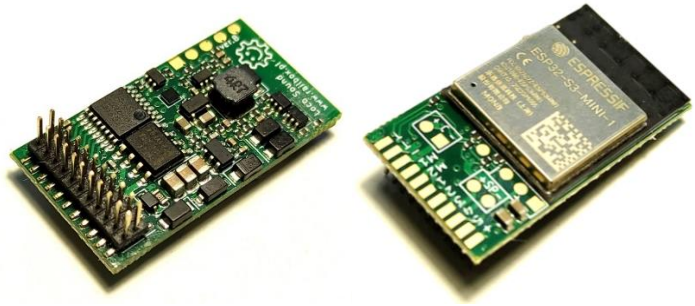
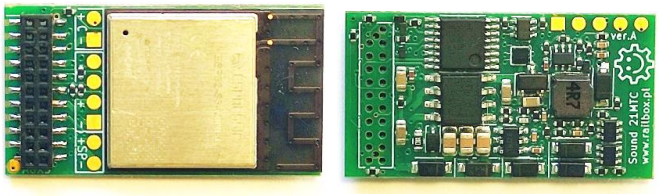
DCC Wi-Fi Loco sound decoder RB 2300



and RB 2310



Contents

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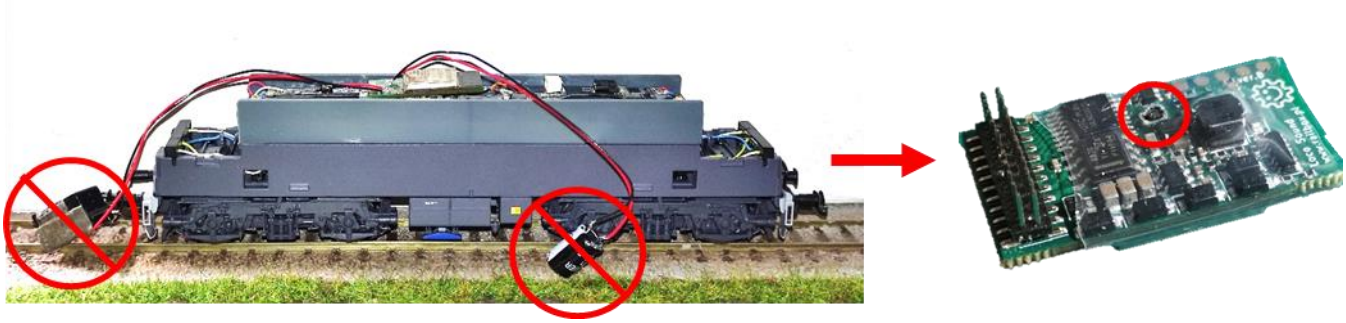
Introduction:

DCC Wi-Fi sound loco decoder RB 2300 and RB2310 are designed to control HO scale locomotive models in digital mode (DCC) with the ability to play sounds. The decoder RB 2300 comes with a Plux22 or NEM652 connector, and the RB2310 version comes with 21MTC connector, all have a built-in Wi-Fi module for recording sounds without buying additional hardware or installing software, and a backEMF function for smooth engine control. The decoder works in accordance with the DCC standard and supports the Railcom ® protocol.

Note: When testing the decoder, it is best to close the locomotive model to avoid damaging by touching tracks by the bare external components (e.g.speaker), or secure it in another way, e.g. by inserting such elements into a string bag. The entire decoder is well protected by a heat shrinkable tube, but this does not apply to external components, so damage during unprotected testing of the decoder cannot be a reason for complaint and is entirely the responsibility of the customer.



Basic functions:

- **The decoder supports addresses 1-10239**
- **Group addresses for multiple traction (consist) 1-127**
- **Support F0-F28 for function outputs and up to F63 for sounds**
- **Support 28 or 128 speed steps**
- **Ability to program CV on the main track (PoM) and on the programming track**
- **Supports Railcom ® protocol**
- **Ability to easily configure the decoder via RailBOX: Railroad Control mobile application**
- **Back-EMF System (allows control smoothly at low speeds)**
- **9 function outputs and 3 logic outputs**
- **Output mapping and lighting effects**
- **Possibility to connect an external UPS capacitor to ensure uninterrupted operation on dirty tracks or when driving through turnouts without a powered crossover (UPS capacitor 1000uF 25V is included)**
- **Possibility to connect up to two model serwomotors (e.g. for controlling pantographs)**
- **Ability to enable/disable Wi-Fi via DCC function**
- **Ability to update the decoder software via Wi-Fi without the need to open the model**
- **A web server for uploading your own audio files through the browser without the need to purchase additional hardware and/or installing software**
- **Pre-installed basic sound package for electric, steam and diesel locomotives**
- **Synchronization of a sound with the current speed of the locomotive**

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Technical parameters:

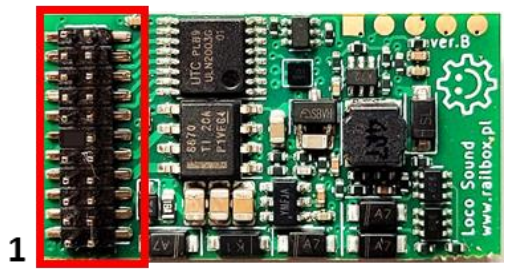
- **Decoder dimensions-30 x 16 x 6.5 mm (NMRA Plux22 Standard)**
- **Decoder power supply-7-22V (DCC)**
- **Maximum output load-0.5 A**
- **Motor instantaneous load- 2.5 A**
- **Continuous motor load - 1A**
- **Maximum total output load for model servomotors: - 0.5 A**
- **Wi-Fi: standard 802.11 b/g/n (2.4 GHz)**
- **Sound:**
- **6MB of internal memory (total length up to 350 sec)**
- **Supported audio formats: PCM, ADPCM, Vorbis (OGG)**
- **Sampling rate: 8kHz, 16kHz, 32kHz and 44.1 kHz**
- **Number of bits per sample: 16**
- **Maximum power for speaker output 2.5 W (4Ohm) (speaker with resonance chamber is included)**

Connection

Decoder connector variants and description of its outputs

The decoder is available in two variants: with Plux22 connector and with NEM652.

