

# MORE BLUELINE IS COMING YOUR WAY!



**EMD SD-9**  
HO Scale Diesel Locomotive

**AVAILABLE ITEMS**

- BLI5020 MILW #508, DC Sound/DCC Ready, HO
- BLI5021 MILW #533, DC Sound/DCC Ready, HO
- BLI5022 PC #6913, DC Sound/DCC Ready, HO
- BLI5023 PC #6915, DC Sound/DCC Ready, HO
- BLI5024 PRR #7600, DC Sound/DCC Ready, HO
- BLI5025 PRR #7611, DC Sound/DCC Ready, HO
- BLI5026 C&NW #1701, DC Sound/DCC Ready, HO
- BLI5027 C&NW #1702, DC Sound/DCC Ready, HO
- BLI5028 BN #6128, DC Sound/DCC Ready, HO
- BLI5029 BN #6131, DC Sound/DCC Ready, HO
- BLI5030 SOU #202, DC Sound/DCC Ready, HO
- BLI5031 SOU #203, DC Sound/DCC Ready, HO
- BLI5032 Undecorated, DC Sound/DCC Ready, HO

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**GE AC6000**  
HO Scale Diesel Locomotive

**AVAILABLE ITEMS**

- BLI5055 UP #7510, DC Sound/DCC Ready, Low Ditch Light, HO
- BLI5056 UP #7549, DC Sound/DCC Ready, Low Ditch Light, HO
- BLI5057 CSX #5000, DC Sound/DCC Ready, High Ditch Light, Diversity Scheme, HO
- BLI5058 CSX #5001, DC Sound/DCC Ready, High Ditch Light, Diversity Scheme, HO
- BLI5059 BHP Iron Ore #6071, DC Sound/DCC Ready, Low Ditch Light, Blue Scheme, HO
- BLI5060 BHP Iron Ore #6076, DC Sound/DCC Ready, Low Ditch Light, Bubbles Scheme, HO
- BLI5061 SP #601, DC Sound/DCC Ready, Low Ditch Light, Speed Lettering, HO
- BLI5062 SP #602, DC Sound/DCC Ready, Low Ditch Light, Speed Lettering, HO
- BLI5063 CP #9800, DC Sound/DCC Ready, High Ditch Light, Golden Beaver Scheme, HO
- BLI5064 CP #9801, DC Sound/DCC Ready, High Ditch Light, Golden Beaver Scheme, HO
- BLI5065 Unpainted, DC Sound/DCC Ready, Low Ditch Light, UP Details, HO
- BLI5066 Unpainted, DC Sound/DCC Ready, High Ditch Light, CSX Details, HO

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**GE C30-7**  
HO Scale Diesel Locomotive

**AVAILABLE ITEMS**

- BLI5040 C30-7, ATSF #8022, Yellow Bonnet Scheme, DC Sound/DCC Ready, HO
- BLI5041 C30-7, ATSF #8023, Yellow Bonnet Scheme, DC Sound/DCC Ready, HO
- BLI5042 C30-7, ATSF #8018, Kodachrome, DC Sound/DCC Ready, HO
- BLI5043 C30-7, ATSF #8051, Kodachrome, DC Sound/DCC Ready, HO
- BLI5044 C30-7, L&N #7051, Family Lines, DC Sound/DCC Ready, HO
- BLI5045 C30-7, L&N #7050, Family Lines, DC Sound/DCC Ready, HO
- BLI5046 C30-7, LS&I #3073 BN Patch, DC Sound/DCC Ready, HO
- BLI5047 C30-7, LS&I #3074 BN Patch, DC Sound/DCC Ready, HO
- BLI5048 C30-7, NS #8004, Black, DC Sound/DCC Ready, HO
- BLI5049 C30-7, NS #8005, Black, DC Sound/DCC Ready, HO
- BLI5050 C30-7, UP #2477, "We Will Deliver", DC Sound/DCC Ready, HO
- BLI5051 C30-7, UP #2451, "We Will Deliver" Scheme, DC Sound/DCC Ready, HO
- BLI5052 C30-7, Undecorated, DC Sound/DCC Ready, HO

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**PRR M1a/M1b**  
HO Scale Steam Locomotive

**AVAILABLE ITEMS**

- BLI5033 M1a 4-8-2, #6778, Post 1946, DC Sound/DCC Ready, HO
- BLI5034 M1a 4-8-2, #6791, Post 1946, DC Sound/DCC Ready, HO
- BLI5035 M1a 4-8-2, Unlet/Unnum, Post 1946, DC Sound/DCC Ready, HO
- BLI5036 M1b 4-8-2, #6755, Standard Version, DC Sound/DCC Ready, HO
- BLI5037 M1b 4-8-2, #6794, Standard Version, DC Sound/DCC Ready, HO
- BLI5038 M1b 4-8-2, Unlet/Unnum, Standard, DC Sound/DCC Ready, HO

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**Operator's Manual**  
BlueLine Diesel Locomotives

## ***Introduction***

Thank you for purchasing a BlueLine diesel locomotive equipped with Broadway Limited Imports' state-of-the-art digital sound system. This locomotive will operate on most HO transformers up to 16 volts DC. The locomotive is ready-to-run. To operate the whistle and bell and many other features in DC operation, you will need a DCMaster (BLI stk# 1011 or PCM stk# 1001). See below for details.

