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Smart and intelligent! The ROCO Lokmaus[®]2 is an economy-priced digital control system. It was designed and developed for digital beginners as well as for the advanced enthusiasts. It is the second generation of the very successful ROCO Lokmaus. The compatibility to the standards of NMRA-DCC guarantees you to get a system that fits the world-standard for two rails digital command controls (DCC).

The Lokmaus[®]2 offers to you two levels of operation. Functions that could cause problems if they are used by children can be easily protected against unintentional use

You take profit from a Digital System that offers to you the most important features without the necessity to read a lot of instructions and manuals.

The factory-setup of the system allows you to control your layout by intuition because the system is self-explaining – even the most important professional features. This level is explained by the short instruction that comes with the set and is included to the Lokmaus[®]2 as it is sold separately.

This more detailed manual tells you everything about the advanced mode for the 'professional' players and model railroaders. We wish you happy hours with your layout controlled by the Lokmaus[®]2 and reading this book.

Warning: Using components of other manufacturers together with ROCO components you risk damage or malfunctions. We approved a lot of components of other manufacturers that work well. See the list at the end of this instruction.

Features of the Lokmaus[®]2

- controls 99 loco-addresses
 - operates headlights and four additional functions
 - easy control of a loco by speed and direction by a knob
 - easy standard-programming-mode for address, minimum speed acceleration and deceleration delay and maximum speed (CVs 1 to 5)
 - programming the CV29 with important settings for the operation of the loco
 - two digits LED display of the selected address or other information
 - 14, 28 and 128 speed steps mode for all locos together or individually selectable for any loco separately
 - emergency-stop that stops the complete layout and cuts current supply
 - autoconfiguration of the RocoNet address
 - the system coordinates 31 devices such as the ROCO Lokmaus[®]2 the switch keyboard etc
 - setup-menu to change a lot of system-features
 - protected mode (programming and emergency-stop can be switched off)
 - operates semaphores and switches if the decoder reacts to loco addresses
 - compatibility to the 'Lenz digital plus-System' and other NMRA-systems.
- ... and additionally in the professional mode:
- easy programming of the CVs 1-99 with values from 0 to 99
 - big system of menus to setup the system's features and functions
 - using a more powerful amplifier you can read out the decoders in the range from 01 to 99

Plug and play – wiring the Lokmaus[®]2

The wire of the feeding track is plugged into the connector 'track out' of the amplifier. Then you connect the two pole feeding wire of the amplifier to the two clamps of the transformer. Put the western-plug of the Lokmaus[®]2 into the clip called 'master' of the amplifier. The scheme fig. 1 on page 2 shows the wiring diagram of all devices of the starting sets. The clip named 'slave' must be used for all further Lokmaus[®]2. One Lokmaus[®]2 can be plugged directly to the amplifier, to connect a second, third etc Lokmaus[®]2 you need the RocoNet-Y-modul 10758. This is shown by fig. 2 on page 35 that shows the wiring diagram of the amplifier and three mice.

The RocoNet

RocoNet is called the connection between the amplifier and the Lokmaus[®]2 that represents the second generation of the Lokmaus, the Digital System by ROCO. There must be connected one Lokmaus[®]2 to the 'master' connector of the amplifier. This Lokmaus[®]2 gets automatically the function of the central unit of the complete system. It coordinates all devices and generates the track signal. If there is no Lok-

maus^{®2} connected to the 'master' connector the system doesn't run at all because the track signal is missing. The keyboard cannot be connected to this plug, because it can't be master. There must be no further mouse connected to the 'master'. All further Lokmaus^{®2} have to be plugged to the 'slave' connector. The Lokmaus^{®2} system can handle up to 31 devices. But the maximum number of devices that work together depends on the power consumption of these devices. Therefore you can connect 10 Lokmaus^{®2} to the amplifier 10761. Every device connected to the RocoNet must have a unique address to be addressed personally by the 'master-Lokmaus^{®2}'. This is necessary to coordinate the data exchange between the master and the slaves. But you don't have to care about this because the Lokmaus^{®2} has an autoconfiguration facility. If you use a Lokmaus^{®2} the first time and another device uses already the address of this Lokmaus^{®2} it recognizes this problem and after a short error-message ('E6') it changes automatically to the next unused address. If you got several new devices we recommend that you don't plug them all at once, better is to connect them one after the other. It makes the autoconfiguration work faster.

IMPORTANT: The number of the devices connected to the amplifier must not be greater than the number indicated in the menu C8. The default setting is 5 devices. You can raise the number up to 28 devices (see page 28).

Two addresses are reserved for special devices. The address 29 is reserved for the translation-module 10759 (to connect the old Lokmaus to the new system) and the address 30 for the Lenz PC-interface LI100. Those two addresses are always used independently from the settings of C8.

We recommend to add new components one by one to the system if they are used the first time. So it is easier for the autoconfiguration of the system to find a free RocoNet address for each device. Remember that only the Lokmaus^{®2} has the autoconfiguration mode.

Devices of other manufacturers may not have an autoconfiguration of the RocoNet address. So you have to set the address by a setup procedure. How this is done please read the instruction of those devices or contact the manufacturer. If it is necessary to have an adaptor-plug please take a look at 'www.roco.co.at/digital' if there is a plug offered by ROCO.

ATTENTION! If you make your own adaptor-plug you must strictly avoid short circuits! Pay attention to the correct wiring! Otherwise you can damage the devices. In case of any doubt, please contact our service-department. They will help you.

Handling of the Lokmaus^{®2}



The display, a two digit red LED display tells you the actual selected loco address or selections in menus or their values. It informs you in case of emergency stop, occupied loco addresses or errors. It is easily readable and even in dark rooms visible because it is illuminated.



