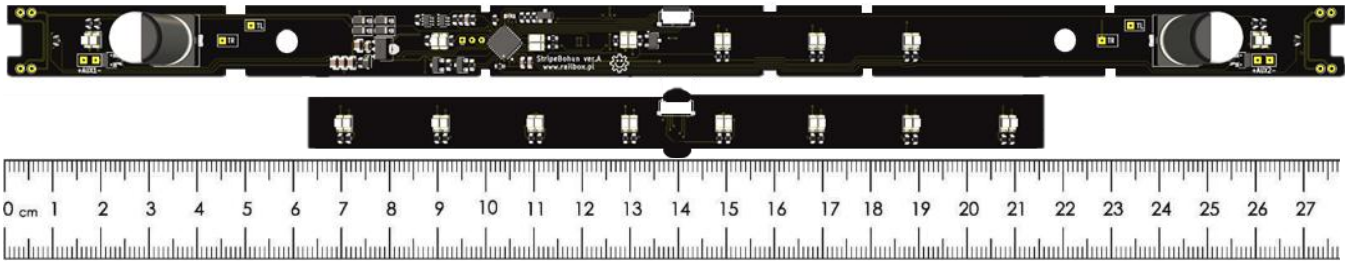
Lighting for double-decker carriages RB2150



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Application:

RB 2150 rail for double-decker carriages in H0 scale with length over buffers 308mm (eg. PIKO5762X) of the Polish, Czech, German and other railways. The Strip is equipped with a DCC decoder and can dynamically change the color of the light and in addition independently of some selected lamps. The strip works in DCC mode and in "analog", supports the Railcom® protocol and all systems of automatic detection by the command station, including DCCA.

Main functions:

- **Dynamic lighting control** – the strip allows full adjustment of the general interior lighting color (from warm to neutral), as well as independent color control of selected LEDs through CV settings.
- **Built-in Hall sensor** – enables quick sequential switching of interior and end lights using a magnetic wand (details available *here*).
- **Automatic direction detection** – recognizes train movement direction in both DCC and analog modes.

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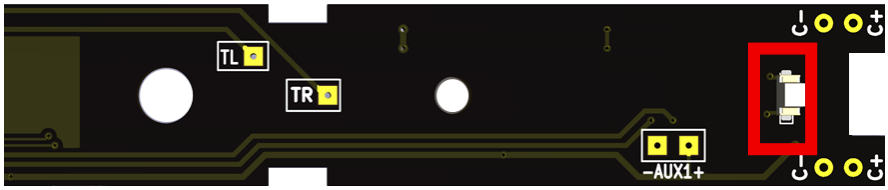
- **On-board energy storage** – includes built-in capacitors 940 µF in total, with four additional solder pads to expand capacity further.
- **Easy configuration via the RailBOX: Railroad Control app (more here)**
- **Two high-voltage auxiliary outputs (AUX1 and AUX2 ~16 V)** – for connecting additional lighting or accessories.
- **Fully mappable outputs** – each LED can be freely assigned to any DCC function key.
- **Lighting effects** – supports a wide range of programmable light animations (demo video available *here*).
- **Compatible with DCC and analog operation** (not compatible with Motorola®, Märklin® MFX®).
- **RailCom® and DCCA® support** – ensures full compatibility with advanced communication and automatic decoder-recognition systems.

Technical parameters:

- **Strip dimensions-14.5 x 277 mm (top), 11 x 153 mm (bottom).**
- **Power supply - 7-20 V AC / DC or DCC.**
- **DC power consumption-25 mA**

Connection: description of outputs on the board

- TR – right rail
- "TL"– left rail
- "- AUX1+ ""–AUX2+ " - high voltage outputs (≈16V)
- " C+ " – anode of external electrolytic capacitors (outputs have a diode and a 100 Ohm resistor for proper operation of the CV recording mechanism)
- "C -" – cathode of external electrolytic capacitors
- Red side emitting LEDs to illuminate optical fiber plates for end lights