This manual is designed to quickly get you started operating your new locomotive. For more advanced controls and features, please refer to the BlueLine Diesel Technical Reference Manual at:  
[www.broadway-limited.com](http://www.broadway-limited.com)

This locomotive can be converted to DCC operation using any NMRA DCC decoder that is small enough to fit in the available space. See page 8.

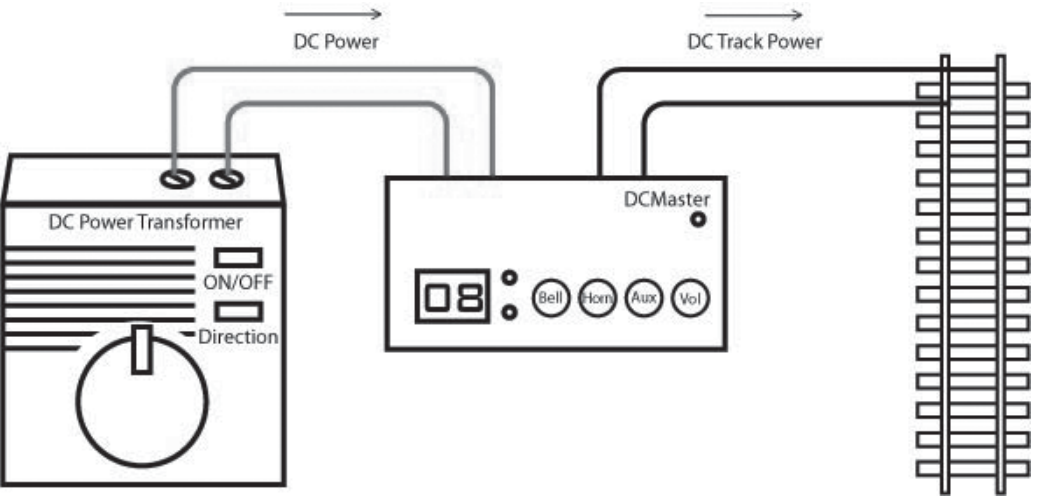
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## ***Operation with a DC Power Pack***

Your BlueLine diesel locomotive is ready-to-run. Simply place the locomotive on a track powered by any DC power pack with a variable output up to 16 volts DC. As you increase the track voltage, the sound system will begin functioning at around 7 volts DC. If you increase track power slowly, you will hear the sound of a diesel locomotive starting, then idling. As you slowly increase track voltage, you will hear the brake release sounds followed by the sound of a diesel engine increasing in speed as the locomotive prepares to move. Once under way, you will hear the engine increasing its RPM. There are a number of sounds the locomotive will produce automatically to simulate the sound of a full-size diesel locomotive.

While the sound system will function with just a power pack, the DCMaster Analog Control Module(BLI stk# 1011 or PCM stk# 1001), is required for user-activation of the whistle, bell and other sounds, and to control the volume. The DCMaster is shown below, connected between the power pack and the track.



## ***Volume/Mute***

Your BlueLine locomotive's sound system has 8 volume levels that can be set from the DCMaster. At startup, it is at the loudest setting. To lower the volume, press the "Vol" button on the DCMaster two times quickly (like double-clicking a mouse button on your PC). The volume will decrease one level each time you do this. When the lowest level is reached the volume will start to increase with subsequent double-clicks of the button until the highest volume level is reached, at which point the locomotive coupler crash sound will play to signal maximum volume.

To mute the sounds, press the "Vol" button once. To turn the sounds back on, press the "Vol" button once. Horn and bell still work when the other sounds are muted.

**Tip:** If the volume is decreasing and you want it to increase, muting then un-muting the sounds will cause the volume to increase with the next double press of the volume button, saving the time required to cycle all the way to the lowest level and back up.

## ***Manually Activated Sounds***

### **Horn**

Plays when the "horn" button on the DCMaster is pressed. The BlueLine horn is highly playable. A quick press and release plays a short horn blast while holding down and releasing produces a long horn blast. Holding the horn active for a long blast, releasing quickly and pressing again, then releasing, plays an alternative horn ending. This ending is unique for each locomotive.

### **Bell**

Turns on when the "bell" button on the DCMaster is pressed. Turns off when the "bell" button on the DCMaster is pressed a second time.

### **Air Compressor**

Press the "AUX" button on the DCMaster while the locomotive is stopped.

## Dynamic Brakes

### Blower Motor

Press the “AUX” button on the DCMaster while the locomotive is moving.

## ***Automatically Activated Sounds***

### Startup

The sound of a diesel locomotive starting is heard when the track power is turned on.

### Shutdown

The sound of a diesel locomotive being turned off is heard when track power is lowered to about 5 volts.

### Brake Set

Plays automatically when the locomotive stops.

### Brake Release

Plays automatically when the locomotive starts to move.

### Brake Squeal

Plays automatically when the locomotive is slowed quickly.

### Diesel Rev Levels

The sound of a diesel locomotive speeding up and slowing down is heard when the model changes speed.

## ***Randomly Activated Sounds***

The following sounds will be heard when the locomotive is running or sitting at idle. Various other random sounds may play if appropriate for each locomotive.

