



Econami Digital Sound Decoder

Diesel Technical Reference

Software Release 1.6**

** Previous software versions included

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Primary CVs

CV 1: Primary Address

Description

CV 1 is used to set the decoder's primary address from 1 to 127.

Bit 7							Bit 0
0	A6	A5	A4	A3	A2	A1	A0

A0-A6: Primary Address

0: Reserved

Additional Information

Entering values from 1 to 127 into CV 1 will set the primary address while in Service Mode. The decoder will ignore commands that attempt to program this CV with values outside the range of 1 to 127.

The decoder will process all valid instruction packets addressed with the value contained in CV 1 when bit 5 of CV 29 (Configuration Data 1) is set to 0.

Entering a new value into CV 1 will:

- Set the value of CV 19 (Consist Address) to 0.
- Clear the Extended Address Mode Enable bit in CV 29 (bit 5).

Bit 5 of CV 29 must be set to 1 in order for the value of CV 1 to be changed in Operations Mode. Setting bit 5 of CV 29 back to 0 will then allow the decoder to recognize the new primary address.

Default Value: 3

Related CVs: CV 17-18 (Extended Address)
CV 19 (Consist Address)
CV 29 (Configuration Data 1)



Primary CVs

CV 2: Vstart

Description

CV 2 is used to set the voltage level applied to the motor at speed-step 1.

Bit 7

Bit 0

D7	D6	D5	D4	D3	D2	D1	D0
----	----	----	----	----	----	----	----

D0-D7: Motor Start Voltage

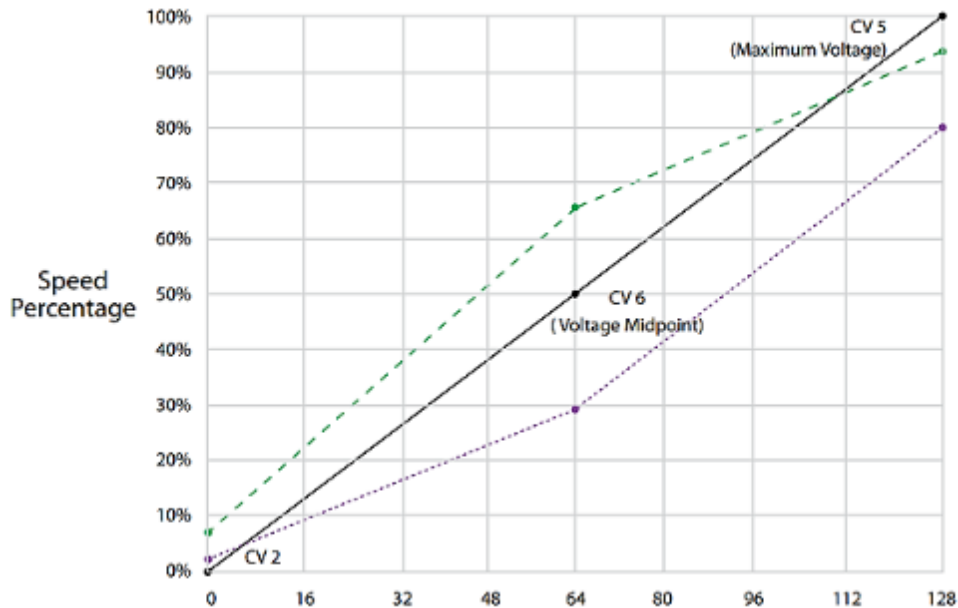
Additional Information

The motor start voltage is calculated as a fraction of the available supply voltage. Entering a value from 0 to 255 into CV 2 will adjust the starting voltage level.

Starting voltage is calculated as:

$$\text{Starting Voltage} = \text{Supply Voltage} \times \text{CV 2} \div 255$$

When CV 2 is set to a non-zero value, the decoder will offset all points of the speed table as speed increases. CV 2 is used in conjunction with CV 5 (Vhigh) and CV 6 (Vmid) to configure the 3-point speed table. The 3-point speed table is active when bit 4 (STE) of CV 29 is set to 0 and CVs 2, 5, and 6 are set to non-zero values.



Default Value: 0

Related CVs: CV 5 (Vhigh)
CV 6 (Vmid)
CV 29 (Configuration Data 1)



Primary CVs

CV 3: Baseline Acceleration Rate

Description

CV 3 is used to set the decoder's acceleration rate.

Bit 7							Bit 0
D7	D6	D5	D4	D3	D2	D1	D0

D0-D7: Acceleration Rate

Additional Information

Setting CV 3 to value from 0 to 255 will adjust the acceleration rate.

Acceleration is calculated as:

$$\text{Seconds/Speed Step} = \text{CV 3} \times 0.896 \div \text{Number of Speed Steps}$$

When the value of CV 3 is 0, acceleration will respond instantly to increases in the throttle setting. When the value of CV 3 is 255, the decoder will accelerate from a stop to full speed in approximately 3.8 minutes.

Setting CV 3 to a non-zero value in 14 or 28 speed-step mode will create a smoother acceleration response; the decoder is designed to interpolate between speed steps during acceleration when CV 3 is set to a non-zero value to eliminate erratic transitions

Default Value: 0

Related CVs: CV 4 (Baseline Deceleration Rate)
 CV 23 (Consist Acceleration Rate)
 CV 24 (Consist Deceleration Rate)



Primary CVs

CV 4: Baseline Deceleration Rate

Description

CV 4 is used to set the decoder's deceleration rate.

Bit 7							Bit 0
D7	D6	D5	D4	D3	D2	D1	D0

D0-D7: Deceleration Rate

Additional Information

A value from 0 to 255 may be entered into CV 4 to adjust the deceleration rate.

Deceleration is calculated as:

$$\text{Seconds/Speed Step} = \text{CV 4} \times 0.896 \div \text{Number of Speed Steps}$$

When the value of CV 4 is 0, deceleration will respond instantly to decreases in the throttle setting. When the value of CV 4 is 255, the decoder will decelerate from full speed to a stop in approximately 3.8 minutes.

Setting CV 4 to a non-zero value in 14 or 28 speed-step mode will create a smoother deceleration response; the decoder is designed to interpolate between speed steps during deceleration when CV 4 is set to a non-zero value to eliminate erratic transitions.

Default Value: 0

Related CVs: CV 3 (Baseline Acceleration Rate)
 CV 23 (Consist Acceleration Rate)
 CV 24 (Consist Deceleration Rate)
 CV 117 (F11 Brake Rate)

CV 5: Vhigh

Description

CV 5 is used to set the voltage level applied to the motor at maximum speed and is active when the 3-point speed table is enabled.

Bit 7							Bit 0
D7	D6	D5	D4	D3	D2	D1	D0

D0-D7: Maximum Voltage Value

Additional Information

Maximum voltage is calculated as a fraction of the available supply voltage. Entering a value from 0 to 255 into CV 5 will adjust the maximum speed voltage level.

Maximum voltage is calculated as:

$$\text{Maximum Voltage} = \text{Supply Voltage} \times \text{CV 5} \div 255$$

Values of 0 and 1 will disable the Vhigh speed table setting. A value of 255 will set the Vhigh speed table setting to the maximum available voltage (100%). CV 5 is used in conjunction with CV 2 (Vstart) and CV 6 (Vmid) to configure the 3-point speed table. The 3-point speed table is active when bit 4 (STE) of CV 29 is set to 0 and CVs 2, 5, and 6 are set to non-zero values.

Default Value: 0
Related CVs: CV 2 (Vstart)
CV 6 (Vmid)
CV 29 (Configuration Data 1)

Primary CVs

CV 6: Vmid

Description

CV 6 is used to set the voltage level applied to the motor at the middle speed step and is active when the 3-point speed table is enabled.

Bit 7							Bit 0
D7	D6	D5	D4	D3	D2	D1	D0

D0-D7: Midpoint Voltage Value

Additional Information

Midpoint voltage is calculated as a fraction of the available supply voltage. Entering a value from 0 to 255 into CV 6 will adjust the mid-speed voltage level.

Midpoint voltage is calculated as:

$$\text{Midpoint Voltage} = \text{Supply Voltage} \times \text{CV 6} \div 255$$

Values of 0 and 1 will disable the Vmid speed table setting. A value of 255 will set the Vmid speed table setting to the maximum available voltage (100%). CV 6 is used in conjunction with CV 2 (Vstart) and CV 5 (Vhigh) to configure the 3-point speed table. The 3-point speed table is active when bit 4 (STE) of CV 29 is set to 0 and CVs 2, 5, and 6 are set to non-zero values.

Default Value: 0
Related CVs: CV 2 (Vstart)
CV 5 (Vhigh)
CV 29 (Configuration Data 1)



Primary CVs

CV 7: Manufacturer Version (Read-Only)

Description

CV 7 contains the 8-bit software version identifier. CV 7 is read-only and cannot be modified.

Bit 7							Bit 0
D7	D6	D5	D4	D3	D2	D1	D0

D0-D7: Version Code

70 = Econami Decoder for Steam, Diesel and Electric



Primary CVs

CV 8: Manufacturer ID

Description

CV 8 is used to reset CV settings to factory defaults and contains the NMRA-issued Manufacturer ID Code (141) assigned to SoundTraxx/Throttle Up! Entering a value from 8 to 13 into CV 8 will reset the CVs defined below.

Bit 7							Bit 0
1	0	0	0	1	1	0	1

Bits 0-7: CV Reset

- 8 = Full CV reset
- 9 = Reset CVs 1-128
- 10 = Reset CVs 129-256
- 11 = Reset CVs 1.257-1.512

Manufacturer ID Code: 141



Primary CVs

CV 10: EMF Feedback Cutout

Description

CV 10 is used to gradually reduce back-EMF control as locomotive speed increases.

Bit 7							Bit 0
D7	D6	D5	D4	D3	D2	D1	D0

D0-D7: EMF Feedback Cutout

Additional Information

The BEMF intensity is defined as the amount of the BEMF signal that is fed back to the motor controller to stabilize the speed of the motor. Reducing the intensity does not regulate the speed of the motor as effectively, but helps consisted locomotives from entering a 'push/pull' scenario where one locomotive is doing all the work.

Per the equation below, this CV sets the speed step at which the intensity reaches zero. When CV 10 is set to 0, only the value in CV 212 is used.

$$\text{BEMF Intensity} = \text{CV 212} \times (1 - (\text{speed step} \div \text{CV 10})) \div 255$$

Default Value: 0

Related CVs: CV 212 (BEMF Feedback Intensity)
 CV 213 (BEMF Sample Period)
 CV 214 (BEMF Sample Aperture Time)
 CV 215 (BEMF Reference Voltage)



Primary CVs

CV 11: Packet Time-Out Value

Description

CV 11 is used to set duration in seconds that occurs from the time the decoder receives a valid packet to the time speed-related sound effects and motor processes are deactivated.

Bit 7							Bit 0
D7	D6	D5	D4	D3	D2	D1	D0

D0-D7: Packet Time-Out Value

Additional Information

Entering a value from 0 to 255 into CV 11 will set the packet time-out period. The time-out period is calculated in seconds as follows:

$$\text{Time-Out Period} = \text{CV 11} \times 0.25$$

A value of 0 disables the time-out period. A value of 255 sets the time-out period to approximately 1 minute. The decoder maintains an internal timer that resets each time the decoder receives a valid packet.

In the event no valid packets are received during the time-out period, the decoder will deactivate motor processes and the locomotive will decelerate according to the value of CV 4 (Baseline Deceleration Rate) or CV 24 (Consist Deceleration Rate).

Default Value: 0



Primary CVs

CV 12: Alternate Power Source

Description

CV 12 is used to determine the alternate power source the decoder will employ when a DCC signal is not available. Bit 3 (APS) of CV 29 (Configuration Data 1) must be set to 1 in order for an alternate power source to be used.

Bit 7							Bit 0
0	0	0	0	0	0	0	D0

D0: Alternate Power Source

0 = No alternate power source

1 = Analog power supply

0: Reserved

Default Value: 1

Related CVs: CV 29 (Configuration Data 1)



Primary CVs

CV 13: Analog Mode Function Enable 1

Description

CV 13 is used to enable F1-F8 function assignments for analog mode operation. Refer to CVs 1.257-1.384 (Effect Map Registers) and/or CVs 33-46 (Function Status CVs) for information regarding function mapping.

Bit 7							Bit 0
F8	F7	F6	F5	F4	F3	F2	F1

F1-F8: Analog Mode Function Enable

0 = Function disabled for analog operation

1 = Function enabled for analog operation

Additional Information

Setting bits 0-7 to 1 will enable the F1-F8 functions active in CVs 1.257-1.384 and/or CVs 33-46 for analog mode operation.

Default Value: 0

Related CVs: CV 14 (Analog Mode Function Enable 2)
CV 33-46 (Function Status CVs)
CV 241-243 (Analog Mode Function Enable 3-5)
CV 1.257-1.512 (Extended Function Mapping CVs)



Primary CVs

CV 14: Analog Mode Function Enable 2

Description

CV 14 is used to enable F0(f), F0(r), and F9-F12 function assignments for analog mode operation. Refer to CVs 1.257-1.384 (Effect Map Registers) and/or CVs 33-46 (Function Status CVs) for information regarding function mapping.

Bit 7						Bit 0	
0	0	F12	F11	F10	F9	F0(r)	F0(f)

F0(f)-F0(r): Analog Mode F0 Enable

0 = Function disabled for analog operation

1 = Function enabled for analog operation

F9-F12: Analog Mode Function Enable

0 = Function disabled for analog operation

1 = Function enabled for analog operation

0: Reserved

Additional Information

Setting bits 0-7 to 1 will enable the F0(f), F0(r), F9-F12 functions active in CVs 1.257-1.384 and/or CVs 33-46 for analog mode operation.

