CV	Name	Description	Range	Default
1	Loco address	Short (2 digit) address of locomotive	1 - 127	3
2	Start voltage	Minimum speed of the locomotive	1 - 255	3
3	Accelera-tion	This value multiplied by 0.896 is the time from stop to maximum speed	0 - 255	80
4	Decelera-tion	This value multiplied by 0.896 is the time from maximum speed to stop	0 - 255	80
5	Maximum speed	Maximum speed of the locomotive	0 - 255	255
6	Medium speed	Medium speed of locomotive	0 - 255	88
8	Manufac-turer's ID	Manufacturers's ID ESU - Writing value 8 in this CV triggers a reset to factory default values	151	-
9	Motor PWM frequency	Motor PWM frequency as a multiple of 1000 Hz	10 - 50	40
17 18	Long address of the loco	Long address of engine (see full manual online at www.loksound.com)		
19	Consist Address	Additional address for consist operation. Value 0 or 128 means: consist address is disabled 1 – 127 consist address active, normal direction 129 – 255 consist address active reverse direction	0-255	0
27	Brake mode	Allowed brake modes Bit / Function / Value: 0 ABC braking, voltage higher on the right hand side 1 1 ABC braking, voltage higher on the left hand side 2 2 ZIMO® HLU brakes active 4 3 Brake on DC, if polarity against driving direction 8 4 Brake on DC, if polarity like driving direction 16 7 Loco brakes with constant brake distance, if FS=0 128		28
28	RailCom® Configura-tion	Settings for RailCom® Bit / Function / Value: 0 Channel 1 Address broadcast enabled 1 1 Data transmission allowed on Channel 2 2 7 RailCom® Plus automatic loco recognition active 128		131
29	Config-uration register	Calculated field. Add up the values you want to activate, then write this number into CV 29. Bit / Function / Value: 0 Normal direction of travel 0 Reversed direction of travel 1 1 14 speed steps DCC 0 28 or 128 speed steps DCC 2 2 Disable analog operation 0 Enable analog operation 4 3 Disable RailCom® 0 Enable RailCom® 8 4 Speed curve through CV 2, 6, 5 0 Speed curve through CV 67 - 94 16 5 Short addresses (CV 1) in DCC mode 0 Long addresses (CV 17 + 18) in DCC mode 32		12

CV	Name	Description	Range	Default
31	Index register H	Should be either "0" or "16" for LokSound Decoders	16	16
32	Index register L	CV 32=0 if accessing CVs 1- 255, CV 31=1,2,3 if accessing CVs 257-511	0 - 4	0
49	Extended Configura-tion #1	Bit / Description / Value: 0 Enable Load control (Back-EMF) 1 Disable Load control (Back-EMF) 0 1 Reserved 2 Reserved 3 Märklin® consecutive address „low"-Bit (not for "DCC") 0,8 4 Automatic DCC speed step detection Disable DCC speed step detection 0 Enable DCC speed step detection 16 5 LGB® function button mode Disable LGB® function button mode 0 Enable LGB® function button mode 32 6 Reserved 7 Märklin® consecutive address „High"-Bit (not for "DCC") 0 128	0 - 255	19
50	Analogue mode	Selection of allowed analogue modes Bit / Description / Value: 0 AC Analogue Mode (Only LokSound V4.0) Disable AC Analog Mode 0 Enable AC Analog Mode 1 1 DC Analogue mode Disable DC Analogue mode 0 Enable DC Analogue Mode 2	0 - 3	3
51	«K Slow» Cutoff	Inernal Speedstep, until «K Slow» is active	0 - 255	10
52	BEMF Param. «K Slow»	«K» -Portion of the PI-Controller valid for lower speed steps	0 - 255	10
53	Control Reference voltage	Defines the Back EMF voltage, which the motor should generate at maximum speed. The higher the efficiency of the motor, the higher this value may be set. If the engine does not reach maximum speed, reduce this parameter	0 - 255	140
54	Load control Parame-ter«K»	«K»–component of the internal PI-controller. Defines the effect of load control. The higher the value, the stronger the effect of Back EMF control.	0 - 255	50
55	Load control Parame-ter «I»	«I»–component of the internal PI-controller. Defines the momentum (inertia) of the motor. The higher the momentum of the motor (large flywheel or bigger motor), the lower this value has to be set.	0 - 255	100
56	BEMF Influence at VMin	0-100%. Defines the "Strengh" of the BEMF at minimum speed step	0 - 255	255
63	Sound volume «Master»	Master volume for all sounds.	0 - 192	192