### Spit Valve

Compressor

### Air release

Air filling

## ***Setting Configuration Variables (CV's) without DCC***

Your BlueLine locomotive's sound system is highly configurable even without DCC by using the DCMaster. Most of the locomotive's functions are controlled by setting Configuration Variables (CV's). To change a CV:

1. Place the locomotive on the track with track power off. Hold down both the "Aux" and Vol" buttons on the DCMaster while turning track power on to maximum voltage. The locomotive will not move. The display on the DCMaster will read "E01."
2. Press the bell(-) button or horn(+) button to scroll past E15, then to the CV numbers which range from 1-255 (There is no E in front of the CV numbers.) Stop at the one you want to change and press the Press the "Vol" button.
3. Use the bell(-) button or horn(+) button to scroll to the new value, then press "Vol" to accept. The locomotive will make a 'beep' sound to acknowledge.
4. Turn off track power to finish programming.

**Tip:** Use the bell(-) button to quickly scroll to higher numbers.

**Tip:** The locomotive you are setting should be the only BlueLine locomotive on the track. Otherwise all locomotives on the track will have their CV's reset (unless the decoder is locked.)

**Commonly used DC settings are shown below:**

#	Name	Description	Usual Values	Factory Setting
CV8	Master Reset	Setting CV8 to 8 resets everything to factory settings.	8	8
CV19	Consist address	Set zero to break "Easy Consist"	0-127	60
CV130	Master Volume Sound	There are 16 volume levels. Setting to 2 requires 8 double presses to get from off to loudest.	1,2,4,8	2
CV131	Increment Analog Sound Unit Start/Up	A lower number causes the sounds to start at a lower track voltage.	0-255	56
CV132	Analog Sound Unit Shutdown	A lower number causes the locomotive shutdown sound to play at a lower track voltage.	0-255	48
CV133	Sound Unit Master Volume	higher number is louder.	0-15	15
CV135	Horn Volume	higher number is louder.	0-255	100
CV136	Bell Volume	higher number is louder.	0-255	100
CV137	Diesel Volume	higher number is louder.	0-255	100
CV138	Horn2 Volume	higher number is louder.	0-255	100

CV140	Coupler Volume	higher number is louder.	0-255	100
CV14	Uncouple Volume	higher number is louder.	0-255	100
CV142	Wheel Flange Volume	higher number is louder.	0-255	100
CV143	Compressor Volume	higher number is louder.	0-255	100
CV144	Manual Air Release Volume	higher number is louder.	0-255	100
CV145	Air Filling Volume	higher number is louder.	0-255	100
CV146	Brake Set Volume	higher number is louder.	0-255	100
CV147	Brake Release Volume	higher number is louder.	0-255	100
CV148	Spit Valve Volume	higher number is louder.	0-255	100
CV150	Grid Blower Motor Volume	higher number is louder.	0-255	100
CV151	Brake Squaal Volume	higher number is louder.	0-255	100
CV152	Fuel Fill Volume	higher number is louder.	0-255	100
CV180	Bell Ring Interval	Increasing increases the time between bell rings	0-255	varies
CV184	Analog Brake Control	Increase to play the brake sound more frequently	0-255	64
CV188	Pitch Shift	Change to alter pitch of all sounds. Makes 2 locomotives sound different	0-255	128
CV222	Analog AUX Select for DCMaster	Selects which function is controlled by the Aux button.	0=Comp/ Blower 1=Coupler sound 2=Front/ rear light 3=Mars or Ditch lights 0=single locomotive	0
CV224	DC Easy Consist	Set consist position as front, middle or rear locomotive. Rear locomotive is facing rear.	1=front locomotive 2=middle eng. 3=rear locomotive	0
CV248	Enhanced DC Motor Startup Delay	Delays the motor start up after applying power. Used to match the speed of other osund locomotives.	0-63	8
CV249	Enhanced DC Motor Control	Simulates momentum by delaying the response of the motor to track voltage changes.	1-255	10
CV250	System response	Simulates momentum by delaying the response of the sounds and motor to track voltage changes.	1-255	1
CV251	Enhanced DC Motor Control	Voltage at which 100% of track power is sent to motor. (must be greater than Vmin)	0-255	150
CV252	Enhanced DC Motor Control	Track voltage at which motor will start moving.	0-255	80
CV253	Enhanced DC Motor Control	Portion of track power applied to motor at Vmin	0-255	50

## Consists

BlueLine locomotives can be set to run in consist with each other by setting CV 224 to 1,2, or 3, which designates the locomotive as front, middle or rear (rear loco facing backwards), respectively since railroads commonly run the rear loco in reverse. This automatically sets the lights, bell and horn to respond appropriately. To break the consist,

simply program zero into CV224, the consist address.

BlueLine locomotives can be set to run with other types of locomotives by changing CVs 248-253. Typically matching non-sound locomotives will require reducing all delays and momentums (CV 131, 248, 249, 250, and 252) to their minimum value. Matching other DC sound locomotives typically requires disabling the back EMF motor control of the other locomotives and setting CV 248-253 to the values that provide the best results.

