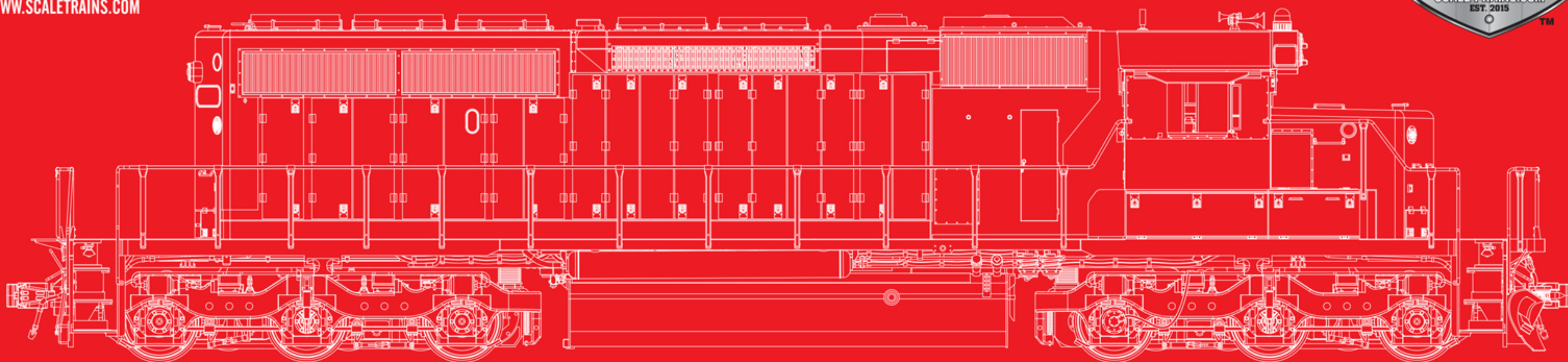




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OPERATOR'S MANUAL



SD40-2 line art drawing is a representation. Details vary by roadname and road number.

HO
1:87 SCALE

AGES
14+

DCC & Sound by...



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EMD SD40-2

Introduction

Thank you for your purchase of our Rivet Counter SD40-2 locomotive. In this booklet you will find information in regard to maintenance, lubrication, body removal and some basic DCC instructions. For additional information, part numbers and exploded drawings please see our web page.

If you have purchased a sound and DCC equipped model then you will have access to all the features of this outstanding locomotive. For those that have purchased the DCC and Sound Ready version the DCC information contained in this manual will not be applicable to your model. All our models are equipped with a 21 pin MTC receptacle should you want to install DCC at a later date. Our SD40-2 should be able to accept any 21 pin DCC decoder.

One new and exciting feature of your new Rivet Counter SD40-2 equipped with DCC and sound is that it has the latest version of ESU software installed which include their "Full Throttle" feature. This allows even more realistic locomotive operation. We recommend that you download the "Full Throttle" Quick Start Guide and the full decoder manual from the ESU website at the following address to learn all about this new feature and other features of the decoder.

<http://www.esu.eu/en/downloads/instruction-manuals/digital-decoders/>

Our DCC and Sound Equipped SD40-2 locomotive model is fitted with the ESU LokSound V5.0 decoder (ESU #58429) full-function decoder. The link above this section will direct you to manuals for many ESU products. The document number for the V5 decoder is #51989.

For those purchasing a DCC and sound ready locomotive and wishing to install sound later, the same decoder may be used. If you wish to install a non-sound decoder, ScaleTrains.com recommends the ESU LokPilot #54615. When choosing a decoder for a DCC and Sound Ready unit it is important to remember that ONLY ESU decoders will have access to the advanced lighting features of our Rivet Counter™ locomotives. Please contact our sales department for assistance in selecting the proper decoder and programming for your operation. The manual for this decoder may be found in the same location on the ESU website and is document #51986. Either choice will allow you to get the most out of the sound or lighting functions designed for your locomotive. Please see the section "Something New" for more information on installing decoders.

