



## How Do They Get The Sound IN?



### **DCC Impulses Column**

by Bruce Petrarca

photos courtesy of SoundTraxx, unless otherwise specified

### **An interview with Nancy and Steve of SoundTraxx.**

In my August 2012 column ([http://model-railroad-hobbyist.com/magazine/mrh-2012-08-aug/dcc\\_impulses](http://model-railroad-hobbyist.com/magazine/mrh-2012-08-aug/dcc_impulses)), I discussed how to get the sound out of your locomotive – good acoustic principles. That got me thinking about the process of getting the sounds into the decoders. Having spent many days in Durango with the SoundTraxx folks, I decided to let you all sit in on a discussion with the two founders and owners of SoundTraxx.

**Q. I know you two were the founders of SoundTraxx. What are your current roles in the company?**

We each retain 50% ownership in the company, with no other shareholders or investors. Steve Dominguez serves as CEO and Chief Engineer, guiding all product development and manufacturing. Nancy Workman serves as Vice President and guides the sales and marketing efforts, also overseeing the general day-to-day business that includes accounting and human resources. Corporate decisions are made jointly.

**Q. Tell us a little about your company history.**

SoundTraxx began as Throttle Up! Corp., in Pocasset, Massachusetts in 1989. Our first product, introduced in January of 1990, was not actually a sound system, but a lighting system called the Hyperlight. The Hyperlight was the first lighting system to use a microprocessor, not only to provide brilliant lighting effects, but also to allow the user to

select the desired effect from within one model. Our Hyperlight effects are now part of every sound decoder (and some motor decoders) that we make.



### **1: The first SoundTraxx system from Throttle Up! (D220-IR) circa 1991**

Our first sound system, the SoundTraxx D220-IR Diesel Sound System, was introduced in 1991. This was the first sound and throttle system to incorporate wireless control.

This was followed a year later by the SoundTraxx S220-IR Steam Sound System, the first digital sound system to offer 'playable' whistles. By this time, everyone was calling us SoundTraxx, so we began marketing and doing business under that name.

We moved the business to Colorado in 1994 and settled in Durango in 1998. We designed and built a modern building for our corporate headquarters and main manufacturing facility.

We announced the first Digital Sound Decoders in 1996, introducing the first DCC decoder to be integrated with sound and lighting functions.

From our first year of production in 1997, we've continued developing sound decoders for other model manufacturers (for example, Bachmann and Athearn) and our end-users, including our SurroundTraxx Multi-Train Sound System.



## 2: The headquarters building designed and built for SoundTraxx in Durango, CO

In 2004, we announced the creation of a new product line, Blackstone Models (3), featuring exquisitely detailed HOn3 locomotives and rolling stock. The Blackstone Models products have been very well received and have been credited with rejuvenating the HO narrow gauge world.



## 3: Blackstone HOn3 Locomotive and cars

**Q. What are the sources of your sound files and why do the Tsunamis sound so good?**

The engineers at SoundTraxx have created all of our sound files. We go into the field, recording from actual prototypes. While we certainly have a 'formula' or procedure for how we make our sound files and recordings, we believe that they sound as good as they do because of what we do with our software after the recording takes place. This includes using the resources within the company – we have two former locomotive engineers here on staff! Some of us are modelers, too, and we don't believe in putting out anything that we would not be proud to have on our own layouts. Of course, the 16-bit sound (we were

the first to do this!) is huge. Anyone who has listened to 8-bit sound decoders can instantly hear the difference.



#### **4: SoundTraxx' personnel recording a diesel loco on site**

**Q. Do you "synthesize" sounds that are not available for live recording?**

No. On rare occasions, we have manipulated digital recordings to replicate something that no longer exists, i.e., a tonal shift perhaps to make one exhaust chuff into another, but they are not 'made up'.