CV	Name	Description	Range	Default
64	Brake sound threshold «Brake On»	If the actual loco speed step is smaller than or equals the value indicated here, the brake sound is triggered.	0 - 255	100
65	Brake sound threshold «Brake Off»	If the actual loco speed step is smaller than the one indicated here (up to 255), the brake sound will be switched off again. .	0 - 255	25
66	Forward Trim	Divided by 128 is the factor used to multiply the motor voltage when driving forward. The value 0 deactivates the trim.	0 - 255	128
67-94	Speed table	Defines motor voltage for speed steps. The values „in between" will be interpolated.	0 - 255	-
95	Reverse Trim	Divided by 128 is the factor used to multiply the motor voltage when driving backwards. Value 0 deactivates the trim.	0 - 255	128
113	Power Fail Bypass	The time that the decoder bridges via the PowerPack after an interrup-tion of voltage. Unit: A multiple of 0.016384 sec.	0 - 255	50
116	Slow speed BEMF Sampling period	Frequency of BEMF measurement in 0.1 milliseconds at speed step 1	50 - 200	50
117	Full speed BEMF Sampling period	Frequency of BEMF measurement in 0.1 milliseconds at speed step 255	50 - 200	150
118	Slow speed BEMF Mea-surement gap length VMin	Length of the BEMF measuring gap in 0.1 milliseconds at speed step 1	10 - 20	150
119	Full speed BEMF Mea-surement gap length Vmax	Length of the BEMF measuring gap in 0.1 milliseconds at speed step 255	10 - 20	15

CV	Name	Description	Range	Default
124	Extended Configura-tion #2	Additional important settings for decoders Bit / Description / Value: 0 Bi-directional bit: Enable driving direction when shifting direction. 1 Disable driving direction. 0 1 Disable decoder lock with CV 15 / 16 0 Enable decoder lock with CV 15 / 16 2 2 Disable prime mover startup delay 0 Enable prime mover startup delay 4 3 Disable serial protocol for C-Sinus 0 Enable serial protocol for C-Sinus 8 4 Adaptive regulation frequency 0 Constant regulation frequency 16 5 Motor safety when blocking. Motor is not switched off when blocked. 0 Motor is switched off for a few seconds when blocked to avoid burnout 32	-	24
125	Starting voltage Analog DC		0 - 255	30
126	Maximum speed Analog DC		0 - 255	130
127	Starting voltage AC	(For LokSound 5 Multiprotocol decoders only)	0 - 255	50
128	Maximum speed Analog AC	(For LokSound 5 Multiprotocol decoders only)	0 - 255	150
134	ABC-Mode „Sensibil-ity"	Threshold, from which asymmentry on ABC shall be recognised.	4 - 32	12
155 - 162	Notch Points	Notch Point 1 - Notch Point 8: The internal speed step where the diesel engine sound notches to the next Notch (Not for all sound projects)	0 - 255	
163	Sound CV9	Horn Select CV	0 - 255	0
164	Sound CV10	Bell Select CV	0 - 255	0
165	Sound CV11	Brake Squeal Select CV	0 - 255	0
166	Sound CV12	Air Dryer Select CV	0 - 255	0