## ***DCC Decoder Installation***

Broadway Limited BlueLine locomotives can be easily equipped with the industry standard remote control known as Digital Command Control or DCC. To convert your BlueLine locomotive to DCC, simply remove the body using the instructions included with your locomotive. (This usually requires removing the couplers, and pulling gently at the sides of the plastic body shell.) Once the body shell is removed, you will see a small circuit board plugged into the top of the main sound circuit board. Gently remove this top board and set it aside, exposing the National Model Railroad Association (NMRA) medium plug.

**Lights.** The front and rear lights can be controlled in DCC either by the sound board or the decoder you install. If you want your decoder to control the lights, unplug the 4 wire plug from the socket labeled “J1” and plug it into the socket labeled “J7.”

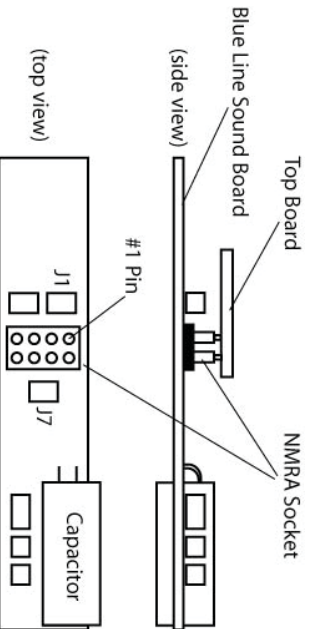
**Install Decoder.** Your BlueLine locomotive’s sound board is compatible with any NMRA compliant decoder. You can use any decoder that has an NMRA medium plug and will physically fit inside the locomotive. Included with the locomotive is an extension plug which goes between the decoder and the sound board to raise some decoders high enough to fit properly. Some recommended decoders are:

<b><i>Brand</i></b>	<b><i>Model</i></b>	<b><i>Extension?</i></b>	<b><i>Note</i></b>
Digitrax	DN143IP	yes	Tiny decoder. Excellent fit.
NCE	N14IP	yes	Tiny decoder. Excellent fit.
Lenz	Silver-MP	no	Excellent Back EMF
Train Control Systems	M1P-SH	no	

ESU	LokPilot Micro#52610	no	Provides excellent back EMF in DC and DCC. Adjustable DC start voltage.
MRC	1650	yes*	*Must shorten plug leads and use adapter to fit over light plug or leave light plug in J1.

Simply plug the decoder into the NMRA medium plug, with pin #1 (orange wire) oriented as shown and replace the body. (No damage will occur if the plug is reversed, but the locomotive will run backwards.)

Once the decoder is installed, the locomotive will run differently in DC depending on the decoder used. The BlueLine DC motor control CV's are no longer active. Setting CV 131 to a lower value will help the sound system start at a lower voltage to prevent the locomotive from running before the sounds start.



## DCC Operation

Once you have installed a DCC decoder, it will control the motor and the front and rear lights. The sound board has its own internal decoder, and can control the rest of the lights and the sound functions. The address of both decoders must be the same. Your BlueLine locomotive's sound board comes preprogrammed as Engine "3".

## Diesel Function Key Definition

Function Key	Description
F0	Front Light/Rear Light

F1	Diesel Bell
F2	Diesel Horn
F3	Uncouple/Couple
F4	Compressor /Grid Blower
F5	Ramp Diesel Engine Up
F6	Ramp Diesel Engine Down
F7	MARS light On/Off
F8	Master Analog Volume/Mute
F9	Startup Diesel Engine/ Shutdown Diesel Engine
F10	Radiator Cooling Fan
F11	Air Filling/Air Release
F12	Brake Set/ Brake Release

### *Diesel Bell (F1)*

Pressing F1 activates the bell. Many controllers allow the bell to latch on or stay on until the F1 is pressed a second time. Remember, the bell is an indication that the locomotive is about to move or until a train leaves the station.

### *Diesel Horn (F2)*

Pressing F2 activates the horn. The Blueline horn is highly playable. A quick press and release plays a short horn blast while holding down and releasing produces a long horn blast. See the section on diesel horn. Holding the horn active for a long blast, releasing quickly and pressing again, then releasing, plays an alternative horn ending. This ending is unique for each locomotive.

### *Coupler (F3)*

Pressing F3 when the locomotive is moving causes a coupling sound effect to play. The effect simulates two cars coupling. The uncoupling sound may be simulated by pressing F3 when the locomotive is stopped. This action arms the uncoupling sound, making it ready to play. The actual uncoupling sound effect plays once the speed step exceeds the value of Uncouple Speed, CV187. The factory value is 3. When speed step 3 is reached, the uncoupling sound effect plays.

### *Compressor and Grid Blower Motor (F4)*

Pressing F4 activates the compressor when the locomotive is stopped. Pressing F4 once the compressor is active shuts the compressor off. The grid blower motor is activated by F4 when the locomotive is moving. Pressing F4 while the grid blower motor is active shuts the grid blower motor off.

### *Diesel Engine Rev Up (F5)*

The diesel locomotive may have its engine throttled up at any throttle stop other than zero. Speed step zero resets manual throttle control back to automatic throttle control. Under automatic throttle control the Rev Levels change according to CV201 (Throttle Stop Rev One), CV202 (Throttle Stop Rev Two) and CV203 (Throttle Stop Rev Three). See Blueline Diesel Technical Reference Manual for a further explanation.

