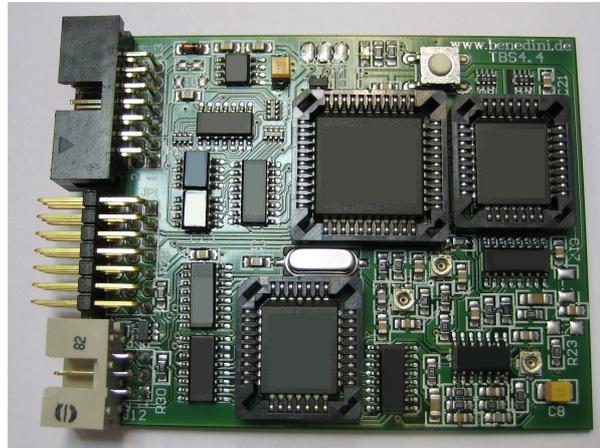


Digital Soundmodule, Type TBS 5 II



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1. Introduction

The Sound Module TBS5 is designed around a micro-controller and is ideal for use on almost all types of RC ground running models. There are many different sounds available that depict the exact sound of the original engines of tanks, trucks and cars.

The engine sound is fully proportional and regulated by the speed of the motor(s) through speed controllers. The sound can also be enhanced to include the sounds of the engine starting and closing down.

Further individual sounds for example the vehicle horn operating, cannon and machine gun sounds, simulated speech and vehicle doors closing can all be played independently and also simultaneously whilst the engine sound is operating proportionally.

The sound can be adjusted to your personal taste by a integrated tone control stage (trebel and bass).

An optional **exhaust smoke module** is available for the production of exhaust smoke also synchronizing to the vehicle speed and engine sound.

The module is highly appropriate for tracked models as it is designed to scan the signals for up to two separate speed controllers to gain individual speed information. The module is galvanic isolated from the receiver and can be controlled by three different methods as required by the customer.

Two further digital outputs are available to trigger additional functions. As an example these could be used for muzzle flashes with a suitable lighting system to synchronize with the machine gun sound.

Note:

It is NOT possible to combine these digital outputs together with the digital control mode!

To maintain flexibility and to give the individual purchaser freedom of choice in output performance and volume, the Sound Module has no integrated amplifier. The Module is extremely flexible and will permit the connection of very small SMD to very large amplifiers.

The Modules performance is only limited by the space in your model. Car Hi-fi components can also be used as well as most common PC speakers.

A list of all available sounds can be found at www.benedini.de.

Set controlmode at delivery

O Encoder

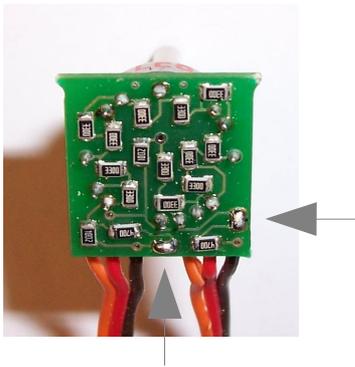
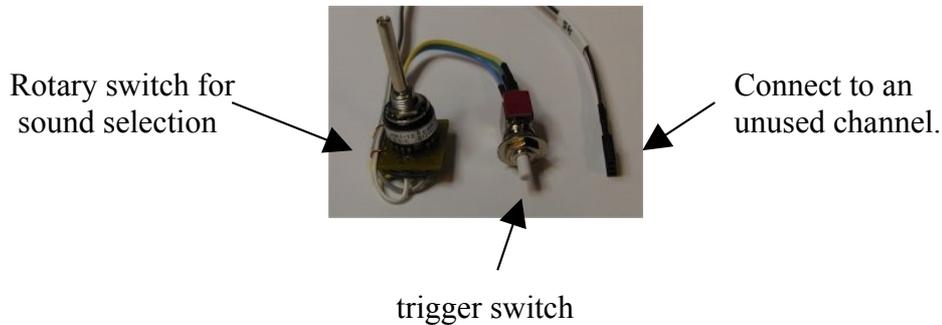
O Digital control

O „Toggle switch“

2. Possible control Modes:

2.1. Encoder

This is a 12 position rotary switch in combination with a push button. The desired sound is selected by the rotary switch and triggered with the pushbutton. The encoder must be fitted into the transmitter and connected to an unallocated proportional channel by the customer.