Quick Start Guide

Edition 6, May 2023

LokSound 5

LokSound 5 DCC

LOKSOUND EST. 1999

Technical Data for LokSound 5 and LokSound 5 DCC Decoders		
Operational modes LokSound 5 DCC	NMRA/DCC with 14, 28, 128 speed steps.	
	2-digit (short) and 4-digit (long) addresses.	
	Analog DC operation (de-selectable).	
	Automatic recognition of operational mode and DCC speed step selection.	
	DCC Servicemode & DCC POM (Programming on Main).	
	RailCom® Feedback system. RailComPlus® automatic Registration.	
Additional Operational modes for LokSound 5	Motorola® with 14, 27, 28 speed steps. Up to 4 addresses (16 Functions)	
	Selectrix®	
	mfx®-compatible M4 protocol. Automatic registration on all Märklin® command stations	
	Analog AC operation (de-selectable)	
Power	Runs all DC and coreless motors.	
	Silent, safe BEMF with up to 50 kHz pulse width frequency	
	Motor output overload protection	
	8 pin and 21MTC decoders	1.50A continuous load / 2.00 A peak load
	Next18 / Select Micro and V4.0 decoders	0.75A continuous load / 1.00 A peak load
Function outputs	8 pin decoders	10 outputs (10 powered)
	21MTC decoders	Up to 14 outputs (10 powered, 4 logic)
	Next18 / LokSound 5 Micro decoders	Up to 9 outputs (6 powered, 3 logic)
Sound	Audio amplifier: 2W @ 4 Ohm load	
	Speaker impedance 4 - 16 Ohms	
	Memory capacity 128 MBit	
	10 sound channels, each up to 16 Bit 31.250 kHz HiFi Quality	
	Over 280 different sounds!	

Default Function Assignment - DIESEL		
Function	Effect	Volume CV
F0	Directional Headlights	-
F1	Bell	283
F2	Playable Airhorn	275
F3	Coupler	291
F4	Dynamic Brake	299
F5	AUX3 (Rotary Beacon)	-
F6	AUX1 + AUX2 (Front) Ditchlights	-
F7	Flange Squeal	435
F8	Sound (On / Off)	259 451 459
F9	Drive Hold	-
F10	Locomotive (Independent) Brake	339
F11	Radiator (Fan) Sound	315
F12	Dimmer (Headlights)	-
F13	AUX4 AUX 5(Rear Ditchlights)	-
F14	Handbrake	363
F15	Isolation Switch	419
F16	Air Dryers on Shutdown	-
F17	Auto Brake Set / Brake Release	483
F18	Sanding Valve	355
F19	Short Air Let Off	443
F20	Compressor	307
F21	Air Dryler	387
F22	Cab Door	371
F23	Engine Compartment doors	379
F24	Reverser Center (Shift 5)	411
F25	Shutters Open/Closed	507
F26	Manual Notching Up	-
F27	Manual Notching Down	-
F28	Manual Notching Logic	-
F29	Automatic Brake Emergency	323
F30	Automatic Brake	331
F31	Soundfader	-

Default Function Assignment - STEAM		
Function	Effect	Volume CV
F0	Directional Headlights	379
F1	Bell	283
F2	Whistle	275
F3	Coupler sounds	315
F4	Coast Mode	
F5	(Aux3) Mars Light	379
F6	(Aux2) Cab Light	379
F7	Switching Mode	
F8	Drive Sounds	259 267 475 507
F9	Heavy Load Mode	
F10	Independent Brake	427
F11	Coal Shoveling	291
F12	Dimmer	
F13	(Aux4) Class Lights	379
F14	Air Pump Variable Speed	299
F15	Air Pump slow	467
F16	Injector	411
F17	Automatic Brake Set/Release Off	
F18	Ash Dump	363
F19	Blowdown	443
F20	Safety Valve	347
F21	Air Horn	419
F22	Grade Crossing sequence	435
F23	Oil Headlight (no dynamo/ generator)	
F24	Stoker	459
F25	Oil Burner Blower	307
F26	Water Refil	395
F27	Dumping	403
F28	Sanding Valve	339
F29	Curve Squeal	371
F30	Disable Brake Squeal Sound	
F31	Sound Fader	

Make sure that Index CV 31 is set to 16 and Index CV 32 is set to 1 before changing a volume CV.

All function buttons are fully mappable. This allows you to customize your Function Assignments in any way you wish. Please see our full manual for information on how to arrange this.

Warnings

- Do not expose to wet and humid conditions.
- Avoid mechanical force or pressure on the decoder.
- Only use the minimum amout of solder needed.
- Always disconnect power before handling the decoder.
- Never wrap the decoder in electrical tape, as this may cause overheating.
- Make sure that neither the decoder nor any blank wire ends may come into contact with the engine chassis (risk of short circuit).
- Make sure that no wires are squeezed/cut when reassembling the locomotive.
- Never operate a LokSound decoder unattended.