Once the throttle stop is greater than zero, manual mode may be activated. Pressing F5 causes the diesel locomotive to rev up one level per press. The manual mode is honored until the speed step exceeds the throttle stop set for CV201, CV202 or CV203, depending on the current diesel motor rev level. Once the speed step exceeds the throttle stop setting for the current rev level, automatic mode is activated.

### *Diesel Engine Rev Down (F6)*

The diesel locomotive may have its engine throttled down at any throttle stop other than zero. Speed step zero resets manual throttle control back to automatic throttle control. Under automatic throttle control the Rev Levels change according to CV201 (Throttle Stop Rev One), CV202 (Throttle Stop Rev Two) and CV203 (Throttle Stop Rev Three). See Blueline Diesel Technical Reference Manual for a further explanation.

Pressing F6 causes the diesel engine to rev down one level per press. The manual mode is honored until the speed step falls below the throttle stop set for CV201, CV202 or CV203, depending on the current diesel motor rev level. Once the speed step falls below the throttle stop setting for the current rev level, automatic mode is activated.

### *Mars Light (F7)*

Pressing F7 will toggle lighting visual effects from on to off or from off to on. See L1 Lighting.

### *Master Volume and Mute (F8)*

Your BlueLine locomotive's sound system has 8 volume levels that can be set from the DCC handheld cab. At startup, it is at the loudest setting. To lower the volume, press the F8 button two times quickly (like double-clicking a mouse button on your PC). The volume will decrease one level each time you do this. When the lowest level is reached the volume will start to increase with subsequent double-clicks of the button until the highest volume level is reached, at which point the locomotive coupler crash sound will play to signal maximum volume.

To mute the sounds, press the F8 button once. To turn the sounds back on, press the F8 button once. Horn and bell still work when the other sounds are muted.

Pressing F8 once mutes all sounds except the Horn and Bell.

### *Startup/Shutdown Diesel Engine (F9)*

The sound system powers up with all sound effects off. The startup sound effect is played by throttling up or by pressing F9. If the locomotive is already playing sound effects, pressing F9 initiates the shutdown diesel locomotive sound effect.

### *Radiator Cooling Fan (F10)*

Pressing F10 activates the radiator cooling fan. Once the fan is active, pressing F10 turns the fan off. See Radiator Cooling Fan.

### *Air Filling and Air Release (F11)*

Pressing F11 while the locomotive is stopped activates the air filling sound effect and while the locomotive is moving, pressing F11 activates the air release sound effect. See Filling Air Lines and Manual Air Release.

## *Brake Set and Brake Release (F12)*

While the locomotive's throttle stop is the same as the DCC Brake Set Throttle Stop (CV209), pressing F12 activates the brake set sound effect. While the locomotive's throttle stop is the same or greater than the DCC Brake Release Throttle stop (CV210), pressing F12 activates the brake release sound effect. The factory brake set throttle stop value is zero, while the factory brake release throttle stop value is two. See Brake Set and Brake Release. See the BlueLine Diesel Technical Reference Manual.

This automatic brake set and brake release may be disabled by clearing bit 0 of CV227.

## *Brake Squeal*

Brake squeal is an automatically generated sound if the preset conditions are met. The conditions are programmable and clearing bit one of CV227 disables the brake squeal effect. (See the BlueLine Diesel Technical Reference Manual.) A sudden change in throttle steps in a decreasing direction activates the brake squeal sound effect. DCC Brake Control (CV185) contains this value. The factory value is ten. Increasing this value decreases the brake sensitivity while decreasing this value increases the sensitivity. The more sensitive, the more likely the brakes squeal sound effect is activated.

The DCC Brake Timer (CV186) determines the time interval between throttle samples. The throttle samples are compared and if in decreasing magnitude and exceeding CV227 (above), the brake squeal sound effect is activated.

## ***CV Programming***

### ***Service Mode***

Service mode programming usually requires a separate programming track connected to the DCC controller's programming outputs. Your BlueLine locomotive's sound system accepts Direct Page programming and supports reading and writing all CV's. When programming, the

decoder responds with an audible tone upon changing a CV or reading a CV.

## ***Operations Mode***

Operations mode (Ops Mode) programming allows CV programming of the decoder while on the mainline. Care must be taken to have unique addresses for each locomotive. Ops mode programming allows programming of an addressed locomotive only.

Most of the CV's for the sound system are in the range of 130-255. Most DCC decoders use CV's 1-128. For most users, there should be no interference between the decoder and the sound system CV's. The user can program the desired CV as if there were just one sound decoder in the locomotive. Should a conflict develop, Your BlueLine locomotive's sound system supports the NMRA lock standard using CV15 and CV16 described below.

## ***Reading CV's***

Your BlueLine locomotive's sound system supports direct mode verify, which allows reading of all CV's. The method of reading is configuration variable access acknowledgement in service mode. Most DCC controllers support this method. Your BlueLine locomotive's sound system responds with an audible tone, indicating that the controller read the CV properly. Once a DCC decoder is installed in the BlueLine locomotive, the CV's can only be read independently from the sound system and the decoder by locking the other. This is done using CV15 and 16. The value stored in CV16 is the lock code, set CV16 to 2 (with the decoder unplugged) for the sound system and 1 for the motor decoder. Then, set CV15 to 1 to read/write to the motor decoder, and set CV15 to 2 to read/write to your BlueLine locomotive's sound board.