The knob is to control speed and direction of a loco. set to the middle the speed of the loco is 00 and the loco stops. Turning it right you make the loco run forward with increasing speed. Turning the knob to the left the loco runs backwards. Turning it back to the middle makes the loco run slower.

The loco reacts with the programmed acceleration and deceleration delay. If this delay is programmed to a high value the reaction to the movement of the knob doesn't come immediately but may take some time. That way the loco decoder simulates the big weight of a long train.



By the arrow-buttons 'up' and 'down' you select the address of the loco you want to control. Pressing 'up' for a short time increments the loco address by one. Pressing this button for a longer time it starts the smart-search-function upwards. The same you do by pressing the 'down' button but the address is decremented by one or the smart-search-function is started downwards. The selection of the loco address gets valid in the moment when you give a command to this loco, e.g. a speed command or if you switch a function on or off. The point at the right of the display gets visible permanently.

The smart-search-function makes it easy to re-find a loco address (see below). Inside a menu these buttons select the parameter-value.



The button 'stop' causes an emergency stop. All locomotives stop and the feeding of the layout is interrupted. During this emergency stop mode you can select new loco addresses and give commands to those locos e.g. to stop them or give new commands so that they don't continue their way after releasing the stop-mode. Pressing 'STOP' the second time you release the stop mode and the locos re-start to run. The commands you gave during the stop-mode are executed now immediately.



If a short circuit had happened you release it by pressing 'STOP'. Inside a programming menu you quit the menu by pressing 'STOP'.

The programming button 'P' leads you into the programming menu for locomotives and switch-decoders and to different setup-menus. With this button you confirm selected parameters and start the programming procedures.



The star-button switches the headlights on and off. Pressing this button the first time the headlights start to shine, pressing it the second time it switches the headlights off. It is important to make sure that the selected speed steps of the loco decoder and the selected speed steps of the Lokmaus®2 will match. If not the headlights don't work correctly or the loco doesn't run (see programming of the CV29 page 25).



The function buttons 'F1' to 'F4' control the additional functions of a loco such as smoke, digital uncoupler or sound. You also operate the additional functions of a car equipped with a function decoder e. g. headlights, illumination or signal horn. Pressing this button the first time it switches on the function, pressing it a second time it switches off the function.

Important: Most of the locos have one function only – the headlights. Few locomotives have a second function (e. g. a digitally controlled smoke generator, digital uncoupler, sound etc.) Therefore on most of the locos the function keys

don't control nothing. To operate those additional functions the loco must be equipped with a special decoder or an additional function decoder. For the future it is ROCO's plan to raise the playworth of the railroad by adding functions to locos and cars. So these functions already have been integrated into the Lokmaus®2.

IMPORTANT: At the Lokmaus®2 the address of the digital crane must be set to the 14-speed-steps mode!

Taking a loco from an other Lokmaus®2

The selection of the loco gets valid at the moment when you give a command to this loco, that means when you turn the knob or push a function button. The point at the right of the display gets visible permanently. If this loco will be taken by an other Lokmaus, this point starts to flash.

The selected loco address is listed immediately in the smart-search list. This function gives you a great advantage in controlling a lot of locos (see below).

The Smart-Search Function

The smart search function helps you to select a loco. The address of any loco you select during your play is listed in the smart-search list. If you start the smart-search-function by pressing an arrow-key it stops for a short moment at the addresses of any loco that was already controlled during that session. So you find the addresses of your locos very easily (e.g. the addresses 04, 17, 45 and 98). The length of the smart-search-list is programmable by the setup of the system (setup C1). The valid range for the length of the list is from 1 to 22 addresses; default length from factory is 5 addresses. If you select more addresses then the length of the list, the oldest address is canceled from the list of smart search. You delete all smart search addresses by re-starting the digital system (cutting the power supply). Only the setup of the Master-Lokmaus is valid.

The Master - Slave system

In the new ROCO Lokmaus^{®2} digital system every Lokmaus^{®2} can be the Master (central unit). A Lokmaus^{®2} plugged to the 'master' connector of the amplifier automatically becomes the master. The master coordinates the complete system and generates the track-signal. In any case **only one Lokmaus^{®2}** can be connected to this plug. Any Lokmaus^{®2} or other devices that are plugged to the 'slave' input of the amplifier automatically become slaves. By the range of addresses here can be plugged up to 30 devices. But due to the power consumption of the devices e.g. only 10 mice can be plugged.

If the master Lokmaus^{®2} is unplugged the system stops (because there is no more the track signal) and the layout isn't fed with current. The system loses all information and the smart search list is canceled.

The slave Lokmaus^{®2} may be unplugged during the session as often as you like without any interrupt of the system or loss of information.

Function that are only available at the 'Master Lokmaus^{®2}'

Any Lokmaus^{®2} can be master or slave. Any setup you make at the individual Lokmaus^{®2} is stored but at some setups only the stored information of the master is valid:

- the smart search addresses (the smart search list) is stored here
- the number of speed steps of the locos is memorized here
- the master stores the position of the switches for the turnout keyboard 10770

The result is that you should remember which of your Lokmaus^{®2} is master and which are slaves. If you exchange master and slave the setup of master and slave could be different. The three setups listed above can be done at any mouse and are saved at any mouse but only the setup of the master-Lokmaus^{®2} takes effect. The setup inside the slave Lokmaus^{®2} is not valid, but stays memorized and takes effect if that Lokmaus^{®2} becomes the master. By that way you can store different setups (e.g. different speed-steps for locos) inside different Lokmaus^{®2}.

Setting up the speed steps (14, 28 or 128 speed steps)

You can set up the speed step mode of the Lokmaus^{®2} in two ways. The first defines the used speed steps valid for all locomotives – that means e. g. all locos run with 28 speed steps. The second defines the speed steps different for each loco – e.g. loco 04 runs with 28 speed step, loco 17 with 128 and loco 98 only with 14. The factory default setting is 28 speed steps for all locomotives (this setting is restored by the system-reset using C7). This setup is done by the menu C6 (see page 29). You can define the general mode to 14 speed steps if there occur problems using the 28 speed steps mode.