RB2150 connection diagram to the current collectors and connecting external elements

Important: the connection of the strip to the current collectors must be made in accordance with the design of the bogies of the model that allows current to be drawn from one or both pairs of bogie wheels. **To light the ends, we use original plastic fibers that are connected to a dedicated LED.**

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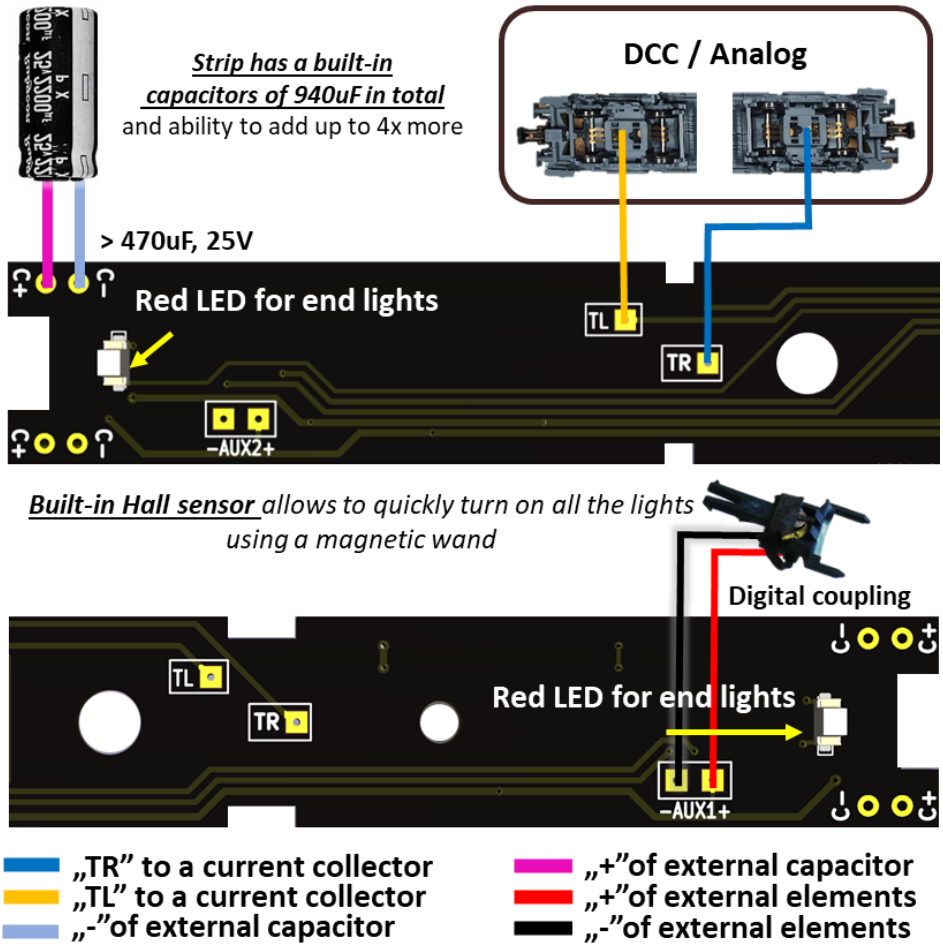

The built-in Hall sensor allows you to control the lighting in the following sequence:

- **First tap with the "wand" - turns on all internal lights at the same time**
- **Second touch-additionally turns on the end lights (lights on one side of the carriage)**
- **Third touch-changes the direction of glow for end lights**
- **Fourth touch-turns off all lights**

Installation of the lighting strips step by step

Note: For the installation of the strip inside the model carriage in addition to the set you only need tools such as soldering device and glue or double side tape to fix the strip in its place.

