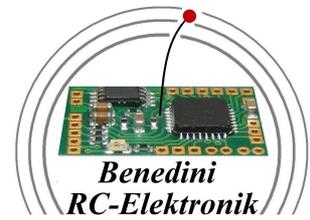


# Digital Multifunctional Soundunit

# TBS Mini



**\*\*\* FREE OF CHARGE soundlibraries available at [www.benedini.de](http://www.benedini.de) \*\*\***

## Content

1. Features
2. Connections
  - 2.1. Installation schematic
3. Control modes
  - 3.1. Controlling the soundunit by the 12-position "encoder" (12-Key coder)
    - 3.1.1 Alternative to the rotary switch encoder
    - 3.1.2. Teaching the sound unit for encoder control
  - 3.2. Direct sound selection
    - 3.2.1. Teaching the direct sound selection
  - 3.3. Indirect soundselection "2-Key Coder"
    - 3.3.1. Teaching the sound unit for toggle switch / joystick control
  - 3.4. Autostart
4. Changing a already set control mode
5. Configuration of the soundunit by the optional programming cable and a common PC
6. Technical data

### **Set control mode at delivery:**

- Encoder (Prop3)                       direct soundselection (Prop2)  
 indirect soundselection (Prop3)     Autostart

Loaded sound: \_\_\_\_\_

Flashing output:     None       Out1       Out2

## 1. Features

The TBS Mini is developed specially for electric powered airplanes or other models having a lot of special functions that need to be operated. This unit is an enhanced version of the proofed TBS Micro soundunit.

- Fully customer programmable. Your own sounds can be loaded!
- Large soundlibrary of original recordings available. Please check [www.benedini.de](http://www.benedini.de)
- Soundquality 8 / 11 / 16 / 22KHz
- Capability to play two sounds simultaneously (engine and one special sound)
- 16Mbit soundmemory, enough for 93sec. at 22KHz
- Internal amplifier with 1,2W at 8 Ohm speaker
- External high power amplifiers available  
(f.e. 2x40W at 2Ohm and 12V supply OR 50W at 8 Ohm and 50V supply)
- Up to 6 switching outputs
  - Triggerable by sound (f.e. Muzzle flashing) or independantly
  - Switching-, momentary- or flashing mode adjustable
- Two servo signal outputs (f.e. For retractable landing gears)
- Only one proportional channel necessary to control the unit.
- Speed signal derived from the receiver. This allows combination with brushless or brushed motors.
- Horizontal plug connections. This allows total electric isolation by shrinking plastic tube.
- Very little dimensions and weight
- USB or RS232 programming cable available (optional)
- Totally programmable by the free of charge software "TBS Flash":
  - You can load your own soundcreation or any of the Benedini sounds available at [www.benedini.de](http://www.benedini.de)
  - Firmware update! This means you have always the latest software at you unit.
  - **FREE OF CHARGE soundlibraries available at [www.benedini.de](http://www.benedini.de)**

The TBS Mini soundunit can be fully configured by the optional programming cable and a common PC. Please see the separate programming manual.

The unit can be controlled by a spare proportional channel by one of the following modes:

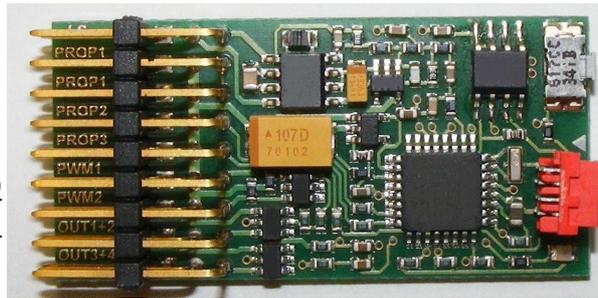
- 12-position encoder (combination of rotary switch and push button)
- 2-way switch for direct soundselection (please see page 6 )
- 2-way switch for **ind**irect soundselection (please see page 6 )
- Autostart (without any additional proportional channel for control)

The desired control mode can be set by the programming cable or manually (without PC).