The speed steps for the control of an individual locomotive can be changed in the running system very easily:

Select that loco and turn the knob to zero (middle position). Push the 'P' button and keep it pressed. Now press additionally the arrow button 'up' or 'down'. The display shows you the actual valid setting. One bar means 14 speed steps, two bars 28 speed steps and three bars indicate 128 speed steps. If you press the button 'up' a second time the number of speed steps is raised, if you press 'down' it is lowered. The new actual setting is shown in the display. The Lokmaus^{®2} memorizes this setting even at the end of the session or in case of an interruption of the power supply (only inside the master Lokmaus^{®2}!).

If you only want to control the setting of the speed steps of a loco the knob doesn't have to be in the position zero but then it can't be changed.

IMPORTANT: It is recommended that you also change the setting of the decoder accordingly to the settings of the Lokmaus! Most decoders are set to the right speed step mode by a programming of the CV29 (see page 25). How to do this you find in the decoder's or locomotive's manual. If you don't find information there please contact the decoder's manufacturer. For the ROCO decoders you find a list of features and settings at page 34.

If the settings of the Lokmaus^{®2} and the loco decoder don't match the headlights do not work correctly or not at all or the loco doesn't move. By a wrong setting the loco decoder **cannot be damaged!**

IMPORTANT: Remember that there are loco decoders that don't support all speed step settings (e.g. the old ROCO loco decoders only support 14 speed steps). At a setting to 128 speed steps such a loco doesn't run at all and if the speed mode is set to 28 steps the light flickers if the loco accelerates or decelerates but cannot be controlled by the Lokmaus^{®2}.

Programming modes and programming procedures of the Lokmaus®2

Before you start to program a loco decoder you should read the instruction to find out what parameters and which values can be programmed and which kind of programming mode is required. An overview for the ROCO decoders and the decoders of other manufacturers that we have tested you find in the compatibility-list on page 33. There you find a list of the facilities of the ROCO decoders too.

Using the Lokmaus®2 you can take advantage of all the features of a loco decoder including the programming. The Lokmaus offers two modes of programming: the standard and the professional mode. Using the standard mode you can program the loco address, the minimum speed, the acceleration and deceleration, the maximum speed and the CV29. Using the professional mode you can program all important settings of the decoders by programming the CVs from 01 to 99 indicating values from 00 to 99.

IMPORTANT: there must be only one decoder in the system during the programming procedure (except the digital turnout drive. 42624). If there are more than one loco or switch decoder on the track or connected to the amplifier all decoders are programmed simultaneously including switch-decoders! By that way e.g. all decoders could be programmed to the same address!

Therefore it is the best way to program loco and switch decoders on a separate programming-track. So first unplug all feeding tracks of your layout, second plug the programming track and then start the programming procedure. Instead of unplugging you can install a two-pole-switch that cuts the feeding of the driving area of your layout and only feeds the programming track (see fig. 4 on page 37).

IMPORTANT: Be careful with switch decoders, they could be damaged that way!

Standard Programming Procedure

In this mode you can change the most important parameters of a loco such as the address, minimum speed, acceleration and deceleration delay and the maximum speed. Pressing 'P' and one of the function buttons 'star' or 'F1' to 'F4' leads you into the standard programming mode. By the same procedure you select the parameter that you want to program (see the list below).

Meanwhile you press the two buttons the display shows 'SP' and all trains on the layout stop. The two points of the display flash alternately to indicate the standard programming mode. After you released the two buttons the mouse indicates in the display the default value for the selected parameter (connected to an amplifier or central unit that can read out the decoder it indicates the actual setting of the decoder). If you want to change this value e.g. the loco address you select an other setting by the 'up' or 'down' button. Pressing the button 'P' you confirm the selection and start the programming procedure that writes the setting into the decoder. This procedure takes some time depending on the programming modes that are executed. The display indicates this procedure showing 'P'. After this procedure the Lokmaus®2 returns automatically to the normal state and the locos restart to run. By pressing 'STOP' you can return to the normal state without writing something into the decoder.

IMPORTANT: Pay attention to the valid range for the parameters! Please read the instruction of the loco decoder. A list of the features of the ROCO decoders you find on page 34.

This programming mode can be deactivated by the menu C3 – so it can't be used unintentionally by children – see on page 28.

- 'P' + 'star' programs the address,
value 01 to 99, default is 03
- 'P' + 'F1' defines the minimum speed,
value 01 to 99, default is 08
- 'P' + 'F2' defines the acceleration delay,
value 01 to 99, default is 04
- 'P' + 'F3' defines the deceleration delay,
value 01 to 99, default is 04
- 'P' + 'F4' defines the maximum speed
(only can be programmed if the decoder is load regulated)
value 01 to 99, default is 15
- 'P' + 'STOP' programs the CV29 that contains basic settings of the decoder
value 01 to 99, default is 04

Programming the CV29

The CV29 is used for the setup of the decoder. It defines the behaviour of the decoder according to the facilities of the central unit and to your wishes. The CV29 sets up the following features:

- the sense of driving
- the speed step mode
- the automatical recognition of the DC operation (by this way you can use DC to stop the loco in front of a red semaphore)

The valid values for the CV29 are at most of the locos:

0	sense of driving: normal	speed step mode14	digital only
1	sense of driving: inverted	speed step mode14	digital only
2	sense of driving: normal	speed step mode28	digital only
3	sense of driving: inverted	speed step mode28	digital only
4	sense of driving: normal	speed step mode14	digital and DC
5	sense of driving: inverted	speed step mode14	digital and DC
6	sense of driving: normal	speed step mode 28	digital and DC (default)
7	sense of driving: inverted	speed step mode28	digital and DC

Professional Programming Procedure

Press the button 'P' for at least 8 seconds (this time can be changed by the menu C5 see page 28). You enter the professional programming mode. The display shows 'EP' and both points of the display flash simultaneously. Release 'P' and changes to indicates '01' for the CV01 the first memory of the decoder. If you want to program a different CV then you select this CV using the 'up' and 'down' buttons e.g. the CV04 to program the deceleration delay. The range of CVs you can program by the Lokmaus®2 is from 01 to 99 with values from 00 to 99.

