

Ge 4/4 I

16Bit
SOUND



Origin:

The Ge 4/4 I locomotives were manufactured in 1947 and 1953 by the Swiss Locomotive and Machine Factory (SLM) in Winterthur and delivered to the RhB. The entire series was modernized between 1986 and 1991. In its modernized version, the locomotive is also used on commuter trains. The locomotive has a distinctive sound due to the step switches for the motor control and the electric brake; the “clattering” of the electric brake steps is particularly noticeable when coming to a stop. The locomotive is equipped with a compressor to power the auxiliary units and a vacuum pump with up to three stages for the brake vacuum.
Source: Wikipedia

Implementation in the model:

The original recordings of the high-voltage step switch used in this model produce characteristic sounds. From the locomotive, you can mainly hear the fan and the commutator noise.

The pantographs supply the prototype with power. Without this power, none of the components can produce any sound. For this reason, the pantograph is not just a “nice-to-have” gadget that can be raised and lowered at will. Raising and lowering the pantograph is therefore tied to operational procedures.

Changing the direction of travel is only possible by turning the locomotive off and then back on, combined with raising and lowering the pantographs.

The locomotives were originally delivered with operating authorization lights—red on top and white on the bottom. With the modernization, the operating authorization lights were removed.

The Sound Project can be switched between a simple mode (F26 off) and a prototypical mode (F26 on).

F26 off is intended for smaller scales without powered pantographs. In this mode, all sequences are kept short.

F26 on is the prototypical mode. All states are based on the locomotive engineer’s work location.

A change in the locomotive engineer’s work location (e.g., at a terminal station) causes this locomotive to shut down with the pantographs lowered and then restart with the pantographs raised in the other cab. Sometimes you can hear the locomotive engineer walking through the locomotive. Simultaneous switching operations in both cabs could have immediately caused an electrical fire. For safety reasons, there was only one reversing switch handle per locomotive, which the engineer could only remove from the control console after shutting down the locomotive and reinsert it in the other cab, thereby forcing a brief shutdown of the locomotive.

During shunting maneuvers, the locomotive engineer always remains at the same workstation. Consequently, in shunting mode F4, neither the pantographs nor the front lights nor the cab light change. The direction of travel changes immediately. When reversing, the shunting supervisor takes over visual monitoring, which is indicated by a recurring beep.

With F10, you can repeat the yardmaster’s commands one after another by pressing the button multiple times.

To drive without sound but with the Panto lights on, press F26; to mute the sound, press F16, then press F8.

To drive with sound but without the Panto lights on, press F8.

To drive with sound and with the Panto lights on, press F8 and F26..

We’ve programmed the complex Swiss lighting system to be very easy for you to operate.

F0 turns on the white Swiss 3+1 lighting

F1 turns on 3 white + red

F5 turns on the cab lighting at the front in the direction of travel.

F18: Emergency lighting in the direction of travel—only 3 red lights; rear lighting remains unchanged

F19: Turns off the light on driver's cab side 1

F20: Turns off the light on driver's cab side 2

F23: Authorization lighting for travel on the wrong track of a double-track section.

The various lighting options and their corresponding function outputs are listed in the table below.

The function outputs are configured so that many options are also possible with decoders designed for narrow gauges and fewer outputs. To achieve this, the lower-left lamp must sometimes be wired in parallel with other lamps. The outputs for the lamps at the bottom left are therefore FA11 and 13 for cab 1 and FA10 and 12 for cab 2 (side), and are available as a premium function via the higher function outputs of the MS 990.

Please note that logic-level outputs can be amplified and inverted to standard outputs using the Zimo M4000Z.

To prevent outputs FA10 through 13 from being used for their intended lighting purposes, you can use CV 1019 set to value 2 to disable Pantoscript control for these outputs. Next, carefully remove the entries for these outputs from the NMRA mapping and the Zimo function mapping, and set the output properties to 0. After that, these outputs can be used freely. Once these steps are complete, it is possible to use these outputs for motorized pantograph drives. To do this, you must activate the "FA Control via Servo V2.0" script and select the outputs using the CVs (CV1010 and 1011). To modify such specialized features, it is essential to delve deeply into the technology of the Zimo decoder in order to understand its nearly limitless functional capabilities. We cannot provide any warranty for such modifications. Support from us in these matters amounts to paid training.