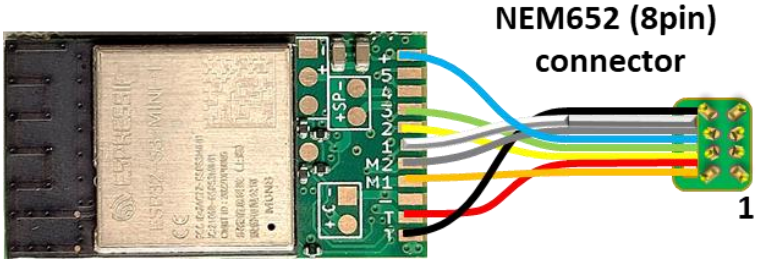
PluX22 (21pin) connector

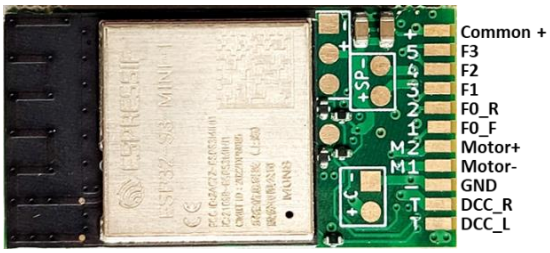


Output	NEM652	Description
DCC	Black	RailL
DCC	Red	RailR
1	White	Front light
2	Yellow	Rear light
3	Green	Cabin light (F1)
4		F2 (Changeable)

Output	NEM652	Description
5		F3 (Changeable)
M1	Brown	Motor +
M2	Grey	Motor -
+	Blue	Common LED anode
G/GND		Ground

NEM652 (8pin) connector





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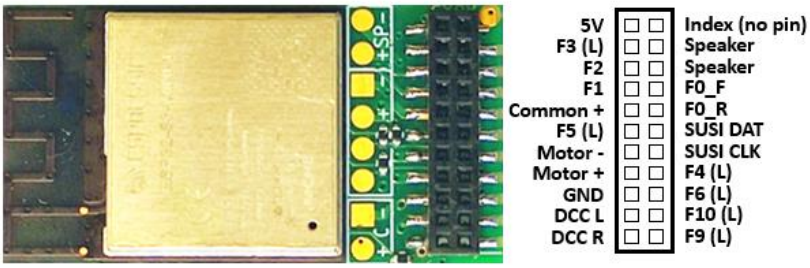
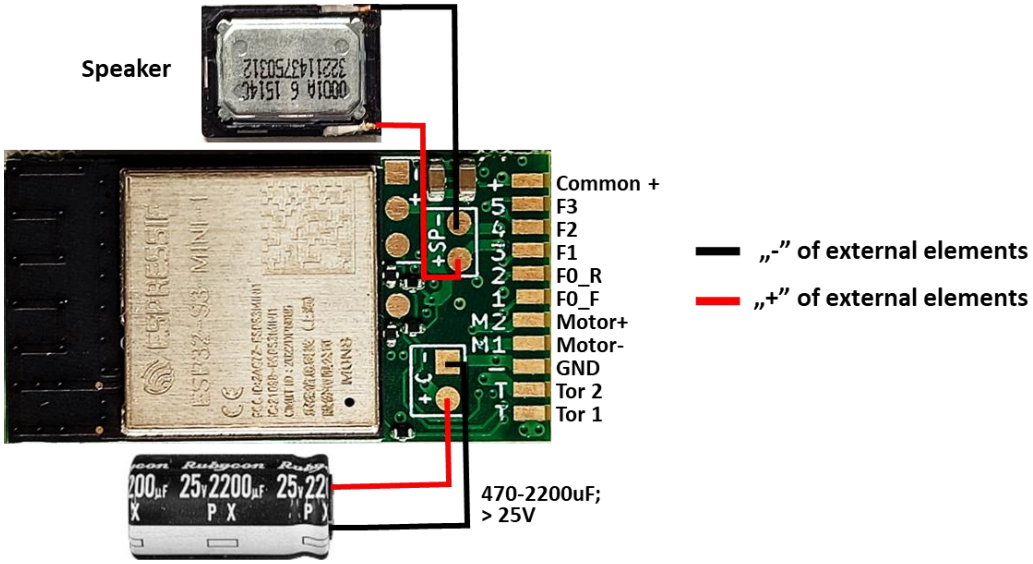
The **RB 2310**, on the other hand, has a **21mtc** connector.



Connection of basic external elements (speaker and capacitor)

To increase the operation smoothness of the decoder on dirty tracks, it is possible to connect an additional external capacitor (+ C -). Some locomotive models have a dedicated space for connecting capacitors on the built-in board, which you can also use to install a capacitor attached to the decoder. The speaker is installed by default, but, if necessary, it can be replaced with another one according to the schemes (+ SP -), or also moved to the locomotive built-in board. Connection diagram:



Connection of additional external elements (servos, digital couplings)

You can connect two servos to RB 2300 AND RB2310 decoder to (- + ◯(S1) and ◯ (S2)) to control the movable parts of locomotive models (e.g. pantographs). It is also possible to connect the digital coupling to the " + " output and to the selected function output (external outputs on the decoder board). Also, the coupler can be connected to the appropriate output on the built-in plate of locomotive models, if there is any. Connection diagram:

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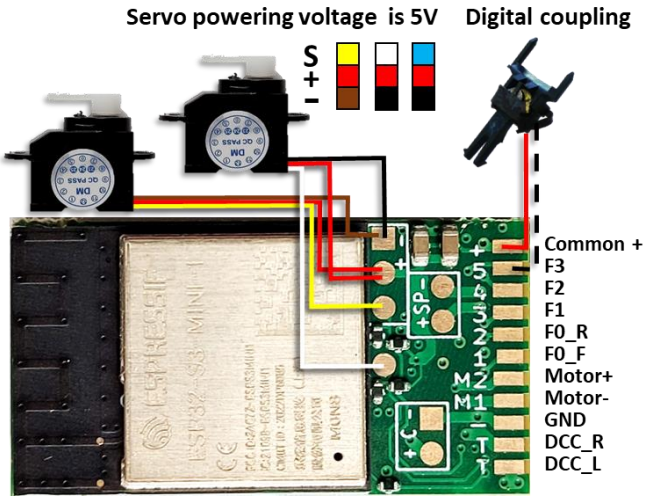

Decoder programming

Connection with mobile app RailBOX: Railroad Control

This symbol means "Easy configuration". All RailBOX products with this symbol on the PCB or sticker on the case are enabling round-way communication (Railcom® protocol) with Railcom® Command station:

- **Automatic detection of new decoders connected to the tracks and the ability to automatically assign the address to the decoder (only with Command stations, e.g., DCC Wi-Fi Command Station RB 1110)**
- **Ability to read and write configuration variables (CV) at any time on the main track (POM)**
- **Ability to assign a short name to the decoder (POM) for quick identification of the device in the RailBOX: Railroad Control App**

Users of RailBOX decoders with the symbol and the DCC Wi-Fi Command station RB 1110 no longer need to manually program addresses of the decoders (accessories and RailBOX wagon and loco decoders), just connect a new device to the tracks (Command station) and the system itself will automatically find the next free address and transmit it to the decoder. In the RailBOX: Railroad Control application, a new locomotive or accessory will automatically appear with already established address.

Add this decoder in mobile app RailBOX: Railroad control

Configuration of the BackeEMF decoder system:

Parameters of the RB 2300 AND RB2310 sound decoder by default optimized for the standard locomotive model, however, depending on the engine type, these parameters can be adjusted. The main CV configs are:

1. **Acceleration and deceleration (CV 3 and 4).**
2. **Maximum speed**: there are two configurations for maximum speed:
   a. CV 5-used to create a speed curve along with average speed (CV 6) and minimum speed (CV 2).
   b. CV 60 is slightly different because it is the voltage at maximum speed that the BackEMF System will attempt to maintain at maximum speed. Therefore, if this voltage is less than the maximum BackEMF voltage on the motor, the DCC voltage will change, but the motor will still rotate at a constant speed.

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3. PID.

a. the main PID factor that can be customized IS KP (CV 50) and low speed KP (CV 51). This is the force of reaction to a change in engine speed. At low speed we need to have it faster to constantly maintain speed without oscillation.

b. in all tests, the integer (CV 52, CV53) does not add any improvements, so it is set to 0 by default.

c. the default value of the derivative (CV 54, CV 55) is sufficient for most cases.

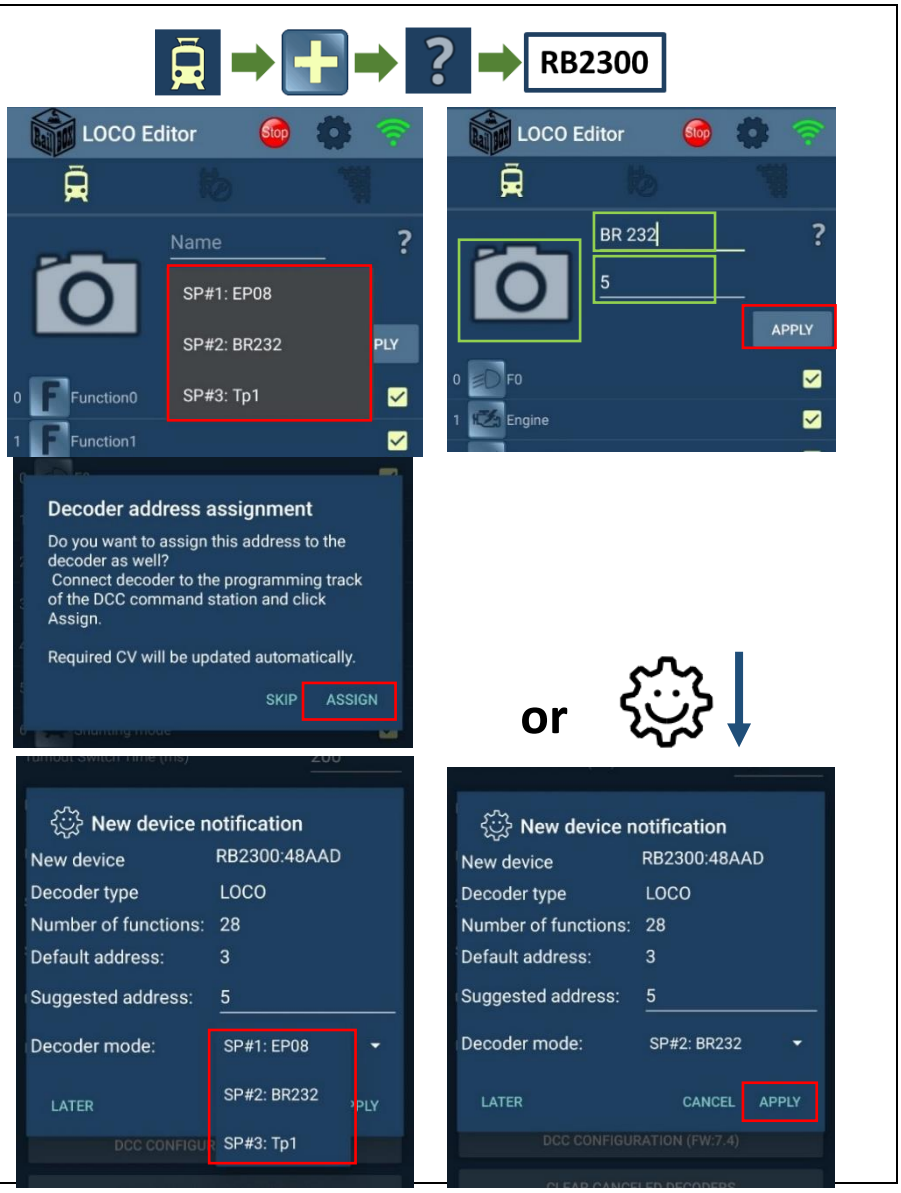
d. KFF_A (CV 54) and KFF_D (CV 55) correspond to an immediate change in the applied motor voltage in the event of a change in the desired speed. Mainly used only for high accelerations and delays.