Your state-of-the-art locomotive model is designed to utilize either two sugar cube type speakers, 11mm x 15mm, in a custom enclosure and wired in parallel back to the main board or a 16 X35MM oval speaker mounted directly into the die-cast frame.

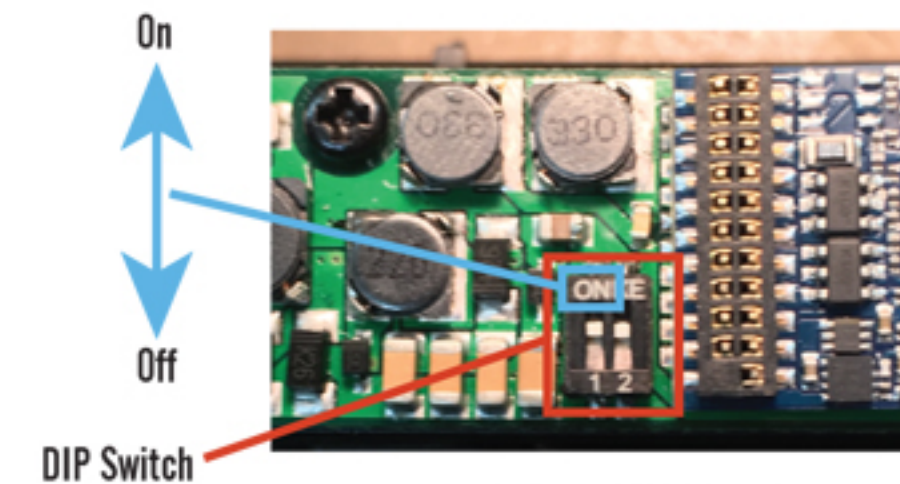
NOTE: Other brand 21-pin decoders may fit however they will not have access to certain electronic components on the main board that control some lighting functions or the Power Pack circuit.

Something New

DIP Switches and Decoders

Due to the many lighting features that our Rivet Counter DCC and Sound Equipped SD40-2 is equipped with, we have employed two DIP switches on the main circuit board. These help with the DCC functionality for the lighting features. If your Rivet Counter model has factory installed

DCC and sound these two DIP switch are turned ON to help with the lighting effects. If you have a DCC and Sound Ready version of the Rivet Counter model the switches are turned OFF. If you desire to add DCC or DCC and sound please note that the only DCC decoders that will function with these switches, and allow full access to all the available lighting features on each version of the Rivet Counter SD40-2, are ESU DCC decoders, the ESU LokSound Decoder for sound models and the ESU LokPilot for non sound models. Decoders from other manufactures will only have partial access to the basic lighting features. When using non ESU Decoders you will have directional headlights, lit number boards and the class lights, if equipped, will come on only in the white color. The same condition applies for DC operation as well on non-DCC and Sound Equipped models. If you do install an ESU decoder into your DCC and Sound Ready version of the Rivet Counter SD40-2 be sure both DIP switches are in the ON position so that you can access to all the lighting functions. For all other DCC decoders the switches need to stay in the OFF position. Turning them on using Non ESU decoders will have no effect. See illustration below.



WARRANTY

ScaleTrains.com, Inc. (ScaleTrains.com) warrants product purchased from authorized resellers to be free from defects in material and workmanship for a period of one (1) year from the date of purchase. The warranty period can be increased to two (2) years by registering your product on-line at <http://www.ScaleTrains.com/pages/warranty>.

If the product fails during the limited warranty period, carefully pack the model in the original packaging and include the sales receipt and explanation of the issue. Ship the model to our Customer Service address noted below. We recommend using a traceable service and adding insurance. Costs associated with shipping are not covered under warranty. If ScaleTrains.com deems the product to be defective, we will either (1) repair or (2) replace at our discretion.