FA 9 is intended for the engine compartment lighting, which is turned on and off using F6.

When set to "off" with F26, no pantographs are raised, and they lower immediately and silently when the power is turned off.

The sound project is based on the Zimo Advanced Standard.

The MS decoder must have at least software version 5.29. The project is designed entirely for 16-bit decoders and requires far more than the 6 simultaneous sound channels supported by MX technology; therefore, the sound project cannot be used in MX decoders.

If you need support, please read out CVs 105, 106, 254, 255, 256, and 257 and provide them to us so we can clearly identify the sound project version you are using.

Warnings:

The values in CVs 3, 4, 5, 154, and 158 are relevant to this sound project. Changing them will cause the sound project to malfunction!

Under no circumstances should the maximum speed be set using CV 5; it must be set exclusively using CV 57.

The sound project enables Railcom by default in DCC mode. To operate using Märklin's proprietary MFX protocol, Railcom must be disabled and MFX enabled.

Special Features:

Users whose digital system does not yet support all 28 functions, or who prefer a different key layout for the functions, can use Zimo input mapping to reassign the functions to any function key as desired.

400+Fu number = CV of the function. Its value = number of the function key.

Default value 0: The function number is the key number.

Caution: You can assign multiple functions to a single key and you can invert them!

<http://www.zimo.at/web2010/documents/Zimo%20Eingangsmapping.pdf>

CV 401 Value 8

CV 408 Value 1

This example shows how to change the sound start from the internationally standard F8 to Key 1, and how the red taillights are then no longer controlled by Function 1 but by Key 8.

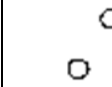
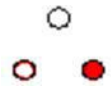
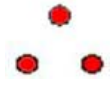
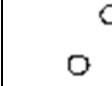
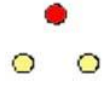
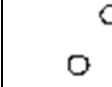
Note that Function 1 remains Function 1, and Function 8 remains Function 8; however, after the swap, they are controlled by different keys.

Function	Setup	Function Output	Sound Function
F0	Lights on	See Lighting Tables	
F1	Rear lights	See Lighting Tables	
F2	Whistle		Playable Whistle
F3	Conductor's whistle		Mouth Whistle
F4	Shunting mode: no light or pantograph changes		Reverse Beep
F5	Driver's cab lights in the direction of travel	FA5v FA6r	
F6	Engine compartment lighting	FA9	Mouth Whistle
F7	Normal/high beam in direction of travel	Fade in See Lighting Tables	
F8	Sound on/off	Servo 1 and 2	Panto Main Switch Idle Noise
F9	Curve squeal		Wheel-Rail Squeak
F10	Shunting mode: Length indication during reverse travel	Only works in reverse when F4 is on	Each time the function is toggled, another command is issued
F11	--		
F12	Uncoupling		Uncoupling
F13	Coupling		Coupling
F14	Brakes: Evacuation		Vacuum pump, 3rd stage
F15	Compressed air for pantographs		Compressor
F16	Tunnel fade		Fade in/out smoothly
F17	Station announcement 1		
F18	Warning signal: all lights in the direction of travel red	See Lighting Tables	
F19	Driver's cab side 1 dark		
F20	Driver's cab side 2 dark		
F21	Station announcement 2		Announcement for St. Moritz
F22	Station announcement 3		Announcement for Chur
F23	Authorization light: red, top front		
F24	Use pantograph 1	Servo 1	
F25	Use pantograph 2	Servo 2	
F26	Switch to prototype mode	Servo 1 + 2	
F27	Volume -		Quieter
F28	Volume +		Louder

Random effect	Noise	Effect
Z1 Script 9	Vacuum Pump in Travel Mode	
Z2 Script 9	Vacuum Pump	
Z3 Script 5	Compressor	
Z4		
Z5	Führerstandstür knallt zu	

