Electronic Solutions Ulm

LokSound2

Operating Manual

Mehano G2000

Version 1.0

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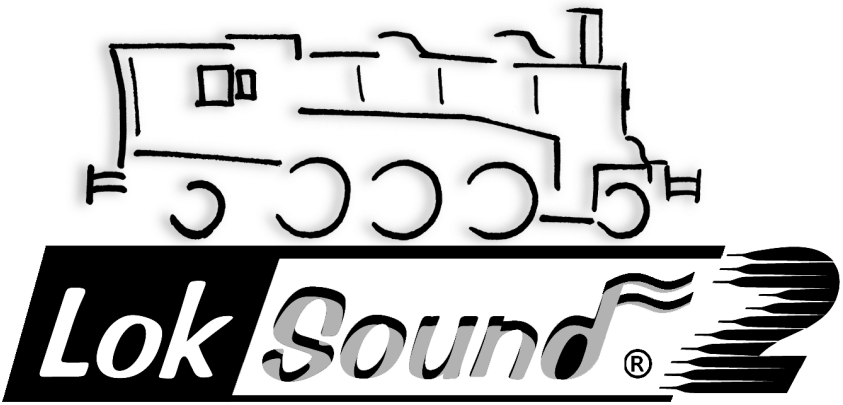

Contents

Not suitable for children under 3 years of age. Inappropriate use may result in injury due to sharp points and edges.

1. Introduction

The LokSound2-decoder by ESU Electronic Solutions UlmGmbH represents a key component of your newly acquired G2000. The LokSound2-Circuitry is responsible for all drive control functions as well as special functions of the Mehano G2000:

- Motor control forwards and reverse
- Control of all lighting functions
- Sound and special sound functions

The LokSound2-decoder supports the most commonly used control systems: Analogue operation with DC or AC, digital operation with Märklin® digital (Motorola-Format) or DCC-Systems (i.e. Lenz, etc.)

The G2000 is preset at the factory for immediate operation (the LokSound2-decoder recognizes the required operating mode automatically). Nevertheless we kindly ask you to first read these instructions before you set this locomotive onto a power track.

Chapter 2 provides an overview of the **permitted operating mode** and which functions may be activated in which mode (many functions can only be utilized in digital operation).

If you intend to **change** the **factory settings** (i.e. the address, or the sound volume), we strongly recommend to study **chapter 3** first. There you will find out about all parameters of the LokSound2-decoder and how to set them with the commonly available digital command stations. You will also find instructions of how to reprogram the factory settings.

In **Chapter 4** we provide answers to **frequently asked questions**.

Chapter 5 is written for the experts amongst our customers who want to know more about the LokSound2-decoder and its technology, which has been awarded many distinctions.

Should you still have questions please study **Chapter 6**, which tells you how to **obtain support** and assistance.

We wish you lots of fun with your new Mehano G2000.

ESU electronic solutions ulm GmbH

Important Warning:

- This LokSound2 decoder is designed for use in Mehano's G2000 only
- Do not expose to wet and humid conditions
- Don't remove the heat shrink sleeve on the decoder
- Always disconnect the circuit when installing the decoder. Please install the body shell before appling voltage.
- Make sure that not any blank wire ends may come into contact with the locomotive (a risk of short circuit).
- Make sure that no wires are squeezed or cut by the model's transmission parts when reassembling the locomotive.
- Handle the speaker with extreme care: Do not touch the membrane or apply pressure!

2. Set-up and Installation

The G2000 can be operated straight out of the box. The selection of the appropriate operating mode happens automatically. You do not have to change any parameters .

2.1.1 Permitted Operating Mode of the G2000

The G2000 may be operated on conventional (analogue) as well as on digital layouts. The number of functions available varies considerably:

Analogue Operation

Motor control forwards-stop-reverse

Directional lighting

Digital Operation

Motor control forwards-stop-reverse with load compensation·

Digital address: "03"·

14 Speed steps with Märklin® Motorola·
14 Speed steps with DCC preset, automatic recognition of 28 or 128 speed steps

Lighting: Lights on / off ·

F1: Sound on / off·

F2: Horn #1

F3: Horn #2

F4: Air pressure blowout

2.1.1 Analogue Operation

Any DC (i.e. from Fleischmann) or AC controller (i.e. from Märklin®, Titan) is suitable for analogue operation.