Defects due to misuse, improper maintenance, and/or modification are not covered under warranty. This warranty gives you specific legal rights and you may also have other rights, which vary from state to state. These terms are covered by the State of Tennessee.

ScaleTrains.com, Inc.
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7598 Highway 411
Benton, TN 37307

Customer Service Crew Contact Information

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Toll-Free Fax: 844-388-0779

MAINTENANCE, LUBRICATION & HOW TO REMOVE SHELL

Lubrication

The ScaleTrains SD40-2 Locomotive represents hours of careful research and design work, and we are proud to present it to you. With the right care, it should provide years and years of model railroading enjoyment. Out of the box, the model should be ready for service, no lubrication should be necessary; it has been carefully lubricated at the factory for optimum performance. However, if the need to lubricate should arise, please follow these guidelines:

- Be sure to use a plastic-compatible lubricant! Most household lubricants, such as “3-in-1” type oils, may damage the slippery engineering plastic found in the driveline of the model. Wherever possible, use lubricants designed specifically for model railroad or similar hobby uses, and if in doubt, check the label for any compatibility warnings.

- Use the right type of lubricant in the right location! For metal-to-metal bearing surfaces, the use of light or medium oils is recommended. For plastic-to-plastic applications, such as gears, light greases are recommended.

- Always use lubricant sparingly! As the saying goes, a little goes a long way. When applying lubricant to bearing surfaces, a tiny drop or dab applied with a fine point, such as a toothpick, should be more than sufficient. Any excess lubricant oozing from a bearing surface should be carefully wiped away with a paper towel.

Lubrication points will be the same as would be expected in most any model locomotive. On the locomotive power trucks the bearing is behind the wheel so a small drop of light plastic compatible oil can be used behind each wheel as necessary. The interior of the model is filled with circuit boards and wiring for the many features of your SD40-2 locomotive so great care must be taken when applying lubrication to areas that may require lubrication inside the locomotive. Refer to the disassembly instructions and exploded diagrams (available on our webpage) to understand how to remove the body to access the inner workings of the locomotive. Lubrication points inside the model would be the motor bearings, where a small drop of oil between the motor ends and the brass flywheels, on the motor shaft, will be sufficient. The other location would be the at the worm shafts on the top of the gearboxes. These too can use a small drop of oil at both ends of the shaft. One end being where the driveshafts are attached to the metal worm shaft and the other being the opposite end where the shaft slightly protrudes out of the bearing. Grease can be applied to the gear box gear by removing the worm cover and then the worm and shaft. Once the worm and shaft are removed a small amount of grease can be applied to the top gear box gear, the one that contacts the worm gear then the worm and worm cover can be reinstalled. As the locomotive runs the grease will be distributed inside the gearbox to all the gears. Whenever possible, avoid contact of lubricants with the model’s exterior finish. Oils and greases can possibly harm the factory paint and lettering; any excess that may make contact should be gently wiped away with a paper towel or other fine cloth. Due the delicate nature of the interior components inside the locomotives if there is any concern it may be best to contact your local dealer or contact us directly to help guide you through the lubrication process.

Handling

Due to the delicate nature of the model, it is advised that care should be taken when removing the model from its packaging, and placing it onto your test track or layout. Carefully remove the locomotive blister from the box. To remove the locomotive, carefully slide off the outer sleeve from the “clamshell” plastic holder cradling each unit, and set it aside.

Next, unsnap the plastic clamshell holder; note that at one end is hinged, and designed to snap into the top half of the holder. Do this on a flat surface, to reduce the risk of the clamshell or the model slipping from your grip and falling to the floor. Once the clamshell is fully open, carefully remove the model; reverse the process to place it back into its packaging for storage. NOTE: Pay close attention to the model's orientation in the clamshell container. The model will only fit correctly one way. Improper placement may result in the Damage of small detail parts on the model. When handling the model, it is recommended that it is gripped firmly at its mid-section, avoiding the fine steps, grab irons, or other small details that may be present.