Sound pack configuration

By default, the RB 2300 and RB2310 sound decoder has few basic sound packs loaded, for details ask the store. You can download other sounds from www.railbox.pl/sounds/ and there are many tips on creating and uploading your own sound packs.

Basic tips for uploading and editing files:

- Add a loco and assign the RB 2300 AND RB2310 decoder to it in RailBOX: Railroad Control app manually or via the easy configuration system ⚙ (details are here)
- Choose your sound pack right away or you can change it later via CV 202
- If necessary, you can also change the name of the locomotive or function and add a photo or change the icon and function type
- **Important: you can use a short function name (up to 5 characters) then the function name will also be visible on the main Loco screen**



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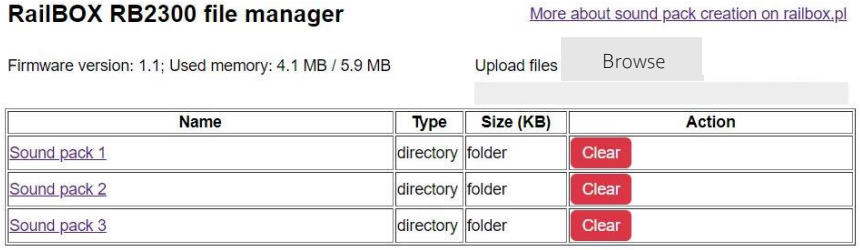
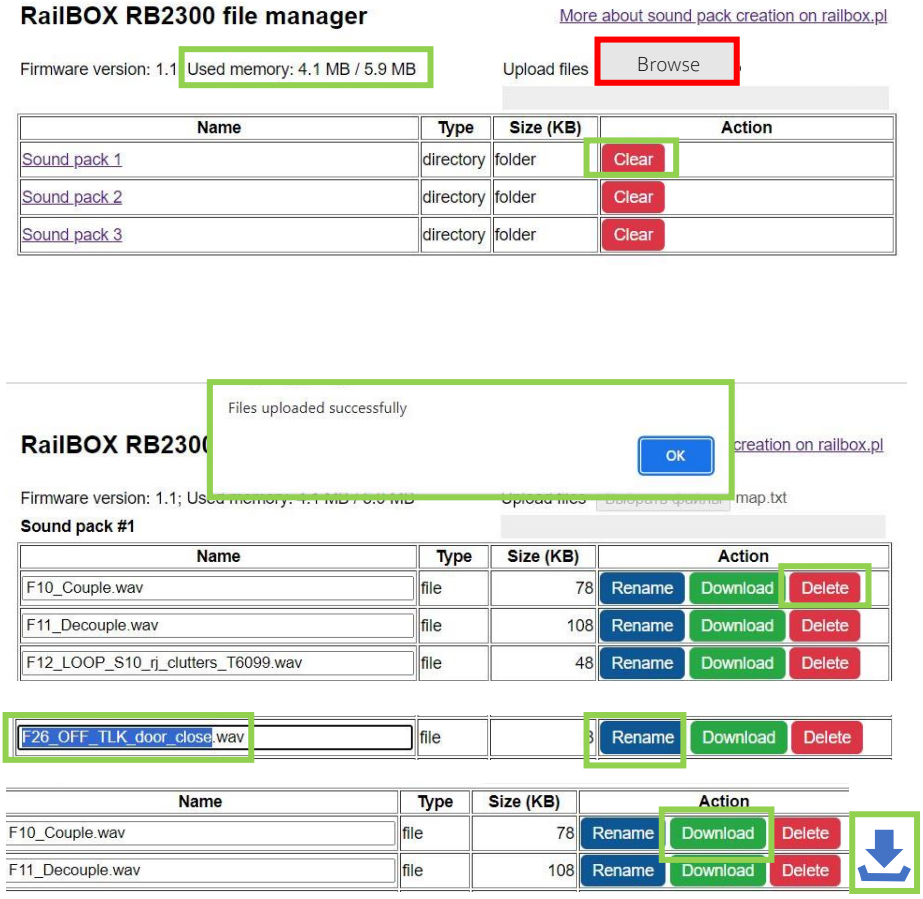
- Enable Wi-Fi by enabling F28 function
- **Connect to the Wi-Fi** network with the name "**RB2300_XXXXX**" by entering the password: **000000000**, from the device (tablet / laptop or PC), on which sound packs and other files are prepared for uploading

Note: network range is about 1-2m

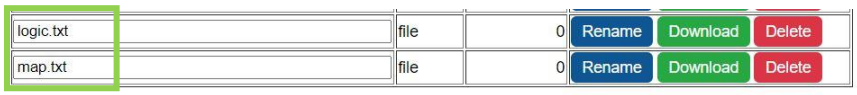
- Enter the page http://192.168.4.1 in your browser