## 2. Connection

### Plugs (from top to bottom)

1. Speaker or external amplifier
2. Prop1 **Input** (Receiver IN)
3. **Prop1 Output** (ESC Out)
4. Prop2 Input (Receiver), optional
5. Prop3 Input (Control channel)
6. PWM1 (Servosignal 1) or Out 10
7. PWM2 (Servosignal 2) or Out 11
8. Out 1+2 switching output
9. Out 3+4 switching output



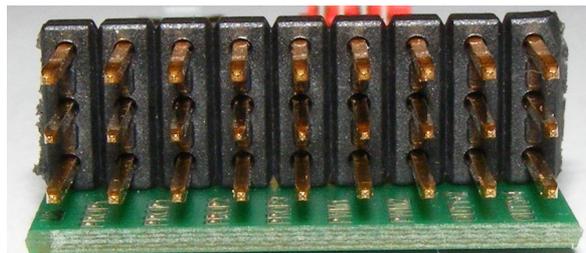
Learn Button

Prog. Cable

All outputs are switching to **NEGATIVE!**

### **Attention:**

All plugs must be connected with the signal lead (orange) on TOP and the negative supply lead (brown or black) at BOTTOM !!!!

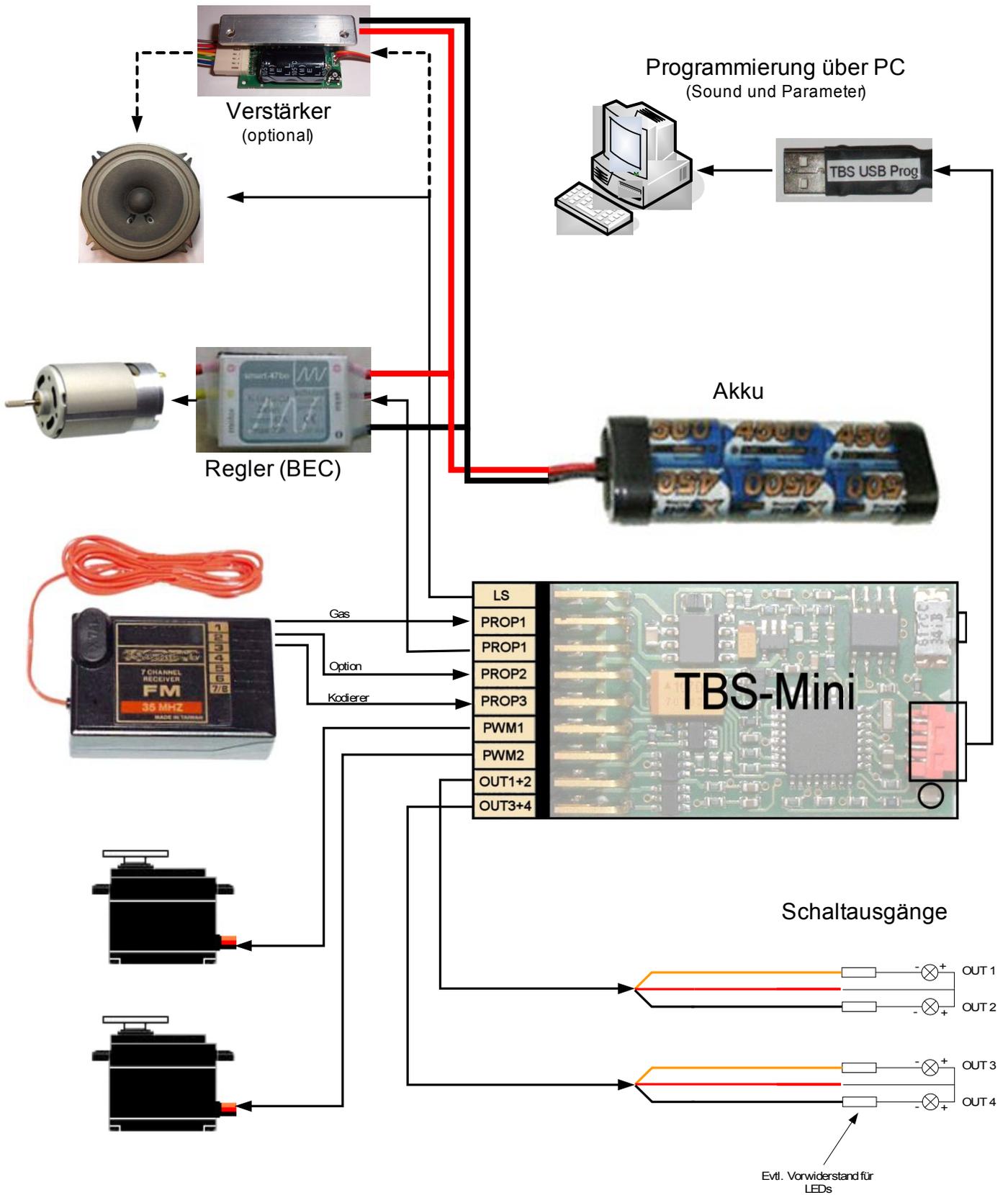


**Top:** Signal (orange)  
**Center:** Power (red)  
**Bottom:** GND (black)

| Speaker / Ampl. | PROP 1 In | PROP 1 Out | PROP 2 In | PROP 3 In | PWM 1 (OUT10) | PWM 2 (OUT 11) | OUT 1+2 (neg. switching) | OUT 3+4 (neg. switching) |
|-----------------|-----------|------------|-----------|-----------|---------------|----------------|--------------------------|--------------------------|
|-----------------|-----------|------------|-----------|-----------|---------------|----------------|--------------------------|--------------------------|

|               |                |                 |                |                |                 |                 |                  |                  |
|---------------|----------------|-----------------|----------------|----------------|-----------------|-----------------|------------------|------------------|
