

Denver & Rio Grande Western K-27, Version 3

16Bit
SOUND



Photo © Heinz Daeppen, Bachmann Spectrum G-Scale auf seiner eigenen Gartenbahn in der Schweiz

Prototyp Information

The K-27 class D&RGW is a narrow gauge Mikado 2-8-2 type locomotive, on 3 foot gauge. The locomotives were built for the Denver and Rio Grande Railroad by the Baldwin Locomotive Works in 1903. They became known by the nickname "Mudhen" (coot).

Fifteen locomotives were built as Class 125s and renamed K-27s in 1924.

The K-27s were built as Vaucrain compound locomotives, with two cylinders on each side. The steam enters the smaller cylinder first, and then drives the larger cylinder. The additional maintenance cost of the two cylinders proved to be greater than the coal savings. From 1907-1909, they were converted to single cylinders. They were the last of the Rio Grande's compound locomotives. The locomotives had a main structural frame with driving wheels inside, counterweights and rods were located outside the frame.

The locomotives were used for freight, passenger, and mixed trains. They ran on the entire D&RGW narrow gauge lines in the Rocky Mountains of Colorado. The 455 also spent time with the Rio Grande Southern.

Number 463 was sold to cowboy actor and country singer Gene Autry in May 1955. Autry never operated the Mudhen and later donated it to the city of Antonito, Colorado. She was restored in 1994 and did service on the Cumbres and Toltec Scenic Railroad. In 2002, she was taken out of service with a broken pushrod. In 2009, it was taken to the Cumbres and Toltec shops in Chama, New Mexico, where it was refurbished from the ground up. 463 is now running again on the Cumbres and Toltec. In 1975, it was placed on the National Register of Historic Places as locomotive 463.

The only other K-27 still in existence is 464, which was memorialized in Durango in the 1960s and sold to Knotts Berry Farm in 1973. There it was operated little if at all, primarily because of its condition, but also because of the small clearance between the counterweights and the track. The Huckleberry Railroad in Flint, Michigan, acquired the locomotive in 1981, restored it over eight years, and placed it in active service.

Source: Wikipedia

Sound Project Information

The sound project is now in its 3rd generation and is consistently designed with new recordings to the 16 bit MS decoders, and no longer backward compatible with the MX decoders. The MS software currently does

not yet support the crossfade function in the MX decoders. Hard transitions in the steam hits are the result. If this bothers you, please ask Zimo about the availability of new MS decoder software with the fade function. The project reproduces not only the gentle exhaust stroke but also the powerful exhaust steam stroke as well as light coasting in flat terrain. The function keys F14 and F15 can be used to switch between the three modes. The announced giro sensor in the large train decoders should one day additionally allow an automation of these modes according to inclination.

The sound project is based on the Zimo Advanced Standard and uses 6 different script programming that complement the decoder software. **These allow the generator to spin up only when the lights are turned on, but not turn off until the last light is turned off.**

- The Kadee 11220 servo couplers are directly linked to the corresponding sounds and can be plugged into servo at connector 1 and 2.
- A servo can be plugged into servo port 3 which sets the reversing of the locomotive visible from the outside depending on the driving condition.
- The swinging bell is programmed to be driven sound-synchronously with a servo at connection 4.

The decoder must have at least SW version 4.229.

CVs 3, 4, 5, 154 and 158 are relevant for this sound project. Changes can cause sound malfunctions!

Especially the final speed is not to be set with CV5 under any circumstances, but exclusively with CV 57.

The function output FA3 is permanently programmed and cannot be changed! It switches on from speed level 20/256 and off from speed level 15. This means that the fan for cooling the motor, which is annoyingly loud when the vehicle is stationary, can be switched on for the effective driving time by means of suitable rewiring.

The Bachmann Spectrum model in nominal size Fn3 has an anomaly in the operation of the built-in clock. Other sound devices need a transistor circuit which reverses this anomaly. In the Zimo decoder only two CVs have to be changed. CV 133 with value 4 is used to change the polarity without soldering and CV 268 with value 1 activates the clock input. But you can also use the virtual clock which evaluates the motor feedback for load balancing and set very synchronous steam strokes with CV 267.