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

2.2. Digital inputs

A simple voltage signal (4.8-12V) applied to one of six inputs triggers a sound. Each input is galvanic isolated. Such a signal can be derived from a electronic switch unit, a simple servo and micro switch combination or a design of the customer's own choice and design.

This control method requires **additional** hardware (digital control unit) to be connected to the sound module.



Input signal: **4,8-12V**
 Upper pins: **Plus**
 Lower pins: **Minus**

Plus lead of the control signals must be connected to the UPPER pin of the input connector !

2.3. Toggle switch

The sound module can be controlled with a simple 3position switch with momentary contacts to both sides (toggle switch) connected to an auxiliary proportional channel or to a normal 'joy stick' operated channel.

The desired sound is **selected** by pushing the joy stick/ toggle switch x-times in one direction and is **triggered** by pushing the joy stick/switch in the opposite direction. The last sound selected continues to operate and can be triggered multiple times until a new sound is selected.

This control method needs no changes in your transmitter and no additional hardware.

All soundunits are shipped with this control mode if not changed at your order.

One of these control methods can be selected, by setting the appropriate parameter -> see the section titled **Parameter Setting**.

The LED indicates the actual operating mode during power up. The LED will indicate by flashing. Flashing **once** for the encoder mode, **two** flashes for the digital input mode and **three** flashes for the toggle switch control.

2.4. Teaching sequence

The sounds are taught in the following sequence:

1. Engine Start
2. Short engine reeve up
3. Engine full speed (permanent reeve up)
4. Special sounds

The number and type of special sounds is different on each soundunit. It depends on the already allocated memory by the engine sound sections, which has higher priority than special sounds. The special sounds depend in the type of model (tank, truck, ...)

3. The Sound Module

Input Connector (top to bottom):

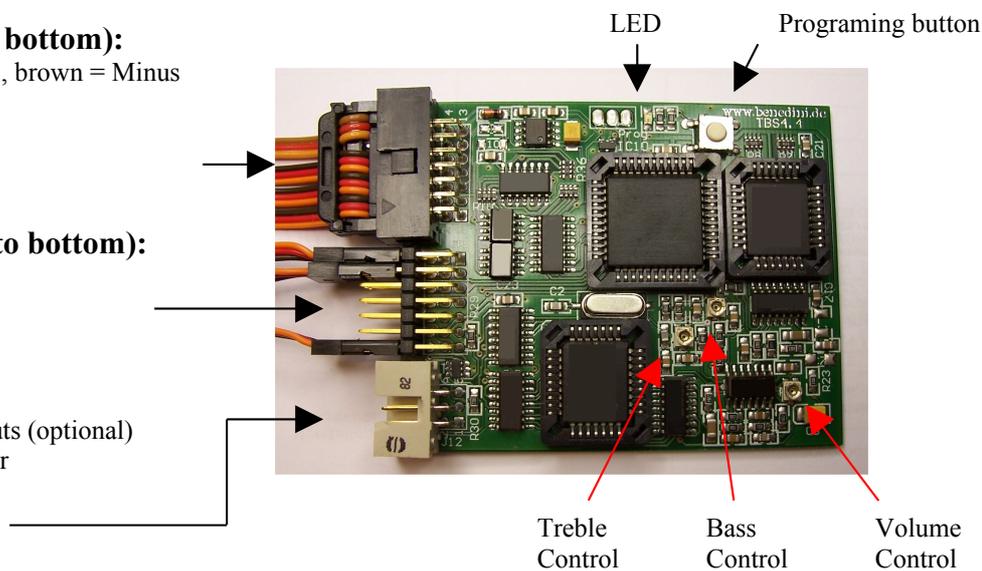
1. Power: 7.2-12V, red = PLUS, brown = Minus
(orange is not used)
2. Receiver Speed 2 (optional)
3. Receiver Speed 1 (must)
4. Receiver Control (optional)

Output Connector (top to bottom):

1. Speed controller 1
2. Speed controller 2
3. Prop3 In (optional)
4. Prop3 Out (optional)
5. Smoker (optional)
6. Universal onboard outputs (optional)
7. Soundsignal to Amplifier

Universal Connector

Used for digital control unit



Note:

If the soundunit is supplied for **TWO** ESCs, but you want to run it with only **ONE** ESC, you need to connect it as following:

- | | |
|---|---|
| Soundunit Input "Receiver Speed 1" | -> Receiver speedchannel |
| Soundunit Input "Receiver Speed 2" | -> Soundunit Output "Speed controller 1" |
| Speedcontroller | -> Soundunit Output "Speed controller 2" |

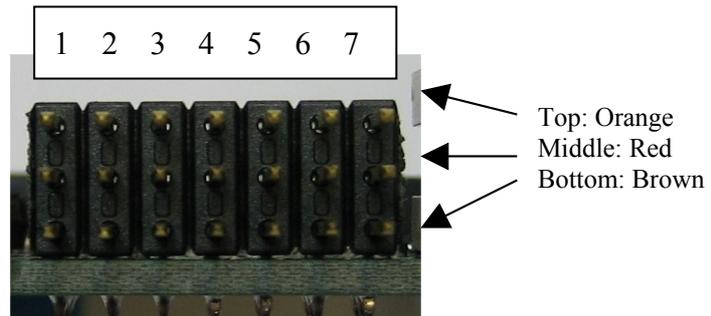
In this case the **single** speedsignal coming from the receiver is "looped" through both speed channels of the soundunit.

N.B. All plugs connected at the output connector must be orientated with the signal lead (orange) at the upper side of the sound unit!

The max. supply voltage of the receiver must not exceed 5V.

A 4.8V battery or a BEC system is recommended.

DON'T use a 6V battery !

Details Output Connector**1. Output to speed controller 1****Top** Signal (orange), Middle Plus, Bottom Minus**2. Output to speed controller 2****Top** Signal (orange), Middle Plus, Bottom Minus**3. Input 3. Prop. channel (optional)****Top** Signal (orange), Middle Plus, Bottom Minus**4. Output 3. Prop. channel (optional)****Top** Signal (orange), Middle Plus, Bottom Minus**5. Output to smoke controller (optional)****Top** +5V Soundunit (orange), Middle Signal A, Bottom Signal B**6. Universal onboard outputs****Top** Output1, **Middle** +5V Soundunit, **Bottom** Output2

Both outputs are switching to ground and have integrated 270Ohm resistors. Common LEDs can be connected directly.

7. NF-Output to amplifier**Top** Soundsignal (orange), Middle +Power(**12V**), Bottom Ground**Note:****All plugs must be connected in right orientation.****Orange = Signal is always on TOP !**

Connection diagram (Encoder or toggle switch controlled version)