| Speaker Plus  | Signal (Input) | Signal (Output) | Signal (Input) | Signal (Input) | Signal (Output) | Signal (Output) | OUT 1 (negative) | OUT 3 (negative) |
| Speaker Minus | Power          | Power           | Power          | Power          | Power           | Power           | Power            | Power            |
| Ground        | Ground         | Ground          | Ground         | Ground         | Ground          | Ground          | Out 2 (negative) | OUT 4 (negative) |

## 2.1. Installation schematic



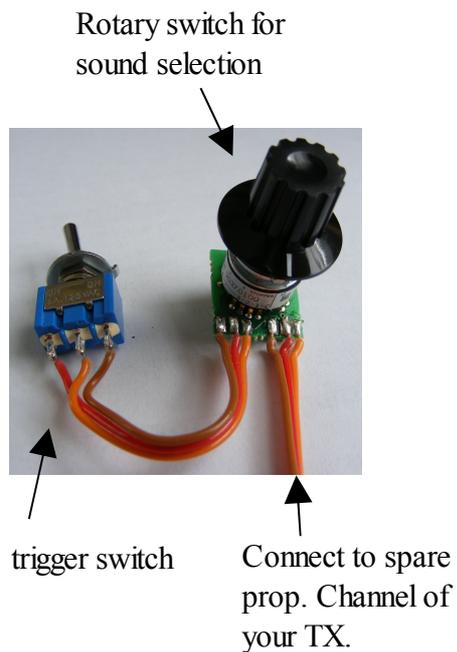
### 3. Control modes

#### 3.1. Controlling the soundunit by the 12-positon “encoder” (12-Key coder)

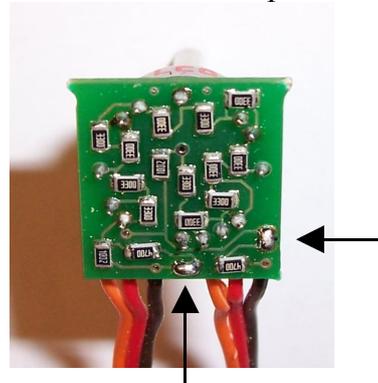
The most comfortable way of controlling the sound unit is using the socalled “12-position encoder”. It consists of a 12 position rotary switch in combination with a push button. The desired sound is **selected** by the rotary switch and is **triggered** by the pushbutton.

The encoder is mounted in your transmitter and connected at a spare proportional channel. It is optional and must be ordered separately!

After installation you should test the encoder by a common servo at the according receiver channel. Keep the encoder push button pressed and move the rotary switch through all positions. The attached servo must move to a new position at each rotary switch position. The total movement of the servo should be about the same as at a normal joystick channels set to 100% travel.