> Please note, that not all electronic controllers which supply pulsed DC (PWM Operation) guarantee 100% reliable operation. Since there are so many different products commercially available we can only recommend to carry out your own tests.

DC Operation

DC Operation is possible without any difficulties, however, there is one difference compared to operating DC vehicles without decoder:

The control knob has to be turned up until approximately 7-8 Volt track voltage are available. Only then the locomotive will start to move. The maximum speed is reached when the control knob is set to the limit. This behavior is absolutely normal and is due to the minimum voltage required by the LokSound2-decoder. Sound functions cannot be activated in DC mode.

AC Operation (Märklin®)

This works in the same way as you know it from other models: Speed control is achieved through turning the control knob.

Change of direction is achieved by pushing the control knob beyond the stop position towards the left.

> The G2000 must have come to a complete standstill before you may activate the change of direction command. Never try to change direction while the locomotive is still moving. Push down the control knob somewhat longer (about 0.5 sec) to assure reliable change of direction. !

Sound effects cannot be activated in AC operation.

2.1.2. Digital Operation

For prototypical operation we recommend the use of a digital command control system. Besides the fact that special functions are only available in digital mode, the LokSound2-decoder offers silent, load compensated motor control.

The LokSound2-decoder "understands" commands from the Märklin® 6021 command station based on the widely used Motorola-Protocol as well as from DCC-systems from Lenz, ZIMO and Uhlenbrock, which are based on the NMRA-DCC-Protocol. Therefore it does not matter which commercially available system you use since LokSound2-decoders auto-detect the protocol and then operate accordingly.

Nevertheless, there are considerable differences between the various commercially available digital systems. Therefore the remainder of chapter 2 is focusing purely on driving the G2000 with different systems and also to highlight typical problems and limitations.

Please read Chapter 3 if you intend to change the factory settings of the LokSound2-decoder.

Digital Operation with DCC-Systems

> Remove capacitors that may be connected to the track section (e.g. in ROCO connecting track). They may impede normal operation of the decoder.

The LokSound2 Digital Decoder can be run with any system that conforms to DCC. The automatic speed step detection has been tested with the following appliances: ROCO Lokmaus 2, Uhlenbrock Intellibox, Lenz Digital plus V2.3, ZIMO MX1.

The detection does not function when operated with Lenz Digital plus V3.0 if you wish to run 14 speed steps. Use 28/128 speed steps.

Each time that the LokSound2 Digital Decoder receives a current (i.e. after the system is switched on) and the light is switched on it tries to detect the speed steps settings. If you switchover the speed steps settings during operation you must briefly switch off the current supply to the Premium Digital Decoder so that the automatic mode functions as desired. The detection takes up to 30 seconds.

Functions F1 to F4 allow you to activate the various sound effects when using DCC-systems

Digital Operation with Märklin® Digital (6021)

The G2000 will operate reliably with the Märklin® 6021 command station.

In certain cases your 6021 has to be reconfigured to be able to activate functions F1 to F4:

The two outer DIP-switches at the back of the control

unit must be set in the "on" position. An arrow next to the display of the locomotive address indicates this operating mode. Please disconnect the plug from the mains before changing the position of the switch.

In order to be able to operate the G2000 on Märklin® brake sections you have to activate the recognition of the latter. Please refer to Chapters 3.2.3

3. Programming of Parameters for Digital Operation

Even though the LokSound2-decoder has been adapted optimally to the G2000 you may adapt many of the characteristics to suit your own preferences. All parameters are internally stored as numbers (values) in the LokSound2-decoder. According to the NMRA-DCC Standards all parameters are stored in memory cells called CV's (Configuration Variable). Whenever you change a CV the decoder will adjust its behavior accordingly.

All CV's may be changed by programming with the aid of a digital command control station. Depending on which type of command station you have the procedure varies:

If you use a **DCC** command station i.e. Lenz Digital plus, ZIMO MX1 or Uhlenbrock Intellibox, please refer to **Chapter 3.1**.