Default Value: 3

Related CVs: CV 13 (Analog Mode Function Enable 1)
CV 33-46 (Function Status CVs)
CV 241-243 (Analog Mode Function Enable 3-5)
CV 1.257-1.512 (Extended Function Mapping CVs)



Primary CVs

CV 15: CV Unlock Code

Description

CV 15 is used for unlocking access to the decoder's CVs.

Bit 7					Bit 0		
0	0	0	0	0	D2	D1	D0

D0-D2: CV Unlock Code

0: Reserved

Additional Information

Entering a value from 0 to 7 into CV 15 determines the decoder's lock status. CV 15 can be accessed regardless of the decoder's lock status.

Locked State: If the value of CV 15 is not equal to the value of CV 16 (CV Lock ID), all CVs are locked and read and write operations will be ignored.

Unlocked State: The decoder's CVs can be accessed only when the value of CV 15 is equal to the value of CV 16.

Note: *Bit 0 (CV Lock Enable) of CV 30 (Error Information) must be set to 1 in order for the lock feature in CVs 15 and 16 to be used.*

Default Value: 0

Related CVs: CV 16 (CV Lock ID)
CV 30 (Error Information)



Primary CVs

CV 16: CV Lock ID

Description

CV 16 is used in conjunction with CV 15 (CV Unlock Code) to determine the decoder's lock status. CV 16 determines the lock code used to lock the decoder's CVs.

Bit 7					Bit 0		
0	0	0	0	0	ID2	ID1	ID0

ID0-ID2: CV Lock Code

0: Reserved

Additional Information

Entering a value from 0 to 7 into CV 16 determines the decoder's lock status. CV 16 can be accessed regardless of the decoder's lock status.

Locked State: If the value of CV 16 is not equal to the value of CV 15 (CV Unlock Code), all CVs are locked and all read and write operations will be ignored.

Unlocked State: The decoder's CVs will only be accessible when the value of CV 15 is equal to the value of CV 16.

Note: *Bit 0 (CV Lock Enable) of CV 30 (Error Information) must be set to 1 in order for the lock feature in CVs 15 and 16 to be used.*

Default Value: 0

Related CVs: CV 15 (CV Unlock Code)
CV 30 (Error Information)

CVs 17-18: Extended Address

Description

CVs 17 and 18 contain the decoder's 14-bit extended address and are merged as a "paired" CV.

CV 17: Extended Address MSB

Bit 7							Bit 0
A15	A14	A13	A12	A11	A10	A9	A8

CV 18: Extended Address LSB

Bit 7							Bit 0
A7	A6	A5	A4	A3	A2	A1	A0

A0-A15: Extended Address Value

Additional Information

Most command stations recognize from addresses 0000-9999.

Bit 5 of CV 29 (Configuration Data 1) must be set to 1 for the decoder to recognize commands sent to the extended address.

The decoder will ignore commands sent to the primary address when bit 5 of CV 29 is set to 1. Setting bit 5 of CV 29 to 0 will enable the primary address.

CV 17 contains the most significant bits of the two-byte address and can be set to values from 192 to 231 (0xC0-0xE7).

CV 18 contains the least significant bits of the two-byte address and can be set to values from 0 to 255.

CV 17 must be set before CV 18. The decoder will ignore attempts to adjust the values of CVs 17 and 18 out-of-order.

CV 17 and CV 18 can be modified in Service Mode at any time, but cannot be modified in Operations Mode unless bit 5 of CV 29 is set to 0 (i.e., CV 1, Primary Address is enabled).

Default Value: CV 17 = 192
 CV 18 = 3 (Address 0003)

Related CVs: CV 1 (Primary Address)
 CV 19 (Consist Address)
 CV 29 (Configuration Data 1)

CV 19: Consist Address

Description

CV 19 is used to set the address and direction for advanced consist operation.

Bit 7								Bit 0
CDIR	A6	A5	A4	A3	A2	A1	A0	

A0-A6: Consist Address Value

CDIR: Consist Direction
 0 = Normal direction
 1 = Inverted direction

Additional Information

Bits 0-6 (A0-A6) are used to assign the consist address from 1 to 127. Setting bit 7 (CDIR) to 1 will invert consist direction.

Entering a value from 1 to 127 will set the consist address from 1 to 127 for the normal direction. Entering a value from 129 to 255 will set the consist address from 1 to 127 for the inverted direction. Setting CV 19 to 0 or 128 will disable the consist address. When CV 19 is set to a non-zero value, the decoder will ignore throttle commands sent to the decoder's primary or extended address.

The decoder will process valid commands sent to the consist address with the following exceptions:

- Long-form CV access instructions will be ignored.
- The direction of a speed/direction command or an advanced operation command will be inverted when bit 7 (CDIR) is set to 1.

Default Value: 0

Related CVs: CV 1 (Primary Address)
 CVs 17-18 (Extended Address)
 CVs 21-22 (Consist Function Enable 1-2)
 CV 23 (Consist Acceleration Rate)
 CV 24 (Consist Deceleration Rate)
 CVs 245-247 (Consist Function Enable 3-5)



Primary CVs

CV 21: Consist Function Enable 1

Description

CV 21 is used to enable F1-F8 function assignments for advanced consist operation. Refer to CVs 1.257-1.384 (Effect Map Registers) and/or CVs 33-46 (Function Status CVs) for more information regarding function mapping.

Bit 7							Bit 0
F8	F7	F6	F5	F4	F3	F2	F1

F1-F8: Consist Function Enable

0 = Function disabled for consist operation

1 = Function enabled for consist operation

Additional Information

CV 21 is commonly used to differentiate various engines and cars of the same consist. Setting bits 0-7 to 1 will enable the F1-F8 functions active in CVs 1.257-1.384 and/or CVs 33-46 for advanced consist operation.

Default Value: 0

Related CVs: CV 19 (Consist Function Enable 2)
CVs 33-46 (Function Status CVs)
CVs 245-247 (Consist Function Enable 3-5)
CVs 1.257-1.512 (Extended Function Mapping CVs)



Primary CVs

CV 22: Consist Function Enable 2

Description

CV 22 is used to enable F0(f), F0(r), and F9-F12 function assignments for advanced consist operation. Refer to CVs 1.257-1.384 (Effect Map Registers) and/or CVs 33-46 (Function Status CVs) for more information regarding function mapping.

Bit 7						Bit 0	
0	0	F12	F11	F10	F9	F0(r)	F0(f)

F0(f)-F0(r): Consist F0 Enable

0 = Function disabled for consist operation

1 = Function enabled for consist operation

F9-F12: Consist Function Enable

0 = Function disabled for consist operation

1 = Function enabled for consist operation

0: Reserved

Additional information

CV 22 is commonly used to differentiate various engines and cars of the same consist. Setting bits 0-7 to 1 will enable the F0(f), F0(r), and F9-F12 functions active in CVs 1.257-1.384 and/or CVs 33-46 for advanced consist operation.

Default Value: 0

Related CVs: CV 19 (Consist Address)
CV 21 (Consist Function Enable 1)
CVs 33-46 (Function Status CVs)
CVs 245-247 (Consist Function Enable 3-5)
CVs 1.257-1.512 (Extended Function Mapping CVs)



Primary CVs

CV 23: Consist Acceleration Rate

Description

CV 23 is used to set the consist acceleration rate. CV 19 must contain a valid consist address for the consist acceleration rate to be active.

Bit 7							Bit 0
SIGN	D6	D5	D4	D3	D2	D1	D0

D0-D6: Consist Acceleration Offset

SIGN: Sign

0 = Positive value

1 = Negative value

Additional Information

The value of CV 23 determines the consist acceleration rate in relation to CV 3 (Baseline Acceleration Rate). When the consist address is active, the consist acceleration rate is added to or subtracted from the decoder's baseline acceleration rate depending on the sign bit.

Entering a value from 1 to 127 into CV 23 will increase the consist acceleration rate from the baseline acceleration rate in CV 3. Entering values from 129 to 255 into CV 23 will decrease the consist acceleration rate from the baseline acceleration rate in CV 3.

Values of 0 and 128 will disable the consist acceleration rate and the decoder will use the value in CV 3.

When bit 7 (SIGN) of CV 23 is set to 0, the value added to CV 3 will be positive, where if bit 7 is set to 1, the value added to CV 3 will be negative:

0-127	128-255
0 = 0	128 = 0
1 = 1	129 = -1
.	.
.	.
.	.
127 = 127	255 = -127

Acceleration is calculated as:

$$\text{Seconds/Speed Step} = (\text{CV 3} + \text{CV 23}) \times 0.896 \div \text{Number of Speed Steps}$$

Default Value: 0

Related CVs: CV 3 (Baseline Acceleration Rate)
CV 4 (Baseline Deceleration Rate)
CV 19 (Consist Address)
CV 24 (Consist Deceleration Rate)



Primary CVs

CV 24: Consist Deceleration Rate

Description

CV 24 is used to set the consist deceleration rate. CV 19 must contain a valid consist address for the consist deceleration rate to be active.

Bit 7							Bit 0
SIGN	D6	D5	D4	D3	D2	D1	D0

D0-D6: Consist Deceleration Offset

SIGN: Sign

0 = Positive value

1 = Negative value

Additional Information

The value of CV 24 determines the consist deceleration rate in relation to CV 4 (Baseline Deceleration Rate). When the consist address is active, the consist deceleration rate is added to or subtracted from the decoder's baseline deceleration rate depending on the sign bit.

Entering a value from 1 to 127 into CV 24 will increase the consist deceleration rate from the baseline deceleration rate in CV 4. Entering values from 129 to 255 into CV 24 will decrease the consist deceleration rate from the baseline deceleration rate in CV 4.

Values of 0 and 128 will disable the consist deceleration rate and the decoder will use the value in CV 3.

When bit 7 (SIGN) of CV 24 is set to 0, the value added to CV 4 will be positive, where if bit 7 is set to 1, the value added to CV 4 will be negative:

0-127	128-255
0 = 0	128 = 0
1 = 1	129 = -1
.	.
.	.
.	.
127 = 127	255 = -127

Deceleration is calculated as:

$$\text{Seconds/Speed Step} = (\text{CV 4} + \text{CV 24}) \times 0.896 \div \text{Number of Speed Steps}$$

Default Value: 0

Related CVs: CV 3 (Baseline Acceleration Rate)
CV 4 (Baseline Deceleration Rate)
CV 19 (Consist Address)
CV 23 (Consist Acceleration Rate)



Primary CVs

CV 25: Speed Table Enable

Description

CV 25 is used in conjunction with CV 29 (Configuration Data 1) to enable the linear or 28-point speed table.

Bit 7							Bit 0
MIDSPD	D6	D5	D4	D3	D2	D1	D0

D0-D6: Table Identifier

- 0 = Disabled, Speed Curves not used
- 1 = Disabled, Speed Curves not used
- 2 = Linear Speed Curve
- 3 = Reserved
- 4 = Reserved
- 5 = Reserved
- 6 = Reserved
- 7 = Reserved
- 8 = Reserved
- 9 = Reserved
- 10 = Reserved
- 11 = Reserved
- 12 = Reserved
- 13 = Reserved
- 14 = Reserved
- 15 = Reserved
- 16 = User Defined Speed Table defined by CVs 67-94

MIDSPD: Reserved

Additional Information

Speed tables are disabled by default and voltage is directly proportional to the speed step.

Default Value: 2

Related CVs:

- CV 2 (Vmid)
- CV 5 (Vhigh)
- CV 6 (Vmid)
- CV 29 (Configuration Data 1)
- CVs 67-94 (Custom Speed Table)



Primary CVs

CV 29: Configuration Data 1

Description

CV 29 contains miscellaneous configuration bits.

Bit 7							Bit 0
0	0	EAM	STE	0	APS	F0	DIR

DIR: Direction

- 0 = Normal direction
- 1 = Inverted direction

F0: F0 Location

- 0 = 14 speed-step mode enabled
- 1 = 28/128 speed-step mode enabled

APS: Alternate Power Source Enable

- 0 = NMRA-digital only
- 1 = Alternate power source enabled (CV 12)

STE: Speed Table Enable

- 0 = 3-point speed table enabled (CVs 2, 5 & 6)
- 1 = Linear/28-point speed table (CV 25)

EAM: Extended Address Mode Enable

- 0 = Primary address enabled (CV 1)
- 1 = Extended address enabled (CVs 17-18)

0: Reserved

Note: Command stations that do not support the extended address can interfere with normal operation if bit 5 of CV 29 is programmed inadvertently. In this situation, connect the decoder to a programming track and set bit 5 of CV 29 to 0.

Default Value:

2

Related CVs:

- CV 1 (Primary Address)
- CV 2 (Vstart)
- CV 5 (Vhigh)
- CV 6 (Vmid)
- CV 12 (Alternate Power Source)
- CVs 17-18 (Extended Address)
- CV 25 (Speed Table Enable)
- CVs 67-94 (Custom Speed Table)



Primary CVs

CV 30: Error Information

Description

CV 30 is used to allow the decoder's CVs to be locked and unlocked with CV 15 (CV Unlock Code) and CV 16 (CV Lock ID).