Inputs	Noise	Effect
S1		
S2		
S3		

Swiss Light Mapping: Tabular Explanation

		Lfront 2 white LEDs, top front Lrear 2 white LEDs, top rear FA1 lower white LED, front left FA3 lower white LED, front right FA2 lower white LED, rear left FA4 lower white LED, rear right FA9 red LED, top front FA10 red LED, front rear FA11 lower white LED, front left FA7 lower red LED, front right FA12 lower red LED, rear left FA8 lower red LED, rear right	Lvor FA7 FA11 FA1 FA13 FA3	Lrück FA8 FA10 FA2 FA12 FA4
F0 forward (cab 1 leading)	Lvor FA1 FA2 FA11	Train run, cars coupled on the side of cab 2, standard train without a control car		
F0 forward (cab 2 leading)	Lrück FA1 FA2 FA10	Train run, cars coupled on the side of cab 1, standard train without a control car		
F1 forward (cab 1 leading)	Lvor FA1 FA4 FA11	Locomotive trip or commuter train		
F1 reverse (cab 2 leading)	Lrück FA2 FA4 FA10	Locomotive trip or commuter train		
F18 forward (cab 1 leading)	FA2 FA3 FA7 FA13	Warning signal, all lights: FST 1 red		
F18 reverse (cab 2 leading)	FA1 FA4 FA8 FA12	Warning signal, all lights: FST 2 red		
F23 forward (cab 1 leading)	FA1 FA2 FA7 FA11	Authorization light		
F23 reverse (cab 2 leading)	FA1 FA2 FA8 FA10	Authorization light		

If multiple lighteffects are turned on at the same time, errors may occur!

F18 turns on 3 red lights in the direction of travel. Emergency lighting in the event of a serious accident.

F19 turns off all lights on the FST 1 side when F0 or F1 is activated.

F20 turns off all lights on the FST 2 side when F0 or F1 is activated.

F23 Driving authorization lighting.*

Prior to the year 2000, most Swiss electric locomotives that operated exclusively on Swiss rail networks had only one red LED lit in the lower right corner.

*The track authorization lighting was required only on double-track sections—where traffic had previously been restricted to the left track—when trains were exceptionally operating on the right track and signals were displayed on the left track. This type of signaling disappeared in the early part of Era 4.

Outputs Table												
Light	Light	Mapping				Position						
		NMRA	Zimo	Script		L	TL	TM	TR	R		
	Top center: red		x	x	FA7							vorne
	Top center: white	x	x	x	LV							
Light												
Light												
Light	Left: red		x	X	FA13							
Light	Left: white	x	x	X	FA11							
Light	Right: red		x	X	FA3							
	Right: white	x	x	X	FA1							
Light	Driver's cab	x	x	X	FA5							
Light												
	Top center: red		x	X	FA8							hinten
	Top center: white	x	x	X	LR							
Light												
Light												
Light	Left: red		x	X	FA12							
Light	Left: white	x	x	X	FA10							
Light	Right: red		x	X	FA4							
Light/Clutch	Right: white	x	x	X	FA2							
Smoker 1	Driver's cab	x	x	x	FA6							
Smoker 1	Lights: Engine/Passenger/Luggage/Coupler				FA9							
Smoker 2	Heating/Fan											Raucher
Smoker 2	Fan											
Smoker 3	Heating											
Smoker 3	Fan											
Servo 1	Heating											
Servo 2	Fan											
Servo 3	Front pantograph				SE1							
Servo 4	Rear pantograph				SE2							
Light	Top center: red											
Light	Top center: white											