Lock Disabled	0
Motor Decoder	1
Sound Decoder	2
Function Decoder	3

## Factory CV Reset

Anytime the factory programmed CV values need to be restored, simply program 8 into CV8. The decoder reverts back to the factory-programmed state.

#	Name	Description	Usual values	Factory Setting
CV1	Primary Address	DCC address	1-127	3
CV7	Manufacturer Version	Read only software version		varies
CV8	Manufacturer ID	NMRA manufacturers ID number	38	38
CV15	Unlock ID Code	Unlocked when CV15=CV16	0,1,2,3	0
CV16	Lock ID Number	Lock	0,1,2,3	0
CV17	Extended Address MSB	Valid when CV29 bit 5 =1, see tech manual	0-10239	Engine 128
CV18	Extended Address LSB	Valid when CV29 bit 5 =1	0-10239	Engine 128
CV19	Consist Address		0-255	0
CV21	Consist Address Functions Type 0	see tech manual	0-255	255
CV22	Consist Address Functions Type 1	see tech manual		
CV29	Configuration Bits	see tech manual		
CV33	F0(f) Output	selects which function FO activates in forward		
CV34	F0(r) Output	selects which function FO activates in reverse		
CV35	F1 Output	see tech manual		
CV36	F2 Output	see tech manual		
CV37	F3 Output	see tech manual		
CV38	F4 Output	see tech manual		
CV39	F5 Output	see tech manual		
CV40	F6 Output	see tech manual		
CV41	F7 Output	see tech manual		
CV42	F8 Output	see tech manual		
CV43	F9 Output	see tech manual		
CV44	F10 Output	see tech manual		
CV45	F11 Output	see tech manual		
CV46	F12 Output	see tech manual		
CV130	Master Volume Sound Increment	There are 16 volume levels. Setting to 2 requires 8 presses to get from off to loudest.	1,2,4,8	2
CV133	Sound Unit Master Volume	higher number is louder.	0-15	15
CV135	Horn Volume	higher number is louder.	0-255	100
CV136	Bell Volume	higher number is louder.	0-255	100
CV137	Diesel Volume	higher number is louder.	0-255	100
CV138	Horn2 Volume	higher number is louder.	0-255	100

CV140	Coupler Volume	higher number is louder.	0-255	100
CV141	Uncouple Volume	higher number is louder.	0-255	100
CV142	Wheel Flange Volume	higher number is louder.	0-255	100
CV143	Compressor Volume	higher number is louder.	0-255	100
CV144	Manual Air Release Volume	higher number is louder.	0-255	100
CV145	Air Filling Volume	higher number is louder.	0-255	100
CV146	Brake Set Volume	higher number is louder.	0-255	100
CV147	Brake Release Volume	higher number is louder.	0-255	100
CV148	Spit Valve Volume	higher number is louder.	0-255	100
CV150	Blower Motor Volume	higher number is louder.	0-255	100
CV151	Brake Squeal Volume	higher number is louder.	0-255	100
CV152	Fuel Fill Volume	higher number is louder.	0-255	100
CV159	System Lighting	Controls system lighting. See tech manual		
CV160	L1 Light Definition	see tech manual	0,1,2,3	varies
CV161	L1 Parameter 1	see tech manual		
CV162	L1 Parameter 2	see tech manual		
CV163	L1 Parameter 3	see tech manual		
CV164	L1 Parameter 4			
CV180	Bell Ring Interval	Increasing increases the time between bell rings	0-120	varies
CV181	Horn Fade In	see tech manual		
CV182	Horn Fade Out	see tech manual		
CV183	Horn Fade In Level	see tech manual		
CV185	DCC Brake Control	increasing decreases brake sensitivity	0-255	10
CV186	DCC Brake Timer	increasing decreases brake duration	0-255	1
CV187	Coupler	Sets the throttle speed step at which coupler sound is played.	0-255	3
CV188	Pitch Shift	Change to alter pitch of all sounds. Makes 2 locomotives sound different	0-255	128
CV201	DCC Rev Level One Throttle Stop	Sets the throttle speed step at which locomotive reverse from idle to notch 1.	0-255	2
CV202	DCC Rev Level Two Throttle Stop	Sets the throttle speed step at which locomotive reverse from notch 1 to notch 2.	0-255	8

CV203	DCC Rev Level Three Throttle Stop	Sets the throttle speed step at which locomotive reverse from notch 2 to notch 3.	0-255	15
CV208	DCC Cab Light Throttle Stop	If equipped, cab light is turned on below this speed step.	0-255	3
CV209	DCC Brake Set Throttle Stop	Brake is set below this throttle level.	0-128	1
CV210	DCC Brake Release Throttle Stop	Brake is released when speed exceeds this throttle level.	0-128	2
CV225	DCC Control One	see tech manual		
CV226	DCC Control Two	see tech manual		
CV227	DCC Control Three	see tech manual		
CV228	DCC Startup Timer	Delat at start up to look for DCC signal.	0-255	2
CV229	DCC Extended Consist Lighting	see tech manual		
CV230	DCC Easy Consist	0=single locomotive, 1=front, 2=middle, 3=rear locomotive in consist.	0,1,2,3	0
CV240	Random Sound Generator Occurrence	Increasing decreases how often random sounds occur.	1-30	24

## ***Locomotive Addressing***

The locomotive is addressed in a DCC system in one of two methods. Either short addressing or long addressing modes are used. Short addressing is a locomotive address between 1 and 127 and is programmed in the Primary Address CV1. The factory value is locomotive three. CV29 bit 5 must be a zero (factory preset) to enable the short address.

