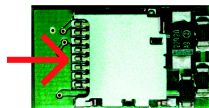
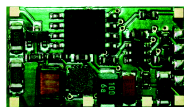


Manual

# EasySound mini

Item no. 43-09200



Sound module  
with SUSI interface



tams elektronik



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Subject to technical modification.

# 1. Getting started

## How to use this manual

This manual gives step-by-step instructions for safe and correct connecting of the module, and operation. Before you start, we advise you to read the whole manual, particularly the chapter on safety instructions and the checklist for trouble shooting. You will then know where to take care and how to prevent mistakes which take a lot of effort to correct.

Keep this manual safely so that you can solve problems in the future. If you pass the module on to another person, please pass on the manual with it.

## Intended use

The EasySound mini is designed to be operated according to the instructions in this manual with digital model railways. Any other use is inappropriate and invalidates any guarantees.

The EasySound mini should not be mounted by children under the age of 14.

Reading, understanding and following the instructions in this manual are mandatory for the user.

## Checking the package contents

Please make sure that your package contains:

- one sound module,
- one microSD card with adapter,
- an electrolytic capacitor (100  $\mu$ F / 25 V),
- a CD (containing the manual and further information).

Note: a loudspeaker is not included in the package.

## Required materials

In order to play the sounds you need:

- a loudspeaker with an impedance of a minimum 32 Ohm and a rated load-carrying capacity of 0,1 Watt;

If you want to release or interrupt the playback automatically you need:

- reed contacts with one normally-open contact (e.g. item no. 84-53110-10) and / or
- Hall-sensors (e.g. item no. 84-53210-01) and
- permanent magnets (e.g. Neodym magnets Ø 3mm, thickness = 2 mm, item no. 84-53990-10).

## 2. Safety instructions

### Mechanical hazards

Cut wires can have sharp ends and can cause serious injuries. Watch out for sharp edges when you pick up the PCB.

Visibly damaged parts can cause unpredictable danger. Do not use damaged parts: recycle and replace them with new ones.

### Electrical hazards

- Touching powered, live components,
- touching conducting components which are live due to malfunction,
- short circuits and connecting the circuit to another voltage than specified,
- impermissibly high humidity and condensation build up

can cause serious injury due to electrical shock. Take the following precautions to prevent this danger:

- Never perform wiring on a powered module.
- Assembling and mounting the kit should only be done in closed, clean, dry rooms. Beware of humidity.

- Only use low power for this module as described in this manual and only use certified transformers.
- Connect transformers and soldering irons only in approved mains sockets installed by an authorised electrician.
- Observe cable diameter requirements.
- After condensation build up, allow a minimum of 2 hours for dispersion.
- Use only original spare parts if you have to repair the kit or the ready-built module.

### **Fire risk**

Touching flammable material with a hot soldering iron can cause fire, which can result in injury or death through burns or suffocation. Connect your soldering iron or soldering station only when actually needed. Always keep the soldering iron away from inflammable materials. Use a suitable soldering iron stand. Never leave a hot soldering iron or station unattended.

### **Thermal danger**

A hot soldering iron or liquid solder accidentally touching your skin can cause skin burns. As a precaution:

- use a heat-resistant mat during soldering,
- always put the hot soldering iron in the soldering iron stand,
- point the soldering iron tip carefully when soldering, and
- remove liquid solder with a thick wet rag or wet sponge from the soldering tip.

### **Dangerous environments**

A working area that is too small or cramped is unsuitable and can cause accidents, fires and injury. Prevent this by working in a clean, dry room with enough freedom of movement.

## Other dangers

Children can cause any of the accidents mentioned above because they are inattentive and not responsible enough. Children under the age of 14 should not be allowed to work with this kit or the ready-built module.

**Caution:**

Little children can swallow small components with sharp edges, with fatal results! Do not allow components to reach small children.

In schools, training centres, clubs and workshops, assembly must be supervised by qualified personnel.

In industrial institutions, health and safety regulations applying to electronic work must be adhered to.