Requirements for Installation

The locomotive must be in perfect operating condition prior to the conversion: Only a locomotive with faultless mechanical properties and smooth running characteristics in analogue mode is worth converting to digital. Check and replace all wear and tear parts such as motor brushes, wheel contacts, light bulbs etc., if necessary.

Installing the Decoder

Locomotives with 8-pin interface

Some LokSound decoders are supplied with an 8-pin plug (refer to Fig 1). Remove the dummy plug from the socket. Insert the plug of the decoder in such a way that pin 1 of the plug (this is the side with the red / orange wires) sits next to the corner of the socket that is usually marked with *, +, • or "1".

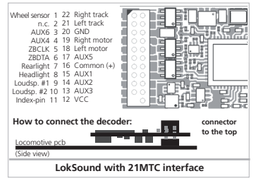
Do not rely on the assumption that the wires of the harness have to face in a certain direction: the only reliable reference is the marking of pin 1.

Pin	Description	Color
1	Right motor terminal	orange
2	Rear light	yellow
3	Output AUX1	green
4	Left track terminal	black
5	Left motor terminal	gray
6	Head light	white
7	Common (+pole)	blue
8	Right track terminal	red

Fig. 1: LokSound with 8-pin interface

Locomotives with 21MTC interface

Some LokSound decoders are equipped with a 21MTC interface (fig. 2) You can insert the decoder in two ways: either the pins are put through the decoder (most common); the socket of the decoder remains visible after installation (mounting on top) or the decoder is inserted in such a way that the pins go straight into the socket. Which of the two mounting positions is the correct one depends solely on the locomotive. The position of the marker-pin is the crucial indicator. Plug the decoder into the socket in such a way that the locomotive interface corresponds with the decoder. Do not apply too much pressure when inserting the plug. The decoder must go in without force.



LokSound with 21MTC interface

Locomotives without interface

All LokSound decoders have an interface (plug). There is no "wires-only" version. Please remove the plug at the end of the harness should hard wiring become necessary.

First, please cut all wires installed in the locomotive. Take special care to remove any connections to the chassis (ground): the motor leads must be positively potential-free, in other words they may not have any contact to the chassis or body or the wheels and wheel contacts. Figure 3 and Figure 4 shows all connections.

Function outputs

You can wire all kind of loads to the function outputs.

Please make sure that the load does not exceed the permitted maximum current and there are no short circuits. The outputs of the LokSound have protection but if an external voltage is applied, the outputs may suffer damage or destruction.

Only install bulbs rated 16V or higher and with a nominal current draw, that does not exceed 50 mA. If you like to use LEDs, a resistor with a rating between 470 Ohms and 2.2 kOhms need to be wired in series. Running the LED without resistor will lead to their immediate destruction!

DCC Operation

The LokSound works with any DCC system. Remove any capacitors that are wired into the track feeders. This could impair the functionality of the decoder.

The address is set to 03 with 28 speed steps.

Decoder Reset

You can reset the decoder to the default settings at any time. In most cases POM programming will not work to reset a decoder. Please use a separate programming track.

Enter the value 08 into CV 08.

To complete the reset, power to the decoder must be interrupted.

Volume Control

Master volume is controlled with CV 63. The range is 0 - 192.

Individual volumes (CVs as shown) range from 0 - 128.

BEMF Autotune Function

Set CV54 to a value of 0, place loco on Mainline and press F1 on your throttle. Loco will quickly take off then stop.

Please leave about 5 feet in front of the loco for movement. Once loco stops BEMF is Auto tuned and you continue to operate as normal.

You may adjust the BEMF values found by the Auto Tune function manually after autotune.

LokSound 5 DCC Direct

The LokSound 5 DCC Direct is unique as it was designed to fit in multiple brands of locomotives. Please use the same mounting method as the Manufacturer's light board. This will insure a seemless installation.

On the LokSound 5 DCC Direct Board we have already added a resistor with 2.2k for each function output. This will result in a current between 8mA and 10mA suitable for most locomotives. Thus you can directly connect your LEDs without thinking of resistor values.

However, should you use bulbs consider the following:

First locate the appropriate soldering bridge on the LokSound 5 DCC Direct Board (see diagram above) for the output desired. Use a small amount of solder to connect the two soldering pads. This will bypass the installed 2.2k resistor.