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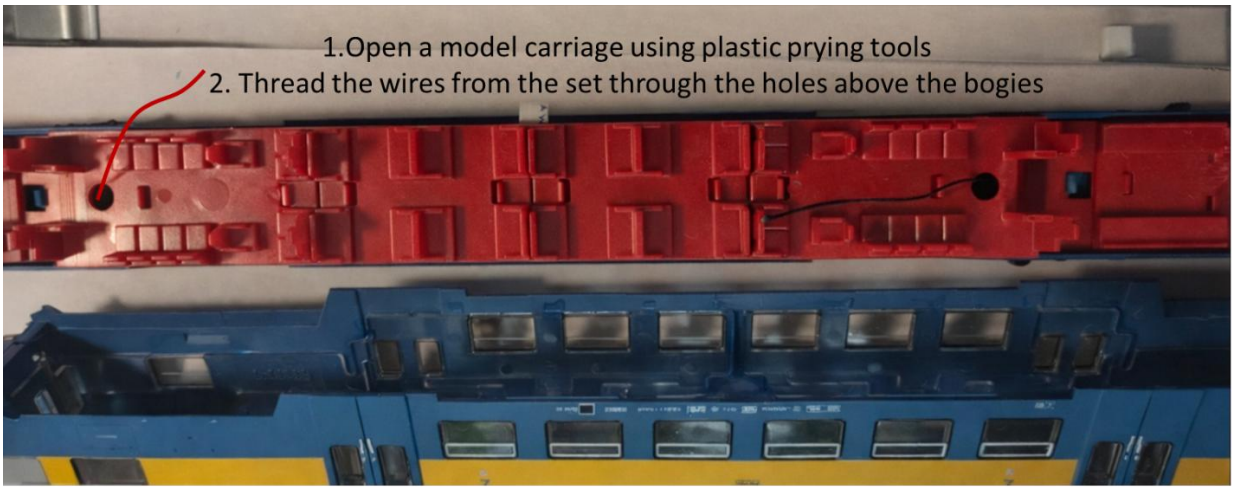
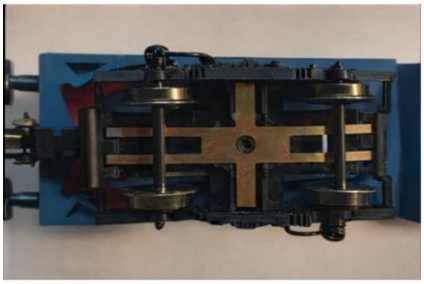
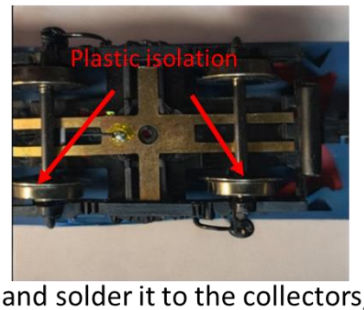
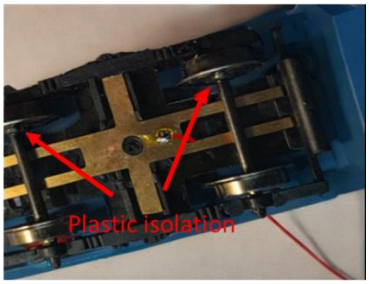


3. Turn over the model carriage and insert the current collectors from the set as shown

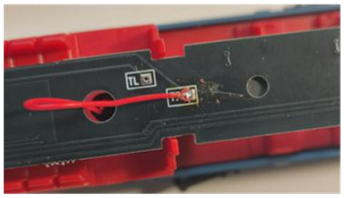






4.Thread out the wires and solder it to the collectors, paying attention to the positioning of plastic isolation on the wheel axis (must be opposite)

5. Prepare the strip by removing technical connectors along perforation
6. Insert the shorter bottom part of the strip as shown and glue it in place using double side tape



7. Insert back the carriage interior and thread wires further up through the holes in the upper strip
8. Solder wires in accordance with the picture above: to the right and left side (one to TR another to TL)

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Programming the decoder

Programming can be performed in Programming track or POM mode.

