



# TECH NOTES



## Soundtraxx Heats Up with Atlas DCC

We have revised this Bulletin posted several days ago to optimize performance of the Atlas Commander and Generator and Soundtraxx Digital Sound Decoders when used together.

Atlas Commander users have been reporting premature failures of some Soundtraxx decoders. The issue is excessive heating of these decoders as a result of the 18 volts, DCC that the Atlas Commander outputs to the track when used with the Atlas Generator power supply. Also in some cases, with some N Scale decoders heating may also distort plastic locomotive shells.

The Soundtraxx manual specifies 16 volts DCC! This is not an issue where either manufacturer is at fault. It is an example of minor incompatibility in a small segment of DCC that there are practical solutions to:

- (1) If you are using an Atlas Commander and Generator and do not intend to use Soundtraxx or N Scale decoders then you have no concerns.
- (2) If you are using an Atlas Commander and another power supply that has about an 18 volt AC output please see (3) below.
- (3) If you are using the Atlas Commander and Generator or plan to buy one and use or want to use Soundtraxx or N Scale decoders, then you can reduce the track voltage to about 16 volts DCC by lowering the output voltage from the Commander as follows:

### Using Soundtraxx Decoders on DCC Systems with High Output Voltage

The NMRA specifications are somewhat vague as to the MAXIMUM allowable voltage on the railheads. Standard S9 states: "Full throttle voltage available at railhead shall not be less than 12 volts direct current at maximum anticipated load." The standards for DCC state: "The RMS value of NMRA digital signal, measured at the track, shall not exceed by more than 2 volts the voltage specified in standard S9 for the applicable scale." Since S9 specifies a minimum of 12V, it would appear that 14V would be the minimum required. At the other end of the spectrum, the standard S9.1 states:

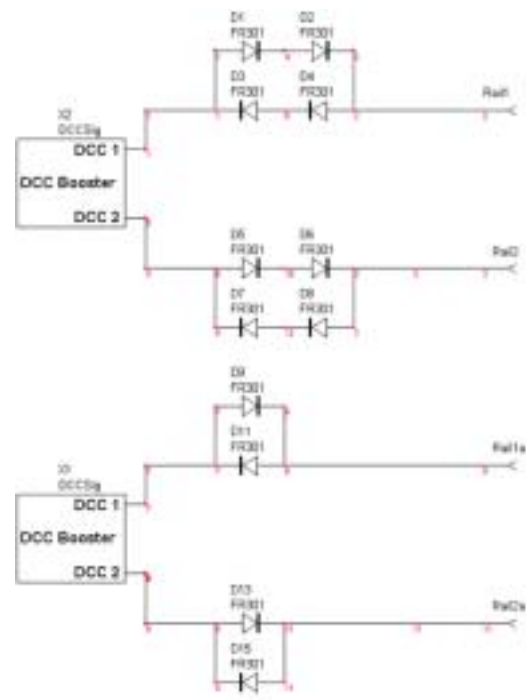
Digital Decoders intended for "N" and smaller scales shall be designed to withstand a DC voltage of at least 24 volts as measured at the track. Digital Decoders intended for scales larger than "N" shall be designed to withstand a DC voltage of at least 27 volts as measured at the track." The requirements are unclear what the maximum normal operating voltage should be. The result is some variation in DCC track voltages. Digitrax in the HO setting measures about 14.4V, while NCE uses 14.6V for the 5 amp booster and 16.5V for the 10 amp booster. Atlas has chosen to use 18V. All of these systems appear to be compliant to the basic NMRA specifications.

Soundtraxx states that their decoders should not be used above a track voltage of 16V. Soundtraxx has a somewhat unique problem because they provide not only motive power, but also sound. Based on pure physics, these decoders must dissipate more power than a standard decoder, yet they must occupy the same amount of space. The result is that they have a higher power density, which means that they operate hotter than normal decoders. To minimize the stress on the decoder and to maximize the decoder reliability, they recommend a maximum of 16V operation. This is not a hard limit. The device will not fail at 16.1V, but as you exceed the recommended operating conditions, you run the risk of damaging the decoder through excess heat.

The real problem then is how to use Soundtraxx decoders with systems that output more than 16V and still not impact the decoder reliability. The easiest solution is to place several diodes in series with the DCC track feed wire. These diodes will drop the peak value of the DCC signal, thus reducing the voltage at the track. The diagram below shows two possible configurations. The first one uses two diodes in series with each power feeder. In this configuration, an 18V DCC signal will be reduced to 14.4V at a current of about 0.5 amps. The second configuration uses only one diode in series with each DCC feed wire, and results in a track voltage of 16.2V at about 0.5 amps. Either of these configurations should be adequate to run the Soundtraxx decoder on the Atlas system. The one diode approach leaves more voltage available in systems with heavy current draw (three or more locomotives) while the two diode approach ensures safe operation in systems that are relatively lightly loaded (one or two locomotives).