CF Driver's Cab I
 CR Driver's Cab II
 LR / Ku Engine Compartments; Coupler

Changed CV

CV# 3 = 20 Acceleration rate
CV# 4 = 20 Deceleration rate
CV# 5 = 255 Top speed
CV# 7 = 5 Decoder version major
CV# 9 = 55 Motor control frequency
CV# 12 = 4 operating modes
CV# 13 = 128 Analog functions F1-F8
CV# 27 = 0 Asymmetrical stops (ABC) and HLU
CV# 28 = 79 RailCom Configuration
CV# 33 = 13 Function mapp. F0f
CV# 34 = 14 Function mapp. F0r
CV# 35 = 0 Function mapp. F1
CV# 36 = 0 Function mapp. F2
CV# 37 = 0 Function mapp. F3
CV# 38 = 0 Function mapp. F4
CV# 39 = 24 Function mapp. F5
CV# 40 = 0 Function mapp. F6
CV# 41 = 0 Function mapp. F7
CV# 42 = 0 Function mapp. F8
CV# 43 = 0 Function mapp. F9
CV# 44 = 0 Function mapp. F10
CV# 45 = 0 Function mapp. F11
CV# 46 = 0 Function mapp. F12
CV# 56 = 0 Motor regulation: PID
CV# 57 = 140 Motor regulation: voltage reference
CV# 59 = 5 acceleration delay HLU/ABC
CV# 60 = 181 Dimming general
CV# 63 = 62 Effects cycle
CV# 64 = 0 Ditchlight modifications
CV# 98 = 1 Deactivate east/west reception
CV# 99 = 2 Deactivate railcom datagrams
CV# 105 = 145 User Data 1
CV# 106 = 1 User Data 2
CV# 107 = 51 Light suppression on cab side 1(front)
CV# 108 = 84 Light suppression on cab side 2 (rear)
CV# 109 = 43 Light suppression front 3rd output
CV# 110 = 52 Light suppression rear 3rd output
CV# 112 = 4 ZIMO configuration bits (binary)
CV# 114 = 0 Dim Mask FOfront-FO6
CV# 115 = 66 Uncoupler control
CV# 116 = 145 Automatic uncouple
CV# 124 = 0 Shunting keys configuration (binary)
CV# 125 = 88 Effects FOfront
CV# 126 = 88 Effects FOrear
CV# 127 = 88 Effects FO1
CV# 128 = 88 Effects FO2
CV# 129 = 88 Effects FO3
CV# 130 = 88 Effects FO4
CV# 131 = 89 Effects FO5
CV# 132 = 90 Effects FO6
CV# 134 = 10 Asym. stopping (ABC)
CV# 136 = 24 RailCom mph factor
CV# 147 = 80 Motor regulation: I value
CV# 148 = 100 Motor regulation: D value
CV# 149 = 120 Motor regulation: P value
CV# 152 = 0 Dim mask FO7-FO12, RiBi
CV# 154 = 18 ZIMO configuration bits 2 (binary)
CV# 158 = 4 Several sound bits
CV# 159 = 88 Effects FO7
CV# 160 = 88 Effects FO8
CV# 163 = 255 Servo 1 right stop
CV# 165 = 25 Servo 1 speed [0.1s]
CV# 167 = 255 Servo 2 right stop
CV# 169 = 25 Servo 2 speed [0.1s]
CV# 173 = 10 Servo 3 speed [0.1s]
CV# 177 = 10 Servo 4 speed [0.1s]
CV# 181 = 202 Servo 1 - Function Assignment