Disassembly

When disassembling the locomotive, it is recommended that it is placed upside-down into a foam cradle to protect it from damage. In order to remove the body simply remove the coupler box screws, couplers and coupler boxes. Once the screws and coupler boxes are removed the body shell can now be removed from the mechanism. There are no wires or other connections between the body and chassis so gently lifting up on the body, paying attention to the many details, should allow the body to be easily removed from the chassis. Take great care when setting the body down as to not damage all the delicate parts. At this point maintenance can be preformed. To install crew figures, first gently detach the handrails from the cab. There is a tab at the top rear of the cab where it connects to the long hood. Once the handrails are detached the cab can lift up vertically. This will take a small amount of force to pop the tab loose to allow the cab to come up.

NOTE: On roadnames or paint schemes where there are details (radio conduit, etc.) that are attached to both the cab roof and top of the body and on models with any kind of cab roof beacon we do NOT recommend trying to remove the cab. These parts are delicate and can be easily broken. To install figures in these models we recommend that you install them through the side windows. Trimming of the figures will almost always be necessary to accomplish this job. To reinstall the cab and body just reverse the process.

Cleaning

If kept out of its protective packaging for extended periods, it is likely your SD40-2 may accumulate dust or other debris. While unsightly, it can also potentially damage the finish of the model if allowed to accumulate. To remove light dust, it is recommended that a fine paint brush is used to gently knock off dust particles. For heavier accumulations, canned air dusters (commonly used for cleaning electronics), or air from an airbrush, can be used.

Basic DCC/DC Instructions

The Prototype

The SD40-2 is powered sixteen-cylinder 645E3 turbocharged prime mover and was the flagship of the “Dash-2” series when introduced 1972. Domestic production of the SD40-2 continued until July 1984, making it one of EMD’s most popular locomotives of all time. Many remain in service today, both with original owners as well as secondhand operators.

The Model

Your ScaleTrains SD40-2 model is a meticulously designed and crafted model to match the prototype. DCC and sound equipped SD40-2 models includes an on-board sound system, featuring speakers designed to replicate the roar of the prototype. Also included are sounds for the horn, bell and various auxiliary systems.

Start Up Cycle F8

Like most LokSound equipped models, the sound is off when you first put the locomotive on the track. In DCC, pressing F8 will initiate the start-up sequence. In DC the start up sequence will start as soon as there is sufficient electrical power on the track. The start-up sounds of the ScaleTrains SD40-2 is one of the most realistic in the hobby to date! If you wish for the sound to be on upon layout power up, please change the following CV’s.

CV31 = 16, CV32 = 3

CV419 = 32

**Please note, like the prototype the model will not move while in the start up process.

Headlights FO

Like most models, in DCC, FO will illuminate the front headlight. You can dim either light by pressing F12. Please note that headlights are only illuminated in the direction of travel. In DC operations the headlights are automatic in their direction control, and are on all the time with sufficient track power.

Class Lights F5

Some SD40-2 are equipped with changeable tri-color class lights (based on prototype). The colors signified train status on the prototype:

Green: Second section of the same train symbol/number

White: "Extra" train not shown in the timetable

Red: Reverse move (pushers)

Please visit <http://trn.trains.com/railroads/abcs-of-railroading/2006/05/locomotive-classification-lights> if you would like additional information on prototype class light operation.

On the model, you can press F5 to illuminate the class lights. A single press will activate a white light; press again, and it will change to red, and again to go to green. A fourth press will turn the class lights off, and a fifth will start the cycle again.

In DC operation the class lights will come on automatically and in the white color only.

Ditch Lights F6

Some SD40-2s are equipped with working front and rear ditch lights (based on the prototype). Also, based on the prototype, some will have ditch lights that flash when the horn is blown. **NOTE: Ditch lights will only function in DCC operation.**

ESU PowerPack

Sound Equipped Models come equipped with ESU PowerPack Energy storage built into the locomotive. These PowerPack devices will work as a backup if the models lose power for a short period of time. Please remember these are a backup, not batteries. This is not an excuse to never clean your track again! They must be charged using track power to function and need the track power to stay charged.