Press 'F1' to confirm your selection and read the decoder or 'F4' to confirm and write it.

If you press 'F1' the display shows 'FS' to indicated the reading procedure and after that it shows you the result.

IMPORTANT: The actual amplifier 10761 is not able to read out the decoder, therefore you get an error-message in the display of the Lokmaus®2. For the future ROCO plans to develop a device that is more powerful and supports to read the decoder. If you use the Lokmaus®2 together with a LZ100 and LV101 by Lenz then you can read out the loco decoder already today.

If you select 'F4' to write the decoder then you must indicate the value you want to program by the buttons 'up' and 'down'. By principle all values from 00 to 99 are programmable, but most of the decoders only support a smaller range of values. ROCO decoder e.g. accept for the deceleration a range from 01 to 31. In this example you indicate 10 for the deceleration.

Pressing the button 'P' you start the programming procedure and the value is written into the decoder. This procedure takes some time. The display shows 'FP' to indicate this procedure. After that the Lokmaus®2 returns to the selection of the CV and you can select the next CV in order to program it. At any time during the programming menu you can cancel the procedure by pressing the 'STOP' button and quit the menu without reading or writing the decoder.

The time you have to press the button 'P' to enter this programming mode can be defined by the menu C5 and in the same menu it can be deactivated – so it can't be used unintentionally by children – see on page 28.

Programming Modes

There exist some different methods to transmit the programming information to the decoder: the address-only-mode, the register-mode, the paged-mode and the direct-mode (direct CV-programming).

The **address-only-mode** can only determin the address of a loco. It was designed for very simple decoders, that don't support other features.

The **register-mode** (physical register mode) is the oldest method to transmit the programming information to the decoder. The programming information are transmitted as commands for the loco addresses 120 to 127 and are accepted as programming information by every loco after a reset (therefor you should not use the addresses 120 to 127 to control a loco). The selected address defines which kind of information (which memory of the decoder) is accessed. So you have a maximum of eight memories

that you can address. But very soon the loco decoders had been that powerful that eight memories had not been enough to store all necessary information for the loco decoder setup (e.g. the speed table). The **paged mode** was invented to 'repair' this problem. Two registers are used to access additional memories: the registers 5 and 6. The programming is done in two steps. In the first step the desired memory is stored in the register 5 and in the second step the information is written into register 6. After the programming the decoder itself transports the information into the indicated memory. A complicate procedure that didn't survive a long time.

The **direct-mode** (direct-CV-programming) solves the problem in a much more intelligent way. The programming information is transmitted in one stroke and contains both information, the memory and the data. This is the actual easiest and fastest way to program a decoder.

For you it is a great help that the Lokmaus[®]2 can execute all those programming modes. By the menu C9 you define which mode(s) of programming are done (see page 29).

IMPORTANT: Read the instruction of the decoder to be sure which programming mode, which memories and which range of values are required by the decoder that you want to program! It differs from one decoder-typ to the other. For the ROCO loco decoders you find a table with their features on page 34.

Programming the Digital Turnout Drive 42624

Install the drive into your layout. Plug the green programming-wire to the track as shown in the instruction of the digital turnout drive 42624. Be sure that there is no loco on the tracks! Select at the Lokmaus[®]2 the address that the turnout drive should get. Press the buttons 'P' and 'star' simultaneously to enter the standard programming mode for addresses. By the buttons 'up' and 'down' select the address that the turnout drive should take. Press 'P' to start the programming procedure which writes the address into the digital turnout drive. This procedure takes some time and the display indicates it by showing 'P'.

After this procedure the Lokmaus[®]2 automatically return to the normal operation. Release the green programming wire from the track. The turnout drive now can be operated by the button 'F1'.

During this programming procedure further digital turnout drives 42624 may stay installed because the turnout drive takes the address only in case that the green programming wire is attached to the track.

Be careful with switch decoders of other manufacturers (e.g. k87N, k73 and k74). They can be damaged if they are programmed to a loco address!

IMPORTANT: in the 28 speed steps mode you can only use the button 'F1' to operate the drives. Using the 14 speed steps mode allows you to use either the 'star' button and the 'F1'. In this case you can operate two drives on the same address – controlled by the 'star' and the 'F1' keys (see instruction of the digital turnout drive 42624).

In order to use both buttons you must set the address of the drive to 14 speed steps at the Lokmaus[®]2.

After the normal programming procedure – as shown above – you must press the button 'star' or 'F1' before you release the green programming wire from the track. By this button the turnout drive can be operated afterwards.

How to program other digital turnout drive or digital decoders for drives read the manuals of these decoders. For drive decoders that can't be operated by loco addresses you need the ROCO turnout keyboard 10770.

Short circuit and overload

If a short circuit or an overload occurs then the Lokmaus[®]2 cuts the feeding of the layout. The display shows two vertical bars with wide and small distance that flash alternately. You must remove the short circuit or reduce the load of the layout. After that you can re-start the layout by pressing the 'stop' button. After a short delay (about 1 second) the layout restarts.