Have fun, drive like a real locomotive driver with power controller and brake. Change the following CVs: CV4 value 255, CV39 value 0, CV309 value 5, CV349 value 20, CV 448 value 24, CV450 value 5, CV452 value 5. Now the cab light is switched with function 24 and function 5 is the brake. The loco starts only when the brake is released (function 5 off). The locomotive accelerates as usual when the controller is open. If you close the controller, the locomotive rolls out several meters and can be stopped effectively at any time with the brake function 5. Of course everything with the appropriate sounds. With the value in CV 349 the effect of the brake can be set stronger or weaker.

By default, the function number is the same as the function key number. All functions can be assigned to other function keys with the Zimo input mapping. The function key number is entered as a value in the CV400+Fu number, and the function key is already assigned. Attention, several functions can be assigned to the same function key this way! Please read the instructions on Zimo website

Function	Installation	Function output	Sound effect
F0	Light on	FA 0v+0r fades in smoothly	Alternator spins up
F1	Bell	Servo4 Swings to the rhythm of the bell	Bell
F2	Whistle l-l-s-l		Highway crossing signal
F3	Whistle l		Playable as long as you press the button
F4	Whistle s		Short whistle
F5	Cab light	FA 5	Alternator spins up
F6	Smoke generator on heater, load controlled Also replaceable with Zimo blowing smoker	FA 6 + FA 7 Heating evaporator, protective shutdown after 15 minutes Fan Output for smoke blower	
F7	Cylinder valve	FA 9 for fan cylinder steam	Blow down
F8	Sound on / off		
F9	Rail squeal		Sound of wheels squealing on sharp curves
F10	coal shovel	FA 8 flickers automatically	Door shovel door
F11	blower	Smoke fan on	Steam blowing
F12	coupler open engine twist back and for	Serrvo1 +2 open electrically	Uncoupling sound
F13	Coupling		Coupling
F14	Smooth running / Downhill		Switching between three sound modes
F15	Full power / Mountain travel		Switching between three sound modes
F16	Tunnel fader (muting)		Muting in 2.5 Sekunden
F17	conductor		„All aboard!“
F18	injector		Feeding water in the boiler
F19	Dual Westinghouse air pump fast		Compound air pump fast
F20	Water fill in the tender		Water swallow
F21	Steam blast at the side	FA1 for steam generator side blow	Very loud steam blast
F22	Marker Lights	FA4	Alternator spins up
F23	Doghouse Licht	FA2	Alternator spins up
F24			
F25	Pop valve (safety valve)		Loud steam blast
F26	Cutoff switch for startup whistles		No starting whistles
F27	Vol -		quieter
F28	Vol +		louder

Random effect	Noise	
Z1	Dual air pump fast	Every time the loco stops
Z2	Dual air pump slow	Maintaining air pressure
Z3	Coal shovel	FA8 flickering
Z4	Blower	Ventilator blows smoke out of stack
Z5	Injector	Steam injects water into the boiler
Z6	Safety valve	Loud popping valve
Z7	Firebox door	
Z8		