Bit 7							Bit 0
0	0	0	0	0	0	0	LCK

LCK: CV Lock/Unlock Enable

0 = CV lock/unlock feature disabled

1 = CV lock/unlock feature enabled (CVs 15-16)

0: Reserved

Default Value: 0

Related CVs: CV 15 (CV Unlock Code)

CV 16 (CV Lock ID)



Primary CVs

CV 31: CV Index 1

Description

CV 31 and CV 32 (CV Index 2) contain the indexed address used for accessing CVs exceeding CV 256. CV 31 contains the most significant bits of the two-byte address and enables indexed CV operation, as determined by CV 32.

Note: *Modifying the default value of CV 31 will disable indexed CV operation; CV 31 should never be programmed from its default value.*

Bit 7							Bit 0
D7	D6	D5	D4	D3	D2	D1	D0

D0-D7: CV Index MSB
16 = Indexed address

Default Value: 16
Related CVs: CV 32 (CV Index 2)

Primary CVs

CV 32: CV Index 2

CV 32 provides access to CVs exceeding CV 256 and is used to select the active indexed CV page. Econami for diesel models supports one indexed CV page:

1. CVs 1.257-1.512: Indexed CV Page 1

The value of CV 32 indicates the active indexed CV page. CVs 257-512 allow access to indexed CVs when an indexed CV page is selected in CV 32.

Bit 7							Bit 0
D7	D6	D5	D4	D3	D2	D1	D0

D0-D7: CV Index LSB
1 = Indexed CV Page 1

Additional Information

Entering a value of 1 into CV 32 will select Indexed CV Page 1 as the active indexed CV page. Indexed CV Page 1 contains Flex-Map function mapping CVs:

- CVs 1.257-1.384: Effect Map Registers
- CVs 1.385-1.512: Effect Auxiliary Map Registers

Entering a value of 0 or values from 2 to 255 into CV 32 will disable access to CVs exceeding CV 256. If your system does not allow access to CVs exceeding CV 256, contact the manufacturer for more information.

Default Value: 1
Related CVs: CV 31 (CV Index 1)
CVs 1.257-1.512 (Extended Function Mapping CVs)



Primary CVs

CVs 33-46: Function Status CVs

Function Status CVs 33-46 can be used to map a limited range of effects to functions F0-F12 and are included to remain consistent with NMRA Standards for DCC Configuration Variables (S-9.2.2, p.7).

Note: CVs 33-46 are set to values of 0 by default, are a secondary method of function mapping for those wishing to use the Legacy Function Mapping associated with the prior generation of Tsunami products, and are not used to determine Econami's default function assignments.

CVs 1.257-1.512 (Flex-Map Function Mapping CVs) provide function assignments for 28 function keys and offer comprehensive function mapping support for all of Econami's effects in an uncomplicated and versatile format. However, mapping an effect to a function key (F0(f), F0(r), or F1-F12) using CVs 33-46 will override the corresponding function assignment mapped within CVs 1.257-1.384.

Note: The use of Legacy Function Mapping and Flex-Map Function Mapping together may produce undesirable results and is not recommended.

Effects mapped to CV 33 (F0(f) Output Location) can be activated in the forward direction only and effects mapped to CV 34 (F0(r) Output Location) can be activated in the reverse direction only. This output is bidirectional only when same effect has been mapped to both CVs. The function mapping table provided below indicates the values used for mapping functions to effects. All provided effects cannot be mapped to all F0-F12 functions keys.

Function Output Map																
Function Key	CV	HL Output	BL Output	Airhorn	Bell	FX3 Output	FX4 Output	Dynamic Brake	Short Airhorn	Reserved	Reserved	Dimmer	Mute	Reserved	Brake	Coupler
F0(f)	33	1	2	4	8	16	32	64	128							
F0(r)	34	1	2	4	8	16	32	64	128							
F1	35	1	2	4	8	16	32	64	128							
F2	36	1	2	4	8	16	32	64	128							
F3	37				1	2	4	8	16	32	64	128				
F4	38				1	2	4	8	16	32	64	128				
F5	39				1	2	4	8	16	32	64	128				
F6	40				1	2	4	8	16	32	64	128				
F7	41							1	2	4	8	16	32	64	128	
F8	42							1	2	4	8	16	32	64	128	
F9	43							1	2	4	8	16	32	64	128	
F10	44								1	2	4	8	16	32	64	128
F11	45								1	2	4	8	16	32	64	128
F12	46								1	2	4	8	16	32	64	128



Primary CVs

CV 33: F0(f) Output Location

Description

CV 33 is used to map a given effect to the F0(f) function key. The enabled effect will be activated when the F0(f) function is turned on. Disabled effects will have no relation to the F0(f) function key.

Bit 7						Bit 0	
SAH	DYN	FX4	FX3	BEL	AH	BL	HL

HL: Headlight Output

0 = Headlight disabled

1 = Headlight enabled

BL: Backup Light Output

0 = Backup light disabled

1 = Backup light enabled

AH: Airhorn

0 = Airhorn disabled

1 = Airhorn enabled

BEL: Bell

0 = Bell disabled

1 = Bell enabled

FX3: FX3 Output

0 = FX3 disabled

1 = FX3 enabled

FX4: FX4 Output

0 = FX4 disabled

1 = FX4 enabled

DYN: Dynamic Brake

0 = Dynamic brake disabled

1 = Dynamic brake enabled

SAH: Short Airhorn

0 = Short airhorn disabled

1 = Short airhorn enabled

Default Value: 0



Primary CVs

CV 34: F0(r) Output Location

Description

CV 34 is used to map a given effect to the F0(r) function key. The enabled effect will be activated when the F0(r) function is turned on. Disabled effects will have no relation to the F0(r) function key.

Bit 7						Bit 0	
SAH	DYN	FX4	FX3	BEL	AH	BL	HL

HL: Headlight Output

0 = Headlight disabled

1 = Headlight enabled

BL: Backup Light Output

0 = Backup light disabled

1 = Backup light enabled

AH: Airhorn

0 = Airhorn disabled

1 = Airhorn enabled

BEL: Bell

0 = Bell disabled

1 = Bell enabled

FX3: FX3 Output

0 = FX3 disabled

1 = FX3 enabled

FX4: FX4 Output

0 = FX4 disabled

1 = FX4 enabled

DYN: Dynamic Brake

0 = Dynamic brake disabled

1 = Dynamic brake enabled

SAH: Short Airhorn

0 = Short airhorn disabled

1 = Short airhorn enabled

Default Value: 0



Primary CVs

CV 35: F1 Output Location

Description

CV 35 is used to map a given effect to the F1 function key. The enabled effect will be activated when the F1 function is turned on. Disabled effects will have no relation to the F1 function key.

Bit 7						Bit 0	
SAH	DYN	FX4	FX3	BEL	AH	BL	HL

HL: Headlight Output
 0 = Headlight disabled
 1 = Headlight enabled

BL: Backup Light Output
 0 = Backup light disabled
 1 = Backup light enabled

AH: Airhorn
 0 = Airhorn disabled
 1 = Airhorn enabled

BEL: Bell
 0 = Bell disabled
 1 = Bell enabled

FX3: FX3 Output
 0 = FX3 disabled
 1 = FX3 enabled

FX4: FX4 Output
 0 = FX4 disabled
 1 = FX4 enabled

DYN: Dynamic Brake
 0 = Dynamic brake disabled
 1 = Dynamic brake enabled

SAH: Short Airhorn
 0 = Short airhorn disabled
 1 = Short airhorn enabled

Default Value: 0



Primary CVs

CV 36: F2 Output Location

Description

CV 36 is used to map a given effect to the F2 function key. The enabled effect will be activated when the F2 function is turned on. Disabled effects will have no relation to the F2 function key.

Bit 7						Bit 0	
SAH	DYN	FX4	FX3	BEL	AH	BL	HL

HL: Headlight Output

0 = Headlight disabled

1 = Headlight enabled

BL: Backup Light Output

0 = Backup light disabled

1 = Backup light enabled

AH: Airhorn

0 = Airhorn disabled

1 = Airhorn enabled

BEL: Bell

0 = Bell disabled

1 = Bell enabled

FX3: FX3 Output

0 = FX3 disabled

1 = FX3 enabled

FX4: FX4 Output

0 = FX4 disabled

1 = FX4 enabled

DYN: Dynamic Brake

0 = Dynamic brake disabled

1 = Dynamic brake enabled

SAH: Short Airhorn

0 = Short airhorn disabled

1 = Short airhorn enabled

Default Value: 0



Primary CVs

CV 37: F3 Output Location

Description

CV 37 is used to map a given effect to the F3 function key. The enabled effect will be activated when the F3 function is turned on. Disabled effects will have no relation to the F3 function key.

Bit 7								Bit 0
	DIM	0	0	SAH	DYN	FX4	FX3	BEL

BEL: Bell

- 0 = Bell disabled
- 1 = Bell enabled

FX3: FX3 Output

- 0 = FX3 disabled
- 1 = FX3 enabled

FX4: FX4 Output

- 0 = FX4 disabled
- 1 = FX4 enabled

DYN: Dynamic Brake

- 0 = Dynamic brake disabled
- 1 = Dynamic brake enabled

SAH: Short Airhorn

- 0 = Short airhorn disabled
- 1 = Short airhorn enabled

DIM: Dimmer

- 0 = Dimmer disabled
- 1 = Dimmer enabled

0: Reserved

Default Value: 0



Primary CVs

CV 38: F4 Output Location

Description

CV 38 is used to map a given effect to the F4 function key. The enabled effect will be activated when the F4 function is turned on. Disabled effects will have no relation to the F4 function key.

Bit 7								Bit 0
	DIM	0	0	SAH	DYN	FX4	FX3	BEL

BEL: Bell

- 0 = Bell disabled
- 1 = Bell enabled

FX3: FX3 Output

- 0 = FX3 disabled
- 1 = FX3 enabled

FX4: FX4 Output

- 0 = FX4 disabled
- 1 = FX4 enabled

DYN: Dynamic Brake

- 0 = Dynamic brake disabled
- 1 = Dynamic brake enabled

SAH: Short Airhorn

- 0 = Short airhorn disabled
- 1 = Short airhorn enabled

DIM: Dimmer

- 0 = Dimmer disabled
- 1 = Dimmer enabled

0: Reserved

Default Value: 0



Primary CVs

CV 39: F5 Output Location

Description

CV 39 is used to map a given effect to the F5 function key. The enabled effect will be activated when the F5 function is turned on. Disabled effects will have no relation to the F5 function key.

Bit 7								Bit 0
	DIM	0	0	SAH	DYN	FX4	FX3	BEL

BEL: Bell

- 0 = Bell disabled
- 1 = Bell enabled

FX3: FX3 Output

- 0 = FX3 disabled
- 1 = FX3 enabled

FX4: FX4 Output

- 0 = FX4 disabled
- 1 = FX4 enabled

DYN: Dynamic Brake

- 0 = Dynamic brake disabled
- 1 = Dynamic brake enabled

SAH: Short Airhorn

- 0 = Short airhorn disabled
- 1 = Short airhorn enabled

DIM: Dimmer

- 0 = Dimmer disabled
- 1 = Dimmer enabled

0: Reserved

Default Value: 0



Primary CVs

CV 40: F6 Output Location

Description

CV 40 is used to map a given effect to the F6 function key. The enabled effect will be activated when the F6 function is turned on. Disabled effects will have no relation to the F6 function key.

Bit 7								Bit 0
	DIM	0	0	SAH	DYN	FX4	FX3	BEL

BEL: Bell

- 0 = Bell disabled
- 1 = Bell enabled

FX3: FX3 Output

- 0 = FX3 disabled
- 1 = FX3 enabled

FX4: FX4 Output

- 0 = FX4 disabled
- 1 = FX4 enabled

DYN: Dynamic Brake

- 0 = Dynamic brake disabled
- 1 = Dynamic brake enabled

SAH: Short Airhorn

- 0 = Short airhorn disabled
- 1 = Short airhorn enabled

DIM: Dimmer

- 0 = Dimmer disabled
- 1 = Dimmer enabled

0: Reserved

Default Value: 0



Primary CVs

CV 41: F7 Output Location

Description

CV 41 is used to map a given effect to the F7 function key. The enabled effect will be activated when the F7 function is turned on. Disabled effects will have no relation to the F7 function key.

Bit 7							Bit 0	
	BRK	0	MUT	DIM	0	0	SAH	DYN

DYN: Dynamic Brake
 0 = Dynamic brake disabled
 1 = Dynamic brake enabled

SAH: Short Airhorn
 0 = Short airhorn disabled
 1 = Short airhorn enabled

DIM: Dimmer
 0 = Dimmer disabled
 1 = Dimmer enabled

MUT: Mute
 0 = Mute disabled
 1 = Mute enabled

BRK: Brake
 0 = Brake disabled
 1 = Brake enabled

0: Reserved

Default Value: 0



Primary CVs

CV 42: F8 Output Location

Description

CV 42 is used to map a given effect to the F8 function key. The enabled effect will be activated when the F8 function is turned on. Disabled effects will have no relation to the F8 function key.

Bit 7							Bit 0
BRK	0	MUT	DIM	0	0	SAH	DYN

DYN: Dynamic Brake
 0 = Dynamic brake disabled
 1 = Dynamic brake enabled

SAH: Short Airhorn
 0 = Short airhorn disabled
 1 = Short airhorn enabled

DIM: Dimmer
 0 = Dimmer disabled
 1 = Dimmer enabled

MUT: Mute
 0 = Mute disabled
 1 = Mute enabled

BRK: Brake
 0 = Brake disabled
 1 = Brake enabled

0: Reserved

Default Value: 0



Primary CVs

CV 43: F9 Output Location

Description

CV 43 is used to map a given effect to the F9 function key. The enabled effect will be activated when the F9 function is turned on. Disabled effects will have no relation to the F9 function key.