The total resistance of the encoder can be adjusted to your TX by two solder bridges at the rear side of the encoder pcb:

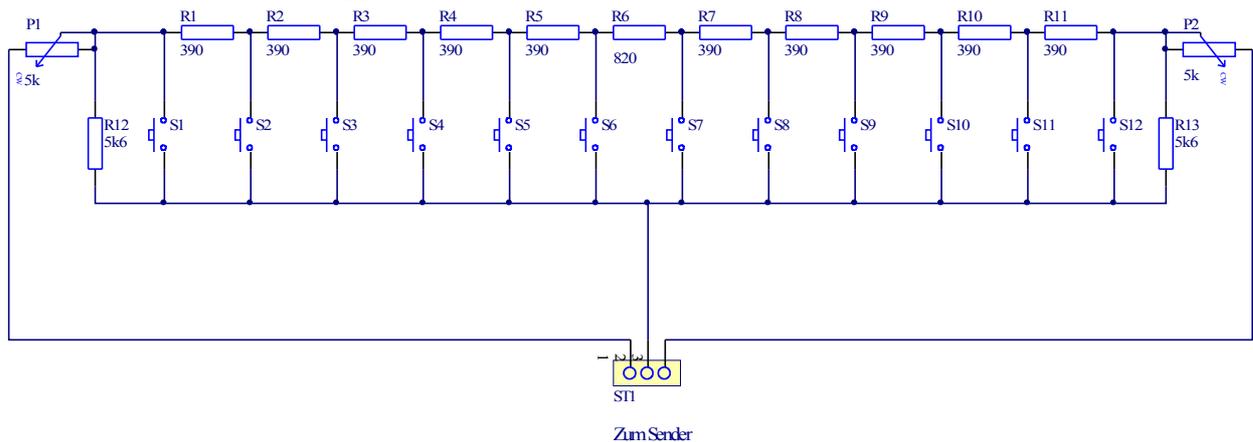


| <u>BOTH bridges</u> | <u>Total resistance</u> |
|---------------------|-------------------------|
| open                | app. 22 KOhm            |
| closed              | app. 5 KOhm             |

**The installation of the encoder in your transmitter is on your own risk**  
**Proper functionality is not guaranteed at ALL transmitter brands / types**

### 3.1.1. Push button encoder

A simple resistor array combined with some push buttons can be also used to control the soundunit. This is only a suggestion and needs to be build by your own:



You should check the operation by a common servo. Adjust the min. and max. travel range with the potentiometers P1 and P2 in comparison to the travel at a common joystick channel(f.e.Ch1).

**The installation of this circuit in your transmitter is on your own risk**  
**Proper functionality is not guaranteed at ALL transmitter brands / types**

### 3.1.2. Teaching the sound unit for encoder control

- 1) Power transmitter and receiver. LED blinks fast -> normal mode  
Bring all joysticks to neutral position. Model must not move.
- 2) Press the TEACH. button until one beep occurs -> LED cont. lit.  
At this moment all neutral / idle positions are stored.
- 3) Move throttle stick to your desired acceleration point (throttle stick position where engine idle sound changes to moving sound) and push the button of the encoder.  
-> A short sequence of acceleration is played
- 4) Move throttle stick to full speed and push the encoder button again  
A short sequence of full speed is played.
- 5) Bring the encoder rotary switch to its first position and push the encoder button  
-> Engine start/stop is stored to this position  
**Hint:** The rotary switch has no mechanical limits. You can define any position as the "first" one.
- 6) Bring the encoder rotary switch to the next position, wait about 2s and push the encoder button again.  
-> Reeving up the engine is stored to this position
- 7) Repeat step 6 until all 12 rotary switch positions are stored
- 8) After teaching all positions the sound unit beeps 3x and is back in normal operation mode.

#### **Hint:**

If you are using the resistor network shown above instead of the encoder, each rotary switch position is represented by one of the push buttons.

## **3.2. Direct sound selection**

If you want to run only the engine sound and **ONE** special sound (f.e. MG), you can use this control mode.

You need a proportional channel equipped with a 3 position switch with neutral position and momentary contacts to **both** sides or a common joystick channel.

A attached servo must leave its center/neutral position when the switch is pressed in one direction and must return to its center position when the switch is released. Pushing the switch in the opposite direction causes the servo to move to the other side.

Please compare the very left and very right positions of the servo with a common joystick channel. They should be about the same.

This is the first test you should do before teaching the sound unit.