**Q. So you have to find a functioning entity for your recording (motor, whistle, air pump, etc.) and send folks there to record it.**

Yes. In general, it takes from a half day to two days to collect the raw recordings for each engine. It also typically takes two people.

**Q. I've visited your facility several times and have always been impressed with your sound editing facility. Give our readers a tour of it, please.**

When we had our building designed, we included a special room (5) that would eliminate unwanted echoes and isolate the sound engineer from other sounds within the building. We use a Mac computer , with the latest in hardware and software tools.



**5: SoundTraxx' sound editing room – this specially built room has no parallel walls to reduce reflections**

**Q. Explain what goes into taking a sound file from your raw recording and turning it into a sample ready for inclusion in a decoder.**

The raw sounds of course, need to be put into the digital format that we use for editing. There is a lot of cleanup – regardless of how careful you are – sometimes you can't control sounds occurring around you during the recording process. Most of what happens next is to make the sounds fit with our software design. Lots of testing, lots of tweaks!

**Q. Can you estimate the number of man-hours that goes into a new sound set? Starting from the field recording and going through your sound room and making the files ready for inclusion in a Tsunami decoder.**

Well this certainly varies. Obviously a trip to England or Japan to record takes longer to collect the raw recording than popping in down the street at the Durango & Silverton

Narrow Gauge Railroad! So there is the recording session investment that we discussed previously: 1 to 4 man-days per loco plus travel time.

Once we have the sound recorded, it takes several weeks to massage the sound into the format we need and then again into our software. So, it takes about 100 man-hours after the sound is captured before the sound set is ready for one version of decoder.



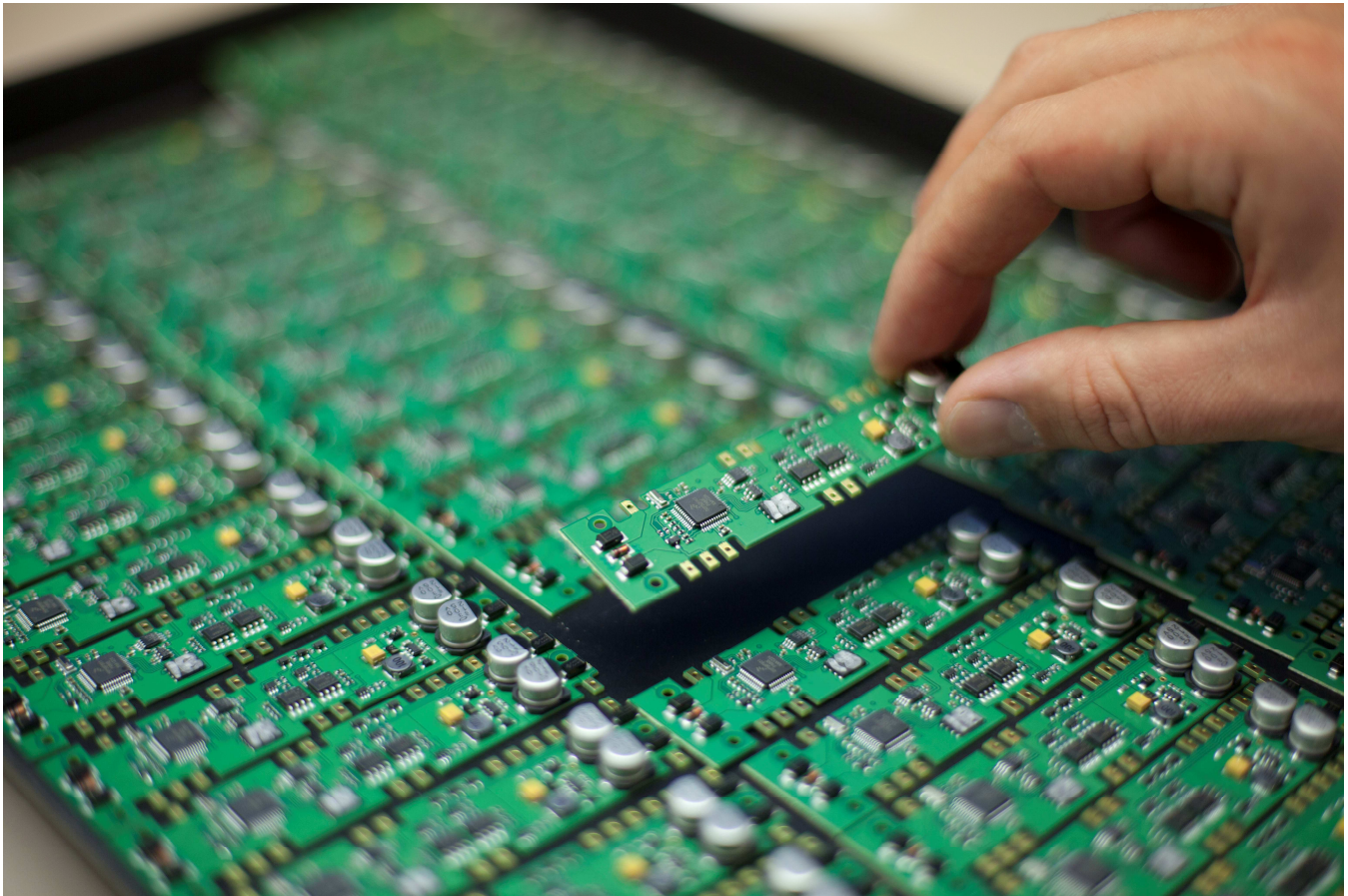
**6: One of SoundTraxx' two pick-and-place SMT assembly machines – keeping the jobs and technology in the U.S.A.**