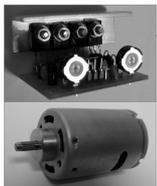
Battery 7,2 – 12V



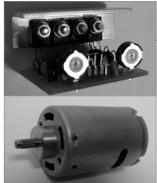
Receiver



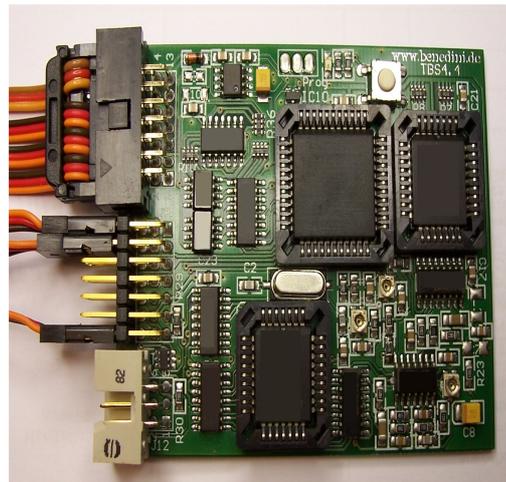
Power
Speed Ch2
Speed Ch1
Encoder



Speed
Controller 1



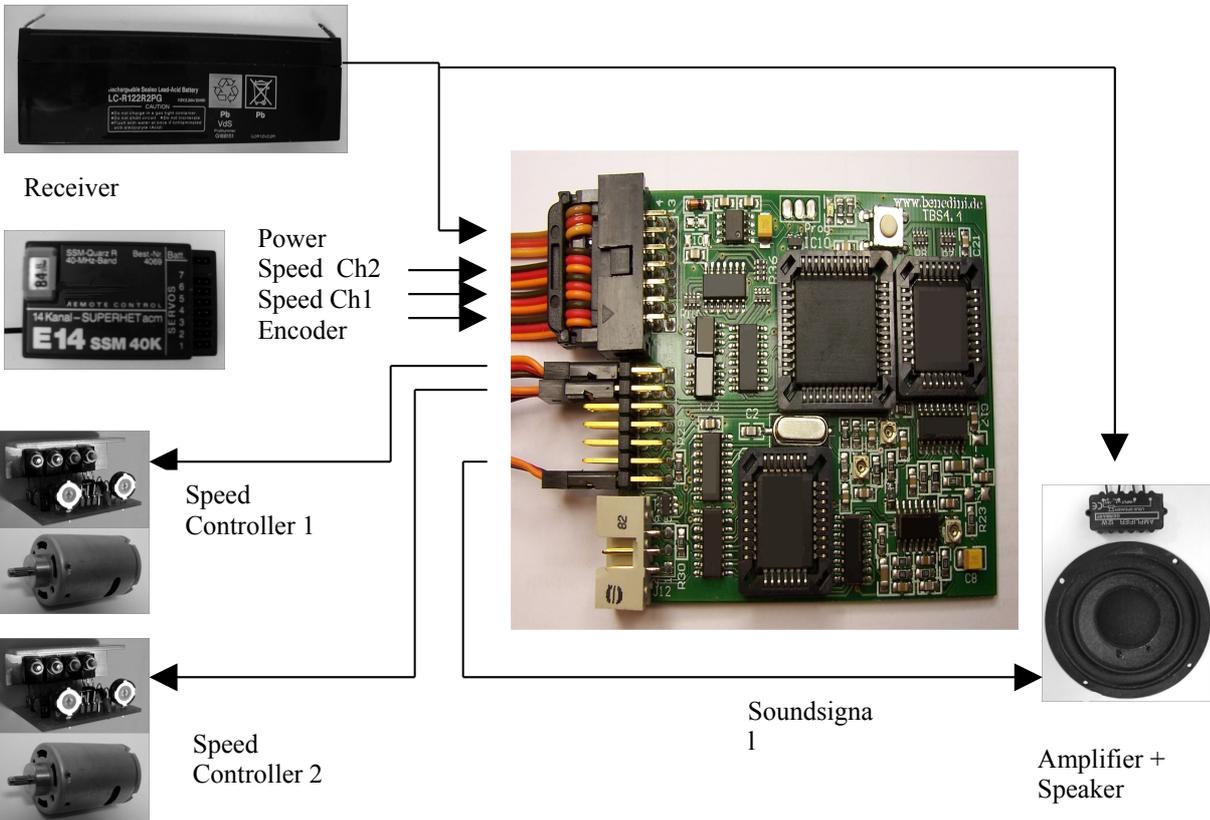
Speed
Controller 2



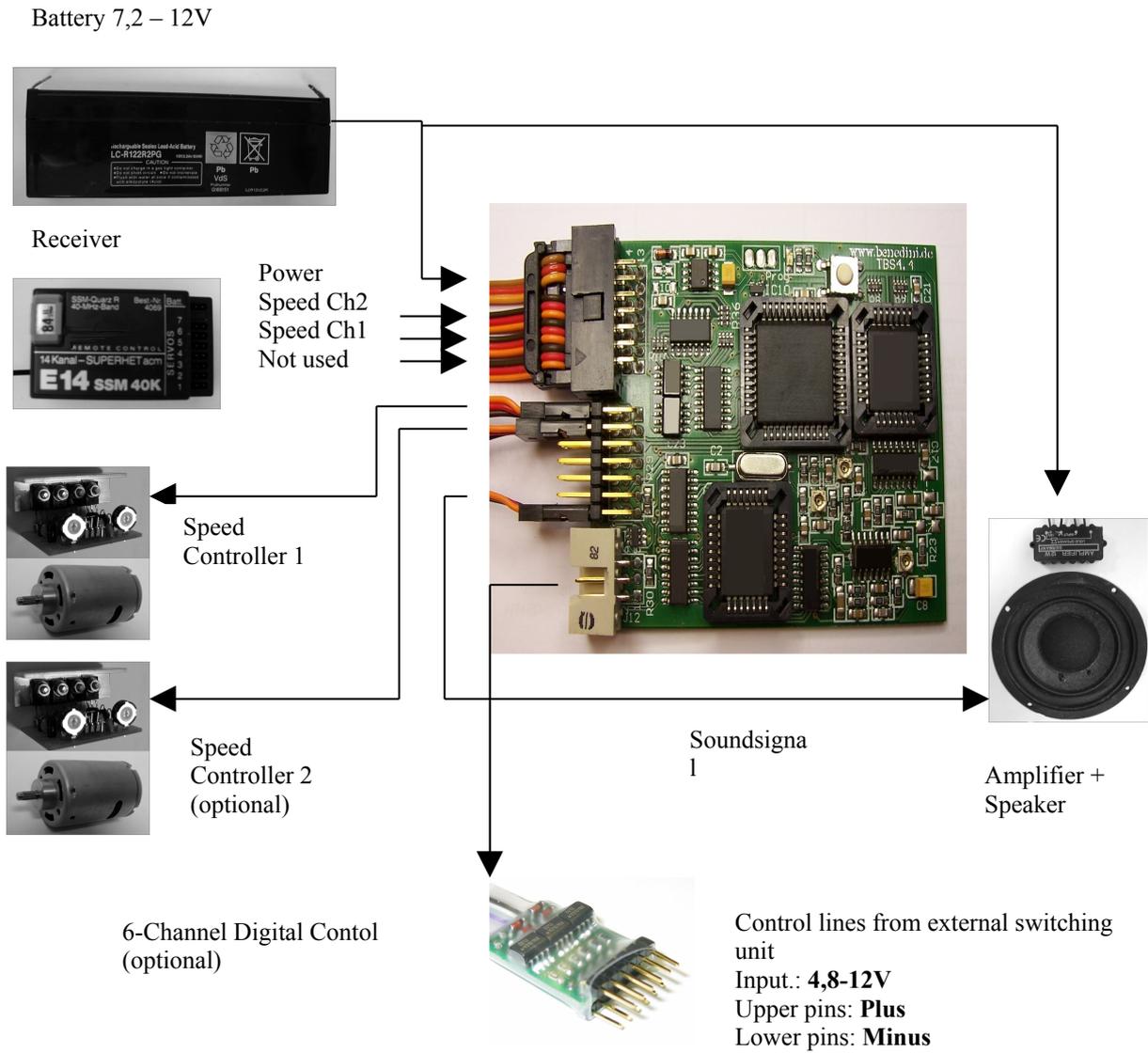
Soundsigna
1



Amplifier +
Speaker



Connection diagram (Digital controlled version)



Installing the TBS5 soundmodule with **digital control**

1. Locate the module in your model and connect between the receiver and speed controller(s). Power it with 7.2 to 12V.
2. Connect the control lines with a "control unit". This can be a multi switch or a simple servo and micro switch/es combination. The voltage supplied to the input pins can be between 4.8V to a maximum of 12V. The upper pin row is **PLUS (+)** and the lower pin row is **MINUS (-)**.
3. Connect Power Amplifier with its speaker(s) to the module and to its power supply. Smaller amplifiers are powered from the sound unit. If you use large car Hi-fi amplifiers, they must be powered directly from the **same battery as the sound unit!**
4. Switch on transmitter and model. The Sound Module LED will flash twice. Set all joysticks of your transmitter to neutral positions, so that the model does not move!
5. Push the programming button located and indicated on the module
6. Wait until the programming LED on the module flashes 3 times.
7. During the programming procedure the whole list of special sounds that is supplied with each module will be passed through. Each sound can be mapped to a free control line. Applying current for a short time to the control lines does this. After this the sound will be played. Wait until the sound is finished to store the next one!
If you wish to skip a sound, just trigger again an **already allocated** line. The next sound will be played but not stored. Repeat this procedure until the programming LED starts to **constantly flash**. This indicates the end of the sound list. If you run out control lines, you will have to finish the programming procedure with an already occupied line.
8. Switch receiver off and on.