Connecting to the RailBOX app: Railroad Control

This symbol indicates easy setup. All RailBOX products that have this symbol on the board or this sticker on the case provide two-way communication (Railcom® protocol) with switches that support Railcom:

- **Automatic detection of new decoders connected to tracks and the ability to automatically determine the decoder address (only with the control panel, for example, Wi-Fi control panel RB 1110)**
- **Ability to read and write configuration variables at any time on the main track (POM)**
- **Ability to set a short decoder name (POM) for quick device identification in the RailBOX app: Railroad Control**

Users of RailBOX prefixes with a symbol and the RB 1110 switch no longer need to accept the configuration of addresses of decoders (accessories, wagon and locomotive decoder RailBOX), just connect the new device to the tracks (switch), and the system will automatically find another free Address and transmit it to the decoder. In the RailBOX: Railroad Control app, a new locomotive or accessory with the address already set will automatically appear.

Dodaj ten dekoder w aplikacji RailBOX: Railroad control

Table of CV address settings for the decoder

CV	Meaning	value default	value Description
1	1..127	3	decoder address
7	0..255		decoder software version
8	0..255	172	manufacturer's code / decoder reset: manufacturer's code / writing value 1 resets the decoder to factory settings
settings 110	0..100	21	product code 1: read-only product code 1. The x value of the product code in the format RBXXYY
111	0..100	50	Product code 2: read-only product code 1. The Y value of the product code in the format RBXXYY
as Cv110 13	bits		analog mode 1, state F1-F8
	0	1	F1: 0-off, 1-on
	1	1	F2: 0 - off, 1-on
	2	1	F3: 0 - off, 1-on
	.3	1	F4: 0-off, 1-on

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CV	Meaning	value default	value Description
	4	1	F5: 0 - off, 1-on
	5	1	F6: 0 - off, 1-on
	6	1	F7: 0-off, 1-on
	7	1	F8: 0-off., 1-on
. 14	bit		analog mode 2, FL state, F9-F12
	0	1	F0f: 0-off, 1-on
	1	1	F0r: 0 - off, 1-on
	2	1	F9: 0-off, 1-on
	3	1	F10: 0-off, 1-on
	4	1	F11: 0-off, 1-on
	5	1	F12: 0 - off, 1-on
17	192..231	192	long address (higher byte): long decoder address (CV17 and 18). Enable: cv29 set bit 5 to CV29
18	0..255	100	long address (lower byte): just like CV17
19	0..127	0	Address for the specified traction: if CV #19 > 0: speed and direction are determined by this address
28	bits		Railcom configuration
	0	0	transmitting the decoder address on the first channel CH1: 0-off, 1-on
	1	1	enabling the second channel CH2: 0-off, 1-on
	7	1	Enabling automatic recognition system: 0-off, 1-on
29	bits		decoder configuration 1
	1	1	Number of speed stages: 0-14 / 27, 1-28/128
	2	1	Analog mode: 0-exclusively DCC, 1-yes
	3	1	RailCom: 0-disabled, 1-enabled
	5	0	address type: 0-short address in CV1, 1-long address in CV17 and CV18
56	bits		color configuration of selected bulbs
	0	0	output 'down lamp 2': 0-CV58, 1-CV90