Users of the **Märklin® 6021** find relevant information in **Chapter 3.2**.

If you prefer to change the settings of the G2000 by using the **LokProgrammer** by ESU we recommend to first study **Chapter 5**. There you will find out many important details.

3.1 Programming with DCC-Systems (Lenz, ZIMO, Intellibox)

Any digital command station, which offers the programming features according to the NMRA-DCC specification, can be used to program the LokSound2-decoder. Depending on the type and features of your command station you may be able to read and write CV's (Lenz LH100, Uhlenbrock Intellibox, ZIMO MX1, Arnold digital) or you may only be able to write CV's (Lenz digital compact, Lenz LH200, ROCO LokMaus II).

3.1.1 Which Settings may be changed?

Figure 1 on page 6 shows the adjustable parameters.

CV's 29 and 49 are different to other CV's: Generally you would write a value into a CV whereas for CV29 and 49 the actual value has to be calculated. This depends on the desired settings:

First you decide which option should be switched on or off. In the column value you find two numbers for each option. If the option is switched off the value is zero otherwise the value is any number between 1-32. Add all the values for each option to get the total which has to be written into the CV.

Example 1: You want to activate the Märklin® brake section while load compensation remains active. Therefore you write (1 + 2+ 64 = 67) in CV49. Now you have to deactivate the analogue recognition CV29 since it is not advisable to activate the Märklin® brake section and analogue operation at the same time. Therefore you write 0 + 0 + 0 + 0 = 0 in CV29.

Example 2: You want to reduce the sound volume of the G2000 to achieve this you write **value 1** in **CV63**.

3.1.2 How to set parameters

We cannot provide a general instruction for programming with all DCC-systems since there are so many differences in the way they operate. You should always try to use the DCC direct mode if possible (byte-weise CV-programming with Uhlenbrock) or the DCC paged mode.

The relevant information for users of the Intellibox are found in Chapter 9 "programming" of the technical manual. You should take particular notice of Chapter 9.5 "Programming of DCC-decoders". Programming should always be done in "CV-programming byte-weise".

3.1.3 Decoder Reset using DCC

You can reinstate the factory settings at any time if you cannot get any further:

Set **CV8** to value **8** for automatic resetting

Figure 1: Programming table for DCC - List of most important CVs.

CV	Name	Description	Range	Default
1	Locomotive address	Motorola-address of locomotive	1 - 119	3
2	Start voltage	Sets the minimum speed of the locomotive	0 - 63	3
3	Acceleration	This value multiplied by 0.869 is the time from stop to maximum speed	0 - 63	04
4	Deceleration	This value multiplied by 0.869 is the time from maximum speed to stop	0 - 63	04
5	Maximum speed	Maximum speed of locomotive	0 - 63	63
6	Vmid	Medium speed of locomotive	0 - 63	25
17 18	Extended locomotive address	long address of locomotive CV 17 contains byte with higher value (Bit 6 and Bit 7 must always be active), CV18 contains byte with lower value. Only active when function in CV 29 is switched on. (see below)	128 - 9999	0
29	Configuration register	The most complex CV within the DCC standards. This register contains important information, which is only relevant in DCC operation.	-	4

Bit	function	value
0	Reverse direction of travel (forward becomes reverse)	
	normal direction	0
	reversed direction	1
1	speed steps (only for DCC operation)	
	14 speed steps	0
	28 or 128 speed steps	2
2	analogue operation	
	analogue operation switched off	0
	analogue operation permitted	4
4	selection of speed curve	
	speed curve through CV 2,5, 6	0
	speed curve through CV 67 - 96	16
5	selection of locoaddress (only for DCC operation)	
	short addresses (CV 1) in DCC operation	0
	long addresses (CV 17 + 18) in DCC operation	32

49	Extended configuration	Additional configuration options	-	65

Bit	description	value
0	load control activated	1
1	Märklin brake track activated	2
6	DCC automatic speed step detection	64

63	sound volume	0 = low, 1 = medium, 2 = loud	0,1, 2	2

Lenz digital plus

There are various software versions available of the Lenz digital plus command station. You need firmware version 2.3 or higher in order to program LokSound2 decoders. Contact Lenz for more details regarding upgrades of older versions.