Installing the TBS4 soundmodule with **encoder control**

1. Build the encoder in your transmitter like an additional proportional channel. Sometimes the plug of the encoder must be adapted to your transmitter.
2. Test the encoder by connecting a usual servo at the according receiver channel. Each time you press the trigger button of the encoder at your transmitter, the servo has to move. The position of the servo is defined by the position of the rotary switch. Each rotary switch position must cause the servo to move to different location. **Keep the push button pressed, turn the encoder through all positions and check the servo movement.** If the servo moves only to a few positions, plug the delivered Encoder Adapter between transmitter and encoder or change the programming of this channel at a computer transmitter.
Test also the remaining functions of your RC system.
3. Locate the sound module in your model and connect it:
 - a) Between receiver and speed controller(s).
 - b) To the receiver channel, on which you connected the encoder in the transmitter.
 - c) Power it with 7.2 to 12V.
4. Connect Power Amplifier with its speakers to the module and to its power supply. Smaller amplifiers are powered from the sound unit. If you use large car Hi Fi amplifiers, they must be powered directly from the **same battery as the sound unit!**
5. Switch on transmitter and model. The Sound Module will flash once. Set all joysticks to neutral positions, so that the model does not move!
6. Push the programming button. The LED on the module flashes 3 times.
7. During the programming procedure the whole list of special sounds that is shipped with each module will be passed through. Each sound can be mapped to an unallocated rotary switch position.

Pressing the pushbutton on the transmitter does this. After pressing the button the sound will be played. Wait until the sound is finished to store the next one!

If you want to miss out a sound, just trigger again an already allocated rotary switch position. The next sound will be played but not stored. Repeat this procedure until the programming LED starts permanently flashing. This indicates the end of the sound list. In case you run out rotary switch positions, you have to finish the programming procedure with an already occupied position.

8. Switch receiver off and on.

Installing the TBS5 soundmodule with **toggle switch control**

1. Locate the sound module in your model and connect it:

- a). Between receiver and speed controller(s).
- b). To the receiver channel, through which you want to control the sound unit.
- c). Power supply (7.2 to 12V)

2. Connect Power Amplifier with its speakers to the module and to its power supply. Smaller amplifiers are powered from the sound unit. If you use large car Hi-fi amplifiers, they must be powered directly from the **same battery as the sound unit!**

3. Switch on transmitter and model. The Sound Module will flash three times. Set all joysticks to neutral positions, so that the model does not move!

4. Push the programming button. The LED on the module flashes 3 times.

After this all available sounds will be played once automatically, according the list of sounds delivered with each unit. Storage is done automatically.

5. LED starts permanently flashing. This indicates the end of the sound list.

6. Switch receiver off and on.

Readjustment of the Sound Module

Should you discover that after operation that model speed and engine sound are no longer synchronized, readjust as follows:

1. Switch on transmitter and the receiver.
2. Ensure the control sticks are in the neutral position.
3. Push the programming button on the sound module.
- 4) Wait until the programming LED flashes 3 times.
- 5) If the toggle switch control mode is selected, wait until all sounds are played and the LED flashes continuously.
- 6) Switch the transmitter and the receiver off, the receiver first and then switch the transmitter followed by the receiver on again.

The new joystick positions will have been stored and the special sound programming will not have been changed.

Parameter settings:

The following parameters are available:

Number	Name	Values
1.	Control Mode	1: Encoder control 2: Digital control 3: Toggle switch control Hint: After power up, the LED indicates the actual control mode.
2.	Switching Outputs	1: No outputs 2: Onboard Outputs 3: External decoder, 0 universal outputs 4: External decoder, 1 universal outputs 5: External decoder, 2 universal outputs 6: External decoder, 3 universal outputs 7: External decoder, 4 universal outputs 8: Directoutput, 1xUniversal momentary contact 9: Directoutput, 1 x Univ. switching, 1 x Univ. momentary 10: Directoutput, 2x Univ. switching 11: Directoutput, 1 x Univ. switching, 2 x Univ. momentary 12: Directoutput, 2 x Univ. switching, 1 x Univ. momentary 13: Directoutput, 3 x Universal switching 14: Directoutput, 2 x Univ. switching-, 2 x Univ. momentary 15: Directoutput, 4 x Universal switching
3.	Smoker Type	1: OIL smoker 2: WATER smoker (default)

Comments to possible switching outputs (parameter #2):

Universal outputs can be switched without any sound and are thought for universal usage. The number of available universal outputs, is defined by the corresponding value of parameter #2.