If the bulbs to be used are less than 16V types, please add a resistor between the LokSound 5 DCC Direct and the bulbs.

- Athearn: 2 - 1.5 Volt Bulbs 360-510Ohms (Front or rear lights)
- Athearn: 1 - 1.5 Volt Bulb 680-1K Ohm (Acc. Lights)
- Atlas: Resistors may already be attached to Factory LED's, you may be also bypass the LokSound 5 DCC Direct installed 2.2k resistors

PowerPack

You can solder a powerful energy buffer to all LokSound 5 or LokSound 5 micro decoders. The connection diagram figure 3 and figure 4 shows you how to do it. This „PowerPack" allows your locomotive to keep running for 2 seconds without power.

ESU supplies under the article number 54671 or 54672 suitable PowerPack modules. Please do ONLY use these.

- The PowerPack only operates in digital mode. It automatically turns off on analogue layouts.
- It may take up to two minutes to fully charge the capacitor („GoldCap"). Therefore, the time bridged with the energy buffer depends on the current draw of your locomotive and the charge-up time.
- Further information about how to use the PowerPack module is to be found in the "PowerPack module" manual.
- The LokSound 5 L, LokSound 5 L DCC and LokSound 5 XL have an integral PowerPack matching the higher current needed by models of the larger gauges. Additional buffering with capacitors or further PowerPacks is neither intended nor necessary.

The time to be bridged with the PowerPack can be set in CV 113. Output AUX9 or AUX7 needs to be set to "PowerPackControl".

Configure the PowerPack

When you connect an external capacitor or PowerPack, you are able to make the decoder switch off after a certain time. CV113 is responsible for that, since you are able to determine at what time the decoder is to switch off (as a multiple of 0.0328 seconds). You should set a time between 0.3 and 1.0 seconds to prevent your locos from driving too far during an emergency.

For the PowerPack to work, the function output responsible for the charge (typically AUX9 for LokSound, AUX7 for LokSound micro) must be configured to the „PowerPackControl" function.

Set CV 31 = 16, CV 32 = 0 first.

Then set CV339 = 31 for LokSound (AUX9)

Then set CV323 = 31 for LokSound micro (AUX7).