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CV	Meaning	value default	value Description
	1	0	output 'down lamp 4': 0-CV58, 1-CV91
	2	0	output ' up Light bulb lamp 1': 0-CV58, 1-CV92
	3	0	output 'lamp mount 2': 0-CV58, 1-CV93
	4	0	output 'lamp mount 6': 0-CV58, 1-CV94
58	0..255	0	main color of light bulbs
90	0..255	0	output color 'down light bulb 2'
91	0..255	0	output color 'down light bulb 4'
92	0..255	0	output color 'top light bulb 1'
93	0..255	0	output color 'top light bulb 2'
94	0..255	0	output color 'top light bulb 4'
33	0..139	0	light effect, output F0_F: 0: light bulb 1: flashing at frequency 1 (frequency in CV 49) 2: flashing at frequency 1 (reverse) 3: flashing at frequency 2 (Frequency in CV 50) 4: flashing at frequency 2 (reverse) 5: short pulse over time with CV53 6: first own sequence (CV60-72) 7: second own sequence (CV73-85) 10: fluorescent lamp 11: fluorescent lamp old -- additional effects -- + 16 enables smooth switching with time from CV51 + 32 enables smooth switching with time from CV52 + 64 enables smooth switching with time of 500 ms + 128 to CV value disables your own sequence after 1 execution.
34	0..139	0	light effect, output F0_R: same as CV33
35	0..139	0	light effect, output 'down': just like CV33
36	0..139	0	light effect, exit 'down door': just like CV33
37	0..139	0	light effect, output 'up': just like CV33
38	0..139	0	light effect, output 'Top 2': just like CV33
39	0..139	0	light effect, output 'down lamp 2': just like CV33
40	0..139	0	light effect, output 'down lamp 4': just like CV33
100	0..139	0	light effect, output 'lamp mount 1': just like CV33

CV	Meaning	value default	value Description
101	0..139	0	light effect, output 'lamp mount 2': just like CV33
102	0..139	0	light effect, output 'lamp mount 6': just like CV33
103	0..139	0	light effect, AUX1 output: same as CV33
104	0..139	0	light effect, AUX2 output: same as CV33
41	0..255	255	maximum brightness, output F0_F
42	0..255	255	maximum brightness, output F0_R
43	0..255	255	maximum brightness, output 'down'
44	0..255	255	maximum brightness, exit 'down door'
45	0..255	255	maximum brightness, output ' top '
46	0..255	255	maximum brightness, output 'Top 2'
47	0..255	255	maximum brightness, output 'down lamp 2'
48	0..255	255	max brightness, output 'down lamp 4'
112	0..255	255	max brightness, output lamp 1
113	0..255	255	maximum brightness, output lamp 2 '
114	0..255	255	maximum brightness, output lamp 6 '
115	0..255	255	maximum brightness, AUX1
output 116	0..255	255	maximum brightness, AUX2 output
49	0..255	100	flash period 1: flash period 1 (value x 10 msec)
50	0..255	100	flash period 2: same as CV49
51	0..255	10	smooth switching time 1
52	0..255	50	smooth switching time 2
53	0..255	1	single flash time
54	0..255	1	step time of own sequences
55	0..1	1	power-up output state: 1- Remember the output state when the decoder power is turned off 0-do not remember
57	0..68	15	function number for the Hall sensor: function number to activate when controlled with a 'stick'
60			first own sequence, start: first own sequence CV60-CV72 enter one byte of the sequence each---------- 1 factory sequence ---------- 0xB5, 0xFD, 0x6F,0xf7,0xB5,0xFD,0x6F,0xF7, 0xB5,0xFD, 0x6F,0xF7, 0xB5
72			first own sequence, end
73			second own sequence, start: the second own sequence is CV73-CV85 ---------- 2 factory sequence---------- 0xC7, 0x9F,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xff,0xff, 0xff
85			second own sequence, end

Output configuration table (mapping):