Bit 7							Bit 0
BRK	0	MUT	DIM	0	0	SAH	DYN

DYN: Dynamic Brake
 0 = Dynamic brake disabled
 1 = Dynamic brake enabled

SAH: Short Airhorn
 0 = Short airhorn disabled
 1 = Short airhorn enabled

DIM: Dimmer
 0 = Dimmer disabled
 1 = Dimmer enabled

MUT: Mute
 0 = Mute disabled
 1 = Mute enabled

BRK: Brake
 0 = Brake disabled
 1 = Brake enabled

0: Reserved

Default Value: 0



Primary CVs

CV 44: F10 Output Location

Description

CV 44 is used to map a given effect to the F10 function key. The enabled effect will be activated when the F10 function is turned on. Disabled effects will have no relation to the F10 function key.

Bit 7				Bit 0			
CPL	BRK	0	MUT	DIM	0	0	SAH

SAH: Short Airhorn
0 = Short airhorn disabled
1 = Short airhorn enabled

DIM: Dimmer
0 = Dimmer disabled
1 = Dimmer enabled

MUT: Mute
0 = Mute disabled
1 = Mute enabled

CPL: Coupler
0 = Coupler disabled
1 = Coupler enabled

BRK: Brake
0 = Brake disabled
1 = Brake enabled

0: Reserved

Default Value: 0



Primary CVs

CV 45: F11 Output Location

Description

CV 45 is used to map a given effect to the F11 function key. The enabled effect will be activated when the F11 function is turned on. Disabled effects will have no relation to the F11 function key.

Bit 7				Bit 0			
CPL	BRK	0	MUT	DIM	0	0	SAH

SAH: Short Airhorn

- 0 = Short airhorn disabled
- 1 = Short airhorn enabled

DIM: Dimmer

- 0 = Dimmer disabled
- 1 = Dimmer enabled

MUT: Mute

- 0 = Mute disabled
- 1 = Mute enabled

CPL: Coupler

- 0 = Coupler disabled
- 1 = Coupler enabled

BRK: Brake

- 0 = Brake disabled
- 1 = Brake enabled

0: Reserved

Default Value: 0



Primary CVs

CV 46: F12 Output Location

Description

CV 46 is used to map a given effect to the F12 function key. The enabled effect will be activated when the F12 function is turned on. Disabled effects will have no relation to the F12 function key.

Bit 7				Bit 0			
CPL	BRK	0	MUT	DIM	0	0	SAH

SAH: Short Airhorn

- 0 = Short airhorn disabled
- 1 = Short airhorn enabled

DIM: Dimmer

- 0 = Dimmer disabled
- 1 = Dimmer enabled

MUT: Mute

- 0 = Mute disabled
- 1 = Mute enabled

CPL: Coupler

- 0 = Coupler disabled
- 1 = Coupler enabled

BRK: Brake

- 0 = Brake disabled
- 1 = Brake enabled

0: Reserved

Default Value: 0



Lighting Effect CVs

CVs 49-54: Hyperlight Effect Select

Description

CVs 49-54 are used to configure up to six lighting outputs with Hyperlight lighting effects and other lighting features. Bit definitions for CVs 49-54 are identical.

- CV 49: Headlight Configuration (F0(f) by default)
- CV 50: Backup Light Configuration (F0(r) by default)
- CV 51: FX3 Configuration (F24 by default)
- CV 52: FX4 Configuration (F25 by default)
- CV 53: FX5 Configuration (F26 by default) **
- CV 54: FX6 Configuration (F27 by default) **

** Available on select formats

Bit 7							Bit 0
LED	XING	PHSE	EF4	EF3	EF2	EF1	EF0

EF0-EF4: Hyperlight Effect Select

- 0 = On/off output
- 1 = Dimmable on/off headlight
- 2 = Mars Light
- 3 = Pyle-National Gyalite
- 4 = Oscillating headlight
- 5 = Single-flash strobe 1
- 6 = Double-flash strobe
- 7 = Western-Cullen D312 Rotary Beacon
- 8 = Prime Stratolite
- 9 = Ditch light type I
- 10 = Ditch light type II
- 11 = Flashing rear-end device (FRED)
- 12 = Engine exhaust flicker
- 13 = Firebox flicker
- 14 = Reserved
- 15 = Dyno-light
- 16 = Auto-dim forward
- 17 = Auto-dim reverse
- 18 = Brake light
- 19 = On/off – brightness 1
- 20 = On/off – brightness 2
- 21 = Emergency Gyalite
- 22 = Reserved
- 23 = Ash pan flicker
- 24 = Reserved
- 25 = Single-flash strobe 2



Lighting Effect CVs

PHSE: Phase Select

0 = Phase A

1 = Phase B

XING: Grade-Crossing Logic Enable

0 = Grade-Crossing Logic disabled

1 = Grade-Crossing Logic enabled

LED: LED Compensation Mode Enable

0 = Incandescent-compatible outputs enabled

1 = LED-compatible outputs enabled

Additional Information

On/Off Output

On/Off Output

The on/off lighting effect provides on/off control for the corresponding function. Use this effect when the function output is being utilized to drive external electronics such as a low power relay to control a smoke generator or a servo motor.

Dimmable On/Off Headlight

The output set to the dimmable headlight will be reduced to the brightness setting in CV 63 when you turn on the dimmer function (F7 by default).

Mars Light

The Mars light warning beacon follows the famous figure-eight sweep pattern and oscillates more rapidly than the Gyalrite.

Pyle-National Gyalrite

The Pyle-National Gyalrite is similar to the Mars Light, but oscillates in a circular or elliptical pattern.

Oscillating Headlight

The dual-oscillating headlight generates two beams that follow each other in a tight, circular sweep pattern.

Single-Flash Strobes 1 and 2

The xenon single-flash strobe 1 effect flashes once during each flash rate timing cycle. The xenon single-flash strobe 2 flashes once during each flash rate timing cycle, but at a slightly faster rate.

This effect allows you to mimic warning lights found on many Amtrak locomotives as well as remote control operated (or "RCO") locomotives.

Double-Flash Strobe

The xenon double-flash strobe effect emits two rapid flashes of light during each flash rate timing cycle. CV 59 is used to modify the flash rate timing cycle.

Western-Cullen D312 Rotary Beacon

The Western-Cullen D312 Rotary Beacon effect follows a revolving reflector and bulb assembly flash-pattern.



Lighting Effect CVs

Prime Stratolite

The Stratolite is made up of four individual lamps arranged in a circular pattern. The Stratolite flashes in a clockwise direction in a mechanical “stepped” fashion, unlike the smooth motion of the rotary beacon.

Ditch Lights Type I and II

Ditch lights type I and II flash together by default. When Grade-Crossing Logic is enabled, ditch light I assumes a steady “on” state before and after the crossing hold timer countdown. Conversely, ditch light II will remain off before and after the crossing hold timer countdown. To configure alternating ditch lights, set one lighting output to ditch light I or II and enable Grade-Crossing Logic, and then set a second lighting output to the same ditch light and enable Grade-Crossing Logic and phase offset.

FRED (Flashing Rear End Device)

The FRED effect is a flashing red taillight that indicates the rear of the train.

Engine Exhaust Flicker

This effect produces a random flicker whose intensity increases with locomotive speed. This effect is best used by placing a red/orange LED in the exhaust stack. As the locomotive increases speed, it will glow brighter, imitating an increase in sparks and exhaust gases.

Dyno-Light

In a diesel locomotive, the lights will fade on and fade off to simulate the heating and cooling of the bulb filaments.

Auto-Dim Forward and Reverse

The auto-dim forward effect will automatically dim lighting outputs to the dimmer level in CV 63 when in the forward direction, and the auto-dim reverse effect will automatically dim lighting outputs to the dimmer level in CV 63 when in the reverse direction.

Brake Light

The brake light effect is dimmed to the brightness setting in CV 63 when active. The brake light brightness level will be automatically set to 100% when you turn on the independent or train brake function (F11 by default).

On/Off Brightness 1 and 2

On/Off Brightness effects 1 and 2 allow you to independently adjust the level of up to 2 lighting outputs. You can accurately recreate low brilliance lighting effects on your model such as class lights, lit number boards or marker lamps. The on/off brightness 1 and 2 effects will set lighting outputs to the brightness levels of CVs 61 and 62, respectively.

Emergency Gyalite

The emergency Gyalite follows the same oscillating sweep pattern as the Gyalite, and will automatically disable all active lighting effects.

Phase Offset

Add a value of 32 to the value of flashing Hyperlight effects to set the corresponding lighting output to Phase B from Phase A. Flashing effects set to Phase B will flash opposite of flashing effects set to Phase A, i.e., Phase A turns off when Phase B turns on, and Phase A turns on when Phase B turns off.



Lighting Effect CVs

Grade-Crossing Logic

Grade-Crossing Logic allows you to set up lighting functions, the bell, and airhorn to automatically simulate encountering grade crossings. Add a value of 64 to enable Grade-Crossing Logic. Turning on the long airhorn function (F2 by default) or the grade-crossing signal function (F9 by default) will start the crossing hold timer countdown and allow lighting effects to assume a flashing state. Shown in Table F, flashing Hyperlight effects will return to an on or off state after the countdown ends. You can adjust the crossing hold timer countdown from 0 to 15 seconds by entering a value from 0 to 15 into CV 60 (Grade-Crossing Hold Time).

Refer to Table F located below for a list of Hyperlight effects commonly configured with Grade Crossing Logic (including alternating ditch lights) and corresponding CV values.

Table F. Commonly Configured Hyperlight Effects					
Effect Type	CV Value				Grade Crossing Logic Effect State
	Crossing Logic Off		Crossing Logic On		
	Phase A	Phase B	Phase A	Phase B	
Mars Light	2	34	66	98	On
Pyle-National Gyalite	3	35	67	99	On
Oscillating Headlight	3	36	68	100	On
Single-Flash Strobe 1	5	37	69	101	Off
Single-Flash Strobe 2	25	57	89	131	Off
Double-Flash Strobe	6	38	70	102	Off
D312 Rotary Beacon	7	39	71	103	Off
Prime Stratolite	8	40	72	104	Off
Ditch Light I	9	41	73	105	On
Ditch Light II	10	42	74	106	Off
FRED	11	43	75	107	Off

LED Compensation Mode

The brightness of an incandescent bulb is determined by voltage, whereas an LED's brightness is determined by current. LED Compensation Mode alters the method of sending current to the LED to balance the LED and incandescent brightness levels. Add a value of 128 to enable LED Compensation Mode for the corresponding lighting output.

Note: *Enabling LED Compensation Mode will not change the output voltage. Resistors may still be necessary depending on the board format and drive voltage of the LED.*

- Default Value:** CV 49 = Varies by software version
CV 50 = Varies by software version
CVs 51-54 = 0
- Related CVs:** CVs 57-63 (Lighting Effect CVs)



Lighting Effect CVs

CV 57: Forward Direction Enable

Description

CV 57 (Forward Direction Enable) and CV 58 (Reverse Direction Enable) are used to determine the directionality of the FX lighting outputs. Use CV 57 to enable a lighting output for the forward direction.

Bit 7						Bit 0	
0	0	FX6	FX5	FX4	FX3	BL	HL

HL: Headlight Forward Enable

0 = Headlight output disabled in forward direction

1 = Headlight output enabled in forward direction

BL: Backup Light Forward Enable

0 = Backup light output disabled in forward direction

1 = Backup light output enabled in forward direction

FX3-FX6: FX3-FX6 Forward Enable

0 = FX output disabled in forward direction

1 = FX output enabled in forward direction

0: Reserved

Additional Information

Setting bits 0-5 to 1 will enable the corresponding lighting output for the forward direction. A given lighting output can be made bidirectional by setting corresponding bits of CVs 57 and 58. Refer to indexed CVs 1.257-1.512 (Extended Function Mapping CVs) for information regarding mapping functions to lighting outputs.

Default Value: Software versions 1.1 through 1.3: 253

Software version 1.5 and higher: 61

Related CVs: CVs 49-54 (Hyperlight Effect Select)

CV 58 (Reverse Direction Enable)

CVs 1.257-1.512 (Extended Function Mapping CVs)



Lighting Effect CVs

CV 58: Reverse Direction Enable

Description

CV 58 (Reverse Direction Enable) and CV 57 (Forward Direction Enable) are used to determine the directionality of the FX outputs. Use CV 58 to enable a lighting output for the reverse direction.

Bit 7							Bit 0
0	0	FX6	FX5	FX4	FX3	BL	HL

HL: Headlight Reverse Enable

0 = Headlight output disabled in reverse direction

1 = Headlight output enabled in reverse direction

BL: Backup Light Reverse Enable

0 = Backup light output disabled in reverse direction

1 = Backup light output enabled in reverse direction

FX3-FX6: FX3-FX6 Reverse Enable

0 = FX output disabled in reverse direction

1 = FX output enabled in reverse direction

0: Reserved

Additional Information

Setting bits 0-5 to 1 will enable the corresponding lighting output for the reverse direction. A given lighting output can be made bidirectional by setting corresponding bits of CVs 57 and 58. Refer to indexed CVs 1.257-1.512 (Extended Function Mapping CVs) for information regarding mapping functions to lighting outputs.

Default Value: Software versions 1.1 through 1.3: 254

Software version 1.5 and higher: 62

Related CVs: CVs 49-54 (Hyperlight Effect Select)

CV 57 (Forward Direction Enable)

CVs 1.257-1.512 (Extended Function Mapping CVs)



Lighting Effect CVs

CV 59: Hyperlight Flash Rate

Description

CV 59 is used to set the flash rate of all enabled flashing Hyperlight effects.