P/N 00619-20870

58410 LokSound 5
58420 LokSound 5 DCC

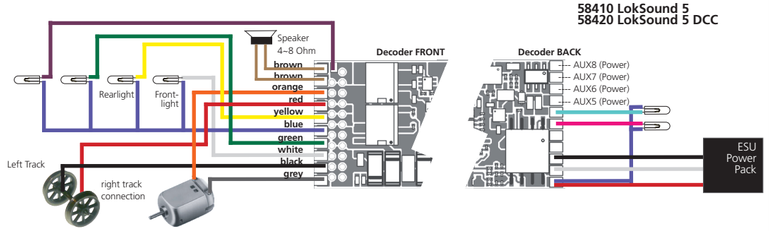


Figure 1: LokSound 5 / LokSound 5 DCC - Wiring Diagram

58810 LokSound 5 micro
58820 LokSound 5 micro DCC

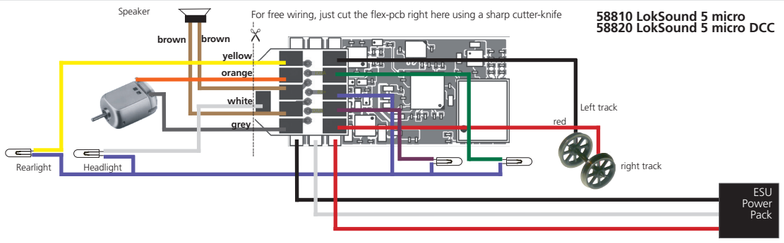


Figure 2: LokSound 5 micro / LokSound 5 micro DCC - Wiring Diagram

58731 LokSound 5 micro DCC KATO

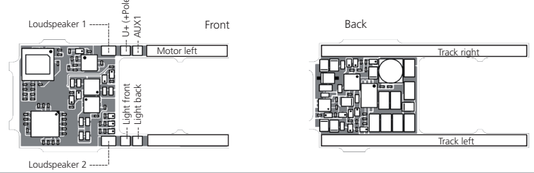


Figure 3: LokSound 5 micro DCC Kato

58741 LokSound 5 micro DCC Kato USA

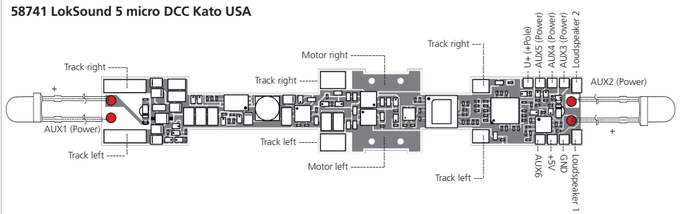


Figure 4: LokSound 5 micro DCC Kato USA

58923 LokSound 5 nano DCC

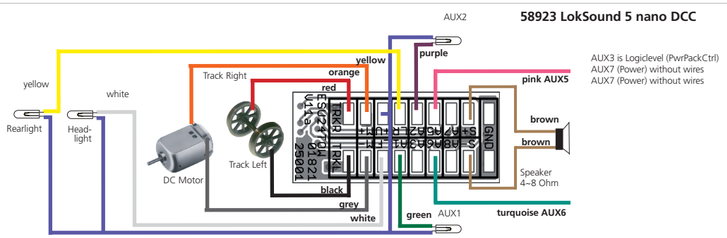


Figure 7: LokSound 5 nano DCC

58721 LokSound 5 micro DCC Direct

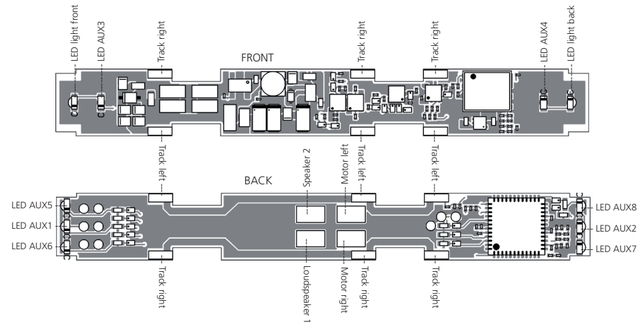
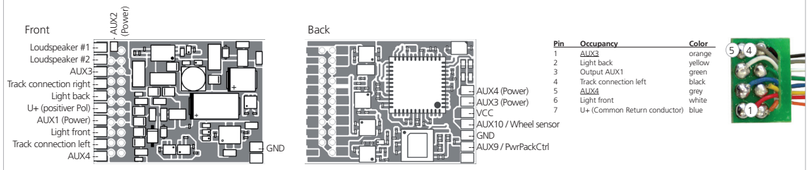


Figure 5: LokSound 5 micro DCC Direct

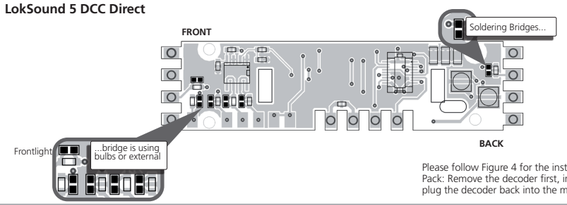
58210 LokSound 5 Fx
58220 LokSound 5 Fx



Pin	Occupancy	Color
1	AUX1	orange
2	Light back	yellow
3	Output AUX1	green
4	Track connection left	black
5	AUX4	grey
6	Light front	white
7	U+ (Common Return conductor)	blue

Figure 10: LokSound 5 Fx with 8-pin NEM652 interface

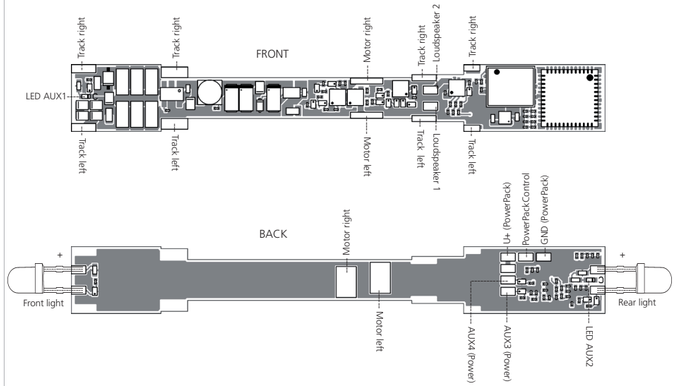
58821 LokSound 5 DCC Direct



Please follow Figure 4 for the installation of the Power-Pack: Remove the decoder first, install the wires, then plug the decoder back into the mainboard.