### 3. Safe and correct soldering

**Caution:**

Incorrect soldering can cause dangers through fires and heat. Avoid these dangers by reading and following the directions given in the chapter **Safety instructions**.

- Use a small soldering iron with max. 30 Watt or a regulated soldering iron.
- Only use electronic tin solder with flux.
- When soldering electronic circuits never use soldering-water or soldering grease. They contain acids that can corrode components and copper tracks.
- Insert the component connecting pins of into the PCB's holes as far as possible without force. The components should be close to the PCB's surface.
- Observe correct polarity orientation of the parts before soldering.
- Solder quickly: holding the iron on the joints longer than necessary can destroy components and can damage copper tracks or soldering eyes.
- Apply the soldering tip to the soldering spot in such a way that the part and the soldering eye are heated at the same time. Simultaneously add solder (not too much). As soon as the solder becomes liquid take it away. Hold the soldering tip at the spot for a few seconds so that the solder flows into the joint, then remove the soldering iron.
- Do not move the component for about 5 seconds after soldering.
- To make a good soldering joint you must use a clean and unoxidised soldering tip. Clean the soldering tip with a damp piece of cloth, a damp sponge or a piece of silicon cloth.

- Cut the wires after soldering directly above the soldering joint with a side cutter.
- After placing the parts, please double check for correct polarity. Check the PCB tracks for solder bridges and short circuits created by accident. This would cause faulty operation or, in the worst case, damage. You can remove excess solder by putting a clean soldering tip on the spot. The solder will become liquid again and flow from the soldering spot to the soldering tip.



## 4. Operation overview

The sound module EasySound mini has to be connected via a SUSI interface to a digital vehicle decoder (locomotive or function decoder) and is controlled by the vehicle decoder. The digital format used to control the vehicle decoder has no effect on the EasySound mini's mode of operation. The module can play 13 different sound files separately.

### **Data storage**

In order to save the sounds to be reproduced by the EasySound maxi an integrated micro SD-card is used, which has to be put into a card holder on the rear side. Cards with any memory space can be applied.

Sound recordings available as audio-file in waveform audio file format (file extension "wav"), have to be copied from a PC to the SD-card (e.g. from a sound CD, an internet sound archive or a self-made recording). By means of sound processing programs the audio-files can be adapted to special requirements or individual soundscapes can be made.

### **Releasing the sound files**

You can release up to 12 different sounds by activating the function buttons F1 to F12. The files are assigned to the function buttons by indicating their numbers in the file's names.

An additional (13<sup>th</sup>) sound is released as soon as the switching input #1 on the module is connected to ground. In order to establish the ground you can

- connect the switching input #1 to a function output of the decoder. As soon as the function is switched on, the file is played.
- release an external contact. This version allows the release of the playback automatically. For this purpose you can use reed contacts or Hall sensors in combination with permanent magnets in the track for example.



## Replay modes

You define for each sound file

- how often it shall be played,
- how to stop the playback and
- which effects switching on and off the assigned function key has, by adding abbreviations in the file name accordingly.

Replay mode	Digital switching commands to...	
	...release	...break / stop
once	function key on <b>or</b> off	none
endless	function key on	selecting a sound file with a higher number → break  (Sequence: break sound A – sound B – continuation sound A)  function key off → stop  (Sequence: stop sound A – sound B)
with 1 to 9 repetitions	function key on Note: Before releasing the sound file anew, the function has to be switched off first.	none

## Breaking the playback

It is possible to stop the playback of a sound file with the replay mode "endless" by switching the assigned function to "off". With the other replay modes it is not possible to stop the playback by using a digital switching command.

In order to stop the playback of the active sound file with any replay mode, the switching input #2 has to be connected to ground. In order to establish the ground you can

- connect the switching input #2 to a function output of the decoder. As soon as the function is switched **on**, the active sound file will be stopped. The function has to be switched **off** before playing a sound file anew.
- release an external contact. This version allows to stop the playback automatically. For this purpose you can use reed contacts or Hall sensors in combination with permanent magnets in the track for example.

