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HORNBY®



DIGITAL ((((SOUND))))

CLASS A4

6 7 8 9 10 11 12

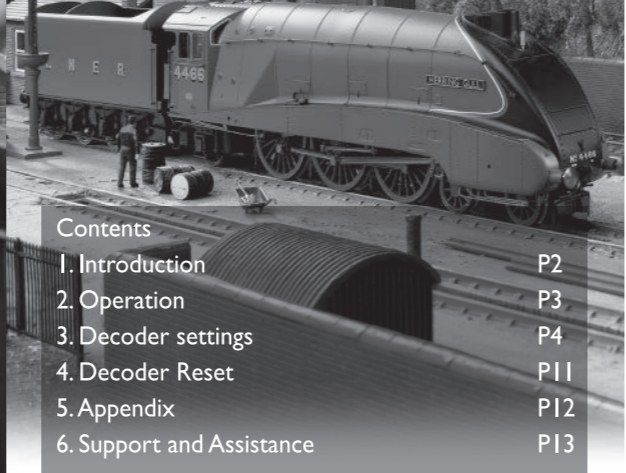
Operating Manual



Hornby Hobbies Limited, Margate, Kent CT9 4JX. Tel: +44 (0) 1843 233525

For more information visit: www.hornby.com

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1. Introduction

The LokSound V4.0 decoder by ESU is a versatile digital decoder integrating a full-featured, 8 channel sound system, various lighting outputs and a I.1A motor controller.

LokSound V4.0 decoders are compatible with all NMRA DCC standards & RPs, support short and long addressing. Advanced consisting, 14, 28, 128 speed steps and also support RailCom-Plus®.

The "Class A4" is preset at the factory for immediate operation. Nevertheless, we kindly ask you to first read these instructions before you set this locomotive onto a power track.

Please note that some aspects of this Decoder User manual may not be applicable to your particular purchase, dependant on choice of Controller, and also Functions available, such as Lighting.

1.1. Decoder ratings

The "Class A4" can be operated straight out of the box. The selection of the appropriate operating mode happens automatically.

Table with 2 columns: Parameter (Track voltage, Operation modes, Steady state motor current, Function output current) and Value (47 volts maximum, DCC, Motorola, AC & DC, 1.1A, 0.25A each)

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Table with 2 columns: Parameter (Number of function outputs, Total current of function outputs, Audio amplifier, Speaker impedance, Memory capacity, Number of sound channels, Dimensions) and Value (4 + 2 logic outputs, 0.5A, 2W @ 4 Ohms load, 4 - 8 Ohms, 32 MBit, 8, 28mm diameter)

Important Warning:

- This LokSound decoder is designed for use in Hornby "Class A4" only.
Do not expose to wet and humid conditions.
Do not remove Heat shrink sleeve if fitted to Decoder.
Always disconnect the circuit when installing the decoder. Please install the body shell before applying 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. Operation

2.1. Function assignments

Function Key Effect table with 3 columns: F0-F9 and their corresponding effects (Not applicable, Airpump, Conductors signal, Sound on/off, Injector, Brake release, Steam whistle, Shunting mode, Signal whistle #1, Coupler clank, Coal shovelling, Signal whistle #2)

The default address for DCC operation is "03".

2.2. Using your LokSound decoder under DCC

The default address assigned to the LokSound decoder is 3. Simply set your controller to this locomotive number and place it on the mainline.

If you use a DCC system which supports RailComPlus®, it will most likely ask you to change the locomotive address. All function button icons will be displayed correctly after the assignment of the new address.

2.3. Using your LokSound decoder under Märklin® Motorola®

The default address assigned to the LokSound decoder is 3. Simply set your controller to this locomotive number and place it on the mainline. If everything is set up properly, the "Class A4" should react as shown on the table 3.1. Usually, under Motorola® system, you can control the function buttons F0, F1 to F4 only.

3 4

2.4. Using your LokSound decoder under DC or AC

Although we highly recommend the use of a DCC system in order to enjoy all features of the LokSound, you may also use your conventional DC or AC controller. You will be able to control the motor of the locomotive and will also hear the engine sounds.

The table starting on page 10 covers setting of the most important parameters of the LokSound decoder. A full list of CVs can be found in the reference manual available for download under www.esu.eu

3. Decoder settings

3.1. Basics of DCC programming

The hardware determines some features such as the number of function outputs as well as the maximum permitted current of the motor output and therefore they are not programmable.