The extended address is programmed in CV17 (MSB Extended Address) and CV18 (LSB Extended Address). The factory value is locomotive 128. CV29 bit 5 must be rest to one to enable the extended address. Some DCC controllers conveniently set CV29 bit 5 when programming an extended address. Engines from 128 to 10,239 are valid if the DCC controller supports them all.

## ***Consist Address***

The extended consist locomotive address is stored in CV19. The value may be from 1 to 255. A value of zero breaks

the consist, and the consist lighting, Consist Functions Type 0 and Consist Functions Type 1 are ignored. For advanced consist instructions, see the *BlueLine Diesel Technical Reference Manual*.

## **Easy Consist**

Most basic consist configurations set up functions and lighting in a similar fashion. A quick consist may be configured by using DCC Easy Consist CV230 setup as follows:

CV230 = 0	Breaks Consist
CV230 = 1	Front Engine
CV230 = 2	Middle Engine
CV230 = 3	Rear-Facing Rear Engine

See the *BlueLine Diesel Technical Reference Manual* for more details.

## **Sound Mixer**



Much like a professional sound mixer board, all the sound effects may be mixed for complete user preference by setting CV's 135-152. All of these sounds are factory set to 100 meaning 100% volume. Proper values may vary from 0 (off) to 255 (maximum loudness). Care should be taken when changing these values. The amount of energy contained in playing back each sound will combine with others when played simultaneously. Should the volume of two sounds playing simultaneously mix at an energy level higher than the systems limits, distortion may result, creating a rather unpleasant audio experience or a popping sound. This distortion is referred to as clipping. If increasing one sound causes distortion, other sounds must be reduced to correct the problem.

## ***Pitch Shift***

A further distinction may be programmed into the locomotive sound unit. The pitch of all sounds may be varied higher or lower. Changing pitch shift CV188 alters all sound effects. Personalization as well as double heading similar sounding locomotives allows unique sounding locomotives. The factory value for CV188 is 128. Increasing CV188 increases the overall sound effect pitches and decreasing CV188 decreases the overall sound effect pitches.

## ***Random Sounds Generator Occurrence***

Changing CV240 varies the occurrences of all randomly generated sounds. The factory value is 24 and the value may be 1 to 30. Increasing this value decreases the occurrences of random sound effects while decreasing this value increases the occurrences of random sound effects.

## ***Bell Ring Interval***

Changing the bell ring interval CV180 varies the interval between bell strikes. The factory value varies from locomotive to locomotive. Increasing this value increases the time between strikes while decreasing this value decrease the time between strikes. Acceptable values range from 0 to 120.

## ***Available Sounds***

*Horn*-The diesel horn is an audible signaling device used to warn that the train is approaching and also to communicate with rail workers. Because trains generally have a high mass and low braking friction, stopping is very difficult. Train horns are relatively inexpensive compared to other warning devices, and with its loud and distinct sound, the preferred safety method for railroad operators.

Railroads are required by a variety of state and federal laws to sound horns in advance of all railroad crossings. The Federal Railroad Administration in the United States published the final rulings on locomotive horn usage at all

public grade crossings. This rule requires that locomotive horns sound at all public grade crossings 15 to 20 seconds before entering the crossing but not more than one quarter of a mile (400 meters) in advance. This rule applies to trains traveling below 45 mph (70 km/h). Trains traveling faster must sound their horns at the designated locations (usually marked with a whistle post).

The following table lists the required horn signals in most railroads' operating rules. Signals illustrated by a "•" are for short sounds and signals illustrated by a "--" are for long sounds. Your BlueLine locomotive's sound system has a highly playable horn. A short and long blast is easy to play!

Rule number	Sequence	Meaning
14 (a)	•	Apply air brakes
14 (b)	--	Release air brakes proceed forward
14 (g)	• •	Generic acknowledgement
14 (h)	• • •	Back up
14 (i)	• • • •	Requesting signals.
14 (l)	-- • •	Approaching public crossings at grade. The signal will be sounded until the train is on the crossing. Approaching tunnels, yards, or other points. Passing standing trains.
14 (o)	• --	Inspect train for a leak in brake pipe system or for brakes sticking.
14 (p)	Succession of Sounds	Warning to people and/or animals.
14 (q)	-- •	When running against the current of traffic, approaching stations, curves, or other points where view may be obscured and approaching passenger or freight trains and when passing freight trains.

**Bell-**The diesel bell is used as a warning device in yards and at railroad crossings. Bells on passenger trains were activated for a short period before the train moved and continuing until the locomotive left the train station. The bell is an indication the train is either moving or about to move.