CV# 182 = 203 Servo 2 - Function Assignment
CV# 183 = 12 Servo 3 - Function Assignment
CV# 184 = 12 Servo 4 - Function Assignment
CV# 186 = 0 Special panto 1
CV# 187 = 0 Special panto 2
CV# 188 = 0 Special panto 3
CV# 189 = 0 Special panto 4
CV# 190 = 30 Up-dimming time for FO
CV# 191 = 20 Down-dimming time for FO
CV# 195 = 88 Effects FO9
CV# 196 = 88 Effects FO10
CV# 197 = 88 Effects FO11
CV# 198 = 88 Effects FO12
CV# 199 = 88 Effects FO13
CV# 254 = 64 Project-ID
CV# 256 = 34 Project-ID
CV# 264 = 0 n.a.
CV# 265 = 101 Selection of the locomotive type
CV# 275 = 128 Volume with no load slow travel
CV# 276 = 128 Volume with no load speed run
CV# 282 = 50 Duration of the acceleration noise [0.1s]
CV# 283 = 128 volume at full acceleration
CV# 285 = 50 Duration of the noise reduction with delay [0.1s]
CV# 286 = 128 Volume reduced driving noise during deceleration
CV# 287 = 180 Threshold for brake squeal
CV# 288 = 50 Brake squeal time spent driving [0.1s]
CV# 296 = 255 Electromotor largest volume
CV# 297 = 30 Electromotor: begin of audible noise
CV# 298 = 9 Electromotor: begin of full volume
CV# 299 = 120 Electromotor noise depending on the speed of the pitch
CV# 307 = 128 cornering squeal inputs
CV# 308 = 9 cornering squeal key
CV# 310 = 8 Sound on/off button for road- and random noise
CV# 311 = 8 General on/off button for functional noise
CV# 313 = 116 Mute button
CV# 314 = 25 Mute fade time [0.1s]
CV# 344 = 80 Follow-up time for fan noise
CV# 350 = 70 Tap changer lockout [0.1s]
CV# 359 = 1 Tap changer hight limit/loop time
CV# 360 = 70 Tap changer after stop
CV# 361 = 5 Tap changer wainig time [0.1s]
CV# 363 = 10 Tap changer number of steps
CV# 376 = 181 Driving sound volume
CV# 393 = 8 ZIMO configuration 5 (binary)
CV# 394 = 32 ZIMO configuration 4 (binary)
CV# 395 = 120 Maximum volume for increase key
CV# 396 = 27 Volume decrease key
CV# 397 = 28 Volume increase key
CV# 430 = 19 Advanced Mapping 1 F-key
CV# 431 = 253 Advanced Mapping 1 M-key
CV# 432 = 199 Advanced Mapping 1 A1 forw.
CV# 433 = 203 Advanced Mapping 1 A2 forw.
CV# 434 = 199 Advanced Mapping 1 A1 rev.
CV# 435 = 203 Advanced Mapping 1 A2 rev.
CV# 436 = 19 Advanced Mapping 2 F-key
CV# 437 = 253 Advanced Mapping 2 M-key
CV# 438 = 205 Advanced Mapping 2 A1 forw.
CV# 440 = 205 Advanced Mapping 2 A1 rev.
CV# 442 = 20 Advanced Mapping 3 F-key
CV# 443 = 253 Advanced Mapping 3 M-key
CV# 444 = 200 Advanced Mapping 3 A1 forw.
CV# 445 = 202 Advanced Mapping 3 A2 forw.
CV# 446 = 200 Advanced Mapping 3 A1 rev.
CV# 447 = 202 Advanced Mapping 3 A2 rev.
CV# 448 = 20 Advanced Mapping 4 F-key
CV# 449 = 253 Advanced Mapping 4 M-key
CV# 450 = 204 Advanced Mapping 4 A1 forw.