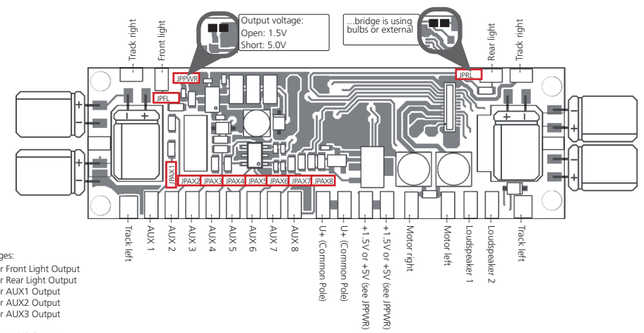
Figure 6: LokSound 5 Direct - Wiring Diagram

58751 LokSound 5 micro DCC Direct „Atlas Legacy"



LokSound 5 micro DCC Direct Atlas Legacy

58921 LokSound 5 DCC Direct „PowerPack"



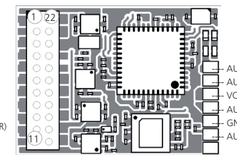
Legend for Soldering bridges:
JPFL Soldering bridge for Front Light Output
JPFR Soldering bridge for Rear Light Output
JPAX1 Soldering bridge for AUX1 Output
JPAX2 Soldering bridge for AUX2 Output
JPAX3 Soldering bridge for AUX3 Output
...
JPAX8 Soldering bridge for AUX8 Output

If bridged, resistors on the board are bypassed. This should be done if Bulbs are used

Figure 8: LokSound 5 DCC Direct „Power Pack" - Wiring Diagram

58219 LokSound 5 Fx 21MTC
58229 LokSound 5 Fx DCC 21MTC

AUX10 / Wheel sensor	1	22	Rail connection right
AUX7 (Logiclevel)	2	21	Rail connection left
AUX6 (Logiclevel)	3	20	GND
AUX4 (Logiclevel / PWR)	4	19	-
AUX12 / SUSI Clk / Servo6	5	18	-
AUX11 / SUSI Dta / Servo5	6	17	AUX5 (Logiclevel)
Light back	7	16	U+ (+Pol)
Light front	8	15	AUX1
Lodspeaker #1	9	14	AUX2
Loudspeaker #2	10	13	AUX3 (Logiclevel/PWR)
Indexpin	11	12	VCC



AUX9, AUX10 are Logiclevel inputs/outputs
AUX11, AUX12 are Logiclevel outputs

AUX3, AUX4 at 21MTC
are switchable Power / Logiclevel:
CV124Bit7=0: Logic Level
CV124Bit7=1: Power Output

Figure 9: LokSound 5 Fx with 21MTC interface

58941 LokSound 5 micro DCC Kato USA Widebody

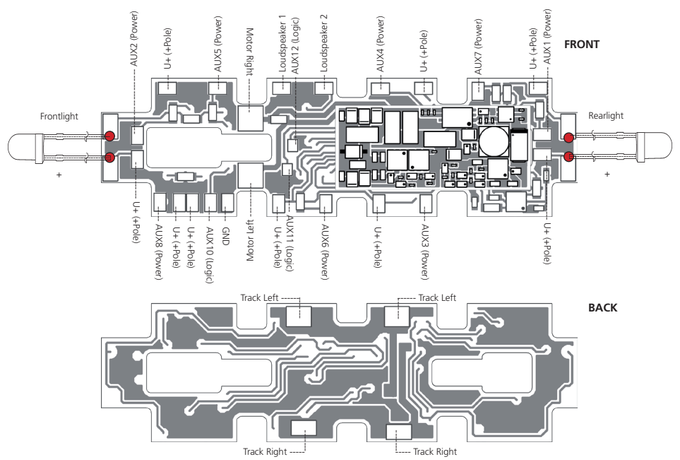


Figure 11: LokSound 5 micro DCC Kato USA Widebody