- 3 audio packs up to 6 MB in total can be uploaded to the decoder, the pack number you plan to use is written in CV 202
- To clear the entire pack folder press "Clear"
- To clear only some sounds, first enter the selected pack and then press "Delete" in the line of the selected sound
- To upload new sounds and/or other files (for example, logic.txt and map.txt) press "Browse" and select prepared files
- After a successful file upload, window "Uploaded successfully" will appear, press " Ok " and the files will appear on the page
- You can also edit the file name, to do this, rename the file by setting the cursor to the selected line, rename and then press "Rename" to confirm it
- After pressing "Download" you will download the selected file



You can also upload files that determine the output mapping to a specific loco model (file **map.txt**, details), a logic file that allows you to add basic audio playback automation (file **logic.txt**, details), and a file **cv.txt** to change CVs, where you enter e.g. CV1=5, etc. (details)



www.railbox.pl

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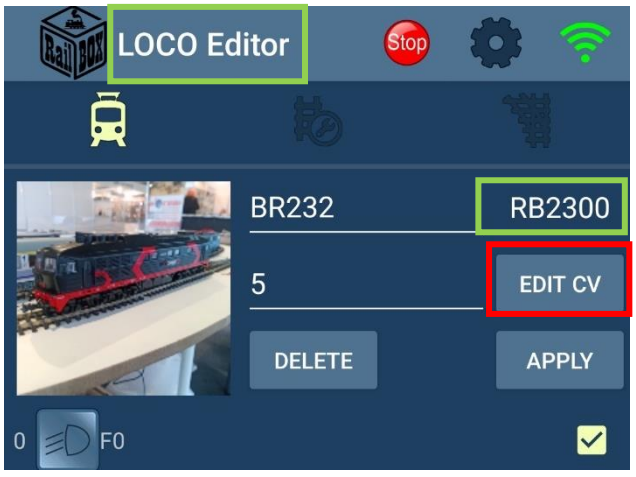
Output (AUX) mapping

Uploading file **map.txt** to the decoder is not necessary, but it allows you to immediately map the light outputs to the decoder according to the manufacturer's instructions for a particular locomotive model. Use web generator to map outputs at www.railbox.pl/sounds to create your own mapping.

AUX1-AUXx represents the output number (**AUX**) as indicated in the loco model manual **F0-FX** is the number of the function to which the selected OX **(AUX)** output will be mapped The **<> symbols** represent the direction of loco travel in which the selected lights must be lit **Important: it is possible to map the same outputs to several functions and different driving directions**	**Default output mapping for EP08 (PIKO) Plux22:** F0F:F0> F0R:F0< AUX1:F7>,F27<> AUX2:F7<,F27<> AUX3:F8> AUX4:F8< AUX5:F6>,F27> AUX6:F6<,F27< **Default output mapping for BR232 (PIKO) Plux22:** F0F:F0> F0R:F0< AUX1:F7>,F27<> AUX2:F7<,F27<> AUX3:F8> AUX4:F8< AUX5:F5<> AUX6:F6>,F27> AUX7:F6<,F27< ***Important: decoders with a NEM652 connector do not have uploaded file map.txt and output mapping is set successively by default starting from F0***

Also, output mapping is possible via the **RailBOX Railroad control mobile application.**

• If the RB 2300 AND RB2310 decoder has already been assigned in RailBOX Railroad control application, then go to "loco editor" by pressing on the loco picture • Press the "edit CV" Button and go to the list of decoder CVs	

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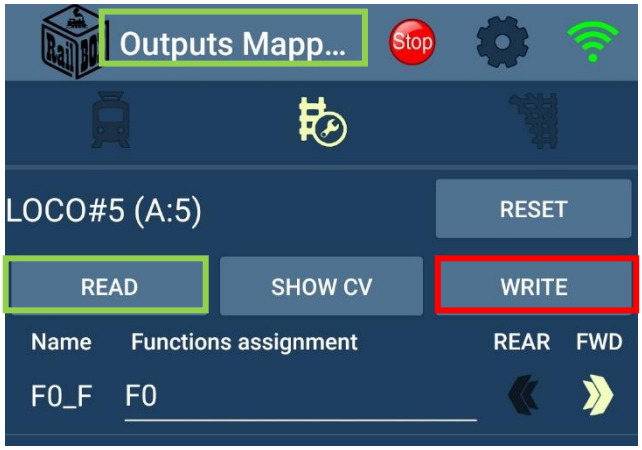
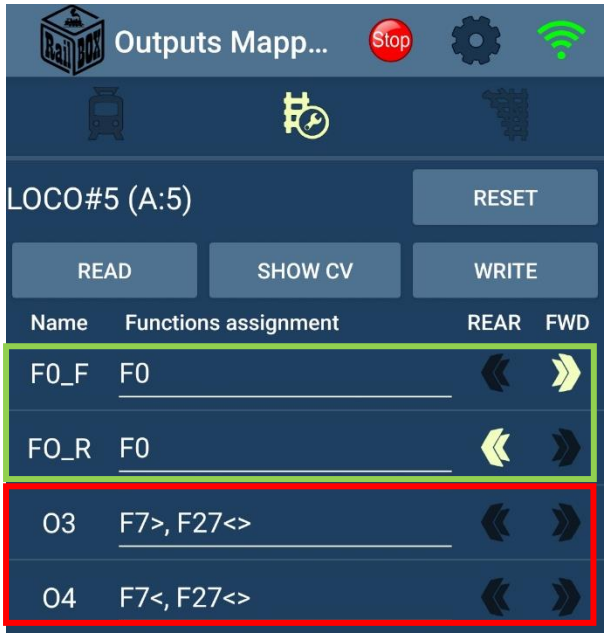
• Next, press "OUTPUTS MAPPING" at the top of the screen	
• Press "Read" If you want to see the default decoder mapping • Enter the necessary changes in the appropriate lines using F "function number" or several functions separated by a comma, and mark the direction of travel with the arrows or use the < > symbols if you have different direction options for the selected functions **Important: if you use different direction options for several functions mapped to the same output, use only the <> symbols, leaving the arrows blank** • Make sure that the selected loco with the decoder is on the programming track, and then press "Write" and wait for the changes to be uploaded into the decoder	 