Summary	description	set. Fabr.	Bit							
			7 Down L4	6 Down L2	5 Upper2	4 Upper 1	By 3 Down door,	2 Down,	1 F0_R	0 F0_F
120	F0 (forward FL)	1	0	0	0	0	0	0	0	1
121	F0 (back FR)	2	0	0	0	0	0	0	1	0
122	F1 (forward)	196	1	1	0	0	0	1	0	0
123	F1 (back)	196	1	1	0	0	0	1	0	0
124	F2 (forward)	8	0	0	0	0	1	0	0	0
125	F2 (back)	8	0	0	0	0	1	0	0	0
126	F3 (forward)	16	0	0	0	1	0	0	0	0
127	F3 (back)	16	0	0	0	1	0	0	0	0
128	F4 (forward)	32	0	0	1	0	0	0	0	0
129	F4 (back)	32	0	0	1	0	0	0	0	0
130	F5 (forward)	0	0	0	0	0	0	0	0	0
131	F5 (back)	0	0	0	0	0	0	0	0	0
132	F6 (forward)	0	0	0	0	0	0	0	0	0
133	F6 (back)	0	0	0	0	0	0	0	0	0
134	F7 (forward)	0	0	0	0	0	0	0	0	0
135	F7 (back)	0	0	0	0	0	0	0	0	0
136	F8 (forward)	0	0	0	0	0	0	0	0	0
137	F8 (back)	0	0	0	0	0	0	0	0	0
138	F9 (forward)	0	0	0	0	0	0	0	0	0
139	F9 (back)	0	0	0	0	0	0	0	0	0
140	F10 (front)	0	0	0	0	0	0	0	0	0
141	F10 (back)	0	0	0	0	0	0	0	0	0
142	F11 (forward)	0	0	0	0	0	0	0	0	0
143	F11 (back)	0	0	0	0	0	0	0	0	0
144	F12 (forward)	0	0	0	0	0	0	0	0	0
145	F12 (back)	0	0	0	0	0	0	0	0	0
146	F13 (forward)	0	0	0	0	0	0	0	0	0
147	F13 (back)	0	0	0	0	0	0	0	0	0
148	F14 (forward)	0	0	0	0	0	0	0	0	0
149	F14 (back)	0	0	0	0	0	0	0	0	0
150	F15 (forward)	252	1	1	1	1	1	1	0	0
151	F15 (back)	252	1	1	1	1	1	1	0	0
152	F16 (forward)	0	0	0	0	0	0	0	0	0
153	F16 (back)	0	0	0	0	0	0	0	0	0
154	F17 (forward)	0	0	0	0	0	0	0	0	0
155	F17 (back)	0	0	0	0	0	0	0	0	0
156	F18 (forward)	0	0	0	0	0	0	0	0	0
157	F18 (back)	0	0	0	0	0	0	0	0	0
158	F19 (forward)	0	0	0	0	0	0	0	0	0
159	F19 (back)	0	0	0	0	0	0	0	0	0
160	F20 (forward)	0	0	0	0	0	0	0	0	0
161	F20 (back)	0	0	0	0	0	0	0	0	0

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Summary	description	set. Fabr.	Bit							
			7 Down L4	6 Down L2	5 Upper2	4 Upper 1	By 3 Down door,	2 Down,	1 F0_R	0 F0_F
163	F21 (back)	0	0	0	0	0	0	0	0	0
164	F22 (forward)	0	0	0	0	0	0	0	0	0
165	F22 (back)	0	0	0	0	0	0	0	0	0
166	F23 (forward)	0	0	0	0	0	0	0	0	0
167	F23 (back)	0	0	0	0	0	0	0	0	0
168	F24 (forward)	0	0	0	0	0	0	0	0	0
169	F24 (back)	0	0	0	0	0	0	0	0	0
170	F25 (forward)	0	0	0	0	0	0	0	0	0
171	F25 (back)	0	0	0	0	0	0	0	0	0
172	F26 (forward)	0	0	0	0	0	0	0	0	0
173	F26 (back)	0	0	0	0	0	0	0	0	0
174	F27 (forward)	0	0	0	0	0	0	0	0	0
175	F27 (back)	0	0	0	0	0	0	0	0	0
176	F28 (forward)	0	0	0	0	0	0	0	0	0
177	F28 (back)	0	0	0	0	0	0	0	0	0