**Q. I've been impressed with your fabrication facility. Tell the readers why you are so committed to in-house manufacturing.**

We believe that we can and should do it in the U. S. A. It is all about quality and service. We can completely control the manufacturing process, which is key to our quality control. We also control our delivery – pretty much guaranteeing that we will have product available when our customers need it. We have seen what happens to companies that manufacture overseas – product is late shipping, pricing is not within their control, and quality is average at best.

With the closing of so many factories over the past twenty years, the subject of how we are able to successfully manufacture our products in the U.S. A. is frequently broached.

We invest regularly in quality capital equipment. Our SMT (Surface Mount Technology) machines are fast and efficient, and continually upgraded and improved. In the past six months, we have added two new pieces of production equipment. This is just part of our commitment to continually improving our processes while keeping a stable workforce. Adding some automation does not take away jobs! In fact, it offers opportunities for some of our employees to ‘specialize’ in the operation and maintenance of these unique pieces of equipment, keeping what could otherwise become a routine job a tad more interesting.



### **7: A batch of SoundTraxx Tsunami decoders ready for 100% testing**

Making our electronics in the U. S. A. allows us to completely control our production – time to delivery, cost and quality. Automating some of the manufacturing allows us to offer competitive wages to our employees. Parts procurement and pricing is more controlled. We don't suffer the delays and expense of having our product shipped from outside the country. It is our intent to continue the design and manufacture of our electronic products in the U. S. A.

Of course, the subject of Blackstone Models comes up as well. We design them here but, at present, can only economically produce them in China. Nobody would be happier than we to manufacture these products here. Watching wages overseas rising, customers are often under the impression that we could now successfully bring this manufacturing on

shore. The labor rate in China has increased from \$0.90 per hour to \$2.00 per hour. It is still a fraction of the domestic minimum wage of \$7.50/hr. There are so many manual assembly processes in the making of a model that we can't assemble it here and deliver it at a cost that the market wants.