You could visualise the storage spaces as index cards in a large file box. In order to enable you to find the right card again, they all have numbers and / or names outlining the properties of this particular card such as "locomotive address" or "maximum speed".

Thus, you can determine the content of the storage spaces in the decoder even during operation and of course, the decoder will follow the instructions. Via the procedure known as "Programming", you can enter the desired data into the storage spaces.

3.1.1. Configuration variables (CV)

The LokSound decoders follow the CV concept developed in the US. CV stands for "Configuration Variable" and indicates that the storage cells described above are not only variable but they also determine the behaviour of the decoder.

3.1.2. Standardisation in the NMRA

The NMRA (National Model Railroad Association) has defined which CVs determine certain parameters of a decoder. The DCC standard allocates fixed numbers for certain CVs (adherence is obligatory).

The DCC concept permits you to enter numbers ranging from 0 to 255 into CVs. Each CV carries only one number.

While the position number is predetermined, the range of values may vary. Not all CVs must accept values ranging from 0 to 255.

3.1.3. Bits and Bytes

Most CVs contain numbers: CV 1 for instance contains the locomotive address. This can be any number between 1 and 127. While most CVs expect numbers to be entered, some others are rather like a "collection point" of various "switches".

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Have a look at the explanations for CV 29 in the table on page 10: firstly, decide which options should be active. The column "Value" has two numbers for each option. If the option is switched off, the value is 0.

3.1.4. Programming methods

LokSound decoders support all NMRA programming modes as there are the programming track modes (Direct Mode, Register Mode, Paged Mode) and the mode for the main ("POM", "Programming on the Main").

3.1.4.1. Programming on The Main

Programming on the Main (also called "Operations Mode programming") enables you to programme your decoders comfortably without having to remove the locomotive from the layout.

"Locomotive number 50, write the value 7 into CV 3!". Thus knowing the locomotive address is a precondition.

3.1.4.2. Service Mode Programming

This programming mode usually requires the locomotive to be placed on a special programming track output of the command station. CVs can only be read on the service track unless your DCC command stations supports RailCom.

In order to be able to read back the CV values from your decoder, the motor terminals must be properly connected to the motor. The motor is used to produce the "feedback" current detected by the command station.

3.1.5. Programming procedure using various DCC systems

As each DCC system is different, the procedure for changing a CV will vary depending upon the system. We are very sorry that we are unable to provide detailed instructions to cover every system on the market.

3.1.6. Programming with the ESU LokProgrammer

The LokProgrammer 53450 / 53452 offers the easiest and most comfortable way of setting the CVs of the LokSound decoders: simply by a few mouse clicks on an MS-Windows® computer.

3.1.3. Bits and Bytes

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3.2. Setting up your LokSound

3.2.1. Address Settings

Each LokSound decoder requires a definite address to be addressable for the central unit. Depending on the type of decoder and the digital system, there are several possibilities how to allocate addresses.

If CV 29, Bit 5 is cleared, the decoder listens to the primary address stored in CV 1. If CV 29, Bit 5 is set, the decoder listens to the extended address stored in CV 17 AND CV 18.

3.2.1.1. Primary Address

Normally you would control LokSound decoders with the short address that is stored in CV 1. In DCC mode, the permitted values range from 1 to 127.

Some digital systems (e.g.: ROCO® Lokmaus2, Lenz® digital plus, Lenz compact) only support the values 1 - 99 as short addresses.

3.2.1.2. Extended Address

You can also operate LokSound decoders with extended addresses (4-digit addresses). The supported values range from 128 - 10239. The extended address is stored in CVs 17 and 18.

If you want to use your LokSound with the extended address it is practical to programme this address directly with your digital system: most modern digital systems have a menu for programming long addresses.

Both the primary and the extended address may be changed at any time using service mode (on the programming track).

Some DCC systems (such as ESU ECoS, ESU Navigator) will allow the decoder address to be modified using Programming On The Main. LokSound will accept the programming commands, but the following restrictions apply:

- If the decoders primary address is enabled, the decoder will accept a new primary address and follow this immediately.
If the decoders primary address is enabled, the decoder will accept a new secondary address (write of CV 17, 18)
If the decoders extended address is enabled, the decoder will only accept a new primary address. You can not change an extended address to another number using Programming On The Main.