### **3.2.1. Teaching the direct sound selection using Prop3 input**

1. Power on transmitter and receiver. LED blinks fast -> normal mode  
Bring all joysticks to neutral position. Model must not move.
2. Press the prog. button until one beep occurs -> LED cont. on.  
At this moment all neutral / idle positions are stored.
3. Move throttle stick to your desired acceleration point (throttle stick position where idle dead band stops and engine running sound starts) and flick the toggle switch.  
-> A short sequence of acceleration is played  
Now the dead (neutral) band of the speed channel is defined
4. Move throttle stick to full speed position and flick the switch again  
-> A short sequence of full speed is played.
5. Flick the switch **UP**  
-> Engine start/stop is stored to this switching direction of the switch
6. If you want to **skip** the next sound, flick the switch again **UP**. A section of the next sound is played but **NOT** stored to this direction of the switch, because it is already occupied.
7. Repeat step 6 to **skip** further sounds
8. If your desired special sound comes up **next** flick the switch **DOWN**
9. Switch soundunit **off** and **on**.
10. Now you can select the two selected sounds directly by the switch.

#### **Hint:**

- The control mode for Prop3 must be set to “**12 position encoder**”
- The 3-pos switch receiver channel must be connected to **Prop3**
- You may run the teaching sequence several times because you don't know at the very first run which sound appears next in the soundlist.
- Advantage of this direct sound selection is, that you can choose the desired sounds during teaching

### **3.2.2. Teaching direct soundselection using Prop2 input**

This is a alternative method for direct soundselection. In this case the 3pos switch receiver channel must be connected to **Prop2** input of the TBS Mini. Prop2 input must be set to **Function ½** at the TBS Flash software. The desired sounds must be selected too.

Programming is very simple and is the same as described below for **Autostart**.

#### **Hint:**

The triggered sounds are fix (as set by the TBS Flash) and can not be selected during teaching

### **3.3. Indirect soundselection “2-Key Coder”**

Another control mode is using a 3 position switch with neutral position and two momentary contacts at a spare proportional channel. A common joystick can also be used.

A attached servo must leave its center/neutral position when the switch is pressed in one direction and must return to its center position when the switch is released. Pushing the switch in the opposite direction causes the servo to move to the other side.

Please compare the very left and right positions of the servo with a common joystick channel. They should be about the same.

This is the first test you should do before teaching the sound unit.

#### **Selecting a Sound:**

The desired sound (f.e. sound #3) is selected by pushing the switch/stick 3 times from its center position into one direction. The now selected sound is triggered by pushing the switch to the **other** direction. The last selected sound can be triggered multiple times, without new selection.



- 1: **Selection** of sound / action (1-12)
- 2: **Triggering** of selected sound / action

#### **3.3.1. Teaching the sound unit for “2-Key Coder” control**

1. Power on transmitter and receiver. LED blinks fast -> normal mode.  
Bring throttle stick to minimum and control the center position of the toggle switch
2. Press the programing button until beep -> LED cont. on.  
At this moment all neutral positions are stored.
3. Move throttle stick to your desired acceleration point (throttle stick position where idle dead band stops and engine running sound starts) and push the switch/joystick of the control channel once -> A short sequence of acceleration is played.  
Now the dead (neutral) band of the speed channel is defined
4. Move the throttle stick to full speed position and push the switch/stick of the control channel again -> A short sequence of full speed is played.
5. Soundunit returns to normal operation mode

### **3.4. Autostart**

If you are interested only in engine sound, the “autostart” mode can be used. The engine starts automatically at first short acceleration.

If the engine is more than 20s idle, it shuts down automatically. There is on extra control channel necessary.

**No special sounds** can be played in this mode!

Teaching the autostart mode:

1. Power on transmitter and receiver. LED blinks fast -> normal mode  
Bring throttle stick to idle. Motor must not move.
2. Press the programing button until beep -> LED cont. on.  
At this moment the idle position of the throttle stick is stored.
3. Move throttle stick to your desired acceleration point and wait for a beep
4. Move the throttle stick to full speed position and wait for three beeps.
5. After this the sound unit is back in the normal operation mode.

**During the programing sequence:**

**After you left the last stored throttle stick position, a very short beep is played. Since then, you have about 2 seconds to adjust the new throttle stick position to be stored next.**

### **4. Changing a already set control mode**

It is possible to change the set control mode **without** the optional programing cable:

1. Press the programing button **DURING** powering the soundunit
2. Release the button
3. Press the prog. button momentarily and wait for the “Beep-Code”
4. Repeat pressing the button until the desired control mode is signalized by the according “Beep-Code”
5. Switch soundmodule off and on again

**„Beep-Code“**

- |          |    |                     |
|----------|----|---------------------|
| 1 x Beep | -> | Autostart           |
| 2 x Beep | -> | Toggle switch       |
| 3 x Beep | -> | 12 position encoder |