## 5. Technical specifications

Power supply	via a digital locomotive or function decoder (data format optional)
Digital formats	all
Supply voltage	max. 24 V
Interface	SUSI
Max. number of sound files	
- releasing via function keys	12
- releasing via switching input #1	1
Number of loudspeaker outputs	1
Replay	mono
Impedance of the loudspeaker	$\geq 32 \text{ Ohm}$
Rated load-carrying capacity	$\geq 0,1 \text{ Watt}$
Number of switching inputs	2
Current consumption max.	100 mA
Protected to	IP 00
Ambient temperature in use	0 ... +60 °C
Ambient temperature in storage	-10 ... +80 °C
Comparative humidity allowed	max. 85 %
Dimensions of the PCB (approx.)	21,5 x 13,5 x 5,5 mm
Weight of the circuit including SUSI connecting socket, without microSD card (approx.)	2,2 g

## 6. Connections

**⚠ Caution:** The sound module should not have any contact to metal parts of the vehicle. Risk of short circuit! The module will be damaged when put into operation.

Connection	Colour of cable	Connection to		Connection mandatory
X1 Switching input #1	green	Output of a vehicle decoder, reed contact, output of a Hall sensor, or similar.		no
X2 Switching input #2	violet	X1 → releasing the 13 <sup>th</sup> sound file X2 → immediate stop of the active sound file		no
X3	black	SUSI- interface	ground (GND)	yes
X4	grey		data (DATA)	yes
X5	blue		clock (CLK)	yes
X6	red		power supply (PLUS)	yes
X7, X8	brown	loudspeaker		yes
X9	---	buffer capacitor	minus-pole (-)	no
X10	---		plus-pole (+)	no

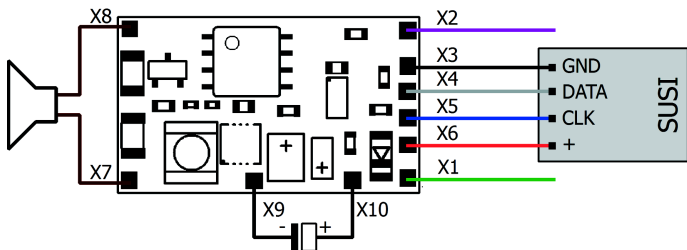


Fig. 1: Connection of the vehicle decoder, the loudspeaker and a buffer capacitor

### Connection to the SUSI interface of the vehicle decoder

The SUSI interface is a standardized interface for the connection of accessory modules to a vehicle decoder. Controlling the SUSI module has to be carried out by the vehicle decoder.

Insert the socket soldered to the EasySound module to the SUSI plug connector. Socket and plug connector are designed that way they only fit in one direction onto another – without using force. Alternatively you can solder the connection wires directly when the vehicle decoder has a SUSI interface but no plug connector. For that purpose follow the manual of the decoder producer.

### Connecting a loudspeaker

As a rule the replay quality increases with the dimensions of the loudspeaker. For that reason you should select a loudspeaker as large as possible.

Moreover the method of mounting determines for the replay quality. One side of the loudspeaker diaphragm should be able to emit directly to the outside, the other side to the inside of the vehicle, which should be closed airtight as far as possible. The larger the volume inside the vehicle is, the better is the sound.

Suitable places to mount the loudspeaker are e.g. the vehicle's bottom or the cab's back board.

### **Connecting a buffer capacitor**

When the voltage supply provided by the vehicle decoder is too low, buzzing of the loudspeaker may occur. In this case you should connect a buffer capacitor. You should use a capacitor with a minimum proof voltage of 25 V and a minimum value of 100  $\mu\text{F}$ .

In order to achieve an optimum performance the value has to be chosen as high as possible. As the value and the outer dimensions are directly associated with each other, as a rule the maximum value results from the place provided.



Check the buffer capacitor's polarity. When mounting the capacitor incorrectly polarized, it will explode when put into operation. Subsequent damages to the carriage are possible.