3.2.1.3. Motorola® Address

You can also operate LokSound decoders with the Motorola® format. The address for this operating mode is stored in CV 1.

This address is identical to the short address in DCC mode. The LokSound decoder responds both to commands in DCC and in Motorola® mode at the same time.

Märklin® digital devices (6020, 6021, Delta®) can only work with addresses from 1 to 80. Should you have entered a higher value in CV 1 you will not be able to drive this locomotive with these central units.

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3.2.2. Configuring the decoders behaviour

3.2.2.1. Acceleration / Deceleration

Acceleration and brake time can be set independently of each other. Therefore, you could for instance programme a short acceleration and a much longer brake time.

The time for accelerating from 0 to maximum speed is adjusted in CV 3 while deceleration is set in CV 4. Permitted values are 0 (no delay) to 63.

The times set in these CVs work speed dependant. Therefore, the acceleration distance and the brake distance are longer at high speeds. In other words, the faster the locomotive moves, the longer is the distance until it stops.

3.2.2.2. Starting voltage, Max and Medium Speed

LokSound decoders know 255 speed steps internally. They can be adapted to the characteristic of the locomotive and allocated to the actual available speed steps (14, 28, or 128):

Motor characteristic via CV 2, 5, and 6: enter the start voltage in CV 2 and the maximum speed in CV 5. CV 6 corresponds with the speed at a medium speed step. Thus, you can define a kink in the speed curve. This mode is active if bit 4 = 0 in CV 29.

The values of the start, mid and maximum speed are dependent on each other. Selecting a mid speed that is lower than the start speed or higher than the maximum speed could lead to some erratic driving performance. Therefore always adhere to the principle: start voltage < mid speed < maximum speed.

3.2.2.5. Shunting mode

The shunting mode reduces the speed to about 50%. Thus, you have smoother control of your locomotive in the lower speed ranges, which is important for shunting.

3.2.2.6. Analogue mode

The LokSound can also be used on conventional layouts. By default, this option is enabled. If you don't want to use the LokSound on conventional layouts, please disable the analogue mode by clearing bit 2 of CV 29. Disabling this mode is useful if you plan to use some automatic braking modes.

3.2.3. Brake Sectors

Brake sectors have the purpose to slow down the locomotive independently from the commands issued by the command station. Frequently, this function serves for stopping a train in front of a red signal. If a LokSound detects a brake command, it will slow down with the programmed deceleration and then stop. After this enforced stop, the locomotive will accelerate again as per the programmed values in CV 3.

Depending on the type of digital system, there are several options on how to influence the decoder so that it stops the train.

3.2.3.1. DC Brake Mode

In order to activate the DC brake mode you must set bit 3 in CV 27. The decoder will start brake once it moves from a digital sector into a DC sector provided the brake mode is active and the polarity of the track voltage does NOT match the current direction of travel. The locomotive will stop taking into account the programmed deceleration.

3.2.3.2. Märklin® Brake Mode

In principle, the Märklin® modules 72441 / 72442 apply a DC voltage to the track instead of the digital signals. Provided bit 3 and bit 4 in CV 27 is set, then LokSound decoders detect this voltage and will stop the train (CV 27 = Value 24). The signal generated by these modules looks the same as DC from conventional DC-transformers. The LokSound could possibly misinterpret this and switch to the analogue mode instead of brake. If you wish to control the decoder with DCC signals and keep your Märklin® brake sectors then you should switch off the DC analogue mode by deleting bit 1 in CV 50.

3.2.3.3. Lenz® ABC Brake Mode

LokSound V4.0 decoder support the ABC braking technique introduced by Lenz®. In order to use this function a group of anti-parallel diodes will be soldered to one half of the track. The resulting voltage drop generates an asymmetrical DCC signal. LokSound decoders will detect the difference between the left and right half of the signal. If desired, the decoder will be stopped.

To be able to use the ABC technique you also need, beside the adequate LokSound V4.0 decoder, an appropriate brake module. The ABC technique can only be operated with boosters offering an exact symmetrical output. We do not recommend the use of Boosters that do not offer the above facility.

- If you wish to stop the LokSound decoder when the track signal is stronger on the right side than on the left side (the diodes are also installed on the left side), set bit 0 in CV 27.
● If you wish to stop the LokSound decoder when the track signal is stronger on the left side than on the right side (the diodes are also installed on the right side), set bit 1 in CV 27.
● If you want to stop the decoder no matter in which half of the track the diodes are set, please set bit 0 and bit 1 in CV 27 (CV 27 = 3).