Input	Sound	
1		
2		
3	Cam chuff trigger	

Changing CVs values used by the reset

CV# 3 = 25 Acceleration rate	CV# 285 = 40 Duration of the noise reduction with delay
CV# 4 = 22 Deceleration rate	CV# 286 = 100 Volume reduced driving noise during deceleration
CV# 7 = ---	CV# 287 = 120 Threshold for brake squeal
CV# 17 = ---	CV# 296 = 100 Electromotor largest volume
CV# 18 = ---	CV# 297 = 150 Electromotor: begin of audible noise
CV# 22 = 12 Consist function F0, F9-F12	CV# 298 = 5 Electromotor: begin of full volume
CV# 28 = 3 RailCom Configuration	CV# 307 = 128 cornering squeal inputs
CV# 29 = ---	CV# 308 = 9 cornering squeal key
CV# 35 = 0 Function mapp. F1	CV# 312 = 7 Drainage button
CV# 36 = 0 Function mapp. F2	CV# 313 = 116 Mute button
CV# 37 = 0 Function mapp. F3	CV# 314 = 25 Mute fade time
CV# 38 = 0 Function mapp. F4	CV# 315 = 1 Random Z1 min interval
CV# 40 = 48 Function mapp. F6	CV# 316 = 20 Random Z1 max interval
CV# 41 = 0 Function mapp. F7	CV# 317 = 15 Random generator Z1 playback time
CV# 42 = 0 Function mapp. F8	CV# 318 = 150 Random Z2 min interval
CV# 43 = 0 Function mapp. F9	CV# 319 = 150 Random Z2 max interval
CV# 44 = 0 Function mapp. F10	CV# 320 = 45 Random generator Z2 playback time
CV# 45 = 0 Function mapp. F11	CV# 321 = 100 Random Z3 min interval
CV# 46 = 4 Function mapp. F12	CV# 322 = 100 Random Z3 max interval
CV# 57 = 120 Motor regulation: voltage reference	CV# 323 = 12 Random generator Z3 playback time
CV# 60 = 204 Dimming general	CV# 324 = 110 Random Z4 min interval
CV# 65 = 0 Sub-Vers. Number	CV# 325 = 150 Random Z4 max interval
CV# 114 = 255 Dim Mask FO0-FO6	CV# 326 = 12 Random generator Z4 playback time
CV# 115 = 76 Uncoupler control	CV# 327 = 150 Random Z5 min interval
CV# 116 = 178 Automatic uncouple	CV# 328 = 150 Random Z5 max interval
CV# 125 = 88 Effects F0 front	CV# 329 = 7 Random generator Z5 playback time
CV# 126 = 88 Effects F0 rear	CV# 330 = 255 Random Z6 min interval
CV# 130 = 88 Effects F4	CV# 331 = 255 Random Z6 max interval
CV# 131 = 88 Effects F5	CV# 332 = 10 Random generator Z6 playback time
CV# 132 = 72 Effects F6	CV# 333 = 210 Random Z7 min interval
CV# 133 = 4 FO4 or FO10 for exhaust fan	CV# 334 = 210 Random Z7 max interval
CV# 137 = 153 Smoke generator at standstill	CV# 335 = 1 Random generator Z7 playback time
CV# 138 = 204 Smoke generator at cruising speed	CV# 336 = 40 Random Z8 min interval
CV# 139 = 255 Smoke generator at acceleration	CV# 341 = 5 Switching input 1 Playback time
CV# 152 = 5 Dim mask FO7-FO12, RiBi	CV# 342 = 5 Switching input 2 Playback time
CV# 154 = 146 ZIMO configuration bits 2 (binary)	CV# 343 = 5 Switching input 3 Playback time
CV# 158 = 8 Several sound bits + RailCom variants	CV# 345 = 14 Sound-switch-key
CV# 159 = 72 Effects F7	CV# 346 = 2 Sound-switch-conditions
CV# 160 = 8 Effects F8	CV# 351 = 213 Smoke fan pwm at constant speed
CV# 163 = 255 Servo 1 right stop	CV# 352 = 204 Smoke fan pwm at acceleration
CV# 167 = 255 Servo 2 right stop	CV# 353 = 40 Smoke heater max. operating time
CV# 181 = 12 Servo 1 - Function Assignment	CV# 372 = 120 Electromotor volume acceleration
CV# 182 = 12 Servo 2 - Function Assignment	CV# 373 = 70 Electromotor volume deceleration
CV# 183 = 204 Servo 3 - Function Assignment	CV# 376 = 181 Driving sound volume
CV# 184 = 201 Servo 4 - Function Assignment	CV# 392 = 5 Reed4 play time [s]
CV# 186 = 1 Special panto 1	CV# 394 = 32 ZIMO configuration 4 (binary)
CV# 187 = 1 Special panto 2	CV# 395 = 120 maximal volume
CV# 188 = 1 Special panto 3	CV# 396 = 27 Volume decrease key
CV# 189 = 1 Special panto 4	CV# 397 = 28 Volume increase key
CV# 190 = 12 Up-dimming time for FO	CV# 430 = 21 ZIMO Mapping 1 F-key
CV# 191 = 8 Down-dimming time for FO	CV# 432 = 1 ZIMO Mapping 1 A1 forw.
CV# 250 = 250 Decoder-ID 1	CV# 434 = 1 ZIMO Mapping 1 A1 rev.
CV# 251 = 250 Decoder-ID 2	CV# 436 = 22 ZIMO Mapping 2 F-key
CV# 253 = 63 Decoder-ID 4	CV# 438 = 4 ZIMO Mapping 2 A1 forw.
CV# 260 = 0 Loading code 1	CV# 440 = 4 ZIMO Mapping 2 A1 rev.
CV# 265 = 1 Selection of the locomotive type	CV# 442 = 23 ZIMO Mapping 3 F-key
CV# 267 = 230 Chuff sound rate	CV# 444 = 2 ZIMO Mapping 3 A1 forw.
CV# 272 = 150 Drainage time	CV# 446 = 2 ZIMO Mapping 3 A1 rev.
CV# 273 = 10 Starting delay	CV# 516 = 137 F2 soundnumber
CV# 274 = 70 min. drainage downtime [0.1s]	CV# 519 = 138 F3 soundnumber
CV# 275 = 181 Volume with no load slow travel	CV# 521 = 8 F3 information on loop
CV# 276 = 181 Volume with no load speed run	CV# 522 = 143 F4 soundnumber
CV# 281 = 5 Threshold for full acceleration sound	CV# 540 = 135 F10 soundnumber
CV# 282 = 40 Duration of the acceleration noise [0.1s]	CV# 541 = 64 F10 volume
CV# 283 = 181 volume at full acceleration	CV# 542 = 8 F10 information on loop
CV# 284 = 3 Threshold for noise reduction in delay	