### **Connecting the switching inputs**

The switching input #1 (releasing the 13<sup>th</sup> sound) and #2 (stopping immediately the playback of the active sound file) switch to ground and thus can be connected to all (external) circuits providing a ground connection. Possibilities:

- **Connection to a function output of the vehicle decoder:** The return circuit is effected by the decoder.



### ▪ Connecting a reed contact:

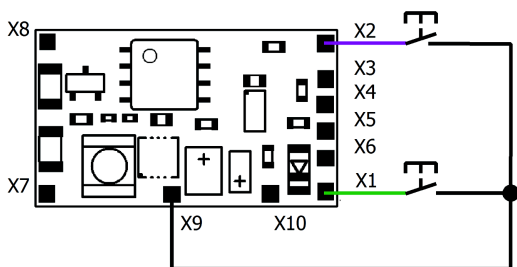


Fig. 2: Connection of reed contacts to the switching inputs

Connection 1 of the reed contact	X1   X2
Connection 2 of the reed contact	X9

### ▪ Connecting a Hall sensor:

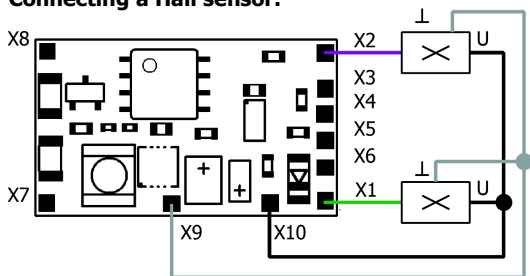


Fig. 3: Connection of Hall sensors to the switching inputs

Output of the Hall-Sensor	X1   X2	When connecting the Hall sensor check the polarity. When interchanging the ground connector and the connector for the voltage supply, the Hall sensor may be damaged.
Ground connector of the Hall-Sensors	X9	
Voltage supply of the Hall sensor	X10	

**Fixing the module**

Upon completion of all connections you should fix the module, in order to avoid short circuits by contact to metal parts of the vehicle, for example. Here you can use double-sided adhesive tape.

## 7. Saving and releasing the sound files

You save the sound files (with any length) as audio file in waveform audio file format (file extension ".wav") on a microSD-card. You can release 12 different sound files singularly via the function keys F1 to F12. An additional (13<sup>th</sup>) sound file will be played when the switching input #1 is connected to ground.

It is not possible to set the sound level once installed. You can only alter the sound level by editing the sound file accordingly.

### File names

With the file names you determine

- which function key releases a sound file,
- how often the sound is repeated.

You can add any further letters in order to comment the contents of the sound file.

Examples for file names	Release with	Replay mode
01_whistle.wav	F1	once
03E_motor.wav	F3	endless
10R5_bell.wav	F10	5 times repetition

File number	<p>The file number must consist of two digits: 01, 02, 03, ... 13.</p> <p>Files with numbers between 01 and 12 will be released via the corresponding function keys, file number 13 as soon as the integrated switching input #1 has been connected to ground.</p>
No letter	<p>The file will be played once always after activating the function key (both "on" and "off").</p> <p>Note: The playback can be stopped only by connecting the integrated switching input #2 to earth.</p>
Letter "E"	<p>The sound file is repeated endlessly after switching on the function.</p> <p>The playback is stopped after switching off the function.</p> <p>The playback is interrupted after releasing a sound file with a higher number and will be continued when playing the sound file with the higher number has been finished.</p> <p>Note: You can also stop the replay by connecting the integrated switching input #2 to ground.</p>
Letter "R" and number (0...9)	<p>After switching on the function the sound file is played once and will be repeated then as often as given in the number following the file letter "R". The possible number of repetitions is 0 to 9. When no number is given, the file will be played only once.</p> <p>Before you can release the sound again (by switching on the according function) you have to switch off the function first.</p> <p>Note: The playback can be stopped only by connecting the integrated switching input #2 to earth.</p>
Further letters	To comment the sound file's content.
File format	.wav (Other file formats are not allowed.)