Atlas says that standard diodes, like IN4001, available from Radio Shack will be suitable.

We prefer to use high speed diodes because normal power diodes are relatively slow to turn off. This means that they continue to conduct for a while after the voltage across them has reversed. For a short period of time around their turn off point, they will conduct in both directions. This behavior results in some waveform distortion of the DCC signal. There may be voltage spikes at the waveform transitions that exceed the desired voltage levels, and for systems that have anomalies near 0V, the diodes may further distort the waveform transition and make the DCC signal difficult for decoders to detect (by specification, the decoder uses the region within 4 volts of 0V to determine waveform edges for the detection of the DCC code). All this means is that high speed diodes are preferable for the voltage reduction application. The diagram shows the use of FR301 high-speed rectifier diodes. They are available from DigiKey (part number FR301CT-ND) for \$0.32 each in lots of 10 or more. They are rated at 3 amps continuous. Since each diode conducts for only half of the time, the configuration shown is good for 6 amps DCC current. The same series has diodes rated at 6 amps (FR601CT-ND) or 8 amps (FR801-ND) if higher current ratings are required.



**Tony's Train Exchange, Pinewood Plaza, 57 River Road, Box 1023, Essex Jct, Vermont 05452**

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# Locomotive Sound Systems.

Tony's sells and stocks more Soundtraxx than anyone!



The Digital Sound Decoder (DSD) is a state-of-the-art module providing the benefits of today's DCC technology with the addition of high quality, digital onboard sound. Each DSD installs inside your locomotive and integrates a full featured digital

sound system, sophisticated lighting effects and a DCC decoder into a single, miniature electronic module. SoundTraxx Digital Sound Decoders are available in both Steam, Diesel, in wired, plug'n'play and sound-only versions, each featuring a full spectrum of sound effects for each prototype.

## STEAM

### Tsunami Sound/Power

List \$179  
TTE \$137.95  
4 @ \$133.95

#### Product #

Product #	Description
TBD	DRGW 2-8-2, K-36 No. 484
TBD	DRGW 2-8-2, K-37 No. 497
TBD	DRGW 2-8-2, K-28 No. 473
TBD	DRGW 2-8-2, K-27 No. 463
TBD	East Broad Top, 2-8-2
TBD	UP 4-6-4, Challenger 3985
TBD	SP 4-8-4, Daylight GS-4
TBD	N&W 2-6-6-4, A
TBD	British L-1 Tank
TBD	Westside Lumber Co. Shay
TBD	C-16
TBD	Santa Fe No. 3751
TBD	Frisco No 1522 Mountain, 4-8-2

### DSX Sound Only

List \$129  
TTE \$99.95  
4 @ \$96.95

#### Product #

Product #	Description
824203	DRGW 2-8-2, K-36 No. 484
824206	DRGW 2-8-2, K-37 No. 497
824207	DRGW 2-8-2, K-28 No. 473
824208	DRGW 2-8-2, K-27 No. 463
824209	East Broad Top, 2-8-2
824210	UP 4-6-4, Challenger 3985
824211	SP 4-8-4, Daylight GS-4
824212	N&W 2-6-6-4, A
824214	British L-1 Tank
824215	Westside Lumber Co. Shay
824216	C-16
824218	Santa Fe No. 3751
824224	Frisco No 1522 Mountain, 4-8-2

## DIESEL, 1st Generation

### Tsunami Sound/Power

List \$179  
TTE \$137.95  
4 @ \$133.95

#### Product #

Product #	Description
TBD	EMD 1st Gen Wabco Airhorn
TBD	EMD 1st Gen 3-Chime Leslie
TBD	EMD 1st Gen Nathan Airhorn
TBD	EMD 1st Gen Wabco E2 1-Chime
TBD	EMD 1st Gen Nath M5 5-Chime
TBD	EMD 1st Gen Nath P3 3-Chime
TBD	ALCO Wabco 1-Chime Airhorn
TBD	ALCO Leslie 3-Chime Airhorn
TBD	ALCO w/Nathan 3-Chime
TBD	ALCO w/Wabco E2 1-Chime
TBD	ALCO w/Nathan M5 5-Chime
TBD	ALCO w/Nathan P3 3-Chime