DCC Function Mapping

As with all LokSound decoders, the function buttons can be changed to work in any way you desire. By default, the SD40-2 is set up as follows:

F0 - Front Headlight	F7 - Effect Light (Beacons,etc.)	F13 - Slow Spitter Valve
F1 - Bell	F8 - Prime Mover Sound and Start Up	F16 - Spitter at Shutdown
F2 - Horn	F9 - Drive Hold(See ESU website for info)	F17 - Brake Set / Release
F3 - Coupler Crash	F10 - Independent Brake	F18 - Sanding Valve
F4 - Dynamic Brake	F11 - Manual Radiator Fan	F19 - Short Air Let Off
F5 - Class Lights	F12 - Headlight Dimmer	F20 - Compressor
F6 - Ditch Lights (If Equipped)		

For more info on changing the function mapping to your liking, please consult the Full LokSound Manuals at www.LokSound.com

Basic Programming Notes

It is recommended that you use Paged Mode programming to adjust CV settings. If you are not familiar with Paged Mode programming, refer to your DCC system manual for more information. Programming track boosters are not necessary in order to program the decoders. If you will operate your model on a DC track or layout, these instructions do not apply.

If you will operate your SD40-2 on DCC, it is recommended that you download, read and understand the appropriate Loksound decoder manual covering the decoders used in your model. The SD40-2 uses the LokSound V5.0 decoder. A clear understanding is necessary to maintain your model's sound and operation to optimum levels. To download the LokSound manual, visit their website at this URL:

<http://www.esu.eu/en/downloads/instruction-manuals/digital-decoders/>.

From the factory the model is set to default address 03

The decoder can be set to 2 or 4 digit addresses with normal addressing on all DCC systems.

The decoders support CV 1 Addressing Short Address 1-127

Each decoder supports CV 17/18 Long Address 128-9999 - Please add 32 to value of CV29 to enter Long addresses.

Each decoder supports NMRA Consisting Using CV's 19, 21 and 22.

A decoder reset can be accomplished by setting CV8 to a value of 8 on the program track.

Short address CV1 -03

Manufacturer CV8 -151

Long (Extended) Address CV17/CV18 – 192/128

CV8 Resetting the Decoder

Should it become necessary to reset the decoder on any of the units, place the unit on the programming track and follow these instructions:

Enter Paged Mode Programming on a DCC system.

Enter CV programming and change CV8 to a value of 8 *.

NOTES:

1. When reading CV8 to perform a reset, you will note the default value reads: Manufacturer ID: 151.

2. CV1 (Short address) will be returned to default value: 03.

3. Long (Extended) Address CV17/18 – 192/128.

*DO NOT reset the decoder using POM (Programming On the Main) as you will need to cycle the power OFF and ON to complete the reset cycle. Failure to do so may result in the decoder not properly resetting.

CV163 / CV164 Sound Options / Alternate Horns and Bells

Your new Rivet Counter SD40-2 will come to you with the correct horn and bell right out of the box per the specific prototype. But in case you would like to hear a different horn or bell sound, we have provided an assortment.