Universal outputs are programmed first to the desired encoder position(s), before the special sounds are programmed.

The remaining outputs (no universal outputs) are triggered by special sounds in ascending order.

Soundsynchron actions (f.e. muzzle flash) can be realized by such outputs.

Onboard:

Two outputs are directly available at the output connector (Socket #6). They are handled by the first two special sounds. LEDs can be connected directly. They can be used for muzzle flash simulation.

External Decoder:

This decoder is optional available and offers *eight* outputs. It is connected at the universal connector of the TBS5. Only “momentary contact” mode is possible!

Performance: max. 12V/1.5Amp per channel, negative switching

Directoutput:

Four outputs are routed directly to the universal connector (Signal A-D, 5V logic, active low). Momentary and switching mode is possible.

Note: This are only low power signals. External power stage is absolutely necessary (optional available)

Changing a parameter value:

1. **Hold** the programming button **DURING power up** -> LED flashes twice.
2. Enter the desired parameter **NUMBER** by pressing the programming button at the sound unit 'X' times.
3. Wait until the LED flashes 'X' times -> confirmation of the selected parameter **NUMBER**
4. Enter the desired parameter **VALUE** by pressing the programming button at the sound unit 'Y' times.
5. Wait until the LED flashes "Y" times -> confirmation of the selected parameter **VALUE**
6. LED starts a slow continuous double flashing -> Parameter successfully entered
7. Restart the sound unit

If a not valid parameter **number**, parameter **value** or **nothing** is entered the LED starts **fast** continuous flashing -> error indication -> try again.

Examples for parameter changes:**1. Setting the control mode to toggle switch**

1. Hold programming button down during power up -> Led flashes twice.
2. Release button
3. Push programming button once (select parameter #1)
4. Wait until LED flashes once (confirmation of selected parameter #1)
5. Push programming button 3x (set parameter value to 3)
6. Wait until LED flashes 3x. (Confirmation of entered parameter value)
7. LED starts slow continuous double flashing indicating the parameter has been set successfully.
8. Restart the sound unit -> LED will flash three times after power up

If you would try to enter another value than 1,2,or3, the LED starts fast continuous flashing (indicating an error) and the original value will be kept.

2. Activating the onboard outputs

1. Hold programming button down during power up -> Led flashes twice.
2. Release button
3. Push programming button 2x (select parameter #2)
4. Wait until LED flashes 2x (confirmation of selected parameter #2)
5. Push programming button 2x (set parameter value to 2)
6. Wait until LED flashes 2x. (Confirmation of entered parameter value)
7. LED starts slow continuous double flashing indicating the parameter has been set successfully.
8. Restart the sound unit

RF Interference

Although each Sound Module is thoroughly tested prior to dispatch, it is possible that interference from an individual combination of electric motors, the RC and some types of speed controller can induce interference. Should this occur the simplest solution other than changing the above possible sources is to provide a dedicated and separate power supply (battery) for the sound unit and amplifier.

Technical data:

Soundmodule TBS5

Voltage: 7.2 – 24V DC

Current: app. 50mA (without power amplifier)

Max. supply voltage of the receiver: 5V

Scanning ability: Up to two speed controller signals and encoder channel

Electrically isolated from the RC receiver by optocouplers

Amplification: External power amplifier

Dimensions: 80 x 65 x 10mm (3.14 x 2.6 x 0.4 inch)

Housing: Heat shrunk plastic tube

Encoder

N.B. An unallocated proportional channel is necessary to operate the Encoder. The fitting of the encoder into the transmitter is the responsibility of the purchaser. A maximum of 12 special sounds are possible selectable with a rotary switch and operated by a pushbutton.

Dimensions: Ø17 x 15mm (0.7 x 0.6 inch)

Digital control (replaces encoder)

Control of up to 6 special sounds

Input voltage 4.8 to 12V (electrically isolated to the sound unit)

Digital Outputs

Switched polarity: Supply GND

Resistors: 270R resistors to internal +5V supply for each output are integrated

Different Amplifiers available

2 x 40W: 30 x 50 x 25mm (1.2 x 2.0 x 1.0 inch)

Housing: Shrunken plastic tube

Other amplifiers.

Various wattage amplifiers are also available to suit individual requirements on request.

Disclaimer

1. 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.
2. 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.
3. 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.
4. 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.