Summary	description	set. Fab.	Bit							
			7	6	5	4 AUX2	3 AUX1	2 Top L6	1 Top L2	0 Top L1
190	F0 (forward FL)	0	0	0	0	0	0	0	0	0
191	F0 (back FR)	0	0	0	0	0	0	0	0	0
192	F1 (forward)	0	0	0	0	0	0	0	0	0
193	F1 (back)	0	0	0	0	0	0	0	0	0
194	F2 (forward)	0	0	0	0	0	0	0	0	0
195	F2 (back)	0	0	0	0	0	0	0	0	0
196	F3 (forward)	7	0	0	0	0	0	1	1	1
197	F3 (back)	7	0	0	0	0	0	1	1	1
198	F4 (forward)	0	0	0	0	0	0	0	0	0
199	F4 (back)	0	0	0	0	0	0	0	0	0
200	F5 (forward)	8	0	0	0	0	1	0	0	0
201	F5 (back)	8	0	0	0	0	1	0	0	0
202	F6 (forward)	16	0	0	0	1	0	0	0	0
203	F6 (back)	16	0	0	0	1	0	0	0	0
204	F7 (forward)	0	0	0	0	0	0	0	0	0
205	F7 (back)	0	0	0	0	0	0	0	0	0
206	F8 (forward)	0	0	0	0	0	0	0	0	0
207	F8 (back)	0	0	0	0	0	0	0	1	0
208	F9 (forward)	0	0	0	0	0	0	0	0	0
209	F9 (back)	0	0	0	0	0	0	0	0	0
210	F10 (front)	0	0	0	0	0	0	0	0	0
211	F10 (back)	0	0	0	0	0	0	0	0	0
212	F11 (forward)	0	0	0	0	0	0	0	0	0
213	F11 (back)	0	0	0	0	0	0	0	0	0

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Summary	description	set. Fab.	Bit							
			7	6	5	4 AUX2	3 AUX1	2 Top L6	1 Top L2	0 Top L1
214	F12 (forward)	0	0	0	0	0	0	0	0	0
215	F12 (back)	0	0	0	0	0	0	0	0	0
216	F13 (forward)	0	0	0	0	0	0	0	0	0
217	F13 (back)	0	0	0	0	0	0	0	0	0
218	F14 (forward)	0	0	0	0	0	0	0	0	0
219	F14 (back)	0	0	0	0	0	0	0	0	0
220	F15 (forward)	255	0	0	0	0	0	1	1	1
221	F15 (back)	255	0	0	0	0	0	1	1	1
222	F16 (forward)	0	0	0	0	0	0	0	0	0
223	F16 (back)	0	0	0	0	0	0	0	0	0
224	F17 (forward)	0	0	0	0	0	0	0	0	0
225	F17 (back)	0	0	0	0	0	0	0	0	0
226	F18 (forward)	0	0	0	0	0	0	0	0	0
227	F18 (back)	0	0	0	0	0	0	0	0	0
228	F19 (forward)	0	0	0	0	0	0	0	0	0
229	F19 (back)	0	0	0	0	0	0	0	0	0
230	F20 (forward)	0	0	0	0	0	0	0	0	0
231	F20 (back)	0	0	0	0	0	0	0	0	0
233	F21 (back)	0	0	0	0	0	0	0	0	0
234	F22 (forward)	0	0	0	0	0	0	0	0	0
235	F22 (back)	0	0	0	0	0	0	0	0	0
236	F23 (forward)	0	0	0	0	0	0	0	0	0
237	F23 (back)	0	0	0	0	0	0	0	0	0
238	F24 (forward)	0	0	0	0	0	0	0	0	0
239	F24 (back)	0	0	0	0	0	0	0	0	0
240	F25 (forward)	0	0	0	0	0	0	0	0	0
241	F25 (back)	0	0	0	0	0	0	0	0	0
242	F26 (forward)	0	0	0	0	0	0	0	0	0
243	F26 (back)	0	0	0	0	0	0	0	0	0
244	F27 (forward)	0	0	0	0	0	0	0	0	0
245	F27 (back)	0	0	0	0	0	0	0	0	0
246	F28 (forward)	0	0	0	0	0	0	0	0	0
247	F28 (back)	0	0	0	0	0	0	0	0	0

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