The booster 10762

You need a booster if the Lokmaus[®]2 often shows the short circuit message but no train is derailed. In that case an overload is occurred by too much power consumption e.g. by locomotives or illuminated cars. The booster offers another 3 Amps to feed the layout and solves the overload. Every booster must get his energy from a separate transformer 10718.

IMPORTANT: Booster and amplifier or two boosters must not be plugged together to the same transformer.

Using one or more boosters 10762

Devide your layout into separated feeding sections. Define the sections in a way that every section needs nearly the same amount of power. To calculate the power consumption see the following list:

- standing locos including headlights about 100 mA
- driving locos depending on the type of loco and its load 300 to 600 mA
- illuminated car per bulb about 30 mA
- digital uncoupler or smoke generator about 100 mA

If the sum of power consumption is higher than 2500 mA then the section is overloaded and must be devided. Please remember that bulbs have a big tolerance in power consumption. It can reach from 25 to 70 mA. If you use the digital turnout drive 46264 or connect other switch decoders directly to the tracks then you must calculate a reserve of 500 mA to operate them.

Those sections are without any influence on the running of the locos or on the way how to operate a turnout. At any time and at any place of the layout always the same information is available. Therefore you do not need to know in which section a loco is running to address and control it.

In order to install the sections switch off the layout. Devide it into separated sections by using the ROCO plastic connectors 42611, by using sectionated track or simply cut the profiles of the tracks on both sides. Install a feeding track ROCO 42517 or use the wire 22217 to feed the section. Connect it to the track out plug of the booster. The booster gets its energy via the two-ople black wire from the transformer 10718. The booster gets its information to amplify via the special wire that comes with the booster. It connects the plug 'booster out' of the amplifier with the plug 'booster in' of the booster. The plug 'booster out' of the booster can be used to connect an additional booster. A maximum of four boosters can be used. The scheme fig. 3 on page 36 shows the wiring diagram.

IMPORTANT: Make sure that the tracks at all sections have the same polarity, so that there don't happen short circuits if a train passes from one section to an other. If a short circuit occurs simply turn the plug of the feeding track by 180°!

Analogue locos (locos without digital decoder) on digital tracks

The second generation of the ROCO digital system does not support controlling a loco without a digital decoder (also the old digital is cool system didn't). The reason is that a loco without digital decoder on a digital layout causes an enormously bothering high-frequency noise. There is also the danger that small motors (originally N-scale motors) that are installed in some small H0 locos could be damaged.

ATTENTION: in no case you may plug parallelly to a digital system a normal DC-transformer to the same tracks! The digital amplifier will be damaged!

Even locos that you already have can be equipped with a decoder. If the loco is equipped with a NEM-plug it is very easy to install the decoder. Inside those locos you find the plug to connect the decoder. There is no nesessity of mechanical works because the space for the decoder is prepared. How to install the decoder is shown in the instruction of those locomotives.

Most of the locos that are not equipped with a NEM plug can be converted to digital too. But in that case mechanical works could be necessary and therefore it is better to ask your specialized dealer to convert your locos.

Locos of other manufacturers can be converted to digital too. If they are equipped with a NEM-plug the conversion is as easy as to convert a ROCO locomotive. If the loco is not prepared for the digital conversion you must find a space for the decoder inside the loco or make it by mechanical works.

If you want to install the decoder with load regulation then the loco must be equipped with a DC-motor or the AC-motor must be converted from electrical field magnets to a motor with permanent magnets.

Compatibility of the new system (RocoNet) to the old digital system (Maus-Bus)

The new Lokmaus[®]2 10760 and amplifier 10761 offer a lot of additional features compared to the old ROCO 'digital is cool' system with the Lokmaus 10750 and the central unit 10751. The new Lokmaus[®]2 can control 99 locos, can program all features of the decoders and can be combined with more devices. This extension only was possible by creating a new, extended structure of data-communication between the Lokmaus[®]2 and the amplifier. We call it the RocoNet. That is why it is not possible to use the Lokmaus[®]2 in combination with the former central unit 10751 (you must not try to connect it to the old system – what is not possible because of the different plugs).

The old 'digital is cool' system by ROCO (Lokmaus 10750 and central unit 10751) can be used – with its old facilities – together with the new system. In order to connect it to the new system you need the translator modul 10759 that is plugged to the RocoNet as any Lokmaus[®]2 (slave input of the amplifier or via an Y-adaptor to the extended RocoNet). The wiring diagram shows fig 3 on page 35.

In that way you can control by the old system eight locos in the new system (addresses 1 to 8) and operate the headlights and one additional function F1. You can operate the switches 1 to 8 and control the digital crane 46800.

IMPORTANT: Locomotives that you control by the old Lokmaus must be programmed to the 14 speed steps mode because the Lokmaus of the first generation only 'knows' this mode. The new container crane can't be operated neither by the old nor by the new Lokmaus. You need the joystick 10780.

Compatibility of control devices and decoders

The new Lokmaus[®]2 is fully compatible to the actual devices of the Lenz digital plus system (X-Bus and XpressNet see list on page 33). More detailed and actual information you get from the support department of ROCO in your country or via internet at 'www.roco.co.at'.

On a layout that is controlled by the ROCO Lokmaus[®]2 you can also control locos equipped with a ROCO Decoder but also all decoders that are compatible to the standards of NMRA-DCC. A list that tells you all decoders that we have tested for compatible is printed on page 33.

You can also equip locos of other brands with ROCO decoders. Conditions are enough space to install the decoder. If you want to install the decoder with load regulation then the loco must be equipped with a DC-motor or the AC-motor must be converted from electrical field magnets to a motor with permanent magnets.

The menu system of the Lokmaus[®]2

The menu system of the Lokmaus[®]2 allows you to define a lot of settings of this digital system to adapt it to the specifications of your layout and your wishes. For example you can protect the system from unintentional programming and emergency-stop.