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Basic sound playback automation:

Uploading file **logic.txt** into the decoder is not necessary, but it allows you to set the basic automation of sound playback, as well as lighting effects (from software version. 1.3), and the ability to mute sounds to the specified level via a single function. Use web generator for logical functions at www.railbox.pl/sounds to create your own sound playback logic

Available logical functions:

***START*:** allows you to play the selected sound at a set time at the start of locomotive travel (it is necessary to indicate the parameters L and D)

Example1:

F3_START_L1500_D1000

Where F3 - horn playback function, means that for 1sec. (D = 1000ms) after the locomotive starts moving, a horn signal of 1.5 sec long will be played. (L = 1500ms)

Example2:

F15_START_L2500_D2000_R2

Where F15 – the function to play the announcement of the next station, means that 2sec. (D = 2000ms) after every second (R = 2) start of the locomotive moving, the announcement of the next station will be played (L = 2500ms, this is the actual length of the announcement)

STOP*:* allows you to play the selected sound at a specified time when stopping the locomotive (it is necessary to indicate the parameters L and D)

Example1:

F16_STOP_L25000_D1000

Where F16-the function of playing the station announcement about arrival of the train, means that 1sec. (D = -1000ms) after locomotive stops it will start play the announcement 25sec. long (L = 25000ms, this is the actual length of the announcement)

Example2:

F26_STOP_L1500_D1000_R2

Where F26-the function of playing the sound of opening the door in the passenger wagon, means that 1sec. (D = 1000ms) after every second (R = 2) stopping of the locomotive, the sound of opening the door in the wagon will be played (L = 1500ms, this is the actual length of the sound of opening the door in the car)

ESTOP - **"Emergency stop"** - allows you to play sound at a fixed time using rapid emergency braking (it is necessary to indicate the parameters L and D)

Important: activation of the emergency stop of the train in the RailBOX Railroad control application is possible by a quick double tap on the "STOP" button at loco control panel, then braking by default takes about 2 seconds.

Example1:

F2_ESTOP_L1500_D200

Where F24 - high horn signal playback function, means 0.2 sec. (D = 200ms) after activation of the locomotive ESTOP, it will start playing the hornt sound for 1.5 sec. (L = 1500ms)

Example2:

F24_STOP_L3500_D1000

Default logic functions for EP08:

F2_L1500_ESTOP_D200

F4_BLOCK_F1

F6_BLOCK_F12

F9_BLOCKDRV

F10_BLOCKDRV

F11_BLOCKDRV

F14_BLOCKDRV

F15_BLOCKDRV

F16_BLOCKDRV

F20_BLOCKDRV

F25_BLOCKDRV

F26_BLOCKDRV

F17_L4000_DCL_V300

F21_ACCDCL_V500_L4000

F13_DCL_V200_L4000

Default logic functions for BR232:

F2_L1500_ESTOP_D200

F6_BLOCK_F12

F9_BLOCKDRV

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Where F24 - audio playback function of the radio connection, means 1sec. (D = 1000ms) after the locomotive emergency stop, the radio call sound will be played (L = 3500ms, this is the actual length of the radio call sound) **ON - "Turn on function"** - allows you to play the selected sound at a specified time after turning on the trigger function (it is necessary to specify the parameters L and D) *Example:* *F9_L1500_F25_ON_D6000* *Where F9 – the function of playing the conductor's whistle, means that 6secs. (D = 6000ms) after the F25 trigger function is activated - the sound of opening the door in the passenger wagon, the whistle will start playing for 1.5 seconds. (L = 1500ms, this is the actual length of the whistle sound)* **OFF – "Turn off function"** - allows you to play the selected sound at a specified time after turning off the trigger function (it is necessary to indicate the trigger function and parameters L and D) *Example:* *F18_L1500_F25_OFF_D1000* *Where F18 – the function of playing the pressure drop, means that 1sec. (D = 1000ms) after you turn off the F25 trigger function-the sound of closing the door in the passenger wagon, it will start playing the sound of the pressure drop for 1.5 seconds. (L = 1500ms, this is the actual length of the pressure drop sound)* **ONOFF – "turn on and off function"** - allows you to play the selected sound at a specified time when the trigger function is turned on or off (it is necessary to indicate the trigger function and the parameters L, D and R (preferably odd)) *Example:* *F19_L4000_F25_ONOFF_D1000_R5* *Where F18 – compressor sound playback function, means 1sec. (D = 1000ms) after every fifth (R5 odd) turn on/off (first time on, next time off) of the F25 trigger function – the sound of opening/closing doors in the wagon, will start playing the sound of the compressor for 4 seconds. (L = 4000ms)* **LON** - allows you to completely play the selected sound type ON at a specified time when the trigger function is turned on (it is necessary to specify the trigger function and parameter D) *Example:* *F10_LON_F6_ON_D4000* *Where F10 – coupling sound playback function, means 4sec. (D = 4000ms) after you turn on the trigger function F6-shunting mode, the ccoupling sound will be played.* **LOFF**-allows you to completely play the selected sound type OFF at a specified time after the trigger function is turned off (it is necessary to indicate the trigger function and parameter D) *Example:* *F14_LOFF_F25_OFF_D1000* *Where F14-brake release sound playback function, means 1sec. (D = 1000ms) after you turn off the F25 trigger function-the sound of closing the door in the wagon, the sound of releasing the brake will be played*	F10_BLOCKDRV F11_BLOCKDRV F14_BLOCKDRV F20_BLOCKDRV F17_L4000_DCL_V300 F19_L4000_ACC_V200 F21_L4000_ACCDCL_V500 F13_DCL_V200_L4000 **Default logic functions for Tp1:** F2_ESTOP_D200 F9_BLOCKDRV F10_BLOCKDRV F11_BLOCKDRV F14_BLOCKDRV F15_BLOCKDRV F16_BLOCKDRV F20_BLOCKDRV F21_BLOCKDRV F24_BLOCKDRV F17_L4000_DCL_V300 F21_ACCDCL_V500_L4000 F19_ACC_V500_L4000 F13_DCL_V200_L4000