### DSX Sound Only

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4 @ \$96.95

#### Product #

Product #	Description
825201	EMD 1st Gen Wabco Airhorn
825202	EMD 1st Gen 3-Chime Leslie
825203	EMD 1st Gen Nathan Airhorn
825204	EMD 1st Gen Wabco E2 1-Chime
825205	EMD 1st Gen Nath M5 5-Chime
825208	EMD 1st Gen Nath P3 3-Chime
825211	ALCO Wabco 1-Chime Airhorn
825212	ALCO Leslie 3-Chime Airhorn
825213	ALCO w/Nathan 3-Chime
825214	ALCO w/Wabco E2 1-Chime
825215	ALCO w/Nathan M5 5-Chime
825218	ALCO w/Nathan P3 3-Chime

## DIESEL, 2nd Generation EMD and General Electric

### Tsunami Sound/Power

List \$179  
TTE \$137.95  
4 @ \$133.95

#### Product #

Product #	Description
TBD	EMD 2nd Gen, Leslie S5T 5-chime
TBD	EMD 2nd Gen, Leslie S3 3-chime
TBD	EMD 2nd Gen, Nathan K3LA 3-chime
TBD	EMD 2nd Gen, Nathan K5LA 5-chime
TBD	EMD 2nd Gen, Nathan M3 3-chime
TBD	EMD 2nd Gen, Nathan P3 3-chime
TBD	GE Leslie S5 5-chime
TBD	GE Wabco 1-chime
TBD	GE Leslie S3 3-chime
TBD	GE Wabco E2
TBD	GE Nathan K5 5-chime
TBD	GE Nathan P3 3-chime
TBD	Fairbanks-Morse with Wabco
TBD	Fairbanks-Morse with Leslie S3
TBD	Fairbanks-Morse with Wabco E2
TBD	Fairbanks-Morse with Nathan M5
TBD	Fairbanks-Morse with Nathan K5
TBD	Fairbanks-Morse with Nathan M3
TBD	Rio Grande Southern Galloping Goose

### DSX Sound Only

List \$129  
TTE \$99.95  
4 @ \$96.95

#### Product #

Product #	Description
825220	EMD 2nd Gen, Leslie S5T 5-chime
825222	EMD 2nd Gen, Leslie S3 3-chime
825223	EMD 2nd Gen, Nathan K3LA 3-chime
825226	EMD 2nd Gen, Nathan K5LA 5-chime
825227	EMD 2nd Gen, Nathan M3 3-chime
825228	EMD 2nd Gen, Nathan P3 3-chime
825230	GE Leslie S5 5-chime
825231	GE Wabco 1-chime
825232	GE Leslie S3 3-chime
823234	GE Wabco E2
825236	GE Nathan K5 5-chime
825238	GE Nathan P3 3-chime
825241	Fairbanks-Morse with Wabco
825242	Fairbanks-Morse with Leslie S3
825244	Fairbanks-Morse with Wabco E2
825245	Fairbanks-Morse with Nathan M5
825246	Fairbanks-Morse with Nathan K5
825247	Fairbanks-Morse with Nathan M3
825250	Rio Grande Southern Galloping Goose

To order call 800-978-3472.

## DSD-100LC, Low Cost & PnP Sound & Power

Generic	List	TTE	TTE@4
DSD-100LC Generic sound/power/lights 1A (0.65"x1.90"x0.23")			
820001: for Steam, 820002: for Diesel	\$99.95	\$79.95	\$76.95
<b>DSD-Plug and Play Decoders</b>			
820010: DSD-B280LC for Bach. 2-8-0, w/spkr, EZ install	\$155.00	\$119.95	\$116.95
820020: DSD-C628LC for the Stewart Century C628	\$179.00	\$144.95	\$141.95
820040: DSD-AT100LC EMD 1st Gen for Atlas HO	\$139.00	\$114.95	\$111.95
820041: DSD-AT100LC EMD 2nd Gen for Atlas HO	\$139.00	\$114.95	\$111.95
820042: DSD-AT100LC ALCO for Atlas HO	\$139.00	\$114.95	\$111.95
820043: DSD-AT100LC Gen. Electric for Atlas HO	\$139.00	\$114.95	\$111.95
820044: DSD-AT100LC Fairbanks-Morse w/3 sel. horns	\$139.00	\$114.95	\$111.95
820050: DSD-LL100LC EMD Series for LLP2K, E6, E7, E8	\$145.00	\$119.95	\$116.95
820051: DSD-LL100LC Alco PA/FA for LLP2K, E6, E7, E8	\$145.00	\$119.95	\$116.95
820060: DSD-B3TSLC for Bach Spec 3 Truck Shay	\$155.00	\$119.95	\$116.95
820061: DSD-B2TSLC for Bach Spec 4-6-0 and ON30 2 Truck Shay	\$155.00	\$119.95	\$116.95
820070: DSD-LL100LC EMD1 GP7, GP9	\$145.00	\$119.95	\$116.95
820071: DSD-LL100LC EMD2 GP30, SD60	\$145.00	\$119.95	\$116.95
820080: DSD-LL080LC for LL 0-8-0, 0-6-0, w/spkr	\$145.00	\$119.95	\$116.95
820090: DSD-Bac100LC for Bachmann Decapod	\$145.00	\$119.95	\$116.95