In order to enter the menu system you must unplug the Lokmaus[®]2 while the amplifier is running. Keep the button 'P' pushed meanwhile you re-plug the Lokmaus[®]2. The display shows you the first menu 'C0'. Using the buttons 'up' and 'down' you can also select other menus e.g. 'C3'. Push 'P' again and the display shows the actual value of 'C3'. By the buttons 'up' and 'down' you can change this value of 'C3' and pushing 'P' you confirm and activate your input. Pushing 'STOP' you quit this menu.

The following list tells you the various menus and explains the system-functions that you define by those menus:

C0 – the device address of the individual Lokmaus[®]2. Normally the autoconfiguration feature of the Lokmaus[®]2 selects it automatically. But if you have deactivated this feature by the menu CA then you have to do it yourself (e.g. in case of difficulties). Addresses are valid from 01 to 30. Factory default is 01.

C1 – the number of smart-search-addresses defines the length of the smart search list. It should be as long as the number of locos that are running on your layout. Making it longer slows down the data transmission to the locos. But it is possible to run more locos than places in this list.

This setting affects all input devices, but only the setting of the master-Lokmaus[®]2 is activated. Changing C1 at a slave-Lokmaus[®]2 don't affect the system but are stored in the memory of this Lokmaus[®]2 and get activated if this Lokmaus[®]2 becomes master. Minimum is 1 maximum is 22 addresses, default is 5.

C2 – the smart-search-function can be enabled and disabled by this menu. If you select the value 00 the smart-search-function for this individual Lokmaus[®]2 is disabled. The search function at this device doesn't stop at any address but runs continuously. =1 enables the smart-search-function.

C3 – the protection (1) disables the standard programming mode for this individual Lokmaus[®]2 and the changement of the speed steps mode. So it protects the system from unintentional use of those functions e.g. by children. 00 deactivates those functions, 01 enables the standard programming and the changement of the speed step mode.

C4 – the protection (2) disables the button 'STOP' of this individual Lokmaus[®]2. So the 'STOP' can't be used unintentionally e.g. by children. In any case after a short circuit you can release the layout with this button. 00 disables the button and 01 enables it again.

C5 – protection (3) this menu defines the time you have to push the button 'P' continuously to enter the experts' programming mode. Setting it to 00 disables this programming mode on this individual Lok-

maus^{®2} and protects it against unintentional use e.g. by children. A value from 01 to 15 enables the experts' programming mode and defines the time you have to push the button 'P' to enter the programming tool.

C6 – the basic definition of the speed step mode. This setup defines the default speed step mode for any loco. The display indicates it by horizontal bars: one bar means 14 speed steps, two bars 28 and 3 bars symbolize 128 speed steps. For every individual loco you can change this setup. An example: you have selected 28 speed steps as default for all locos then you can set individually 128 speed steps for the locos 04, 19 and 73 and 14 steps for the address 01 because this loco only supports this mode.

C7 – the reset-function restores the factory defaults of this individual Lokmaus^{®2}. C7 normally is 00. Setting it to 01 causes the reset. All menus of this Lokmaus are re-defined in the way it came from the factory.

C8 – the number of addressed devices defines how many devices are addressed by the master Lokmaus^{®2}. Only a device that is addressed can send information to the master-Lokmaus^{®2} in order to control a loco or in order to operate a turnout drive. Therefore you must increment the number of addressed devices if you use more than 5 devices such as Lokmaus^{®2} or turnout keyboards 10770. The addresses 29 and 30 that are reserved for the Translator 10759 and the Lenz interface LI100 are always addressed and don't have to be included in your calculation. It is not useful to raise this number higher than the number of devices you use because it slows down the reaction of the system.

C9 – choice of the programming methods that are executed by the Lokmaus^{®2}. The Lokmaus^{®2} can program a loco by four methods (see page 25). Any programming method takes time so it is not useful to execute methods that are not necessary. By this menu you can disable those methods. The following table shows the values for C9 and the programming methods you select by this values:

C9	AO	RG	CV	PM	C9	AO	RG	CV	PM
00	—	—	—	—	08	on	—	—	—
01	—	—	—	on	09	on	—	—	on
02	—	—	on	—	10	on	—	on	—
03	—	—	on	on	11	on	—	on	on
04	—	on	—	—	12	on	on	—	—
05	—	on	—	on	13	on	on	—	on
06	—	on	on	— (default)	14	on	on	on	—
07	—	on	on	on	15	on	on	on	on

AO = address only, RG = register mode, CV = CV direkt, PM = paged mode

Default is 14 (at the Lokmaus^{®2} that are included in the starting sets 41203 and 41212 default is 06) that means that the Lokmaus^{®2} executes the three methods address only, register and CV direct one after the other.

Only the setup of the master-Lokmaus^{®2} takes effect. The setup of the slave Lokmaus^{®2} takes no effect but is stored in this Lokmaus^{®2}.

CA – the autoconfiguration procedure is managed by this menu. The autoconfiguration automatically searches the next free RocoNet address if a device is plugged the first time to a system. By default this is set to 01 in order to enable this procedure. By 00 you disable this procedure. In this case you have to define the device address yourself. This makes only sense if there are problems with the autoconfiguration or if autoconfiguration is not supported by the system the Lokmaus^{®2} is plugged to.

CB – the software-version of the Lokmaus^{®2} is displayed. The display tells you the software-version of this individual Lokmaus^{®2}. The function is read-only. You can't change it.

CC – the software-version of the RocoNet is displayed. The display tells you the version of the RocoNet. The function is read-only. You can't change it.