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BLOCK - allows you to block the playback of the indicated function by turning on the trigger function (it is necessary to indicate the trigger function and the function that will be blocked)

Example:

F6_BLOCK_F12

Where F12-the function of playing the sound of the wheels, means that when you turn on the trigger function F6-shunting mode, the sound of the wheels will be completely muted

BLOCKDRV - allows you to block the audio playback of the indicated function while driving (it is necessary to indicate the function that will be blocked while driving)

Example:

F15_BLOCKDRV

Where F15-the function of playing the station announcement, means that while driving the playback of the announcement sound will be impossible

ACC – "Acceleration" - allows you to play the sound depending on the total value of the acceleration of the locomotive (it is necessary to indicate the parameters L and V)

Example:

F19_L4000_ACC_V200

Where F19 - the function of playing the sound of the oil pump, means that this sound of 4 sec.long (L = 4000ms) will be played when the total acceleration value reaches 200% (V = 200), where 100% is the total acceleration from 0 to 100%

DCL – „Deceleration" allows you to play the sound depending on the total speeding down value of the locomotive (it is necessary to indicate the parameters L and V)

Example 1:

F21_L4000_DCL_V300

Where F19 – the function of playing the wheels screech on the rail turns, means that this sound of 4 sec. Long (L = 4000ms) will be played when the total speeding down value reaches 300% (V = 300), where 100% is the total deceleration from 0 to 100%

Example2:

F21_L4000_ACCDCL_V500

Where F19 – sanding playback function, means that this sound of 4 sec. Long (L = 4000ms) will be played when the total value of acceleration and deceleration will reach the value 500% (V = 500), where 100% - is the total acceleration/decelaration from 0 to 100%

DIM - "Dim the light" is a lighting logic function that allows you to reduce the brightness of selected lights when the indicated function is turned on (it is necessary to indicate the parameter V) (software version above 1.3)

Example:

F6_DIM_F0_V50

Where F6 is the function reducing the brightness of the lamps of function F0 to 50%

VOL – "Volume" is a logical function that allows you to mute all sounds to the specified level (it is necessary to specify the parameter V) (software version above 1.3)

Example: *F23_VOL_V50* *Where F23-reduces all sounds to a 50%volume* **Additional logical parameters:** **L - "Length"** – the length of sound playback, which in different cases can be the actual length of the sound (sound type "ON" and "ON-LOOP-OFF") or automatically shortened if necessary to adapt to the specific situation (sound type "ON-LOOP_OFF") **R – "Repeat"** – means repeating the sound, where R1 means repeating each time (if you do not specify the parameter R, by default R1), and R2 means repeating every other time and so on. **D - "Delay"** - delay sound playback **V - "Value"** - a value indicating, as a percentage, the total value of acceleration (ACC), deceleration (DCL), or brightness (DIM), and sound volume (VOL)	

Tips on programming CVs

You can upload a dedicated file (**cv.txt**) for programming CVs directly into decoder. You can specify and set some important CVs in that file like address and PID settings for specific loco model. Just write down in a column CVs you want to set as default for this loco model and upload it into appropriate sound pack folder:

cv1=3
cv50=40
cv51=130

By uploading this into decoder you'll prevent the loss of it, even after reset to factory settings decoder will automatically upload this file and CVs that set in it as default values for featured CVs. All CVs and their descriptions are in the below table.

CV configuration settings table:

CV	Value	Default value	Description
1	1..127	3	Decoder address
2	0..127	4	Minimum speed: Minimum speed (starting voltage)
3	0..255	34	Acceleration time: 4 - acceleration from 0 to maximum speed in 1 s 8 - acceleration from 0 to maximum speed in 2 s
4	0..255	25	Deceleration time: 4 - deceleration from maximum to minimum speed in 1 s 8 - deceleration from maximum to minimum speed in 2 s
5	0..255	255	Maximum speed: Actual maximum speed of the locomotive compared to the speed in %
6	10..200	127	Average speed: Together with the maximum (CV5) and minimum speed (CV2) are used to create a speed curve

CV	Value	Default value	Description
7			Software version: Read only
8	0..255	172	Manufacturer ID / Decoder reset: Manufacturer code / Write value 1 to reset decoder to factory settings
110	0..100	23	Product code 1: Product code 1, read only. Value X of the product code in format RBXXYY
111	0..100	0	Product code 2: Product code 2, read only. Value Y of the product code in format RBXXYY
17	192..231	192	Long address (higher byte): Long decoder address (CV17 and 18). To turn on: CV29 set 5 bit in CV29
18	0..255	3	Long address (lower byte): Same as CV17
19	0..127	0	Address for multiple traction: If CV #19 > 0: speed and direction are defined by this address
28	bit		Railcom Configuration
	0	0	Decoder address transmission in the first channel CH1: 0-off, 1-on
	1	1	Enabling the second channel CH2: 0-off, 1-on
	7	1	Enable automatic detection system: 0-off, 1-on
29	bit		Decoder configuration 1
	0	0	Locomotive direction: 0-normal, 1-reversed
	1	1	Number of speed steps: 0-14/27, 1-28/128
	3	1	RailCom: 0-disabled, 1-enabled
	5	0	Address type: 0-Short address in CV1, 1-Long address in CV17 and CV18
112	0..135	0	Lighting effect, output 1: 0: light bulb 1: flashing with frequency 1 (frequency in CV 133) 2: flashing with frequency 1 (reverse) 3: flashing with frequency 2 (frequency in CV 134) 4: flashing with frequency 2 (reverse) 5: short pulse with time with CV137 6: first own sequence (CV139-151) 7: second own sequence (CV151-164) 9: Servo Mode -- Additional effects -- + 16 enables light intensity fade in during time from CV135 + 32 enables light intensity fade in during time from CV136 + 64 enables light intensity fade in during 500 ms + 128 to the CV value will disable own sequence after 1 execution.
113	0..135	0	Lighting effect, output 2: Same as CV112