CV# 543 = 129 F11 soundnumber
CV# 544 = 91 F11 volume
CV# 545 = 72 F11 information on loop
CV# 546 = 148 F12 soundnumber
CV# 547 = 91 F12 volume
CV# 549 = 139 F13 soundnumber
CV# 551 = 8 F13 information on loop
CV# 561 = 141 F17 soundnumber
CV# 562 = 181 F17 volume
CV# 564 = 134 F18 soundnumber
CV# 565 = 64 F18 volume
CV# 566 = 72 F18 information on loop
CV# 567 = 131 F19 soundnumber
CV# 568 = 64 F19 volume
CV# 569 = 8 F19 information on loop
CV# 577 = 147 soundnumber squeal
CV# 578 = 91 volume squeal
CV# 581 = 151 soundnumber starting whistle
CV# 583 = 150 Soundnumber drainage
CV# 584 = 181 Volume dewatering
CV# 585 = 152 Soundnumber electromotor
CV# 603 = 145 cornering squeal sound number
CV# 673 = 142 F20 soundnumber
CV# 674 = 128 F20 volume
CV# 675 = 72 F20 information on loop
CV# 676 = 130 F21 soundnumber
CV# 678 = 72 F21 information on loop
CV# 732 = 150 Soundnumber trigger 4
CV# 733 = 11 Trigger 4 to FO
CV# 734 = 129 Soundnumber trigger 5
CV# 735 = 255 Trigger 5 to FO
CV# 736 = 135 Soundnumber trigger 6
CV# 737 = 10 Trigger 6 to FO
CV# 744 = 131 Soundnumber Z1
CV# 745 = 64 Volume Z1
CV# 746 = 8 Information on loop Z1
CV# 747 = 132 Soundnumber Z2
CV# 748 = 64 Volume Z2
CV# 749 = 8 Information on loop Z2
CV# 750 = 135 Soundnumber Z3
CV# 751 = 64 Volume Z3
CV# 752 = 8 Information on loop Z3
CV# 753 = 129 Soundnumber Z4
CV# 754 = 91 Volume Z4
CV# 755 = 8 Information on loop Z4
CV# 756 = 134 Soundnumber Z5
CV# 757 = 64 Volume Z5
CV# 758 = 8 Information on loop Z5
CV# 759 = 139 Soundnumber Z6
CV# 761 = 8 Information on loop Z6
CV# 762 = 136 Soundnumber Z7
CV# 763 = 91 Volume Z7
CV# 764 = 8 Information on loop Z7
CV# 766 = 128 Volume Z8
CV# 767 = 8 Information on loop Z8
CV# 835 = 2 Number of sets + keys
CV# 980 = 15
CV# 981 = 15
CV# 982 = 20