Combination of digital and non-digital parts of a layout

All ROCO digital locomotives also run on conventional DC layouts (except the versions for the Märklin Motorola digital system that run on a conventional AC layout). The loco decoder automatically detects the system he is running in. Therefore it is easily possible to construct a layout that combines digital and conventional sections e.g. in the phase of converting your layout from conventional to digital. In this phase not digitalized locos can run on the DC-section of your layout without problems parallelly to the digital locos that can run on both sections.

Installing the separator 10768

The digital and the DC-section of your layout must be strictly separated from each other. In order to be sure that it is insulated separate the sections by using the ROCO plastic connectors 42611 on both sides of the track or cut both track profiles (see fig. 6 on page 38).

In spite of the insulation the two sections are connected by the wheels of a train that passes from one section to the other. This causes a short circuit between the digital and the conventional system that could damage the digital amplifier or booster. In order to avoid the short circuit the separator is installed between the DC transformer and the feeding track of the conventional section. The separator cuts the connection between the DC transformer and the tracks automatically if the insulation between the two sections is bridged by a train. So the short circuit detection of the Lokmaus[®]2 is not activated and the train can pass from one system to the other.

Passing from the digital system to the DC-section the loco decoder automatically detects the different feeding and assimilates the speed of the loco to the DC tension on the tracks. It also checks the polarity of the tracks. If it matches the sense of driving of the loco then it continues its run. If it doesn't match the train stops with the programmed deceleration delay. To make it continue, you have to set the knob of the DC transformer to the middle (stop-position) and re-start the train.

In the same way the decoder reacts passing from the DC-section to the digital system. In the digital section it immediately gets the digital information and regards these commands. It also checks the information of the direction and in case that it doesn't match the train stops with the programmed deceleration delay. Now you must change the sense of driving of the train to make it re-start.

A pass-over-section

This simple wiring and procedure with the ROCO separator 10768 includes a small disadvantage if there are several trains on the tracks:

Meanwhile one train passes the separation between the two systems the complete DC-section is fed by the digital system. This causes all conventional locos to stop and all digital locos get digital informations and could react according to those commands. This effect can be avoided by installing a pass-over-section as shown in fig. 7 on page 38. This section must be longer than the longest train that passes over it. It is insulated on both ends on both sides. A train that passes over this section only connects the pass-over-section to the digital or to the DC system that is controlled by the separator. In that way no digital information can enter the DC-section and influence the locos running there.

Turning loops in a digital layout

Everybody knows the problems caused by a turning loop in a conventional DC layout. Also on a digital layout after a loop the left and the right track profile meet each other and would cause a short circuit if you don't install a wiring that avoids this matter.

The ROCO digital turnaround loop module 10769 solves the problems of a turnaround loop in the digital system. Separate the turnaround loop at both ends on both track profiles as shown in fig. 5 on page 37.

The separated section must be longer than the longest train that will pass the loop. The feeding of the turnaround loop is controlled by the turnaround loop module 10769. The modul itself is powered from a track outside of the loop or directly connected to the amplifier or a booster.

The turnaround loop module 10769 works as follows: If a train enters the turnaround loop – doesn't matter from which direction – and the polarity of the tracks before and inside the loop are not identical then a short circuit occurs inside the turnaround loop modul that is detected immediately and the modul inverts the polarity of the loops. This happens that fast that the amplifier doesn't detect a short circuit or that the train slows down. Now the loop has the right polarity to enter the loop.

This procedure must be repeated when the train leaves the loop, because now the polarity of the loop is wrong for leaving it. For the digital operation of the trains the polarity of the tracks doesn't matter the train is not disturbed if the polarity of the tracks is inverted. It can pass the loop without stopping and with any action that would have to be done by you.

To make sure that the turnaround modul 10769 detects the short circuit fast enough you must adjust the sensitivity of the modul by the lateral potentiometer (see instruction of the modul).

Trouble-shooting

Headlights don't work correctly flashes or can't be switched on or off	speed step mode of the Lokmaus [®] 2 and the loco-decoder don't match. The speed step mode for the address of the loco at the Lokmaus [®] 2 is wrong or the CV29 is programmed faulty. How to define the speed step mode see page 23 How to program the CV29 you find on page 25
loco doesn't move (128 speed step mode)	speed step mode of the Lokmaus [®] 2 and the loco-decoder don't match. The speed step mode for the address of the loco at the Lokmaus [®] 2 is wrong or the decoder doesn't support this mode. How to define the speed step mode see page 23 How to program the CV29 you find on page 25
sense of driving of the loco is inversed	the programming of the CV29 must be corrected to change the sense of driving. How to program the CV29 you read on page 25
headlights of the pilot car (e.g. of the ICE don't match direction	By programming the CV29 you must change the sense of driving of the pilot car. Put the pilot car without loco on the programming track! How to program the CV29 you read on page 25
the speed step mode can't be changed	knob is not in middle position (00). In this position you can control the speed step mode, but you can't change it. How to change the speed step mode you can read on page 23.
the display shows the message 'PA'	an other Lokmaus [®] 2 in the system is programming. You can program only by one Lokmaus [®] 2 simultaneously. During this time no other Lokmaus [®] 2 can make an input. If the programming procedure is finished, this message disappears automatically and the locos re-start to run.