Use "paged CV" mode for programming. Depending on the firmware version the "CV mode" might cause problems.

Older command stations such as "Digital plus", "Lenz compact" and "Arnold Digital" create another phenomenon:

- Programming is not possible. The Lenz command station displays "err02", the Arnold command station "short circuit":

This is caused by the overload protection of the digital system, which is very sensitive. The LokSound2 decoder with the built in audio amplifier uses a higher current than other decoders and thus activates the overload protection of the systems. To rectify this, solder a resistor with 47 ohm (0,5 Watt) in one of the two wires, connecting the digital command station with the programming track. See figure 2.

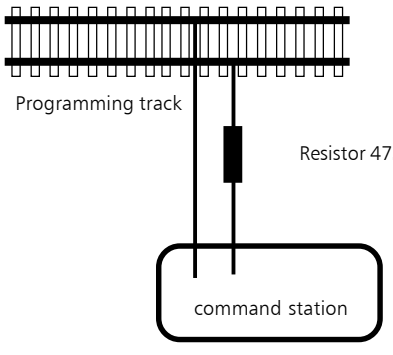

Fig. 2: Lenz command station with 47Ω resistor

3.2 Programming with Märklin® 6021

With the Märklin® command station you cannot modify standard CVs as it does not comply with the NMRA DCC standards.

However, the most important CVs of LokSound2 decoders may be changed . The CVs as described in chapter 3.0 are now called **registers**. Depending on which value you write into a register, the decoder will adjust it's properties accordingly.

3.2.1 What parameters (registers) can be adjusted?

Figure 3 on page 8 shows the permitted values.

Registers 22 and 23 have to be dealt with differently: Normally we write a numerical value into the appropriate register, while we have to calculate these values for registers 22 and 23 ourselves. The value depends on the desired setting:

First you have to decide which options should be switched on or off. You will find a value for each option in the table. 0 means the option is switched off, while "on" is indicated by a value between 1 and 32. Add up all numerical values for the respective option to get the number, which has to be written into the register.

Example 1: You want to activate the Märklin® braking track and load control should remain active. Therefore you write 1+2+64 = 67 into register 23. Please also refer to chapter 3.2.3

Example 2: You want to turn down the sound volume. To do this, you write the value **01** into **register 15**.

3.2.2 How to program using the 6021

Set decoder into programming mode before entering any changes with the 6021. Only then may the register be selected and the new value entered and confirmed. Once you have modified all parameters you want to change, exit the programming mode with register "80".

Peep sounds, varying in pitch and length, indicate which mode you are currently using. That keeps you in control:

Figure 3: Programming table for Motorola - - List of most important registers

Register	Name	description	Range	Default
01	Locomotive address	Motorola-address of locomotive	1 - 119	03
02	Start voltage	Sets the minimum speed of the locomotive	0 - 63	03
05	Acceleration	This value multiplied by 0.869 is the time from stop to maximum speed	0 - 63	04
06	Deceleration	This value multiplied by 0.869 is the time from maximum speed to stop	0 - 63	04
04	Maximum speed	Maximum speed of locomotive	0 - 63	63
03	Vmid	Medium speed of locomotive	0 - 63	25
22	Configuration register	The most complex CV within the DCC standards. This register contains important information, which is only relevant in DCC operation. Bit 0: Reverse direction of travel (forward becomes reverse) — normal direction: 0; reversed direction: 1 Bit 1: speed steps (only for DCC operation) — 14 speed steps: 0; 28 or 128 speed steps: 2 Bit 2: analogue operation — analogue operation switched off: 0; analogue operation permitted: 4 Bit 4: selection of speed curve — speed curve through CV 2,5, 6: 0; speed curve through CV 67 - 96: 16 Bit 5: selection of locoaddress (only for DCC operation) — short addresses (CV 1) in DCC operation: 0; long addresses (CV 17 + 18) in DCC operation: 32	-	4
23	Extended configuration	Additional configuration options Bit 0: load control activated — 1 Bit 1: Märklin brake track activated — 2 Bit 6: DCC automatic speed step detection — 64	-	65
15	sound volume	0 = low, 1 = medium, 2 = loud	0,1, 2	02

a) Register input mode (01 to 64 or 80)

• • • (short, low tones, long intervals)

b) value input mode (01 to 80)

—••—••—•• (combination from long / short tones, high frequency)

c) Confirmation

— (long, high tone)

Please note:

- The regulator must be set to 0.
- Take all other locomotives off the track.
- Listen to the sound signals of the locomotive.