Horns: CV163=0 Nathan P5	CV163=6 Nathan k3H	CV163=12 Leslie S5T	Bells: CV164=0 EMD 8475495 Steel Bell 003
CV163=1 Nathan K5LA	CV163=7 Nathan K5H	CV163=13 Nathan K5LR24	CV164=1 EMD 8004156 Bronze Bell 003
CV163=2 Nathan M3H	CV163=8 Nathan P5A	CV163=14 Leslie S5LR24	CV164=2 UKM B443 Steel Bell 001
CV163=3 Leslie RS-2M	CV163=9 Nathan P5 (Old Cast)		CV164=3 Graham-White E-Bell 004
CV163=4 Nathan K3HA	CV163=10 Nathan M3RT1		CV164=4 Transtronic E-Bell 001
CV163=5 Nathan K3L	CV163=11 LeslieS3L		CV164=5 WC Hayes0333 M-Bell 001

CV165 / CV166 Sound Options / Brake Squeal and Air Dryer

Brake Squeal: CV165=0 Composite Brake Shoe
CV165= 1 Cast Iron Brake Shoe

Air Dryer: CV166=0 Air Dryer Default
CV166= 1 Air Dryer Slow

For a full listing of all sound CVs please download the LokSound Bulletin for the SD40-2 at the following web address.

<http://projects.esu.eu/projectoverviews/6>

Note that there is more than one bulletin for the SD40-2 due to the variations. Be sure that you are using the correct bulletin for your specific model.

Function Button and Sound slot Chart

Key	Function	Sound Slot	CV #	Factory Volume Setting
F0	Directional Headlight			
F1	Bell	4	283	90
F2	Playable Horn	3	275	128
F3	Coupler	5	291	128
F4	Dynamic Brake When Moving	6	299	90
F5	Aux2 + Aux7 + Aux8 (Class Lights)			
F6	Aux3 + Aux4 + Aux5 + Aux6 (Ditch Lights)			
F7	Aux9 + Aux10 Effect Lights (Beacons)			
F8	Engine Sound (On/Off) And Start Up Sequence	1	259	128
F9	Drive Hold	2	267	128
F10	Independent Brake	11	339	20
F11	Radiator (Fan) Sound	8	315	50
F12	Dimmer (Headlights, Turn Off Ditchlights)			
F13	Slow Spitter Valve	17	387	50
F14	Not In Use			
F15	Not In Use			
F16	Spitter at Shutdown			
F17	Brake Set / Release			
F18	Sanding Valve	13	355	128
F19	Short Air Let Off	14	363	128
F20	Compressor	7	307	50 (SD40-3 128)

Note: Make sure the index CV31 is set to a value of 16 and the index CV32 is set to a value of 1 before changing a volume CV.

Digitrax CV Programming for CV's over 255

Some Older Digitrax Systems do not allow programming of CVs above 255. In order to make full Programming possible, we have implemented an assistance tool. This helps to write the number of the CVs desired temporarily into two assisting CVs (so-called address registers), since the usual CVs cannot be reached. Afterwards the value of the CV desired will be programmed into another assisting CV (so-called value register). When the value register is written, the content will be copied to the actual desired position and the assisting CV will be set back. Consequently, 3 CVs have to be programmed to write one CV. These 3 CVs are described in the following chart:

CV	Name	Description	Value range
96	Address offset	Saves the CV number that should be actually programmed in hundreds.	0 – 9
97	Address	Saves the CV number that should be actually programmed in units and tens.	0-99
99	Value	Saves the value of the CV that should be actually programmed.	0-255

Example: You wish to program CV 317 with value 120.

Proceed as follows:

Program the value of the CV number in hundreds in CV 96.

- In this example: CV 96 = 3.

Program the value of the CV number in units and tens in CV 97.

- In our example: CV 97 = 17.

Program the desired value in CV 99.

- In our example: CV 99 = 120.

As soon as you have programmed CV 99, the value of CV 99 will be transferred into CV 317. When the programming finished, CVs 96, 97 and 99 will be set back automatically.

This procedure is ONLY needed when programming CV's above 255 on some older Digitrax DCC Systems.

Note: Please make sure that Index CV 32 is set to 1 and Index CV 31 is set to value 16 before you change any of the sound volume CVs. Please refer to the decoder's user manual.

Notes:



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SXT80563 Rev 5-19
ESU V5 Decoder

WARNING: This product may contain a chemical known to the State of California to cause cancer or birth defects or other reproductive harm.