Bit 7							Bit 0
0	0	0	0	FR3	FR2	FR1	FR0

FR0-FR3: Hyperlight Flash Rate Select

0 = Fastest flash rate

.

.

.

15 = Slowest flash rate

0: Reserved

Default Value: Software versions 1.1 through 1.3: 2

Software version 1.5 and higher: 3

Related CVs: CVs 49-54 (Hyperlight Effect Select)

CV 60 (Grade-Crossing Hold Time)



Lighting Effect CVs

CV 60: Grade-Crossing Hold Time

Description

CV 60 is used to set the duration of the crossing hold countdown from 0 to 15 seconds.

Bit 7				Bit 0			
0	0	0	0	HT3	HT2	HT1	HT0

HT0-HT3: Hold Time Select

0 = 0 seconds

.

.

.

15 = 15 seconds

0: Reserved

Additional Information

The countdown will occur when the long airhorn function (F2 by default) or grade crossing horn is turned on to activate Grade-Crossing Logic. Setting bit 6 to 1 of CVs 49-54 (Hyperlight Effect Select) will enable Grade-Crossing Logic.

Default Value: 4

Related CVs: CVs 49-54 (Hyperlight Effect Select)
CV 57 (Forward Direction Enable)
CV 58 (Reverse Direction Enable)
CV 59 (Hyperlight Flash Rate)



Lighting Effect CVs

CV 61: Brightness Register 1

Description

CV 61 is used to adjust the brightness level of lighting outputs set to the on/off brightness 1 effect.

Bit 7							Bit 0
D7	D6	D5	D4	D3	D2	D1	D0

D0-D7: Brightness Level 1
0 = 0% brightness
.
.
255 = 100% brightness

Default Value: 153
Related CVs: CVs 49-54 (Hyperlight Effect Select)
CV 63 (Dimmer Level)



Lighting Effect CVs

CV 62: Brightness Register 2

Description

CV 62 is used to adjust the brightness level of lighting outputs set to the on/off brightness 2 effect.

Bit 7							Bit 0
D7	D6	D5	D4	D3	D2	D1	D0

D0-D7: Brightness Level 2
0 = 0% brightness
.
.
255 = 100% brightness

Default Value: 153
Related CVs: CVs 49-54 (Hyperlight Effect Select)
CV 63 (Dimmer Level)



Lighting Effect CVs

CV 63: Dimmer Level

Description

CV 63 is used to adjust the brightness level of the on/off dimmable headlight effect. The brightness of the headlight will be automatically dimmed to the value of CV 63 when the dimmer function (F7 by default) is turned on.

Bit 7							Bit 0
D7	D6	D5	D4	D3	D2	D1	D0

D0-D7: Dimmer Level

0 = 0% brightness

.

.

.

255 = 100% brightness

Default Value: 153

Related CVs: CVs 49-54 (Hyperlight Effect Select)
CV 61 (Brightness Register 1)
CV 62 (Brightness Register 2)



Speed Table CVs

CV 66: Forward Motor Trim

Description

CV 66 is used to determine the scaling factor that will increase or decrease the forward drive voltage.

Bit 7							Bit 0
D7	D6	D5	D4	D3	D2	D1	D0

D0-D7: Forward Trim Scalar

- 0 = Disabled
- 1 = Voltage \times 0.008
- .
- .
- .
- 127 = Voltage \times 0.91
- 128 = Disabled
- 129 = Voltage \times 1.09
- .
- .
- .
- 255 = Voltage \times 1.91

Additional Information

Values from 0 to 255 may be entered into CV 66 to determine the scaling factor for the forward drive voltage. Entering a value of 0 or 128 will disable the forward trim scalar. Entering a value from 1 to 127 will multiply the forward drive voltage by 0.008-0.91. Entering a value from 129 to 255 will multiply the forward drive voltage by 1.09-1.91.

Note: Bit 4 (STE) of CV 29 (Configuration Data 1) must be set to 1 to enable the forward trim scaling factor in CV 66. Also, CV 25 cannot be set to either 1 or 0.

- Default Value:** 128
- Related CVs:** CV 25 (Speed Table Enable)
CV 29 (Configuration Data 1)
CVs 67-94 (Custom Speed Table)
CV 95 (Reverse Motor Trim)

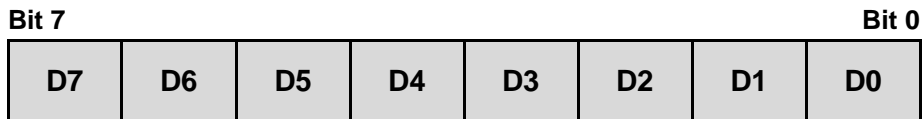


Speed Table CVs

CVs 67-94: Custom Speed Table

Description

CVs 67-94 are used to set the 28-point custom speed table.



D0-D7: Speed Table Data

0 = 0% throttle

.

.

255 = 100% throttle

CV	Speed Point	% of Speed	CV Value
67	1	4	9
68	2	7	18
69	3	11	27
70	4	14	36
71	5	18	45
72	6	22	55
73	7	25	64
74	8	29	73
75	9	32	82
76	10	36	91
77	11	39	100
78	12	43	109
79	13	46	118
80	14	50	127
81	15	54	137
82	16	57	146
83	17	61	155
84	18	64	164
85	19	67	173
86	20	71	182
87	21	75	191
88	22	78	200
89	23	82	209
90	24	86	219
91	25	89	228
92	26	93	237
93	27	96	246
94	28	100	255

Additional Information

Entering values from 0 to 255 into CVs 67-94 will set each point of the 28-point custom speed table from 0% to 100% of the maximum throttle setting. The 28-point speed table is linear by default.

Related CVs:

- CV 25 (Speed Table Enable)
- CV 29 (Configuration Data 1)
- CV 66 (Forward Motor Trim)
- CV 95 (Reverse Motor Trim)



Speed Table CVs

CV 95: Reverse Motor Trim

Description

CV 95 is used to determine the scaling factor that will increase or decrease the reverse drive voltage.

Bit 7							Bit 0
D7	D6	D5	D4	D3	D2	D1	D0

D0-D7: Reverse Trim Scalar

- 0 = Disabled
- 1 = Voltage ÷ 0.008
- .
- .
- .
- 127 = Voltage ÷ 0.99
- 128 = Disabled
- 129 = Voltage × 1.09
- .
- .
- .
- 255 = Voltage × 1.99

Additional Information

Values from 0 to 255 may be entered into CV 95 to determine the scaling factor for the reverse drive voltage. Entering a value of 0 or 128 will disable the reverse trim scalar. Entering a value from 1 to 127 will decrease the reverse drive voltage by 0.008-0.99. Entering a value from 129 to 255 will increase the reverse drive voltage by 1.09-1.99.

Note: *Bit 4 (STE) of CV 29 (Configuration Data 1) must be set to 1 to enable the reverse trim scaling factor in CV 95. Also, CV 25 cannot be set to either 1 or 0.*

- Default Value:** 128
- Related CVs:** CV 25 (Speed Table Enable)
CV 29 (Configuration Data 1)
CVs 67-94 (Custom Speed Table)
CV 66 (Forward Motor Trim)



User Information CVs

CV 105: User Identifier 1

Description

CV 105 indicates the software's major revision code and provides storage for user-supplied data. This CV has no other effect on decoder operation.

Bit 7							Bit 0
D7	D6	D5	D4	D3	D2	D1	D0

D0-D7: User Identifier Data

Additional Information

This CV may be programmed with any value from 0 to 255. CV 105 will return to the software's major revision code when the decoder is reset to factory settings.

Default Value: 1

Related CVs: CV 106 (User Identifier 2)



User Information CVs

CV 106: User Identifier 2

Description

CV 106 indicates the software's minor revision code. This CV may be used to provide storage for user-supplied data. This CV has no other effect on decoder operation.

Bit 7							Bit 0
D7	D6	D5	D4	D3	D2	D1	D0

D0-D7: User Identifier Data

Additional Information

This CV may be programmed with any value from 0 to 255. CV 106 will return to the software's minor revision code when the decoder is reset to factory settings.

Default Value: Varies by software revision

Related CVs: CV 105 (User Identifier 1)



Sound Control CVs

CV 113: Quiet Mode Time-Out Period

Description

CV 113 is used to set the quiet mode time-out period. When the throttle is set to zero and all functions are off all sound effects will automatically deactivate after the quiet mode time-out period elapses. Setting CV 113 to a non-zero value will adjust the time-out period and allow sound effects to be reactivated only when the decoder is addressed.

Bit 7

Bit 0

QM7	QM6	QM5	QM4	QM3	QM2	QM1	QM0
-----	-----	-----	-----	-----	-----	-----	-----

QM0-QM7: Quiet Mode Time-Out Period

0 = Disabled

1 = 1 second

.

.

.

255 = 255 seconds

Additional Information

Entering a value from 1 to 255 into CV 113 will adjust the quiet mode time-out period from 1 second to 255 seconds. Entering a value of 0 into CV 113 will disable the quiet mode time-out period.

Default Value: 0

Related CVs: CVs 112-200 (Sound Control CVs)



Sound Control CVs

CV 114: Engine Exhaust Control

Description

CV 114 is used to adjust the auto-notching sensitivity level, enable engine interlock, enable auto-start, and select from four dynamic braking modes. Decimal values for bits 0-3 (AN0-AN3) and binary values for bits 4-7 (LOCK, ASTRT, and DB0-DB1) are defined as follows:

Bit 7							Bit 0	
	DB1	DB0	ASTRT	LOCK	AN3	AN2	AN1	AN0

AN0-AN3: Auto-Notching Sensitivity

- 0 = Auto-notching disabled
- 1 = 1 speed step/notch
- .
- .
- .
- 15 = 15 speed steps/notch

LOCK: Engine Interlock Enable

- 0 = Engine interlock disabled
- 1 = Engine interlock enabled

ASTRT: Auto-Start Enable

- 0 = Auto-start disabled
- 1 = Auto-start enabled

DB0-DB1: Dynamic Braking Mode Select

- 00 = Normal operation (default)
- 01 = Idle speed (notch 1)
- 10 = Half-speed (notch 4)
- 11 = Full speed (notch 8)

Additional Information

Entering values from 1 to 15 into bits 0-3 (AN0-AN3) will:

- Enable auto-notching
- Designate the number of speed steps contained within each engine RPM notch

Values from 1 to 15 specify the number of speed steps within each engine RPM notch from 1 to 15. For example, when CV 114 is set to 15 and 128 speed-step mode is in use, increasing the throttle from zero to speed-step 90 will heighten the engine RPM from idle (notch 1) to notch 8.

Setting bits 0-3 to 0 will disable auto-notching and enable manual notching.



Sound Control CVs

Setting bit 4 (LOCK) to 1 will enable engine interlock. When engine interlock is enabled, the prime mover must be started prior to setting the locomotive into motion, and cannot be turned off during movement; locomotive speed must be zero for the prime mover to be started and shut off, respectively.

Setting bit 5 (ASTRT) to 1 will enable auto-start. Auto-start allows the prime mover to be started automatically when the decoder receives track power. For DCC operation, the prime mover will not start upon receiving track power when bit 5 is set to 0 and auto-start is disabled. For analog mode (DC) operation, the prime mover will start when the decoder receives track power regardless of bit 5, i.e., auto-start cannot be disabled with CV 114 in analog mode.

Bits 6-7 (DB0-DB1) are used to select from four dynamic braking modes. When bits 6-7 are equal to a non-zero value, turning on the dynamic brake function (F4 by default) will set the engine RPM sound effect from its current state to a designated notch setting.

Decimal values used for selecting dynamic braking modes are provided below and must be added to the value of CV 114:

- 0 = Normal: Dynamic brake application only (default)
- 64 = Idle speed: Dynamic brake sets RPM to notch 1
- 128 = Half-speed: Dynamic brake sets RPM to notch 4
- 192 = Full speed: Dynamic brake sets RPM to notch 8

Default Value: 39
Related CVs: CVs 112-208 (Sound Control CVs)



Sound Control CVs

CV 117: F11 Brake Rate

Description

CV 117 configures the motive effect of the brake. When the brake rate is set to any value other than 0 or 128, the locomotive comes to a stop when the brake is on. The rate at which the locomotive decelerates is equal to the combined rate from CVs 4 and 24 plus the brake rate value.

Bit 7							Bit 0
SIGN	D6	D5	D4	D3	D2	D1	D0

D0-D6: Brake Rate Value

SIGN: Sign
0 = Positive value
1 = Negative value

Additional Information

Bits 0-7 are used to adjust the brake rate in relation to the value of CV 4.

Bit 7 (SIGN) determines if the brake rate is lesser or greater than the baseline deceleration rate. Entering values from 0 to 127 will increase the brake rate from the baseline deceleration rate. Entering values from 129 to 255 will decrease the brake rate from the baseline deceleration rate. The brake function will not impede the motor when CV 117 is set to a value of 0 or 128.

$$\text{Seconds/Speed Step} = (\text{CV 4} + \text{CV 117}) \times 0.896 \div \text{Number of Speed Steps}$$

Default Value: 0
Related CVs: CV 4 (Baseline Deceleration Rate)



Sound Control CVs

CV 119: Max Engine Recovery Speed

Description

CV 119 is used to designate the speed to which the motor will resume after momentary power losses. The recovery speed can be determined as a fixed speed step (absolute limiting) or a fraction of the current throttle setting (proportional limiting).