CV# 452 = 204 Advanced Mapping 4 A1 rev.
CV# 454 = 1 Advanced Mapping 5 F-key
CV# 455 = 253 Advanced Mapping 5 M-key
CV# 456 = 194 Advanced Mapping 5 A1 forw.
CV# 457 = 4 Advanced Mapping 5 A2 forw.
CV# 458 = 193 Advanced Mapping 5 A1 rev.
CV# 459 = 3 Advanced Mapping 5 A2 rev.
CV# 460 = 18 Advanced Mapping 6 F-key
CV# 461 = 157 Advanced Mapping 6 M-key
CV# 462 = 2 Advanced Mapping 6 A1 forw.
CV# 463 = 13 Advanced Mapping 6 A2 forw.
CV# 464 = 1 Advanced Mapping 6 A1 rev.
CV# 465 = 12 Advanced Mapping 6 A2 rev.
CV# 466 = 18 Advanced Mapping 7 F-key
CV# 467 = 157 Advanced Mapping 7 M-key
CV# 468 = 7 Advanced Mapping 7 A1 forw.
CV# 469 = 3 Advanced Mapping 7 A2 forw.
CV# 470 = 8 Advanced Mapping 7 A1 rev.
CV# 471 = 4 Advanced Mapping 7 A2 rev.
CV# 472 = 23 Advanced Mapping 8 F-key
CV# 473 = 253 Advanced Mapping 8 M-key
CV# 474 = 206 Advanced Mapping 8 A1 forw.
CV# 475 = 7 Advanced Mapping 8 A2 forw.
CV# 476 = 207 Advanced Mapping 8 A1 rev.
CV# 477 = 8 Advanced Mapping 8 A2 rev.
CV# 478 = 7 Advanced Mapping 9 F-key
CV# 479 = 255 Advanced Mapping 9 M-key
CV# 480 = 14 Advanced Mapping 9 A1 forw.
CV# 481 = 1 Advanced Mapping 9 A2 forw.
CV# 482 = 15 Advanced Mapping 9 A1 rev.
CV# 483 = 2 Advanced Mapping 9 A2 rev.
CV# 484 = 7 Advanced Mapping 10 F-key
CV# 485 = 255 Advanced Mapping 10 M-key
CV# 486 = 11 Advanced Mapping 10 A1 forw.
CV# 488 = 10 Advanced Mapping 10 A1 rev.
CV# 490 = 29 Advanced Mapping 11 F-key
CV# 491 = 96 Advanced Mapping 11 M-key
CV# 492 = 11 Advanced Mapping 11 A1 forw.
CV# 494 = 10 Advanced Mapping 11 A1 rev.
CV# 516 = 24 F2 soundnumber
CV# 517 = 0 F2 volume
CV# 518 = 8 F2 information on loop
CV# 519 = 21 F3 soundnumber
CV# 520 = 128 F3 volume
CV# 521 = 0 F3 information on loop
CV# 546 = 22 F12 soundnumber
CV# 547 = 91 F12 volume
CV# 548 = 8 F12 information on loop
CV# 549 = 23 F13 soundnumber
CV# 550 = 64 F13 volume
CV# 551 = 8 F13 information on loop
CV# 561 = 20 F17 soundnumber
CV# 562 = 0 F17 volume
CV# 563 = 0 F17 information on loop
CV# 577 = 28 soundnumber squeal
CV# 578 = 0 volume squeal
CV# 581 = 30 soundnumber starting whistle
CV# 582 = 64 volume starting whistle
CV# 585 = 27 Soundnumber electromotor
CV# 586 = 0 Volume electromotor
CV# 589 = 9 Soundnumber tap changer
CV# 590 = 91 Volume tap changer
CV# 603 = 29 cornering squeal sound number
CV# 604 = 0 cornering squeal volume
CV# 676 = 8 F21 soundnumber
CV# 677 = 0 F21 volume
CV# 678 = 0 F21 information on loop
CV# 679 = 11 F22 soundnumber
CV# 680 = 0 F22 volume
CV# 681 = 0 F22 information on loop

CV# 724 = 1 HS tap changer set
CV# 768 = 32 Actual used steam/diesel-set
CV# 769 = 5 Last drive direction
CV# 770 = 127 Servo 1 last position
CV# 771 = 127 Servo 2 last position
CV# 772 = 127 Servo 3 last position
CV# 773 = 127 Servo 4 last position
CV# 774 = 255 Last used rail data format
CV# 807 = 96 Advanced Mapping 15 M-key
CV# 818 = 6 Advanced Mapping 17 F-key
CV# 820 = 9 Advanced Mapping 17 A1 forw.
CV# 822 = 9 Advanced Mapping 17 A1 rev.
CV# 837 = 0 Deactivate scripts (binary)
CV# 843 = 1 Deactivate scripts 9 to 16
CV# 980 = 40 Script CV
CV# 981 = 39 Script CV
CV# 982 = 70 Script CV
CV# 983 = 40 Script CV
CV# 984 = 80 Script CV
CV# 985 = 40 Script CV
CV# 986 = 90 Script CV
CV# 987 = 20 Script CV
CV# 988 = 0 Script CV
CV# 990 = 20 Script CV
CV# 991 = 15 Script CV
CV# 992 = 15 Script CV
CV# 994 = 60 Script CV
CV# 995 = 60 Script CV
CV# 997 = 0 Script CV
CV# 998 = 0 Script CV
CV#1008 = 30 Script CV
CV#1009 = 20 Script CV