**Q. Tell us a bit about SurroundTraxx, now that it has been out for a while.**

SurroundTraxx is a unique digital sound system designed for the layout, not the individual model. Working with today's DCC technology, SurroundTraxx gives the modeler the realism of high-fidelity sound moving with your train as it travels about the layout without installing speakers onboard the engine! It uses the latest Digital Signal Processing (DSP) technology and advanced block detection techniques to reproduce the sounds made by each train on the layout to direct the sound to the speaker closest to the trains' location. We believe it is the perfect solution for small scales such as N-Scale, where you are at the mercy of too-tiny onboard speakers.



**8: Dealers getting a “hands on” look at SurroundTraxx during the 2013 Dealer Training Seminar**

Unfortunately, none of our customers have sent us photos of their final installations, so the only photo I have to share with you and your readers (8) is one from a demonstration in the factory for our August 2013 Dealer Training Seminar.

**Q. Are the sound files in SurroundTraxx the same as what are in the Tsunami decoders?**

The manner in which the sound files are structured is different, but they start with the same raw recordings. The editing is different because of the different usages. So, the SurroundTraxx files are unique.

**Q. I asked you for a motor and light decoder to simplify speed matching with your Tsunamis. I've been very happy with the product you've provided. How are these "Tsilent Tsunamis" being received without being paired with a sound Tsunami?**

Very well. It has been a steadily growing market for us. It seemed to take a while for customers to realize they were getting a really good decoder for an incredibly competitive price.

**Q. I hear from lots of folks that they would love to have a Tsunami for their O- or G-scale locos. Any chance of a SoundTraxx offering for larger locos?**

We've been slowly looking at this. We've learned a lot about what will and won't work for larger scales by producing products for such manufacturers as Bachmann and Piko. We hope this allows us to work towards a product for these folks – we hear them.

**Q. How do you respond to customer requests?**

We use our customer feedback to determine the direction our product development will take. The problem of course, is limited resources and the return on the investment. Some products by necessity take a higher priority. Putting a timeframe to anything is nearly impossible unless it is an active project.

Thank you, Nancy and Steve for sharing with the MRH readers. Hopefully, readers will better understand what it takes to get a soundset into a decoder now. If you liked this column, please click on the Reader Feedback link here and rate it **awesome**. Please join in the conversation that invariably develops there about the topics presented in the column. Share your experiences. You might also comment there if you'd like to see similar interviews with other players in the DCC world. Thanks.