To get into programming mode:

- Press the "stop" and "go" keys simultaneously on 6021 to activate a reset (or pull the plug of the power pack).
- To switch off the track voltage, press the "stop" key.
- Enter the current decoder address (alternative "80").
- Activate the change of direction feature (turn the control knob far left until you hear a "click"), hold the knob in position and press the "go"-key.
- The Loksound2 decoder is now in *register input mode*.
- Enter the register number you want to change. Make sure you always enter a two digit number (e.g. "01" and not "1")
- To confirm any entry turn the knob far left (change of direction feature). The decoder is now in *value input mode*.
- Now enter a new value for the register as a two digit number.

Note that you may only enter values 01 to 80 with the 6021. Value "0" is missing, enter instead "80".

- Turn the knob far left to confirm. You hear a long, high tone.
- The LokSound2 decoder changes again to r*egister input mode*. Enter further CVs you want to modify.
- Exit the programming mode by selecting register "80" or switch the track voltage off and on (press "stop"-key and then "go"-key on 6021).

3.2.3 Activating the Märklin® brake track

The automatic recognition of the Märklin® brake track is turned off at the factory, since the DC generated by the Märklin® brake track could be interpreted as DC for analogue operation.

Enter the value "67" in register 23. Now you have to de-activate analogue operation. Enter "0" in register 22 (please note: you have to enter "80" on the 6021 to get "0").

3.2.4 Decoder Reset using 6021

You can reinstate the factory settings at any time if you cannot get any further:

Set **register 79** to value **„80"** for automatic resetting

4. Frequently asked questions

„I would like to install LokSound2-decoders in other locomotives. Are suitable decoders available for particular locomotives?"

- LokSound2-decoders are designed for HO gauge model trains. Several types are available and most likely one of them will fit into your model. Please contact you local dealer to obtain information on all available decoders as well as our installation service. A list of qualified dealers/hobby shops is available on our website http://www.loksound.de.

„I already know your decoders, but the type installed in the G2000 seems to offer less options regarding the settings of parameters than the others?"

- The decoder installed in the G2000 has been specifically adapted to this locomotive and the requirements of Mehano. It is based on the LokSound2 technology and offers more options than can be described in this short manual. Please read the following chapter 5 for more information.

5. Additional Information

The LokSound2-decoder installed in your G2000 locomotive offers more options than described in this manual. However, they have already been optimally adjusted to the model and thus there is no need to adjust them.

The experts amongst you can use the information as outlined in the comprehensive "LokSound2 Installation and Operating Manual". You can download this manual free of charge from our website http://www.loksound.de under the section "instructions" ("Anleitungen").

To easy programming of the numerous options offered by the LokSound2-decoder we recommend to use the "LokProgrammer". With the aid of this interface and the software that is supplied with the LokProgrammer you can easily adjust all parameters on your PC. System requirements are Windows 95 or 98. No need for studying tables and calculating values – everything can be done by mouse click while you have all-important information readily available on the screen.

Please note: you require at least version 1.33 of the LokProgrammer software to be able to program your Mehano G2000. An update is available from our website!

6. Service - Support and Assistance

Your first contact should always be the model train or hobby shop where you have purchased your Mehano G2000. Your dealer is your competent partner for all your questions regarding model trains and also LokSound2-decoders.

You may also contact us directly. For enquiries please use either email or fax (don't forget to provide your own fax-no.) and we will reply within a few days.

We also offer a telephone hotline service. However, please call our hotline only in case of complex enquiries that can't be dealt with by email or fax. The hotline is often very busy and you may encounter delays.

Also check our website for more information. You will find many hints regarding FAQ and even feed back from other users.

Of course we are always available to provide support:

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