Bit 7								Bit 0
	MRS	MRS	MRS	MRS	MRS	MRS	MRS	MRS

MRS: Max Recovery Speed

- 0 = Disabled
- 1 = Speed-step 1 (absolute limiting)
- .
- .
- 127 = Speed-step 127 (absolute limiting)
- 128 = Disabled
- 129 = 1% of throttle setting (proportional limiting)
- .
- .
- 255 = 100% of throttle setting (proportional limiting)

Additional Information

Entering a value from 1 to 127 will designate the recovery speed as a fixed speed step from 1 to 127 (absolute limiting). If the recovery speed step in CV 119 is greater than the last speed step before power loss, the decoder will resume the throttle setting being received by the command station. Otherwise, the decoder will resume from the speed step defined by CV 119.

Entering a value from 129 to 255 will designate the recovery speed as a fraction of the current throttle setting (proportional limiting). Higher values indicate higher speed settings. The decoder calculates the recovery speed after power losses as:

$$\text{Recovery Speed} = (\text{CV 119} - 128 \times \text{Speed Step}) \div 127$$

Entering a value of 0 or 128 into CV 119 will disable the recovery speed setting and the prime mover will start at speed-step 0 following power losses.

Default Value: 204

Related CVs: CVs 209-218 (Advanced Motor Control CVs)



Sound Control CVs

CV 120: Airhorn Select

Description

CV 120 is used to select one of a large selection of airhorn sound effects for the long and short airhorn functions (F2 and F3 by default). For a list of airhorn sound effects and corresponding values, refer to the product packaging or the *Econami Diesel Sound Selection Reference* found on our website.

Bit 7				Bit 0			
0	0	0	0	HS3	HS2	HS1	HS0

HS0-HS3: Airhorn Select

0 = Airhorn 1

.

.

.

15 = Airhorn 16

0: Reserved

Default Value: 0

Related CVs: CV 121 (Auxiliary Airhorn Select)
CV 129 (Airhorn Mixer Channel Volume Control)

The low-tone airhorn (F2 by default) is enabled as the primary airhorn in UK decoders.



Sound Control CVs

CV 121: Alternate Airhorn Select

Description

CV 121 is used for selecting one of a large number of alternate airhorn sound effects. For a list of airhorn sound effects and corresponding values, refer to the product packaging or the *Econami Diesel Sound Selection Reference* found on our website.

Bit 7						Bit 0	
0	0	AH5	AH4	AH3	AH2	AH1	AH0

AH0-AH5: Alternate Airhorn Select

0 = Alternate airhorn disabled

1 = Replaces short airhorn with alternate airhorn 1

.

.

.

16 = Replaces short airhorn with alternate airhorn 16

0: Reserved

More Information

Bits 0-5 (AH0-AH5) are used to select the alternate airhorn sound effect. When the alternate airhorn is enabled, the short airhorn function is disabled. When the alternate airhorn is enabled and the short airhorn function is turned on, the long airhorn function is used to activate the alternate airhorn sound effect.

Default Value: 0

Related CVs: CV 120 (Airhorn Select)
CV 129 (Airhorn Mixer Channel Volume Control)

The two-tone airhorn (F3 by default) is enabled in place of the short airhorn in UK decoders.



Sound Control CVs

CV 122: Bell Select

Description

CV 122 is used for configuring the bell sound effect and ring-rate, and for enabling the selected bell to ring during the crossing-timer countdown when Grade-Crossing Logic is activated. Refer to CVs 49-54 (Hyperlight Effect Select) for more information regarding Grade-Crossing Logic. The number of available bells and bell types will vary with each decoder version. For a list of bell sound effects and corresponding values, refer to the *Econami Diesel Sound Selection Reference* found on our website.

Bit 7							Bit 0
BXING	0	BS5	BS4	BS3	BS2	BS1	BS0

BS0-BS5: Bell Select

BXING: Grade-Crossing Bell Enable

0 = Disabled

1 = Enabled

0: Reserved

Default Value: 2

Related CVs: CVs 49-54 (Hyperlight Effect Select)
CV 60 (Grade-Crossing Hold Time)
CV 130 (Bell Primary Mixer Channel)

The high-tone airhorn (F1 by default) is enabled in place of the bell in UK decoders.



Sound Control CVs

CV 123: Prime Mover Select

Description

CV 123 is used to select one of up to 12* prime mover sound effects. For a full list of prime movers and corresponding values, refer to the product packaging or the *Econami Diesel Sound Selection Reference* found on our website.

Bit 7					Bit 0		
0	0	0	0	0	PM2	PM1	PM0

PM0-PM2: Prime Mover Select

- 0 = Prime mover 1
- 1 = Prime mover 2
- 2 = Prime mover 3
- 3 = Prime mover 4
- 4 = Prime mover 5

0: Reserved

Default Value: 0

Related CVs: CV 131 (Prime Mover Mixer Channel Volume Control)

There are 6 prime mover selections in UK decoders.

* Software versions prior to 1.2 only include up to 9 prime mover choices.



Sound Control CVs

CV 124: Air Compressor Select

Description

CV 124 is used to select an air compressor sound effect. For a list of air compressors and corresponding values, refer to the *Econami Diesel Sound Selection Reference* found on our website.

Bit 7							Bit 0
0	0	0	0	0	0	0	ACS

ACS: Air Compressor Select

0 = Air Compressor 1

1 = Air Compressor 2

0: Reserved

Additional Information

The selected air compressor sound effect cycles on and off continuously when the prime mover is on.

Default Value: 0

Related CVs: CV 132 (Air Compressor Mixer Channel Volume Control)



Sound Control CVs

CV 126: Coupler Select

Description

CV 126 is used to select the coupler sound effect that will be activated by the couple/uncouple functions (F13 by default).

Bit 7							Bit 0
CRP	0	0	0	0	CPL2	CPL1	CPL0

CPL0-CPL1: Coupler Select

- 0 = Medium coupler
- 1 = Heavy coupler
- 2 = Link-and-pin
- 3 = Buffers (UK decoders only)

CRP: Uncouple Function Polarity

- 0 = Uncouple when function is turned on
- 1 = Uncouple when function is turned off

0: Reserved

Additional Information

By default, bit 7 (CRP) is set to 1 and the couple and uncouple functions are mapped to F13; turning on F13 will activate the coupling sound effect and turning off F13 will activate the uncoupling sound effect.

When bit 7 is set to 0 and the couple and uncouple functions are mapped to the same function key, turning on the function key will activate the coupling sound effect and turning off the function key will have no effect.

When bit 7 is set to 0 and the couple and uncouple functions are mapped to separate function keys, turning on the couple function key will activate the coupling sound effect and turning on the uncouple function key will activate the uncoupling sound effect. Turning off the couple and uncouple function keys will have no effect.

The link-and-pin coupler does not include the uncouple or glad hand release.

Default Value: 128

Related CVs: CV 137 (Coupler Mixer Channel Volume Control)

Buffers are the default coupler in UK decoders (CV 126 = 131).



Sound Control CVs

CV 128: Master Volume

Description

CV 128 is used to set the volume level of all sound channels.

Bit 7							Bit 0
VOL7	VOL6	VOL5	VOL4	VOL3	VOL2	VOL1	VOL0

VOL0-VOL7: Master Volume

0 = 0% volume

.

.

.

255 = 100% volume

Default Value: 192

Related CVs: CVs 129-150 (Mixer Channel Volume Control)



Sound Control CVs

CVs 129-150: Mixer Channel Volume Control

Description

CVs 129-150 are used in conjunction with CV 128 (Master Volume) to set the volume level of each sound effect.

Bit 7

Bit 0

MIX7	MIX6	MIX5	MIX4	MIX3	MIX2	MIX1	MIX0
------	------	------	------	------	------	------	------

MIX0-MIX7: Mixer Channel Volume Control

0 = 0% of master volume

.

.

.

255 = 100% of master volume

CV	Sound Effect	Default Value
129	Airhorn	225
130	Bell	85
131	Prime Mover	150
132	Air Compressor	100
133	Dynamic Brake	125
134	Radiator Fans	75
135	Reserved	0
136	Reserved	0
137	Coupler	128
138	Reserved	0
139	Brake Squeal	100
140	Brake Release	70
141	Reserved	0
142	Reserved	0
143	Poppet Valve	60
144	Reserved	0
145	Reserved	0
146	Reserved	0
147	Reserved	0
148	E-Brake App.	70
149	Glad Hand Release	150
150	"All Aboard!" / Coach Doors*	192

Additional Information

Setting CVs 129-150 to a value from 0 to 255 will adjust the corresponding sound effect's volume level from the master volume level in CV 128. For example, if CV 128 is set to 50% volume (CV 128 = 128), setting CV 129 to a value of 128 will adjust the airhorn volume level to 50% of the master volume level, i.e., the airhorn volume will be set to 25% of the maximum volume level.

Related CVs: CV 128 (Master Volume)

* Not included in software releases prior to version 1.3

🇬🇧 The bell and dynamic brake volume levels are set to 0% in UK decoders.

🇬🇧 The "All Aboard!" effect is replaced with a Guard's whistle effect in UK decoders.



Sound Control CVs

CV 193: Auto-Bell On Set Point

Description

CV 193 is used to determine the speed step at which the bell sound effect will be automatically turned on and CV 194 (Auto-Bell On Time) is used to adjust the duration in seconds that elapses before the bell sound effect will be automatically turned off. Also CV 197 (Analog Mode Auto-Sound Enable) and CV 198 (DCC Mode Auto-Sound Enable) must have bit 2 set to 1.

Bit 7							Bit 0
0	D6	D5	D4	D3	D2	D1	D0

D0-D6: Auto-Bell On Set Point
 0 = Auto-bell disabled
 1 = Speed-step 1
 .
 .
 .
 127 = Speed-step 127

0: Reserved

Default Value: 1
Related CVs: CV 194 (Auto-Bell On Time)
 CV 197 (Analog Auto-Sound Enable)
 CV 198 (DCC Auto-Sound Enable)

The bell is disabled by default in UK decoders.



Sound Control CVs

CV 194: Auto-Bell On Time

Description

CV 194 is used to set the duration in seconds that elapses from the time the bell sound effect is automatically turned on to the time it is turned off. CV 193 (Auto-Bell On Set Point) is used to determine the speed step at which the bell sound effect is turned on. Also CV 197 (Analog Mode Auto-Sound Enable) and CV 198 (DCC Mode Auto-Sound Enable) must have bit 2 set to 1.

Bit 7						Bit 0	
D7	D6	D5	D4	D3	D2	D1	D0

D0-D7: Auto-Bell On Time

0 = Auto-bell disabled

1 = 1 second

.

.

.

255 = 255 seconds

Default Value: 15

Related CVs: CV 193 (Auto-Bell On Set Point)
CV 197 (Analog Mode Auto-Sound Enable)
CV 198 (DCC Auto-Sound Enable)

The bell is disabled by default in UK decoders.



Sound Control CVs

CV 195: Coach Door Count*

Description

CV 195 is used to set the maximum number of coach door slams that will occur when the “all aboard!”/coach doors function (F23 by default) is turned on. From the range defined by the value of CV 195, a random number of coach door slams will be issued when the “all aboard!”/coach doors function is turned on.

Bit 7				Bit 0			
0	0	0	0	CD3	CD2	CD1	CD0

CD0-CD3: Coach Doors

0 = Disabled

1 = 1 slam

.

.

.

15 = 15 slams

0: Reserved

Default Value: 5

Related CVs: CV 150 (“All Aboard!”/Coach Doors Mixer Channel Volume Control)

* Not included in software releases prior to version 1.3

🇬🇧 Guard whistle effect replaces “All Aboard!” announcement in UK decoders.



Sound Control CVs

CV 196: Brake Squeal Sensitivity

Description

CV 196 is used to adjust the automatic brake activation point. The value of CV 196 sets the rate of throttle decrease that will activate the brake sound effect.

Bit 7							Bit 0
D7	D6	D5	D4	D3	D2	D1	D0

D0-D7: Brake Sensitivity

0 = 0.10 speed steps/second

.

.

.

.

255 = 25.5 speed steps/second

Additional Information

The value of CV 196 indicates the rate of throttle decrease required for the brake sound effect to be automatically activated and is calculated as:

$$\text{CV Value} = \text{Speed Steps/Second} \div 10$$

Default Value: 3

Related CVs: CV 4 (Baseline Deceleration Rate)
CV 117 (F11 Brake Rate)
CV 139 (Brake Squeal Mixer Channel Volume Control)



Sound Control CVs

CV 197: Analog Mode Auto-Sound Enable

Description

CV 197 is used to enable automatic sound effects for analog mode operation.

Bit 7	0	0	0	0	0	ABK	ABL	Bit 0
--------------	----------	----------	----------	----------	----------	------------	------------	--------------

ABL: Auto-Bell Enable

0 = Disabled

1 = Enabled

ABK: Auto-Brake Enable

0 = Disabled

1 = Enabled

0: Reserved

Default Value: 0

Related CVs: CV 12 (Alternate Power Source)

CV 29 (Configuration Data 1)

The bell is disabled by default in UK decoders.



Sound Control CVs

CV 198: DCC Mode Auto-Sound Enable

Description

CV 198 is used to enable automatic sound effects in DCC mode.

Bit 7					Bit 0		
0	0	0	0	0	ABK	ABL	0

ABL: Auto-Bell Enable

0 = Disabled

1 = Enabled

ABK: Auto-Brake Enable

0 = Disabled

1 = Enabled

0: Reserved

Default Value: 0

Related CVs: CV 12 (Alternate Power Source)

CV 29 (Configuration Data 1)

🇬🇧 The bell is disabled by default in UK decoders.