3.2.4. Adjust the sound volume

The LokSound allows the individual volume control of each sound. Please refer to the following table to see which CV you need to change:

Table with columns: Function, Slot, CV, Value. Lists volume control settings for Master volume, Steam Chuffs, Whistle, Coupler clank, Air pump, Injector, Coal shovelling, Conductors signal, Brake release, Short whistle #1/#2, Steam hiss, Random sounds, Brake squeal.

Before you change any of the volume control CVs, please make sure that the CV 31 is set to 16 and CV 32 = 1! These two CVs are used as index selection registers to distinguish between the real function of CV 257 - 511.

The master volume control CV 63 controls all sound effects. The resulting sound volume for each individual sound effect therefore is a mixture of the master volume control settings and the individual volume control sliders.

When you adjust the volume levels, please keep in mind that you should not exceed the maximum mixer levels to avoid a condition called "clipping" which occurs when the sum of two or more signals exceeds the capacity of the output channel.

Programming Table – List of most important CVs

Table with columns: CV, Name, Description, Range, Default. Lists CVs 1 through 29 including Locomotive address, Start voltage, Acceleration, Deceleration, Maximum speed, Vmid, Analogue mode, Extended locomotive address, Consist Address, Brake mode, RailCom® Configuration, and Configuration register.

9 10

Table with columns: CV, Name, Description, Range, Default. Lists CVs 30 through 52 including Index registers, Extended Configuration #1/#2, Analogue mode, and Load control parameter «K».

5. Appendix

5.1. Programming Long Addresses

As described in chapter 3.1.1.2 the long address is split into two CVs. The byte with the higher value of the address is in CV 17. This byte determines the range in which the extended address will be located. For instance, if you enter the value 192 in CV 17 then the extended address may be between 0 and 255.

If 193 is written into CV 17 then the extended address will be between 256 and 511. You can continue this up to addresses with values of 9984 and 10239. The possible values are shown in the table below.

5.1.1. Write address

To programme a long address you first of all need to calculate the values for CV 17 and CV 18 and then programme it. Please note that it is not possible to programme addresses via the programming mode "POM".

To programme the long address proceed as follows:

- First you determine the desired address, for instance 4007.
● Then you look for the appropriate address range in the table below. The value to be entered into CV 17 can be found in the column on the right. In our example, it is 207.

The value for CV 18 is established as follows:

desired address 4007
minus first address in the address range - 3840

equals value for CV 18 167

● 167 is therefore the value to be entered in CV 18. Thus your decoder is now programmed to address 4007.

5.1.2. Read out address

If you wish to read out the address of a locomotive please read the values of CV 17 and CV 18 one after another and proceed then in reverse order:

Let's assume you have read:

CV 17 = 196; CV 18 = 147. Look up the corresponding address range showing in the table below. The first possible address within this range is 1024. Then you have to add the value from CV 18 and you arrive at the locomotive address: 1024 + 147 = 1171

Table with columns: AddressRange from to CV17, AddressRange from to CV17, AddressRange from to CV17. Shows mapping between CV values and address ranges.

6. Support and Assistance

Your model train dealer or hobby shop is your competent partner for all questions regarding your LokSound decoder. In fact he is your competent partner for all questions around model trains.

There are many ways to get in touch with us. For enquiries please use either email or fax (don't forget to provide your own fax-no. or email address) and we will reply within a few days.

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. Rather send an email or fax and also check our website for more information. You will find many hints under "Support / FAQ" and even feedback from other users that may help you with your particular question.

Of course we will always assist you; please contact us at:

USA & Canada (English support), please contact:
Phone: +1 (570) 649-5048
Tuesday & Thursday 9:00am - 3:00pm (CT)
Fax: +1 (866) 591-6440
Email: support@loksound.com
Mail: ESU LLC
477 Knopp Drive
US-PA-17756 Muncy

Germany and all other countries, please contact:
Phone: ++49 (0) 700 - 56 57 68 63
Tuesday & Wednesday 10:00am - 12:00am
Fax: ++49 (0) 700 - 37 87 25 37
Email: support@esu.eu
Mail: ESU GmbH & Co. KG
- Technischer Support -
D-89081 Ulm
Internet: www.esu.eu