## DSD-090, N Scale Sound & Power (NEW)

	List	TTE	TTE@4
821101: DSD-090 Light steam engine	\$169.95	\$129.95	\$126.95
821102: DSD-090 Medium steam engine	\$169.95	\$129.95	\$126.95
821103: DSD-090 Heavy steam engine	\$169.95	\$129.95	\$126.95
821200: DSD-090 EMD/1	\$169.95	\$129.95	\$126.95
821220: DSD-090 EMD/2	\$169.95	\$129.95	\$126.95
821210: DSD-090 ALCO	\$169.95	\$129.95	\$126.95
821230: DSD-090 GE	\$169.95	\$129.95	\$126.95
821240: DSD-090 Fairbanks-Morse, 3 select. horns	\$169.95	\$129.95	\$126.95
821250: DSD-090 Goose, Rail Bus	\$169.95	\$129.95	\$126.95

Sierra, Sound Only for Large Scale DC and DCC List \$189, TTE \$147.95

## STEAM

Prod #	Description	Prod #	Description
830103	DRGW 2-8-2, K-36 No. 487	831000	F3 USA Tr. w/Les. S5 5chm Airhn
830104	DRGW 2-8-2, K-36 No. 488	831001	GP7/9 USA Trains w/Wabco Airh
830105	DRGW 2-8-2, K-36 No. 489	831002	GP7/9 USA Tr. w/Les. S3 3chm Air
830106	DRGW 2-8-2, K-37 No. 497	831004	F3 USA Trains w/Wabco E2 Airhn
830108	DRGW 2-8-2, K-27 No. 463	831012*	ALCO Arist. RS-3 w/Les. S3, L. \$184
830109	East Broad Top, 2-8-2	831014*	ALCO Arist. RS-3 w/Wab. E2, L. \$184
830115	Westside Lumber Co. Shay	831021	GP30 USA Tr. w/Wabco
830116	DRGW C-16	831022	GP38 USA Tr. w/Les. S3 3chm Airh
830119	Climax List \$199.00	831023	SD40 USA Tr. w/Nat K3 3chm Airh
830120	Logging/Euro 'Peanut' Whistle	831026	GP38 USA Tr. w/Nat K5 5chm Airh
830121	4-4-0 "American"	831027	SD40 USA Tr. w/Nat M3 3chm Airh
830122	LGB "Mogul"	831028	GP30 USA Tr. w/Nat P3
830123	Bachmann 2-6-0	831046	SD-45 for Aristocraft w/Nathan K5
830124	Bachmann 2-8-0	831048	SD-45 for Aristocraft w/Nathan P3
830125	Aristo-Craft Mikado, List \$184	831050	Sierra Goose, Rail Bus, List \$195

\* Speakers not included

## Tony's Precision Speakers

TTE 1/2"	1/2" dia x 1/8"h, HO/N	\$7.90	\$6.90
TTE 3/4"	3/4" dia x 1/8"h, HO/N	\$7.90	\$6.90
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TTE BOXe	7/8" dia x 1/4"h, self-enclosed, edgeport	\$17.95	\$16.95
TTE Mini Oval	14mm x 25mm, oval design	\$9.95	\$8.95
TTE Small Oval	16mm x 35mm, oval design	\$9.95	\$8.95
TTE OVAL	20mm x 40mm, HO/S, oval design	\$14.95	\$11.95
TTE ELIP	1.1" x 1.7" x 1/4", HO/S, oval design	\$14.95	\$11.95
Large Sc	1.5", 2.0", 2.5", 3.0" diameters	\$7.90	\$6.90

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TTE SpeakEZ: 1/2", 3/4", 1.1" Hsng, ext & cap for round spkrs	\$4.95	\$4.50
TTE SpeakEZ: Sm. Oval, Oval, Ellip Housing for Oval/Ellip spkrs	\$6.95	\$6.50

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