Sound Control CVs

CV 200: Poppet Valve Release Rate

Description

CV 200 is used to adjust the duration that occurs between each subsequent “pop!” of the automatic poppet valve sound effect.

Bit 7							Bit 0
D7	D6	D5	D4	D3	D2	D1	D0

D0-D7: Poppet Valve Release Rate
 0 = Poppet valve disabled
 1 = Fastest release rate
 .
 .
 .
 255 = Slowest release rate

Default Value: 25
Related CVs: CV 143 (Poppet Valve Mixer Channel Volume Control)

Spirax valve replaces poppet valve in UK decoders.



Advanced Motor Control CVs

CVs 209-218: Advanced Motor Control Registers

Description

CVs 209-218 are used to adjust aspects of advanced motor processes and optimize back-EMF control algorithms to complement a given installation.

CV 209: PID Kp Parameter

Description

CV 209 is used to set the Kp coefficient. Values from 0 to 255 may be entered to specify a gain factor for the proportional coefficient of the PID motor control equation.

Bit 7							Bit 0
D7	D6	D5	D4	D3	D2	D1	D0

D0-D7: Kp Coefficient

Default Value: 48

Related CVs: CVs 209-218 (Advanced Motor Control CVs)



Advanced Motor Control CVs

CV 210: PID Ki Parameter

Description

CV 210 is used to set the Ki coefficient. Values from 0 to 255 may be entered to specify a gain factor for the integral coefficient of the PID motor control equation.

Bit 7							Bit 0
D7	D6	D5	D4	D3	D2	D1	D0

D0-D7: Ki Coefficient

Default Value: 16
Related CVs: CVs 209-218 (Advanced Motor Control CVs)



CV 211: Low-Speed Compensation

Description

CV 211 is used to specify the gain value that is applied to the PID motor equation at low speeds to compensate for irregularities that occur during low-speed operation. Values from 0 to 255 may be entered to adjust low-speed motor operation.

Bit 7							Bit 0
D7	D6	D5	D4	D3	D2	D1	D0

D0-D7: Gain Value

- 0 = Disabled
- 1 = Minimum gain value
- .
- .
- .
- 255 = Maximum gain value

Additional Information

Increasing the gain value will allow the motor to start running at lower speeds. When CV 211 is set to a value of 255, the effect is applied across the first nine speed steps; the gain value has a decreasing effect upon the motor as speed steps increase. The gain value also advances the starting point at which the PWM is applied to the motor when CV 211 is set to high values. This helps compensate for motors that are more difficult to start.

In the event that you have an efficient motor that already spins at minimal voltages, it is possible that setting the gain value too high could elevate the locomotive's minimum speed, and/or cause a stutter at low speeds while the control loop attempts to slow the motor. If you notice this, reduce the value of CV 211. We suggest setting CV 211 to the lowest value that will still improve low-speed operation.

Default Value: 180

Related CVs: CVs 209-218 (Advanced Motor Control CVs)



Advanced Motor Control CVs

CV 212: BEMF Feedback Intensity

Description

CV 212 is used to set the back-EMF motor control intensity. Values from 0 to 255 may be entered to specify the percentage of back-EMF error ($n/255$) that is fed back from the control loop. Setting CV 212 to a value of 0 will disable load compensation.

Bit 7							Bit 0
D7	D6	D5	D4	D3	D2	D1	D0

D0-D7: BEMF Feedback Intensity

Default Value: 255
Related CVs: CV 10 (EMF Feedback Cutoff)
CVs 209-218 (Advanced Motor Control CVs)



Advanced Motor Control CVs

CV 213: BEMF Sample Period

Description

CV 213 is used to set the back-EMF sample period.

Bit 7								Bit 0
0	0	0	D4	D3	D2	D1	D0	

D0-D4: BEMF Sample Period

0: Reserved

Additional Information

Values from 0 to 31 may be entered into bits 0-4 (D0-D4) to set the BEMF Sample Period that specifies the time period in ms (milliseconds) between measurements.

Default Value: 9

Related CVs: CVs 209-218 (Advanced Motor Control CVs)



Advanced Motor Control CVs

CV 214: BEMF Sample Aperture Time

Description

CV 214 is used to set the back-EMF sample aperture time.

Bit 7								Bit 0			
0	0	0	0	D3	D2	D1	D0				

D0-D3: BEMF Sample Aperture Time

0: Reserved

Additional Information

Values from 0 to 15 may be entered into bits 0-4 (D0-D4) to set the BEMF Sample Aperture Time Period that specifies the time period in ms (milliseconds) that the aperture is open.

Default Value: 6

Related CVs: CVs 209-218 (Advanced Motor Control CVs)



Advanced Motor Control CVs

CV 215: BEMF Reference Voltage

Description

CV 215 is used to set the back-EMF reference voltage.

Bit 7							Bit 0
D7	D6	D5	D4	D3	D2	D1	D0

D0-D7: BEMF Reference Voltage

0-59 = Reserved

60 = 6.0 volts (minimum)

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.

.

255 = 25.5 volts

Additional Information

A value from 60 to 255 may be entered into CV 215 to specify the baseline reference voltage by 0.10 volt increments from a minimum of 6 volts. The decoder is designed with a minimum track reference of 6 volts and will ignore values lower than 60.

Default Value: 150

Related CVs: CVs 209-218 (Advanced Motor Control CVs)



Advanced Motor Control CVs

CV 216: Motor Speed Step Deadband*

Description

CV 216 is used to determine the speed step at which voltage is first applied to the motor output to put the locomotive into motion.

Bit 7

Bit 0

0	D6	D5	D4	D3	D2	D1	D0
---	----	----	----	----	----	----	----

D0-D6: Motor Speed Step Deadband

0 = Disabled

1 = Speed-step 1

.

.

.

127 = Speed-step 127

0: Reserved

Default Value: 0

Related CVs: CVs 209-218 (Advanced Motor Control CVs)

* Not included in software releases prior to version 1.3



Advanced Motor Control CVs

CV 217: Motor Control Register

Description

CV 217 is used to enable back-EMF control and auto-stop.

Bit 7										Bit 0	
0	0	0	0	STP	0	BEMF	0				0

BEMF: Back-EMF Enable
0 = Back-EMF disabled
1 = Back-EMF enabled

STP: Auto-Stop Enable
0 = Auto-stop disabled
1 = Auto-stop enabled

Additional Information

Setting bit 1 (BEMF) to 1 will enable back-EMF motor control.

Setting bit 3 (STP) to 1 will enable the auto-stop feature. When auto-stop is enabled, direction commands will bring the motor to a full stop for a duration of 500ms before the decoder changes locomotive direction.

Default Value: 10
Related CVs: CVs 209-218 (Advanced Motor Control CVs)



CV 218: Analog Mode Motor Start Voltage

Description

CV 218 is sets the track voltage in analog mode at which voltage is first applied to the motor.

Bit 7							Bit 0
D7	D6	D5	D4	D3	D2	D1	D0

D0-D7: Analog Mode Motor Start Voltage

Additional Information

A value from 0 to 255 may be entered into CV 218 to adjust the analog mode motor start voltage. Starting voltage is calculated as:

$$\text{Starting Voltage} = (\text{CV 218} \div 10) + 6\text{V}$$

Entering a value of 0 into CV 218 will set the starting voltage to 6V. Entering a value of 255 into CV 218 will set the starting voltage to the maximum setting. Set CV 218 to the lowest value that still achieves desired results. The motor will not start when the voltage level in CV 218 is set to an excessively high value.

Note: Starting the motor at too low a voltage can cause the voltage from the powerpack to sag, resulting in a condition where the decoder loses power when attempting to power the motor.

Default Value: 7 (Software versions 1.1 through 1.3)
15 (Software version 1.5)

Related CVs: CV 12 (Alternate Power Source)
CV 29 (Configuration Data 1)
CV 219 (Analog Mode Engine Start Voltage)



Advanced Motor Control CVs

CV 219: Analog Mode Engine Start Voltage**

Description

CV 219 is provided for adjusting the track voltage in analog mode at which prime mover startup sequence begins.

Bit 7							Bit 0
D7	D6	D5	D4	D3	D2	D1	D0

D0-D7: Analog Mode Engine Start Voltage

Additional Information

A value from 0 to 255 may be entered into CV 219. Starting voltage is calculated as:

$$\text{Starting Voltage} = (\text{CV 219} \div 10) + 5V$$

Entering a value of 0 into CV 219 will set the starting voltage to 5V. Entering a value of 255 into CV 219 will set the starting voltage to the maximum setting. Set CV 219 to the lowest value that still achieves desired results.

Note: Playing the prime mover startup sounds at too low a voltage can cause the voltage from the powerpack to sag, resulting in a condition where the decoder loses power when attempting to power the motor. The prime mover sounds will not start when the voltage level in CV 219 is set to an excessively high value.

Default Value: 0

Related CVs: CV 12 (Alternate Power Source)
CV 29 (Configuration Data 1)
CV 218 (Analog Mode Motor Start Voltage)

** Not included in software releases prior to version 1.5



7-Band Equalizer CVs

CV 225: Equalizer Control Register

Description

CV 225 is used for presetting the boost/cut levels of the 7-band equalizer to accommodate a range of speaker sizes or to allow each band of the equalizer to be adjusted according to CVs 226-232 (Boost/Cut Controls).

Bit 7					Bit 0		
0	0	0	0	0	EQ2	EQ1	EQ0

EQ0-EQ2: Equalizer Presets

- 0 = Flat (equalizer disabled)
- 1 = Micro speaker (smaller than 1")
- 2 = Small speaker (from 1" to 2")
- 3 = Medium speaker (from 2" to 4")
- 4 = Large speaker (larger than 4")
- 5 = Reserved
- 6 = Reserved
- 7 = User-adjustable (CVs 226-232)

0: Reserved

Additional Information

Setting CV 225 to a value from 1 to 4 will adjust the 7-band equalizer frequency response according to speaker size.

Setting CV 225 to a value of 7 allows the boost/cut levels of the 7-band equalizer to be adjusted using CVs 226-232. Setting CV 225 to a value of 0 will disable the equalizer, i.e., all frequency levels will be set to 0dB (flat).

Default Value: 0

Related CVs: CVs 226-232 (Cut/Boost Controls)



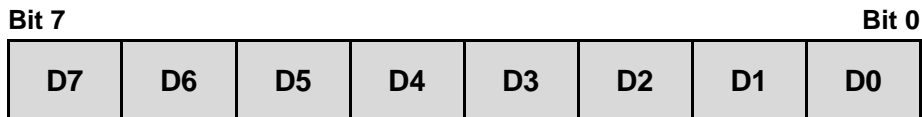
7-Band Equalizer CVs

CVs 226-232: Cut/Boost Controls

Description

The frequency levels of the equalizer are divided into seven bands, ranging from 62Hz to 4kHz. Modify each band's frequency response from -12dB (cut) to +12dB (boost) by entering values from 0 to 255 into the following CVs:

- CV 226: 62Hz Cut/Boost
- CV 227: 125Hz Cut/Boost
- CV 228: 250Hz Cut/Boost
- CV 229: 500Hz Cut/Boost
- CV 230: 1kHz Cut/Boost
- CV 231: 2kHz Cut/Boost
- CV 232: 4kHz Cut/Boost



D0-D7: Cut/Boost Level

- 0 = -12dB cut
- .
- .
- 127 = -0.95dB cut
- 128 = 0dB (flat)
- 129 = +0.95dB boost
- .
- .
- 255 = +12dB boost

Note: CV 225 (Equalizer Control Register) must be set to a value of 7 for CVs 226-232 (Boost/Cut Controls) to be programmed.

- Default Value:**
- CV 226 = 128
 - CV 227 = 128
 - CV 228 = 128
 - CV 229 = 128
 - CV 230 = 128
 - CV 231 = 128
 - CV 232 = 128

Related CVs: CVs 224-236 (Audio Control CVs)



Analog Function Enable CVs

CV 241: Analog Mode Function Enable 3

Description

CV 241 is used to enable F13-F20 function assignments for analog mode operation. Refer to CVs 1.257-1.384 (Effect Map Registers) and/or CVs 33-46 (Function Status CVs) for more information about function mapping.

Bit 7							Bit 0
F20	F19	F18	F17	F16	F15	F14	F13

F13-F20: Analog Mode Function Enable

0 = Function disabled for analog mode operation

1 = Function enabled for analog mode operation

Additional Information

When a given bit is set to 1 in CV 241, the active F13-F20 function mapped to a corresponding effect within CVs 1.257-1.384 will be enabled for analog mode operation. Any function key can be mapped to any effect with CVs 1.257-1.384.

Default Value: 0

Related CVs: CV 13-14 (Analog Mode Function Enable 1-2)
CVs 33-46 (Function Status CVs)
CVs 242-243 (Analog Mode Function Enable 4-5)
CVs 1.257-1.512 (Extended Function Mapping CVs)



Analog Function Enable CVs

CV 242: Analog Mode Function Enable 4

Description

CV 242 is used to enable F21-F28 function assignments for analog mode operation. Refer to CVs 1.257-1.384 (Effect Map Registers) and/or CVs 33-46 (Function Status CVs) for more information about function mapping.

Bit 7							Bit 0
F28	F27	F26	F25	F24	F23	F22	F21

F21-F28: Analog Mode Function Enable

0 = Function disabled for analog mode operation

1 = Function enabled for analog mode operation

Additional Information

When a given bit is set to 1 in CV 242, the active F21-F28 function mapped to a corresponding effect within CVs 1.257-1.384 will be enabled for analog mode operation. Any function key can be mapped to any effect with CVs 1.257-1.384.