CV	Value	Default value	Description
114	0..135	0	Lighting effect, output 3: Same as CV112
115	0..135	0	Lighting effect, output 4: Same as CV112
116	0..135	0	Lighting effect, output 5: Same as CV112
117	0..135	0	Lighting effect, output 6: Same as CV112
118	0..135	0	Lighting effect, output 7: Same as CV112
212	0..135	0	Lighting effect, output 8: Same as CV112
213	0..135	0	Lighting effect, output 9: Same as CV112
214	0..135	0	Lighting effect, output 10: Same as CV112
215	0..135	0	Lighting effect, output 11: Same as CV112
119	0..255	255	Maximum brightness, output 1
120	0..255	255	Maximum brightness, output 2
121	0..255	255	Maximum brightness, output 3
122	0..255	255	Maximum brightness, output 4
123	0..255	255	Maximum brightness, output 5
124	0..255	255	Maximum brightness, output 6
125	0..255	255	Maximum brightness, output 7
219	0..255	255	Maximum brightness, output 8
220	0..255	255	Maximum brightness, output 9
221	0..255	255	Maximum brightness, output 10
222	0..255	255	Maximum brightness, output 11
133	0..255	100	Flashing period 1: Flashing period 1 (value x 10 msec)
134	0..255	100	Flashing period 2: Same as CV133
135	0..255	20	Light intensity fade in time 1
136	0..255	50	Light intensity fade in time 2
137	0..255	1	Single flash time: Single flash time (value x 10 msec)
138	0..255	1	Own sequences step time
139			First own sequence, beginning: First own sequence CV139-CV151 write one byte of sequence at a time ---------- 1 Factory sequence ---------- 0xB5, 0xFD, 0x6F, 0xF7, 0xB5, 0xFD, 0x6F, 0xF7, 0xB5, 0xFD, 0x6F, 0xF7, 0xB5

CV	Value	Default value	Description
151			First own sequence, end
152			Second own sequence, beginning: Second own sequence CV152-CV164 write one byte of sequence at a time ---------- 2 factory sequence ---------- 0xC7, 0x9F, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF
164			Second own sequence, end
165	0..28	6	Shunting mode function number
50	0..255	40	PID KP (fast driving): Proportional coefficient for fast driving
51	0..255	130	PID KP (slow driving): Same as CV50
54	0..40	7	PID KD (fast driving): Differential coefficient for fast driving
55	0..40	12	PID KD (slow driving): Same as CV54
58	40..160	80	BackEMF: PID interval
59	6..20	6	BackEMF: measurement delay
60	30..90	90	BackEMF: Voltage at maximum speed
61	0..255	10	Acceleration time (shunting mode): 4 - acceleration from 0 to maximum speed in 1 s 8 - acceleration from 0 to maximum speed in 2 s
62	0..255	10	Deceleration time (shunting mode): 4 - deceleration from maximum to minimum speed in 1 s 8 - deceleration from maximum to minimum speed in 2 s
63	0..255	10	Start delay: Driving start delay time (value x 100 ms)
64	bit		Pins configuration
	0	0	SUSI: 0-on, 1-off
	1	0	O12(GPIO/C) as input IN1: 0-on, 1-off
	3	0	Inverted O12(GPIO/C): 0-No, 1-Yes
192	0..68	1	Function volume (Function number): CV192 - Function Number, CV193 - volume from 1 to 200%. Value 0 - factory setting (i.e., 100%). First, enter the function number to configure in CV192. Use CV193 to configure the volume level.
193	0..200	100	Function volume (Level): Same as CV192
200	0..100	28	Wi-Fi function: Set value >68 to turn off Wi-Fi function

CV	Value	Default value	Description
201	20..80	40	Wi-Fi signal strength: 20 - 5dBm, 80 - 20dBm
202	1..3	1	Sound pack number
203	0..255	64	Volume: Sound playback volume. Values above 64 may cause interference.
204	0..100	35	Smoothness of sound functions changes: Value x 10 ms
205	0..100	95	Smoothness of engine sound changes: File length value in %, but not less than value from CV204
206	0..100	22	Mute braking sound: Braking sound mute function number
207	0..100	23	Mute all sounds at once: Function number to mute all sounds at once
208	bit		Disabling logical operations
	0	0	Complete logic disabling: 0-off, 1-on
	1	0	Disabling of periodic sounds: 0-off, 1-on
	2	0	Disabling of function blocking: 0-off, 1-on
	3	0	Disabling of start sounds: 0-off, 1-on
	4	0	Disabling of stop sounds: 0-off, 1-on
209	0..1	0	21MTC connector standard: 21MTC connector standard. 0 - NEM660. AUX3 i AUX4 as logic outputs. 1 - MKL - AUX3 i AUX4 as power outputs.
210	1..255	100	Frequency of Fx_LOOP_Px sounds: Configuration of the frequency of the "chiu-chiu" sounds (Fx_LOOP_Px). Repetition period = x * (CV210 / 100) / speed
126	0..255	0	Minimum brightness, output 1
127	0..255	0	Minimum brightness, output 2
128	0..255	0	Minimum brightness, output 3
129	0..255	0	Minimum brightness, output 4
130	0..255	0	Minimum brightness, output 5
131	0..255	0	Minimum brightness, output 6
132	0..255	0	Minimum brightness, output 7
226	0..255	0	Minimum brightness, output 8
227	0..255	0	Minimum brightness, output 9
228	0..255	0	Minimum brightness, output 10
229	0..255	0	Minimum brightness, output 11