## 8. Check list for troubleshooting

- Parts are getting too hot and/or start to smoke.



Disconnect the system from the mains immediately!

Possible cause: the module is defective. → Send in the module for repair.

- The loudspeaker hums.

Possible cause: The supply voltage the vehicle decoder can supply is too low. → Connect a buffer capacitor (min. 100  $\mu$ F / 25 V) to the module (see section 6.)

- After switching on a function key no sound is to be heard.

Possible cause: The loudspeaker is connected incorrectly. → Check the connections.

Possible cause: The EasySound mini is not connected correctly to the SUSI interface. → Check the connections.

Possible cause: The corresponding sound file is blank or does not exist. → Check the file and the file name.

Possible cause: The switching input #2 is connected to a function output of the decoder and the corresponding function is switched **on**. → Switch off the function.

- After passing a permanent magnet no sound is to be heard.

Possible cause: The distance to the magnet is too large or the magnet is too weak. → Alter the position of the magnet (if possible) or use a stronger one.

Possible cause: The magnet has been mounted incorrectly polarized. → Alter the mounting direction.

**Hotline:** If problems with your module occur, our hotline is pleased to help you (mail address on the last page).

**Repairs:** You can send in a defective module for repair (address on the last page). In case of guarantee the repair is free of charge for you. With damages not covered by guarantee, the maximum fee for the repair is 50 % of the sales price according to our valid price list. We reserve the right to reject the repairing of a module when the repair is impossible for technical or economic reasons.

Please do not send in modules for repair charged to us. In case of warranty we will reimburse the forwarding expenses up to the flat rate we charge according to our valid price list for the delivery of the product. With repairs not covered by guarantee you have to bear the expenses for sending back and forth.

## 9. Guarantee bond

For this product we issue voluntarily a guarantee of 2 years from the date of purchase by the first customer, but in maximum 3 years after the end of series production. The first customer is the consumer first purchasing the product from us, a dealer or another natural or juristic person reselling or mounting the product on the basis of self-employment. The guarantee exists supplementary to the legal warranty of merchantability due to the consumer by the seller.

The warranty includes the free correction of faults which can be proved to be due to material failure or factory flaw. With kits we guarantee the completeness and quality of the components as well as the function of the parts according to the parameters in not mounted state. We guarantee the adherence to the technical specifications when the kit has been assembled and the ready-built circuit connected according to the manual and when start and mode of operation follow the instructions.

We retain the right to repair, make improvements, to deliver spares or to return the purchase price. Other claims are excluded. Claims for secondary damages or product liability consist only according to legal requirements.

Condition for this guarantee to be valid, is the adherence to the manual. In addition, the guarantee claim is excluded in the following cases:

- if arbitrary changes in the circuit are made,
- if repair attempts have failed with a ready-built module or device,
- if damaged by other persons,
- if damaged by faulty operation or by careless use or abuse.

## 10. EU declaration of conformity



This product conforms with the EC-directive 2004/108/EG on electromagnetic compatibility and is therefore CE certified.

It is developed and tested in accordance with the harmonised European standards EN 55014-1 and EN 61000-6-3.

To guarantee the electromagnetic tolerance in operation you must take the following precautions:

- Connect the transformer only to an approved mains socket installed by an authorised electrician.
- Make no changes to the original parts and accurately follow the instructions, connection diagrams and PCB layout included with this manual.
- Use only original spare parts for repairs.

## 11. Declarations conforming to RoHs and WEEE directives



This product conforms with the EC-directives 2002/96/EG on waste electrical and electronic equipment (WEEE) and 2002/95/EG on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS).



DE 37847206

The Tams Elektronik GmbH is registered with the WEEE-no. DE 37847206, according to. § 6 sect. 2 of the German electro regulations from the responsible authority for the disposal of used electro equipment.

Don't dispose of this product in the house refuse, bring it to the next recycling bay.