Default Value: 0

Related CVs: CV 13-14 (Analog Mode Function Enable 1-2)
CVs 33-46 (Function Status CVs)
CVs 241 and 243 (Analog Mode Function Enable 3 and 5)
CVs 1.257-1.512 (Extended Function Mapping CVs)



Analog Function Enable CVs

CV 243: Analog Mode Function Enable 5

Description

CV 243 is used in conjunction with CVs 1.385-1.512 (Effect Auxiliary Map Registers) to enable automatic effects for analog mode operation.

Bit 7				Bit 0			
0	0	0	0	REVS	FWDS	REVD	FWDD

FWDD: Forward-Driving

0 = Disabled

1 = Effect active when moving in forward direction

REVD: Reverse-Driving

0 = Disabled

1 = Effect active when moving in reverse direction

FWDS: Forward-Standing

0 = Disabled

1 = Effect active when stopped in forward direction

REVS: Reverse-Standing

0 = Disabled

1 = Effect active when stopped in reverse direction

0: Reserved

Default Value: 0

Related CVs: CV 13-14 (Analog Mode Function Enable 1-2)
CVs 33-46 (Function Status CVs)
CVs 241-242 (Analog Mode Function Enable 3-4)
CVs 1.257-1.512 (Extended Function Mapping CVs)



Consist Function Enable CVs

CV 245: Consist Function Enable 3

Description

CV 245 is used to enable F13-F20 function assignments for advanced consist operation. Refer to CVs 1.257-1.384 (Effect Map Registers) and/or CVs 33-46 (Function Status CVs) for more information about function mapping.

Bit 7							Bit 0
F20	F19	F18	F17	F16	F15	F14	F13

F13-F20: Consist Function Enable

0 = Function disabled for consist operation

1 = Function enabled for consist operation

Additional Information

When a given bit is set to 1 in CV 245, the active F13-F20 function mapped to a corresponding effect within CVs 1.257-1.384 will be enabled for consist operation. Any function key can be mapped to any effect with CVs 1.257-1.384.

Default Value: 0

Related CVs: CV 19 (Consist Address)
CVs 21-22 (Consist Function Enable 1-2)
CVs 33-46 (Function Status CVs)
CVs 246-247 (Consist Function Enable 4-5)
CVs 1.257-1.512 (Extended Function Mapping CVs)



Consist Function Enable CVs

CV 246: Consist Function Enable 4

Description

CV 246 is used to enable F21-F28 function assignments for advanced consist operation. Refer to CVs 1.257-1.384 (Effect Map Registers) and/or CVs 33-46 (Function Status CVs) for more information about function mapping.

Bit 7							Bit 0
F28	F27	F26	F25	F24	F23	F22	F21

F21-F28: Consist Function Enable

0 = Function disabled for consist operation

1 = Function enabled for consist operation

Additional Information

When a given bit is set to 1 in CV 246, the active F21-F28 function mapped to a corresponding effect within CVs 1.257-1.384 will be enabled for consist operation. Any function key can be mapped to any effect with CVs 1.257-1.384.

Default Value: 0

Related CVs: CV 19 (Consist Address)
CVs 21-22 (Consist Function Enable 1-2)
CVs 33-46 (Function Status CVs)
CVs 245 and 247 (Consist Function Enable 3 and 5)
CVs 1.257-1.512 (Extended Function Mapping CVs)



Consist Function Enable CVs

CV 247: Consist Function Enable 5

Description

CV 247 is used in conjunction with CVs 1.385-1.512 (Effect Auxiliary Map Registers) to enable automatic effects and map an effect to the emergency stop button for advanced consist operation. The emergency stop button will bring the motor to a stop regardless of effect mapping.

Bit 7

Bit 0

0	0	0	ESTP	REVS	FWDS	REVD	FWDD
---	---	---	------	------	------	------	------

FWDD: Forward-Driving

0 = Effect is function controlled only

1 = Effect active when moving in forward direction

REVD: Reverse-Driving

0 = Effect is function controlled only

1 = Effect active when moving in reverse direction

FWDS: Forward-Standing

0 = Effect is function controlled only

1 = Effect active when stopped in forward direction

REVS: Reverse-Standing

0 = Effect is function controlled only

1 = Effect active when stopped in reverse direction

ESTP: Emergency Stop Button

0 = Emergency brake application sound effects enabled

1 = Effect mapped in CVs 1.385-1.512 (bit 4: ESTP) enabled

0: Reserved

Default Value: 0

Related CVs: CV 19 (Consist Address)
CVs 21-22 (Consist Function Enable 1-2)
CVs 33-46 (Function Status CVs)
CVs 245-246 (Consist Function Enable 3-4)
CVs 1.257-1.512 (Extended Function Mapping CVs)



Indexed CV Page 1

CVs 1.257-1.512: Extended Function Mapping CVs

Description

CVs 1.257-1.512 are used for mapping any F0-F28 function key to any effect, customizing effects to activate in response to direction and movement changes, and mapping an effect to the emergency stop button.

Note: To access Indexed CV Page 1 with CVs 257-512, CV 31 (CV Index 1) must be set to a value of 16 (default) and CV 32 (CV Index 2) must be set to a value of 1 (default).

Indexed CV Page 1 is divided into two sets of CVs:

1. CVs 1.257-1.384 (Effect Map Registers) are used for function mapping.
2. CVs 1.385-1.512 (Effect Auxiliary Map Registers) are used for customizing effects to activate in response to direction and movement changes and mapping an effect to the emergency stop button.

CVs 1.257-1.384: Effect Map Registers

Each effect corresponds to a CV. Each CV determines the function key used to control that effect. Values 0-28 correspond to function keys F0-F28. A value of 255 will disable that effect.

0 = F0
1 = F1
↓
28 = F28
29-254 = Reserved
255 = Effect disabled

CVs 1.385-1.512: Effect Auxiliary Map Registers

Each effect corresponds to a CV. Each CV determines how the effect responds to direction and movement changes during operation, or if the effect is mapped to the emergency stop button.


Refer to the following page to view each effect and each corresponding CV.



Indexed CV Page 1

CVs 1.257-1.512: Extended Function Mapping CVs	
Effect Map Registers	Effect Auxiliary Map Registers
CV 1.257: Headlight	CV 1.385: Headlight
CV 1.258: Backup Light	CV 1.386: Backup Light
CV 1.259: FX3 Effect	CV 1.387: FX3 Effect
CV 1.260: FX4 Effect	CV 1.388: FX4 Effect
CV 1.261: FX5 Effect	CV 1.389: FX5 Effect
CV 1.262: FX6 Effect	CV 1.390: FX6 Effect
CVs 1.263-1.272: Reserved	CVs 1.391-1.400: Reserved
CV 1.273: Dimmer	CV 1.401: Dimmer
CV 1.274: Mute	CV 1.402: Mute
CV 1.275: Brake	CV 1.403: Brake
CV 1.276: Half-Speed	CV 1.404: Half-Speed
CV 1.277: Momentum Override	CV 1.405: Momentum Override
CV 1.278: Grade-Crossing Signal	CV 1.406: Grade-Crossing Signal
CV 1.279: Forward Whistle Signal	CV 1.407: Forward Whistle Signal
CV 1.280: Reverse Whistle Signal	CV 1.408: Reverse Whistle Signal
CV 1.281: Stop Whistle Signal	CV 1.409: Stop Whistle Signal
CVs 1.282-1.284: Reserved	CVs 1.410-1.412: Reserved
CV 1.285: RPM+	CV 1.413: RPM+
CV 1.286: RPM-	CV 1.414: RPM-
CV 1.287: Two Shorts Whistle Signal	CV 1.415: Two Shorts Whistle Signal
CV 1.288: One Long Whistle Signal	CV 1.416: One Long Whistle Signal
CVs 1.289-1.296: Reserved	CVs 1.417-1.424: Reserved
CV 1.297: Airhorn	CV 1.425: Airhorn
CV 1.298: Bell	CV 1.426: Bell
CV 1.299: Dynamic Brake	CV 1.427: Dynamic Brake
CV 1.300: Short Airhorn	CV 1.428: Short Airhorn
CVs 1.301-1.304: Reserved	CVs 1.429-1.432: Reserved
CV 1.305: Couple	CV 1.433: Couple
CV 1.306: Uncouple	CV 1.434: Uncouple
CVs 1.307-1.310: Reserved	CVs 1.435-1.438: Reserved
CV 1.311: All Aboard/Coach Doors*	CV 1.439: All Aboard/Coach Doors*
CVs 1.312-1.320: Reserved	CVs 1.440-1.448: Reserved
CV 1.321: E-Brake App.	CV 1.449: E-Brake App.
CVs 1.322-1.384: Reserved	CVs 1.450-1.512: Reserved

* Not included in software releases prior to version 1.3

 **Note:** On Econami UK Diesel decoders the high note of the two-tone airhorn is mapped using CV 1.297 (Airhorn) and the low note is mapped using CV 1.313 (Airhorn 2). The short airhorn (CV 1.300) is replaced with a "high-low" effect which is mapped to the F3 key by default. The dynamic brake effect is also un-mapped in Econami UK Diesel decoders.

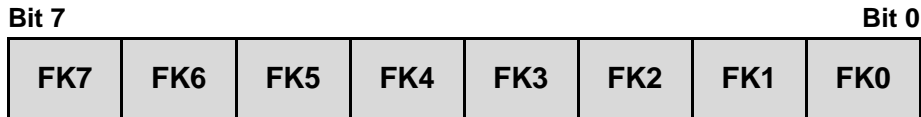
The Econami UK Diesel decoder does not support any other whistle signals besides the "high-low" signal mapped with CV1.301. As no other signals can be played, the F9 key is left unassigned. The Guard whistle sound effect replaces the "All Aboard!" effect mapped to the F23 key.



CVs 1.257-1.384: Effect Map Registers

Description

CVs 1.257-1.384 are used for mapping function keys F0-F28 to effects.



FK0-FK7: Function Key (F0-F28)

0 = F0

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.

.

28 = F28

29-254 = Reserved

255 = Effect disabled

Additional Information

Setting CVs 1.257-1.384 to a value from 0 to 28 will map the designated effect to the corresponding F0-F28 function key. Values from 29-254 are reserved for future expansion. Setting CVs 1.257-1.384 to a value of 255 will disable function-control for the corresponding effect.

CV 57 (Forward Direction Enable) and CV 58 (Reverse Direction Enable) are used to determine the directionality of lighting outputs. Programming CVs 57 and 58 will control the directionality of the corresponding function key mapped to the given lighting output effect in CVs 1.257-1.262 (Physical Effect Map Registers). The headlight is enabled in the forward direction and the backup light is enabled in the reverse direction by default.

Default Function Assignments

F0(f): Headlight	CV 1.257 = 0
F0(r): Backup Light	CV 1.258 = 0
F1: Bell	CV 1.298 = 1
F2: Airhorn	CV 1.297 = 2
F3: Short Airhorn	CV 1.300 = 3
F4: Dynamic Brake	CV 1.299 = 4
F5: RPM+	CV 1.285 = 5
F6: RPM-	CV 1.286 = 6
F7: Dimmer	CV 1.273 = 7
F8: Mute	CV 1.274 = 8
F9: Xing Signal	CV 1.278 = 9
F11: Brake Function	CV 1.275 = 11
F13: Coupler	CV 1.305 = 13
F13: Coupler Release	CV 1.306 = 13
F14: Half-Speed	CV 1.276 = 14
F14: Mom. Override	CV 1.277 = 14
F23: "All Aboard!"/Coach Doors*	CV 1.311 = 23
F24: FX3 Output	CV 1.259 = 24
F25: FX4 Output	CV 1.260 = 25
F26: FX5 Output	CV 1.261 = 26
F27: FX6 Output	CV 1.262 = 27

* Not included in software releases prior to version 1.3

🇬🇧 The bell (CV 1.298 = 255) and dynamic brake (CV 1.299 = 255) are disabled in UK decoders.

🇬🇧 The high-tone airhorn is mapped to F1 (CV 1.313 = 1) in UK decoders.

🇬🇧 The low-tone airhorn replaces the airhorn and is mapped to F2 (CV 1.297 = 2) in UK decoders.

🇬🇧 The two-tone airhorn replaces the short airhorn and is mapped to F3 (CV 1.300 = 3) in UK decoders.

🇬🇧 F9 key is left unassigned in UK decoder.



CVs 1.385-1.512: Effect Auxiliary Map Registers

Description

CVs 1.385-1.512 are used for configuring automatic effects and mapping an effect to the emergency stop button. A given effect can be configured to respond automatically to changes in direction (forward/reverse) and movement (driving/standing) during operation. The emergency stop button will perform the same utility irrespective of the effect mapped to it. CV 32 (CV Index 2) must be set to a value of 1 when accessing CVs 1.257-1.512.

Bit 7

Bit 0

0	0	0	ESTP	REVS	FWDS	REVD	FWDD
---	---	---	------	------	------	------	------

FWDD: Forward-Driving

0 = Effect activated by function key only

1 = Effect active when moving in forward direction

REVD: Reverse-Driving

0 = Effect activated by function key only

1 = Effect active when moving in reverse direction

FWDS: Forward-Standing

0 = Effect activated by function key only

1 = Effect active when stopped in forward direction

REVS: Reverse-Standing

0 = Effect activated by function key only

1 = Effect active when stopped in reverse direction

ESTP: Emergency Stop Button

0 = Emergency brake application sound effects (default)

1 = Effect mapped to emergency stop button

0: Reserved