Error Messages

error-code E1	<p>A short circuit on the programming track has occurred. Please make sure that the loco is not derailed and that there's no fault in the wiring of the programming track. A newly converted loco may have a faulty wired decoder.</p>
error-code E2	<p>Trying to read the decoder didn't have a result because the loco didn't answer. Please make sure that the loco is not derailed and that there's no fault in the wiring of the programming track. A newly converted loco may have a faulty wired decoder.</p>
error-code E3	<p>the result of reading a decoder is higher than 99 and therefore the Lokmaus[®]2 can't display it on their 2-digits display. It can display values from 00 to 99. If the result is higher then you get this error-message.</p>
error code E6	<p>The actual RocoNet address of the Lokmaus[®]2 is already in use. After this error message the Lokmaus[®]2 automatically starts to search for a new free device-address. If you have disabled the autoconfiguration you must correct the device address yourself. How to change the device-address you can read on page 28.</p>
error code E7	<p>The actual RocoNet address of the Lokmaus[®]2 is not addressed. This error message may occur because you added more devices to the system than defined in the menu C8. How you raise the number of devices you read on page 29. This error message can also appear in the moment that you plug the Lokmaus[®]2 to the system very slowly. The data transmission is connected later than the power supply of the Lokmaus[®]2. This error is corrected automatically after a short time.</p>
error code E8	<p>A data communication error in the RocoNet has happened. If the system doesn't continue after this error message please unplug the amplifier from the transformer and re-plug it.</p>
error code E9	<p>The Lokmaus[®]2 has received an unknown command or the data transmission was disturbed. This error message also occurs if you try to read a decoder but the Lokmaus[®]2 is plugged to an amplifier (e.g. the amplifier 10761) that doesn't support this feature. By pressing 'STOP' you release this error message.</p>

Compatibility of loco decoders

Manufacturer	Code	AO	PM	RG	CV	Comment
Roco	10740	ok	—	—	ok	
	10741	ok	—	—	ok	
	10742	ok	ok	ok	ok	
	10745	ok	ok	ok	ok	
	10771	ok	CV01	CV01	ok	
	Köf	ok	ok	ok	ok	
	ICE	—	—	—	—	from starting-sets 41100 and 41101 not programmable
	215	—	—	—	—	headlight-decoder ICE
	ICE	—	CV01	—	CV01	
	BR310	ok	ok	ok	ok	
42624	—	CV01	—	CV01	digital turnout drive	
Arnold	81200	ok	—	ok	ok	
	81210	ok	—	ok	ok	
	81220	ok	—	ok	ok	
Digitrax	DH140	—	ok	ok	ok	
	HAG501	—	ok	ok	ok	
ESU Kühn	LokSound	ok	—	ok	ok	
	T121	ok	ok	ok	ok	
Lenz	LE100	ok	—	—	ok	
	LE111N	ok	ok	ok	ok	
	LE131N	ok	ok	ok	ok	
MRC Soundtraxx	AC310	—	—	—	ok	
	DSD150	ok	—	—	ok	
System One Zimo	CH155	ok	ok	—	ok	
	MX61R/N	ok	ok	ok	ok	

Devices of other brands as input devices at the RocoNet

manufacturer	device	autoconfiguration	comment
Lenz	LH100	—	you need an adaptor-plug
	LH200	ok	can't be master
	LI100	—	you need an adaptor-plug
Arnold	81210	—	you need an adaptor-plug
	81220	—	you need an adaptor-plug

Lokmaus®2 as input device for other systems

manufacturer	central unit	bus system	comment
Lenz	LZ100	XBUS / XpressNet	you need an adaptor-plug
	LV101	XBUS / XpressNet	—
Arnold	81200	XBUS	you need an adaptor-plug (you can't program by the mouse)

Eigenschaften der ROCO / LENZ Lokdecoder

CV	Werte	Bezeichnung	Einschränkungen
01	01 - 99	Lokadresse	nicht bei ICE / 215 aus 41100
02	01 - 15	Mindestanfahrspannung	nicht bei 10740
03	01 - 31	Anfahrverzögerung	nicht bei 10740
04	01 - 31	Bremsverzögerung	nicht bei 10740
05	01 - 15	Maximalgeschwindigkeit	nur bei ROCO 10745!!
07	??	Versionsnummer	nur lesen (nicht bei 10740)
08	??	Herstellereerkennung	nur lesen (nicht bei 10740)
29	00 - 07	Fahrstufen, Fahrtrichtung, etc. siehe Seite 9	nicht bei 10740 10741 nur 14 Fahrstufen

Features of the ROCO / LENZ loco decoders

CV	range	feature	restrictions
01	01 - 99	loco address	not for ICE / 215 from 41100
02	01 - 15	minimum speed	not 10740
03	01 - 31	acceleration delay	not 10740
04	01 - 31	deceleration delay	not 10740
05	01 - 15	maximum speed	only ROCO 10745 !
07	??	software-version	read-only (not 10740)
08	??	Manufacturer	read only (not 10740)
29	00 - 07	setup (speed step mode etc.) see page 25	not 10740 10741 only 14 speed steps

Proprietes du décodeur ROCO / LENZ Lokdecoder

CV	valeurs	paramètre	limitations
01	01 - 99	adresse de la locomotive	pas pour l' ICE / 215 de 41100
02	01 - 15	vitesse minimale	pas pour le décodeur 10740
03	01 - 31	vitesse de accélération	pas pour le décodeur 10740
04	01 - 31	vitesse de décélération	pas pour le décodeur 10740
05	01 - 15	vitesse maximale	seulement ROCO 10745!!
07	??	version du logiciel	seulement lire (10740 non)
08	??	identification du fabricant	seulement lire (10740 non)
29	00 - 07	definitions de base voir côte 45	pas pour le decodeur 10740 10741 seulement 14 niveaux de vitesses

Qualità delle ROCO / LENZ loco decodificatori

CV	intervallo	parametro	restrizioni
01	01 - 99	indirizzo	ICE e 215 della 41100/1 no
02	01 - 15	velocità minima	10740 no
03	01 - 31	accelerazione	10740 no
04	01 - 31	decelerazione	10740 no
05	01 - 15	velocità massima	solamente ROCO 10745 !
07	??	versione della software	sol. leggere (10740 no)
08	??	identificazione della fabbrica	sol. leggere (10740 no)
29	00 - 07	determinazioni (setup). vede pagina 61	10740 no 10741 sol. 14 passi di veloc.