**Note:**

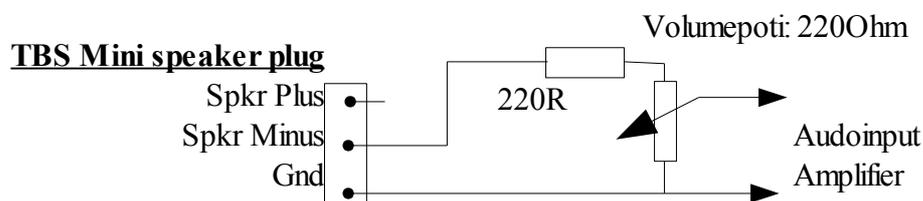
**If the control mode “autostart” is selected, there is no control channel defined.**

**If you want to switch from autostart to another control mode you need to select a control channel by the optional programming cable!**

### **5. Connecting an external amplifier**

If you want to connect an external amplifier, other than a Benedini one, please follow this schematic:

**Watch ground connection !!!!**



## 6. Configuration of the soundunit by the optional programming cable and a common PC

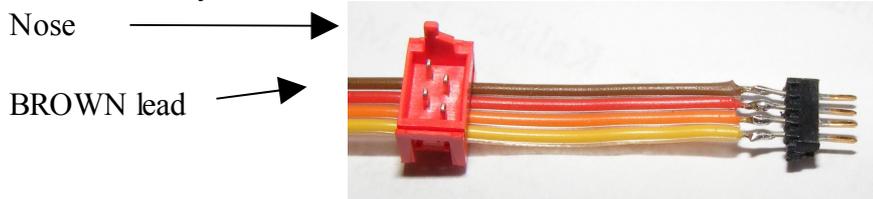
Please see the separate manual for the configuration software called “TBS Flash”.  
The manual as well as the software is available free of charge at [www.benedini.de](http://www.benedini.de).

### Adapting the TBS Micro programming cable to TBS Mini

The programming cable of the TBS Micro can be used for the TBS Mini as well.  
A extra connector at the programmers ribbon cable is necessary to connect the TBS Mini.

#### Adding the connector:

1. Remove the rear side of the connector carefully by a small screwdriver
2. Add the cable to the connectors body. Watch the right orientation!  
The **BROWN** lead must be located at the **NOSE** of the connector. (see the picture below)
3. Reinstall the removed rear clamp at the body. Check if all leads of the ribbon cable are located at the cut outs of the plug. Press body and clamp **carefully** together until they are locked, indicated by a „click“. This can be done f.e. in a bench vice.



## 7. Technical datas

Supplyrange: 3,5 – 12V (from receiver)  
Internal amplifier: 1,2W at 8 Ohm and 5V supply  
Switching outputs: Negative switching, max. 12V/0,5A each  
Dimensions: 55x25x10mm  
Weight: about 6g

**You must do a rangecheck of your remote control after installation and ensure a proper working system under all conditions !**

### Disclaimer

- a.) [www.benedini.de](http://www.benedini.de) provides the equipment solely to be used by each purchaser in accordance with the specific instructions supplied with each Sound Module and that the purchaser undertakes that the Sound Module and any associated equipment e.g. Amplifier, Speakers, etc. will be operated within the parameters contained therein.
- b.) [www.benedini.de](http://www.benedini.de) accepts no liability for any damage to any Sound Module if it is determined that the damage has been caused by either non adherence to the instructions or due to any malfunction by any cause or reason whatsoever within the model or its equipment and thereby outside of the control of [www.benedini.de](http://www.benedini.de).
- c.) [www.benedini.de](http://www.benedini.de) supplies each Sound Module on the strict undertaking that it will be used in such a manner to comply with the laws of the purchaser’s country of residence.
- d.) [www.benedini.de](http://www.benedini.de) has no control over the final assembly, no liability shall be assumed nor accepted for any damage resulting from any use by user of the final assembled product, the user accepts all resulting liability.

**Technical changes reserved**

**Not suitable for children under 14 years**



TBS Mini

Benedini Modellbauelektronik  
Müllergasse 15, 52159 Roetgen (Germany)  
Web: [www.benedini.de](http://www.benedini.de)  
Mail: [Thomas@Benedini.de](mailto:Thomas@Benedini.de)

[www.benedini.de](http://www.benedini.de)



**Standard wiring of TBS Mini in "Autostart" control mode, together with 2x40W amplifier**