**Startup-Diesel-electrics** generate huge amounts of electric energy and use that generated energy to drive the wheels. Locomotives use a diesel locomotive to generate huge amounts of electric power, and then use the electric power to run individual motors at each wheel. So a diesel locomotive is a combination of a large diesel locomotive, a generator, and many smaller electric locomotives.

The main diesel locomotive can run at its most efficient speeds, turning an electrical generator. The electric generator sends power to a traction motor at each axle. The axle then powers the wheels. The traction motors can produce adequate torque at any speed, from a complete stop to speeds beyond 100 mph, without needing to change gears.

Your BlueLine locomotive's sound system generates a startup sound for both DCC and DC appropriate for the locomotive.

**Shutdown-**Your BlueLine locomotive's sound system generates a sound for turning the diesel engine off when appropriate for the locomotive.

**Engine Rev. Levels-**Your BlueLine locomotive's sound system has multiple rev levels corresponding to the throttle notches on a diesel locomotive. Each throttle notch causes the truck voltage to increase. To deliver the necessary power to the trucks from the generator the diesel engine works harder, supplying more electricity to the electric truck motors.

**Uncoupling-**Pressing F3 when the locomotive is moving causes a coupling sound effect to play. The effect simulates two cars coupling. The sound may be simulated by pressing F3 when the locomotive is stopped. This action arms the uncoupling sound, making it ready to play. The actual uncoupling sound effect plays once the speed step exceeds the value of Uncouple Speed, CV187. The factory value is 3. When speed step 3 is reached, the coupler slack sound effect plays.

**Coupling-**The coupling sound effect may be activated to simulate the sound of two cars coupling and only plays if the locomotive is moving.

**Compressor-**Compressing air makes the compressor hot, so at least one set of cooling pipes will be provided. Some compressors have two sets of pipes. The pumping is split into two stages and a set of cooling pipes is provided between each, an inter-cooler and an after-cooler. Of course, the cooling produces condensation, which collects as water in the air pipes and, combined with oil from

the compressor lubrication, forms a sludge, which can quickly clog up sensitive brake valves. To overcome this problem, air systems are nowadays always provided with air dryers.

The air dryer consists of a pair of cylinders containing desiccant, which extracts the water and allows dry air to pass into the main reservoir. Water collected is automatically dumped once in each pumping cycle – the noise of the burst of water being discharged can often be heard at the end of the compressor's pumping cycle.

**Air Fill-**Each compressor has its own storage reservoir, normally called the main reservoir. This pressure-tested vessel is capable of storing enough air for multiple operations of all the equipment on the locomotive plus the train brakes. If there is more than one compressor, there will be more main reservoirs. Most modern locomotives have several reservoirs and a multiple unit train will often have one on each car, whether there is a compressor on the car or not. Individual items of pneumatic equipment will also have their own storage reservoirs.

Once compressed, the air has to be distributed around the locomotive and along the train. Normally, for a freight train, the air is only needed for control of the braking system and a "brake pipe" is run the length of the train to achieve this.

**Manual Air Release-**Most train cars have an MR pipe "angle cock" at each end. The angle cock can be closed to shut off the air supply at that point. Before uncoupling a vehicle, it is normal to close the angle cock on either side of the uncoupling position. This prevents any kick from the pipe as it is disengaged. Closing the angle cocks also has the effect of bleeding off the air trapped in the hose. The angle cock has a special bleed hole for this purpose.

**Brake Set-**The brake set sound effect simulates the mechanical brakes applied to the locomotive. Some locomotives use an air-powered piston pushing a pad against the outer surface of the train wheel.

The rear truck may also have a hand brake. Since the brakes are air powered, they only function while the compressor is running. If the train has been shut down for

a while, there will be no air pressure to keep the brakes engaged. Without a hand brake, even a slight slope would be enough to get the train rolling because of its immense weight and the very low rolling friction between the wheels and the track.

The hand brake is a crank that pulls a chain. Many turns of the crank are necessary to tighten the chain. The chain pulls the piston out applying the brakes.

**Brake Release**-The brake release sound effect simulates releasing the mechanical brakes applied to the locomotive.

**Brake Squeal**-The brake squeal sound effect simulates the sound of the air powered mechanical brakes being applied.

**Dynamic Brake Grid Blower Motor**-In addition to the mechanical brakes, diesel locomotives have dynamic brakes. Most motors become generators of power in the absence of drive power. Dynamic braking makes the truck traction motors act like a generator, using the wheels of the train to apply torque to the motors and generate electrical current. The torque that the wheels apply to turn the motors slows the train down (instead of the motors turning the wheels, the wheels turn the motors). The current generated (up to 760 amps) is routed into a giant resistive grid that turns that current into heat. A cooling fan sucks air through the mesh and blows it out the top of the locomotive.

The grid blower motor is the cooling fan that cools the dynamic braking resistive grid and is activated when the dynamic braking is applied. This sound effect simulates the grid blower motor.

**Cooling Fan**-The diesel locomotive needs to work at an optimum temperature for best efficiency. A cooling system keeps the temperature stable. This cooling system consists of a water-based coolant circulating around the locomotive block, the coolant kept cool by passing through a radiator. A thermostat monitors the temperature regulating the speed of the (electric or hydraulic) radiator fan motor to adjust the cooling rate. This fan draws cooler air through the radiator, cooling the coolant.