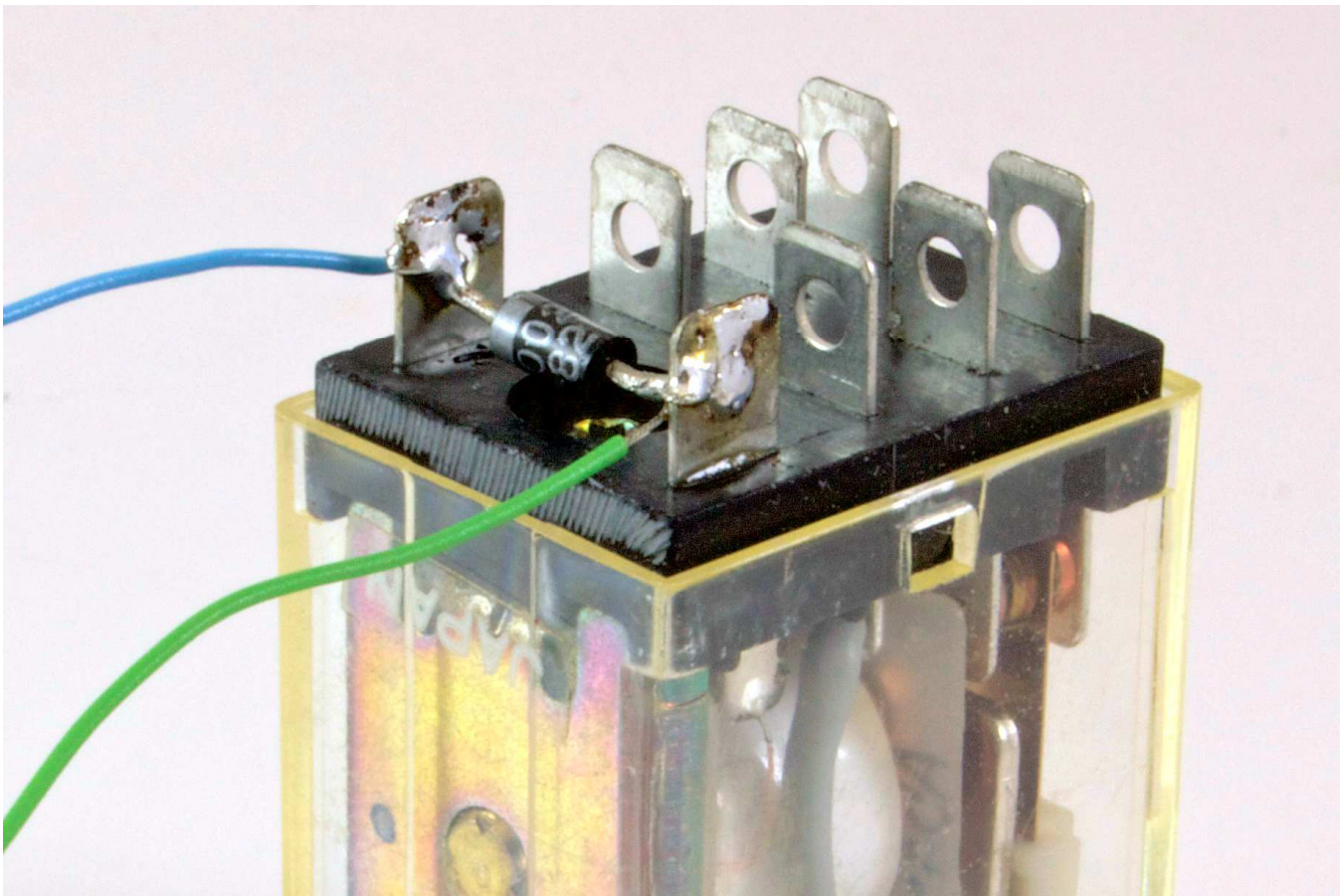
Until next month, I wish you green boards.

## From Mr. DCC's workbench

### How do I switch more current with my decoder?

Occasionally there is a need to switch a load that isn't compatible with the output of a DCC decoder. Whether this need is due to the voltage or current needed, or if a contact closure (or opening) is needed, it can frequently be filled by using a relay.

A relay is an electro-mechanical device that takes some electrical current and uses the resulting magnetic field to move some contacts, just like throwing a switch. There is a mechanical lag time while the contacts physically move, so they are not well suited for items that get turned on and off quickly. Likewise, they don't do dimming, just on and off, so no fancy lighting effects, either.



**9: A diode protects the decoder from being damaged by the high voltage spike when the decoder drops the current to the coil. Note: diode band is toward blue wire. Photo by the author.**

Sounds easy, just connect the relay to the blue and green (or other function) wire and be done with it, right? Uh, no, not actually.

Think about the spark coil that generates thousands of volts to ignite the gasoline in our car engines. They work on the concept of turning the current on and off through a coil. Similarly, a relay will generate a large spike of voltage when the current is turned off. This spike is enough to blow the output transistor (and, perhaps, more circuitry) inside the decoder if the relay is hooked up directly to the decoder.

A simple diode will fix the problem. It is put across (in parallel with) the relay coil in a direction where the normal current will flow through the coil, but when the current is turned off, the spike of voltage goes through the diode. This means that the end of the diode with the band connects to the blue (or positive) wire from the decoder as shown in the detail photo, figure 9.

Select a relay with a coil voltage of 12 volts and an activation current less than the decoder function output is rated for. Frequently the functions are rated for 100 mA (0.1 A), so a coil resistance above 150 ohms is needed. Make sure the contacts are rated for voltages and currents higher than you are going to be switching.